Appendix D
Hydrology Study

HYDROLOGY STUDY

San Clemente Street & Lomita Way
Laguna Beach, California 92651

Prepared for:

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03/09/21

3.9.21

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1.0 PURPOSE

This report has been prepared to accompany the Street Improvement Plan for the proposed construction of a cul-de-sac at the Northwesterly terminus of San Clemente Street and the Precise grading plan for the proposed private residence at 2354 San Clemente Street.

2.0 DESCRIPTION OF SITE

San Clemente Street is bounded to the East and West be existing residential developments, to the South by Alta Vista Way and to the North by a descending slope and natural drainage course.

Lomita Way is parallel and easterly of San Clemente street and is bounded to the East and West be existing residential developments, to the South by Alta Vista Way and to the North by a descending slope and natural drainage course.

Site soils are classified as Hydrologic Soil Group D per the Orange County Hydrology Manual Plate B.

See Figure 1 for a depiction of the project location and Figure 2 for an aerial photograph of the site, all in Appendix A.

3.0 EXISTING DRAINAGE

Runoff from San Clemente street flows generally as surface flow in a northwesterly direction toward the existing terminus of the street. Site runoff currently sheet flows down the slope from the street terminus to the natural drainage course.

Runoff from Lomita Way flows generally as surface flow in a northwesterly direction toward the existing terminus of the street where it enters an existing 12” diameter pipe that currently outlets at the slope within the property at 2354 San Clemente Street.

The natural drainage course discharges to Glenneyre Street below where it enters the City Storm Drain System.

4.0 PROPOSED DEVELOPMENT

As requested by the city, the developer proposes to construct a cul-de-sac at the northwesterly terminus of San Clemente Street. The construction will include appurtenant curb/gutter, curb-opening manhole structure and a storm drainline that outlets to the natural drainage course below. The proposed improvements are shown on the Street Improvement Plans for San Clemente Street referenced above.

The developer proposes to demolish and reconstruct a single family residence project at 2354 San Clemente Street. The proposed improvements are shown on the Precise grading plans for 2354 San Clemente Street.

5.0 PROPOSED DRAINAGE

Stormwater runoff from San Clemente Street will be collected in a storm drain system and discharged directly to the natural drainage course below. This proposed runoff/discharge will avoid sheet flowing over the slope, allow for energy dissipation at the outlet and reduce the potential for erosion and slope issues associated with street runoff.

The existing 12" storm drainline from Lomita Way currently discharges within the proposed development of 2354 San Clemente Street. This 12" line is being redirected to a similar point near the bottom of the slope and will have energy dissipation at the outlet to reduce the potential for erosion and slope issues associated with street runoff. The runoff was discharged at the limit of the "non-buildable" lots.

Stormwater runoff from the proposed project at 2354 San Clemente Street will be collected in a storm drain system and discharged to the natural drainage course below. This proposed runoff/discharge will sheet flow over the slope with energy dissipation at the outlet to reduce the potential for erosion and slope issues associated with the project runoff. The project runoff was discharged at the limit of the "non-buildable" lots.

6.0 METHODOLOGY

For project conditions, we divided the site into drainage subareas (Each street is a subarea and the single family residence is also a subarea) and performed a rational method hydrologic analysis and small unity hydrology model (Using AES software) based on Orange County Hydrology Manual (OCHM) Section D to estimate the peak runoff quantities and runoff volumes discharged from the areas.

Peak runoff quantities and total catchment runoff volumes were compared to the full flow capacity of the pipes discharging from each subarea to ensure adequate drainage system capacity and to calculate the storm drain storage requirements for the proposed project. Full flow capacity of proposed drain lines was estimated using the AES hydraulic element software.

The energy dissipators at the outlet to the natural drainage course were sized per CASQA EC-10 shown on the post-construction drainage map H2 in Appendix C.

All calculations are shown in Appendix B. The Drainage Maps in Appendix C graphically depicts the project watershed and data relevant to the runoff calculations. A map showing the existing and proposed impervious areas has been added in Appendix C as Map H3.

7.0 RESULTS AND ANALYSIS

Our hydrologic and hydraulic analysis of the site yielded the following results:

Table 1. 100-Yr Peak Runoff.

Street	*Pre-project runoff volume* (Acre-ft)	*Post-project runoff volume* (Acre-ft)	*Δ V* Acre-ft	*Pre-project* Q_{100} (cfs)	*Post-project* Q_{100} (cfs)	*Δ Q (cfs)*	Flow Depth at Curb Inlet (ft)	Min Curb Inlet Width Req'd (ft)
Area A (Lomita Way)	0.35	0.36	0.01	5.52	5.83	0.31	n/a	n/a
Area B (San Clemente St)	0.16	0.16	0	2.71	2.71	0	0.21	9.12

Table 2. Proposed Pipe Capacity Verification.

Pipe	Size (in)	Q_{100} (cfs)	Flow Depth (inches)	Energy Dissipator min Length (ft)
1	12	2.71	0.2	10'
2	12	3.43	0.25	n/a
3	18	5.55	0.48	10'

Table 1 shows that the proposed 10' wide curb opening manhole structure has been sized to accommodate the 100 year storm event tributary to San Clemente Street. The difference in peak runoff of 0.31 cfs equates to a volume increase of 0.01 acre-ft (435.6 cu-ft). This volume is contained by the provided storage system (42" dia x 48' long stormwater detention pipe with capacity of 462 cu-ft).

Table 2 shows for all pipes the proposed pipe slope is sized to accommodate the 100 year storm event. The energy dissipators have been sized to meet the energy dissipation requirements related for the peak flow.

Policy 9I from the City of Laguna Beach zoning standards states that new development shall control the increase in volume, velocity, and sediment load of runoff from the greatest development areas at or near the source of increase to the greatest extent feasible. To comply with this policy, Toal Engineering, Inc. has proposed energy dissipaters and a stormwater storage system to address the calculated increase in flowrate of 0.31 cfs which equates to a volume of 435.6 cu-ft.

Policy 9J from the City of Laguna Beach zoning standards states that new development shall maintain runoff characteristics as near as possible to natural discharge characteristics by maintaining the natural conditions of the watershed. To comply, the proposed site design is consistent with the existing site conditions, the drainage pattern is largely unchanged, and the project will implement the Policy 9I compliance items listed above.

8.0 CONCLUSIONS

The proposed storm drain system has sufficient capacity to convey estimated peak discharges to the community storm drain system and to meet the energy dissipation requirements. Additionally, the provided stormwater detention pipe has sufficient capacity to address the increase in runoff volume due to the private development at 2354 San Clemente Street.

