HYDROLOGY & HYDRAULIC STUDY

FOR

Tentative Tract Map 37538

9045 56TH STREET, JURUPA VALLEY, CA

Prepared by:

Pacific Geotech, Inc

Engineer Jirayus Pukkanasut Registration No. RCE 73728

1424 Rolling Hills Drive,
Fullerton, CA 92835
(714) 723-9703

Prepared on: 8/5/22

TABLE OF CONTENTS

INTRODUCTION 1

PROJECT DESCRIPTION 1

EXISTING CONDITION
PROPOSED CONDITION

HYDROLOGY CALCULATION 2
HYDRAULIC CALCULATION 3
CONCLUSION & RECOMMENDATION 3

APPENDIX 1 DRAINAGE MAP
APPENDIX 2 RATIONAL METHOD CALCULATION
APPENDIX 3 PLATES FROM COUNTY OF RIVERSIDE HYDROLOGT MANUAL
APPENDIX 4 BMP SIZING WORKSHEET

Introduction

Onsite area

The Project is a proposed 6 lot single family residential subdivisions with common access The Total area in this study is 3.66 acres.

Existing Condition

The existing site is undeveloped land. Total current area is 3.66 acres. Runoff sheet flow northerly off the site.

Proposed Condition

The Project is a 6 lot single family residential subdivisions with common access. The total area in this study is 3.66 acres. Drainage area will be devised into 6 areas, A1 to A6.
See post development drainage map.
Area A1
Runoff from area A1 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd. Area A1 = 0.62 ac, Q100 = 1.03 cfs.
Area A2
Runoff from area A2 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd. Area A2 = 0.60 ac, Q100 = 1.00 cfs.
Area A3
Runoff from area A3 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd.
Area A3 = 0.662 ac, Q100 = 1.03 cfs.
Area A4
Runoff from area A4 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd.
Area A4 = 0.69 ac, Q100 = 0.94 cfs.
Area A5
Runoff from area A5 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd.
Area A5 = 0.65 ac, Q100 = 1.03 cfs.
Combine runoff from A3, A4, A5, Q100= 5.18 cfs will flow into a catch basin and detain in underground tank and pumped at rate of Q = 0.6 cfs to Van Buren Blvd.
Area A6
Runoff from area A6 flowing northwesterly will be collected into a concrete curb to a catch basin and pipe to Van Buren Blvd. Area A6 = 0.56 ac, Q100 = 0.79 cfs.

Total Q allow = 0.6+0.79 = 1.39 cfs to mimic the existing Q and flow pattern

Overflow will flow through 24"storm drain to Van Buran Blvd.

Methodology

Hydrologic calculation were performed using the Riverside County Rational Method per the RCFC & WCD Hydrology Manual, dated April 1978. Using AES software.

Calculation

Total Property Area = 3.66 acres after street dedication.

Total Study Area = 3.66 acres

Existing Impervious	=	0 acres	=	0% impervious
Existing Pervious	=	3.66 acres	=	100% pervious
Proposed Impervious	=	1.26 acres	=	34.4% impervious
Proposed Pervious	=	2.40 acres	=	65.6% pervious

Rational Method Equation. The Rational Method is based on the direct relationship between rainfall and runoff, and is expressed by the following equation:

$$Q = CIA$$

In which:
Q = the maximum rate of runoff (cubic feet per second [cfs])
C = the runoff coefficient that is the ratio between the runoff volume from an area and the average rainfall depth over a given duration for that area
I = the average intensity of rainfall for a duration equal to the time of concentration (inches/hour)
A = basin area (acres)
V = (Q x 43560)/12

