DETERMINATION OF BIOLOGICALLY EQUIVALENT OR SUPERIOR PRESERVATION

KILEY PROPERTIES – TRACT 37154

RIVERSIDE COUNTY, CALIFORNIA

LSA

May 2019

DETERMINATION OF BIOLOGICALLY EQUIVALENT OR SUPERIOR PRESERVATION

KILEY PROPERTIES – TRACT 37154

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

Highlands at Sycamore Creek
4338 Plazzo Lane
Corona, California 92883

Prepared by:

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LSA Project No. HSC1801

LSA

May 2019

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FIGURES

TABLES

APPENDIX

1.0 EXECUTIVE SUMMARY

LSA prepared a Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) consistency analysis for Tract 37154. This analysis included a Jurisdictional Delineation and found that the project will affect MSHCP Section 6.1.2 Riparian/Riverine Resources, specifically riverine resources associated with an ephemeral drainage feature. Project impacts to this drainage feature are the focus of this Determination of Biologically Equivalent or Superior Preservation (DBESP) report.

The project will result in 0.20 acre of permanent and 0.03 acre of temporary effects to riparian/ riverine resources, and 0.38 acre of permanent and 0.01 acre of temporary effects to riverine resources. To compensate for the permanent loss of riparian/riverine resources, the project will mitigate at a 3:1 ratio. Compensation for permanent effects will include one or a combination of the following: off-site habitat enhancement/preservation, off-site participation in an in-lieu fee program for habitat restoration (reestablishment/rehabilitation), and/or purchase of credits from a mitigation bank for habitat restoration (reestablishment/rehabilitation). For temporary effects to riparian/riverine resources, the drainage feature will be recontoured to its original grade and allowed to revegetate naturally over time.

2.0 INTRODUCTION

2.1 Project Area

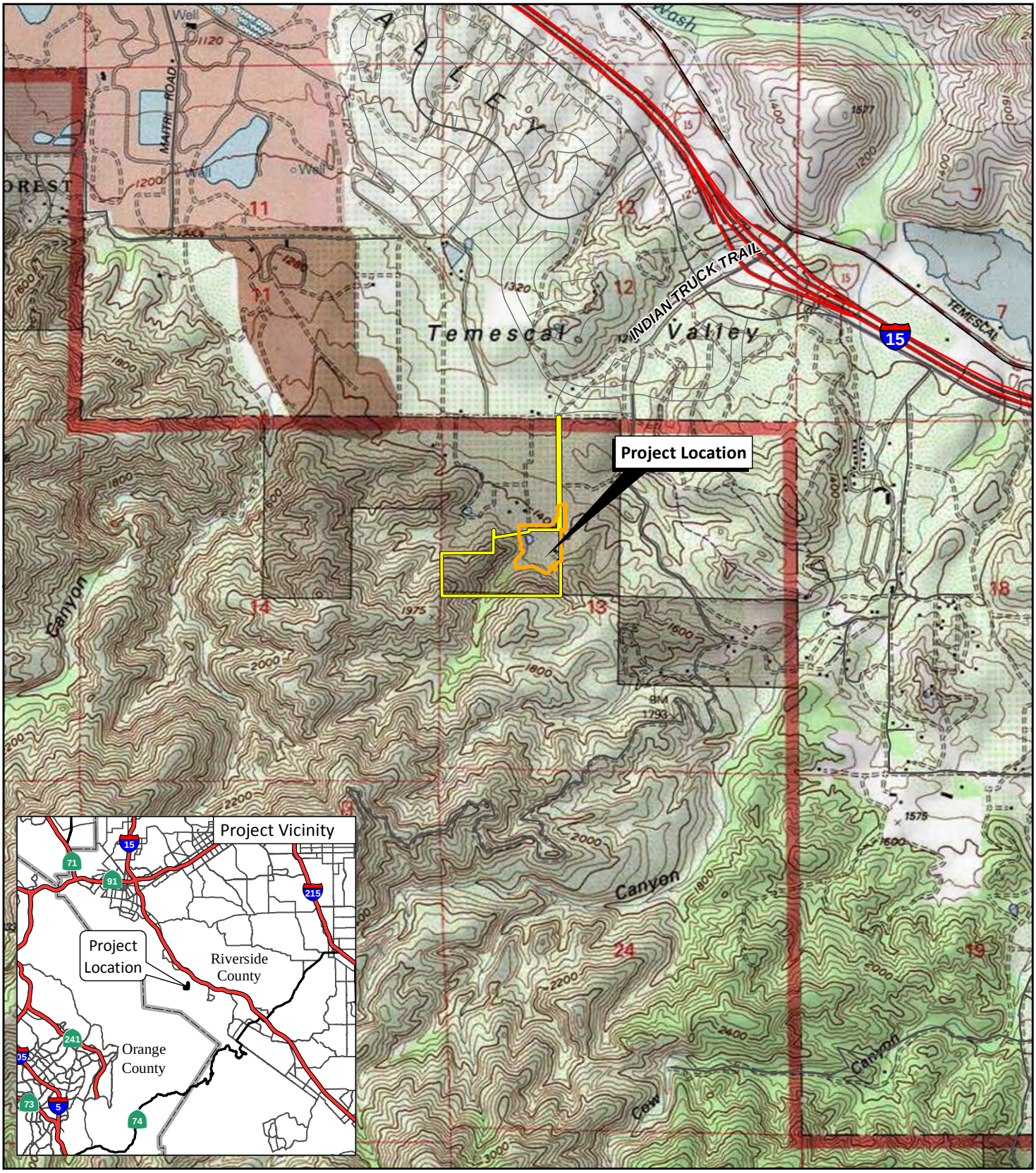
LSA was retained by Highlands at Sycamore to conduct an MSHCP DBESP for Tract 37154 (Assessor's Parcel Numbers [APNs] 290-160-011 and 290-160-014). This report documents the project's findings, as required under the MSHCP, that the project design (including mitigation) is biologically equivalent or would have superior preservation to what would have occurred without the proposed project.

The project area has an overall acreage of approximately 36 acres. A study area was created to include Tract 37154 and consists of approximately 10 acres, which is the focus of this study. Tract 37154 is located in Section 13, Township 5 South Range 6 West, in the unincorporated Temescal Canyon area of Riverside County, California as depicted on the United States Geological Survey (USGS) *Alberhill, California* 7.5-minute topographic quadrangle map (Figure 1).

2.2 Project Description

The project proposes the development of a residential subdivision (Figure 2) comprising 15 residential lots. The project site or study area is located within the northwesterly corner of the larger project area and consists of approximately 10 acres, which includes the grading limits of Tract 37154. Staging areas will be confined to within the grading limits of the project. No off-site improvements will occur. Off-site access and utility improvements have been completed by adjacent development.

The project site is not within the MSHCP Criteria Area; however, the project is part a Habitat Assessment and Negotiation Strategy (HANS), specifically HANS/PAR 582/Intake 648. The project



LSA

FIGURE 1

LEGEND

Parcel Boundary (290-160-011)

Study Area

N

0 1000 2000

FEET

Kiley Properties - TR 37154

Regional and Project Location

SOURCE: USGS 7.5' Quads: Alberhill & Lake Mathews, 1988, CA; Riverside County, 2017.

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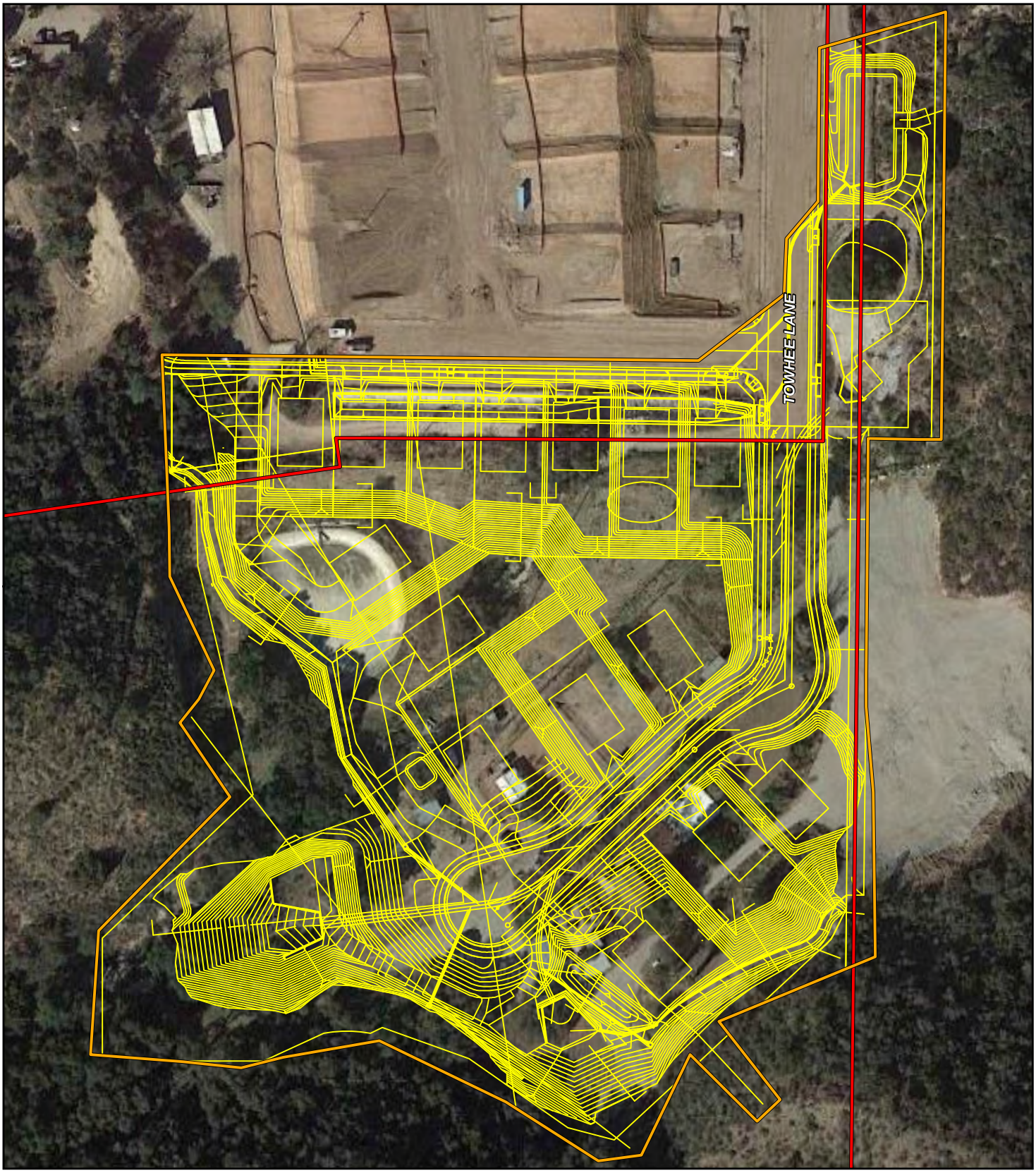


LSA

Project Boundary
Study Area
Site Plan

FIGURE 2

N

0 60 120
FEET

Kiley Properties - TR 37154

Site Plan

SOURCE: Google (2018); Soil Data Mart (2017).

I:\HSC1801\Reports\DBESP\SitePlan.mxd (5/3/2019)

will dedicate approximately 27 acres of the southerly portion of APN 290-160-011 for conservation in accordance with HANS/PAR 582/Intake 648.

2.3 Existing Setting

The study area for Tract 37154 is primarily developed with existing residences and associated infrastructure, ornamental landscaping, and ruderal vegetation. It is bordered to the north by residential development and to the south, east, and west by undeveloped open space. The topography of the study area slopes to the northeast and the elevation ranges from approximately 1,400 to 1,475 feet above mean sea level. Vegetation present consists of California live oak woodland, individual California live oak (*Quercus agrifolia*) trees and chamise chaparral. A drainage feature runs from the southwest to the northeast through project site. It drains into a flood control feature, along the northerly study area boundary, that discharges into a rectangular concrete box culvert structure at Towhee Lane, and then joins the natural flow path toward the northeast.

3.0 RIPARIAN/RIVERINE MITIGATION (SECTION 6.1.2)

3.1 Methods

LSA Biologists Claudia Bauer and Denise Woodard conducted the fieldwork for delineation of riparian/riverine areas on January 24, 2018. Potential riparian/riverine areas, and federal and State jurisdictional features were identified in the study area, evaluated on foot, and mapped using aerial photographs and GPS. Areas of potential jurisdiction were evaluated according to the most current U.S. Army Corps of Engineers (USACE) and California Department of Fish and Wildlife (CDFW) regulatory criteria and guidance. The boundaries of the potential jurisdictional areas within the study area were observed in the field and mapped on an aerial photograph (the scale is 1 inch = approximately 150 feet). Any areas supporting plant species that were potentially indicative of wetlands were evaluated according to routine wetland delineation procedures described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). Hydrological conditions, including any surface inundation, saturated soils, groundwater levels, and/or other wetland hydrology indicators were also noted.

3.2 Results/Impacts

The on-site drainage feature is considered to be an MSHCP Section 6.1.2 riverine resource. This drainage feature is approximately 1,439 feet long and flows from the southwest to the northeast through study area. It drains into a flood control feature, at the northerly study area boundary, that discharges to a concrete box culvert structure at Towhee Lane, and then joins the natural flow path toward the northeast. The drainage is ephemeral and vegetated by ruderal vegetation and California live oak woodland and individual California live oak trees. California live oak woodland/trees associated with the drainage feature are considered to be riparian habitat protected under MSHCP Section 6.1.2.

The project will result in 0.20 acre of permanent and 0.03 acre of temporary effects to riparian/ riverine resources, and 0.38 acre of permanent and 0.01 acre of temporary effects to riverine resources. The drainage feature will be entirely developed within the project footprint. The total riparian/riverine resources in the study area comprises 0.29 acre, and the total riverine resources in

the study area comprises 0.40 acre. The project effects are provided in Table A and shown in Figure 3.

Table A: Effects to Riparian/Riverine Resources

Riparian/Riverine (acres)		Riverine (acres)	
Permanent	**Temporary**	**Permanent**	**Temporary**
0.20	0.03	0.38	0.01

Functions and Values

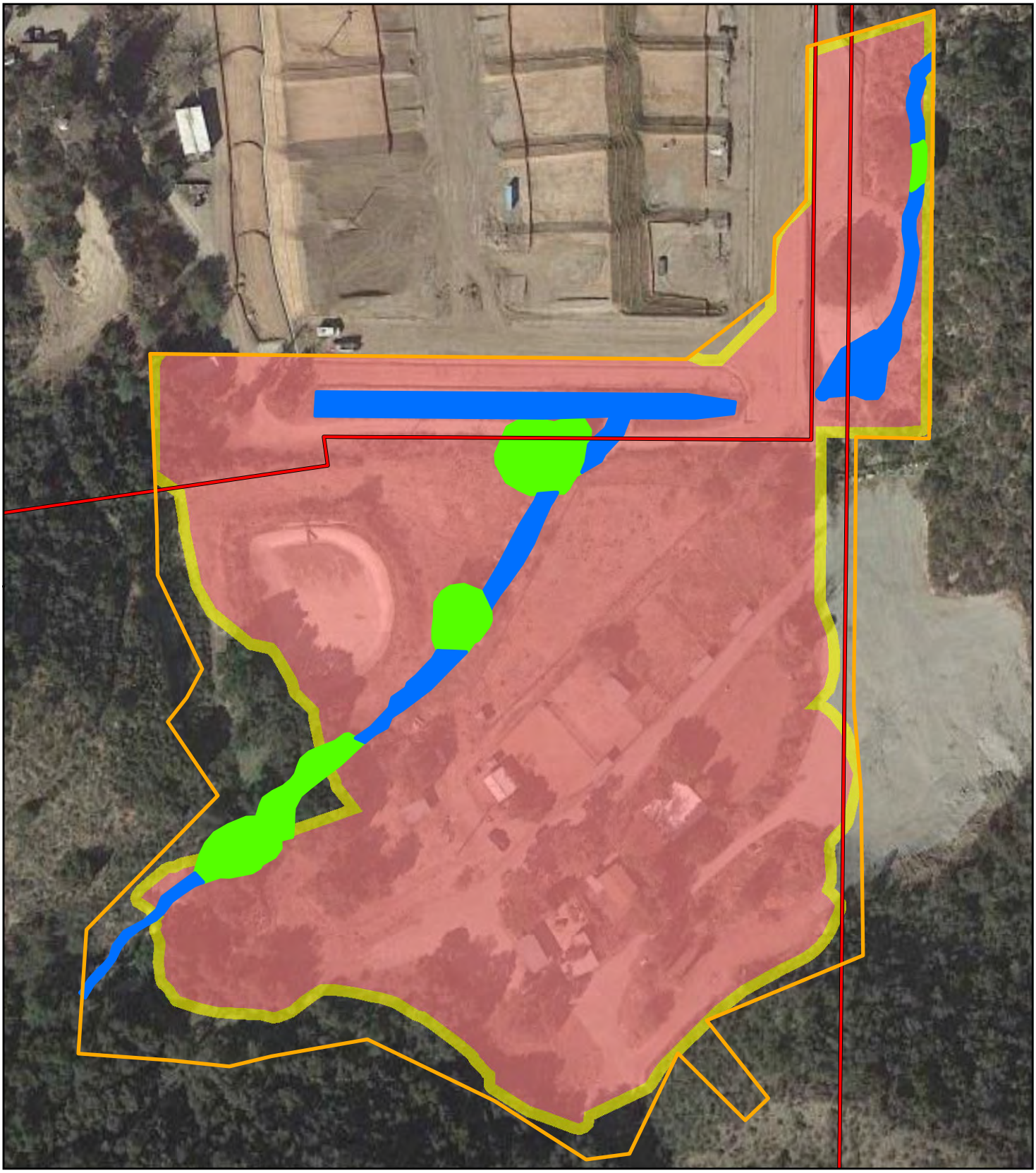
A qualitative functions and values analysis of the existing drainage feature was conducted as part of the Jurisdictional Delineation (LSA 2019). In addition, a Hydrology/Hydrolic Study for Tract 37154 (Adkan Engineers 2019; see Appendix A) was prepared to ensure storm water infrastructure is adequately sized for an anticipated 10- and 100-year storm events, including streets, catch basins, storm drains, and drainage ditches.

The following functions were analyzed at low, moderate, or high value levels based on the criteria below and as shown in Table B.

Table B: Functions and Values of Drainage Feature Within the Study Area

Drainage	Hydrologic Regime	Flood Storage and Flood Flow Modification	Sediment Retention	Nutrient Retention and Transformation	Toxicant Trapping	Social Significance	Wildlife Habitat	Aquatic Habitat
Drainage Feature	Low to Moderate	Low to Moderate	Low	Low	Low	Low to Moderate	Low to Moderate	Low

- **Hydrologic Regime.** This function is the ability of a wetland or stream to absorb and store water belowground. The degree of this saturation is dependent on the soil composition and is affected by prior flooding events. For example, clay soils possess more pore space than sandy soils. However, the smaller pore size slows the rate at which water is absorbed and released; therefore, clay soil has a lower capacity to store water than sandy soils. The storage of water belowground allows for the fluctuation between anaerobic and aerobic conditions that benefit environmental conditions necessary for microbial cycling.
- **Flood Storage and Flood Flow Modification.** This function is determined based on the ability of a wetland or stream at which the peak flow in a watershed can be attenuated during major storm events and during peak domestic flows to take in surface water that may otherwise cause flooding. This is dependent on the size of the wetland or stream, the amount of water it can hold, and the location in the watershed. For instance, larger wetlands or streams that have a greater capacity to receive waters have a greater ability to reduce flooding. In addition, areas high in the watershed may have more ability to reduce flooding in downstream areas, but areas lower in the watershed may have greater benefits to a specific area. Vegetation, shape, and the configuration of the wetland or stream may also affect flood storage by dissipating the energy of flows during flood events.



LSA

FIGURE 3

Kiley Properties - TR 37154

Riparian Riverine Resources and Impacts

SOURCE: Google (2018); Soil Data Mart (2017).

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- **Sediment Retention.** Removal of sediment is the process that keeps sediments from migrating downstream. This is accomplished through the natural process of sediment retention and entrapment. This function is dependent on the sediment load being delivered by runoff into the watershed. Similar to the above, the vegetation, shape, and configuration of a wetland will also affect sediment retention if water is detained for long durations, as would be the case with dense vegetation, a bowl-shaped watershed, or slow-moving water. This function would be demonstrated (i.e., high) if the turbidity of the incoming water is greater than that of the outgoing water.
- **Nutrient Retention and Transformation.** Nutrient cycling consists of two variables: uptake of nutrients by plants and detritus turnover, in which nutrients are released for uptake by plants downstream. Wetland systems in general are much more productive with regard to nutrients than upland habitats. The regular availability of water associated with the wetland or stream may cause the growth of plants (nutrient uptake) and associated detritivores and generate nutrients that may be used by a variety of aquatic and terrestrial wildlife downstream.
- **Toxicant Trapping.** The major processes by which wetlands remove nutrients and toxicants are as follows: (1) by trapping sediments rich in nutrients and toxicants, (2) by absorption to soils high in clay content or organic matter, and (3) through nitrification and denitrification in alternating oxic and anoxic conditions. Removal of nutrients and toxicants is closely tied to the processes that provide for sediment removal.
- **Social Significance.** This is a measure of the probability that a wetland or stream will be used by the public because of its natural features, economic value, official status, and/or location. This includes being used by the public for recreational uses (e.g., boating, fishing, birding, and walking) and other passive recreational activities. A wetland or stream that is used as an outdoor classroom, is a location for scientific study, or is near a nature center would have a higher social significance standing.
- **Wildlife Habitat.** General habitat suitability is the ability of a wetland to provide habitat for a wide range of wildlife. Vegetation is a large component of wildlife habitat. As plant community diversity increases along with connectivity with other habitats, so does potential wildlife diversity. In addition, a variety of open water, intermittent ponding, and perennial ponding is also an important habitat element for wildlife.
- **Aquatic Habitat.** The ability of a wetland or stream to support aquatic species requires that there be ample food supply, pool and riffle complexes, and sufficient soil substrate. Food supply is typically in the form of aquatic invertebrates and detrital matter from nearby vegetation. Pool and riffle complexes provide a variety of habitats for species diversity as well as habitat for breeding and rearing activities. Species diversity is directly related to the complexity of the habitat structure.

Based on the functions and values analysis, the drainage feature has low and, in some cases, low to moderate functions and values. This is because the drainage conveys ephemeral flows, is vegetated by a monotypic stand of riparian vegetation consisting of California live oak trees, and does not support wetlands vegetation. With the development of the project site with construction of storm water improvements and through implementation of avoidance, minimization and mitigation

measures described in the following section, these functions and values will not be substantially affected.

3.3 Mitigation and Equivalency

Direct Effects

The project will result in direct effects as a result of the permanent loss of 0.20 acre of riparian/ riverine resources and 0.38 acre of permanent effects to riverine resources. To compensate for the permanent loss of riparian/riverine resources, the project will mitigate for permanent impacts at a 3:1 ratio. Compensation for permanent impacts will include one or a combination of the following: off-site habitat enhancement/preservation, off-site participation in an in-lieu fee program for habitat restoration (reestablishment/rehabilitation), and/or purchase of credits from a mitigation bank for habitat restoration (reestablishment/rehabilitation).

