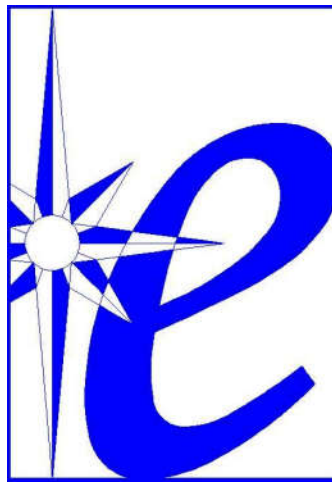


TENTATIVE TRACT 20334

Rancho Cucamonga, CA

DRAINAGE STUDY

December 21, 2020



Reference [job number]

PREPARED BY:

Encompass Associates, Inc.

5699 Cousins Place
Rancho Cucamonga, CA 91737
909-684-0093

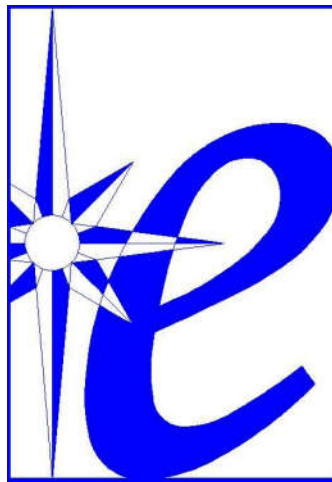
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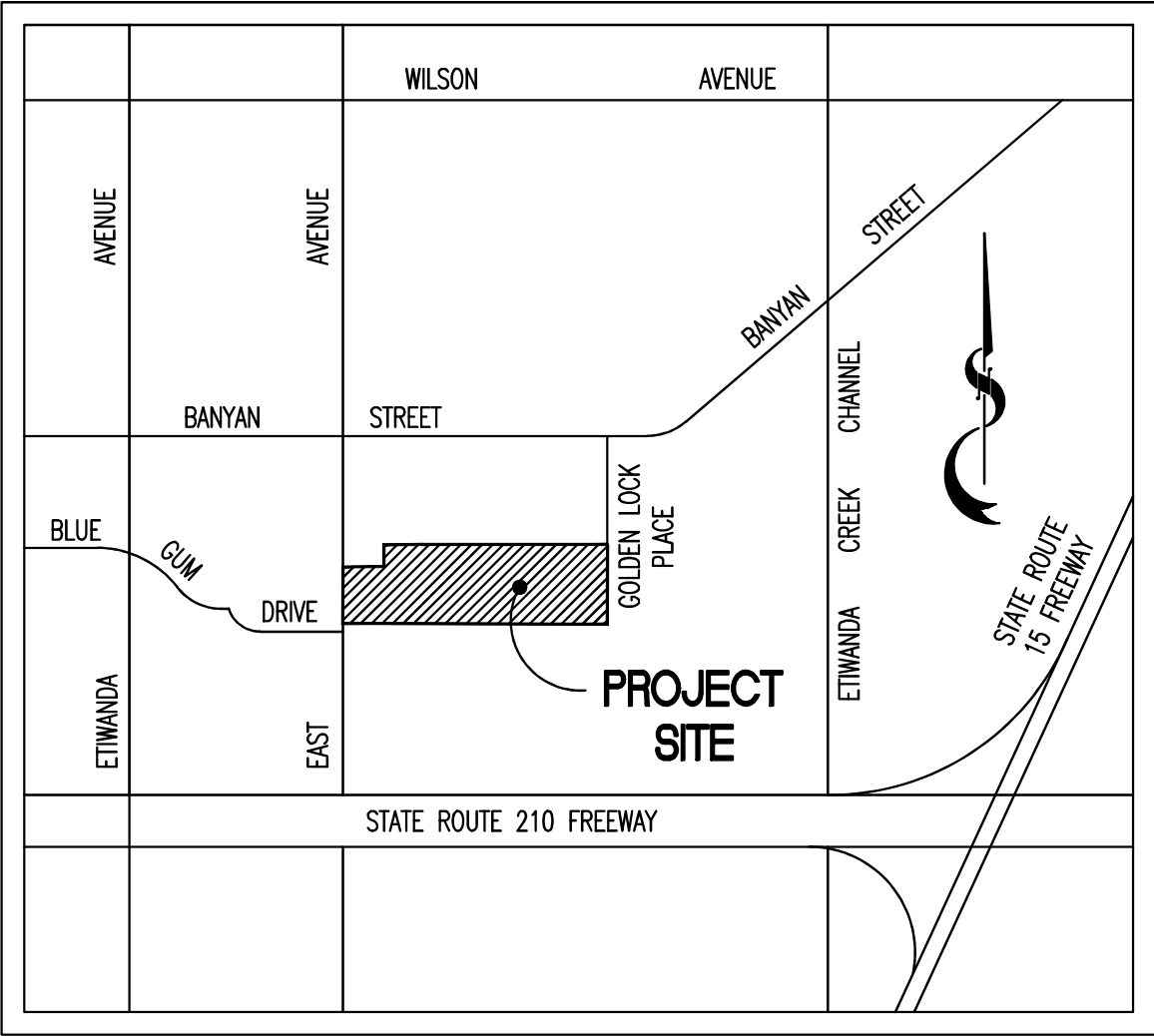
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-



VICINITY MAP

N.T.S.

DISCUSSION

The purpose of this drainage study is to determine the drainage facility requirements for Tentative Tract 20334 in Rancho Cucamonga. Specifically, the subject project is located south of approximately 10 acres of mostly undeveloped vacant land, west of Golden Lock Place and existing residences, north of existing low density residences, and east of East Avenue and existing residences, in the City of Rancho Cucamonga, County of San Bernardino, California.

The subject site will consist of 17 single-family residences, with an approximate area of 10 acres. Proposed drainage is overland and by sheet flow generally in a southeasterly direction. The site is subject to off-site runoff from approximately 10 acres to the north. A small portion of the westerly off-site area will drain to and through the project, with the balance tributary to the north property line.

An extension to the existing storm drain south on Golden Lock Place is proposed, and will be handled with two parallel 24" storm drain lines. One storm drain will extend north of the site to collect runoff from the 10 northerly acres. Developed condition hydrology was estimated for this area, with node elevations, flow path orientation, and anticipated land use consistent with likely development of this parcel. For instance, runoff will likely be directed down a future street located roughly in the middle of the property, and the site will likely sit below Banyan Street in order to better balance the site from an earthwork and retaining wall standpoint. In order to collect current, undeveloped runoff, a v-gutter is proposed along the north property line, draining to a proposed drop inlet at the east end. The future northerly development can install a storm drain to this inlet as applicable. The inlet and storm drain are designed to collect the full 10-year storm, with excess runoff being directed to Golden Lock Place. Street flow calculations for Golden Lock Place is not performed for the 10-year storm because the 100-year storm is maintained below the top of curb (see below). Pipe hydraulics for the inlet and storm drain (10-year storm) are included herein.

The second 24" storm drain line will serve the proposed project, being extended onto the site to two proposed 21-foot catch basins. These inlets will collect the majority of the 100-year storm. A proposed storm Water Quality BMP is proposed in the common openspace located at the southeast corner of the site, and overflow from this system will also be directed to the site 24" storm drain line.

With some 100-year storm runoff being directed to Golden Lock Place as sheet flow, an assessment of street flow is provided. The difference between the 10-year and 100-year off-site runoff not collected by the proposed inlet is (18.7-9.8) 8.9 cfs. The amount not collected by the two 21' on-site catch basins is (24.4-10.61-10.61) 3.18 cfs. The easterly most portion of the site downstream of the proposed catch basins, plus the small area comprising the west side of Golden Lock, contribute 1.43 and 0.87 cfs, respectively, resulting in a total of 14.38 cfs flowing on the west side of Golden Lock Place. Given a minimum street grade shown on the Conceptual Grading Plan of 3.2%, street flow depth will be 0.46', below the top of the proposed 6" curb.

The rational method hydrologic model, as defined by Flood Control for San Bernardino County, was followed in the determination of storm runoff for the 10- and 100-year storm events. AES software was utilized for hydrology calculations and some street flow depth and catch basin analysis. CivilDesign's WSPGW hydraulic software program was used to validate pipe sizes.

RATIONAL METHOD

HYDROLOGY

10-YEAR

100-YEAR

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1584

Analysis prepared by:

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***** DESCRIPTION OF STUDY *****

* TRACT 20334 - EAST S/O BANYAN *
* 100-YEAR *
* *

FILE NAME: X:\FTP\AES\20334.DAT
TIME/DATE OF STUDY: 12:01 12/18/2020

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500

ANTECEDENT MOISTURE CONDITION (AMC) III 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)	MANINGG FACTOR (n)
1	18.0	9.0	0.020/0.020/0.020	0.50	2.00	0.0313	0.125	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 50.00 TO NODE 4.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00
ELEVATION DATA: UPSTREAM(FEET) = 1500.00 DOWNSTREAM(FEET) = 1474.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.967
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.717
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.)
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        5.26      0.74      0.700     52  13.97
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA RUNOFF(CFS) = 15.14
TOTAL AREA(ACRES) = 5.26 PEAK FLOW RATE(CFS) = 15.14

*****
FLOW PROCESS FROM NODE 4.00 TO NODE 10.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 1474.00 DOWNSTREAM ELEVATION(FEET) = 1464.00
STREET LENGTH(FEET) = 520.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 9.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.80
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 15.22
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.69
STREET FLOW TRAVEL TIME(MIN.) = 2.16 Tc(MIN.) = 16.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.410
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
    LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        3.58      0.74      0.700     52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA AREA(ACRES) = 3.58 SUBAREA RUNOFF(CFS) = 9.31
EFFECTIVE AREA(ACRES) = 8.84 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 8.8 PEAK FLOW RATE(CFS) = 23.00

END OF SUBAREA STREET FLOW HYDRAULICS:
```

DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 16.21
FLOW VELOCITY(FEET/SEC.) = 4.14 DEPTH*VELOCITY(FT*FT/SEC.) = 1.83
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 10.00 = 1470.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.13
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.410
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL GOOD COVER					
"GRASS"	A	0.58	0.66	1.000	58

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.66
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.58 SUBAREA RUNOFF(CFS) = 1.44
EFFECTIVE AREA(ACRES) = 9.42 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.73 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 9.4 PEAK FLOW RATE(CFS) = 24.43

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1459.00 DOWNSTREAM(FEET) = 1451.00
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.20
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.43
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 16.43
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 11.00 = 1710.00 FEET.

FLOW PROCESS FROM NODE 11.00 TO NODE 11.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.43
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.372
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.51	0.74	0.850	52
RESIDENTIAL					
"2 DWELLINGS/ACRE"	A	1.13	0.74	0.700	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.747
SUBAREA AREA(ACRES) = 1.64 SUBAREA RUNOFF(CFS) = 4.16
EFFECTIVE AREA(ACRES) = 11.06 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 11.1 PEAK FLOW RATE(CFS) = 28.27

```

*****
FLOW PROCESS FROM NODE      11.00 TO NODE      79.00 IS CODE =  31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1451.00  DOWNSTREAM(FEET) =  1446.00
FLOW LENGTH(FEET) =  150.00  MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  13.87
ESTIMATED PIPE DIAMETER(INCH) =  24.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  28.27
PIPE TRAVEL TIME(MIN.) =  0.18  Tc(MIN.) =  16.61
LONGEST FLOWPATH FROM NODE      50.00 TO NODE      79.00 =  1860.00 FEET.

*****
FLOW PROCESS FROM NODE      10.00 TO NODE      10.00 IS CODE =  1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  16.61
RAINFALL INTENSITY(INCH/HR) =  3.35
AREA-AVERAGED Fm(INCH/HR) =  0.53
AREA-AVERAGED Fp(INCH/HR) =  0.74
AREA-AVERAGED Ap =  0.72
EFFECTIVE STREAM AREA(ACRES) =  11.06
TOTAL STREAM AREA(ACRES) =  11.06
PEAK FLOW RATE(CFS) AT CONFLUENCE =  28.27

*****
FLOW PROCESS FROM NODE      60.00 TO NODE      65.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  985.00
ELEVATION DATA: UPSTREAM(FEET) =  1498.00  DOWNSTREAM(FEET) =  1482.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  15.729
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.461
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.)
RESIDENTIAL
"2 DWELLINGS/ACRE"      A      5.89      0.74      0.700      52  15.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
SUBAREA RUNOFF(CFS) =  15.59
TOTAL AREA(ACRES) =  5.89  PEAK FLOW RATE(CFS) =  15.59

*****
FLOW PROCESS FROM NODE      65.00 TO NODE      66.00 IS CODE =  62
-----

```

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1482.00 DOWNSTREAM ELEVATION(FEET) = 1477.00
STREET LENGTH(FEET) = 135.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 9.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.31
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 12.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.83
STREET FLOW TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 16.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.403
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"2 DWELLINGS/ACRE"	A	1.32	0.74	0.700	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA AREA(ACRES) = 1.32 SUBAREA RUNOFF(CFS) = 3.43
EFFECTIVE AREA(ACRES) = 7.21 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 7.2 PEAK FLOW RATE(CFS) = 18.71

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 13.04
FLOW VELOCITY(FEET/SEC.) = 5.06 DEPTH*VELOCITY(FT*FT/SEC.) = 1.91
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 1120.00 FEET.

FLOW PROCESS FROM NODE 66.00 TO NODE 67.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1472.00 DOWNSTREAM(FEET) = 1461.00
FLOW LENGTH(FEET) = 183.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.57
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.71
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 16.38
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 67.00 = 1303.00 FEET.

FLOW PROCESS FROM NODE 67.00 TO NODE 67.00 IS CODE = 81

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

```

=====
MAINLINE Tc(MIN.) = 16.38
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.378
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        0.34    0.74    0.700    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA AREA(ACRES) = 0.34    SUBAREA RUNOFF(CFS) = 0.87
EFFECTIVE AREA(ACRES) = 7.55    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.74    AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 7.6    PEAK FLOW RATE(CFS) = 19.42

```

FLOW PROCESS FROM NODE 67.00 TO NODE 79.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 1461.00    DOWNSTREAM(FEET) = 1446.00
FLOW LENGTH(FEET) = 454.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.60
ESTIMATED PIPE DIAMETER(INCH) = 21.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.42
PIPE TRAVEL TIME(MIN.) = 0.60    Tc(MIN.) = 16.98
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 79.00 = 1757.00 FEET.

```

FLOW PROCESS FROM NODE 79.00 TO NODE 79.00 IS CODE = 81

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

```

=====
MAINLINE Tc(MIN.) = 16.98
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.306
SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
    LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        0.57    0.74    0.700    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA AREA(ACRES) = 0.57    SUBAREA RUNOFF(CFS) = 1.43
EFFECTIVE AREA(ACRES) = 8.12    AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.74    AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 8.1    PEAK FLOW RATE(CFS) = 20.36

```

FLOW PROCESS FROM NODE 79.00 TO NODE 79.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

```
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 16.98
RAINFALL INTENSITY(INCH/HR) = 3.31
AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA(ACRES) = 8.12
TOTAL STREAM AREA(ACRES) = 8.12
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.36
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	28.27	16.61	3.350	0.74 (0.53)	0.72	11.1	50.00
2	20.36	16.98	3.306	0.74 (0.52)	0.70	8.1	60.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.50	16.61	3.350	0.74 (0.53)	0.71	19.0	50.00
2	48.19	16.98	3.306	0.74 (0.53)	0.71	19.2	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```
PEAK FLOW RATE(CFS) = 48.50 Tc(MIN.) = 16.61
EFFECTIVE AREA(ACRES) = 19.00 AREA-AVERAGED Fm(INCH/HR) = 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.71
TOTAL AREA(ACRES) = 19.2
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 79.00 = 1860.00 FEET.
```

END OF STUDY SUMMARY:

```
TOTAL AREA(ACRES) = 19.2 TC(MIN.) = 16.61
EFFECTIVE AREA(ACRES) = 19.00 AREA-AVERAGED Fm(INCH/HR)= 0.53
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.713
PEAK FLOW RATE(CFS) = 48.50
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.50	16.61	3.350	0.74 (0.53)	0.71	19.0	50.00
2	48.19	16.98	3.306	0.74 (0.53)	0.71	19.2	60.00

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1584

Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* TRACT 20334 - EAST S/O BANYAN *
* 10-YEAR *
* *

FILE NAME: X:\FTP\AES\20334D10.DAT
TIME/DATE OF STUDY: 12:37 12/18/2020

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0000

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 HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	18.0	9.0	0.020/0.020/0.020	0.50	2.00 0.0313 0.125	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 50.00 TO NODE 4.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00
ELEVATION DATA: UPSTREAM(FEET) = 1500.00 DOWNSTREAM(FEET) = 1474.00

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

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 13.967

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.398

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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RESIDENTIAL

"2 DWELLINGS/ACRE"	A	5.26	0.98	0.700	32	13.97
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SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.97

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.700

SUBAREA RUNOFF (CFS) = 8.12

TOTAL AREA (ACRES) = 5.26 PEAK FLOW RATE (CFS) = 8.12

FLOW PROCESS FROM NODE 4.00 TO NODE 10.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 1474.00 DOWNSTREAM ELEVATION(FEET) = 1464.00

STREET LENGTH(FEET) = 520.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 9.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.52

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.35

HALFSTREET FLOOD WIDTH(FEET) = 11.71

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.47

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.21

STREET FLOW TRAVEL TIME(MIN.) = 2.50 T_c (MIN.) = 16.47

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.172

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
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RESIDENTIAL

"2 DWELLINGS/ACRE"	A	3.58	0.98	0.700	32
--------------------	---	------	------	-------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.700

SUBAREA AREA (ACRES) = 3.58 SUBAREA RUNOFF (CFS) = 4.80

EFFECTIVE AREA (ACRES) = 8.84 AREA-AVERAGED F_m (INCH/HR) = 0.68

AREA-AVERAGED F_p (INCH/HR) = 0.97 AREA-AVERAGED A_p = 0.70

TOTAL AREA (ACRES) = 8.8 PEAK FLOW RATE (CFS) = 11.85

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 12.34
FLOW VELOCITY(FEET/SEC.) = 3.55 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 10.00 = 1470.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.47					
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.172					
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL GOOD COVER					
"GRASS"	A	0.58	0.94	1.000	38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.94					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
SUBAREA AREA(ACRES) = 0.58		SUBAREA RUNOFF(CFS) = 0.65			
EFFECTIVE AREA(ACRES) = 9.42		AREA-AVERAGED Fm(INCH/HR) = 0.70			
AREA-AVERAGED Fp(INCH/HR) = 0.97		AREA-AVERAGED Ap = 0.72			
TOTAL AREA(ACRES) = 9.4		PEAK FLOW RATE(CFS) = 12.50			

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1459.00		DOWNSTREAM(FEET) = 1451.00	
FLOW LENGTH(FEET) = 240.00		MANNING'S N = 0.013	
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES			
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.33			
ESTIMATED PIPE DIAMETER(INCH) = 18.00		NUMBER OF PIPES = 1	
PIPE-FLOW(CFS) = 12.50			
PIPE TRAVEL TIME(MIN.) = 0.35		Tc(MIN.) = 16.82	
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 11.00 =		1710.00 FEET.	

FLOW PROCESS FROM NODE 11.00 TO NODE 11.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.82					
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145					
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.51	0.98	0.850	32
RESIDENTIAL					
"2 DWELLINGS/ACRE"	A	1.13	0.98	0.700	32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.747					
SUBAREA AREA(ACRES) = 1.64		SUBAREA RUNOFF(CFS) = 2.09			
EFFECTIVE AREA(ACRES) = 11.06		AREA-AVERAGED Fm(INCH/HR) = 0.70			
AREA-AVERAGED Fp(INCH/HR) = 0.97		AREA-AVERAGED Ap = 0.72			

TOTAL AREA (ACRES) = 11.1 PEAK FLOW RATE (CFS) = 14.36

FLOW PROCESS FROM NODE 11.00 TO NODE 79.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 1451.00 DOWNSTREAM (FEET) = 1446.00
FLOW LENGTH (FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.66
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 14.36
PIPE TRAVEL TIME (MIN.) = 0.21 Tc (MIN.) = 17.04
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 79.00 = 1860.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 17.04
RAINFALL INTENSITY (INCH/HR) = 2.13
AREA-AVERAGED Fm (INCH/HR) = 0.70
AREA-AVERAGED Fp (INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.72
EFFECTIVE STREAM AREA (ACRES) = 11.06
TOTAL STREAM AREA (ACRES) = 11.06
PEAK FLOW RATE (CFS) AT CONFLUENCE = 14.36

FLOW PROCESS FROM NODE 60.00 TO NODE 65.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH (FEET) = 985.00
ELEVATION DATA: UPSTREAM (FEET) = 1498.00 DOWNSTREAM (FEET) = 1482.00

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

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 15.729

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.233

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.)
RESIDENTIAL "2 DWELLINGS/ACRE"	A	5.89	0.98	0.700	32	15.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700

SUBAREA RUNOFF (CFS) = 8.22

TOTAL AREA (ACRES) = 5.89 PEAK FLOW RATE (CFS) = 8.22

FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 62

```

-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 1482.00  DOWNSTREAM ELEVATION(FEET) = 1477.00
STREET LENGTH(FEET) = 135.00  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 9.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.11
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 9.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.32
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.32
STREET FLOW TRAVEL TIME(MIN.) = 0.52  Tc(MIN.) = 16.25
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        1.32    0.98    0.700    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.700
SUBAREA AREA(ACRES) = 1.32  SUBAREA RUNOFF(CFS) = 1.79
EFFECTIVE AREA(ACRES) = 7.21  AREA-AVERAGED Fm(INCH/HR) = 0.68
AREA-AVERAGED Fp(INCH/HR) = 0.98  AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 7.2  PEAK FLOW RATE(CFS) = 9.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31  HALFSTREET FLOOD WIDTH(FEET) = 9.88
FLOW VELOCITY(FEET/SEC.) = 4.35  DEPTH*VELOCITY(FT*FT/SEC.) = 1.37
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 1120.00 FEET.

*****
FLOW PROCESS FROM NODE 66.00 TO NODE 67.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1472.00  DOWNSTREAM(FEET) = 1461.00
FLOW LENGTH(FEET) = 183.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.31
ESTIMATED PIPE DIAMETER(INCH) = 15.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.78
PIPE TRAVEL TIME(MIN.) = 0.23  Tc(MIN.) = 16.48
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 67.00 = 1303.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =  16.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.171
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        0.34      0.98      0.700      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
SUBAREA AREA(ACRES) =  0.34      SUBAREA RUNOFF(CFS) =  0.46
EFFECTIVE AREA(ACRES) =  7.55      AREA-AVERAGED Fm(INCH/HR) =  0.68
AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.70
TOTAL AREA(ACRES) =  7.6      PEAK FLOW RATE(CFS) =  10.12

*****
FLOW PROCESS FROM NODE      67.00 TO NODE      79.00 IS CODE =  31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1461.00  DOWNSTREAM(FEET) = 1446.00
FLOW LENGTH(FEET) =  454.00  MANNING'S N =  0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.53
ESTIMATED PIPE DIAMETER(INCH) = 15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  10.12
PIPE TRAVEL TIME(MIN.) =  0.72  Tc(MIN.) =  17.20
LONGEST FLOWPATH FROM NODE      60.00 TO NODE      79.00 =  1757.00 FEET.

*****
FLOW PROCESS FROM NODE      79.00 TO NODE      79.00 IS CODE =  81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) =  17.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.116
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
    LAND USE          GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"2 DWELLINGS/ACRE"      A        0.57      0.98      0.700      32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
SUBAREA AREA(ACRES) =  0.57      SUBAREA RUNOFF(CFS) =  0.74
EFFECTIVE AREA(ACRES) =  8.12      AREA-AVERAGED Fm(INCH/HR) =  0.68
AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.70
TOTAL AREA(ACRES) =  8.1      PEAK FLOW RATE(CFS) =  10.48

*****
FLOW PROCESS FROM NODE      79.00 TO NODE      79.00 IS CODE =  1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

```

>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

```
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 17.20
RAINFALL INTENSITY(INCH/HR) = 2.12
AREA-AVERAGED Fm(INCH/HR) = 0.68
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.70
EFFECTIVE STREAM AREA(ACRES) = 8.12
TOTAL STREAM AREA(ACRES) = 8.12
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.48
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.36	17.04	2.128	0.97(0.70)	0.72	11.1	50.00
2	10.48	17.20	2.116	0.98(0.68)	0.70	8.1	60.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.82	17.04	2.128	0.97(0.69)	0.71	19.1	50.00
2	24.71	17.20	2.116	0.97(0.69)	0.71	19.2	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```
PEAK FLOW RATE(CFS) = 24.82 Tc(MIN.) = 17.04
EFFECTIVE AREA(ACRES) = 19.10 AREA-AVERAGED Fm(INCH/HR) = 0.69
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.71
TOTAL AREA(ACRES) = 19.2
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 79.00 = 1860.00 FEET.
```

END OF STUDY SUMMARY:

```
TOTAL AREA(ACRES) = 19.2 TC(MIN.) = 17.04
EFFECTIVE AREA(ACRES) = 19.10 AREA-AVERAGED Fm(INCH/HR) = 0.69
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.713
PEAK FLOW RATE(CFS) = 24.82
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.82	17.04	2.128	0.97(0.69)	0.71	19.1	50.00
2	24.71	17.20	2.116	0.97(0.69)	0.71	19.2	60.00

END OF RATIONAL METHOD ANALYSIS

STREET FLOW DEPTH

AND

CATCH BASIN CAPACITY

CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title: Tr20334 Etiwanda 17

Designer: ATS/ENCOMPASS ASSOCIATES, INC.

Project Date: Friday, December 18, 2020

Project Units: U.S. Customary Units

Notes: ASSESSMENT OF V-GUTTER AND DROP INLET FOR OFF-SITE
RUNOFF COLLECTION - 10-YEAR STORM

Median/Ditch Drop-Inlet Analysis: Median/Ditch Drop-Inlet Analysis

Channel Analysis: Channel Analysis

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0140

Flow: 9.8000 cfs

Result Parameters

Depth: 0.5973 ft

Area of Flow: 1.0702 ft²

Wetted Perimeter: 3.7775 ft

Hydraulic Radius: 0.2833 ft

Average Velocity: 9.1572 ft/s

Top Width: 3.5836 ft

Froude Number: 2.9530

Critical Depth: 0.9210 ft

Critical Velocity: 3.8508 ft/s

Critical Slope: 0.0040 ft/ft

Critical Top Width: 5.53 ft

Calculated Max Shear Stress: 1.4908 lb/ft²

Calculated Avg Shear Stress: 0.7071 lb/ft²

Inlet Data:

Grate Width: 4.0000 ft

Grate Length: 4.0000 ft

HYDRAULIC ELEMENTS - I PROGRAM PACKAGE
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Analysis prepared by:

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TIME/DATE OF STUDY: 07:12 12/21/2020
=====

Problem Descriptions:

TRACT 20334
STREET FLOW AND CATCH BASIN CALCULATIONS
100-YEAR - ON-SITE

>>>>STREETFLOW MODEL INPUT INFORMATION<<<<

CONSTANT STREET GRADE(FEET/FEET) = 0.021000
CONSTANT STREET FLOW(CFS) = 24.40
AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000
CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) = 18.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 9.00
INTERIOR STREET CROSSFALL(DECIMAL) = 0.017000
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017000
CONSTANT SYMMETRICAL CURB HEIGHT(FEET) = 0.50
CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) = 2.00
CONSTANT SYMMETRICAL GUTTER-LIP(FEET) = 0.03125
CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) = 0.16700
FLOW ASSUMED TO FILL STREET EVENLY ON BOTH SIDES
=====

STREET FLOW MODEL RESULTS:

STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 17.50
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.36
PRODUCT OF DEPTH&VELOCITY = 2.01
=====

Problem Descriptions:

TRACT 20334
STREET FLOW AND CATCH BASIN CALCULATIONS
100-YEAR - ON-SITE

>>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<<

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

STREETFLOW(CFS) = 12.20
GUTTER FLOWDEPTH(FEET) = 0.46
BASIN LOCAL DEPRESSION(FEET) = 0.33

FLOWBY BASIN ANALYSIS RESULTS:

BASIN WIDTH	FLOW INTERCEPTION
2.75	1.89
3.00	2.05
3.50	2.38
4.00	2.69
4.50	3.01
5.00	3.32
5.50	3.64
6.00	3.95
6.50	4.26
7.00	4.56
7.50	4.87
8.00	5.18
8.50	5.46
9.00	5.73
9.50	5.99
10.00	6.24
10.50	6.48
11.00	6.72
11.50	6.96
12.00	7.20
12.50	7.43
13.00	7.66
13.50	7.89
14.00	8.12
14.50	8.33
15.00	8.55
15.50	8.75
16.00	8.96
16.50	9.15
17.00	9.33
17.50	9.51
18.00	9.68
18.50	9.84
19.00	10.01
19.50	10.16
20.00	10.32
20.50	10.47
21.00	10.61
21.50	10.75
22.00	10.89
22.50	11.02
23.00	11.16
23.50	11.28
24.00	11.41
24.50	11.53
25.00	11.65
25.50	11.76
26.00	11.88
26.50	11.99

27.00	12.09
27.50	12.20
27.51	12.20

=====
Problem Descriptions:

TRACT 20334

STREET FLOW AND CATCH BASIN CALCULATIONS

100-YEAR - W/S GOLDEN LOCK

>>>>STREETFLOW MODEL INPUT INFORMATION<<<<

CONSTANT STREET GRADE (FEET/FEET) = 0.032000
CONSTANT STREET FLOW (CFS) = 14.38
AVERAGE STREETFLOW FRICTION FACTOR (MANNING) = 0.015000
CONSTANT SYMMETRICAL STREET HALF-WIDTH (FEET) = 22.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 11.00
INTERIOR STREET CROSSFALL (DECIMAL) = 0.017000
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.017000
CONSTANT SYMMETRICAL CURB HEIGHT (FEET) = 0.50
CONSTANT SYMMETRICAL GUTTER-WIDTH (FEET) = 2.00
CONSTANT SYMMETRICAL GUTTER-LIP (FEET) = 0.03125
CONSTANT SYMMETRICAL GUTTER-HIKE (FEET) = 0.16700
FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS
=====

STREET FLOW MODEL RESULTS:

STREET FLOW DEPTH (FEET) = 0.46
HALFSTREET FLOOD WIDTH (FEET) = 17.31
AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.24
PRODUCT OF DEPTH&VELOCITY = 2.40
=====

PIPE

HYDRAULIC

CALCULATIONS

TRACT 20334
Drainage Study

FILE: offsiteSd-10.WSW

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
--------------	------------	-------------	-------------------	-------------------	----------------------	---------------	----	----	-------------	------	------	------	------	------	------	------	------	------	-------

CD	24	4	1		2.000														
----	----	---	---	--	-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TRACT 20334

HEADING LINE NO 2 IS -

OFF-SITE SYSTEM TO EXISTING SYSTEM

HEADING LINE NO 3 IS -

10-YEAR

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	1446.000	24	1452.380												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1100.280	1449.390	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											.000	.000	.000	0					
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1112.010	1449.790	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											92.445	-7.270	.000	0					
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1136.520	1450.620	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											.000	.000	.000	0					
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1148.300	1451.020	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											92.840	7.270	.000	0					
ELEMENT NO	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1414.640	1460.020	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											.000	.000	.000	0					
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1438.200	1460.820	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											22.498	-60.000	.000	0					
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT													
				1443.910	1461.000	24		N	.013		RADIUS	ANGLE	ANG PT	MAN H					
											.000	.000	.000	0					
ELEMENT NO	9 IS A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT													
				1443.910	1461.000	24					W S ELEV								
											1461.000								

TRACT 20334
Drainage Study

FILE: offsiteSd-10.WSW

W S P G W - CIVILDESIGN Version 14.08
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WATER SURFACE PROFILE LISTING

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TRACT 20334
OFF-SITE SYSTEM TO EXISTING SYSTEM
10-YEAR

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
1000.000	1446.000	6.380	1452.380	9.80	3.12	.15	1452.53	.00	1.12	.00	2.000	.000	.00	1 .0
100.280	.0338					.0019	.19	6.38	.00	.66	.013	.00	.00	PIPE
1100.280	1449.390	3.178	1452.568	9.80	3.12	.15	1452.72	.00	1.12	.00	2.000	.000	.00	1 .0
11.730	.0341					.0019	.02	.00	.00	.66	.013	.00	.00	PIPE
1112.010	1449.790	2.809	1452.599	9.80	3.12	.15	1452.75	.00	1.12	.00	2.000	.000	.00	1 .0
24.510	.0339					.0019	.05	2.81	.00	.66	.013	.00	.00	PIPE
1136.520	1450.620	2.025	1452.645	9.80	3.12	.15	1452.80	.00	1.12	.00	2.000	.000	.00	1 .0
.847	.0340					.0019	.00	.00	.00	.66	.013	.00	.00	PIPE
1137.367	1450.649	2.000	1452.649	9.80	3.12	.15	1452.80	2.00	1.12	.00	2.000	.000	.00	1 .0
5.255	.0340					.0017	.01	2.00	.00	.66	.013	.00	.00	PIPE
1142.622	1450.827	1.815	1452.642	9.80	3.27	.17	1452.81	.00	1.12	1.16	2.000	.000	.00	1 .0
.230	.0340					.0016	.00	1.82	.36	.66	.013	.00	.00	PIPE
1142.852	1450.835	1.815	1452.650	9.80	3.27	.17	1452.82	.00	1.12	1.16	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
1142.852	1450.835	.660	1451.495	9.80	10.84	1.83	1453.32	.07	1.12	1.88	2.000	.000	.00	1 .0
5.448	.0340					.0339	.18	.73	2.76	.66	.013	.00	.00	PIPE
1148.300	1451.020	.661	1451.681	9.80	10.82	1.82	1453.50	.00	1.12	1.88	2.000	.000	.00	1 .0
111.263	.0338					.0338	3.76	.66	2.75	.66	.013	.00	.00	PIPE

TRACT 20334
Drainage Study

FILE: offsiteSd-10.WSW

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WATER SURFACE PROFILE LISTING

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TRACT 20334
OFF-SITE SYSTEM TO EXISTING SYSTEM
10-YEAR

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1259.563	1454.780	.661	1455.440	9.80	10.82	1.82	1457.26	.00	1.12	1.88	2.000	.000	.00	1 .0
67.415	.0338					.0336	2.26	.66	2.75	.66	.013	.00	.00	PIPE
1326.978	1457.058	.663	1457.721	9.80	10.78	1.80	1459.52	.00	1.12	1.88	2.000	.000	.00	1 .0
56.727	.0338					.0313	1.78	.66	2.73	.66	.013	.00	.00	PIPE
1383.705	1458.975	.686	1459.661	9.80	10.27	1.64	1461.30	.00	1.12	1.90	2.000	.000	.00	1 .0
19.633	.0338					.0274	.54	.69	2.55	.66	.013	.00	.00	PIPE
1403.339	1459.638	.711	1460.349	9.80	9.80	1.49	1461.84	.00	1.12	1.91	2.000	.000	.00	1 .0
11.301	.0338					.0241	.27	.71	2.39	.66	.013	.00	.00	PIPE
1414.640	1460.020	.736	1460.756	9.80	9.34	1.35	1462.11	.23	1.12	1.93	2.000	.000	.00	1 .0
3.103	.0340					.0220	.07	.97	2.23	.66	.013	.00	.00	PIPE
1417.743	1460.125	.746	1460.871	9.80	9.18	1.31	1462.18	.23	1.12	1.93	2.000	.000	.00	1 .0
6.652	.0340					.0201	.13	.97	2.18	.66	.013	.00	.00	PIPE
1424.395	1460.351	.772	1461.124	9.80	8.75	1.19	1462.31	.21	1.12	1.95	2.000	.000	.00	1 .0
4.915	.0340					.0176	.09	.98	2.03	.66	.013	.00	.00	PIPE
1429.309	1460.518	.800	1461.318	9.80	8.35	1.08	1462.40	.19	1.12	1.96	2.000	.000	.00	1 .0
3.748	.0340					.0155	.06	.99	1.90	.66	.013	.00	.00	PIPE
1433.058	1460.645	.830	1461.475	9.80	7.96	.98	1462.46	.17	1.12	1.97	2.000	.000	.00	1 .0
2.897	.0340					.0136	.04	1.00	1.77	.66	.013	.00	.00	PIPE

TRACT 20334
Drainage Study

FILE: offsiteSd-10.WSW

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WATER SURFACE PROFILE LISTING

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TRACT 20334
OFF-SITE SYSTEM TO EXISTING SYSTEM
10-YEAR

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
1435.955	1460.744	.860	1461.604	9.80	7.59	.89	1462.50	.16	1.12	1.98	2.000	.000	.00	1 .0
2.245	.0340					.0119	.03	1.02	1.66	.66	.013	.00	.00	PIPE
1438.200	1460.820	.892	1461.712	9.80	7.23	.81	1462.52	.00	1.12	1.99	2.000	.000	.00	1 .0
.106	.0315					.0111	.00	.89	1.54	.67	.013	.00	.00	PIPE
1438.306	1460.823	.893	1461.717	9.80	7.22	.81	1462.53	.00	1.12	1.99	2.000	.000	.00	1 .0
1.912	.0315					.0104	.02	.89	1.54	.67	.013	.00	.00	PIPE
1440.218	1460.884	.927	1461.810	9.80	6.88	.74	1462.55	.00	1.12	1.99	2.000	.000	.00	1 .0
1.433	.0315					.0092	.01	.93	1.44	.67	.013	.00	.00	PIPE
1441.652	1460.929	.961	1461.890	9.80	6.56	.67	1462.56	.00	1.12	2.00	2.000	.000	.00	1 .0
1.035	.0315					.0081	.01	.96	1.34	.67	.013	.00	.00	PIPE
1442.686	1460.962	.998	1461.959	9.80	6.26	.61	1462.57	.00	1.12	2.00	2.000	.000	.00	1 .0
.698	.0315					.0071	.00	1.00	1.25	.67	.013	.00	.00	PIPE
1443.384	1460.984	1.036	1462.020	9.80	5.96	.55	1462.57	.00	1.12	2.00	2.000	.000	.00	1 .0
.397	.0315					.0063	.00	1.04	1.16	.67	.013	.00	.00	PIPE
1443.781	1460.996	1.076	1462.072	9.80	5.69	.50	1462.57	.00	1.12	1.99	2.000	.000	.00	1 .0
.129	.0315					.0055	.00	1.08	1.08	.67	.013	.00	.00	PIPE
1443.910	1461.000	1.120	1462.120	9.80	5.42	.46	1462.58	.00	1.12	1.99	2.000	.000	.00	1 .0

TRACT 20334
Drainage Study

FILE: tractSD.WSW

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT 1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										
CD	2	2	0	.000	6.530	14.000			.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TRACT 20334

HEADING LINE NO 2 IS -

ON-SITE SYSTEM TO EXISTING SYSTEM

HEADING LINE NO 3 IS -

100-YEAR

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
				1000.000	1446.000	24	1449.590												
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1004.450	1446.150	24	.013	.000	.000	.000	0								
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1090.770	1449.070	24	.013	.000	.000	.000	0								
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1102.550	1449.470	24	.013	22.498	-30.000	.000	0								
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1110.490	1449.740	24	.013	.000	.000	.000	0								
ELEMENT NO	6 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1122.270	1450.140	24	.013	22.498	30.000	.000	0								
ELEMENT NO	7 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
				1150.650	1451.100	24	18	0	.013	4.200	.000	1451.350	.000	-90.000	.000				
												RADIUS	ANGLE						
												.000	.000						
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1224.370	1453.590	24	.013	.000	.000	.000	0								
ELEMENT NO	9 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1295.100	1455.980	24	.013	45.028	-90.000	.000	0								
ELEMENT NO	10 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1360.710	1458.200	24	.013	.000	.000	.000	0								
ELEMENT NO	11 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H								
				1378.380	1458.800	24	.013	22.498	-45.000	.000	0								
ELEMENT NO	12 IS A	REACH																	

TRACT 20334
Drainage Study

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1384.620	1459.000	24	.013	.000	.000	.000	0
				W S P G W				
WATER SURFACE PROFILE - ELEMENT CARD LISTING								
				*				
ELEMENT NO 13 IS A WALL ENTRANCE								
U/S DATA	STATION	INVERT	SECT	FP				
	1384.620	1459.000	2	.200				
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS								
				*	*			
ELEMENT NO 14 IS A SYSTEM HEADWORKS								
U/S DATA	STATION	INVERT	SECT	W S ELEV				
	1384.620	1459.000	24	1459.000				

TRACT 20334
Drainage Study

FILE: tractSD.WSW

W S P G W - CIVILDESIGN Version 14.08
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WATER SURFACE PROFILE LISTING

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TRACT 20334
ON-SITE SYSTEM TO EXISTING SYSTEM
100-YEAR

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
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1446.000	3.590	1449.590	25.42	8.09	1.02	1450.61	.00	1.77	.00	2.000	.000	.00	1 .0
4.450	.0337					.0126	.06	3.59	.00	1.13	.013	.00	.00	PIPE
1004.450	1446.150	3.496	1449.646	25.42	8.09	1.02	1450.66	.00	1.77	.00	2.000	.000	.00	1 .0
43.393	.0338					.0126	.55	3.50	.00	1.13	.013	.00	.00	PIPE
1047.843	1447.618	2.576	1450.194	25.42	8.09	1.02	1451.21	.00	1.77	.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
1047.843	1447.618	1.183	1448.801	25.42	13.14	2.68	1451.48	.00	1.77	1.97	2.000	.000	.00	1 .0
19.526	.0338					.0284	.55	1.18	2.34	1.13	.013	.00	.00	PIPE
1067.369	1448.278	1.206	1449.484	25.42	12.84	2.56	1452.05	.00	1.77	1.96	2.000	.000	.00	1 .0
23.401	.0338					.0260	.61	1.21	2.25	1.13	.013	.00	.00	PIPE
1090.770	1449.070	1.255	1450.325	25.42	12.25	2.33	1452.65	.40	1.77	1.93	2.000	.000	.00	1 .0
11.780	.0340					.0234	.28	1.66	2.08	1.13	.013	.00	.00	PIPE
1102.550	1449.470	1.296	1450.766	25.42	11.80	2.16	1452.93	.00	1.77	1.91	2.000	.000	.00	1 .0
7.940	.0340					.0214	.17	1.30	1.96	1.13	.013	.00	.00	PIPE
1110.490	1449.740	1.334	1451.074	25.42	11.42	2.03	1453.10	.34	1.77	1.89	2.000	.000	.00	1 .0
4.313	.0340					.0200	.09	1.67	1.85	1.13	.013	.00	.00	PIPE
1114.803	1449.886	1.360	1451.246	25.42	11.18	1.94	1453.19	.32	1.77	1.87	2.000	.000	.00	1 .0
7.467	.0340					.0184	.14	1.68	1.78	1.13	.013	.00	.00	PIPE

TRACT 20334
Drainage Study

FILE: tractSD.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7216
WATER SURFACE PROFILE LISTING

PAGE 2

Date:12-21-2020 Time:10:48:44

TRACT 20334
ON-SITE SYSTEM TO EXISTING SYSTEM
100-YEAR

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1122.270	1450.140	1.420	1451.560	25.42	10.66	1.76	1453.32	.00	1.77	1.82	2.000	.000	.00	1 .0
JUNCT STR	.0338					.0255	.72	1.42	1.64		.013	.00	.00	PIPE
1150.650	1451.100	1.014	1452.114	21.22	13.28	2.74	1454.85	.00	1.65	2.00	2.000	.000	.00	1 .0
73.720	.0338					.0333	2.45	1.01	2.62	1.01	.013	.00	.00	PIPE
1224.370	1453.590	1.020	1454.610	21.22	13.18	2.70	1457.31	.24	1.65	2.00	2.000	.000	.00	1 .0
70.730	.0338					.0313	2.21	1.26	2.59	1.01	.013	.00	.00	PIPE
1295.100	1455.980	1.052	1457.032	21.22	12.66	2.49	1459.52	.00	1.65	2.00	2.000	.000	.00	1 .0
17.342	.0338					.0289	.50	1.05	2.44	1.01	.013	.00	.00	PIPE
1312.442	1456.567	1.070	1457.637	21.22	12.40	2.39	1460.03	.00	1.65	2.00	2.000	.000	.00	1 .0
23.630	.0338					.0264	.62	1.07	2.36	1.01	.013	.00	.00	PIPE
1336.072	1457.366	1.112	1458.478	21.22	11.83	2.17	1460.65	.00	1.65	1.99	2.000	.000	.00	1 .0
14.594	.0338					.0233	.34	1.11	2.19	1.01	.013	.00	.00	PIPE
1350.666	1457.860	1.156	1459.016	21.22	11.28	1.97	1460.99	.00	1.65	1.98	2.000	.000	.00	1 .0
10.044	.0338					.0206	.21	1.16	2.04	1.01	.013	.00	.00	PIPE
1360.710	1458.200	1.203	1459.403	21.22	10.75	1.80	1461.20	.31	1.65	1.96	2.000	.000	.00	1 .0
2.516	.0340					.0190	.05	1.52	1.89	1.01	.013	.00	.00	PIPE
1363.226	1458.285	1.218	1459.503	21.22	10.59	1.74	1461.25	.30	1.65	1.95	2.000	.000	.00	1 .0
6.589	.0340					.0176	.12	1.52	1.84	1.01	.013	.00	.00	PIPE

TRACT 20334
Drainage Study

FILE: tractSD.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7216
WATER SURFACE PROFILE LISTING

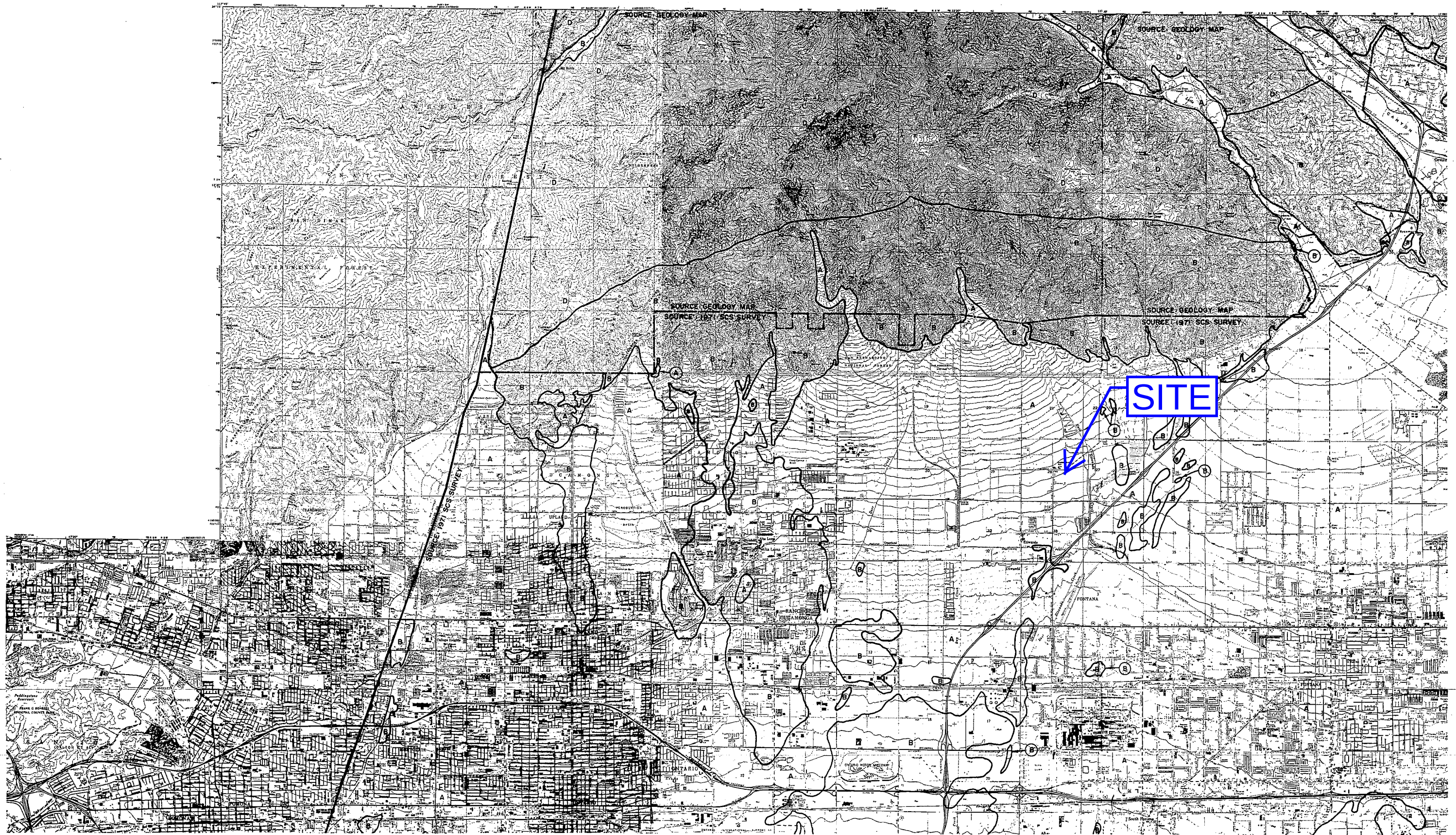
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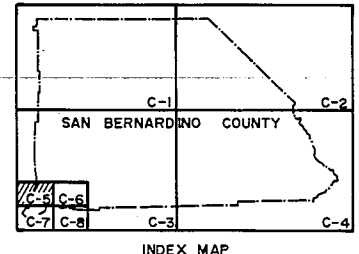
TRACT 20334
ON-SITE SYSTEM TO EXISTING SYSTEM
100-YEAR

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
1369.814	1458.509	1.268	1459.777	21.22	10.10	1.58	1461.36	.27	1.65	1.93	2.000	.000	.00	1 .0
4.914	.0340					.0156	.08	1.54	1.70	1.01	.013	.00	.00	PIPE
1374.728	1458.676	1.322	1459.998	21.22	9.63	1.44	1461.44	.24	1.65	1.89	2.000	.000	.00	1 .0
3.652	.0340					.0139	.05	1.56	1.57	1.01	.013	.00	.00	PIPE
1378.380	1458.800	1.379	1460.180	21.22	9.18	1.31	1461.49	.00	1.65	1.85	2.000	.000	.00	1 .0
2.406	.0320					.0125	.03	1.38	1.45	1.03	.013	.00	.00	PIPE
1380.786	1458.877	1.428	1460.306	21.22	8.84	1.21	1461.52	.00	1.65	1.81	2.000	.000	.00	1 .0
2.131	.0320					.0113	.02	1.43	1.35	1.03	.013	.00	.00	PIPE
1382.916	1458.945	1.494	1460.440	21.22	8.43	1.10	1461.54	.00	1.65	1.74	2.000	.000	.00	1 .0
1.268	.0320					.0101	.01	1.49	1.23	1.03	.013	.00	.00	PIPE
1384.185	1458.986	1.567	1460.553	21.22	8.04	1.00	1461.56	.00	1.65	1.65	2.000	.000	.00	1 .0
.435	.0320					.0092	.00	1.57	1.12	1.03	.013	.00	.00	PIPE
1384.620	1459.000	1.649	1460.649	21.22	7.66	.91	1461.56	.00	1.65	1.52	2.000	.000	.00	1 .0
WALL ENTRANCE														
1384.620	1459.000	3.266	1462.266	21.22	.46	.00	1462.27	.00	.41	14.00	6.530	14.000	.00	0 .0

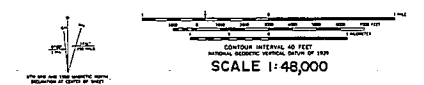
REFERENCES & MAPS



SITE



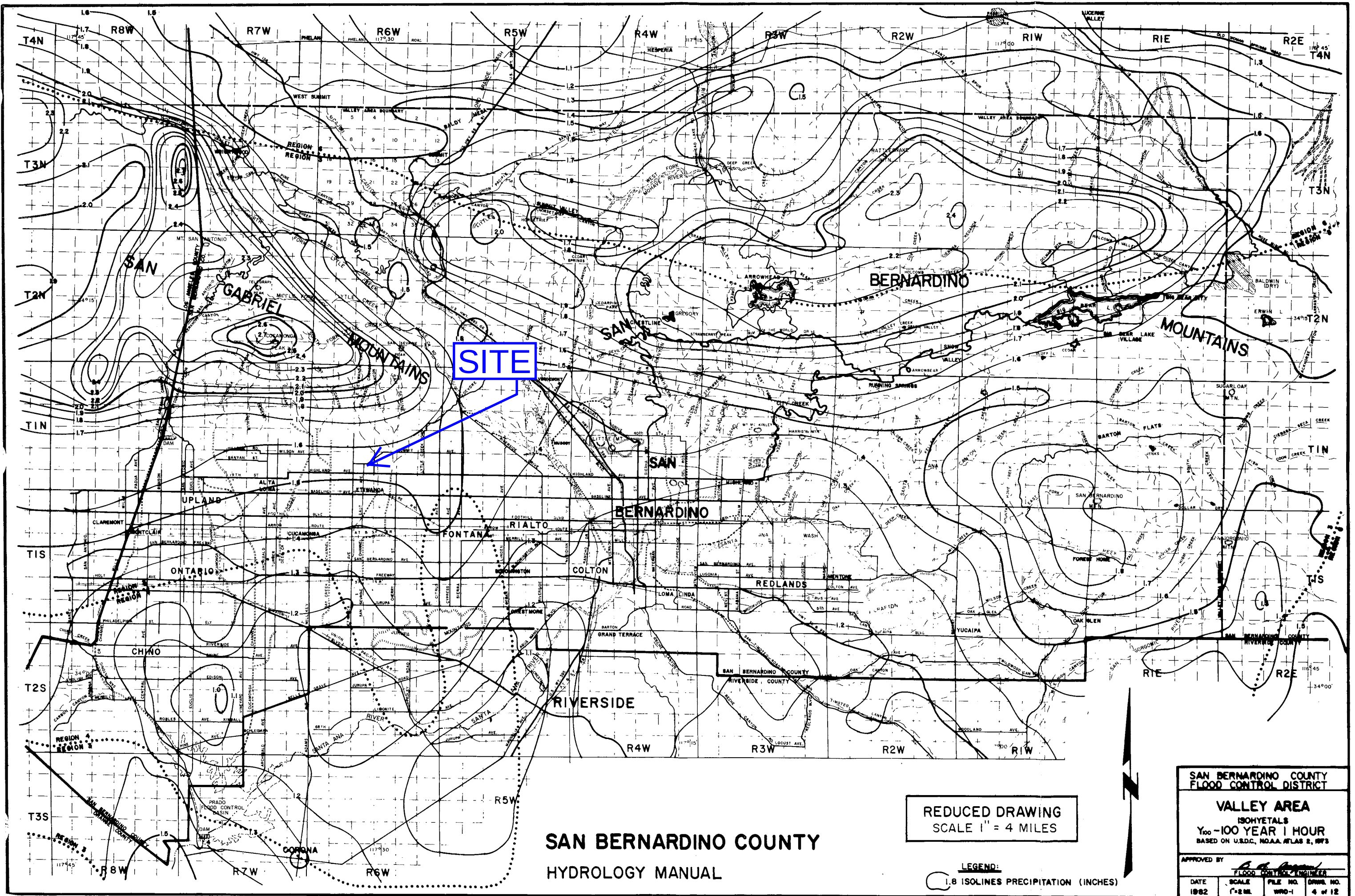
- LEGEND
- SOIL GROUP BOUNDARY
 - A SOIL GROUP DESIGNATION
 - BOUNDARY OF INDICATED SOURCE



SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA



NOAA Atlas 14, Volume 6, Version 2
Location name: Rancho Cucamonga, California,
USA*



Latitude: 34.1416°, Longitude: -117.5126°
Elevation: 1477.18 ft**

* source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.130 (0.108-0.158)	0.170 (0.142-0.207)	0.223 (0.185-0.272)	0.266 (0.218-0.326)	0.323 (0.257-0.411)	0.367 (0.285-0.477)	0.411 (0.312-0.548)	0.457 (0.337-0.627)	0.519 (0.366-0.743)	0.567 (0.386-0.842)
10-min	0.186 (0.155-0.226)	0.244 (0.203-0.297)	0.320 (0.265-0.389)	0.381 (0.313-0.468)	0.463 (0.368-0.589)	0.526 (0.409-0.683)	0.590 (0.447-0.786)	0.655 (0.482-0.899)	0.744 (0.525-1.07)	0.813 (0.554-1.21)
15-min	0.225 (0.188-0.273)	0.295 (0.246-0.359)	0.386 (0.320-0.471)	0.460 (0.379-0.566)	0.560 (0.445-0.712)	0.636 (0.494-0.826)	0.713 (0.540-0.950)	0.792 (0.583-1.09)	0.900 (0.635-1.29)	0.984 (0.670-1.46)
30-min	0.331 (0.275-0.401)	0.433 (0.360-0.527)	0.567 (0.470-0.691)	0.676 (0.555-0.830)	0.822 (0.653-1.05)	0.933 (0.726-1.21)	1.05 (0.793-1.40)	1.16 (0.856-1.60)	1.32 (0.932-1.89)	1.44 (0.983-2.14)
60-min	0.490 (0.408-0.594)	0.642 (0.534-0.780)	0.840 (0.697-1.02)	1.00 (0.823-1.23)	1.22 (0.967-1.55)	1.38 (1.08-1.80)	1.55 (1.18-2.07)	1.72 (1.27-2.36)	1.96 (1.38-2.80)	2.14 (1.46-3.17)
2-hr	0.767 (0.638-0.930)	1.01 (0.840-1.23)	1.31 (1.09-1.60)	1.55 (1.28-1.91)	1.86 (1.48-2.37)	2.09 (1.63-2.72)	2.32 (1.76-3.09)	2.54 (1.87-3.49)	2.84 (2.00-4.06)	3.06 (2.08-4.54)
3-hr	0.998 (0.831-1.21)	1.31 (1.09-1.60)	1.70 (1.41-2.08)	2.01 (1.65-2.47)	2.39 (1.90-3.04)	2.68 (2.08-3.48)	2.95 (2.23-3.93)	3.22 (2.37-4.41)	3.56 (2.51-5.10)	3.82 (2.60-5.67)
6-hr	1.49 (1.24-1.81)	1.96 (1.63-2.38)	2.53 (2.10-3.09)	2.97 (2.44-3.65)	3.52 (2.80-4.48)	3.92 (3.04-5.09)	4.29 (3.25-5.72)	4.66 (3.43-6.39)	5.12 (3.61-7.33)	5.46 (3.72-8.10)
12-hr	2.05 (1.71-2.48)	2.69 (2.24-3.27)	3.47 (2.88-4.23)	4.06 (3.34-4.99)	4.79 (3.81-6.10)	5.32 (4.13-6.91)	5.81 (4.40-7.74)	6.29 (4.63-8.63)	6.89 (4.86-9.86)	7.32 (4.98-10.9)
24-hr	2.79 (2.47-3.22)	3.70 (3.27-4.26)	4.79 (4.22-5.54)	5.62 (4.92-6.55)	6.66 (5.64-8.02)	7.39 (6.13-9.10)	8.10 (6.56-10.2)	8.77 (6.91-11.4)	9.62 (7.28-13.0)	10.2 (7.48-14.3)
2-day	3.40 (3.01-3.92)	4.60 (4.07-5.31)	6.10 (5.38-7.06)	7.28 (6.37-8.49)	8.81 (7.46-10.6)	9.94 (8.24-12.2)	11.0 (8.94-13.9)	12.1 (9.56-15.7)	13.6 (10.3-18.3)	14.6 (10.7-20.4)
3-day	3.58 (3.17-4.12)	4.92 (4.35-5.67)	6.64 (5.86-7.68)	8.03 (7.02-9.36)	9.89 (8.37-11.9)	11.3 (9.38-13.9)	12.7 (10.3-16.0)	14.2 (11.2-18.4)	16.1 (12.2-21.7)	17.6 (12.9-24.6)
4-day	3.85 (3.41-4.43)	5.33 (4.72-6.15)	7.27 (6.41-8.41)	8.85 (7.75-10.3)	11.0 (9.32-13.3)	12.7 (10.5-15.6)	14.4 (11.6-18.1)	16.1 (12.7-20.8)	18.5 (14.0-24.9)	20.3 (14.9-28.4)
7-day	4.41 (3.91-5.09)	6.15 (5.44-7.09)	8.43 (7.44-9.76)	10.3 (9.03-12.0)	12.9 (10.9-15.6)	14.9 (12.4-18.4)	17.0 (13.8-21.4)	19.2 (15.1-24.8)	22.1 (16.7-29.9)	24.5 (17.9-34.1)
10-day	4.85 (4.29-5.58)	6.77 (5.99-7.81)	9.33 (8.23-10.8)	11.4 (10.0-13.3)	14.4 (12.2-17.3)	16.7 (13.8-20.5)	19.0 (15.4-24.0)	21.5 (16.9-27.8)	24.9 (18.8-33.6)	27.6 (20.2-38.5)
20-day	5.67 (5.02-6.54)	8.03 (7.10-9.27)	11.2 (9.89-13.0)	13.9 (12.1-16.2)	17.6 (14.9-21.2)	20.6 (17.1-25.3)	23.7 (19.2-29.9)	27.0 (21.3-34.9)	31.6 (23.9-42.6)	35.3 (25.8-49.3)
30-day	6.66 (5.90-7.68)	9.50 (8.40-11.0)	13.3 (11.8-15.4)	16.6 (14.5-19.4)	21.2 (18.0-25.6)	24.9 (20.7-30.6)	28.8 (23.3-36.3)	33.0 (26.0-42.7)	38.9 (29.4-52.5)	43.7 (32.0-61.0)
45-day	7.93 (7.02-9.13)	11.3 (9.97-13.0)	15.9 (14.0-18.4)	19.8 (17.3-23.1)	25.4 (21.5-30.6)	30.0 (24.9-36.9)	34.8 (28.2-43.9)	40.1 (31.6-51.9)	47.6 (36.0-64.2)	53.7 (39.3-75.0)
60-day	9.21 (8.16-10.6)	13.0 (11.5-15.0)	18.3 (16.1-21.1)	22.8 (19.9-26.6)	29.3 (24.8-35.3)	34.6 (28.7-42.5)	40.3 (32.6-50.7)	46.5 (36.6-60.2)	55.4 (41.9-74.8)	62.9 (46.0-87.8)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

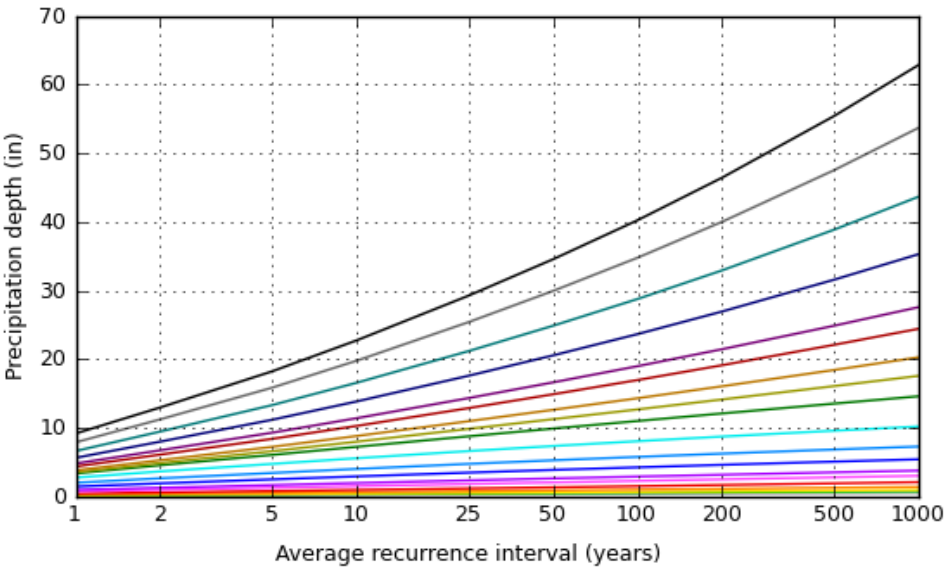
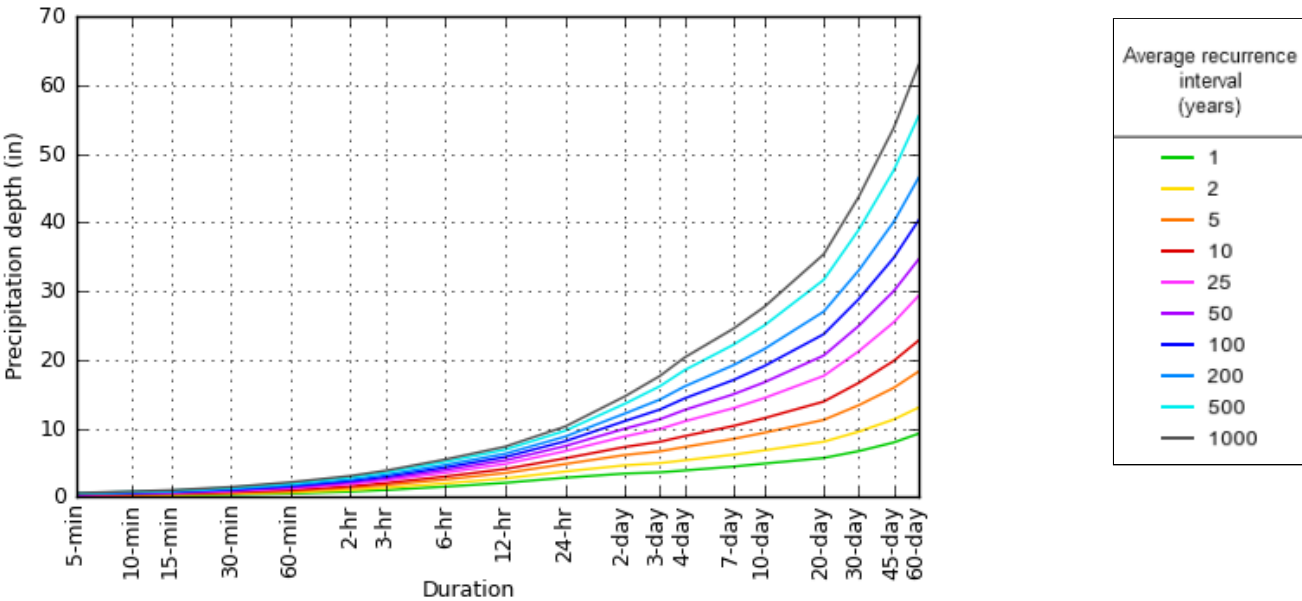
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

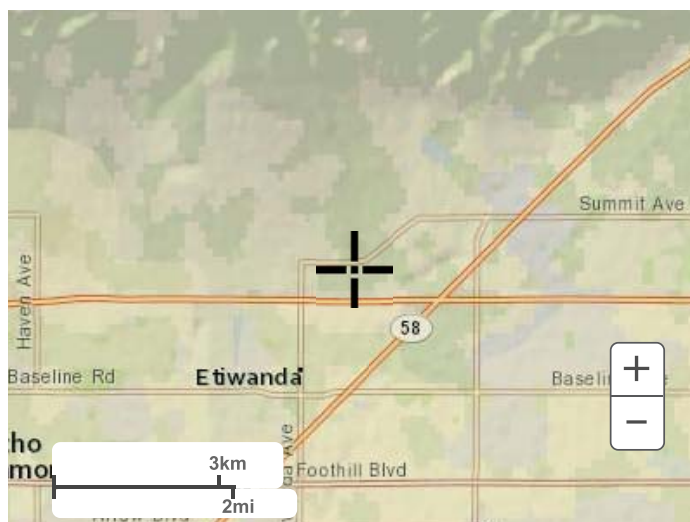
PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.1416°, Longitude: -117.5126°



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Maps & aerials

Small scale terrain



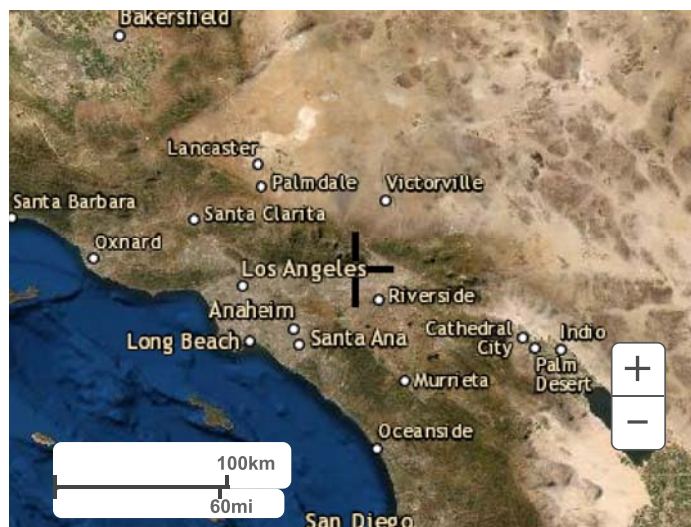
Large scale terrain



Large scale map

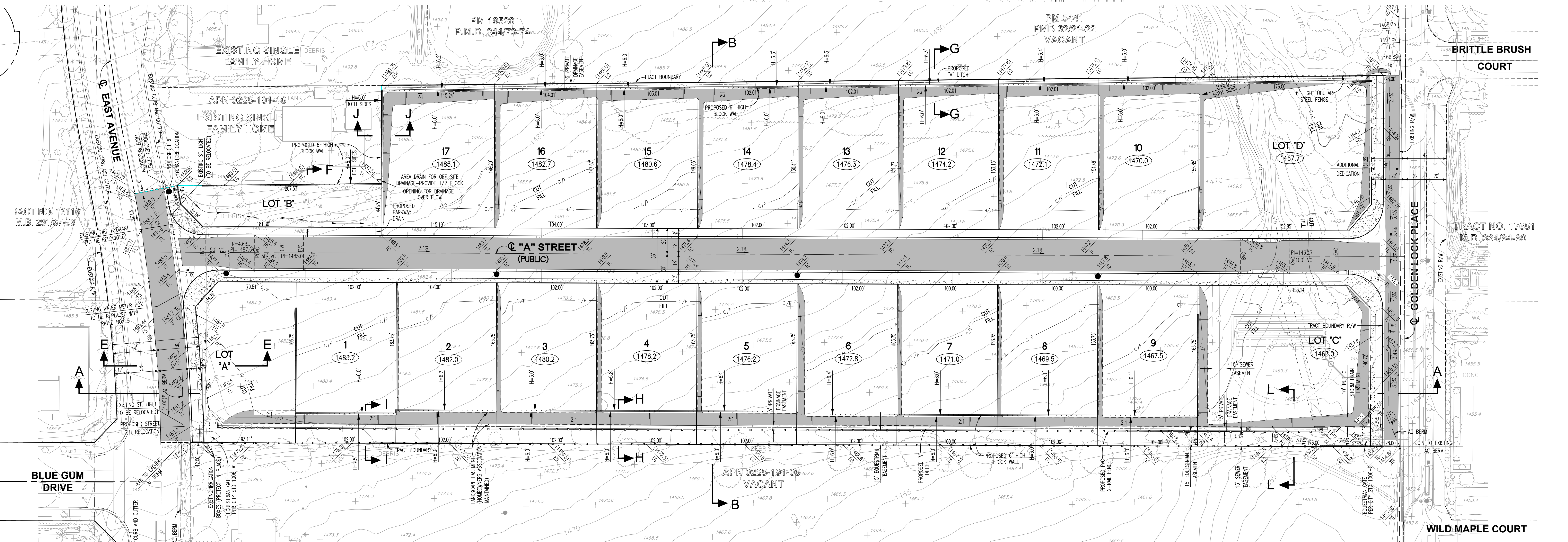
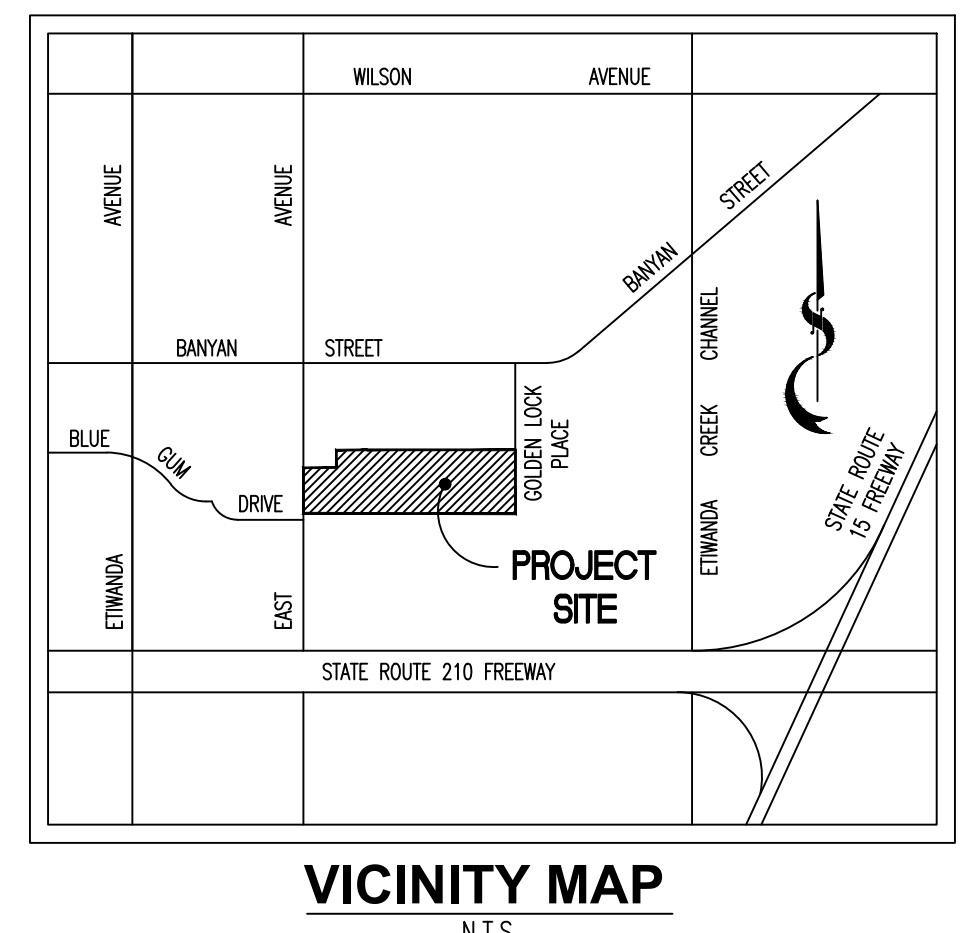
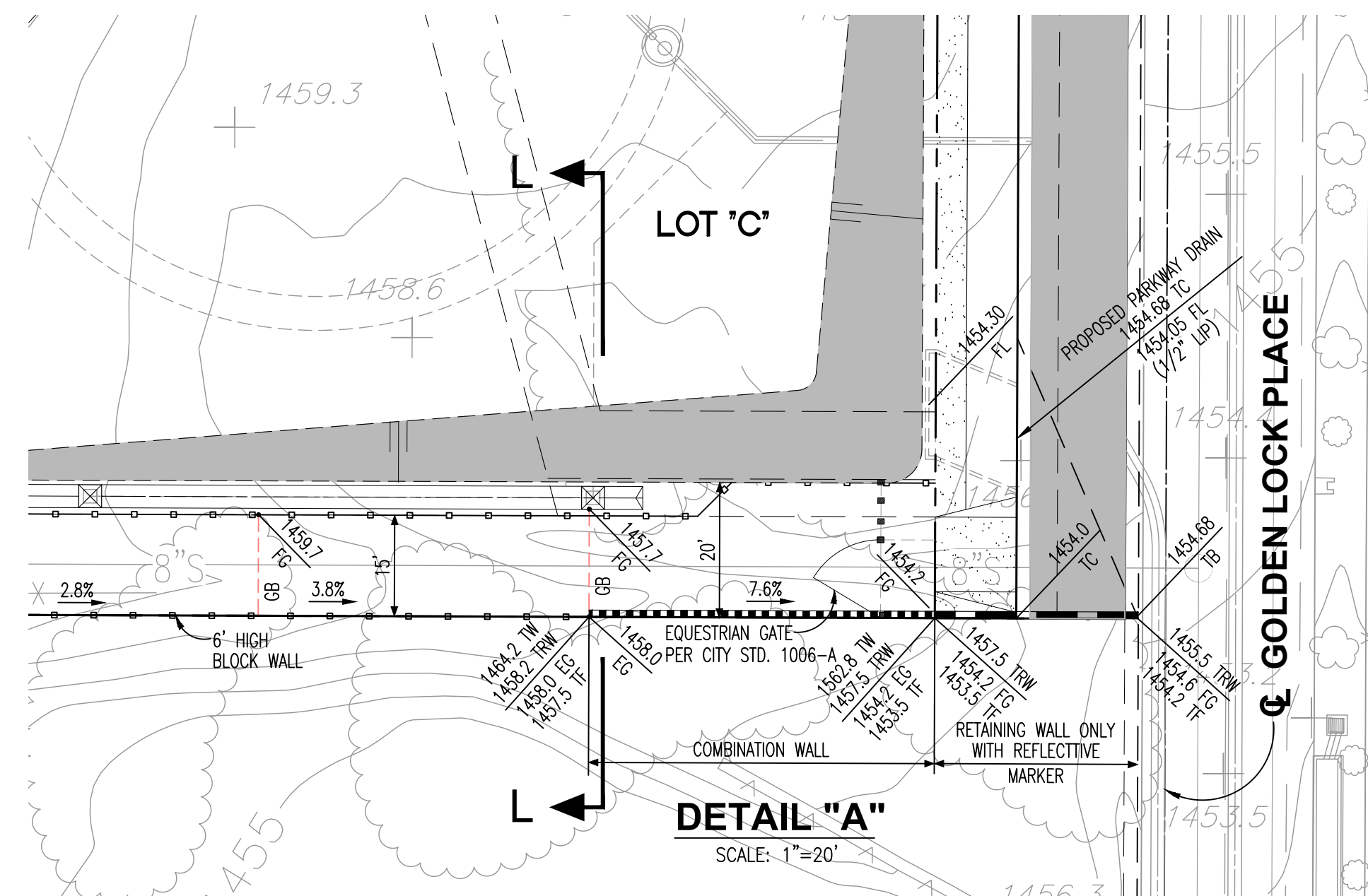
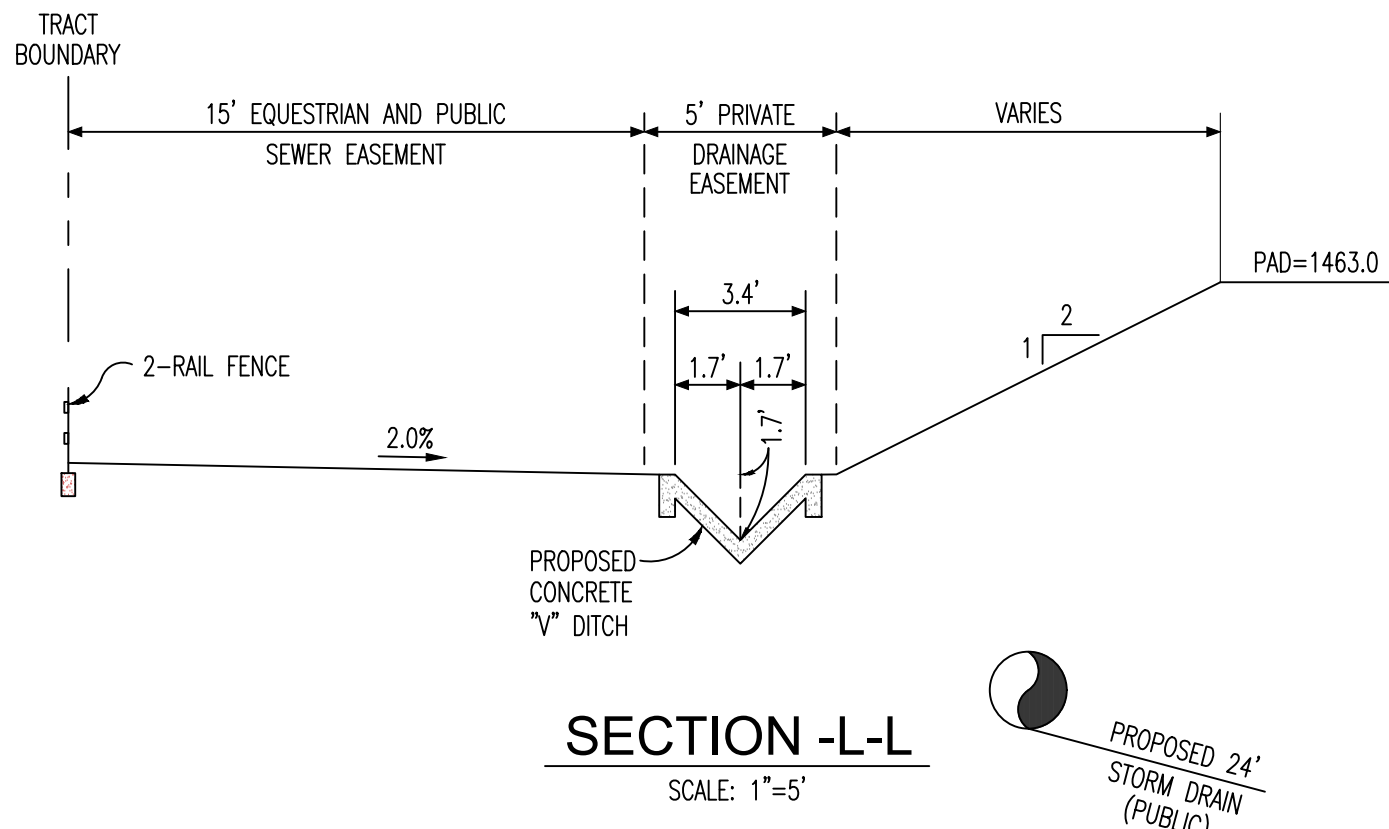
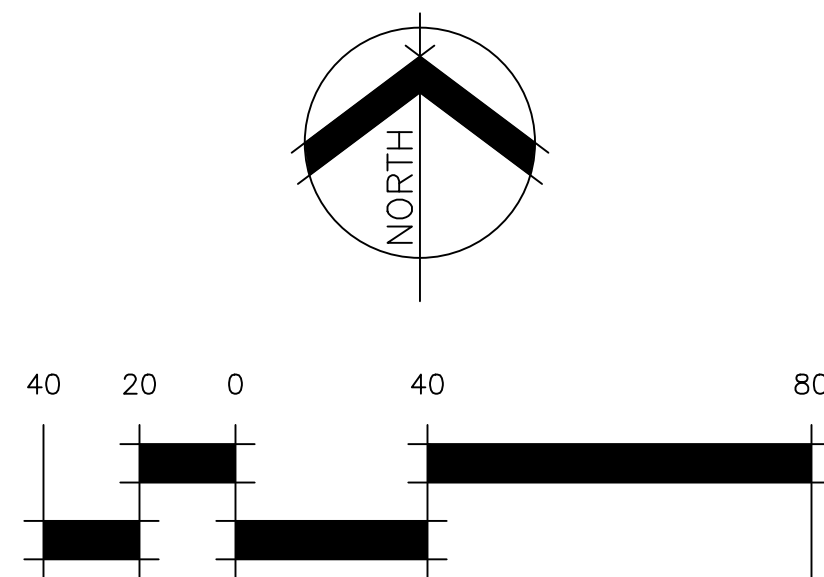


Large scale aerial

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[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)



BENCH MARK

SET 2.5" BRASS DISK NORTHWEST CORNER OF NORTHERLY CATCH BASIN AT THE NORTHWEST CORNER OF EAST AVENUE & BANYAN 36" NORTH OF THE BOR ON THE WEST SIDE OF EAST AVENUE STAMPED "RANCHO CUCAMONGA BENCH MARK 1088 A"

EARTHWORK SUMMARY

	CUT	FILL
MASS EXCAVATION	22,950 CY	7,488 CY
SHRINKAGE (20.0%)	(-) 2,869	
SUBSIDENCE (0.8 FT)	(-) 1,800	1,434 CY
PAD OVERLAY (7.0 FT)	70,879 CY	82,928 CY
LOT SPOLITS CY/LOT AND UNDERGROUND CHAMBER	2,700 CY	
TOTAL EARTHWORK	91,850 CY	91,850 CY

UTILITIES

WATER/SEWER
CUCAMONGA VALLEY WATER DISTRICT
10440 ASHFORD STREET
P.O. BOX 638
RANCHO CUCAMONGA, CA 91730
(909) 967-2991

GAS
SOUTHERN CALIFORNIA GAS CO.
1981 W. LUCONIA AVENUE
REDLANDS, CA 92373
RANCHO CUCAMONGA, CA 91730
(909) 335-7715

AREA SUMMARY

GROSS AREA	=	10.74 AC
NET AREA	=	9.74 AC
DISTURBED AREA	=	8.63 AC

CABLE
FRONTIER COMMUNICATIONS
(877) 426-9117

TELEPHONE
CDX COMMUNICATIONS
(877) 473-2013

NOTE:

ALL IMPROVEMENTS WITHIN THE PUBLIC RIGHT-OF-WAY, INCLUDING STREET TREES SHALL BE INSTALLED PER THE PUBLIC IMPROVEMENT PLANS.

OWNER/APPLICANT/DEVELOPER

MANNING HOMES
20151 SW BIRCH STREET SUITE 150
NEWPORT BEACH, CA. 92660
CONTACT: CRAIG KOZMA
TEL: (949) 250-4200

LEGEND

- EXISTING STREET ELEVATION
- EXISTING STORM DRAIN
- EXISTING SEWER SYSTEM
- EXISTING WATER SYSTEM
- PROPOSED STREET ELEVATION
- PROPOSED STORM DRAIN SYSTEM
- PROPOSED SEWER SYSTEM
- PROPOSED WATER SYSTEM
- PROPOSED LOT NUMBER
- RETAINING WALL
- 6' HIGH BLOCK WALL WITH RETAINING
- 6' HIGH BLOCK WALL
- TUBULAR STEEL FENCE
- PVC 2-RAIL FENCE
- TENTATIVE TRACT BOUNDARY
- PROPOSED 21 OR 34 SLOPE STREET LOTS
- PROPOSED FIRE HYDRANT
- STREET LIGHT
- DAYLIGHT LIGHT
- WATER QUALITY INFILTRATION PIPE SYSTEM
- HEIGHT OF EXPOSED WALL AT THIS DIRECTION

PREPARED FOR:

MANNING HOMES
20151 SW BIRCH STREET SUITE 150
NEWPORT BEACH, CA. 92660
CONTACT: CRAIG KOZMA
TEL: (949) 250-4200

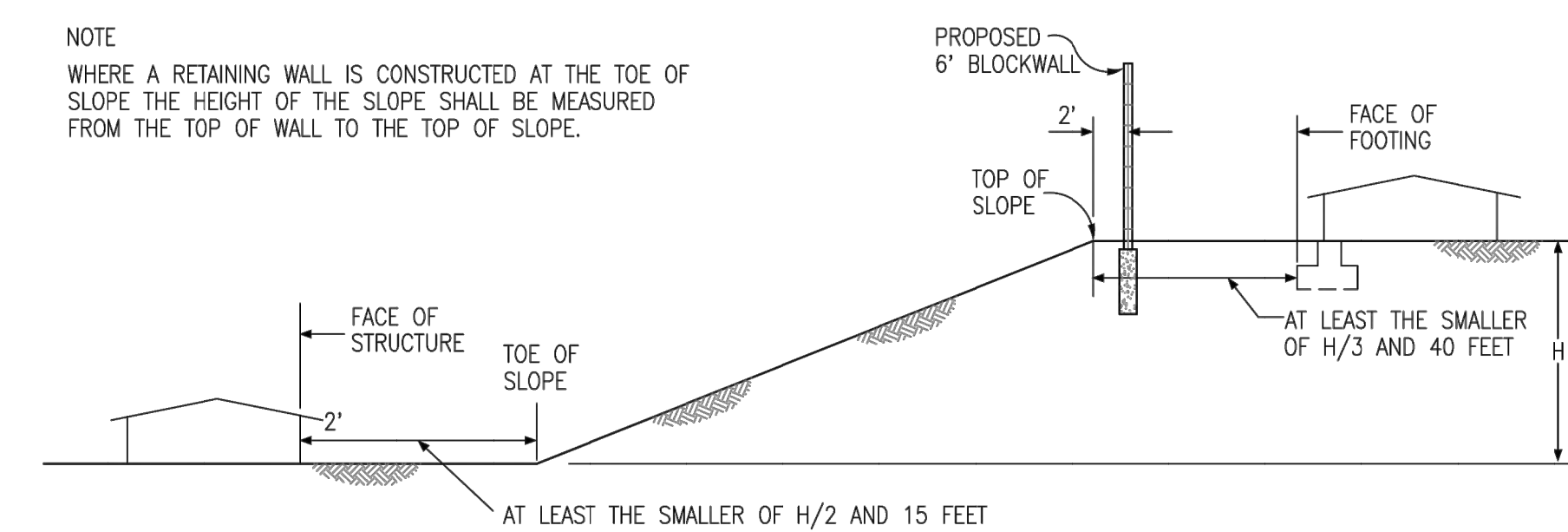
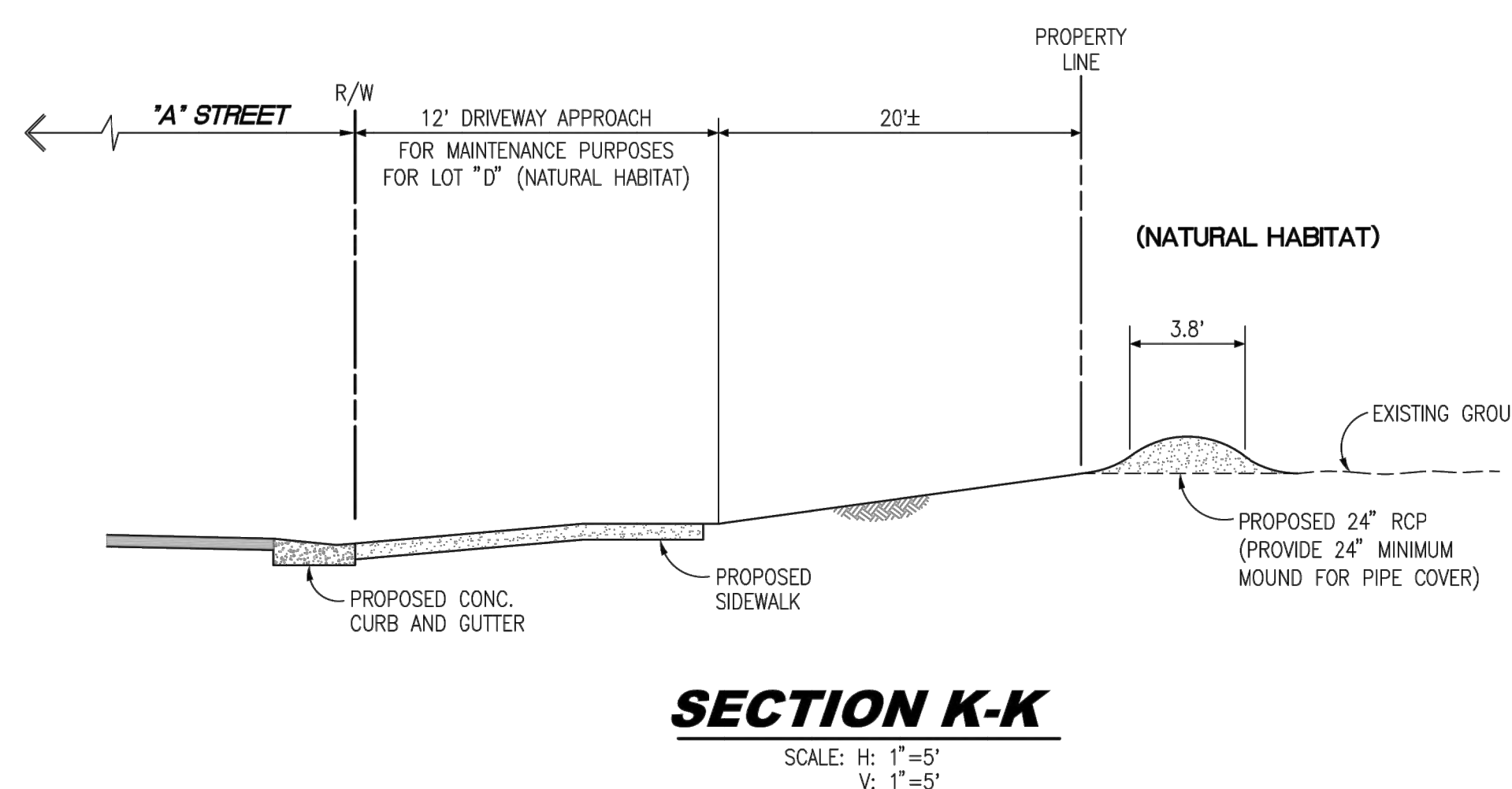
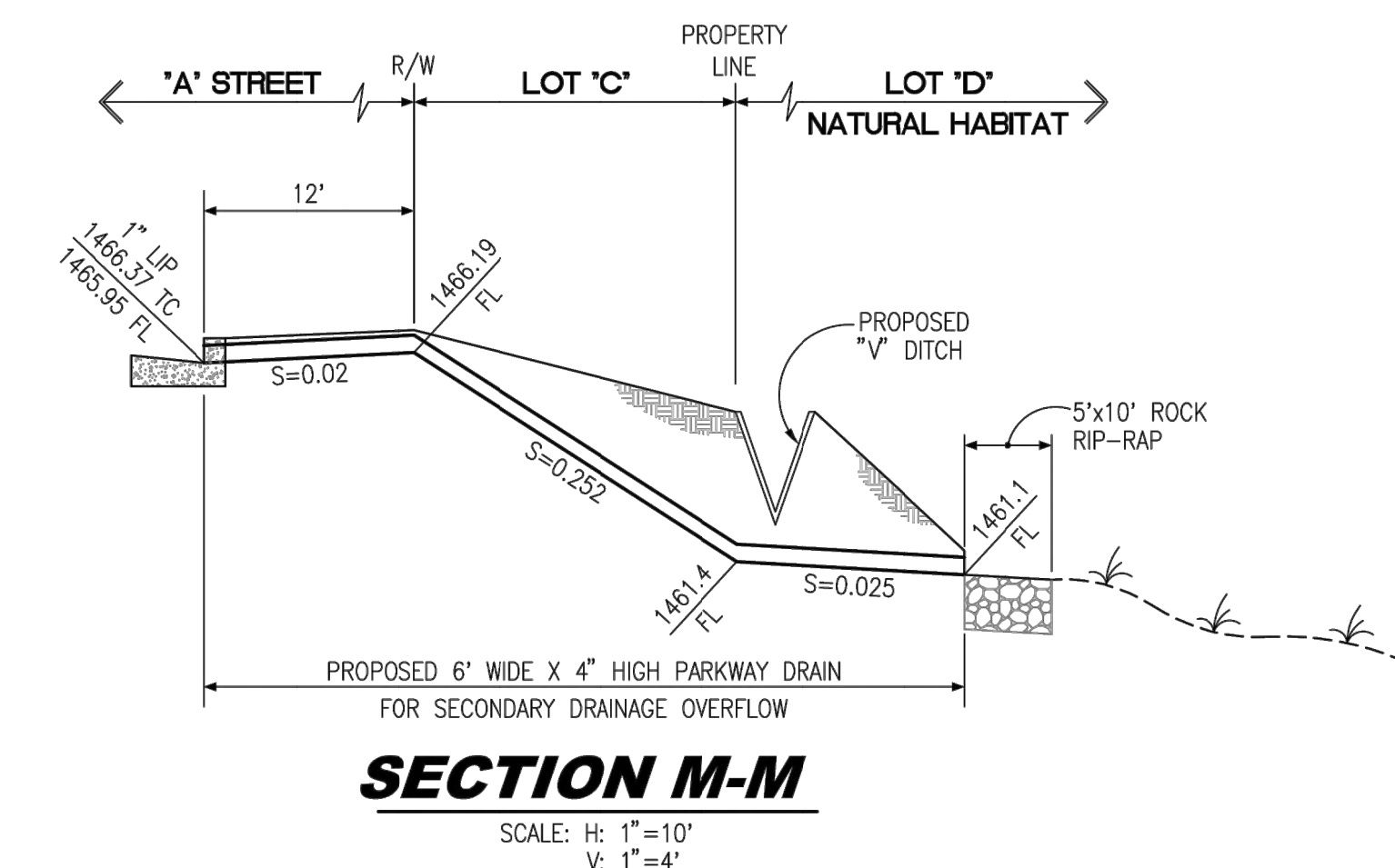
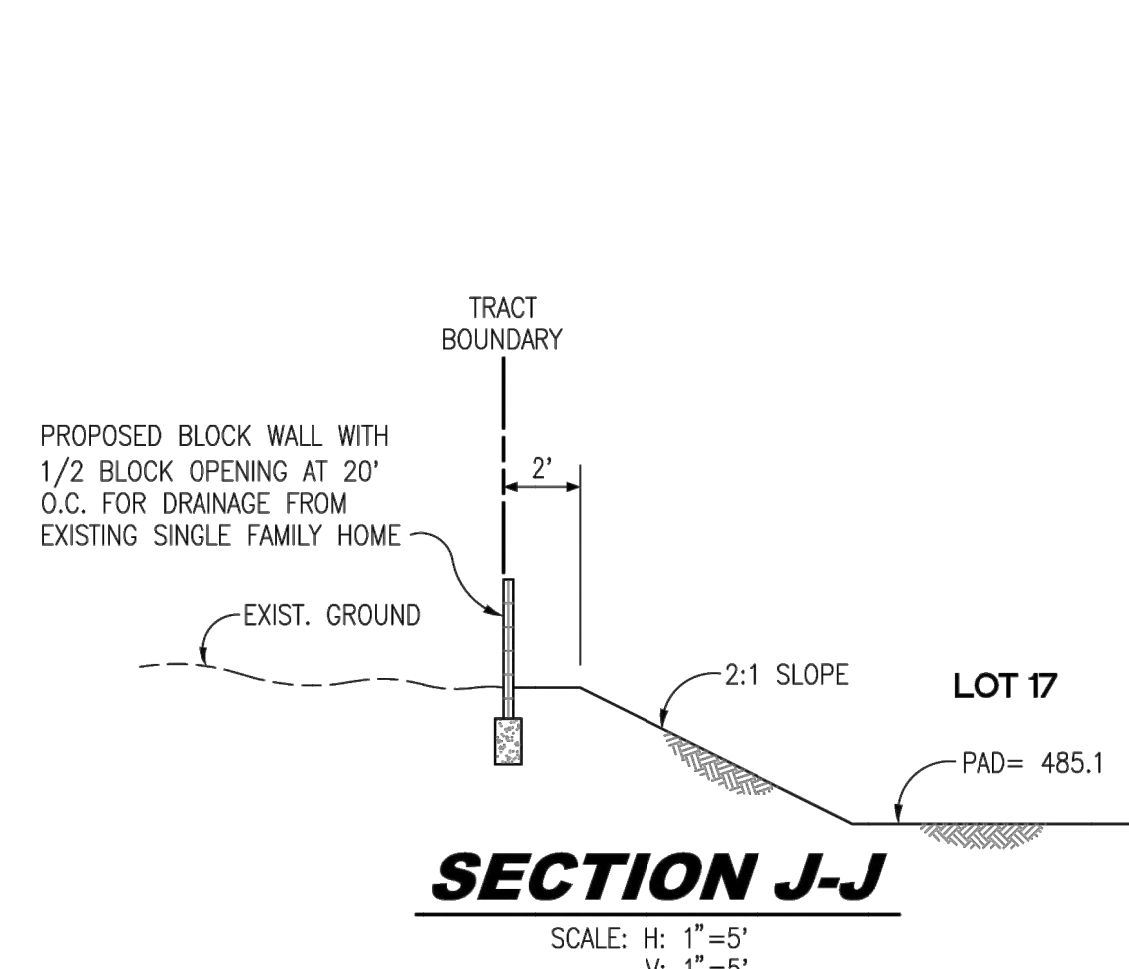
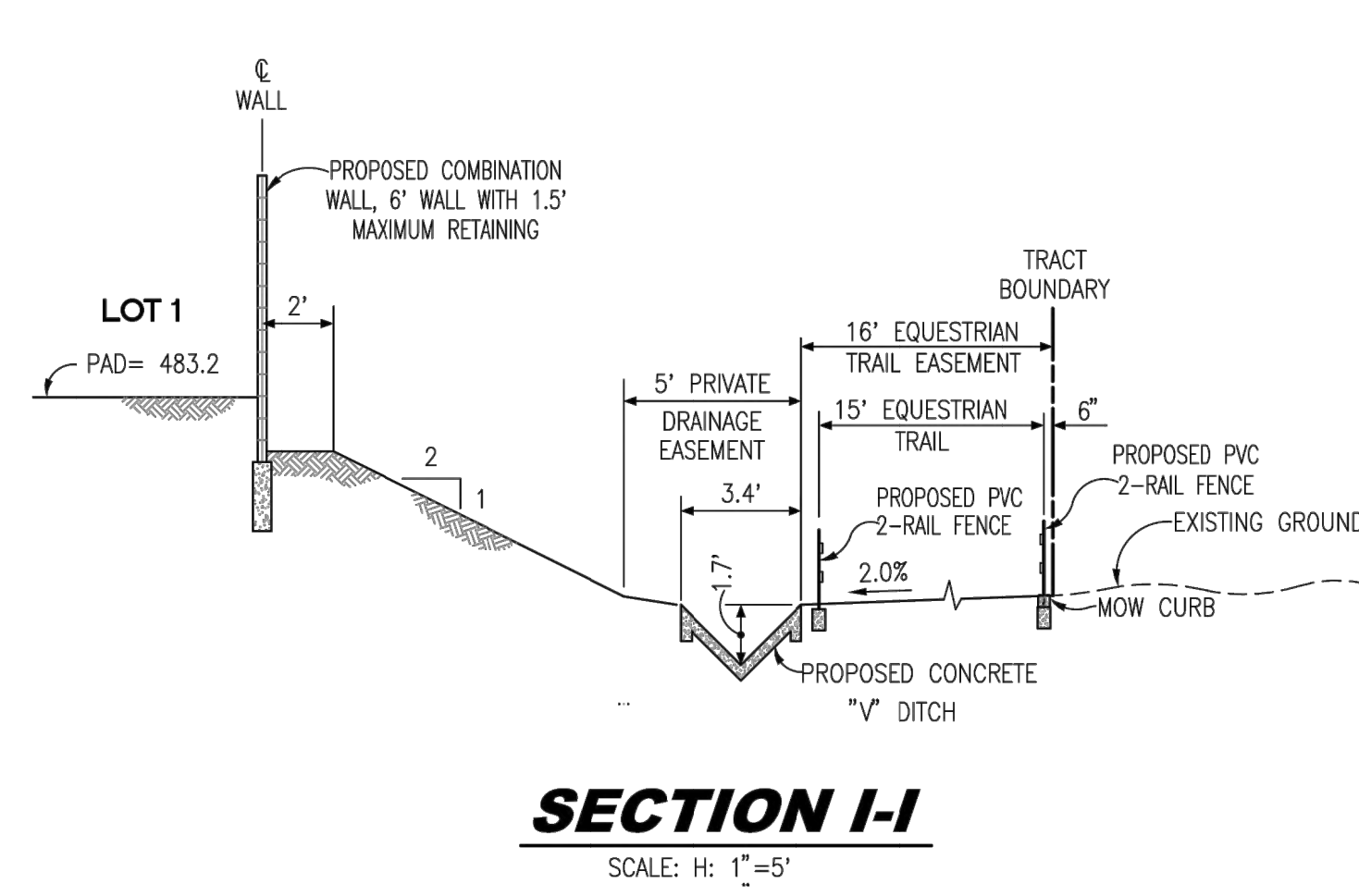
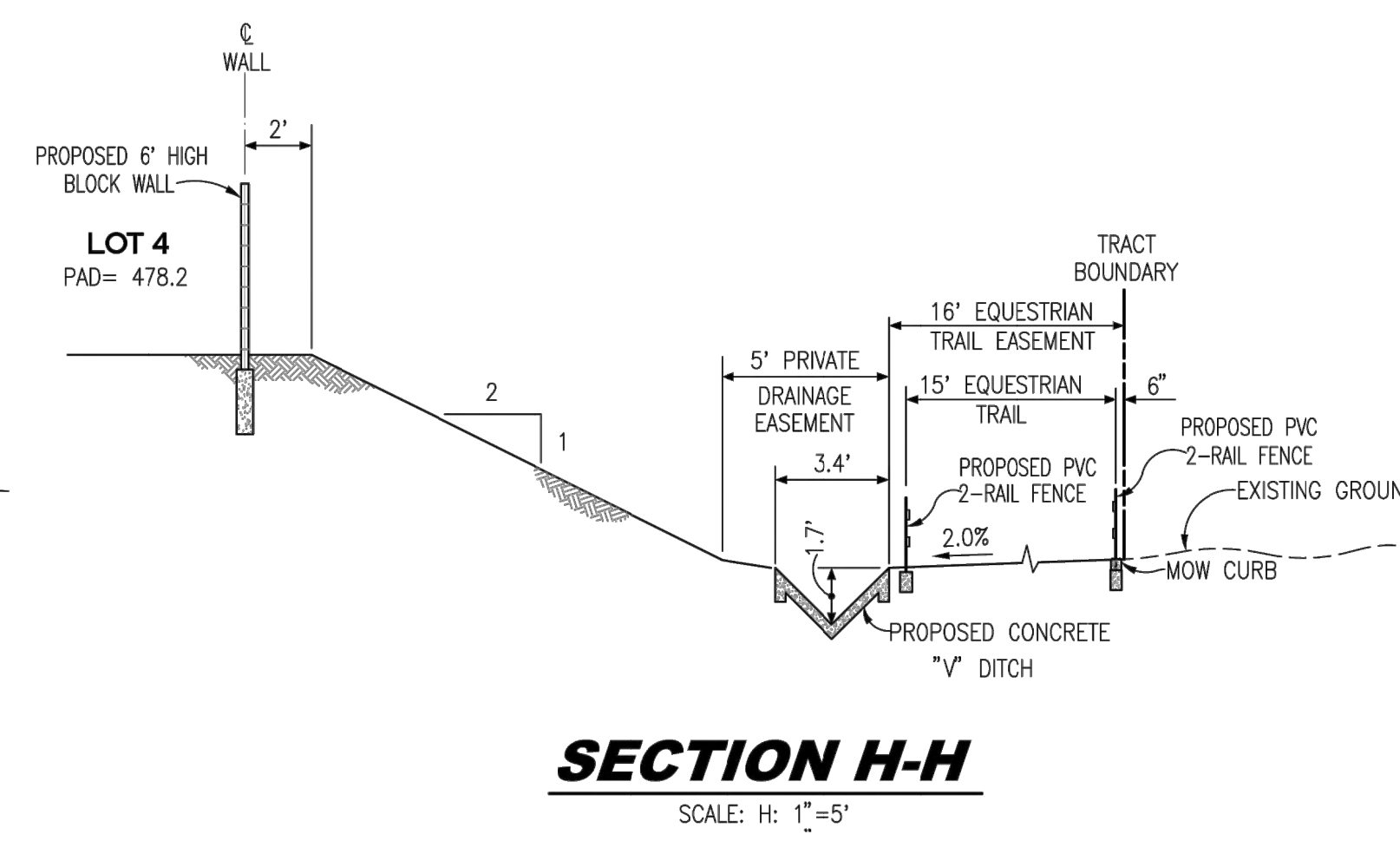
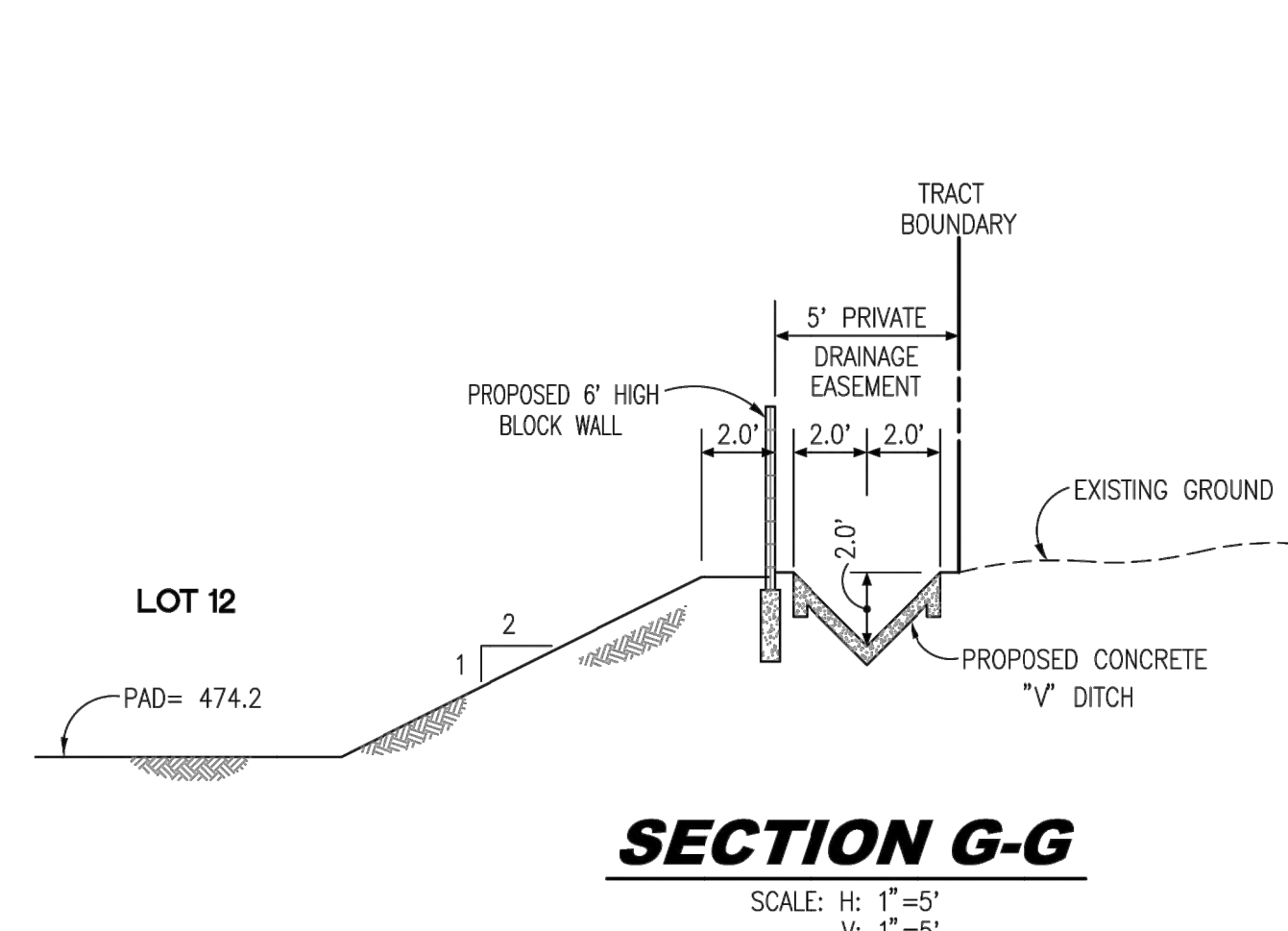
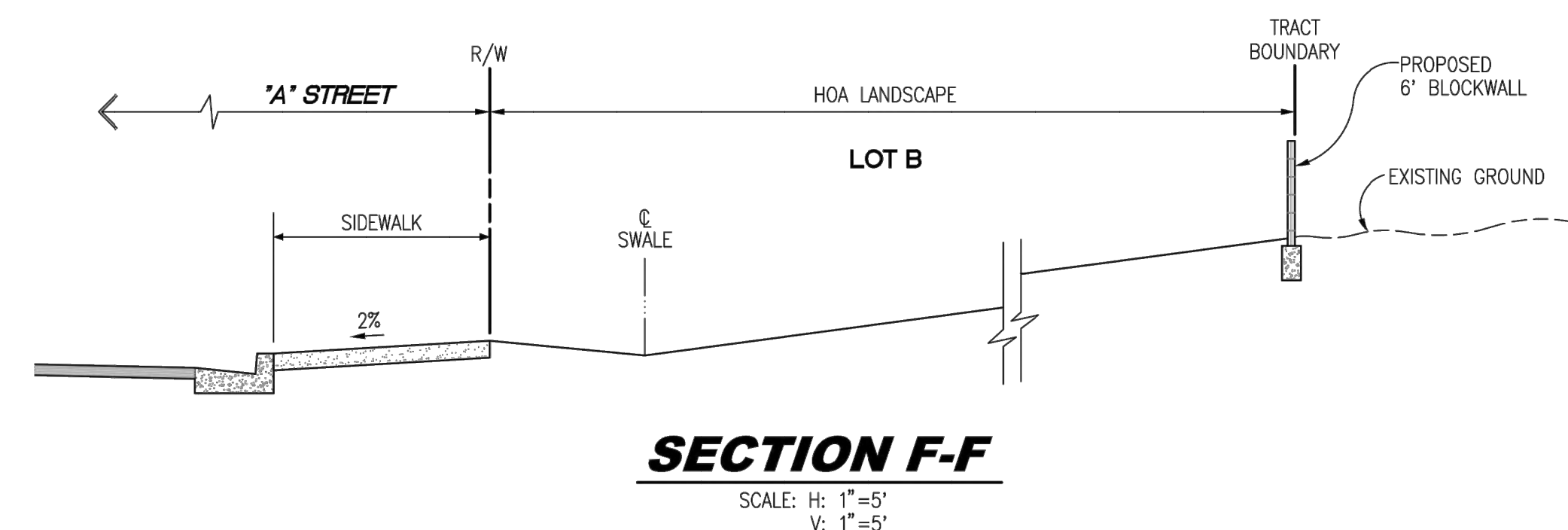
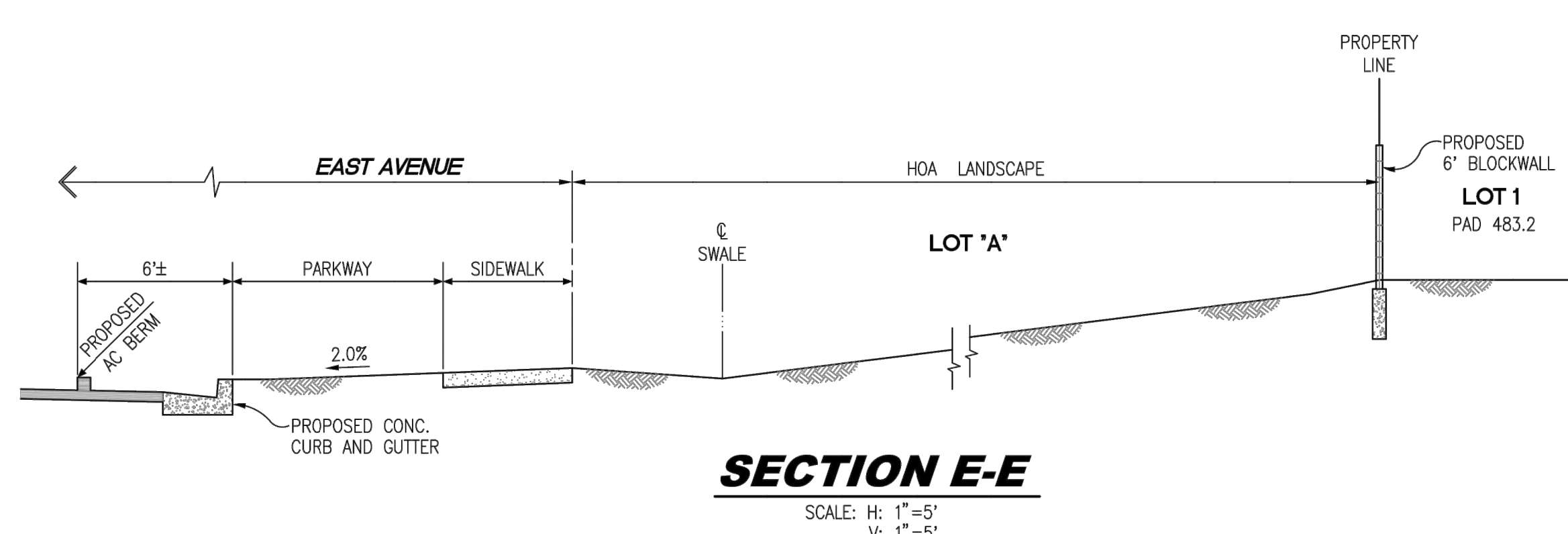
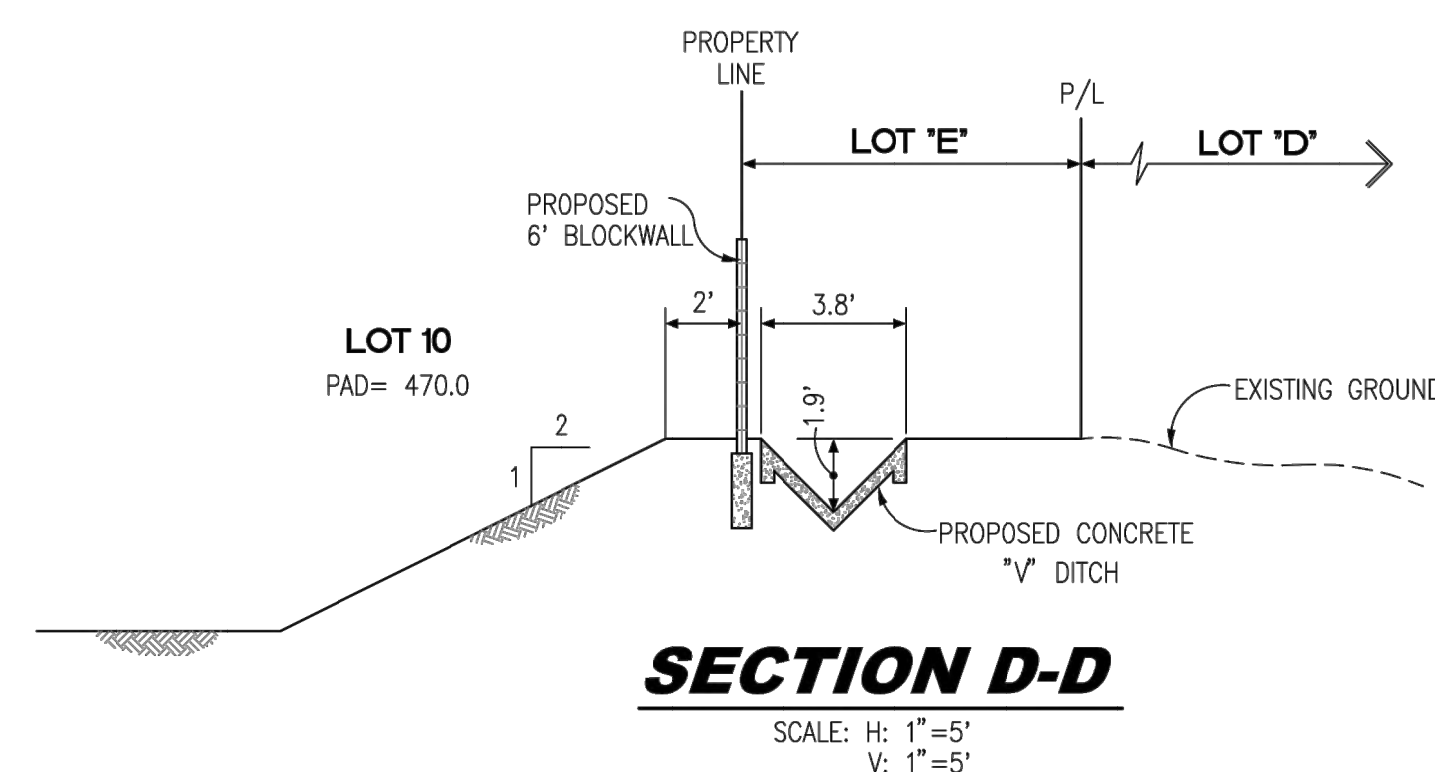
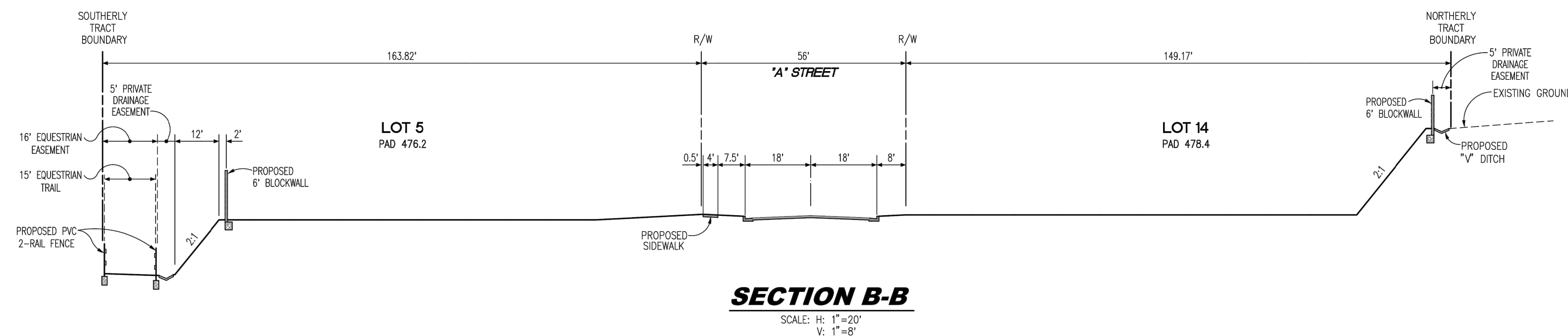
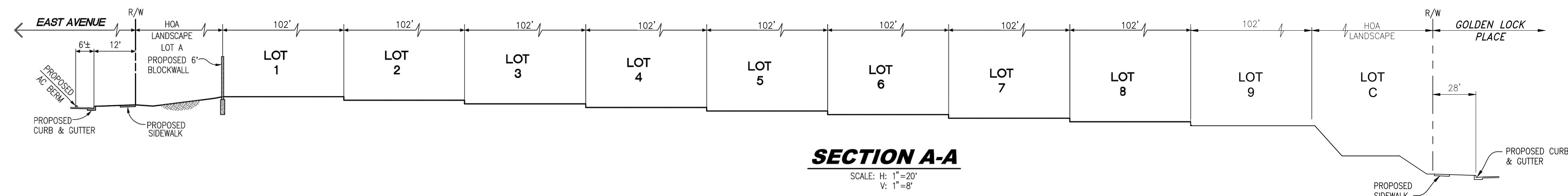
PREPARED BY:

MADOLE & ASSOCIATES, INC.
Engineering Communities for Life
9002 PITTSBURGH AVE. SUITE 200
RANCHO CUCAMONGA, CA. 91730
PHONE: 909.481.6322
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TENTATIVE TRACT NO. 20334
RESIDENTIAL LOTS 1-17
CONCEPTUAL GRADING PLAN
SUBTT 20334

DATE PREPARED: NOVEMBER 20, 2020
SHEET C-5 OF 11
CITY OF RANCHO CUCAMONGA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

TENTATIVE TRACT NO. 20334



FOUNDATION CLEARANCE FROM SLOPES
FIGURE 1808A.7.1
CBC 2016
NOT TO SCALE

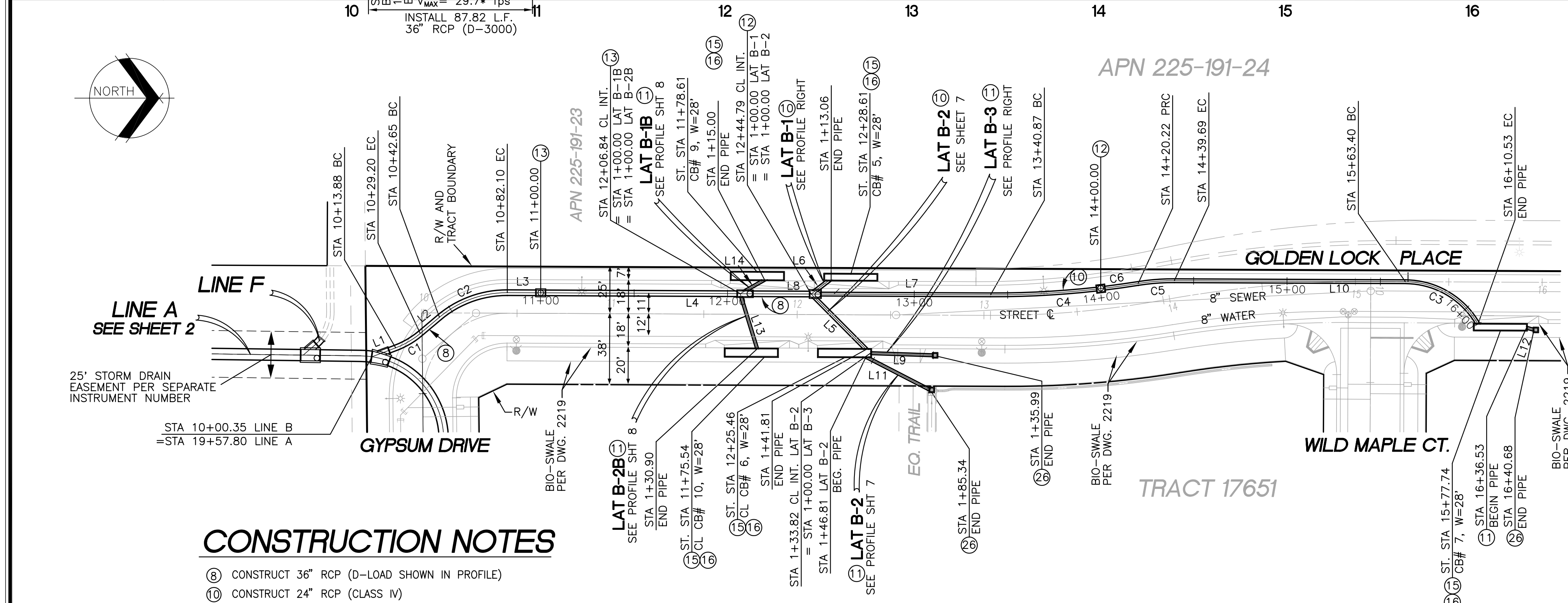
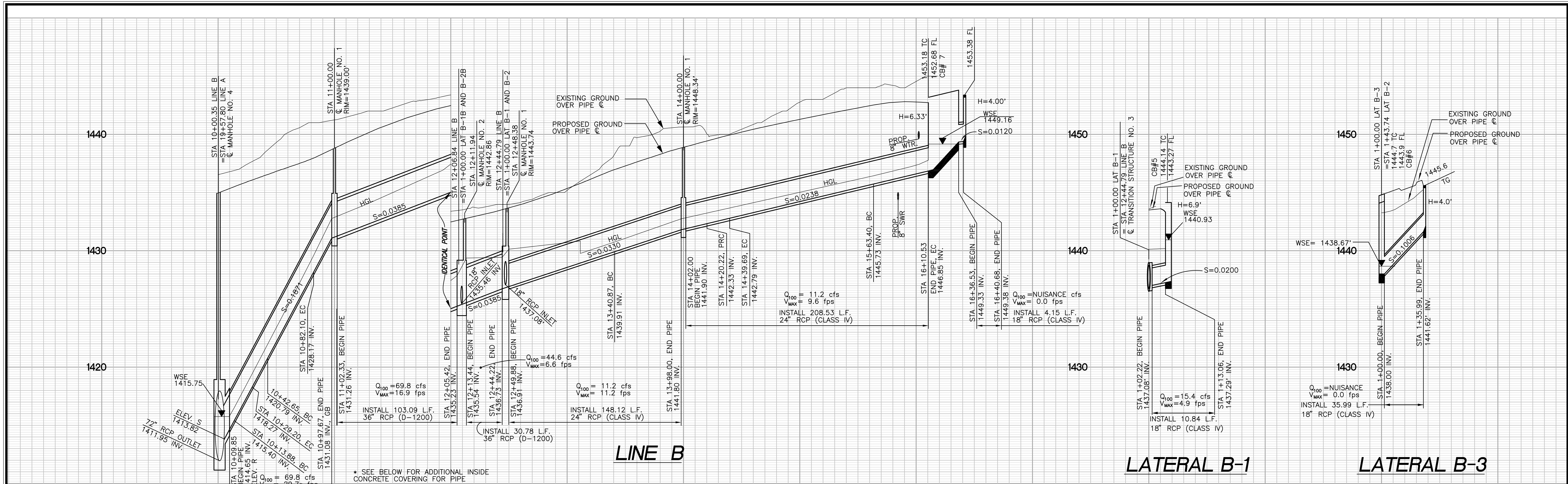
WALL NOTES
SECTION 17.48.030 OF THE MUNICIPAL CODE EXHIBIT HOW TO MEASURE WALL HEIGHT ON THE THE PROPERTY LINE OF ADJACENT LOTS WITH DIFFERENT GRADES.
FENCE AND WALL HEIGHT SHALL BE MEASURED FROM THE FINISH GRADE AT THE BASE OF THE FENCE OR WALL TO THE UPPERMOST PART OF THE FENCE OR WALL; EXCEPT WHEN THERE IS A DIFFERENCE IN THE GROUND LEVEL BETWEEN TWO ADJOINING PARCELS, THE FENCE OR WALL SHALL BE MEASURED AT THE MID-POINT OF THE RETAINING WALL HEIGHT AS MEASURED ON THE SIDE WITH THE LOWEST FINISH GRADE. SEE FIGURE 17.48.030-2 (MEASUREMENT OF FENCE AND WALL HEIGHT ON PARCELS WITH DIFFERENT ELEVATION).

PREPARED FOR:
MANNING HOMES
20151 SW BIRCH STREET SUITE 150
NEWPORT BEACH, CA. 92660
CONTACT: CRAIG KOZMA
TEL: (949) 250-4200

PREPARED BY:
MADOLE & ASSOCIATES, INC.
9002 PITTSBURGH AVE. SUITE 200
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FAX: 909.481.6520

TENTATIVE
TRACT NO. 20334
RESIDENTIAL LOTS 1-17
GRADING SECTIONS
SUBTT 20334
DATE PREPARED: NOVEMBER 20, 2020
SHEET C-6 OF 11
CITY OF RANCHO CUCAMONGA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

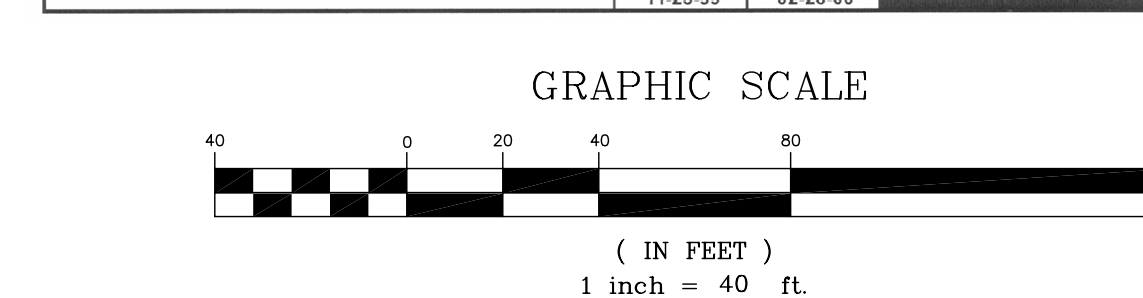
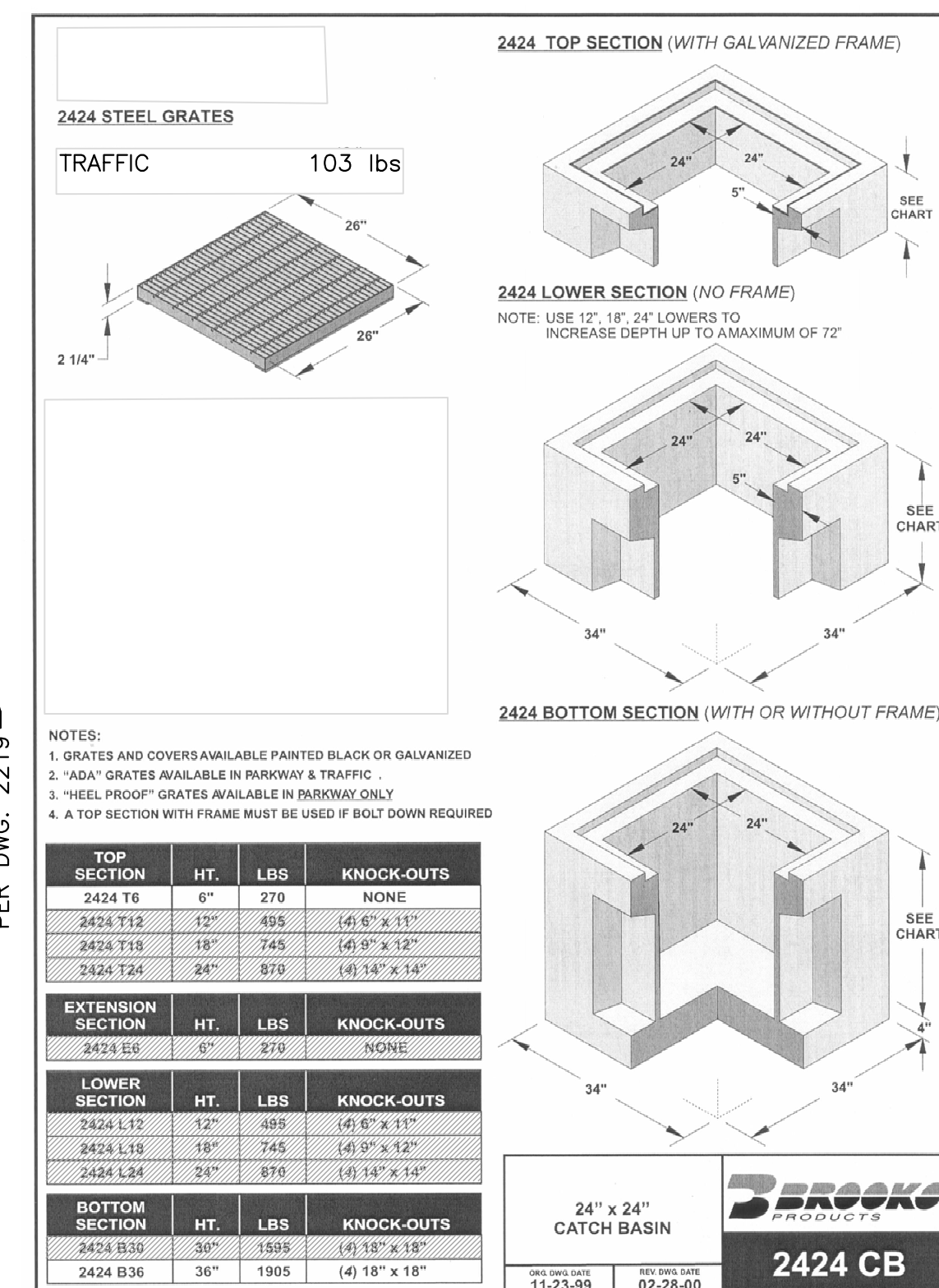
TENTATIVE TRACT NO. 20334



CONSTRUCTION NOTES

- ⑧ CONSTRUCT 36" RCP (D-LOAD SHOWN IN PROFILE)
- ⑩ CONSTRUCT 24" RCP (CLASS IV)
- ⑪ CONSTRUCT 18" RCP (CLASS IV)
- ⑫ CONSTRUCT MANHOLE NO.1 PER CITY STD. 318
- ⑬ CONSTRUCT MANHOLE NO.2 PER CITY STD. 319
- ⑮ CONSTRUCT CATCH BASIN PER CITY STD. 300
- ⑯ CONSTRUCT LOCAL DEPRESSION PER CITY STD. 307, TYPE A
- ⑰ CONSTRUCT 24"x24" CATCH BASIN BROOKS PRODUCTS 2424CB WITH TRAFFIC GRATE PER DETAILS HEREON

NOTE: THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MINIMUM OF 1.5 ADDITIONAL INCHES OF COVER OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FPS. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE $F'c=5000$ PSI FOR VELOCITIES EXCEEDING 20 FPS AND $F'c=6,000$ PSI FOR VELOCITIES EXCEEDING 30 FPS



CURVE TABLE				
ID	ANGLE	RADIUS	LENGTH	TAN.
C1	19°30'22"	45.00'	15.32'	7.73'
C2	40°21'44"	56.00'	39.45'	20.58'
C3	60°00'15"	45.00'	47.13'	25.98'
C4	6°55'42"	489.00'	59.13'	29.60'
C5	9°17'70"	120.00'	19.47'	9.76'
C6	2°22'09"	489.00'	20.22'	10.11'

LENGTH TABLE		
ID	BEARING	LENGTH
L1	N 20°50'49" W	13.53'
L2	N 40°21'23" W	13.45'
L3	N 00°00'21" E	17.90'
L4	N 00°00'21" E	106.84'
L5	N 44°52'42" E	41.81'
L6	N 37°40'56" W	12.26'
L7	N 00°00'21" E	96.08'
L8	N 00°00'21" E	37.95'
L9	N 01°43'44" E	33.53'
L10	N 00°00'21" E	123.71'
L11	N 27°01'15" E	38.53'
L12	N 15°13'08" E	4.15'
L13	N 72°41'04" E	30.90'
L14	N 29°59'24" W	15.00'

CITY OF RANCHO CUCAMONGA

STORM DRAIN IMPROVEMENTS PLAN AND PROFILE FOR LINE B

STA. 10+00.30 TO STA. 16+10.52
PROFILE LAT. B-1 AND B-3

APPROVED BY :
CITY ENGINEER

DESIGN
S.E.T

DRAWN
S.E.T

CHECKED
E.J.L.

DATE: _____
RCE NO 53672

RECOMMENDED

SHEET 5 OF 8

DRAWING NO. 2219-D

K. HOVNANIAN HOMES

1500 S. HAVEN STE.100
ONTARIO, CA. 91761
Ph: (909) 937-3270

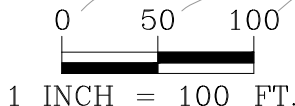
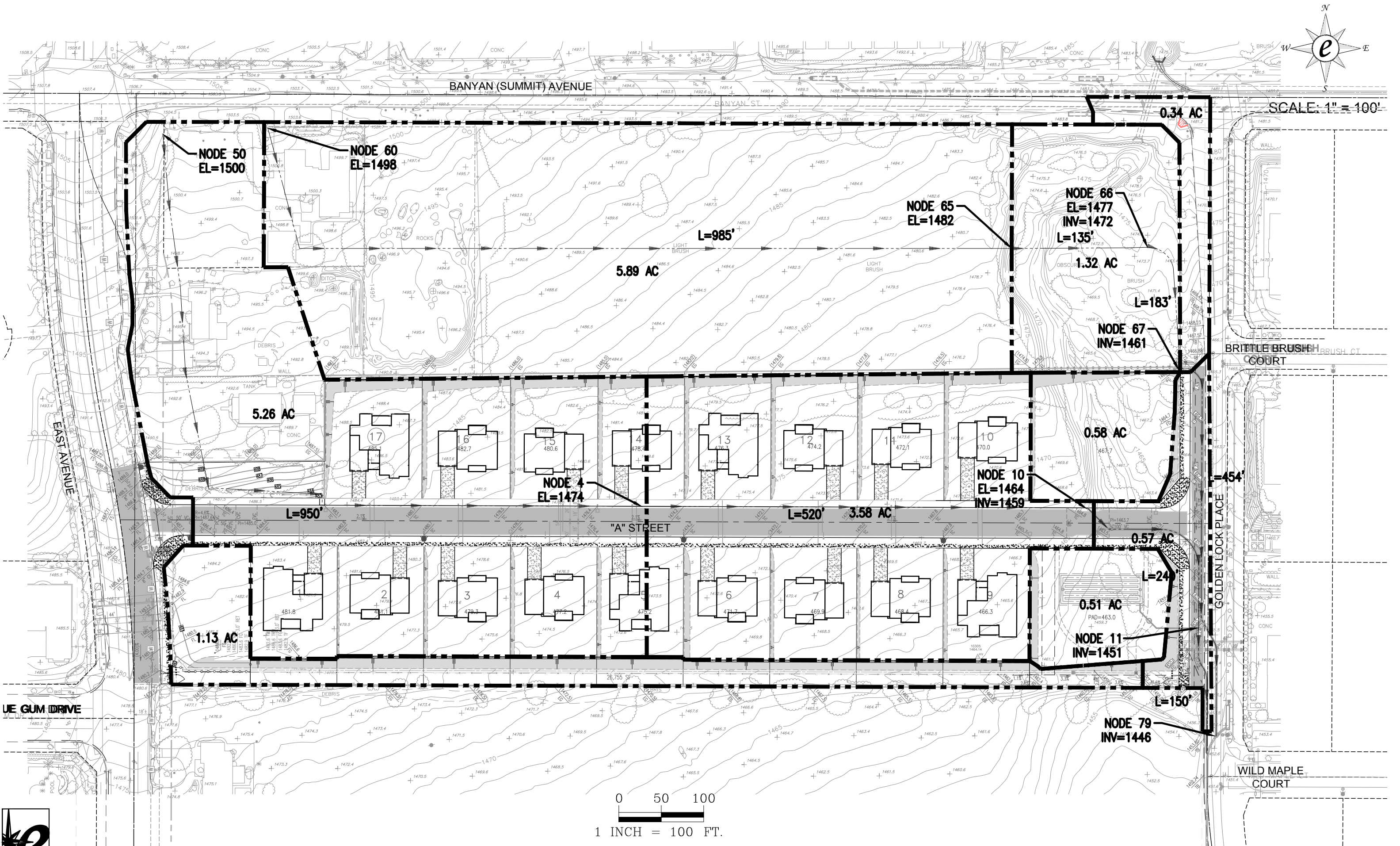
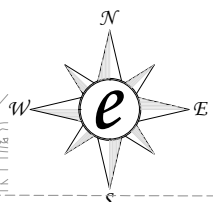
DESCRIPTION OF REVISION

DATE

CITY APPROVED:

CITY OF RANCHO CUCAMONGA

BENCH MARK NUMBER 150
ELEVATION : 1507.007'
FD. CHIZ. "X" IN MIDDLE OF CONC. HEADWALL
AT SWC OF SUMMIT AVENUE AND EAST AVENUE.



1 INCH = 100 FT.



ENCOMPASS ASSOCIATES, INC.

TRACT 20334
HYDROLOGY MAP