Pre Development

Pre Development

Storm Frequency	Runoff	Volume
	Q(cfs)	V(cf)
100yr-24hr	1.39	5046

Post Development

Post Development

Storm Frequency	Runoff	Volume
	Q(cfs)	V(cf)
100yr-24hr	6.01	21816

ΔV 100-24 21,816-5,046 = -16,770 cf

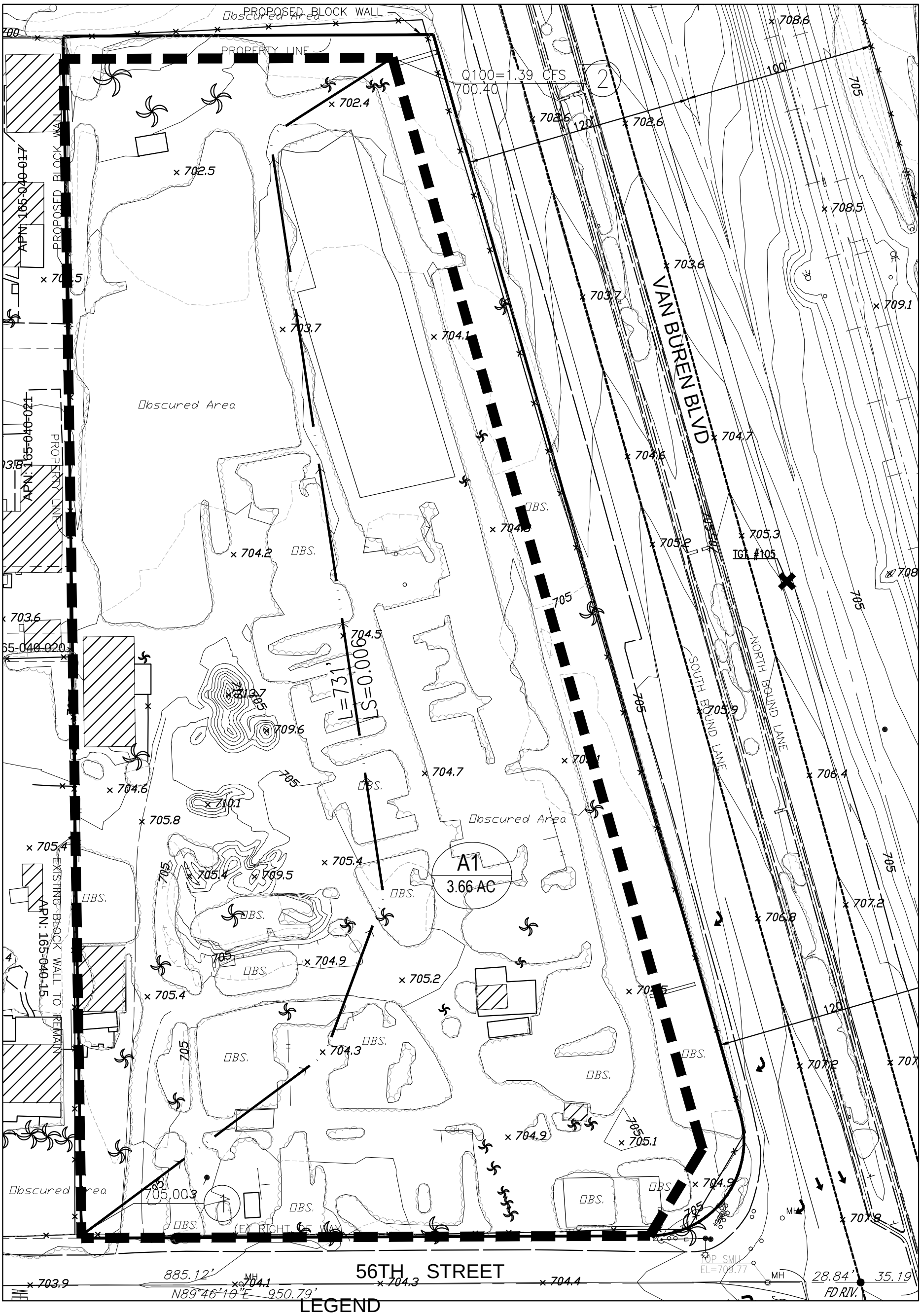
Post development runoff > Pre development runoff; therefore, detention = 16,770 CF is required.

Conclusion and Recommendation

Based on the hydrology study post development runoff is more than pre development runoff; therefore post development runoff = 16,770 cf is required to be hold onsite.

The project will provide:

1. Five (5) 16,000 gal of underground tank to detain 16,700 cf
2. A sump pump to discharge Q = 0.6 cfs to Van Buren Blvd.
3. Area A6 Q100 = 0.79 cfs will be discharge to Van Buren Blvd.
4. Overflow will be conveyed by 24" storm drain to discharge to Van Buren Blvd.