APPENDIX A

Vicinity Map, Aerial Image, Soil Map

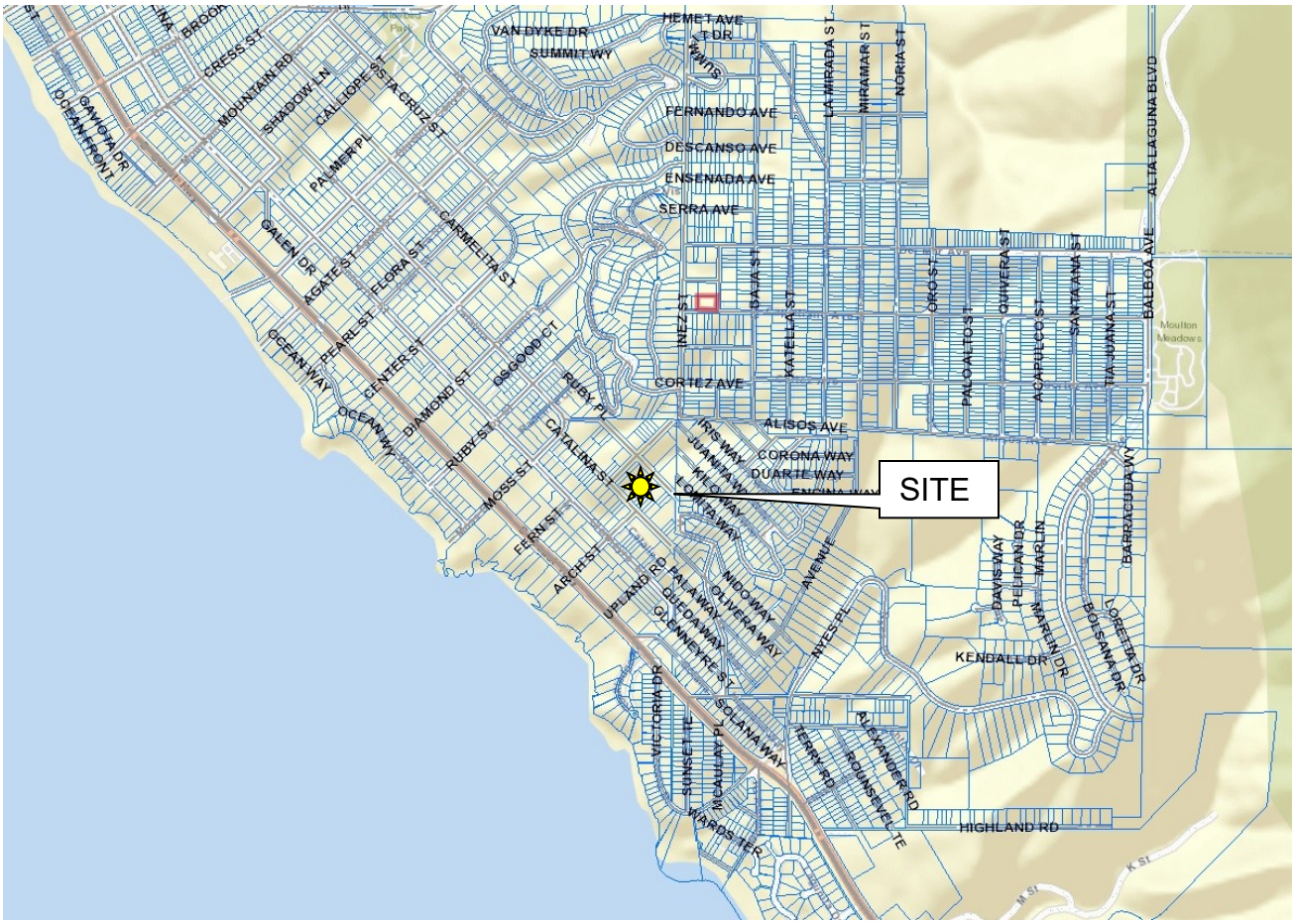

Figure 1. Vicinity Map
maps.google.com

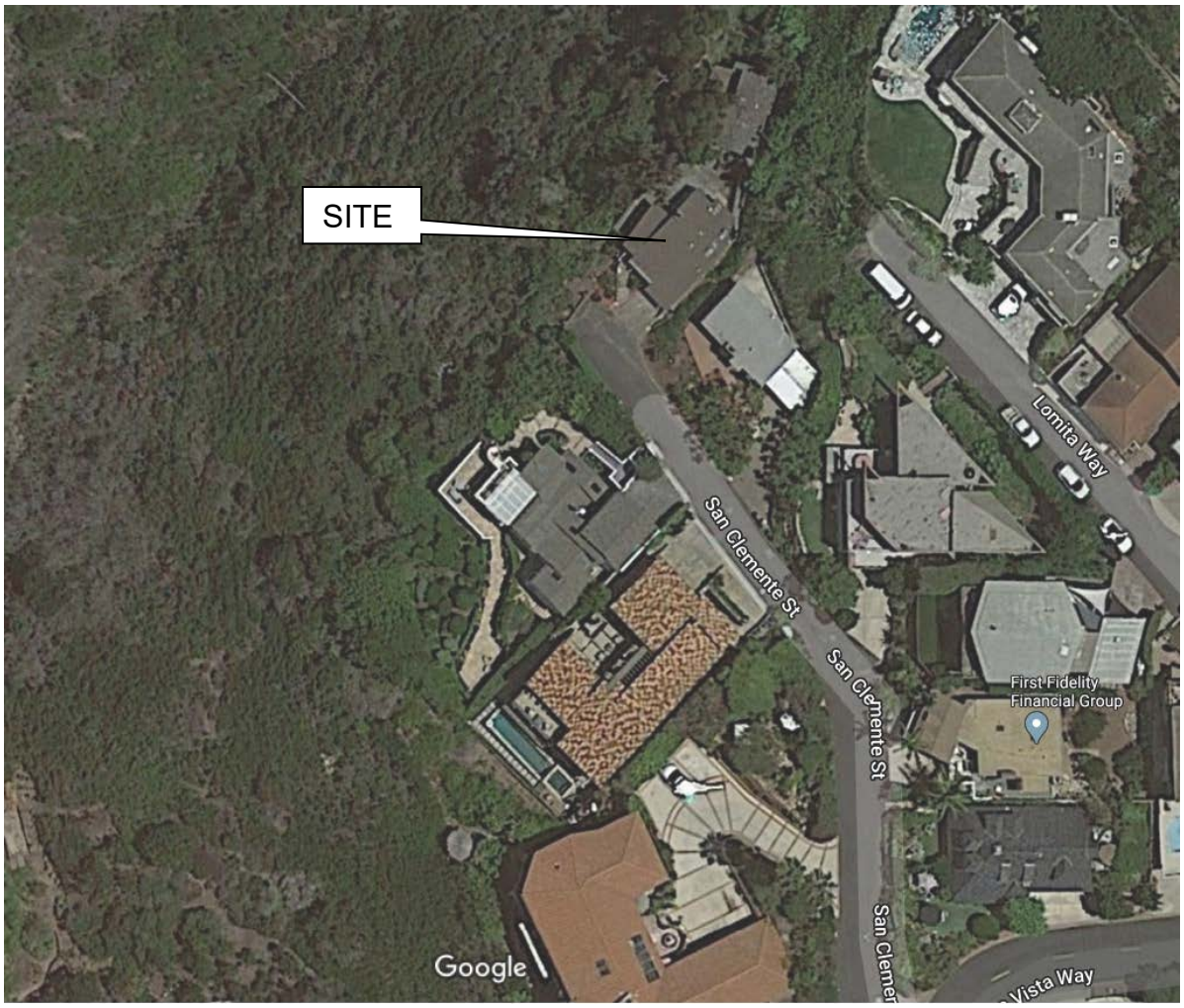

Figure 2. Aerial Image
maps.google.com

APPENDIX B

Calculations

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_____________________________________________________________________________
*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2012 Advanced Engineering Software (aes)
            Ver. 18.2  Release Date: 05/08/2012  License ID 1448

                          Analysis prepared by:

                           Toal Engineering, Inc.
                             139 Avenida Navarro
                             San Clemente, CA
                               949-492-8586
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Pre-Project Area A

```
-----------------------------------------------------------------------------
  FILE NAME: 18156E1.DAT
  TIME/DATE OF STUDY: 15:45 03/03/2021
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    406.50  DOWNSTREAM(FEET) =    342.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.485
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.868
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.66      0.20     0.500    75    5.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.43
  TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   300.90
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.38
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.61
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     427.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.7  TC(MIN.) =      5.61
  EFFECTIVE AREA(ACRES) =      0.66  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.500
  PEAK FLOW RATE(CFS)   =       3.43
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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******************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==============================================================================
          (C) Copyright 1989-2012 Advanced Engineering Software (aes)
              Ver. 19.0  Release Date: 06/01/2012  License ID 1448

                          Analysis prepared by:
                           Toal Engineering, Inc.
                             139 Avenida Navarro
                                949-492-8586



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 Problem Descriptions:  Pre-Project Area A


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    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.07
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.100
    LOW LOSS FRACTION = 0.306
    TIME OF CONCENTRATION(MIN.) =  5.61
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.35
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.16

******************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
------------------------------------------------------------------------------
  0.01      0.0000      0.00  Q         .         .         .         .
  0.10      0.0002      0.06  Q         .         .         .         .
  0.20      0.0007      0.06  Q         .         .         .         .
  0.29      0.0011      0.06  Q         .         .         .         .
  0.39      0.0016      0.06  Q         .         .         .         .
```

0.48	0.0020	0.06	Q	.	.	.	.
0.57	0.0025	0.06	Q	.	.	.	.
0.67	0.0030	0.06	Q	.	.	.	.
0.76	0.0034	0.06	Q	.	.	.	.
0.85	0.0039	0.06	Q	.	.	.	.
0.95	0.0044	0.06	Q	.	.	.	.
1.04	0.0048	0.06	Q	.	.	.	.
1.13	0.0053	0.06	Q	.	.	.	.
1.23	0.0058	0.06	Q	.	.	.	.
1.32	0.0062	0.06	Q	.	.	.	.
1.41	0.0067	0.06	Q	.	.	.	.
1.51	0.0072	0.06	Q	.	.	.	.
1.60	0.0077	0.06	Q	.	.	.	.
1.69	0.0082	0.06	Q	.	.	.	.
1.79	0.0086	0.06	Q	.	.	.	.
1.88	0.0091	0.06	Q	.	.	.	.
1.97	0.0096	0.06	Q	.	.	.	.
2.07	0.0101	0.06	Q	.	.	.	.
2.16	0.0106	0.06	Q	.	.	.	.
2.26	0.0111	0.06	Q	.	.	.	.
2.35	0.0116	0.06	Q	.	.	.	.
2.44	0.0121	0.06	Q	.	.	.	.
2.54	0.0126	0.06	Q	.	.	.	.
2.63	0.0131	0.07	Q	.	.	.	.
2.72	0.0136	0.07	Q	.	.	.	.
2.82	0.0141	0.07	Q	.	.	.	.
2.91	0.0146	0.07	Q	.	.	.	.
3.00	0.0151	0.07	Q	.	.	.	.
3.10	0.0156	0.07	Q	.	.	.	.
3.19	0.0161	0.07	Q	.	.	.	.
3.28	0.0167	0.07	Q	.	.	.	.
3.38	0.0172	0.07	Q	.	.	.	.
3.47	0.0177	0.07	Q	.	.	.	.
3.56	0.0182	0.07	Q	.	.	.	.
3.66	0.0188	0.07	Q	.	.	.	.
3.75	0.0193	0.07	Q	.	.	.	.
3.84	0.0198	0.07	Q	.	.	.	.
3.94	0.0204	0.07	Q	.	.	.	.
4.03	0.0209	0.07	Q	.	.	.	.
4.13	0.0214	0.07	Q	.	.	.	.
4.22	0.0220	0.07	Q	.	.	.	.
4.31	0.0225	0.07	Q	.	.	.	.
4.41	0.0231	0.07	Q	.	.	.	.
4.50	0.0236	0.07	Q	.	.	.	.
4.59	0.0242	0.07	Q	.	.	.	.
4.69	0.0247	0.07	Q	.	.	.	.
4.78	0.0253	0.07	Q	.	.	.	.
4.87	0.0258	0.07	Q	.	.	.	.
4.97	0.0264	0.07	Q	.	.	.	.
5.06	0.0270	0.07	Q	.	.	.	.
5.15	0.0276	0.07	Q	.	.	.	.
5.25	0.0281	0.07	Q	.	.	.	.
5.34	0.0287	0.07	Q	.	.	.	.
5.43	0.0293	0.08	Q	.	.	.	.

5.53	0.0299	0.08	Q	.	.	.	.
5.62	0.0305	0.08	Q	.	.	.	.
5.71	0.0311	0.08	Q	.	.	.	.
5.81	0.0316	0.08	Q	.	.	.	.
5.90	0.0322	0.08	Q	.	.	.	.
6.00	0.0328	0.08	Q	.	.	.	.
6.09	0.0334	0.08	Q	.	.	.	.
6.18	0.0341	0.08	Q	.	.	.	.
6.28	0.0347	0.08	Q	.	.	.	.
6.37	0.0353	0.08	Q	.	.	.	.
6.46	0.0359	0.08	Q	.	.	.	.
6.56	0.0365	0.08	Q	.	.	.	.
6.65	0.0372	0.08	Q	.	.	.	.
6.74	0.0378	0.08	Q	.	.	.	.
6.84	0.0384	0.08	Q	.	.	.	.
6.93	0.0391	0.08	Q	.	.	.	.
7.02	0.0397	0.08	Q	.	.	.	.
7.12	0.0403	0.08	Q	.	.	.	.
7.21	0.0410	0.08	Q	.	.	.	.
7.30	0.0417	0.09	Q	.	.	.	.
7.40	0.0423	0.09	Q	.	.	.	.
7.49	0.0430	0.09	Q	.	.	.	.
7.58	0.0436	0.09	Q	.	.	.	.
7.68	0.0443	0.09	Q	.	.	.	.
7.77	0.0450	0.09	Q	.	.	.	.
7.87	0.0457	0.09	Q	.	.	.	.
7.96	0.0464	0.09	Q	.	.	.	.
8.05	0.0471	0.09	Q	.	.	.	.
8.15	0.0478	0.09	Q	.	.	.	.
8.24	0.0485	0.09	Q	.	.	.	.
8.33	0.0492	0.09	Q	.	.	.	.
8.43	0.0499	0.09	Q	.	.	.	.
8.52	0.0506	0.09	Q	.	.	.	.
8.61	0.0513	0.09	Q	.	.	.	.
8.71	0.0521	0.09	Q	.	.	.	.
8.80	0.0528	0.10	Q	.	.	.	.
8.89	0.0535	0.10	Q	.	.	.	.
8.99	0.0543	0.10	Q	.	.	.	.
9.08	0.0550	0.10	Q	.	.	.	.
9.17	0.0558	0.10	Q	.	.	.	.
9.27	0.0566	0.10	Q	.	.	.	.
9.36	0.0573	0.10	Q	.	.	.	.
9.45	0.0581	0.10	Q	.	.	.	.
9.55	0.0589	0.10	Q	.	.	.	.
9.64	0.0597	0.10	Q	.	.	.	.
9.74	0.0605	0.10	Q	.	.	.	.
9.83	0.0613	0.11	Q	.	.	.	.
9.92	0.0621	0.11	Q	.	.	.	.
10.02	0.0630	0.11	Q	.	.	.	.
10.11	0.0638	0.11	Q	.	.	.	.
10.20	0.0646	0.11	Q	.	.	.	.
10.30	0.0655	0.11	Q	.	.	.	.
10.39	0.0664	0.11	Q	.	.	.	.
10.48	0.0672	0.11	Q	.	.	.	.

