

civTEC

999 Corporate Dr., Suite 100
 Ladera Ranch, CA 92694
 p: 949.463.8822
 e: tec@civtec.net



HYDROLOGY and HYDRAULIC REPORT

Project: **Costa Mesa Fire Station No. 2**
 800 Baker Street
 Costa Mesa, CA 92626

Owner: **City of Costa Mesa**
 77 Fair Drive
 Costa Mesa, CA 92626

Date Prepared: **January 19, 2026**

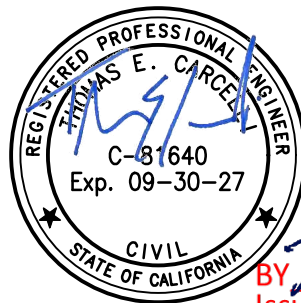
Prepared By: **civTEC**
 999 Corporate Dr., Suite 100
 Ladera Ranch, CA 92694
 p: 949.463.8822
 e: tec@civtec.net

DIVISION OF BUILDING SAFETY
 CITY OF COSTA MESA
 REVIEWED FOR CODE COMPLIANCE

BY Jeff Tol DATE 06/04/2026

The approved plans and attached specifications MUST be kept in the job site at all times. No inspections shall be performed without the approved plans on-site. It is unlawful to make any changes or alterations on same without written permission from the Division of Building and Safety, City of Costa Mesa.

The stamping of this plan and attached specifications SHALL NOT be construed to permit or approve the violation of any provisions of any City of Costa Mesa Ordinance, State, or Federal law. These permits shall expire and become null and void if the work is not commenced or maintained per CB105.5/CRC 105.5



RECOMMEND FOR APPROVAL
CITY OF COSTA MESA
SCOTT FAZEKAS & ASSOCIATES, INC.

BY Kyle Tonokawa DATE 06/03/2026

Issuance of a building permit is pending approval of all applicable City Agencies.

This issuance or granting of a permit based on approval of these plans shall not be construed to permit or approve any violation of the applicable codes or ordinances. No permit presumed to give authority to violate or cancel the provisions of such codes shall be valid.

TABLE OF CONTENTS

	<u>Page</u>
1.0 PROJECT DESCRIPTION and SUMMARY -----	1
• Vicinity Map	
• Purpose	
• Study Methodology	
• Summary	
2.0 HYDROLOGY CALCULATIONS -----	3
• Existing 25-Year Storm Event Hydrology	
• Proposed 25-Year Storm Event Hydrology	
3.0 SOILS MAP -----	8
• Soils Map	
4.0 HYDROLOGY MAP -----	9
• Existing and Proposed Hydrology Map	

1.0 PROJECT DESCRIPTION and SUMMARY

Vicinity Map



Purpose

To analyze the impact of the proposed development with a comparison of the existing runoff with the proposed runoff from a 25-year storm event.



1.0 PROJECT DESCRIPTION and SUMMARY

Study Methodology

To show the impact of the proposed development on the site watershed for a 25-year storm, this study presents:

1. Calculations of the 25-year storm runoff for the existing site and the proposed site- both analyzed with the proposed development watershed so as to obtain a direct comparison,
2. A discussion of the 25-year storm hydrology as it relates to the calculated runoff from the proposed site to the existing site.

Summary

The existing site has two distinct subareas. The biggest subarea is the northerly portion of the site that drains to existing drain inlets in the middle of the site. The other smaller subarea is the southerly portion which drains overland onto the right-of-way of Baker St. The total 25-year storm runoff is calculated to be a total of 3.2 cfs total for both subareas.

The proposed site drains via sheet flow into catch basins positioned throughout the site and then through an underground storm drain system into the proposed MWS treatment unit in the northerly edge of the site. The proposed 25-year runoff is calculated to be 2.8 cfs – an actual decrease of 0.4 cfs or an 12%.

