PRELIMINARY DRAINAGE REPORT

FOR

LEGACY AT COTO

23333 AND 23335 AVENIDA LA CAZA, COTO DE CAZA

UNINCORPORATED ORANGE COUNTY

APN 804-231-02 AND 804-231-04

Prepared for:

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HUITT-ZOLLARS

February 24, 2020

PRELIMINARY DRAINAGE REPORT
FOR
LEGACY AT COTO
COTO DE CAZA

Prepared By: Jenny Mital 2/24/20

Jenny Mital, P.E. Date
(949) 988-5815

JUNE 2020

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1. Introduction

1.1 PROJECT DESCRIPTION

This report documents the preliminary storm drain design for the proposed Legacy at Coto located within the unincorporated area of Coto de Caza in south Orange County. Legacy at Coto is a proposed three-story luxury senior residential village with about 100 to 110 units. The proposed village will include a driveway, above and below ground parking, and a combined residential building with a restaurant, a pool, and landscaping. The site is located at 23333 and 23335 Avenida La Caza in the Coto de Caza Community, Orange County, California. It is bordered to the northwest by Via Alondra, to the southeast by Avenida La Caza, to the east by the existing Coto Valley Country Club, and to the west by existing residential homes and tennis courts. The existing site is developed and consists of tennis courts, a pool, parking, and offices.

The project is located in the upstream end of Gobernadora Canada. The existing drainage course passes through the site via two 30" RCP, which are planned to be replaced to route around the proposed building. The entire site is approximately 3.9 acres, and approximately 3.4 acres are planned to be redeveloped, with the remaining 0.5 acres consisting of natural area that will not be touched. There is a FEMA Zone A floodzone to the west (downstream) of the project, and federal and state jurisdictional waters both east and west (upstream and downstream). Water quality requirements will be satisfied through proprietary biofiltration BMPs, as described in the WQMP. No flood control mitigation criteria have been imposed on the project by Orange County. This report covers preliminary offsite hydrology and hydraulics calculations for the offsite drainage at the site. Onsite drainage design will be provided during final design.

The vicinity map is shown in Exhibit 1, and the proposed site plan and drainage facilities are shown in Exhibit 2.

In addition to drainage impacts and facility requirements, this report is coordinated with the project preliminary Water Quality Management Plan (WQMP) to address any impacts associated with hydromodification and water quality requirements. For details on water quality and hydromodification design, please consult the project preliminary WQMP.

1.2 REPORT OBJECTIVES

The primary objectives of the preliminary Offsite Drainage Report are to:

- Document proposed offsite runon to the existing double 30" RCP that travels through the existing site
- Provide preliminary calculations for the proposed replacement for the double 30" RCP
- Provide a basis for a future FEMA Letter of Map Revision (LOMR) at the site

This report and analysis has been prepared to comply with relevant Orange County drainage policies and requirements in effect at the time of this report.

1.3 OFFSITE HYDROLOGY

Approximately 77 acres of offsite runon from Gobernadora Canada are tributary to the existing storm drains through the site.

2. Hydrology

2.1 DATA

The offsite drainage area was determined using USGS 1/3 meter DEM elevation data and the Orange County Flood Control District (OCFCD) Basemap of Drainage Facilities in Orange County Map sheet 59, dated January 12, 2000 (Exhibit 6). Both the contours and OCFCD Basemap show the existing canyon upstream of the site draining through the site, and cross roads draining down the canyon as well. A 2019 site visit determined that the area has limited curbs in most streets, further supporting the drainage area delineation.

2.2 HYDROLOGIC METHODS

Approved hydrologic methods from the County of Orange Hydrology Manual, dated October 1986 and its 1996 Addendum No. 1 were used on this project. The Orange County Rational Method (RM) was used to compute peak runoff rates.

Rational Method

The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for watersheds less than 640 acres and storms of a given recurrence interval. The design discharges were computed by generating a hydrologic "link-node" model (Advanced Engineering Software (AES), Rational Method Hydrology Model (RMHM)) which divides the analysis area into drainage subareas, with each tributary area to a concentration point or hydrologic node point determined by existing or proposed terrain.

High confidence Rational Method runoff calculations were performed and used for preliminary flood control design purposes. These analyses consisted of proposed condition calculations for the 100-year high confidence storm event for the area tributary to the site. Per Section C.5 of the Hydrology Manual, the 100-year high confidence flow rate was analyzed using an ambient soil moisture condition (AMC) of III.

The following assumptions/guidelines were applied under the Rational Method.

1) The Rational Method hydrology includes the effects of infiltration caused by soil surface characteristics. This area is largely soil D on the steep upper hillslopes, and soil A in the flatter lower portions of the drainage area. Exhibit 3 shows the drainage area overlaid with NRCS soil information. Hydrologic soil ratings are based on a scale of "A" through "D," where "D" is the least pervious, yielding the highest runoff.
2) The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surfaces. The curve numbers (Refer to Figure C-3 in the Orange County Hydrology Manual) used were based on the existing ground cover, open brush with 50% impervious development (5-7 dwellings/acre).
3) Standard rainfall intensity-duration curve data were obtained from the County of Orange Hydrology Manual dated October 1986.
4) The Kirpich Formula was used to determine the times of concentration for the initial overland flow paths, as calculated by the Advanced Engineering Software (AES) Orange County Hydrology Program.
5) No bulking factor was applied to flows. The drainage area does include natural areas that could burn. The use of a bulking factor may be necessary and will be determined during final design.

Exhibit 4 displays the Orange County Rational Method offsite tributary area hydrology map, delineated for the tributary area to the storm drain through the site. Attachment A shows contains the offsite hydrology model.

WinTR-55

Hydrologic computations were performed using the WinTR-55 software, a FEMA approved hydrology program. The existing and proposed TR-55 models can be used to determine the flow impact of the proposed development to the 100-year floodplain downstream of the site. A LOMR will be needed prior to construction to update the FEMA Flood Insurance Rate Map (FIRM), which currently shows the floodplain encroaching on the proposed site due to lack of a detailed study to determine Base Flood Elevations (BFEs). (FEMA FIRM shown in Exhibit 6). 100-year 24-hour hydrographs were derived for the drainage area from the top of the canyon to just downstream of the site. The following assumptions were made:

1. 24-hour precipitation depths from NOAA Atlas 14. The 100-year 24-hour depth is 8.06 inches.
2. The same landuse and soil data as the Orange County methodology study was used. The site is approximately 75% impervious in the existing condition, and will be approximately 90% impervious in the proposed condition.
3. A curve number of 98 was applied to the impervious areas.

Model Calibration

Typically FEMA studies require calibration to ensure that model results are accurate. At this site, the calibration methods described in the report "Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2016" (USGS Scientific Investigations Report 2012-5113) were used to calculate the expected peak 100-yr flow for the watershed. The calculations for a site without a

stream gage yielded a peak flow of approximately 56cfs for the 100-yr existing condition, which is much less than the TR-55 existing condition model Q100 of 342cfs. It is likely that the USGS flow calculations are based on more mildly sloped watersheds and do not apply to the very steep drainage area to the site. The report's calculation for a site with a gage downstream also could not be used because the nearest streamgage, USGS # 11046530 in San Juan Creek, has a tributary area of 109 square miles. The site tributary area is only 0.14 square miles, and the calculation only works for areas at least 50% of the area of the gaged site. Therefore, this calibration reference is not applicable to the site, and no modifications were needed for the existing model.

2.3 HYDRAULICS

Storm Drain

The existing double 30" RCP under the site is proposed to be replaced, and the new alignment will be directed around the proposed building. The preliminary proposed storm drain is a double 42" RCP. The hydraulic model consisted of LA County's WSPGw Hydraulic Program for the 100-yr high confidence storm event. To account for the downstream Zone A Floodplain, the model tailwater was set to 2 feet of depth, which is the approximate depth of the zone A floodplain. Due to the steep terrain, the stream will have a critical flow regime downstream of the site, so substantial backwater effects should not be an issue. The preliminary pipe alignment and profile are shown in Exhibit 8, and hydraulic calculations are shown in Attachment B, Hydraulics.

2.4 OWNERSHIP AND MAINTENANCE

CGV Coto, LLC owns the site and will have maintenance responsibility.

3. Results

The 100-year High Confidence flow entering the existing 2x30" RCP pipe under the existing site was found to have a tributary area of approximately 77 acres, producing a flow of 271 cfs. The preliminary proposed pipe around the proposed building was modeled as 2x42" RCP to convey the offsite flow without allowing water to enter the site.

The FEMA TR-55 hydrology results show an increase of approximately 7cfs in the 100-yr 24-hr storm event due to the proposed development, which will increase the impervious area at the site from 75% to 90%. A LOMR study will be needed to determine the extent of the 100-yr flood zone and the base flood elevations downstream of the site to ensure that the proposed building finished floor is at least 1 foot above the 100-yr flood elevation. The hydrology summary table is shown in Table 1 below.

Table 1. Hydrology Summary

		Area, ac	Q, cfs
TR-55 FEMA	**Existing including site**	88.8	341.5
TR-55 FEMA	**Proposed including site**	88.8	348.5
OC Rational 100-YR HC	**Existing to pipe**	77	271

4. Summary

This report has presented the preliminary offsite hydrology and hydraulic calculations for the proposed Legacy at Coto. A FEMA LOMR is anticipated prior to development of the site. Proposed offsite flows upstream of the site will be conveyed around the proposed building. Onsite flow mitigation has not been required. Drainage design will occur during the final design phase.