SCALE 1"=50'

LEGEND

DRAINAGE AREA BOUNDARY

FLOW ARROW

FLOW DIRECTION

A1 / 0.22 AC — SUBAREA DESIGNATION / SUBAREA ACRES

L= LENGTH

S= SLOPE

304.36

2 Q100=0.7522 CFS

ELEVATION

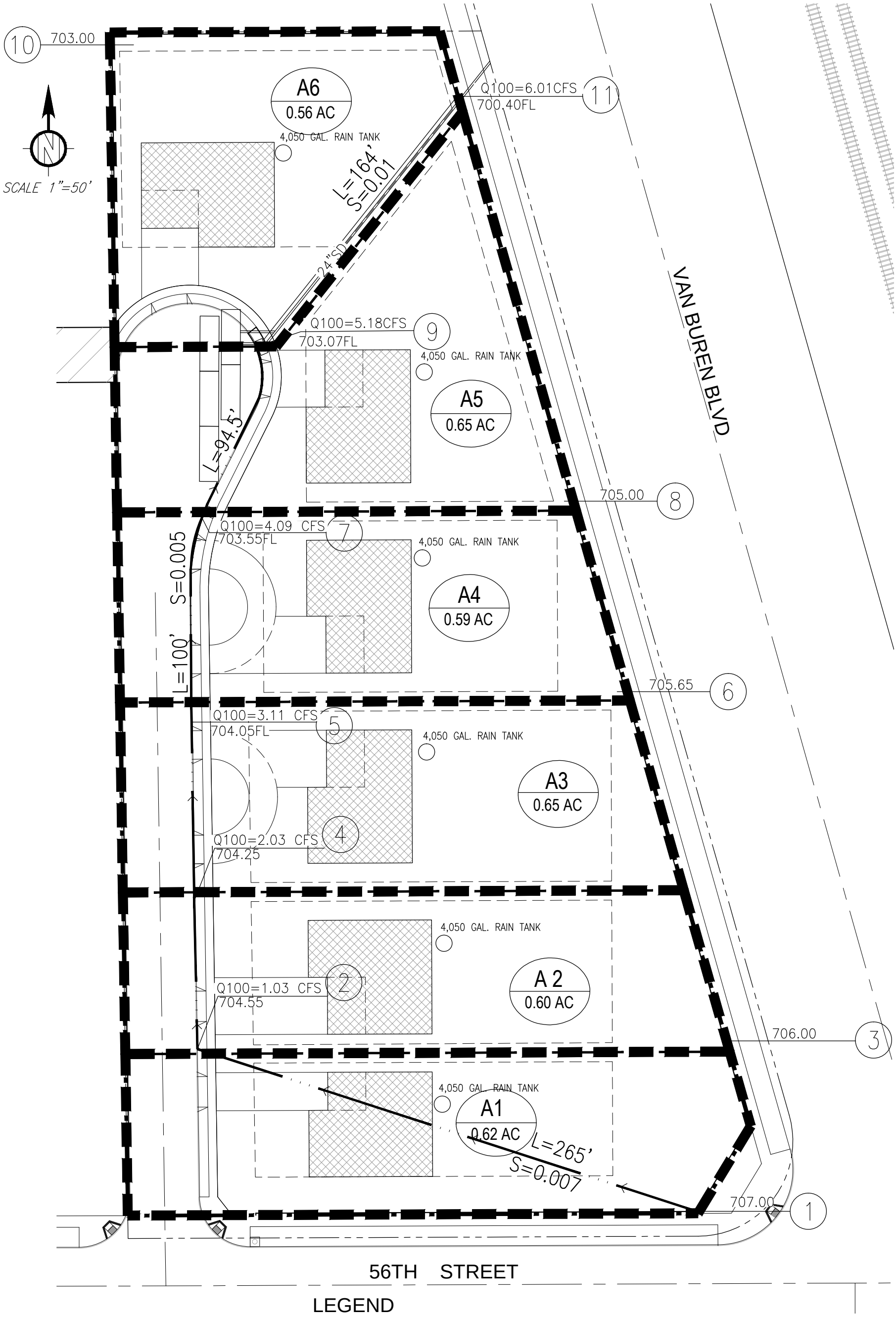
NODE # — NODE ELEVATION / NODE FLOW

PRE DEVELOPMENT DRAINAGE AREA SUMMARY

ID	IMPERVIOUS	PERVIOUS	AREA	%IMP
	SF	SF	AC	
A1	0.00	159254.41	3.66	0.00

TTM 37538

PRE DEVELOPMENT DRAINAGE MAP



LEGEND

DRAINAGE AREA BOUNDARY

FLOW ARROW

FLOW DIRECTION

A1 / 0.22 AC — SUBAREA DESIGNATION / SUBAREA ACRES

L= LENGTH

S= SLOPE

304.36

ELEVATION

2 Q100=0.7522 CFS

NODE # — NODE ELEVATION / NODE FLOW

POST DEVELOPMENT DRAINAGE AREA SUMMARY

ID	IMPERVIOUS	PERVIOUS	AREA	%IMP
	SF	SF	AC	
A1	8337.36	18738.65	0.62	0.31
A2	9083.59	16984.74	0.60	0.35
A3	10295.36	17888.16	0.65	0.37
A4	10425.29	15071.62	0.59	0.41
A5	10544.56	17637.08	0.65	0.37
A6	6228.01	18019.99	0.56	0.26
SUB TOTAL	54914.17	104340.24	3.66	
TOTAL		159254.41	3.66	

TTM 37538

POST DEVELOPMENT DRAINAGE MAP

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1693

                          Analysis prepared by:



--------------------------------------------------------------------------
  FILE NAME: 56VANPR.DAT
  TIME/DATE OF STUDY: 15:54 08/01/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.700
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.680
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.000
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5513834
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5501947
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.000
  SLOPE OF INTENSITY DURATION CURVE = 0.5502
  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      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   731.00
  UPSTREAM ELEVATION(FEET) =    705.00
  DOWNSTREAM ELEVATION(FEET) =    700.40
  ELEVATION DIFFERENCE(FEET) =      4.60
  TC = 0.937*[(  731.00**3)/(     4.60)]**.2 =   36.118
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.322
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2864
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      3.66   TOTAL RUNOFF(CFS) =      1.39
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =     36.12
  PEAK FLOW RATE(CFS)   =       1.39
============================================================================
============================================================================
  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 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1693

                          Analysis prepared by:



--------------------------------------------------------------------------
  FILE NAME: 56VANPO.DAT
  TIME/DATE OF STUDY: 13:35 08/05/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.700
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.680
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.000
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5513834
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5501947
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.000
  SLOPE OF INTENSITY DURATION CURVE = 0.5502
  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      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY(1/2 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   265.00
  UPSTREAM ELEVATION(FEET) =    707.00
  DOWNSTREAM ELEVATION(FEET) =    704.55
  ELEVATION DIFFERENCE(FEET) =      2.45
  TC = 0.422*[(  265.00**3)/(     2.45)]**.2 =   10.035
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6222
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.03
  TOTAL AREA(ACRES) =      0.62   TOTAL RUNOFF(CFS) =      1.03

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6222
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       2.03
  TC(MIN.) =   10.04

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6222
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.65   SUBAREA RUNOFF(CFS) =    1.08
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       3.11
  TC(MIN.) =   10.04

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
```

```
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6222
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.59   SUBAREA RUNOFF(CFS) =    0.98
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       4.09
  TC(MIN.) =   10.04

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6222
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.65   SUBAREA RUNOFF(CFS) =    1.08
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       5.18
  TC(MIN.) =   10.04

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     11.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.07  DOWNSTREAM(FEET) =   700.40
  FLOW LENGTH(FEET) =   164.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.52
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.18
  PIPE TRAVEL TIME(MIN.) =   1.79    Tc(MIN.) =   11.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.443
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .6101
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    0.83
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =       6.01
  TC(MIN.) =   11.83