10.58	0.0681	0.11	Q	.	.	.	.
10.67	0.0690	0.12	Q	.	.	.	.
10.76	0.0699	0.12	Q	.	.	.	.
10.86	0.0708	0.12	Q	.	.	.	.
10.95	0.0717	0.12	Q	.	.	.	.
11.04	0.0726	0.12	Q	.	.	.	.
11.14	0.0736	0.12	Q	.	.	.	.
11.23	0.0745	0.12	Q	.	.	.	.
11.32	0.0755	0.12	Q	.	.	.	.
11.42	0.0764	0.13	Q	.	.	.	.
11.51	0.0774	0.13	Q	.	.	.	.
11.61	0.0784	0.13	Q	.	.	.	.
11.70	0.0794	0.13	Q	.	.	.	.
11.79	0.0805	0.13	Q	.	.	.	.
11.89	0.0815	0.13	Q	.	.	.	.
11.98	0.0826	0.14	Q	.	.	.	.
12.07	0.0836	0.15	Q	.	.	.	.
12.17	0.0849	0.18	Q	.	.	.	.
12.26	0.0863	0.18	Q	.	.	.	.
12.35	0.0877	0.18	Q	.	.	.	.
12.45	0.0891	0.18	Q	.	.	.	.
12.54	0.0905	0.19	Q	.	.	.	.
12.63	0.0920	0.19	Q	.	.	.	.
12.73	0.0934	0.19	Q	.	.	.	.
12.82	0.0949	0.19	Q	.	.	.	.
12.91	0.0965	0.20	Q	.	.	.	.
13.01	0.0980	0.20	Q	.	.	.	.
13.10	0.0996	0.21	Q	.	.	.	.
13.20	0.1012	0.21	Q	.	.	.	.
13.29	0.1028	0.21	Q	.	.	.	.
13.38	0.1044	0.22	Q	.	.	.	.
13.48	0.1061	0.22	Q	.	.	.	.
13.57	0.1079	0.23	Q	.	.	.	.
13.66	0.1096	0.23	Q	.	.	.	.
13.76	0.1115	0.24	Q	.	.	.	.
13.85	0.1134	0.25	Q	.	.	.	.
13.94	0.1153	0.25	.Q	.	.	.	.
14.04	0.1173	0.27	.Q	.	.	.	.
14.13	0.1194	0.27	.Q	.	.	.	.
14.22	0.1216	0.29	.Q	.	.	.	.
14.32	0.1238	0.29	.Q	.	.	.	.
14.41	0.1262	0.31	.Q	.	.	.	.
14.50	0.1286	0.32	.Q	.	.	.	.
14.60	0.1311	0.34	.Q	.	.	.	.
14.69	0.1337	0.35	.Q	.	.	.	.
14.78	0.1365	0.37	.Q	.	.	.	.
14.88	0.1394	0.38	.Q	.	.	.	.
14.97	0.1425	0.41	.Q	.	.	.	.
15.07	0.1457	0.43	.Q	.	.	.	.
15.16	0.1491	0.46	.Q	.	.	.	.
15.25	0.1528	0.48	.Q	.	.	.	.
15.35	0.1567	0.54	. Q	.	.	.	.
15.44	0.1607	0.51	. Q	.	.	.	.
15.53	0.1649	0.56	. Q	.	.	.	.

15.63	0.1694	0.61	. Q . . . .
15.72	0.1747	0.76	. Q . . . .
15.81	0.1810	0.87	. Q . . . .
15.91	0.1892	1.27	. Q . . . .
16.00	0.2009	1.77	. Q . . . .
16.09	**0.2291**	**5.52**	**. . . Q . .**
16.19	0.2543	1.02	. Q . . . .
16.28	0.2609	0.68	. Q . . . .
16.37	0.2655	0.52	. Q . . . .
16.47	0.2695	0.51	. Q . . . .
16.56	0.2732	0.44	.Q . . . .
16.65	0.2764	0.39	.Q . . . .
16.75	0.2793	0.36	.Q . . . .
16.84	0.2819	0.33	.Q . . . .
16.93	0.2844	0.30	.Q . . . .
17.03	0.2866	0.28	.Q . . . .
17.12	0.2887	0.26	.Q . . . .
17.22	0.2906	0.24	Q . . . .
17.31	0.2925	0.23	Q . . . .
17.40	0.2942	0.22	Q . . . .
17.50	0.2959	0.21	Q . . . .
17.59	0.2975	0.20	Q . . . .
17.68	0.2990	0.20	Q . . . .
17.78	0.3005	0.19	Q . . . .
17.87	0.3020	0.19	Q . . . .
17.96	0.3034	0.18	Q . . . .
18.06	0.3047	0.18	Q . . . .
18.15	0.3060	0.14	Q . . . .
18.24	0.3070	0.13	Q . . . .
18.34	0.3080	0.13	Q . . . .
18.43	0.3090	0.13	Q . . . .
18.52	0.3099	0.12	Q . . . .
18.62	0.3109	0.12	Q . . . .
18.71	0.3118	0.12	Q . . . .
18.81	0.3127	0.11	Q . . . .
18.90	0.3136	0.11	Q . . . .
18.99	0.3144	0.11	Q . . . .
19.09	0.3153	0.11	Q . . . .
19.18	0.3161	0.11	Q . . . .
19.27	0.3169	0.10	Q . . . .
19.37	0.3177	0.10	Q . . . .
19.46	0.3185	0.10	Q . . . .
19.55	0.3193	0.10	Q . . . .
19.65	0.3200	0.10	Q . . . .
19.74	0.3208	0.10	Q . . . .
19.83	0.3215	0.09	Q . . . .
19.93	0.3222	0.09	Q . . . .
20.02	0.3229	0.09	Q . . . .
20.11	0.3236	0.09	Q . . . .
20.21	0.3243	0.09	Q . . . .
20.30	0.3250	0.09	Q . . . .
20.39	0.3256	0.09	Q . . . .
20.49	0.3263	0.08	Q . . . .
20.58	0.3270	0.08	Q . . . .

20.67	0.3276	0.08	Q	.	.	.	.
20.77	0.3282	0.08	Q	.	.	.	.
20.86	0.3289	0.08	Q	.	.	.	.
20.96	0.3295	0.08	Q	.	.	.	.
21.05	0.3301	0.08	Q	.	.	.	.
21.14	0.3307	0.08	Q	.	.	.	.
21.24	0.3313	0.08	Q	.	.	.	.
21.33	0.3319	0.08	Q	.	.	.	.
21.42	0.3325	0.08	Q	.	.	.	.
21.52	0.3330	0.07	Q	.	.	.	.
21.61	0.3336	0.07	Q	.	.	.	.
21.70	0.3342	0.07	Q	.	.	.	.
21.80	0.3347	0.07	Q	.	.	.	.
21.89	0.3353	0.07	Q	.	.	.	.
21.98	0.3358	0.07	Q	.	.	.	.
22.08	0.3364	0.07	Q	.	.	.	.
22.17	0.3369	0.07	Q	.	.	.	.
22.26	0.3375	0.07	Q	.	.	.	.
22.36	0.3380	0.07	Q	.	.	.	.
22.45	0.3385	0.07	Q	.	.	.	.
22.55	0.3390	0.07	Q	.	.	.	.
22.64	0.3395	0.07	Q	.	.	.	.
22.73	0.3401	0.07	Q	.	.	.	.
22.83	0.3406	0.06	Q	.	.	.	.
22.92	0.3411	0.06	Q	.	.	.	.
23.01	0.3415	0.06	Q	.	.	.	.
23.11	0.3420	0.06	Q	.	.	.	.
23.20	0.3425	0.06	Q	.	.	.	.
23.29	0.3430	0.06	Q	.	.	.	.
23.39	0.3435	0.06	Q	.	.	.	.
23.48	0.3440	0.06	Q	.	.	.	.
23.57	0.3444	0.06	Q	.	.	.	.
23.67	0.3449	0.06	Q	.	.	.	.
23.76	0.3454	0.06	Q	.	.	.	.
23.85	0.3458	0.06	Q	.	.	.	.
23.95	0.3463	0.06	Q	.	.	.	.
24.04	0.3467	0.06	Q	.	.	.	.
24.13	0.3470	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1441.8
10%	50.5
20%	16.8
30%	11.2
40%	5.6
50%	5.6

60%	5.6
70%	5.6
80%	5.6
90%	5.6

```
_______________________________________________________________________________
*******************************************************************************
                      SMALL AREA UNIT HYDROGRAPH MODEL
===============================================================================
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                              Analysis prepared by:
                               Toal Engineering, Inc.
                                139 Avenida Navarro
                                   949-492-8586




*******************************************************************************
-------------------------------------------------------------------------------

 Problem Descriptions: Post-Project Area A


-------------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.07
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.090
    LOW LOSS FRACTION = 0.278
    TIME OF CONCENTRATION(MIN.) =  5.57
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

-------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.36
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.15

*******************************************************************************
  TIME     VOLUME        Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)       (CFS)
-------------------------------------------------------------------------------
  0.03      0.0000      0.00  Q         .         .         .         .
  0.13      0.0002      0.06  Q         .         .         .         .
  0.22      0.0007      0.06  Q         .         .         .         .
```

