# ALANTE
# Drainage Study

PROJECT# 648597

## Rancho Carmel Drive & Provencal Place
## City of San Diego, CA, 92102

Legal Description: (Portion of APN: 539-563-01-00) Lots 13-24 through 24

Prepared by:
Hunsaker & Associates - San Diego, Inc.
9707 Waples Street
San Diego, CA 92121
Telephone: (858) 558-4500
H&A W.O.#: 2606-0045

Prepared for:
New Point Communities, Inc.
16880 West Bernardo Drive, Suite 110
Solana Beach CA 92127

Preparation/Revision Date:
March 4th, 2020

Alisa S. Vialpando, R.C.E. #47945
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# Contents



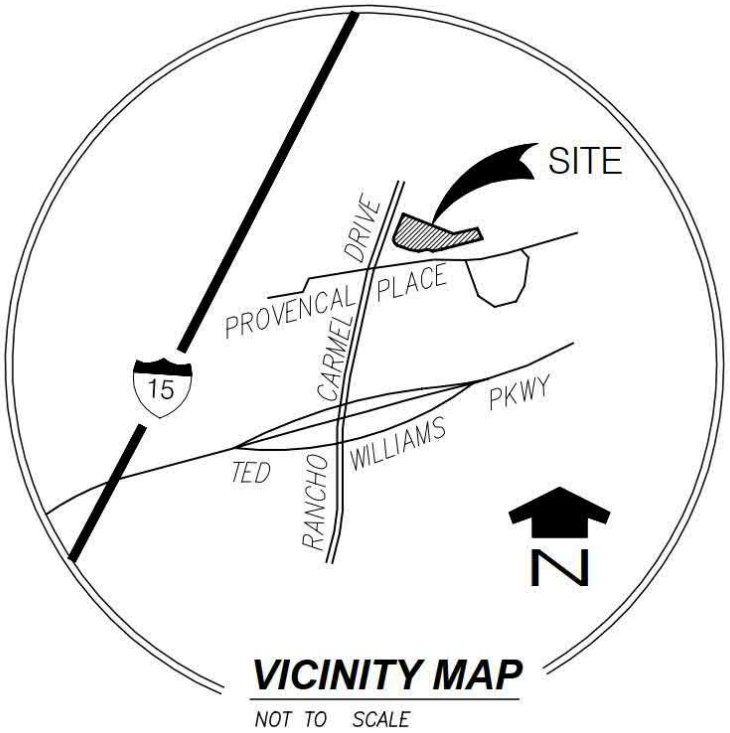
# List of Appendices

# 1 Scope

The purpose of this study is to provide hydrology and hydraulic calculations in support of a proposed development of a new four story 50-unit apartment atop the existing parking structure in the City of San Diego, California. This report will quantify proposed runoff for the 100-year frequency storm event and size storm drain infrastructure to safely convey stormwater through the site.

# 2 Existing Conditions

Proposed site is about 0.43 acre and, located at the northeast corner of Rancho Carmel Drive and Provencal Place in the Carmel Mountain Ranch Community Planning Area in the City of San Diego, California. The site is currently occupied by an existing two level parking garage (former park and ride facility). Please see vicinity map below.




The runoff from the property in existing conditions drains overland and through existing storm drains to northwest to an inlet adjacent to the Rancho Carmel Drive and flow into storm drain. The storm drain flows towards Chicarita Creek and is tributary to Los Peñasquitos Creek as a part of the Los Peñasquitos Hydrologic Area (906.10). The site is not mapped within any special flood hazard areas or watercourses on site so no FEMA map revisions or Federal Clean Water Act section 401 & 404 will be acquired for the project.

A runoff coefficient of Per criteria set forth in the “2003 San Diego County Hydrology Manual”, a runoff coefficient of 0.79 was selected for neighborhood commercial as the site is currently parking lot.

According to the City of San Diego Drainage Design Manual, type “D” soils are assumed for the entire site. Type “D” soils are categorized as having a slow infiltration rate when thoroughly wet.

Table 2.1 Summary of Existing Conditions

| Existing | | |
|---|---|---|
| Node | Area | Q (cfs) |
| 104 | 0.43 | 2.56 |

# 3 Proposed Conditions

The proposed development will construct a new 4 story 50 unit apartment atop the existing parking structure. This report will quantify proposed runoff for the 100-year frequency storm event and size storm drain infrastructure to safely convey stormwater through the site.