Indirect Effects

Project indirect effects that will result from the project construction include temporary effects of 0.03 acre to riparian/riverine resources and 0.01 acre of temporary effects to riverine resources. Additional indirect effects that may occur include construction-related fugitive dust and contaminants, habitat modification, and an increase in invasive species. To avoid and minimize indirect effects, the project will incorporate the following:

- Prior to clearing or construction, highly visible barriers (e.g., orange construction fencing) will be installed along the boundaries of the project footprint. All construction equipment should be operated in a manner to prevent accidental damage to areas outside the project footprint. No structure of any kind, or incidental storage of equipment or supplies, will be allowed within these protected zones. Silt fence barriers will be installed at the project boundary to prevent accidental deposition of fill material in areas where vegetation is adjacent to planned grading activities.
- All equipment maintenance, staging, and dispensing of fuel, oil, or any other such activities will occur in developed or designated non-sensitive upland habitat areas. The designated upland areas will be located in such a manner as to prevent any spill runoff from riverine areas.
- A weed abatement program will be developed to minimize the importation of nonnative plant material during and after construction. Eradication strategies would be employed should an invasion occur.
- A biologist will monitor construction for the duration of the project construction to ensure that vegetation removal, best management practices (BMPs), and all avoidance and minimization measures are properly constructed and followed.
- Riverine areas temporarily affected by the project will be recontoured to their original grades. These areas are sparsely vegetated in the alluvial stream bottoms and are anticipated to revegetate naturally over time to the extent that they will support vegetation.

In addition, because the project is adjacent to HANS/PAR 582/Intake 648, it will be subject to MSHCP Section 6.1.4: Guidelines Pertaining to the Urban/Wildlands Interface as discussed in the project MSHCP report (LSA 2019).

With the implementation of the mitigation and avoidance and minimization measures identified above, the project will be biologically equivalent to the existing condition.

4.0 REFERENCES

Adkan Engineers. 2019. Hydrology/Hydraulic Study for Kiley Family Trust, Tract 37154, Located in Riverside County.

LSA. 2019. MSHCP Consistency Analysis, Kiley Properties-Tract 37154, Riverside County, CA.

NETRonline Historic Aerials. 2019 https://www.historicaerials.com.

United States Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0).

United States Geological Survey (USGS). 1988. *Alberhill, California* 7.5-minute topographic quadrangle map.

APPENDIX A

PRELIMINARY HYDROLOGY/HYDRAULIC STUDY FOR TRACT 37155

Hydrology / Hydraulic Study
for
Kiley Family Trust

Tract 37154
Located in the County of Riverside, Ca

Prepared For:
Kiley Family Trust
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Corona, Ca 92883
Tel. (951) 603-0966

Prepared by:

adkan
ENGINEERS
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adkan
Job No. 8770.T3

Prepared
January 28, 2019

Mitchell J. Adkison, R.C.E. NO. 75731 DATE
EXP. 6/30/20

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PROJECT DESCRIPTION

The project is located at the southwest corner of Litchi Street and Towhee Lane, In Section 13, Township 5 South Range 6 West, in the Temescal Canyon Area of Riverside County. The total size of the tract is 34.1+/- Gross acres and will only develop on 7.3+/- acres, leaving the remainder in its natural condition. The development will consist of 15 single family residences.

The tract is comprised of varied terrain ranging from smooth, low-gradient areas in the northeastern portion of the site, to steep, brushy slopes to the southwest that continue south into the greater Santa Ana Mountains. Existing site improvements include the two residences and their related overhead electric utility services. Mountainous terrain borders the property to the south and west. To the north is Temescal Valley Water District reservoir property, portions of future Tract No. 36317, and acreage that will be retained as open space south of future subdivided residential lots within Tentative Tract Map No. 37027. Vacant hillsides abut the east side of the project.

PURPOSE

Rational Hydrology Study:

The purpose of the rational hydrology report is to ensure storm water infrastructure is adequately sized for an anticipated 10 and 100 year storm events. This includes streets, catch basins, storm drains and drainage ditches. The tract has been designed to contain on-site flows for a 10 year storm event within the curb to curb street section and the 100 year storm volume within the right of way to right of way street section. Detailed hydrologic calculations are provided in Appendix A & B, hydraulic calculations for inlet structures and street capacities are provided in Appendix E.

Results from hydrology and hydraulic reports approved by Riverside County Flood Control for Tracts 31908 and 31908-1, prepared by Webb and Associates, were incorporated for offsite flow analysis from the adjacent canyon watersheds to the south and southwest. Storm water infrastructure was sized for the anticipated 100 year storm event with a bulking factor of 1.5 to handle potential debris. Emergency overflow routes were also taken into consideration should failure of the headwall or reinforced concrete piping occur and no offsite

runoff is anticipated to intrude within lot pads. Detailed hydrologic calculations are provided in Appendix C, hydraulic calculations for inlet structures and overflow routes are provided in Appendix E.

Unit Hydrology Study:

The purpose of the unit hydrology study is to demonstrate that the proposed development peak flow rates for the 2 year 24 hour storm have been mitigated to within 10% of the existing undeveloped peak flow rates in order to qualify for hydrologic condition of concern exemption. The entire developed portion of the site will be treated by an infiltration trench located at the northeastern corner of the site.

EXISTING AND PROPOSED HYDROLOGY

The entire site currently drains predominantly from southeast to northwest. The tract is a receptor of collected runoff from the canyon watershed to the south. An existing flood control channel in located along the northern border of the tract which captures runoff from the southwest and discharges to an outlet structure east of Towhee Lane where it joins the natural flow path and continues to the northeast.

The proposed development will collect the majority of the off-site runoff from the canyon watershed through multiple v-ditches and two headwalls. The runoff will be routed through a series of reinforced concrete pipes under Towhee Lane to the existing flood control outlet structure located at the north eastern corner tract.

The on-site flows will be directed into proposed catch basins located at the northeastern corner of Towhee Lane and Litchi Street. These volumes will be directed to the proposed infiltration trench through a series of reinforces concrete pipes. Any storm event volumes which exceed the anticipated 2 year 24 hour storm event will overflow and discharge into the existing flow path, comingling with the off-site flows routed through the tract.

METHOD OF ANALYSIS.

The hydrology for the site was based on the Riverside County Flood Control & Conservation District (RCFC&WCD) Hydrology Manual, dated April 1978, from which pertinent information such as soil and rain fall data was obtained.

Hydrology calculations were generated using "RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM", Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

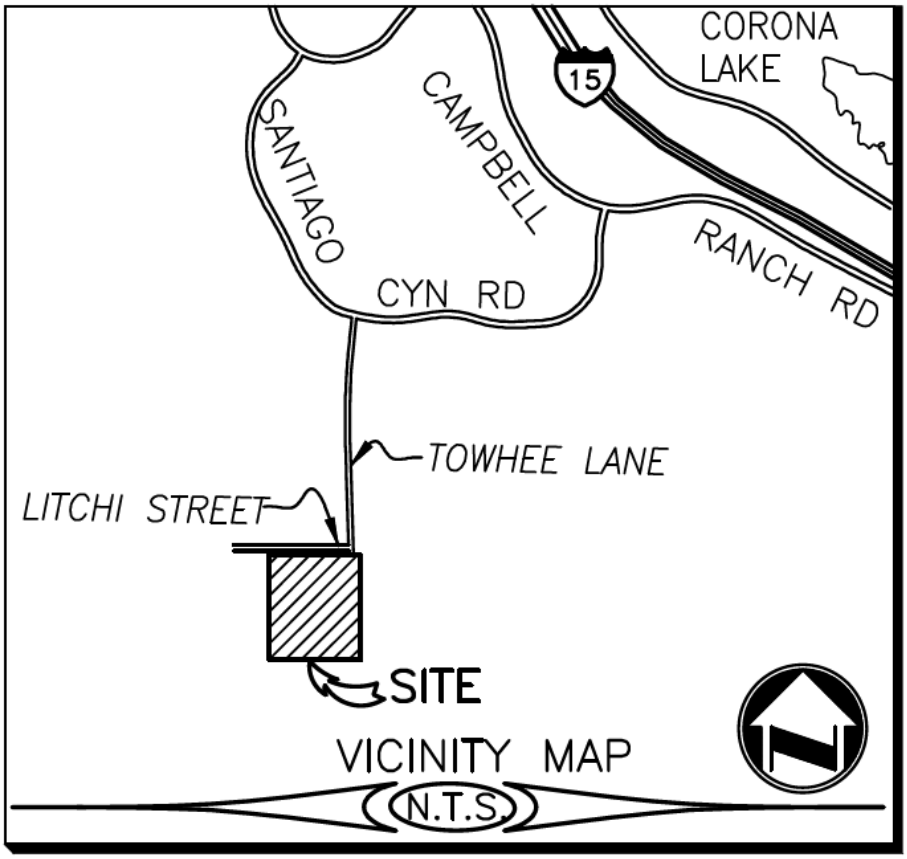
The site was also analyzed by the "SYNTHETIC UNIT HYDROLOGY METHOD COMPUTER PROGRAM", Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering

Reference is made Sycamore Creek Offsite drainage Tract 31908 & 31908-1 prepared by Albert A. Webb Associates.

CONCLUSIONS

The rational method hydrologic calculations provided herein substantiate the design of the proposed project to indicate adequate sizing of the proposed inlets, storm drains and the on-site infiltration trench. The site has been shown to mitigate the required 2 year 24 hour storm event using the unit hydrograph analysis.

VICINITY MAP



SEC. 13, T.5S, R.6W

APPENDIX A - 10 & 100 YEAR EXISTING RATIONAL

TRACT 37154
EXISTING HYDROLOGY MAP

LEGEND

AREA | ACRES
LENGTH | SOIL

NODE
ELEV

WATERSHED BOUNDARY

FLOW PATH

0 40 120
20 80 160
SCALE: 1" = 40'

PRELIMINARY EXISTING HYDROLOGY MAP
PREPARATION DATE : JANUARY 2019

PLAN PREPARED BY:
adkan ENGINEERS
Civil Engineering - Surveying - Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 · Fax:(951) 688-0599

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
        Rational Hydrology Study        Date: 01/28/19  File:ex10.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 5006
```

Existing Condition 10-YR STORM EVENT

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------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.980(In/Hr)
Slope of intensity duration curve = 0.4800




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000(Ft.) to Point/Station        2.000(Ft.)
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   771.000(Ft.)
Top (of initial area) elevation =  1437.000(Ft.)
Bottom (of initial area) elevation =  1388.100(Ft.)
Difference in elevation =    48.900(Ft.)
Slope =    0.06342  s(percent)=       6.34
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.142 min.
Rainfall intensity =      2.031(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.832
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     10.518(CFS)
Total initial stream area =        6.220(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            6.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
        Rational Hydrology Study        Date: 01/28/19  File:ex.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 5006
```

Existing Condition 100-YR STORM EVENT

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.500(In/Hr)
Slope of intensity duration curve = 0.4800




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   771.000(Ft.)
Top (of initial area) elevation =  1437.000(Ft.)
Bottom (of initial area) elevation =  1388.100(Ft.)
Difference in elevation =    48.900(Ft.)
Slope =    0.06342  s(percent)=       6.34
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.142 min.
Rainfall intensity =      3.109(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     16.529(CFS)
Total initial stream area =        6.220(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            6.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

APPENDIX B – 10 & 100 YEAR PROPOSED RATIONAL

TRACT 37154
PRELIMINARY RATIONAL HYDROLOGY MAP

SCALE: 1" = 100'

LEGEND

AREA | ACRES
LENGTH | SOIL

NODE | Q10= ____ cfs
ELEV | Q100= ____ cfs
TC= ____ min
ACRES=

WATERSHED BOUNDARY
FLOW PATH

TR 37155
TR 36317
TR 37027
TR 37154
TRACT BOUNDARY

128 1379 | Q10= 11.03 cfs | Q100= 17.45 cfs | TC= 10.91 min | ACRES=6.22
127 1388.1 | Q10= 3.08 cfs | Q100= 5.01 cfs | TC= 10.75 min | ACRES= 1.67
125 1380.5
119 1384 | Q10= 209.10 cfs | Q100= 418.29 cfs | TC=14.56 min | ACRES=175.83
122 1384.8
124 1345.5 | Q10= 4.38 cfs | Q100= 7.12 cfs | TC=10.66 min | ACRES=2.36
121 1396 | Q10= 3.88 cfs | Q100= 6.33 cfs | TC= 11.61 min | ACRES=2.19
120 1431.0
123 1421.0
PRO 2.36 L=780' D
PRO 2.19 L=498' D
PRO 1.67 L=414' D
OFFSITE 0.51 L=414' D
OFFSITE 1.59 L=677' D
OFFSITE 0.71 L=262' D
OFFSITE 9.06 L=715' D
OFFSITE 4.03 L=614' D
OFFSITE 6.28 L=1000' D
OFFSITE 45.80 L=1847' D
117 1570
118 1498 | Q10= 1.24 cfs | Q100= 2.07 cfs | TC= 7.38 min | ACRES=0.51
116 1412.2
111 1403.3
108 1411.5
115 1429 | Q10= 35.35 cfs | Q100= 57.25 cfs | TC= 11.79 min | ACRES=19.31
126 1436
107 1441 | Q10= 1.89 cfs | Q100= 3.00 cfs | TC= 5.41 min | ACRES=0.71
105 1411.8
106 1603
104 1419 | Q10= 252.20 cfs | Q100= 418.40 cfs | TC= 14.15 min | ACRES=153.65
110 1427 | Q10= 3.08 cfs | Q100= 4.96 cfs | TC= 9.35 min | ACRES=1.53
109 1608
113 1560
114 1705
112 1833.5
103 1610 | Q10= 178.32 cfs | Q100= 297.20 cfs | TC= 12.75 min | ACRES=107.85

PER HYDROLOGY AND HYDRAULIC REPORT
SYCAMORE CREEK OFFSITE DRAINAGE
TRACTS 31908 AND 31908-1
PREPARED BY: WEBB AND ASSOCIATES

PRELIMINARY RATIONAL
HYDROLOGY MAP
PREPARATION DATE : JANUARY 2019

PLAN PREPARED BY:
adkan ENGINEERS
Civil Engineering · Surveying · Planning
6879 Airport Drive, Riverside, CA 92504
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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
       Rational Hydrology Study        Date: 01/25/19  File:pro10.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 5006
```

Proposed Condition 10-YR STORM EVENT

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.980(In/Hr)
Slope of intensity duration curve = 0.4800



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   935.000(Ft.)
Top (of initial area) elevation =  1431.000(Ft.)
Bottom (of initial area) elevation =  1396.000(Ft.)
Difference in elevation =    35.000(Ft.)
Slope =    0.03743  s(percent)=       3.74
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.607 min.
Rainfall intensity =      2.156(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.886(CFS)
Total initial stream area =        2.190(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      121.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1396.000(Ft.)
Downstream point/station elevation =  1384.800(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.886(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.886(CFS)
Normal flow depth in pipe =    4.32(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.56(Ft/s)
Travel time through pipe =    0.04 min.
```

```
Time of concentration (TC) =    11.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      122.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.190(Ac.)
Runoff from this stream =      3.886(CFS)
Time of concentration =   11.65 min.
Rainfall intensity =     2.153(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   730.000(Ft.)
Top (of initial area) elevation =  1421.000(Ft.)
Bottom (of initial area) elevation =  1395.500(Ft.)
Difference in elevation =    25.500(Ft.)
Slope =    0.03493  s(percent)=       3.49
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.660 min.
Rainfall intensity =      2.246(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.377(CFS)
Total initial stream area =        2.360(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1395.500(Ft.)
Downstream point/station elevation =  1384.800(Ft.)
Pipe length  =    74.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.377(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.377(CFS)
Normal flow depth in pipe =    5.53(In.)
Flow top width inside pipe =    8.76(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.39(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      122.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.360(Ac.)
Runoff from this stream =      4.377(CFS)
Time of concentration =   10.74 min.
Rainfall intensity =     2.238(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.886     11.65                2.153
2        4.377     10.74                2.238
Largest stream flow has longer or shorter time of concentration
Qp =      4.377 + sum of
          Qa          Tb/Ta
           3.886 *    0.922 =      3.584
Qp =      7.960

Total of 2 streams to confluence:
Flow rates before confluence point:
```

```
      3.886       4.377
Area of streams before confluence:
       2.190        2.360
Results of confluence:
Total flow rate =      7.960(CFS)
Time of concentration =    10.740 min.
Effective stream area after confluence =      4.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1384.800(Ft.)
Downstream point/station elevation =  1380.300(Ft.)
Pipe length  =   103.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.960(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.960(CFS)
Normal flow depth in pipe =    8.29(In.)
Flow top width inside pipe =   14.92(In.)
Critical Depth =   13.35(In.)
Pipe flow velocity =     11.45(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    10.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.550(Ac.)
Runoff from this stream =      7.960(CFS)
Time of concentration =   10.89 min.
Rainfall intensity =     2.223(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      127.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   914.000(Ft.)
Top (of initial area) elevation =  1436.000(Ft.)
Bottom (of initial area) elevation =  1388.100(Ft.)
Difference in elevation =    47.900(Ft.)
Slope =    0.05241  s(percent)=       5.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.754 min.
Rainfall intensity =      2.237(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.083(CFS)
Total initial stream area =        1.670(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      127.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1388.100(Ft.)
Downstream point/station elevation =  1380.300(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.083(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     3.083(CFS)
Normal flow depth in pipe =    4.28(In.)
Flow top width inside pipe =    5.43(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.58(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    10.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

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Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
--------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.670(Ac.)
Runoff from this stream =       3.083(CFS)
Time of concentration =   10.77 min.
Rainfall intensity =     2.235(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1         7.960     10.89                  2.223
2         3.083     10.77                  2.235
Largest stream flow has longer time of concentration
Qp =      7.960 + sum of
          Qb          Ia/Ib
           3.083 *    0.995 =      3.067
Qp =     11.027

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.960       3.083
Area of streams before confluence:
       4.550       1.670
Results of confluence:
Total flow rate =     11.027(CFS)
Time of concentration =    10.890 min.
Effective stream area after confluence =      6.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =  1380.300(Ft.)
Downstream point/station elevation =  1379.000(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.027(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.027(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   13.66(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.90(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.93 min.
End of computations, total study area =            6.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number =  75.0
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
       Rational Hydrology Study        Date: 01/25/19  File:pro.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 5006
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Proposed Condition 100-YR STORM EVENT

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.500(In/Hr)
Slope of intensity duration curve = 0.4800




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   935.000(Ft.)
Top (of initial area) elevation =  1431.000(Ft.)
Bottom (of initial area) elevation =  1396.000(Ft.)
Difference in elevation =    35.000(Ft.)
Slope =    0.03743  s(percent)=       3.74
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.607 min.
Rainfall intensity =      3.300(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.335(CFS)
Total initial stream area =        2.190(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      121.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1396.000(Ft.)
Downstream point/station elevation =  1384.800(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.335(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.335(CFS)
Normal flow depth in pipe =    5.87(In.)
Flow top width inside pipe =    8.58(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.78(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    11.64 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      122.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.190(Ac.)
Runoff from this stream =      6.335(CFS)
Time of concentration =   11.64 min.
Rainfall intensity =     3.295(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   730.000(Ft.)
Top (of initial area) elevation =  1421.000(Ft.)
Bottom (of initial area) elevation =  1395.500(Ft.)
Difference in elevation =    25.500(Ft.)
Slope =    0.03493  s(percent)=       3.49
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.660 min.
Rainfall intensity =      3.438(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.119(CFS)
Total initial stream area =        2.360(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1395.500(Ft.)
Downstream point/station elevation =  1384.800(Ft.)
Pipe length  =    74.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.119(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.119(CFS)
Normal flow depth in pipe =    6.18(In.)
Flow top width inside pipe =   11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.46(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    10.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      122.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.360(Ac.)
Runoff from this stream =      7.119(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     3.427(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1         6.335     11.64                 3.295
2         7.119     10.73                 3.427
Largest stream flow has longer or shorter time of concentration
Qp =      7.119 + sum of
          Qa          Tb/Ta
           6.335 *    0.922 =      5.838
Qp =     12.957

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.335       7.119
```

```
Area of streams before confluence:
        2.190        2.360
Results of confluence:
Total flow rate =      12.957(CFS)
Time of concentration =    10.730 min.
Effective stream area after confluence =      4.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1384.800(Ft.)
Downstream point/station elevation =  1380.300(Ft.)
Pipe length  =   103.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.957(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    12.957(CFS)
Normal flow depth in pipe =   11.79(In.)
Flow top width inside pipe =   12.31(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.53(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    10.87 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.550(Ac.)
Runoff from this stream =     12.957(CFS)
Time of concentration =   10.87 min.
Rainfall intensity =     3.406(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      127.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   914.000(Ft.)
Top (of initial area) elevation =  1436.000(Ft.)
Bottom (of initial area) elevation =  1388.100(Ft.)
Difference in elevation =    47.900(Ft.)
Slope =    0.05241  s(percent)=       5.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.754 min.
Rainfall intensity =      3.423(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.016(CFS)
Total initial stream area =        1.670(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      127.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1388.100(Ft.)
Downstream point/station elevation =  1380.300(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.016(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.016(CFS)
Normal flow depth in pipe =    4.36(In.)
Flow top width inside pipe =    9.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     23.67(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
```

```
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.670(Ac.)
Runoff from this stream =      5.016(CFS)
Time of concentration =   10.77 min.
Rainfall intensity =     3.421(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       12.957     10.87                 3.406
2        5.016     10.77                 3.421
Largest stream flow has longer time of concentration
Qp =     12.957 + sum of
          Qb         Ia/Ib
           5.016 *    0.996 =      4.993
Qp =     17.950

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.957       5.016
Area of streams before confluence:
        4.550        1.670
Results of confluence:
Total flow rate =     17.950(CFS)
Time of concentration =    10.867 min.
Effective stream area after confluence =      6.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________
Upstream point/station elevation =  1380.300(Ft.)
Downstream point/station elevation =  1379.000(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.950(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    17.950(CFS)
Normal flow depth in pipe =   12.73(In.)
Flow top width inside pipe =   16.38(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.44(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.91 min.
End of computations, total study area =            6.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number =  75.0
```

APPENDIX C – OFFSITE 10 & 100 YEAR RATIONAL

TRACT 37154
PRELIMINARY RATIONAL HYDROLOGY MAP

SCALE: 1" = 100'

