DEVELOPMENT PLAN REVIEW – VTTM 38811-3, PARCELS 5-11
CITY OF PERRIS
RIVERSIDE COUNTY, CALIFORNIA

Drainage Study Report

Prepared for:
Howard Industrial Partners LLC
1944 North Tustin Street, Suite 122
Orange, CA 92865

Prepared By:

29995 Technology Drive, Suite 306
Murrieta, CA 92563

Engineer of Work/Contacts:

Francisco Martinez, Jr.

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SECTION 1 - GENERAL OVERVIEW

INTRODUCTION

The purpose of this study is to support the entitlement phase and determine minimum drainage improvements required for the proposed commercial retail and restaurant development of approximately 35.1 acres and 10 major retail buildings (totaling 203,363 square feet) with 5 truck docks, 8 food/retail buildings (totaling 47,249 square feet), and a parking lot that lays within the Harvest Landing Specific Plan, located in the City of Perris, County of Riverside CA. More specifically, the project site is bounded to the north by Orange Ave, proposed regional water quality facilities to the west, Daniela Way to the south and Perris Boulevard to the east.

The primary objectives of this report are as follows:

1. Delineate the drainage areas tributary to the onsite underground basin

2. Based on drainage patterns, ground slope, land use and soil type and using the Riverside County Rational Method, perform hydrologic and hydraulics of onsite drainage facilities.

3. Determine the 100-year peak storm flows based upon the pre-project, proposed land use per the MDP and post-project condition for the 24-hour storm duration utilizing the Unit Hydrograph Method as outlined in the Riverside County Flood Control & Water Conservation District Hydrology Manual.

4. Determine the required underground detention facilities to mitigate the 100-year peak storm flows for the 24-hour storm duration in the post-project condition to flows less than or equal to the proposed land use condition flow rates.

5. Determine the required the minimum storm drain infrastructure to flood protect the project site for the 100-year storm event.

6. Preparation of a hydrology report, which consist of hydrological and analytical results and exhibits.

BACKGROUND

EXISTING CONDITIONS

The project site is located within Riverside County Flood Control's Perris Valley Master Drainage Plan, and tributary to a low point in Perris Boulevard and the existing MDP Line "K" (earthen V-Channel) located about 2600 lineal feet east of Indian Avenue.

The site is in a relatively mild to flat sloping undeveloped terrain on a drainage area which drains easterly towards Perris Boulevard with no offsite flows. All the developed storm flows continue to travel easterly through the property, and to two different low points. The southerly half of the existing site condition is being picked up by an existing headwall. The northerly half of the existing site is being picked up by an existing inlet that lies to the west of Perris Boulevard. Once the flows are intercepted, they are conveyed via their respective laterals into a 54" main line on Perris Blvd. This 54" pipe ties into the existing MDP Line "K". MDP Line "K" is an earthen "V" channel (w= 16', H=8' & z=1:1) and planned as a future Trapezoidal Channel (b=6', d=8').

DEVELOPED CONDITIONS

The preliminary offsite design is shown on Exhibit F "Harvest Landing Industrial Phase 1 Offsite Master Storm Drain & Low Flow System". The offsite master storm drain system (backbone) will be part of a separate report and therefore excluded. The onsite storm water runoff will be collected via onsite storm drain system and conveyed to a CDS unit for pretreatment and directed to an offsite water quality retention system for water quality mitigation. However, the higher flow rates will be directed to an on-site underground pipe chamber which will mitigate the 100-year frequency storm event and release flows to be at or below the proposed land use condition flow rates. See the table below for the rational method results:

Description	**Q100 Peak Flow Rates**		
Watershed Area	**A**	B	C
Proposed	27.1	22.4	14.2
Existing	16.3	14.7	21.8
Onsite MDP	18.1	16.2	25.3

For purposes of this preliminary drainage report, the 100-year 24-hour peak flow rates for the post developed condition, predeveloped condition and proposed developed condition per the land use on the MDP were the only storm events analyzed for mitigation for watersheds A and B. Since watershed C generated less flow in the proposed condition compared to the proposed developed condition per the land use on the MDP no increased runoff mitigation is required for this watershed. Therefore, no unit hydrographs for the watershed C were provided. The project storm mitigation is provided by utilizing the underground storm drain detention system and the outlet control structures. The total mitigation volume required was determined by selecting the flow rates from the recess limb of the proposed unit hydrograph runs for the 100-year 24-hour storm event that are equal or less than the flow rates from the proposed land use conditions. Smaller storm events were not analyzed in this preliminary phase however, since the storm volume demand to mitigate the storm flows from the 100-year 24hour event is expected to be considerably larger than volumes produced by the smaller storm events, thus a conservative approach.

MDP Land Use Condition Watershed A Volume: 1.65 ac-ft; $Q_{100\text{-}24hr}$: 5.43 cfs
Proposed Condition Watershed A Volume: 2.78 ac-ft; $Q_{100\text{-}24hr}$: 7.50 cfs
Underground Chamber Watershed A Volume: *2.87 ac-ft

MDP Land Use Condition Watershed B Volume: 1.59 ac-ft; $Q_{100\text{-}24hr}$: 5.01 cfs
Proposed Condition Watershed B Volume: 2.31 ac-ft; $Q_{100\text{-}24hr}$: 6.14 cfs
Underground Chamber Watershed B Volume: *2.46 ac-ft

*For watershed "A" since this volume is greater than 2.86 ac-ft the underground chambers have enough storage to mitigate peak storm flows to the proposed land use levels. Similarly for watershed "B" since the volume provided by the underground chambers exceeds 2.37 ac-ft, there is enough storage to mitigate peak storm flows to the proposed land use levels. See the table on the following page for the unit hydrograph results:

Watershed A:

Storm Duration	SP Q_{peak}	SP V_{TOTAL}	MDP Q_{PEAK}	MDP V_{TOTAL}
1	30.43	1.1349	26.57	0.9038
3	20.53	1.8024	17.12	1.2763
6	17.00	2.1921	13.88	1.444
24	7.50	4.2598	5.43	2.5742
Acreage	12.14		11.21	

Watershed B:

Storm Duration	SP Q_{peak}	SP V_{TOTAL}	MDP Q_{PEAK}	MDP V_{TOTAL}
1	23.54	0.8679	26.09	0.8709
3	17.11	1.4844	16.76	1.2084
6	14.15	1.8091	13.51	1.3741
24	6.14	3.5159	5.01	2.4376
Acreage	10.13		11.08	

METHODOLOGY

HYDROLOGY

Hydrologic calculations were performed using the Riverside County Rational Method from RCFCD & WCD Hydrology Manual, dated April 1978. The 100-year design discharge was computed by generating a hydrologic "link-node" model in which divides the area into drainage sub-areas, each tributary to a concentration point or hydrologic "node" point determined by the proposed layout. The computer results are included in section 2. The following assumptions/guidelines were applied for use of the Rational Method:

1. The map from the Riverside County Hydrology Manual indicates that the study area consists Group "B", "C" AND "D" soils. A USGS soils map for the project site is included as Exhibit D, under the Exhibit section.
2. Initial sub-areas were drawn to be less than 10-acres in size and less than 1,000 feet in length, per County guidelines. Time of concentration for the initial sub-area is based on Time of Concentration Nomograph for Initial Sub-area from the Hydrology Manual.
3. Antecedent Moisture Condition 2 was used for 100-year storm events.
4. Standard intensity-duration curve data for the project area was used for the Perris Valley area; Plate D-4.1.

HYDRAULICS

Civil Design hydrology module was used for preliminarily sizing the storm drainpipe system. The onsite storm drain infrastructure will consist of pipe sizes ranging from 12"-48" in diameter. A more detail

analysis will be provided in subsequent submittals and a WSPG analysis for onsite storm drainpipe system will be performed during final engineering.

CONCLUSIONS & RECOMMENDATIONS

The hydrology analyses evaluated the proposed development to determine the necessary onsite drainage improvements required to mitigate flows for increased runoff and it has been concluded that:

1. The proposed drainage facilities will adequately convey the 100-year flows and provide flood protection to the project site.
2. The proposed underground pipe chamber system will have sufficient storage to adequately mitigate for increased runoff.

SECTION 2 - HYDROLOGY ANALYSIS

100-YEAR EXISTING ON-SITE HYDROLOGY WATERSHED A (RATIONAL METHOD)

100-YEAR EXISTING ON-SITE HYDROLOGY WATERSHED B (RATIONAL METHOD)

100-YEAR EXISTING OFF-SITE HYDROLOGY WATERSHED C (RATIONAL METHOD)

100-YEAR PROPOSED MPD LAND USE ON-SITE HYDROLOGY WATERSHED A (RATIONAL METHOD)

100-YEAR PROPOSED MPD LAND USE ON-SITE HYDROLOGY WATERSHED B (RATIONAL METHOD)

100-YEAR PROPOSED MPD LAND USE OFF-SITE HYDROLOGY WATERSHED C (RATIONAL METHOD)

100-YEAR PROPOSED ON-SITE HYDROLOGY WATERSHED A (RATIONAL METHOD)

100-YEAR PROPOSED ON-SITE HYDROLOGY WATERSHED B (RATIONAL METHOD)

100-YEAR PROPOSED OFF-SITE HYDROLOGY WATERSHED C (RATIONAL METHOD)

100-YEAR PROPOSED ON-SITE HYDROLOGY WITH OFFSITES WATERSHED A-B-X (RATIONAL METHOD)

100-YEAR-24 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-24 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-24 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-24 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-6 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-6 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-6 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-6 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-3 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-3 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-3 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-3 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-1 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-1 HOUR STORM PROPOSED MDP LAND USE ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

100-YEAR-1 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED A (UNIT HYDROGRAPH METHOD)

100-YEAR-1 HOUR STORM PROPOSED ON-SITE HYDROLOGY WATERSHED B (UNIT HYDROGRAPH METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/19/23 File:qa100x.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
EXISTING CONDITION - WATERSHED A
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 455.000(Ft.)
Top (of initial area) elevation = 1443.800(Ft.)
Bottom (of initial area) elevation = 1440.000(Ft.)
Difference in elevation = 3.800(Ft.)

```
Slope =    0.00835  s(percent)=       0.84
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.963 min.
Rainfall intensity =      2.143(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.766
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.904(CFS)
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       11.000 to Point/Station       12.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      9.628(CFS)
Depth of flow =   0.312(Ft.), Average velocity =   0.992(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      9.628(CFS)
  '     '    flow top width =     62.313(Ft.)
  '     '    velocity=    0.992(Ft/s)
  '     '    area =      9.707(Sq.Ft)
  '     '    Froude number =     0.443

Upstream point elevation =  1440.000(Ft.)
Downstream point elevation =  1437.900(Ft.)
Flow length =   439.000(Ft.)
Travel time  =    7.38 min.
Time of concentration =   23.34 min.
Depth of flow =   0.312(Ft.)
Average velocity =   0.992(Ft/s)
Total irregular channel flow =     9.628(CFS)
Irregular channel normal depth above invert elev. =   0.312(Ft.)
Average velocity of channel(s) =   0.992(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.150
Decimal fraction soil group C = 0.710
Decimal fraction soil group D = 0.140
RI index for soil(AMC 2)  =  85.22
Pervious area fraction =  1.000; Impervious fraction =  0.000
```

Rainfall intensity = 1.779(In/Hr) for a 100.0 year storm
Subarea runoff = 13.374(CFS) for 9.440(Ac.)
Total runoff = 16.278(CFS) Total area = 11.210(Ac.)
Depth of flow = 0.379(Ft.), Average velocity = 1.131(Ft/s)
End of computations, total study area = 11.21 (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 = 84.1

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/19/23 File:qb100x.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
EXISTING CONDITION - WATERSHED B
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 20.000 to Point/Station 21.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 328.000(Ft.)
Top (of initial area) elevation = 1442.900(Ft.)
Bottom (of initial area) elevation = 1440.900(Ft.)
Difference in elevation = 2.000(Ft.)

```
Slope =    0.00610  s(percent)=       0.61
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.914 min.
Rainfall intensity =      2.215(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.769
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.335(CFS)
Total initial stream area =        1.370(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       21.000 to Point/Station       22.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.543(CFS)
Depth of flow =   0.317(Ft.), Average velocity =   0.850(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      8.543(CFS)
  '     '    flow top width =     63.395(Ft.)
  '     '    velocity=    0.850(Ft/s)
  '     '    area =     10.047(Sq.Ft)
  '     '    Froude number =     0.376

Upstream point elevation =  1440.900(Ft.)
Downstream point elevation =  1439.000(Ft.)
Flow length =   553.000(Ft.)
Travel time  =   10.84 min.
Time of concentration =   25.75 min.
Depth of flow =   0.317(Ft.)
Average velocity =   0.850(Ft/s)
Total irregular channel flow =     8.543(CFS)
Irregular channel normal depth above invert elev. =   0.317(Ft.)
Average velocity of channel(s) =   0.850(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.850
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2)  =  79.65
Pervious area fraction =  1.000; Impervious fraction =  0.000
```

Rainfall intensity = 1.695(In/Hr) for a 100.0 year storm
Subarea runoff = 12.335(CFS) for 9.710(Ac.)
Total runoff = 14.670(CFS) Total area = 11.080(Ac.)
Depth of flow = 0.388(Ft.), Average velocity = 0.973(Ft/s)
End of computations, total study area = 11.08 (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 = 79.4

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/07/24
File:c100pretail.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
EXISTING CONDITION - WATERSHED C
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++

Process from Point/Station 40.000 to Point/Station 41.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 519.000(Ft.)
Top (of initial area) elevation = 1449.300(Ft.)
Bottom (of initial area) elevation = 1443.200(Ft.)

```
Difference in elevation =     6.100(Ft.)
Slope =    0.01175  s(percent)=       1.18
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.715 min.
Rainfall intensity =      2.159(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.330
Decimal fraction soil group C = 0.670
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  83.36
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.004(CFS)
Total initial stream area =        6.360(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       40.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.360(Ac.)
Runoff from this stream =     11.004(CFS)
Time of concentration =   15.71 min.
Rainfall intensity =     2.159(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   496.000(Ft.)
Top (of initial area) elevation =  1449.300(Ft.)
Bottom (of initial area) elevation =  1443.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.01270  s(percent)=       1.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      2.195(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.773
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.920
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.64
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.108(CFS)
Total initial stream area =        6.550(Ac.)
Pervious area fraction = 1.000


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

```
Process from Point/Station       40.000 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.550(Ac.)
Runoff from this stream =     11.108(CFS)
Time of concentration =   15.19 min.
Rainfall intensity =     2.195(In/Hr)
Summary of stream data:

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


1       11.004     15.71               2.159
2       11.108     15.19               2.195
Largest stream flow has longer or shorter time of concentration
Qp =     11.108 + sum of
        Qa          Tb/Ta
        11.004 *    0.967 =     10.640
Qp =     21.748

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.004      11.108
Area of streams before confluence:
        6.360        6.550


Results of confluence:
Total flow rate =     21.748(CFS)
Time of concentration =    15.195 min.
Effective stream area after confluence  =     12.910(Ac.)
End of computations, total study area =           12.91 (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 =  81.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/15/23 File:qa100x.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LANDUSE CONDITION - WATERSHED A
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 455.000(Ft.)
Top (of initial area) elevation = 1443.800(Ft.)
Bottom (of initial area) elevation = 1440.000(Ft.)
Difference in elevation = 3.800(Ft.)

```
Slope =    0.00835  s(percent)=       0.84
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.747 min.
Rainfall intensity =      2.490(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.767
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.380(CFS)
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =     10.771(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   1.020(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     10.771(CFS)
  '     '    flow top width =     64.990(Ft.)
  '     '    velocity=    1.020(Ft/s)
  '     '    area =     10.559(Sq.Ft)
  '     '    Froude number =     0.446

Upstream point elevation =  1440.000(Ft.)
Downstream point elevation =  1437.900(Ft.)
Flow length =   439.000(Ft.)
Travel time  =    7.17 min.
Time of concentration =   18.92 min.
Depth of flow =   0.325(Ft.)
Average velocity =   1.020(Ft/s)
Total irregular channel flow =    10.771(CFS)
Irregular channel normal depth above invert elev. =   0.325(Ft.)
Average velocity of channel(s) =   1.020(Ft/s)
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.150
Decimal fraction soil group C = 0.710
Decimal fraction soil group D = 0.140
RI index for soil(AMC 2)  =  67.89
Pervious area fraction =  0.500; Impervious fraction =  0.500
```

Rainfall intensity = 1.972(In/Hr) for a 100.0 year storm
Subarea runoff = 14.721(CFS) for 9.440(Ac.)
Total runoff = 18.101(CFS) Total area = 11.210(Ac.)
Depth of flow = 0.395(Ft.), Average velocity = 1.161(Ft/s)
End of computations, total study area = 11.21 (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 = 66.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/15/23 File:qb100x.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PRK
PROPOSED LANDUSE CONDITION - WATERHSED B
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 20.000 to Point/Station 21.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 328.000(Ft.)
Top (of initial area) elevation = 1442.900(Ft.)
Bottom (of initial area) elevation = 1440.900(Ft.)
Difference in elevation = 2.000(Ft.)

```
Slope =    0.00610  s(percent)=       0.61
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.974 min.
Rainfall intensity =      2.575(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.770
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.716(CFS)
Total initial stream area =        1.370(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       21.000 to Point/Station       22.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      9.476(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   0.873(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2            100.00              0.00
      3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      9.476(CFS)
  '     '    flow top width =     65.907(Ft.)
  '     '    velocity=    0.873(Ft/s)
  '     '    area =     10.859(Sq.Ft)
  '     '    Froude number =     0.379

Upstream point elevation =  1440.900(Ft.)
Downstream point elevation =  1439.000(Ft.)
Flow length =   553.000(Ft.)
Travel time  =   10.56 min.
Time of concentration =   21.54 min.
Depth of flow =   0.330(Ft.)
Average velocity =   0.873(Ft/s)
Total irregular channel flow =     9.476(CFS)
Irregular channel normal depth above invert elev. =   0.330(Ft.)
Average velocity of channel(s) =   0.873(Ft/s)
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.850
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2)  =  58.85
Pervious area fraction =  0.500; Impervious fraction =  0.500
```

Rainfall intensity = 1.850(In/Hr) for a 100.0 year storm
Subarea runoff = 13.461(CFS) for 9.710(Ac.)
Total runoff = 16.177(CFS) Total area = 11.080(Ac.)
Depth of flow = 0.403(Ft.), Average velocity = 0.997(Ft/s)
End of computations, total study area = 11.08 (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 = 58.5

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/07/24
File:c100pretail.out

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

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

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 40.000 to Point/Station 41.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 519.000(Ft.)
Top (of initial area) elevation = 1449.300(Ft.)
Bottom (of initial area) elevation = 1443.200(Ft.)
Difference in elevation = 6.100(Ft.)
Slope = 0.01175 s(percent)= 1.18
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.564 min.
Rainfall intensity = 2.510(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.000

```
Decimal fraction soil group B = 0.330
Decimal fraction soil group C = 0.670
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  64.71
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     12.751(CFS)
Total initial stream area =        6.360(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.360(Ac.)
Runoff from this stream =     12.751(CFS)
Time of concentration =   11.56 min.
Rainfall intensity =     2.510(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   496.000(Ft.)
Top (of initial area) elevation =  1449.300(Ft.)
Bottom (of initial area) elevation =  1443.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.01270  s(percent)=       1.27
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.181 min.
Rainfall intensity =      2.551(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.773
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.920
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     12.916(CFS)
Total initial stream area =        6.550(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       40.000 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.550(Ac.)
Runoff from this stream =     12.916(CFS)
Time of concentration =   11.18 min.
```

Rainfall intensity = 2.551(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	12.751	11.56	2.510
2	12.916	11.18	2.551

Largest stream flow has longer or shorter time of concentration
Qp = 12.916 + sum of

Qa	Tb/Ta	
12.751 *	0.967 =	12.329

Qp = 25.245

Total of 2 main streams to confluence:
Flow rates before confluence point:
12.751 12.916
Area of streams before confluence:
6.360 6.550

Results of confluence:
Total flow rate = 25.245(CFS)
Time of concentration = 11.181 min.
Effective stream area after confluence = 12.910(Ac.)
End of computations, total study area = 12.91 (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 = 60.8

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/26/23 File:aretail.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED A
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 11.100 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 637.000(Ft.)
Top (of initial area) elevation = 1447.200(Ft.)
Bottom (of initial area) elevation = 1443.100(Ft.)
Difference in elevation = 4.100(Ft.)
Slope = 0.00644 s(percent)= 0.64

```
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.891 min.
Rainfall intensity =      2.584(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.540
Decimal fraction soil group C = 0.460
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.98
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.875(CFS)
Total initial stream area =        4.350(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1436.170(Ft.)
Downstream point/station elevation =  1434.060(Ft.)
Pipe length  =   421.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.875(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.875(CFS)
Normal flow depth in pipe =   15.28(In.)
Flow top width inside pipe =   18.70(In.)
Critical Depth =   14.03(In.)
Pipe flow velocity =      5.26(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    12.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.350(Ac.)
Runoff from this stream =      9.875(CFS)
Time of concentration =   12.22 min.
Rainfall intensity =     2.442(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.100 to Point/Station       20.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   467.000(Ft.)
Top (of initial area) elevation =  1445.460(Ft.)
Bottom (of initial area) elevation =  1439.100(Ft.)
Difference in elevation =     6.360(Ft.)
Slope =    0.01362  s(percent)=       1.36
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    8.280 min.
Rainfall intensity =      2.956(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.940
Decimal fraction soil group D = 0.060
RI index for soil(AMC 2)  =  69.36
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.214(CFS)
Total initial stream area =        3.140(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.200 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1434.980(Ft.)
Downstream point/station elevation =  1434.060(Ft.)
Pipe length  =   184.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.214(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.214(CFS)
Normal flow depth in pipe =   13.36(In.)
Flow top width inside pipe =   20.21(In.)
Critical Depth =   12.76(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =     8.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.200 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.140(Ac.)
Runoff from this stream =      8.214(CFS)
Time of concentration =    8.88 min.
Rainfall intensity =     2.856(In/Hr)
Summary of stream data:

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


1        9.875     12.22               2.442
2        8.214      8.88               2.856
Largest stream flow has longer time of concentration
Qp =      9.875 + sum of
        Qb         Ia/Ib
         8.214 *    0.855 =      7.025
Qp =     16.899
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
       9.875       8.214
Area of streams before confluence:
        4.350        3.140


Results of confluence:
Total flow rate =     16.899(CFS)
Time of concentration =    12.224 min.
Effective stream area after confluence  =      7.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1434.060(Ft.)
Downstream point/station elevation =  1432.920(Ft.)
Pipe length  =   228.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.899(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.899(CFS)
Normal flow depth in pipe =   17.79(In.)
Flow top width inside pipe =   25.60(In.)
Critical Depth =   17.23(In.)
Pipe flow velocity =      6.08(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =    12.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.490(Ac.)
Runoff from this stream =     16.899(CFS)
Time of concentration =   12.85 min.
Rainfall intensity =     2.383(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.100 to Point/Station       21.200
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   373.000(Ft.)
Top (of initial area) elevation =  1446.300(Ft.)
Bottom (of initial area) elevation =  1440.300(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01609  s(percent)=       1.61
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.320 min.
Rainfall intensity =      3.140(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
```

```
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.670
Decimal fraction soil group D = 0.330
RI index for soil(AMC 2)  =  70.98
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.266(CFS)
Total initial stream area =        2.610(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.200 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1433.930(Ft.)
Downstream point/station elevation =  1433.000(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.266(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.266(CFS)
Normal flow depth in pipe =   14.63(In.)
Flow top width inside pipe =   14.05(In.)
Critical Depth =   12.53(In.)
Pipe flow velocity =      4.73(Ft/s)
Travel time through pipe =    0.67 min.
Time of concentration (TC) =     7.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.200 to Point/Station       22.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.610(Ac.)
Runoff from this stream =      7.266(CFS)
Time of concentration =    7.99 min.
Rainfall intensity =     3.007(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       21.300
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   390.000(Ft.)
Top (of initial area) elevation =  1447.600(Ft.)
Bottom (of initial area) elevation =  1440.900(Ft.)
Difference in elevation =     6.700(Ft.)
Slope =    0.01718  s(percent)=       1.72
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.354 min.
Rainfall intensity =      3.133(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.790
```

```
Decimal fraction soil group C = 0.160
Decimal fraction soil group D = 0.050
RI index for soil(AMC 2)  =  59.03
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.235(CFS)
Total initial stream area =        1.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.300 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1433.450(Ft.)
Downstream point/station elevation =  1433.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.235(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.235(CFS)
Normal flow depth in pipe =   11.06(In.)
Flow top width inside pipe =   17.52(In.)
Critical Depth =   10.57(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =     7.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.300 to Point/Station       22.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.900(Ac.)
Runoff from this stream =      5.235(CFS)
Time of concentration =    7.67 min.
Rainfall intensity =     3.068(In/Hr)
Summary of stream data:

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


1        7.266      7.99                3.007
2        5.235      7.67                3.068
Largest stream flow has longer time of concentration
Qp =      7.266 + sum of
        Qb         Ia/Ib
         5.235 *    0.980 =      5.131
Qp =     12.397

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.266       5.235
Area of streams before confluence:
        2.610        1.900
Results of confluence:
Total flow rate =     12.397(CFS)
```

```
Time of concentration =     7.993 min.
Effective stream area after confluence =      4.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1433.000(Ft.)
Downstream point/station elevation =  1432.920(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.397(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.397(CFS)
Normal flow depth in pipe =   15.87(In.)
Flow top width inside pipe =   22.72(In.)
Critical Depth =   15.19(In.)
Pipe flow velocity =      5.62(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     8.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.510(Ac.)
Runoff from this stream =     12.397(CFS)
Time of concentration =    8.04 min.
Rainfall intensity =     2.999(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.100 to Point/Station       22.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =    97.000(Ft.)
Top (of initial area) elevation =  1442.600(Ft.)
Bottom (of initial area) elevation =  1438.000(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.04742  s(percent)=       4.74
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
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 =  0.100; Impervious fraction =  0.900
```

```
Initial subarea runoff =      0.472(CFS)
Total initial stream area =        0.140(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.200 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1434.000(Ft.)
Downstream point/station elevation =  1432.920(Ft.)
Pipe length  =   215.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.472(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.472(CFS)
Normal flow depth in pipe =    3.97(In.)
Flow top width inside pipe =    8.94(In.)
Critical Depth =    3.72(In.)
Pipe flow velocity =      2.51(Ft/s)
Travel time through pipe =    1.43 min.
Time of concentration (TC) =     6.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.200 to Point/Station       23.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.140(Ac.)
Runoff from this stream =      0.472(CFS)
Time of concentration =    6.43 min.
Rainfall intensity =     3.346(In/Hr)
Summary of stream data:

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


1       16.899     12.85               2.383
2       12.397      8.04               2.999
3        0.472      6.43               3.346
Largest stream flow has longer time of concentration
Qp =     16.899 + sum of
        Qb         Ia/Ib
        12.397 *    0.795 =      9.853
        Qb         Ia/Ib
         0.472 *    0.712 =      0.336
Qp =     27.088

Total of 3 main streams to confluence:
Flow rates before confluence point:
      16.899      12.397       0.472
Area of streams before confluence:
        7.490        4.510        0.140
```

Results of confluence:
Total flow rate = 27.088(CFS)
Time of concentration = 12.849 min.
Effective stream area after confluence = 12.140(Ac.)
End of computations, total study area = 12.14 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 65.5

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/26/23
File:Q100PRETAIL.out

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

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

20-001 HARVEST LANDING RETAIL CENTER CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED B
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 571.000(Ft.)
Top (of initial area) elevation = 1447.600(Ft.)
Bottom (of initial area) elevation = 1440.500(Ft.)

```
Difference in elevation =     7.100(Ft.)
Slope =    0.01243  s(percent)=       1.24
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.138 min.
Rainfall intensity =      2.816(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.830
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.170
RI index for soil(AMC 2)  =  59.23
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.296(CFS)
Total initial stream area =        3.760(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       11.000 to Point/Station       11.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.640
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2)  =  62.84
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.14 min.
Rainfall intensity =      2.816(In/Hr) for a   100.0 year storm
Subarea runoff =      5.008(CFS) for      2.020(Ac.)
Total runoff =     14.305(CFS)      Total area =       5.780(Ac.)


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Process from Point/Station       11.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1434.290(Ft.)
Downstream point/station elevation =  1433.300(Ft.)
Pipe length  =   203.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.305(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.305(CFS)
Normal flow depth in pipe =   17.91(In.)
Flow top width inside pipe =   20.89(In.)
Critical Depth =   16.35(In.)
Pipe flow velocity =      5.70(Ft/s)
Travel time through pipe =    0.59 min.
Time of concentration (TC) =     9.73 min.


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Process from Point/Station       11.000 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.780(Ac.)
Runoff from this stream =     14.305(CFS)
Time of concentration =    9.73 min.
Rainfall intensity =     2.731(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.100 to Point/Station       11.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   614.000(Ft.)
Top (of initial area) elevation =  1447.200(Ft.)
Bottom (of initial area) elevation =  1442.900(Ft.)
Difference in elevation =     4.300(Ft.)
Slope =    0.00700  s(percent)=       0.70
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.552 min.
Rainfall intensity =      2.625(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.894(CFS)
Total initial stream area =        3.440(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       11.200 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1437.410(Ft.)
Downstream point/station elevation =  1434.780(Ft.)
Pipe length  =   359.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.894(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.894(CFS)
Normal flow depth in pipe =   13.08(In.)
Flow top width inside pipe =   16.05(In.)
Critical Depth =   13.06(In.)
Pipe flow velocity =      5.74(Ft/s)
Travel time through pipe =    1.04 min.
Time of concentration (TC) =    11.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.200 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
```

```
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.440(Ac.)
Runoff from this stream =      7.894(CFS)
Time of concentration =   11.59 min.
Rainfall intensity =     2.506(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.300 to Point/Station       11.400
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   224.000(Ft.)
Top (of initial area) elevation =  1445.000(Ft.)
Bottom (of initial area) elevation =  1441.600(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.01518  s(percent)=       1.52
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.039 min.
Rainfall intensity =      3.450(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.426(CFS)
Total initial stream area =        0.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.400 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1434.970(Ft.)
Downstream point/station elevation =  1434.780(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.426(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.426(CFS)
Normal flow depth in pipe =    9.46(In.)
Flow top width inside pipe =    9.81(In.)
Critical Depth =    8.00(In.)
Pipe flow velocity =      3.65(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     6.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.400 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.800(Ac.)
Runoff from this stream =      2.426(CFS)
```

```
Time of concentration =    6.21 min.
Rainfall intensity =     3.403(In/Hr)
Summary of stream data:

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


1        7.894     11.59                2.506
2        2.426      6.21                3.403
Largest stream flow has longer time of concentration
Qp =      7.894 + sum of
        Qb         Ia/Ib
         2.426 *    0.737 =      1.787
Qp =      9.681

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.894       2.426
Area of streams before confluence:
        3.440        0.800
Results of confluence:
Total flow rate =      9.681(CFS)
Time of concentration =    11.594 min.
Effective stream area after confluence =      4.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1434.780(Ft.)
Downstream point/station elevation =  1433.300(Ft.)
Pipe length  =   203.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.681(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.681(CFS)
Normal flow depth in pipe =   13.14(In.)
Flow top width inside pipe =   20.33(In.)
Critical Depth =   13.90(In.)
Pipe flow velocity =      6.11(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    12.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.240(Ac.)
Runoff from this stream =      9.681(CFS)
Time of concentration =   12.15 min.
Rainfall intensity =     2.450(In/Hr)
Summary of stream data:
```

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


1       14.305      9.73               2.731
2        9.681     12.15               2.450
Largest stream flow has longer or shorter time of concentration
Qp =     14.305 + sum of
        Qa          Tb/Ta
         9.681 *    0.801 =      7.756
Qp =     22.061

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.305       9.681
Area of streams before confluence:
        5.780        4.240


Results of confluence:
Total flow rate =     22.061(CFS)
Time of concentration =     9.732 min.
Effective stream area after confluence  =     10.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1433.300(Ft.)
Downstream point/station elevation =  1433.150(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.061(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.061(CFS)
Normal flow depth in pipe =   18.66(In.)
Flow top width inside pipe =   24.95(In.)
Critical Depth =   19.72(In.)
Pipe flow velocity =      7.53(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     9.78 min.


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Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.020(Ac.)
Runoff from this stream =     22.061(CFS)
Time of concentration =    9.78 min.
Rainfall intensity =     2.725(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
Process from Point/Station       13.100 to Point/Station       13.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =    95.000(Ft.)
Top (of initial area) elevation =  1443.500(Ft.)
Bottom (of initial area) elevation =  1438.400(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.05368  s(percent)=       5.37
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.310
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.690
RI index for soil(AMC 2)  =  69.11
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.370(CFS)
Total initial stream area =        0.110(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1434.590(Ft.)
Downstream point/station elevation =  1433.150(Ft.)
Pipe length  =   288.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.370(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.370(CFS)
Normal flow depth in pipe =    4.59(In.)
Flow top width inside pipe =    5.08(In.)
Critical Depth =    3.71(In.)
Pipe flow velocity =      2.30(Ft/s)
Travel time through pipe =    2.09 min.
Time of concentration (TC) =     7.09 min.