0.31	0.0012	0.06	Q	.	.	.	.
0.40	0.0016	0.06	Q	.	.	.	.
0.50	0.0021	0.06	Q	.	.	.	.
0.59	0.0026	0.06	Q	.	.	.	.
0.68	0.0031	0.06	Q	.	.	.	.
0.78	0.0035	0.06	Q	.	.	.	.
0.87	0.0040	0.06	Q	.	.	.	.
0.96	0.0045	0.06	Q	.	.	.	.
1.05	0.0050	0.06	Q	.	.	.	.
1.15	0.0055	0.06	Q	.	.	.	.
1.24	0.0060	0.06	Q	.	.	.	.
1.33	0.0065	0.06	Q	.	.	.	.
1.43	0.0069	0.06	Q	.	.	.	.
1.52	0.0074	0.06	Q	.	.	.	.
1.61	0.0079	0.06	Q	.	.	.	.
1.70	0.0084	0.06	Q	.	.	.	.
1.80	0.0089	0.07	Q	.	.	.	.
1.89	0.0094	0.07	Q	.	.	.	.
1.98	0.0099	0.07	Q	.	.	.	.
2.07	0.0104	0.07	Q	.	.	.	.
2.17	0.0109	0.07	Q	.	.	.	.
2.26	0.0115	0.07	Q	.	.	.	.
2.35	0.0120	0.07	Q	.	.	.	.
2.45	0.0125	0.07	Q	.	.	.	.
2.54	0.0130	0.07	Q	.	.	.	.
2.63	0.0135	0.07	Q	.	.	.	.
2.72	0.0140	0.07	Q	.	.	.	.
2.82	0.0146	0.07	Q	.	.	.	.
2.91	0.0151	0.07	Q	.	.	.	.
3.00	0.0156	0.07	Q	.	.	.	.
3.10	0.0161	0.07	Q	.	.	.	.
3.19	0.0167	0.07	Q	.	.	.	.
3.28	0.0172	0.07	Q	.	.	.	.
3.37	0.0177	0.07	Q	.	.	.	.
3.47	0.0183	0.07	Q	.	.	.	.
3.56	0.0188	0.07	Q	.	.	.	.
3.65	0.0194	0.07	Q	.	.	.	.
3.75	0.0199	0.07	Q	.	.	.	.
3.84	0.0205	0.07	Q	.	.	.	.
3.93	0.0210	0.07	Q	.	.	.	.
4.02	0.0216	0.07	Q	.	.	.	.
4.12	0.0221	0.07	Q	.	.	.	.
4.21	0.0227	0.07	Q	.	.	.	.
4.30	0.0233	0.07	Q	.	.	.	.
4.40	0.0238	0.07	Q	.	.	.	.
4.49	0.0244	0.07	Q	.	.	.	.
4.58	0.0250	0.07	Q	.	.	.	.
4.67	0.0255	0.08	Q	.	.	.	.
4.77	0.0261	0.08	Q	.	.	.	.
4.86	0.0267	0.08	Q	.	.	.	.
4.95	0.0273	0.08	Q	.	.	.	.
5.05	0.0279	0.08	Q	.	.	.	.
5.14	0.0285	0.08	Q	.	.	.	.
5.23	0.0291	0.08	Q	.	.	.	.

5.32	0.0297	0.08	Q	.	.	.	.
5.42	0.0303	0.08	Q	.	.	.	.
5.51	0.0309	0.08	Q	.	.	.	.
5.60	0.0315	0.08	Q	.	.	.	.
5.70	0.0321	0.08	Q	.	.	.	.
5.79	0.0327	0.08	Q	.	.	.	.
5.88	0.0333	0.08	Q	.	.	.	.
5.97	0.0339	0.08	Q	.	.	.	.
6.07	0.0345	0.08	Q	.	.	.	.
6.16	0.0352	0.08	Q	.	.	.	.
6.25	0.0358	0.08	Q	.	.	.	.
6.35	0.0364	0.08	Q	.	.	.	.
6.44	0.0371	0.08	Q	.	.	.	.
6.53	0.0377	0.08	Q	.	.	.	.
6.62	0.0384	0.08	Q	.	.	.	.
6.72	0.0390	0.08	Q	.	.	.	.
6.81	0.0397	0.09	Q	.	.	.	.
6.90	0.0403	0.09	Q	.	.	.	.
7.00	0.0410	0.09	Q	.	.	.	.
7.09	0.0417	0.09	Q	.	.	.	.
7.18	0.0423	0.09	Q	.	.	.	.
7.27	0.0430	0.09	Q	.	.	.	.
7.37	0.0437	0.09	Q	.	.	.	.
7.46	0.0444	0.09	Q	.	.	.	.
7.55	0.0451	0.09	Q	.	.	.	.
7.64	0.0458	0.09	Q	.	.	.	.
7.74	0.0465	0.09	Q	.	.	.	.
7.83	0.0472	0.09	Q	.	.	.	.
7.92	0.0479	0.09	Q	.	.	.	.
8.02	0.0486	0.09	Q	.	.	.	.
8.11	0.0493	0.09	Q	.	.	.	.
8.20	0.0500	0.09	Q	.	.	.	.
8.29	0.0508	0.10	Q	.	.	.	.
8.39	0.0515	0.10	Q	.	.	.	.
8.48	0.0522	0.10	Q	.	.	.	.
8.57	0.0530	0.10	Q	.	.	.	.
8.67	0.0537	0.10	Q	.	.	.	.
8.76	0.0545	0.10	Q	.	.	.	.
8.85	0.0552	0.10	Q	.	.	.	.
8.94	0.0560	0.10	Q	.	.	.	.
9.04	0.0568	0.10	Q	.	.	.	.
9.13	0.0576	0.10	Q	.	.	.	.
9.22	0.0584	0.10	Q	.	.	.	.
9.32	0.0592	0.10	Q	.	.	.	.
9.41	0.0600	0.11	Q	.	.	.	.
9.50	0.0608	0.11	Q	.	.	.	.
9.59	0.0616	0.11	Q	.	.	.	.
9.69	0.0624	0.11	Q	.	.	.	.
9.78	0.0633	0.11	Q	.	.	.	.
9.87	0.0641	0.11	Q	.	.	.	.
9.97	0.0649	0.11	Q	.	.	.	.
10.06	0.0658	0.11	Q	.	.	.	.
10.15	0.0667	0.11	Q	.	.	.	.
10.24	0.0675	0.11	Q	.	.	.	.

10.34	0.0684	0.12	Q	.	.	.	.
10.43	0.0693	0.12	Q	.	.	.	.
10.52	0.0702	0.12	Q	.	.	.	.
10.62	0.0711	0.12	Q	.	.	.	.
10.71	0.0720	0.12	Q	.	.	.	.
10.80	0.0730	0.12	Q	.	.	.	.
10.89	0.0739	0.12	Q	.	.	.	.
10.99	0.0749	0.12	Q	.	.	.	.
11.08	0.0758	0.13	Q	.	.	.	.
11.17	0.0768	0.13	Q	.	.	.	.
11.27	0.0778	0.13	Q	.	.	.	.
11.36	0.0788	0.13	Q	.	.	.	.
11.45	0.0798	0.13	Q	.	.	.	.
11.54	0.0808	0.13	Q	.	.	.	.
11.64	0.0818	0.14	Q	.	.	.	.
11.73	0.0829	0.14	Q	.	.	.	.
11.82	0.0840	0.14	Q	.	.	.	.
11.92	0.0850	0.14	Q	.	.	.	.
12.01	0.0861	0.14	Q	.	.	.	.
12.10	0.0873	0.17	Q	.	.	.	.
12.19	0.0887	0.19	Q	.	.	.	.
12.29	0.0901	0.19	Q	.	.	.	.
12.38	0.0916	0.19	Q	.	.	.	.
12.47	0.0930	0.19	Q	.	.	.	.
12.57	0.0945	0.20	Q	.	.	.	.
12.66	0.0960	0.20	Q	.	.	.	.
12.75	0.0975	0.20	Q	.	.	.	.
12.84	0.0991	0.20	Q	.	.	.	.
12.94	0.1007	0.21	Q	.	.	.	.
13.03	0.1023	0.21	Q	.	.	.	.
13.12	0.1039	0.21	Q	.	.	.	.
13.22	0.1056	0.22	Q	.	.	.	.
13.31	0.1072	0.22	Q	.	.	.	.
13.40	0.1090	0.22	Q	.	.	.	.
13.49	0.1107	0.23	Q	.	.	.	.
13.59	0.1125	0.24	Q	.	.	.	.
13.68	0.1144	0.25	Q	.	.	.	.
13.77	0.1163	0.25	.Q	.	.	.	.
13.86	0.1182	0.26	.Q	.	.	.	.
13.96	0.1202	0.27	.Q	.	.	.	.
14.05	0.1223	0.28	.Q	.	.	.	.
14.14	0.1245	0.28	.Q	.	.	.	.
14.24	0.1267	0.30	.Q	.	.	.	.
14.33	0.1290	0.31	.Q	.	.	.	.
14.42	0.1314	0.32	.Q	.	.	.	.
14.51	0.1339	0.33	.Q	.	.	.	.
14.61	0.1365	0.35	.Q	.	.	.	.
14.70	0.1392	0.36	.Q	.	.	.	.
14.79	0.1421	0.38	.Q	.	.	.	.
14.89	0.1450	0.39	.Q	.	.	.	.
14.98	0.1481	0.42	.Q	.	.	.	.
15.07	0.1514	0.44	.Q	.	.	.	.
15.16	0.1549	0.47	.Q	.	.	.	.
15.26	0.1586	0.50	.Q	.	.	.	.

15.35	0.1626	0.55	. Q . . . .
15.44	0.1667	0.52	. Q . . . .
15.54	0.1709	0.57	. Q . . . .
15.63	0.1755	0.63	. Q . . . .
15.72	0.1809	0.77	. Q . . . .
15.81	0.1872	0.88	. Q . . . .
15.91	0.1955	1.28	. Q . . . .
16.00	0.2072	1.78	. Q . . . .
16.09	**0.2354**	**5.55**	**. . . Q . .**
16.19	0.2606	1.03	. Q . . . .
16.28	0.2672	0.69	. Q . . . .
16.37	0.2719	0.53	. Q . . . .
16.46	0.2760	0.52	. Q . . . .
16.56	0.2797	0.45	.Q . . . .
16.65	0.2830	0.41	.Q . . . .
16.74	0.2860	0.37	.Q . . . .
16.84	0.2887	0.34	.Q . . . .
16.93	0.2912	0.31	.Q . . . .
17.02	0.2935	0.29	.Q . . . .
17.11	0.2957	0.27	.Q . . . .
17.21	0.2977	0.26	.Q . . . .
17.30	0.2996	0.24	Q . . . .
17.39	0.3014	0.23	Q . . . .
17.49	0.3031	0.22	Q . . . .
17.58	0.3047	0.21	Q . . . .
17.67	0.3064	0.21	Q . . . .
17.76	0.3079	0.20	Q . . . .
17.86	0.3094	0.19	Q . . . .
17.95	0.3109	0.19	Q . . . .
18.04	0.3123	0.18	Q . . . .
18.14	0.3136	0.14	Q . . . .
18.23	0.3146	0.14	Q . . . .
18.32	0.3157	0.13	Q . . . .
18.41	0.3167	0.13	Q . . . .
18.51	0.3177	0.13	Q . . . .
18.60	0.3187	0.13	Q . . . .
18.69	0.3196	0.12	Q . . . .
18.78	0.3206	0.12	Q . . . .
18.88	0.3215	0.12	Q . . . .
18.97	0.3224	0.11	Q . . . .
19.06	0.3232	0.11	Q . . . .
19.16	0.3241	0.11	Q . . . .
19.25	0.3249	0.11	Q . . . .
19.34	0.3258	0.11	Q . . . .
19.43	0.3266	0.10	Q . . . .
19.53	0.3274	0.10	Q . . . .
19.62	0.3281	0.10	Q . . . .
19.71	0.3289	0.10	Q . . . .
19.81	0.3297	0.10	Q . . . .
19.90	0.3304	0.10	Q . . . .
19.99	0.3312	0.10	Q . . . .
20.08	0.3319	0.09	Q . . . .
20.18	0.3326	0.09	Q . . . .
20.27	0.3333	0.09	Q . . . .