LEGEND

AREA | ACRES
LENGTH | SOIL

NODE | Q10= ____ cfs
ELEV | Q100= ____ cfs
TC= ____ min
ACRES=

WATERSHED BOUNDARY
FLOW PATH

TR 37155
TR 36317
TR 37027
TR 37154
TRACT BOUNDARY

128 1379 | Q10= 11.03 cfs | Q100= 17.45 cfs | TC= 10.91 min | ACRES=6.22
127 1388.1 | Q10= 3.08 cfs | Q100= 5.01 cfs | TC= 10.75 min | ACRES= 1.67
125 1380.5
119 1384 | Q10= 209.10 cfs | Q100= 418.29 cfs | TC=14.56 min | ACRES=175.83
122 1384.8
124 1345.5 | Q10= 4.38 cfs | Q100= 7.12 cfs | TC=10.66 min | ACRES=2.36
121 1396 | Q10= 3.88 cfs | Q100= 6.33 cfs | TC= 11.61 min | ACRES=2.19
120 1431.0
123 1421.0
PRO 2.36 L=780' D
PRO 2.19 L=498' D
PRO 1.67 L=414' D
OFFSITE 0.51 L=414' D
OFFSITE 1.59 L=677' D
OFFSITE 0.71 L=262' D
OFFSITE 9.06 L=715' D
OFFSITE 4.03 L=614' D
OFFSITE 6.28 L=1000' D
OFFSITE 45.80 L=1847' D
117 1570
118 1498 | Q10= 1.24 cfs | Q100= 2.07 cfs | TC= 7.38 min | ACRES=0.51
116 1412.2
111 1403.3
108 1411.5
115 1429 | Q10= 35.35 cfs | Q100= 57.25 cfs | TC= 11.79 min | ACRES=19.31
126 1436
107 1441 | Q10= 1.89 cfs | Q100= 3.00 cfs | TC= 5.41 min | ACRES=0.71
105 1411.8
106 1603
104 1419 | Q10= 252.20 cfs | Q100= 418.40 cfs | TC= 14.15 min | ACRES=153.65
110 1427 | Q10= 3.08 cfs | Q100= 4.96 cfs | TC= 9.35 min | ACRES=1.53
109 1608
113 1560
114 1705
112 1833.5
103 1610 | Q10= 178.32 cfs | Q100= 297.20 cfs | TC= 12.75 min | ACRES=107.85

PER HYDROLOGY AND HYDRAULIC REPORT
SYCAMORE CREEK OFFSITE DRAINAGE
TRACTS 31908 AND 31908-1
PREPARED BY: WEBB AND ASSOCIATES

PRELIMINARY RATIONAL
HYDROLOGY MAP
PREPARATION DATE : JANUARY 2019

PLAN PREPARED BY:
adkan ENGINEERS
Civil Engineering · Surveying · Planning
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Tel:(951) 688-0241 · Fax:(951) 688-0599

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
       Rational Hydrology Study        Date: 01/25/19  File:offsite10.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 5006
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Offsite 10-YR STORM EVENT

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------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.980(In/Hr)
Slope of intensity duration curve = 0.4800




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Rainfall intensity =      2.061(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.816
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
RI index for soil(AMC 2)  =  86.30
Pervious area fraction =  1.000; Impervious fraction =  0.000
User specified values are as follows:
TC =  12.75 min.  Rain intensity =       2.06(In/Hr)
Total area =       107.85(Ac.)  Total runoff =    178.32(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1610.000(Ft.)
End of natural channel elevation =   1415.000(Ft.)
Length of natural channel  =  1897.000(Ft.)
Estimated mean flow rate at midpoint of channel =    216.183(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  19.18(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1028
Corrected/adjusted channel slope =  0.1020
Travel time =    1.65 min.     TC =   14.40  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.944(In/Hr) for a    10.0 year storm
Subarea runoff =     73.880(CFS) for     45.800(Ac.)
Total runoff =    252.200(CFS)       Total area =     153.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1415.000(Ft.)
Downstream point/station elevation =  1411.800(Ft.)
Pipe length  =   134.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   252.200(CFS)
Nearest computed pipe diameter  =     51.00(In.)
Calculated individual pipe flow  =   252.200(CFS)
Normal flow depth in pipe =   40.31(In.)
Flow top width inside pipe =   41.51(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.95(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    14.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    153.650(Ac.)
Runoff from this stream =    252.200(CFS)
Time of concentration =   14.50 min.
Rainfall intensity =     1.937(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   262.000(Ft.)
Top (of initial area) elevation =  1603.000(Ft.)
Bottom (of initial area) elevation =  1441.000(Ft.)
Difference in elevation =   162.000(Ft.)
Slope =    0.61832  s(percent)=      61.83
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.412 min.
Rainfall intensity =      3.110(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.887(CFS)
Total initial stream area =        0.710(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1441.000(Ft.)
Downstream point/station elevation =  1411.800(Ft.)
Pipe length  =    93.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.887(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.887(CFS)
Normal flow depth in pipe =    3.35(In.)
Flow top width inside pipe =    5.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.74(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     5.50 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.710(Ac.)
Runoff from this stream =      1.887(CFS)
Time of concentration =    5.50 min.
Rainfall intensity =     3.085(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      252.200     14.50                 1.937
2        1.887      5.50                 3.085
Largest stream flow has longer time of concentration
Qp =    252.200 + sum of
          Qb          Ia/Ib
           1.887 *    0.628 =      1.185
Qp =    253.385

Total of 2 streams to confluence:
Flow rates before confluence point:
     252.200       1.887
Area of streams before confluence:
      153.650        0.710
Results of confluence:
Total flow rate =    253.385(CFS)
Time of concentration =    14.505 min.
Effective stream area after confluence =    154.360(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1411.800(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =     8.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   253.385(CFS)
Nearest computed pipe diameter  =     48.00(In.)
Calculated individual pipe flow  =   253.385(CFS)
Normal flow depth in pipe =   35.95(In.)
Flow top width inside pipe =   41.62(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.09(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    14.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    154.360(Ac.)
Runoff from this stream =    253.385(CFS)
Time of concentration =   14.51 min.
Rainfall intensity =     1.937(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   677.000(Ft.)
Top (of initial area) elevation =  1608.000(Ft.)
Bottom (of initial area) elevation =  1427.000(Ft.)
Difference in elevation =   181.000(Ft.)
Slope =    0.26736  s(percent)=      26.74
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.356 min.
Rainfall intensity =      2.391(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.080(CFS)
Total initial stream area =        1.530(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1427.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    83.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.080(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.080(CFS)
Normal flow depth in pipe =    4.13(In.)
Flow top width inside pipe =    8.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.58(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     9.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.530(Ac.)
Runoff from this stream =      3.080(CFS)
Time of concentration =    9.44 min.
Rainfall intensity =     2.380(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      253.385     14.51                 1.937
2        3.080      9.44                 2.380
Largest stream flow has longer time of concentration
Qp =    253.385 + sum of
          Qb          Ia/Ib
           3.080 *    0.814 =      2.507
Qp =    255.892

Total of 2 streams to confluence:
Flow rates before confluence point:
     253.385       3.080
Area of streams before confluence:
      154.360        1.530
Results of confluence:
Total flow rate =    255.892(CFS)
Time of concentration =    14.510 min.
Effective stream area after confluence =    155.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1411.500(Ft.)
Downstream point/station elevation =  1408.200(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   255.892(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =   255.892(CFS)
Normal flow depth in pipe =   37.88(In.)
Flow top width inside pipe =   32.85(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.81(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    14.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
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```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    155.890(Ac.)
Runoff from this stream =    255.892(CFS)
Time of concentration =   14.56 min.
Rainfall intensity =     1.934(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1833.500(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation =   273.500(Ft.)
Slope =    0.27350  s(percent)=      27.35
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.886 min.
Rainfall intensity =      2.223(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.700(CFS)
Total initial stream area =        6.280(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.280(Ac.)
Runoff from this stream =     11.700(CFS)
Time of concentration =   10.89 min.
Rainfall intensity =     2.223(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   614.000(Ft.)
Top (of initial area) elevation =  1705.000(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation =   145.000(Ft.)
Slope =    0.23616  s(percent)=      23.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.224 min.
Rainfall intensity =      2.408(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.173(CFS)
Total initial stream area =        4.030(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.030(Ac.)
Runoff from this stream =      8.173(CFS)
Time of concentration =    9.22 min.
Rainfall intensity =     2.408(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                (In/Hr)


1       11.700     10.89                 2.223
2        8.173      9.22                 2.408
Largest stream flow has longer time of concentration
Qp =     11.700 + sum of
          Qb          Ia/Ib
           8.173 *    0.924 =      7.548
Qp =     19.248

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.700       8.173
Area of streams before confluence:
        6.280        4.030
Results of confluence:
Total flow rate =     19.248(CFS)
Time of concentration =    10.886 min.
Effective stream area after confluence =     10.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      115.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1560.000(Ft.)
End of natural channel elevation =   1429.000(Ft.)
Length of natural channel  =   775.000(Ft.)
Estimated mean flow rate at midpoint of channel =     27.705(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  12.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1690
Corrected/adjusted channel slope =  0.1445
Travel time =    1.04 min.     TC =   11.92  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.128(In/Hr) for a    10.0 year storm
Subarea runoff =     16.108(CFS) for      9.060(Ac.)
Total runoff =     35.356(CFS)        Total area =      19.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1429.000(Ft.)
Downstream point/station elevation =  1412.200(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    35.356(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    35.356(CFS)
Normal flow depth in pipe =    9.53(In.)
Flow top width inside pipe =   14.44(In.)
Critical depth could not be calculated.
Pipe flow velocity =     43.01(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     19.370(Ac.)
Runoff from this stream =     35.356(CFS)
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```
Time of concentration =   11.94 min.
Rainfall intensity =     2.127(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   414.000(Ft.)
Top (of initial area) elevation =  1570.000(Ft.)
Bottom (of initial area) elevation =  1435.000(Ft.)
Difference in elevation =   135.000(Ft.)
Slope =    0.32609  s(percent)=      32.61
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.386 min.
Rainfall intensity =      2.679(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.294(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      118.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1435.000(Ft.)
Downstream point/station elevation =  1412.200(Ft.)
Pipe length  =   116.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.294(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.294(CFS)
Normal flow depth in pipe =    3.07(In.)
Flow top width inside pipe =    6.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.79(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     7.54 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.570(Ac.)
Runoff from this stream =      1.294(CFS)
Time of concentration =    7.54 min.
Rainfall intensity =     2.653(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       35.356     11.94                2.127
2        1.294      7.54                2.653
Largest stream flow has longer time of concentration
Qp =     35.356 + sum of
          Qb         Ia/Ib
           1.294 *    0.802 =      1.038
Qp =     36.394

Total of 2 streams to confluence:
Flow rates before confluence point:
      35.356       1.294
Area of streams before confluence:
       19.370        0.570
Results of confluence:
Total flow rate =     36.394(CFS)
Time of concentration =    11.935 min.
Effective stream area after confluence =     19.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      116.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1412.200(Ft.)
Downstream point/station elevation =  1408.200(Ft.)
Pipe length  =    93.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    36.394(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    36.394(CFS)
Normal flow depth in pipe =   15.89(In.)
Flow top width inside pipe =   22.70(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.50(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    12.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.940(Ac.)
Runoff from this stream =     36.394(CFS)
Time of concentration =   12.03 min.
Rainfall intensity =     2.119(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      255.892     14.56               1.934
2       36.394     12.03               2.119
Largest stream flow has longer time of concentration
Qp =    255.892 + sum of
          Qb         Ia/Ib
          36.394 *    0.912 =     33.207
Qp =    289.099

Total of 2 main streams to confluence:
Flow rates before confluence point:
     255.892      36.394
Area of streams before confluence:
      155.890       19.940


Results of confluence:
Total flow rate =    289.099(CFS)
Time of concentration =    14.560 min.
Effective stream area after confluence  =    175.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1408.200(Ft.)
Downstream point/station elevation =  1384.000(Ft.)
Pipe length  =   506.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   289.099(CFS)
Nearest computed pipe diameter  =     48.00(In.)
Calculated individual pipe flow  =   289.099(CFS)
Normal flow depth in pipe =   36.28(In.)
Flow top width inside pipe =   41.24(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.36(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =    14.86 min.
End of computations, total study area =          175.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  87.3
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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
       Rational Hydrology Study        Date: 01/25/19  File:offsite.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

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Program License Serial Number 5006
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Offsite 100-YR STORM EVENT

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------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Elsinore-Wildomar ] area used.
10 year storm 10 minute intensity =  2.320(In/Hr)
10 year storm 60 minute intensity =  0.980(In/Hr)
100 year storm 10 minute intensity =  3.540(In/Hr)
100 year storm 60 minute intensity =  1.500(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.500(In/Hr)
Slope of intensity duration curve = 0.4800




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Rainfall intensity =      3.155(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
RI index for soil(AMC 3)  =  94.52
Pervious area fraction =  1.000; Impervious fraction =  0.000
User specified values are as follows:
TC =  12.75 min.  Rain intensity =       3.15(In/Hr)
Total area =       107.85(Ac.)  Total runoff =    297.20(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1610.000(Ft.)
End of natural channel elevation =   1415.000(Ft.)
Length of natural channel  =  1897.000(Ft.)
Estimated mean flow rate at midpoint of channel =    360.305(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  22.52(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.1028
Corrected/adjusted channel slope =  0.1020
Travel time =    1.40 min.     TC =   14.15  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.000(In/Hr) for a   100.0 year storm
Subarea runoff =    121.200(CFS) for     45.800(Ac.)
Total runoff =    418.400(CFS)       Total area =     153.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1415.000(Ft.)
Downstream point/station elevation =  1411.800(Ft.)
Pipe length  =   134.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   418.400(CFS)
Nearest computed pipe diameter  =     60.00(In.)
Calculated individual pipe flow  =   418.400(CFS)
Normal flow depth in pipe =   51.56(In.)
Flow top width inside pipe =   41.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =     23.28(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    14.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    153.650(Ac.)
Runoff from this stream =    418.400(CFS)
Time of concentration =   14.25 min.
Rainfall intensity =     2.991(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   262.000(Ft.)
Top (of initial area) elevation =  1603.000(Ft.)
Bottom (of initial area) elevation =  1441.000(Ft.)
Difference in elevation =   162.000(Ft.)
Slope =    0.61832  s(percent)=      61.83
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.412 min.
Rainfall intensity =      4.760(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.003(CFS)
Total initial stream area =        0.710(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1441.000(Ft.)
Downstream point/station elevation =  1411.800(Ft.)
Pipe length  =    93.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.003(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     3.003(CFS)
Normal flow depth in pipe =    4.69(In.)
Flow top width inside pipe =    4.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.23(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     5.50 min.
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.710(Ac.)
Runoff from this stream =      3.003(CFS)
Time of concentration =    5.50 min.
Rainfall intensity =     4.724(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      418.400     14.25                 2.991
2        3.003      5.50                 4.724
Largest stream flow has longer time of concentration
Qp =    418.400 + sum of
          Qb         Ia/Ib
           3.003 *    0.633 =      1.901
Qp =    420.300

Total of 2 streams to confluence:
Flow rates before confluence point:
     418.400       3.003
Area of streams before confluence:
      153.650        0.710
Results of confluence:
Total flow rate =    420.300(CFS)
Time of concentration =    14.250 min.
Effective stream area after confluence =    154.360(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1411.800(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =     8.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   420.300(CFS)
Nearest computed pipe diameter  =     57.00(In.)
Calculated individual pipe flow  =   420.300(CFS)
Normal flow depth in pipe =   44.63(In.)
Flow top width inside pipe =   47.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.26(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =    14.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    154.360(Ac.)
Runoff from this stream =    420.300(CFS)
Time of concentration =   14.25 min.
Rainfall intensity =     2.990(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   677.000(Ft.)
Top (of initial area) elevation =  1608.000(Ft.)
Bottom (of initial area) elevation =  1427.000(Ft.)
Difference in elevation =   181.000(Ft.)
Slope =    0.26736  s(percent)=      26.74
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.356 min.
Rainfall intensity =      3.660(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.957(CFS)
Total initial stream area =        1.530(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1427.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    83.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.957(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.957(CFS)
Normal flow depth in pipe =    5.51(In.)
Flow top width inside pipe =    8.77(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.47(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     9.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.530(Ac.)
Runoff from this stream =      4.957(CFS)
Time of concentration =    9.44 min.
Rainfall intensity =     3.645(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      420.300     14.25                 2.990
2        4.957      9.44                 3.645
Largest stream flow has longer time of concentration
Qp =    420.300 + sum of
          Qb         Ia/Ib
           4.957 *    0.820 =      4.066
Qp =    424.367

Total of 2 streams to confluence:
Flow rates before confluence point:
     420.300       4.957
Area of streams before confluence:
      154.360        1.530
Results of confluence:
Total flow rate =    424.367(CFS)
Time of concentration =    14.254 min.
Effective stream area after confluence =    155.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1411.500(Ft.)
Downstream point/station elevation =  1408.200(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   424.367(CFS)
Nearest computed pipe diameter  =     54.00(In.)
Calculated individual pipe flow  =   424.367(CFS)
Normal flow depth in pipe =   46.69(In.)
Flow top width inside pipe =   36.95(In.)
Critical depth could not be calculated.
Pipe flow velocity =     29.05(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
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The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    155.890(Ac.)
Runoff from this stream =    424.367(CFS)
Time of concentration =   14.30 min.
Rainfall intensity =     2.986(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1833.500(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation =   273.500(Ft.)
Slope =    0.27350  s(percent)=      27.35
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.886 min.
Rainfall intensity =      3.403(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     18.895(CFS)
Total initial stream area =        6.280(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.280(Ac.)
Runoff from this stream =     18.895(CFS)
Time of concentration =   10.89 min.
Rainfall intensity =     3.403(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   614.000(Ft.)
Top (of initial area) elevation =  1705.000(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation =   145.000(Ft.)
Slope =    0.23616  s(percent)=      23.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.224 min.
Rainfall intensity =      3.685(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     13.147(CFS)
Total initial stream area =        4.030(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.030(Ac.)
Runoff from this stream =     13.147(CFS)
Time of concentration =    9.22 min.
Rainfall intensity =     3.685(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
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 No.       (CFS)       (min)                (In/Hr)


1       18.895     10.89                 3.403
2       13.147      9.22                 3.685
Largest stream flow has longer time of concentration
Qp =     18.895 + sum of
          Qb          Ia/Ib
          13.147 *    0.924 =     12.142
Qp =     31.036

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.895      13.147
Area of streams before confluence:
        6.280        4.030
Results of confluence:
Total flow rate =     31.036(CFS)
Time of concentration =    10.886 min.
Effective stream area after confluence =     10.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      115.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1560.000(Ft.)
End of natural channel elevation =   1429.000(Ft.)
Length of natural channel  =   775.000(Ft.)
Estimated mean flow rate at midpoint of channel =     44.673(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  14.25(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1690
Corrected/adjusted channel slope =  0.1445
Travel time =    0.91 min.     TC =   11.79  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.275(In/Hr) for a   100.0 year storm
Subarea runoff =     26.214(CFS) for      9.060(Ac.)
Total runoff =     57.250(CFS)       Total area =      19.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1429.000(Ft.)
Downstream point/station elevation =  1412.200(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    57.250(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    57.250(CFS)
Normal flow depth in pipe =   11.39(In.)
Flow top width inside pipe =   17.35(In.)
Critical depth could not be calculated.
Pipe flow velocity =     48.52(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     19.370(Ac.)
Runoff from this stream =     57.250(CFS)
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Time of concentration =   11.80 min.
Rainfall intensity =     3.274(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   414.000(Ft.)
Top (of initial area) elevation =  1570.000(Ft.)
Bottom (of initial area) elevation =  1435.000(Ft.)
Difference in elevation =   135.000(Ft.)
Slope =    0.32609  s(percent)=      32.61
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.386 min.
Rainfall intensity =      4.100(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.072(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      118.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1435.000(Ft.)
Downstream point/station elevation =  1412.200(Ft.)
Pipe length  =   116.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.072(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.072(CFS)
Normal flow depth in pipe =    4.18(In.)
Flow top width inside pipe =    5.51(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.17(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     7.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.570(Ac.)
Runoff from this stream =      2.072(CFS)
Time of concentration =    7.52 min.
Rainfall intensity =     4.064(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1        57.250     11.80                 3.274
2         2.072      7.52                 4.064
Largest stream flow has longer time of concentration
Qp =     57.250 + sum of
          Qb         Ia/Ib
           2.072 *    0.806 =      1.669
Qp =     58.919

Total of 2 streams to confluence:
Flow rates before confluence point:
      57.250       2.072
Area of streams before confluence:
       19.370        0.570
Results of confluence:
Total flow rate =     58.919(CFS)
Time of concentration =    11.803 min.
Effective stream area after confluence =     19.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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Process from Point/Station      116.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1412.200(Ft.)
Downstream point/station elevation =  1408.200(Ft.)
Pipe length  =    93.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    58.919(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    58.919(CFS)
Normal flow depth in pipe =   20.34(In.)
Flow top width inside pipe =   23.27(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.32(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    11.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.940(Ac.)
Runoff from this stream =     58.919(CFS)
Time of concentration =   11.89 min.
Rainfall intensity =     3.263(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      424.367     14.30               2.986
2       58.919     11.89               3.263
Largest stream flow has longer time of concentration
Qp =    424.367 + sum of
          Qb         Ia/Ib
          58.919 *    0.915 =     53.923
Qp =    478.289

Total of 2 main streams to confluence:
Flow rates before confluence point:
     424.367      58.919
Area of streams before confluence:
      155.890       19.940