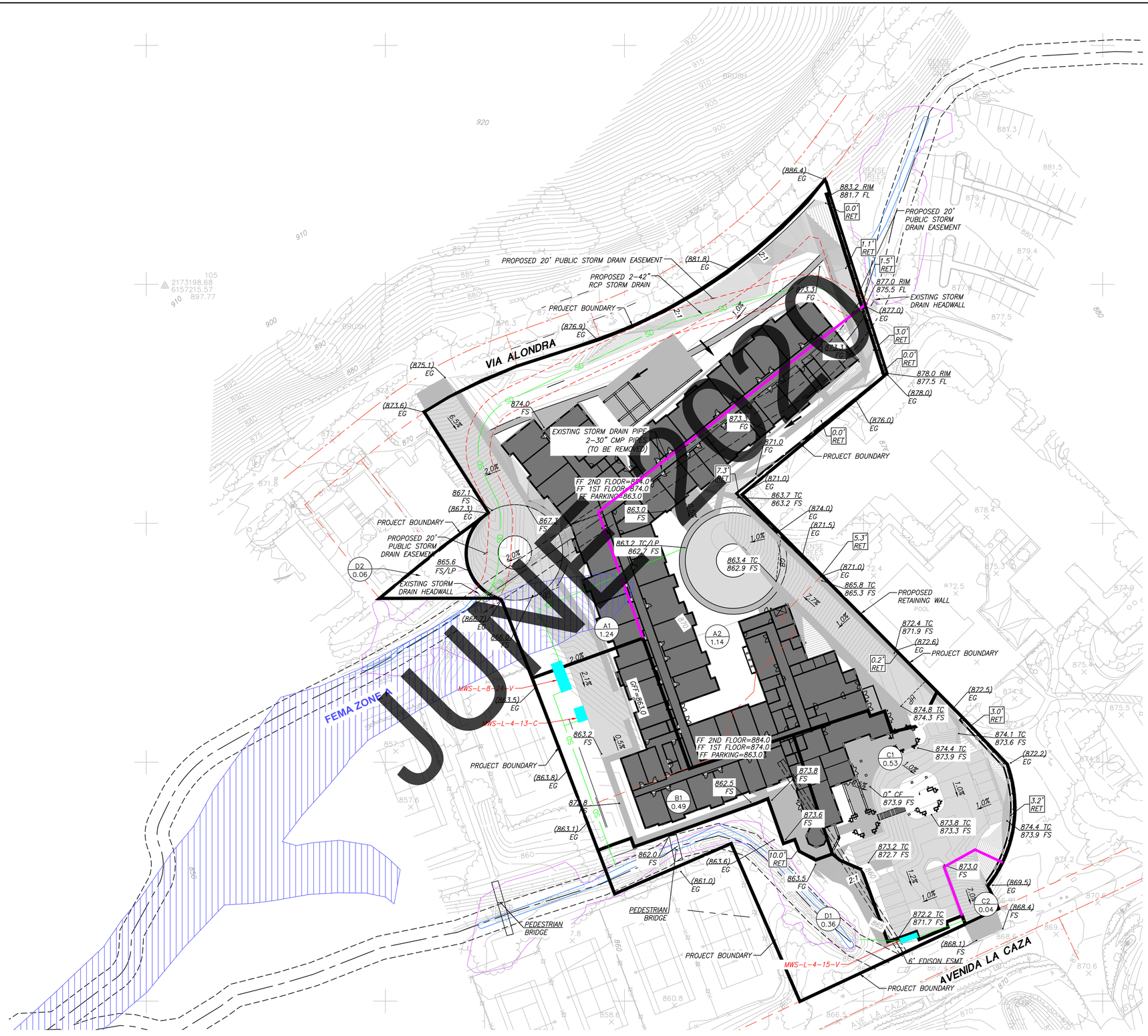
5. Attachments

Exhibits

Attachments

Exhibits


Site
JUNE 2020
Canada Gobernadora
Limestone Canyon Regional Park
Foothill Ranch
Trabuco Canyon
Cleveland National Forest
Dove Canyon
Rancho Santa Margarita
Coto de Caza
El Toro
Lake Forest
Mission Viejo
Laguna Woods
Laguna Hills
Ladera Ranch
Aliso Viejo
Laguna Niguel
Caspers Wilderness Park
Aliso & Wood Canyons Wilderness Pk
San Juan Creek
San Juan Capistrano
Dana Point
Capistrano Beach
San Clemente
Foothill Transportation Corridor
Santiago Canyon Rd
Live Oak Canyon Rd
Alton Pkwy
Bake Pkwy
Trabuco Rd
Lake Forest Dr
Jeronimo Rd
Muirlands Blvd
El Toro Rd
Los Alisos Blvd
Marguerite Pkwy
Melinda Rd
Santa Margarita Pkwy
Alicia Pkwy
Olympiad Rd
Antonio Pkwy
241
San Diego Fwy
Paseo de Valencia
Glenwood Dr
Moulton Pkwy
La Paz Rd
Aliso Viejo Pkwy
Aliso Creek Rd
Oso Pkwy
Felipe Rd
Cabot Rd
Crown Valley Pkwy
Ortega Hwy
Camino Capistrano
Avenida La Pata
Golden Lantern
Del Obispo St
Pacific Coast Hwy
Stonehill Dr
Selva Rd
Avenida Vista Hermosa
Avenida Pico
Calle Frontera
N El Camino Real
S El Camino Real
Riverside
Orange
San Diego
73
74
5
2 1 0 2 Miles
N
HUITT-ZOLLARS
Coto de Caza Vicinity Map
EXHIBIT 1



LEGEND

- DRAINAGE MANAGEMENT AREA
- DRAINAGE SUBAREA
- SURFACE FLOW
- PROPOSED STORM DRAIN
- PROPOSED MODULAR WETLAND BIORETENTION BMP
- FEMA FLOOD ZONE A
- WATERS OF THE US
- WATERS OF THE STATE
- C1 / 0.53 — SUBAREA NAME

N

40 0 20 40 80

SCALE 1"= 40'

EXHIBIT 2
LEGACY AT COTO
PRELIMINARY DRAINAGE MANAGEMENT AREAS
COTO DE CAZA, CA

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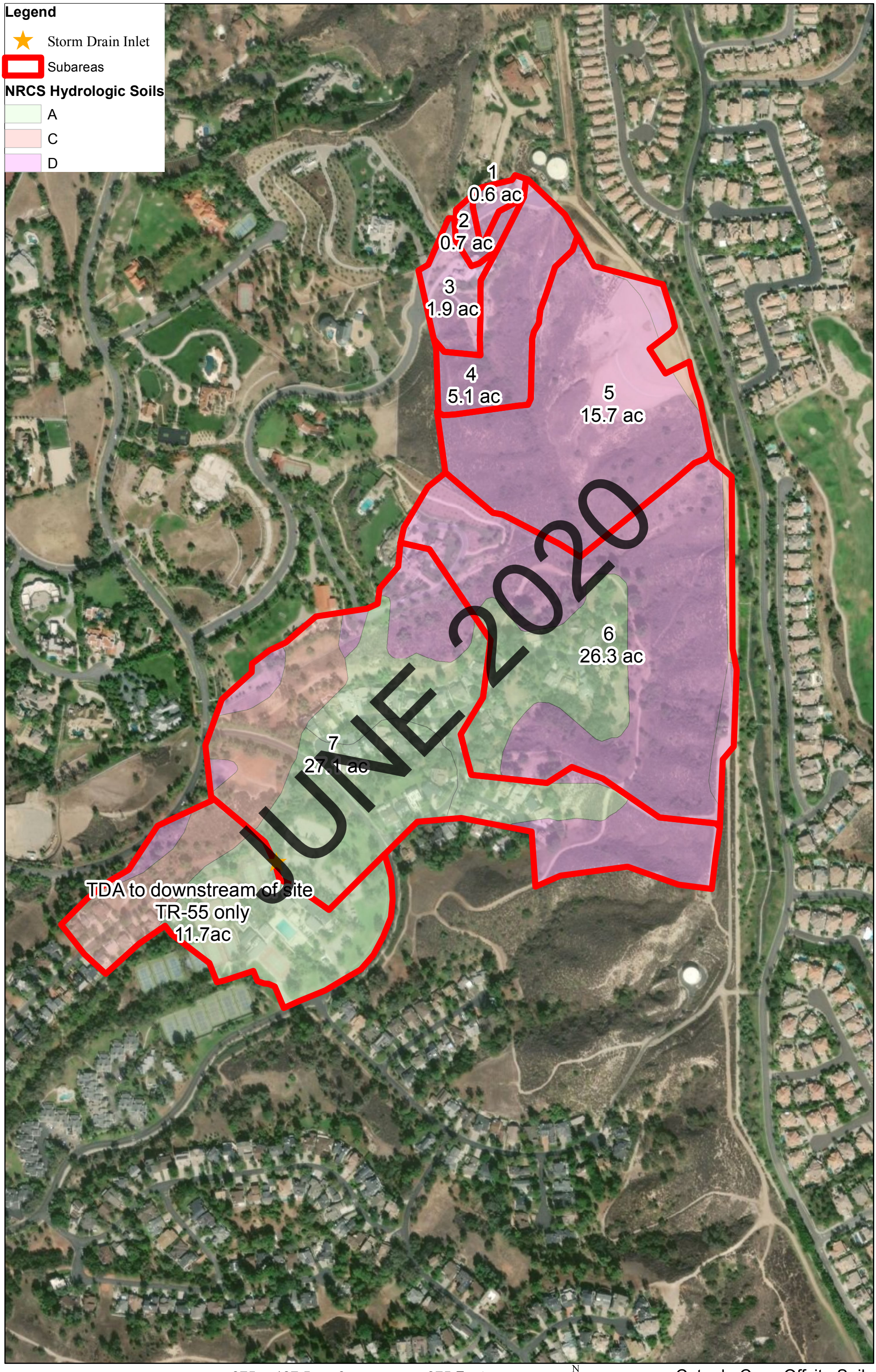
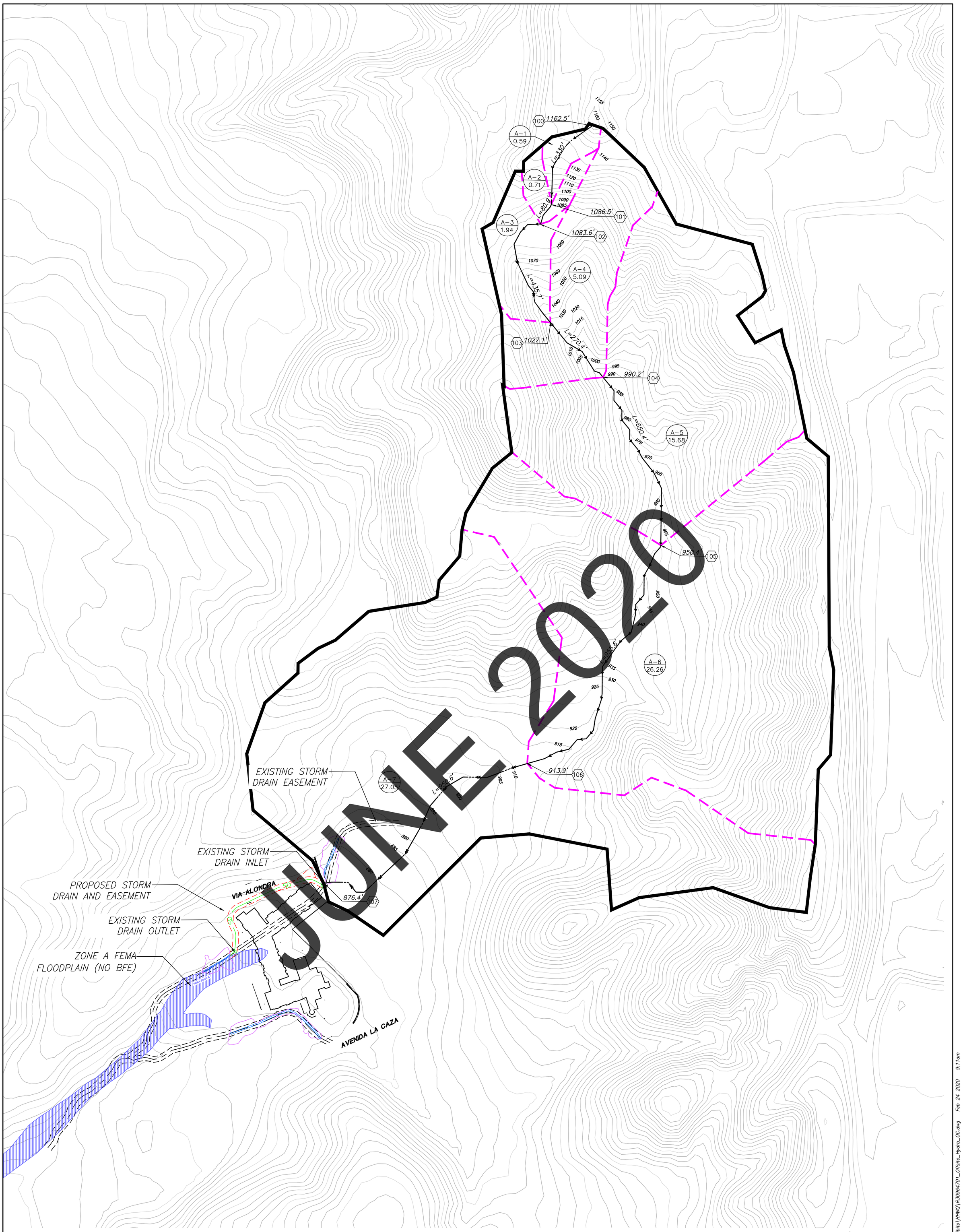


