

civTEC

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

civTEC
CIVIL ENGINEERING
CONSULTING

Preliminary HYDROLOGY REPORT

Project: **Chino Valley Fire District FS No. 68**
Soquel Canyon Road, Chino Hills, CA

Owner: **Chino Valley Fire District**
14011 City Center Drive
Chino Hills, CA 91709

Date Prepared: **May 5, 2023**

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

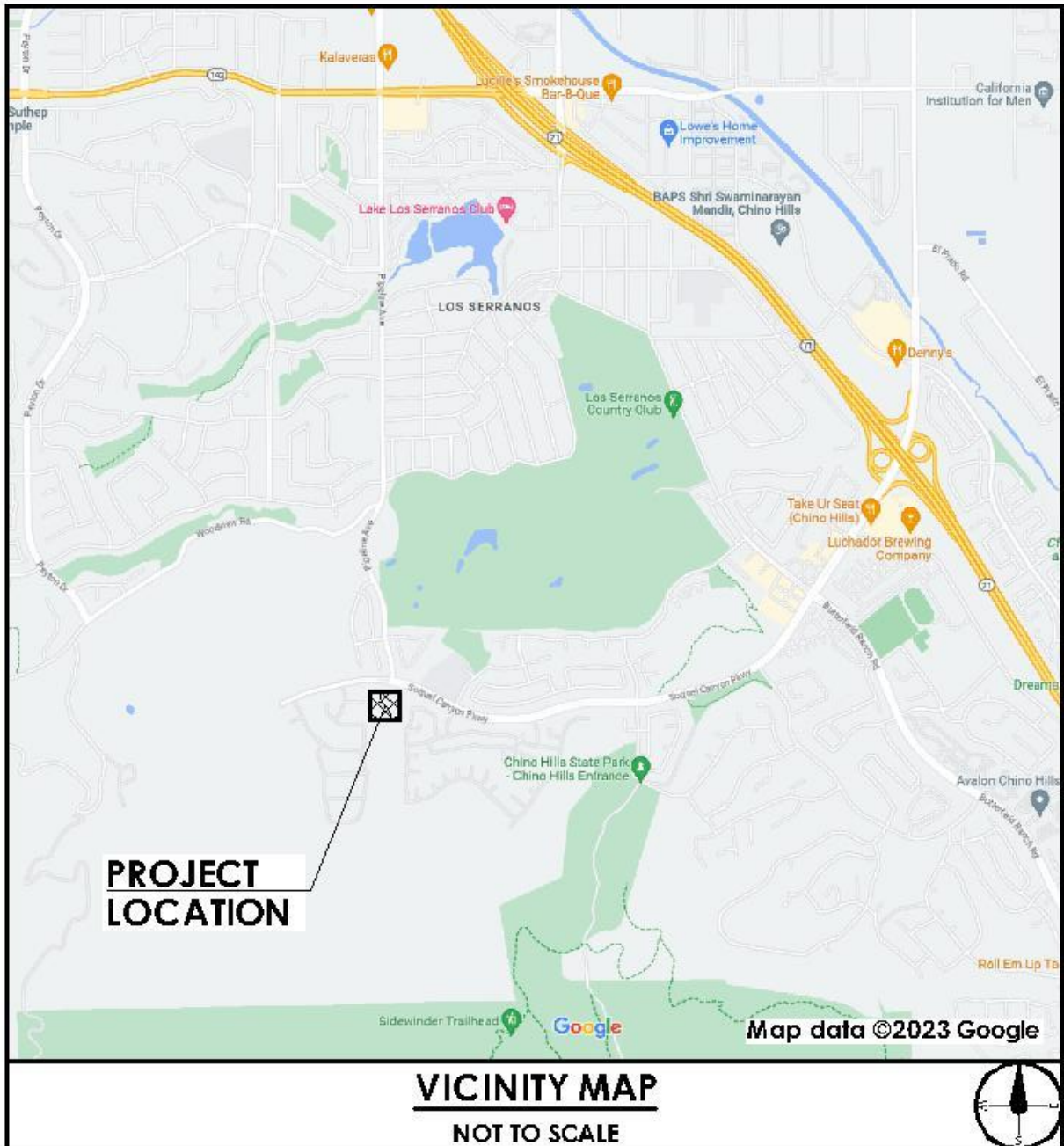


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1.0 PROJECT DESCRIPTION and SUMMARY

Location Map



1.0 PROJECT DESCRIPTION and SUMMARY

Purpose

The purpose of this report is to provide a Hydrology study to show if any additional runoff is expected from the proposed improvements and to ensure the proposed buildings are protected from flooding during the 25-yr storm.

Background

The project site is a vacant lot on Soquel Canyon Road at the intersection with Pipeline Ave. The proposed improvements will clear the existing site. The new construction will include a new fire station and an apparatus building, landscaping, and parking areas.

Site Description

The existing site is approximately 3.6-acres in size. It is bordered to the north by Soquel Canyon Road, on the east by open space next to a housing tract, on the south by open space and a detention basin below, and on the west by a housing tract.

The existing site slopes from the southwest to the northeast and has no existing inlets or underground storm drain system. The existing site has no trees on its main pad and is mostly dirt with some rock and light vegetation. The existing site drains through surface sheet flow and has no onsite drainage devices.

The proposed site will drain via sheet flow and gutter flow into proposed catch basins. The catch basins will route the water to two proposed bioinfiltration areas that will treat the water per NPDES requirements. The treated water will then connect to the existing storm drain that outlets into the existing detention basin south of the project site.

Methodology/Design Criteria

The site hydrology for existing and proposed conditions will be calculated for a 25-year storm event.

The 25-year hydrology analyses were completed for the site using The Rational Method. The computations were done using: RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE (Reference: 1986 SAN BERNARDINO COUNTY HYDROLOGY CRITERION) (c) Copyright 1983-2015 Advanced Engineering Software (aes) Ver. 22.0 Release Date: 07/01/2015.

References:

1. The proposed grading plans for the subject site as prepared by civTEC.
2. Site plan for the subject site as prepared by PBK
3. "San Bernardino County Hydrology Manual", dated August 1986.

1.0 PROJECT DESCRIPTION and SUMMARY

Hydrology Summary

For the 25-year storm event, the additive runoff total for the existing condition is 10.60 cfs and the additive runoff from the proposed condition is 11.64 cfs. There is an expected increase in runoff due to the proposed improvements of 1.04 cfs or an increase of 9.8%.

The proposed improvements will increase the overall runoff due to the proposed impervious surfaces being constructed. The existing storm drain pipe the project is proposed to connect to shows a flow of 269.90 cfs. Due to the addition of water quality BMPs being proposed (bioinfiltration basins) and the relatively minor increase in flows, any negative impact on downstream structures or capacity will be mitigated from the proposed improvements

2.0 HYDROLOGY CALCULATIONS

Existing 25-year Storm Event Hydrology

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. 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 *****
* FIRE STATION NO. 68 *
* EXISTING CONDITION *
* 25-YEAR STORM EVENT *
*****
```

```
FILE NAME: 17005E.DAT
TIME/DATE OF STUDY: 11:34 05/02/2023
```

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

```
USER SPECIFIED STORM EVENT (YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 4.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
10-YEAR STORM 60-MINUTE INTENSITY (INCH/HOUR) = 0.900
100-YEAR STORM 60-MINUTE INTENSITY (INCH/HOUR) = 1.300
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY (INCH/HOUR) = 1.0385
SLOPE OF INTENSITY DURATION CURVE = 0.6000
```

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- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

2.0 HYDROLOGY CALCULATIONS

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) = 575.00
ELEVATION DATA: UPSTREAM (FEET) = 783.00 DOWNSTREAM (FEET) = 166.00

$$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.575

* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.913

SUBAREA T_c AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F _p (INCH/HR)	A _p (DECIMAL)	SCS CN	T _c (MIN.)
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NATURAL POOR COVER

"OPEN BRUSH"	B	2.16	0.45	1.000	76	6.58
--------------	---	------	------	-------	----	------

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.45

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000

SUBAREA RUNOFF (CFS) = 6.73

TOTAL AREA (ACRES) = 2.16 PEAK FLOW RATE (CFS) = 6.73

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) = 235.00
ELEVATION DATA: UPSTREAM (FEET) = 793.00 DOWNSTREAM (FEET) = 769.00

$$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.358

* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.658

SUBAREA T_c AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F _p (INCH/HR)	A _p (DECIMAL)	SCS CN	T _c (MIN.)
-------------------------------	-------------------	-----------------	-----------------------------	-----------------------------	-----------	--------------------------

NATURAL POOR COVER

2.0 HYDROLOGY CALCULATIONS

Proposed 25-year Storm Event Hydrology

```
*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 22.0 Release Date: 07/01/2015 License ID 1678
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Analysis prepared by:

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

```
***** DESCRIPTION OF STUDY *****
* FIRE STATION NO. 68 *
* PROPOSED CONDITION *
* 25-YEAR STORM EVENT *
*****
```

FILE NAME: 17005P.DAT
 TIME/DATE OF STUDY: 16:59 05/04/2023

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT (YEAR) = 25.00
 SPECIFIED MINIMUM PIPE SIZE (INCH) = 4.00
 SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
 10-YEAR STORM 60-MINUTE INTENSITY (INCH/HOUR) = 0.900
 100-YEAR STORM 60-MINUTE INTENSITY (INCH/HOUR) = 1.300
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT = 25.00 1-HOUR INTENSITY (INCH/HOUR) = 1.0385
 SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

NO.	HALF-	CROWN TO	STREET-CROSSFALL:			CURB	GUTTER-GEOMETRIES:			MANNING
	WIDTH	CROSSFALL	IN-	/	OUT-/PARK-	HEIGHT	WIDTH	LIP	HIKE	FACTOR
	(FT)	(FT)	SIDE	/	SIDE/ WAY	(FT)	(FT)	(FT)	(FT)	(n)
1	30.0	20.0	0.018	/	0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

2.0 HYDROLOGY CALCULATIONS

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) = 789.00 DOWNSTREAM (FEET) = 776.90

$$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$$

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.000

* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.612

SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
CONDOMINIUMS	B	0.05	0.75	0.350	56	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.75

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350

SUBAREA RUNOFF (CFS) = 0.20

TOTAL AREA (ACRES) = 0.05 PEAK FLOW RATE (CFS) = 0.20

FLOW PROCESS FROM NODE 1.02 TO NODE 1.03 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 774.50 DOWNSTREAM (FEET) = 765.50
 FLOW LENGTH (FEET) = 525.00 MANNING'S N = 0.011
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.0 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 3.49
 ESTIMATED PIPE DIAMETER (INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 0.20
 PIPE TRAVEL TIME (MIN.) = 2.51 Tc (MIN.) = 7.51
 LONGEST FLOWPATH FROM NODE 1.01 TO NODE 1.03 = 575.00 FEET.

FLOW PROCESS FROM NODE 1.03 TO NODE 1.03 IS CODE = 81

2.0 HYDROLOGY CALCULATIONS

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc (MIN.) = 7.51
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.613
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	B	1.51	0.75	0.350	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA (ACRES) = 1.51 SUBAREA RUNOFF (CFS) = 4.55
 EFFECTIVE AREA (ACRES) = 1.56 AREA-AVERAGED Fm (INCH/HR) = 0.26
 AREA-AVERAGED Fp (INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.35
 TOTAL AREA (ACRES) = 1.6 PEAK FLOW RATE (CFS) = 4.71

 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) = 340.00
 ELEVATION DATA: UPSTREAM (FEET) = 799.00 DOWNSTREAM (FEET) = 774.51

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.645
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.288
 SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
APARTMENTS	B	1.07	0.75	0.200	56	5.64

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF (CFS) = 3.99
 TOTAL AREA (ACRES) = 1.07 PEAK FLOW RATE (CFS) = 3.99

 FLOW PROCESS FROM NODE 2.02 TO NODE 2.03 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<
 =====

ELEVATION DATA: UPSTREAM (FEET) = 770.50 DOWNSTREAM (FEET) = 769.00
 FLOW LENGTH (FEET) = 60.00 MANNING'S N = 0.011
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 8.68

2.0 HYDROLOGY CALCULATIONS

ESTIMATED PIPE DIAMETER (INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 3.99
 PIPE TRAVEL TIME (MIN.) = 0.12 Tc (MIN.) = 5.76
 LONGEST FLOWPATH FROM NODE 2.01 TO NODE 2.03 = 400.00 FEET.

 FLOW PROCESS FROM NODE 3.01 TO NODE 3.02 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH (FEET) = 185.00
 ELEVATION DATA: UPSTREAM (FEET) = 800.00 DOWNSTREAM (FEET) = 762.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.814

* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.213

SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL POOR COVER						
"OPEN BRUSH"	B	0.87	0.45	1.000	76	5.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.45

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

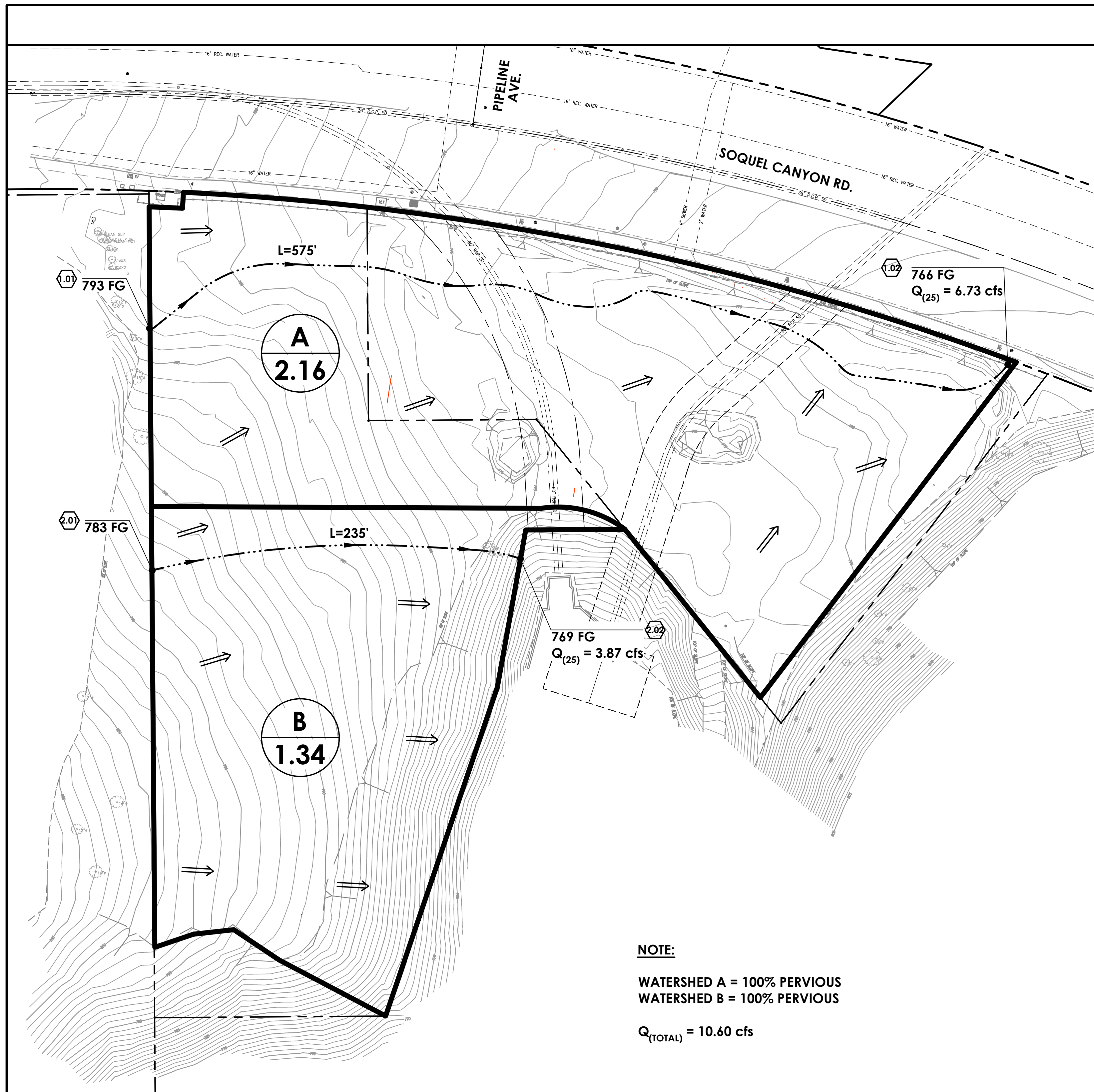
SUBAREA RUNOFF (CFS) = 2.94

TOTAL AREA (ACRES) = 0.87 PEAK FLOW RATE (CFS) = 2.94

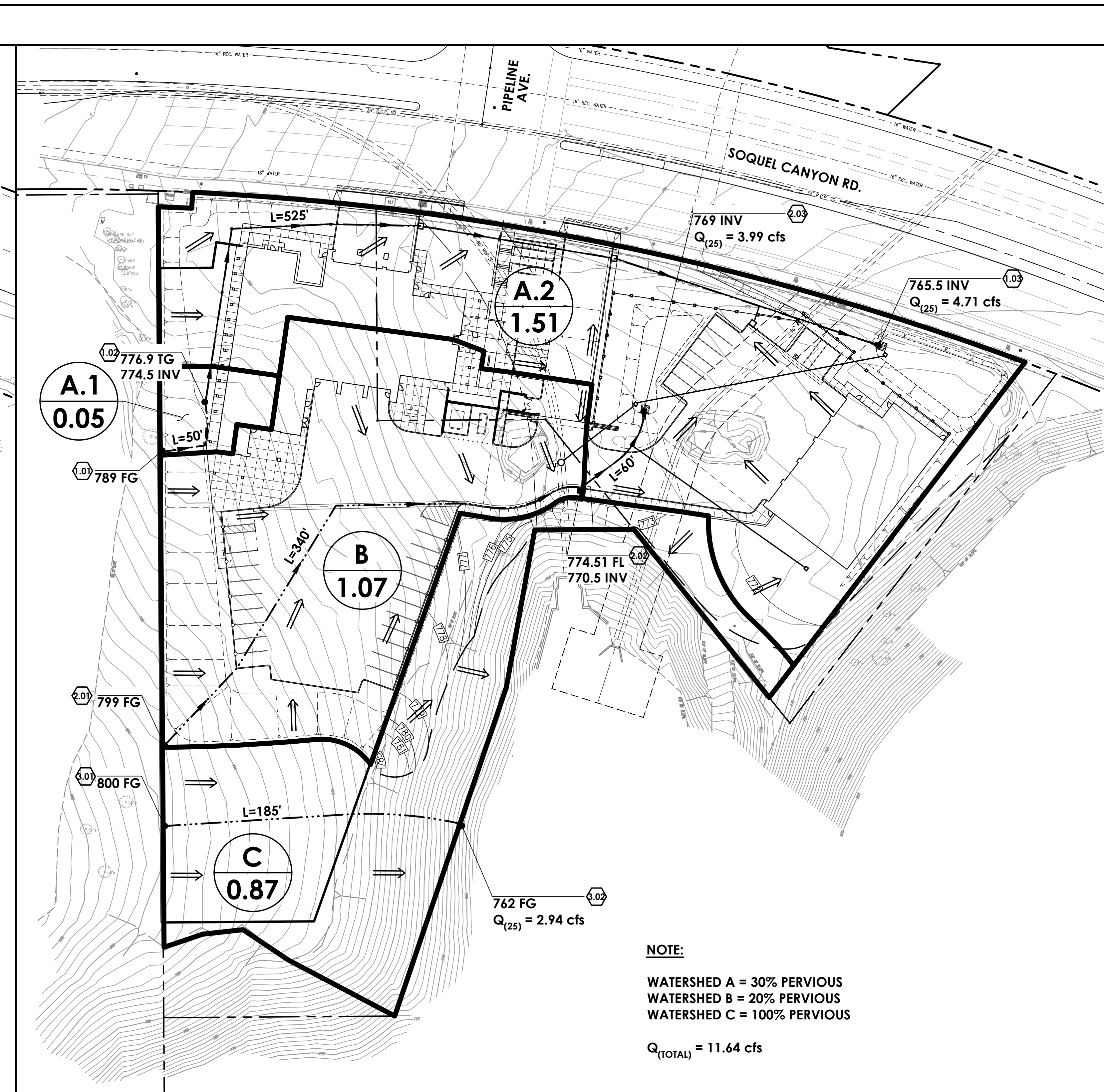
=====
 END OF RATIONAL METHOD ANALYSIS

3.0 HYDROLOGY MAP

Hydrology Map



HYDROLOGY MAP - EXISTING

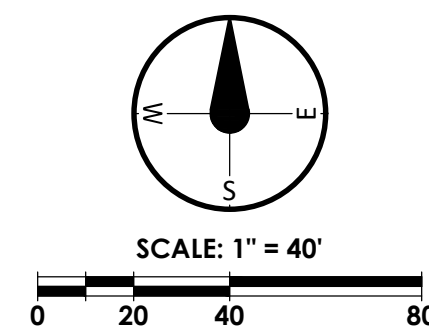


HYDROLOGY MAP - PROPOSED

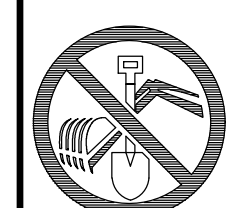
LEGEND

- WATERSHED BORDER
- NODE NUMBER
- SUBAREA DESIGNATION
- ACREAGE
- DRAINAGE FLOW LINE
- DIRECTION OF RUNOFF

NOTE:
 ASSUME ALL SOIL GROUP B
 10-YEAR 1-HOUR ISOHYETAL = 0.9 INCHES
 100-YEAR 1-HOUR ISOHYETAL = 1.3 INCHES
 SLOPE OF INTENSITY DURATION CURVE = 0.6



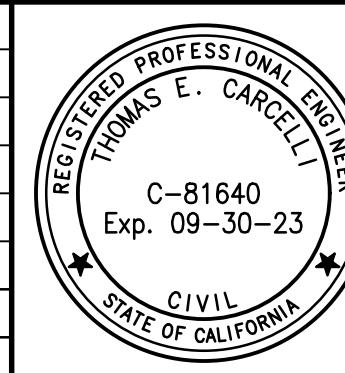
UNDERGROUND SERVICE ALERT



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

SCALE: PER PLAN

DATE: 5/4/23
 DRAWN BY: STAFF
 CHECKED BY: TEC
 PLOT DATE: 5/4/23

HYDROLOGY MAP
CHINO VALLEY FIRE DISTRICT FS NO. 68
SOQUEL CANYON ROAD
CHINO HILLS, CA

DRAWING NUMBER:
HYD-1
 SHEET 1 OF 1
 JN 170.05

NOT FOR CONSTRUCTION