Both the existing site and the proposed site have roughly the same amount of impervious area - that is both are highly impervious. The decrease of runoff in the proposed site can be attributed to the increase in the time of concentration and thus a decrease in the storm intensity. Due to the proposed project having a decrease in runoff, we anticipate no detrimental downstream effects based upon the calculations provided.



2.0 HYDROLOGY CALCULATIONS

Existing 25-Year Storm Event Hydrology

```
*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2015 Advanced Engineering Software (aes)
Ver. 22.0 Release Date: 07/01/2015 License ID 1678
```

Analysis prepared by:

civTEC
999 Corporate Dr., Suite 100
Ladera Ranch, CA 92694
ph: 949.463.8822

```
***** DESCRIPTION OF STUDY *****
* COSTA MESA FIRE STATION NO. 2 *
* EXISTING CONDITION *
* 25-YEAR STORM EVENT *
*****
```

FILE NAME: 17001E.DAT
TIME/DATE OF STUDY: 17:48 05/22/2025

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT (YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (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 1.01 TO NODE 1.02 IS CODE = 21
```



2.0 HYDROLOGY CALCULATIONS

```

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 195.00
ELEVATION DATA: UPSTREAM (FEET) = 41.30 DOWNSTREAM (FEET) = 38.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.665
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.495
SUBAREA Tc AND LOSS RATE DATA (AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              D        0.65    0.20    0.100    75    5.66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF (CFS) = 2.62
TOTAL AREA (ACRES) = 0.65 PEAK FLOW RATE (CFS) = 2.62

*****
FLOW PROCESS FROM NODE 2.01 TO NODE 2.02 IS CODE = 21
=====
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 32.00
ELEVATION DATA: UPSTREAM (FEET) = 41.40 DOWNSTREAM (FEET) = 41.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA (AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
APARTMENTS              D        0.13    0.20    0.200    75    5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF (CFS) = 0.56
TOTAL AREA (ACRES) = 0.13 PEAK FLOW RATE (CFS) = 0.56
=====
=====
END OF RATIONAL METHOD ANALYSIS

```



2.0 HYDROLOGY CALCULATIONS

Proposed 25-Year Storm Event Hydrology

```
*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2015 Advanced Engineering Software (aes)
Ver. 22.0 Release Date: 07/01/2015 License ID 1678
*****
```

Analysis prepared by:

civTEC
999 Corporate Dr., Suite 100
Ladera Ranch, CA 92694
ph: 949.463.8822

```
***** DESCRIPTION OF STUDY *****
* COSTA MESA FIRE STATION NO. 2 *
* PROPOSED CONDITION *
* 25-YEAR STORM EVENT *
*****
```

FILE NAME: 17001P.DAT
TIME/DATE OF STUDY: 17:54 05/22/2025

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT) (FT)	MANNING HIKE FACTOR (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      1.01 TO NODE      1.02 IS CODE = 21
*****
```

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
ELEVATION DATA: UPSTREAM(FEET) = 41.90 DOWNSTREAM(FEET) = 40.86



2.0 HYDROLOGY CALCULATIONS

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
    LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              D      0.06      0.20      0.100    75    5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.26
TOTAL AREA(ACRES) = 0.06 PEAK FLOW RATE(CFS) = 0.26

*****
FLOW PROCESS FROM NODE 1.02 TO NODE 1.03 IS CODE = 41
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 38.70 DOWNSTREAM(FEET) = 36.83
FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.011
DEPTH OF FLOW IN 8.0 INCH PIPE IS 2.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.12
GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.26
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 5.91
LONGEST FLOWPATH FROM NODE 1.01 TO NODE 1.03 = 220.00 FEET.