Results of confluence:
Total flow rate =    478.289(CFS)
Time of concentration =    14.299 min.
Effective stream area after confluence  =    175.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1408.200(Ft.)
Downstream point/station elevation =  1384.000(Ft.)
Pipe length  =   506.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   478.289(CFS)
Nearest computed pipe diameter  =     57.00(In.)
Calculated individual pipe flow  =   478.289(CFS)
Normal flow depth in pipe =   44.91(In.)
Flow top width inside pipe =   46.61(In.)
Critical depth could not be calculated.
Pipe flow velocity =     31.93(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    14.56 min.
End of computations, total study area =          175.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  87.3
```

APPENDIX D – PROPOSED & EXISTING 2-YEAR 24 HOUR UNIT HYDROGRAPH

TRACT 37154
PRELIMINARY UNIT HYDROLOGY MAP

LEGEND

AREA | ACRES
LENGTH | SOIL

NODE
ELEV

WATERSHED BOUNDARY

FLOW PATH

0 40 120
20 80 160
SCALE: 1" = 40'

PRELIMINARY UNIT HYDROLOGY MAP
PREPARATION DATE : JANUARY 2019

PLAN PREPARED BY:
adkan ENGINEERS
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       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
              Study date  01/25/19 File: EX242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 5006
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Existing Condition 2-YR 24-HR STORM EVENT

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------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



------------------------------------------------------------------------
------------------------------------------------------------------------
Drainage Area =       6.22(Ac.)  =      0.010 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       6.22(Ac.)  =      0.010 Sq. Mi.
Length along longest watercourse =     885.00(Ft.)
Length along longest watercourse measured to centroid =     442.50(Ft.)
Length along longest watercourse =      0.168 Mi.
Length along longest watercourse measured to centroid =      0.084 Mi.
Difference in elevation =      47.90(Ft.)
Slope along watercourse =    285.7763 Ft./Mi.
Average Manning's 'N' = 0.040
Lag time =    0.065 Hr.
Lag time =     3.89 Min.
25% of lag time =     0.97 Min.
40% of lag time =     1.56 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        6.22            2.50                 15.55

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        6.22            7.00                 43.54

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    7.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     6.220           93.00          0.000
 Total Area Entered =      6.22(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
93.0  83.4      0.205     0.000         0.205       1.000      0.205
                                                  Sum (F) =    0.205
Area averaged mean soil loss (F) (In/Hr) =  0.205
Minimum soil loss rate ((In/Hr)) =  0.103
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
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U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	128.561	24.198	1.517
2	0.167	257.122	55.715	3.493
3	0.250	385.683	14.449	0.906
4	0.333	514.243	4.090	0.256
5	0.417	642.804	1.058	0.066
6	0.500	771.365	0.490	0.031
			Sum = 100.000	Sum= 6.269

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.020	(0.364)	0.018	0.002
2	0.17	0.07	0.020	(0.362)	0.018	0.002
3	0.25	0.07	0.020	(0.361)	0.018	0.002
4	0.33	0.10	0.030	(0.360)	0.027	0.003
5	0.42	0.10	0.030	(0.358)	0.027	0.003
6	0.50	0.10	0.030	(0.357)	0.027	0.003
7	0.58	0.10	0.030	(0.355)	0.027	0.003
8	0.67	0.10	0.030	(0.354)	0.027	0.003
9	0.75	0.10	0.030	(0.353)	0.027	0.003
10	0.83	0.13	0.040	(0.351)	0.036	0.004
11	0.92	0.13	0.040	(0.350)	0.036	0.004
12	1.00	0.13	0.040	(0.349)	0.036	0.004
13	1.08	0.10	0.030	(0.347)	0.027	0.003
14	1.17	0.10	0.030	(0.346)	0.027	0.003
15	1.25	0.10	0.030	(0.344)	0.027	0.003
16	1.33	0.10	0.030	(0.343)	0.027	0.003
17	1.42	0.10	0.030	(0.342)	0.027	0.003
18	1.50	0.10	0.030	(0.340)	0.027	0.003
19	1.58	0.10	0.030	(0.339)	0.027	0.003
20	1.67	0.10	0.030	(0.338)	0.027	0.003
21	1.75	0.10	0.030	(0.336)	0.027	0.003
22	1.83	0.13	0.040	(0.335)	0.036	0.004
23	1.92	0.13	0.040	(0.334)	0.036	0.004
24	2.00	0.13	0.040	(0.332)	0.036	0.004
25	2.08	0.13	0.040	(0.331)	0.036	0.004
26	2.17	0.13	0.040	(0.329)	0.036	0.004
27	2.25	0.13	0.040	(0.328)	0.036	0.004
28	2.33	0.13	0.040	(0.327)	0.036	0.004
29	2.42	0.13	0.040	(0.325)	0.036	0.004
30	2.50	0.13	0.040	(0.324)	0.036	0.004
31	2.58	0.17	0.050	(0.323)	0.045	0.005
32	2.67	0.17	0.050	(0.321)	0.045	0.005
33	2.75	0.17	0.050	(0.320)	0.045	0.005
34	2.83	0.17	0.050	(0.319)	0.045	0.005
35	2.92	0.17	0.050	(0.318)	0.045	0.005
36	3.00	0.17	0.050	(0.316)	0.045	0.005
37	3.08	0.17	0.050	(0.315)	0.045	0.005
38	3.17	0.17	0.050	(0.314)	0.045	0.005
39	3.25	0.17	0.050	(0.312)	0.045	0.005
40	3.33	0.17	0.050	(0.311)	0.045	0.005
41	3.42	0.17	0.050	(0.310)	0.045	0.005
42	3.50	0.17	0.050	(0.308)	0.045	0.005
43	3.58	0.17	0.050	(0.307)	0.045	0.005
44	3.67	0.17	0.050	(0.306)	0.045	0.005
45	3.75	0.17	0.050	(0.305)	0.045	0.005
46	3.83	0.20	0.060	(0.303)	0.054	0.006
47	3.92	0.20	0.060	(0.302)	0.054	0.006
48	4.00	0.20	0.060	(0.301)	0.054	0.006
49	4.08	0.20	0.060	(0.299)	0.054	0.006
50	4.17	0.20	0.060	(0.298)	0.054	0.006
51	4.25	0.20	0.060	(0.297)	0.054	0.006
52	4.33	0.23	0.070	(0.296)	0.063	0.007
53	4.42	0.23	0.070	(0.294)	0.063	0.007
54	4.50	0.23	0.070	(0.293)	0.063	0.007
55	4.58	0.23	0.070	(0.292)	0.063	0.007
56	4.67	0.23	0.070	(0.291)	0.063	0.007
57	4.75	0.23	0.070	(0.289)	0.063	0.007
58	4.83	0.27	0.080	(0.288)	0.072	0.008
59	4.92	0.27	0.080	(0.287)	0.072	0.008

60	5.00	0.27	0.080	(0.286)	0.072	0.008
61	5.08	0.20	0.060	(0.284)	0.054	0.006
62	5.17	0.20	0.060	(0.283)	0.054	0.006
63	5.25	0.20	0.060	(0.282)	0.054	0.006
64	5.33	0.23	0.070	(0.281)	0.063	0.007
65	5.42	0.23	0.070	(0.279)	0.063	0.007
66	5.50	0.23	0.070	(0.278)	0.063	0.007
67	5.58	0.27	0.080	(0.277)	0.072	0.008
68	5.67	0.27	0.080	(0.276)	0.072	0.008
69	5.75	0.27	0.080	(0.275)	0.072	0.008
70	5.83	0.27	0.080	(0.273)	0.072	0.008
71	5.92	0.27	0.080	(0.272)	0.072	0.008
72	6.00	0.27	0.080	(0.271)	0.072	0.008
73	6.08	0.30	0.090	(0.270)	0.081	0.009
74	6.17	0.30	0.090	(0.269)	0.081	0.009
75	6.25	0.30	0.090	(0.267)	0.081	0.009
76	6.33	0.30	0.090	(0.266)	0.081	0.009
77	6.42	0.30	0.090	(0.265)	0.081	0.009
78	6.50	0.30	0.090	(0.264)	0.081	0.009
79	6.58	0.33	0.100	(0.263)	0.090	0.010
80	6.67	0.33	0.100	(0.261)	0.090	0.010
81	6.75	0.33	0.100	(0.260)	0.090	0.010
82	6.83	0.33	0.100	(0.259)	0.090	0.010
83	6.92	0.33	0.100	(0.258)	0.090	0.010
84	7.00	0.33	0.100	(0.257)	0.090	0.010
85	7.08	0.33	0.100	(0.256)	0.090	0.010
86	7.17	0.33	0.100	(0.254)	0.090	0.010
87	7.25	0.33	0.100	(0.253)	0.090	0.010
88	7.33	0.37	0.110	(0.252)	0.099	0.011
89	7.42	0.37	0.110	(0.251)	0.099	0.011
90	7.50	0.37	0.110	(0.250)	0.099	0.011
91	7.58	0.40	0.120	(0.249)	0.108	0.012
92	7.67	0.40	0.120	(0.247)	0.108	0.012
93	7.75	0.40	0.120	(0.246)	0.108	0.012
94	7.83	0.43	0.130	(0.245)	0.117	0.013
95	7.92	0.43	0.130	(0.244)	0.117	0.013
96	8.00	0.43	0.130	(0.243)	0.117	0.013
97	8.08	0.50	0.150	(0.242)	0.135	0.015
98	8.17	0.50	0.150	(0.241)	0.135	0.015
99	8.25	0.50	0.150	(0.240)	0.135	0.015
100	8.33	0.50	0.150	(0.238)	0.135	0.015
101	8.42	0.50	0.150	(0.237)	0.135	0.015
102	8.50	0.50	0.150	(0.236)	0.135	0.015
103	8.58	0.53	0.160	(0.235)	0.144	0.016
104	8.67	0.53	0.160	(0.234)	0.144	0.016
105	8.75	0.53	0.160	(0.233)	0.144	0.016
106	8.83	0.57	0.170	(0.232)	0.153	0.017
107	8.92	0.57	0.170	(0.231)	0.153	0.017
108	9.00	0.57	0.170	(0.230)	0.153	0.017
109	9.08	0.63	0.190	(0.228)	0.171	0.019
110	9.17	0.63	0.190	(0.227)	0.171	0.019
111	9.25	0.63	0.190	(0.226)	0.171	0.019
112	9.33	0.67	0.200	(0.225)	0.180	0.020
113	9.42	0.67	0.200	(0.224)	0.180	0.020
114	9.50	0.67	0.200	(0.223)	0.180	0.020
115	9.58	0.70	0.210	(0.222)	0.189	0.021
116	9.67	0.70	0.210	(0.221)	0.189	0.021
117	9.75	0.70	0.210	(0.220)	0.189	0.021
118	9.83	0.73	0.220	(0.219)	0.198	0.022
119	9.92	0.73	0.220	(0.218)	0.198	0.022
120	10.00	0.73	0.220	(0.217)	0.198	0.022
121	10.08	0.50	0.150	(0.216)	0.135	0.015
122	10.17	0.50	0.150	(0.215)	0.135	0.015
123	10.25	0.50	0.150	(0.214)	0.135	0.015
124	10.33	0.50	0.150	(0.213)	0.135	0.015
125	10.42	0.50	0.150	(0.212)	0.135	0.015
126	10.50	0.50	0.150	(0.210)	0.135	0.015
127	10.58	0.67	0.200	(0.209)	0.180	0.020
128	10.67	0.67	0.200	(0.208)	0.180	0.020
129	10.75	0.67	0.200	(0.207)	0.180	0.020
130	10.83	0.67	0.200	(0.206)	0.180	0.020
131	10.92	0.67	0.200	(0.205)	0.180	0.020
132	11.00	0.67	0.200	(0.204)	0.180	0.020
133	11.08	0.63	0.190	(0.203)	0.171	0.019
134	11.17	0.63	0.190	(0.202)	0.171	0.019
135	11.25	0.63	0.190	(0.201)	0.171	0.019
136	11.33	0.63	0.190	(0.200)	0.171	0.019
137	11.42	0.63	0.190	(0.199)	0.171	0.019
138	11.50	0.63	0.190	(0.198)	0.171	0.019
139	11.58	0.57	0.170	(0.197)	0.153	0.017
140	11.67	0.57	0.170	(0.196)	0.153	0.017
141	11.75	0.57	0.170	(0.195)	0.153	0.017

142	11.83	0.60	0.180	(0.194)	0.162	0.018
143	11.92	0.60	0.180	(0.194)	0.162	0.018
144	12.00	0.60	0.180	(0.193)	0.162	0.018
145	12.08	0.83	0.250	0.192	(0.225)	0.058
146	12.17	0.83	0.250	0.191	(0.225)	0.059
147	12.25	0.83	0.250	0.190	(0.225)	0.060
148	12.33	0.87	0.260	0.189	(0.234)	0.071
149	12.42	0.87	0.260	0.188	(0.234)	0.072
150	12.50	0.87	0.260	0.187	(0.234)	0.073
151	12.58	0.93	0.280	0.186	(0.252)	0.094
152	12.67	0.93	0.280	0.185	(0.252)	0.095
153	12.75	0.93	0.280	0.184	(0.252)	0.096
154	12.83	0.97	0.290	0.183	(0.261)	0.107
155	12.92	0.97	0.290	0.182	(0.261)	0.108
156	13.00	0.97	0.290	0.181	(0.261)	0.109
157	13.08	1.13	0.340	0.180	(0.306)	0.160
158	13.17	1.13	0.340	0.179	(0.306)	0.161
159	13.25	1.13	0.340	0.178	(0.306)	0.161
160	13.33	1.13	0.340	0.178	(0.306)	0.162
161	13.42	1.13	0.340	0.177	(0.306)	0.163
162	13.50	1.13	0.340	0.176	(0.306)	0.164
163	13.58	0.77	0.230	0.175	(0.207)	0.055
164	13.67	0.77	0.230	0.174	(0.207)	0.056
165	13.75	0.77	0.230	0.173	(0.207)	0.057
166	13.83	0.77	0.230	0.172	(0.207)	0.058
167	13.92	0.77	0.230	0.171	(0.207)	0.059
168	14.00	0.77	0.230	0.170	(0.207)	0.060
169	14.08	0.90	0.270	0.170	(0.243)	0.100
170	14.17	0.90	0.270	0.169	(0.243)	0.101
171	14.25	0.90	0.270	0.168	(0.243)	0.102
172	14.33	0.87	0.260	0.167	(0.234)	0.093
173	14.42	0.87	0.260	0.166	(0.234)	0.094
174	14.50	0.87	0.260	0.165	(0.234)	0.095
175	14.58	0.87	0.260	0.164	(0.234)	0.096
176	14.67	0.87	0.260	0.164	(0.234)	0.096
177	14.75	0.87	0.260	0.163	(0.234)	0.097
178	14.83	0.83	0.250	0.162	(0.225)	0.088
179	14.92	0.83	0.250	0.161	(0.225)	0.089
180	15.00	0.83	0.250	0.160	(0.225)	0.090
181	15.08	0.80	0.240	0.159	(0.216)	0.081
182	15.17	0.80	0.240	0.159	(0.216)	0.081
183	15.25	0.80	0.240	0.158	(0.216)	0.082
184	15.33	0.77	0.230	0.157	(0.207)	0.073
185	15.42	0.77	0.230	0.156	(0.207)	0.074
186	15.50	0.77	0.230	0.155	(0.207)	0.075
187	15.58	0.63	0.190	0.155	(0.171)	0.035
188	15.67	0.63	0.190	0.154	(0.171)	0.036
189	15.75	0.63	0.190	0.153	(0.171)	0.037
190	15.83	0.63	0.190	0.152	(0.171)	0.038
191	15.92	0.63	0.190	0.151	(0.171)	0.039
192	16.00	0.63	0.190	0.151	(0.171)	0.039
193	16.08	0.13	0.040	(0.150)	0.036	0.004
194	16.17	0.13	0.040	(0.149)	0.036	0.004
195	16.25	0.13	0.040	(0.148)	0.036	0.004
196	16.33	0.13	0.040	(0.148)	0.036	0.004
197	16.42	0.13	0.040	(0.147)	0.036	0.004
198	16.50	0.13	0.040	(0.146)	0.036	0.004
199	16.58	0.10	0.030	(0.145)	0.027	0.003
200	16.67	0.10	0.030	(0.145)	0.027	0.003
201	16.75	0.10	0.030	(0.144)	0.027	0.003
202	16.83	0.10	0.030	(0.143)	0.027	0.003
203	16.92	0.10	0.030	(0.142)	0.027	0.003
204	17.00	0.10	0.030	(0.142)	0.027	0.003
205	17.08	0.17	0.050	(0.141)	0.045	0.005
206	17.17	0.17	0.050	(0.140)	0.045	0.005
207	17.25	0.17	0.050	(0.140)	0.045	0.005
208	17.33	0.17	0.050	(0.139)	0.045	0.005
209	17.42	0.17	0.050	(0.138)	0.045	0.005
210	17.50	0.17	0.050	(0.138)	0.045	0.005
211	17.58	0.17	0.050	(0.137)	0.045	0.005
212	17.67	0.17	0.050	(0.136)	0.045	0.005
213	17.75	0.17	0.050	(0.135)	0.045	0.005
214	17.83	0.13	0.040	(0.135)	0.036	0.004
215	17.92	0.13	0.040	(0.134)	0.036	0.004
216	18.00	0.13	0.040	(0.133)	0.036	0.004
217	18.08	0.13	0.040	(0.133)	0.036	0.004
218	18.17	0.13	0.040	(0.132)	0.036	0.004
219	18.25	0.13	0.040	(0.132)	0.036	0.004
220	18.33	0.13	0.040	(0.131)	0.036	0.004
221	18.42	0.13	0.040	(0.130)	0.036	0.004
222	18.50	0.13	0.040	(0.130)	0.036	0.004
223	18.58	0.10	0.030	(0.129)	0.027	0.003

224	18.67	0.10	0.030	(0.128)	0.027	0.003
225	18.75	0.10	0.030	(0.128)	0.027	0.003
226	18.83	0.07	0.020	(0.127)	0.018	0.002
227	18.92	0.07	0.020	(0.127)	0.018	0.002
228	19.00	0.07	0.020	(0.126)	0.018	0.002
229	19.08	0.10	0.030	(0.125)	0.027	0.003
230	19.17	0.10	0.030	(0.125)	0.027	0.003
231	19.25	0.10	0.030	(0.124)	0.027	0.003
232	19.33	0.13	0.040	(0.124)	0.036	0.004
233	19.42	0.13	0.040	(0.123)	0.036	0.004
234	19.50	0.13	0.040	(0.122)	0.036	0.004
235	19.58	0.10	0.030	(0.122)	0.027	0.003
236	19.67	0.10	0.030	(0.121)	0.027	0.003
237	19.75	0.10	0.030	(0.121)	0.027	0.003
238	19.83	0.07	0.020	(0.120)	0.018	0.002
239	19.92	0.07	0.020	(0.120)	0.018	0.002
240	20.00	0.07	0.020	(0.119)	0.018	0.002
241	20.08	0.10	0.030	(0.119)	0.027	0.003
242	20.17	0.10	0.030	(0.118)	0.027	0.003
243	20.25	0.10	0.030	(0.118)	0.027	0.003
244	20.33	0.10	0.030	(0.117)	0.027	0.003
245	20.42	0.10	0.030	(0.117)	0.027	0.003
246	20.50	0.10	0.030	(0.116)	0.027	0.003
247	20.58	0.10	0.030	(0.116)	0.027	0.003
248	20.67	0.10	0.030	(0.115)	0.027	0.003
249	20.75	0.10	0.030	(0.115)	0.027	0.003
250	20.83	0.07	0.020	(0.114)	0.018	0.002
251	20.92	0.07	0.020	(0.114)	0.018	0.002
252	21.00	0.07	0.020	(0.113)	0.018	0.002
253	21.08	0.10	0.030	(0.113)	0.027	0.003
254	21.17	0.10	0.030	(0.112)	0.027	0.003
255	21.25	0.10	0.030	(0.112)	0.027	0.003
256	21.33	0.07	0.020	(0.112)	0.018	0.002
257	21.42	0.07	0.020	(0.111)	0.018	0.002
258	21.50	0.07	0.020	(0.111)	0.018	0.002
259	21.58	0.10	0.030	(0.110)	0.027	0.003
260	21.67	0.10	0.030	(0.110)	0.027	0.003
261	21.75	0.10	0.030	(0.109)	0.027	0.003
262	21.83	0.07	0.020	(0.109)	0.018	0.002
263	21.92	0.07	0.020	(0.109)	0.018	0.002
264	22.00	0.07	0.020	(0.108)	0.018	0.002
265	22.08	0.10	0.030	(0.108)	0.027	0.003
266	22.17	0.10	0.030	(0.108)	0.027	0.003
267	22.25	0.10	0.030	(0.107)	0.027	0.003
268	22.33	0.07	0.020	(0.107)	0.018	0.002
269	22.42	0.07	0.020	(0.107)	0.018	0.002
270	22.50	0.07	0.020	(0.106)	0.018	0.002
271	22.58	0.07	0.020	(0.106)	0.018	0.002
272	22.67	0.07	0.020	(0.106)	0.018	0.002
273	22.75	0.07	0.020	(0.105)	0.018	0.002
274	22.83	0.07	0.020	(0.105)	0.018	0.002
275	22.92	0.07	0.020	(0.105)	0.018	0.002
276	23.00	0.07	0.020	(0.105)	0.018	0.002
277	23.08	0.07	0.020	(0.104)	0.018	0.002
278	23.17	0.07	0.020	(0.104)	0.018	0.002
279	23.25	0.07	0.020	(0.104)	0.018	0.002
280	23.33	0.07	0.020	(0.104)	0.018	0.002
281	23.42	0.07	0.020	(0.104)	0.018	0.002
282	23.50	0.07	0.020	(0.103)	0.018	0.002
283	23.58	0.07	0.020	(0.103)	0.018	0.002
284	23.67	0.07	0.020	(0.103)	0.018	0.002
285	23.75	0.07	0.020	(0.103)	0.018	0.002
286	23.83	0.07	0.020	(0.103)	0.018	0.002
287	23.92	0.07	0.020	(0.103)	0.018	0.002
288	24.00	0.07	0.020	(0.103)	0.018	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 5.9

Flood volume = Effective rainfall 0.49(In)
times area 6.2(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 2.01(In)
Total soil loss = 1.040(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 11131.5 Cubic Feet
Total soil loss = 45314.3 Cubic Feet

Peak flow rate of this hydrograph = 1.024(CFS)

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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	0.0001	0.01	Q				
0+15	0.0002	0.01	Q				
0+20	0.0003	0.01	Q				
0+25	0.0004	0.02	Q				
0+30	0.0005	0.02	Q				
0+35	0.0006	0.02	Q				
0+40	0.0008	0.02	Q				
0+45	0.0009	0.02	Q				
0+50	0.0010	0.02	Q				
0+55	0.0012	0.02	Q				
1+ 0	0.0014	0.02	Q				
1+ 5	0.0015	0.02	Q				
1+10	0.0017	0.02	Q				
1+15	0.0018	0.02	Q				
1+20	0.0019	0.02	Q				
1+25	0.0021	0.02	Q				
1+30	0.0022	0.02	Q				
1+35	0.0023	0.02	Q				
1+40	0.0025	0.02	Q				
1+45	0.0026	0.02	Q				
1+50	0.0027	0.02	Q				
1+55	0.0029	0.02	Q				
2+ 0	0.0031	0.02	Q				
2+ 5	0.0032	0.02	Q				
2+10	0.0034	0.03	Q				
2+15	0.0036	0.03	Q				
2+20	0.0038	0.03	Q				
2+25	0.0039	0.03	Q				
2+30	0.0041	0.03	Q				
2+35	0.0043	0.03	Q				
2+40	0.0045	0.03	Q				
2+45	0.0047	0.03	Q				
2+50	0.0049	0.03	Q				
2+55	0.0051	0.03	Q				
3+ 0	0.0053	0.03	Q				
3+ 5	0.0056	0.03	Q				
3+10	0.0058	0.03	Q				
3+15	0.0060	0.03	Q				
3+20	0.0062	0.03	Q				
3+25	0.0064	0.03	QV				
3+30	0.0066	0.03	QV				
3+35	0.0069	0.03	QV				
3+40	0.0071	0.03	QV				
3+45	0.0073	0.03	QV				
3+50	0.0075	0.03	QV				
3+55	0.0078	0.04	QV				
4+ 0	0.0080	0.04	QV				
4+ 5	0.0083	0.04	QV				
4+10	0.0085	0.04	QV				
4+15	0.0088	0.04	QV				
4+20	0.0091	0.04	QV				
4+25	0.0094	0.04	QV				
4+30	0.0097	0.04	QV				
4+35	0.0100	0.04	QV				
4+40	0.0103	0.04	QV				
4+45	0.0106	0.04	QV				
4+50	0.0109	0.05	QV				
4+55	0.0112	0.05	QV				
5+ 0	0.0116	0.05	QV				
5+ 5	0.0119	0.05	QV				
5+10	0.0122	0.04	QV				
5+15	0.0124	0.04	QV				
5+20	0.0127	0.04	QV				
5+25	0.0130	0.04	Q V				
5+30	0.0133	0.04	Q V				
5+35	0.0136	0.05	Q V				
5+40	0.0139	0.05	Q V				
5+45	0.0143	0.05	Q V				
5+50	0.0146	0.05	Q V				
5+55	0.0150	0.05	Q V				
6+ 0	0.0153	0.05	Q V				
6+ 5	0.0157	0.05	Q V				
6+10	0.0161	0.06	Q V				
6+15	0.0164	0.06	Q V				
6+20	0.0168	0.06	Q V				
6+25	0.0172	0.06	Q V				
6+30	0.0176	0.06	Q V				

6+35	0.0180	0.06	Q V	|	|	|	|
6+40	0.0184	0.06	Q V	|	|	|	|
6+45	0.0189	0.06	Q V	|	|	|	|
6+50	0.0193	0.06	Q V	|	|	|	|
6+55	0.0197	0.06	Q V	|	|	|	|
7+ 0	0.0202	0.06	Q V	|	|	|	|
7+ 5	0.0206	0.06	Q V	|	|	|	|
7+10	0.0210	0.06	Q V	|	|	|	|
7+15	0.0215	0.06	Q V	|	|	|	|
7+20	0.0219	0.06	Q V	|	|	|	|
7+25	0.0224	0.07	Q V	|	|	|	|
7+30	0.0228	0.07	Q V	|	|	|	|
7+35	0.0233	0.07	Q V	|	|	|	|
7+40	0.0238	0.07	Q V	|	|	|	|
7+45	0.0243	0.07	Q V	|	|	|	|
7+50	0.0249	0.08	Q V	|	|	|	|
7+55	0.0254	0.08	Q V	|	|	|	|
8+ 0	0.0260	0.08	Q V	|	|	|	|
8+ 5	0.0266	0.08	Q V	|	|	|	|
8+10	0.0272	0.09	Q V	|	|	|	|
8+15	0.0278	0.09	Q V	|	|	|	|
8+20	0.0285	0.09	Q V	|	|	|	|
8+25	0.0291	0.09	Q V	|	|	|	|
8+30	0.0298	0.09	Q V	|	|	|	|
8+35	0.0304	0.10	Q V	|	|	|	|
8+40	0.0311	0.10	Q V	|	|	|	|
8+45	0.0318	0.10	Q V	|	|	|	|
8+50	0.0325	0.10	Q V	|	|	|	|
8+55	0.0332	0.11	Q V	|	|	|	|
9+ 0	0.0340	0.11	Q V	|	|	|	|
9+ 5	0.0347	0.11	Q V	|	|	|	|
9+10	0.0355	0.12	Q V	|	|	|	|
9+15	0.0363	0.12	Q V	|	|	|	|
9+20	0.0372	0.12	Q V	|	|	|	|
9+25	0.0380	0.12	Q V	|	|	|	|
9+30	0.0389	0.13	Q V	|	|	|	|
9+35	0.0398	0.13	Q V	|	|	|	|
9+40	0.0407	0.13	Q V	|	|	|	|
9+45	0.0416	0.13	Q V	|	|	|	|
9+50	0.0425	0.13	Q V	|	|	|	|
9+55	0.0434	0.14	Q V	|	|	|	|
10+ 0	0.0444	0.14	Q V	|	|	|	|
10+ 5	0.0452	0.13	Q V	|	|	|	|
10+10	0.0460	0.10	Q V	|	|	|	|
10+15	0.0466	0.10	Q V	|	|	|	|
10+20	0.0473	0.09	Q V	|	|	|	|
10+25	0.0479	0.09	Q V	|	|	|	|
10+30	0.0486	0.09	Q V	|	|	|	|
10+35	0.0493	0.10	Q V	|	|	|	|
10+40	0.0501	0.12	Q V	|	|	|	|
10+45	0.0509	0.12	Q V	|	|	|	|
10+50	0.0518	0.12	Q V	|	|	|	|
10+55	0.0527	0.13	Q V	|	|	|	|
11+ 0	0.0535	0.13	Q V	|	|	|	|
11+ 5	0.0544	0.12	Q V	|	|	|	|
11+10	0.0552	0.12	Q V	|	|	|	|
11+15	0.0560	0.12	Q V	|	|	|	|
11+20	0.0569	0.12	Q V	|	|	|	|
11+25	0.0577	0.12	Q V	|	|	|	|
11+30	0.0585	0.12	Q V	|	|	|	|
11+35	0.0593	0.12	Q V	|	|	|	|
11+40	0.0600	0.11	Q V	|	|	|	|
11+45	0.0608	0.11	Q V	|	|	|	|
11+50	0.0615	0.11	Q V	|	|	|	|
11+55	0.0623	0.11	Q V	|	|	|	|
12+ 0	0.0631	0.11	Q V	|	|	|	|
12+ 5	0.0643	0.17	Q V	|	|	|	|
12+10	0.0665	0.32	|Q V	|	|	|	|
12+15	0.0689	0.36	|Q V	|	|	|	|
12+20	0.0716	0.39	|Q |V	|	|	|	|
12+25	0.0746	0.43	|Q |V	|	|	|	|
12+30	0.0777	0.45	|Q | V	|	|	|	|
12+35	0.0810	0.49	|Q | V	|	|	|	|
12+40	0.0849	0.56	| Q | V	|	|	|	|
12+45	0.0890	0.59	| Q | V	|	|	|	|
12+50	0.0932	0.61	| Q | V	|	|	|	|
12+55	0.0978	0.66	| Q | V	|	|	|	|
13+ 0	0.1024	0.67	| Q | V	|	|	|	|
13+ 5	0.1076	0.76	| Q | V	|	|	|	|
13+10	0.1141	0.94	| Q | V	|	|	|	|
13+15	0.1209	0.99	| Q | V	|	|	|	|
13+20	0.1278	1.01	| Q | V	|	|	|	|

13+25	0.1348	1.02	| Q	|	|V	|	|
13+30	0.1419	1.02	| Q	|	V	|	|
13+35	0.1478	0.86	| Q	|	V	|	|
13+40	0.1511	0.48	|Q	|	V	|	|
13+45	0.1538	0.39	|Q	|	V	|	|
13+50	0.1564	0.37	|Q	|	V	|	|
13+55	0.1589	0.37	|Q	|	V	|	|
14+ 0	0.1614	0.37	|Q	|	V	|	|
14+ 5	0.1644	0.43	|Q	|	V	|	|
14+10	0.1684	0.58	| Q	|	V	|	|
14+15	0.1727	0.62	| Q	|	V	|	|
14+20	0.1769	0.62	| Q	|	V	|	|
14+25	0.1810	0.59	| Q	|	V	|	|
14+30	0.1851	0.59	| Q	|	V	|	|
14+35	0.1892	0.59	| Q	|	V	|	|
14+40	0.1933	0.60	| Q	|	V	|	|
14+45	0.1975	0.60	| Q	|	V	|	|
14+50	0.2016	0.59	| Q	|	V	|	|
14+55	0.2055	0.56	| Q	|	V	|	|
15+ 0	0.2093	0.56	| Q	|	V	|	|
15+ 5	0.2131	0.55	| Q	|	V	|	|
15+10	0.2167	0.52	| Q	|	V	|	|
15+15	0.2202	0.51	| Q	|	V	|	|
15+20	0.2237	0.50	| Q	|	V	|	|
15+25	0.2269	0.47	|Q	|	V	|	|
15+30	0.2301	0.47	|Q	|	V	|	|
15+35	0.2329	0.41	|Q	|	V	|	|
15+40	0.2348	0.27	|Q	|	V	|	|
15+45	0.2364	0.24	Q	|	V	|	|
15+50	0.2381	0.24	Q	|	V	|	|
15+55	0.2397	0.24	Q	|	V	|	|
16+ 0	0.2414	0.24	Q	|	V	|	|
16+ 5	0.2427	0.19	Q	|	V	|	|
16+10	0.2432	0.07	Q	|	V	|	|
16+15	0.2434	0.04	Q	|	V	|	|
16+20	0.2436	0.03	Q	|	V	|	|
16+25	0.2438	0.03	Q	|	V	|	|
16+30	0.2440	0.03	Q	|	V	|	|
16+35	0.2441	0.02	Q	|	V	|	|
16+40	0.2443	0.02	Q	|	V	|	|
16+45	0.2444	0.02	Q	|	V	|	|
16+50	0.2445	0.02	Q	|	V	|	|
16+55	0.2447	0.02	Q	|	V	|	|
17+ 0	0.2448	0.02	Q	|	V	|	|
17+ 5	0.2449	0.02	Q	|	V	|	|
17+10	0.2451	0.03	Q	|	V	|	|
17+15	0.2453	0.03	Q	|	V	|	|
17+20	0.2456	0.03	Q	|	V	|	|
17+25	0.2458	0.03	Q	|	V	|	|
17+30	0.2460	0.03	Q	|	V	|	|
17+35	0.2462	0.03	Q	|	V	|	|
17+40	0.2464	0.03	Q	|	V	|	|
17+45	0.2466	0.03	Q	|	V	|	|
17+50	0.2468	0.03	Q	|	V	|	|
17+55	0.2470	0.03	Q	|	V	|	|
18+ 0	0.2472	0.03	Q	|	V	|	|
18+ 5	0.2474	0.03	Q	|	V	|	|
18+10	0.2475	0.03	Q	|	V	|	|
18+15	0.2477	0.03	Q	|	V	|	|
18+20	0.2479	0.03	Q	|	V	|	|
18+25	0.2481	0.03	Q	|	V	|	|
18+30	0.2482	0.03	Q	|	V	|	|
18+35	0.2484	0.02	Q	|	V	|	|
18+40	0.2485	0.02	Q	|	V	|	|
18+45	0.2487	0.02	Q	|	V	|	|
18+50	0.2488	0.02	Q	|	V	|	|
18+55	0.2489	0.01	Q	|	V	|	|
19+ 0	0.2490	0.01	Q	|	V	|	|
19+ 5	0.2491	0.01	Q	|	V	|	|
19+10	0.2492	0.02	Q	|	V	|	|
19+15	0.2493	0.02	Q	|	V	|	|
19+20	0.2495	0.02	Q	|	V	|	|
19+25	0.2496	0.02	Q	|	V	|	|
19+30	0.2498	0.02	Q	|	V	|	|
19+35	0.2500	0.02	Q	|	V	|	|
19+40	0.2501	0.02	Q	|	V	|	|
19+45	0.2502	0.02	Q	|	V	|	|
19+50	0.2503	0.02	Q	|	V	|	|
19+55	0.2504	0.01	Q	|	V	|	|
20+ 0	0.2505	0.01	Q	|	V	|	|
20+ 5	0.2506	0.01	Q	|	V	|	|
20+10	0.2507	0.02	Q	|	V	|	|

20+15	0.2509	0.02	Q	|	|	|	V|
20+20	0.2510	0.02	Q	|	|	|	V|
20+25	0.2511	0.02	Q	|	|	|	V|
20+30	0.2513	0.02	Q	|	|	|	V|
20+35	0.2514	0.02	Q	|	|	|	V|
20+40	0.2515	0.02	Q	|	|	|	V|
20+45	0.2517	0.02	Q	|	|	|	V|
20+50	0.2518	0.02	Q	|	|	|	V|
20+55	0.2519	0.01	Q	|	|	|	V|
21+ 0	0.2520	0.01	Q	|	|	|	V|
21+ 5	0.2521	0.01	Q	|	|	|	V|
21+10	0.2522	0.02	Q	|	|	|	V|
21+15	0.2523	0.02	Q	|	|	|	V|
21+20	0.2524	0.02	Q	|	|	|	V|
21+25	0.2525	0.01	Q	|	|	|	V|
21+30	0.2526	0.01	Q	|	|	|	V|
21+35	0.2527	0.01	Q	|	|	|	V|
21+40	0.2528	0.02	Q	|	|	|	V|
21+45	0.2529	0.02	Q	|	|	|	V|
21+50	0.2531	0.02	Q	|	|	|	V|
21+55	0.2532	0.01	Q	|	|	|	V|
22+ 0	0.2533	0.01	Q	|	|	|	V|
22+ 5	0.2533	0.01	Q	|	|	|	V|
22+10	0.2535	0.02	Q	|	|	|	V|
22+15	0.2536	0.02	Q	|	|	|	V|
22+20	0.2537	0.02	Q	|	|	|	V|
22+25	0.2538	0.01	Q	|	|	|	V|
22+30	0.2539	0.01	Q	|	|	|	V|
22+35	0.2540	0.01	Q	|	|	|	V|
22+40	0.2541	0.01	Q	|	|	|	V|
22+45	0.2542	0.01	Q	|	|	|	V|
22+50	0.2542	0.01	Q	|	|	|	V|
22+55	0.2543	0.01	Q	|	|	|	V|
23+ 0	0.2544	0.01	Q	|	|	|	V|
23+ 5	0.2545	0.01	Q	|	|	|	V|
23+10	0.2546	0.01	Q	|	|	|	V|
23+15	0.2547	0.01	Q	|	|	|	V|
23+20	0.2548	0.01	Q	|	|	|	V|
23+25	0.2548	0.01	Q	|	|	|	V|
23+30	0.2549	0.01	Q	|	|	|	V|
23+35	0.2550	0.01	Q	|	|	|	V|
23+40	0.2551	0.01	Q	|	|	|	V|
23+45	0.2552	0.01	Q	|	|	|	V|
23+50	0.2553	0.01	Q	|	|	|	V|
23+55	0.2554	0.01	Q	|	|	|	V|
24+ 0	0.2555	0.01	Q	|	|	|	V|
24+ 5	0.2555	0.01	Q	|	|	|	V|
24+10	0.2555	0.00	Q	|	|	|	V|
24+15	0.2555	0.00	Q	|	|	|	V|
24+20	0.2555	0.00	Q	|	|	|	V|
24+25	0.2555	0.00	Q	|	|	|	V|