20.36	0.3340	0.09	Q	.	.	.	.
20.46	0.3347	0.09	Q	.	.	.	.
20.55	0.3354	0.09	Q	.	.	.	.
20.64	0.3360	0.09	Q	.	.	.	.
20.73	0.3367	0.09	Q	.	.	.	.
20.83	0.3373	0.08	Q	.	.	.	.
20.92	0.3380	0.08	Q	.	.	.	.
21.01	0.3386	0.08	Q	.	.	.	.
21.11	0.3392	0.08	Q	.	.	.	.
21.20	0.3399	0.08	Q	.	.	.	.
21.29	0.3405	0.08	Q	.	.	.	.
21.38	0.3411	0.08	Q	.	.	.	.
21.48	0.3417	0.08	Q	.	.	.	.
21.57	0.3423	0.08	Q	.	.	.	.
21.66	0.3429	0.08	Q	.	.	.	.
21.76	0.3434	0.08	Q	.	.	.	.
21.85	0.3440	0.07	Q	.	.	.	.
21.94	0.3446	0.07	Q	.	.	.	.
22.03	0.3451	0.07	Q	.	.	.	.
22.13	0.3457	0.07	Q	.	.	.	.
22.22	0.3462	0.07	Q	.	.	.	.
22.31	0.3468	0.07	Q	.	.	.	.
22.41	0.3473	0.07	Q	.	.	.	.
22.50	0.3479	0.07	Q	.	.	.	.
22.59	0.3484	0.07	Q	.	.	.	.
22.68	0.3489	0.07	Q	.	.	.	.
22.78	0.3495	0.07	Q	.	.	.	.
22.87	0.3500	0.07	Q	.	.	.	.
22.96	0.3505	0.07	Q	.	.	.	.
23.06	0.3510	0.07	Q	.	.	.	.
23.15	0.3515	0.07	Q	.	.	.	.
23.24	0.3520	0.07	Q	.	.	.	.
23.33	0.3525	0.06	Q	.	.	.	.
23.43	0.3530	0.06	Q	.	.	.	.
23.52	0.3535	0.06	Q	.	.	.	.
23.61	0.3540	0.06	Q	.	.	.	.
23.71	0.3545	0.06	Q	.	.	.	.
23.80	0.3549	0.06	Q	.	.	.	.
23.89	0.3554	0.06	Q	.	.	.	.
23.98	0.3559	0.06	Q	.	.	.	.
24.08	0.3563	0.06	Q	.	.	.	.
24.17	0.3566	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1442.6
10%	50.1

20%	16.7
30%	11.1
40%	5.6
50%	5.6
60%	5.6
70%	5.6
80%	5.6
90%	5.6

```
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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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           Ver. 18.2  Release Date: 05/08/2012  License ID 1448

                          Analysis prepared by:
                         Toal Engineering, Inc.
                           139 Avenida Navarro
                            San Clemente, CA
                              949-492-8586
```

Post-Project Area A

```
-----------------------------------------------------------------------------
  FILE NAME: 18156E2.DAT
  TIME/DATE OF STUDY: 09:17 03/08/2021
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    406.50  DOWNSTREAM(FEET) =    342.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.485
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.868
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.66      0.20     0.500    75    5.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.43
 TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   342.00  DOWNSTREAM(FEET) =   293.00
 FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.02
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.43
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.57
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     445.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.57
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.815
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.41      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.41      SUBAREA RUNOFF(CFS) =    2.12
 EFFECTIVE AREA(ACRES) =      1.07   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       5.51
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      5.57
 EFFECTIVE AREA(ACRES) =      1.07  AREA-AVERAGED Fm(INCH/HR)=  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.443
 PEAK FLOW RATE(CFS)   =       5.51
============================================================================
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END OF RATIONAL METHOD ANALYSIS

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                        SMALL AREA UNIT HYDROGRAPH MODEL

=============================================================================
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                              Analysis prepared by:
                             Toal Engineering, Inc.
                              139 Avenida Navarro
                                  949-492-8586




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-----------------------------------------------------------------------------

  Problem Descriptions: Pre & Post Project Area B



-----------------------------------------------------------------------------


     RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
     TOTAL CATCHMENT AREA(ACRES) =    0.49
     SOIL-LOSS RATE, Fm,(INCH/HR) =  0.100
     LOW LOSS FRACTION = 0.306
     TIME OF CONCENTRATION(MIN.) =  5.00
     SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
     ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
     RETURN FREQUENCY(YEARS) = 100
        5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
       30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
        1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
        3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
        6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
       24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63


-----------------------------------------------------------------------------

     TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.16
     TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.07
```

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.08	0.0001	0.03	Q	.	.	.	.
0.17	0.0003	0.03	Q	.	.	.	.
0.25	0.0005	0.03	Q	.	.	.	.
0.33	0.0006	0.03	Q	.	.	.	.
0.42	0.0008	0.03	Q	.	.	.	.
0.50	0.0010	0.03	Q	.	.	.	.
0.58	0.0012	0.03	Q	.	.	.	.
0.67	0.0014	0.03	Q	.	.	.	.
0.75	0.0016	0.03	Q	.	.	.	.
0.83	0.0018	0.03	Q	.	.	.	.
0.92	0.0020	0.03	Q	.	.	.	.
1.00	0.0022	0.03	Q	.	.	.	.
1.08	0.0023	0.03	Q	.	.	.	.
1.17	0.0025	0.03	Q	.	.	.	.
1.25	0.0027	0.03	Q	.	.	.	.
1.33	0.0029	0.03	Q	.	.	.	.
1.42	0.0031	0.03	Q	.	.	.	.
1.50	0.0033	0.03	Q	.	.	.	.
1.58	0.0035	0.03	Q	.	.	.	.
1.67	0.0037	0.03	Q	.	.	.	.
1.75	0.0039	0.03	Q	.	.	.	.
1.83	0.0041	0.03	Q	.	.	.	.
1.92	0.0043	0.03	Q	.	.	.	.
2.00	0.0045	0.03	Q	.	.	.	.
2.08	0.0047	0.03	Q	.	.	.	.
2.17	0.0049	0.03	Q	.	.	.	.
2.25	0.0051	0.03	Q	.	.	.	.
2.33	0.0053	0.03	Q	.	.	.	.
2.42	0.0055	0.03	Q	.	.	.	.
2.50	0.0057	0.03	Q	.	.	.	.
2.58	0.0059	0.03	Q	.	.	.	.
2.67	0.0061	0.03	Q	.	.	.	.
2.75	0.0063	0.03	Q	.	.	.	.
2.83	0.0065	0.03	Q	.	.	.	.
2.92	0.0067	0.03	Q	.	.	.	.
3.00	0.0070	0.03	Q	.	.	.	.
3.08	0.0072	0.03	Q	.	.	.	.
3.17	0.0074	0.03	Q	.	.	.	.
3.25	0.0076	0.03	Q	.	.	.	.
3.33	0.0078	0.03	Q	.	.	.	.
3.42	0.0080	0.03	Q	.	.	.	.
3.50	0.0082	0.03	Q	.	.	.	.
3.58	0.0084	0.03	Q	.	.	.	.
3.67	0.0086	0.03	Q	.	.	.	.
3.75	0.0089	0.03	Q	.	.	.	.
3.83	0.0091	0.03	Q	.	.	.	.

3.92	0.0093	0.03	Q	.	.	.	.
4.00	0.0095	0.03	Q	.	.	.	.
4.08	0.0097	0.03	Q	.	.	.	.
4.17	0.0100	0.03	Q	.	.	.	.
4.25	0.0102	0.03	Q	.	.	.	.
4.33	0.0104	0.03	Q	.	.	.	.
4.42	0.0106	0.03	Q	.	.	.	.
4.50	0.0109	0.03	Q	.	.	.	.
4.58	0.0111	0.03	Q	.	.	.	.
4.67	0.0113	0.03	Q	.	.	.	.
4.75	0.0115	0.03	Q	.	.	.	.
4.83	0.0118	0.03	Q	.	.	.	.
4.92	0.0120	0.03	Q	.	.	.	.
5.00	0.0122	0.03	Q	.	.	.	.
5.08	0.0125	0.03	Q	.	.	.	.
5.17	0.0127	0.03	Q	.	.	.	.
5.25	0.0129	0.03	Q	.	.	.	.
5.33	0.0132	0.03	Q	.	.	.	.
5.42	0.0134	0.03	Q	.	.	.	.
5.50	0.0136	0.03	Q	.	.	.	.
5.58	0.0139	0.03	Q	.	.	.	.
5.67	0.0141	0.03	Q	.	.	.	.
5.75	0.0144	0.04	Q	.	.	.	.
5.83	0.0146	0.04	Q	.	.	.	.
5.92	0.0149	0.04	Q	.	.	.	.
6.00	0.0151	0.04	Q	.	.	.	.
6.08	0.0153	0.04	Q	.	.	.	.
6.17	0.0156	0.04	Q	.	.	.	.
6.25	0.0158	0.04	Q	.	.	.	.
6.33	0.0161	0.04	Q	.	.	.	.
6.42	0.0163	0.04	Q	.	.	.	.
6.50	0.0166	0.04	Q	.	.	.	.
6.58	0.0169	0.04	Q	.	.	.	.
6.67	0.0171	0.04	Q	.	.	.	.
6.75	0.0174	0.04	Q	.	.	.	.
6.83	0.0176	0.04	Q	.	.	.	.
6.92	0.0179	0.04	Q	.	.	.	.
7.00	0.0181	0.04	Q	.	.	.	.
7.08	0.0184	0.04	Q	.	.	.	.
7.17	0.0187	0.04	Q	.	.	.	.
7.25	0.0189	0.04	Q	.	.	.	.
7.33	0.0192	0.04	Q	.	.	.	.
7.42	0.0195	0.04	Q	.	.	.	.
7.50	0.0198	0.04	Q	.	.	.	.
7.58	0.0200	0.04	Q	.	.	.	.
7.67	0.0203	0.04	Q	.	.	.	.
7.75	0.0206	0.04	Q	.	.	.	.
7.83	0.0209	0.04	Q	.	.	.	.
7.92	0.0211	0.04	Q	.	.	.	.
8.00	0.0214	0.04	Q	.	.	.	.
8.08	0.0217	0.04	Q	.	.	.	.
8.17	0.0220	0.04	Q	.	.	.	.

