Conceptual Drainage Study

Project Name: Mission Village Shopping Center

For:
Mission Village Shopping Center
SEC of Mission Blvd & Stobbs Way
Jurupa Valley, California

Prepared for:
Mission BLVD. Properties.
433 North Camden Dr. Suite 1000
Beverly Hills, CA 90210

Prepared by:
Joseph C. Truxaw & Associates, Inc.
Civil Engineers & Land Surveyors
1915 W. Orangewood Ave., Suite 101
Orange, CA 92868
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REGISTERED PROFESSIONAL ENGINEER
RANDY J. DECKER
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STATE OF CALIFORNIA

April 7, 2022
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Project Description

The subject site is an approximately 8.406 acre area site consisting of an existing vacant dirt lot and is bounded on the north by Mission Blvd, on the south & west by Stobbs way, and finally by an existing parking lot on the east side. The site slopes from the north to the south. the overall site is broken into two portions with an existing development on the east side half, and a vacant undeveloped land on the west side of the site. The east side consists largely of surface parking along the north of the east side portion with existing small retail center at the south.

Existing onsite runoff for Sub Area A sheet flows from the northwest corner of the site to the southeast corner of the empty dirt lot, with a lot of the runoff infiltrating into the existing soil. The rest is picked up by a curb and gutter on Stobbs Way. Runoff is then conveyed into an existing public storm drain system after entering the curb and gutter. For Sub Area B, runoff runs Northwest to Southeast before being picked up by a catch basin. From here it enters the public storm drain system. Once the runoff enters the public storm drain system at the Rathke Channel, it continues to the Sunnyslope Channel and then onto the Santa Ana River reach 3. From here it continues into the Pacific Ocean.

The redevelopment of the site includes the precise grading of the dirt lot, the construction of the Mission Blvd Shopping Center paving of traffic areas, concrete drive-thru, parking, various locations for trash enclosure with storage room, and landscape planters. Proposed buildings include a car wash, a coffee shop, a single-story restaurant, and the shopping center. The proposed development will not alter the existing drainage patterns by conforming to the natural landforms and avoiding excessive grading. Site runoff will be collected by a private storm drain system and conveyed to an underground infiltration unit with pretreatment. Once the system reaches capacity, the storm water will flow into the shopping center and then to the public curb and gutter; (onsite stormwater treatment facilities to be maintained by landlord under annual facilities budget covered under CC&R's, refer to WQMP for further information). From here it is conveyed to the existing San Bernardino County storm drain system. Once the runoff enters the public storm drain system at the Rathke Channel, it continues to the Sunnyslope Channel and then onto the Santa Ana River Reach 3. From here it continues into the Pacific Ocean.

As discussed within the project geotechnical report, fill soils to a depth of approximately 3 to 4 feet below grade where encountered during the investigation. Onsite fill soils consist of silty sand and sandy silt soils. Native soils encountered at the site generally consists of stiff to hard sand silts and dense to very dense silty sand soils. Groundwater was not encountered in our borings to the depth explored. For further information and recommendations please refer to the project geotechnical report by Garcrest Engineering and Construction, Inc., Armen Gaprelian, PE, (2021-09-27), *"Report of Geotechnical Investigation, Proposed Retail Buildings and Parking"*, G21-034/1.

Hydrology Analysis

Methodology

For the purpose of this study, all drainage runoffs have been calculated based on a 10, 50 and 100 year frequency. The following hydrology calculations are based on the San Bernardino County Hydrology Manual where the peak flow is determined by the equation: [Q=C*I*A] using the Advanced Engineering Software (AES) program. Rainfall data was taken from the nearest gage station located at Latitude: 34.0028 degrees Longitude: -117.3778. See Appendix for more information on the precipitation frequency data.

Summary of Conclusion

TOTAL SITE DISCHARGE FROM THE PROJECT SITE

STORM EVENT (YEAR)	PRE-PROJECT CONDITION (cfs)	POST-PROJECT CONDITION (cfs)
10	6.92	12.09
50	10.19	16.80
100	11.65	18.81

Post Q_{10} = 12.09 cfs minus the Pre Q_{10} = 6.92 cfs
ΔQ = 5.17 cfs.

Hydraulic Analysis

GRATED INLET# 1 – NODE 301:

Q_{50} = C A $\sqrt{2Gh}$

A = Area of proposed 24" by 24" opening ➔ 50% opening = 4 / 2 = 2 sq-ft.

Assumed 50% clogging factor ➔ 2 / 2 = 1.0 sf.
A = 1.0 sf
G = 32.2
C = 0.67
h = depth of water over the grated inlet

Q_{50} = 3.63+5.59= 9.22 cfs

9.22 = 0.67 X 1.0 $\sqrt{2X\ 32.2\ X\ h}$

h = 2.94 ft. = 35.3"🡐 Depth of ponding over grated inlet # 1.

GRATED INLET# 2 – NODE 201:

Q_{50} = C A $\sqrt{2Gh}$

A = Area of proposed 24" by 24" opening ➔ 50% opening = 4 / 2 = 2 sq-ft.

Assumed 50% clogging factor ➔ 2 / 2 = 1.0 sf.
A = 1.0 sf
G = 32.2
C = 0.67
h = depth of water over the grated inlet