*****
FLOW PROCESS FROM NODE 1.03 TO NODE 1.03 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 5.91
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.389
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D      0.21      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.21 SUBAREA RUNOFF(CFS) = 0.83
EFFECTIVE AREA(ACRES) = 0.27 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.06

*****
FLOW PROCESS FROM NODE 1.03 TO NODE 1.04 IS CODE = 41
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 36.83 DOWNSTREAM(FEET) = 34.75
FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.011
DEPTH OF FLOW IN 8.0 INCH PIPE IS 4.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.75
GIVEN PIPE DIAMETER(INCH) = 8.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.06
PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 6.50
LONGEST FLOWPATH FROM NODE 1.01 TO NODE 1.04 = 390.00 FEET.

```



2.0 HYDROLOGY CALCULATIONS

```

*****
FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =      6.50
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.157
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D        0.09    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) =    0.09    SUBAREA RUNOFF(CFS) =    0.34
EFFECTIVE AREA(ACRES) =    0.36    AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) =    0.4    PEAK FLOW RATE(CFS) =    1.34

*****
FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =      6.50
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.157
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL              D        0.39    0.20    0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) =    0.39    SUBAREA RUNOFF(CFS) =    1.45
EFFECTIVE AREA(ACRES) =    0.75    AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20    AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) =    0.8    PEAK FLOW RATE(CFS) =    2.79
=====
END OF RATIONAL METHOD ANALYSIS