Coto de Caza Offsite Soils

EXHIBIT 3

LEGACY AT COTO



LEGEND

- HYDROLOGY SUBAREA
- SURFACE FLOW
- PROPOSED STORM DRAIN (SD)
- FEMA FLOOD ZONE A
- WATERS OF THE US
- WATERS OF THE STATE
- SUBAREA NAME (PR2.2 / 0.53)
- HYDROLOGY NODE (876' / 202)

N

150 0 75 150 300

SCALE 1"= 150'

EXHIBIT 4
LEGACY AT COTO
OFFSITE HYDROLOGY MAP – ORANGE COUNTY RATIONAL METHOD
COTO DE CAZA, CA

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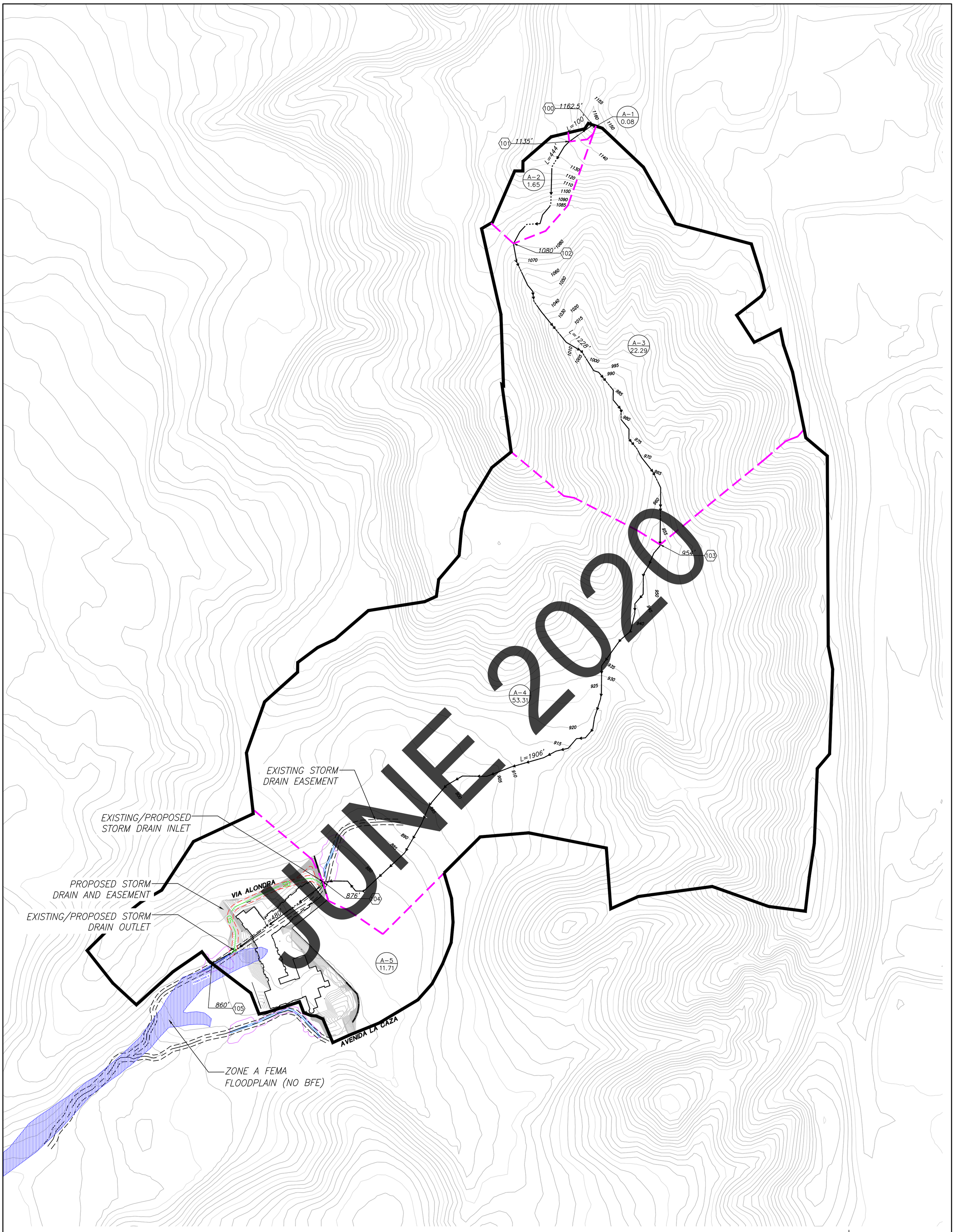

LEGEND

- HYDROLOGY SUBAREA
- SURFACE FLOW
- PROPOSED STORM DRAIN (SD)
- FEMA FLOOD ZONE A
- WATERS OF THE US
- WATERS OF THE STATE
- PR2.2 / 0.53 — SUBAREA NAME
- 876' (202) — HYDROLOGY NODE

N

150 0 75 150 300

SCALE 1"= 150'