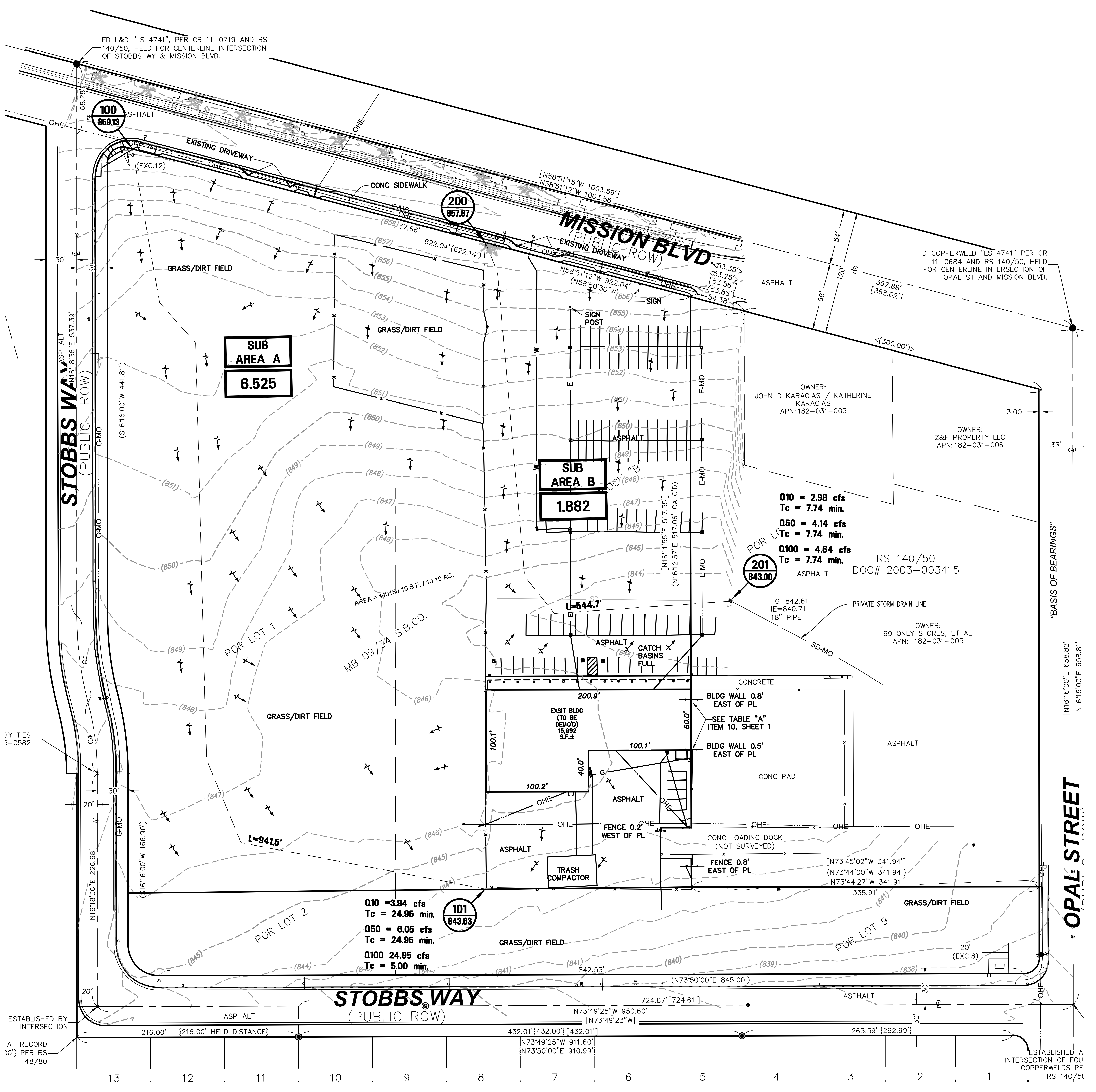
Q_{50} = 5.44 cfs

5.44 = 0.67 X 1.0 $\sqrt{2X\ 32.2\ X\ h}$

h = 1.02 ft. = 12.3"🡐 Depth of ponding over grated inlet # 2.

Pipe Sizing Calculations

Pre-project Condition



LEGEND

▬	LIMIT OF SUBAREA
101	NODE
	CONCENTRATION POINT
450	ELEVATION
0.497	AREA IN ACRES
Q_{25} = 1.17 cfs	TOTAL DESIGN FLOW
Q_{10} = 0.94 cfs	ALLOWABLE FLOW
←	PATH OF FLOW

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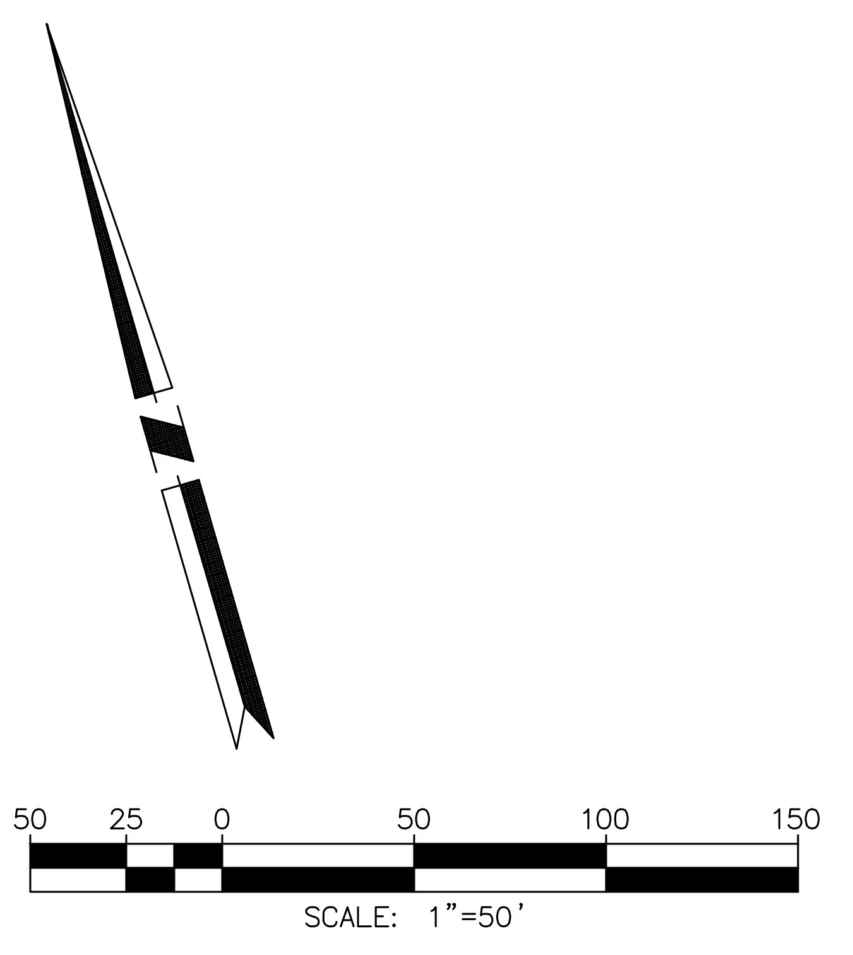
No. 81077



THIS PLAN IS:

PRELIMINARY

(NOT FOR CONSTRUCTION)

NOTICE TO CONTRACTOR

THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF ALL UTILITIES, PIPES, AND/OR STRUCTURES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

IMPORTANT NOTICE

Section 4216 of the Government Code requires a Dig Alert Identification Number be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number call Underground Service Alert
CALL 811
Two working days before you dig.