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.83
  RAINFALL INTENSITY(INCH/HR) =   2.44
  TOTAL STREAM AREA(ACRES) =     3.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.01
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         3.7  TC(MIN.) =     11.83
  PEAK FLOW RATE(CFS)   =       6.01
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

RAINFALL INTENSITY—INCHES PER HOUR

RIVERSIDE			RIVERSIDE (FOOTHILL AREAS)			RUBIDOUX			SAN JACINTO			SUN CITY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.75	3.92	5	3.14	4.71	5	3.18	4.71	5	2.81	4.16	5	3.25	4.85
6	2.48	3.55	6	2.84	4.26	6	2.87	4.26	6	2.56	3.79	6	2.95	4.40
7	2.28	3.26	7	2.61	3.91	7	2.64	3.91	7	2.37	3.51	7	2.72	4.06
8	2.12	3.03	8	2.42	3.63	8	2.45	3.63	8	2.22	3.29	8	2.53	3.78
9	1.99	2.84	9	2.27	3.41	9	2.30	3.41	9	2.09	3.10	9	2.38	3.55
10	1.88	2.68	10	2.14	3.21	10	2.17	3.21	10	1.98	2.94	10	2.25	3.36
11	1.78	2.54	11	2.03	3.05	11	2.06	3.05	11	1.89	2.80	11	2.14	3.19
12	1.70	2.42	12	1.94	2.91	12	1.96	2.91	12	1.81	2.68	12	2.04	3.05
13	1.62	2.32	13	1.86	2.78	13	1.88	2.78	13	1.74	2.58	13	1.96	2.92
14	1.56	2.23	14	1.78	2.67	14	1.80	2.67	14	1.68	2.48	14	1.88	2.81
15	1.50	2.14	15	1.71	2.57	15	1.74	2.57	15	1.62	2.40	15	1.81	2.71
16	1.45	2.07	16	1.66	2.48	16	1.68	2.48	16	1.57	2.32	16	1.75	2.62
17	1.40	2.00	17	1.60	2.40	17	1.62	2.40	17	1.52	2.25	17	1.70	2.54
18	1.36	1.94	18	1.55	2.33	18	1.57	2.33	18	1.48	2.19	18	1.65	2.46
19	1.32	1.88	19	1.51	2.26	19	1.52	2.26	19	1.44	2.13	19	1.60	2.39
20	1.28	1.83	20	1.46	2.20	20	1.48	2.20	20	1.40	2.08	20	1.56	2.33
22	1.22	1.74	22	1.39	2.08	22	1.41	2.08	22	1.34	1.98	22	1.48	2.21
24	1.16	1.66	24	1.32	1.99	24	1.34	1.99	24	1.28	1.90	24	1.41	2.11
26	1.11	1.58	26	1.27	1.90	26	1.28	1.90	26	1.23	1.82	26	1.36	2.03
28	1.06	1.52	28	1.22	1.82	28	1.23	1.82	28	1.19	1.76	28	1.30	1.95
30	1.02	1.46	30	1.17	1.76	30	1.19	1.76	30	1.15	1.70	30	1.26	1.88
32	.99	1.41	32	1.13	1.70	32	1.14	1.70	32	1.11	1.64	32	1.21	1.81
34	.96	1.37	34	1.09	1.64	34	1.11	1.64	34	1.08	1.59	34	1.18	1.76
36	.93	1.32	36	1.06	1.59	36	1.07	1.59	36	1.05	1.55	36	1.14	1.70
38	.90	1.29	38	1.03	1.54	38	1.04	1.54	38	1.02	1.51	38	1.11	1.66
40	.87	1.25	40	1.00	1.50	40	1.01	1.50	40	.99	1.47	40	1.08	1.61
45	.82	1.17	45	.94	1.41	45	.95	1.41	45	.94	1.39	45	1.01	1.51
50	.77	1.11	50	.88	1.33	50	.90	1.33	50	.89	1.31	50	.96	1.43
55	.73	1.05	55	.84	1.26	55	.85	1.26	55	.85	1.25	55	.91	1.36
60	.70	1.00	60	.80	1.20	60	.81	1.20	60	.81	1.20	60	.87	1.30
65	.67	.96	65	.77	1.15	65	.78	1.15	65	.78	1.15	65	.83	1.25
70	.64	.92	70	.73	1.10	70	.74	1.10	70	.75	1.11	70	.80	1.20
75	.62	.88	75	.71	1.06	75	.72	1.06	75	.72	1.07	75	.77	1.15
80	.60	.85	80	.68	1.02	80	.69	1.02	80	.70	1.04	80	.75	1.12
85	.58	.83	85	.66	.99	85	.67	.99	85	.68	1.01	85	.72	1.08
SLOPE = .550			SLOPE = .550			SLOPE = .550			SLOPE = .500			SLOPE = .530		