EXHIBIT 5
LEGACY AT COTO
OFFSITE HYDROLOGY MAP –
FEMA APPROVED TR–55
COTO DE CAZA, CA

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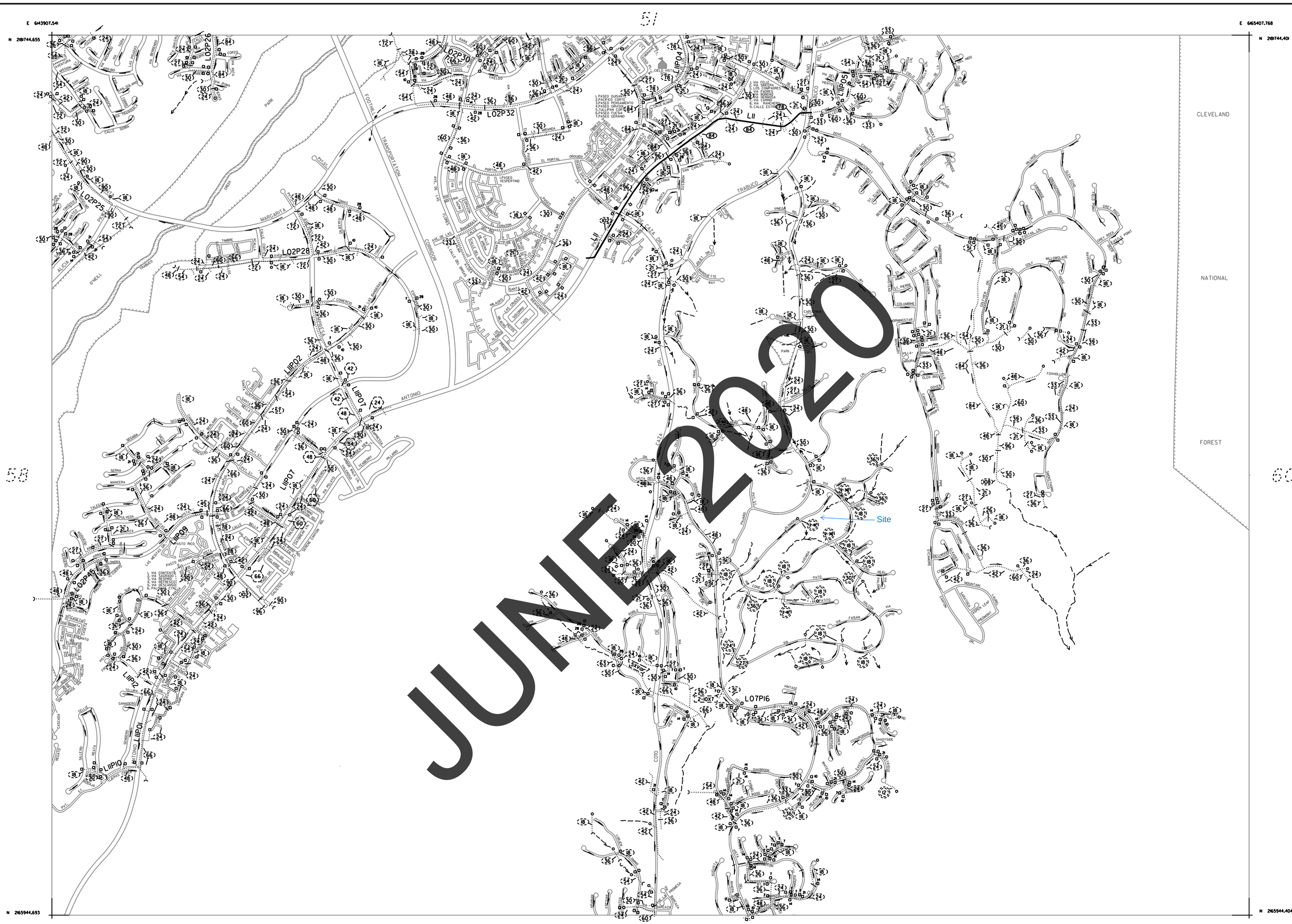


NOTICE

This drainage map has been prepared for information purposes only. The location and ownership of facilities have been determined from available information provided by public agencies, but may not be exact. The user of this map is responsible for verifying exact location, ownership and regional versus local character of drainage facilities.
Additional information may be obtained from public plans and recorded deeds.
Character designations shown on this map are for convenience only and are not controlling. Neither the County of Orange nor The Orange County Flood Control District (OCFCD) assume any liabilities for inaccuracy of this map.

Call Alan Vu at (714) 834-5986 to notify Public Facility and Resources Department (PFRD) of additions or corrections.

ORANGE COUNTY FLOOD CONTROL DISTRICT			
BASEMAP OF DRAINAGE FACILITIES IN ORANGE COUNTY			
REVISION	DATE	SHEET NO.	DWG. NO.
AVU	JAN.12/2000	59	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G Greenbelt
- P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- Ownership (if other than city or county)
- P Private
- S State
- F Federal

Existing O.C.F.C.D. / Existing LOCAL

- Earth Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Rectangular Channel (base width by height in feet)
- Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
- Reinforced Concrete Pipe (RCP) (diameter in inches)
- Corrugated Metal Pipe (CMP) (diameter in inches)
- Concrete Pipe (diameter in inches)
- Concrete Oval Pipe (width by height in inches)
- Steel Pipe (diameter in inches)
- Reinforced Concrete Arch (base span by height in inches)
- Corrugated Metal Arch (base span by height in inches)

EXHIBIT 6

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from the National Agriculture Imagery Program, dated 2005.

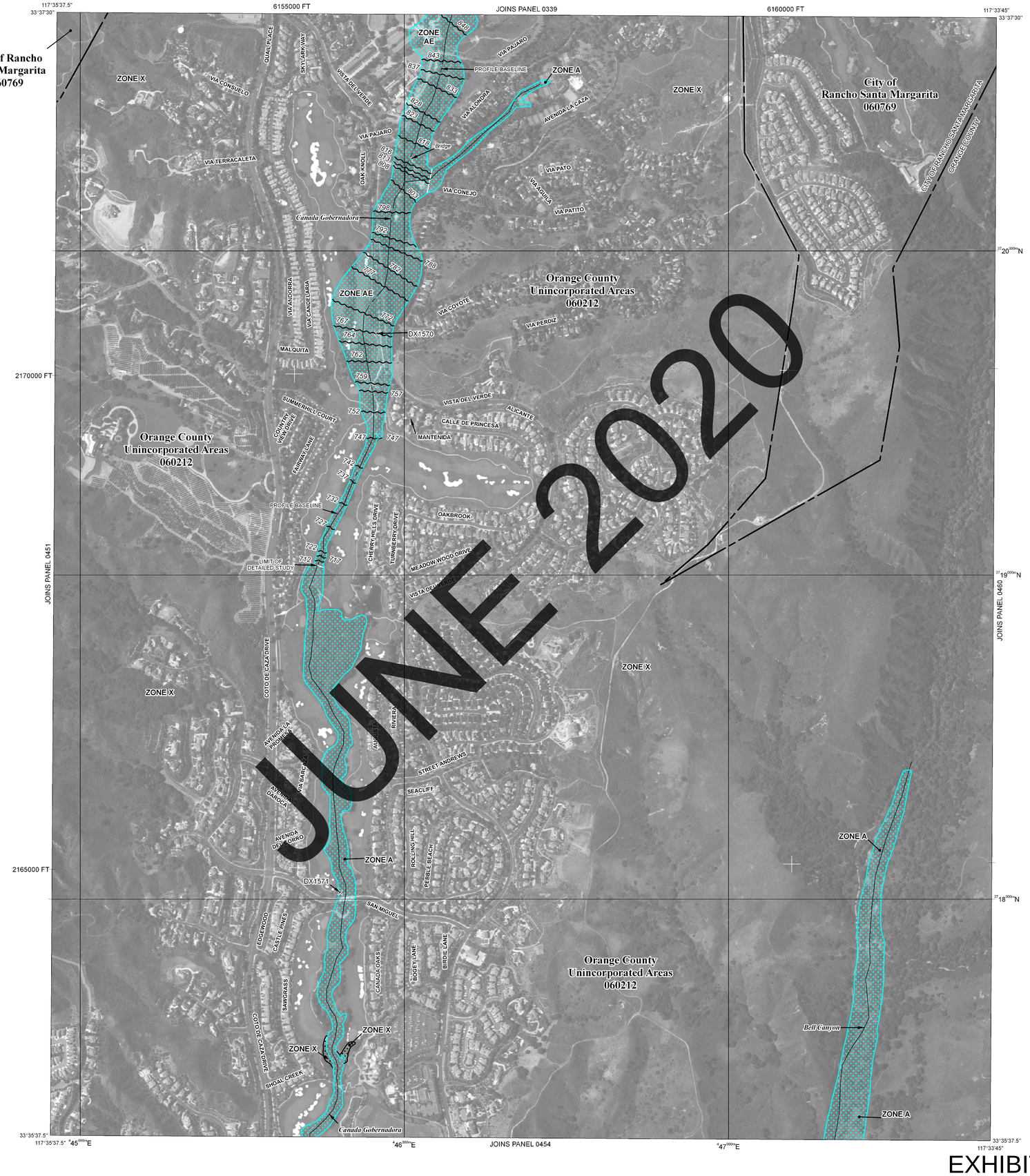
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



JUNE 2020

EXHIBIT 7

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3776000mN	1000-meter Universal Transverse Mercator grid values, zone NAD 1983 UTM Zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 15, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 5, 1992 - November 3, 1993 - January 3, 1997 - February 18, 2004 - December 3, 2009 : for description of revisions, see Notice to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0452J

FIRM
FLOOD INSURANCE RATE MAP

ORANGE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 452 OF 539

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ORANGE COUNTY	060212	0452	J
RANCHO SANTA MARGARITA, CITY OF	060769	0452	J

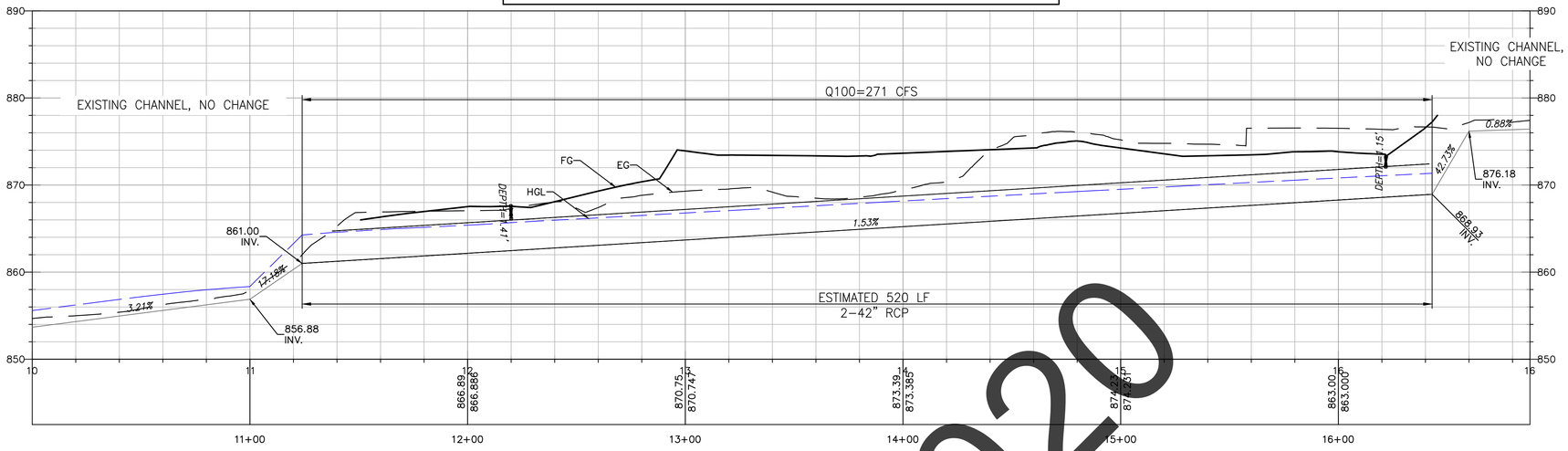
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