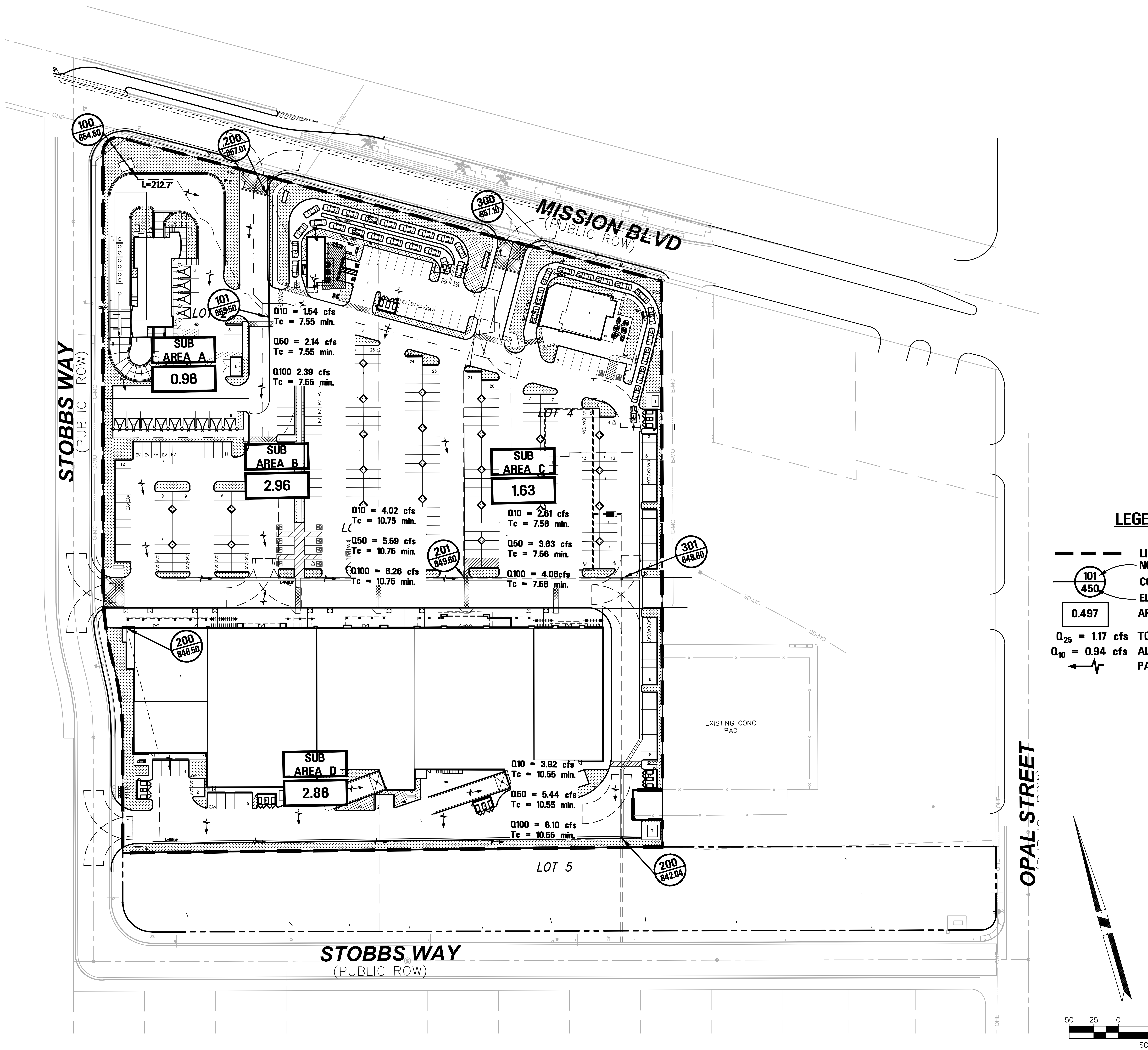
NO.	REVISIONS	DATE

Prepared by:
Joseph C. Truxaw and Associates, Inc.
Civil Engineers and Land Surveyors
1915 W. Orangewood Ave., Suite 101, Orange, CA 92868 (714) 935-0265 Truxaw.com

EXISTING HYDROLOGY
MISSION VILLAGE SHOPPING CENTER
SEC MISSION BOULEVARD AND STOBBS WAY
IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DATE
07–26–22
DRAWN BY
JRW
CHECKED BY
RJD
JOB NO.
MBP21038
SHEET NO.
1
OF 2 SHEETS

Post-project Condition



LEGEND

▬ ▬ ▬	LIMIT OF SUBAREA
101	NODE
	CONCENTRATION POINT
450	ELEVATION
0.497	AREA IN ACRES
Q_{25} = 1.17 cfs	TOTAL DESIGN FLOW
Q_{10} = 0.94 cfs	ALLOWABLE FLOW
←∿	PATH OF FLOW

RANDY J. DECKER
No. 81077

50 25 0 50 100 150
SCALE: 1"=50'

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PRELIMINARY

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CALL 811
Two working days before you dig.