8.25	0.0223	0.04	Q	.	.	.	.
8.33	0.0226	0.04	Q	.	.	.	.
8.42	0.0229	0.04	Q	.	.	.	.
8.50	0.0232	0.04	Q	.	.	.	.
8.58	0.0234	0.04	Q	.	.	.	.
8.67	0.0237	0.04	Q	.	.	.	.
8.75	0.0240	0.04	Q	.	.	.	.
8.83	0.0243	0.04	Q	.	.	.	.
8.92	0.0247	0.04	Q	.	.	.	.
9.00	0.0250	0.04	Q	.	.	.	.
9.08	0.0253	0.05	Q	.	.	.	.
9.17	0.0256	0.05	Q	.	.	.	.
9.25	0.0259	0.05	Q	.	.	.	.
9.33	0.0262	0.05	Q	.	.	.	.
9.42	0.0265	0.05	Q	.	.	.	.
9.50	0.0268	0.05	Q	.	.	.	.
9.58	0.0272	0.05	Q	.	.	.	.
9.67	0.0275	0.05	Q	.	.	.	.
9.75	0.0278	0.05	Q	.	.	.	.
9.83	0.0282	0.05	Q	.	.	.	.
9.92	0.0285	0.05	Q	.	.	.	.
10.00	0.0288	0.05	Q	.	.	.	.
10.08	0.0292	0.05	Q	.	.	.	.
10.17	0.0295	0.05	Q	.	.	.	.
10.25	0.0299	0.05	Q	.	.	.	.
10.33	0.0302	0.05	Q	.	.	.	.
10.42	0.0306	0.05	Q	.	.	.	.
10.50	0.0309	0.05	Q	.	.	.	.
10.58	0.0313	0.05	Q	.	.	.	.
10.67	0.0316	0.05	Q	.	.	.	.
10.75	0.0320	0.05	Q	.	.	.	.
10.83	0.0324	0.05	Q	.	.	.	.
10.92	0.0327	0.05	Q	.	.	.	.
11.00	0.0331	0.05	Q	.	.	.	.
11.08	0.0335	0.06	Q	.	.	.	.
11.17	0.0339	0.06	Q	.	.	.	.
11.25	0.0343	0.06	Q	.	.	.	.
11.33	0.0347	0.06	Q	.	.	.	.
11.42	0.0351	0.06	Q	.	.	.	.
11.50	0.0355	0.06	Q	.	.	.	.
11.58	0.0359	0.06	Q	.	.	.	.
11.67	0.0363	0.06	Q	.	.	.	.
11.75	0.0367	0.06	Q	.	.	.	.
11.83	0.0371	0.06	Q	.	.	.	.
11.92	0.0375	0.06	Q	.	.	.	.
12.00	0.0380	0.06	Q	.	.	.	.
12.08	0.0385	0.08	Q	.	.	.	.
12.17	0.0390	0.08	Q	.	.	.	.
12.25	0.0396	0.08	Q	.	.	.	.
12.33	0.0402	0.08	Q	.	.	.	.
12.42	0.0407	0.08	Q	.	.	.	.
12.50	0.0413	0.08	Q	.	.	.	.

12.58	0.0419	0.09	Q	.	.	.	.
12.67	0.0425	0.09	Q	.	.	.	.
12.75	0.0431	0.09	Q	.	.	.	.
12.83	0.0437	0.09	Q	.	.	.	.
12.92	0.0443	0.09	Q	.	.	.	.
13.00	0.0450	0.09	Q	.	.	.	.
13.08	0.0456	0.09	Q	.	.	.	.
13.17	0.0463	0.09	Q	.	.	.	.
13.25	0.0469	0.10	Q	.	.	.	.
13.33	0.0476	0.10	Q	.	.	.	.
13.42	0.0483	0.10	Q	.	.	.	.
13.50	0.0490	0.10	Q	.	.	.	.
13.58	0.0497	0.11	Q	.	.	.	.
13.67	0.0504	0.11	Q	.	.	.	.
13.75	0.0512	0.11	Q	.	.	.	.
13.83	0.0519	0.11	Q	.	.	.	.
13.92	0.0527	0.12	Q	.	.	.	.
14.00	0.0535	0.12	Q	.	.	.	.
14.08	0.0544	0.13	Q	.	.	.	.
14.17	0.0552	0.13	Q	.	.	.	.
14.25	0.0561	0.13	Q	.	.	.	.
14.33	0.0571	0.14	Q	.	.	.	.
14.42	0.0580	0.14	Q	.	.	.	.
14.50	0.0590	0.15	Q	.	.	.	.
14.58	0.0601	0.15	Q	.	.	.	.
14.67	0.0611	0.16	Q	.	.	.	.
14.75	0.0622	0.17	Q	.	.	.	.
14.83	0.0634	0.17	Q	.	.	.	.
14.92	0.0646	0.18	Q	.	.	.	.
15.00	0.0659	0.19	Q	.	.	.	.
15.08	0.0672	0.20	Q	.	.	.	.
15.17	0.0687	0.21	Q	.	.	.	.
15.25	0.0702	0.23	Q	.	.	.	.
15.33	0.0718	0.24	Q	.	.	.	.
15.42	0.0734	0.23	Q	.	.	.	.
15.50	0.0750	0.24	Q	.	.	.	.
15.58	0.0768	0.28	.Q	.	.	.	.
15.67	0.0788	0.30	.Q	.	.	.	.
15.75	0.0811	0.37	.Q	.	.	.	.
15.83	0.0839	0.43	.Q	.	.	.	.
15.92	0.0875	0.62	. Q	.	.	.	.
16.00	0.0926	0.87	. Q	.	.	.	.
16.08	**0.1049**	**2.71**	.	**Q**	.	.	.
16.17	0.1160	0.50	. Q	.	.	.	.
16.25	0.1189	0.33	.Q	.	.	.	.
16.33	0.1209	0.26	.Q	.	.	.	.
16.42	0.1227	0.25	.Q	.	.	.	.
16.50	0.1243	0.22	Q	.	.	.	.
16.58	0.1257	0.19	Q	.	.	.	.
16.67	0.1270	0.18	Q	.	.	.	.
16.75	0.1281	0.16	Q	.	.	.	.
16.83	0.1292	0.15	Q	.	.	.	.

16.92	0.1302	0.14	Q	.	.	.	.
17.00	0.1311	0.13	Q	.	.	.	.
17.08	0.1320	0.12	Q	.	.	.	.
17.17	0.1328	0.11	Q	.	.	.	.
17.25	0.1336	0.11	Q	.	.	.	.
17.33	0.1343	0.10	Q	.	.	.	.
17.42	0.1350	0.10	Q	.	.	.	.
17.50	0.1357	0.10	Q	.	.	.	.
17.58	0.1363	0.09	Q	.	.	.	.
17.67	0.1370	0.09	Q	.	.	.	.
17.75	0.1376	0.09	Q	.	.	.	.
17.83	0.1382	0.09	Q	.	.	.	.
17.92	0.1388	0.08	Q	.	.	.	.
18.00	0.1393	0.08	Q	.	.	.	.
18.08	0.1398	0.06	Q	.	.	.	.
18.17	0.1403	0.06	Q	.	.	.	.
18.25	0.1407	0.06	Q	.	.	.	.
18.33	0.1411	0.06	Q	.	.	.	.
18.42	0.1415	0.06	Q	.	.	.	.
18.50	0.1419	0.06	Q	.	.	.	.
18.58	0.1423	0.06	Q	.	.	.	.
18.67	0.1426	0.05	Q	.	.	.	.
18.75	0.1430	0.05	Q	.	.	.	.
18.83	0.1434	0.05	Q	.	.	.	.
18.92	0.1437	0.05	Q	.	.	.	.
19.00	0.1441	0.05	Q	.	.	.	.
19.08	0.1444	0.05	Q	.	.	.	.
19.17	0.1448	0.05	Q	.	.	.	.
19.25	0.1451	0.05	Q	.	.	.	.
19.33	0.1454	0.05	Q	.	.	.	.
19.42	0.1457	0.05	Q	.	.	.	.
19.50	0.1461	0.05	Q	.	.	.	.
19.58	0.1464	0.04	Q	.	.	.	.
19.67	0.1467	0.04	Q	.	.	.	.
19.75	0.1470	0.04	Q	.	.	.	.
19.83	0.1473	0.04	Q	.	.	.	.
19.92	0.1476	0.04	Q	.	.	.	.
20.00	0.1479	0.04	Q	.	.	.	.
20.08	0.1481	0.04	Q	.	.	.	.
20.17	0.1484	0.04	Q	.	.	.	.
20.25	0.1487	0.04	Q	.	.	.	.
20.33	0.1490	0.04	Q	.	.	.	.
20.42	0.1492	0.04	Q	.	.	.	.
20.50	0.1495	0.04	Q	.	.	.	.
20.58	0.1498	0.04	Q	.	.	.	.
20.67	0.1500	0.04	Q	.	.	.	.
20.75	0.1503	0.04	Q	.	.	.	.
20.83	0.1506	0.04	Q	.	.	.	.
20.92	0.1508	0.04	Q	.	.	.	.
21.00	0.1511	0.04	Q	.	.	.	.
21.08	0.1513	0.04	Q	.	.	.	.
21.17	0.1516	0.04	Q	.	.	.	.