```
       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  01/25/19 File: PRO242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 5006
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Proposed Condition 2-YR 24-HR STORM EVENT

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------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



------------------------------------------------------------------------
------------------------------------------------------------------------
Drainage Area =       6.22(Ac.)  =      0.010 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       6.22(Ac.)  =      0.010 Sq. Mi.
Length along longest watercourse =     885.00(Ft.)
Length along longest watercourse measured to centroid =     442.50(Ft.)
Length along longest watercourse =      0.168 Mi.
Length along longest watercourse measured to centroid =      0.084 Mi.
Difference in elevation =      47.90(Ft.)
Slope along watercourse =    285.7763 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.024 Hr.
Lag time =     1.46 Min.
25% of lag time =     0.36 Min.
40% of lag time =     0.58 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        6.22            2.50                 15.55

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        6.22            7.00                 43.54

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.500(In)
Area Averaged 100-Year Rainfall =    7.000(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     6.220           75.00          0.500
 Total Area Entered =      6.22(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.500         0.275       1.000      0.275
                                                  Sum (F) =    0.275
Area averaged mean soil loss (F) (In/Hr) =  0.275
Minimum soil loss rate ((In/Hr)) =  0.138
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
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U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %		Unit Hydrograph (CFS)
1	0.083	342.829	62.333		3.907
2	0.167	685.658	36.487		2.287
3	0.250	1028.487	1.180		0.074
			Sum = 100.000	Sum=	6.269

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	Pattern	Storm Rain	Loss rate(In./Hr)		Effective
(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1 0.08	0.07	0.020	(0.488)	0.010	0.010
2 0.17	0.07	0.020	(0.486)	0.010	0.010
3 0.25	0.07	0.020	(0.484)	0.010	0.010
4 0.33	0.10	0.030	(0.482)	0.015	0.015
5 0.42	0.10	0.030	(0.481)	0.015	0.015
6 0.50	0.10	0.030	(0.479)	0.015	0.015
7 0.58	0.10	0.030	(0.477)	0.015	0.015
8 0.67	0.10	0.030	(0.475)	0.015	0.015
9 0.75	0.10	0.030	(0.473)	0.015	0.015
10 0.83	0.13	0.040	(0.471)	0.020	0.020
11 0.92	0.13	0.040	(0.469)	0.020	0.020
12 1.00	0.13	0.040	(0.468)	0.020	0.020
13 1.08	0.10	0.030	(0.466)	0.015	0.015
14 1.17	0.10	0.030	(0.464)	0.015	0.015
15 1.25	0.10	0.030	(0.462)	0.015	0.015
16 1.33	0.10	0.030	(0.460)	0.015	0.015
17 1.42	0.10	0.030	(0.458)	0.015	0.015
18 1.50	0.10	0.030	(0.456)	0.015	0.015
19 1.58	0.10	0.030	(0.455)	0.015	0.015
20 1.67	0.10	0.030	(0.453)	0.015	0.015
21 1.75	0.10	0.030	(0.451)	0.015	0.015
22 1.83	0.13	0.040	(0.449)	0.020	0.020
23 1.92	0.13	0.040	(0.447)	0.020	0.020
24 2.00	0.13	0.040	(0.446)	0.020	0.020
25 2.08	0.13	0.040	(0.444)	0.020	0.020
26 2.17	0.13	0.040	(0.442)	0.020	0.020
27 2.25	0.13	0.040	(0.440)	0.020	0.020
28 2.33	0.13	0.040	(0.438)	0.020	0.020
29 2.42	0.13	0.040	(0.437)	0.020	0.020
30 2.50	0.13	0.040	(0.435)	0.020	0.020
31 2.58	0.17	0.050	(0.433)	0.025	0.025
32 2.67	0.17	0.050	(0.431)	0.025	0.025
33 2.75	0.17	0.050	(0.430)	0.025	0.025
34 2.83	0.17	0.050	(0.428)	0.025	0.025
35 2.92	0.17	0.050	(0.426)	0.025	0.025
36 3.00	0.17	0.050	(0.424)	0.025	0.025
37 3.08	0.17	0.050	(0.422)	0.025	0.025
38 3.17	0.17	0.050	(0.421)	0.025	0.025
39 3.25	0.17	0.050	(0.419)	0.025	0.025
40 3.33	0.17	0.050	(0.417)	0.025	0.025
41 3.42	0.17	0.050	(0.415)	0.025	0.025
42 3.50	0.17	0.050	(0.414)	0.025	0.025
43 3.58	0.17	0.050	(0.412)	0.025	0.025
44 3.67	0.17	0.050	(0.410)	0.025	0.025
45 3.75	0.17	0.050	(0.409)	0.025	0.025
46 3.83	0.20	0.060	(0.407)	0.030	0.030
47 3.92	0.20	0.060	(0.405)	0.030	0.030
48 4.00	0.20	0.060	(0.403)	0.030	0.030
49 4.08	0.20	0.060	(0.402)	0.030	0.030
50 4.17	0.20	0.060	(0.400)	0.030	0.030
51 4.25	0.20	0.060	(0.398)	0.030	0.030
52 4.33	0.23	0.070	(0.397)	0.035	0.035
53 4.42	0.23	0.070	(0.395)	0.035	0.035
54 4.50	0.23	0.070	(0.393)	0.035	0.035
55 4.58	0.23	0.070	(0.391)	0.035	0.035
56 4.67	0.23	0.070	(0.390)	0.035	0.035
57 4.75	0.23	0.070	(0.388)	0.035	0.035
58 4.83	0.27	0.080	(0.386)	0.040	0.040
59 4.92	0.27	0.080	(0.385)	0.040	0.040
60 5.00	0.27	0.080	(0.383)	0.040	0.040
61 5.08	0.20	0.060	(0.381)	0.030	0.030
62 5.17	0.20	0.060	(0.380)	0.030	0.030

63	5.25	0.20	0.060	(0.378)	0.030	0.030
64	5.33	0.23	0.070	(0.376)	0.035	0.035
65	5.42	0.23	0.070	(0.375)	0.035	0.035
66	5.50	0.23	0.070	(0.373)	0.035	0.035
67	5.58	0.27	0.080	(0.372)	0.040	0.040
68	5.67	0.27	0.080	(0.370)	0.040	0.040
69	5.75	0.27	0.080	(0.368)	0.040	0.040
70	5.83	0.27	0.080	(0.367)	0.040	0.040
71	5.92	0.27	0.080	(0.365)	0.040	0.040
72	6.00	0.27	0.080	(0.363)	0.040	0.040
73	6.08	0.30	0.090	(0.362)	0.045	0.045
74	6.17	0.30	0.090	(0.360)	0.045	0.045
75	6.25	0.30	0.090	(0.359)	0.045	0.045
76	6.33	0.30	0.090	(0.357)	0.045	0.045
77	6.42	0.30	0.090	(0.355)	0.045	0.045
78	6.50	0.30	0.090	(0.354)	0.045	0.045
79	6.58	0.33	0.100	(0.352)	0.050	0.050
80	6.67	0.33	0.100	(0.351)	0.050	0.050
81	6.75	0.33	0.100	(0.349)	0.050	0.050
82	6.83	0.33	0.100	(0.347)	0.050	0.050
83	6.92	0.33	0.100	(0.346)	0.050	0.050
84	7.00	0.33	0.100	(0.344)	0.050	0.050
85	7.08	0.33	0.100	(0.343)	0.050	0.050
86	7.17	0.33	0.100	(0.341)	0.050	0.050
87	7.25	0.33	0.100	(0.340)	0.050	0.050
88	7.33	0.37	0.110	(0.338)	0.055	0.055
89	7.42	0.37	0.110	(0.337)	0.055	0.055
90	7.50	0.37	0.110	(0.335)	0.055	0.055
91	7.58	0.40	0.120	(0.333)	0.060	0.060
92	7.67	0.40	0.120	(0.332)	0.060	0.060
93	7.75	0.40	0.120	(0.330)	0.060	0.060
94	7.83	0.43	0.130	(0.329)	0.065	0.065
95	7.92	0.43	0.130	(0.327)	0.065	0.065
96	8.00	0.43	0.130	(0.326)	0.065	0.065
97	8.08	0.50	0.150	(0.324)	0.075	0.075
98	8.17	0.50	0.150	(0.323)	0.075	0.075
99	8.25	0.50	0.150	(0.321)	0.075	0.075
100	8.33	0.50	0.150	(0.320)	0.075	0.075
101	8.42	0.50	0.150	(0.318)	0.075	0.075
102	8.50	0.50	0.150	(0.317)	0.075	0.075
103	8.58	0.53	0.160	(0.315)	0.080	0.080
104	8.67	0.53	0.160	(0.314)	0.080	0.080
105	8.75	0.53	0.160	(0.312)	0.080	0.080
106	8.83	0.57	0.170	(0.311)	0.085	0.085
107	8.92	0.57	0.170	(0.309)	0.085	0.085
108	9.00	0.57	0.170	(0.308)	0.085	0.085
109	9.08	0.63	0.190	(0.307)	0.095	0.095
110	9.17	0.63	0.190	(0.305)	0.095	0.095
111	9.25	0.63	0.190	(0.304)	0.095	0.095
112	9.33	0.67	0.200	(0.302)	0.100	0.100
113	9.42	0.67	0.200	(0.301)	0.100	0.100
114	9.50	0.67	0.200	(0.299)	0.100	0.100
115	9.58	0.70	0.210	(0.298)	0.105	0.105
116	9.67	0.70	0.210	(0.296)	0.105	0.105
117	9.75	0.70	0.210	(0.295)	0.105	0.105
118	9.83	0.73	0.220	(0.294)	0.110	0.110
119	9.92	0.73	0.220	(0.292)	0.110	0.110
120	10.00	0.73	0.220	(0.291)	0.110	0.110
121	10.08	0.50	0.150	(0.289)	0.075	0.075
122	10.17	0.50	0.150	(0.288)	0.075	0.075
123	10.25	0.50	0.150	(0.287)	0.075	0.075
124	10.33	0.50	0.150	(0.285)	0.075	0.075
125	10.42	0.50	0.150	(0.284)	0.075	0.075
126	10.50	0.50	0.150	(0.282)	0.075	0.075
127	10.58	0.67	0.200	(0.281)	0.100	0.100
128	10.67	0.67	0.200	(0.280)	0.100	0.100
129	10.75	0.67	0.200	(0.278)	0.100	0.100
130	10.83	0.67	0.200	(0.277)	0.100	0.100
131	10.92	0.67	0.200	(0.276)	0.100	0.100
132	11.00	0.67	0.200	(0.274)	0.100	0.100
133	11.08	0.63	0.190	(0.273)	0.095	0.095
134	11.17	0.63	0.190	(0.271)	0.095	0.095
135	11.25	0.63	0.190	(0.270)	0.095	0.095
136	11.33	0.63	0.190	(0.269)	0.095	0.095
137	11.42	0.63	0.190	(0.267)	0.095	0.095
138	11.50	0.63	0.190	(0.266)	0.095	0.095
139	11.58	0.57	0.170	(0.265)	0.085	0.085
140	11.67	0.57	0.170	(0.264)	0.085	0.085
141	11.75	0.57	0.170	(0.262)	0.085	0.085
142	11.83	0.60	0.180	(0.261)	0.090	0.090
143	11.92	0.60	0.180	(0.260)	0.090	0.090
144	12.00	0.60	0.180	(0.258)	0.090	0.090