NO.	REVISIONS	DATE

Prepared by:
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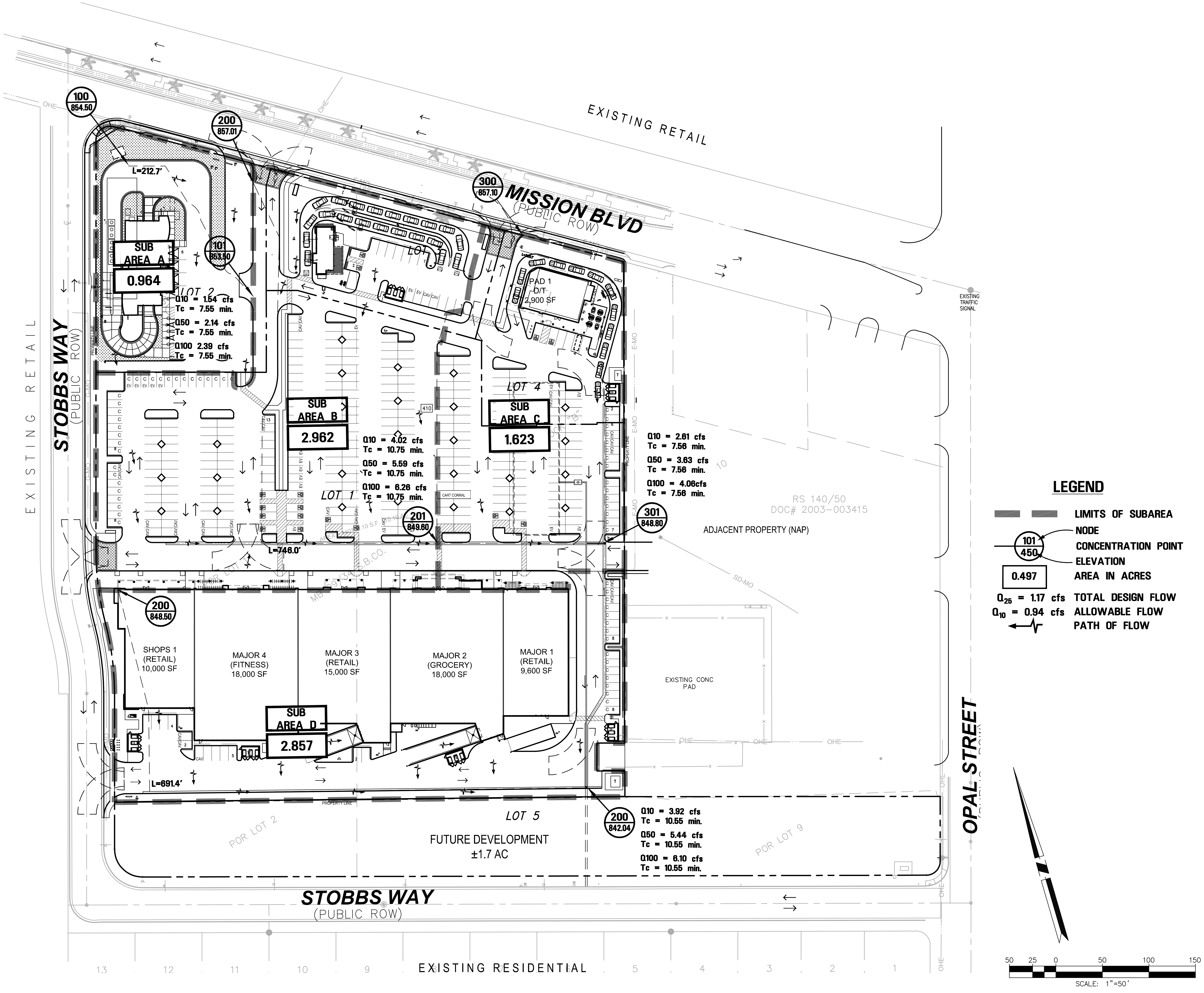
1915 W. Orangewood Ave., Suite 101, Orange, CA 92868 (714) 935-0265 Truxaw.com

PROPOSED HYDROLOGY
MISSION VILLAGE SHOPPING CENTER
SEC MISSION BOULEVARD AND STOBBS WAY
IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DATE
4/6/21
DRAWN BY
JRW
CHECKED BY
RJD
JOB NO.
MBP21038
SHEET NO.
2
OF 2 SHEETS

Appendix

I. Vicinity Map



THIS PLAN IS:

PRELIMINARY

(NOT FOR CONSTRUCTION)

NOTICE TO CONTRACTOR

THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF ALL UTILITIES, PIPES, AND/OR STRUCTURES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

IMPORTANT NOTICE

Section 4216 of the Government Code requires a Dig Alert Identification Number be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number call Underground Service Alert
CALL 811
Two working days before you dig.

RANDY J. DECKER
No. 81077
CIVIL

NO.	REVISIONS	DATE

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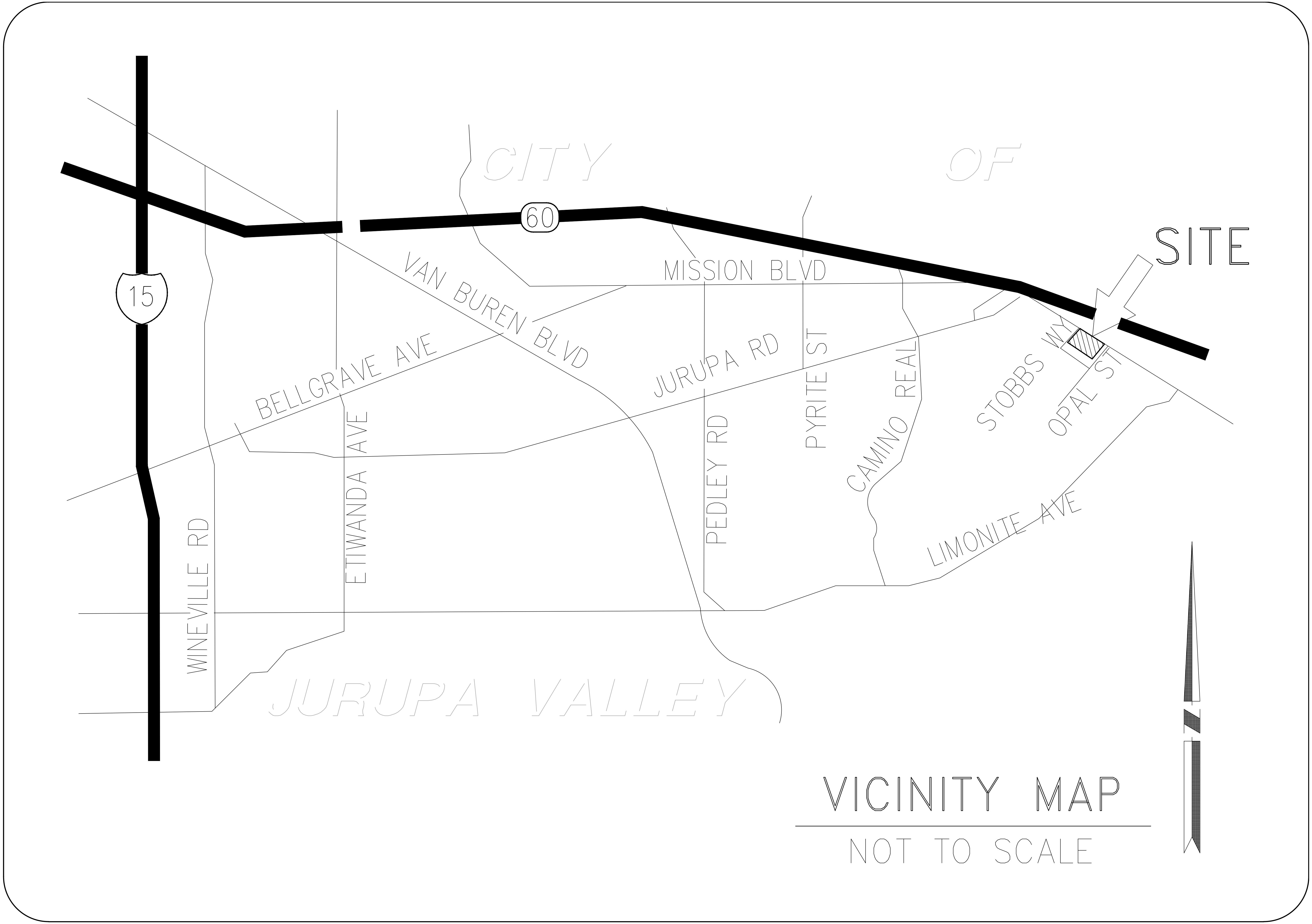
PROPOSED HYDROLOGY