The majority of the runoff is generated from the proposed new building rooftop from which the flow are collected by rooftop drain and conveyed to outside of the building by underground downspouts.

Due to the downstream easement restrictions, the onsite runoff is completely diverted from EX condition downstream at northwest corner to PR condition downstream at southwest corner of the project boundary.

Onsite drainage improvements will include swales, ditches and storm drains to safely convey the stormwater through the project site.

**Drainage Routing and Improvements;**

The runoff from the project drains the inlet, located near the near south westerly project boundary. All runoff will drain to the existig 18” storm drain and connect to existing 24” storm drain west of the Rancho Carmel Drive.

Per criteria set forth in the “2003 San Diego County Hydrology Manual”, the following runoff coefficients were selected for the proposed condition for different land covers.

Table 3.1 Runoff Coefficients

| Land Use | %Imper. | Runoff C |
|---|---|---|
| Landscape | 0 | 0.35 |
| Rooftop | 95% | 0.87 |
| Mixed | 65% | 0.71 |

Table 3.2 shows the proposed conditions before biofiltration basins mitigate the runoff.

Table 3.2 Summary of Proposed Conditions

| Proposed | | |
|---|---|---|
| Node | Area | Q (cfs) |
| 108 | 0.44 | 2.59 |

# 4 Methodology

## *4.1 Hydrology*

The Rational Method as described in the June 2003 San Diego County Hydrology Manual (SDCHM), Section 3, was used for the hydrologic calculations for this project. The Rational Method formula is expressed as follows:

$Q = C\ I\ A$

$I = 7.44 P_6 T_c^{-0.645}$

$T_c = T_t + T_i$

$T_t = (11.9 * L^3 / \Delta E)^{0.385}$

Where:
Q = Peak discharge, in cubic feet per second (cfs).
C = Runoff coefficient, proportion of the rainfall that runs off the surface. The C coefficient was obtained from Table 3-1 of the SDCHM. It has no units and is based on the soil group and the development type for the drainage sub-area.
A = Drainage area contributing to the design location (ac).
I = Average rainfall intensity (in/hr). The formula can be found on Figure 3-2 of the SDCHM.
$P_6$ = 6-hour precipitation (in). This value was taken from the 6-hour isopluvial maps found in Appendix B of the SDCHM.
$T_i$ = Initial time of concentration, from Table 3-2 of the SDCHM.
$T_t$ = Travel time (min), from Figure 3-4 of the SDCHM.
L = Longest flow path distance (mi).
$\Delta E$ = Change in elevation along flowpath (ft).

### *4.2 Hydraulics*

The hydrology calculations discussed above provide peak flowrates which are entered into a separate program called Hydraflow Storm Sewer to perform hydraulic analysis and design of storm drain lines.

In order to provide adequate flood control, increases in peak flow rates at the outfall location for this site were mitigated using the design of the proposed basin. Mitigation within the basin was modeled using RickRatHydro as an input to Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2011.

RickRatHydro was used to produce a hydrograph for the project drainage areas, based on the area, time of concentration, P6 value, runoff coefficient, and peak flow rate.

The hydrograph was then imported into Hydraflow Hydrographs and was routed through the proposed basin by using an iteration of outlet structures, until the resulting outlet structure provided a flow rate to the outfall that was equal to or less than that during the existing condition, and the water surface elevation was below the top of the basin.

# 5 Results and Conclusions

The following tabulates the results for the project hydrology for the project.

**Summary of Total Pre vs. Unmitigated & Mitigated Developed Conditions**

| | Existing | | | Proposed | | |
|---|---|---|---|---|---|---|
| Drainage Basin | Node | Area | Q (cfs) | Node | Area | Q (cfs) |
| ALANTE | 104 | 0.43 | 2.56 | 108 | 0.44 | 2.58 |

The project imperviousness in existing and proposed conditions is very similar, there is no change in overall runoff coefficient for both exiting, and the proposed conditions based on the land use.

**Conclusions**;

As illustrated above, development of the Alante project site only results in 0.03 cfs of increase in runoff rate (2.56 cfs in existing vs. 2.59 in proposed conditions). Given this amount of runoff is ignorable, we can conclude that the project does not increase runoff in the 100-year storm event so there is no need for onsite flood attenuation, there will be no negative impacts to downstream drainage facilities as well.

## Watershed Information

- Runoff C
- Isopluvial Map

## Table 3-1
## RUNOFF COEFFICIENTS FOR URBAN AREAS

| Land Use | | Runoff Coefficient "C" | | | | |
|---|---|---|---|---|---|---|
| | | | Soil Type | | | |
| NRCS Elements | County Elements | % IMPER. | A | B | C | D |
| Undisturbed Natural Terrain (Natural) | Permanent Open Space | 0* | 0.20 | 0.25 | 0.30 | 0.35 |
| Low Density Residential (LDR) | Residential, 1.0 DU/A or less | 10 | 0.27 | 0.32 | 0.36 | 0.41 |
| Low Density Residential (LDR) | Residential, 2.0 DU/A or less | 20 | 0.34 | 0.38 | 0.42 | 0.46 |
| Low Density Residential (LDR) | Residential, 2.9 DU/A or less | 25 | 0.38 | 0.41 | 0.45 | 0.49 |
| Medium Density Residential (MDR) | Residential, 4.3 DU/A or less | 30 | 0.41 | 0.45 | 0.48 | 0.52 |
| Medium Density Residential (MDR) | Residential, 7.3 DU/A or less | 40 | 0.48 | 0.51 | 0.54 | 0.57 |
| Medium Density Residential (MDR) | Residential, 10.9 DU/A or less | 45 | 0.52 | 0.54 | 0.57 | 0.60 |
| Medium Density Residential (MDR) | Residential, 14.5 DU/A or less | 50 | 0.55 | 0.58 | 0.60 | 0.63 |
| High Density Residential (HDR) | Residential, 24.0 DU/A or less | 65 | 0.66 | 0.67 | 0.69 | 0.71 |
| High Density Residential (HDR) | Residential, 43.0 DU/A or less | 80 | 0.76 | 0.77 | 0.78 | 0.79 |
| Commercial/Industrial (N. Com) | Neighborhood Commercial | 80 | 0.76 | 0.77 | 0.78 | 0.79 |
| Commercial/Industrial (G. Com) | General Commercial | 85 | 0.80 | 0.80 | 0.81 | 0.82 |
| Commercial/Industrial (O.P. Com) | Office Professional/Commercial | 90 | 0.83 | 0.84 | 0.84 | 0.85 |
| Commercial/Industrial (Limited I.) | Limited Industrial | 90 | 0.83 | 0.84 | 0.84 | 0.85 |
| Commercial/Industrial (General I.) | General Industrial | 95 | 0.87 | 0.87 | 0.87 | 0.87 |

PROPOSED
PROPOSED
EXISTING
PROPOSED

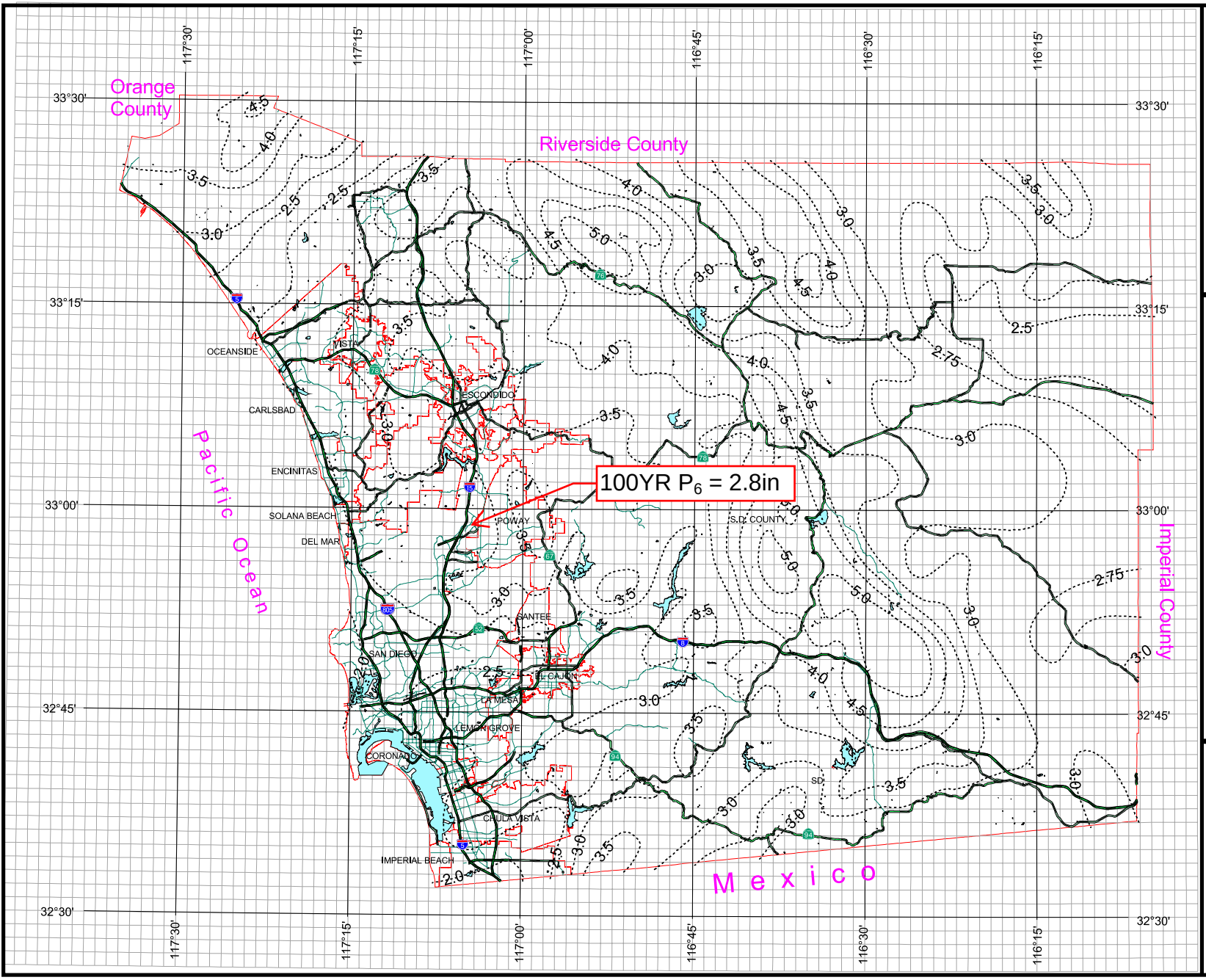
*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

# County of San Diego Hydrology Manual

*Rainfall Isopluvials*

**100 Year Rainfall Event - 6 Hours**

Isopluvial (inches)




DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
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N
W E
S