21.25	0.1518	0.04	Q	.	.	.	.
21.33	0.1520	0.03	Q	.	.	.	.
21.42	0.1523	0.03	Q	.	.	.	.
21.50	0.1525	0.03	Q	.	.	.	.
21.58	0.1527	0.03	Q	.	.	.	.
21.67	0.1530	0.03	Q	.	.	.	.
21.75	0.1532	0.03	Q	.	.	.	.
21.83	0.1534	0.03	Q	.	.	.	.
21.92	0.1537	0.03	Q	.	.	.	.
22.00	0.1539	0.03	Q	.	.	.	.
22.08	0.1541	0.03	Q	.	.	.	.
22.17	0.1543	0.03	Q	.	.	.	.
22.25	0.1545	0.03	Q	.	.	.	.
22.33	0.1548	0.03	Q	.	.	.	.
22.42	0.1550	0.03	Q	.	.	.	.
22.50	0.1552	0.03	Q	.	.	.	.
22.58	0.1554	0.03	Q	.	.	.	.
22.67	0.1556	0.03	Q	.	.	.	.
22.75	0.1558	0.03	Q	.	.	.	.
22.83	0.1560	0.03	Q	.	.	.	.
22.92	0.1562	0.03	Q	.	.	.	.
23.00	0.1564	0.03	Q	.	.	.	.
23.08	0.1566	0.03	Q	.	.	.	.
23.17	0.1568	0.03	Q	.	.	.	.
23.25	0.1570	0.03	Q	.	.	.	.
23.33	0.1572	0.03	Q	.	.	.	.
23.42	0.1574	0.03	Q	.	.	.	.
23.50	0.1576	0.03	Q	.	.	.	.
23.58	0.1578	0.03	Q	.	.	.	.
23.67	0.1580	0.03	Q	.	.	.	.
23.75	0.1582	0.03	Q	.	.	.	.
23.83	0.1584	0.03	Q	.	.	.	.
23.92	0.1585	0.03	Q	.	.	.	.
24.00	0.1587	0.03	Q	.	.	.	.
24.08	0.1588	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1440.0
10%	45.0
20%	15.0
30%	10.0
40%	5.0
50%	5.0

60%	5.0
70%	5.0
80%	5.0
90%	5.0

Area B Curb Inlet Calculations

Hydraulic Element Results:

```
*******************************************************************************
 >>>>SUMP TYPE BASIN INPUT INFORMATION<<<<
 -------------------------------------------------------------------------------


     Curb Inlet Capacities are approximated based on the Bureau of
     Public Roads nomograph plots for flowby basins and sump basins.


     BASIN INFLOW(CFS) =    2.71
     BASIN OPENING(FEET) =  0.66
     DEPTH OF WATER(FEET) =  0.21

     >>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) =       9.12

 ===============================================================================
```

Area B Street Depth Calculations

Hydraulic Element Results:

```
**************************************************************************
 >>>>STREETFLOW MODEL INPUT INFORMATION<<<<
--------------------------------------------------------------------------
    CONSTANT STREET GRADE(FEET/FEET) = 0.050000
    CONSTANT STREET FLOW(CFS) =    2.71
    AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.014000
    CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) =   25.00
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   23.00
    INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000
    OUTSIDE  STREET CROSSFALL(DECIMAL) = 0.020000
    CONSTANT SYMMETRICAL CURB HEIGHT(FEET) =   0.50
    CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) =   2.00
    CONSTANT SYMMETRICAL GUTTER-LIP(FEET) =  0.03125
    CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) =  0.12500
    FLOW ASSUMED TO FILL STREET EVENLY ON BOTH SIDES
==========================================================================
    STREET FLOW MODEL RESULTS:
--------------------------------------------------------------------------
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
    PRODUCT OF DEPTH&VELOCITY =    0.80
==========================================================================
```

Area B Pipe Flow Calculations
Pipe #1

Hydraulic Element Results:

```
**************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
 --------------------------------------------------------------------------
     PIPE DIAMETER(FEET) =   1.000
     PIPE SLOPE(FEET/FEET) =  0.5000
     PIPEFLOW(CFS) =         2.71
     MANNINGS FRICTION FACTOR = 0.011000
 ==========================================================================
     CRITICAL-DEPTH FLOW INFORMATION:
 --------------------------------------------------------------------------
     CRITICAL DEPTH(FEET) =      0.71
     CRITICAL FLOW AREA(SQUARE FEET) =     0.592
     CRITICAL FLOW TOP-WIDTH(FEET) =   0.911
     CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           35.55
     CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.575
     CRITICAL FLOW VELOCITY HEAD(FEET) =            0.32
     CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.65
     CRITICAL FLOW SPECIFIC ENERGY(FEET) =            1.03
 ==========================================================================
     NORMAL-DEPTH FLOW INFORMATION:
 --------------------------------------------------------------------------
     NORMAL DEPTH(FEET) =      0.20
     FLOW AREA(SQUARE FEET) =      0.11
     FLOW TOP-WIDTH(FEET) =     0.806
     FLOW PRESSURE + MOMENTUM(POUNDS) =          124.46
     FLOW VELOCITY(FEET/SEC.) =          23.582
```

FLOW VELOCITY HEAD(FEET) = 8.636

HYDRAULIC DEPTH(FEET) = 0.14

FROUDE NUMBER = 11.004

SPECIFIC ENERGY(FEET) = 8.84

==========

```
**************************************************************************
 >>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
     Area A Pipe Flow Calculations
      PIPE #3
 --------------------------------------------------------------------------
     PIPE DIAMETER(FEET) =   1.500
     PIPE SLOPE(FEET/FEET) =  0.0500
     PIPEFLOW(CFS) =         5.55
     MANNINGS FRICTION FACTOR = 0.012000
 ==========================================================================
     CRITICAL-DEPTH FLOW INFORMATION:
 --------------------------------------------------------------------------
     CRITICAL DEPTH(FEET) =      0.91
     CRITICAL FLOW AREA(SQUARE FEET) =     1.119
     CRITICAL FLOW TOP-WIDTH(FEET) =   1.466
     CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =           80.76
     CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.958
     CRITICAL FLOW VELOCITY HEAD(FEET) =            0.38
     CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.76
     CRITICAL FLOW SPECIFIC ENERGY(FEET) =            1.29
 ==========================================================================
     NORMAL-DEPTH FLOW INFORMATION:
 --------------------------------------------------------------------------
     NORMAL DEPTH(FEET) =      0.48
     FLOW AREA(SQUARE FEET) =      0.48
     FLOW TOP-WIDTH(FEET) =     1.396
     FLOW PRESSURE + MOMENTUM(POUNDS) =          129.87
     FLOW VELOCITY(FEET/SEC.) =          11.521
     FLOW VELOCITY HEAD(FEET) =           2.061
     HYDRAULIC DEPTH(FEET) =      0.35
     FROUDE NUMBER =     3.457
     SPECIFIC ENERGY(FEET) =            2.54
```

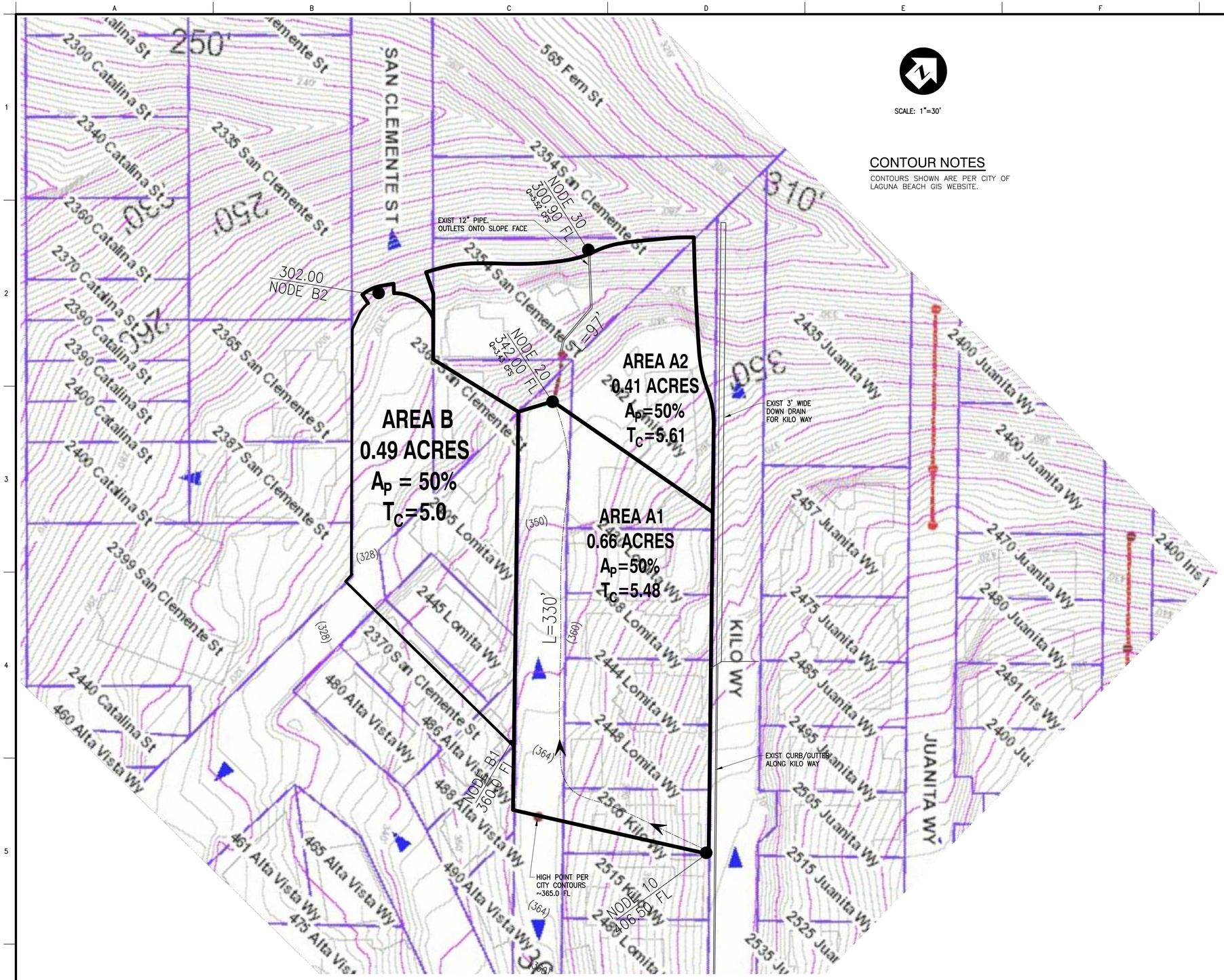
APPENDIX C

Drainage Maps

SCALE: 1"=30'

CONTOUR NOTES

CONTOURS SHOWN ARE PER CITY OF LAGUNA BEACH GIS WEBSITE.