MISSION VILLAGE SHOPPING CENTER
SEC MISSION BOULEVARD AND STOBBS WAY
IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DATE
07-26-22
DRAWN BY
JRW
CHECKED BY
RJD
JOB NO.
MBP21038
SHEET NO.
2
OF 2 SHEETS



VICINITY MAP

NOT TO SCALE

II. AES Calculations

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*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2012 Advanced Engineering Software (aes)
                      (Rational Tabling Version 18.2)
                   Release Date: 05/08/2012  License ID 1537

                           Analysis prepared by:








 ************************** DESCRIPTION OF STUDY **************************
* Mission Blvd Shopping Center                                              *
* Pre-Construction Hydrology                                                *
* 10 Year Storm                                                             *
 **************************************************************************

  FILE NAME: 038PRE10.DAT
  TIME/DATE OF STUDY: 15:04 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.702
  SLOPE OF INTENSITY DURATION CURVE = 0.4619
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   941.50
  UPSTREAM ELEVATION(FEET) =    859.13
  DOWNSTREAM ELEVATION(FEET) =    843.63
  ELEVATION DIFFERENCE(FEET) =     15.50
  TC = 0.709*[(  941.50**3)/(    15.50)]**.2 =   24.953
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.053
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5736
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.94
  TOTAL AREA(ACRES) =      6.53   TOTAL RUNOFF(CFS) =      3.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   544.70
  UPSTREAM ELEVATION(FEET) =    857.87
  DOWNSTREAM ELEVATION(FEET) =    843.00
  ELEVATION DIFFERENCE(FEET) =     14.87
  TC = 0.303*[(  544.70**3)/(    14.87)]**.2 =    7.741
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.807
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8776
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.98
  TOTAL AREA(ACRES) =      1.88   TOTAL RUNOFF(CFS) =      2.98
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      7.74
  PEAK FLOW RATE(CFS)   =       2.98
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2012 Advanced Engineering Software (aes)
                      (Rational Tabling Version 18.2)
                   Release Date: 05/08/2012  License ID 1537

                           Analysis prepared by:






 ************************** DESCRIPTION OF STUDY **************************
* Mission Blvd Shopping Center                                             *
* Pre-Construction Hydrology                                               *
* 50 Year Storm                                                            *
 **************************************************************************

  FILE NAME: 038PRE10.DAT
  TIME/DATE OF STUDY: 15:10 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =    6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   50.00   1-HOUR INTENSITY(INCH/HOUR) =   0.971
  SLOPE OF INTENSITY DURATION CURVE = 0.4605
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0      20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   941.50
  UPSTREAM ELEVATION(FEET) =    859.13
  DOWNSTREAM ELEVATION(FEET) =    843.63
  ELEVATION DIFFERENCE(FEET) =     15.50
  TC = 0.709*[(  941.50**3)/(    15.50)]**.2 =   24.953
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.455
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6375
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      6.05
  TOTAL AREA(ACRES) =      6.53   TOTAL RUNOFF(CFS) =      6.05

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   544.70
  UPSTREAM ELEVATION(FEET) =    857.87
  DOWNSTREAM ELEVATION(FEET) =    843.00
  ELEVATION DIFFERENCE(FEET) =     14.87
  TC = 0.303*[(  544.70**3)/(    14.87)]**.2 =    7.741
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8826
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.14
  TOTAL AREA(ACRES) =      1.88   TOTAL RUNOFF(CFS) =      4.14
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      7.74
  PEAK FLOW RATE(CFS)   =       4.14
============================================================================
```

```
============================================================================
  END OF RATIONAL METHOD ANALYSIS

↑



____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2012 Advanced Engineering Software (aes)
                    (Rational Tabling Version 18.2)
                 Release Date: 05/08/2012  License ID 1537

                         Analysis prepared by:






 ************************* DESCRIPTION OF STUDY *************************
* Mission Blvd Shopping Center                                             *
* Pre-Construction Hydrology                                               *
* 100 Year Storm                                                           *
 **************************************************************************

  FILE NAME: 038PRE10.DAT
  TIME/DATE OF STUDY: 15:16 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.090
  SLOPE OF INTENSITY DURATION CURVE = 0.4588
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
```

```
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   941.50
  UPSTREAM ELEVATION(FEET) =    859.13
  DOWNSTREAM ELEVATION(FEET) =    843.63
  ELEVATION DIFFERENCE(FEET) =     15.50
  TC = 0.709*[(  941.50**3)/(    15.50)]**.2 =   24.953
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.630
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6582
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      7.01
  TOTAL AREA(ACRES) =      6.53   TOTAL RUNOFF(CFS) =      7.01

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   544.70
  UPSTREAM ELEVATION(FEET) =    857.87
  DOWNSTREAM ELEVATION(FEET) =    843.00
  ELEVATION DIFFERENCE(FEET) =     14.87
  TC = 0.303*[(  544.70**3)/(    14.87)]**.2 =    7.741
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.789
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8841
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.64
  TOTAL AREA(ACRES) =      1.88   TOTAL RUNOFF(CFS) =      4.64
============================================================================
```

```
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      7.74
  PEAK FLOW RATE(CFS)   =       4.64
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
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                      (Rational Tabling Version 18.2)
                   Release Date: 05/08/2012  License ID 1537

                           Analysis prepared by:






 ************************* DESCRIPTION OF STUDY *************************
* Mission Blvd Shopping Center                                             *
* Post-Construction Development                                            *
* 10 Year Hydrology                                                        *
 **************************************************************************

  FILE NAME: 38POS10.DAT
  TIME/DATE OF STUDY: 16:07 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.702
  SLOPE OF INTENSITY DURATION CURVE = 0.4619
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.70
  UPSTREAM ELEVATION(FEET) =    854.50
  DOWNSTREAM ELEVATION(FEET) =    853.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  212.70**3)/(     1.00)]**.2 =    7.555
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.828
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8778
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.54
  TOTAL AREA(ACRES) =      0.96   TOTAL RUNOFF(CFS) =      1.54