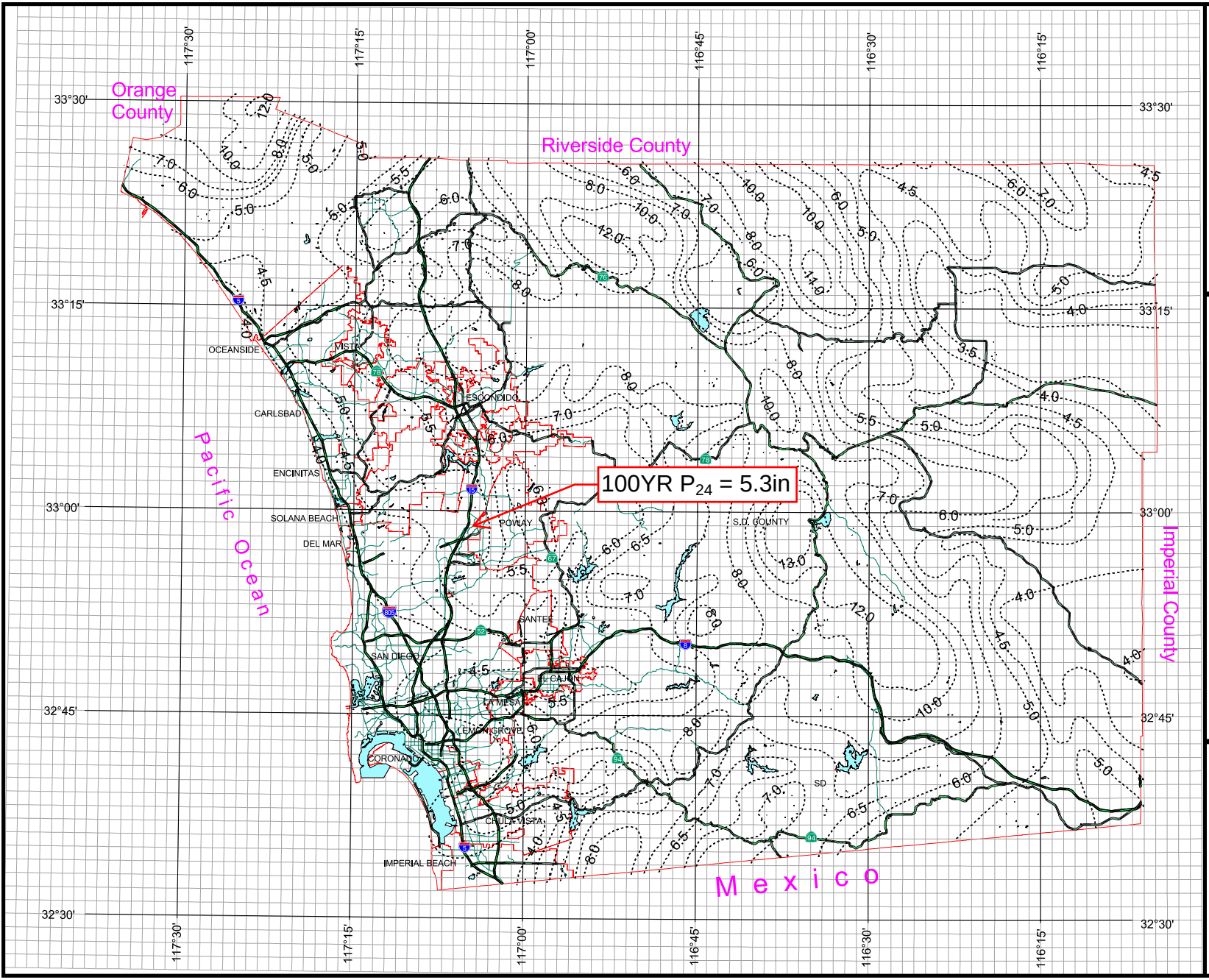
3 0 3 Miles

# County of San Diego Hydrology Manual

*Rainfall Isopluvials*

**100 Year Rainfall Event - 24 Hours**

Isopluvial (inches)




DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

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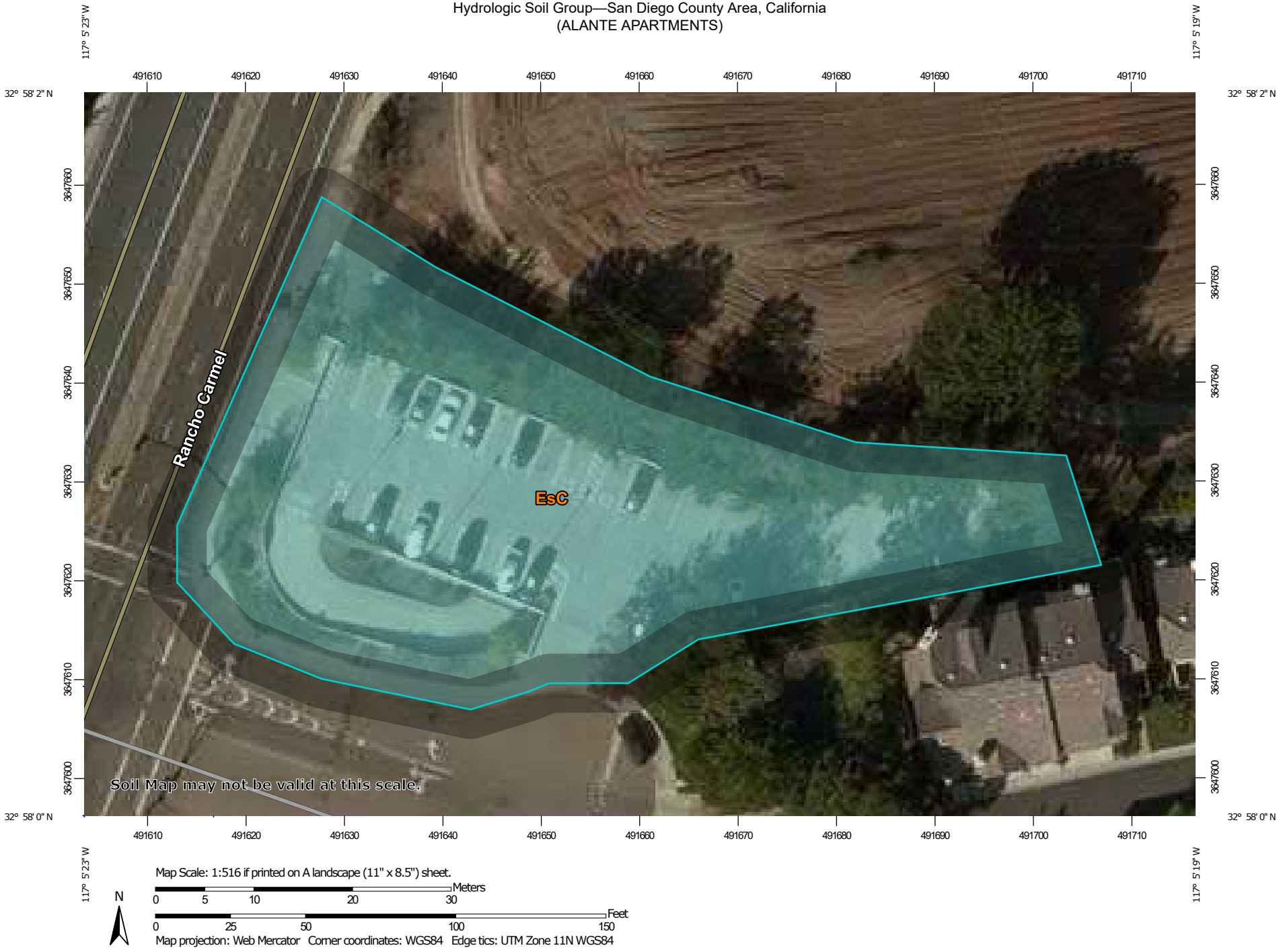
W E
S