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Process from Point/Station       13.200 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.110(Ac.)
Runoff from this stream =      0.370(CFS)
Time of concentration =    7.09 min.
Rainfall intensity =     3.189(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

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


1       22.061      9.78               2.725
2        0.370      7.09               3.189
Largest stream flow has longer time of concentration
Qp =     22.061 + sum of
        Qb         Ia/Ib
         0.370 *    0.854 =      0.316
Qp =     22.376

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.061       0.370
Area of streams before confluence:
       10.020        0.110


Results of confluence:
Total flow rate =     22.376(CFS)
Time of concentration =     9.776 min.
Effective stream area after confluence  =     10.130(Ac.)
End of computations, total study area =           10.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  58.7
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/26/23 File:q100abo.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED AREAS A+B+X
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 14.000 to Point/Station 14.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 2.725(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000

```
Decimal fraction soil group B = 0.860
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.140
RI index for soil(AMC 2)  =  58.66
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =   9.78 min.  Rain intensity =       2.72(In/Hr)
Total area =        10.13(Ac.)  Total runoff =     22.38(CFS)


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Process from Point/Station       14.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1435.480(Ft.)
Downstream point/station elevation =  1433.560(Ft.)
Pipe length  =   383.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.376(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.376(CFS)
Normal flow depth in pipe =   22.69(In.)
Flow top width inside pipe =   19.78(In.)
Critical Depth =   19.87(In.)
Pipe flow velocity =      6.28(Ft/s)
Travel time through pipe =    1.02 min.
Time of concentration (TC) =    10.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.130(Ac.)
Runoff from this stream =     22.376(CFS)
Time of concentration =   10.79 min.
Rainfall intensity =     2.596(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
----------------------------------------------------------------------------
Rainfall intensity =      2.383(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.320
Decimal fraction soil group C = 0.580
Decimal fraction soil group D = 0.100
RI index for soil(AMC 2)  =  65.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  12.85 min.  Rain intensity =       2.38(In/Hr)
Total area =        12.14(Ac.)  Total runoff =     27.09(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1433.640(Ft.)
Downstream point/station elevation =  1433.560(Ft.)
Pipe length  =    15.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.088(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    27.088(CFS)
Normal flow depth in pipe =   22.34(In.)
Flow top width inside pipe =   26.17(In.)
Critical Depth =   21.30(In.)
Pipe flow velocity =      6.91(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.140(Ac.)
Runoff from this stream =     27.088(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     2.380(In/Hr)
Summary of stream data:

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


1       22.376     10.79               2.596
2       27.088     12.89               2.380
Largest stream flow has longer time of concentration
Qp =     27.088 + sum of
        Qb         Ia/Ib
        22.376 *    0.917 =     20.515
Qp =     47.603

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.376      27.088
Area of streams before confluence:
       10.130       12.140


Results of confluence:
Total flow rate =     47.603(CFS)
Time of concentration =    12.885 min.
Effective stream area after confluence  =     22.270(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1433.560(Ft.)
Downstream point/station elevation =  1429.970(Ft.)
Pipe length  =   518.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.603(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    47.603(CFS)
Normal flow depth in pipe =   25.66(In.)
Flow top width inside pipe =   32.57(In.)
Critical Depth =   26.97(In.)
Pipe flow velocity =      8.83(Ft/s)
Travel time through pipe =    0.98 min.
Time of concentration (TC) =    13.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       31.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1429.970(Ft.)
Downstream point/station elevation =  1429.800(Ft.)
Pipe length  =    54.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.603(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.603(CFS)
Normal flow depth in pipe =   33.00(In.)
Flow top width inside pipe =   28.14(In.)
Critical Depth =   26.42(In.)
Pipe flow velocity =      6.35(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    14.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       31.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.270(Ac.)
Runoff from this stream =     47.603(CFS)
Time of concentration =   14.00 min.
Rainfall intensity =     2.285(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       30.100
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   742.000(Ft.)
Top (of initial area) elevation =  1443.300(Ft.)
Bottom (of initial area) elevation =  1438.000(Ft.)
Difference in elevation =     5.300(Ft.)
```

```
Slope =    0.00714  s(percent)=       0.71
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.337 min.
Rainfall intensity =      2.534(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.924(CFS)
Total initial stream area =        0.860(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.100 to Point/Station       31.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1433.000(Ft.)
Downstream point/station elevation =  1429.800(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.924(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.924(CFS)
Normal flow depth in pipe =    4.16(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    7.59(In.)
Pipe flow velocity =      9.64(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    11.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.100 to Point/Station       31.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.860(Ac.)
Runoff from this stream =      1.924(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     2.526(In/Hr)
Summary of stream data:

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


1       47.603     14.00               2.285
2        1.924     11.42               2.526
Largest stream flow has longer time of concentration
Qp =     47.603 + sum of
        Qb         Ia/Ib
         1.924 *    0.905 =      1.740
```

```
Qp =     49.343

Total of 2 main streams to confluence:
Flow rates before confluence point:
      47.603       1.924
Area of streams before confluence:
       22.270        0.860


Results of confluence:
Total flow rate =     49.343(CFS)
Time of concentration =    14.005 min.
Effective stream area after confluence  =     23.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1429.800(Ft.)
Downstream point/station elevation =  1428.770(Ft.)
Pipe length  =   344.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    49.343(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    49.343(CFS)
Normal flow depth in pipe =   31.03(In.)
Flow top width inside pipe =   36.90(In.)
Critical Depth =   26.35(In.)
Pipe flow velocity =      6.47(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    14.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       34.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     23.130(Ac.)
Runoff from this stream =     49.343(CFS)
Time of concentration =   14.89 min.
Rainfall intensity =     2.217(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.100 to Point/Station       31.200
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   736.000(Ft.)
Top (of initial area) elevation =  1443.030(Ft.)
Bottom (of initial area) elevation =  1439.500(Ft.)
Difference in elevation =     3.530(Ft.)
Slope =    0.00480  s(percent)=       0.48
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.238 min.
```

```
Rainfall intensity =      2.441(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.680
Decimal fraction soil group C = 0.220
Decimal fraction soil group D = 0.100
RI index for soil(AMC 2)  =  60.76
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.439(CFS)
Total initial stream area =        1.140(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.200 to Point/Station       31.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1435.000(Ft.)
Downstream point/station elevation =  1433.600(Ft.)
Pipe length  =    64.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.439(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.439(CFS)
Normal flow depth in pipe =    7.35(In.)
Flow top width inside pipe =    6.97(In.)
Critical Depth =    8.25(In.)
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    12.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.300 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1433.600(Ft.)
Downstream point/station elevation =  1432.370(Ft.)
Pipe length  =   350.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.439(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.439(CFS)
Normal flow depth in pipe =    8.70(In.)
Flow top width inside pipe =   14.81(In.)
Critical Depth =    7.50(In.)
Pipe flow velocity =      3.31(Ft/s)
Travel time through pipe =    1.76 min.
Time of concentration (TC) =    14.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.300 to Point/Station       32.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.140(Ac.)
Runoff from this stream =      2.439(CFS)
```

```
Time of concentration =   14.17 min.
Rainfall intensity =     2.272(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.400 to Point/Station       31.500
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   385.000(Ft.)
Top (of initial area) elevation =  1439.400(Ft.)
Bottom (of initial area) elevation =  1439.080(Ft.)
Difference in elevation =     0.320(Ft.)
Slope =    0.00083  s(percent)=       0.08
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.408 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
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 =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.178(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.500 to Point/Station       31.500
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.886
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 =  0.100; Impervious fraction =  0.900
Time of concentration =    13.41 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
Subarea runoff =      0.682(CFS) for      0.330(Ac.)
Total runoff =      1.860(CFS)      Total area =       0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.500 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1434.640(Ft.)
Downstream point/station elevation =  1432.370(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.860(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.860(CFS)
```

```
Normal flow depth in pipe =    5.31(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    7.47(In.)
Pipe flow velocity =      6.86(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    13.60 min.


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Process from Point/Station       31.500 to Point/Station       32.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.860(CFS)
Time of concentration =   13.60 min.
Rainfall intensity =     2.318(In/Hr)
Summary of stream data:

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


1        2.439     14.17                2.272
2        1.860     13.60                2.318
Largest stream flow has longer time of concentration
Qp =      2.439 + sum of
        Qb         Ia/Ib
         1.860 *    0.980 =      1.823
Qp =      4.262

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.439       1.860
Area of streams before confluence:
        1.140        0.900
Results of confluence:
Total flow rate =      4.262(CFS)
Time of concentration =    14.170 min.
Effective stream area after confluence =      2.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1432.370(Ft.)
Downstream point/station elevation =  1431.010(Ft.)
Pipe length  =   725.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.262(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.262(CFS)
Normal flow depth in pipe =   13.83(In.)
Flow top width inside pipe =   15.19(In.)
Critical Depth =    9.49(In.)
Pipe flow velocity =      2.93(Ft/s)
Travel time through pipe =    4.13 min.
```

```
Time of concentration (TC) =    18.30 min.


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Process from Point/Station       32.000 to Point/Station       33.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.040(Ac.)
Runoff from this stream =      4.262(CFS)
Time of concentration =   18.30 min.
Rainfall intensity =     2.004(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.400 to Point/Station       32.100
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   374.000(Ft.)
Top (of initial area) elevation =  1439.400(Ft.)
Bottom (of initial area) elevation =  1437.700(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00455  s(percent)=       0.45
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.435 min.
Rainfall intensity =      2.773(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
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 =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.353(CFS)
Total initial stream area =        0.550(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       32.100 to Point/Station       32.100
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.270
Decimal fraction soil group D = 0.730
RI index for soil(AMC 2)  =  73.38
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.44 min.
Rainfall intensity =      2.773(In/Hr) for a   100.0 year storm
Subarea runoff =      1.377(CFS) for      0.560(Ac.)
Total runoff =      2.730(CFS)      Total area =       1.110(Ac.)
```

++
Process from Point/Station 32.100 to Point/Station 33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1433.280(Ft.)
Downstream point/station elevation = 1431.010(Ft.)
Pipe length = 77.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.730(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 2.730(CFS)
Normal flow depth in pipe = 7.08(In.)
Flow top width inside pipe = 7.38(In.)
Critical Depth = 8.49(In.)
Pipe flow velocity = 7.32(Ft/s)
Travel time through pipe = 0.18 min.
Time of concentration (TC) = 9.61 min.

++
Process from Point/Station 32.100 to Point/Station 33.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 1.110(Ac.)
Runoff from this stream = 2.730(CFS)
Time of concentration = 9.61 min.
Rainfall intensity = 2.748(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	4.262	18.30	2.004
2	2.730	9.61	2.748

Largest stream flow has longer time of concentration
Qp = 4.262 + sum of
Qb Ia/Ib
2.730 * 0.729 = 1.991
Qp = 6.253

Total of 2 streams to confluence:
Flow rates before confluence point:
4.262 2.730
Area of streams before confluence:
2.040 1.110
Results of confluence:
Total flow rate = 6.253(CFS)
Time of concentration = 18.300 min.
Effective stream area after confluence = 3.150(Ac.)

++
Process from Point/Station 33.000 to Point/Station 34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1431.010(Ft.)

```
Downstream point/station elevation =  1428.770(Ft.)
Pipe length  =   665.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.253(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.253(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   20.53(In.)
Critical Depth =   11.07(In.)
Pipe flow velocity =      4.11(Ft/s)
Travel time through pipe =    2.70 min.
Time of concentration (TC) =    21.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.150(Ac.)
Runoff from this stream =      6.253(CFS)
Time of concentration =   21.00 min.
Rainfall intensity =     1.874(In/Hr)
Summary of stream data:

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


1       49.343     14.89               2.217
2        6.253     21.00               1.874
Largest stream flow has longer or shorter time of concentration
Qp =     49.343 + sum of
        Qa          Tb/Ta
         6.253 *    0.709 =      4.435
Qp =     53.778

Total of 2 main streams to confluence:
Flow rates before confluence point:
      49.343       6.253
Area of streams before confluence:
       23.130        3.150


Results of confluence:
Total flow rate =     53.778(CFS)
Time of concentration =    14.891 min.
Effective stream area after confluence  =     26.280(Ac.)
End of computations, total study area =           26.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  63.5
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/07/24
File:100pcretail.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED C
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 40.000 to Point/Station 41.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 445.000(Ft.)
Top (of initial area) elevation = 1451.200(Ft.)
Bottom (of initial area) elevation = 1443.000(Ft.)

```
Difference in elevation =     8.200(Ft.)
Slope =    0.01843  s(percent)=       1.84
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.954 min.
Rainfall intensity =      1.756(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.606
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.267(CFS)
Total initial stream area =        3.070(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1438.120(Ft.)
Downstream point/station elevation =  1437.110(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.267(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.267(CFS)
Normal flow depth in pipe =    9.39(In.)
Flow top width inside pipe =   14.52(In.)
Critical Depth =    8.73(In.)
Pipe flow velocity =      4.05(Ft/s)
Travel time through pipe =    0.83 min.
Time of concentration (TC) =    24.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.070(Ac.)
Runoff from this stream =      3.267(CFS)
Time of concentration =   24.79 min.
Rainfall intensity =     1.727(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.100 to Point/Station       41.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   391.000(Ft.)
Top (of initial area) elevation =  1451.400(Ft.)
Bottom (of initial area) elevation =  1442.900(Ft.)
Difference in elevation =     8.500(Ft.)
```

```
Slope =    0.02174  s(percent)=       2.17
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.006 min.
Rainfall intensity =      1.831(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.870
Decimal fraction soil group C = 0.130
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.69
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.759(CFS)
Total initial stream area =        3.270(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.200 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1437.660(Ft.)
Downstream point/station elevation =  1437.110(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.759(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.759(CFS)
Normal flow depth in pipe =    7.97(In.)
Flow top width inside pipe =   11.34(In.)
Critical Depth =    9.91(In.)
Pipe flow velocity =      6.79(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    22.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.200 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.270(Ac.)
Runoff from this stream =      3.759(CFS)
Time of concentration =   22.08 min.
Rainfall intensity =     1.828(In/Hr)
Summary of stream data:

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


1        3.267     24.79              1.727
2        3.759     22.08              1.828
Largest stream flow has longer or shorter time of concentration
Qp =      3.759 + sum of
        Qa          Tb/Ta
         3.267 *    0.891 =      2.910
```

```
Qp =      6.670

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.267       3.759
Area of streams before confluence:
        3.070        3.270


Results of confluence:
Total flow rate =      6.670(CFS)
Time of concentration =    22.080 min.
Effective stream area after confluence  =      6.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1437.110(Ft.)
Downstream point/station elevation =  1433.230(Ft.)
Pipe length  =   776.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.670(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.670(CFS)
Normal flow depth in pipe =   13.32(In.)
Flow top width inside pipe =   15.79(In.)
Critical Depth =   12.00(In.)
Pipe flow velocity =      4.76(Ft/s)
Travel time through pipe =    2.72 min.
Time of concentration (TC) =    24.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.340(Ac.)
Runoff from this stream =      6.670(CFS)
Time of concentration =   24.80 min.
Rainfall intensity =     1.727(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.100 to Point/Station       42.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   363.000(Ft.)
Top (of initial area) elevation =  1450.500(Ft.)
Bottom (of initial area) elevation =  1442.000(Ft.)
Difference in elevation =     8.500(Ft.)
Slope =    0.02342  s(percent)=       2.34
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.047 min.
```

```
Rainfall intensity =      1.871(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.340
Decimal fraction soil group C = 0.660
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.58
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.766(CFS)
Total initial stream area =        4.490(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.200 to Point/Station       42.200
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.688
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.320
Decimal fraction soil group C = 0.680
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.84
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    21.05 min.
Rainfall intensity =      1.871(In/Hr) for a   100.0 year storm
Subarea runoff =      2.679(CFS) for      2.080(Ac.)
Total runoff =      8.445(CFS)      Total area =       6.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.200 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1434.280(Ft.)
Downstream point/station elevation =  1433.230(Ft.)
Pipe length  =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.445(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.445(CFS)
Normal flow depth in pipe =   12.43(In.)
Flow top width inside pipe =   16.64(In.)
Critical Depth =   13.51(In.)
Pipe flow velocity =      6.48(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    21.33 min.


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Process from Point/Station       42.200 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.570(Ac.)
```

Runoff from this stream = 8.445(CFS)
Time of concentration = 21.33 min.
Rainfall intensity = 1.859(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.670	24.80	1.727
2	8.445	21.33	1.859

Largest stream flow has longer or shorter time of concentration
Qp = 8.445 + sum of

Qa		Tb/Ta	
6.670	*	0.860	= 5.736

Qp = 14.181

Total of 2 main streams to confluence:
Flow rates before confluence point:
6.670 8.445
Area of streams before confluence:
6.340 6.570

Results of confluence:
Total flow rate = 14.181(CFS)
Time of concentration = 21.330 min.
Effective stream area after confluence = 12.910(Ac.)
End of computations, total study area = 12.91 (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 = 65.8

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 10/11/23 File: QA100XUH24100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED A
100 YEAR, 24 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.21(Ac.) = 0.018 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.21(Ac.) = 0.018 Sq. Mi.
Length along longest watercourse = 894.00(Ft.)
Length along longest watercourse measured to centroid = 600.00(Ft.)
Length along longest watercourse = 0.169 Mi.
Length along longest watercourse measured to centroid = 0.114 Mi.
Difference in elevation = 5.90(Ft.)
Slope along watercourse = 34.8456 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.054 Hr.
Lag time = 3.27 Min.
25% of lag time = 0.82 Min.
40% of lag time = 1.31 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]
11.21	2.00	22.42

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	5.00	56.05

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.210	64.40	0.500

Total Area Entered = 11.21(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
64.4	64.4	0.422	0.500	0.232	1.000	0.232
					Sum (F) =	0.232

Area averaged mean soil loss (F) (In/Hr) = 0.232
Minimum soil loss rate ((In/Hr)) = 0.116
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	152.961	33.884	3.828
2	0.167	305.923	46.792	5.286
3	0.250	458.884	11.012	1.244
4	0.333	611.845	4.794	0.542
5	0.417	764.807	2.382	0.269
6	0.500	917.768	1.136	0.128

Sum = 100.000 Sum= 11.298

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	0.040	(0.412)	0.020	0.020
2	0.17	0.07	0.040	(0.410)	0.020	0.020
3	0.25	0.07	0.040	(0.409)	0.020	0.020
4	0.33	0.10	0.060	(0.407)	0.030	0.030
5	0.42	0.10	0.060	(0.406)	0.030	0.030
6	0.50	0.10	0.060	(0.404)	0.030	0.030
7	0.58	0.10	0.060	(0.402)	0.030	0.030
8	0.67	0.10	0.060	(0.401)	0.030	0.030
9	0.75	0.10	0.060	(0.399)	0.030	0.030
10	0.83	0.13	0.080	(0.398)	0.040	0.040
11	0.92	0.13	0.080	(0.396)	0.040	0.040
12	1.00	0.13	0.080	(0.395)	0.040	0.040
13	1.08	0.10	0.060	(0.393)	0.030	0.030
14	1.17	0.10	0.060	(0.391)	0.030	0.030
15	1.25	0.10	0.060	(0.390)	0.030	0.030
16	1.33	0.10	0.060	(0.388)	0.030	0.030
17	1.42	0.10	0.060	(0.387)	0.030	0.030
18	1.50	0.10	0.060	(0.385)	0.030	0.030
19	1.58	0.10	0.060	(0.384)	0.030	0.030
20	1.67	0.10	0.060	(0.382)	0.030	0.030
21	1.75	0.10	0.060	(0.381)	0.030	0.030
22	1.83	0.13	0.080	(0.379)	0.040	0.040
23	1.92	0.13	0.080	(0.378)	0.040	0.040
24	2.00	0.13	0.080	(0.376)	0.040	0.040
25	2.08	0.13	0.080	(0.375)	0.040	0.040
26	2.17	0.13	0.080	(0.373)	0.040	0.040
27	2.25	0.13	0.080	(0.372)	0.040	0.040
28	2.33	0.13	0.080	(0.370)	0.040	0.040
29	2.42	0.13	0.080	(0.368)	0.040	0.040
30	2.50	0.13	0.080	(0.367)	0.040	0.040
31	2.58	0.17	0.100	(0.365)	0.050	0.050
32	2.67	0.17	0.100	(0.364)	0.050	0.050
33	2.75	0.17	0.100	(0.362)	0.050	0.050
34	2.83	0.17	0.100	(0.361)	0.050	0.050
35	2.92	0.17	0.100	(0.360)	0.050	0.050
36	3.00	0.17	0.100	(0.358)	0.050	0.050
37	3.08	0.17	0.100	(0.357)	0.050	0.050
38	3.17	0.17	0.100	(0.355)	0.050	0.050
39	3.25	0.17	0.100	(0.354)	0.050	0.050
40	3.33	0.17	0.100	(0.352)	0.050	0.050
41	3.42	0.17	0.100	(0.351)	0.050	0.050

42	3.50	0.17	0.100	(0.349)	0.050	0.050
43	3.58	0.17	0.100	(0.348)	0.050	0.050
44	3.67	0.17	0.100	(0.346)	0.050	0.050
45	3.75	0.17	0.100	(0.345)	0.050	0.050
46	3.83	0.20	0.120	(0.343)	0.060	0.060
47	3.92	0.20	0.120	(0.342)	0.060	0.060
48	4.00	0.20	0.120	(0.340)	0.060	0.060
49	4.08	0.20	0.120	(0.339)	0.060	0.060
50	4.17	0.20	0.120	(0.338)	0.060	0.060
51	4.25	0.20	0.120	(0.336)	0.060	0.060
52	4.33	0.23	0.140	(0.335)	0.070	0.070
53	4.42	0.23	0.140	(0.333)	0.070	0.070
54	4.50	0.23	0.140	(0.332)	0.070	0.070
55	4.58	0.23	0.140	(0.330)	0.070	0.070
56	4.67	0.23	0.140	(0.329)	0.070	0.070
57	4.75	0.23	0.140	(0.328)	0.070	0.070
58	4.83	0.27	0.160	(0.326)	0.080	0.080
59	4.92	0.27	0.160	(0.325)	0.080	0.080
60	5.00	0.27	0.160	(0.323)	0.080	0.080
61	5.08	0.20	0.120	(0.322)	0.060	0.060
62	5.17	0.20	0.120	(0.321)	0.060	0.060
63	5.25	0.20	0.120	(0.319)	0.060	0.060
64	5.33	0.23	0.140	(0.318)	0.070	0.070
65	5.42	0.23	0.140	(0.316)	0.070	0.070
66	5.50	0.23	0.140	(0.315)	0.070	0.070
67	5.58	0.27	0.160	(0.314)	0.080	0.080
68	5.67	0.27	0.160	(0.312)	0.080	0.080
69	5.75	0.27	0.160	(0.311)	0.080	0.080
70	5.83	0.27	0.160	(0.309)	0.080	0.080
71	5.92	0.27	0.160	(0.308)	0.080	0.080
72	6.00	0.27	0.160	(0.307)	0.080	0.080
73	6.08	0.30	0.180	(0.305)	0.090	0.090
74	6.17	0.30	0.180	(0.304)	0.090	0.090
75	6.25	0.30	0.180	(0.303)	0.090	0.090
76	6.33	0.30	0.180	(0.301)	0.090	0.090
77	6.42	0.30	0.180	(0.300)	0.090	0.090
78	6.50	0.30	0.180	(0.299)	0.090	0.090
79	6.58	0.33	0.200	(0.297)	0.100	0.100
80	6.67	0.33	0.200	(0.296)	0.100	0.100
81	6.75	0.33	0.200	(0.295)	0.100	0.100
82	6.83	0.33	0.200	(0.293)	0.100	0.100
83	6.92	0.33	0.200	(0.292)	0.100	0.100
84	7.00	0.33	0.200	(0.291)	0.100	0.100
85	7.08	0.33	0.200	(0.289)	0.100	0.100
86	7.17	0.33	0.200	(0.288)	0.100	0.100
87	7.25	0.33	0.200	(0.287)	0.100	0.100
88	7.33	0.37	0.220	(0.285)	0.110	0.110
89	7.42	0.37	0.220	(0.284)	0.110	0.110
90	7.50	0.37	0.220	(0.283)	0.110	0.110
91	7.58	0.40	0.240	(0.281)	0.120	0.120

92	7.67	0.40	0.240	(0.280)	0.120	0.120
93	7.75	0.40	0.240	(0.279)	0.120	0.120
94	7.83	0.43	0.260	(0.278)	0.130	0.130
95	7.92	0.43	0.260	(0.276)	0.130	0.130
96	8.00	0.43	0.260	(0.275)	0.130	0.130
97	8.08	0.50	0.300	(0.274)	0.150	0.150
98	8.17	0.50	0.300	(0.272)	0.150	0.150
99	8.25	0.50	0.300	(0.271)	0.150	0.150
100	8.33	0.50	0.300	(0.270)	0.150	0.150
101	8.42	0.50	0.300	(0.269)	0.150	0.150
102	8.50	0.50	0.300	(0.267)	0.150	0.150
103	8.58	0.53	0.320	(0.266)	0.160	0.160
104	8.67	0.53	0.320	(0.265)	0.160	0.160
105	8.75	0.53	0.320	(0.264)	0.160	0.160
106	8.83	0.57	0.340	(0.262)	0.170	0.170
107	8.92	0.57	0.340	(0.261)	0.170	0.170
108	9.00	0.57	0.340	(0.260)	0.170	0.170
109	9.08	0.63	0.380	(0.259)	0.190	0.190
110	9.17	0.63	0.380	(0.257)	0.190	0.190
111	9.25	0.63	0.380	(0.256)	0.190	0.190
112	9.33	0.67	0.400	(0.255)	0.200	0.200
113	9.42	0.67	0.400	(0.254)	0.200	0.200
114	9.50	0.67	0.400	(0.253)	0.200	0.200
115	9.58	0.70	0.420	(0.251)	0.210	0.210
116	9.67	0.70	0.420	(0.250)	0.210	0.210
117	9.75	0.70	0.420	(0.249)	0.210	0.210
118	9.83	0.73	0.440	(0.248)	0.220	0.220
119	9.92	0.73	0.440	(0.247)	0.220	0.220
120	10.00	0.73	0.440	(0.245)	0.220	0.220
121	10.08	0.50	0.300	(0.244)	0.150	0.150
122	10.17	0.50	0.300	(0.243)	0.150	0.150
123	10.25	0.50	0.300	(0.242)	0.150	0.150
124	10.33	0.50	0.300	(0.241)	0.150	0.150
125	10.42	0.50	0.300	(0.239)	0.150	0.150
126	10.50	0.50	0.300	(0.238)	0.150	0.150
127	10.58	0.67	0.400	(0.237)	0.200	0.200
128	10.67	0.67	0.400	(0.236)	0.200	0.200
129	10.75	0.67	0.400	(0.235)	0.200	0.200
130	10.83	0.67	0.400	(0.234)	0.200	0.200
131	10.92	0.67	0.400	(0.233)	0.200	0.200
132	11.00	0.67	0.400	(0.231)	0.200	0.200
133	11.08	0.63	0.380	(0.230)	0.190	0.190
134	11.17	0.63	0.380	(0.229)	0.190	0.190
135	11.25	0.63	0.380	(0.228)	0.190	0.190
136	11.33	0.63	0.380	(0.227)	0.190	0.190
137	11.42	0.63	0.380	(0.226)	0.190	0.190
138	11.50	0.63	0.380	(0.225)	0.190	0.190
139	11.58	0.57	0.340	(0.224)	0.170	0.170
140	11.67	0.57	0.340	(0.222)	0.170	0.170
141	11.75	0.57	0.340	(0.221)	0.170	0.170

142	11.83	0.60	0.360	(	0.220)	0.180		0.180
143	11.92	0.60	0.360	(	0.219)	0.180		0.180
144	12.00	0.60	0.360	(	0.218)	0.180		0.180
145	12.08	0.83	0.500		0.217	(0.250)		0.283
146	12.17	0.83	0.500		0.216	(0.250)		0.284
147	12.25	0.83	0.500		0.215	(0.250)		0.285
148	12.33	0.87	0.520		0.214	(0.260)		0.306
149	12.42	0.87	0.520		0.213	(0.260)		0.307
150	12.50	0.87	0.520		0.212	(0.260)		0.308
151	12.58	0.93	0.560		0.210	(0.280)		0.350
152	12.67	0.93	0.560		0.209	(0.280)		0.351
153	12.75	0.93	0.560		0.208	(0.280)		0.352
154	12.83	0.97	0.580		0.207	(0.290)		0.373
155	12.92	0.97	0.580		0.206	(0.290)		0.374
156	13.00	0.97	0.580		0.205	(0.290)		0.375
157	13.08	1.13	0.680		0.204	(0.340)		0.476
158	13.17	1.13	0.680		0.203	(0.340)		0.477
159	13.25	1.13	0.680		0.202	(0.340)		0.478
160	13.33	1.13	0.680		0.201	(0.340)		0.479
161	13.42	1.13	0.680		0.200	(0.340)		0.480
162	13.50	1.13	0.680		0.199	(0.340)		0.481
163	13.58	0.77	0.460		0.198	(0.230)		0.262
164	13.67	0.77	0.460		0.197	(0.230)		0.263
165	13.75	0.77	0.460		0.196	(0.230)		0.264
166	13.83	0.77	0.460		0.195	(0.230)		0.265
167	13.92	0.77	0.460		0.194	(0.230)		0.266
168	14.00	0.77	0.460		0.193	(0.230)		0.267
169	14.08	0.90	0.540		0.192	(0.270)		0.348
170	14.17	0.90	0.540		0.191	(0.270)		0.349
171	14.25	0.90	0.540		0.190	(0.270)		0.350
172	14.33	0.87	0.520		0.189	(0.260)		0.331
173	14.42	0.87	0.520		0.188	(0.260)		0.332
174	14.50	0.87	0.520		0.187	(0.260)		0.333
175	14.58	0.87	0.520		0.186	(0.260)		0.334
176	14.67	0.87	0.520		0.185	(0.260)		0.335
177	14.75	0.87	0.520		0.184	(0.260)		0.336
178	14.83	0.83	0.500		0.183	(0.250)		0.317
179	14.92	0.83	0.500		0.182	(0.250)		0.318
180	15.00	0.83	0.500		0.181	(0.250)		0.319
181	15.08	0.80	0.480		0.181	(0.240)		0.299
182	15.17	0.80	0.480		0.180	(0.240)		0.300
183	15.25	0.80	0.480		0.179	(0.240)		0.301
184	15.33	0.77	0.460		0.178	(0.230)		0.282
185	15.42	0.77	0.460		0.177	(0.230)		0.283
186	15.50	0.77	0.460		0.176	(0.230)		0.284
187	15.58	0.63	0.380		0.175	(0.190)		0.205
188	15.67	0.63	0.380		0.174	(0.190)		0.206
189	15.75	0.63	0.380		0.173	(0.190)		0.207
190	15.83	0.63	0.380		0.172	(0.190)		0.208
191	15.92	0.63	0.380		0.172	(0.190)		0.208

192	16.00	0.63	0.380	0.171	(0.190)	0.209
193	16.08	0.13	0.080	(0.170)	0.040	0.040
194	16.17	0.13	0.080	(0.169)	0.040	0.040
195	16.25	0.13	0.080	(0.168)	0.040	0.040
196	16.33	0.13	0.080	(0.167)	0.040	0.040
197	16.42	0.13	0.080	(0.166)	0.040	0.040
198	16.50	0.13	0.080	(0.165)	0.040	0.040
199	16.58	0.10	0.060	(0.165)	0.030	0.030
200	16.67	0.10	0.060	(0.164)	0.030	0.030
201	16.75	0.10	0.060	(0.163)	0.030	0.030
202	16.83	0.10	0.060	(0.162)	0.030	0.030
203	16.92	0.10	0.060	(0.161)	0.030	0.030
204	17.00	0.10	0.060	(0.161)	0.030	0.030
205	17.08	0.17	0.100	(0.160)	0.050	0.050
206	17.17	0.17	0.100	(0.159)	0.050	0.050
207	17.25	0.17	0.100	(0.158)	0.050	0.050
208	17.33	0.17	0.100	(0.157)	0.050	0.050
209	17.42	0.17	0.100	(0.157)	0.050	0.050
210	17.50	0.17	0.100	(0.156)	0.050	0.050
211	17.58	0.17	0.100	(0.155)	0.050	0.050
212	17.67	0.17	0.100	(0.154)	0.050	0.050
213	17.75	0.17	0.100	(0.153)	0.050	0.050
214	17.83	0.13	0.080	(0.153)	0.040	0.040
215	17.92	0.13	0.080	(0.152)	0.040	0.040
216	18.00	0.13	0.080	(0.151)	0.040	0.040
217	18.08	0.13	0.080	(0.150)	0.040	0.040
218	18.17	0.13	0.080	(0.150)	0.040	0.040
219	18.25	0.13	0.080	(0.149)	0.040	0.040
220	18.33	0.13	0.080	(0.148)	0.040	0.040
221	18.42	0.13	0.080	(0.147)	0.040	0.040
222	18.50	0.13	0.080	(0.147)	0.040	0.040
223	18.58	0.10	0.060	(0.146)	0.030	0.030
224	18.67	0.10	0.060	(0.145)	0.030	0.030
225	18.75	0.10	0.060	(0.145)	0.030	0.030
226	18.83	0.07	0.040	(0.144)	0.020	0.020
227	18.92	0.07	0.040	(0.143)	0.020	0.020
228	19.00	0.07	0.040	(0.143)	0.020	0.020
229	19.08	0.10	0.060	(0.142)	0.030	0.030
230	19.17	0.10	0.060	(0.141)	0.030	0.030
231	19.25	0.10	0.060	(0.141)	0.030	0.030
232	19.33	0.13	0.080	(0.140)	0.040	0.040
233	19.42	0.13	0.080	(0.139)	0.040	0.040
234	19.50	0.13	0.080	(0.139)	0.040	0.040
235	19.58	0.10	0.060	(0.138)	0.030	0.030
236	19.67	0.10	0.060	(0.137)	0.030	0.030
237	19.75	0.10	0.060	(0.137)	0.030	0.030
238	19.83	0.07	0.040	(0.136)	0.020	0.020
239	19.92	0.07	0.040	(0.136)	0.020	0.020
240	20.00	0.07	0.040	(0.135)	0.020	0.020
241	20.08	0.10	0.060	(0.134)	0.030	0.030

242	20.17	0.10	0.060	(0.134)	0.030	0.030
243	20.25	0.10	0.060	(0.133)	0.030	0.030
244	20.33	0.10	0.060	(0.133)	0.030	0.030
245	20.42	0.10	0.060	(0.132)	0.030	0.030
246	20.50	0.10	0.060	(0.131)	0.030	0.030
247	20.58	0.10	0.060	(0.131)	0.030	0.030
248	20.67	0.10	0.060	(0.130)	0.030	0.030
249	20.75	0.10	0.060	(0.130)	0.030	0.030
250	20.83	0.07	0.040	(0.129)	0.020	0.020
251	20.92	0.07	0.040	(0.129)	0.020	0.020
252	21.00	0.07	0.040	(0.128)	0.020	0.020
253	21.08	0.10	0.060	(0.128)	0.030	0.030
254	21.17	0.10	0.060	(0.127)	0.030	0.030
255	21.25	0.10	0.060	(0.127)	0.030	0.030
256	21.33	0.07	0.040	(0.126)	0.020	0.020
257	21.42	0.07	0.040	(0.126)	0.020	0.020
258	21.50	0.07	0.040	(0.125)	0.020	0.020
259	21.58	0.10	0.060	(0.125)	0.030	0.030
260	21.67	0.10	0.060	(0.124)	0.030	0.030
261	21.75	0.10	0.060	(0.124)	0.030	0.030
262	21.83	0.07	0.040	(0.124)	0.020	0.020
263	21.92	0.07	0.040	(0.123)	0.020	0.020
264	22.00	0.07	0.040	(0.123)	0.020	0.020
265	22.08	0.10	0.060	(0.122)	0.030	0.030
266	22.17	0.10	0.060	(0.122)	0.030	0.030
267	22.25	0.10	0.060	(0.121)	0.030	0.030
268	22.33	0.07	0.040	(0.121)	0.020	0.020
269	22.42	0.07	0.040	(0.121)	0.020	0.020
270	22.50	0.07	0.040	(0.120)	0.020	0.020
271	22.58	0.07	0.040	(0.120)	0.020	0.020
272	22.67	0.07	0.040	(0.120)	0.020	0.020
273	22.75	0.07	0.040	(0.119)	0.020	0.020
274	22.83	0.07	0.040	(0.119)	0.020	0.020
275	22.92	0.07	0.040	(0.119)	0.020	0.020
276	23.00	0.07	0.040	(0.118)	0.020	0.020
277	23.08	0.07	0.040	(0.118)	0.020	0.020
278	23.17	0.07	0.040	(0.118)	0.020	0.020
279	23.25	0.07	0.040	(0.118)	0.020	0.020
280	23.33	0.07	0.040	(0.117)	0.020	0.020
281	23.42	0.07	0.040	(0.117)	0.020	0.020
282	23.50	0.07	0.040	(0.117)	0.020	0.020
283	23.58	0.07	0.040	(0.117)	0.020	0.020
284	23.67	0.07	0.040	(0.117)	0.020	0.020
285	23.75	0.07	0.040	(0.117)	0.020	0.020
286	23.83	0.07	0.040	(0.116)	0.020	0.020
287	23.92	0.07	0.040	(0.116)	0.020	0.020
288	24.00	0.07	0.040	(0.116)	0.020	0.020
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	33.1

Flood volume = Effective rainfall 2.76(In)

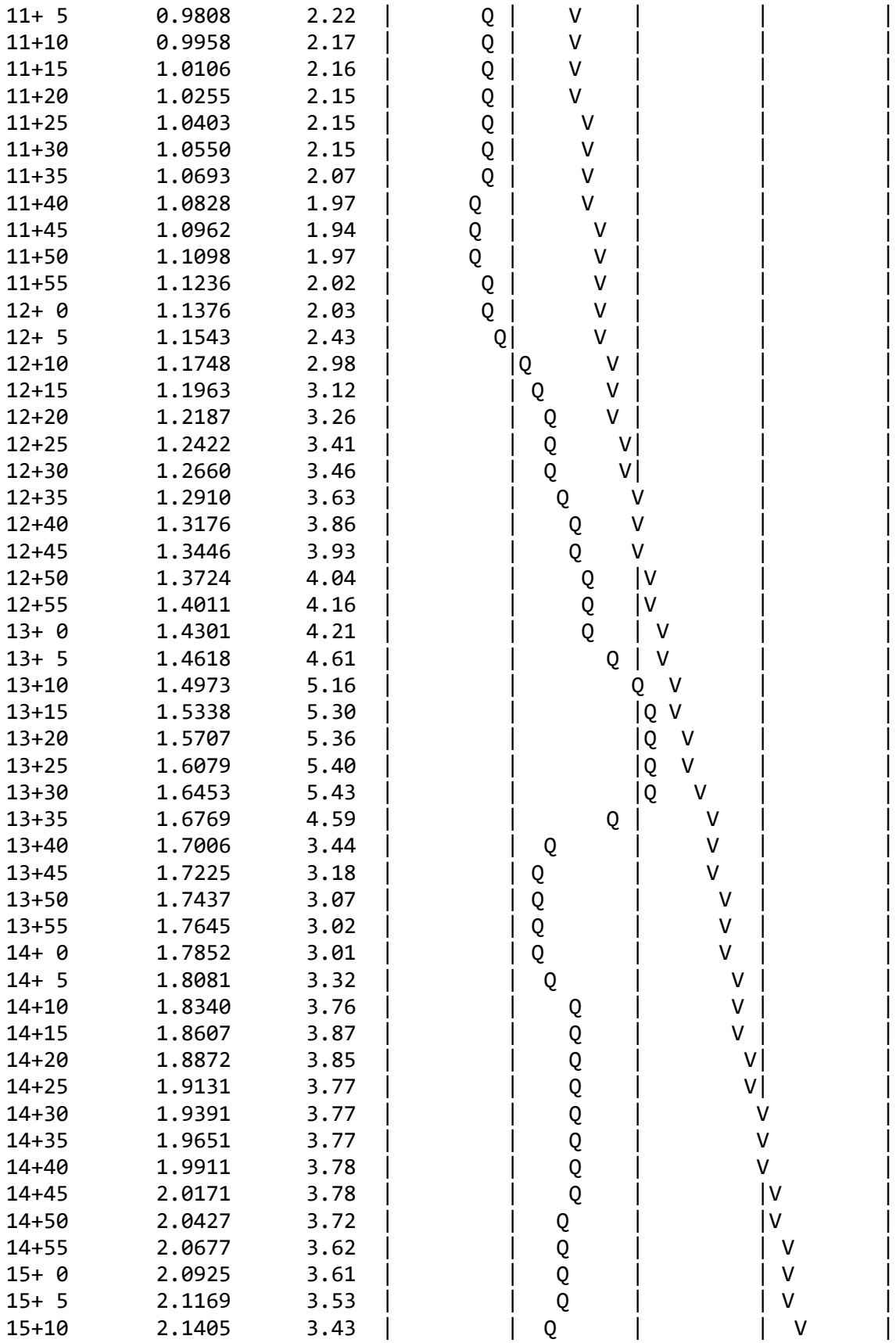
```
 times area      11.2(Ac.)/[(In)/(Ft.)] =       2.6(Ac.Ft)
Total soil loss =      2.24(In)
Total soil loss =     2.097(Ac.Ft)
Total rainfall =      5.00(In)
Flood volume =      112131.8 Cubic Feet
Total soil loss =       91325.2 Cubic Feet
---------------------------------------------------------------------
 Peak flow rate of this hydrograph =      5.425(CFS)
---------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    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))