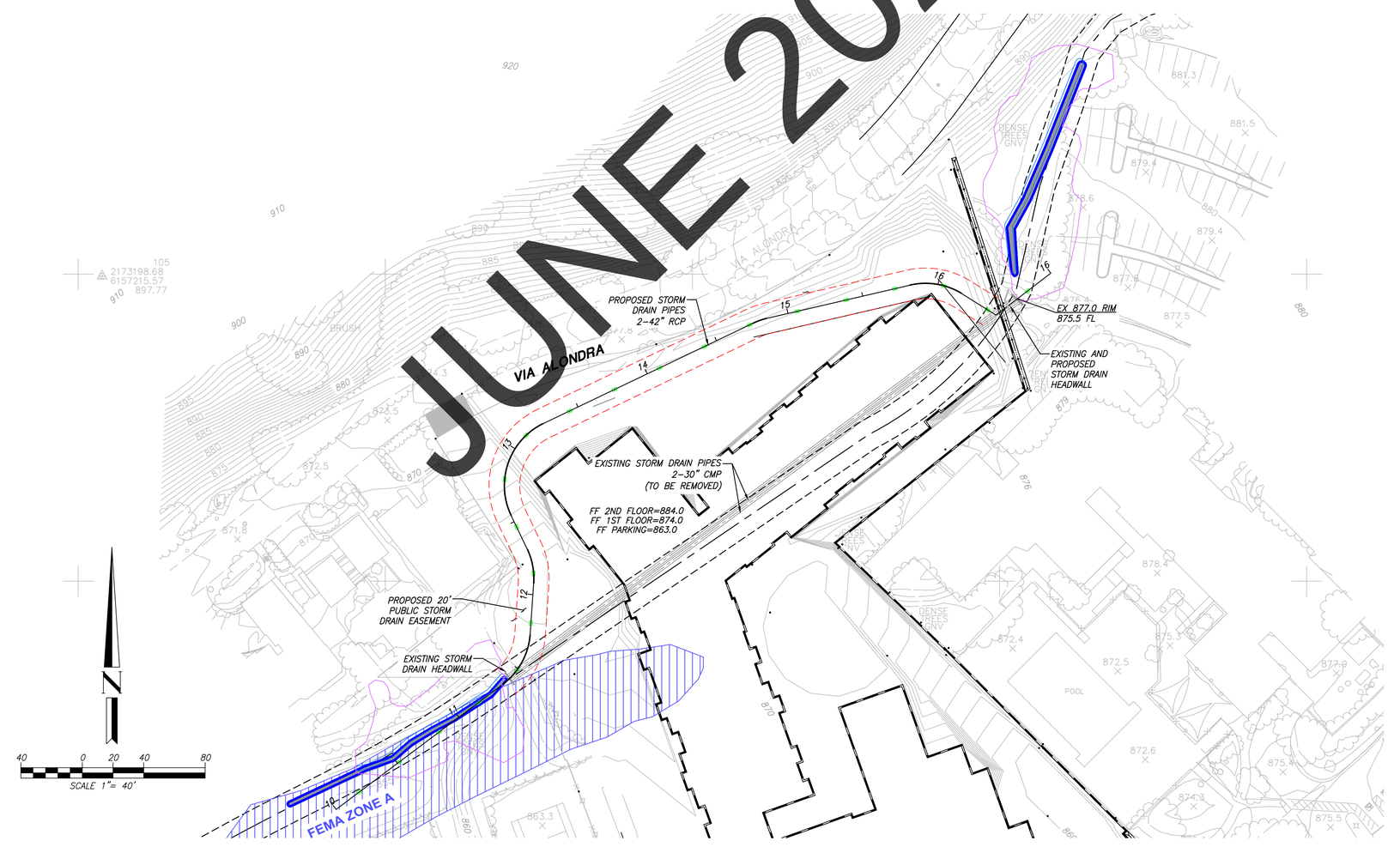
MAP NUMBER
06059C0452J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

CONCEPTUAL PROFILE OFFSITE STORM DRAIN –2X42"
SCALE: 10
DATUM: 850.00





LEGEND

- PROPOSED STORM DRAIN
- FEMA FLOOD ZONE A
- WATERS OF THE US
- WATERS OF THE STATE

PREPARED BY:
HUITT-ZOLLARS
Irvine
Huitt-Zollars, Inc.
2603 Main Street, Suite 400
Irvine, California 92614
Phone (949) 988-5815 Fax (949) 988-5820

EXHIBIT 8
LEGACY AT COTO
CONCEPTUAL OFFSITE STORM DRAIN DESIGN
COTO DE CAZA, CA

Attachment A Offsite Hydrology

JUNE 2020

Rational Method

JUNE 2020

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 21.0  Release Date: 06/01/2014  License ID 1202

                        Analysis prepared by:

                          Huitt-Zollars, Inc.
                    2603 Main Street, Irvine CA. 92614
                              Suite 400
                            949-988-5815

 **************             DESCRIPTION OF STUDY *************************
* COTO DE CAZA                                                           *
* 01/20/2020 JMITAL                                                      *
* 100-YR HC PR OFFSITE DRAINAGE                                          *
 **************************************************************************

  FILE NAME: OFF00PR.DAT
  TIME/DATE OF STUDY: 15:23 01/20/2020
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III 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 0.0312 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    100.00 TO NODE    101.00 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) =   1162.50  DOWNSTREAM(FEET) =   1086.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.308
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.979
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
```

```
  "OPEN BRUSH"               D        0.09      0.20     1.000    96    9.63
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.50      0.20     0.500    91    5.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.576
  SUBAREA RUNOFF(CFS) =      3.11
  TOTAL AREA(ACRES) =      0.59   PEAK FLOW RATE(CFS) =      3.11

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1086.50  DOWNSTREAM(FEET) =   1083.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =    80.90   CHANNEL SLOPE =  0.0358
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.806
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    96
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.669
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.81
  AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.28
  Tc(MIN.) =    5.59
  SUBAREA AREA(ACRES) =     0.71     SUBAREA RUNOFF(CFS) =    3.62
  EFFECTIVE AREA(ACRES) =      1.30     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   0.20   AREA-AVERAGED Ap =   0.63
  TOTAL AREA(ACRES) =        1.3      PEAK FLOW RATE(CFS) =       6.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   5.21
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     410.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1083.60  DOWNSTREAM(FEET) =   1027.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   435.70   CHANNEL SLOPE =  0.1297
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.398
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20     1.000    96
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.758
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.60
  AVERAGE FLOW DEPTH(FEET) =   0.69   TRAVEL TIME(MIN.) =   0.76
```

```
  Tc(MIN.) =    6.34
  SUBAREA AREA(ACRES) =     1.94       SUBAREA RUNOFF(CFS) =    9.16
  EFFECTIVE AREA(ACRES) =      3.24     AREA-AVERAGED Fm(INCH/HR) =   0.14
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.71
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =      15.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =  10.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     846.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1027.10  DOWNSTREAM(FEET) =    990.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.40   CHANNEL SLOPE =  0.1365
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.227
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        4.70      0.20      1.000    96
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.39      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.962
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.24
  AVERAGE FLOW DEPTH(FEET) =   1.06   TRAVEL TIME(MIN.) =   0.37
  Tc(MIN.) =    6.71
  SUBAREA AREA(ACRES) =     5.09       SUBAREA RUNOFF(CFS) =   23.06
  EFFECTIVE AREA(ACRES) =      8.33     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.86
  TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =      37.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =  13.37
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1117.00 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) =    990.20  DOWNSTREAM(FEET) =    950.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.40   CHANNEL SLOPE =  0.0612
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.848
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.22      0.25      1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D       15.46      0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      70.71
```

```
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.53
 AVERAGE FLOW DEPTH(FEET) =   2.03   TRAVEL TIME(MIN.) =   0.94
 Tc(MIN.) =    7.65
 SUBAREA AREA(ACRES) =    15.68       SUBAREA RUNOFF(CFS) =   65.59
 EFFECTIVE AREA(ACRES) =     24.01     AREA-AVERAGED Fm(INCH/HR) =   0.19
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.95
 TOTAL AREA(ACRES) =       24.0         PEAK FLOW RATE(CFS) =     100.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.38   FLOW VELOCITY(FEET/SEC.) =  12.55
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1767.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    950.40  DOWNSTREAM(FEET) =    913.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   955.60   CHANNEL SLOPE =  0.0382
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               A        3.17      0.40      1.000    66
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        3.28      0.40      0.500    52
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.46      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       18.05      0.20      1.000    96
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.30      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.913
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     150.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.60
 AVERAGE FLOW DEPTH(FEET) =   3.13   TRAVEL TIME(MIN.) =   1.37
 Tc(MIN.) =    9.03
 SUBAREA AREA(ACRES) =    26.26       SUBAREA RUNOFF(CFS) =   99.05
 EFFECTIVE AREA(ACRES) =     50.27     AREA-AVERAGED Fm(INCH/HR) =   0.21
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.93
 TOTAL AREA(ACRES) =       50.3         PEAK FLOW RATE(CFS) =     190.24