3 0 3 Miles

# 6 Appendices

# Appendix 1 - Soils Information




Map Scale: 1:516 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

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 Rating Polygons**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Lines**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Points**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**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 1:24,000.

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: San Diego County Area, California
Survey Area Data: Version 14, Sep 16, 2019

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

Date(s) aerial images were photographed: Nov 3, 2014—Nov 22, 2014

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.

# Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| EsC | Escondido very fine sandy loam, 5 to 9 percent slopes | C | 0.6 | 100.0% |
| **Totals for Area of Interest** | | | **0.6** | **100.0%** |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

# Appendix 2 - Hydrology Calculations and Exhibits

# EXISTING CONDITION

```
****************************************************************************

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2015 Advanced Engineering Software (aes)
            Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                          Analysis prepared by:

                   Hunsaker & Associates San Diego, Inc.
                             9707 Waples Street
                            San Diego,  CA 92121


 ************************* DESCRIPTION OF STUDY *************************
* ALANTE  - CITY OF SAN DIEGO                                           *
*  100-YEAR EXISTING HYDROLOGY/HYDRAULICS STUDY                         *
*                                                                       *
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  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
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  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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   44.0     22.0    0.007/0.007/0.007   0.50    1.50 0.0312 0.125 0.0150
  2   44.0     22.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
```





```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+---------------------------------------------------------------------------+
|  ALANTE UPSTREAM NODE 100                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    584.00
  DOWNSTREAM ELEVATION(FEET) =    575.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.832
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  386.10  DOWNSTREAM ELEVATION(FEET) =  381.90
  STREET LENGTH(FEET) =   246.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 44.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.007
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.007

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.007
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =   12.95
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.44
  STREET FLOW TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =    4.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    2.45
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       2.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =  17.44
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     296.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.4  TC(MIN.) =      4.03
  PEAK FLOW RATE(CFS)   =       2.56
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

104

$Q_{100}$ = 2.56cfs.

A= 0.43 ac.

$T_c$ = 4.03min.

0.43 ACRES

D

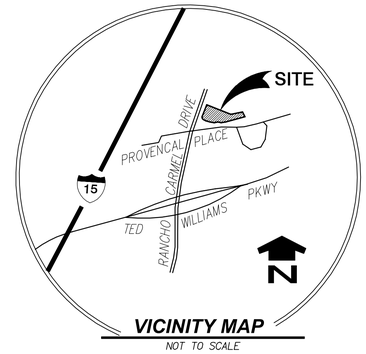
RANCHO CARMEL DR

DENSE TREES GNV

104

102

100




VICINITY MAP

NOT TO SCALE

## LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- INTIAL SUBAREA
- FLOW DIRECTION
- 00.00 ACRES — AREA
- D — HYDROLOGIC SOIL TYPE
- 406 — NODE NUMBER

H&A

20 0 20 40 60

SCALE 1"= 20'

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING ENGINEERING SURVEYING

9707 Waples Street
San Diego, Ca 92121
PH(858)558-4500 · FX(858)558-1414

EXISTING DRAINAGE MAP

# ALANTE

CITY OF SAN DEIGO, CALIFORNIA

MAP 1 OF 2

W.O.# 2606-0945

T:\26Z=\ Alante DR Map.dwg In R:\T\26Z\Hyd\XREF on Thursday, February 27, 2020 10:39:40 AM

# PROPOSED CONDITION