145	12.08	0.83	0.250	(0.257)	0.125	0.125
146	12.17	0.83	0.250	(0.256)	0.125	0.125
147	12.25	0.83	0.250	(0.254)	0.125	0.125
148	12.33	0.87	0.260	(0.253)	0.130	0.130
149	12.42	0.87	0.260	(0.252)	0.130	0.130
150	12.50	0.87	0.260	(0.251)	0.130	0.130
151	12.58	0.93	0.280	(0.249)	0.140	0.140
152	12.67	0.93	0.280	(0.248)	0.140	0.140
153	12.75	0.93	0.280	(0.247)	0.140	0.140
154	12.83	0.97	0.290	(0.246)	0.145	0.145
155	12.92	0.97	0.290	(0.244)	0.145	0.145
156	13.00	0.97	0.290	(0.243)	0.145	0.145
157	13.08	1.13	0.340	(0.242)	0.170	0.170
158	13.17	1.13	0.340	(0.241)	0.170	0.170
159	13.25	1.13	0.340	(0.239)	0.170	0.170
160	13.33	1.13	0.340	(0.238)	0.170	0.170
161	13.42	1.13	0.340	(0.237)	0.170	0.170
162	13.50	1.13	0.340	(0.236)	0.170	0.170
163	13.58	0.77	0.230	(0.235)	0.115	0.115
164	13.67	0.77	0.230	(0.233)	0.115	0.115
165	13.75	0.77	0.230	(0.232)	0.115	0.115
166	13.83	0.77	0.230	(0.231)	0.115	0.115
167	13.92	0.77	0.230	(0.230)	0.115	0.115
168	14.00	0.77	0.230	(0.229)	0.115	0.115
169	14.08	0.90	0.270	(0.228)	0.135	0.135
170	14.17	0.90	0.270	(0.226)	0.135	0.135
171	14.25	0.90	0.270	(0.225)	0.135	0.135
172	14.33	0.87	0.260	(0.224)	0.130	0.130
173	14.42	0.87	0.260	(0.223)	0.130	0.130
174	14.50	0.87	0.260	(0.222)	0.130	0.130
175	14.58	0.87	0.260	(0.221)	0.130	0.130
176	14.67	0.87	0.260	(0.220)	0.130	0.130
177	14.75	0.87	0.260	(0.218)	0.130	0.130
178	14.83	0.83	0.250	(0.217)	0.125	0.125
179	14.92	0.83	0.250	(0.216)	0.125	0.125
180	15.00	0.83	0.250	(0.215)	0.125	0.125
181	15.08	0.80	0.240	(0.214)	0.120	0.120
182	15.17	0.80	0.240	(0.213)	0.120	0.120
183	15.25	0.80	0.240	(0.212)	0.120	0.120
184	15.33	0.77	0.230	(0.211)	0.115	0.115
185	15.42	0.77	0.230	(0.210)	0.115	0.115
186	15.50	0.77	0.230	(0.209)	0.115	0.115
187	15.58	0.63	0.190	(0.207)	0.095	0.095
188	15.67	0.63	0.190	(0.206)	0.095	0.095
189	15.75	0.63	0.190	(0.205)	0.095	0.095
190	15.83	0.63	0.190	(0.204)	0.095	0.095
191	15.92	0.63	0.190	(0.203)	0.095	0.095
192	16.00	0.63	0.190	(0.202)	0.095	0.095
193	16.08	0.13	0.040	(0.201)	0.020	0.020
194	16.17	0.13	0.040	(0.200)	0.020	0.020
195	16.25	0.13	0.040	(0.199)	0.020	0.020
196	16.33	0.13	0.040	(0.198)	0.020	0.020
197	16.42	0.13	0.040	(0.197)	0.020	0.020
198	16.50	0.13	0.040	(0.196)	0.020	0.020
199	16.58	0.10	0.030	(0.195)	0.015	0.015
200	16.67	0.10	0.030	(0.194)	0.015	0.015
201	16.75	0.10	0.030	(0.193)	0.015	0.015
202	16.83	0.10	0.030	(0.192)	0.015	0.015
203	16.92	0.10	0.030	(0.191)	0.015	0.015
204	17.00	0.10	0.030	(0.190)	0.015	0.015
205	17.08	0.17	0.050	(0.189)	0.025	0.025
206	17.17	0.17	0.050	(0.188)	0.025	0.025
207	17.25	0.17	0.050	(0.187)	0.025	0.025
208	17.33	0.17	0.050	(0.186)	0.025	0.025
209	17.42	0.17	0.050	(0.185)	0.025	0.025
210	17.50	0.17	0.050	(0.185)	0.025	0.025
211	17.58	0.17	0.050	(0.184)	0.025	0.025
212	17.67	0.17	0.050	(0.183)	0.025	0.025
213	17.75	0.17	0.050	(0.182)	0.025	0.025
214	17.83	0.13	0.040	(0.181)	0.020	0.020
215	17.92	0.13	0.040	(0.180)	0.020	0.020
216	18.00	0.13	0.040	(0.179)	0.020	0.020
217	18.08	0.13	0.040	(0.178)	0.020	0.020
218	18.17	0.13	0.040	(0.177)	0.020	0.020
219	18.25	0.13	0.040	(0.176)	0.020	0.020
220	18.33	0.13	0.040	(0.176)	0.020	0.020
221	18.42	0.13	0.040	(0.175)	0.020	0.020
222	18.50	0.13	0.040	(0.174)	0.020	0.020
223	18.58	0.10	0.030	(0.173)	0.015	0.015
224	18.67	0.10	0.030	(0.172)	0.015	0.015
225	18.75	0.10	0.030	(0.171)	0.015	0.015
226	18.83	0.07	0.020	(0.171)	0.010	0.010

227	18.92	0.07	0.020	(0.170)	0.010	0.010
228	19.00	0.07	0.020	(0.169)	0.010	0.010
229	19.08	0.10	0.030	(0.168)	0.015	0.015
230	19.17	0.10	0.030	(0.167)	0.015	0.015
231	19.25	0.10	0.030	(0.167)	0.015	0.015
232	19.33	0.13	0.040	(0.166)	0.020	0.020
233	19.42	0.13	0.040	(0.165)	0.020	0.020
234	19.50	0.13	0.040	(0.164)	0.020	0.020
235	19.58	0.10	0.030	(0.164)	0.015	0.015
236	19.67	0.10	0.030	(0.163)	0.015	0.015
237	19.75	0.10	0.030	(0.162)	0.015	0.015
238	19.83	0.07	0.020	(0.161)	0.010	0.010
239	19.92	0.07	0.020	(0.161)	0.010	0.010
240	20.00	0.07	0.020	(0.160)	0.010	0.010
241	20.08	0.10	0.030	(0.159)	0.015	0.015
242	20.17	0.10	0.030	(0.158)	0.015	0.015
243	20.25	0.10	0.030	(0.158)	0.015	0.015
244	20.33	0.10	0.030	(0.157)	0.015	0.015
245	20.42	0.10	0.030	(0.156)	0.015	0.015
246	20.50	0.10	0.030	(0.156)	0.015	0.015
247	20.58	0.10	0.030	(0.155)	0.015	0.015
248	20.67	0.10	0.030	(0.154)	0.015	0.015
249	20.75	0.10	0.030	(0.154)	0.015	0.015
250	20.83	0.07	0.020	(0.153)	0.010	0.010
251	20.92	0.07	0.020	(0.153)	0.010	0.010
252	21.00	0.07	0.020	(0.152)	0.010	0.010
253	21.08	0.10	0.030	(0.151)	0.015	0.015
254	21.17	0.10	0.030	(0.151)	0.015	0.015
255	21.25	0.10	0.030	(0.150)	0.015	0.015
256	21.33	0.07	0.020	(0.150)	0.010	0.010
257	21.42	0.07	0.020	(0.149)	0.010	0.010
258	21.50	0.07	0.020	(0.148)	0.010	0.010
259	21.58	0.10	0.030	(0.148)	0.015	0.015
260	21.67	0.10	0.030	(0.147)	0.015	0.015
261	21.75	0.10	0.030	(0.147)	0.015	0.015
262	21.83	0.07	0.020	(0.146)	0.010	0.010
263	21.92	0.07	0.020	(0.146)	0.010	0.010
264	22.00	0.07	0.020	(0.145)	0.010	0.010
265	22.08	0.10	0.030	(0.145)	0.015	0.015
266	22.17	0.10	0.030	(0.144)	0.015	0.015
267	22.25	0.10	0.030	(0.144)	0.015	0.015
268	22.33	0.07	0.020	(0.144)	0.010	0.010
269	22.42	0.07	0.020	(0.143)	0.010	0.010
270	22.50	0.07	0.020	(0.143)	0.010	0.010
271	22.58	0.07	0.020	(0.142)	0.010	0.010
272	22.67	0.07	0.020	(0.142)	0.010	0.010
273	22.75	0.07	0.020	(0.141)	0.010	0.010
274	22.83	0.07	0.020	(0.141)	0.010	0.010
275	22.92	0.07	0.020	(0.141)	0.010	0.010
276	23.00	0.07	0.020	(0.140)	0.010	0.010
277	23.08	0.07	0.020	(0.140)	0.010	0.010
278	23.17	0.07	0.020	(0.140)	0.010	0.010
279	23.25	0.07	0.020	(0.139)	0.010	0.010
280	23.33	0.07	0.020	(0.139)	0.010	0.010
281	23.42	0.07	0.020	(0.139)	0.010	0.010
282	23.50	0.07	0.020	(0.139)	0.010	0.010
283	23.58	0.07	0.020	(0.138)	0.010	0.010
284	23.67	0.07	0.020	(0.138)	0.010	0.010
285	23.75	0.07	0.020	(0.138)	0.010	0.010
286	23.83	0.07	0.020	(0.138)	0.010	0.010
287	23.92	0.07	0.020	(0.138)	0.010	0.010
288	24.00	0.07	0.020	(0.138)	0.010	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.0

Flood volume = Effective rainfall 1.25(In)
times area 6.2(Ac.)/[(In)/(Ft.)] = 0.6(Ac.Ft)
Total soil loss = 1.25(In)
Total soil loss = 0.648(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 28222.9 Cubic Feet
Total soil loss = 28222.9 Cubic Feet

Peak flow rate of this hydrograph = 1.066(CFS)

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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	0.0003	0.04	Q				
0+10	0.0007	0.06	Q				
0+15	0.0011	0.06	Q				
0+20	0.0017	0.08	Q				
0+25	0.0023	0.09	Q				
0+30	0.0030	0.09	Q				
0+35	0.0036	0.09	Q				
0+40	0.0043	0.09	Q				
0+45	0.0049	0.09	Q				
0+50	0.0057	0.11	Q				
0+55	0.0066	0.13	Q				
1+ 0	0.0074	0.13	Q				
1+ 5	0.0082	0.11	Q				
1+10	0.0088	0.09	Q				
1+15	0.0095	0.09	Q				
1+20	0.0101	0.09	Q				
1+25	0.0108	0.09	Q				
1+30	0.0114	0.09	Q				
1+35	0.0121	0.09	Q				
1+40	0.0127	0.09	Q				
1+45	0.0134	0.09	Q				
1+50	0.0141	0.11	Q				
1+55	0.0150	0.13	Q				
2+ 0	0.0159	0.13	Q				
2+ 5	0.0167	0.13	QV				
2+10	0.0176	0.13	QV				
2+15	0.0185	0.13	QV				
2+20	0.0193	0.13	QV				
2+25	0.0202	0.13	QV				
2+30	0.0210	0.13	QV				
2+35	0.0220	0.14	QV				
2+40	0.0231	0.16	QV				
2+45	0.0242	0.16	QV				
2+50	0.0253	0.16	QV				
2+55	0.0264	0.16	QV				
3+ 0	0.0274	0.16	QV				
3+ 5	0.0285	0.16	QV				
3+10	0.0296	0.16	QV				
3+15	0.0307	0.16	QV				
3+20	0.0318	0.16	QV				
3+25	0.0328	0.16	Q V				
3+30	0.0339	0.16	Q V				
3+35	0.0350	0.16	Q V				
3+40	0.0361	0.16	Q V				
3+45	0.0372	0.16	Q V				
3+50	0.0384	0.18	Q V				
3+55	0.0397	0.19	Q V				
4+ 0	0.0410	0.19	Q V				
4+ 5	0.0423	0.19	Q V				
4+10	0.0436	0.19	Q V				
4+15	0.0449	0.19	Q V				
4+20	0.0463	0.21	Q V				
4+25	0.0478	0.22	Q V				
4+30	0.0493	0.22	Q V				
4+35	0.0508	0.22	Q V				
4+40	0.0523	0.22	Q V				
4+45	0.0538	0.22	Q V				
4+50	0.0555	0.24	Q V				
4+55	0.0572	0.25	|Q V				
5+ 0	0.0589	0.25	|Q V				
5+ 5	0.0604	0.21	Q V				
5+10	0.0617	0.19	Q V				
5+15	0.0630	0.19	Q V				
5+20	0.0644	0.21	Q V				
5+25	0.0659	0.22	Q V				
5+30	0.0674	0.22	Q V				
5+35	0.0691	0.24	Q V				
5+40	0.0708	0.25	|Q V				
5+45	0.0725	0.25	|Q V				
5+50	0.0743	0.25	|Q V				
5+55	0.0760	0.25	|Q V				
6+ 0	0.0777	0.25	|Q V				
6+ 5	0.0796	0.27	|Q V				
6+10	0.0815	0.28	|Q V				
6+15	0.0835	0.28	|Q V				
6+20	0.0854	0.28	|Q V				
6+25	0.0874	0.28	|Q V				
6+30	0.0893	0.28	|Q V				
6+35	0.0914	0.30	|Q V				
6+40	0.0935	0.31	|Q V				
6+45	0.0957	0.31	|Q V				

6+50	0.0979	0.31		Q V			
6+55	0.1000	0.31		Q V			
7+ 0	0.1022	0.31		Q V			
7+ 5	0.1043	0.31		Q V			
7+10	0.1065	0.31		Q V			
7+15	0.1087	0.31		Q V			
7+20	0.1110	0.33		Q V			
7+25	0.1133	0.34		Q V			
7+30	0.1157	0.34		Q V			
7+35	0.1182	0.36		Q V			
7+40	0.1208	0.38		Q V			
7+45	0.1234	0.38		Q V			
7+50	0.1261	0.40		Q V			
7+55	0.1289	0.41		Q V			
8+ 0	0.1317	0.41		Q V			
8+ 5	0.1348	0.45		Q V			
8+10	0.1380	0.47		Q V			
8+15	0.1413	0.47		Q V			
8+20	0.1445	0.47		Q V			
8+25	0.1478	0.47		Q V			
8+30	0.1510	0.47		Q V			
8+35	0.1544	0.49		Q V			
8+40	0.1578	0.50		Q V			
8+45	0.1613	0.50		Q V			
8+50	0.1649	0.52		Q V			
8+55	0.1685	0.53		Q V			
9+ 0	0.1722	0.53		Q V			
9+ 5	0.1762	0.57		Q V			
9+10	0.1803	0.60		Q	V		
9+15	0.1844	0.60		Q	V		
9+20	0.1886	0.62		Q	V		
9+25	0.1929	0.63		Q	V		
9+30	0.1972	0.63		Q	V		
9+35	0.2017	0.65		Q	V		
9+40	0.2062	0.66		Q	V		
9+45	0.2108	0.66		Q	V		
9+50	0.2154	0.68		Q	V		
9+55	0.2202	0.69		Q	V		
10+ 0	0.2249	0.69		Q	V		
10+ 5	0.2287	0.55		Q	V		
10+10	0.2320	0.47		Q	V		
10+15	0.2352	0.47		Q	V		
10+20	0.2385	0.47		Q	V		
10+25	0.2417	0.47		Q	V		
10+30	0.2449	0.47		Q	V		
10+35	0.2489	0.57		Q	V		
10+40	0.2532	0.63		Q	V		
10+45	0.2575	0.63		Q	V		
10+50	0.2618	0.63		Q	V		
10+55	0.2661	0.63		Q	V		
11+ 0	0.2704	0.63		Q	V		
11+ 5	0.2746	0.61		Q	V		
11+10	0.2787	0.60		Q	V		
11+15	0.2828	0.60		Q	V		
11+20	0.2869	0.60		Q	V		
11+25	0.2910	0.60		Q	V		
11+30	0.2951	0.60		Q	V		
11+35	0.2990	0.56		Q	V		
11+40	0.3027	0.53		Q	V		
11+45	0.3063	0.53		Q	V		
11+50	0.3101	0.55		Q	V		
11+55	0.3140	0.56		Q	V		
12+ 0	0.3179	0.56		Q	V		
12+ 5	0.3227	0.70		Q	V		
12+10	0.3281	0.78		Q V			
12+15	0.3335	0.78		Q V			
12+20	0.3391	0.80		Q V			
12+25	0.3447	0.81		Q	V		
12+30	0.3503	0.82		Q	V		
12+35	0.3562	0.85		Q	V		
12+40	0.3622	0.88		Q	V		
12+45	0.3683	0.88		Q	V		
12+50	0.3744	0.90		Q	V		
12+55	0.3807	0.91		Q	V		
13+ 0	0.3870	0.91		Q	V		
13+ 5	0.3939	1.01		Q	V		
13+10	0.4012	1.06		Q	V		
13+15	0.4086	1.07		Q	V		
13+20	0.4159	1.07		Q	V		
13+25	0.4233	1.07		Q	V		
13+30	0.4306	1.07		Q	V		
13+35	0.4365	0.85		Q	V		

13+40	0.4415	0.73	Q		V		
13+45	0.4464	0.72	Q		V		
13+50	0.4514	0.72	Q		V		
13+55	0.4564	0.72	Q		V		
14+ 0	0.4613	0.72	Q		V		
14+ 5	0.4668	0.80	Q		V		
14+10	0.4727	0.85	Q		V		
14+15	0.4785	0.85	Q		V		
14+20	0.4842	0.83	Q		V		
14+25	0.4898	0.82	Q		V		
14+30	0.4954	0.82	Q		V		
14+35	0.5010	0.82	Q		V		
14+40	0.5066	0.82	Q		V		
14+45	0.5123	0.82	Q		V		
14+50	0.5177	0.80	Q		V		
14+55	0.5231	0.78	Q		V		
15+ 0	0.5285	0.78	Q		V		
15+ 5	0.5338	0.76	Q		V		
15+10	0.5390	0.75	Q		V		
15+15	0.5442	0.75	Q		V		
15+20	0.5492	0.73	Q		V		
15+25	0.5542	0.72	Q		V		
15+30	0.5592	0.72	Q		V		
15+35	0.5636	0.64	Q		V		
15+40	0.5677	0.60	Q		V		
15+45	0.5718	0.60	Q		V		
15+50	0.5759	0.60	Q		V		
15+55	0.5800	0.60	Q		V		
16+ 0	0.5841	0.60	Q		V		
16+ 5	0.5862	0.30	Q		V		
16+10	0.5871	0.13	Q		V		
16+15	0.5880	0.13	Q		V		
16+20	0.5888	0.13	Q		V		
16+25	0.5897	0.13	Q		V		
16+30	0.5906	0.13	Q		V		
16+35	0.5913	0.11	Q		V		
16+40	0.5919	0.09	Q		V		
16+45	0.5926	0.09	Q		V		
16+50	0.5932	0.09	Q		V		
16+55	0.5939	0.09	Q		V		
17+ 0	0.5945	0.09	Q		V		
17+ 5	0.5954	0.13	Q		V		
17+10	0.5965	0.16	Q		V		
17+15	0.5976	0.16	Q		V		
17+20	0.5987	0.16	Q		V		
17+25	0.5998	0.16	Q		V		
17+30	0.6008	0.16	Q		V		
17+35	0.6019	0.16	Q		V		
17+40	0.6030	0.16	Q		V		
17+45	0.6041	0.16	Q		V		
17+50	0.6050	0.14	Q		V		
17+55	0.6059	0.13	Q		V		
18+ 0	0.6068	0.13	Q		V		
18+ 5	0.6076	0.13	Q		V		
18+10	0.6085	0.13	Q		V		
18+15	0.6093	0.13	Q		V		
18+20	0.6102	0.13	Q		V		
18+25	0.6111	0.13	Q		V		
18+30	0.6119	0.13	Q		V		
18+35	0.6127	0.11	Q		V		
18+40	0.6133	0.09	Q		V		
18+45	0.6140	0.09	Q		V		
18+50	0.6145	0.07	Q		V		
18+55	0.6149	0.06	Q		V		
19+ 0	0.6153	0.06	Q		V		
19+ 5	0.6159	0.08	Q		V		
19+10	0.6166	0.09	Q		V		
19+15	0.6172	0.09	Q		V		
19+20	0.6180	0.11	Q		V		
19+25	0.6188	0.13	Q		V		
19+30	0.6197	0.13	Q		V		
19+35	0.6204	0.11	Q		V		
19+40	0.6211	0.09	Q		V		
19+45	0.6217	0.09	Q		V		
19+50	0.6223	0.07	Q		V		
19+55	0.6227	0.06	Q		V		
20+ 0	0.6231	0.06	Q		V		
20+ 5	0.6237	0.08	Q		V		
20+10	0.6243	0.09	Q		V		
20+15	0.6250	0.09	Q		V		
20+20	0.6256	0.09	Q		V		
20+25	0.6263	0.09	Q		V		