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   746.00
  UPSTREAM ELEVATION(FEET) =    857.01
  DOWNSTREAM ELEVATION(FEET) =    849.60
  ELEVATION DIFFERENCE(FEET) =      7.41
  TC = 0.303*[(  746.00**3)/(     7.41)]**.2 =   10.746
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.553
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8750
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.02
  TOTAL AREA(ACRES) =      2.96   TOTAL RUNOFF(CFS) =      4.02

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
```

```
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   431.00
  UPSTREAM ELEVATION(FEET) =    857.10
  DOWNSTREAM ELEVATION(FEET) =    848.80
  ELEVATION DIFFERENCE(FEET) =      8.30
  TC = 0.303*[(  431.00**3)/(     8.30)]**.2 =    7.559
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.827
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8778
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.61
  TOTAL AREA(ACRES) =      1.63   TOTAL RUNOFF(CFS) =      2.61

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   691.40
  UPSTREAM ELEVATION(FEET) =    848.50
  DOWNSTREAM ELEVATION(FEET) =    842.04
  ELEVATION DIFFERENCE(FEET) =      6.46
  TC = 0.303*[(  691.40**3)/(     6.46)]**.2 =   10.553
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.566
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8751
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.92
  TOTAL AREA(ACRES) =      2.86   TOTAL RUNOFF(CFS) =      3.92
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.9  TC(MIN.) =     10.55
  PEAK FLOW RATE(CFS)   =       3.92
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2012 Advanced Engineering Software (aes)
                      (Rational Tabling Version 18.2)
                   Release Date: 05/08/2012  License ID 1537
```

```
                           Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
* Mission Blvd Shopping Center                                             *
* Post-Construction Development                                            *
* 50 Year Hydrology                                                        *
 **************************************************************************

  FILE NAME: 38POS10.DAT
  TIME/DATE OF STUDY: 16:21 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   50.00   1-HOUR INTENSITY(INCH/HOUR) =   0.971
  SLOPE OF INTENSITY DURATION CURVE = 0.4605
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.70
  UPSTREAM ELEVATION(FEET) =    854.50
  DOWNSTREAM ELEVATION(FEET) =    853.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  212.70**3)/(     1.00)]**.2 =    7.555
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.522
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.14
  TOTAL AREA(ACRES) =      0.96   TOTAL RUNOFF(CFS) =      2.14

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   746.00
  UPSTREAM ELEVATION(FEET) =    857.01
  DOWNSTREAM ELEVATION(FEET) =    849.60
  ELEVATION DIFFERENCE(FEET) =      7.41
  TC = 0.303*[(  746.00**3)/(     7.41)]**.2 =   10.746
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.144
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8803
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      5.59
  TOTAL AREA(ACRES) =      2.96   TOTAL RUNOFF(CFS) =      5.59

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   431.00
  UPSTREAM ELEVATION(FEET) =    857.10
  DOWNSTREAM ELEVATION(FEET) =    848.80
  ELEVATION DIFFERENCE(FEET) =      8.30
  TC = 0.303*[(  431.00**3)/(     8.30)]**.2 =    7.559
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.521
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
```

```
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.63
  TOTAL AREA(ACRES) =      1.63   TOTAL RUNOFF(CFS) =      3.63

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   691.40
  UPSTREAM ELEVATION(FEET) =    848.50
  DOWNSTREAM ELEVATION(FEET) =    842.04
  ELEVATION DIFFERENCE(FEET) =      6.46
  TC = 0.303*[(  691.40**3)/(     6.46)]**.2 =   10.553
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.162
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8805
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      5.44
  TOTAL AREA(ACRES) =      2.86   TOTAL RUNOFF(CFS) =      5.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.9  TC(MIN.) =     10.55
  PEAK FLOW RATE(CFS)   =       5.44
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
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                      (Rational Tabling Version 18.2)
                   Release Date: 05/08/2012  License ID 1537

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* Mission Blvd Shopping Center                                             *
* Post-Construction Development                                            *
```

```
* 100 Year Hydrology                                                            *
 **************************************************************************

  FILE NAME: 38POS10.DAT
  TIME/DATE OF STUDY: 16:22 11/22/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.10
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.590
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.695
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.480
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.090
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4618796
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4588119
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.090
  SLOPE OF INTENSITY DURATION CURVE = 0.4588
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.70
  UPSTREAM ELEVATION(FEET) =    854.50
  DOWNSTREAM ELEVATION(FEET) =    853.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  212.70**3)/(     1.00)]**.2 =    7.555
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.820
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8842
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.39
  TOTAL AREA(ACRES) =      0.96   TOTAL RUNOFF(CFS) =      2.39

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   746.00
  UPSTREAM ELEVATION(FEET) =    857.01
  DOWNSTREAM ELEVATION(FEET) =    849.60
  ELEVATION DIFFERENCE(FEET) =      7.41
  TC = 0.303*[(  746.00**3)/(     7.41)]**.2 =   10.746
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.399
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8820
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      6.26
  TOTAL AREA(ACRES) =      2.96   TOTAL RUNOFF(CFS) =      6.26

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   431.00
  UPSTREAM ELEVATION(FEET) =    857.10
  DOWNSTREAM ELEVATION(FEET) =    848.80
  ELEVATION DIFFERENCE(FEET) =      8.30
  TC = 0.303*[(  431.00**3)/(     8.30)]**.2 =    7.559
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.820
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8842
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.06
  TOTAL AREA(ACRES) =      1.63   TOTAL RUNOFF(CFS) =      4.06

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
```

```
       DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   691.40
 UPSTREAM ELEVATION(FEET) =    848.50
 DOWNSTREAM ELEVATION(FEET) =    842.04
 ELEVATION DIFFERENCE(FEET) =      6.46
 TC = 0.303*[(  691.40**3)/(     6.46)]**.2 =   10.553
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.420
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      6.10
 TOTAL AREA(ACRES) =      2.86   TOTAL RUNOFF(CFS) =      6.10
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.9  TC(MIN.) =     10.55
 PEAK FLOW RATE(CFS)   =       6.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

III. USGS Soil Survey

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

Western Riverside Area, California

November 22, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map

Map Scale: 1:1,590 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N 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 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

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

Date(s) aerial images were photographed: Apr 17, 2018—Jun 28, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RaB3	Ramona sandy loam, 0 to 5 percent slopes, severely eroded	6.5	100.0%
Totals for Area of Interest		**6.5**	**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.