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CIVIL
STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE: _____

PREPARED FOR:

KEVIN AARONSON

REVISIONS	BY	DATE	APVD.	DATE

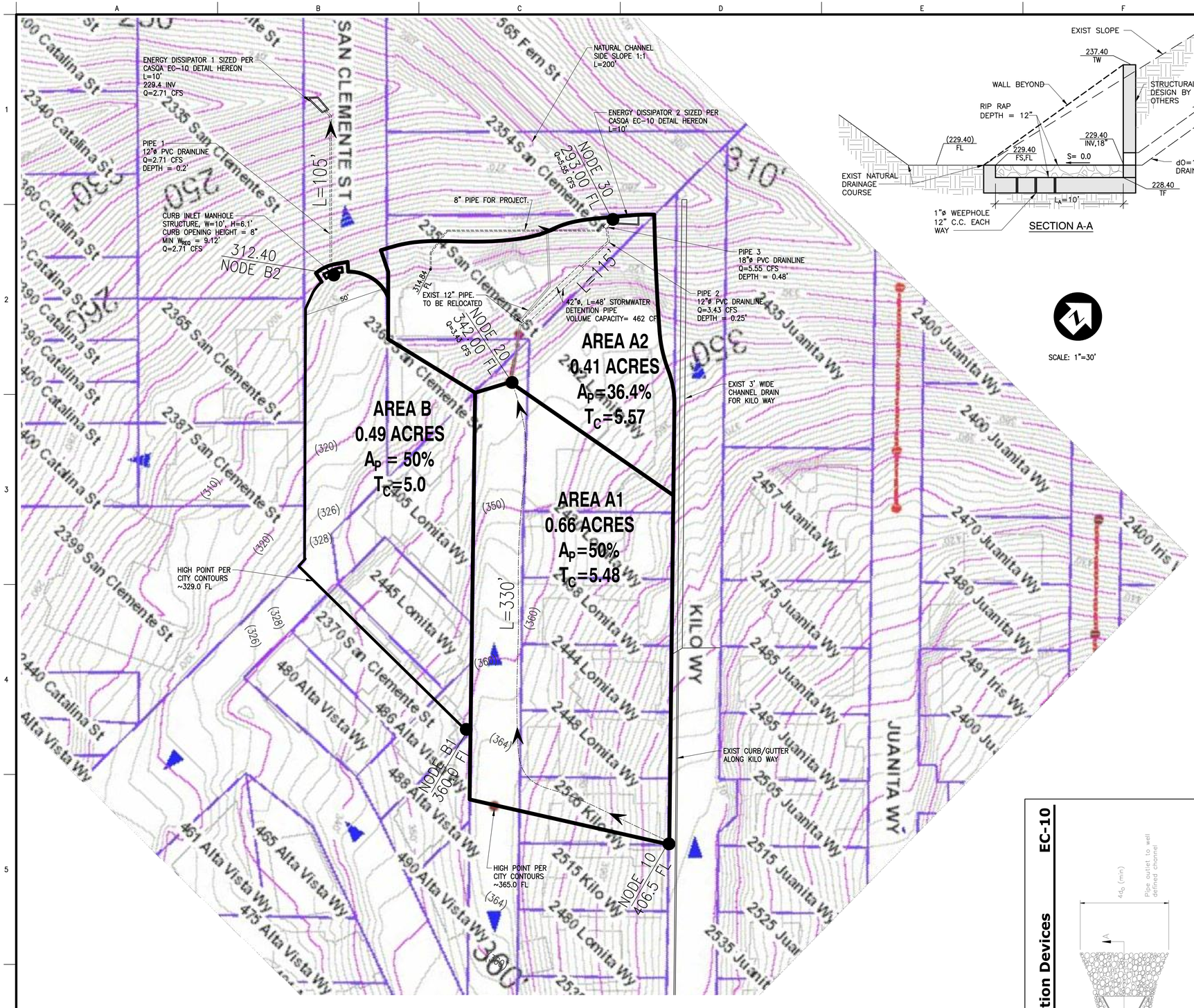
AARONSON RESIDENCE

EXISTING DRAINAGE MAP
SAN CLEMENTE & LOMITA WAY

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

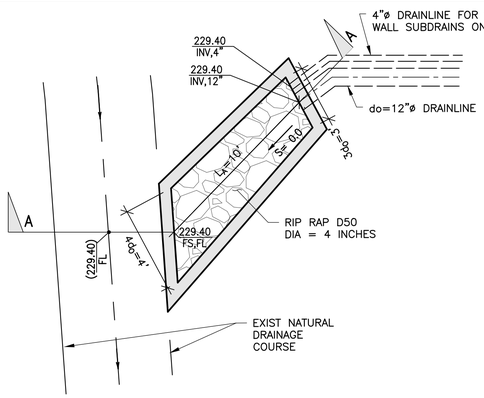
DATE: 3/9/21	H. SCALE: 1"=30'
SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO. H1
CHD.: C.R.	
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

3/9/2021 2:30:12 PM N:\18\xx\18156\Reports\Hydrology\18156-HYDROLOGY-SITE-PLAN-LOMITA-WAY-EXISTING.dwg

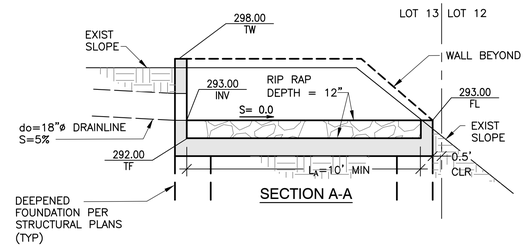


SECTION A-A

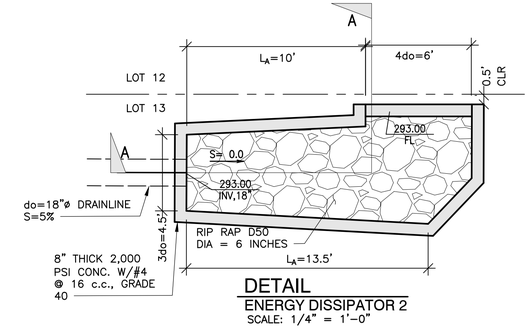
SCALE: 1"=30'



DETAIL
ENERGY DISSIPATOR 1
SCALE: 1/4" = 1'-0"



SECTION A-A



DETAIL
ENERGY DISSIPATOR 2
SCALE: 1/4" = 1'-0"

CONTOUR NOTES
CONTOURS SHOWN ARE PER CITY OF LAGUNA BEACH GIS WEBSITE.

Velocity Dissipation Devices EC-10

Pipe Diameter inches	Discharge Q%	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	39	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

California Stormwater BMP Handbook
Construction
www.cabmp.org

January 2011

5 of 5

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R.C.E. 57587
DATE:

PREPARED FOR:
KEVIN AARONSON

REVISIONS	BY	DATE

AARONSON RESIDENCE

PROPOSED DRAINAGE MAP
SAN CLEMENTE & LOMITA WAY

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21	H. SCALE: 1"=30'
SURVEY DATE: 10/01/18	V. SCALE: N/A
DRN.: O.R.	DWG. NO. H2
CHD.: C.R.	
APPD.: C.R.	
JOB NO. 18156	SHEET 1 OF 1

3/9/2021 2:30:24 PM N:\18Toal\18156\Reports\Hydrology\18156-HYDROLOGY-SITE-PLAN-LOMITA-WAY-PROPOSED.dwg

LOT 10 | LOT 9 | LOT 8 | LOT 7 | LOT 6 | LOT 5 | LOT 4

SCALE: 1/8"= 1'-0"

SAN CLEMENTE STREET

N 45°25'14" W 125.00'

N 44°34'15" E 212.77'

LOT 11

WATER COURSE CENTERLINE

WATER COURSE

NON-BUILDABLE

LOT 11

LOT 12

NON-BUILDABLE

N.A.P.

P.L.

LOT 12

LOT 13

SLOPE

LOTS 11-15
BLOCK 6
LOMA TRACT

N 00°10'15" E 176.88'

SLOPE

TRACT 26

LOT 13

LOT 14

P.L.

SLOPE

316.79 Deck

316.72 Deck

316.60 Deck

319.79 Deck

319.60 Deck

PA

LOT 14

LOT 15

319.88 Deck

319.72 Deck

SLOPE

P.L.

N 44°34'15" E 85.14'

LOT 15

P.L.

LOT 16

335.12 Roof ridge

315.81 Deck

Guard rail

Water meter

Telephone pole

Cluster

PERVIOUS LEGEND

	PERVIOUS DECOMPOSED GRANITE
PA	PLANTER AREA
SLOPE	SLOPE AREA

IMPERVIOUS LEGEND

	EXIST CONCRETE PAVING/WALLS 1,341 SF (0.030 AC)
	EXISTING BUILDING STRUCTURE LIMITS 1,299 SF (0.030 AC)

IMP TOTAL = 2,640 SF (0.060 AC)

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CIVIL
STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

REVISIONS	BY	DATE	APVD.	DATE

AARONSON RESIDENCE

PRE-DEVELOPMENT IMPERVIOUS AREA EXHIBIT

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21		H. SCALE: 1"=8'	
SURVEY DATE: 10/01/18		V. SCALE: N/A	
DRN.: O.R.		DWG. NO. H3	
CHD.: C.R.			
APPD.: C.R.			
JOB NO. 18156	SHEET 1	OF 1	

3/9/2021 12:32:17 PM N:\18xxx\18156\Reports\Hydrology\Impervious Area Exhibit - Pre-Development.dwg

LOT 10 | LOT 9 | LOT 8 | LOT 7 | LOT 6 | LOT 5 | LOT 4

LOT 11

NON-BUILDABLE

WATER COURSE CENTERLINE

WATER COURSE

LOT 11

LOT 12

S=(22%)

S=(22%)

NON-BUILDABLE

N.A.P.

SAN CLEMENTE STREET

LOT 12

LOT 13

P.L.

(291.20) FS

295.00 FS

SLOPE

298.25 FS

(297.00) FS

293.00 FL

0%

293.00 INV.FL 18"

FM

FM

292.50 FS

4.5%

4.5%

PA

PA

PA

PA

300

SLOPE

SLOPE

LOTS 11-15 BLOCK 6 LOMA TRACT

MECH T/SLAB =300.23

F.F.=299.88

LOT 13

LOT 14

299.50 FG

300.15 FS

304.00 FG

305

309.50 FG

309.69 FS

297.50 FS

304.58 FS

307.35 FS

314.84 FG

312.92 FS

312.92 FS

F.F.=313.00

LOT 14

LOT 15

314.10 FS

1.8%

313.79 GFF

GARAGE

1%

314.00 GFF

F.F.=313.00

312.92 FS

312.29 FG

P.L.

314.00 GFF

313.79 GFF

314.50 FS

3.6%

315.34 FG

4%

PA

LOT 15

P.L.

313.75 FS

313.75 FS

312.92 FS

312.79 FG

312.92 FS

25' HALF-STREET R.O.W.

LOT 16

TRACT 26

0 8 16

SCALE: 1/8"= 1'-0"

PERVIOUS LEGEND

PERVIOUS DECOMPOSED GRANITE

PA PLANTER AREA

SLOPE SLOPE AREA

IMPERVIOUS LEGEND

PROPOSED CONCRETE PAVING/WALLS
1,072 SF (0.024 AC)

PROPOSED BUILDING STRUCTURE LIMITS
4,007 SF (0.092 AC)

IMP TOTAL = 5,079 SF (0.116 AC)

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STATE OF CALIFORNIA

CALEB RIOS
R.C.E. 57587
DATE:

PREPARED FOR:

KEVIN AARONSON

REVISIONS	BY	DATE	APVD.	DATE

AARONSON RESIDENCE

POST-DEVELOPMENT IMPERVIOUS AREA EXHIBIT

LOTS 11-15, BLOCK 6, LOMA TRACT
2354 SAN CLEMENTE, LAGUNA BEACH CA

DATE: 3/9/21		H. SCALE: 1"=8'	
SURVEY DATE: 10/01/18		V. SCALE: N/A	
DRN.: O.R.		DWG. NO. H4	
CHD.: C.R.			
APPD.: C.R.			
JOB NO. 18156		SHEET 1	OF 1

3/9/2021 12:32:34 PM N:\18Toal\18156\Reports\Hydrology\Impervious Area Exhibit - Post-Development.dwg