20+30	0.6269	0.09	Q	|	|	|	V |
20+35	0.6276	0.09	Q	|	|	|	V |
20+40	0.6282	0.09	Q	|	|	|	V |
20+45	0.6289	0.09	Q	|	|	|	V |
20+50	0.6294	0.07	Q	|	|	|	V |
20+55	0.6298	0.06	Q	|	|	|	V |
21+ 0	0.6302	0.06	Q	|	|	|	V |
21+ 5	0.6308	0.08	Q	|	|	|	V |
21+10	0.6315	0.09	Q	|	|	|	V |
21+15	0.6321	0.09	Q	|	|	|	V|
21+20	0.6326	0.07	Q	|	|	|	V|
21+25	0.6331	0.06	Q	|	|	|	V|
21+30	0.6335	0.06	Q	|	|	|	V|
21+35	0.6341	0.08	Q	|	|	|	V|
21+40	0.6347	0.09	Q	|	|	|	V|
21+45	0.6353	0.09	Q	|	|	|	V|
21+50	0.6359	0.07	Q	|	|	|	V|
21+55	0.6363	0.06	Q	|	|	|	V|
22+ 0	0.6367	0.06	Q	|	|	|	V|
22+ 5	0.6373	0.08	Q	|	|	|	V|
22+10	0.6379	0.09	Q	|	|	|	V|
22+15	0.6386	0.09	Q	|	|	|	V|
22+20	0.6391	0.07	Q	|	|	|	V|
22+25	0.6395	0.06	Q	|	|	|	V|
22+30	0.6400	0.06	Q	|	|	|	V|
22+35	0.6404	0.06	Q	|	|	|	V|
22+40	0.6408	0.06	Q	|	|	|	V|
22+45	0.6413	0.06	Q	|	|	|	V|
22+50	0.6417	0.06	Q	|	|	|	V|
22+55	0.6421	0.06	Q	|	|	|	V|
23+ 0	0.6426	0.06	Q	|	|	|	V|
23+ 5	0.6430	0.06	Q	|	|	|	V|
23+10	0.6434	0.06	Q	|	|	|	V|
23+15	0.6439	0.06	Q	|	|	|	V|
23+20	0.6443	0.06	Q	|	|	|	V|
23+25	0.6447	0.06	Q	|	|	|	V|
23+30	0.6451	0.06	Q	|	|	|	V|
23+35	0.6456	0.06	Q	|	|	|	V|
23+40	0.6460	0.06	Q	|	|	|	V|
23+45	0.6464	0.06	Q	|	|	|	V|
23+50	0.6469	0.06	Q	|	|	|	V|
23+55	0.6473	0.06	Q	|	|	|	V|
24+ 0	0.6477	0.06	Q	|	|	|	V|
24+ 5	0.6479	0.02	Q	|	|	|	V|
24+10	0.6479	0.00	Q	|	|	|	V

APPENDIX E – HYDRAULIC CALCULATIONS

Catch Basin Sizing

Project Description	
Worksheet	**NODE 121_CB#1 COMBO**
Type	Combination Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	6.33	cfs
Local Depression	4.0	in
Local Depression Width	4.00	ft
Slope	0.019500	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results		
Efficiency	1.00	
Intercepted Flow	6.32	cfs
Bypass Flow	0.01	cfs
Spread	10.85	ft
Depth	0.24	ft
Flow Area	0.5	ft²
Gutter Depression	1.4	in
Total Depression	5.4	in
Velocity	3.99	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.03	
Grate Flow Ratio	0.99	
Equivalent Cross Slope	0.080449	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.50	
Total Interception Length	24.55	ft

Project Description	
Worksheet	**NODE 124_CB#2 COMBO**
Type	Combination Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	7.12	cfs
Local Depression	4.0	in
Local Depression Width	4.00	ft
Slope	0.048000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results		
Efficiency	1.00	
Intercepted Flow	7.09	cfs
Bypass Flow	0.03	cfs
Spread	9.33	ft
Depth	0.24	ft
Flow Area	0.5	ft^2
Gutter Depression	1.4	in
Total Depression	5.4	in
Velocity	6.29	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.02	
Grate Flow Ratio	0.99	
Equivalent Cross Slope	0.088699	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.39	
Total Interception Length	31.87	ft

Project Description	
Worksheet	**NODE 127_CB#3 COMBO**
Type	Combination Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	5.01	cfs
Local Depression	4.0	in
Local Depression Width	4.00	ft
Slope	0.080000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results		
Efficiency	0.99	
Intercepted Flow	4.97	cfs
Bypass Flow	0.04	cfs
Spread	6.90	ft
Depth	0.19	ft
Flow Area	0.2	ft²
Gutter Depression	1.4	in
Total Depression	5.4	in
Velocity	7.61	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	0.98	
Side Flow Factor	0.01	
Grate Flow Ratio	1.00	
Equivalent Cross Slope	0.105407	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.43	
Total Interception Length	28.90	ft

INF. Overflow Route
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	INF. OVERFLOV
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Discharge

Input Data		
Mannings Coeffic	0.035	
Slope	430000	ft/ft
Depth	0.19	ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	10.00	ft

Results		
Discharge	17.95	cfs
Flow Area	2.0	ft²
Wetted Perim	11.57	ft
Top Width	11.52	ft
Critical Depth	0.44	ft
Critical Slope	0.024901	ft/ft
Velocity	8.77	ft/s
Velocity Head	1.20	ft
Specific Energ	1.39	ft
Froude Numb	3.67	
Flow Type	Supercritical	

Interceptor Drain Sizing

Project Description	
Worksheet	**NODE 110_GRATE INLET #1**
Type	Grate Inlet In Sag
Solve For	Spread

Input Data		
Discharge	4.96	cfs
Gutter Width	0.00	ft
Gutter Cross Slope	0.000000	ft/ft
Road Cross Slope	0.200000	ft/ft
Grate Width	3.00	ft
Grate Length	3.00	ft
Local Depression	2.0	in
Local Depression Width	3.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	1.66	ft
Depth	0.26	ft
Gutter Depression	0.0	in
Total Depression	2.0	in
Open Grate Area	4.0	ft²
Active Grate Weir Length	6.00	ft

Project Description	
Worksheet	**NODE 107_GRATE INLET #2**
Type	Grate Inlet In Sag
Solve For	Spread

Input Data		
Discharge	3.08	cfs
Gutter Width	0.00	ft
Gutter Cross Slope	0.000000	ft/ft
Road Cross Slope	0.500000	ft/ft
Grate Width	3.00	ft
Grate Length	3.00	ft
Local Depression	2.0	in
Local Depression Width	3.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	0.55	ft
Depth	0.14	ft
Gutter Depression	0.0	in
Total Depression	2.0	in
Open Grate Area	4.0	ft^2
Active Grate Weir Length	6.00	ft

Project Description	
Worksheet	**NODE 118_GRATE INLET #3**
Type	Grate Inlet In Sag
Solve For	Spread

Input Data		
Discharge	2.07	cfs
Gutter Width	0.00	ft
Gutter Cross Slope	0.000000	ft/ft
Road Cross Slope	0.500000	ft/ft
Grate Width	3.00	ft
Grate Length	3.00	ft
Local Depression	2.0	in
Local Depression Width	3.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	0.43	ft
Depth	0.07	ft
Gutter Depression	0.0	in
Total Depression	2.0	in
Open Grate Area	4.0	ft^2
Active Grate Weir Length	6.00	ft

Street Capacity Calculations

Project Description	
Worksheet	**Litchi Street 100yr flow capacity**
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.060000	ft/ft
Discharge	7.12	cfs

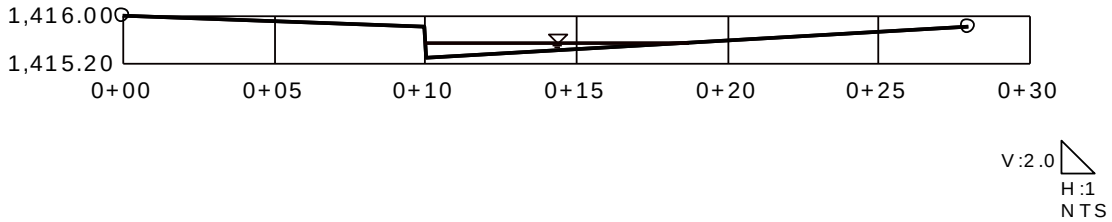
Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	1,415.54	ft
Elevation Range	1,415.30 to 1,416.00	
Flow Area	1.1	ft²
Wetted Perimeter	8.97	ft
Top Width	8.73	ft
Actual Depth	0.24	ft
Critical Elevation	1,415.70	ft
Critical Slope	0.004382	ft/ft
Velocity	6.73	ft/s
Velocity Head	0.70	ft
Specific Energy	1,416.25	ft
Froude Number	3.41	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+28	0.013

Section Data		
Mannings Coefficient	0.013	
Slope	0.060000	ft/ft
Water Surface Elevation	1,415.54	ft
Elevation Range	1,415.30 to 1,416.00	
Discharge	7.12	cfs

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	1,416.00
0+10	1,415.80
0+10	1,415.30
0+28	1,415.80



Project Description	
Worksheet	**Towhee Lane 100yr flow capacity**
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.050000	ft/ft
Discharge	11.34	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	1,418.52	ft
Elevation Range	1,418.30 to 1,419.00	
Flow Area	1.9	ft²
Wetted Perimeter	17.68	ft
Top Width	17.23	ft
Actual Depth	0.22	ft
Critical Elevation	1,418.65	ft
Critical Slope	0.004545	ft/ft
Velocity	5.85	ft/s
Velocity Head	0.53	ft
Specific Energy	1,419.06	ft
Froude Number	3.08	
Flow Type	Supercritical	

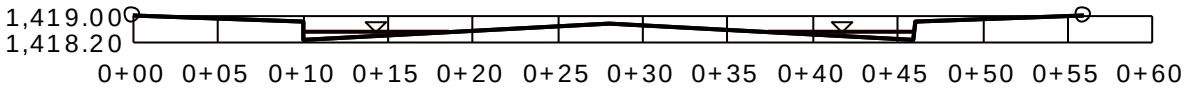
Calculation Messages:
Flow is divided.

Section Data		
Mannings Coefficient	0.013	
Slope	0.050000	ft/ft
Water Surface Elevation	1,418.52	ft
Elevation Range	1,418.30 to 1,419.00	
Discharge	11.34	cfs

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+56	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	1,419.00
0+10	1,418.80
0+10	1,418.30
0+28	1,418.77
0+46	1,418.30
0+46	1,418.80
0+56	1,419.00

Project Description	
Worksheet	Towhee Lane
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth



V :2 .0
H :1
N T S

Inlet Headwater Calculations

Solve For: Headwater Elevation

Node 104 Southwest Headwall

Culvert Summary					
Allowable HW Elevation	0.00	ft	Headwater Depth/Height	1.70	
Computed Headwater Elevation	1,425.23	ft	Discharge	418.40	cfs
Inlet Control HW Elev.	1,425.23	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,424.94	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,415.00	ft	Downstream Invert	1,411.80	ft
Length	134.00	ft	Constructed Slope	0.023881	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	4.03	ft
Slope Type	Steep		Normal Depth	3.49	ft
Flow Regime	Supercritical		Critical Depth	5.41	ft
Velocity Downstream	20.69	ft/s	Critical Slope	0.008574	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	72 inch		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,424.94	ft	Upstream Velocity Head	3.77	ft
Ke	0.20		Entrance Loss	0.75	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,425.23	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	28.3	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Solve For: Headwater Elevation

Node 115 South Headwall

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.92
Computed Headwater Elevation	1,432.68 ft	Discharge	57.25 cfs
Inlet Control HW Elev.	1,431.29 ft	Tailwater Elevation	0.00 ft
Outlet Control HW Elev.	1,432.68 ft	Control Type	Entrance Control

Grades			
Upstream Invert	1,429.00 ft	Downstream Invert	1,412.20 ft
Length	30.00 ft	Constructed Slope	0.560000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.80 ft
Slope Type	Steep	Normal Depth	0.63 ft
Flow Regime	Supercritical	Critical Depth	2.28 ft
Velocity Downstream	32.12 ft/s	Critical Slope	0.004143 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	1,432.68 ft	Upstream Velocity Head	0.93 ft
Ke	0.50	Entrance Loss	0.47 ft

Inlet Control Properties			
Inlet Control HW Elev.	1,431.29 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	12.6 ft^2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Overflow Water Surface Calculations

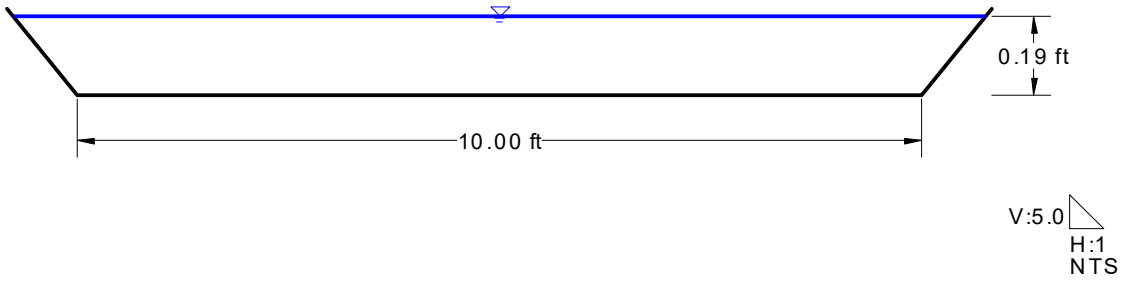
Infiltration Trench Overflow Route

Project Description	
Worksheet	INF. OVERFLOW
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.035	
Slope	0.430000	ft/ft
Depth	0.19	ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	10.00	ft

Results		
Discharge	17.95	cfs
Flow Area	2.0	ft²
Wetted Perimeter	11.57	ft
Top Width	11.52	ft
Critical Depth	0.44	ft
Critical Slope	0.024901	ft/ft
Velocity	8.77	ft/s
Velocity Head	1.20	ft
Specific Energy	1.39	ft
Froude Number	3.67	
Flow Type	Supercritical	

Section Data		
Mannings Coefficient	0.035	
Slope	0.430 000	ft/ft
Depth	0.19	ft
Left Side Slope	0.25	V : H
Right Side Slope	0.25	V : H
Bottom Width	10.00	ft
Discharge	17.95	cfs



Project Description	
Worksheet	**Towhee Lane Emergency Overflow Conditon_Lot 6&3**
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.050000	ft/ft
Discharge	713.50	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	1,419.35	ft
Elevation Range	1,418.30 to 1,435.00	
Flow Area	38.8	ft²
Wetted Perimeter	59.73	ft
Top Width	58.64	ft
Actual Depth	1.05	ft
Critical Elevation	1,420.36	ft
Critical Slope	0.002391	ft/ft
Velocity	18.37	ft/s
Velocity Head	5.25	ft
Specific Energy	1,424.60	ft
Froude Number	3.98	
Flow Type	Supercritical	

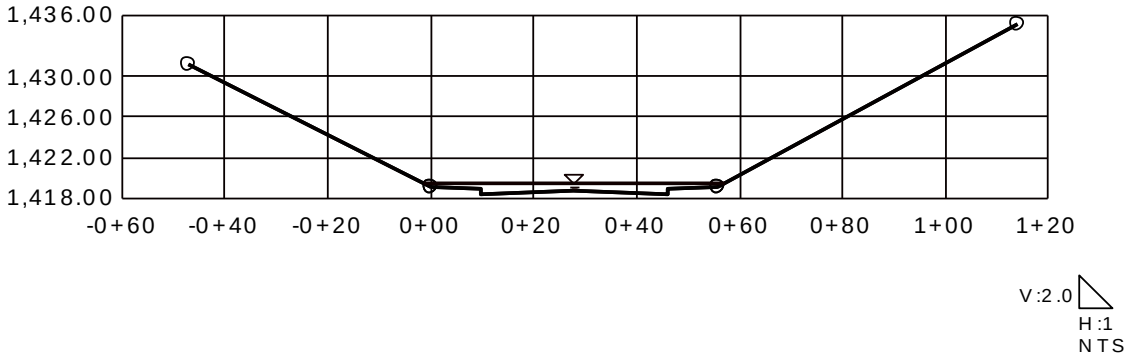
Section Data		
Mannings Coefficient	0.014	
Slope	0.050000	ft/ft
Water Surface Elevation	1,419.35	ft
Elevation Range	1,418.30 to 1,435.00	
Discharge	713.50	cfs

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+47	0+00	0.035
0+00	0+56	0.013
0+56	1+14	0.035

Natural Channel Points

Station (ft)	Elevation (ft)
-0+47	1,431.00
0+00	1,419.00
0+10	1,418.80
0+10	1,418.30
0+28	1,418.77
0+46	1,418.30
0+46	1,418.80
0+56	1,419.00
1+14	1,435.00



Project Description	
Worksheet	**Towhee Lane Emergency Overflow Conditon_Lots 7 & 2**
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.050000	ft/ft
Discharge	713.50	cfs

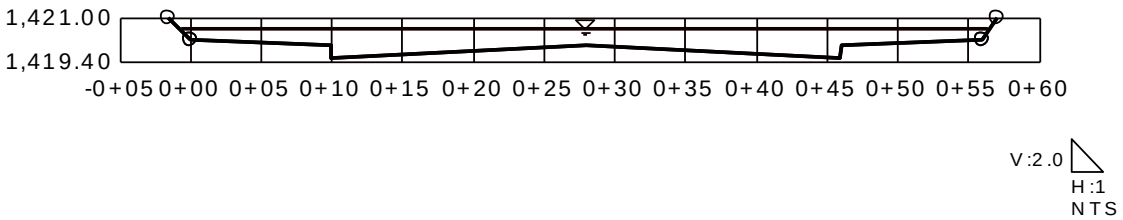
Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+02	1,421.00
0+00	1,420.20
0+10	1,420.00
0+10	1,419.50
0+28	1,419.97
0+46	1,419.50
0+46	1,420.00
0+56	1,420.20
0+57	1,421.00

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	1,420.55	ft
Elevation Range	1,419.50 to 1,421.00	
Flow Area	38.6	ft²
Wetted Perimeter	58.31	ft
Top Width	57.10	ft
Actual Depth	1.05	ft
Critical Elevation	1,421.56	ft
Critical Slope	0.002429	ft/ft
Velocity	18.48	ft/s
Velocity Head	5.31	ft
Specific Energy	1,425.86	ft
Froude Number	3.96	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+02	0+00	0.035
0+00	0+56	0.013
0+56	0+57	0.035

Section Data		
Mannings Coefficient	0.014	
Slope	0.050000	ft/ft
Water Surface Elevation	1,420.55	ft
Elevation Range	1,419.50 to 1,421.00	
Discharge	713.50	cfs



Project Description	
Worksheet	**Towhee Lane Emergency Overflow Conditon_Lots 8 & 1**
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.050000	ft/ft
Discharge	713.50	cfs

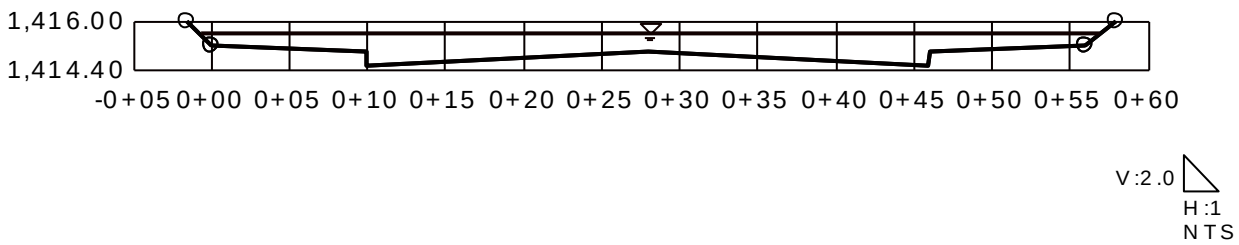
Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	1,415.56	ft
Elevation Range	1,414.50 to 1,416.00	
Flow Area	39.1	ft²
Wetted Perimeter	58.72	ft
Top Width	57.56	ft
Actual Depth	1.06	ft
Critical Elevation	1,416.56	ft
Critical Slope	0.002500	ft/ft
Velocity	18.27	ft/s
Velocity Head	5.19	ft
Specific Energy	1,420.75	ft
Froude Number	3.91	
Flow Type	Supercritical	

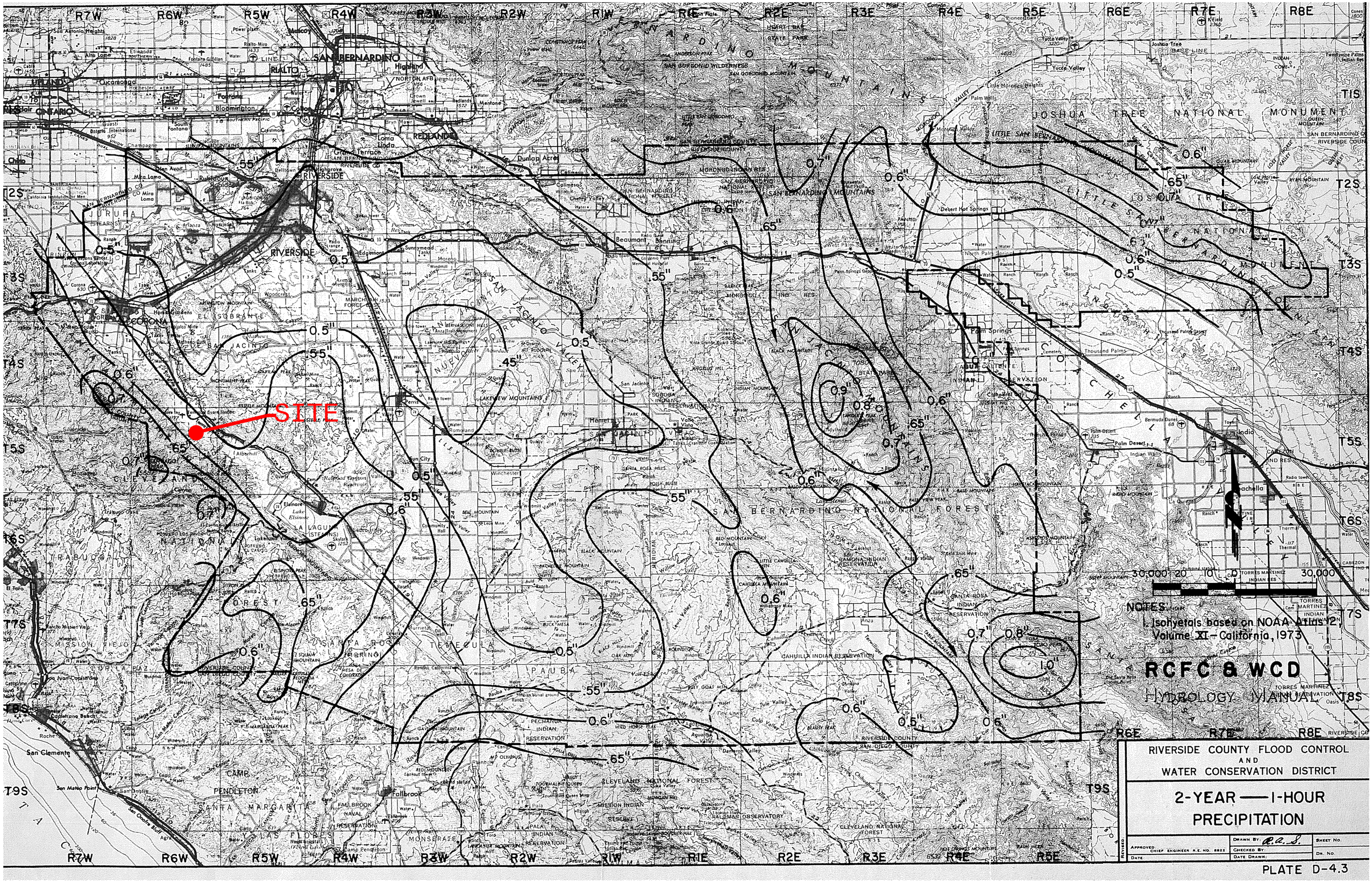
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+02	0+00	0.035
0+00	0+56	0.013
0+56	0+58	0.035