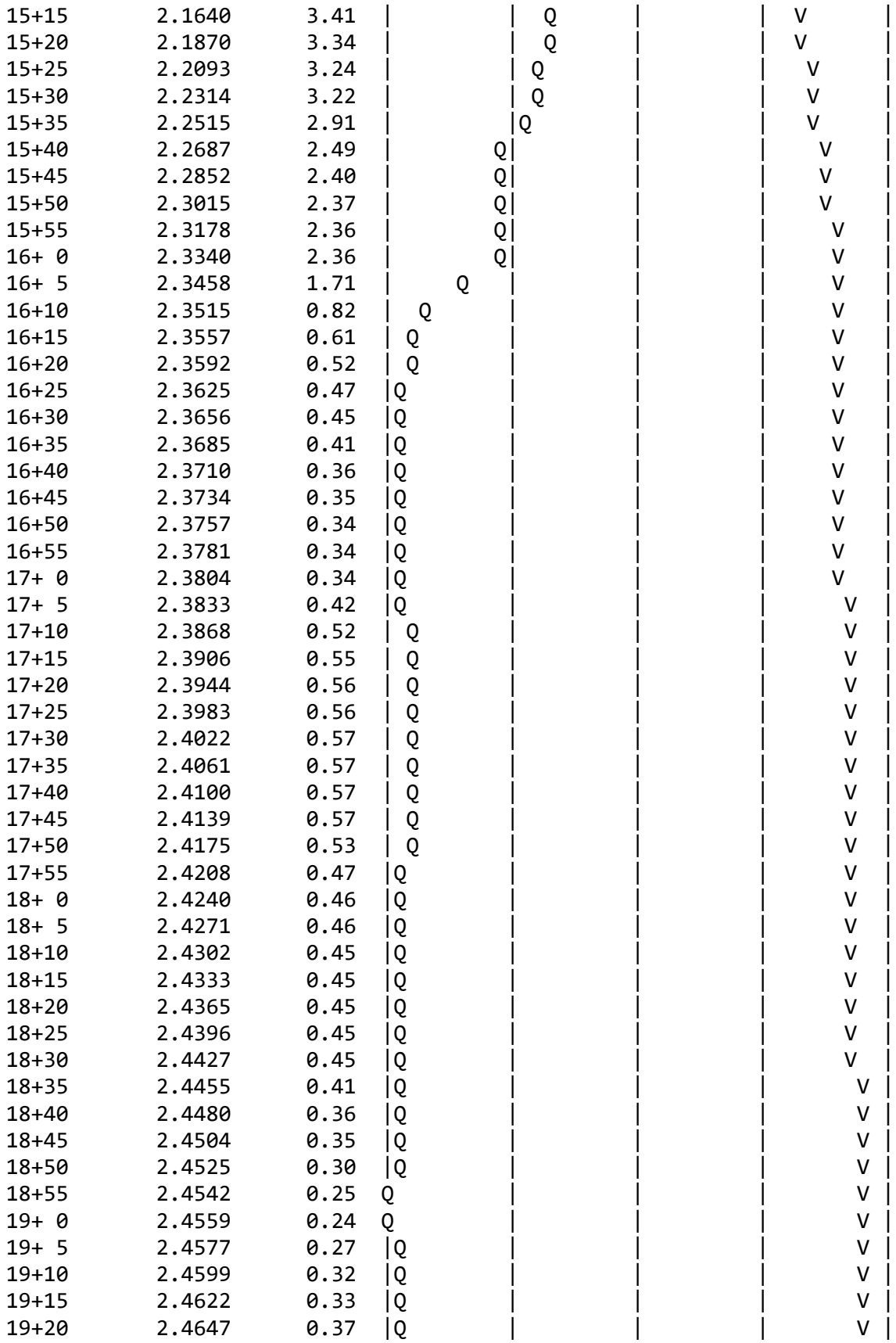
---------------------------------------------------------------------
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Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0005	0.08	Q				
0+10	0.0018	0.18	Q				
0+15	0.0032	0.21	Q				
0+20	0.0050	0.26	VQ				
0+25	0.0071	0.31	VQ				
0+30	0.0094	0.33	VQ				
0+35	0.0117	0.34	VQ				
0+40	0.0140	0.34	VQ				
0+45	0.0164	0.34	VQ				
0+50	0.0190	0.38	VQ				
0+55	0.0219	0.43	VQ				
1+ 0	0.0250	0.44	VQ				
1+ 5	0.0278	0.41	VQ				
1+10	0.0303	0.36	VQ				
1+15	0.0327	0.35	VQ				
1+20	0.0351	0.34	VQ				
1+25	0.0374	0.34	VQ				
1+30	0.0397	0.34	VQ				
1+35	0.0421	0.34	VQ				
1+40	0.0444	0.34	VQ				
1+45	0.0467	0.34	VQ				
1+50	0.0493	0.38	VQ				
1+55	0.0523	0.43	VQ				
2+ 0	0.0554	0.44	VQ				
2+ 5	0.0584	0.45	VQ				
2+10	0.0615	0.45	VQ				
2+15	0.0647	0.45	|Q				
2+20	0.0678	0.45	|Q				
2+25	0.0709	0.45	|Q				
2+30	0.0740	0.45	|Q				
2+35	0.0774	0.49	|Q				
2+40	0.0811	0.54	|VQ				

2+45	0.0849	0.56	VQ				
2+50	0.0888	0.56	VQ				
2+55	0.0927	0.56	VQ				
3+ 0	0.0966	0.57	VQ				
3+ 5	0.1005	0.57	VQ				
3+10	0.1044	0.57	VQ				
3+15	0.1083	0.57	VQ				
3+20	0.1122	0.57	VQ				
3+25	0.1161	0.57	VQ				
3+30	0.1199	0.57	VQ				
3+35	0.1238	0.57	VQ				
3+40	0.1277	0.57	VQ				
3+45	0.1316	0.57	Q				
3+50	0.1358	0.60	Q				
3+55	0.1403	0.66	Q				
4+ 0	0.1449	0.67	Q				
4+ 5	0.1495	0.67	Q				
4+10	0.1542	0.68	Q				
4+15	0.1589	0.68	Q				
4+20	0.1638	0.72	Q				
4+25	0.1691	0.77	VQ				
4+30	0.1745	0.78	VQ				
4+35	0.1799	0.79	VQ				
4+40	0.1854	0.79	VQ				
4+45	0.1908	0.79	VQ				
4+50	0.1965	0.83	Q				
4+55	0.2026	0.88	Q				
5+ 0	0.2088	0.89	Q				
5+ 5	0.2144	0.82	Q				
5+10	0.2194	0.72	QV				
5+15	0.2242	0.70	QV				
5+20	0.2292	0.72	QV				
5+25	0.2345	0.77	Q				
5+30	0.2399	0.78	Q				
5+35	0.2456	0.83	Q				
5+40	0.2516	0.88	Q				
5+45	0.2578	0.89	QV				
5+50	0.2640	0.90	QV				
5+55	0.2702	0.90	QV				
6+ 0	0.2765	0.90	QV				
6+ 5	0.2829	0.94	QV				
6+10	0.2898	1.00	QV				
6+15	0.2967	1.01	Q				
6+20	0.3037	1.01	Q				
6+25	0.3107	1.02	Q				
6+30	0.3177	1.02	Q				
6+35	0.3250	1.06	QV				
6+40	0.3326	1.11	QV				
6+45	0.3403	1.12	QV				
6+50	0.3481	1.13	QV				

6+55	0.3559	1.13	QV			
7+ 0	0.3637	1.13	QV			
7+ 5	0.3714	1.13	QV			
7+10	0.3792	1.13	QV			
7+15	0.3870	1.13	Q V			
7+20	0.3951	1.17	Q V			
7+25	0.4035	1.22	Q V			
7+30	0.4120	1.23	Q V			
7+35	0.4208	1.28	QV			
7+40	0.4300	1.33	QV			
7+45	0.4392	1.35	QV			
7+50	0.4488	1.39	QV			
7+55	0.4588	1.45	Q V			
8+ 0	0.4688	1.46	Q V			
8+ 5	0.4794	1.54	QV			
8+10	0.4908	1.65	QV			
8+15	0.5024	1.68	QV			
8+20	0.5140	1.69	QV			
8+25	0.5256	1.69	Q V			
8+30	0.5373	1.70	Q V			
8+35	0.5493	1.73	Q V			
8+40	0.5616	1.79	QV			
8+45	0.5740	1.80	QV			
8+50	0.5866	1.84	Q V			
8+55	0.5997	1.90	Q V			
9+ 0	0.6129	1.91	Q V			
9+ 5	0.6266	1.99	Q V			
9+10	0.6411	2.10	QV			
9+15	0.6558	2.13	Q V			
9+20	0.6708	2.18	Q V			
9+25	0.6862	2.24	Q V			
9+30	0.7017	2.25	QV			
9+35	0.7175	2.29	Q V			
9+40	0.7337	2.35	Q V			
9+45	0.7499	2.36	Q V			
9+50	0.7665	2.41	Q V			
9+55	0.7835	2.46	Q V			
10+ 0	0.8006	2.48	Q V			
10+ 5	0.8158	2.21	Q V			
10+10	0.8285	1.85	Q V			
10+15	0.8407	1.76	Q V			
10+20	0.8525	1.72	Q V			
10+25	0.8643	1.70	Q V			
10+30	0.8759	1.70	Q V			
10+35	0.8889	1.89	Q V			
10+40	0.9038	2.15	Q V			
10+45	0.9190	2.21	Q V			
10+50	0.9344	2.24	Q V			
10+55	0.9500	2.25	Q V			
11+ 0	0.9655	2.26	Q V			





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19+25       2.4677      0.43  |Q        |         |         |        V |
19+30       2.4707      0.44  |Q        |         |         |        V |
19+35       2.4736      0.41  |Q        |         |         |        V |
19+40       2.4760      0.36  |Q        |         |         |        V |
19+45       2.4784      0.35  |Q        |         |         |        V |
19+50       2.4805      0.30  |Q        |         |         |        V |
19+55       2.4823      0.25  Q         |         |         |        V |
20+ 0       2.4839      0.24  Q         |         |         |        V |
20+ 5       2.4857      0.27  |Q        |         |         |        V |
20+10       2.4879      0.32  |Q        |         |         |        V |
20+15       2.4902      0.33  |Q        |         |         |        V |
20+20       2.4925      0.34  |Q        |         |         |        V |
20+25       2.4948      0.34  |Q        |         |         |        V |
20+30       2.4972      0.34  |Q        |         |         |        V |
20+35       2.4995      0.34  |Q        |         |         |        V |
20+40       2.5018      0.34  |Q        |         |         |        V |
20+45       2.5042      0.34  |Q        |         |         |        V |
20+50       2.5062      0.30  |Q        |         |         |        V |
20+55       2.5079      0.25  Q         |         |         |        V |
21+ 0       2.5096      0.24  Q         |         |         |        V |
21+ 5       2.5114      0.27  |Q        |         |         |         V|
21+10       2.5136      0.32  |Q        |         |         |         V|
21+15       2.5159      0.33  |Q        |         |         |         V|
21+20       2.5179      0.30  |Q        |         |         |         V|
21+25       2.5196      0.25  Q         |         |         |         V|
21+30       2.5212      0.24  Q         |         |         |         V|
21+35       2.5231      0.27  |Q        |         |         |         V|
21+40       2.5253      0.32  |Q        |         |         |         V|
21+45       2.5276      0.33  |Q        |         |         |         V|
21+50       2.5296      0.30  |Q        |         |         |         V|
21+55       2.5313      0.25  Q         |         |         |         V|
22+ 0       2.5329      0.24  Q         |         |         |         V|
22+ 5       2.5348      0.27  |Q        |         |         |         V|
22+10       2.5370      0.32  |Q        |         |         |         V|
22+15       2.5392      0.33  |Q        |         |         |         V|
22+20       2.5413      0.30  |Q        |         |         |         V|
22+25       2.5430      0.25  Q         |         |         |         V|
22+30       2.5446      0.24  Q         |         |         |         V|
22+35       2.5462      0.23  Q         |         |         |         V|
22+40       2.5477      0.23  Q         |         |         |         V|
22+45       2.5493      0.23  Q         |         |         |         V|
22+50       2.5509      0.23  Q         |         |         |         V|
22+55       2.5524      0.23  Q         |         |         |         V|
23+ 0       2.5540      0.23  Q         |         |         |         V|
23+ 5       2.5555      0.23  Q         |         |         |         V|
23+10       2.5571      0.23  Q         |         |         |         V|
23+15       2.5586      0.23  Q         |         |         |         V|
23+20       2.5602      0.23  Q         |         |         |         V|
23+25       2.5618      0.23  Q         |         |         |         V|
23+30       2.5633      0.23  Q         |         |         |         V|
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23+35	2.5649	0.23	Q	|	|	|	V|
23+40	2.5664	0.23	Q	|	|	|	V|
23+45	2.5680	0.23	Q	|	|	|	V|
23+50	2.5695	0.23	Q	|	|	|	V|
23+55	2.5711	0.23	Q	|	|	|	V|
24+ 0	2.5727	0.23	Q	|	|	|	V|
24+ 5	2.5737	0.15	Q	|	|	|	V|
24+10	2.5740	0.04	Q	|	|	|	V|
24+15	2.5741	0.02	Q	|	|	|	V|
24+20	2.5742	0.01	Q	|	|	|	V|
24+25	2.5742	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 10/11/23 File: QB100XUH24100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED B
100 YEAR, 24 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.08(Ac.) = 0.017 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.08(Ac.) = 0.017 Sq. Mi.
Length along longest watercourse = 881.00(Ft.)
Length along longest watercourse measured to centroid = 378.00(Ft.)
Length along longest watercourse = 0.167 Mi.
Length along longest watercourse measured to centroid = 0.072 Mi.
Difference in elevation = 3.90(Ft.)
Slope along watercourse = 23.3734 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.049 Hr.
Lag time = 2.94 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 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]
11.08	2.00	22.16

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	5.00	55.40

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.080	58.19	0.500

Total Area Entered = 11.08(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.2	58.2	0.488	0.500	0.269	1.000	0.269
					Sum (F) =	0.269

Area averaged mean soil loss (F) (In/Hr) = 0.269
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.941	37.677	4.207
2	0.167	339.883	45.521	5.083
3	0.250	509.824	10.142	1.133
4	0.333	679.765	4.262	0.476
5	0.417	849.706	2.398	0.268
			Sum = 100.000	Sum= 11.167

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	0.040	(0.476)	0.020	0.020
2	0.17	0.07	0.040	(0.474)	0.020	0.020
3	0.25	0.07	0.040	(0.473)	0.020	0.020
4	0.33	0.10	0.060	(0.471)	0.030	0.030
5	0.42	0.10	0.060	(0.469)	0.030	0.030
6	0.50	0.10	0.060	(0.467)	0.030	0.030
7	0.58	0.10	0.060	(0.465)	0.030	0.030
8	0.67	0.10	0.060	(0.463)	0.030	0.030
9	0.75	0.10	0.060	(0.462)	0.030	0.030
10	0.83	0.13	0.080	(0.460)	0.040	0.040
11	0.92	0.13	0.080	(0.458)	0.040	0.040
12	1.00	0.13	0.080	(0.456)	0.040	0.040
13	1.08	0.10	0.060	(0.454)	0.030	0.030
14	1.17	0.10	0.060	(0.453)	0.030	0.030
15	1.25	0.10	0.060	(0.451)	0.030	0.030
16	1.33	0.10	0.060	(0.449)	0.030	0.030
17	1.42	0.10	0.060	(0.447)	0.030	0.030
18	1.50	0.10	0.060	(0.445)	0.030	0.030
19	1.58	0.10	0.060	(0.444)	0.030	0.030
20	1.67	0.10	0.060	(0.442)	0.030	0.030
21	1.75	0.10	0.060	(0.440)	0.030	0.030
22	1.83	0.13	0.080	(0.438)	0.040	0.040
23	1.92	0.13	0.080	(0.437)	0.040	0.040
24	2.00	0.13	0.080	(0.435)	0.040	0.040
25	2.08	0.13	0.080	(0.433)	0.040	0.040
26	2.17	0.13	0.080	(0.431)	0.040	0.040
27	2.25	0.13	0.080	(0.430)	0.040	0.040
28	2.33	0.13	0.080	(0.428)	0.040	0.040
29	2.42	0.13	0.080	(0.426)	0.040	0.040
30	2.50	0.13	0.080	(0.424)	0.040	0.040
31	2.58	0.17	0.100	(0.423)	0.050	0.050
32	2.67	0.17	0.100	(0.421)	0.050	0.050
33	2.75	0.17	0.100	(0.419)	0.050	0.050
34	2.83	0.17	0.100	(0.417)	0.050	0.050
35	2.92	0.17	0.100	(0.416)	0.050	0.050
36	3.00	0.17	0.100	(0.414)	0.050	0.050
37	3.08	0.17	0.100	(0.412)	0.050	0.050
38	3.17	0.17	0.100	(0.411)	0.050	0.050
39	3.25	0.17	0.100	(0.409)	0.050	0.050
40	3.33	0.17	0.100	(0.407)	0.050	0.050
41	3.42	0.17	0.100	(0.405)	0.050	0.050
42	3.50	0.17	0.100	(0.404)	0.050	0.050

43	3.58	0.17	0.100	(0.402)	0.050	0.050
44	3.67	0.17	0.100	(0.400)	0.050	0.050
45	3.75	0.17	0.100	(0.399)	0.050	0.050
46	3.83	0.20	0.120	(0.397)	0.060	0.060
47	3.92	0.20	0.120	(0.395)	0.060	0.060
48	4.00	0.20	0.120	(0.394)	0.060	0.060
49	4.08	0.20	0.120	(0.392)	0.060	0.060
50	4.17	0.20	0.120	(0.390)	0.060	0.060
51	4.25	0.20	0.120	(0.389)	0.060	0.060
52	4.33	0.23	0.140	(0.387)	0.070	0.070
53	4.42	0.23	0.140	(0.385)	0.070	0.070
54	4.50	0.23	0.140	(0.384)	0.070	0.070
55	4.58	0.23	0.140	(0.382)	0.070	0.070
56	4.67	0.23	0.140	(0.380)	0.070	0.070
57	4.75	0.23	0.140	(0.379)	0.070	0.070
58	4.83	0.27	0.160	(0.377)	0.080	0.080
59	4.92	0.27	0.160	(0.375)	0.080	0.080
60	5.00	0.27	0.160	(0.374)	0.080	0.080
61	5.08	0.20	0.120	(0.372)	0.060	0.060
62	5.17	0.20	0.120	(0.371)	0.060	0.060
63	5.25	0.20	0.120	(0.369)	0.060	0.060
64	5.33	0.23	0.140	(0.367)	0.070	0.070
65	5.42	0.23	0.140	(0.366)	0.070	0.070
66	5.50	0.23	0.140	(0.364)	0.070	0.070
67	5.58	0.27	0.160	(0.363)	0.080	0.080
68	5.67	0.27	0.160	(0.361)	0.080	0.080
69	5.75	0.27	0.160	(0.359)	0.080	0.080
70	5.83	0.27	0.160	(0.358)	0.080	0.080
71	5.92	0.27	0.160	(0.356)	0.080	0.080
72	6.00	0.27	0.160	(0.355)	0.080	0.080
73	6.08	0.30	0.180	(0.353)	0.090	0.090
74	6.17	0.30	0.180	(0.351)	0.090	0.090
75	6.25	0.30	0.180	(0.350)	0.090	0.090
76	6.33	0.30	0.180	(0.348)	0.090	0.090
77	6.42	0.30	0.180	(0.347)	0.090	0.090
78	6.50	0.30	0.180	(0.345)	0.090	0.090
79	6.58	0.33	0.200	(0.344)	0.100	0.100
80	6.67	0.33	0.200	(0.342)	0.100	0.100
81	6.75	0.33	0.200	(0.341)	0.100	0.100
82	6.83	0.33	0.200	(0.339)	0.100	0.100
83	6.92	0.33	0.200	(0.338)	0.100	0.100
84	7.00	0.33	0.200	(0.336)	0.100	0.100
85	7.08	0.33	0.200	(0.334)	0.100	0.100
86	7.17	0.33	0.200	(0.333)	0.100	0.100
87	7.25	0.33	0.200	(0.331)	0.100	0.100
88	7.33	0.37	0.220	(0.330)	0.110	0.110
89	7.42	0.37	0.220	(0.328)	0.110	0.110
90	7.50	0.37	0.220	(0.327)	0.110	0.110
91	7.58	0.40	0.240	(0.325)	0.120	0.120
92	7.67	0.40	0.240	(0.324)	0.120	0.120

93	7.75	0.40	0.240	(0.322)	0.120	0.120
94	7.83	0.43	0.260	(0.321)	0.130	0.130
95	7.92	0.43	0.260	(0.319)	0.130	0.130
96	8.00	0.43	0.260	(0.318)	0.130	0.130
97	8.08	0.50	0.300	(0.316)	0.150	0.150
98	8.17	0.50	0.300	(0.315)	0.150	0.150
99	8.25	0.50	0.300	(0.314)	0.150	0.150
100	8.33	0.50	0.300	(0.312)	0.150	0.150
101	8.42	0.50	0.300	(0.311)	0.150	0.150
102	8.50	0.50	0.300	(0.309)	0.150	0.150
103	8.58	0.53	0.320	(0.308)	0.160	0.160
104	8.67	0.53	0.320	(0.306)	0.160	0.160
105	8.75	0.53	0.320	(0.305)	0.160	0.160
106	8.83	0.57	0.340	(0.303)	0.170	0.170
107	8.92	0.57	0.340	(0.302)	0.170	0.170
108	9.00	0.57	0.340	(0.301)	0.170	0.170
109	9.08	0.63	0.380	(0.299)	0.190	0.190
110	9.17	0.63	0.380	(0.298)	0.190	0.190
111	9.25	0.63	0.380	(0.296)	0.190	0.190
112	9.33	0.67	0.400	(0.295)	0.200	0.200
113	9.42	0.67	0.400	(0.293)	0.200	0.200
114	9.50	0.67	0.400	(0.292)	0.200	0.200
115	9.58	0.70	0.420	(0.291)	0.210	0.210
116	9.67	0.70	0.420	(0.289)	0.210	0.210
117	9.75	0.70	0.420	(0.288)	0.210	0.210
118	9.83	0.73	0.440	(0.286)	0.220	0.220
119	9.92	0.73	0.440	(0.285)	0.220	0.220
120	10.00	0.73	0.440	(0.284)	0.220	0.220
121	10.08	0.50	0.300	(0.282)	0.150	0.150
122	10.17	0.50	0.300	(0.281)	0.150	0.150
123	10.25	0.50	0.300	(0.280)	0.150	0.150
124	10.33	0.50	0.300	(0.278)	0.150	0.150
125	10.42	0.50	0.300	(0.277)	0.150	0.150
126	10.50	0.50	0.300	(0.276)	0.150	0.150
127	10.58	0.67	0.400	(0.274)	0.200	0.200
128	10.67	0.67	0.400	(0.273)	0.200	0.200
129	10.75	0.67	0.400	(0.272)	0.200	0.200
130	10.83	0.67	0.400	(0.270)	0.200	0.200
131	10.92	0.67	0.400	(0.269)	0.200	0.200
132	11.00	0.67	0.400	(0.268)	0.200	0.200
133	11.08	0.63	0.380	(0.266)	0.190	0.190
134	11.17	0.63	0.380	(0.265)	0.190	0.190
135	11.25	0.63	0.380	(0.264)	0.190	0.190
136	11.33	0.63	0.380	(0.262)	0.190	0.190
137	11.42	0.63	0.380	(0.261)	0.190	0.190
138	11.50	0.63	0.380	(0.260)	0.190	0.190
139	11.58	0.57	0.340	(0.258)	0.170	0.170
140	11.67	0.57	0.340	(0.257)	0.170	0.170
141	11.75	0.57	0.340	(0.256)	0.170	0.170
142	11.83	0.60	0.360	(0.255)	0.180	0.180

143	11.92	0.60	0.360	(0.253)	0.180	0.180
144	12.00	0.60	0.360	(0.252)	0.180	0.180
145	12.08	0.83	0.500	(0.251)	0.250	0.250
146	12.17	0.83	0.500	0.250	(0.250)	0.250
147	12.25	0.83	0.500	0.248	(0.250)	0.252
148	12.33	0.87	0.520	0.247	(0.260)	0.273
149	12.42	0.87	0.520	0.246	(0.260)	0.274
150	12.50	0.87	0.520	0.245	(0.260)	0.275
151	12.58	0.93	0.560	0.243	(0.280)	0.317
152	12.67	0.93	0.560	0.242	(0.280)	0.318
153	12.75	0.93	0.560	0.241	(0.280)	0.319
154	12.83	0.97	0.580	0.240	(0.290)	0.340
155	12.92	0.97	0.580	0.238	(0.290)	0.342
156	13.00	0.97	0.580	0.237	(0.290)	0.343
157	13.08	1.13	0.680	0.236	(0.340)	0.444
158	13.17	1.13	0.680	0.235	(0.340)	0.445
159	13.25	1.13	0.680	0.234	(0.340)	0.446
160	13.33	1.13	0.680	0.232	(0.340)	0.448
161	13.42	1.13	0.680	0.231	(0.340)	0.449
162	13.50	1.13	0.680	0.230	(0.340)	0.450
163	13.58	0.77	0.460	0.229	(0.230)	0.231
164	13.67	0.77	0.460	0.228	(0.230)	0.232
165	13.75	0.77	0.460	0.227	(0.230)	0.233
166	13.83	0.77	0.460	0.225	(0.230)	0.235
167	13.92	0.77	0.460	0.224	(0.230)	0.236
168	14.00	0.77	0.460	0.223	(0.230)	0.237
169	14.08	0.90	0.540	0.222	(0.270)	0.318
170	14.17	0.90	0.540	0.221	(0.270)	0.319
171	14.25	0.90	0.540	0.220	(0.270)	0.320
172	14.33	0.87	0.520	0.219	(0.260)	0.301
173	14.42	0.87	0.520	0.218	(0.260)	0.302
174	14.50	0.87	0.520	0.216	(0.260)	0.304
175	14.58	0.87	0.520	0.215	(0.260)	0.305
176	14.67	0.87	0.520	0.214	(0.260)	0.306
177	14.75	0.87	0.520	0.213	(0.260)	0.307
178	14.83	0.83	0.500	0.212	(0.250)	0.288
179	14.92	0.83	0.500	0.211	(0.250)	0.289
180	15.00	0.83	0.500	0.210	(0.250)	0.290
181	15.08	0.80	0.480	0.209	(0.240)	0.271
182	15.17	0.80	0.480	0.208	(0.240)	0.272
183	15.25	0.80	0.480	0.207	(0.240)	0.273
184	15.33	0.77	0.460	0.206	(0.230)	0.254
185	15.42	0.77	0.460	0.205	(0.230)	0.255
186	15.50	0.77	0.460	0.203	(0.230)	0.257
187	15.58	0.63	0.380	(0.202)	0.190	0.190
188	15.67	0.63	0.380	(0.201)	0.190	0.190
189	15.75	0.63	0.380	(0.200)	0.190	0.190
190	15.83	0.63	0.380	(0.199)	0.190	0.190
191	15.92	0.63	0.380	(0.198)	0.190	0.190
192	16.00	0.63	0.380	(0.197)	0.190	0.190

193	16.08	0.13	0.080	(0.196)	0.040	0.040
194	16.17	0.13	0.080	(0.195)	0.040	0.040
195	16.25	0.13	0.080	(0.194)	0.040	0.040
196	16.33	0.13	0.080	(0.193)	0.040	0.040
197	16.42	0.13	0.080	(0.192)	0.040	0.040
198	16.50	0.13	0.080	(0.191)	0.040	0.040
199	16.58	0.10	0.060	(0.190)	0.030	0.030
200	16.67	0.10	0.060	(0.189)	0.030	0.030
201	16.75	0.10	0.060	(0.188)	0.030	0.030
202	16.83	0.10	0.060	(0.187)	0.030	0.030
203	16.92	0.10	0.060	(0.187)	0.030	0.030
204	17.00	0.10	0.060	(0.186)	0.030	0.030
205	17.08	0.17	0.100	(0.185)	0.050	0.050
206	17.17	0.17	0.100	(0.184)	0.050	0.050
207	17.25	0.17	0.100	(0.183)	0.050	0.050
208	17.33	0.17	0.100	(0.182)	0.050	0.050
209	17.42	0.17	0.100	(0.181)	0.050	0.050
210	17.50	0.17	0.100	(0.180)	0.050	0.050
211	17.58	0.17	0.100	(0.179)	0.050	0.050
212	17.67	0.17	0.100	(0.178)	0.050	0.050
213	17.75	0.17	0.100	(0.177)	0.050	0.050
214	17.83	0.13	0.080	(0.176)	0.040	0.040
215	17.92	0.13	0.080	(0.176)	0.040	0.040
216	18.00	0.13	0.080	(0.175)	0.040	0.040
217	18.08	0.13	0.080	(0.174)	0.040	0.040
218	18.17	0.13	0.080	(0.173)	0.040	0.040
219	18.25	0.13	0.080	(0.172)	0.040	0.040
220	18.33	0.13	0.080	(0.171)	0.040	0.040
221	18.42	0.13	0.080	(0.171)	0.040	0.040
222	18.50	0.13	0.080	(0.170)	0.040	0.040
223	18.58	0.10	0.060	(0.169)	0.030	0.030
224	18.67	0.10	0.060	(0.168)	0.030	0.030
225	18.75	0.10	0.060	(0.167)	0.030	0.030
226	18.83	0.07	0.040	(0.166)	0.020	0.020
227	18.92	0.07	0.040	(0.166)	0.020	0.020
228	19.00	0.07	0.040	(0.165)	0.020	0.020
229	19.08	0.10	0.060	(0.164)	0.030	0.030
230	19.17	0.10	0.060	(0.163)	0.030	0.030
231	19.25	0.10	0.060	(0.163)	0.030	0.030
232	19.33	0.13	0.080	(0.162)	0.040	0.040
233	19.42	0.13	0.080	(0.161)	0.040	0.040
234	19.50	0.13	0.080	(0.160)	0.040	0.040
235	19.58	0.10	0.060	(0.160)	0.030	0.030
236	19.67	0.10	0.060	(0.159)	0.030	0.030
237	19.75	0.10	0.060	(0.158)	0.030	0.030
238	19.83	0.07	0.040	(0.157)	0.020	0.020
239	19.92	0.07	0.040	(0.157)	0.020	0.020
240	20.00	0.07	0.040	(0.156)	0.020	0.020
241	20.08	0.10	0.060	(0.155)	0.030	0.030
242	20.17	0.10	0.060	(0.155)	0.030	0.030

243	20.25	0.10	0.060	(0.154)	0.030	0.030
244	20.33	0.10	0.060	(0.153)	0.030	0.030
245	20.42	0.10	0.060	(0.153)	0.030	0.030
246	20.50	0.10	0.060	(0.152)	0.030	0.030
247	20.58	0.10	0.060	(0.151)	0.030	0.030
248	20.67	0.10	0.060	(0.151)	0.030	0.030
249	20.75	0.10	0.060	(0.150)	0.030	0.030
250	20.83	0.07	0.040	(0.149)	0.020	0.020
251	20.92	0.07	0.040	(0.149)	0.020	0.020
252	21.00	0.07	0.040	(0.148)	0.020	0.020
253	21.08	0.10	0.060	(0.148)	0.030	0.030
254	21.17	0.10	0.060	(0.147)	0.030	0.030
255	21.25	0.10	0.060	(0.147)	0.030	0.030
256	21.33	0.07	0.040	(0.146)	0.020	0.020
257	21.42	0.07	0.040	(0.145)	0.020	0.020
258	21.50	0.07	0.040	(0.145)	0.020	0.020
259	21.58	0.10	0.060	(0.144)	0.030	0.030
260	21.67	0.10	0.060	(0.144)	0.030	0.030
261	21.75	0.10	0.060	(0.143)	0.030	0.030
262	21.83	0.07	0.040	(0.143)	0.020	0.020
263	21.92	0.07	0.040	(0.142)	0.020	0.020
264	22.00	0.07	0.040	(0.142)	0.020	0.020
265	22.08	0.10	0.060	(0.141)	0.030	0.030
266	22.17	0.10	0.060	(0.141)	0.030	0.030
267	22.25	0.10	0.060	(0.140)	0.030	0.030
268	22.33	0.07	0.040	(0.140)	0.020	0.020
269	22.42	0.07	0.040	(0.140)	0.020	0.020
270	22.50	0.07	0.040	(0.139)	0.020	0.020
271	22.58	0.07	0.040	(0.139)	0.020	0.020
272	22.67	0.07	0.040	(0.138)	0.020	0.020
273	22.75	0.07	0.040	(0.138)	0.020	0.020
274	22.83	0.07	0.040	(0.138)	0.020	0.020
275	22.92	0.07	0.040	(0.137)	0.020	0.020
276	23.00	0.07	0.040	(0.137)	0.020	0.020
277	23.08	0.07	0.040	(0.137)	0.020	0.020
278	23.17	0.07	0.040	(0.136)	0.020	0.020
279	23.25	0.07	0.040	(0.136)	0.020	0.020
280	23.33	0.07	0.040	(0.136)	0.020	0.020
281	23.42	0.07	0.040	(0.136)	0.020	0.020
282	23.50	0.07	0.040	(0.135)	0.020	0.020
283	23.58	0.07	0.040	(0.135)	0.020	0.020
284	23.67	0.07	0.040	(0.135)	0.020	0.020
285	23.75	0.07	0.040	(0.135)	0.020	0.020
286	23.83	0.07	0.040	(0.135)	0.020	0.020
287	23.92	0.07	0.040	(0.134)	0.020	0.020
288	24.00	0.07	0.040	(0.134)	0.020	0.020

(Loss Rate Not Used)

Sum = 100.0 Sum = 31.7

Flood volume = Effective rainfall 2.64(In)

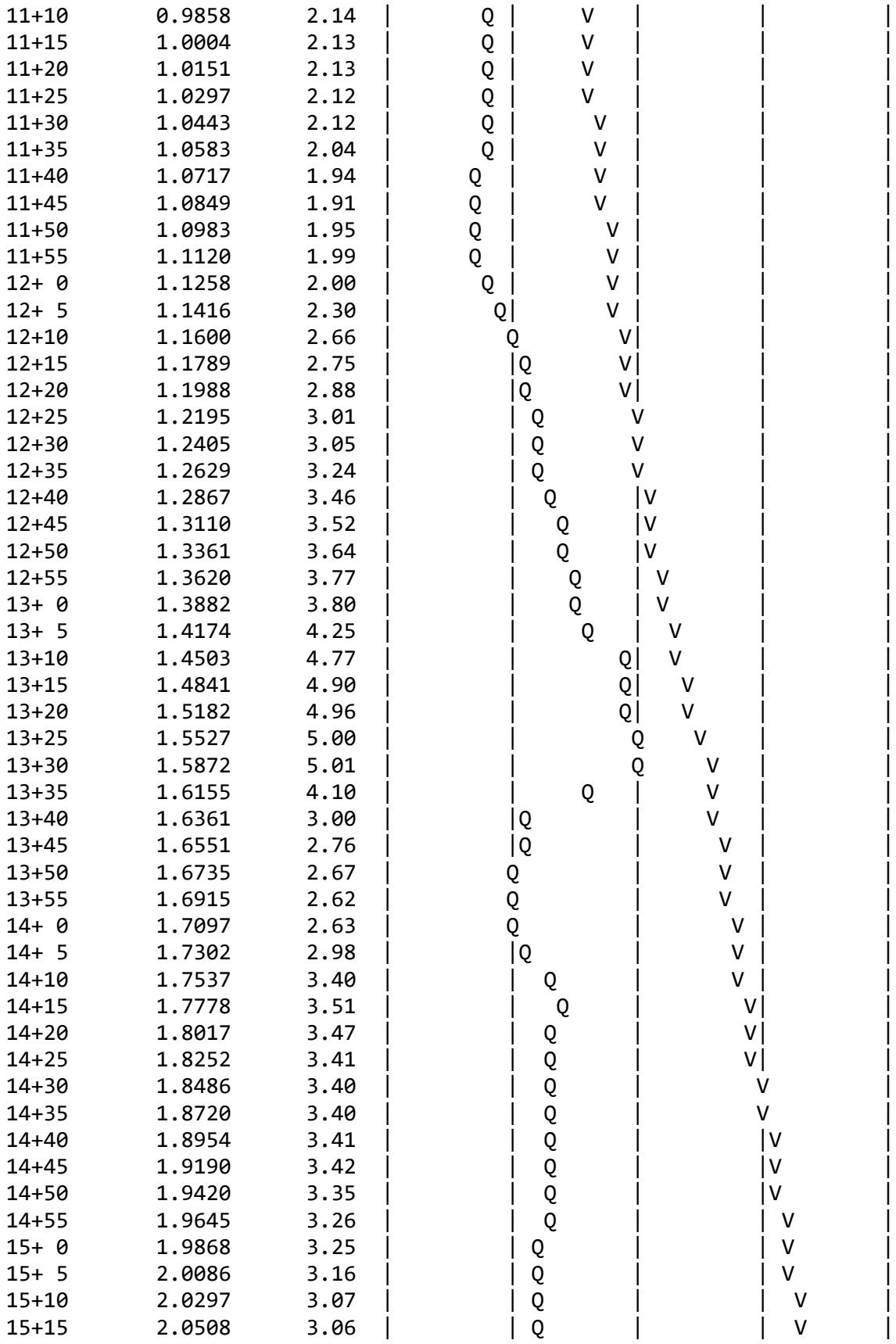
times area 11.1(Ac.)/[(In)/(Ft.)] = 2.4(Ac.Ft)

```
      Total soil loss =      2.36(In)
      Total soil loss =     2.179(Ac.Ft)
      Total rainfall =      5.00(In)
      Flood volume =      106183.9 Cubic Feet
      Total soil loss =       94913.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      5.015(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          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       0.0006      0.08  Q         |         |         |         |
  0+10       0.0019      0.19  Q         |         |         |         |
  0+15       0.0033      0.21  Q         |         |         |         |
  0+20       0.0051      0.26  VQ        |         |         |         |
  0+25       0.0073      0.32  VQ        |         |         |         |
  0+30       0.0095      0.33  VQ        |         |         |         |
  0+35       0.0118      0.33  VQ        |         |         |         |
  0+40       0.0141      0.34  VQ        |         |         |         |
  0+45       0.0164      0.34  VQ        |         |         |         |
  0+50       0.0190      0.38  VQ        |         |         |         |
  0+55       0.0220      0.43  VQ        |         |         |         |
  1+ 0       0.0250      0.44  VQ        |         |         |         |
  1+ 5       0.0278      0.40  VQ        |         |         |         |
  1+10       0.0302      0.35  VQ        |         |         |         |
  1+15       0.0326      0.34  VQ        |         |         |         |
  1+20       0.0349      0.34  VQ        |         |         |         |
  1+25       0.0372      0.34  VQ        |         |         |         |
  1+30       0.0395      0.34  VQ        |         |         |         |
  1+35       0.0418      0.34  VQ        |         |         |         |
  1+40       0.0441      0.34  VQ        |         |         |         |
  1+45       0.0464      0.34  VQ        |         |         |         |
  1+50       0.0490      0.38  VQ        |         |         |         |
  1+55       0.0520      0.43  VQ        |         |         |         |
  2+ 0       0.0550      0.44  VQ        |         |         |         |
  2+ 5       0.0581      0.44  VQ        |         |         |         |
  2+10       0.0611      0.45  |Q        |         |         |         |
  2+15       0.0642      0.45  |Q        |         |         |         |
  2+20       0.0673      0.45  |Q        |         |         |         |
  2+25       0.0704      0.45  |Q        |         |         |         |
  2+30       0.0735      0.45  |Q        |         |         |         |
  2+35       0.0768      0.49  |Q        |         |         |         |
  2+40       0.0805      0.54  |VQ       |         |         |         |
  2+45       0.0843      0.55  |VQ       |         |         |         |
```

2+50	0.0882	0.56	VQ				
2+55	0.0920	0.56	VQ				
3+ 0	0.0959	0.56	VQ				
3+ 5	0.0997	0.56	VQ				
3+10	0.1036	0.56	VQ				
3+15	0.1074	0.56	VQ				
3+20	0.1113	0.56	VQ				
3+25	0.1151	0.56	VQ				
3+30	0.1189	0.56	VQ				
3+35	0.1228	0.56	Q				
3+40	0.1266	0.56	Q				
3+45	0.1305	0.56	Q				
3+50	0.1346	0.60	Q				
3+55	0.1391	0.65	Q				
4+ 0	0.1437	0.66	Q				
4+ 5	0.1483	0.67	Q				
4+10	0.1529	0.67	Q				
4+15	0.1575	0.67	Q				
4+20	0.1624	0.71	Q				
4+25	0.1677	0.76	VQ				
4+30	0.1730	0.77	VQ				
4+35	0.1784	0.78	VQ				
4+40	0.1838	0.78	Q				
4+45	0.1891	0.78	Q				
4+50	0.1948	0.82	Q				
4+55	0.2008	0.87	Q				
5+ 0	0.2070	0.89	Q				
5+ 5	0.2125	0.81	Q				
5+10	0.2174	0.71	QV				
5+15	0.2221	0.69	QV				
5+20	0.2270	0.72	QV				
5+25	0.2323	0.76	Q				
5+30	0.2376	0.77	Q				
5+35	0.2433	0.82	Q				
5+40	0.2493	0.87	QV				
5+45	0.2554	0.89	QV				
5+50	0.2616	0.89	QV				
5+55	0.2677	0.89	QV				
6+ 0	0.2739	0.89	QV				
6+ 5	0.2803	0.94	QV				
6+10	0.2871	0.99	QV				
6+15	0.2940	1.00	QV				
6+20	0.3009	1.00	Q				
6+25	0.3078	1.01	QV				
6+30	0.3147	1.01	QV				
6+35	0.3220	1.05	QV				
6+40	0.3295	1.10	QV				
6+45	0.3372	1.11	QV				
6+50	0.3448	1.11	QV				
6+55	0.3525	1.12	QV				

7+ 0	0.3602	1.12	QV			
7+ 5	0.3679	1.12	Q V			
7+10	0.3756	1.12	Q V			
7+15	0.3833	1.12	Q V			
7+20	0.3913	1.16	Q V			
7+25	0.3996	1.21	Q V			
7+30	0.4080	1.22	Q V			
7+35	0.4168	1.27	QV			
7+40	0.4259	1.32	QV			
7+45	0.4351	1.33	Q V			
7+50	0.4446	1.38	Q V			
7+55	0.4544	1.43	Q V			
8+ 0	0.4644	1.44	Q V			
8+ 5	0.4750	1.53	QV			
8+10	0.4862	1.64	QV			
8+15	0.4977	1.66	Q V			
8+20	0.5092	1.67	Q V			
8+25	0.5207	1.68	Q V			
8+30	0.5323	1.68	Q V			
8+35	0.5441	1.72	Q V			
8+40	0.5563	1.77	Q V			
8+45	0.5685	1.78	Q V			
8+50	0.5811	1.83	Q V			
8+55	0.5941	1.88	Q V			
9+ 0	0.6071	1.89	Q V			
9+ 5	0.6207	1.98	Q V			
9+10	0.6351	2.09	Q V			
9+15	0.6496	2.11	Q V			
9+20	0.6645	2.16	Q V			
9+25	0.6798	2.22	Q V			
9+30	0.6951	2.23	Q V			
9+35	0.7108	2.27	Q V			
9+40	0.7268	2.33	Q V			
9+45	0.7429	2.34	Q V			
9+50	0.7593	2.39	Q V			
9+55	0.7761	2.44	Q V			
10+ 0	0.7930	2.45	Q V			
10+ 5	0.8079	2.16	Q V			
10+10	0.8203	1.81	Q V			
10+15	0.8322	1.73	Q V			
10+20	0.8439	1.69	Q V			
10+25	0.8554	1.68	Q V			
10+30	0.8670	1.68	Q V			
10+35	0.8800	1.89	Q V			
10+40	0.8947	2.14	Q V			
10+45	0.9098	2.20	Q V			
10+50	0.9251	2.22	Q V			
10+55	0.9405	2.23	Q V			
11+ 0	0.9559	2.23	Q V			
11+ 5	0.9710	2.19	Q V			



15+20	2.0713	2.98	|	Q	|	V	|
15+25	2.0912	2.88	|	Q	|	V	|
15+30	2.1109	2.87	|	Q	|	V	|
15+35	2.1287	2.59	|	Q	|	V	|
15+40	2.1442	2.25	|	Q	|	V	|
15+45	2.1592	2.17	|	Q	|	V	|
15+50	2.1739	2.14	|	Q	|	V	|
15+55	2.1885	2.12	|	Q	|	V	|
16+ 0	2.2032	2.12	|	Q	|	V	|
16+ 5	2.2134	1.49	|	Q	|	V	|
16+10	2.2184	0.73	|	Q	|	V	|
16+15	2.2223	0.56	|	Q	|	V	|
16+20	2.2256	0.49	|	Q	|	V	|
16+25	2.2287	0.45	|	Q	|	V	|
16+30	2.2318	0.45	|	Q	|	V	|
16+35	2.2346	0.40	|	Q	|	V	|
16+40	2.2370	0.35	|	Q	|	V	|
16+45	2.2394	0.34	|	Q	|	V	|
16+50	2.2417	0.34	|	Q	|	V	|
16+55	2.2440	0.34	|	Q	|	V	|
17+ 0	2.2463	0.34	|	Q	|	V	|
17+ 5	2.2492	0.42	|	Q	|	V	|
17+10	2.2528	0.52	|	Q	|	V	|
17+15	2.2566	0.54	|	Q	|	V	|
17+20	2.2604	0.55	|	Q	|	V	|
17+25	2.2642	0.56	|	Q	|	V	|
17+30	2.2681	0.56	|	Q	|	V	|
17+35	2.2719	0.56	|	Q	|	V	|
17+40	2.2758	0.56	|	Q	|	V	|
17+45	2.2796	0.56	|	Q	|	V	|
17+50	2.2832	0.52	|	Q	|	V	|
17+55	2.2864	0.47	|	Q	|	V	|
18+ 0	2.2895	0.45	|	Q	|	V	|
18+ 5	2.2926	0.45	|	Q	|	V	|
18+10	2.2957	0.45	|	Q	|	V	|
18+15	2.2987	0.45	|	Q	|	V	|
18+20	2.3018	0.45	|	Q	|	V	|
18+25	2.3049	0.45	|	Q	|	V	|
18+30	2.3080	0.45	|	Q	|	V	|
18+35	2.3108	0.40	|	Q	|	V	|
18+40	2.3132	0.35	|	Q	|	V	|
18+45	2.3156	0.34	|	Q	|	V	|
18+50	2.3176	0.30	|	Q	|	V	|
18+55	2.3193	0.24	|	Q	|	V	|
19+ 0	2.3209	0.23	|	Q	|	V	|
19+ 5	2.3227	0.27	|	Q	|	V	|
19+10	2.3249	0.32	|	Q	|	V	|
19+15	2.3271	0.33	|	Q	|	V	|
19+20	2.3297	0.37	|	Q	|	V	|
19+25	2.3327	0.43	|	Q	|	V	|

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19+30       2.3357      0.44  |Q        |         |         |        V |
19+35       2.3385      0.40  |Q        |         |         |        V |
19+40       2.3409      0.35  |Q        |         |         |        V |
19+45       2.3433      0.34  |Q        |         |         |        V |
19+50       2.3453      0.30  |Q        |         |         |        V |
19+55       2.3470      0.24  Q         |         |         |        V |
20+ 0       2.3486      0.23  Q         |         |         |        V |
20+ 5       2.3504      0.27  |Q        |         |         |        V |
20+10       2.3526      0.32  |Q        |         |         |        V |
20+15       2.3548      0.33  |Q        |         |         |        V |
20+20       2.3571      0.33  |Q        |         |         |        V |
20+25       2.3594      0.34  |Q        |         |         |        V |
20+30       2.3617      0.34  |Q        |         |         |        V |
20+35       2.3641      0.34  |Q        |         |         |        V |
20+40       2.3664      0.34  |Q        |         |         |        V |
20+45       2.3687      0.34  |Q        |         |         |        V |
20+50       2.3707      0.29  |Q        |         |         |        V |
20+55       2.3724      0.24  Q         |         |         |        V |
21+ 0       2.3739      0.23  Q         |         |         |        V |
21+ 5       2.3758      0.27  |Q        |         |         |        V |
21+10       2.3780      0.32  |Q        |         |         |         V|
21+15       2.3802      0.33  |Q        |         |         |         V|
21+20       2.3822      0.29  |Q        |         |         |         V|
21+25       2.3839      0.24  Q         |         |         |         V|
21+30       2.3855      0.23  Q         |         |         |         V|
21+35       2.3873      0.27  |Q        |         |         |         V|
21+40       2.3895      0.32  |Q        |         |         |         V|
21+45       2.3918      0.33  |Q        |         |         |         V|
21+50       2.3938      0.29  |Q        |         |         |         V|
21+55       2.3954      0.24  Q         |         |         |         V|
22+ 0       2.3970      0.23  Q         |         |         |         V|
22+ 5       2.3989      0.27  |Q        |         |         |         V|
22+10       2.4011      0.32  |Q        |         |         |         V|
22+15       2.4033      0.33  |Q        |         |         |         V|
22+20       2.4053      0.29  |Q        |         |         |         V|
22+25       2.4070      0.24  Q         |         |         |         V|
22+30       2.4086      0.23  Q         |         |         |         V|
22+35       2.4101      0.23  Q         |         |         |         V|
22+40       2.4117      0.22  Q         |         |         |         V|
22+45       2.4132      0.22  Q         |         |         |         V|
22+50       2.4147      0.22  Q         |         |         |         V|
22+55       2.4163      0.22  Q         |         |         |         V|
23+ 0       2.4178      0.22  Q         |         |         |         V|
23+ 5       2.4194      0.22  Q         |         |         |         V|
23+10       2.4209      0.22  Q         |         |         |         V|
23+15       2.4224      0.22  Q         |         |         |         V|
23+20       2.4240      0.22  Q         |         |         |         V|
23+25       2.4255      0.22  Q         |         |         |         V|
23+30       2.4271      0.22  Q         |         |         |         V|
23+35       2.4286      0.22  Q         |         |         |         V|
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   23+40       2.4301      0.22  Q         |          |          |         V|
   23+45       2.4317      0.22  Q         |          |          |         V|
   23+50       2.4332      0.22  Q         |          |          |         V|
   23+55       2.4348      0.22  Q         |          |          |         V|
   24+ 0       2.4363      0.22  Q         |          |          |         V|
   24+ 5       2.4372      0.14  Q         |          |          |         V|
   24+10       2.4375      0.04  Q         |          |          |         V|
   24+15       2.4376      0.01  Q         |          |          |         V|
   24+20       2.4376      0.01  Q         |          |          |          V
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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

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Study date 09/26/23 File: qauh24100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED A
100 YEAR, 24 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 12.14(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.14(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 1286.00(Ft.)
Length along longest watercourse measured to centroid = 1036.00(Ft.)
Length along longest watercourse = 0.244 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 14.28(Ft.)
Slope along watercourse = 58.6302 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.052 Hr.
Lag time = 3.14 Min.
25% of lag time = 0.78 Min.
40% of lag time = 1.26 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]

12.14 2.00 24.28

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	5.00	60.70

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.140	65.50	0.900

Total Area Entered = 12.14(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.5	65.5	0.411	0.900	0.078	1.000	0.078
					Sum (F) =	0.078

Area averaged mean soil loss (F) (In/Hr) = 0.078
Minimum soil loss rate ((In/Hr)) = 0.039
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	159.336	35.360	4.326
2	0.167	318.671	46.318	5.667
3	0.250	478.007	10.666	1.305
4	0.333	637.342	4.600	0.563
5	0.417	796.678	2.225	0.272
6	0.500	956.014	0.832	0.102
		Sum = 100.000	Sum=	12.235

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	0.040	(0.138)	0.007	0.033
2	0.17	0.07	0.040	(0.138)	0.007	0.033

3	0.25	0.07	0.040	(0.137)	0.007	0.033
4	0.33	0.10	0.060	(0.137)	0.011	0.049
5	0.42	0.10	0.060	(0.136)	0.011	0.049
6	0.50	0.10	0.060	(0.136)	0.011	0.049
7	0.58	0.10	0.060	(0.135)	0.011	0.049
8	0.67	0.10	0.060	(0.135)	0.011	0.049
9	0.75	0.10	0.060	(0.134)	0.011	0.049
10	0.83	0.13	0.080	(0.134)	0.014	0.066
11	0.92	0.13	0.080	(0.133)	0.014	0.066
12	1.00	0.13	0.080	(0.132)	0.014	0.066
13	1.08	0.10	0.060	(0.132)	0.011	0.049
14	1.17	0.10	0.060	(0.131)	0.011	0.049
15	1.25	0.10	0.060	(0.131)	0.011	0.049
16	1.33	0.10	0.060	(0.130)	0.011	0.049
17	1.42	0.10	0.060	(0.130)	0.011	0.049
18	1.50	0.10	0.060	(0.129)	0.011	0.049
19	1.58	0.10	0.060	(0.129)	0.011	0.049
20	1.67	0.10	0.060	(0.128)	0.011	0.049
21	1.75	0.10	0.060	(0.128)	0.011	0.049
22	1.83	0.13	0.080	(0.127)	0.014	0.066
23	1.92	0.13	0.080	(0.127)	0.014	0.066
24	2.00	0.13	0.080	(0.126)	0.014	0.066
25	2.08	0.13	0.080	(0.126)	0.014	0.066
26	2.17	0.13	0.080	(0.125)	0.014	0.066
27	2.25	0.13	0.080	(0.125)	0.014	0.066
28	2.33	0.13	0.080	(0.124)	0.014	0.066
29	2.42	0.13	0.080	(0.124)	0.014	0.066
30	2.50	0.13	0.080	(0.123)	0.014	0.066
31	2.58	0.17	0.100	(0.123)	0.018	0.082
32	2.67	0.17	0.100	(0.122)	0.018	0.082
33	2.75	0.17	0.100	(0.122)	0.018	0.082
34	2.83	0.17	0.100	(0.121)	0.018	0.082
35	2.92	0.17	0.100	(0.121)	0.018	0.082
36	3.00	0.17	0.100	(0.120)	0.018	0.082
37	3.08	0.17	0.100	(0.120)	0.018	0.082
38	3.17	0.17	0.100	(0.119)	0.018	0.082
39	3.25	0.17	0.100	(0.119)	0.018	0.082
40	3.33	0.17	0.100	(0.118)	0.018	0.082
41	3.42	0.17	0.100	(0.118)	0.018	0.082
42	3.50	0.17	0.100	(0.117)	0.018	0.082
43	3.58	0.17	0.100	(0.117)	0.018	0.082
44	3.67	0.17	0.100	(0.116)	0.018	0.082
45	3.75	0.17	0.100	(0.116)	0.018	0.082
46	3.83	0.20	0.120	(0.115)	0.022	0.098
47	3.92	0.20	0.120	(0.115)	0.022	0.098
48	4.00	0.20	0.120	(0.114)	0.022	0.098
49	4.08	0.20	0.120	(0.114)	0.022	0.098
50	4.17	0.20	0.120	(0.113)	0.022	0.098
51	4.25	0.20	0.120	(0.113)	0.022	0.098
52	4.33	0.23	0.140	(0.112)	0.025	0.115
53	4.42	0.23	0.140	(0.112)	0.025	0.115
54	4.50	0.23	0.140	(0.111)	0.025	0.115
55	4.58	0.23	0.140	(0.111)	0.025	0.115
56	4.67	0.23	0.140	(0.110)	0.025	0.115
57	4.75	0.23	0.140	(0.110)	0.025	0.115
58	4.83	0.27	0.160	(0.110)	0.029	0.131
59	4.92	0.27	0.160	(0.109)	0.029	0.131

60	5.00	0.27	0.160	(0.109)	0.029	0.131
61	5.08	0.20	0.120	(0.108)	0.022	0.098
62	5.17	0.20	0.120	(0.108)	0.022	0.098
63	5.25	0.20	0.120	(0.107)	0.022	0.098
64	5.33	0.23	0.140	(0.107)	0.025	0.115
65	5.42	0.23	0.140	(0.106)	0.025	0.115
66	5.50	0.23	0.140	(0.106)	0.025	0.115
67	5.58	0.27	0.160	(0.105)	0.029	0.131
68	5.67	0.27	0.160	(0.105)	0.029	0.131
69	5.75	0.27	0.160	(0.104)	0.029	0.131
70	5.83	0.27	0.160	(0.104)	0.029	0.131
71	5.92	0.27	0.160	(0.103)	0.029	0.131
72	6.00	0.27	0.160	(0.103)	0.029	0.131
73	6.08	0.30	0.180	(0.103)	0.032	0.148
74	6.17	0.30	0.180	(0.102)	0.032	0.148
75	6.25	0.30	0.180	(0.102)	0.032	0.148
76	6.33	0.30	0.180	(0.101)	0.032	0.148
77	6.42	0.30	0.180	(0.101)	0.032	0.148
78	6.50	0.30	0.180	(0.100)	0.032	0.148
79	6.58	0.33	0.200	(0.100)	0.036	0.164
80	6.67	0.33	0.200	(0.099)	0.036	0.164
81	6.75	0.33	0.200	(0.099)	0.036	0.164
82	6.83	0.33	0.200	(0.098)	0.036	0.164
83	6.92	0.33	0.200	(0.098)	0.036	0.164
84	7.00	0.33	0.200	(0.098)	0.036	0.164
85	7.08	0.33	0.200	(0.097)	0.036	0.164
86	7.17	0.33	0.200	(0.097)	0.036	0.164
87	7.25	0.33	0.200	(0.096)	0.036	0.164
88	7.33	0.37	0.220	(0.096)	0.040	0.180
89	7.42	0.37	0.220	(0.095)	0.040	0.180
90	7.50	0.37	0.220	(0.095)	0.040	0.180
91	7.58	0.40	0.240	(0.094)	0.043	0.197
92	7.67	0.40	0.240	(0.094)	0.043	0.197
93	7.75	0.40	0.240	(0.094)	0.043	0.197
94	7.83	0.43	0.260	(0.093)	0.047	0.213
95	7.92	0.43	0.260	(0.093)	0.047	0.213
96	8.00	0.43	0.260	(0.092)	0.047	0.213
97	8.08	0.50	0.300	(0.092)	0.054	0.246
98	8.17	0.50	0.300	(0.091)	0.054	0.246
99	8.25	0.50	0.300	(0.091)	0.054	0.246
100	8.33	0.50	0.300	(0.091)	0.054	0.246
101	8.42	0.50	0.300	(0.090)	0.054	0.246
102	8.50	0.50	0.300	(0.090)	0.054	0.246
103	8.58	0.53	0.320	(0.089)	0.058	0.262
104	8.67	0.53	0.320	(0.089)	0.058	0.262
105	8.75	0.53	0.320	(0.089)	0.058	0.262
106	8.83	0.57	0.340	(0.088)	0.061	0.279
107	8.92	0.57	0.340	(0.088)	0.061	0.279
108	9.00	0.57	0.340	(0.087)	0.061	0.279
109	9.08	0.63	0.380	(0.087)	0.068	0.312
110	9.17	0.63	0.380	(0.086)	0.068	0.312
111	9.25	0.63	0.380	(0.086)	0.068	0.312
112	9.33	0.67	0.400	(0.086)	0.072	0.328
113	9.42	0.67	0.400	(0.085)	0.072	0.328
114	9.50	0.67	0.400	(0.085)	0.072	0.328
115	9.58	0.70	0.420	(0.084)	0.076	0.344
116	9.67	0.70	0.420	(0.084)	0.076	0.344

117	9.75	0.70	0.420	(0.084)	0.076	0.344
118	9.83	0.73	0.440	(0.083)	0.079	0.361
119	9.92	0.73	0.440	(0.083)	0.079	0.361
120	10.00	0.73	0.440	(0.082)	0.079	0.361
121	10.08	0.50	0.300	(0.082)	0.054	0.246
122	10.17	0.50	0.300	(0.082)	0.054	0.246
123	10.25	0.50	0.300	(0.081)	0.054	0.246
124	10.33	0.50	0.300	(0.081)	0.054	0.246
125	10.42	0.50	0.300	(0.080)	0.054	0.246
126	10.50	0.50	0.300	(0.080)	0.054	0.246
127	10.58	0.67	0.400	(0.080)	0.072	0.328
128	10.67	0.67	0.400	(0.079)	0.072	0.328
129	10.75	0.67	0.400	(0.079)	0.072	0.328
130	10.83	0.67	0.400	(0.078)	0.072	0.328
131	10.92	0.67	0.400	(0.078)	0.072	0.328
132	11.00	0.67	0.400	(0.078)	0.072	0.328
133	11.08	0.63	0.380	(0.077)	0.068	0.312
134	11.17	0.63	0.380	(0.077)	0.068	0.312
135	11.25	0.63	0.380	(0.077)	0.068	0.312
136	11.33	0.63	0.380	(0.076)	0.068	0.312
137	11.42	0.63	0.380	(0.076)	0.068	0.312
138	11.50	0.63	0.380	(0.075)	0.068	0.312
139	11.58	0.57	0.340	(0.075)	0.061	0.279
140	11.67	0.57	0.340	(0.075)	0.061	0.279
141	11.75	0.57	0.340	(0.074)	0.061	0.279
142	11.83	0.60	0.360	(0.074)	0.065	0.295
143	11.92	0.60	0.360	(0.074)	0.065	0.295
144	12.00	0.60	0.360	(0.073)	0.065	0.295
145	12.08	0.83	0.500	0.073	(0.090)	0.427
146	12.17	0.83	0.500	0.072	(0.090)	0.428
147	12.25	0.83	0.500	0.072	(0.090)	0.428
148	12.33	0.87	0.520	0.072	(0.094)	0.448
149	12.42	0.87	0.520	0.071	(0.094)	0.449
150	12.50	0.87	0.520	0.071	(0.094)	0.449
151	12.58	0.93	0.560	0.071	(0.101)	0.489
152	12.67	0.93	0.560	0.070	(0.101)	0.490
153	12.75	0.93	0.560	0.070	(0.101)	0.490
154	12.83	0.97	0.580	0.070	(0.104)	0.510
155	12.92	0.97	0.580	0.069	(0.104)	0.511
156	13.00	0.97	0.580	0.069	(0.104)	0.511
157	13.08	1.13	0.680	0.069	(0.122)	0.611
158	13.17	1.13	0.680	0.068	(0.122)	0.612
159	13.25	1.13	0.680	0.068	(0.122)	0.612
160	13.33	1.13	0.680	0.068	(0.122)	0.612
161	13.42	1.13	0.680	0.067	(0.122)	0.613
162	13.50	1.13	0.680	0.067	(0.122)	0.613
163	13.58	0.77	0.460	0.066	(0.083)	0.394
164	13.67	0.77	0.460	0.066	(0.083)	0.394
165	13.75	0.77	0.460	0.066	(0.083)	0.394
166	13.83	0.77	0.460	0.065	(0.083)	0.395
167	13.92	0.77	0.460	0.065	(0.083)	0.395
168	14.00	0.77	0.460	0.065	(0.083)	0.395
169	14.08	0.90	0.540	0.064	(0.097)	0.476
170	14.17	0.90	0.540	0.064	(0.097)	0.476
171	14.25	0.90	0.540	0.064	(0.097)	0.476
172	14.33	0.87	0.520	0.063	(0.094)	0.457
173	14.42	0.87	0.520	0.063	(0.094)	0.457

174	14.50	0.87	0.520	0.063	(0.094)	0.457
175	14.58	0.87	0.520	0.063	(0.094)	0.457
176	14.67	0.87	0.520	0.062	(0.094)	0.458
177	14.75	0.87	0.520	0.062	(0.094)	0.458
178	14.83	0.83	0.500	0.062	(0.090)	0.438
179	14.92	0.83	0.500	0.061	(0.090)	0.439
180	15.00	0.83	0.500	0.061	(0.090)	0.439
181	15.08	0.80	0.480	0.061	(0.086)	0.419
182	15.17	0.80	0.480	0.060	(0.086)	0.420
183	15.25	0.80	0.480	0.060	(0.086)	0.420
184	15.33	0.77	0.460	0.060	(0.083)	0.400
185	15.42	0.77	0.460	0.059	(0.083)	0.401
186	15.50	0.77	0.460	0.059	(0.083)	0.401
187	15.58	0.63	0.380	0.059	(0.068)	0.321
188	15.67	0.63	0.380	0.058	(0.068)	0.322
189	15.75	0.63	0.380	0.058	(0.068)	0.322
190	15.83	0.63	0.380	0.058	(0.068)	0.322
191	15.92	0.63	0.380	0.058	(0.068)	0.322
192	16.00	0.63	0.380	0.057	(0.068)	0.323
193	16.08	0.13	0.080	(0.057)	0.014	0.066
194	16.17	0.13	0.080	(0.057)	0.014	0.066
195	16.25	0.13	0.080	(0.056)	0.014	0.066
196	16.33	0.13	0.080	(0.056)	0.014	0.066
197	16.42	0.13	0.080	(0.056)	0.014	0.066
198	16.50	0.13	0.080	(0.056)	0.014	0.066
199	16.58	0.10	0.060	(0.055)	0.011	0.049
200	16.67	0.10	0.060	(0.055)	0.011	0.049
201	16.75	0.10	0.060	(0.055)	0.011	0.049
202	16.83	0.10	0.060	(0.054)	0.011	0.049
203	16.92	0.10	0.060	(0.054)	0.011	0.049
204	17.00	0.10	0.060	(0.054)	0.011	0.049
205	17.08	0.17	0.100	(0.054)	0.018	0.082
206	17.17	0.17	0.100	(0.053)	0.018	0.082
207	17.25	0.17	0.100	(0.053)	0.018	0.082
208	17.33	0.17	0.100	(0.053)	0.018	0.082
209	17.42	0.17	0.100	(0.053)	0.018	0.082
210	17.50	0.17	0.100	(0.052)	0.018	0.082
211	17.58	0.17	0.100	(0.052)	0.018	0.082
212	17.67	0.17	0.100	(0.052)	0.018	0.082
213	17.75	0.17	0.100	(0.052)	0.018	0.082
214	17.83	0.13	0.080	(0.051)	0.014	0.066
215	17.92	0.13	0.080	(0.051)	0.014	0.066
216	18.00	0.13	0.080	(0.051)	0.014	0.066
217	18.08	0.13	0.080	(0.050)	0.014	0.066
218	18.17	0.13	0.080	(0.050)	0.014	0.066
219	18.25	0.13	0.080	(0.050)	0.014	0.066
220	18.33	0.13	0.080	(0.050)	0.014	0.066
221	18.42	0.13	0.080	(0.050)	0.014	0.066
222	18.50	0.13	0.080	(0.049)	0.014	0.066
223	18.58	0.10	0.060	(0.049)	0.011	0.049
224	18.67	0.10	0.060	(0.049)	0.011	0.049
225	18.75	0.10	0.060	(0.049)	0.011	0.049
226	18.83	0.07	0.040	(0.048)	0.007	0.033
227	18.92	0.07	0.040	(0.048)	0.007	0.033
228	19.00	0.07	0.040	(0.048)	0.007	0.033
229	19.08	0.10	0.060	(0.048)	0.011	0.049
230	19.17	0.10	0.060	(0.047)	0.011	0.049

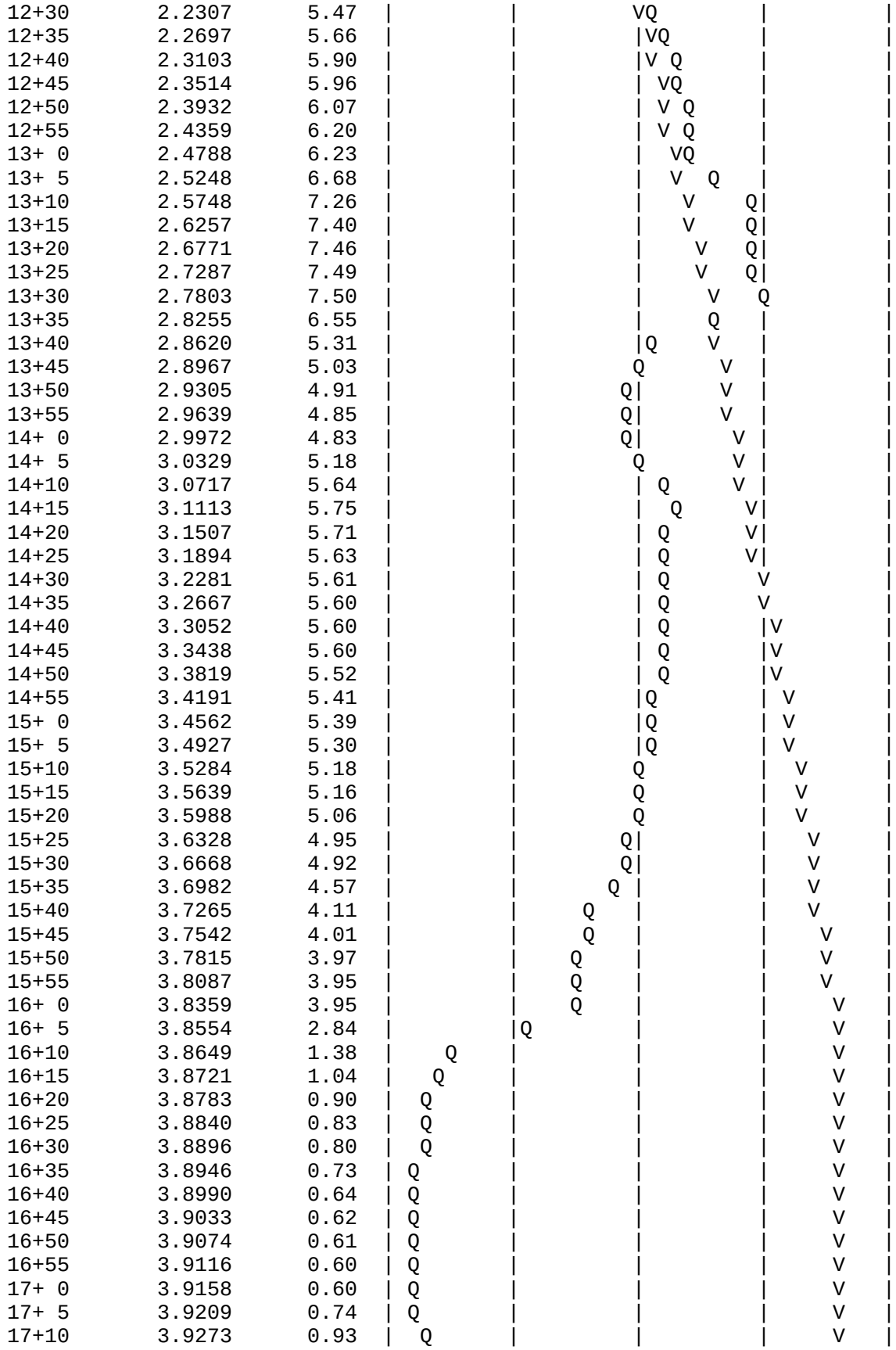
231	19.25	0.10	0.060	(0.047)	0.011	0.049
232	19.33	0.13	0.080	(0.047)	0.014	0.066
233	19.42	0.13	0.080	(0.047)	0.014	0.066
234	19.50	0.13	0.080	(0.047)	0.014	0.066
235	19.58	0.10	0.060	(0.046)	0.011	0.049
236	19.67	0.10	0.060	(0.046)	0.011	0.049
237	19.75	0.10	0.060	(0.046)	0.011	0.049
238	19.83	0.07	0.040	(0.046)	0.007	0.033
239	19.92	0.07	0.040	(0.046)	0.007	0.033
240	20.00	0.07	0.040	(0.045)	0.007	0.033
241	20.08	0.10	0.060	(0.045)	0.011	0.049
242	20.17	0.10	0.060	(0.045)	0.011	0.049
243	20.25	0.10	0.060	(0.045)	0.011	0.049
244	20.33	0.10	0.060	(0.045)	0.011	0.049
245	20.42	0.10	0.060	(0.044)	0.011	0.049
246	20.50	0.10	0.060	(0.044)	0.011	0.049
247	20.58	0.10	0.060	(0.044)	0.011	0.049
248	20.67	0.10	0.060	(0.044)	0.011	0.049
249	20.75	0.10	0.060	(0.044)	0.011	0.049
250	20.83	0.07	0.040	(0.043)	0.007	0.033
251	20.92	0.07	0.040	(0.043)	0.007	0.033
252	21.00	0.07	0.040	(0.043)	0.007	0.033
253	21.08	0.10	0.060	(0.043)	0.011	0.049
254	21.17	0.10	0.060	(0.043)	0.011	0.049
255	21.25	0.10	0.060	(0.043)	0.011	0.049
256	21.33	0.07	0.040	(0.042)	0.007	0.033
257	21.42	0.07	0.040	(0.042)	0.007	0.033
258	21.50	0.07	0.040	(0.042)	0.007	0.033
259	21.58	0.10	0.060	(0.042)	0.011	0.049
260	21.67	0.10	0.060	(0.042)	0.011	0.049
261	21.75	0.10	0.060	(0.042)	0.011	0.049
262	21.83	0.07	0.040	(0.041)	0.007	0.033
263	21.92	0.07	0.040	(0.041)	0.007	0.033
264	22.00	0.07	0.040	(0.041)	0.007	0.033
265	22.08	0.10	0.060	(0.041)	0.011	0.049
266	22.17	0.10	0.060	(0.041)	0.011	0.049
267	22.25	0.10	0.060	(0.041)	0.011	0.049
268	22.33	0.07	0.040	(0.041)	0.007	0.033
269	22.42	0.07	0.040	(0.041)	0.007	0.033
270	22.50	0.07	0.040	(0.040)	0.007	0.033
271	22.58	0.07	0.040	(0.040)	0.007	0.033
272	22.67	0.07	0.040	(0.040)	0.007	0.033
273	22.75	0.07	0.040	(0.040)	0.007	0.033
274	22.83	0.07	0.040	(0.040)	0.007	0.033
275	22.92	0.07	0.040	(0.040)	0.007	0.033
276	23.00	0.07	0.040	(0.040)	0.007	0.033
277	23.08	0.07	0.040	(0.040)	0.007	0.033
278	23.17	0.07	0.040	(0.040)	0.007	0.033
279	23.25	0.07	0.040	(0.040)	0.007	0.033
280	23.33	0.07	0.040	(0.039)	0.007	0.033
281	23.42	0.07	0.040	(0.039)	0.007	0.033
282	23.50	0.07	0.040	(0.039)	0.007	0.033
283	23.58	0.07	0.040	(0.039)	0.007	0.033
284	23.67	0.07	0.040	(0.039)	0.007	0.033
285	23.75	0.07	0.040	(0.039)	0.007	0.033
286	23.83	0.07	0.040	(0.039)	0.007	0.033
287	23.92	0.07	0.040	(0.039)	0.007	0.033

```
288  24.00     0.07      0.040       (  0.039)       0.007        0.033
           (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    50.5
     Flood volume = Effective rainfall      4.21(In)
      times area      12.1(Ac.)/[(In)/(Ft.)] =       4.3(Ac.Ft)
     Total soil loss =      0.79(In)
     Total soil loss =     0.798(Ac.Ft)
     Total rainfall =      5.00(In)
     Flood volume =      185556.3 Cubic Feet
     Total soil loss =       34779.4 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =      7.502(CFS)
     ---------------------------------------------------------------------
     +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         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       0.0010      0.14  Q         |         |         |         |
   0+10       0.0032      0.33  VQ        |         |         |         |
   0+15       0.0058      0.37  VQ        |         |         |         |
   0+20       0.0090      0.46  VQ        |         |         |         |
   0+25       0.0128      0.56  V Q       |         |         |         |
   0+30       0.0169      0.59  V Q       |         |         |         |
   0+35       0.0210      0.60  V Q       |         |         |         |
   0+40       0.0251      0.60  V Q       |         |         |         |
   0+45       0.0293      0.60  V Q       |         |         |         |
   0+50       0.0339      0.67  V Q       |         |         |         |
   0+55       0.0392      0.77  V  Q      |         |         |         |
   1+ 0       0.0446      0.79  V  Q      |         |         |         |
   1+ 5       0.0496      0.73  V Q       |         |         |         |
   1+10       0.0540      0.64  V Q       |         |         |         |
   1+15       0.0582      0.62  V Q       |         |         |         |
   1+20       0.0624      0.61  V Q       |         |         |         |
   1+25       0.0666      0.60  V Q       |         |         |         |
   1+30       0.0707      0.60  V Q       |         |         |         |
   1+35       0.0749      0.60  V Q       |         |         |         |
   1+40       0.0790      0.60  V Q       |         |         |         |
   1+45       0.0832      0.60  V Q       |         |         |         |
   1+50       0.0878      0.67  V Q       |         |         |         |
   1+55       0.0931      0.77  V  Q      |         |         |         |
   2+ 0       0.0985      0.79  V  Q      |         |         |         |
   2+ 5       0.1040      0.80  V  Q      |         |         |         |
   2+10       0.1095      0.80  |V Q       |         |         |         |
   2+15       0.1151      0.80  |V Q       |         |         |         |
   2+20       0.1206      0.80  |V Q       |         |         |         |
   2+25       0.1261      0.80  |V Q       |         |         |         |
   2+30       0.1316      0.80  |V Q       |         |         |         |
   2+35       0.1377      0.87  |V Q       |         |         |         |
   2+40       0.1443      0.97  |V Q       |         |         |         |
   2+45       0.1511      0.99  |V Q       |         |         |         |
   2+50       0.1580      1.00  |V Q       |         |         |         |
   2+55       0.1649      1.00  |V  Q      |         |         |         |
```

3+ 0	0.1718	1.00	|V Q |	|	|	|
3+ 5	0.1787	1.00	|V Q |	|	|	|
3+10	0.1856	1.00	|V Q |	|	|	|
3+15	0.1926	1.00	|V Q |	|	|	|
3+20	0.1995	1.00	|V Q |	|	|	|
3+25	0.2064	1.00	|V Q |	|	|	|
3+30	0.2133	1.00	| V Q |	|	|	|
3+35	0.2202	1.00	| V Q |	|	|	|
3+40	0.2271	1.00	| V Q |	|	|	|
3+45	0.2340	1.00	| V Q |	|	|	|
3+50	0.2414	1.07	| V Q |	|	|	|
3+55	0.2495	1.17	| V Q |	|	|	|
4+ 0	0.2577	1.19	| V Q |	|	|	|
4+ 5	0.2659	1.20	| V Q |	|	|	|
4+10	0.2742	1.20	| V Q |	|	|	|
4+15	0.2825	1.20	| V Q |	|	|	|
4+20	0.2913	1.28	| V Q |	|	|	|
4+25	0.3007	1.37	| V Q |	|	|	|
4+30	0.3103	1.39	| V Q |	|	|	|
4+35	0.3199	1.40	| V Q |	|	|	|
4+40	0.3296	1.40	| V Q |	|	|	|
4+45	0.3393	1.41	| V Q |	|	|	|
4+50	0.3494	1.48	| V Q |	|	|	|
4+55	0.3602	1.57	| V Q|	|	|	|
5+ 0	0.3712	1.59	| V Q|	|	|	|
5+ 5	0.3812	1.46	| V Q |	|	|	|
5+10	0.3900	1.28	| V Q |	|	|	|
5+15	0.3985	1.24	| VQ |	|	|	|
5+20	0.4074	1.29	| V Q |	|	|	|
5+25	0.4168	1.37	| V Q |	|	|	|
5+30	0.4264	1.39	| VQ |	|	|	|
5+35	0.4365	1.47	| VQ |	|	|	|
5+40	0.4473	1.57	| V Q |	|	|	|
5+45	0.4583	1.59	| V Q |	|	|	|
5+50	0.4693	1.60	| V Q |	|	|	|
5+55	0.4804	1.60	| V Q |	|	|	|
6+ 0	0.4914	1.61	| V Q |	|	|	|
6+ 5	0.5030	1.68	| V Q |	|	|	|
6+10	0.5152	1.77	| V Q|	|	|	|
6+15	0.5275	1.79	| V Q|	|	|	|
6+20	0.5399	1.80	| V Q|	|	|	|
6+25	0.5523	1.81	| V Q|	|	|	|
6+30	0.5648	1.81	| V Q|	|	|	|
6+35	0.5777	1.88	| V Q|	|	|	|
6+40	0.5913	1.97	| V Q|	|	|	|
6+45	0.6050	1.99	| V Q|	|	|	|
6+50	0.6188	2.00	| V Q|	|	|	|
6+55	0.6326	2.01	| V Q|	|	|	|
7+ 0	0.6464	2.01	| V Q|	|	|	|
7+ 5	0.6602	2.01	| V Q|	|	|	|
7+10	0.6741	2.01	| V Q|	|	|	|
7+15	0.6879	2.01	| V Q|	|	|	|
7+20	0.7022	2.08	| V Q|	|	|	|
7+25	0.7172	2.17	| V Q|	|	|	|
7+30	0.7323	2.19	| V Q|	|	|	|
7+35	0.7479	2.27	| V Q|	|	|	|
7+40	0.7643	2.37	| V Q|	|	|	|

7+45	0.7807	2.39	V Q|			
7+50	0.7978	2.47	V Q|			
7+55	0.8155	2.57	V Q			
8+ 0	0.8334	2.59	V Q			
8+ 5	0.8523	2.75	V Q			
8+10	0.8725	2.94	V |Q			
8+15	0.8930	2.98	V |Q			
8+20	0.9137	3.00	V |Q			
8+25	0.9344	3.01	V | Q			
8+30	0.9551	3.01	V | Q			
8+35	0.9763	3.08	V| Q			
8+40	0.9982	3.18	V| Q			
8+45	1.0202	3.20	V| Q			
8+50	1.0428	3.28	V| Q			
8+55	1.0660	3.37	V Q			
9+ 0	1.0894	3.40	V Q			
9+ 5	1.1139	3.55	V Q			
9+10	1.1396	3.74	V Q			
9+15	1.1657	3.78	V Q			
9+20	1.1924	3.87	|V Q			
9+25	1.2197	3.97	|V Q			
9+30	1.2473	4.00	|V Q			
9+35	1.2754	4.08	|V Q			
9+40	1.3041	4.18	| V Q			
9+45	1.3331	4.20	| V Q			
9+50	1.3626	4.28	| V Q			
9+55	1.3927	4.38	| V Q			
10+ 0	1.4230	4.40	| V Q			
10+ 5	1.4500	3.91	| V Q			
10+10	1.4725	3.27	| Q			
10+15	1.4939	3.12	| Q V			
10+20	1.5150	3.05	| Q V			
10+25	1.5358	3.02	| Q V			
10+30	1.5565	3.01	| Q V			
10+35	1.5797	3.37	| QV			
10+40	1.6061	3.83	| Q			
10+45	1.6332	3.94	| Q			
10+50	1.6607	3.98	| Q			
10+55	1.6883	4.01	| VQ			
11+ 0	1.7159	4.02	| Q			
11+ 5	1.7431	3.94	| QV			
11+10	1.7696	3.85	| QV			
11+15	1.7960	3.83	| QV			
11+20	1.8223	3.82	| Q V			
11+25	1.8486	3.82	| Q V			
11+30	1.8748	3.81	| Q V			
11+35	1.9001	3.67	| Q V			
11+40	1.9241	3.49	| Q V			
11+45	1.9479	3.44	| Q V			
11+50	1.9719	3.50	| Q V			
11+55	1.9966	3.58	| Q V			
12+ 0	2.0214	3.60	| Q V			
12+ 5	2.0501	4.18	| Q V|			
12+10	2.0841	4.93	| Q|			
12+15	2.1193	5.11	| VQ			
12+20	2.1556	5.28	| VQ			
12+25	2.1930	5.43	| VQ			



17+15	3.9340	0.97	| Q	|	|	| V	|
17+20	3.9408	0.99	| Q	|	|	| V	|
17+25	3.9477	1.00	| Q	|	|	| V	|
17+30	3.9546	1.00	| Q	|	|	| V	|
17+35	3.9615	1.00	| Q	|	|	| V	|
17+40	3.9684	1.00	| Q	|	|	| V	|
17+45	3.9754	1.00	| Q	|	|	| V	|
17+50	3.9818	0.93	| Q	|	|	| V	|
17+55	3.9876	0.84	| Q	|	|	| V	|
18+ 0	3.9932	0.82	| Q	|	|	| V	|
18+ 5	3.9988	0.81	| Q	|	|	| V	|
18+10	4.0043	0.80	| Q	|	|	| V	|
18+15	4.0098	0.80	| Q	|	|	| V	|
18+20	4.0154	0.80	| Q	|	|	| V	|
18+25	4.0209	0.80	| Q	|	|	| V	|
18+30	4.0264	0.80	| Q	|	|	| V	|
18+35	4.0315	0.73	| Q	|	|	| V	|
18+40	4.0359	0.64	| Q	|	|	| V	|
18+45	4.0401	0.62	| Q	|	|	| V	|
18+50	4.0438	0.54	| Q	|	|	| V	|
18+55	4.0469	0.44	|Q	|	|	| V	|
19+ 0	4.0497	0.42	|Q	|	|	| V	|
19+ 5	4.0530	0.48	|Q	|	|	| V	|
19+10	4.0569	0.57	| Q	|	|	| V	|
19+15	4.0610	0.59	| Q	|	|	| V	|
19+20	4.0656	0.67	| Q	|	|	| V	|
19+25	4.0708	0.76	| Q	|	|	| V	|
19+30	4.0763	0.79	| Q	|	|	| V	|
19+35	4.0813	0.73	| Q	|	|	| V	|
19+40	4.0857	0.64	| Q	|	|	| V	|
19+45	4.0899	0.62	| Q	|	|	| V	|
19+50	4.0936	0.54	| Q	|	|	| V	|
19+55	4.0966	0.44	|Q	|	|	| V	|
20+ 0	4.0995	0.42	|Q	|	|	| V	|
20+ 5	4.1028	0.48	|Q	|	|	| V	|
20+10	4.1067	0.57	| Q	|	|	| V	|
20+15	4.1108	0.59	| Q	|	|	| V	|
20+20	4.1149	0.60	| Q	|	|	| V	|
20+25	4.1190	0.60	| Q	|	|	| V	|
20+30	4.1231	0.60	| Q	|	|	| V	|
20+35	4.1273	0.60	| Q	|	|	| V	|
20+40	4.1314	0.60	| Q	|	|	| V	|
20+45	4.1356	0.60	| Q	|	|	| V	|
20+50	4.1392	0.53	| Q	|	|	| V	|
20+55	4.1423	0.44	|Q	|	|	| V	|
21+ 0	4.1451	0.42	|Q	|	|	| V	|
21+ 5	4.1484	0.48	|Q	|	|	| V	|
21+10	4.1523	0.57	| Q	|	|	| V	|
21+15	4.1564	0.59	| Q	|	|	| V	|
21+20	4.1600	0.53	| Q	|	|	| V	|
21+25	4.1630	0.44	|Q	|	|	| V	|
21+30	4.1659	0.42	|Q	|	|	| V	|
21+35	4.1692	0.48	|Q	|	|	| V	|
21+40	4.1731	0.57	| Q	|	|	| V	|
21+45	4.1771	0.59	| Q	|	|	| V	|
21+50	4.1807	0.53	| Q	|	|	| V	|
21+55	4.1837	0.44	|Q	|	|	| V	|

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  22+ 0       4.1866      0.42  |Q        |         |         |        V|
  22+ 5       4.1899      0.48  |Q        |         |         |        V|
  22+10       4.1938      0.57  | Q       |         |         |        V|
  22+15       4.1979      0.59  | Q       |         |         |        V|
  22+20       4.2015      0.53  | Q       |         |         |        V|
  22+25       4.2045      0.44  |Q        |         |         |        V|
  22+30       4.2073      0.42  |Q        |         |         |        V|
  22+35       4.2102      0.41  |Q        |         |         |        V|
  22+40       4.2129      0.40  |Q        |         |         |        V|
  22+45       4.2157      0.40  |Q        |         |         |        V|
  22+50       4.2185      0.40  |Q        |         |         |        V|
  22+55       4.2212      0.40  |Q        |         |         |        V|
  23+ 0       4.2240      0.40  |Q        |         |         |        V|
  23+ 5       4.2268      0.40  |Q        |         |         |        V|
  23+10       4.2295      0.40  |Q        |         |         |        V|
  23+15       4.2323      0.40  |Q        |         |         |        V|
  23+20       4.2351      0.40  |Q        |         |         |        V|
  23+25       4.2378      0.40  |Q        |         |         |        V|
  23+30       4.2406      0.40  |Q        |         |         |        V|
  23+35       4.2433      0.40  |Q        |         |         |        V|
  23+40       4.2461      0.40  |Q        |         |         |        V|
  23+45       4.2489      0.40  |Q        |         |         |        V|
  23+50       4.2516      0.40  |Q        |         |         |        V|
  23+55       4.2544      0.40  |Q        |         |         |        V|
  24+ 0       4.2572      0.40  |Q        |         |         |        V|
  24+ 5       4.2590      0.26  |Q        |         |         |        V|
  24+10       4.2595      0.07  Q         |         |         |        V|
  24+15       4.2597      0.03  Q         |         |         |        V|
  24+20       4.2598      0.01  Q         |         |         |        V|

  24+25       4.2598      0.00  Q         |         |         |        V|
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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

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Study date 09/26/23 File: qbuh24100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - WATERSHED B
100 YEAR, 24 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 10.13(Ac.) = 0.016 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 10.13(Ac.) = 0.016 Sq. Mi.
Length along longest watercourse = 1196.00(Ft.)
Length along longest watercourse measured to centroid = 993.00(Ft.)
Length along longest watercourse = 0.227 Mi.
Length along longest watercourse measured to centroid = 0.188 Mi.
Difference in elevation = 14.05(Ft.)
Slope along watercourse = 62.0268 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.050 Hr.
Lag time = 2.97 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.19 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]

10.13	2.00	20.26

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	5.00	50.65

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.130	58.70	0.900

Total Area Entered = 10.13(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.900	0.092	1.000	0.092
					Sum (F) =	0.092

Area averaged mean soil loss (F) (In/Hr) = 0.092
Minimum soil loss rate ((In/Hr)) = 0.046
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	168.240	37.316	3.810
2	0.167	336.480	45.647	4.660
3	0.250	504.720	10.225	1.044
4	0.333	672.960	4.317	0.441
5	0.417	841.200	2.495	0.255
			Sum = 100.000	Sum= 10.209

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	0.040	(0.163)		0.007	0.033
2	0.17	0.07	0.040	(0.162)		0.007	0.033
3	0.25	0.07	0.040	(0.162)		0.007	0.033

4	0.33	0.10	0.060	(0.161)	0.011	0.049
5	0.42	0.10	0.060	(0.160)	0.011	0.049
6	0.50	0.10	0.060	(0.160)	0.011	0.049
7	0.58	0.10	0.060	(0.159)	0.011	0.049
8	0.67	0.10	0.060	(0.158)	0.011	0.049
9	0.75	0.10	0.060	(0.158)	0.011	0.049
10	0.83	0.13	0.080	(0.157)	0.014	0.066
11	0.92	0.13	0.080	(0.157)	0.014	0.066
12	1.00	0.13	0.080	(0.156)	0.014	0.066
13	1.08	0.10	0.060	(0.155)	0.011	0.049
14	1.17	0.10	0.060	(0.155)	0.011	0.049
15	1.25	0.10	0.060	(0.154)	0.011	0.049
16	1.33	0.10	0.060	(0.153)	0.011	0.049
17	1.42	0.10	0.060	(0.153)	0.011	0.049
18	1.50	0.10	0.060	(0.152)	0.011	0.049
19	1.58	0.10	0.060	(0.152)	0.011	0.049
20	1.67	0.10	0.060	(0.151)	0.011	0.049
21	1.75	0.10	0.060	(0.150)	0.011	0.049
22	1.83	0.13	0.080	(0.150)	0.014	0.066
23	1.92	0.13	0.080	(0.149)	0.014	0.066
24	2.00	0.13	0.080	(0.149)	0.014	0.066
25	2.08	0.13	0.080	(0.148)	0.014	0.066
26	2.17	0.13	0.080	(0.147)	0.014	0.066
27	2.25	0.13	0.080	(0.147)	0.014	0.066
28	2.33	0.13	0.080	(0.146)	0.014	0.066
29	2.42	0.13	0.080	(0.146)	0.014	0.066
30	2.50	0.13	0.080	(0.145)	0.014	0.066
31	2.58	0.17	0.100	(0.144)	0.018	0.082
32	2.67	0.17	0.100	(0.144)	0.018	0.082
33	2.75	0.17	0.100	(0.143)	0.018	0.082
34	2.83	0.17	0.100	(0.143)	0.018	0.082
35	2.92	0.17	0.100	(0.142)	0.018	0.082
36	3.00	0.17	0.100	(0.141)	0.018	0.082
37	3.08	0.17	0.100	(0.141)	0.018	0.082
38	3.17	0.17	0.100	(0.140)	0.018	0.082
39	3.25	0.17	0.100	(0.140)	0.018	0.082
40	3.33	0.17	0.100	(0.139)	0.018	0.082
41	3.42	0.17	0.100	(0.139)	0.018	0.082
42	3.50	0.17	0.100	(0.138)	0.018	0.082
43	3.58	0.17	0.100	(0.137)	0.018	0.082
44	3.67	0.17	0.100	(0.137)	0.018	0.082
45	3.75	0.17	0.100	(0.136)	0.018	0.082
46	3.83	0.20	0.120	(0.136)	0.022	0.098
47	3.92	0.20	0.120	(0.135)	0.022	0.098
48	4.00	0.20	0.120	(0.135)	0.022	0.098
49	4.08	0.20	0.120	(0.134)	0.022	0.098
50	4.17	0.20	0.120	(0.133)	0.022	0.098
51	4.25	0.20	0.120	(0.133)	0.022	0.098
52	4.33	0.23	0.140	(0.132)	0.025	0.115
53	4.42	0.23	0.140	(0.132)	0.025	0.115
54	4.50	0.23	0.140	(0.131)	0.025	0.115
55	4.58	0.23	0.140	(0.131)	0.025	0.115
56	4.67	0.23	0.140	(0.130)	0.025	0.115
57	4.75	0.23	0.140	(0.129)	0.025	0.115
58	4.83	0.27	0.160	(0.129)	0.029	0.131
59	4.92	0.27	0.160	(0.128)	0.029	0.131
60	5.00	0.27	0.160	(0.128)	0.029	0.131

61	5.08	0.20	0.120	(0.127)	0.022	0.098
62	5.17	0.20	0.120	(0.127)	0.022	0.098
63	5.25	0.20	0.120	(0.126)	0.022	0.098
64	5.33	0.23	0.140	(0.126)	0.025	0.115
65	5.42	0.23	0.140	(0.125)	0.025	0.115
66	5.50	0.23	0.140	(0.124)	0.025	0.115
67	5.58	0.27	0.160	(0.124)	0.029	0.131
68	5.67	0.27	0.160	(0.123)	0.029	0.131
69	5.75	0.27	0.160	(0.123)	0.029	0.131
70	5.83	0.27	0.160	(0.122)	0.029	0.131
71	5.92	0.27	0.160	(0.122)	0.029	0.131
72	6.00	0.27	0.160	(0.121)	0.029	0.131
73	6.08	0.30	0.180	(0.121)	0.032	0.148
74	6.17	0.30	0.180	(0.120)	0.032	0.148
75	6.25	0.30	0.180	(0.120)	0.032	0.148
76	6.33	0.30	0.180	(0.119)	0.032	0.148
77	6.42	0.30	0.180	(0.119)	0.032	0.148
78	6.50	0.30	0.180	(0.118)	0.032	0.148
79	6.58	0.33	0.200	(0.117)	0.036	0.164
80	6.67	0.33	0.200	(0.117)	0.036	0.164
81	6.75	0.33	0.200	(0.116)	0.036	0.164
82	6.83	0.33	0.200	(0.116)	0.036	0.164
83	6.92	0.33	0.200	(0.115)	0.036	0.164
84	7.00	0.33	0.200	(0.115)	0.036	0.164
85	7.08	0.33	0.200	(0.114)	0.036	0.164
86	7.17	0.33	0.200	(0.114)	0.036	0.164
87	7.25	0.33	0.200	(0.113)	0.036	0.164
88	7.33	0.37	0.220	(0.113)	0.040	0.180
89	7.42	0.37	0.220	(0.112)	0.040	0.180
90	7.50	0.37	0.220	(0.112)	0.040	0.180
91	7.58	0.40	0.240	(0.111)	0.043	0.197
92	7.67	0.40	0.240	(0.111)	0.043	0.197
93	7.75	0.40	0.240	(0.110)	0.043	0.197
94	7.83	0.43	0.260	(0.110)	0.047	0.213
95	7.92	0.43	0.260	(0.109)	0.047	0.213
96	8.00	0.43	0.260	(0.109)	0.047	0.213
97	8.08	0.50	0.300	(0.108)	0.054	0.246
98	8.17	0.50	0.300	(0.108)	0.054	0.246
99	8.25	0.50	0.300	(0.107)	0.054	0.246
100	8.33	0.50	0.300	(0.107)	0.054	0.246
101	8.42	0.50	0.300	(0.106)	0.054	0.246
102	8.50	0.50	0.300	(0.106)	0.054	0.246
103	8.58	0.53	0.320	(0.105)	0.058	0.262
104	8.67	0.53	0.320	(0.105)	0.058	0.262
105	8.75	0.53	0.320	(0.104)	0.058	0.262
106	8.83	0.57	0.340	(0.104)	0.061	0.279
107	8.92	0.57	0.340	(0.103)	0.061	0.279
108	9.00	0.57	0.340	(0.103)	0.061	0.279
109	9.08	0.63	0.380	(0.102)	0.068	0.312
110	9.17	0.63	0.380	(0.102)	0.068	0.312
111	9.25	0.63	0.380	(0.101)	0.068	0.312
112	9.33	0.67	0.400	(0.101)	0.072	0.328
113	9.42	0.67	0.400	(0.100)	0.072	0.328
114	9.50	0.67	0.400	(0.100)	0.072	0.328
115	9.58	0.70	0.420	(0.099)	0.076	0.344
116	9.67	0.70	0.420	(0.099)	0.076	0.344
117	9.75	0.70	0.420	(0.098)	0.076	0.344

118	9.83	0.73	0.440	(0.098)	0.079	0.361
119	9.92	0.73	0.440	(0.097)	0.079	0.361
120	10.00	0.73	0.440	(0.097)	0.079	0.361
121	10.08	0.50	0.300	(0.096)	0.054	0.246
122	10.17	0.50	0.300	(0.096)	0.054	0.246
123	10.25	0.50	0.300	(0.096)	0.054	0.246
124	10.33	0.50	0.300	(0.095)	0.054	0.246
125	10.42	0.50	0.300	(0.095)	0.054	0.246
126	10.50	0.50	0.300	(0.094)	0.054	0.246
127	10.58	0.67	0.400	(0.094)	0.072	0.328
128	10.67	0.67	0.400	(0.093)	0.072	0.328
129	10.75	0.67	0.400	(0.093)	0.072	0.328
130	10.83	0.67	0.400	(0.092)	0.072	0.328
131	10.92	0.67	0.400	(0.092)	0.072	0.328
132	11.00	0.67	0.400	(0.091)	0.072	0.328
133	11.08	0.63	0.380	(0.091)	0.068	0.312
134	11.17	0.63	0.380	(0.091)	0.068	0.312
135	11.25	0.63	0.380	(0.090)	0.068	0.312
136	11.33	0.63	0.380	(0.090)	0.068	0.312
137	11.42	0.63	0.380	(0.089)	0.068	0.312
138	11.50	0.63	0.380	(0.089)	0.068	0.312
139	11.58	0.57	0.340	(0.088)	0.061	0.279
140	11.67	0.57	0.340	(0.088)	0.061	0.279
141	11.75	0.57	0.340	(0.087)	0.061	0.279
142	11.83	0.60	0.360	(0.087)	0.065	0.295
143	11.92	0.60	0.360	(0.087)	0.065	0.295
144	12.00	0.60	0.360	(0.086)	0.065	0.295
145	12.08	0.83	0.500	0.086	(0.090)	0.414
146	12.17	0.83	0.500	0.085	(0.090)	0.415
147	12.25	0.83	0.500	0.085	(0.090)	0.415
148	12.33	0.87	0.520	0.084	(0.094)	0.436
149	12.42	0.87	0.520	0.084	(0.094)	0.436
150	12.50	0.87	0.520	0.084	(0.094)	0.436
151	12.58	0.93	0.560	0.083	(0.101)	0.477
152	12.67	0.93	0.560	0.083	(0.101)	0.477
153	12.75	0.93	0.560	0.082	(0.101)	0.478
154	12.83	0.97	0.580	0.082	(0.104)	0.498
155	12.92	0.97	0.580	0.081	(0.104)	0.498
156	13.00	0.97	0.580	0.081	(0.104)	0.499
157	13.08	1.13	0.680	0.081	(0.122)	0.599
158	13.17	1.13	0.680	0.080	(0.122)	0.600
159	13.25	1.13	0.680	0.080	(0.122)	0.600
160	13.33	1.13	0.680	0.079	(0.122)	0.601
161	13.42	1.13	0.680	0.079	(0.122)	0.601
162	13.50	1.13	0.680	0.079	(0.122)	0.601
163	13.58	0.77	0.460	0.078	(0.083)	0.382
164	13.67	0.77	0.460	0.078	(0.083)	0.382
165	13.75	0.77	0.460	0.077	(0.083)	0.383
166	13.83	0.77	0.460	0.077	(0.083)	0.383
167	13.92	0.77	0.460	0.077	(0.083)	0.383
168	14.00	0.77	0.460	0.076	(0.083)	0.384
169	14.08	0.90	0.540	0.076	(0.097)	0.464
170	14.17	0.90	0.540	0.075	(0.097)	0.464
171	14.25	0.90	0.540	0.075	(0.097)	0.465
172	14.33	0.87	0.520	0.075	(0.094)	0.445
173	14.42	0.87	0.520	0.074	(0.094)	0.446
174	14.50	0.87	0.520	0.074	(0.094)	0.446

175	14.58	0.87	0.520	0.074	(0.094)	0.446
176	14.67	0.87	0.520	0.073	(0.094)	0.447
177	14.75	0.87	0.520	0.073	(0.094)	0.447
178	14.83	0.83	0.500	0.072	(0.090)	0.428
179	14.92	0.83	0.500	0.072	(0.090)	0.428
180	15.00	0.83	0.500	0.072	(0.090)	0.428
181	15.08	0.80	0.480	0.071	(0.086)	0.409
182	15.17	0.80	0.480	0.071	(0.086)	0.409
183	15.25	0.80	0.480	0.071	(0.086)	0.409
184	15.33	0.77	0.460	0.070	(0.083)	0.390
185	15.42	0.77	0.460	0.070	(0.083)	0.390
186	15.50	0.77	0.460	0.070	(0.083)	0.390
187	15.58	0.63	0.380	(0.069)	0.068	0.312
188	15.67	0.63	0.380	(0.069)	0.068	0.312
189	15.75	0.63	0.380	(0.068)	0.068	0.312
190	15.83	0.63	0.380	0.068	(0.068)	0.312
191	15.92	0.63	0.380	0.068	(0.068)	0.312
192	16.00	0.63	0.380	0.067	(0.068)	0.313
193	16.08	0.13	0.080	(0.067)	0.014	0.066
194	16.17	0.13	0.080	(0.067)	0.014	0.066
195	16.25	0.13	0.080	(0.066)	0.014	0.066
196	16.33	0.13	0.080	(0.066)	0.014	0.066
197	16.42	0.13	0.080	(0.066)	0.014	0.066
198	16.50	0.13	0.080	(0.065)	0.014	0.066
199	16.58	0.10	0.060	(0.065)	0.011	0.049
200	16.67	0.10	0.060	(0.065)	0.011	0.049
201	16.75	0.10	0.060	(0.064)	0.011	0.049
202	16.83	0.10	0.060	(0.064)	0.011	0.049
203	16.92	0.10	0.060	(0.064)	0.011	0.049
204	17.00	0.10	0.060	(0.063)	0.011	0.049
205	17.08	0.17	0.100	(0.063)	0.018	0.082
206	17.17	0.17	0.100	(0.063)	0.018	0.082
207	17.25	0.17	0.100	(0.062)	0.018	0.082
208	17.33	0.17	0.100	(0.062)	0.018	0.082
209	17.42	0.17	0.100	(0.062)	0.018	0.082
210	17.50	0.17	0.100	(0.062)	0.018	0.082
211	17.58	0.17	0.100	(0.061)	0.018	0.082
212	17.67	0.17	0.100	(0.061)	0.018	0.082
213	17.75	0.17	0.100	(0.061)	0.018	0.082
214	17.83	0.13	0.080	(0.060)	0.014	0.066
215	17.92	0.13	0.080	(0.060)	0.014	0.066
216	18.00	0.13	0.080	(0.060)	0.014	0.066
217	18.08	0.13	0.080	(0.059)	0.014	0.066
218	18.17	0.13	0.080	(0.059)	0.014	0.066
219	18.25	0.13	0.080	(0.059)	0.014	0.066
220	18.33	0.13	0.080	(0.059)	0.014	0.066
221	18.42	0.13	0.080	(0.058)	0.014	0.066
222	18.50	0.13	0.080	(0.058)	0.014	0.066
223	18.58	0.10	0.060	(0.058)	0.011	0.049
224	18.67	0.10	0.060	(0.057)	0.011	0.049
225	18.75	0.10	0.060	(0.057)	0.011	0.049
226	18.83	0.07	0.040	(0.057)	0.007	0.033
227	18.92	0.07	0.040	(0.057)	0.007	0.033
228	19.00	0.07	0.040	(0.056)	0.007	0.033
229	19.08	0.10	0.060	(0.056)	0.011	0.049
230	19.17	0.10	0.060	(0.056)	0.011	0.049
231	19.25	0.10	0.060	(0.056)	0.011	0.049

232	19.33	0.13	0.080	(0.055)	0.014	0.066
233	19.42	0.13	0.080	(0.055)	0.014	0.066
234	19.50	0.13	0.080	(0.055)	0.014	0.066
235	19.58	0.10	0.060	(0.055)	0.011	0.049
236	19.67	0.10	0.060	(0.054)	0.011	0.049
237	19.75	0.10	0.060	(0.054)	0.011	0.049
238	19.83	0.07	0.040	(0.054)	0.007	0.033
239	19.92	0.07	0.040	(0.054)	0.007	0.033
240	20.00	0.07	0.040	(0.053)	0.007	0.033
241	20.08	0.10	0.060	(0.053)	0.011	0.049
242	20.17	0.10	0.060	(0.053)	0.011	0.049
243	20.25	0.10	0.060	(0.053)	0.011	0.049
244	20.33	0.10	0.060	(0.052)	0.011	0.049
245	20.42	0.10	0.060	(0.052)	0.011	0.049
246	20.50	0.10	0.060	(0.052)	0.011	0.049
247	20.58	0.10	0.060	(0.052)	0.011	0.049
248	20.67	0.10	0.060	(0.052)	0.011	0.049
249	20.75	0.10	0.060	(0.051)	0.011	0.049
250	20.83	0.07	0.040	(0.051)	0.007	0.033
251	20.92	0.07	0.040	(0.051)	0.007	0.033
252	21.00	0.07	0.040	(0.051)	0.007	0.033
253	21.08	0.10	0.060	(0.050)	0.011	0.049
254	21.17	0.10	0.060	(0.050)	0.011	0.049
255	21.25	0.10	0.060	(0.050)	0.011	0.049
256	21.33	0.07	0.040	(0.050)	0.007	0.033
257	21.42	0.07	0.040	(0.050)	0.007	0.033
258	21.50	0.07	0.040	(0.050)	0.007	0.033
259	21.58	0.10	0.060	(0.049)	0.011	0.049
260	21.67	0.10	0.060	(0.049)	0.011	0.049
261	21.75	0.10	0.060	(0.049)	0.011	0.049
262	21.83	0.07	0.040	(0.049)	0.007	0.033
263	21.92	0.07	0.040	(0.049)	0.007	0.033
264	22.00	0.07	0.040	(0.048)	0.007	0.033
265	22.08	0.10	0.060	(0.048)	0.011	0.049
266	22.17	0.10	0.060	(0.048)	0.011	0.049
267	22.25	0.10	0.060	(0.048)	0.011	0.049
268	22.33	0.07	0.040	(0.048)	0.007	0.033
269	22.42	0.07	0.040	(0.048)	0.007	0.033
270	22.50	0.07	0.040	(0.048)	0.007	0.033
271	22.58	0.07	0.040	(0.047)	0.007	0.033
272	22.67	0.07	0.040	(0.047)	0.007	0.033
273	22.75	0.07	0.040	(0.047)	0.007	0.033
274	22.83	0.07	0.040	(0.047)	0.007	0.033
275	22.92	0.07	0.040	(0.047)	0.007	0.033
276	23.00	0.07	0.040	(0.047)	0.007	0.033
277	23.08	0.07	0.040	(0.047)	0.007	0.033
278	23.17	0.07	0.040	(0.047)	0.007	0.033
279	23.25	0.07	0.040	(0.047)	0.007	0.033
280	23.33	0.07	0.040	(0.046)	0.007	0.033
281	23.42	0.07	0.040	(0.046)	0.007	0.033
282	23.50	0.07	0.040	(0.046)	0.007	0.033
283	23.58	0.07	0.040	(0.046)	0.007	0.033
284	23.67	0.07	0.040	(0.046)	0.007	0.033
285	23.75	0.07	0.040	(0.046)	0.007	0.033
286	23.83	0.07	0.040	(0.046)	0.007	0.033
287	23.92	0.07	0.040	(0.046)	0.007	0.033
288	24.00	0.07	0.040	(0.046)	0.007	0.033

(Loss Rate Not Used)

Sum = 100.0 Sum = 50.0

Flood volume = Effective rainfall 4.16(In)
times area 10.1(Ac.)/[(In)/(Ft.)] = 3.5(Ac.Ft)
Total soil loss = 0.83(In)
Total soil loss = 0.705(Ac.Ft)
Total rainfall = 5.00(In)
Flood volume = 153152.4 Cubic Feet
Total soil loss = 30703.4 Cubic Feet

Peak flow rate of this hydrograph = 6.139(CFS)

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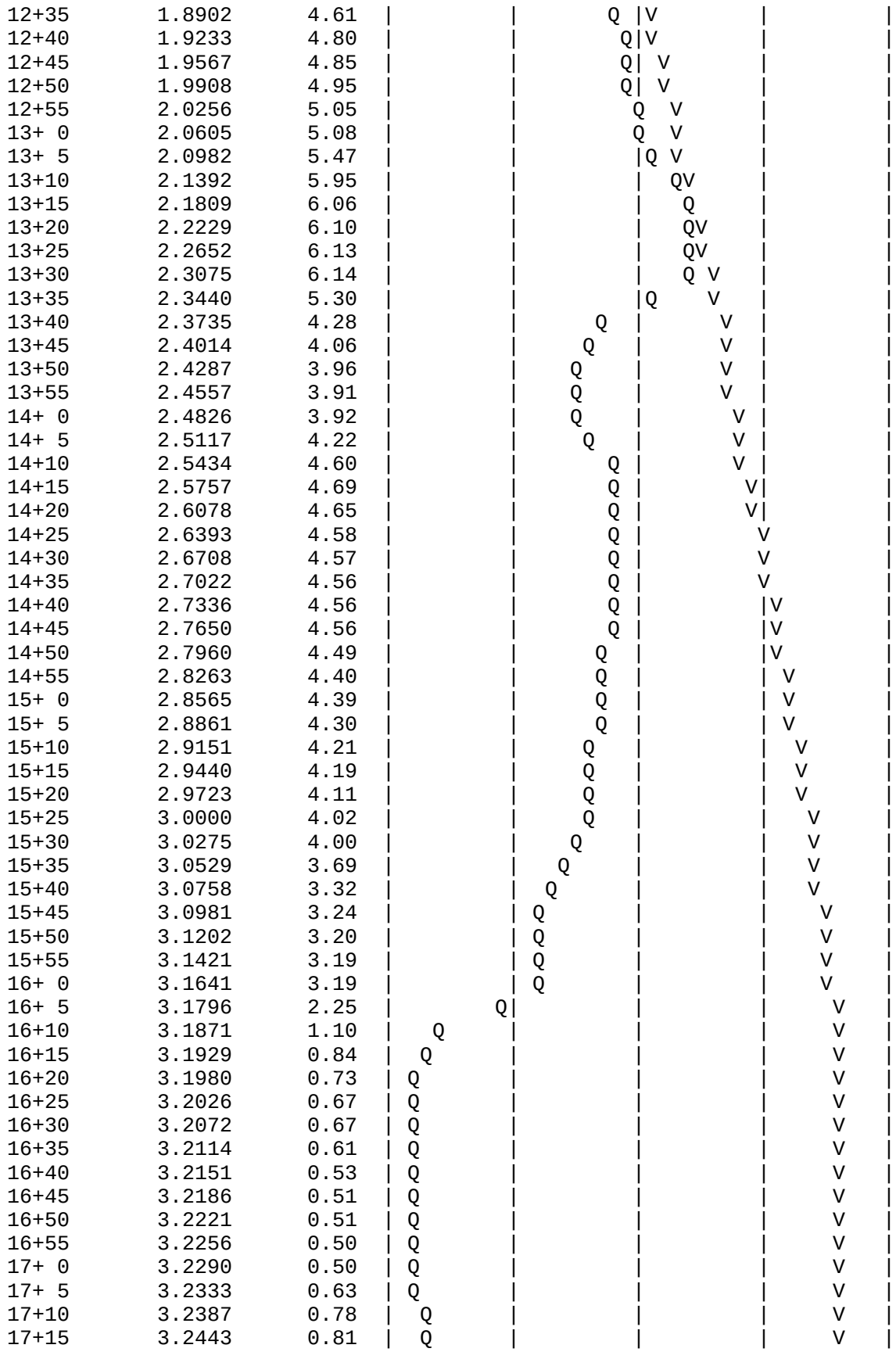
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

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	0.0009	0.13	Q				
0+10	0.0028	0.28	VQ				
0+15	0.0049	0.31	VQ				
0+20	0.0076	0.39	VQ				
0+25	0.0109	0.47	VQ				
0+30	0.0143	0.49	VQ				
0+35	0.0177	0.50	VQ				
0+40	0.0211	0.50	V Q				
0+45	0.0246	0.50	V Q				
0+50	0.0285	0.57	V Q				
0+55	0.0329	0.64	V Q				
1+ 0	0.0375	0.66	V Q				
1+ 5	0.0416	0.60	V Q				
1+10	0.0453	0.53	V Q				
1+15	0.0488	0.51	V Q				
1+20	0.0523	0.51	V Q				
1+25	0.0558	0.50	V Q				
1+30	0.0592	0.50	V Q				
1+35	0.0627	0.50	V Q				
1+40	0.0661	0.50	V Q				
1+45	0.0696	0.50	V Q				
1+50	0.0735	0.57	V Q				
1+55	0.0779	0.64	V Q				
2+ 0	0.0824	0.66	V Q				
2+ 5	0.0870	0.67	V Q				
2+10	0.0916	0.67	|VQ				
2+15	0.0963	0.67	|VQ				
2+20	0.1009	0.67	|VQ				
2+25	0.1055	0.67	|VQ				
2+30	0.1101	0.67	|VQ				
2+35	0.1152	0.73	|VQ				
2+40	0.1207	0.81	|V Q				
2+45	0.1264	0.83	|V Q				
2+50	0.1322	0.83	|V Q				
2+55	0.1379	0.84	|V Q				
3+ 0	0.1437	0.84	|V Q				

3+ 5	0.1495	0.84	|V Q	|	|	|	|
3+10	0.1552	0.84	|V Q	|	|	|	|
3+15	0.1610	0.84	|V Q	|	|	|	|
3+20	0.1668	0.84	|V Q	|	|	|	|
3+25	0.1725	0.84	|V Q	|	|	|	|
3+30	0.1783	0.84	| VQ	|	|	|	|
3+35	0.1841	0.84	| VQ	|	|	|	|
3+40	0.1898	0.84	| VQ	|	|	|	|
3+45	0.1956	0.84	| VQ	|	|	|	|
3+50	0.2018	0.90	| VQ	|	|	|	|
3+55	0.2085	0.98	| VQ	|	|	|	|
4+ 0	0.2154	0.99	| VQ	|	|	|	|
4+ 5	0.2223	1.00	| V Q	|	|	|	|
4+10	0.2292	1.01	| V Q	|	|	|	|
4+15	0.2361	1.01	| V Q	|	|	|	|
4+20	0.2435	1.07	| V Q	|	|	|	|
4+25	0.2513	1.14	| V Q	|	|	|	|
4+30	0.2593	1.16	| V Q	|	|	|	|
4+35	0.2674	1.17	| VQ	|	|	|	|
4+40	0.2755	1.17	| VQ	|	|	|	|
4+45	0.2835	1.17	| VQ	|	|	|	|
4+50	0.2920	1.24	| VQ	|	|	|	|
4+55	0.3011	1.31	| V Q	|	|	|	|
5+ 0	0.3102	1.33	| V Q	|	|	|	|
5+ 5	0.3186	1.21	| VQ	|	|	|	|
5+10	0.3259	1.06	| VQ	|	|	|	|
5+15	0.3330	1.03	| VQ	|	|	|	|
5+20	0.3404	1.08	| VQ	|	|	|	|
5+25	0.3482	1.14	| VQ	|	|	|	|
5+30	0.3562	1.16	| Q	|	|	|	|
5+35	0.3647	1.23	| Q	|	|	|	|
5+40	0.3738	1.31	| VQ	|	|	|	|
5+45	0.3829	1.33	| VQ	|	|	|	|
5+50	0.3921	1.34	| VQ	|	|	|	|
5+55	0.4013	1.34	| VQ	|	|	|	|
6+ 0	0.4106	1.34	| VQ	|	|	|	|
6+ 5	0.4202	1.40	| VQ	|	|	|	|
6+10	0.4304	1.48	| VQ	|	|	|	|
6+15	0.4407	1.50	| Q	|	|	|	|
6+20	0.4511	1.50	| VQ	|	|	|	|
6+25	0.4615	1.51	| VQ	|	|	|	|
6+30	0.4718	1.51	| VQ	|	|	|	|
6+35	0.4827	1.57	| VQ	|	|	|	|
6+40	0.4940	1.65	| VQ	|	|	|	|
6+45	0.5054	1.66	| VQ	|	|	|	|
6+50	0.5170	1.67	| VQ	|	|	|	|
6+55	0.5285	1.68	| Q	|	|	|	|
7+ 0	0.5400	1.68	| Q	|	|	|	|
7+ 5	0.5516	1.68	| Q	|	|	|	|
7+10	0.5631	1.68	| Q	|	|	|	|
7+15	0.5746	1.68	| Q	|	|	|	|
7+20	0.5866	1.74	| Q	|	|	|	|
7+25	0.5991	1.81	| VQ	|	|	|	|
7+30	0.6117	1.83	| VQ	|	|	|	|
7+35	0.6248	1.90	| Q	|	|	|	|
7+40	0.6385	1.98	| Q	|	|	|	|
7+45	0.6522	2.00	| Q	|	|	|	|

7+50	0.6665	2.07	VQ				
7+55	0.6813	2.15	VQ				
8+ 0	0.6962	2.17	VQ				
8+ 5	0.7120	2.30	VQ				
8+10	0.7289	2.46	VQ				
8+15	0.7461	2.49	VQ				
8+20	0.7633	2.50	V Q				
8+25	0.7806	2.51	V Q				
8+30	0.7979	2.51	VQ				
8+35	0.8157	2.58	VQ				
8+40	0.8339	2.65	VQ				
8+45	0.8523	2.67	VQ				
8+50	0.8712	2.74	VQ				
8+55	0.8906	2.82	VQ				
9+ 0	0.9101	2.84	VQ				
9+ 5	0.9306	2.97	VQ				
9+10	0.9521	3.13	V Q				
9+15	0.9739	3.16	VQ				
9+20	0.9961	3.24	VQ				
9+25	1.0190	3.32	V Q				
9+30	1.0420	3.34	V Q				
9+35	1.0655	3.41	VQ				
9+40	1.0895	3.49	VQ				
9+45	1.1137	3.51	V Q				
9+50	1.1383	3.58	V Q				
9+55	1.1635	3.66	VQ				
10+ 0	1.1888	3.67	VQ				
10+ 5	1.2111	3.24	QV				
10+10	1.2298	2.71	Q V				
10+15	1.2477	2.59	Q V				
10+20	1.2652	2.54	Q V				
10+25	1.2825	2.51	Q V				
10+30	1.2998	2.51	Q V				
10+35	1.3192	2.83	Q V				
10+40	1.3413	3.21	Q V				
10+45	1.3640	3.29	Q V				
10+50	1.3869	3.33	Q V				
10+55	1.4100	3.35	Q V				
11+ 0	1.4331	3.35	Q V				
11+ 5	1.4557	3.29	Q V				
11+10	1.4778	3.21	Q V				
11+15	1.4998	3.19	Q V				
11+20	1.5218	3.19	Q V				
11+25	1.5437	3.18	Q V				
11+30	1.5656	3.18	Q V				
11+35	1.5867	3.06	Q V				
11+40	1.6067	2.90	Q V				
11+45	1.6265	2.87	Q V				
11+50	1.6466	2.92	Q V				
11+55	1.6671	2.99	Q V				
12+ 0	1.6878	3.00	Q V				
12+ 5	1.7117	3.46	Q V				
12+10	1.7394	4.03	Q V				
12+15	1.7680	4.15	Q V				
12+20	1.7975	4.29	Q V				
12+25	1.8279	4.41	Q V				
12+30	1.8585	4.44	Q V				



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17+20       3.2500      0.83  |  Q      |         |         |     V   |
17+25       3.2558      0.84  |  Q      |         |         |      V  |
17+30       3.2616      0.84  |  Q      |         |         |      V  |
17+35       3.2673      0.84  |  Q      |         |         |      V  |
17+40       3.2731      0.84  |  Q      |         |         |      V  |
17+45       3.2789      0.84  |  Q      |         |         |      V  |
17+50       3.2842      0.78  |  Q      |         |         |      V  |
17+55       3.2890      0.70  | Q       |         |         |      V  |
18+ 0       3.2937      0.68  | Q       |         |         |      V  |
18+ 5       3.2984      0.67  | Q       |         |         |      V  |
18+10       3.3030      0.67  | Q       |         |         |      V  |
18+15       3.3076      0.67  | Q       |         |         |      V  |
18+20       3.3122      0.67  | Q       |         |         |      V  |
18+25       3.3168      0.67  | Q       |         |         |      V  |
18+30       3.3214      0.67  | Q       |         |         |      V  |
18+35       3.3256      0.61  | Q       |         |         |      V  |
18+40       3.3293      0.53  | Q       |         |         |      V  |
18+45       3.3328      0.51  | Q       |         |         |      V  |
18+50       3.3359      0.44  |Q        |         |         |      V  |
18+55       3.3384      0.36  |Q        |         |         |      V  |
19+ 0       3.3408      0.35  |Q        |         |         |       V |
19+ 5       3.3435      0.40  |Q        |         |         |       V |
19+10       3.3468      0.47  |Q        |         |         |       V |
19+15       3.3502      0.49  |Q        |         |         |       V |
19+20       3.3540      0.56  | Q       |         |         |       V |
19+25       3.3585      0.64  | Q       |         |         |       V |
19+30       3.3630      0.66  | Q       |         |         |       V |
19+35       3.3671      0.60  | Q       |         |         |       V |
19+40       3.3708      0.53  | Q       |         |         |       V |
19+45       3.3743      0.51  | Q       |         |         |       V |
19+50       3.3774      0.44  |Q        |         |         |       V |
19+55       3.3799      0.36  |Q        |         |         |       V |
20+ 0       3.3823      0.35  |Q        |         |         |       V |
20+ 5       3.3851      0.40  |Q        |         |         |       V |
20+10       3.3883      0.47  |Q        |         |         |       V |
20+15       3.3917      0.49  |Q        |         |         |       V |
20+20       3.3951      0.50  |Q        |         |         |       V |
20+25       3.3986      0.50  | Q       |         |         |       V |
20+30       3.4021      0.50  | Q       |         |         |       V |
20+35       3.4055      0.50  | Q       |         |         |       V |
20+40       3.4090      0.50  | Q       |         |         |       V |
20+45       3.4124      0.50  | Q       |         |         |       V |
20+50       3.4155      0.44  |Q        |         |         |       V |
20+55       3.4180      0.36  |Q        |         |         |       V |
21+ 0       3.4204      0.35  |Q        |         |         |       V |
21+ 5       3.4231      0.40  |Q        |         |         |       V |
21+10       3.4264      0.47  |Q        |         |         |       V |
21+15       3.4298      0.49  |Q        |         |         |        V|
21+20       3.4328      0.44  |Q        |         |         |        V|
21+25       3.4353      0.36  |Q        |         |         |        V|
21+30       3.4377      0.35  |Q        |         |         |        V|
21+35       3.4404      0.40  |Q        |         |         |        V|
21+40       3.4437      0.47  |Q        |         |         |        V|
21+45       3.4471      0.49  |Q        |         |         |        V|
21+50       3.4501      0.44  |Q        |         |         |        V|
21+55       3.4526      0.36  |Q        |         |         |        V|
22+ 0       3.4550      0.35  |Q        |         |         |        V|
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22+ 5	3.4577	0.40	|Q	|	|	|	V|
22+10	3.4610	0.47	|Q	|	|	|	V|
22+15	3.4644	0.49	|Q	|	|	|	V|
22+20	3.4674	0.44	|Q	|	|	|	V|
22+25	3.4699	0.36	|Q	|	|	|	V|
22+30	3.4723	0.35	|Q	|	|	|	V|
22+35	3.4746	0.34	|Q	|	|	|	V|
22+40	3.4769	0.34	|Q	|	|	|	V|
22+45	3.4792	0.34	|Q	|	|	|	V|
22+50	3.4815	0.34	|Q	|	|	|	V|
22+55	3.4838	0.34	|Q	|	|	|	V|
23+ 0	3.4862	0.34	|Q	|	|	|	V|
23+ 5	3.4885	0.34	|Q	|	|	|	V|
23+10	3.4908	0.34	|Q	|	|	|	V|
23+15	3.4931	0.34	|Q	|	|	|	V|
23+20	3.4954	0.34	|Q	|	|	|	V|
23+25	3.4977	0.34	|Q	|	|	|	V|
23+30	3.5000	0.34	|Q	|	|	|	V|
23+35	3.5023	0.34	|Q	|	|	|	V|
23+40	3.5046	0.34	|Q	|	|	|	V|
23+45	3.5069	0.34	|Q	|	|	|	V|
23+50	3.5092	0.34	|Q	|	|	|	V|
23+55	3.5115	0.34	|Q	|	|	|	V|
24+ 0	3.5138	0.34	|Q	|	|	|	V|
24+ 5	3.5153	0.21	Q	|	|	|	V|
24+10	3.5157	0.06	Q	|	|	|	V|
24+15	3.5158	0.02	Q	|	|	|	V|
24+20	3.5159	0.01	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 10/11/23 File: QA100XUH6100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED A
100 YEAR, 6 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.21(Ac.) = 0.018 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.21(Ac.) = 0.018 Sq. Mi.
Length along longest watercourse = 894.00(Ft.)
Length along longest watercourse measured to centroid = 600.00(Ft.)
Length along longest watercourse = 0.169 Mi.
Length along longest watercourse measured to centroid = 0.114 Mi.
Difference in elevation = 5.90(Ft.)
Slope along watercourse = 34.8456 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.054 Hr.
Lag time = 3.27 Min.
25% of lag time = 0.82 Min.
40% of lag time = 1.31 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	1.20	13.45

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	2.50	28.03

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(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 %
11.210	64.40	0.500

Total Area Entered = 11.21(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
64.4	64.4	0.422	0.500	0.232	1.000	0.232
					Sum (F) =	0.232

Area averaged mean soil loss (F) (In/Hr) = 0.232
Minimum soil loss rate ((In/Hr)) = 0.116
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	152.961	33.884	3.828
2	0.167	305.923	46.792	5.286
3	0.250	458.884	11.012	1.244
4	0.333	611.845	4.794	0.542
5	0.417	764.807	2.382	0.269
6	0.500	917.768	1.136	0.128

Sum = 100.000 Sum= 11.298

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	0.50	0.150	(0.232)	0.075	0.075
2	0.17	0.60	0.180	(0.232)	0.090	0.090
3	0.25	0.60	0.180	(0.232)	0.090	0.090
4	0.33	0.60	0.180	(0.232)	0.090	0.090
5	0.42	0.60	0.180	(0.232)	0.090	0.090
6	0.50	0.70	0.210	(0.232)	0.105	0.105
7	0.58	0.70	0.210	(0.232)	0.105	0.105
8	0.67	0.70	0.210	(0.232)	0.105	0.105
9	0.75	0.70	0.210	(0.232)	0.105	0.105
10	0.83	0.70	0.210	(0.232)	0.105	0.105
11	0.92	0.70	0.210	(0.232)	0.105	0.105
12	1.00	0.80	0.240	(0.232)	0.120	0.120
13	1.08	0.80	0.240	(0.232)	0.120	0.120
14	1.17	0.80	0.240	(0.232)	0.120	0.120
15	1.25	0.80	0.240	(0.232)	0.120	0.120
16	1.33	0.80	0.240	(0.232)	0.120	0.120
17	1.42	0.80	0.240	(0.232)	0.120	0.120
18	1.50	0.80	0.240	(0.232)	0.120	0.120
19	1.58	0.80	0.240	(0.232)	0.120	0.120
20	1.67	0.80	0.240	(0.232)	0.120	0.120
21	1.75	0.80	0.240	(0.232)	0.120	0.120
22	1.83	0.80	0.240	(0.232)	0.120	0.120
23	1.92	0.80	0.240	(0.232)	0.120	0.120
24	2.00	0.90	0.270	(0.232)	0.135	0.135
25	2.08	0.80	0.240	(0.232)	0.120	0.120
26	2.17	0.90	0.270	(0.232)	0.135	0.135
27	2.25	0.90	0.270	(0.232)	0.135	0.135
28	2.33	0.90	0.270	(0.232)	0.135	0.135
29	2.42	0.90	0.270	(0.232)	0.135	0.135
30	2.50	0.90	0.270	(0.232)	0.135	0.135
31	2.58	0.90	0.270	(0.232)	0.135	0.135
32	2.67	0.90	0.270	(0.232)	0.135	0.135
33	2.75	1.00	0.300	(0.232)	0.150	0.150
34	2.83	1.00	0.300	(0.232)	0.150	0.150
35	2.92	1.00	0.300	(0.232)	0.150	0.150
36	3.00	1.00	0.300	(0.232)	0.150	0.150
37	3.08	1.00	0.300	(0.232)	0.150	0.150
38	3.17	1.10	0.330	(0.232)	0.165	0.165
39	3.25	1.10	0.330	(0.232)	0.165	0.165
40	3.33	1.10	0.330	(0.232)	0.165	0.165
41	3.42	1.20	0.360	(0.232)	0.180	0.180

42	3.50	1.30	0.390	(0.232)	0.195	0.195
43	3.58	1.40	0.420	(0.232)	0.210	0.210
44	3.67	1.40	0.420	(0.232)	0.210	0.210
45	3.75	1.50	0.450	(0.232)	0.225	0.225
46	3.83	1.50	0.450	(0.232)	0.225	0.225
47	3.92	1.60	0.480	0.232	(0.240)	0.248
48	4.00	1.60	0.480	0.232	(0.240)	0.248
49	4.08	1.70	0.510	0.232	(0.255)	0.278
50	4.17	1.80	0.540	0.232	(0.270)	0.308
51	4.25	1.90	0.570	0.232	(0.285)	0.338
52	4.33	2.00	0.600	0.232	(0.300)	0.368
53	4.42	2.10	0.630	0.232	(0.315)	0.398
54	4.50	2.10	0.630	0.232	(0.315)	0.398
55	4.58	2.20	0.660	0.232	(0.330)	0.428
56	4.67	2.30	0.690	0.232	(0.345)	0.458
57	4.75	2.40	0.720	0.232	(0.360)	0.488
58	4.83	2.40	0.720	0.232	(0.360)	0.488
59	4.92	2.50	0.750	0.232	(0.375)	0.518
60	5.00	2.60	0.780	0.232	(0.390)	0.548
61	5.08	3.10	0.930	0.232	(0.465)	0.698
62	5.17	3.60	1.080	0.232	(0.540)	0.848
63	5.25	3.90	1.170	0.232	(0.585)	0.938
64	5.33	4.20	1.260	0.232	(0.630)	1.028
65	5.42	4.70	1.410	0.232	(0.705)	1.178
66	5.50	5.60	1.680	0.232	(0.840)	1.448
67	5.58	1.90	0.570	0.232	(0.285)	0.338
68	5.67	0.90	0.270	(0.232)	0.135	0.135
69	5.75	0.60	0.180	(0.232)	0.090	0.090
70	5.83	0.50	0.150	(0.232)	0.075	0.075
71	5.92	0.30	0.090	(0.232)	0.045	0.045
72	6.00	0.20	0.060	(0.232)	0.030	0.030

(Loss Rate Not Used)

Sum = 100.0 Sum = 18.5

Flood volume = Effective rainfall 1.55(In)
times area 11.2(Ac.)/[(In)/(Ft.)] = 1.4(Ac.Ft)
Total soil loss = 0.95(In)
Total soil loss = 0.891(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 62901.7 Cubic Feet
Total soil loss = 38825.2 Cubic Feet

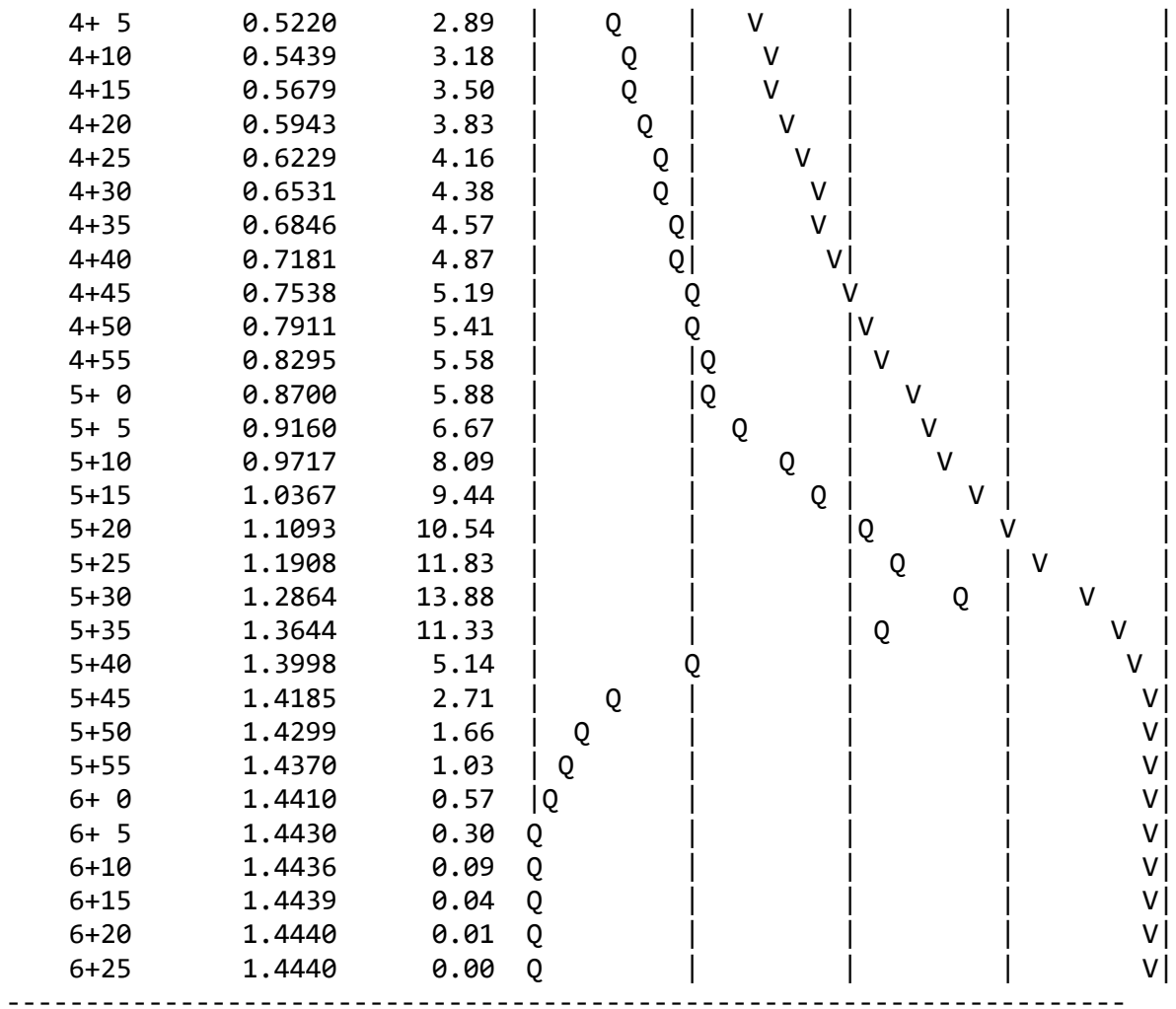
Peak flow rate of this hydrograph = 13.878(CFS)

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6 - 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	5.0	10.0	15.0	20.0
0+ 5	0.0020	0.29	Q				
0+10	0.0071	0.74	VQ				
0+15	0.0134	0.91	VQ				
0+20	0.0201	0.97	VQ				
0+25	0.0270	1.00	V Q				
0+30	0.0344	1.07	V Q				
0+35	0.0423	1.15	|VQ				
0+40	0.0504	1.17	|VQ				
0+45	0.0585	1.18	|VQ				
0+50	0.0667	1.18	|VQ				
0+55	0.0749	1.19	| Q				
1+ 0	0.0834	1.24	| Q				
1+ 5	0.0925	1.32	| Q				
1+10	0.1018	1.34	| Q				
1+15	0.1111	1.35	| QV				
1+20	0.1204	1.35	| QV				
1+25	0.1298	1.36	| QV				
1+30	0.1391	1.36	| QV				
1+35	0.1484	1.36	| Q V				
1+40	0.1578	1.36	| Q V				
1+45	0.1671	1.36	| Q V				
1+50	0.1765	1.36	| Q V				
1+55	0.1858	1.36	| Q V				
2+ 0	0.1955	1.41	| Q V				
2+ 5	0.2054	1.44	| Q V				
2+10	0.2153	1.43	| Q V				
2+15	0.2256	1.50	| Q V				
2+20	0.2361	1.52	| Q V				
2+25	0.2466	1.52	| Q V				
2+30	0.2571	1.52	| Q V				
2+35	0.2676	1.53	| Q V				
2+40	0.2781	1.53	| Q V				
2+45	0.2890	1.58	| Q V				
2+50	0.3004	1.66	| Q V				
2+55	0.3120	1.68	| Q V				
3+ 0	0.3236	1.69	| Q V				
3+ 5	0.3353	1.69	| Q V|			
3+10	0.3474	1.75	| Q V|			
3+15	0.3600	1.83	| Q V|			
3+20	0.3727	1.85	| Q V				
3+25	0.3859	1.92	| Q V				
3+30	0.4001	2.06	| Q |V				
3+35	0.4154	2.21	| Q |V				
3+40	0.4313	2.32	| Q |V				
3+45	0.4479	2.41	| Q | V				
3+50	0.4652	2.50	| Q | V				
3+55	0.4832	2.61	| Q | V				
4+ 0	0.5021	2.74	| Q | V				


4+ 5 0.5220 2.89
4+10 0.5439 3.18
4+15 0.5679 3.50
4+20 0.5943 3.83
4+25 0.6229 4.16
4+30 0.6531 4.38
4+35 0.6846 4.57
4+40 0.7181 4.87
4+45 0.7538 5.19
4+50 0.7911 5.41
4+55 0.8295 5.58
5+ 0 0.8700 5.88
5+ 5 0.9160 6.67
5+10 0.9717 8.09
5+15 1.0367 9.44
5+20 1.1093 10.54
5+25 1.1908 11.83
5+30 1.2864 13.88
5+35 1.3644 11.33
5+40 1.3998 5.14
5+45 1.4185 2.71
5+50 1.4299 1.66
5+55 1.4370 1.03
6+ 0 1.4410 0.57
6+ 5 1.4430 0.30
6+10 1.4436 0.09
6+15 1.4439 0.04
6+20 1.4440 0.01
6+25 1.4440 0.00

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 10/11/23 File: QB100XUH6100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED B
100 YEAR, 6 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.08(Ac.) = 0.017 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.08(Ac.) = 0.017 Sq. Mi.
Length along longest watercourse = 881.00(Ft.)
Length along longest watercourse measured to centroid = 378.00(Ft.)
Length along longest watercourse = 0.167 Mi.
Length along longest watercourse measured to centroid = 0.072 Mi.
Difference in elevation = 3.90(Ft.)
Slope along watercourse = 23.3734 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.049 Hr.
Lag time = 2.94 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	1.20	13.30

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	2.50	27.70

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(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 %
11.080	58.19	0.500

Total Area Entered = 11.08(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.2	58.2	0.488	0.500	0.269	1.000	0.269
					Sum (F) =	0.269

Area averaged mean soil loss (F) (In/Hr) = 0.269
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.941	37.677	4.207
2	0.167	339.883	45.521	5.083
3	0.250	509.824	10.142	1.133
4	0.333	679.765	4.262	0.476
5	0.417	849.706	2.398	0.268
			Sum = 100.000	Sum= 11.167

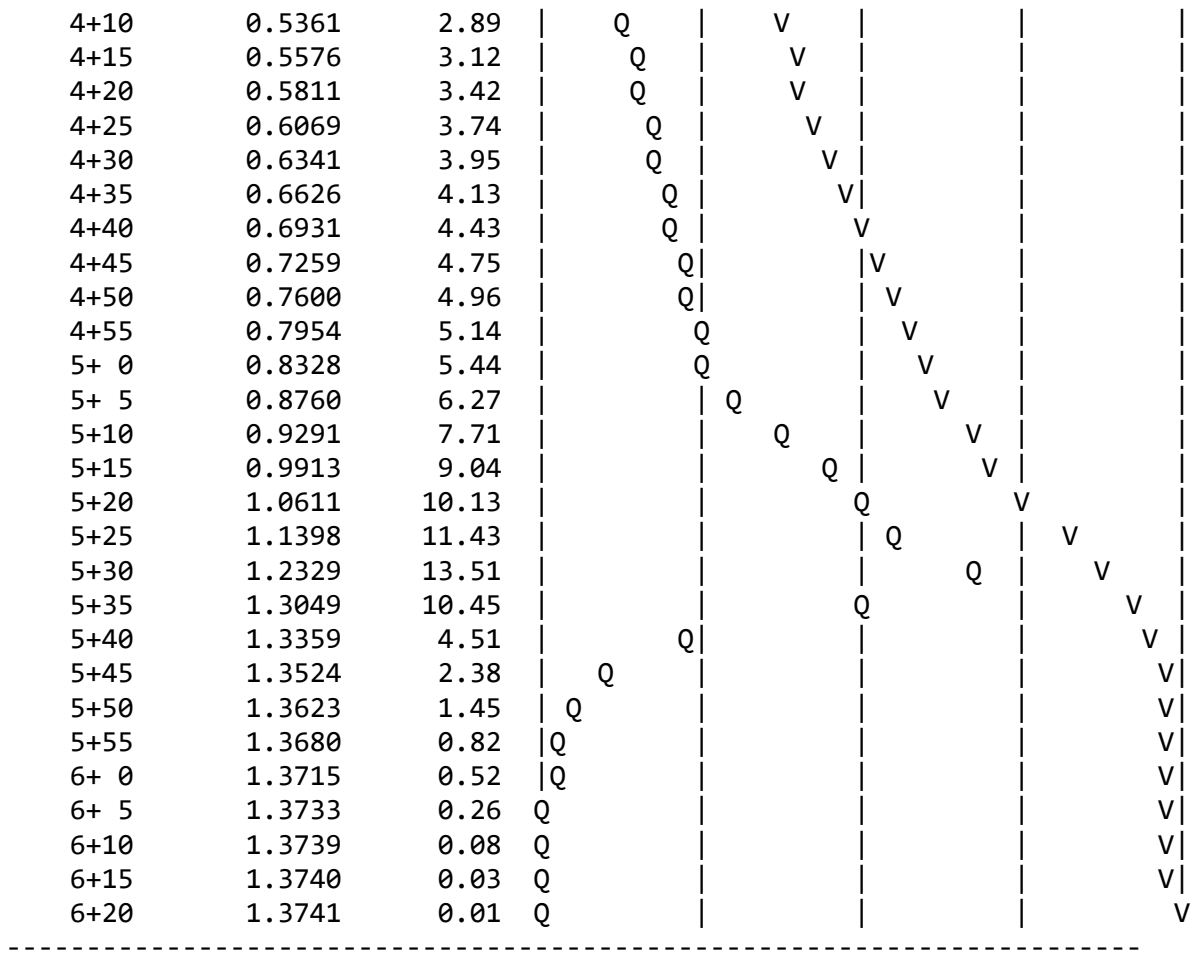
The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.269)	0.075	0.075
2	0.17	0.60	0.180	(0.269)	0.090	0.090
3	0.25	0.60	0.180	(0.269)	0.090	0.090
4	0.33	0.60	0.180	(0.269)	0.090	0.090
5	0.42	0.60	0.180	(0.269)	0.090	0.090
6	0.50	0.70	0.210	(0.269)	0.105	0.105
7	0.58	0.70	0.210	(0.269)	0.105	0.105
8	0.67	0.70	0.210	(0.269)	0.105	0.105
9	0.75	0.70	0.210	(0.269)	0.105	0.105
10	0.83	0.70	0.210	(0.269)	0.105	0.105
11	0.92	0.70	0.210	(0.269)	0.105	0.105
12	1.00	0.80	0.240	(0.269)	0.120	0.120
13	1.08	0.80	0.240	(0.269)	0.120	0.120
14	1.17	0.80	0.240	(0.269)	0.120	0.120
15	1.25	0.80	0.240	(0.269)	0.120	0.120
16	1.33	0.80	0.240	(0.269)	0.120	0.120
17	1.42	0.80	0.240	(0.269)	0.120	0.120
18	1.50	0.80	0.240	(0.269)	0.120	0.120
19	1.58	0.80	0.240	(0.269)	0.120	0.120
20	1.67	0.80	0.240	(0.269)	0.120	0.120
21	1.75	0.80	0.240	(0.269)	0.120	0.120
22	1.83	0.80	0.240	(0.269)	0.120	0.120
23	1.92	0.80	0.240	(0.269)	0.120	0.120
24	2.00	0.90	0.270	(0.269)	0.135	0.135
25	2.08	0.80	0.240	(0.269)	0.120	0.120
26	2.17	0.90	0.270	(0.269)	0.135	0.135
27	2.25	0.90	0.270	(0.269)	0.135	0.135
28	2.33	0.90	0.270	(0.269)	0.135	0.135
29	2.42	0.90	0.270	(0.269)	0.135	0.135
30	2.50	0.90	0.270	(0.269)	0.135	0.135
31	2.58	0.90	0.270	(0.269)	0.135	0.135
32	2.67	0.90	0.270	(0.269)	0.135	0.135
33	2.75	1.00	0.300	(0.269)	0.150	0.150
34	2.83	1.00	0.300	(0.269)	0.150	0.150
35	2.92	1.00	0.300	(0.269)	0.150	0.150
36	3.00	1.00	0.300	(0.269)	0.150	0.150
37	3.08	1.00	0.300	(0.269)	0.150	0.150
38	3.17	1.10	0.330	(0.269)	0.165	0.165
39	3.25	1.10	0.330	(0.269)	0.165	0.165
40	3.33	1.10	0.330	(0.269)	0.165	0.165
41	3.42	1.20	0.360	(0.269)	0.180	0.180
42	3.50	1.30	0.390	(0.269)	0.195	0.195

```
43   3.58     1.40      0.420       (  0.269)       0.210        0.210
44   3.67     1.40      0.420       (  0.269)       0.210        0.210
45   3.75     1.50      0.450       (  0.269)       0.225        0.225
46   3.83     1.50      0.450       (  0.269)       0.225        0.225
47   3.92     1.60      0.480       (  0.269)       0.240        0.240
48   4.00     1.60      0.480       (  0.269)       0.240        0.240
49   4.08     1.70      0.510       (  0.269)       0.255        0.255
50   4.17     1.80      0.540          0.269    (  0.270)       0.271
51   4.25     1.90      0.570          0.269    (  0.285)       0.301
52   4.33     2.00      0.600          0.269    (  0.300)       0.331
53   4.42     2.10      0.630          0.269    (  0.315)       0.361
54   4.50     2.10      0.630          0.269    (  0.315)       0.361
55   4.58     2.20      0.660          0.269    (  0.330)       0.391
56   4.67     2.30      0.690          0.269    (  0.345)       0.421
57   4.75     2.40      0.720          0.269    (  0.360)       0.451
58   4.83     2.40      0.720          0.269    (  0.360)       0.451
59   4.92     2.50      0.750          0.269    (  0.375)       0.481
60   5.00     2.60      0.780          0.269    (  0.390)       0.511
61   5.08     3.10      0.930          0.269    (  0.465)       0.661
62   5.17     3.60      1.080          0.269    (  0.540)       0.811
63   5.25     3.90      1.170          0.269    (  0.585)       0.901
64   5.33     4.20      1.260          0.269    (  0.630)       0.991
65   5.42     4.70      1.410          0.269    (  0.705)       1.141
66   5.50     5.60      1.680          0.269    (  0.840)       1.411
67   5.58     1.90      0.570          0.269    (  0.285)       0.301
68   5.67     0.90      0.270       (  0.269)       0.135        0.135
69   5.75     0.60      0.180       (  0.269)       0.090        0.090
70   5.83     0.50      0.150       (  0.269)       0.075        0.075
71   5.92     0.30      0.090       (  0.269)       0.045        0.045
72   6.00     0.20      0.060       (  0.269)       0.030        0.030
               (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    17.9
      Flood volume = Effective rainfall      1.49(In)
       times area      11.1(Ac.)/[(In)/(Ft.)] =       1.4(Ac.Ft)
      Total soil loss =      1.01(In)
      Total soil loss =     0.934(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =       59855.9 Cubic Feet
      Total soil loss =       40691.3 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     13.515(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - 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        5.0      10.0      15.0      20.0
```

```
---------------------------------------------------------------------
 0+ 5       0.0022      0.32  Q         |          |          |          |
 0+10       0.0074      0.76  VQ        |          |          |          |
 0+15       0.0138      0.92  VQ        |          |          |          |
 0+20       0.0205      0.97  VQ        |          |          |          |
 0+25       0.0274      1.00  V Q       |          |          |          |
 0+30       0.0347      1.07  |VQ       |          |          |          |
 0+35       0.0426      1.14  |VQ       |          |          |          |
 0+40       0.0506      1.16  |VQ       |          |          |          |
 0+45       0.0587      1.17  |VQ       |          |          |          |
 0+50       0.0667      1.17  |VQ       |          |          |          |
 0+55       0.0748      1.17  | Q       |          |          |          |
 1+ 0       0.0833      1.24  | Q       |          |          |          |
 1+ 5       0.0924      1.31  | Q       |          |          |          |
 1+10       0.1015      1.33  | Q       |          |          |          |
 1+15       0.1107      1.34  | QV      |          |          |          |
 1+20       0.1200      1.34  | QV      |          |          |          |
 1+25       0.1292      1.34  | QV      |          |          |          |
 1+30       0.1384      1.34  | Q V     |          |          |          |
 1+35       0.1477      1.34  | Q V     |          |          |          |
 1+40       0.1569      1.34  | Q V     |          |          |          |
 1+45       0.1661      1.34  | Q V     |          |          |          |
 1+50       0.1754      1.34  | Q  V    |          |          |          |
 1+55       0.1846      1.34  | Q  V    |          |          |          |
 2+ 0       0.1943      1.40  | Q  V    |          |          |          |
 2+ 5       0.2040      1.42  | Q  V    |          |          |          |
 2+10       0.2138      1.42  | Q   V   |          |          |          |
 2+15       0.2240      1.49  | Q   V   |          |          |          |
 2+20       0.2344      1.50  |  Q  V   |          |          |          |
 2+25       0.2447      1.50  |  Q   V  |          |          |          |
 2+30       0.2551      1.51  |  Q   V  |          |          |          |
 2+35       0.2655      1.51  |  Q   V  |          |          |          |
 2+40       0.2759      1.51  |  Q    V |          |          |          |
 2+45       0.2867      1.57  |  Q    V |          |          |          |
 2+50       0.2981      1.65  |  Q    V |          |          |          |
 2+55       0.3095      1.66  |  Q     V|          |          |          |
 3+ 0       0.3211      1.67  |  Q     V|          |          |          |
 3+ 5       0.3326      1.68  |  Q     V|          |          |          |
 3+10       0.3446      1.74  |  Q      V          |          |          |
 3+15       0.3571      1.82  |  Q      V          |          |          |
 3+20       0.3697      1.83  |  Q      V          |          |          |
 3+25       0.3828      1.90  |  Q      |V         |          |          |
 3+30       0.3969      2.05  |   Q     |V         |          |          |
 3+35       0.4121      2.20  |   Q     |V         |          |          |
 3+40       0.4279      2.30  |   Q     | V        |          |          |
 3+45       0.4444      2.39  |   Q     | V        |          |          |
 3+50       0.4615      2.48  |   Q     |  V       |          |          |
 3+55       0.4792      2.57  |    Q    |  V       |          |          |
 4+ 0       0.4974      2.65  |    Q    |   V      |          |          |
 4+ 5       0.5162      2.73  |    Q    |    V     |          |          |
```


4+10 0.5361 2.89
4+15 0.5576 3.12
4+20 0.5811 3.42
4+25 0.6069 3.74
4+30 0.6341 3.95
4+35 0.6626 4.13
4+40 0.6931 4.43
4+45 0.7259 4.75
4+50 0.7600 4.96
4+55 0.7954 5.14
5+ 0 0.8328 5.44
5+ 5 0.8760 6.27
5+10 0.9291 7.71
5+15 0.9913 9.04
5+20 1.0611 10.13
5+25 1.1398 11.43
5+30 1.2329 13.51
5+35 1.3049 10.45
5+40 1.3359 4.51
5+45 1.3524 2.38
5+50 1.3623 1.45
5+55 1.3680 0.82
6+ 0 1.3715 0.52
6+ 5 1.3733 0.26
6+10 1.3739 0.08
6+15 1.3740 0.03
6+20 1.3741 0.01

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 10/06/23 File: qauh6100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 6 HOUR STORM EVENT ANALYSIS - WATERSHED A

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

English Units used in output format

Drainage Area = 12.14(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.14(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 1286.00(Ft.)
Length along longest watercourse measured to centroid = 1036.00(Ft.)
Length along longest watercourse = 0.244 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 14.28(Ft.)
Slope along watercourse = 58.6302 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.052 Hr.
Lag time = 3.14 Min.
25% of lag time = 0.78 Min.
40% of lag time = 1.26 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	1.20	14.57

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	2.50	30.35

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(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 %
12.140	65.50	0.900

Total Area Entered = 12.14(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.5	65.5	0.411	0.900	0.078	1.000	0.078
					Sum (F) =	0.078

Area averaged mean soil loss (F) (In/Hr) = 0.078
Minimum soil loss rate ((In/Hr)) = 0.039
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	159.336	35.360	4.326
2	0.167	318.671	46.318	5.667
3	0.250	478.007	10.666	1.305
4	0.333	637.342	4.600	0.563
5	0.417	796.678	2.225	0.272
6	0.500	956.014	0.832	0.102

Sum = 100.000 Sum= 12.235

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	0.50	0.150	(0.078)	0.027	0.123
2	0.17	0.60	0.180	(0.078)	0.032	0.148
3	0.25	0.60	0.180	(0.078)	0.032	0.148
4	0.33	0.60	0.180	(0.078)	0.032	0.148
5	0.42	0.60	0.180	(0.078)	0.032	0.148
6	0.50	0.70	0.210	(0.078)	0.038	0.172
7	0.58	0.70	0.210	(0.078)	0.038	0.172
8	0.67	0.70	0.210	(0.078)	0.038	0.172
9	0.75	0.70	0.210	(0.078)	0.038	0.172
10	0.83	0.70	0.210	(0.078)	0.038	0.172
11	0.92	0.70	0.210	(0.078)	0.038	0.172
12	1.00	0.80	0.240	(0.078)	0.043	0.197
13	1.08	0.80	0.240	(0.078)	0.043	0.197
14	1.17	0.80	0.240	(0.078)	0.043	0.197
15	1.25	0.80	0.240	(0.078)	0.043	0.197
16	1.33	0.80	0.240	(0.078)	0.043	0.197
17	1.42	0.80	0.240	(0.078)	0.043	0.197
18	1.50	0.80	0.240	(0.078)	0.043	0.197
19	1.58	0.80	0.240	(0.078)	0.043	0.197
20	1.67	0.80	0.240	(0.078)	0.043	0.197
21	1.75	0.80	0.240	(0.078)	0.043	0.197
22	1.83	0.80	0.240	(0.078)	0.043	0.197
23	1.92	0.80	0.240	(0.078)	0.043	0.197
24	2.00	0.90	0.270	(0.078)	0.049	0.221
25	2.08	0.80	0.240	(0.078)	0.043	0.197
26	2.17	0.90	0.270	(0.078)	0.049	0.221
27	2.25	0.90	0.270	(0.078)	0.049	0.221
28	2.33	0.90	0.270	(0.078)	0.049	0.221
29	2.42	0.90	0.270	(0.078)	0.049	0.221
30	2.50	0.90	0.270	(0.078)	0.049	0.221
31	2.58	0.90	0.270	(0.078)	0.049	0.221
32	2.67	0.90	0.270	(0.078)	0.049	0.221
33	2.75	1.00	0.300	(0.078)	0.054	0.246
34	2.83	1.00	0.300	(0.078)	0.054	0.246
35	2.92	1.00	0.300	(0.078)	0.054	0.246
36	3.00	1.00	0.300	(0.078)	0.054	0.246
37	3.08	1.00	0.300	(0.078)	0.054	0.246
38	3.17	1.10	0.330	(0.078)	0.059	0.271
39	3.25	1.10	0.330	(0.078)	0.059	0.271
40	3.33	1.10	0.330	(0.078)	0.059	0.271
41	3.42	1.20	0.360	(0.078)	0.065	0.295

42	3.50	1.30	0.390	(0.078)	0.070	0.320
43	3.58	1.40	0.420	(0.078)	0.076	0.344
44	3.67	1.40	0.420	(0.078)	0.076	0.344
45	3.75	1.50	0.450	0.078	(0.081)	0.372
46	3.83	1.50	0.450	0.078	(0.081)	0.372
47	3.92	1.60	0.480	0.078	(0.086)	0.402
48	4.00	1.60	0.480	0.078	(0.086)	0.402
49	4.08	1.70	0.510	0.078	(0.092)	0.432
50	4.17	1.80	0.540	0.078	(0.097)	0.462
51	4.25	1.90	0.570	0.078	(0.103)	0.492
52	4.33	2.00	0.600	0.078	(0.108)	0.522
53	4.42	2.10	0.630	0.078	(0.113)	0.552
54	4.50	2.10	0.630	0.078	(0.113)	0.552
55	4.58	2.20	0.660	0.078	(0.119)	0.582
56	4.67	2.30	0.690	0.078	(0.124)	0.612
57	4.75	2.40	0.720	0.078	(0.130)	0.642
58	4.83	2.40	0.720	0.078	(0.130)	0.642
59	4.92	2.50	0.750	0.078	(0.135)	0.672
60	5.00	2.60	0.780	0.078	(0.140)	0.702
61	5.08	3.10	0.930	0.078	(0.167)	0.852
62	5.17	3.60	1.080	0.078	(0.194)	1.002
63	5.25	3.90	1.170	0.078	(0.211)	1.092
64	5.33	4.20	1.260	0.078	(0.227)	1.182
65	5.42	4.70	1.410	0.078	(0.254)	1.332
66	5.50	5.60	1.680	0.078	(0.302)	1.602
67	5.58	1.90	0.570	0.078	(0.103)	0.492
68	5.67	0.90	0.270	(0.078)	0.049	0.221
69	5.75	0.60	0.180	(0.078)	0.032	0.148
70	5.83	0.50	0.150	(0.078)	0.027	0.123
71	5.92	0.30	0.090	(0.078)	0.016	0.074
72	6.00	0.20	0.060	(0.078)	0.011	0.049

(Loss Rate Not Used)

Sum = 100.0 Sum = 26.0

Flood volume = Effective rainfall 2.17(In)
times area 12.1(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.33(In)
Total soil loss = 0.337(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 95485.9 Cubic Feet
Total soil loss = 14680.0 Cubic Feet

Peak flow rate of this hydrograph = 17.003(CFS)

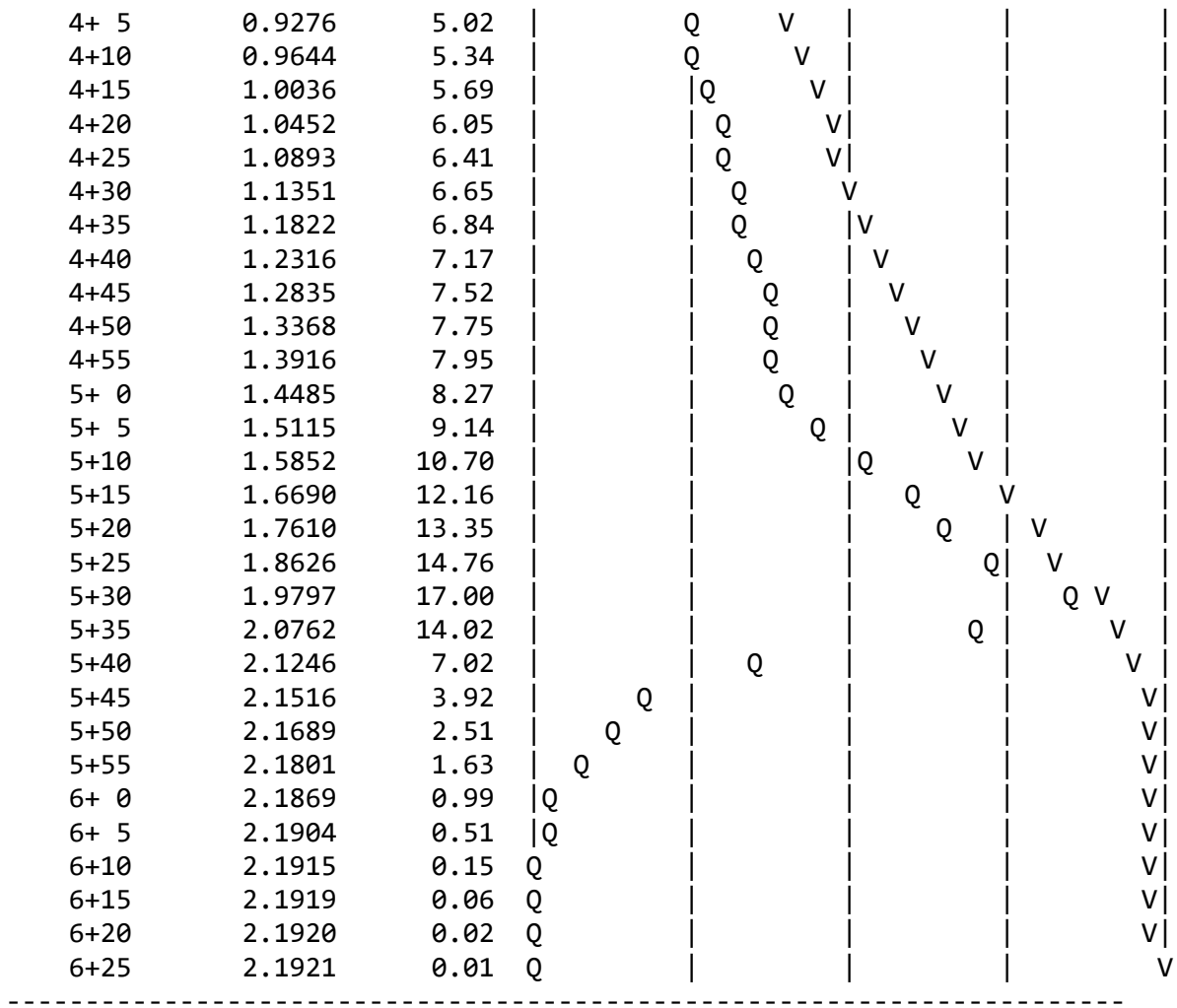
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6 - H O U R S T O R M

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	5.0	10.0	15.0	20.0
0+ 5	0.0037	0.53	VQ				
0+10	0.0129	1.34	V Q				
0+15	0.0241	1.64	V Q				
0+20	0.0361	1.74	V Q				
0+25	0.0484	1.78	V Q				
0+30	0.0616	1.91	V Q				
0+35	0.0757	2.05	V Q				
0+40	0.0901	2.08	V Q				
0+45	0.1045	2.10	V Q				
0+50	0.1190	2.11	V Q				
0+55	0.1335	2.11	V Q				
1+ 0	0.1488	2.21	V Q				
1+ 5	0.1650	2.35	VQ				
1+10	0.1814	2.39	VQ				
1+15	0.1979	2.40	VQ				
1+20	0.2145	2.41	VQ				
1+25	0.2311	2.41	Q				
1+30	0.2477	2.41	Q				
1+35	0.2643	2.41	Q				
1+40	0.2809	2.41	QV				
1+45	0.2975	2.41	QV				
1+50	0.3141	2.41	QV				
1+55	0.3307	2.41	Q V				
2+ 0	0.3480	2.52	QV				
2+ 5	0.3655	2.55	QV				
2+10	0.3831	2.55	QV				
2+15	0.4015	2.67	Q V				
2+20	0.4200	2.69	Q V				
2+25	0.4386	2.70	Q V				
2+30	0.4573	2.71	Q V				
2+35	0.4759	2.71	Q V				
2+40	0.4946	2.71	Q V				
2+45	0.5140	2.82	Q V				
2+50	0.5344	2.96	Q V				
2+55	0.5549	2.99	Q V				
3+ 0	0.5756	3.00	Q V				
3+ 5	0.5963	3.01	Q V				
3+10	0.6178	3.12	Q V				
3+15	0.6402	3.26	Q V				
3+20	0.6629	3.29	Q V				
3+25	0.6864	3.41	Q V				
3+30	0.7116	3.66	Q V				
3+35	0.7387	3.94	Q V				
3+40	0.7672	4.13	Q V				
3+45	0.7968	4.30	Q V				
3+50	0.8276	4.48	Q V				
3+55	0.8597	4.65	Q V				
4+ 0	0.8931	4.84	Q V				


4+ 5 0.9276 5.02
4+10 0.9644 5.34
4+15 1.0036 5.69
4+20 1.0452 6.05
4+25 1.0893 6.41
4+30 1.1351 6.65
4+35 1.1822 6.84
4+40 1.2316 7.17
4+45 1.2835 7.52
4+50 1.3368 7.75
4+55 1.3916 7.95
5+ 0 1.4485 8.27
5+ 5 1.5115 9.14
5+10 1.5852 10.70
5+15 1.6690 12.16
5+20 1.7610 13.35
5+25 1.8626 14.76
5+30 1.9797 17.00
5+35 2.0762 14.02
5+40 2.1246 7.02
5+45 2.1516 3.92
5+50 2.1689 2.51
5+55 2.1801 1.63
6+ 0 2.1869 0.99
6+ 5 2.1904 0.51
6+10 2.1915 0.15
6+15 2.1919 0.06
6+20 2.1920 0.02
6+25 2.1921 0.01

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 10/06/23 File: Q100BUH6100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 6 HOUR STORM EVENT ANALYSIS - WATERSHED B

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

English Units used in output format

Drainage Area = 10.13(Ac.) = 0.016 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 10.13(Ac.) = 0.016 Sq. Mi.
Length along longest watercourse = 1196.00(Ft.)
Length along longest watercourse measured to centroid = 993.00(Ft.)
Length along longest watercourse = 0.227 Mi.
Length along longest watercourse measured to centroid = 0.188 Mi.
Difference in elevation = 14.05(Ft.)
Slope along watercourse = 62.0268 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.050 Hr.
Lag time = 2.97 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.19 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	1.20	12.16

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	2.50	25.33

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(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 %
10.130	58.70	0.900

Total Area Entered = 10.13(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.900	0.092	1.000	0.092
					Sum (F) =	0.092

Area averaged mean soil loss (F) (In/Hr) = 0.092
Minimum soil loss rate ((In/Hr)) = 0.046
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	168.240	37.316	3.810
2	0.167	336.480	45.647	4.660
3	0.250	504.720	10.225	1.044
4	0.333	672.960	4.317	0.441
5	0.417	841.200	2.495	0.255
			Sum = 100.000	Sum= 10.209