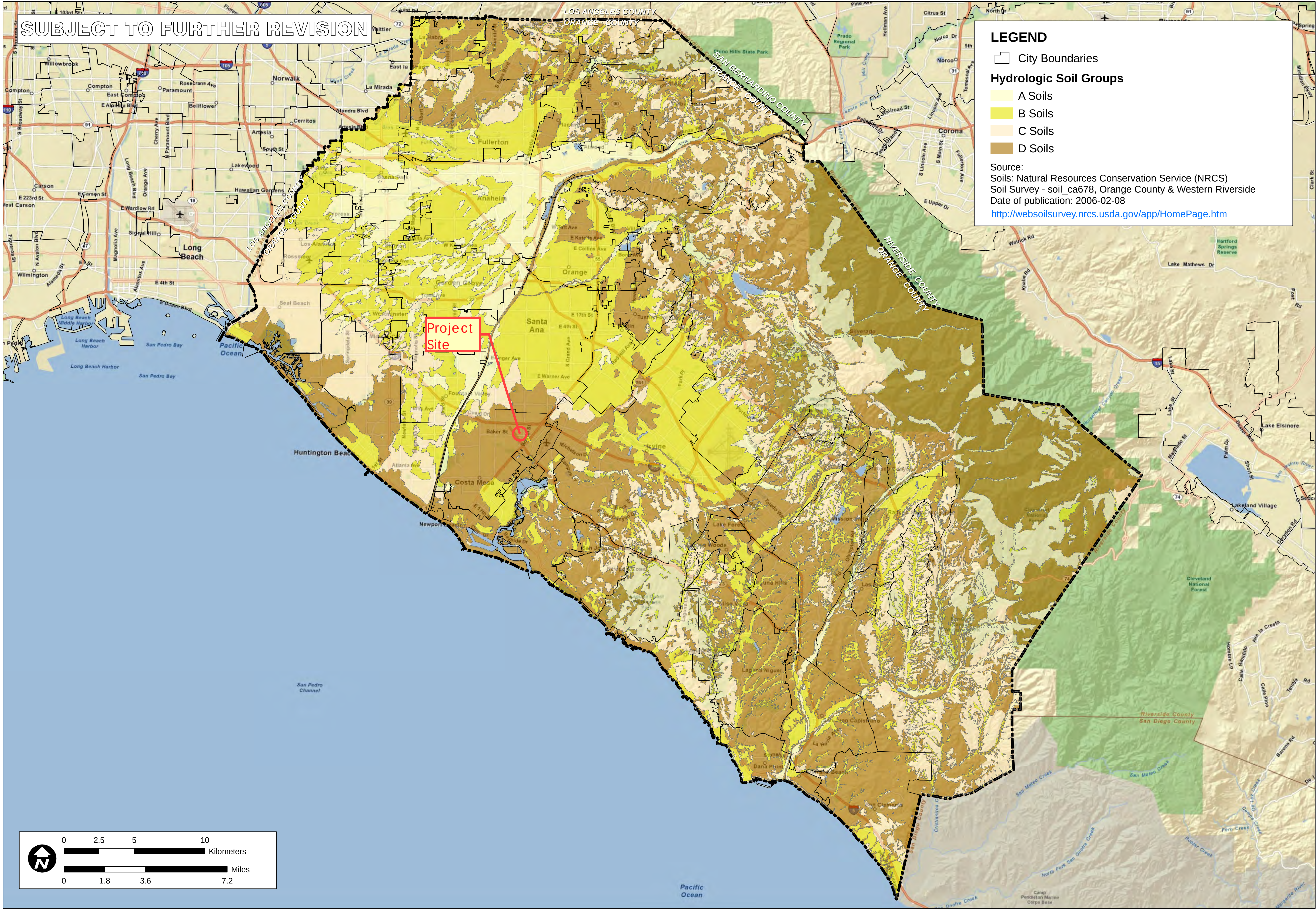
```



3.0 SOILS MAP

Soils Map

P:\9526E\GIS\Mxds\Reports\InfiltrationFeasibility_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd



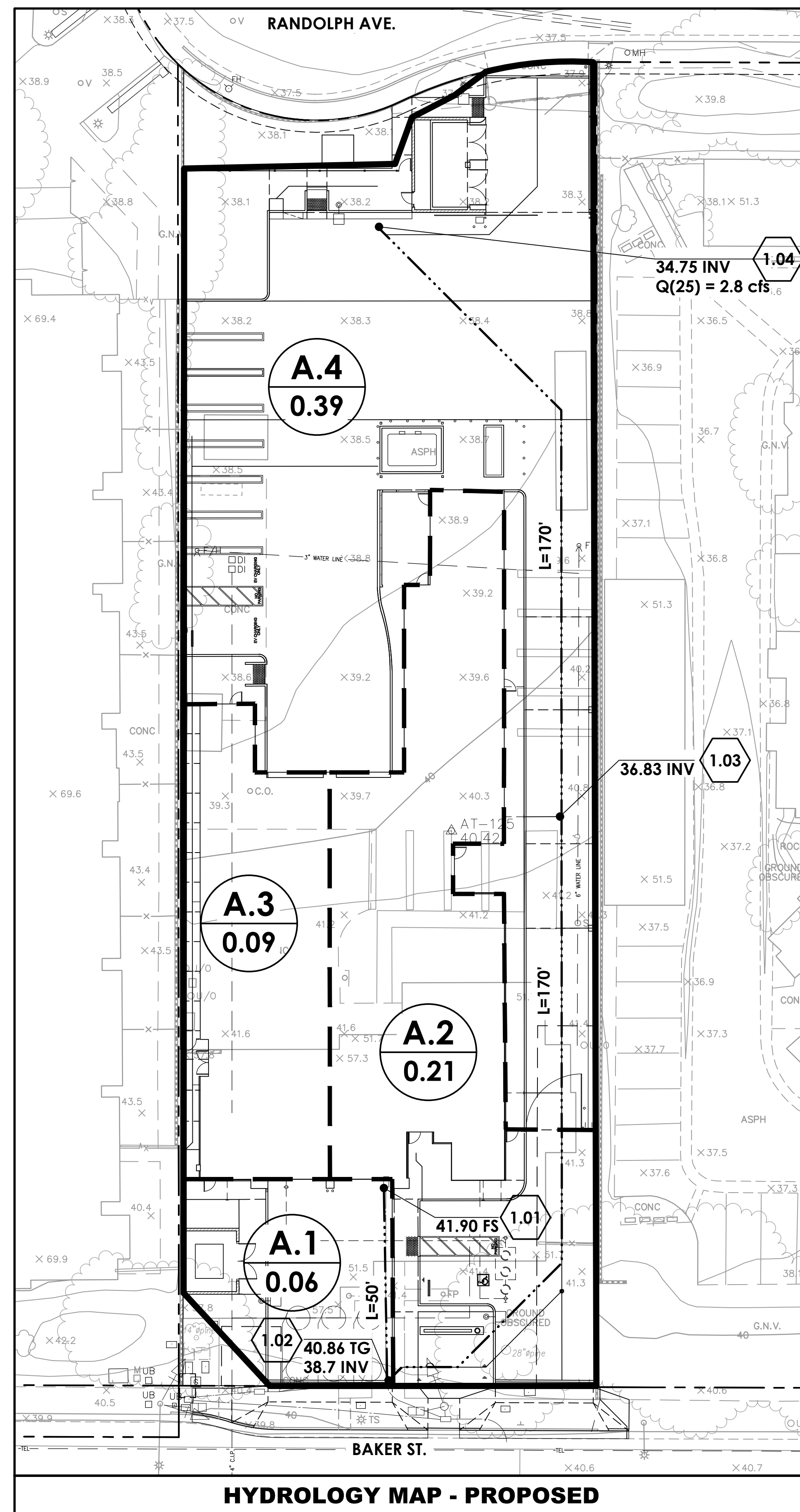
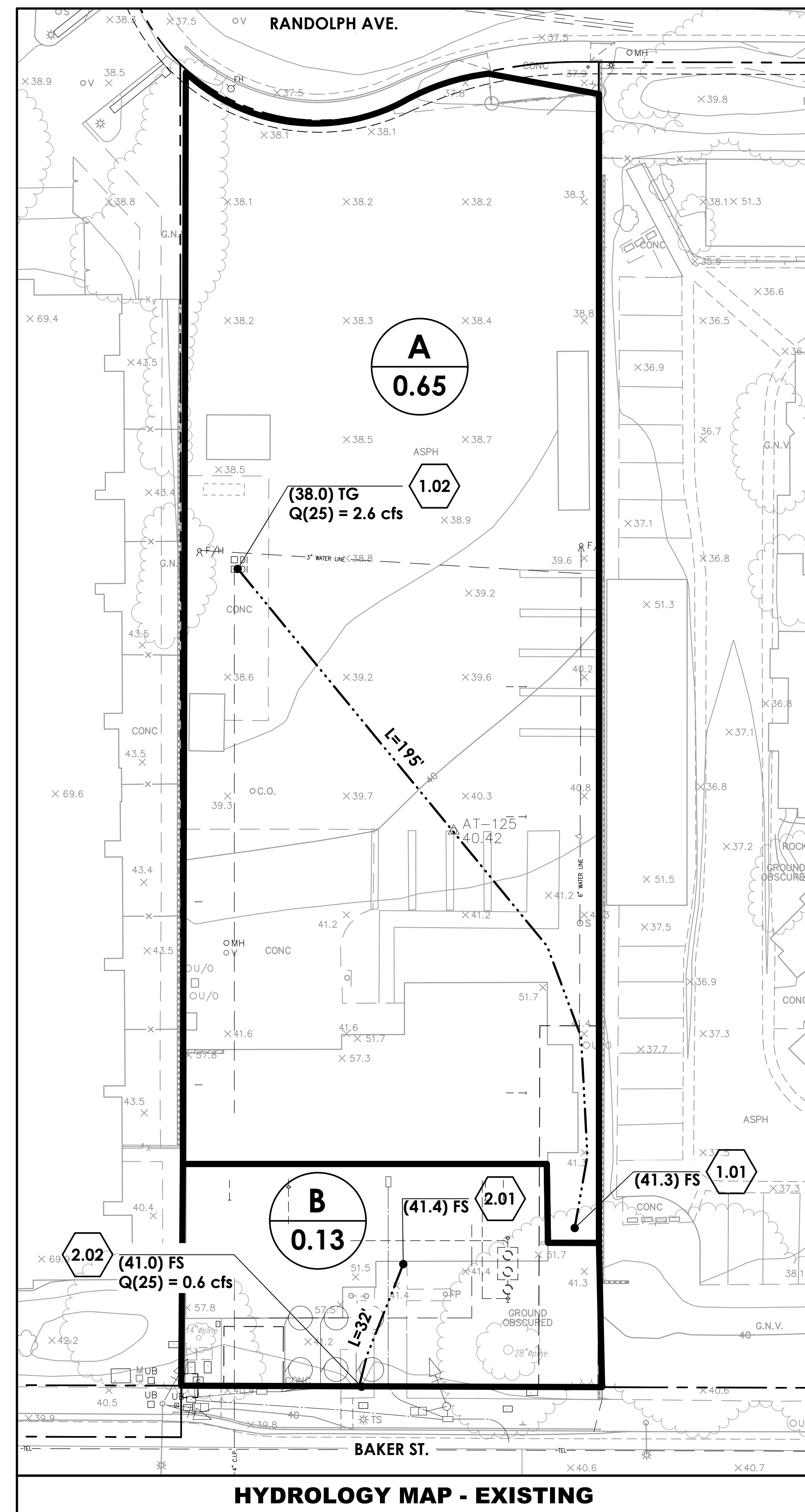
ORANGE COUNTY INFILTRATION STUDY		NRCS HYDROLOGIC SOILS GROUPS	
ORANGE CO.		CA	
JOB		TITLE	
SCALE 1" = 1.8 miles	DESIGNED TH	FIGURE XVI-2a	
DRAWING TH	CHECKED BMP		
DATE 02/09/11	JOB NO. 9526-E		

FIGURE XVI-2a



4.0 HYDROLOGY MAP

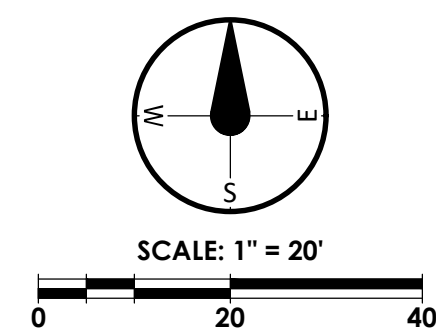
Existing and Proposed Hydrology Map

**LEGEND**

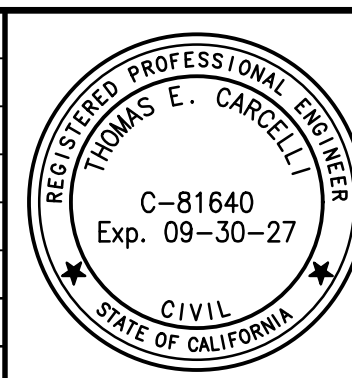
- WATERSHED BORDER
- SUBAREA BOUNDARY
- A
0.7 SUBAREA DESIGNATION
- 0.7 ACREAGE
- DRAINAGE FLOW LINE
- 1 NODE NUMBER

NOTE:
ASSUME ALL SOIL GROUP D

UNDERGROUND SERVICE
ALERT
CALL:
811
TWO WORKING DAYS
BEFORE YOU DIG



NO.	DATE	DESCRIPTION	BY
REVISIONS			



PREPARED BY:
civTEC CIVIL ENGINEERING CONSULTING
999 CORPORATE DR., SUITE 100
LADERA RANCH, CA 92694
p: 949.463.8822
e: tec@civtec.net
THOMAS E. CARCELLI, R.C.E. #81640
1/18/26

SCALE: PER PLAN
DATE: 1/18/26
DRAWN BY: STAFF
CHECKED BY: TEC
PLOT DATE: 1/18/26

**HYDROLOGY MAP
- EXISTING AND PROPOSED -**
COSTA MESA FIRE STATION NO. 2
800 BAKER STREET
COSTA MESA, CA

DRAWING NUMBER:
HYD-1
SHEET 1 OF 1
JN 170.01