Western Riverside Area, California

RaB3—Ramona sandy loam, 0 to 5 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcy6
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 17 inches: fine sandy loam
H3 - 17 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Tujunga

Percent of map unit: 5 percent

Hydric soil rating: No

Hanford

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

Greenfield

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

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IV. NOAA Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Riverside, California, USA*
Latitude: 34.0028°, Longitude: -117.3778°
Elevation: 807.47 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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.12 (0.924-1.34)	1.44 (1.20-1.74)	1.86 (1.55-2.27)	2.22 (1.82-2.72)	2.70 (2.15-3.43)	3.07 (2.40-4.00)	3.47 (2.63-4.61)	3.86 (2.84-5.29)	4.42 (3.12-6.32)	4.85 (3.30-7.19)
10-min	0.798 (0.666-0.966)	1.03 (0.858-1.25)	1.34 (1.11-1.63)	1.59 (1.31-1.95)	1.94 (1.54-2.46)	2.21 (1.72-2.86)	2.48 (1.88-3.31)	2.77 (2.04-3.80)	3.17 (2.24-4.53)	3.47 (2.37-5.15)
15-min	0.644 (0.536-0.780)	0.828 (0.692-1.01)	1.08 (0.896-1.31)	1.28 (1.06-1.57)	1.56 (1.24-1.98)	1.78 (1.38-2.31)	2.00 (1.52-2.66)	2.23 (1.65-3.06)	2.55 (1.80-3.65)	2.80 (1.91-4.15)
30-min	0.478 (0.398-0.578)	0.616 (0.514-0.746)	0.800 (0.664-0.972)	0.950 (0.782-1.17)	1.16 (0.922-1.47)	1.32 (1.03-1.71)	1.49 (1.13-1.98)	1.66 (1.22-2.27)	1.89 (1.34-2.71)	2.08 (1.42-3.08)
60-min	0.349 (0.291-0.423)	0.450 (0.375-0.546)	0.584 (0.485-0.710)	0.695 (0.572-0.852)	0.846 (0.673-1.07)	0.964 (0.751-1.25)	1.09 (0.824-1.45)	1.21 (0.893-1.66)	1.38 (0.977-1.98)	1.52 (1.03-2.25)
2-hr	0.254 (0.212-0.307)	0.322 (0.268-0.391)	0.412 (0.342-0.502)	0.486 (0.400-0.596)	0.586 (0.466-0.745)	0.664 (0.516-0.862)	0.742 (0.564-0.988)	0.824 (0.607-1.13)	0.934 (0.660-1.34)	1.02 (0.694-1.51)
3-hr	0.206 (0.172-0.250)	0.261 (0.217-0.317)	0.333 (0.277-0.405)	0.391 (0.322-0.480)	0.471 (0.374-0.597)	0.531 (0.414-0.689)	0.593 (0.450-0.789)	0.656 (0.484-0.899)	0.741 (0.523-1.06)	0.808 (0.550-1.20)
6-hr	0.143 (0.119-0.173)	0.181 (0.150-0.219)	0.230 (0.191-0.280)	0.270 (0.222-0.331)	0.324 (0.258-0.411)	0.365 (0.284-0.474)	0.407 (0.309-0.541)	0.449 (0.331-0.615)	0.506 (0.358-0.724)	0.550 (0.375-0.816)
12-hr	0.094 (0.078-0.113)	0.120 (0.100-0.145)	0.153 (0.127-0.186)	0.180 (0.149-0.221)	0.217 (0.173-0.276)	0.245 (0.191-0.318)	0.273 (0.207-0.364)	0.302 (0.223-0.414)	0.341 (0.241-0.487)	0.370 (0.252-0.549)
24-hr	0.062 (0.055-0.072)	0.081 (0.071-0.093)	0.105 (0.093-0.121)	0.124 (0.109-0.145)	0.151 (0.128-0.182)	0.171 (0.142-0.210)	0.191 (0.155-0.240)	0.211 (0.167-0.274)	0.239 (0.181-0.323)	0.261 (0.191-0.363)
2-day	0.038 (0.033-0.043)	0.050 (0.044-0.058)	0.066 (0.058-0.076)	0.079 (0.069-0.092)	0.096 (0.082-0.116)	0.110 (0.091-0.135)	0.124 (0.100-0.156)	0.137 (0.108-0.178)	0.156 (0.118-0.211)	0.171 (0.125-0.238)
3-day	0.027 (0.024-0.031)	0.036 (0.032-0.042)	0.048 (0.043-0.056)	0.058 (0.051-0.068)	0.072 (0.061-0.087)	0.082 (0.068-0.101)	0.093 (0.075-0.117)	0.104 (0.082-0.134)	0.118 (0.089-0.159)	0.130 (0.095-0.181)
4-day	0.022 (0.019-0.025)	0.030 (0.026-0.034)	0.040 (0.035-0.046)	0.048 (0.042-0.056)	0.060 (0.051-0.072)	0.069 (0.057-0.085)	0.078 (0.063-0.098)	0.087 (0.069-0.113)	0.099 (0.075-0.134)	0.109 (0.080-0.152)
7-day	0.014 (0.013-0.016)	0.020 (0.017-0.023)	0.027 (0.024-0.031)	0.033 (0.029-0.039)	0.041 (0.035-0.050)	0.048 (0.040-0.059)	0.054 (0.044-0.068)	0.061 (0.048-0.079)	0.070 (0.053-0.095)	0.077 (0.057-0.108)
10-day	0.011 (0.009-0.012)	0.015 (0.013-0.017)	0.021 (0.018-0.024)	0.026 (0.022-0.030)	0.032 (0.027-0.039)	0.037 (0.031-0.046)	0.043 (0.034-0.054)	0.048 (0.038-0.062)	0.055 (0.042-0.075)	0.061 (0.045-0.086)
20-day	0.007 (0.006-0.008)	0.009 (0.008-0.011)	0.013 (0.011-0.015)	0.016 (0.014-0.019)	0.020 (0.017-0.025)	0.024 (0.020-0.029)	0.027 (0.022-0.034)	0.031 (0.024-0.040)	0.036 (0.027-0.049)	0.040 (0.029-0.056)
30-day	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.010 (0.009-0.012)	0.013 (0.011-0.015)	0.016 (0.014-0.019)	0.019 (0.016-0.023)	0.022 (0.018-0.027)	0.025 (0.020-0.032)	0.029 (0.022-0.039)	0.032 (0.024-0.045)
45-day	0.004 (0.004-0.005)	0.006 (0.005-0.007)	0.008 (0.007-0.009)	0.010 (0.009-0.012)	0.013 (0.011-0.015)	0.015 (0.012-0.018)	0.017 (0.014-0.022)	0.020 (0.015-0.025)	0.023 (0.017-0.031)	0.026 (0.019-0.036)
60-day	0.004 (0.003-0.004)	0.005 (0.004-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.010)	0.011 (0.009-0.013)	0.013 (0.010-0.015)	0.015 (0.012-0.018)	0.017 (0.013-0.022)	0.020 (0.015-0.026)	0.022 (0.016-0.031)