```
**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2015 Advanced Engineering Software (aes)
            Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                          Analysis prepared by:

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     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   44.0     22.0    0.007/0.007/0.007   0.50    1.50 0.0312 0.125 0.0150
  2   44.0     22.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+------------------------------------------------------------------------+
| BEGIN ALANTE PROPOSED CONDITION HYDROLOGY                              |
|                                                                        |
```





```
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    584.00
  DOWNSTREAM ELEVATION(FEET) =    575.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.832
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

**************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  576.20  DOWNSTREAM ELEVATION(FEET) =  574.80
  STREET LENGTH(FEET) =    48.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 44.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.007
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.007

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.007
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   0.25   Tc(MIN.) =    2.08
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.843
 SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.26
 TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.37

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  3.22   DEPTH*VELOCITY(FT*FT/SEC.) =   0.50
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =      98.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    571.00  DOWNSTREAM(FEET) =    561.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE =  0.0526
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
 AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.53
 Tc(MIN.) =    4.61
 SUBAREA AREA(ACRES) =     0.03       SUBAREA RUNOFF(CFS) =    0.08
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.679
 TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.45

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.20
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     288.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  561.00  DOWNSTREAM ELEVATION(FEET) =  558.00
```





```
 STREET LENGTH(FEET) =    47.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 44.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  22.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.007
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.007

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.007
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.47
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
 STREET FLOW TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =    4.77
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.668
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.04
 TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.49

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  4.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =     335.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =    4.77
 RAINFALL INTENSITY(INCH/HR) =   7.38
 TOTAL STREAM AREA(ACRES) =     0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.49

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    30.00
  UPSTREAM ELEVATION(FEET) =    625.50
  DOWNSTREAM ELEVATION(FEET) =    624.60
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.572
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.13

********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    114.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    624.60  DOWNSTREAM(FEET) =    623.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.0304
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  33.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.90
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.20
  Tc(MIN.) =    1.77
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.07
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =      53.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    116.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
```





```
  ELEVATION DATA: UPSTREAM(FEET) =   623.90  DOWNSTREAM(FEET) =   581.00
  FLOW LENGTH(FEET) =   102.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.51
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    1.93
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =     155.50 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    116.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.03
  TC(MIN.) =    1.93

********************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =   579.70
  FLOW LENGTH(FEET) =    63.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.03
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    2.15
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =     218.50 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.09   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.60
  TC(MIN.) =    2.15

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   579.70  DOWNSTREAM(FEET) =   555.10
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.60
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    2.22
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    106.00 =     276.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    2.22
  RAINFALL INTENSITY(INCH/HR) =   7.38
  TOTAL STREAM AREA(ACRES) =     0.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.60

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.49     4.77        7.377          0.10
      2        1.60     2.22        7.377          0.25

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
```





```
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        1.83     2.22        7.377
      2        2.10     4.77        7.377

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.10   Tc(MIN.) =    4.77
  TOTAL AREA(ACRES) =        0.3
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =     335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   555.10  DOWNSTREAM(FEET) =   554.56
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.10
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    4.97
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     389.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =    4.97
  RAINFALL INTENSITY(INCH/HR) =   7.38
  TOTAL STREAM AREA(ACRES) =     0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.10

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   123.00
  UPSTREAM ELEVATION(FEET) =    583.90
  DOWNSTREAM ELEVATION(FEET) =    570.50
```