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.47   FLOW VELOCITY(FEET/SEC.) =  12.29
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2723.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    913.90  DOWNSTREAM(FEET) =    876.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   950.60   CHANNEL SLOPE =  0.0394
 CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.105
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"             A        2.30      0.40     1.000    66
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"     A       12.40      0.40     0.500    52
  NATURAL FAIR COVER
  "OPEN BRUSH"             C        3.96      0.25     1.000    92
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"     C        0.55      0.25     0.500    86
  NATURAL FAIR COVER
  "OPEN BRUSH"             D        6.50      0.20     1.000    96
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"     D        1.34      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.736
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     237.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.15
  AVERAGE FLOW DEPTH(FEET) =   3.78   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =   10.23
  SUBAREA AREA(ACRES) =    27.05       SUBAREA RUNOFF(CFS) =   94.64
  EFFECTIVE AREA(ACRES) =     77.32     AREA-AVERAGED Fm(INCH/HR) =   0.21
  AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   0.86
  TOTAL AREA(ACRES) =       77.3         PEAK FLOW RATE(CFS) =     271.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.99   FLOW VELOCITY(FEET/SEC.) =  13.58
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    3673.60 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       77.3  TC(MIN.) =    10.23
  EFFECTIVE AREA(ACRES) =     77.32  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 0.863
  PEAK FLOW RATE(CFS)   =     271.06
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

TR-55

JUNE 2020

TR-55 watershed GIS data

Existing

Pervious and impervious area combined

SOIL	LU	AREA, AC	% IMP	Pervious area, ac	Impervious area
A	open brush, fair	7.05	100.00%	7.05	0.00
C	open brush, fair	6.31	100.00%	6.31	0.00
D	open brush, fair	46.48	100.00%	46.48	0.00
A	res	15.78	50.00%	7.89	7.89
C	res	2.27	50.00%	1.14	1.14
D	res	4.91	50.00%	2.46	2.46
A	Tennis	5.78	75.00%	1.45	4.34
C	Tennis	0.16	75.00%	0.04	0.12
	Sum	88.74		72.81	15.94

Combined urban pervious

SOIL	Pervious urban, ac
A	9.34
C	1.18
D	2.46
Sum	12.97

Proposed

Change of 3.44 acres urban area from 75% impervious (tennis) to 90% impervious

Pervious and impervious area combined

SOIL	LU	AREA, AC	% IMP	Pervious area, ac	Impervious area
A	open brush, fair	7.05	100.00%	7.05	0.00
C	open brush, fair	6.31	100.00%	6.31	0.00
D	open brush, fair	46.48	100.00%	46.48	0.00
A	res	15.78	50.00%	7.89	7.89
C	res	2.27	50.00%	1.14	1.14
D	res	4.91	50.00%	2.46	2.46
A	Tennis	2.34	75.00%	0.59	1.76
C	Tennis	0.16	75.00%	0.04	0.12
A	Site, 90% impervious	3.44	90.00%	0.34	3.10
	Sum	88.74		72.29	16.45

Combined urban pervious

SOIL	Pervious urban, ac
A	8.82
C	1.18
D	2.46
Sum	12.45

TR-55 tc inputs

US node	DS node	L, ft	US elev	DS elev	Slope, ft/ft	Flow type
100	101	100	1162.5	1135	0.275	sheet flow
101	102	444	1135	1080	0.124	shallow concentrated
102	103	1228	1080	954	0.103	shallow concentrated
103	104	1906	954	876	0.041	lower channel
104	105	480	876	860	0.033	pipe

See flowmaster calculations for channel and pipe velocity

WinTR-55 Current Data Description

--- Identification Data ---

User: JMital
Project: CCCVC
SubTitle: Coto_Existing condition
State: California
County: Orange
Filename: R:\R309647.01 - Luxury Senior Living at Coto\05 Design\05.3 Calculations\H&H\Hydrology\TR55\Cot

Date: 2/13/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Existing		Outlet	88.76	81	.22

Total area: 88.76 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	4.08	4.93	6.12	7.07	8.06	2.32

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Coto_Existing condition
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	4.08	4.93	6.12	7.07	8.06	2.32

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Coto_Existing condition
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 100-Yr (cfs)
SUBAREAS	
Existing	341.49
REACHES	
OUTLET	341.49

Coto_Existing condition
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 100-Yr (cfs) (hr)
SUBAREAS	
Existing	341.49 10.01
REACHES	
OUTLET	341.49

Coto_Existing condition
Orange County, California

Structure Output Table

Reach Identifier / Structure Identifier	Peak Flow (PF), Storage Volume (SV), Stage (STG) by Rainfall Return Period 100-Yr

Coto_Existing condition
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Existing	88.76	0.220	81	Outlet	

Total Area: 88.76 (ac)

Coto_Existing condition
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Existing							
SHEET	100	0.2750	0.130				0.052
SHALLOW	444	0.1240	0.050				0.022
SHALLOW	1228	0.1030	0.050				0.066
CHANNEL	1906					7.150	0.074
CHANNEL	480					20.780	0.006
					Time of Concentration		.22

Coto_Existing condition
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Existing	Open space; grass cover 50% to 75%	(fair)	A	9.34	49
	Open space; grass cover 50% to 75%	(fair)	C	1.18	79
	Open space; grass cover 50% to 75%	(fair)	D	2.46	84
	Paved parking lots, roofs, driveways		A	15.94	98
	Desert shrub	(fair)	A	7.05	55
	Desert shrub	(fair)	C	6.31	81
	Desert shrub	(fair)	D	46.48	86
	Total Area / Weighted Curve Number			88.76	81

Coto_Existing condition
Orange County, California

Structure Description - User Entered

Reach Identifier	Surface Area @ Crest (ac)	Height Above Crest (ft)	Surface Area @ Ht Above (ac)	Pipe Diameter (in)	Head on Pipe (ft)	Weir Length (ft)

Coto_Existing condition
Orange County, California

Structure Rating Details - Computed

WinTR-55 Current Data Description

--- Identification Data ---

User: JMital
Project: CCCVC
SubTitle: Coto_Proposed condition
State: California
County: Orange
Filename: R:\R309647.01 - Luxury Senior Living at Coto\05 Design\05.3 Calculations\H&H\Hydrology\TR55\Cot

Date: 2/13/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Proposed		Outlet	88.76	82	.22

Total area: 88.76 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	4.08	4.93	6.12	7.07	8.06	2.32

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Coto_Proposed condition
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	4.08	4.93	6.12	7.07	8.06	2.32

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Coto_Proposed condition
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 100-Yr (cfs)
SUBAREAS	
Proposed	348.51
REACHES	
OUTLET	348.51

JMital CCCVC

Coto_Proposed condition
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 100-Yr (cfs) (hr)
SUBAREAS	
Proposed	348.51 10.01
REACHES	
OUTLET	348.51

Coto_Proposed condition
Orange County, California

Structure Output Table

Reach Identifier / Structure Identifier	Peak Flow (PF), Storage Volume (SV), Stage (STG) by Rainfall Return Period 100-Yr

Coto_Proposed condition
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Proposed	88.76	0.220	82	Outlet	

Total Area: 88.76 (ac)

Coto_Proposed condition
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Proposed							
SHEET	100	0.2750	0.130				0.052
SHALLOW	444	0.1240	0.050				0.022
SHALLOW	1228	0.1030	0.050				0.066
CHANNEL	1906					7.150	0.074
CHANNEL	480					20.780	0.006
					Time of Concentration		.22

Coto_Proposed condition
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Proposed	Open space; grass cover 50% to 75%	(fair)	A	8.83	49
	Open space; grass cover 50% to 75%	(fair)	C	1.18	79
	Open space; grass cover 50% to 75%	(fair)	D	2.46	84
	Paved parking lots, roofs, driveways		A	16.45	98
	Desert shrub	(fair)	A	7.05	55
	Desert shrub	(fair)	C	6.31	81
	Desert shrub	(fair)	D	46.48	86
	Total Area / Weighted Curve Number			88.76	82

Coto_Proposed condition
Orange County, California

Structure Description - User Entered

Reach Identifier	Surface Area @ Crest (ac)	Height Above Crest (ft)	Surface Area @ Ht Above (ac)	Pipe Diameter (in)	Head on Pipe (ft)	Weir Length (ft)

Coto_Proposed condition
Orange County, California

Structure Rating Details - Computed

TR55_offsite-channel-lower

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.04100	ft/ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	55.00	ft
Discharge	270.00	ft³/s

Results

Normal Depth	0.64	ft
Flow Area	37.79	ft²
Wetted Perimeter	62.89	ft
Hydraulic Radius	0.60	ft
Top Width	62.71	ft
Critical Depth	0.88	ft
Critical Slope	0.01415	ft/ft
Velocity	7.15	ft/s
Velocity Head	0.79	ft
Specific Energy	1.44	ft
Froude Number	1.62	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.64	ft
Critical Depth	0.88	ft
Channel Slope	0.04100	ft/ft

TR55_offsite-channel-lower

GVF Output Data

Critical Slope	0.01415	ft/ft

TR55_Pipe-104-105

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03300	ft/ft
Diameter	3.50	ft
Discharge	135.00	ft³/s

Results

Normal Depth	2.24	ft
Flow Area	6.50	ft²
Wetted Perimeter	6.49	ft
Hydraulic Radius	1.00	ft
Top Width	3.36	ft
Critical Depth	3.33	ft
Percent Full	63.9	%
Critical Slope	0.01561	ft/ft
Velocity	20.78	ft/s
Velocity Head	6.71	ft
Specific Energy	8.95	ft
Froude Number	2.64	
Maximum Discharge	196.59	ft³/s
Discharge Full	182.76	ft³/s
Slope Full	0.01801	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.94	%
Downstream Velocity	Infinity	ft/s

TR55_Pipe-104-105

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.24	ft
Critical Depth	3.33	ft
Channel Slope	0.03300	ft/ft
Critical Slope	0.01561	ft/ft

LEGACY AT COTO

OFFSITE MODEL CALIBRATION
USGS 2006 REPORT 2012-5113

2/13/2020

TR-55 Calibration - not used

Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2006

Regression equation, South Coast R5	**TDA**	
Mean Annual Precipitation (in)	17.96	Precipitation from La Novia gage
Existing Condition Drainage area (ac)	89.0	
Existing Condition Drainage area (sq mi)	0.14	
Calculated Q100 (cfs)	**55.8**	Flow is too low for this hilly area. Do not change model.

Final calibration: user input CN for open brush.

Q	**user input CN**	**overall CN**	**depth**

Urban pervious and impervious landuse not included in calibration.