[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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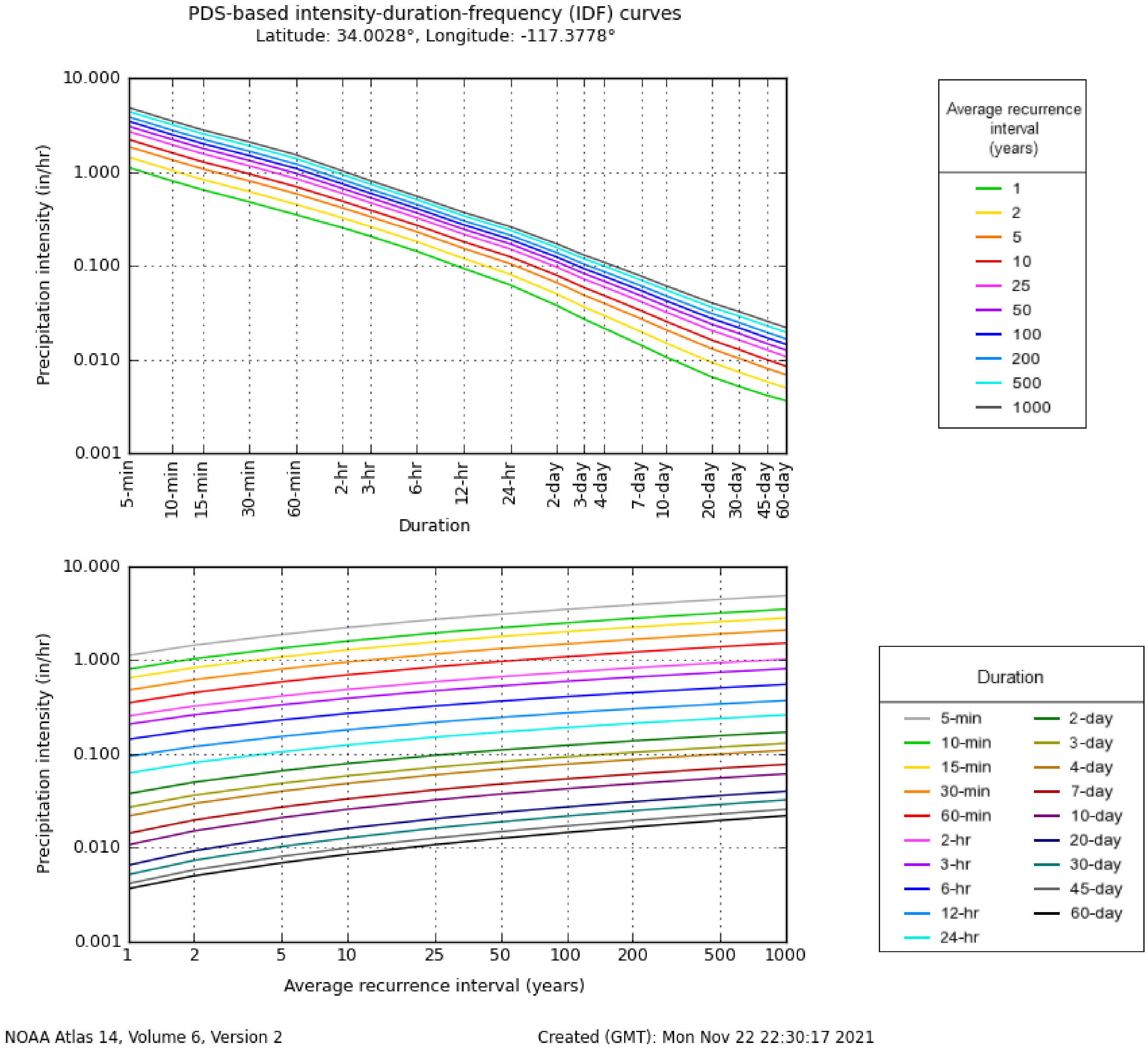
PF graphical



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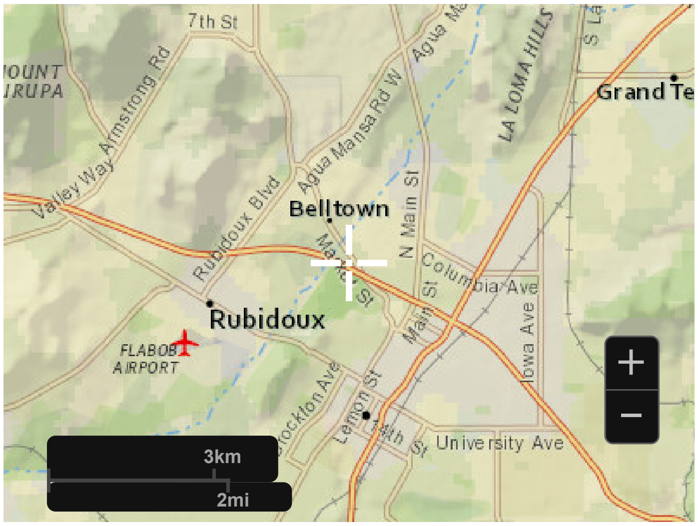
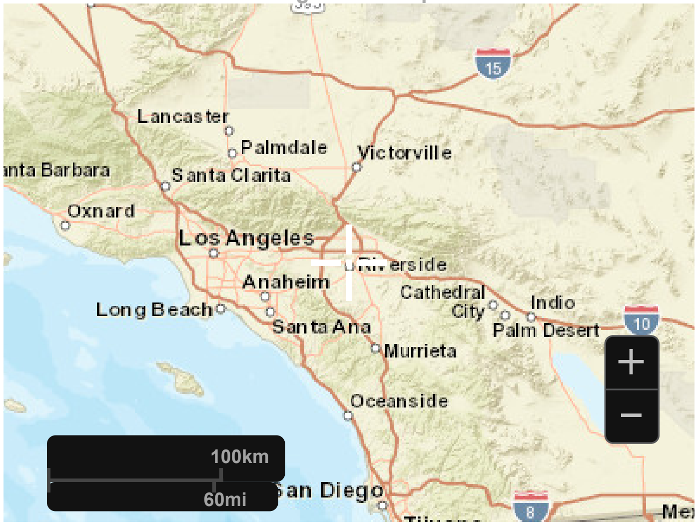
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map



Large scale aerial