```
  ELEVATION DIFFERENCE(FEET) =     13.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.922
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   570.50  DOWNSTREAM(FEET) =   558.10
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   0.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.13
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    2.30
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    108.00 =     227.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.50
  TC(MIN.) =    2.30

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```





```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    2.30
  RAINFALL INTENSITY(INCH/HR) =   7.38
  TOTAL STREAM AREA(ACRES) =     0.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.10     4.97        7.377          0.35
      2        0.50     2.30        7.377          0.09

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.59     2.30       7.377
      2        2.59     4.97       7.377

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.59   Tc(MIN.) =    4.97
  TOTAL AREA(ACRES) =        0.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     389.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.4  TC(MIN.) =      4.97
  PEAK FLOW RATE(CFS)   =       2.59
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

105 — $Q_{100}$ = 0.45cfs. A= 0.34 ac. $T_c$= 4.61min.

106 — $Q_{100}$ = 2.10cfs. A= 0.35 ac. $T_c$= 4.77min.

108 — $Q_{100}$ = 2.59cfs. A= 0.44 ac. $T_c$= 4.97min.

0.01 ACRES | 0.09 ACRES | 0.03 ACRES | 0.08 ACRES | 0.06 ACRES | 0.02 ACRES | 0.07 ACRES | 0.02 ACRES | 0.04 ACRES | 0.02 ACRES

LEVEL: 625.5 — ROOFTOP DRAIN (118)

LEVEL: 625.5 — ROOFTOP DRAIN (116)

LEVEL: 625.5 (SHADED) AND 576.2 (UNSHADED) — ROOFTOP DRAIN (114)

LEVEL: 576.2

CORNER VISIBILITY AREA (SHADED) AND CORNER SIGHT DISTANCE EASEMENT W/ NO OBJECTS HIGHER THAN 36" SHALL BE LOCATED WITHIN THIS AREA

EXIST. WALL OF U.G. PARKING GARAGE

RAMP DN

PROVENCAL PLACE

RANCHO CARMEL DRIVE

DENSE TREES CNV

EXIST. 15" RCP STORM DRAIN PER 22917-D (TO REMAIN)

EXIST. 30" RCP STORM DRAIN PER 22917-D (TO REMAIN)

EXIST. 18" RCP STORM DRAIN PER 22917-D (TO REMAIN)

EXIST. 24" RCP (PER 23141-D (TO REMAIN))

EXIST. 15" RCP STORM DRAIN PER 23141-D (TO REMAIN)

EXIST. 2-18" RCP STORM DRAIN PER 25131-D (TO REMAIN)

EXIST. 10" PVC @ 2.0% PER 25131-D (TO REMAIN)

EXIST. 10" PVC PER 25131-D (TO REMAIN)

EXIST. 8" ACP PER 25131-D (TO REMAIN)

EXIST. 24" PVC (PER 25131-D (TO REMAIN))

EXIST. WATER IRRIGATION FOR EROSION (TO REMAIN)

EXIST. 24" PVC PER 25131-D (TO REMAIN)

EXIST. 8" PVC PER 25131-D (TO REMAIN)

EXIST. 12" ACP PER 25131-D (TO REMAIN)

EXIST. 8" HP GAS (TO REMAIN)

EXIST. 5" GAS PER 25131-D (TO REMAIN)

537.95FL | 545.41FL | 548.44FL | 551.38FL | 557.54FL | 556.6FL | 553.6FL | (551.60FL) SD INLET | (554.26FL) SD INLET | (554.75FL) SD INLET | (555.30FL) | (550.81IE) | (556.13IE) | (557.66IE) SMH | 551.98FL

105 | 106 | 108 | 118 | 116 | 114 | 112 | 110 | 104 | 102 | 100 | 120 | 122

## VICINITY MAP

NOT TO SCALE

SITE — PROVENCAL PLACE — DRIVE — CARMEL — RANCHO — TED WILLIAMS PKWY — 15 — N

## LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- INTIAL SUBAREA
- FLOW DIRECTION
- 00.00 ACRES — AREA
- D — HYDROLOGIC SOIL TYPE
- 406 — NODE NUMBER

H&A

20 0 20 40 60

SCALE 1"= 20'

PREPARED BY:

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PROPOSED DRAINAGE MAP

# ALANTE

CITY OF SAN DEIGO, CALIFORNIA

MAP 2 OF 2

W.O.# 2606-0045

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