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+02	1,416.00
0+00	1,415.20
0+10	1,415.00
0+10	1,414.50
0+28	1,414.97
0+46	1,414.50
0+46	1,415.00
0+56	1,415.20
0+58	1,416.00

Section Data		
Mannings Coefficient	0.014	
Slope	0.050000	ft/ft
Water Surface Elevation	1,415.56	ft
Elevation Range	1,414.50 to 1,416.00	
Discharge	713.50	cfs



APPENDIX F – RIVERSIDE COUNTY HYDROLOGY DATA



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973

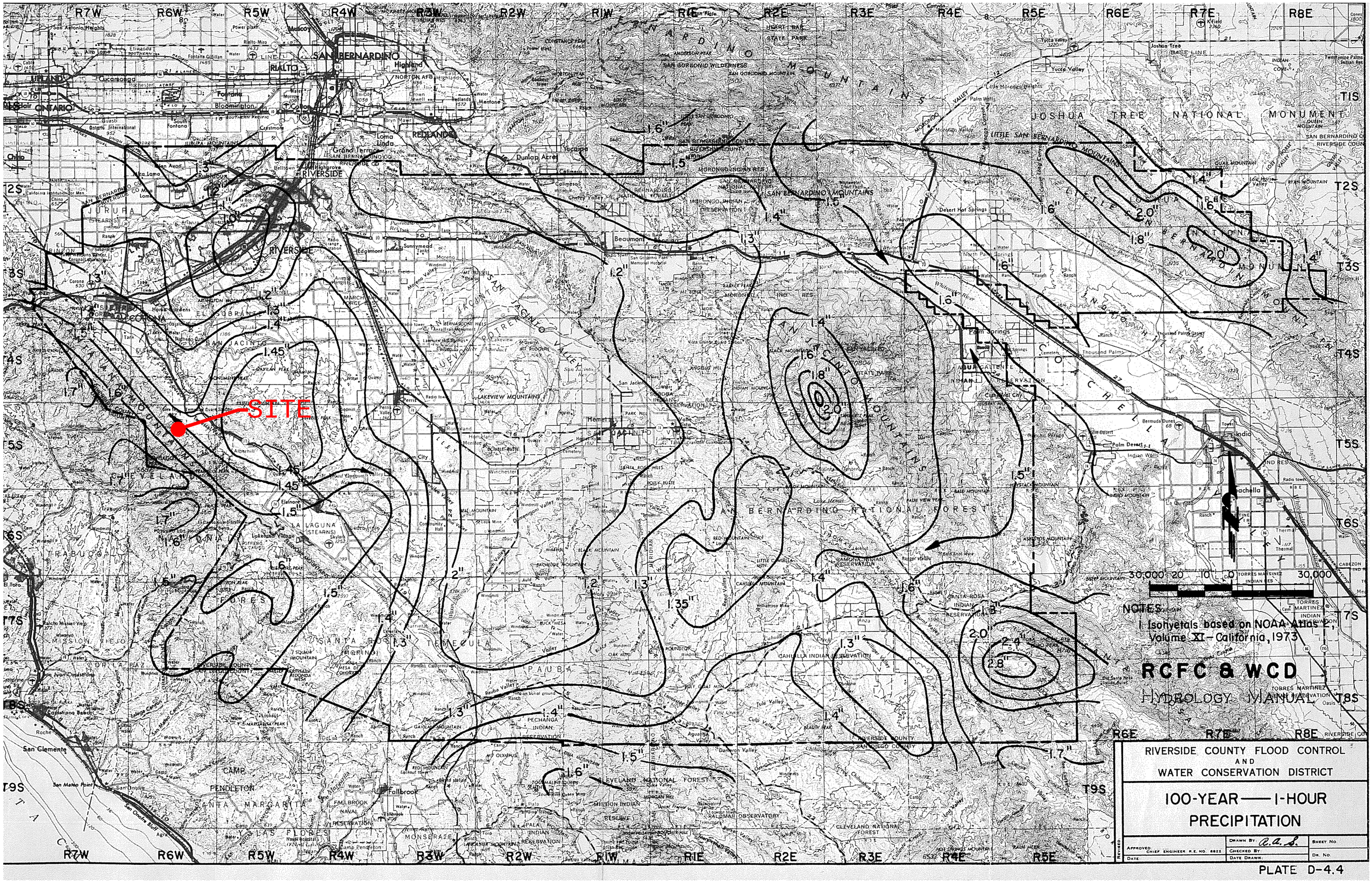
RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR PRECIPITATION

APPROVED CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: R.A.S.	SHEET NO.
DATE	CHECKED BY:	DR. NO.
	DATE DRAWN:	

PLATE D-4.3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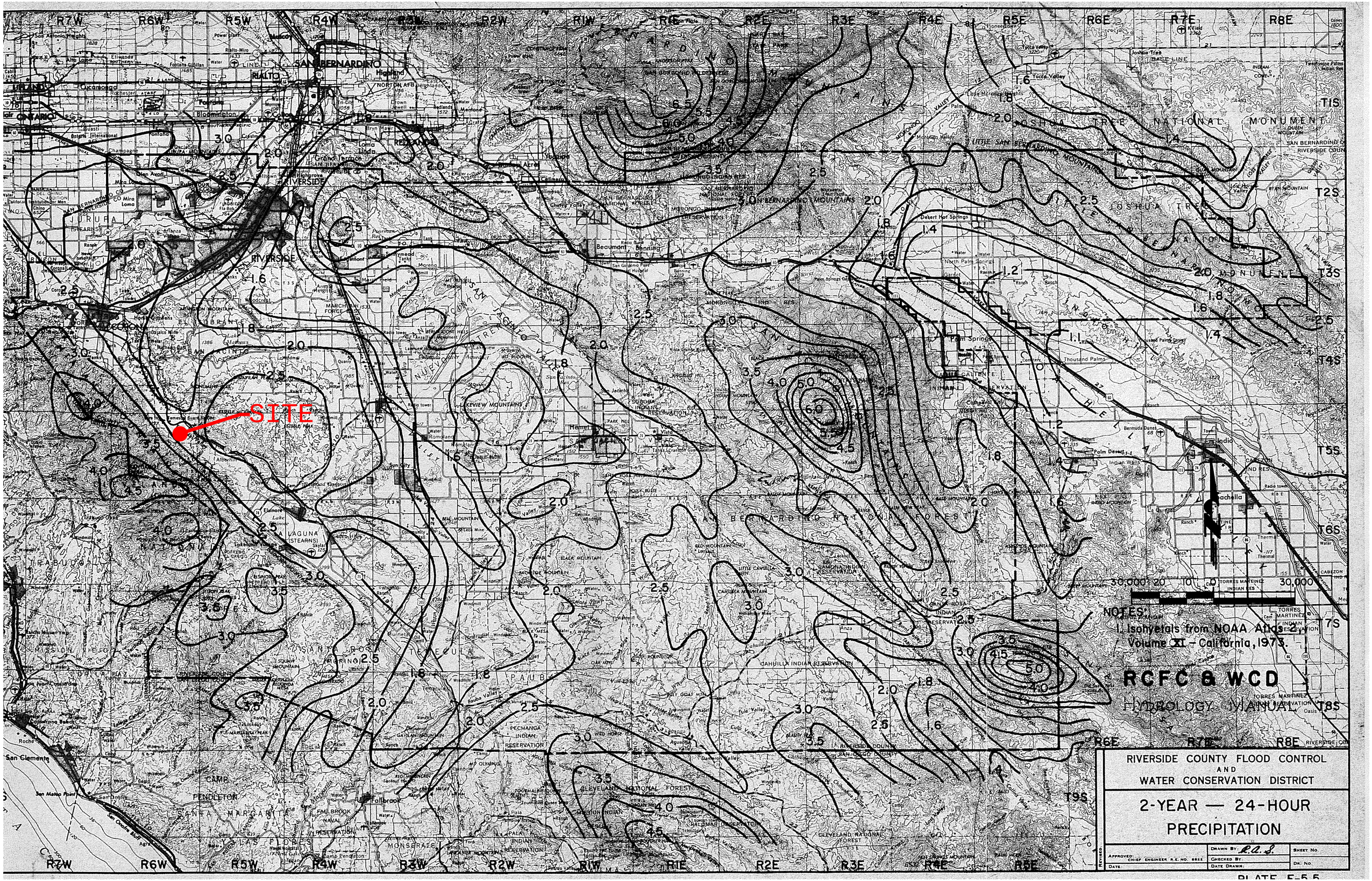
1.6"
1.5"
1.4"
1.3"
1.2"
1.7"
1.8"
2.0"
2.4"
2.8"
1.45"
1.35"
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY: C.A.S.
CHECKED BY
DATE DRAWN
SHEET NO.
DR. NO.
REVISED
PLATE D-4.4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SAN BERNARDINO
RIVERSIDE
RIALTO
ONTARIO
CORONA
NORCO
JURUPA
LOMA LINDA
REDLANDS
HIGHGROVE
BEAUMONT
BANNING
PALM SPRINGS
DESERT HOT SPRINGS
CATHEDRAL CITY
THOUSAND PALMS
INDIO
COACHELLA
LA QUINTA
INDIAN WELLS
PALM DESERT
MORENO VALLEY
PERRIS
TEMECULA
MURRIETA
SUN CITY
HEMET
SAN JACINTO
WINCHESTER
ELSINORE
LAKE MATHEWS
LAKE PERRIS
LAKE ELSINORE
SAN JACINTO MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN GABRIEL MOUNTAINS
SAN JACINTO FAULT
SAN ANDREAS FAULT
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
MARCH AFB
NORTON AFB
CAMP PENDLETON
FALLBROOK NAVAL WEAPONS STATION
SANTA MARGARITA
AGUANGA INDIAN RESERVATION
PECHANGA INDIAN RESERVATION
SOBOBA INDIAN RESERVATION
AGUA CALIENTE INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RESERVATION
R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E
T1S T2S T3S T4S T5S T6S T7S T8S T9S
30,000 0 20 10 0 30,000
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
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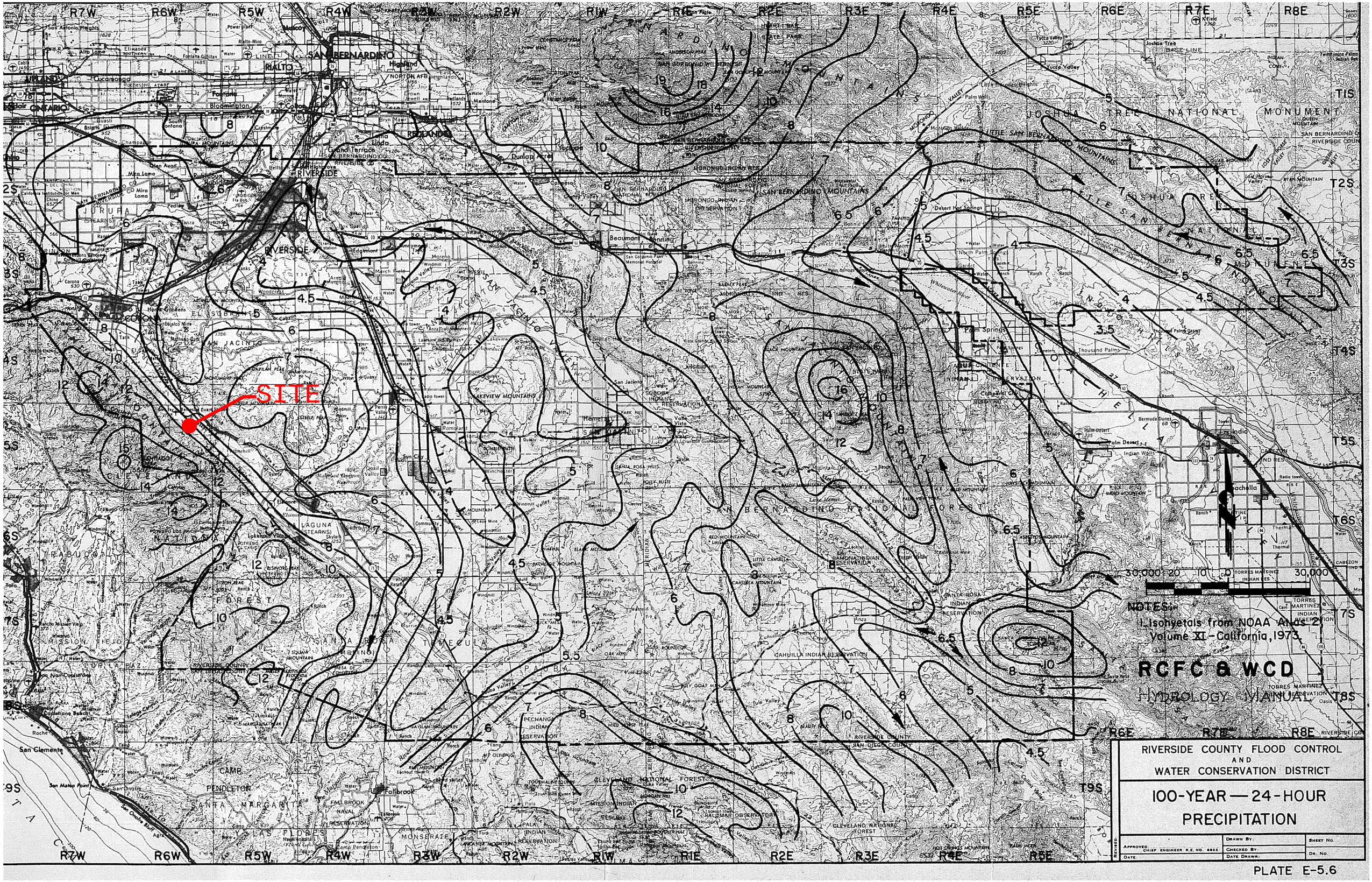
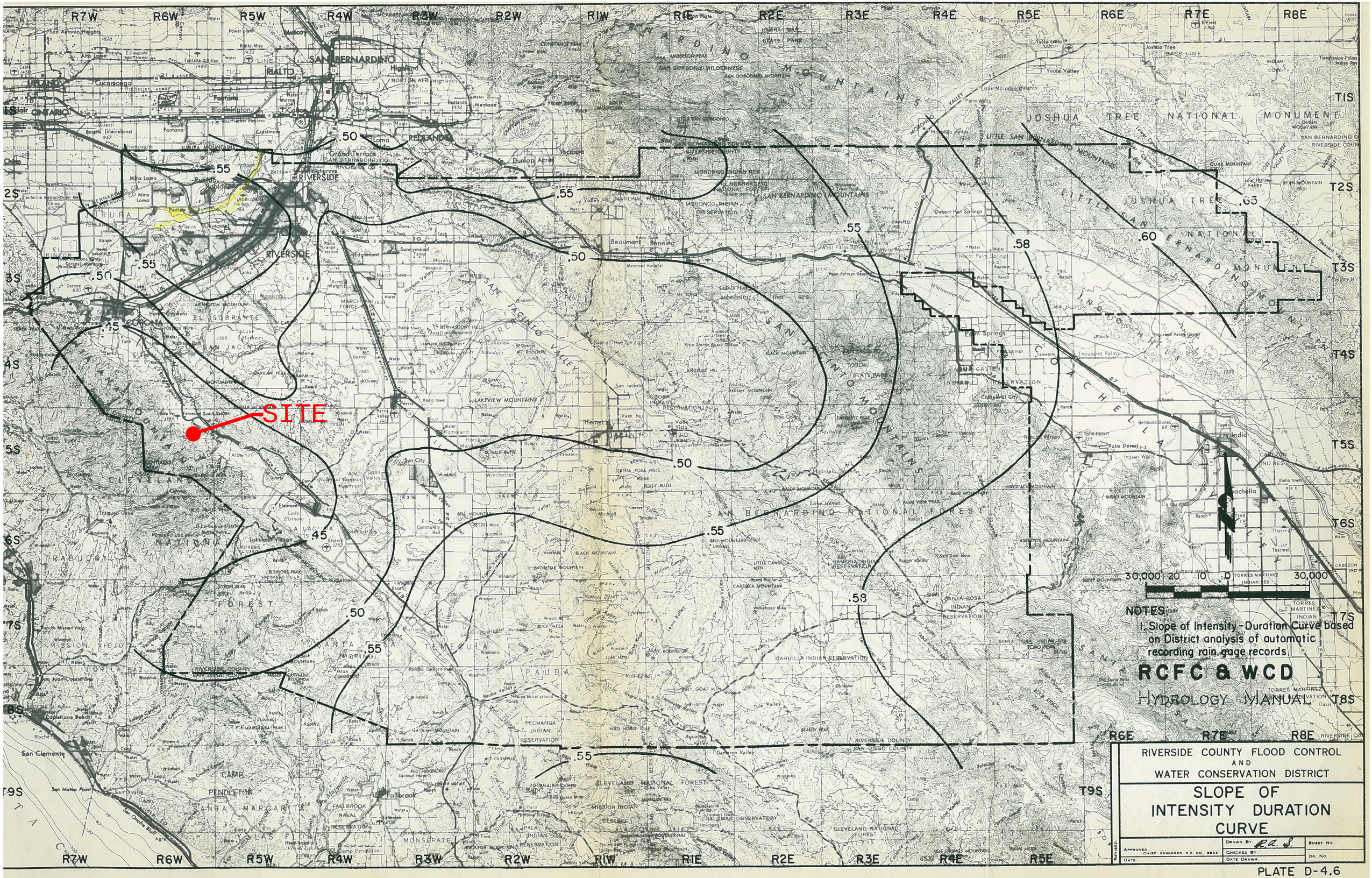
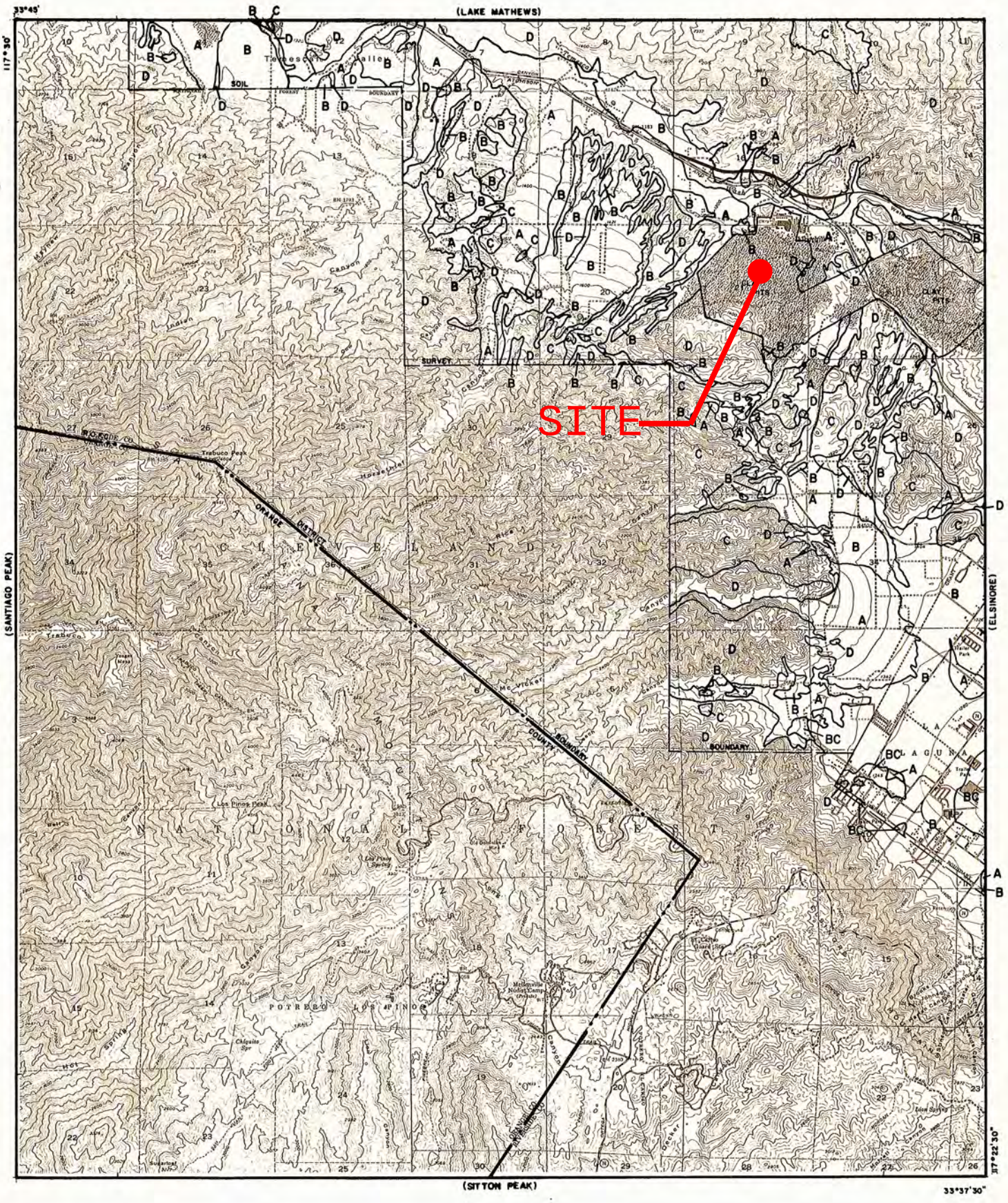
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
APPROVED: CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY R.A.S.
CHECKED BY
DATE DRAWN
SHEET NO.
DR. NO.
REVISED

PLATE E-5.5


SITE
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6


SITE
.50
.55
.58
.60
.63
.45
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
APPROVED CHIEF ENGINEER R.E. NO. 8822
DATE
DRAWN BY R.A.S.
CHECKED BY
DATE DRAWN:
REVISED
SHEET No.
DR. No
PLATE D-4.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

N

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HYDROLOGIC SOILS GROUP MAP FOR ALBERHILL

PLATE C-1.40