STANDARD
INTENSITY—DURATION
CURVES DATA

Bioretention Facility - Design Procedure	BMP ID 6-D	Legend:	Required Entries / Calculated Cells

Company Name:	PGI	Date:	8/2/2022
Designed by:	Mai	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.508	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	398	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	35.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	222	ft^2
Proposed Surface Area	A=	222	ft^2
Minimum Required Length of Bioretention Facility, L	L =	6.3	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes: PLANTER BOX

Bioretention Facility - Design Procedure	BMP ID 4-D	Legend:	Required Entries / Calculated Cells

Company Name:	PGI	Date:	8/2/2022
Designed by:	Mai	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.494	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	381	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	35.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	212	ft^2
Proposed Surface Area	A=	212	ft^2
Minimum Required Length of Bioretention Facility, L	L =	6.1	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes: PLANTER BOX

Bioretention Facility - Design Procedure	BMP ID 4-D	Legend:	Required Entries / Calculated Cells

Company Name:	PGI	Date:	8/2/2022
Designed by:	Mai	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.538	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	479	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	40.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	266	ft^2
Proposed Surface Area	A=	266	ft^2
Minimum Required Length of Bioretention Facility, L	L =	6.7	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes: PLANTER BOX

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries	
	3-D		Calculated Cells	

Company Name:	PGI	Date:	8/2/2022
Designed by:	Mai	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.558	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	485	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	40.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	270	ft^2
Proposed Surface Area	A=	270	ft^2
Minimum Required Length of Bioretention Facility, L	L =	6.8	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes: PLANTER BOX

Bioretention Facility - Design Procedure	BMP ID 2-D	Legend:	Required Entries / Calculated Cells

Company Name:	PGI	Date:	8/2/2022
Designed by:	Mai	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.51	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	443	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	35.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	246	ft^2
Proposed Surface Area	A=	3,302	ft^2
Minimum Required Length of Bioretention Facility, L	L =	7.0	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		3	%
6" Check Dam Spacing		10	feet
Describe Vegetation:			

Notes: PLANTER BOX

Bioretention Facility - Design Procedure	BMP ID 1-D	Legend:	Required Entries / Calculated Cells

Company Name: PGI | Date: 8/2/2022

Designed by: Mai | County/City Case No.:

Design Volume

Enter the area tributary to this feature	A_T = 0.53	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} = 407	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T = 35.0	ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E = 1.80	ft
Minimum Surface Area, A_m		
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M = 226	ft^2
Proposed Surface Area	A= 3,302	ft^2
Minimum Required Length of Bioretention Facility, L	L = 6.5	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	3	%
6" Check Dam Spacing	10	feet
Describe Vegetation:		

Notes: PLANTER BOX

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: Pacific Geotech, Inc — Date: 7/28/2022

Designed by: Mai — Case No:

Company Project Number/Name: 56th & Van Buren

BMP Identification

BMP NAME / ID: ACCESS

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}= 0.80 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)*
7B	24460.87	Concrete or Asphalt	1	0.89	21819.1			
7C	960	Ornamental Landscaping	0.1	0.11	106			
	25420.87	**Total**			21925.1	0.80	1461.7	1465

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{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 | Date

Designed by | Case No

Company Project Number/Name

BMP Identification

BMP NAME / ID

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

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 (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*7B*	*24460.87*	*Concrete or Asphalt*	*1*	*0.89*	*21819.1*			
	7C	*960*	*Ornamental Landscaping*	*0.1*	*0.11046*	*106*			
				0.1	*0.11046*				
		25420.87	***Total***			21925.1	0.20	0.1	0.115

Notes: