

Preliminary Drainage Report

For

Ida Avenue Apartments

In the

City of Solana Beach

County of San Diego, California

Preparation Date: February 9, 2018

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JN 117.1574

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INTRODUCTION

The Ida Avenue Apartments project is a proposal to construct an 8-unit apartment complex on an undeveloped lot. The project site is located in between the Interstate 5 and Ida Ave. in the City of Solana Beach. Existing homes are to the south, west, and north of the site. The site sits within the San Dieguito Hydrological Unit within the Regional Water Quality Control Board San Diego Region (9) San Diego Hydrologic Basin Planning Area.

Review of record data and maps and the site geotechnical report, moderate to high infiltration rates are expected for the site. USDA - NRCSS maps show that the site is underlain with hydrologic soils Group A and Group B soils and the geotechnical report notes that the majority of soils found were silty sand.

The proposed project will consist of two buildings totaling eight two-story apartment units with underground garage parking. Filterra catch basins are proposed to treat onsite stormwater runoff and Advanced Drainage System underground perforated storage chambers are proposed to mitigate the 2-year and 10-year pre-post development volume differentials.

The San Diego County Hydrology Manual was used to create rational method models to analyze stormwater flow rates generated on and off site and unit hydrograph models were created to analyze stormwater volumes generated onsite.

DESIGN CRITERIA

This Drainage Study was based on the following Design Criteria identified by the County of San Diego Flood Control District:

1. Tributary flows must be routed through the site in a safe and non-destructive manner.
2. The **2 and 10 year pre-post development volume differential** must be retained on site and to attenuate peak flows.
3. Onsite private and offsite public catch basins and storm drain lines must be designed to convey the flows through the site without damaging the proposed development

DESIGN METHODOLOGY

1. **RATIONAL METHOD** – The rational method is used to determine the peak discharge for watersheds (less than 1 square mile). Civil Design Software by Bonadiman and Associates was used to model the San Diego County Department of Public Works (SDCDPW) rational method for the project site. The following design data was used within our model:

- A. Rainfall (Rational) – Rainfall for the 6 hour and 24 hour storms were input.
- B. Infiltration – Soil Types “A” and “B” underlie the site area based on a review of the hydrologic soils group map USGS maps.

2. **UNIT HYDROGRAPH** – The unit hydrograph is used to determine the storm water volume generated. Civil Design Software by Bonadiman and Associates was used to model the SDCDPW unit hydrograph for the project site. The following design data was used within our model:

- A. Time of Concentration – The rational method time of concentration is used for estimation of basin lag time.
- B. S-Graphs – The CIVILD program uses an S-Graph summation hydrograph approach where the watershed discharge, in percent ultimate discharge as a function of time expressed in percent of lag, is stored in or calculated by the program. The stored S-Graphs are those developed for Valley, Valley Developed, Foothill, Mountain, or Desert areas.

Narrative

Existing Conditions

The 0.94-acre undeveloped site is located approximately 650' southerly of Genevieve St. between the I-5 and Ida Ave. The site is moderately covered with natural shrubs and grasses and slopes from east to west at a slope range from 10% to 3 to 1. There are no existing improvements or impervious areas.

An existing ridge traverses from east to west and divides the site into two drainage management areas (DMA)s: DMA A and DMA B. Offsite flows begin at a high point at the top of the ridge near the I-5 within CALTRANS right of way and sheet through the site to Ida Ave. Flows are divided by the ridgeline and are conveyed southerly and northerly along Ida Ave. The site area from the proposed project boundary (0.94 acres) was used in the existing conditions to compare pre and post-development flows and volumes.

There are no existing curb and gutter, storm drain catch basins, or storm drain lines in the immediate vicinity of the site or to the south of the site. Existing curbs and gutters to the north of the site convey the flows downstream northerly to existing catch basins near Genevieve St.

DMA A is the northerly watershed tributary to Ida Ave. Offsite flows within the CALTRANS right of way start at approximately 30' north of the site at a high point in DMA A-1. DMA A-1 generates a 100-year flow rate of 0.3 CFS. Flows from DMA A-1 sheet westerly toward onsite DMA A-2. DMA A-2 generates a 100-year onsite flow of 0.4 CFS. The total 100-year flow rate generated from DMA A tributary to Ida Ave. is 0.7 CFS.

DMA B is the southerly watershed tributary to Ida Ave. Offsite flows within the CALTRANS right of way start at approximately 30' north of the site at a high point in DMA B-1. DMA B-1 generates a 100-year flow rate of 0.3 CFS. Flows from DMA B-1 sheet westerly toward onsite DMA B-2. DMA B-2 generates a 100-year onsite flow of 0.4 CFS. The total 100-year flow rate generated from DMA B tributary to Ida Ave. is 0.7 CFS.

One unit hydrograph model for existing conditions was created to determine the total volume generated from the entire 0.94-acre site. The software used requires a minimum site size of 1 acre. The 10-year volume generated from the site was found to be 0 CF due to soil loss of the volume into the ground.

Proposed Conditions

The proposed site consists of two proposed buildings with eight apartment units, driveways, underground parking, sidewalks, landscaping, and a playground area. Sump pumps will be installed in the underground parking garages to convey flow to be treated. Drop inlet catch basins and HDPE pipe will be installed to convey flow generated onsite onto Ida Ave. Two 4'x6' Filterra catch basins will be

constructed on Ida Ave. to treat stormwater generated onsite. The onsite flows will then be conveyed to ADS perforated underground storage chambers to detain the post-development 10-year volumes. These flows will be detained and infiltrate into the ground. For storms higher than the 10-year, flows will be bypassed via overflow and continue along Ida Ave. to perpetuate pre-development flow patterns and quantities.

The proposed site was divided into two DMAs to perpetuate existing drainage patterns: DMA A-2 and DMA B-2. Offsite flows generated upstream of the site within DMAs A-1 (100-year flow = 0.3 CFS) and B-1 (0.1 CFS) will be diverted around the site via proposed v-gutters, drop inlet catch basins, and HDPE pipe to prevent comingling of flows generated onsite.

DMA A-2 is the onsite northerly watershed tributary to Ida Ave, Filtterra Catch Basin A, and Point of Connection 1 (POC 1). DMA A-2 generates a 100-year onsite flow of 1.5 CFS.

DMA B-2 is the onsite southerly watershed tributary to Ida Ave, Filtterra Catch Basin B, and POC 2. DMA B-2 generates a 100-year onsite flow of 1.5 CFS.

One unit hydrograph model for proposed conditions was created to determine the total volume generated from the entire 0.94-acre site. The 10-year volume generated from the site was found to be 4662 CF. This volume will be stored within two separate storage chamber systems distributed between DMA A-2 and B-2.

Each storage chamber was calculated to store approximately 215.1 CF of stormwater within the tank and the gravel trench surrounding the tank. The total required storage of 4662 CF will be stored in 22 storage chambers ($22 \times 215.1 \text{ CF} = 4732 \text{ CF}$).

Using CCS software, the onsite pre and post conditions were modeled to compare hydrologic conditions at the outlet points. The software showed that the proposed site mitigates and reduces flow rates for the 2-25 year storms. The 2 year storm goes from 0.197 CFS for existing conditions to 0.116 CFS for proposed conditions. The 25 year storm goes from 0.494 CFS to 0.427 CFS.

CONCLUSION

The purpose of this drainage analysis is to ensure that the proposed drainage system is designed to accept and convey onsite flows through the project site in a safe and non-destructive manner while adhering to the regional and local design requirements.

The San Diego County requirements of mitigating for hydromodification for the 2 and 10 year storms will be met by installing perforated underground storage chambers to detain post-development flows. The proposed hydromodification system mitigates onsite increased post-development flow rates by storing and

infiltrating stormwater within the underground chambers. The underground chambers will control outflow via a 24" overflow structure.

The CCS software shows that the proposed site reduces flow rates of 2 year to 25 year storms. The proposed onsite stormwater system was designed to mitigate for the required storms and will bypass higher storms without damage to property. The proposed system will also capture and convey offsite flows to bypass through the site to safely perpetuate existing drainage conditions.

DRAINAGE SUMMARY

2/6/2018

PROPOSED CONDITIONS

		ONSITE		OFFSITE	
DMA	SITE	A-2	B-2	A-1	B-1
AREA (SF)	40844	19334	21510	14384	2975
AREA (AC)	0.94	0.44	0.49	0.33	0.07
AREA IMP (SF)	22400				
AREA PERV (SF)	18444				
C	0.539				
RAINFALL d (IN)	0.5			0.5	0.5
DCV (CF)	917				
Tc-10 (MIN)	8.3				
Q-10 (CFS)	1.5				
V-10 (CF)	4662				
V-CHAMBERS (CF)	4900				
Q-100 (CFS)		1.5	1.7	0.3	0.1

EXISTING CONDITIONS

DMA	SITE (A-2+B-2)	A-1	A-2	SUM	B-1	B-2	SUM
AREA (SF)	40810	14384	22621		2975	18189	
AREA (AC)	0.94	0.33	0.52		0.07	0.42	
AREA IMP (SF)	0	0	0		0	0	
AREA PERV (SF)	40810	14384	22621		2975	18189	
TC-10 (MIN)	11.5						
Q-10 (CFS)	0.5						
Q-100 (CFS)		0.3	0.4	0.7	0.1	0.3	0.4
V-10 (CF)	0						

RAINFALL

2YR, 6HR	1.2
2YR, 24HR	1.8
5YR, 6HR	1.5
5YR, 24HR	2.5
10YR, 6HR	1.6
10YR, 24HR	3
25YR, 6HR	2
25YR, 24HR	3.5
50YR, 6HR	2.5
50YR, 24HR	4
100YR, 6HR	2.5
100YR, 24HR	4

Appendix A
Hydrology Calculations – Existing Conditions

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/05/18

100-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
DMA A - EXISTING CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

++++++
Process from Point/Station 100.000 to Point/Station 110.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance = 115.000(Ft.)
Highest elevation = 131.000(Ft.)
Lowest elevation = 124.000(Ft.)
Elevation difference = 7.000(Ft.) Slope = 6.087 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 6.09 %, in a development type of
Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration = 8.63 minutes
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.225) * (100.000^{.5})] / (6.087^{(1/3)}) = 8.63$
The initial area total distance of 115.00 (Ft.) entered leaves a
remaining distance of 15.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 0.18 minutes
for a distance of 15.00 (Ft.) and a slope of 6.09 %
with an elevation difference of 0.91(Ft.) from the end of the top area
 $Tt = [11.9 * length(Mi)^3] / (elevation\ change(Ft.))^{.385} * 60(min/hr)$
= 0.185 Minutes
 $Tt = [(11.9 * 0.0028^3) / (0.91)]^{.385} = 0.18$
Total initial area Ti = 8.63 minutes from Figure 3-3 formula plus
0.18 minutes from the Figure 3-4 formula = 8.81 minutes
Rainfall intensity (I) = 4.571(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff = 0.339(CFS)
Total initial stream area = 0.330(Ac.)

++++++
Process from Point/Station 110.000 to Point/Station 120.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.561(CFS)
Depth of flow = 0.125(Ft.), Average velocity = 1.446(Ft/s)
***** Irregular Channel Data *****

```

-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              1.00
      2             25.00              0.00
      3             50.00              1.00
Manning's 'N' friction factor = 0.035
-----
Sub-Channel flow = 0.561(CFS)
'      ' flow top width = 6.229(Ft.)
'      ' velocity= 1.447(Ft/s)
'      ' area = 0.388(Sq.Ft)
'      ' Froude number = 1.021

Upstream point elevation = 124.000(Ft.)
Downstream point elevation = 108.000(Ft.)
Flow length = 340.000(Ft.)
Travel time = 3.92 min.
Time of concentration = 12.73 min.
Depth of flow = 0.125(Ft.)
Average velocity = 1.446(Ft/s)
Total irregular channel flow = 0.561(CFS)
Irregular channel normal depth above invert elev. = 0.125(Ft.)
Average velocity of channel(s) = 1.446(Ft/s)
Adding area flow to channel
Rainfall intensity (I) = 3.605(In/Hr) for a 100.0 year storm
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN ]
(Permanent Open Space )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Rainfall intensity = 3.605(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.225 CA = 0.191
Subarea runoff = 0.350(CFS) for 0.520(Ac.)
Total runoff = 0.690(CFS) Total area = 0.850(Ac.)
Depth of flow = 0.135(Ft.), Average velocity = 1.523(Ft/s)
End of computations, total study area = 0.850 (Ac.)

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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/05/18

100-YEAR HYDROLOGY
117.1574 - SOLANA BEACH APARTMENTS
DMA B - EXISTING CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 100.000 to Point/Station 210.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance = 50.000(Ft.)
Highest elevation = 131.000(Ft.)
Lowest elevation = 128.000(Ft.)
Elevation difference = 3.000(Ft.) Slope = 6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 6.00 %, in a development type of
Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration = 8.67 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.2250) * (100.000^{.5})] / (6.000^{(1/3)}) = 8.67$
Rainfall intensity (I) = 4.619(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff = 0.073(CFS)
Total initial stream area = 0.070(Ac.)

+++++
Process from Point/Station 210.000 to Point/Station 220.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.258(CFS)
Depth of flow = 0.094(Ft.), Average velocity = 1.174(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 25.00 0.00
3 50.00 1.00
Manning's 'N' friction factor = 0.035

Sub-Channel flow = 0.258(CFS)
' ' flow top width = 4.686(Ft.)

```

'      '      velocity=      1.174(Ft/s)
'      '      area =        0.220(Sq.Ft)
'      '      Froude number =      0.956

Upstream point elevation = 128.000(Ft.)
Downstream point elevation = 111.000(Ft.)
Flow length = 375.000(Ft.)
Travel time = 5.32 min.
Time of concentration = 13.99 min.
Depth of flow = 0.094(Ft.)
Average velocity = 1.174(Ft/s)
Total irregular channel flow = 0.258(CFS)
Irregular channel normal depth above invert elev. = 0.094(Ft.)
Average velocity of channel(s) = 1.174(Ft/s)
Adding area flow to channel
Rainfall intensity (I) = 3.392(In/Hr) for a 100.0 year storm
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN ]
(Permanent Open Space )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Rainfall intensity = 3.392(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.225 CA = 0.110
Subarea runoff = 0.301(CFS) for 0.420(Ac.)
Total runoff = 0.374(CFS) Total area = 0.490(Ac.)
Depth of flow = 0.108(Ft.), Average velocity = 1.289(Ft/s)
End of computations, total study area = 0.490 (Ac.)

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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/02/18

10-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
EXISTING SITE - Tc CALCULATION
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 10.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 1.600
24 hour precipitation(inches) = 3.000
P6/P24 = 53.3%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 210.000 to Point/Station 220.000
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance = 375.000(Ft.)
Highest elevation = 128.000(Ft.)
Lowest elevation = 111.000(Ft.)
Elevation difference = 17.000(Ft.) Slope = 4.533 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 4.53 %, in a development type of
Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration = 9.79 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.2000) * (100.000^{.5})] / (4.533^{(1/3)}) = 9.79$
The initial area total distance of 375.00 (Ft.) entered leaves a
remaining distance of 275.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 1.94 minutes
for a distance of 275.00 (Ft.) and a slope of 4.53 %
with an elevation difference of 12.47(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$
= 1.942 Minutes
 $Tt = [(11.9 * 0.0521^3) / (12.47)^{.385}] = 1.94$
Total initial area Ti = 9.79 minutes from Figure 3-3 formula plus
1.94 minutes from the Figure 3-4 formula = 11.73 minutes
Rainfall intensity (I) = 2.432(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff = 0.457(CFS)
Total initial stream area = 0.940(Ac.)
End of computations, total study area = 0.940 (Ac.)

UNIT HYDROGRAPH ANALYSIS

Copyright (c) CIVILCADD/CIVILDESIGN, 1990 - 2004, Version 7.1

Study date 02/05/18 File: 1574UHEXIST.out

+++++

Program License Serial Number 6313

 10-YEAR UNIT HYDROGRAPH
 SITE - EXISTING CONDITIONS
 117.1574 - IDA AVE APARTMENTS
 ARMSTRONG & BROOKS

+++++

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:
 Sub-Area(Ac.) Rainfall (In)
 1.00 3.00

Rainfall Distribution pattern used in study:
 Type B for San Diego area of California

+++++

***** Area-Averaged SCS Curve Number and Fm *****

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
0.90	0.900	40.0	40.0	0.050	B
0.10	0.100	98.0	98.0		

Area-averaged catchment SCS Curve Number AMC(2) = 45.800
 Area-averaged Fm value using values listed = 0.045(In/Hr)
 +++++
 User entry of time of concentration = 0.192 (hours)
 Watershed area = 1.00(Ac.)
 Catchment Lag time = 0.115 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 72.3380
 Hydrograph baseflow = 0.00(CFS)
 Minimum watershed loss rate(Fm) = 0.100(In/Hr)
 Average adjusted SCS Curve Number = 45.800

Rainfall depth area reduction factors:
 Using a total area of 1.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
 Areal factor ratio (rainfall reduction) = 1.000
 Rainfall entered for study = 3.000(In)
 Adjusted rainfall = 3.000(In)
 +++++

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabriel River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. office, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph is interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

FOOTHILL S-Graph

U N I T H Y D R O G R A P H				
Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)
(K = 12.10 (CFS))				
0.72	0.083	0.176	0.915	0.076
1.45	0.167	1.000	5.200	0.505
2.17	0.250	0.650	3.378	0.785
2.89	0.333	0.248	1.287	0.891
3.62	0.417	0.134	0.698	0.949
4.34	0.500	0.066	0.343	0.977
5.06	0.583	0.023	0.121	0.987
5.79	0.667	0.013	0.069	0.993
6.51	0.750	0.011	0.058	0.997
7.23	0.833	0.006	0.031	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - I_a)^2}{P - I_a + S}$$

Where:

Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad I_a = 0.2 S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.100(In) (for time interval = 0.008(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr- ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0045	0.0000	0.0045	-----	0.0083	0.0000
0.17	0.0090	0.0000	0.0045	-----	0.0083	0.0000
0.25	0.0135	0.0000	0.0045	-----	0.0083	0.0000
0.33	0.0180	0.0000	0.0045	-----	0.0083	0.0000
0.42	0.0225	0.0000	0.0045	-----	0.0083	0.0000

0.50	0.0270	0.0000	0.0045	-----	0.0083	0.0000
0.58	0.0305	0.0000	0.0035	-----	0.0083	0.0000
0.67	0.0340	0.0000	0.0035	-----	0.0083	0.0000
0.75	0.0375	0.0000	0.0035	-----	0.0083	0.0000
0.83	0.0410	0.0000	0.0035	-----	0.0083	0.0000
0.92	0.0445	0.0000	0.0035	-----	0.0083	0.0000
1.00	0.0480	0.0000	0.0035	-----	0.0083	0.0000
1.08	0.0525	0.0000	0.0045	-----	0.0083	0.0000
1.17	0.0570	0.0000	0.0045	-----	0.0083	0.0000
1.25	0.0615	0.0000	0.0045	-----	0.0083	0.0000
1.33	0.0660	0.0000	0.0045	-----	0.0083	0.0000
1.42	0.0705	0.0000	0.0045	-----	0.0083	0.0000
1.50	0.0750	0.0000	0.0045	-----	0.0083	0.0000
1.58	0.0795	0.0000	0.0045	-----	0.0083	0.0000
1.67	0.0840	0.0000	0.0045	-----	0.0083	0.0000
1.75	0.0885	0.0000	0.0045	-----	0.0083	0.0000
1.83	0.0930	0.0000	0.0045	-----	0.0083	0.0000
1.92	0.0975	0.0000	0.0045	-----	0.0083	0.0000
2.00	0.1020	0.0000	0.0045	-----	0.0083	0.0000
2.08	0.1075	0.0000	0.0055	-----	0.0083	0.0000
2.17	0.1130	0.0000	0.0055	-----	0.0083	0.0000
2.25	0.1185	0.0000	0.0055	-----	0.0083	0.0000
2.33	0.1240	0.0000	0.0055	-----	0.0083	0.0000
2.42	0.1295	0.0000	0.0055	-----	0.0083	0.0000
2.50	0.1350	0.0000	0.0055	-----	0.0083	0.0000
2.58	0.1395	0.0000	0.0045	-----	0.0083	0.0000
2.67	0.1440	0.0000	0.0045	-----	0.0083	0.0000
2.75	0.1485	0.0000	0.0045	-----	0.0083	0.0000
2.83	0.1530	0.0000	0.0045	-----	0.0083	0.0000
2.92	0.1575	0.0000	0.0045	-----	0.0083	0.0000
3.00	0.1620	0.0000	0.0045	-----	0.0083	0.0000
3.08	0.1675	0.0000	0.0055	-----	0.0083	0.0000
3.17	0.1730	0.0000	0.0055	-----	0.0083	0.0000
3.25	0.1785	0.0000	0.0055	-----	0.0083	0.0000
3.33	0.1840	0.0000	0.0055	-----	0.0083	0.0000
3.42	0.1895	0.0000	0.0055	-----	0.0083	0.0000
3.50	0.1950	0.0000	0.0055	-----	0.0083	0.0000
3.58	0.2010	0.0000	0.0060	-----	0.0083	0.0000
3.67	0.2070	0.0000	0.0060	-----	0.0083	0.0000
3.75	0.2130	0.0000	0.0060	-----	0.0083	0.0000
3.83	0.2190	0.0000	0.0060	-----	0.0083	0.0000
3.92	0.2250	0.0000	0.0060	-----	0.0083	0.0000
4.00	0.2310	0.0000	0.0060	-----	0.0083	0.0000
4.08	0.2375	0.0000	0.0065	-----	0.0083	0.0000
4.17	0.2440	0.0000	0.0065	-----	0.0083	0.0000
4.25	0.2505	0.0000	0.0065	-----	0.0083	0.0000
4.33	0.2570	0.0000	0.0065	-----	0.0083	0.0000
4.42	0.2635	0.0000	0.0065	-----	0.0083	0.0000
4.50	0.2700	0.0000	0.0065	-----	0.0083	0.0000
4.58	0.2770	0.0000	0.0070	-----	0.0083	0.0000
4.67	0.2840	0.0000	0.0070	-----	0.0083	0.0000
4.75	0.2910	0.0000	0.0070	-----	0.0083	0.0000
4.83	0.2980	0.0000	0.0070	-----	0.0083	0.0000
4.92	0.3050	0.0000	0.0070	-----	0.0083	0.0000
5.00	0.3120	0.0000	0.0070	-----	0.0083	0.0000
5.08	0.3200	0.0000	0.0080	-----	0.0083	0.0000
5.17	0.3280	0.0000	0.0080	-----	0.0083	0.0000
5.25	0.3360	0.0000	0.0080	-----	0.0083	0.0000
5.33	0.3440	0.0000	0.0080	-----	0.0083	0.0000
5.42	0.3520	0.0000	0.0080	-----	0.0083	0.0000
5.50	0.3600	0.0000	0.0080	-----	0.0083	0.0000
5.58	0.3685	0.0000	0.0085	0.0000	0.0085	-----
5.67	0.3770	0.0000	0.0085	0.0000	0.0085	-----
5.75	0.3855	0.0000	0.0085	0.0000	0.0085	-----
5.83	0.3940	0.0000	0.0085	0.0000	0.0085	-----
5.92	0.4025	0.0000	0.0085	0.0000	0.0085	-----
6.00	0.4110	0.0000	0.0085	0.0000	0.0085	-----
6.08	0.4210	0.0000	0.0100	0.0000	0.0100	-----
6.17	0.4310	0.0000	0.0100	0.0000	0.0100	-----
6.25	0.4410	0.0000	0.0100	0.0000	0.0100	-----
6.33	0.4510	0.0000	0.0100	0.0000	0.0100	-----
6.42	0.4610	0.0000	0.0100	0.0000	0.0100	-----
6.50	0.4710	0.0000	0.0100	0.0000	0.0100	-----
6.58	0.4825	0.0000	0.0115	0.0000	0.0115	-----
6.67	0.4940	0.0000	0.0115	0.0000	0.0115	-----
6.75	0.5055	0.0000	0.0115	0.0000	0.0115	-----
6.83	0.5170	0.0000	0.0115	0.0000	0.0115	-----
6.92	0.5285	0.0000	0.0115	0.0000	0.0115	-----
7.00	0.5400	0.0000	0.0115	0.0000	0.0115	-----

7.08	0.5550	0.0000	0.0150	0.0000	0.0150	-----
7.17	0.5700	0.0000	0.0150	0.0000	0.0150	-----
7.25	0.5850	0.0000	0.0150	0.0000	0.0150	-----
7.33	0.6000	0.0000	0.0150	0.0000	0.0150	-----
7.42	0.6150	0.0000	0.0150	0.0000	0.0150	-----
7.50	0.6300	0.0000	0.0150	0.0000	0.0150	-----
7.58	0.6525	0.0000	0.0225	0.0000	0.0225	-----
7.67	0.6750	0.0000	0.0225	0.0000	0.0225	-----
7.75	0.6975	0.0000	0.0225	0.0000	0.0225	-----
7.83	0.7200	0.0000	0.0225	0.0000	0.0225	-----
7.92	0.7425	0.0000	0.0225	0.0000	0.0225	-----
8.00	0.7650	0.0000	0.0225	0.0000	0.0225	-----
8.08	0.7985	0.0000	0.0335	0.0000	0.0335	-----
8.17	0.8320	0.0000	0.0335	0.0000	0.0335	-----
8.25	0.8655	0.0000	0.0335	0.0000	0.0335	-----
8.33	0.8990	0.0000	0.0335	0.0000	0.0335	-----
8.42	0.9325	0.0000	0.0335	0.0000	0.0335	-----
8.50	0.9660	0.0000	0.0335	0.0000	0.0335	-----
8.58	1.0100	0.0000	0.0440	0.0000	0.0440	-----
8.67	1.0540	0.0000	0.0440	0.0000	0.0440	-----
8.75	1.0980	0.0000	0.0440	0.0000	0.0440	-----
8.83	1.1420	0.0000	0.0440	0.0000	0.0440	-----
8.92	1.1860	0.0000	0.0440	0.0000	0.0440	-----
9.00	1.2300	0.0000	0.0440	0.0000	0.0440	-----
9.08	1.2780	0.0000	0.0480	0.0000	0.0480	-----
9.17	1.3260	0.0000	0.0480	0.0000	0.0480	-----
9.25	1.3740	0.0000	0.0480	0.0000	0.0480	-----
9.33	1.4220	0.0000	0.0480	0.0000	0.0480	-----
9.42	1.4700	0.0000	0.0480	0.0000	0.0480	-----
9.50	1.5180	0.0000	0.0480	0.0000	0.0480	-----
9.58	1.5590	0.0000	0.0410	0.0000	0.0410	-----
9.67	1.6000	0.0000	0.0410	0.0000	0.0410	-----
9.75	1.6410	0.0000	0.0410	0.0000	0.0410	-----
9.83	1.6820	0.0000	0.0410	0.0000	0.0410	-----
9.92	1.7230	0.0000	0.0410	0.0000	0.0410	-----
10.00	1.7640	0.0000	0.0410	0.0000	0.0410	-----
10.08	1.7845	0.0000	0.0205	0.0000	0.0205	-----
10.17	1.8050	0.0000	0.0205	0.0000	0.0205	-----
10.25	1.8255	0.0000	0.0205	0.0000	0.0205	-----
10.33	1.8460	0.0000	0.0205	0.0000	0.0205	-----
10.42	1.8665	0.0000	0.0205	0.0000	0.0205	-----
10.50	1.8870	0.0000	0.0205	0.0000	0.0205	-----
10.58	1.9005	0.0000	0.0135	0.0000	0.0135	-----
10.67	1.9140	0.0000	0.0135	0.0000	0.0135	-----
10.75	1.9275	0.0000	0.0135	0.0000	0.0135	-----
10.83	1.9410	0.0000	0.0135	0.0000	0.0135	-----
10.92	1.9545	0.0000	0.0135	0.0000	0.0135	-----
11.00	1.9680	0.0000	0.0135	0.0000	0.0135	-----
11.08	1.9795	0.0000	0.0115	0.0000	0.0115	-----
11.17	1.9910	0.0000	0.0115	0.0000	0.0115	-----
11.25	2.0025	0.0000	0.0115	0.0000	0.0115	-----
11.33	2.0140	0.0000	0.0115	0.0000	0.0115	-----
11.42	2.0255	0.0000	0.0115	0.0000	0.0115	-----
11.50	2.0370	0.0000	0.0115	0.0000	0.0115	-----
11.58	2.0475	0.0000	0.0105	0.0000	0.0105	-----
11.67	2.0580	0.0000	0.0105	0.0000	0.0105	-----
11.75	2.0685	0.0000	0.0105	0.0000	0.0105	-----
11.83	2.0790	0.0000	0.0105	0.0000	0.0105	-----
11.92	2.0895	0.0000	0.0105	0.0000	0.0105	-----
12.00	2.1000	0.0000	0.0105	0.0000	0.0105	-----
12.08	2.1100	0.0000	0.0100	0.0000	0.0100	-----
12.17	2.1200	0.0000	0.0100	0.0000	0.0100	-----
12.25	2.1300	0.0000	0.0100	0.0000	0.0100	-----
12.33	2.1400	0.0000	0.0100	0.0000	0.0100	-----
12.42	2.1500	0.0000	0.0100	0.0000	0.0100	-----
12.50	2.1600	0.0000	0.0100	0.0000	0.0100	-----
12.58	2.1695	0.0000	0.0095	0.0000	0.0095	-----
12.67	2.1790	0.0000	0.0095	0.0000	0.0095	-----
12.75	2.1885	0.0000	0.0095	0.0000	0.0095	-----
12.83	2.1980	0.0000	0.0095	0.0000	0.0095	-----
12.92	2.2075	0.0000	0.0095	0.0000	0.0095	-----
13.00	2.2170	0.0000	0.0095	0.0000	0.0095	-----
13.08	2.2255	0.0000	0.0085	0.0000	0.0085	-----
13.17	2.2340	0.0000	0.0085	0.0000	0.0085	-----
13.25	2.2425	0.0000	0.0085	0.0000	0.0085	-----
13.33	2.2510	0.0000	0.0085	0.0000	0.0085	-----
13.42	2.2595	0.0000	0.0085	0.0000	0.0085	-----
13.50	2.2680	0.0000	0.0085	0.0000	0.0085	-----
13.58	2.2760	0.0000	0.0080	-----	0.0083 0.0000	

13.67	2.2840	0.0000	0.0080	-----	0.0083	0.0000
13.75	2.2920	0.0000	0.0080	-----	0.0083	0.0000
13.83	2.3000	0.0000	0.0080	-----	0.0083	0.0000
13.92	2.3080	0.0000	0.0080	-----	0.0083	0.0000
14.00	2.3160	0.0000	0.0080	-----	0.0083	0.0000
14.08	2.3250	0.0000	0.0090	0.0000	0.0090	-----
14.17	2.3340	0.0000	0.0090	0.0000	0.0090	-----
14.25	2.3430	0.0000	0.0090	0.0000	0.0090	-----
14.33	2.3520	0.0000	0.0090	0.0000	0.0090	-----
14.42	2.3610	0.0000	0.0090	0.0000	0.0090	-----
14.50	2.3700	0.0000	0.0090	0.0000	0.0090	-----
14.58	2.3750	0.0000	0.0050	-----	0.0083	0.0000
14.67	2.3800	0.0000	0.0050	-----	0.0083	0.0000
14.75	2.3850	0.0000	0.0050	-----	0.0083	0.0000
14.83	2.3900	0.0000	0.0050	-----	0.0083	0.0000
14.92	2.3950	0.0001	0.0050	-----	0.0083	0.0000
15.00	2.4000	0.0001	0.0050	-----	0.0083	0.0000
15.08	2.4080	0.0001	0.0080	-----	0.0083	0.0000
15.17	2.4160	0.0002	0.0080	-----	0.0083	0.0000
15.25	2.4240	0.0003	0.0080	-----	0.0083	0.0000
15.33	2.4320	0.0004	0.0080	-----	0.0083	0.0000
15.42	2.4400	0.0004	0.0080	-----	0.0083	0.0000
15.50	2.4480	0.0006	0.0080	-----	0.0083	0.0000
15.58	2.4555	0.0007	0.0075	-----	0.0083	0.0000
15.67	2.4630	0.0008	0.0075	-----	0.0083	0.0000
15.75	2.4705	0.0009	0.0075	-----	0.0083	0.0000
15.83	2.4780	0.0010	0.0075	-----	0.0083	0.0000
15.92	2.4855	0.0012	0.0075	-----	0.0083	0.0000
16.00	2.4930	0.0013	0.0075	-----	0.0083	0.0000
16.08	2.5000	0.0015	0.0070	-----	0.0083	0.0000
16.17	2.5070	0.0016	0.0070	-----	0.0083	0.0000
16.25	2.5140	0.0018	0.0070	-----	0.0083	0.0000
16.33	2.5210	0.0020	0.0070	-----	0.0083	0.0000
16.42	2.5280	0.0022	0.0070	-----	0.0083	0.0000
16.50	2.5350	0.0024	0.0070	-----	0.0083	0.0000
16.58	2.5425	0.0026	0.0075	-----	0.0083	0.0000
16.67	2.5500	0.0028	0.0075	-----	0.0083	0.0000
16.75	2.5575	0.0030	0.0075	-----	0.0083	0.0000
16.83	2.5650	0.0033	0.0075	-----	0.0083	0.0000
16.92	2.5725	0.0035	0.0075	-----	0.0083	0.0000
17.00	2.5800	0.0038	0.0075	-----	0.0083	0.0000
17.08	2.5860	0.0040	0.0060	-----	0.0083	0.0000
17.17	2.5920	0.0042	0.0060	-----	0.0083	0.0000
17.25	2.5980	0.0044	0.0060	-----	0.0083	0.0000
17.33	2.6040	0.0047	0.0060	-----	0.0083	0.0000
17.42	2.6100	0.0049	0.0060	-----	0.0083	0.0000
17.50	2.6160	0.0051	0.0060	-----	0.0083	0.0000
17.58	2.6225	0.0054	0.0065	-----	0.0083	0.0000
17.67	2.6290	0.0057	0.0065	-----	0.0083	0.0000
17.75	2.6355	0.0060	0.0065	-----	0.0083	0.0000
17.83	2.6420	0.0063	0.0065	-----	0.0083	0.0000
17.92	2.6485	0.0065	0.0065	-----	0.0083	0.0000
18.00	2.6550	0.0069	0.0065	-----	0.0083	0.0000
18.08	2.6600	0.0071	0.0050	-----	0.0083	0.0000
18.17	2.6650	0.0073	0.0050	-----	0.0083	0.0000
18.25	2.6700	0.0076	0.0050	-----	0.0083	0.0000
18.33	2.6750	0.0078	0.0050	-----	0.0083	0.0000
18.42	2.6800	0.0081	0.0050	-----	0.0083	0.0000
18.50	2.6850	0.0083	0.0050	-----	0.0083	0.0000
18.58	2.6900	0.0086	0.0050	-----	0.0083	0.0000
18.67	2.6950	0.0089	0.0050	-----	0.0083	0.0000
18.75	2.7000	0.0091	0.0050	-----	0.0083	0.0000
18.83	2.7050	0.0094	0.0050	-----	0.0083	0.0000
18.92	2.7100	0.0097	0.0050	-----	0.0083	0.0000
19.00	2.7150	0.0100	0.0050	-----	0.0083	0.0000
19.08	2.7195	0.0102	0.0045	-----	0.0083	0.0000
19.17	2.7240	0.0105	0.0045	-----	0.0083	0.0000
19.25	2.7285	0.0107	0.0045	-----	0.0083	0.0000
19.33	2.7330	0.0110	0.0045	-----	0.0083	0.0000
19.42	2.7375	0.0113	0.0045	-----	0.0083	0.0000
19.50	2.7420	0.0115	0.0045	-----	0.0083	0.0000
19.58	2.7470	0.0118	0.0050	-----	0.0083	0.0000
19.67	2.7520	0.0121	0.0050	-----	0.0083	0.0000
19.75	2.7570	0.0125	0.0050	-----	0.0083	0.0000
19.83	2.7620	0.0128	0.0050	-----	0.0083	0.0000
19.92	2.7670	0.0131	0.0050	-----	0.0083	0.0000
20.00	2.7720	0.0134	0.0050	-----	0.0083	0.0000
20.08	2.7775	0.0138	0.0055	-----	0.0083	0.0000
20.17	2.7830	0.0141	0.0055	-----	0.0083	0.0000

20.25	2.7885	0.0145	0.0055	-----	0.0083	0.0000
20.33	2.7940	0.0149	0.0055	-----	0.0083	0.0000
20.42	2.7995	0.0153	0.0055	-----	0.0083	0.0000
20.50	2.8050	0.0156	0.0055	-----	0.0083	0.0000
20.58	2.8100	0.0160	0.0050	-----	0.0083	0.0000
20.67	2.8150	0.0164	0.0050	-----	0.0083	0.0000
20.75	2.8200	0.0167	0.0050	-----	0.0083	0.0000
20.83	2.8250	0.0171	0.0050	-----	0.0083	0.0000
20.92	2.8300	0.0174	0.0050	-----	0.0083	0.0000
21.00	2.8350	0.0178	0.0050	-----	0.0083	0.0000
21.08	2.8395	0.0182	0.0045	-----	0.0083	0.0000
21.17	2.8440	0.0185	0.0045	-----	0.0083	0.0000
21.25	2.8485	0.0188	0.0045	-----	0.0083	0.0000
21.33	2.8530	0.0192	0.0045	-----	0.0083	0.0000
21.42	2.8575	0.0195	0.0045	-----	0.0083	0.0000
21.50	2.8620	0.0199	0.0045	-----	0.0083	0.0000
21.58	2.8665	0.0202	0.0045	-----	0.0083	0.0000
21.67	2.8710	0.0206	0.0045	-----	0.0083	0.0000
21.75	2.8755	0.0210	0.0045	-----	0.0083	0.0000
21.83	2.8800	0.0213	0.0045	-----	0.0083	0.0000
21.92	2.8845	0.0217	0.0045	-----	0.0083	0.0000
22.00	2.8890	0.0221	0.0045	-----	0.0083	0.0000
22.08	2.8935	0.0224	0.0045	-----	0.0083	0.0000
22.17	2.8980	0.0228	0.0045	-----	0.0083	0.0000
22.25	2.9025	0.0232	0.0045	-----	0.0083	0.0000
22.33	2.9070	0.0236	0.0045	-----	0.0083	0.0000
22.42	2.9115	0.0240	0.0045	-----	0.0083	0.0000
22.50	2.9160	0.0244	0.0045	-----	0.0083	0.0000
22.58	2.9205	0.0247	0.0045	-----	0.0083	0.0000
22.67	2.9250	0.0251	0.0045	-----	0.0083	0.0000
22.75	2.9295	0.0255	0.0045	-----	0.0083	0.0000
22.83	2.9340	0.0259	0.0045	-----	0.0083	0.0000
22.92	2.9385	0.0263	0.0045	-----	0.0083	0.0000
23.00	2.9430	0.0268	0.0045	-----	0.0083	0.0000
23.08	2.9480	0.0272	0.0050	-----	0.0083	0.0000
23.17	2.9530	0.0277	0.0050	-----	0.0083	0.0000
23.25	2.9580	0.0281	0.0050	-----	0.0083	0.0000
23.33	2.9630	0.0286	0.0050	-----	0.0083	0.0000
23.42	2.9680	0.0291	0.0050	-----	0.0083	0.0000
23.50	2.9730	0.0295	0.0050	-----	0.0083	0.0000
23.58	2.9775	0.0300	0.0045	-----	0.0083	0.0000
23.67	2.9820	0.0304	0.0045	-----	0.0083	0.0000
23.75	2.9865	0.0308	0.0045	-----	0.0083	0.0000
23.83	2.9910	0.0313	0.0045	-----	0.0083	0.0000
23.92	2.9955	0.0317	0.0045	-----	0.0083	0.0000
24.00	3.0000	0.0322	0.0045	-----	0.0083	0.0000

Total soil rain loss = 3.00(In)
Total effective runoff = 0.00(In)

Peak flow rate this hydrograph = 0.00(CFS)
Total runoff volume this hydrograph = 0.0(Ft3)

+++++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				

1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0000	0.00	Q				
6+10	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+20	0.0000	0.00	Q				
6+25	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+35	0.0000	0.00	Q				
6+40	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
6+50	0.0000	0.00	Q				
6+55	0.0000	0.00	Q				
7+ 0	0.0000	0.00	Q				
7+ 5	0.0000	0.00	Q				
7+10	0.0000	0.00	Q				
7+15	0.0000	0.00	Q				
7+20	0.0000	0.00	Q				
7+25	0.0000	0.00	Q				
7+30	0.0000	0.00	Q				
7+35	0.0000	0.00	Q				
7+40	0.0000	0.00	Q				
7+45	0.0000	0.00	Q				
7+50	0.0000	0.00	Q				
7+55	0.0000	0.00	Q				

8+ 0	0.0000	0.00	Q				
8+ 5	0.0000	0.00	Q				
8+10	0.0000	0.00	Q				
8+15	0.0000	0.00	Q				
8+20	0.0000	0.00	Q				
8+25	0.0000	0.00	Q				
8+30	0.0000	0.00	Q				
8+35	0.0000	0.00	Q				
8+40	0.0000	0.00	Q				
8+45	0.0000	0.00	Q				
8+50	0.0000	0.00	Q				
8+55	0.0000	0.00	Q				
9+ 0	0.0000	0.00	Q				
9+ 5	0.0000	0.00	Q				
9+10	0.0000	0.00	Q				
9+15	0.0000	0.00	Q				
9+20	0.0000	0.00	Q				
9+25	0.0000	0.00	Q				
9+30	0.0000	0.00	Q				
9+35	0.0000	0.00	Q				
9+40	0.0000	0.00	Q				
9+45	0.0000	0.00	Q				
9+50	0.0000	0.00	Q				
9+55	0.0000	0.00	Q				
10+ 0	0.0000	0.00	Q				
10+ 5	0.0000	0.00	Q				
10+10	0.0000	0.00	Q				
10+15	0.0000	0.00	Q				
10+20	0.0000	0.00	Q				
10+25	0.0000	0.00	Q				
10+30	0.0000	0.00	Q				
10+35	0.0000	0.00	Q				
10+40	0.0000	0.00	Q				
10+45	0.0000	0.00	Q				
10+50	0.0000	0.00	Q				
10+55	0.0000	0.00	Q				
11+ 0	0.0000	0.00	Q				
11+ 5	0.0000	0.00	Q				
11+10	0.0000	0.00	Q				
11+15	0.0000	0.00	Q				
11+20	0.0000	0.00	Q				
11+25	0.0000	0.00	Q				
11+30	0.0000	0.00	Q				
11+35	0.0000	0.00	Q				
11+40	0.0000	0.00	Q				
11+45	0.0000	0.00	Q				
11+50	0.0000	0.00	Q				
11+55	0.0000	0.00	Q				
12+ 0	0.0000	0.00	Q				
12+ 5	0.0000	0.00	Q				
12+10	0.0000	0.00	Q				
12+15	0.0000	0.00	Q				
12+20	0.0000	0.00	Q				
12+25	0.0000	0.00	Q				
12+30	0.0000	0.00	Q				
12+35	0.0000	0.00	Q				
12+40	0.0000	0.00	Q				
12+45	0.0000	0.00	Q				
12+50	0.0000	0.00	Q				
12+55	0.0000	0.00	Q				
13+ 0	0.0000	0.00	Q				
13+ 5	0.0000	0.00	Q				
13+10	0.0000	0.00	Q				
13+15	0.0000	0.00	Q				
13+20	0.0000	0.00	Q				
13+25	0.0000	0.00	Q				
13+30	0.0000	0.00	Q				
13+35	0.0000	0.00	Q				
13+40	0.0000	0.00	Q				
13+45	0.0000	0.00	Q				
13+50	0.0000	0.00	Q				
13+55	0.0000	0.00	Q				
14+ 0	0.0000	0.00	Q				
14+ 5	0.0000	0.00	Q				
14+10	0.0000	0.00	Q				
14+15	0.0000	0.00	Q				
14+20	0.0000	0.00	Q				
14+25	0.0000	0.00	Q				
14+30	0.0000	0.00	Q				

14+35	0.0000	0.00	Q		V		
14+40	0.0000	0.00	Q			V	
14+45	0.0000	0.00	Q				V
14+50	0.0000	0.00	Q				V
14+55	0.0000	0.00	Q				V
15+ 0	0.0000	0.00	Q				V
15+ 5	0.0000	0.00	Q				V
15+10	0.0000	0.00	Q				V
15+15	0.0000	0.00	Q				V
15+20	0.0000	0.00	Q				V
15+25	0.0000	0.00	Q				V
15+30	0.0000	0.00	Q				V
15+35	0.0000	0.00	Q				V
15+40	0.0000	0.00	Q				V
15+45	0.0000	0.00	Q				V
15+50	0.0000	0.00	Q				V
15+55	0.0000	0.00	Q				V
16+ 0	0.0000	0.00	Q				V
16+ 5	0.0000	0.00	Q				V
16+10	0.0000	0.00	Q				V
16+15	0.0000	0.00	Q				V
16+20	0.0000	0.00	Q				V
16+25	0.0000	0.00	Q				V
16+30	0.0000	0.00	Q				V
16+35	0.0000	0.00	Q				V
16+40	0.0000	0.00	Q				V
16+45	0.0000	0.00	Q				V
16+50	0.0000	0.00	Q				V
16+55	0.0000	0.00	Q				V
17+ 0	0.0000	0.00	Q				V
17+ 5	0.0000	0.00	Q				V
17+10	0.0000	0.00	Q				V
17+15	0.0000	0.00	Q				V
17+20	0.0000	0.00	Q				V
17+25	0.0000	0.00	Q				V
17+30	0.0000	0.00	Q				V
17+35	0.0000	0.00	Q				V
17+40	0.0000	0.00	Q				V
17+45	0.0000	0.00	Q				V
17+50	0.0000	0.00	Q				V
17+55	0.0000	0.00	Q				V
18+ 0	0.0000	0.00	Q				V
18+ 5	0.0000	0.00	Q				V
18+10	0.0000	0.00	Q				V
18+15	0.0000	0.00	Q				V
18+20	0.0000	0.00	Q				V
18+25	0.0000	0.00	Q				V
18+30	0.0000	0.00	Q				V
18+35	0.0000	0.00	Q				V
18+40	0.0000	0.00	Q				V
18+45	0.0000	0.00	Q				V
18+50	0.0000	0.00	Q				V
18+55	0.0000	0.00	Q				V
19+ 0	0.0000	0.00	Q				V
19+ 5	0.0000	0.00	Q				V
19+10	0.0000	0.00	Q				V
19+15	0.0000	0.00	Q				V
19+20	0.0000	0.00	Q				V
19+25	0.0000	0.00	Q				V
19+30	0.0000	0.00	Q				V
19+35	0.0000	0.00	Q				V
19+40	0.0000	0.00	Q				V
19+45	0.0000	0.00	Q				V
19+50	0.0000	0.00	Q				V
19+55	0.0000	0.00	Q				V
20+ 0	0.0000	0.00	Q				V
20+ 5	0.0000	0.00	Q				V
20+10	0.0000	0.00	Q				V
20+15	0.0000	0.00	Q				V
20+20	0.0000	0.00	Q				V
20+25	0.0000	0.00	Q				V
20+30	0.0000	0.00	Q				V
20+35	0.0000	0.00	Q				V
20+40	0.0000	0.00	Q				V
20+45	0.0000	0.00	Q				V
20+50	0.0000	0.00	Q				V
20+55	0.0000	0.00	Q				V
21+ 0	0.0000	0.00	Q				V
21+ 5	0.0000	0.00	Q				V

21+10	0.0000	0.00	Q				V
21+15	0.0000	0.00	Q				V
21+20	0.0000	0.00	Q				V
21+25	0.0000	0.00	Q				V
21+30	0.0000	0.00	Q				V
21+35	0.0000	0.00	Q				V
21+40	0.0000	0.00	Q				V
21+45	0.0000	0.00	Q				V
21+50	0.0000	0.00	Q				V
21+55	0.0000	0.00	Q				V
22+ 0	0.0000	0.00	Q				V
22+ 5	0.0000	0.00	Q				V
22+10	0.0000	0.00	Q				V
22+15	0.0000	0.00	Q				V
22+20	0.0000	0.00	Q				V
22+25	0.0000	0.00	Q				V
22+30	0.0000	0.00	Q				V
22+35	0.0000	0.00	Q				V
22+40	0.0000	0.00	Q				V
22+45	0.0000	0.00	Q				V
22+50	0.0000	0.00	Q				V
22+55	0.0000	0.00	Q				V
23+ 0	0.0000	0.00	Q				V
23+ 5	0.0000	0.00	Q				V
23+10	0.0000	0.00	Q				V
23+15	0.0000	0.00	Q				V
23+20	0.0000	0.00	Q				V
23+25	0.0000	0.00	Q				V
23+30	0.0000	0.00	Q				V
23+35	0.0000	0.00	Q				V
23+40	0.0000	0.00	Q				V
23+45	0.0000	0.00	Q				V
23+50	0.0000	0.00	Q				V
23+55	0.0000	0.00	Q				V
24+ 0	0.0000	0.00	Q				V
24+ 5	0.0000	0.00	Q				V
24+10	0.0000	0.00	Q				V
24+15	0.0000	0.00	Q				V
24+20	0.0000	0.00	Q				V
24+25	0.0000	0.00	Q				V
24+30	0.0000	0.00	Q				V
24+35	0.0000	0.00	Q				V
24+40	0.0000	0.00	Q				V
24+45	0.0000	0.00	Q				V

Appendix B

Hydrology Calculations – Proposed Conditions

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/05/18

100-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
DMA A-2 - PROPOSED CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 101.000(Ft.) to Point/Station 111.000(Ft.)
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL]
(10.9 DU/A or Less)
Impervious value, Ai = 0.450
Sub-Area C Value = 0.530
Initial subarea total flow distance = 10.000(Ft.)
Highest elevation = 123.000(Ft.)
Lowest elevation = 110.000(Ft.)
Elevation difference = 13.000(Ft.) Slope = 130.000 %
Top of Initial Area Slope adjusted by User to 17.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 17.00 %, in a development type of
10.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 3.99 minutes
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})]$
 $TC = [1.8 * (1.1 - 0.5300) * (100.000^{.5}) / (17.000^{(1/3)})] = 3.99$
Calculated TC of 3.990 minutes is less than 5 minutes,
resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) = 6.587(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.530
Subarea runoff = 1.536(CFS)
Total initial stream area = 0.440(Ac.)
End of computations, total study area = 0.440 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/05/18

100-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
DMA B-2 - PROPOSED CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 201.000(Ft.) to Point/Station 211.000(Ft.)
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL]
(10.9 DU/A or Less)
Impervious value, Ai = 0.450
Sub-Area C Value = 0.530
Initial subarea total flow distance = 10.000(Ft.)
Highest elevation = 124.000(Ft.)
Lowest elevation = 110.000(Ft.)
Elevation difference = 14.000(Ft.) Slope = 140.000 %
Top of Initial Area Slope adjusted by User to 23.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 23.00 %, in a development type of
10.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 3.61 minutes
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})]$
 $TC = [1.8 * (1.1 - 0.5300) * (100.000^{.5})] / (23.000^{(1/3)}) = 3.61$
Calculated TC of 3.608 minutes is less than 5 minutes,
resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) = 6.587(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.530
Subarea runoff = 1.711(CFS)
Total initial stream area = 0.490(Ac.)
End of computations, total study area = 0.490 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 03/06/18

100-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
DMA A-1 - PROPOSED CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 109.000 to Point/Station 110.000
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance = 430.000(Ft.)
Highest elevation = 131.000(Ft.)
Lowest elevation = 102.000(Ft.)
Elevation difference = 29.000(Ft.) Slope = 6.744 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 6.74 %, in a development type of
Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration = 8.34 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.225) * (100.000^{.5})] / (6.744^{(1/3)}) = 8.34$
The initial area total distance of 430.00 (Ft.) entered leaves a
remaining distance of 330.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 1.92 minutes
for a distance of 330.00 (Ft.) and a slope of 6.74 %
with an elevation difference of 22.26(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$
= 1.917 Minutes
 $Tt = [(11.9 * 0.0625^3) / (22.26)]^{.385} = 1.92$
Total initial area Ti = 8.34 minutes from Figure 3-3 formula plus
1.92 minutes from the Figure 3-4 formula = 10.25 minutes
Rainfall intensity (I) = 4.145(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff = 0.308(CFS)
Total initial stream area = 0.330(Ac.)
End of computations, total study area = 0.330 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 03/06/18

100-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
DMA B-1 - EXISTING CONDITIONS
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.500
24 hour precipitation(inches) = 4.000
P6/P24 = 62.5%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 109.000 to Point/Station 210.000
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.225
Initial subarea total flow distance = 120.000(Ft.)
Highest elevation = 131.000(Ft.)
Lowest elevation = 121.000(Ft.)
Elevation difference = 10.000(Ft.) Slope = 8.333 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 8.33 %, in a development type of
Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration = 7.77 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.225) * (100.000^{.5})] / (8.333^{(1/3)}) = 7.77$
The initial area total distance of 120.00 (Ft.) entered leaves a
remaining distance of 20.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 0.20 minutes
for a distance of 20.00 (Ft.) and a slope of 8.33 %
with an elevation difference of 1.67(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$
= 0.204 Minutes
 $Tt = [(11.9 * 0.0038^3) / (1.67)]^{.385} = 0.20$
Total initial area Ti = 7.77 minutes from Figure 3-3 formula plus
0.20 minutes from the Figure 3-4 formula = 7.97 minutes
Rainfall intensity (I) = 4.875(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.225
Subarea runoff = 0.077(CFS)
Total initial stream area = 0.070(Ac.)
End of computations, total study area = 0.070 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 02/04/18

10-YEAR HYDROLOGY
117.1574 - IDA AVE APARTMENTS
EXISTING SITE - Tc CALCULATION
ARMSTRONG & BROOKS

***** Hydrology Study Control Information *****

Program License Serial Number 6313

Rational hydrology study storm event year is 10.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 1.600
24 hour precipitation(inches) = 3.000
P6/P24 = 53.3%
San Diego hydrology manual 'C' values used

+++++
Process from Point/Station 100.000 to Point/Station 110.000
*** INITIAL AREA EVALUATION ***

Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL]
(10.9 DU/A or Less)
Impervious value, Ai = 0.450
Sub-Area C Value = 0.520
Initial subarea total flow distance = 500.000(Ft.)
Highest elevation = 128.000(Ft.)
Lowest elevation = 100.000(Ft.)
Elevation difference = 28.000(Ft.) Slope = 5.600 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 5.60 %, in a development type of
10.9 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.88 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.5200) * (100.000^{.5})] / (5.600^{(1/3)}) = 5.88$
The initial area total distance of 500.00 (Ft.) entered leaves a
remaining distance of 400.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 2.39 minutes
for a distance of 400.00 (Ft.) and a slope of 5.60 %
with an elevation difference of 22.40(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$
= 2.389 Minutes
 $Tt = [(11.9 * 0.0758^3) / (22.40)^{.385}] = 2.39$
Total initial area Ti = 5.88 minutes from Figure 3-3 formula plus
2.39 minutes from the Figure 3-4 formula = 8.27 minutes
Rainfall intensity (I) = 3.048(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.520
Subarea runoff = 1.490(CFS)
Total initial stream area = 0.940(Ac.)
End of computations, total study area = 0.940 (Ac.)

UNIT HYDROGRAPH ANALYSIS

Copyright (c) CIVILCADD/CIVILDESIGN, 1990 - 2004, Version 7.1

Study date 02/04/18 File: 1574UHPROPSITE.out

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Program License Serial Number 6313

 10-YEAR UNIT HYDROGRAPH
 117.1574 - IDA AVE APARTMENTS
 PROPOSED SITE
 ARMSTRONG & BROOKS

+++++

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:
 Sub-Area(Ac.) Rainfall (In)
 1.00 3.00

Rainfall Distribution pattern used in study:
 Type B for San Diego area of California

+++++

***** Area-Averaged SCS Curve Number and Fm *****

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
0.50	0.500	77.0	77.0	0.100	A
0.50	0.500	98.0	98.0		

Area-averaged catchment SCS Curve Number AMC(2) = 87.500
 Area-averaged Fm value using values listed = 0.050(In/Hr)
 +++++
 User entry of time of concentration = 0.138 (hours)
 Watershed area = 1.00(Ac.)
 Catchment Lag time = 0.083 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 100.6441
 Hydrograph baseflow = 0.00(CFS)
 Minimum watershed loss rate(Fm) = 0.050(In/Hr)
 Average adjusted SCS Curve Number = 87.500

Rainfall depth area reduction factors:
 Using a total area of 1.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
 Areal factor ratio (rainfall reduction) = 1.000
 Rainfall entered for study = 3.000(In)
 Adjusted rainfall = 3.000(In)
 +++++

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabriel River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. office, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph is interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

FOOTHILL S-Graph

U N I T H Y D R O G R A P H				
Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)
(K =		12.10 (CFS))		
1.01	0.083	0.263	1.772	0.146
2.01	0.167	1.000	6.749	0.704
3.02	0.250	0.328	2.217	0.887
4.03	0.333	0.132	0.891	0.961
5.03	0.417	0.043	0.290	0.985
6.04	0.500	0.015	0.102	0.993
7.05	0.583	0.012	0.079	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - I_a)^2}{P - I_a + S}$$

Where:

Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad I_a = 0.2 S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of $\Delta P(dP) - \Delta Q(dQ)$ then the $dP-dQ$ column equals $f_m = 0.050(In)$ (for time interval = $0.004(In)$) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr- ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0045	0.0000	0.0045	0.0000	0.0045	-----
0.17	0.0090	0.0000	0.0045	0.0000	0.0045	-----
0.25	0.0135	0.0000	0.0045	0.0000	0.0045	-----
0.33	0.0180	0.0000	0.0045	0.0000	0.0045	-----
0.42	0.0225	0.0000	0.0045	0.0000	0.0045	-----
0.50	0.0270	0.0000	0.0045	0.0000	0.0045	-----
0.58	0.0305	0.0000	0.0035	-----	0.0042	0.0000

0.67	0.0340	0.0000	0.0035	-----	0.0042	0.0000
0.75	0.0375	0.0000	0.0035	-----	0.0042	0.0000
0.83	0.0410	0.0000	0.0035	-----	0.0042	0.0000
0.92	0.0445	0.0000	0.0035	-----	0.0042	0.0000
1.00	0.0480	0.0000	0.0035	-----	0.0042	0.0000
1.08	0.0525	0.0000	0.0045	0.0000	0.0045	-----
1.17	0.0570	0.0000	0.0045	0.0000	0.0045	-----
1.25	0.0615	0.0000	0.0045	0.0000	0.0045	-----
1.33	0.0660	0.0000	0.0045	0.0000	0.0045	-----
1.42	0.0705	0.0000	0.0045	0.0000	0.0045	-----
1.50	0.0750	0.0000	0.0045	0.0000	0.0045	-----
1.58	0.0795	0.0000	0.0045	0.0000	0.0045	-----
1.67	0.0840	0.0000	0.0045	0.0000	0.0045	-----
1.75	0.0885	0.0000	0.0045	0.0000	0.0045	-----
1.83	0.0930	0.0000	0.0045	0.0000	0.0045	-----
1.92	0.0975	0.0000	0.0045	0.0000	0.0045	-----
2.00	0.1020	0.0000	0.0045	0.0000	0.0045	-----
2.08	0.1075	0.0000	0.0055	0.0000	0.0055	-----
2.17	0.1130	0.0000	0.0055	0.0000	0.0055	-----
2.25	0.1185	0.0000	0.0055	0.0000	0.0055	-----
2.33	0.1240	0.0000	0.0055	0.0000	0.0055	-----
2.42	0.1295	0.0000	0.0055	0.0000	0.0055	-----
2.50	0.1350	0.0000	0.0055	0.0000	0.0055	-----
2.58	0.1395	0.0000	0.0045	0.0000	0.0045	-----
2.67	0.1440	0.0000	0.0045	0.0000	0.0045	-----
2.75	0.1485	0.0000	0.0045	0.0000	0.0045	-----
2.83	0.1530	0.0000	0.0045	0.0000	0.0045	-----
2.92	0.1575	0.0000	0.0045	0.0000	0.0045	-----
3.00	0.1620	0.0000	0.0045	0.0000	0.0045	-----
3.08	0.1675	0.0000	0.0055	0.0000	0.0055	-----
3.17	0.1730	0.0000	0.0055	0.0000	0.0055	-----
3.25	0.1785	0.0000	0.0055	0.0000	0.0055	-----
3.33	0.1840	0.0000	0.0055	0.0000	0.0055	-----
3.42	0.1895	0.0000	0.0055	0.0000	0.0055	-----
3.50	0.1950	0.0000	0.0055	0.0000	0.0055	-----
3.58	0.2010	0.0000	0.0060	0.0000	0.0060	-----
3.67	0.2070	0.0000	0.0060	0.0000	0.0060	-----
3.75	0.2130	0.0000	0.0060	0.0000	0.0060	-----
3.83	0.2190	0.0000	0.0060	0.0000	0.0060	-----
3.92	0.2250	0.0000	0.0060	0.0000	0.0060	-----
4.00	0.2310	0.0000	0.0060	0.0000	0.0060	-----
4.08	0.2375	0.0000	0.0065	0.0000	0.0065	-----
4.17	0.2440	0.0000	0.0065	0.0000	0.0065	-----
4.25	0.2505	0.0000	0.0065	0.0000	0.0065	-----
4.33	0.2570	0.0000	0.0065	0.0000	0.0065	-----
4.42	0.2635	0.0000	0.0065	0.0000	0.0065	-----
4.50	0.2700	0.0000	0.0065	0.0000	0.0065	-----
4.58	0.2770	0.0000	0.0070	0.0000	0.0070	-----
4.67	0.2840	0.0000	0.0070	0.0000	0.0070	-----
4.75	0.2910	0.0000	0.0070	0.0000	0.0070	-----
4.83	0.2980	0.0001	0.0070	0.0001	0.0069	-----
4.92	0.3050	0.0003	0.0070	0.0002	0.0068	-----
5.00	0.3120	0.0005	0.0070	0.0002	0.0068	-----
5.08	0.3200	0.0008	0.0080	0.0003	0.0077	-----
5.17	0.3280	0.0012	0.0080	0.0004	0.0076	-----
5.25	0.3360	0.0017	0.0080	0.0005	0.0075	-----
5.33	0.3440	0.0023	0.0080	0.0006	0.0074	-----
5.42	0.3520	0.0029	0.0080	0.0007	0.0073	-----
5.50	0.3600	0.0037	0.0080	0.0007	0.0073	-----
5.58	0.3685	0.0045	0.0085	0.0009	0.0076	-----
5.67	0.3770	0.0055	0.0085	0.0009	0.0076	-----
5.75	0.3855	0.0065	0.0085	0.0010	0.0075	-----
5.83	0.3940	0.0076	0.0085	0.0011	0.0074	-----
5.92	0.4025	0.0088	0.0085	0.0012	0.0073	-----
6.00	0.4110	0.0101	0.0085	0.0013	0.0072	-----
6.08	0.4210	0.0117	0.0100	0.0016	0.0084	-----
6.17	0.4310	0.0134	0.0100	0.0017	0.0083	-----
6.25	0.4410	0.0152	0.0100	0.0018	0.0082	-----
6.33	0.4510	0.0171	0.0100	0.0019	0.0081	-----
6.42	0.4610	0.0192	0.0100	0.0020	0.0080	-----
6.50	0.4710	0.0213	0.0100	0.0021	0.0079	-----
6.58	0.4825	0.0238	0.0115	0.0026	0.0089	-----
6.67	0.4940	0.0265	0.0115	0.0027	0.0088	-----
6.75	0.5055	0.0293	0.0115	0.0028	0.0087	-----
6.83	0.5170	0.0322	0.0115	0.0029	0.0086	-----
6.92	0.5285	0.0353	0.0115	0.0030	0.0085	-----
7.00	0.5400	0.0384	0.0115	0.0032	0.0083	-----
7.08	0.5550	0.0427	0.0150	0.0043	0.0107	-----
7.17	0.5700	0.0472	0.0150	0.0045	0.0105	-----

7.25	0.5850	0.0518	0.0150	0.0047	0.0103	-----
7.33	0.6000	0.0567	0.0150	0.0048	0.0102	-----
7.42	0.6150	0.0617	0.0150	0.0050	0.0100	-----
7.50	0.6300	0.0669	0.0150	0.0052	0.0098	-----
7.58	0.6525	0.0749	0.0225	0.0081	0.0144	-----
7.67	0.6750	0.0834	0.0225	0.0084	0.0141	-----
7.75	0.6975	0.0921	0.0225	0.0088	0.0137	-----
7.83	0.7200	0.1012	0.0225	0.0091	0.0134	-----
7.92	0.7425	0.1107	0.0225	0.0094	0.0131	-----
8.00	0.7650	0.1204	0.0225	0.0097	0.0128	-----
8.08	0.7985	0.1354	0.0335	0.0150	0.0185	-----
8.17	0.8320	0.1511	0.0335	0.0157	0.0178	-----
8.25	0.8655	0.1674	0.0335	0.0163	0.0172	-----
8.33	0.8990	0.1842	0.0335	0.0168	0.0167	-----
8.42	0.9325	0.2016	0.0335	0.0174	0.0161	-----
8.50	0.9660	0.2194	0.0335	0.0179	0.0156	-----
8.58	1.0100	0.2437	0.0440	0.0242	0.0198	-----
8.67	1.0540	0.2687	0.0440	0.0250	0.0190	-----
8.75	1.0980	0.2944	0.0440	0.0258	0.0182	-----
8.83	1.1420	0.3209	0.0440	0.0265	0.0175	-----
8.92	1.1860	0.3480	0.0440	0.0271	0.0169	-----
9.00	1.2300	0.3758	0.0440	0.0278	0.0162	-----
9.08	1.2780	0.4067	0.0480	0.0309	0.0171	-----
9.17	1.3260	0.4383	0.0480	0.0316	0.0164	-----
9.25	1.3740	0.4706	0.0480	0.0322	0.0158	-----
9.33	1.4220	0.5034	0.0480	0.0328	0.0152	-----
9.42	1.4700	0.5368	0.0480	0.0334	0.0146	-----
9.50	1.5180	0.5707	0.0480	0.0339	0.0141	-----
9.58	1.5590	0.6001	0.0410	0.0294	0.0116	-----
9.67	1.6000	0.6298	0.0410	0.0297	0.0113	-----
9.75	1.6410	0.6598	0.0410	0.0300	0.0110	-----
9.83	1.6820	0.6902	0.0410	0.0304	0.0106	-----
9.92	1.7230	0.7208	0.0410	0.0307	0.0103	-----
10.00	1.7640	0.7518	0.0410	0.0310	0.0100	-----
10.08	1.7845	0.7674	0.0205	0.0156	0.0049	-----
10.17	1.8050	0.7830	0.0205	0.0157	0.0048	-----
10.25	1.8255	0.7987	0.0205	0.0157	0.0048	-----
10.33	1.8460	0.8145	0.0205	0.0158	0.0047	-----
10.42	1.8665	0.8304	0.0205	0.0158	0.0047	-----
10.50	1.8870	0.8463	0.0205	0.0159	0.0046	-----
10.58	1.9005	0.8568	0.0135	-----	0.0042	0.0093
10.67	1.9140	0.8673	0.0135	-----	0.0042	0.0093
10.75	1.9275	0.8779	0.0135	-----	0.0042	0.0093
10.83	1.9410	0.8885	0.0135	-----	0.0042	0.0093
10.92	1.9545	0.8991	0.0135	-----	0.0042	0.0093
11.00	1.9680	0.9097	0.0135	-----	0.0042	0.0093
11.08	1.9795	0.9188	0.0115	-----	0.0042	0.0073
11.17	1.9910	0.9279	0.0115	-----	0.0042	0.0073
11.25	2.0025	0.9370	0.0115	-----	0.0042	0.0073
11.33	2.0140	0.9462	0.0115	-----	0.0042	0.0073
11.42	2.0255	0.9553	0.0115	-----	0.0042	0.0073
11.50	2.0370	0.9645	0.0115	-----	0.0042	0.0073
11.58	2.0475	0.9729	0.0105	-----	0.0042	0.0063
11.67	2.0580	0.9813	0.0105	-----	0.0042	0.0063
11.75	2.0685	0.9897	0.0105	-----	0.0042	0.0063
11.83	2.0790	0.9981	0.0105	-----	0.0042	0.0063
11.92	2.0895	1.0066	0.0105	-----	0.0042	0.0063
12.00	2.1000	1.0150	0.0105	-----	0.0042	0.0063
12.08	2.1100	1.0231	0.0100	-----	0.0042	0.0058
12.17	2.1200	1.0312	0.0100	-----	0.0042	0.0058
12.25	2.1300	1.0393	0.0100	-----	0.0042	0.0058
12.33	2.1400	1.0474	0.0100	-----	0.0042	0.0058
12.42	2.1500	1.0555	0.0100	-----	0.0042	0.0058
12.50	2.1600	1.0636	0.0100	-----	0.0042	0.0058
12.58	2.1695	1.0713	0.0095	-----	0.0042	0.0053
12.67	2.1790	1.0791	0.0095	-----	0.0042	0.0053
12.75	2.1885	1.0868	0.0095	-----	0.0042	0.0053
12.83	2.1980	1.0946	0.0095	-----	0.0042	0.0053
12.92	2.2075	1.1023	0.0095	-----	0.0042	0.0053
13.00	2.2170	1.1101	0.0095	-----	0.0042	0.0053
13.08	2.2255	1.1171	0.0085	-----	0.0042	0.0043
13.17	2.2340	1.1241	0.0085	-----	0.0042	0.0043
13.25	2.2425	1.1311	0.0085	-----	0.0042	0.0043
13.33	2.2510	1.1380	0.0085	-----	0.0042	0.0043
13.42	2.2595	1.1450	0.0085	-----	0.0042	0.0043
13.50	2.2680	1.1520	0.0085	-----	0.0042	0.0043
13.58	2.2760	1.1586	0.0080	-----	0.0042	0.0038
13.67	2.2840	1.1653	0.0080	-----	0.0042	0.0038
13.75	2.2920	1.1719	0.0080	-----	0.0042	0.0038

13.83	2.3000	1.1785	0.0080	-----	0.0042	0.0038
13.92	2.3080	1.1851	0.0080	-----	0.0042	0.0038
14.00	2.3160	1.1917	0.0080	-----	0.0042	0.0038
14.08	2.3250	1.1992	0.0090	-----	0.0042	0.0048
14.17	2.3340	1.2067	0.0090	-----	0.0042	0.0048
14.25	2.3430	1.2142	0.0090	-----	0.0042	0.0048
14.33	2.3520	1.2217	0.0090	-----	0.0042	0.0048
14.42	2.3610	1.2292	0.0090	-----	0.0042	0.0048
14.50	2.3700	1.2367	0.0090	-----	0.0042	0.0048
14.58	2.3750	1.2408	0.0050	-----	0.0042	0.0008
14.67	2.3800	1.2450	0.0050	-----	0.0042	0.0008
14.75	2.3850	1.2492	0.0050	-----	0.0042	0.0008
14.83	2.3900	1.2534	0.0050	-----	0.0042	0.0008
14.92	2.3950	1.2576	0.0050	-----	0.0042	0.0008
15.00	2.4000	1.2618	0.0050	-----	0.0042	0.0008
15.08	2.4080	1.2685	0.0080	-----	0.0042	0.0038
15.17	2.4160	1.2752	0.0080	-----	0.0042	0.0038
15.25	2.4240	1.2819	0.0080	-----	0.0042	0.0038
15.33	2.4320	1.2886	0.0080	-----	0.0042	0.0038
15.42	2.4400	1.2953	0.0080	-----	0.0042	0.0038
15.50	2.4480	1.3021	0.0080	-----	0.0042	0.0038
15.58	2.4555	1.3084	0.0075	-----	0.0042	0.0033
15.67	2.4630	1.3147	0.0075	-----	0.0042	0.0033
15.75	2.4705	1.3210	0.0075	-----	0.0042	0.0033
15.83	2.4780	1.3273	0.0075	-----	0.0042	0.0033
15.92	2.4855	1.3337	0.0075	-----	0.0042	0.0033
16.00	2.4930	1.3400	0.0075	-----	0.0042	0.0033
16.08	2.5000	1.3459	0.0070	-----	0.0042	0.0028
16.17	2.5070	1.3519	0.0070	-----	0.0042	0.0028
16.25	2.5140	1.3578	0.0070	-----	0.0042	0.0028
16.33	2.5210	1.3637	0.0070	-----	0.0042	0.0028
16.42	2.5280	1.3697	0.0070	-----	0.0042	0.0028
16.50	2.5350	1.3756	0.0070	-----	0.0042	0.0028
16.58	2.5425	1.3820	0.0075	-----	0.0042	0.0033
16.67	2.5500	1.3884	0.0075	-----	0.0042	0.0033
16.75	2.5575	1.3947	0.0075	-----	0.0042	0.0033
16.83	2.5650	1.4011	0.0075	-----	0.0042	0.0033
16.92	2.5725	1.4075	0.0075	-----	0.0042	0.0033
17.00	2.5800	1.4139	0.0075	-----	0.0042	0.0033
17.08	2.5860	1.4190	0.0060	-----	0.0042	0.0018
17.17	2.5920	1.4241	0.0060	-----	0.0042	0.0018
17.25	2.5980	1.4293	0.0060	-----	0.0042	0.0018
17.33	2.6040	1.4344	0.0060	-----	0.0042	0.0018
17.42	2.6100	1.4395	0.0060	-----	0.0042	0.0018
17.50	2.6160	1.4446	0.0060	-----	0.0042	0.0018
17.58	2.6225	1.4502	0.0065	-----	0.0042	0.0023
17.67	2.6290	1.4558	0.0065	-----	0.0042	0.0023
17.75	2.6355	1.4613	0.0065	-----	0.0042	0.0023
17.83	2.6420	1.4669	0.0065	-----	0.0042	0.0023
17.92	2.6485	1.4725	0.0065	-----	0.0042	0.0023
18.00	2.6550	1.4781	0.0065	-----	0.0042	0.0023
18.08	2.6600	1.4824	0.0050	-----	0.0042	0.0008
18.17	2.6650	1.4867	0.0050	-----	0.0042	0.0008
18.25	2.6700	1.4910	0.0050	-----	0.0042	0.0008
18.33	2.6750	1.4953	0.0050	-----	0.0042	0.0008
18.42	2.6800	1.4996	0.0050	-----	0.0042	0.0008
18.50	2.6850	1.5039	0.0050	-----	0.0042	0.0008
18.58	2.6900	1.5082	0.0050	-----	0.0042	0.0008
18.67	2.6950	1.5125	0.0050	-----	0.0042	0.0008
18.75	2.7000	1.5168	0.0050	-----	0.0042	0.0008
18.83	2.7050	1.5211	0.0050	-----	0.0042	0.0008
18.92	2.7100	1.5254	0.0050	-----	0.0042	0.0008
19.00	2.7150	1.5297	0.0050	-----	0.0042	0.0008
19.08	2.7195	1.5336	0.0045	-----	0.0042	0.0003
19.17	2.7240	1.5375	0.0045	-----	0.0042	0.0003
19.25	2.7285	1.5414	0.0045	-----	0.0042	0.0003
19.33	2.7330	1.5453	0.0045	-----	0.0042	0.0003
19.42	2.7375	1.5491	0.0045	-----	0.0042	0.0003
19.50	2.7420	1.5530	0.0045	-----	0.0042	0.0003
19.58	2.7470	1.5574	0.0050	-----	0.0042	0.0008
19.67	2.7520	1.5617	0.0050	-----	0.0042	0.0008
19.75	2.7570	1.5660	0.0050	-----	0.0042	0.0008
19.83	2.7620	1.5703	0.0050	-----	0.0042	0.0008
19.92	2.7670	1.5747	0.0050	-----	0.0042	0.0008
20.00	2.7720	1.5790	0.0050	-----	0.0042	0.0008
20.08	2.7775	1.5838	0.0055	-----	0.0042	0.0013
20.17	2.7830	1.5886	0.0055	-----	0.0042	0.0013
20.25	2.7885	1.5933	0.0055	-----	0.0042	0.0013
20.33	2.7940	1.5981	0.0055	-----	0.0042	0.0013

20.42	2.7995	1.6029	0.0055	-----	0.0042	0.0013
20.50	2.8050	1.6077	0.0055	-----	0.0042	0.0013
20.58	2.8100	1.6120	0.0050	-----	0.0042	0.0008
20.67	2.8150	1.6164	0.0050	-----	0.0042	0.0008
20.75	2.8200	1.6207	0.0050	-----	0.0042	0.0008
20.83	2.8250	1.6251	0.0050	-----	0.0042	0.0008
20.92	2.8300	1.6294	0.0050	-----	0.0042	0.0008
21.00	2.8350	1.6338	0.0050	-----	0.0042	0.0008
21.08	2.8395	1.6377	0.0045	-----	0.0042	0.0003
21.17	2.8440	1.6416	0.0045	-----	0.0042	0.0003
21.25	2.8485	1.6455	0.0045	-----	0.0042	0.0003
21.33	2.8530	1.6494	0.0045	-----	0.0042	0.0003
21.42	2.8575	1.6534	0.0045	-----	0.0042	0.0003
21.50	2.8620	1.6573	0.0045	-----	0.0042	0.0003
21.58	2.8665	1.6612	0.0045	-----	0.0042	0.0003
21.67	2.8710	1.6652	0.0045	-----	0.0042	0.0003
21.75	2.8755	1.6691	0.0045	-----	0.0042	0.0003
21.83	2.8800	1.6730	0.0045	-----	0.0042	0.0003
21.92	2.8845	1.6770	0.0045	-----	0.0042	0.0003
22.00	2.8890	1.6809	0.0045	-----	0.0042	0.0003
22.08	2.8935	1.6848	0.0045	-----	0.0042	0.0003
22.17	2.8980	1.6888	0.0045	-----	0.0042	0.0003
22.25	2.9025	1.6927	0.0045	-----	0.0042	0.0003
22.33	2.9070	1.6966	0.0045	-----	0.0042	0.0003
22.42	2.9115	1.7006	0.0045	-----	0.0042	0.0003
22.50	2.9160	1.7045	0.0045	-----	0.0042	0.0003
22.58	2.9205	1.7085	0.0045	-----	0.0042	0.0003
22.67	2.9250	1.7124	0.0045	-----	0.0042	0.0003
22.75	2.9295	1.7164	0.0045	-----	0.0042	0.0003
22.83	2.9340	1.7203	0.0045	-----	0.0042	0.0003
22.92	2.9385	1.7242	0.0045	-----	0.0042	0.0003
23.00	2.9430	1.7282	0.0045	-----	0.0042	0.0003
23.08	2.9480	1.7326	0.0050	-----	0.0042	0.0008
23.17	2.9530	1.7370	0.0050	-----	0.0042	0.0008
23.25	2.9580	1.7414	0.0050	-----	0.0042	0.0008
23.33	2.9630	1.7458	0.0050	-----	0.0042	0.0008
23.42	2.9680	1.7502	0.0050	-----	0.0042	0.0008
23.50	2.9730	1.7546	0.0050	-----	0.0042	0.0008
23.58	2.9775	1.7585	0.0045	-----	0.0042	0.0003
23.67	2.9820	1.7625	0.0045	-----	0.0042	0.0003
23.75	2.9865	1.7664	0.0045	-----	0.0042	0.0003
23.83	2.9910	1.7704	0.0045	-----	0.0042	0.0003
23.92	2.9955	1.7744	0.0045	-----	0.0042	0.0003
24.00	3.0000	1.7783	0.0045	-----	0.0042	0.0003

Total soil rain loss = 1.72(In)
Total effective runoff = 1.28(In)

Peak flow rate this hydrograph = 0.40(CFS)
Total runoff volume this hydrograph = 4661.9(Ft3)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				

1+35	0.0000	0.00	Q
1+40	0.0000	0.00	Q
1+45	0.0000	0.00	Q
1+50	0.0000	0.00	Q
1+55	0.0000	0.00	Q
2+ 0	0.0000	0.00	Q
2+ 5	0.0000	0.00	Q
2+10	0.0000	0.00	Q
2+15	0.0000	0.00	Q
2+20	0.0000	0.00	Q
2+25	0.0000	0.00	Q
2+30	0.0000	0.00	Q
2+35	0.0000	0.00	Q
2+40	0.0000	0.00	Q
2+45	0.0000	0.00	Q
2+50	0.0000	0.00	Q
2+55	0.0000	0.00	Q
3+ 0	0.0000	0.00	Q
3+ 5	0.0000	0.00	Q
3+10	0.0000	0.00	Q
3+15	0.0000	0.00	Q
3+20	0.0000	0.00	Q
3+25	0.0000	0.00	Q
3+30	0.0000	0.00	Q
3+35	0.0000	0.00	Q
3+40	0.0000	0.00	Q
3+45	0.0000	0.00	Q
3+50	0.0000	0.00	Q
3+55	0.0000	0.00	Q
4+ 0	0.0000	0.00	Q
4+ 5	0.0000	0.00	Q
4+10	0.0000	0.00	Q
4+15	0.0000	0.00	Q
4+20	0.0000	0.00	Q
4+25	0.0000	0.00	Q
4+30	0.0000	0.00	Q
4+35	0.0000	0.00	Q
4+40	0.0000	0.00	Q
4+45	0.0000	0.00	Q
4+50	0.0000	0.00	Q
4+55	0.0000	0.00	Q
5+ 0	0.0000	0.00	Q
5+ 5	0.0000	0.00	Q
5+10	0.0001	0.00	Q
5+15	0.0001	0.00	Q
5+20	0.0001	0.01	Q
5+25	0.0002	0.01	Q
5+30	0.0002	0.01	Q
5+35	0.0003	0.01	Q
5+40	0.0004	0.01	Q
5+45	0.0004	0.01	Q
5+50	0.0005	0.01	Q
5+55	0.0006	0.01	Q
6+ 0	0.0007	0.01	Q
6+ 5	0.0008	0.02	Q
6+10	0.0009	0.02	Q
6+15	0.0011	0.02	Q
6+20	0.0012	0.02	Q
6+25	0.0014	0.02	Q
6+30	0.0015	0.02	Q
6+35	0.0017	0.03	Q
6+40	0.0019	0.03	Q
6+45	0.0021	0.03	Q
6+50	0.0024	0.03	Q
6+55	0.0026	0.03	Q
7+ 0	0.0029	0.04	QV
7+ 5	0.0031	0.04	QV
7+10	0.0035	0.05	QV
7+15	0.0038	0.05	QV
7+20	0.0042	0.06	QV
7+25	0.0046	0.06	QV
7+30	0.0050	0.06	QV
7+35	0.0055	0.07	Q V
7+40	0.0061	0.09	Q V
7+45	0.0067	0.10	Q V
7+50	0.0075	0.10	Q V
7+55	0.0082	0.11	Q V
8+ 0	0.0090	0.11	Q V
8+ 5	0.0098	0.13	Q V

8+10	0.0110	0.16	Q	V						
8+15	0.0122	0.18	Q	V						
8+20	0.0135	0.19	Q	V						
8+25	0.0149	0.20	Q	V						
8+30	0.0163	0.21	Q	V						
8+35	0.0179	0.22	Q	V						
8+40	0.0198	0.27	Q	V						
8+45	0.0218	0.29	Q	V						
8+50	0.0239	0.31	Q	V						
8+55	0.0261	0.32	Q	V						
9+ 0	0.0283	0.32	Q	V						
9+ 5	0.0306	0.34	Q	V						
9+10	0.0331	0.36	Q	V						
9+15	0.0357	0.38	Q	V						
9+20	0.0384	0.39	Q	V						
9+25	0.0411	0.39	Q	V						
9+30	0.0439	0.40	Q	V						
9+35	0.0466	0.40	Q	V						
9+40	0.0492	0.37	Q	V						
9+45	0.0517	0.36	Q	V						
9+50	0.0542	0.36	Q	V						
9+55	0.0567	0.37	Q	V						
10+ 0	0.0593	0.37	Q	V						
10+ 5	0.0616	0.35	Q	V						
10+10	0.0633	0.24	Q	V						
10+15	0.0648	0.21	Q	V						
10+20	0.0661	0.20	Q	V						
10+25	0.0674	0.19	Q	V						
10+30	0.0688	0.19	Q	V						
10+35	0.0700	0.18	Q	V						
10+40	0.0710	0.14	Q	V						
10+45	0.0718	0.12	Q	V						
10+50	0.0726	0.12	Q	V						
10+55	0.0734	0.11	Q	V						
11+ 0	0.0742	0.11	Q	V						
11+ 5	0.0749	0.11	Q	V						
11+10	0.0756	0.10	Q	V						
11+15	0.0762	0.09	Q	V						
11+20	0.0768	0.09	Q	V						
11+25	0.0774	0.09	Q	V						
11+30	0.0780	0.09	Q	V						
11+35	0.0786	0.09	Q	V						
11+40	0.0792	0.08	Q	V						
11+45	0.0797	0.08	Q	V						
11+50	0.0803	0.08	Q	V						
11+55	0.0808	0.08	Q	V						
12+ 0	0.0813	0.08	Q	V						
12+ 5	0.0818	0.08	Q	V						
12+10	0.0823	0.07	Q	V						
12+15	0.0828	0.07	Q	V						
12+20	0.0833	0.07	Q	V						
12+25	0.0838	0.07	Q	V						
12+30	0.0843	0.07	Q	V						
12+35	0.0848	0.07	Q	V						
12+40	0.0852	0.07	Q	V						
12+45	0.0857	0.07	Q	V						
12+50	0.0861	0.06	Q	V						
12+55	0.0866	0.06	Q	V						
13+ 0	0.0870	0.06	Q	V						
13+ 5	0.0875	0.06	Q	V						
13+10	0.0878	0.06	Q	V						
13+15	0.0882	0.05	Q	V						
13+20	0.0886	0.05	Q	V						
13+25	0.0889	0.05	Q	V						
13+30	0.0893	0.05	Q	V						
13+35	0.0897	0.05	Q	V						
13+40	0.0900	0.05	Q	V						
13+45	0.0903	0.05	Q	V						
13+50	0.0906	0.05	Q	V						
13+55	0.0909	0.05	Q	V						
14+ 0	0.0913	0.05	Q	V						
14+ 5	0.0916	0.05	Q	V						
14+10	0.0920	0.05	Q	V						
14+15	0.0924	0.06	Q	V						
14+20	0.0928	0.06	Q	V						
14+25	0.0932	0.06	Q	V						
14+30	0.0936	0.06	Q	V						
14+35	0.0939	0.05	Q	V						
14+40	0.0941	0.02	Q	V						

14+45	0.0942	0.02	Q				V	
14+50	0.0943	0.01	Q				V	
14+55	0.0944	0.01	Q				V	
15+ 0	0.0944	0.01	Q				V	
15+ 5	0.0945	0.02	Q				V	
15+10	0.0948	0.04	Q				V	
15+15	0.0951	0.04	Q				V	
15+20	0.0954	0.04	Q				V	
15+25	0.0957	0.05	Q				V	
15+30	0.0960	0.05	Q				V	
15+35	0.0963	0.05	Q				V	
15+40	0.0966	0.04	Q				V	
15+45	0.0969	0.04	Q				V	
15+50	0.0972	0.04	Q				V	
15+55	0.0975	0.04	Q				V	
16+ 0	0.0977	0.04	Q				V	
16+ 5	0.0980	0.04	Q				V	
16+10	0.0983	0.04	Q				V	
16+15	0.0985	0.03	Q				V	
16+20	0.0987	0.03	Q				V	
16+25	0.0990	0.03	Q				V	
16+30	0.0992	0.03	Q				V	
16+35	0.0995	0.04	Q				V	
16+40	0.0997	0.04	Q				V	
16+45	0.1000	0.04	Q				V	
16+50	0.1003	0.04	Q				V	
16+55	0.1005	0.04	Q				V	
17+ 0	0.1008	0.04	Q				V	
17+ 5	0.1011	0.04	Q				V	
17+10	0.1013	0.03	Q				V	
17+15	0.1014	0.02	Q				V	
17+20	0.1016	0.02	Q				V	
17+25	0.1018	0.02	Q				V	
17+30	0.1019	0.02	Q				V	
17+35	0.1021	0.02	Q				V	
17+40	0.1022	0.03	Q				V	
17+45	0.1024	0.03	Q				V	
17+50	0.1026	0.03	Q				V	
17+55	0.1028	0.03	Q				V	
18+ 0	0.1030	0.03	Q				V	
18+ 5	0.1032	0.03	Q				V	
18+10	0.1033	0.02	Q				V	
18+15	0.1034	0.01	Q				V	
18+20	0.1035	0.01	Q				V	
18+25	0.1035	0.01	Q				V	
18+30	0.1036	0.01	Q				V	
18+35	0.1037	0.01	Q				V	
18+40	0.1037	0.01	Q				V	
18+45	0.1038	0.01	Q				V	
18+50	0.1039	0.01	Q				V	
18+55	0.1039	0.01	Q				V	
19+ 0	0.1040	0.01	Q				V	
19+ 5	0.1041	0.01	Q				V	
19+10	0.1041	0.01	Q				V	
19+15	0.1042	0.00	Q				V	
19+20	0.1042	0.00	Q				V	
19+25	0.1042	0.00	Q				V	
19+30	0.1042	0.00	Q				V	
19+35	0.1043	0.00	Q				V	
19+40	0.1043	0.01	Q				V	
19+45	0.1044	0.01	Q				V	
19+50	0.1045	0.01	Q				V	
19+55	0.1045	0.01	Q				V	
20+ 0	0.1046	0.01	Q				V	
20+ 5	0.1047	0.01	Q				V	
20+10	0.1048	0.01	Q				V	
20+15	0.1049	0.02	Q				V	
20+20	0.1050	0.02	Q				V	
20+25	0.1051	0.02	Q				V	
20+30	0.1052	0.02	Q				V	
20+35	0.1053	0.02	Q				V	
20+40	0.1054	0.01	Q				V	
20+45	0.1055	0.01	Q				V	
20+50	0.1055	0.01	Q				V	
20+55	0.1056	0.01	Q				V	
21+ 0	0.1057	0.01	Q				V	
21+ 5	0.1057	0.01	Q				V	
21+10	0.1058	0.01	Q				V	
21+15	0.1058	0.00	Q				V	

21+20	0.1058	0.00	Q				V
21+25	0.1059	0.00	Q				V
21+30	0.1059	0.00	Q				V
21+35	0.1059	0.00	Q				V
21+40	0.1060	0.00	Q				V
21+45	0.1060	0.00	Q				V
21+50	0.1060	0.00	Q				V
21+55	0.1060	0.00	Q				V
22+ 0	0.1061	0.00	Q				V
22+ 5	0.1061	0.00	Q				V
22+10	0.1061	0.00	Q				V
22+15	0.1062	0.00	Q				V
22+20	0.1062	0.00	Q				V
22+25	0.1062	0.00	Q				V
22+30	0.1062	0.00	Q				V
22+35	0.1063	0.00	Q				V
22+40	0.1063	0.00	Q				V
22+45	0.1063	0.00	Q				V
22+50	0.1063	0.00	Q				V
22+55	0.1064	0.00	Q				V
23+ 0	0.1064	0.00	Q				V
23+ 5	0.1064	0.00	Q				V
23+10	0.1065	0.01	Q				V
23+15	0.1066	0.01	Q				V
23+20	0.1066	0.01	Q				V
23+25	0.1067	0.01	Q				V
23+30	0.1068	0.01	Q				V
23+35	0.1068	0.01	Q				V
23+40	0.1069	0.01	Q				V
23+45	0.1069	0.00	Q				V
23+50	0.1069	0.00	Q				V
23+55	0.1070	0.00	Q				V
24+ 0	0.1070	0.00	Q				V
24+ 5	0.1070	0.00	Q				V
24+10	0.1070	0.00	Q				V
24+15	0.1070	0.00	Q				V
24+20	0.1070	0.00	Q				V
24+25	0.1070	0.00	Q				V
24+30	0.1070	0.00	Q				V

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name: 1574
Site Name: Ida Ave Apartments
Site Address: 748 Ida Avenue
City: Solana Beach
Report Date: 2/9/2018
Gage: ENCINITA
Data Start: 10/01/1963
Data End: 09/30/2004
Timestep: Hourly
Precip Scale: 1.000
Version Date: 2017/08/18

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use acre
A,NatVeg,Steep 0.94

Pervious Total 0.94

Impervious Land Use acre

Impervious Total 0

Basin Total 0.94

Element Flows To:
Surface Interflow Groundwater

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Mitigated Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use acre
A,NatVeg,Steep 0.5

Pervious Total 0.5

Impervious Land Use acre
IMPERVIOUS-MOD 0.5

Impervious Total 0.5

Basin Total 1

Element Flows To:

Surface Interflow Groundwater
Tank 1 Tank 1

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Mitigated Routing

Tank 1

Dimensions
Depth: 3.75 ft.
Tank Type: Arched
Width: 6.42 ft.
Height: 3.75 ft.
Length: 160 ft.
Infiltration On
Infiltration rate: 1.6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 13.537
Total Volume Through Riser (ac-ft.): 1.097
Total Volume Through Facility (ac-ft.): 14.634
Percent Infiltrated: 92.5
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 1.67 ft.
Riser Diameter: 24 in.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
90.000	0.000	0.000	0.000	0.000
90.042	0.004	0.000	0.000	0.008
90.083	0.007	0.000	0.000	0.011
90.125	0.008	0.000	0.000	0.013
90.167	0.009	0.001	0.000	0.015
90.208	0.010	0.001	0.000	0.017
90.250	0.011	0.002	0.000	0.019
90.292	0.012	0.002	0.000	0.020
90.333	0.013	0.003	0.000	0.021
90.375	0.014	0.003	0.000	0.022
90.417	0.014	0.004	0.000	0.023
90.458	0.015	0.004	0.000	0.024
90.500	0.016	0.005	0.000	0.025
90.542	0.016	0.006	0.000	0.026
90.583	0.017	0.006	0.000	0.027
90.625	0.017	0.007	0.000	0.028
90.667	0.018	0.008	0.000	0.029
90.708	0.018	0.009	0.000	0.029
90.750	0.018	0.009	0.000	0.030
90.792	0.019	0.010	0.000	0.031
90.833	0.019	0.011	0.000	0.031
90.875	0.019	0.012	0.000	0.032
90.917	0.020	0.013	0.000	0.032
90.958	0.020	0.014	0.000	0.033
91.000	0.020	0.014	0.000	0.033
91.042	0.021	0.015	0.000	0.034
91.083	0.021	0.016	0.000	0.034
91.125	0.021	0.017	0.000	0.034
91.167	0.021	0.018	0.000	0.035

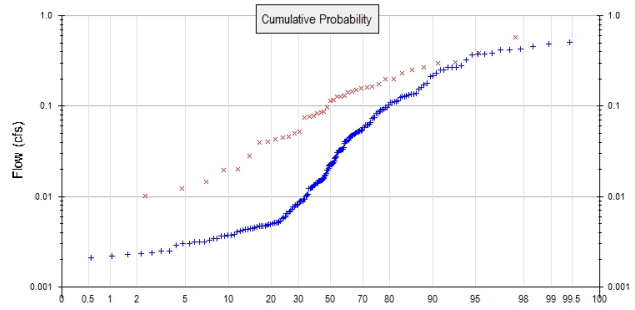
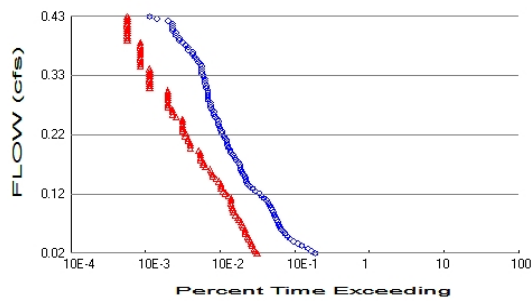
91.208	0.022	0.019	0.000	0.035
91.250	0.022	0.020	0.000	0.035
91.292	0.022	0.021	0.000	0.036
91.333	0.022	0.022	0.000	0.036
91.375	0.022	0.023	0.000	0.036
91.417	0.022	0.024	0.000	0.036
91.458	0.023	0.025	0.000	0.037
91.500	0.023	0.025	0.000	0.037
91.542	0.023	0.026	0.000	0.037
91.583	0.023	0.027	0.000	0.037
91.625	0.023	0.028	0.000	0.037
91.667	0.023	0.029	0.000	0.037
91.708	0.023	0.030	0.159	0.037
91.750	0.023	0.031	0.479	0.038
91.792	0.023	0.032	0.898	0.038
91.833	0.023	0.033	1.395	0.038
91.875	0.023	0.034	1.957	0.038
91.917	0.023	0.035	2.571	0.038
91.958	0.023	0.036	3.230	0.038
92.000	0.023	0.037	3.922	0.038
92.042	0.023	0.038	4.639	0.038
92.083	0.023	0.039	5.369	0.038
92.125	0.023	0.040	6.102	0.038
92.167	0.023	0.041	6.830	0.038
92.208	0.023	0.042	7.540	0.038
92.250	0.023	0.043	8.223	0.038
92.292	0.023	0.044	8.872	0.038
92.333	0.022	0.045	9.476	0.038
92.375	0.022	0.046	10.03	0.038
92.417	0.022	0.047	10.53	0.038
92.458	0.022	0.048	10.97	0.038
92.500	0.022	0.049	11.35	0.038
92.542	0.022	0.050	11.69	0.038
92.583	0.021	0.051	11.97	0.038
92.625	0.021	0.051	12.22	0.038
92.667	0.021	0.052	12.44	0.038
92.708	0.021	0.053	12.83	0.038
92.750	0.020	0.054	13.09	0.038
92.792	0.020	0.055	13.34	0.038
92.833	0.020	0.056	13.58	0.038
92.875	0.019	0.057	13.83	0.038
92.917	0.019	0.058	14.06	0.038
92.958	0.019	0.058	14.30	0.038
93.000	0.018	0.059	14.52	0.038
93.042	0.018	0.060	14.75	0.038
93.083	0.018	0.061	14.97	0.038
93.125	0.017	0.061	15.19	0.038
93.167	0.017	0.062	15.41	0.038
93.208	0.016	0.063	15.62	0.038
93.250	0.016	0.063	15.83	0.038
93.292	0.015	0.064	16.04	0.038
93.333	0.014	0.065	16.24	0.038
93.375	0.014	0.065	16.45	0.038
93.417	0.013	0.066	16.65	0.038
93.458	0.012	0.067	16.84	0.038
93.500	0.011	0.067	17.04	0.038
93.542	0.010	0.067	17.23	0.038
93.583	0.009	0.068	17.42	0.038

93.625	0.008	0.068	17.61	0.038
93.667	0.007	0.069	17.80	0.038
93.708	0.004	0.069	17.98	0.038
93.750	0.000	0.069	18.17	0.038
93.792	0.000	0.000	18.35	0.038

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Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0.94
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.5
Total Impervious Area: 0.5

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.197184
5 year	0.379858
10 year	0.42951
25 year	0.494417

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.115743
5 year	0.200968
10 year	0.297318
25 year	0.42749

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0197	659	109	16	Pass
0.0239	584	103	17	Pass
0.0280	523	100	19	Pass
0.0321	438	93	21	Pass
0.0363	387	92	23	Pass
0.0404	339	90	26	Pass
0.0446	306	86	28	Pass
0.0487	284	81	28	Pass
0.0528	260	76	29	Pass
0.0570	245	76	31	Pass
0.0611	231	76	32	Pass
0.0653	220	72	32	Pass
0.0694	214	69	32	Pass
0.0735	207	67	32	Pass
0.0777	201	63	31	Pass
0.0818	195	60	30	Pass
0.0859	189	57	30	Pass
0.0901	181	53	29	Pass
0.0942	174	52	29	Pass
0.0984	168	51	30	Pass
0.1025	163	50	30	Pass
0.1066	154	49	31	Pass
0.1108	147	49	33	Pass
0.1149	135	49	36	Pass
0.1191	126	45	35	Pass
0.1232	117	41	35	Pass
0.1273	105	39	37	Pass
0.1315	95	36	37	Pass
0.1356	87	36	41	Pass
0.1398	82	36	43	Pass
0.1439	79	34	43	Pass
0.1480	78	31	39	Pass
0.1522	75	28	37	Pass
0.1563	72	28	38	Pass
0.1605	68	27	39	Pass
0.1646	67	26	38	Pass
0.1687	65	22	33	Pass
0.1729	64	21	32	Pass
0.1770	62	21	33	Pass
0.1812	57	19	33	Pass
0.1853	55	19	34	Pass
0.1894	52	19	36	Pass
0.1936	49	19	38	Pass
0.1977	48	18	37	Pass
0.2018	45	14	31	Pass
0.2060	44	14	31	Pass
0.2101	43	14	32	Pass
0.2143	43	13	30	Pass
0.2184	41	13	31	Pass
0.2225	40	12	30	Pass
0.2267	37	12	32	Pass
0.2308	37	11	29	Pass
0.2350	35	11	31	Pass

0.2391	34	11	32	Pass
0.2432	33	11	33	Pass
0.2474	33	11	33	Pass
0.2515	32	11	34	Pass
0.2557	30	9	30	Pass
0.2598	29	8	27	Pass
0.2639	29	8	27	Pass
0.2681	27	8	29	Pass
0.2722	26	7	26	Pass
0.2764	26	7	26	Pass
0.2805	26	7	26	Pass
0.2846	24	7	29	Pass
0.2888	24	7	29	Pass
0.2929	24	7	29	Pass
0.2971	24	7	29	Pass
0.3012	24	7	29	Pass
0.3053	23	4	17	Pass
0.3095	23	4	17	Pass
0.3136	22	4	18	Pass
0.3177	22	4	18	Pass
0.3219	22	4	18	Pass
0.3260	21	4	19	Pass
0.3302	20	4	20	Pass
0.3343	20	4	20	Pass
0.3384	20	4	20	Pass
0.3426	20	3	15	Pass
0.3467	19	3	15	Pass
0.3509	18	3	16	Pass
0.3550	17	3	17	Pass
0.3591	16	3	18	Pass
0.3633	15	3	20	Pass
0.3674	15	3	20	Pass
0.3716	13	3	23	Pass
0.3757	13	3	23	Pass
0.3798	12	3	25	Pass
0.3840	11	3	27	Pass
0.3881	10	2	20	Pass
0.3923	10	2	20	Pass
0.3964	9	2	22	Pass
0.4005	9	2	22	Pass
0.4047	8	2	25	Pass
0.4088	8	2	25	Pass
0.4130	8	2	25	Pass
0.4171	8	2	25	Pass
0.4212	7	2	28	Pass
0.4254	5	2	40	Pass
0.4295	4	2	50	Pass

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Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

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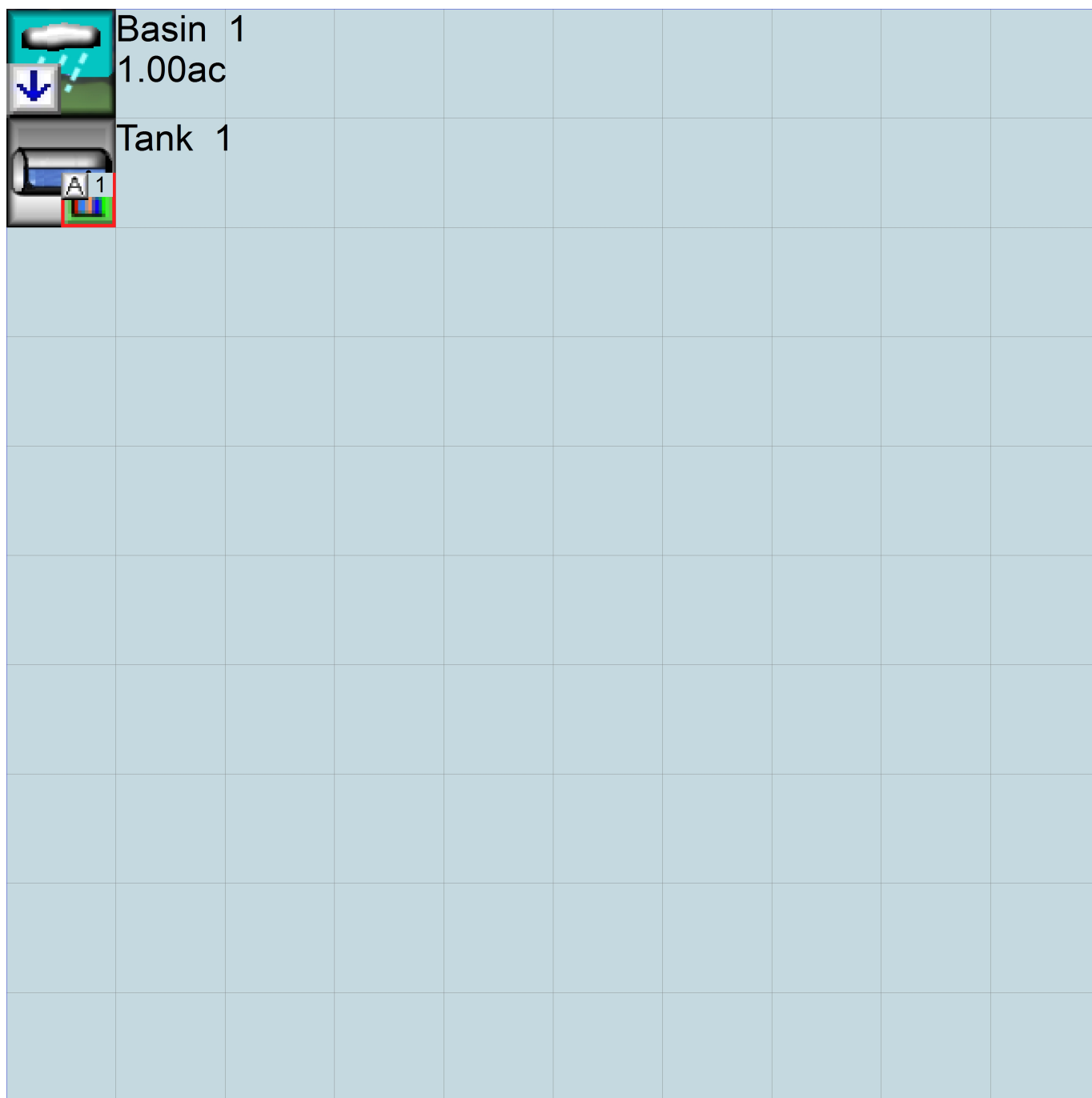
Appendix

Predeveloped Schematic



Basin 1
0.94ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WWM4 model simulation
START      1964 10 01      END      2004 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1
UNIT SYSTEM      1
END GLOBAL
```

FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26      1574.wdm
MESSU    25      Pre1574.MES
          27      Pre1574.L61
          28      Pre1574.L62
          30      POC15741.dat
```

END FILES

OPN SEQUENCE

```
INGRP                      INDELT 00:60
```

```
  PERLND      3
  COPY        501
  DISPLY      1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   Basin 1      MAX      1   2   30   9
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1   1   1
501 1   1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#   # OPCD ***
```

END OPCODE

PARM

```
#   #           K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS      Unit-systems      Printer ***
# - #      User      t-series      Engl Metr ***
```

```
3      A,NatVeg,Steep      1      1      1      1      27      0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST  NITR  PHOS  TRAC ***
3      0      0      1      0      0      0      0      0      0      0      0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST  NITR  PHOS  TRAC *****
3      0      0      4      0      0      0      0      0      0      0      0      1      9
```

END PRINT-INFO

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
3 0 1 1 1 0 0 0 0 1 1 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
3 0 3.5 0.045 75 0.15 2.5 0.915
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
3 0 0 2 2 0 0.05 0.05
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
3 0 0.6 0.04 1 0.3 0
END PWAT-PARM4

MON-LZETPARM
<PLS > PWATER input info: Part 3 ***
# - # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
3 0.4 0.4 0.4 0.4 0.6 0.6 0.6 0.6 0.4 0.4 0.4
END MON-LZETPARM

MON-INTERCEP
<PLS > PWATER input info: Part 3 ***
# - # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
3 0.1 0.1 0.1 0.1 0.06 0.06 0.06 0.06 0.06 0.1 0.1 0.1
END MON-INTERCEP

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
3 0 0 0.01 0 0.4 0.01 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

```

```

IWAT-PARM3
  <PLS >          IWATER input info: Part 3          ***
  # - # ***PETMAX    PETMIN
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  # - # *** RETS      SURS
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->          <--Area-->          <-Target->      MBLK      ***
<Name> #          <-factor->          <Name> #      Tbl#      ***
Basin 1***
PERLND 3          0.94          COPY 501      12
PERLND 3          0.94          COPY 501      13

*****Routing*****
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
COPY 501 OUTPUT MEAN 1 1 12.1      DISPLY 1      INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
END NETWORK

RCHRES
GEN-INFO
  RCHRES      Name      Nexits      Unit Systems      Printer      ***
  # - #<-----><-----> User T-series Engl Metr LKFG      ***
  in out      ***
END GEN-INFO
*** Section RCHRES***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
END ACTIVITY

PRINT-INFO
  <PLS > ***** Print-flags ***** PIVL PYR
  # - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
END PRINT-INFO

HYDR-PARM1
  RCHRES      Flags for each HYDR Section      ***
  # - # VC A1 A2 A3 ODFVFG for each *** ODTGFG for each FUNCT for each
  FG FG FG FG possible exit *** possible exit possible exit
  * * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
  # - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
  <-----><-----><-----><-----><-----><----->
END HYDR-PARM2
HYDR-INIT
  RCHRES      Initial conditions for each HYDR section      ***
  # - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
  *** ac-ft      for each possible exit      for each possible exit
  <-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->
END HYDR-INIT
END RCHRES

```

SPEC-ACTIONS
 END SPEC-ACTIONS
 FTABLES
 END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#
WDM	2	PREC	ENGL	1	PERLND	1	999	EXTNL
WDM	2	PREC	ENGL	1	IMPLND	1	999	EXTNL
WDM	1	EVAP	ENGL	1	PERLND	1	999	EXTNL
WDM	1	EVAP	ENGL	1	IMPLND	1	999	EXTNL

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem	strg
COPY	501	OUTPUT	MEAN	1	1	12.1	WDM	501	FLOW	ENGL

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#<-factor->	<Name>	#	#
MASS-LINK		12					
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		12					
MASS-LINK		13					
PERLND	PWATER	IFWO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		13					

END MASS-LINK

END RUN

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Mitigated UCI File

RUN

GLOBAL

```
WWM4 model simulation
START      1963 10 01      END      2004 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1
UNIT SYSTEM      1
END GLOBAL
```

FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26     1574.wdm
MESSU    25     Mit1574.MES
          27     Mit1574.L61
          28     Mit1574.L62
          30     POC15741.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:60

```
PERLND    3
IMPLND    2
RCHRES    1
COPY      1
COPY      501
DISPLY    1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   Tank 1      MAX      1   2   30   9
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1   1   1
501 1   1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
# # OPCD ***
```

END OPCODE

PARM

```
# # K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
# - # User t-series Engl Metr ***
          in out
```

```
3      A,NatVeg,Steep      1   1   1   1   27   0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
3      0      0      1      0      0      0      0      0      0      0      0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
```

3 0 0 4 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

PWAT-PARM1

<PLS > PWATER variable monthly parameter value flags ***
- # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
3 0 1 1 1 0 0 0 0 1 1 0
END PWAT-PARM1

PWAT-PARM2

<PLS > PWATER input info: Part 2 ***
- # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
3 0 3.5 0.045 75 0.15 2.5 0.915
END PWAT-PARM2

PWAT-PARM3

<PLS > PWATER input info: Part 3 ***
- # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
3 0 0 2 2 0 0.05 0.05
END PWAT-PARM3

PWAT-PARM4

<PLS > PWATER input info: Part 4 ***
- # CEPSC UZSN NSUR INTFW IRC LZETP ***
3 0 0.6 0.04 1 0.3 0
END PWAT-PARM4

MON-LZETPARM

<PLS > PWATER input info: Part 3 ***
- # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
3 0.4 0.4 0.4 0.4 0.6 0.6 0.6 0.6 0.4 0.4 0.4
END MON-LZETPARM

MON-INTERCEP

<PLS > PWATER input info: Part 3 ***
- # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
3 0.1 0.1 0.1 0.1 0.06 0.06 0.06 0.06 0.06 0.1 0.1 0.1
END MON-INTERCEP

PWAT-STATE1

<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
- # *** CEPS SURS UZS IFWS LZS AGWS GWVS
3 0 0 0.01 0 0.4 0.01 0
END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

<PLS ><-----Name-----> Unit-systems Printer ***
- # User t-series Engl Metr ***
in out
2 IMPERVIOUS-MOD 1 1 1 27 0
END GEN-INFO

*** Section IWATER***

ACTIVITY

<PLS > ***** Active Sections *****
- # ATMP SNOW IWAT SLD IWG IQAL ***
2 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO

<ILS > ***** Print-flags ***** PIVL PYR
- # ATMP SNOW IWAT SLD IWG IQAL *****
2 0 0 4 0 0 0 1 9
END PRINT-INFO

IWAT-PARM1

<PLS > IWATER variable monthly parameter value flags ***
- # CSNO RTOP VRS VNN RTLI ***
2 0 0 0 0 1

```

END IWAT-PARM1

IWAT-PARM2
<PLS >          IWATER input info: Part 2          ***
# - # *** LSUR      SLSUR      NSUR      RETSC
2          100        0.1        0.011      0.08
END IWAT-PARM2

IWAT-PARM3
<PLS >          IWATER input info: Part 3          ***
# - # *** PETMAX    PETMIN
2          0          0
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS      SURS
2          0          0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->
<Name> #
Basin 1***
PERLND 3          0.5      RCHRES 1          2
PERLND 3          0.5      RCHRES 1          3
IMPLND 2          0.5      RCHRES 1          5

*****Routing*****
PERLND 3          0.5      COPY 1          12
IMPLND 2          0.5      COPY 1          15
PERLND 3          0.5      COPY 1          13
RCHRES 1          1        COPY 501        17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-> <-Mult--> Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # # <-factor-> strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 12.1 DISPLY 1 INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-> <-Mult--> Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # # <-factor-> strg <Name> # # <Name> # # ***
END NETWORK

RCHRES
GEN-INFO
RCHRES Name Nexits Unit Systems Printer ***
# - # <-----> <----> User T-series Engl Metr LKFG ***
in out ***
1 Tank 1 2 1 1 1 28 0 1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1 1 0 0 0 0 0 0 0 0 0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1 4 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

HYDR-PARM1

```

```

RCHRES  Flags for each HYDR Section                                     ***
# - #   VC A1 A2 A3  ODFVFG for each *** ODGTFG for each  FUNCT  for each
      FG FG FG FG  possible  exit *** possible  exit
      * * * * * * * * *
1       0 1  0  0      4 5  0  0  0      0 0  0  0  0      2 2  2  2  2
END HYDR-PARM1

HYDR-PARM2
# - #   FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
1       1      0.03      0.0      90.0      0.5      0.0
END HYDR-PARM2
HYDR-INIT
RCHRES  Initial conditions for each HYDR section                                     ***
# - #   *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><----->      <-----><-----><-----><----->      *** <-----><-----><-----><-----><----->
1       0      4.0  5.0  0.0  0.0  0.0      0.0  0.0  0.0  0.0  0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
FTABLE  1
91      5
Depth      Area      Volume      Outflow1      Outflow2      Velocity      Travel Time***
(ft)      (acres)      (acre-ft)      (cfs)      (cfs)      (ft/sec)      (Minutes)***
0.000000  0.000000  0.000000  0.000000  0.000000
0.041667  0.004944  0.000138  0.000000  0.007976
0.083333  0.006952  0.000388  0.000000  0.011216
0.125000  0.008466  0.000710  0.000000  0.013658
0.166667  0.009719  0.001090  0.000000  0.015680
0.208333  0.010803  0.001518  0.000000  0.017429
0.250000  0.011764  0.001988  0.000000  0.018980
0.291667  0.012631  0.002497  0.000000  0.020378
0.333333  0.013422  0.003040  0.000000  0.021654
0.375000  0.014149  0.003615  0.000000  0.022827
0.416667  0.014822  0.004218  0.000000  0.023912
0.458333  0.015448  0.004849  0.000000  0.024922
0.500000  0.016032  0.005505  0.000000  0.025865
0.541667  0.016580  0.006185  0.000000  0.026748
0.583333  0.017093  0.006886  0.000000  0.027577
0.625000  0.017576  0.007609  0.000000  0.028357
0.666667  0.018031  0.008351  0.000000  0.029091
0.708333  0.018460  0.009111  0.000000  0.029783
0.750000  0.018865  0.009889  0.000000  0.030436
0.791667  0.019247  0.010683  0.000000  0.031052
0.833333  0.019607  0.011492  0.000000  0.031633
0.875000  0.019948  0.012316  0.000000  0.032182
0.916667  0.020268  0.013154  0.000000  0.032700
0.958333  0.020571  0.014005  0.000000  0.033188
1.000000  0.020856  0.014868  0.000000  0.033648
1.041667  0.021124  0.015743  0.000000  0.034080
1.083333  0.021376  0.016628  0.000000  0.034487
1.125000  0.021613  0.017524  0.000000  0.034868
1.166667  0.021834  0.018429  0.000000  0.035225
1.208333  0.022040  0.019343  0.000000  0.035558
1.250000  0.022233  0.020266  0.000000  0.035869
1.291667  0.022411  0.021196  0.000000  0.036156
1.333333  0.022576  0.022133  0.000000  0.036422
1.375000  0.022727  0.023077  0.000000  0.036667
1.416667  0.022866  0.024027  0.000000  0.036890
1.458333  0.022992  0.024982  0.000000  0.037093
1.500000  0.023105  0.025943  0.000000  0.037276
1.541667  0.023206  0.026907  0.000000  0.037438
1.583333  0.023294  0.027876  0.000000  0.037581
1.625000  0.023371  0.028848  0.000000  0.037705
1.666667  0.023435  0.029824  0.000000  0.037809
1.708333  0.023488  0.030801  0.159277  0.037894

```

1.750000	0.023529	0.031781	0.479800	0.037960
1.791667	0.023558	0.032762	0.898932	0.038007
1.833333	0.023575	0.033744	1.395808	0.038035
1.875000	0.023581	0.034726	1.957056	0.038035
1.916667	0.023575	0.035709	2.571872	0.038035
1.958333	0.023558	0.036691	3.230328	0.038035
2.000000	0.023529	0.037672	3.922657	0.038035
2.041667	0.023488	0.038651	4.638961	0.038035
2.083333	0.023435	0.039629	5.369132	0.038035
2.125000	0.023371	0.040604	6.102898	0.038035
2.166667	0.023294	0.041576	6.829962	0.038035
2.208333	0.023206	0.042545	7.540200	0.038035
2.250000	0.023105	0.043510	8.223910	0.038035
2.291667	0.022992	0.044470	8.872106	0.038035
2.333333	0.022866	0.045426	9.476839	0.038035
2.375000	0.022727	0.046376	10.03156	0.038035
2.416667	0.022576	0.047320	10.53149	0.038035
2.458333	0.022411	0.048257	10.97406	0.038035
2.500000	0.022233	0.049187	11.35931	0.038035
2.541667	0.022040	0.050109	11.69038	0.038035
2.583333	0.021834	0.051023	11.97396	0.038035
2.625000	0.021613	0.051929	12.22081	0.038035
2.666667	0.021376	0.052824	12.44626	0.038035
2.708333	0.021124	0.053710	12.83772	0.038035
2.750000	0.020856	0.054584	13.09277	0.038035
2.791667	0.020571	0.055447	13.34294	0.038035
2.833333	0.020268	0.056298	13.58850	0.038035
2.875000	0.019948	0.057136	13.82971	0.038035
2.916667	0.019607	0.057960	14.06678	0.038035
2.958333	0.019247	0.058770	14.29992	0.038035
3.000000	0.018865	0.059564	14.52932	0.038035
3.041667	0.018460	0.060342	14.75516	0.038035
3.083333	0.018031	0.061102	14.97759	0.038035
3.125000	0.017576	0.061844	15.19676	0.038035
3.166667	0.017093	0.062566	15.41282	0.038035
3.208333	0.016580	0.063268	15.62589	0.038035
3.250000	0.016032	0.063948	15.83609	0.038035
3.291667	0.015448	0.064603	16.04354	0.038035
3.333333	0.014822	0.065234	16.24835	0.038035
3.375000	0.014149	0.065838	16.45060	0.038035
3.416667	0.013422	0.066413	16.65040	0.038035
3.458333	0.012631	0.066956	16.84782	0.038035
3.500000	0.011764	0.067464	17.04296	0.038035
3.541667	0.0110803	0.067935	17.23589	0.038035
3.583333	0.009719	0.068363	17.42669	0.038035
3.625000	0.008466	0.068742	17.61542	0.038035
3.666667	0.006952	0.069065	17.80214	0.038035
3.708333	0.004944	0.069315	17.98693	0.038035
3.750000	0.000000	0.069453	18.16984	0.038035

END FTABLE 1
END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name> # tem strg<-factor-->strg	<Name>	#	#	<Name> # #	***
WDM	2	PREC ENGL 1	PERLND	1	999	EXTNL PREC	
WDM	2	PREC ENGL 1	IMPLND	1	999	EXTNL PREC	
WDM	1	EVAP ENGL 1	PERLND	1	999	EXTNL PETINP	
WDM	1	EVAP ENGL 1	IMPLND	1	999	EXTNL PETINP	

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member-><--Mult-->Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name> # #<-factor-->strg	<Name>	#	<Name>	tem	strg	strg***
RCHRES	1	HYDR RO 1 1 1	WDM	1000	FLOW	ENGL	REPL	
RCHRES	1	HYDR O 1 1 1	WDM	1001	FLOW	ENGL	REPL	
RCHRES	1	HYDR O 2 1 1	WDM	1002	FLOW	ENGL	REPL	
RCHRES	1	HYDR STAGE 1 1 1	WDM	1003	STAG	ENGL	REPL	
COPY	1	OUTPUT MEAN 1 1 12.1	WDM	701	FLOW	ENGL	REPL	

COPY 501 OUTPUT MEAN 1 1 12.1 WDM 801 FLOW ENGL REPL
 END EXT TARGETS

MASS-LINK

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
 <Name> <Name> # #<-factor-> <Name> <Name> # #***

MASS-LINK 2 0.083333 RCHRES INFLOW IVOL
 PERLND PWATER SURO
 END MASS-LINK 2

MASS-LINK 3 0.083333 RCHRES INFLOW IVOL
 PERLND PWATER IFWO
 END MASS-LINK 3

MASS-LINK 5 0.083333 RCHRES INFLOW IVOL
 IMPLND IWATER SURO
 END MASS-LINK 5

MASS-LINK 12 0.083333 COPY INPUT MEAN
 PERLND PWATER SURO
 END MASS-LINK 12

MASS-LINK 13 0.083333 COPY INPUT MEAN
 PERLND PWATER IFWO
 END MASS-LINK 13

MASS-LINK 15 0.083333 COPY INPUT MEAN
 IMPLND IWATER SURO
 END MASS-LINK 15

MASS-LINK 17 1 0.083333 COPY INPUT MEAN
 RCHRES OFLOW OVOL
 END MASS-LINK 17

END MASS-LINK

END RUN

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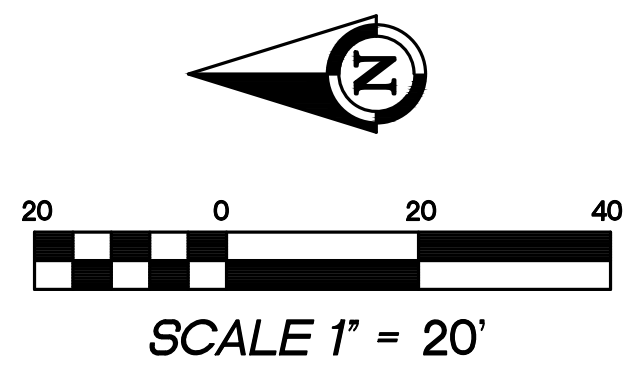
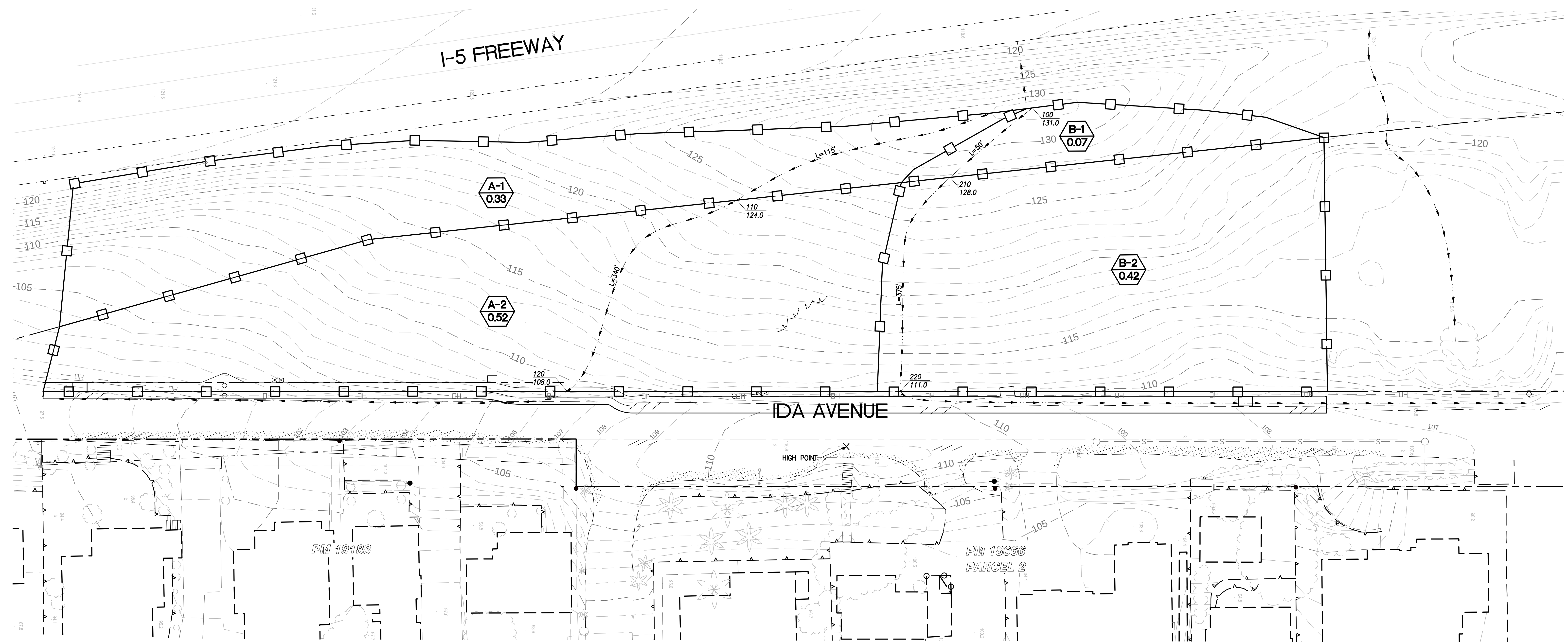
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Local (360)943-0304

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Appendix C
Drainage Exhibits

DRAINAGE EXHIBIT - EXISTING CONDITIONS



LEGEND	
	DMA BOUNDARY
	FLOWLINE
	PROPERTY LINE
	STORM DRAIN
	DRAINAGE MANAGEMENT AREA
	ACREAGE

DRAINAGE EXHIBIT - EXISTING CONDITIONS

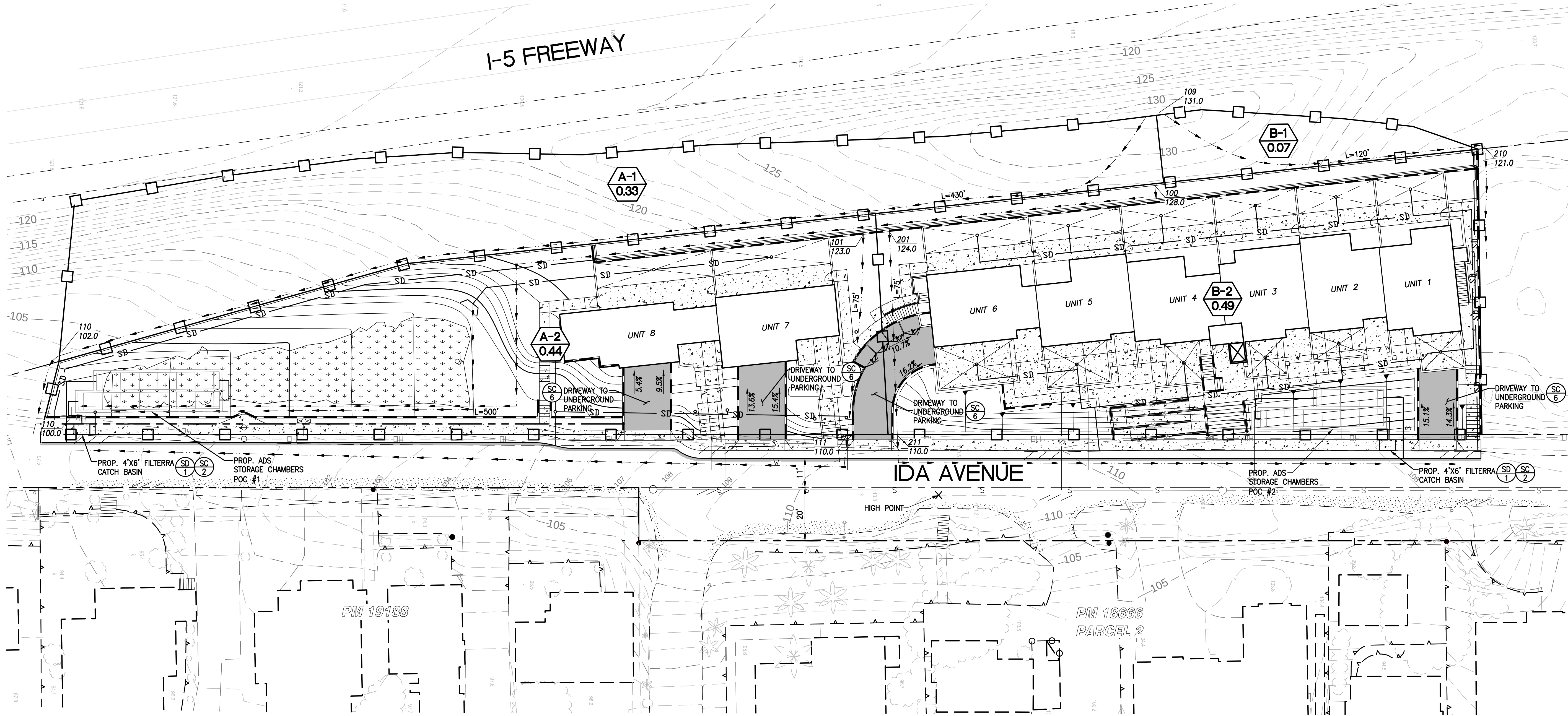
FOR

IDA AVE. APARTMENTS

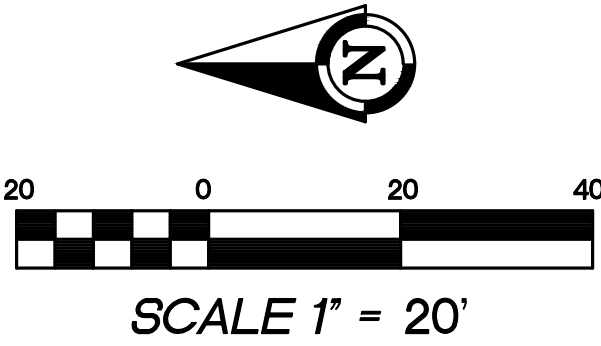
PREPARED BY:

ARMSTRONG & BROOKS CONSULTING ENGINEERS
PLANNING - INFRASTRUCTURE - SITE DEVELOPMENT - WATER RESOURCES
1500 EAST CHASE, TWENTY CORONA, CA 92608
TEL: 951-873-8800 FAX: 951-873-8800

DRAINAGE EXHIBIT - PROPOSED CONDITIONS



* NOTE
GROUNDWATER NOT ENCOUNTERED IN BORINGS



LEGEND

	DMA BOUNDARY		EXIST. AC
	FLOWLINE		PROP. AC
	PROPERTY LINE		PCC
	STORM DRAIN		PROP. LDSCP (SOILS GROUP A)
	DRAINAGE MANAGEMENT AREA ACREAGE		

DRAINAGE EXHIBIT - PROPOSED CONDITIONS
FOR
IDA AVE. APARTMENTS

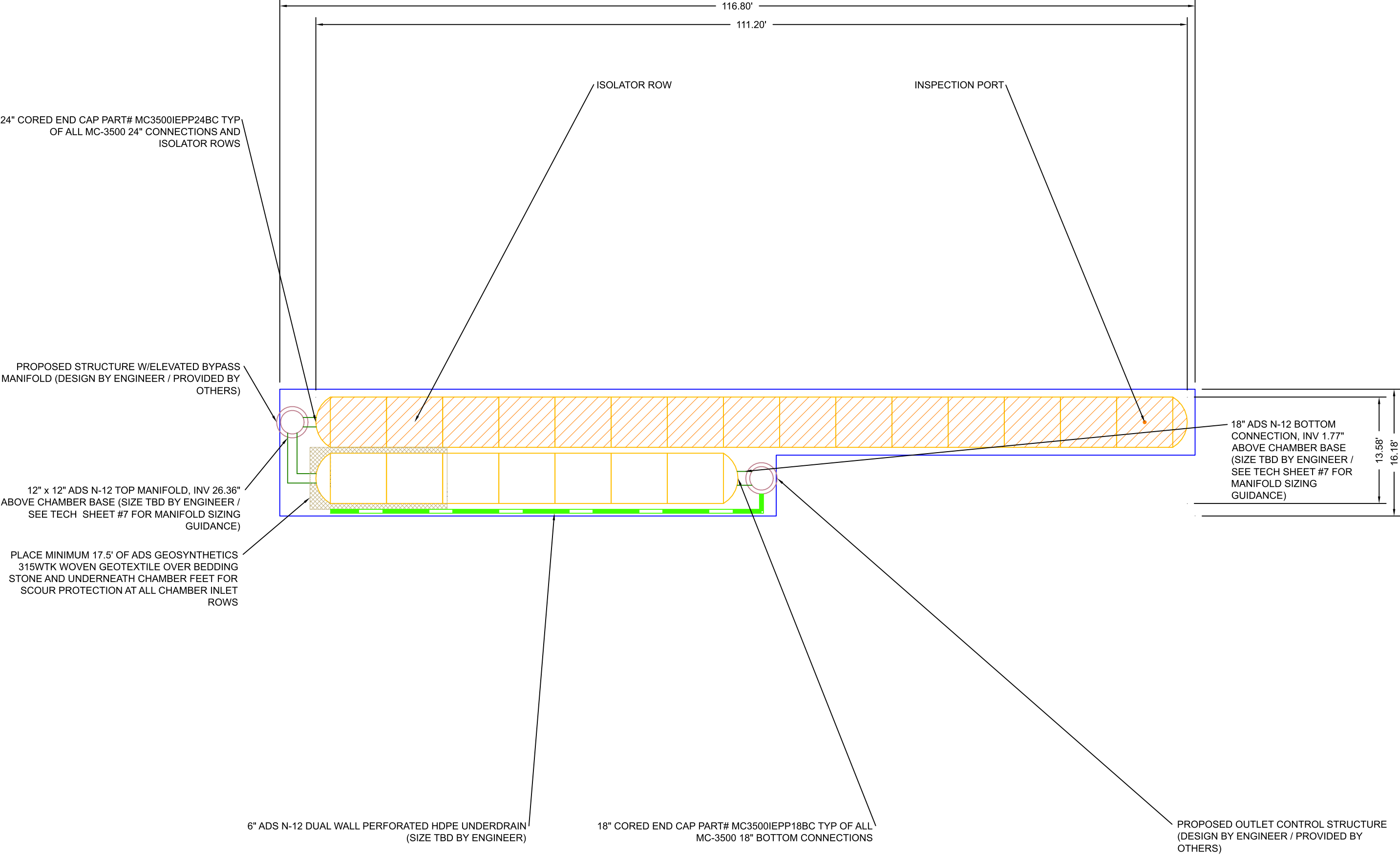
PREPARED BY:

ARMSTRONG & BROOKS CONSULTING ENGINEERS
PLANNING INFRASTRUCTURE SITE DEVELOPMENT WATER RESOURCES
1300 EAST CHASE DRIVE CORONA, CA 92626
P: 951-279-8400 F: 951-279-8499

CONCEPTUAL LAYOUT

(22) STORMTECH MC-3500 CHAMBERS
(4) STORMTECH MC-3500 END CAPS
INSTALLED WITH 12 " COVER STONE, 9 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 4732 CF
AREA OF SYSTEM: 1475 FT²
PERIMETER OF SYSTEM: 266 FT

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



IDA AVE APARTMENTS
SOLANA BEACH

DATE: 02/06/2018
PROJECT #: Tool

DRAWN: DM
CHECKED: ---

REV	DRW	CHK	DESCRIPTION

**Stormtech**
Detention - Retention - Water Quality
70 NWWOOD ROAD, SUITE 3 | ROCKY HILL, CT 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

**ADS**
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

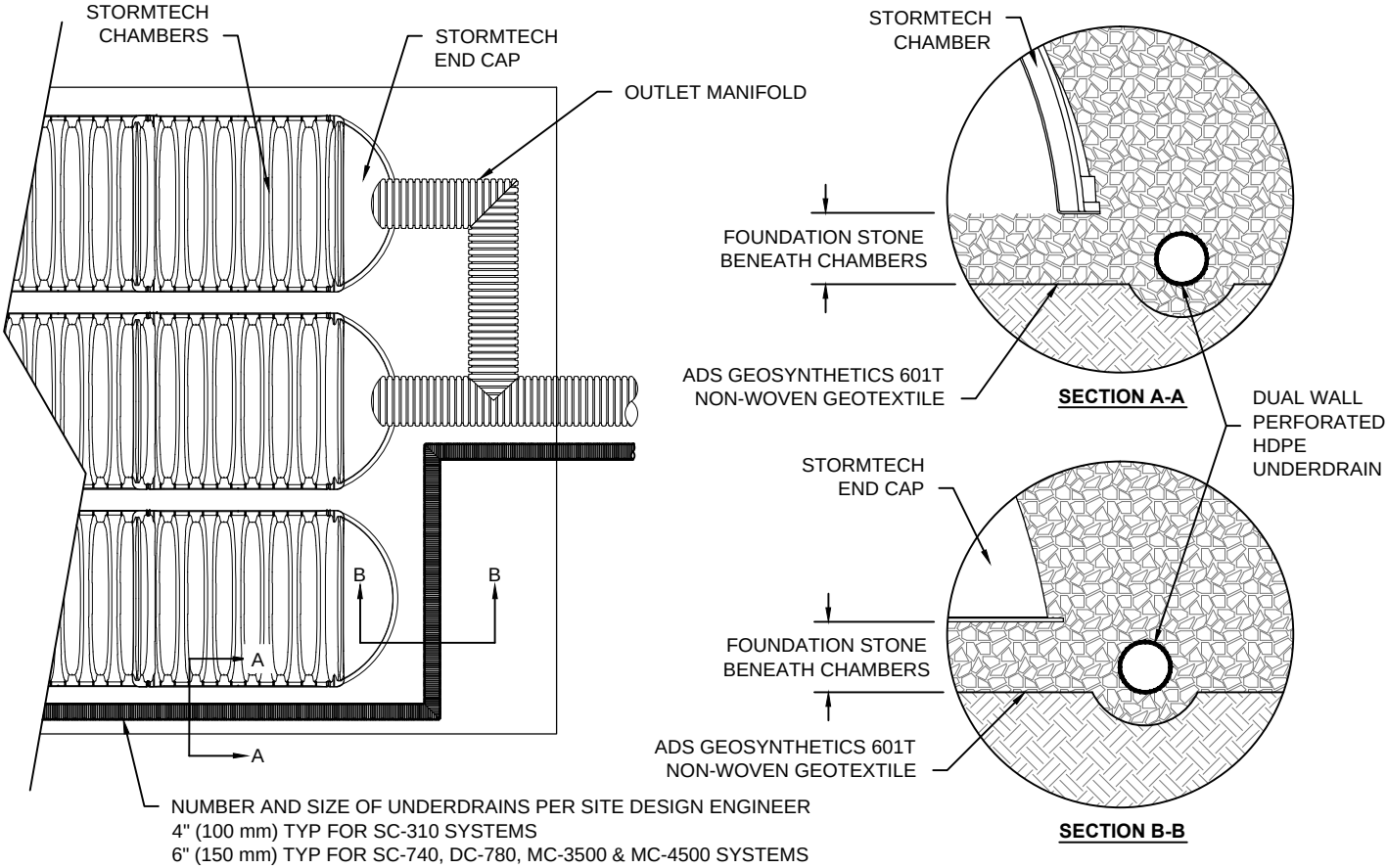
NOT TO SCALE

SHEET
2 OF 6

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

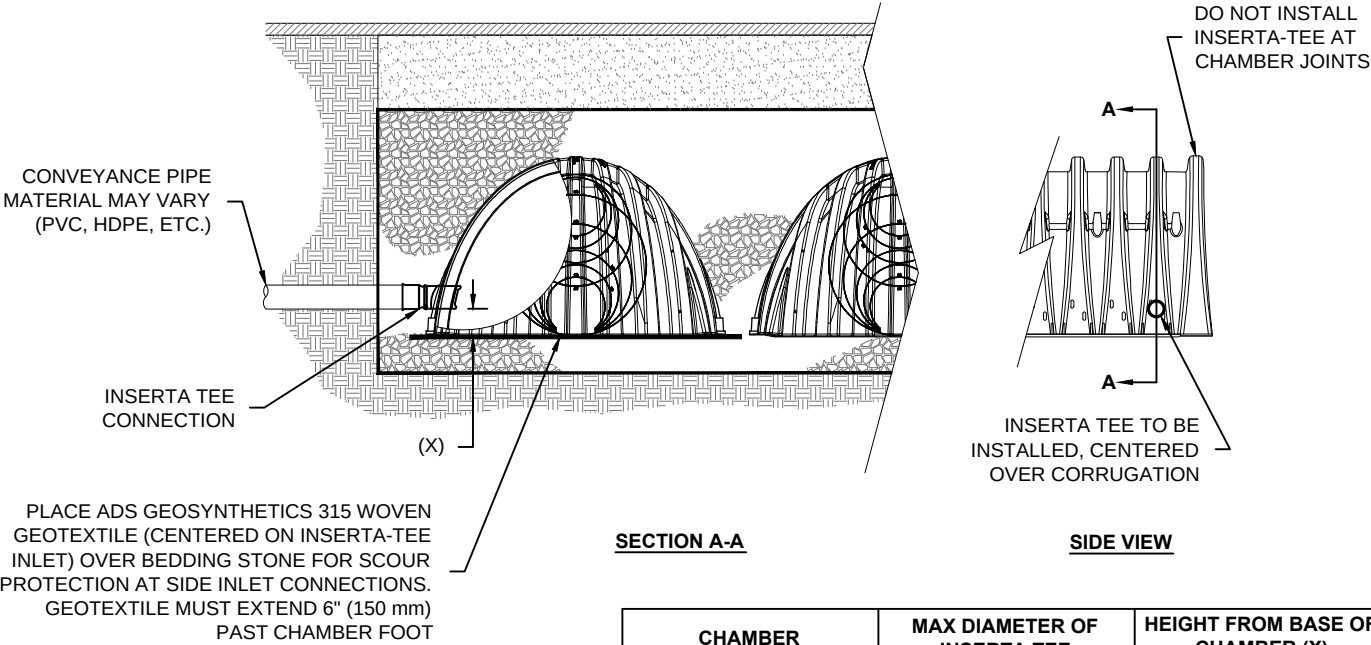
UNDERDRAIN DETAIL

NTS



INSERTA TEE DETAIL

NTS



SECTION A-A

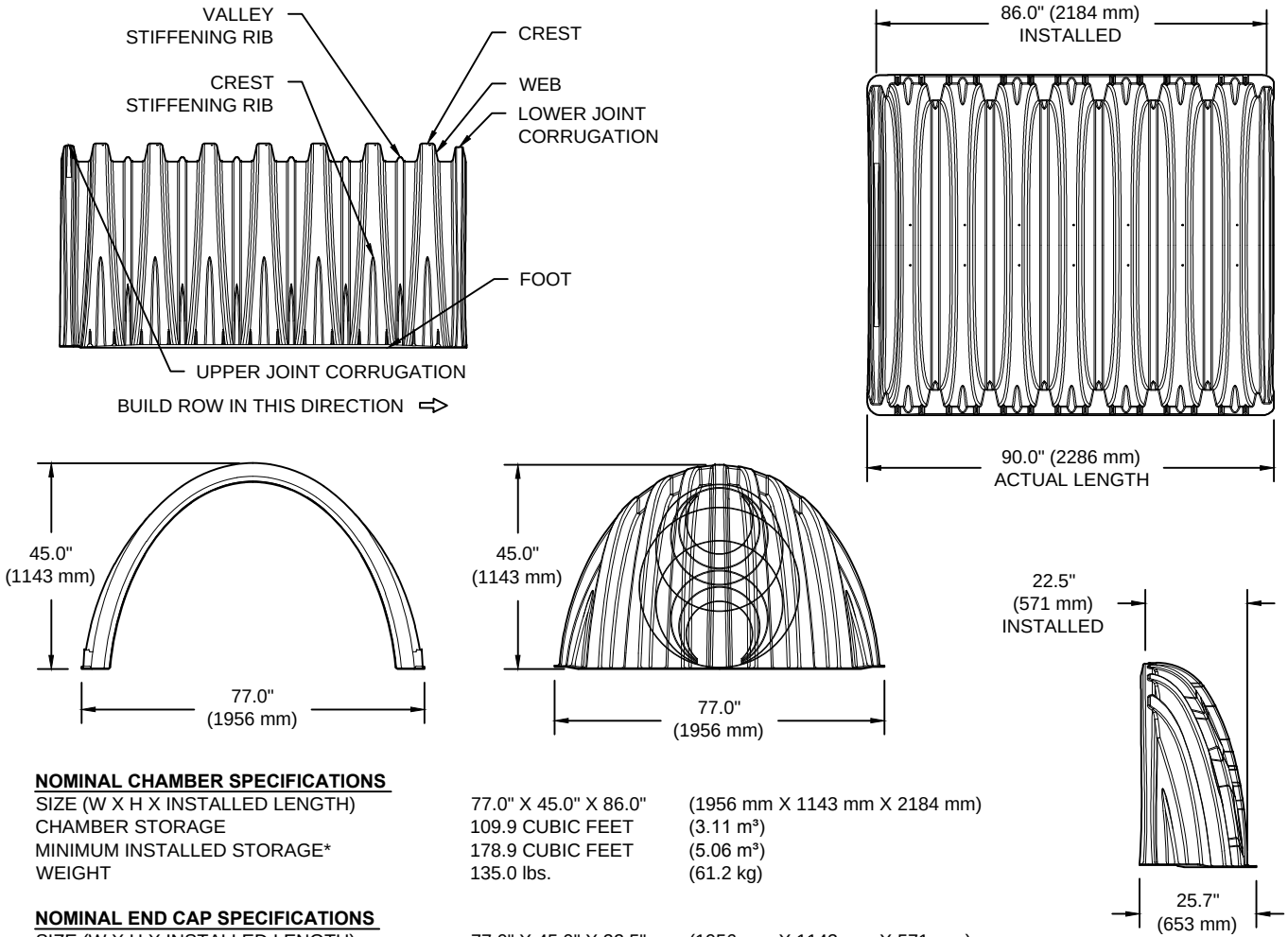
SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS.
CONTACT STORMTECH FOR MORE INFORMATION.

MC-3500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	178.9 CUBIC FEET	(5.06 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 22.5"	(1956 mm X 1143 mm X 571 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	46.0 CUBIC FEET	(1.30 m³)
WEIGHT	50.0 lbs.	(22.7 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP30BC	30" (750 mm)	---	---

NOTE: ALL DIMENSIONS ARE NOMINAL

CUSTOM PRECURED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm) THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

StormTech
Detention/Retention Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEJMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

IDA AVE APARTMENTS
SOLANA BEACH

DATE: 02/06/2018
DRAWN: DM

PROJECT #: Tool
CHECKED: ---

DESCRIPTION

CHK

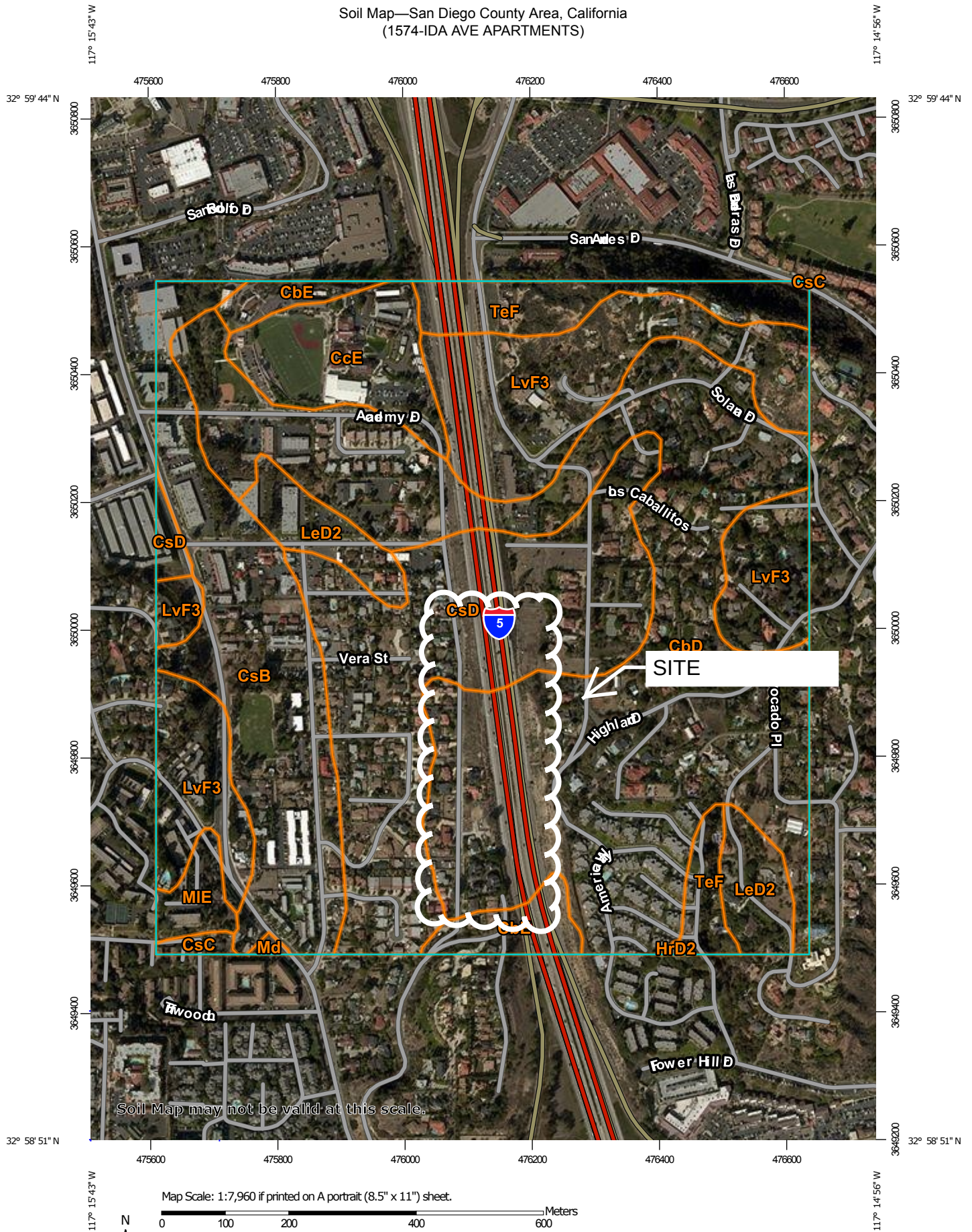
DRW

REV

SHEET

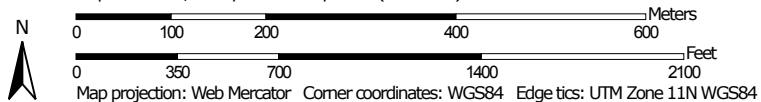
5 OF 6

Soil Map—San Diego County Area, California
(1574-IDA AVE APARTMENTS)



Soil Map may not be valid at this scale.

Map Scale: 1:7,960 if printed on A portrait (8.5" x 11") sheet.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/18/2018
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Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk "*" denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007 (<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—San Diego County Area, California														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
CbD—Carlsbad gravelly loamy sand, 9 to 15 percent slopes														
Carlsbad	85	B	0-21	Gravelly loamy sand	SM	A-1	0- 0- 0	0- 0- 0	80-85-90	60-68-75	30-40-50	10-15-20	0-0 -0	NP
			21-33	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	45-55-65	15-20-25	0-0 -0	NP
			33-50	Indurated	—	—	—	—	—	—	—	—	—	—
CbE—Carlsbad gravelly loamy sand, 15 to 30 percent slopes														
Carlsbad	85	B	0-21	Gravelly loamy sand	SM	A-1	0- 0- 0	0- 0- 0	80-85-90	60-68-75	30-40-50	10-15-20	0-0 -0	NP
			21-28	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	45-55-65	15-20-25	0-0 -0	NP
			28-42	Indurated	—	—	—	—	—	—	—	—	—	—

Engineering Properties--San Diego County Area, California														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
CcE—Carlsbad-Urban land complex, 9 to 30 percent slopes														
Carlsbad	50	B	0-21	Gravelly loamy sand	SM	A-1	0- 0- 0	0- 0- 0	80-85-90	60-68-75	30-40-50	10-15-20	0-0 -0	NP
			21-39	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	45-55-65	15-20-25	0-0 -0	NP
			39-50	Indurated	—	—	—	—	—	—	—	—	—	—
Urban land	30		0-6	Variable	—	—	—	—	—	—	—	—	—	—
CsB—Corralitos loamy sand, 0 to 5 percent slopes														
Corralitos	85	A	0-12	Loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-55-60	15-23-30	0-0 -0	NP
			12-43	Loamy fine sand, loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-60-70	15-23-30	0-0 -0	NP
			43-72	Sand, fine sand	SP-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-58-75	5-10- 15	0-0 -0	NP
CsC—Corralitos loamy sand, 5 to 9 percent slopes														
Corralitos	85	A	0-9	Loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-55-60	15-23-30	0-0 -0	NP
			9-43	Loamy fine sand, loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-60-70	15-23-30	0-0 -0	NP
			43-72	Sand, fine sand	SP-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-58-75	5-10- 15	0-0 -0	NP

Engineering Properties--San Diego County Area, California														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
CsD--Corralitos loamy sand, 9 to 15 percent slopes														
Corralitos	85	A	0-9	Loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-55-60	15-23-30	0-0 -0	NP
			9-43	Loamy fine sand, loamy sand	SM	A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	50-60-70	15-23-30	0-0 -0	NP
			43-72	Sand, fine sand	SP-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-58-75	5-10- 15	0-0 -0	NP
HrD2--Huerhuero loam, 9 to 15 percent slopes, eroded														
Huerhuero	85	D	0-12	Loam	CL-ML, ML	A-4	0- 0- 0	0- 0- 0	95-98-100	90-95-100	80-88-95	50-63-75	25-30 -35	5-8 -10
			12-55	Clay loam, clay	CH, CL	A-7	0- 0- 0	0- 0- 0	95-98-100	90-95-100	90-95-100	70-83-95	40-50 -60	20-25-30
			55-72	Stratified sand to sandy loam	SC-SM	A-2	0- 0- 0	0- 0- 0	90-95-100	90-95-100	50-63-75	25-30-35	15-20 -25	5-8 -10

Soil Map—San Diego County Area, California
(1574-IDA AVE APARTMENTS)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California

Survey Area Data: Version 12, Sep 13, 2017

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CbD	Carlsbad gravelly loamy sand, 9 to 15 percent slopes	97.1	36.2%
CbE	Carlsbad gravelly loamy sand, 15 to 30 percent slopes	6.8	2.5%
CcE	Carlsbad-Urban land complex, 9 to 30 percent slopes	13.0	4.9%
CsB	Corralitos loamy sand, 0 to 5 percent slopes	34.5	12.9%
CsC	Corralitos loamy sand, 5 to 9 percent slopes	0.9	0.3%
CsD	Corralitos loamy sand, 9 to 15 percent slopes	47.2	17.6%
HrD2	Huerhuero loam, 9 to 15 percent slopes, eroded	0.1	0.0%
LeD2	Las Flores loamy fine sand, 9 to 15 percent slopes, eroded	10.6	3.9%
LvF3	Loamy alluvial land-Huerhuero complex, 9 to 50 percent slopes, severely eroded	42.2	15.7%
Md	Made land	0.3	0.1%
MIE	Marina loamy coarse sand, 9 to 30 percent slopes	3.3	1.2%
TeF	Terrace escarpments	12.4	4.6%
Totals for Area of Interest		268.4	100.0%