Gage estimate - not applicable because San Juan Creek watershed at La Novia gage is more than 50% larger than site watershed.

Q gage La Novia, cfs	**Streamgage drainage area, sq mi**	**Q Gage weighted (USGS 2006), cfs**	**Q Gage regression (USGS 2006), cfs**	**Site drainage area, sq mi**	**Delta area, sq mi**	**Q site regression, cfs**	**Qsite weighted, cfs**
34000	110	24900	21100	0.14	109.86	55.8	-15819.1

Equation is not applicable because area of site is too small.

*NOTE: the rainfall, gage drainage area, and weighted and regression streamflow for La Novia gage are from the USGS StreamStats Data-Collection Station Report.

$$Q_{P(u)w} = \left[\left(\frac{2\Delta A}{A_{(g)}}\right) + \left(1 - \frac{2\Delta A}{A_{(g)}}\right)\left(\frac{Q_{P(g)w}}{Q_{P(g)r}}\right)\right] Q_{P(u)r}, \quad (13)$$

where

$Q_{P(u)w}$ is the weighted estimate of peak flow for the selected P-percent annual exceedance probability at the ungaged site, u, in cubic feet per second;

ΔA is the absolute value of the difference between the drainage areas of the streamgage and the ungaged site, in square miles;

$A_{(g)}$ is the drainage area for the streamgage, in square miles; and

$Q_{P(u)r}$ is the peak-flow estimate derived from the applicable regional equations in table 5 for the selected P-percent annual exceedance probability at the ungaged site, in cubic feet per second.

Use of equation 13 gives full weight to the regression equation estimates when the drainage area for the ungaged site is equal to 0.5 or 1.5 times the drainage area for the streamgage and increasing weight to the streamgage estimates as the drainage area ratio approaches 1. The weighting procedure is not applicable when the drainage area ratio for the ungaged site and streamgage is less than 0.5 or greater than 1.5.

Table 6. Average variance of prediction, average standard error of prediction, and pseudo coefficient of determination for the regional regression equations.

[*AVP*, average variance of prediction; $SE_{p,ave}$, average standard error of prediction; R^2_{pseudo}, pseudo coefficient of determination; —, not applicable]

Percent annual exceedance probability	Hydrologic region (shown in pl. 1)								
	North Coast (Region 1)			Lahontan (Region 2)			Sierra Nevada (Region 3)		
	AVP (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)	*AVP* (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)	*AVP* (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)
50	0.056	58.6	93.7	0.126	97.5	82.6	0.083	74.4	88.3
20	0.038	47.4	95.4	0.098	82.7	85.6	0.049	54.4	92.0
10	0.034	44.2	95.9	0.089	77.7	86.6	0.044	51.5	92.3
4	0.032	42.7	96.0	0.086	76.1	86.7	0.046	52.3	91.6
2	0.032	42.7	96.0	0.085	75.7	86.6	0.049	54.6	90.8
1	0.034	44.3	95.6	0.087	77.2	86.0	0.055	58.0	89.6
0.5	0.034	44.4	95.6	0.091	78.9	85.3	0.060	61.5	88.5
0.2	0.036	46.6	95.2	0.099	82.9	84.0	0.070	67.3	86.7

Percent annual exceedance probability	Hydrologic region (shown in pl. 1)								
	Central Coast (Region 4)			South Coast (Region 5)			Desert (Region 6)		
	AVP (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)	*AVP* (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)	*AVP* (log units)	$SE_{p,ave}$ (percent)	R^2_{pseudo} (percent)
50	0.243	164.9	76.9	0.194	134.2	60.6	0.325	214.2	—
20	0.125	97.1	86.3	0.099	83.1	78.8	0.342	226.2	—
10	0.092	79.4	89.2	0.065	64.0	86.4	0.371	248.1	—
4	0.075	69.9	90.7	0.044	51.5	91.4	0.432	297.6	—
2	0.069	66.2	91.4	0.038	47.6	93.1	0.494	356.9	—
1	0.070	66.9	91.0	0.038	47.2	93.7	0.572	444.3	—
0.5	0.071	67.6	90.8	0.039	47.7	93.9	0.665	574.5	—
0.2	0.078	71.5	89.8	0.045	52.0	93.3	0.813	856.2	—

Table 7. Standard errors of estimate from this investigation and from Waananen and Crippen (1977).

Percent annual exceedance probability	Hydrologic region (shown in pl. 1)									
	North Coast (Region 1)		Lahontan (Region 2)		Sierra Nevada (Region 3)		Central Coast (Region 4)		South Coast (Region 5)	
	Standard error of estimate (SE_e) (log units)									
	This investigation (2012)	Waananen and Crippen (1977)	This investigation (2012)	Waananen and Crippen (1977)	This investigation (2012)	Waananen and Crippen (1977)	This investigation (2012)	Waananen and Crippen (1977)	This investigation (2012)	Waananen and Crippen (1977)
50	0.23	0.26	0.34	0.46	0.33	0.34	0.48	0.47	0.43	0.47
20	0.19	0.24	0.30	0.38	0.26	0.32	0.34	0.39	0.30	0.37
10	0.18	0.24	0.28	0.38	0.23	0.27	0.29	0.35	0.24	0.33
4	0.17	0.24	0.27	0.40	0.22	0.30	0.25	0.35	0.19	0.32
2	0.17	0.25	0.27	0.42	0.22	0.34	0.24	0.38	0.17	0.35
1	0.18	0.26	0.27	0.45	0.23	0.37	0.24	0.41	0.17	0.39

Attachment B Offsite Hydraulics

JUNE 2020

```
T1 SD-LINE_A-OFFSITE Q-100                                                    0
T2 COTO DE CAZA
T3 2020-02-12 JMITAL
SO    150.000 813.000  3                          815.000
R    1000.000 854.670  3      .030                              .000    .000 0
R    1100.000 857.880  3      .030                              .000    .000 0
TS   1123.980 862.000  4      .030                            .000    .000 0
TS   1137.100 861.200  2      .013                            .000    .000 0
R    1174.280 861.770  2      .013                            47.343    .000 0
R    1207.350 862.270  2      .013                            .000    .000 0
R    1230.530 862.630  2      .013                            29.509    .000 0
R    1254.500 862.990  2      .013                            .000    .000 0
R    1325.180 864.070  2      .013                            90.000    .000 0
R    1476.300 866.380  2      .013                            .000    .000 0
R    1486.120 866.530  2      .013                            12.499    .000 0
R    1581.540 867.990  2      .013                            .000    .000 0
R    1616.990 868.530  2      .013                            45.144    .000 0
R    1643.020 868.930  2      .013                            .000    .000 0
R    1643.040 868.930  2      .013                              .000  90.000 0
TS   1687.950 876.430  4      .030                              .000
SH   1887.950 880.430  4                          880.430
CD   1  3   0    .000   4.000    5.000  .000  .000   .00
CD   2  4   2    .000   3.500     .000  .000  .000   .00
CD   3  1   0    .000  10.000   34.000 4.000 4.000   .00
CD   4  1   0    .000  10.000    6.000 1.000 1.000   .00
CD   6  4   2    .000   3.500     .000  .000  .000   .00
Q           271.060   .0
```


SD-LINE_A-OFFSITE Q-100
COTO DE CAZA
2020-02-12 JMITAL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
150.000	813.000	2.000	815.000	271.06	3.23	.16	815.16	.00	1.19	50.00	10.000	34.000	4.00	0 .0

```
  1.338    .0490                                        .0023      .00     2.00     .44     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
151.338  813.066    1.921  814.987    271.06    3.38     .18  815.16     .00    1.19    49.37  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
  1.255    .0490                                        .0027      .00     1.92     .47     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
152.593  813.127    1.845  814.972    271.06    3.55     .20  815.17     .00    1.19    48.76  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
  1.170    .0490                                        .0031      .00     1.85     .50     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
153.763  813.185    1.772  814.957    271.06    3.72     .22  815.17     .00    1.19    48.18  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
  1.083    .0490                                        .0035      .00     1.77     .53     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
154.846  813.238    1.701  814.939    271.06    3.90     .24  815.18     .00    1.19    47.61  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
   .372    .0490                                        .0039      .00     1.70     .57     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
155.218  813.256    1.675  814.930    271.06    3.98     .25  815.18     .00    1.19    47.40  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
HYDRAULIC JUMP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
155.218  813.256     .810  814.066    271.06    8.99    1.25  815.32     .00    1.19    40.48  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
810.182    .0490                                        .0490    39.72      .81    1.83     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
965.400  852.974     .810  853.784    271.06    8.99    1.25  855.04     .00    1.19    40.48  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
 22.963    .0490                                        .0461     1.06      .81    1.83     .81    .030       .00  4.00  TRAP
       |        |        |        |        |             |        |       |        |       |       |       |        |     |
988.363  854.099     .841  854.940    271.06    8.63    1.16  856.10     .00    1.19    40.72  10.000  34.000  4.00    0   .0
     -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     |-
   7.695    .0490                                        .0402      .31      .84    1.73     .81    .030       .00  4.00  TRAP
```


Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING Date: 2-12-2020 Time:12:30:18

SD-LINE_A-OFFSITE Q-100
COTO DE CAZA
2020-01-22 JMITAL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

996.059	854.477	.878	855.355	271.06	8.23	1.05	856.41	.00	1.19	41.02	10.000	34.000	4.00	0 .0
3.941	.0490					.0347	.14	.88	1.62	.81	.030	.00	4.00	TRAP
1000.000	854.670	.917	855.587	271.06	7.85	.96	856.54	.00	1.19	41.34	10.000	34.000	4.00	0 .0
32.006	.0321					.0321	1.03	.92	1.51	.92	.030	.00	4.00	TRAP
1032.006	855.697	.917	856.615	271.06	7.85	.96	857.57	.00	1.19	41.34	10.000	34.000	4.00	0 .0
21.809	.0321					.0338	.74	.92	1.51	.92	.030	.00	4.00	TRAP
1053.815	856.398	.890	857.288	271.06	8.11	1.02	858.31	.00	1.19	41.12	10.000	34.000	4.00	0 .0
10.194	.0321					.0384	.39	.89	1.58	.92	.030	.00	4.00	TRAP
1064.009	856.725	.852	857.577	271.06	8.50	1.12	858.70	.00	1.19	40.82	10.000	34.000	4.00	0 .0
6.087	.0321					.0445	.27	.85	1.70	.92	.030	.00	4.00	TRAP
1070.096	856.920	.816	857.736	271.06	8.92	1.23	858.97	.00	1.19	40.53	10.000	34.000	4.00	0 .0
4.509	.0321					.0517	.23	.82	1.81	.92	.030	.00	4.00	TRAP
1074.604	857.065	.781	857.846	271.06	9.35	1.36	859.20	.00	1.19	40.25	10.000	34.000	4.00	0 .0
3.655	.0321					.0601	.22	.78	1.94	.92	.030	.00	4.00	TRAP
1078.260	857.182	.747	857.929	271.06	9.81	1.49	859.42	.00	1.19	39.98	10.000	34.000	4.00	0 .0
3.109	.0321					.0698	.22	.75	2.08	.92	.030	.00	4.00	TRAP
1081.369	857.282	.715	857.997	271.06	10.29	1.64	859.64	.00	1.19	39.72	10.000	34.000	4.00	0 .0
2.724	.0321					.0811	.22	.71	2.23	.92	.030	.00	4.00	TRAP

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1084.093	857.369	.684	858.053	271.06	10.79	1.81	859.86	.00	1.19	39.47	10.000	34.000	4.00	0 .0
2.431	.0321					.0942	.23	.68	2.38	.92	.030	.00	4.00	TRAP
1086.524	857.447	.654	858.102	271.06	11.32	1.99	860.09	.00	1.19	39.23	10.000	34.000	4.00	0 .0
2.199	.0321					.1096	.24	.65	2.55	.92	.030	.00	4.00	TRAP
1088.723	857.518	.626	858.144	271.06	11.87	2.19	860.33	.00	1.19	39.01	10.000	34.000	4.00	0 .0
2.008	.0321					.1274	.26	.63	2.73	.92	.030	.00	4.00	TRAP
1090.731	857.582	.598	858.181	271.06	12.45	2.41	860.59	.00	1.19	38.79	10.000	34.000	4.00	0 .0
1.846	.0321					.1482	.27	.60	2.93	.92	.030	.00	4.00	TRAP
1092.577	857.642	.572	858.214	271.06	13.05	2.65	860.86	.00	1.19	38.58	10.000	34.000	4.00	0 .0
1.706	.0321					.1725	.29	.57	3.14	.92	.030	.00	4.00	TRAP
1094.283	857.696	.547	858.244	271.06	13.69	2.91	861.15	.00	1.19	38.38	10.000	34.000	4.00	0 .0
1.583	.0321					.2008	.32	.55	3.36	.92	.030	.00	4.00	TRAP
1095.866	857.747	.523	858.270	271.06	14.36	3.20	861.47	.00	1.19	38.18	10.000	34.000	4.00	0 .0
1.474	.0321					.2338	.34	.52	3.60	.92	.030	.00	4.00	TRAP
1097.340	857.795	.500	858.295	271.06	15.06	3.52	861.82	.00	1.19	38.00	10.000	34.000	4.00	0 .0
1.375	.0321					.2722	.37	.50	3.86	.92	.030	.00	4.00	TRAP
1098.715	857.839	.478	858.317	271.06	15.80	3.87	862.19	.00	1.19	37.82	10.000	34.000	4.00	0 .0
1.285	.0321					.3171	.41	.48	4.13	.92	.030	.00	4.00	TRAP

SD-LINE_A-OFFSITE Q-100
COTO DE CAZA
2020-01-22 JMITAL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1100.000	857.880	.457	858.337	271.06	16.57	4.26	862.60	.00	1.19	37.65	10.000	34.000	4.00	0 .0
TRANS STR	.1718					.1957	4.69	.46	4.43		.030	.00	4.00	TRAP
1123.980	862.000	2.255	864.255	271.06	14.56	3.29	867.55	.00	3.30	10.51	10.000	6.000	1.00	0 .0
TRANS STR	-.0610					.0126	.17	2.25	1.93		.013	.00	1.00	TRAP
1137.100	861.200	3.335	864.535	271.06	14.33	3.19	867.72	.11	3.34	1.48	3.500	.000	.00	2 .0
30.823	.0153					.0157	.49	3.44	.71	3.50	.013	.00	.00	PIPE
1167.923	861.673	3.335	865.008	271.06	14.33	3.19	868.20	.11	3.34	1.48	3.500	.000	.00	2 .0
HYDRAULIC JUMP														
1167.923	861.673	3.335	865.008	271.06	14.33	3.19	868.20	.11	3.34	1.48	3.500	.000	.00	2 .0
6.357	.0153					.0157	.10	3.44	.71	3.50	.013	.00	.00	PIPE
1174.280	861.770	3.297	865.067	271.06	14.42	3.23	868.30	.00	3.34	1.64	3.500	.000	.00	2 .0
33.070	.0151					.0157	.52	3.30	.75	3.50	.013	.00	.00	PIPE
1207.350	862.270	3.217	865.487	271.06	14.64	3.33	868.82	.14	3.34	1.91	3.500	.000	.00	2 .0
23.180	.0155					.0158	.37	3.36	.83	3.50	.013	.00	.00	PIPE
1230.530	862.630	3.203	865.833	271.06	14.69	3.35	869.18	.00	3.34	1.95	3.500	.000	.00	2 .0
23.970	.0150					.0159	.38	3.20	.84	3.50	.013	.00	.00	PIPE
1254.500	862.990	3.160	866.150	271.06	14.82	3.41	869.56	.16	3.34	2.07	3.500	.000	.00	2 .0

Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING Date: 2-12-2020 Time:12:30:18

SD-LINE_A-OFFSITE Q-100
COTO DE CAZA
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Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
70.680	.0153					.0162	1.14	3.32	.88	3.50	.013	.00	.00	PIPE
1325.180	864.070	3.070	867.140	271.06	15.15	3.57	870.71	.00	3.34	2.30	3.500	.000	.00	2 .0
66.729	.0153					.0168	1.12	3.07	.96	3.50	.013	.00	.00	PIPE
1391.909	865.090	2.971	868.061	271.06	15.56	3.76	871.82	.00	3.34	2.51	3.500	.000	.00	2 .0
84.391	.0153					.0179	1.51	2.97	1.04	3.50	.013	.00	.00	PIPE
1476.300	866.380	2.818	869.198	271.06	16.32	4.14	873.34	.25	3.34	2.77	3.500	.000	.00	2 .0
9.820	.0153					.0189	.19	3.07	1.18	3.50	.013	.00	.00	PIPE
1486.120	866.530	2.799	869.329	271.06	16.43	4.19	873.52	.00	3.34	2.80	3.500	.000	.00	2 .0
43.153	.0153					.0197	.85	2.80	1.19	3.50	.013	.00	.00	PIPE
1529.273	867.190	2.706	869.896	271.06	16.97	4.47	874.37	.00	3.34	2.93	3.500	.000	.00	2 .0
52.267	.0153					.0215	1.12	2.71	1.28	3.50	.013	.00	.00	PIPE
1581.540	867.990	2.583	870.573	271.06	17.80	4.92	875.49	.34	3.34	3.08	3.500	.000	.00	2 .0
35.450	.0152					.0237	.84	2.92	1.41	3.50	.013	.00	.00	PIPE
1616.990	868.530	2.491	871.021	271.06	18.50	5.31	876.34	.00	3.34	3.17	3.500	.000	.00	2 .0
26.030	.0154					.0258	.67	2.49	1.52	3.50	.013	.00	.00	PIPE
1643.020	868.930	2.421	871.351	271.06	19.09	5.66	877.01	.00	3.34	3.23	3.500	.000	.00	2 .0

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     .020    .0000                                        .0267      .00     2.42    1.60     .00    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |        |        |       |       |      |
  1643.040  868.930    2.420  871.350    271.06   19.10     5.66  877.01     .00    3.34     3.23    3.500     .000   .00   2   .0
        -|-       -|-      -|-       -|-       -|-     -|-      -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
 TRANS STR   .1670                                        .0775     3.48    2.42    1.61             .030       .00   .00  PIPE
 FILE: SD-AO-00.WSW                      W S P G W - CIVILDESIGN Version 14.08                                          PAGE    6
                            Program Package Serial Number: 1404
                                         WATER SURFACE PROFILE LISTING                    Date: 2-12-2020  Time:12:30:18
                        SD-LINE_A-OFFSITE Q-100
                          COTO DE CAZA
                            2020-01-22 JMITAL
 ************************************************************************************************************************ ********
           | Invert  |  Depth  |  Water  |    Q    |  Vel      Vel   |  Energy  | Super  |Critical|Flow Top|Height/|Base Wt|     |No Wth
  Station  |  Elev   |  (FT)   |  Elev   |  (CFS)  | (FPS)     Head  | Grd.El.  | Elev   | Depth  | Width  |Dia.-FT|or I.D.|  ZL |Prs/Pip
        -|-       -|-      -|-       -|-       -|-     -|-      -|-       -|-     -|-      -|-      -|-     -|-     -|-    -|
  L/Elem   |Ch Slope |         |         |         |          SF Ave|    HF    |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR |Type Ch
 *********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
           |         |        |         |         |               |         |       |        |        |       |       |      |
  1687.950  876.430    3.295  879.725    271.06    8.85     1.22  880.94     .00    3.30    12.59   10.000    6.000  1.00   0   .0
        -|-       -|-      -|-       -|-       -|-     -|-      -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
           |         |        |         |         |               |         |       |        |        |       |       |      |
  1887.950  880.430    3.295  883.725    271.06    8.85     1.22  884.94     .00    3.30    12.59   10.000    6.000  1.00   0   .0
        -|-       -|-      -|-       -|-       -|-     -|-      -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
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