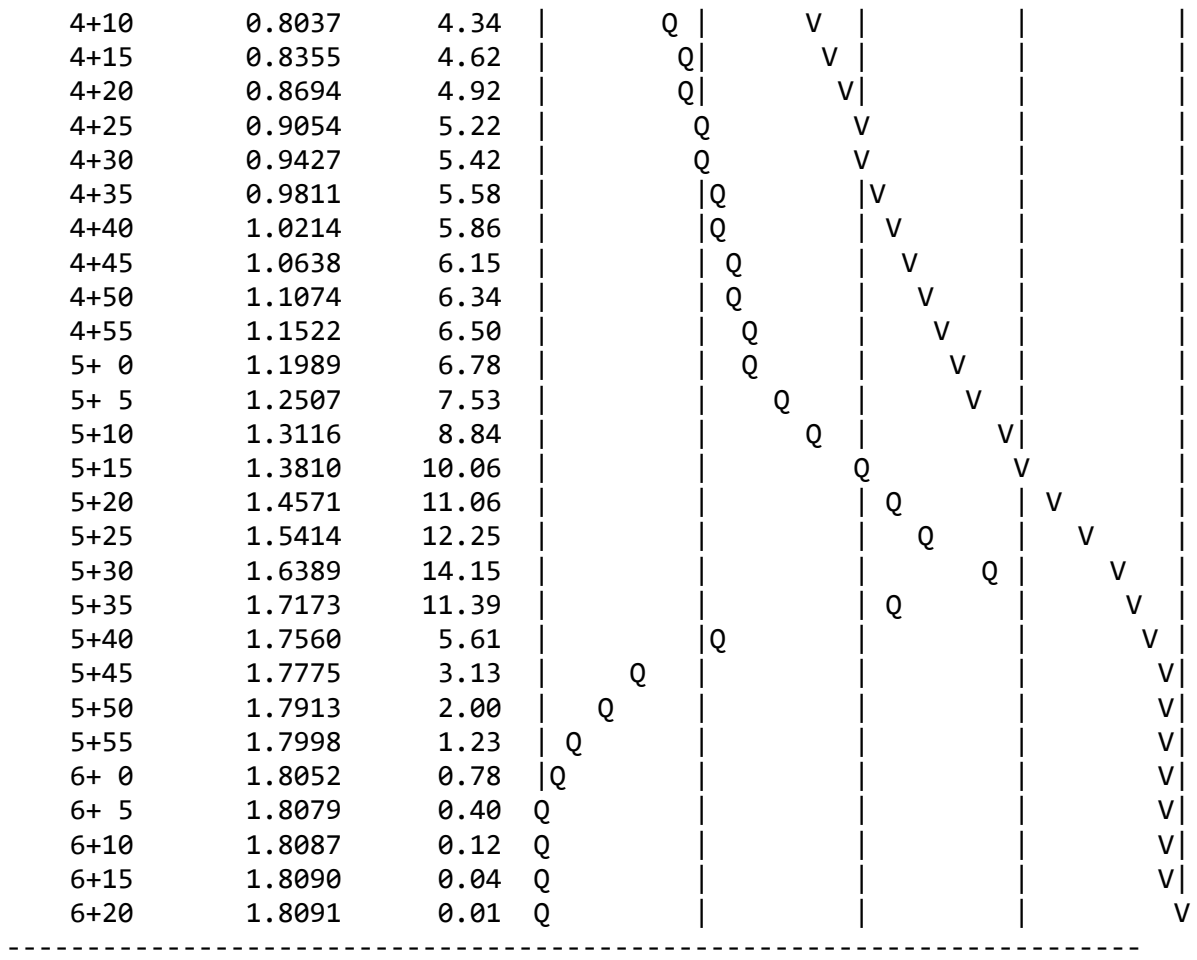
The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.092)	0.027	0.123
2	0.17	0.60	0.180	(0.092)	0.032	0.148
3	0.25	0.60	0.180	(0.092)	0.032	0.148
4	0.33	0.60	0.180	(0.092)	0.032	0.148
5	0.42	0.60	0.180	(0.092)	0.032	0.148
6	0.50	0.70	0.210	(0.092)	0.038	0.172
7	0.58	0.70	0.210	(0.092)	0.038	0.172
8	0.67	0.70	0.210	(0.092)	0.038	0.172
9	0.75	0.70	0.210	(0.092)	0.038	0.172
10	0.83	0.70	0.210	(0.092)	0.038	0.172
11	0.92	0.70	0.210	(0.092)	0.038	0.172
12	1.00	0.80	0.240	(0.092)	0.043	0.197
13	1.08	0.80	0.240	(0.092)	0.043	0.197
14	1.17	0.80	0.240	(0.092)	0.043	0.197
15	1.25	0.80	0.240	(0.092)	0.043	0.197
16	1.33	0.80	0.240	(0.092)	0.043	0.197
17	1.42	0.80	0.240	(0.092)	0.043	0.197
18	1.50	0.80	0.240	(0.092)	0.043	0.197
19	1.58	0.80	0.240	(0.092)	0.043	0.197
20	1.67	0.80	0.240	(0.092)	0.043	0.197
21	1.75	0.80	0.240	(0.092)	0.043	0.197
22	1.83	0.80	0.240	(0.092)	0.043	0.197
23	1.92	0.80	0.240	(0.092)	0.043	0.197
24	2.00	0.90	0.270	(0.092)	0.049	0.221
25	2.08	0.80	0.240	(0.092)	0.043	0.197
26	2.17	0.90	0.270	(0.092)	0.049	0.221
27	2.25	0.90	0.270	(0.092)	0.049	0.221
28	2.33	0.90	0.270	(0.092)	0.049	0.221
29	2.42	0.90	0.270	(0.092)	0.049	0.221
30	2.50	0.90	0.270	(0.092)	0.049	0.221
31	2.58	0.90	0.270	(0.092)	0.049	0.221
32	2.67	0.90	0.270	(0.092)	0.049	0.221
33	2.75	1.00	0.300	(0.092)	0.054	0.246
34	2.83	1.00	0.300	(0.092)	0.054	0.246
35	2.92	1.00	0.300	(0.092)	0.054	0.246
36	3.00	1.00	0.300	(0.092)	0.054	0.246
37	3.08	1.00	0.300	(0.092)	0.054	0.246
38	3.17	1.10	0.330	(0.092)	0.059	0.271
39	3.25	1.10	0.330	(0.092)	0.059	0.271
40	3.33	1.10	0.330	(0.092)	0.059	0.271
41	3.42	1.20	0.360	(0.092)	0.065	0.295
42	3.50	1.30	0.390	(0.092)	0.070	0.320

```
43   3.58     1.40      0.420       (  0.092)       0.076        0.344
44   3.67     1.40      0.420       (  0.092)       0.076        0.344
45   3.75     1.50      0.450       (  0.092)       0.081        0.369
46   3.83     1.50      0.450       (  0.092)       0.081        0.369
47   3.92     1.60      0.480       (  0.092)       0.086        0.394
48   4.00     1.60      0.480       (  0.092)       0.086        0.394
49   4.08     1.70      0.510       (  0.092)       0.092        0.418
50   4.17     1.80      0.540          0.092    (  0.097)        0.448
51   4.25     1.90      0.570          0.092    (  0.103)        0.478
52   4.33     2.00      0.600          0.092    (  0.108)        0.508
53   4.42     2.10      0.630          0.092    (  0.113)        0.538
54   4.50     2.10      0.630          0.092    (  0.113)        0.538
55   4.58     2.20      0.660          0.092    (  0.119)        0.568
56   4.67     2.30      0.690          0.092    (  0.124)        0.598
57   4.75     2.40      0.720          0.092    (  0.130)        0.628
58   4.83     2.40      0.720          0.092    (  0.130)        0.628
59   4.92     2.50      0.750          0.092    (  0.135)        0.658
60   5.00     2.60      0.780          0.092    (  0.140)        0.688
61   5.08     3.10      0.930          0.092    (  0.167)        0.838
62   5.17     3.60      1.080          0.092    (  0.194)        0.988
63   5.25     3.90      1.170          0.092    (  0.211)        1.078
64   5.33     4.20      1.260          0.092    (  0.227)        1.168
65   5.42     4.70      1.410          0.092    (  0.254)        1.318
66   5.50     5.60      1.680          0.092    (  0.302)        1.588
67   5.58     1.90      0.570          0.092    (  0.103)        0.478
68   5.67     0.90      0.270       (  0.092)       0.049        0.221
69   5.75     0.60      0.180       (  0.092)       0.032        0.148
70   5.83     0.50      0.150       (  0.092)       0.027        0.123
71   5.92     0.30      0.090       (  0.092)       0.016        0.074
72   6.00     0.20      0.060       (  0.092)       0.011        0.049
               (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    25.7
      Flood volume = Effective rainfall      2.14(In)
       times area      10.1(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
      Total soil loss =      0.36(In)
      Total soil loss =     0.301(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =       78803.7 Cubic Feet
      Total soil loss =       13122.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     14.146(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - 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        5.0      10.0      15.0      20.0
```

```
---------------------------------------------------------------------
 0+ 5       0.0032      0.47  Q         |          |          |          |
 0+10       0.0111      1.14  V Q       |          |          |          |
 0+15       0.0206      1.38  V Q       |          |          |          |
 0+20       0.0306      1.46  V Q       |          |          |          |
 0+25       0.0409      1.50  V  Q      |          |          |          |
 0+30       0.0520      1.60  |V Q      |          |          |          |
 0+35       0.0638      1.72  |V Q      |          |          |          |
 0+40       0.0758      1.74  |V Q      |          |          |          |
 0+45       0.0879      1.75  |V Q      |          |          |          |
 0+50       0.1000      1.76  | VQ      |          |          |          |
 0+55       0.1121      1.76  | VQ      |          |          |          |
 1+ 0       0.1248      1.85  | VQ      |          |          |          |
 1+ 5       0.1384      1.97  |  Q      |          |          |          |
 1+10       0.1521      1.99  |  Q      |          |          |          |
 1+15       0.1659      2.00  |  VQ     |          |          |          |
 1+20       0.1798      2.01  |  VQ     |          |          |          |
 1+25       0.1936      2.01  |   Q     |          |          |          |
 1+30       0.2074      2.01  |   Q     |          |          |          |
 1+35       0.2213      2.01  |   Q     |          |          |          |
 1+40       0.2351      2.01  |   QV    |          |          |          |
 1+45       0.2490      2.01  |   QV    |          |          |          |
 1+50       0.2628      2.01  |   QV    |          |          |          |
 1+55       0.2767      2.01  |   Q V   |          |          |          |
 2+ 0       0.2912      2.10  |   Q V   |          |          |          |
 2+ 5       0.3058      2.12  |   Q V   |          |          |          |
 2+10       0.3205      2.13  |   Q  V  |          |          |          |
 2+15       0.3358      2.23  |   Q  V  |          |          |          |
 2+20       0.3513      2.25  |   Q  V  |          |          |          |
 2+25       0.3668      2.26  |   Q   V |          |          |          |
 2+30       0.3824      2.26  |   Q   V |          |          |          |
 2+35       0.3980      2.26  |   Q   V |          |          |          |
 2+40       0.4136      2.26  |   Q    V|          |          |          |
 2+45       0.4298      2.36  |   Q    V|          |          |          |
 2+50       0.4468      2.47  |   Q    V|          |          |          |
 2+55       0.4640      2.50  |   Q     V          |          |          |
 3+ 0       0.4812      2.51  |    Q    V          |          |          |
 3+ 5       0.4985      2.51  |    Q    |V         |          |          |
 3+10       0.5165      2.61  |    Q    |V         |          |          |
 3+15       0.5352      2.72  |    Q    |V         |          |          |
 3+20       0.5542      2.75  |    Q    | V        |          |          |
 3+25       0.5738      2.85  |    Q    | V        |          |          |
 3+30       0.5949      3.07  |     Q   |  V       |          |          |
 3+35       0.6176      3.30  |     Q   |  V       |          |          |
 3+40       0.6414      3.45  |     Q   |   V      |          |          |
 3+45       0.6661      3.59  |      Q  |   V      |          |          |
 3+50       0.6917      3.72  |      Q  |    V     |          |          |
 3+55       0.7182      3.85  |      Q  |    V     |          |          |
 4+ 0       0.7456      3.97  |      Q  |     V    |          |          |
 4+ 5       0.7738      4.10  |       Q |      V   |          |          |
```


4+10 0.8037 4.34
4+15 0.8355 4.62
4+20 0.8694 4.92
4+25 0.9054 5.22
4+30 0.9427 5.42
4+35 0.9811 5.58
4+40 1.0214 5.86
4+45 1.0638 6.15
4+50 1.1074 6.34
4+55 1.1522 6.50
5+ 0 1.1989 6.78
5+ 5 1.2507 7.53
5+10 1.3116 8.84
5+15 1.3810 10.06
5+20 1.4571 11.06
5+25 1.5414 12.25
5+30 1.6389 14.15
5+35 1.7173 11.39
5+40 1.7560 5.61
5+45 1.7775 3.13
5+50 1.7913 2.00
5+55 1.7998 1.23
6+ 0 1.8052 0.78
6+ 5 1.8079 0.40
6+10 1.8087 0.12
6+15 1.8090 0.04
6+20 1.8091 0.01

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED A
100 YEAR, 3 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.21(Ac.) = 0.018 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.21(Ac.) = 0.018 Sq. Mi.
Length along longest watercourse = 894.00(Ft.)
Length along longest watercourse measured to centroid = 600.00(Ft.)
Length along longest watercourse = 0.169 Mi.
Length along longest watercourse measured to centroid = 0.114 Mi.
Difference in elevation = 5.90(Ft.)
Slope along watercourse = 34.8456 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.054 Hr.
Lag time = 3.27 Min.
25% of lag time = 0.82 Min.
40% of lag time = 1.31 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	0.80	8.97

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	2.00	22.42

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.210	64.40	0.500

Total Area Entered = 11.21(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
64.4	64.4	0.422	0.500	0.232	1.000	0.232
					Sum (F) =	0.232

Area averaged mean soil loss (F) (In/Hr) = 0.232
Minimum soil loss rate ((In/Hr)) = 0.116
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	152.961	33.884	3.828
2	0.167	305.923	46.792	5.286
3	0.250	458.884	11.012	1.244
4	0.333	611.845	4.794	0.542
5	0.417	764.807	2.382	0.269
6	0.500	917.768	1.136	0.128

Sum = 100.000 Sum= 11.298

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	1.30	0.312	(0.232)	0.156	0.156
2	0.17	1.30	0.312	(0.232)	0.156	0.156
3	0.25	1.10	0.264	(0.232)	0.132	0.132
4	0.33	1.50	0.360	(0.232)	0.180	0.180
5	0.42	1.50	0.360	(0.232)	0.180	0.180
6	0.50	1.80	0.432	(0.232)	0.216	0.216
7	0.58	1.50	0.360	(0.232)	0.180	0.180
8	0.67	1.80	0.432	(0.232)	0.216	0.216
9	0.75	1.80	0.432	(0.232)	0.216	0.216
10	0.83	1.50	0.360	(0.232)	0.180	0.180
11	0.92	1.60	0.384	(0.232)	0.192	0.192
12	1.00	1.80	0.432	(0.232)	0.216	0.216
13	1.08	2.20	0.528	0.232	(0.264)	0.296
14	1.17	2.20	0.528	0.232	(0.264)	0.296
15	1.25	2.20	0.528	0.232	(0.264)	0.296
16	1.33	2.00	0.480	0.232	(0.240)	0.248
17	1.42	2.60	0.624	0.232	(0.312)	0.392
18	1.50	2.70	0.648	0.232	(0.324)	0.416
19	1.58	2.40	0.576	0.232	(0.288)	0.344
20	1.67	2.70	0.648	0.232	(0.324)	0.416
21	1.75	3.30	0.792	0.232	(0.396)	0.560
22	1.83	3.10	0.744	0.232	(0.372)	0.512
23	1.92	2.90	0.696	0.232	(0.348)	0.464
24	2.00	3.00	0.720	0.232	(0.360)	0.488
25	2.08	3.10	0.744	0.232	(0.372)	0.512
26	2.17	4.20	1.008	0.232	(0.504)	0.776
27	2.25	5.00	1.200	0.232	(0.600)	0.968
28	2.33	3.50	0.840	0.232	(0.420)	0.608
29	2.42	6.80	1.632	0.232	(0.816)	1.400
30	2.50	7.30	1.752	0.232	(0.876)	1.520
31	2.58	8.20	1.968	0.232	(0.984)	1.736
32	2.67	5.90	1.416	0.232	(0.708)	1.184
33	2.75	2.00	0.480	0.232	(0.240)	0.248
34	2.83	1.80	0.432	(0.232)	0.216	0.216
35	2.92	1.80	0.432	(0.232)	0.216	0.216
36	3.00	0.60	0.144	(0.232)	0.072	0.072
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	16.4

Flood volume = Effective rainfall 1.37(In)
times area 11.2(Ac.)/[(In)/(Ft.)] = 1.3(Ac.Ft)
Total soil loss = 0.63(In)

```
      Total soil loss =     0.592(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       55596.9 Cubic Feet
      Total soil loss =       25783.7 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     17.116(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - 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        5.0      10.0      15.0      20.0
-------------------------------------------------------------------------
  0+ 5       0.0041      0.60  VQ        |         |         |         |
  0+10       0.0139      1.42  V Q       |         |         |         |
  0+15       0.0244      1.52  V  Q      |         |         |         |
  0+20       0.0359      1.67  |V Q      |         |         |         |
  0+25       0.0492      1.93  |V Q      |         |         |         |
  0+30       0.0639      2.14  | V Q     |         |         |         |
  0+35       0.0791      2.21  | V Q     |         |         |         |
  0+40       0.0944      2.21  | V Q     |         |         |         |
  0+45       0.1108      2.38  |  VQ     |         |         |         |
  0+50       0.1265      2.28  |  VQ     |         |         |         |
  0+55       0.1413      2.15  |   Q     |         |         |         |
  1+ 0       0.1569      2.27  |   Q     |         |         |         |
  1+ 5       0.1754      2.70  |    Q    |         |         |         |
  1+10       0.1971      3.14  |     Q   |         |         |         |
  1+15       0.2195      3.26  |     Q   |         |         |         |
  1+20       0.2410      3.12  |     QV  |         |         |         |
  1+25       0.2647      3.44  |     Q V |         |         |         |
  1+30       0.2940      4.25  |       QV|         |         |         |
  1+35       0.3233      4.25  |       Q V         |         |         |
  1+40       0.3525      4.24  |       Q |V        |         |         |
  1+45       0.3879      5.13  |         Q V       |         |         |
  1+50       0.4277      5.78  |         |Q V      |         |         |
  1+55       0.4659      5.55  |         |Q  V     |         |         |
  2+ 0       0.5032      5.42  |         Q    V    |         |         |
  2+ 5       0.5418      5.60  |         |Q    V   |         |         |
  2+10       0.5882      6.74  |         |  Q    V |         |         |
  2+15       0.6495      8.90  |         |      Q  V         |         |
  2+20       0.7107      8.88  |         |      Q  | V       |         |
  2+25       0.7823     10.40  |         |         Q   V     |         |
  2+30       0.8840     14.78  |         |         |      V Q|         |
  2+35       1.0019     17.12  |         |         |         |V  Q     |
  2+40       1.1166     16.65  |         |         |         |  QV     |
  2+45       1.1899     10.65  |         |         |Q        |      V  |
  2+50       1.2253      5.14  |         Q         |         |       V |
```

```
    2+55       1.2500      3.58  |      Q  |         |         |        V|
    3+ 0       1.2663      2.36  |   Q     |         |         |        V|
    3+ 5       1.2730      0.99  |Q        |         |         |        V|
    3+10       1.2751      0.30  Q         |         |         |        V|
    3+15       1.2759      0.12  Q         |         |         |        V|
    3+20       1.2763      0.05  Q         |         |         |        V|
    3+25       1.2763      0.01  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 10/11/23 File: QB100XUH3100.out

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED B
100 YEAR, 3 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.08(Ac.) = 0.017 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.08(Ac.) = 0.017 Sq. Mi.
Length along longest watercourse = 881.00(Ft.)
Length along longest watercourse measured to centroid = 378.00(Ft.)
Length along longest watercourse = 0.167 Mi.
Length along longest watercourse measured to centroid = 0.072 Mi.
Difference in elevation = 3.90(Ft.)
Slope along watercourse = 23.3734 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.049 Hr.
Lag time = 2.94 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	0.80	8.86

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	2.00	22.16

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.080	58.19	0.500

Total Area Entered = 11.08(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.2	58.2	0.488	0.500	0.269	1.000	0.269
					Sum (F) =	0.269

Area averaged mean soil loss (F) (In/Hr) = 0.269
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.941	37.677	4.207
2	0.167	339.883	45.521	5.083
3	0.250	509.824	10.142	1.133
4	0.333	679.765	4.262	0.476
5	0.417	849.706	2.398	0.268
			Sum = 100.000	Sum= 11.167

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	1.30	0.312	(0.269)	0.156	0.156
2	0.17	1.30	0.312	(0.269)	0.156	0.156
3	0.25	1.10	0.264	(0.269)	0.132	0.132
4	0.33	1.50	0.360	(0.269)	0.180	0.180
5	0.42	1.50	0.360	(0.269)	0.180	0.180
6	0.50	1.80	0.432	(0.269)	0.216	0.216
7	0.58	1.50	0.360	(0.269)	0.180	0.180
8	0.67	1.80	0.432	(0.269)	0.216	0.216
9	0.75	1.80	0.432	(0.269)	0.216	0.216
10	0.83	1.50	0.360	(0.269)	0.180	0.180
11	0.92	1.60	0.384	(0.269)	0.192	0.192
12	1.00	1.80	0.432	(0.269)	0.216	0.216
13	1.08	2.20	0.528	(0.269)	0.264	0.264
14	1.17	2.20	0.528	(0.269)	0.264	0.264
15	1.25	2.20	0.528	(0.269)	0.264	0.264
16	1.33	2.00	0.480	(0.269)	0.240	0.240
17	1.42	2.60	0.624	0.269	(0.312)	0.355
18	1.50	2.70	0.648	0.269	(0.324)	0.379
19	1.58	2.40	0.576	0.269	(0.288)	0.307
20	1.67	2.70	0.648	0.269	(0.324)	0.379
21	1.75	3.30	0.792	0.269	(0.396)	0.523
22	1.83	3.10	0.744	0.269	(0.372)	0.475
23	1.92	2.90	0.696	0.269	(0.348)	0.427
24	2.00	3.00	0.720	0.269	(0.360)	0.451
25	2.08	3.10	0.744	0.269	(0.372)	0.475
26	2.17	4.20	1.008	0.269	(0.504)	0.739
27	2.25	5.00	1.200	0.269	(0.600)	0.931
28	2.33	3.50	0.840	0.269	(0.420)	0.571
29	2.42	6.80	1.632	0.269	(0.816)	1.363
30	2.50	7.30	1.752	0.269	(0.876)	1.483
31	2.58	8.20	1.968	0.269	(0.984)	1.699
32	2.67	5.90	1.416	0.269	(0.708)	1.147
33	2.75	2.00	0.480	(0.269)	0.240	0.240
34	2.83	1.80	0.432	(0.269)	0.216	0.216
35	2.92	1.80	0.432	(0.269)	0.216	0.216
36	3.00	0.60	0.144	(0.269)	0.072	0.072
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	15.7

Flood volume = Effective rainfall 1.31(In)
times area 11.1(Ac.)/[(In)/(Ft.)] = 1.2(Ac.Ft)
Total soil loss = 0.69(In)
Total soil loss = 0.638(Ac.Ft)

```
      Total rainfall =      2.00(In)
      Flood volume =       52637.0 Cubic Feet
      Total soil loss =       27799.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     16.763(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - 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        5.0      10.0      15.0      20.0
-------------------------------------------------------------------------
  0+ 5       0.0045      0.66  VQ        |         |         |         |
  0+10       0.0145      1.45  V Q       |         |         |         |
  0+15       0.0250      1.53  V  Q      |         |         |         |
  0+20       0.0366      1.68  |V Q      |         |         |         |
  0+25       0.0499      1.94  |V Q      |         |         |         |
  0+30       0.0646      2.13  | V Q     |         |         |         |
  0+35       0.0797      2.18  | V Q     |         |         |         |
  0+40       0.0948      2.20  |  VQ     |         |         |         |
  0+45       0.1111      2.36  |  VQ     |         |         |         |
  0+50       0.1266      2.24  |   Q     |         |         |         |
  0+55       0.1411      2.12  |   Q     |         |         |         |
  1+ 0       0.1566      2.25  |   QV    |         |         |         |
  1+ 5       0.1744      2.57  |    Q    |         |         |         |
  1+10       0.1939      2.84  |    QV   |         |         |         |
  1+15       0.2139      2.91  |    Q V  |         |         |         |
  1+20       0.2334      2.84  |    Q V  |         |         |         |
  1+25       0.2556      3.21  |     Q V |         |         |         |
  1+30       0.2822      3.87  |      Q V|         |         |         |
  1+35       0.3085      3.81  |      Q  V         |         |         |
  1+40       0.3348      3.82  |      Q  |V        |         |         |
  1+45       0.3676      4.76  |        Q| V       |         |         |
  1+50       0.4043      5.34  |         Q  V      |         |         |
  1+55       0.4393      5.07  |         Q   V     |         |         |
  2+ 0       0.4734      4.96  |        Q|    V    |         |         |
  2+ 5       0.5089      5.15  |         Q     V   |         |         |
  2+10       0.5528      6.37  |         | Q     V |         |         |
  2+15       0.6116      8.55  |         |      Q  V         |         |
  2+20       0.6690      8.33  |         |     Q   | V       |         |
  2+25       0.7391     10.18  |         |         Q   V     |         |
  2+30       0.8387     14.47  |         |           |      VQ |         |
  2+35       0.9542     16.76  |         |           |         |V Q      |
  2+40       1.0640     15.95  |         |           |         |Q   V    |
  2+45       1.1318      9.84  |         |         Q |         |      V  |
  2+50       1.1637      4.64  |        Q|           |         |       V |
  2+55       1.1863      3.28  |     Q   |           |         |        V|
```

```
    3+ 0       1.2006      2.07  |   Q     |         |         |        V|
    3+ 5       1.2059      0.78  |Q        |         |         |        V|
    3+10       1.2076      0.24  Q         |         |         |        V|
    3+15       1.2082      0.09  Q         |         |         |        V|
    3+20       1.2084      0.02  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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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 3 HOUR STORM EVENT ANALYSIS - WATERSHED A

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

English Units used in output format

Drainage Area = 12.14(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.14(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 1286.00(Ft.)
Length along longest watercourse measured to centroid = 1036.00(Ft.)
Length along longest watercourse = 0.244 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 14.28(Ft.)
Slope along watercourse = 58.6302 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.052 Hr.
Lag time = 3.14 Min.
25% of lag time = 0.78 Min.
40% of lag time = 1.26 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	0.80	9.71

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	2.00	24.28

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.140	65.50	0.900

Total Area Entered = 12.14(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.5	65.5	0.411	0.900	0.078	1.000	0.078
					Sum (F) =	0.078

Area averaged mean soil loss (F) (In/Hr) = 0.078
Minimum soil loss rate ((In/Hr)) = 0.039
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	159.336	35.360	4.326
2	0.167	318.671	46.318	5.667
3	0.250	478.007	10.666	1.305
4	0.333	637.342	4.600	0.563
5	0.417	796.678	2.225	0.272
6	0.500	956.014	0.832	0.102

Sum = 100.000 Sum= 12.235

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	1.30	0.312	(0.078)	0.056	0.256
2	0.17	1.30	0.312	(0.078)	0.056	0.256
3	0.25	1.10	0.264	(0.078)	0.048	0.216
4	0.33	1.50	0.360	(0.078)	0.065	0.295
5	0.42	1.50	0.360	(0.078)	0.065	0.295
6	0.50	1.80	0.432	(0.078)	0.078	0.354
7	0.58	1.50	0.360	(0.078)	0.065	0.295
8	0.67	1.80	0.432	(0.078)	0.078	0.354
9	0.75	1.80	0.432	(0.078)	0.078	0.354
10	0.83	1.50	0.360	(0.078)	0.065	0.295
11	0.92	1.60	0.384	(0.078)	0.069	0.315
12	1.00	1.80	0.432	(0.078)	0.078	0.354
13	1.08	2.20	0.528	0.078	(0.095)	0.450
14	1.17	2.20	0.528	0.078	(0.095)	0.450
15	1.25	2.20	0.528	0.078	(0.095)	0.450
16	1.33	2.00	0.480	0.078	(0.086)	0.402
17	1.42	2.60	0.624	0.078	(0.112)	0.546
18	1.50	2.70	0.648	0.078	(0.117)	0.570
19	1.58	2.40	0.576	0.078	(0.104)	0.498
20	1.67	2.70	0.648	0.078	(0.117)	0.570
21	1.75	3.30	0.792	0.078	(0.143)	0.714
22	1.83	3.10	0.744	0.078	(0.134)	0.666
23	1.92	2.90	0.696	0.078	(0.125)	0.618
24	2.00	3.00	0.720	0.078	(0.130)	0.642
25	2.08	3.10	0.744	0.078	(0.134)	0.666
26	2.17	4.20	1.008	0.078	(0.181)	0.930
27	2.25	5.00	1.200	0.078	(0.216)	1.122
28	2.33	3.50	0.840	0.078	(0.151)	0.762
29	2.42	6.80	1.632	0.078	(0.294)	1.554
30	2.50	7.30	1.752	0.078	(0.315)	1.674
31	2.58	8.20	1.968	0.078	(0.354)	1.890
32	2.67	5.90	1.416	0.078	(0.255)	1.338
33	2.75	2.00	0.480	0.078	(0.086)	0.402
34	2.83	1.80	0.432	(0.078)	0.078	0.354
35	2.92	1.80	0.432	(0.078)	0.078	0.354
36	3.00	0.60	0.144	(0.078)	0.026	0.118
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	21.4

Flood volume = Effective rainfall 1.78(In)
times area 12.1(Ac.)/[(In)/(Ft.)] = 1.8(Ac.Ft)
Total soil loss = 0.22(In)

```
      Total soil loss =     0.221(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       78514.3 Cubic Feet
      Total soil loss =        9617.5 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     20.529(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - 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        7.5      15.0      22.5      30.0
-------------------------------------------------------------------------
  0+ 5       0.0076      1.11  VQ        |         |         |         |
  0+10       0.0252      2.56  V  Q      |         |         |         |
  0+15       0.0440      2.72  V  Q      |         |         |         |
  0+20       0.0645      2.98  |V Q      |         |         |         |
  0+25       0.0883      3.45  |V  Q     |         |         |         |
  0+30       0.1145      3.81  | V  Q    |         |         |         |
  0+35       0.1415      3.92  |  V Q    |         |         |         |
  0+40       0.1687      3.94  |  V Q    |         |         |         |
  0+45       0.1978      4.24  |   VQ    |         |         |         |
  0+50       0.2257      4.04  |    Q    |         |         |         |
  0+55       0.2519      3.81  |    Q    |         |         |         |
  1+ 0       0.2797      4.03  |    QV   |         |         |         |
  1+ 5       0.3118      4.67  |     Q   |         |         |         |
  1+10       0.3480      5.26  |      Q  |         |         |         |
  1+15       0.3852      5.40  |      QV |         |         |         |
  1+20       0.4214      5.26  |      Q V|         |         |         |
  1+25       0.4603      5.64  |      Q  V         |         |         |
  1+30       0.5051      6.51  |       Q |V        |         |         |
  1+35       0.5499      6.49  |       Q | V       |         |         |
  1+40       0.5946      6.50  |       Q |  V      |         |         |
  1+45       0.6461      7.48  |        Q|   V     |         |         |
  1+50       0.7024      8.17  |         Q    V    |         |         |
  1+55       0.7568      7.90  |         Q     V   |         |         |
  2+ 0       0.8102      7.76  |         Q      V  |         |         |
  2+ 5       0.8650      7.96  |         Q        V|         |         |
  2+10       0.9286      9.24  |         | Q       V         |         |
  2+15       1.0085     11.60  |         |    Q    | V       |         |
  2+20       1.0876     11.49  |         |    Q    |   V     |         |
  2+25       1.1791     13.28  |         |      Q  |     V   |         |
  2+30       1.3031     18.00  |         |         |   Q   V |         |
  2+35       1.4445     20.53  |         |         |      Q  | V       |
  2+40       1.5814     19.89  |         |         |     Q   |    V    |
  2+45       1.6726     13.24  |         |      Q  |         |      V  |
  2+50       1.7224      7.24  |        Q|         |         |       V |
```

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    2+55       1.7603      5.50  |      Q  |         |         |        V|
    3+ 0       1.7863      3.77  |    Q    |         |         |        V|
    3+ 5       1.7971      1.58  | Q       |         |         |        V|
    3+10       1.8005      0.49  Q         |         |         |        V|
    3+15       1.8019      0.20  Q         |         |         |        V|
    3+20       1.8024      0.07  Q         |         |         |        V|
    3+25       1.8024      0.01  Q         |         |         |        V|
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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

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 3 HOUR STORM EVENT ANALYSIS - WATERSHED B

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

English Units used in output format

Drainage Area = 10.13(Ac.) = 0.016 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 10.13(Ac.) = 0.016 Sq. Mi.
Length along longest watercourse = 1196.00(Ft.)
Length along longest watercourse measured to centroid = 993.00(Ft.)
Length along longest watercourse = 0.227 Mi.
Length along longest watercourse measured to centroid = 0.188 Mi.
Difference in elevation = 14.05(Ft.)
Slope along watercourse = 62.0268 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.050 Hr.
Lag time = 2.97 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.19 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	0.80	8.10

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	2.00	20.26

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.130	58.70	0.900

Total Area Entered = 10.13(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.900	0.092	1.000	0.092
					Sum (F) =	0.092

Area averaged mean soil loss (F) (In/Hr) = 0.092
Minimum soil loss rate ((In/Hr)) = 0.046
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	168.240	37.316	3.810
2	0.167	336.480	45.647	4.660
3	0.250	504.720	10.225	1.044
4	0.333	672.960	4.317	0.441
5	0.417	841.200	2.495	0.255
		Sum =	100.000 Sum=	10.209

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	1.30	0.312	(0.092)	0.056	0.256
2	0.17	1.30	0.312	(0.092)	0.056	0.256
3	0.25	1.10	0.264	(0.092)	0.048	0.216
4	0.33	1.50	0.360	(0.092)	0.065	0.295
5	0.42	1.50	0.360	(0.092)	0.065	0.295
6	0.50	1.80	0.432	(0.092)	0.078	0.354
7	0.58	1.50	0.360	(0.092)	0.065	0.295
8	0.67	1.80	0.432	(0.092)	0.078	0.354
9	0.75	1.80	0.432	(0.092)	0.078	0.354
10	0.83	1.50	0.360	(0.092)	0.065	0.295
11	0.92	1.60	0.384	(0.092)	0.069	0.315
12	1.00	1.80	0.432	(0.092)	0.078	0.354
13	1.08	2.20	0.528	0.092	(0.095)	0.436
14	1.17	2.20	0.528	0.092	(0.095)	0.436
15	1.25	2.20	0.528	0.092	(0.095)	0.436
16	1.33	2.00	0.480	(0.092)	0.086	0.394
17	1.42	2.60	0.624	0.092	(0.112)	0.532
18	1.50	2.70	0.648	0.092	(0.117)	0.556
19	1.58	2.40	0.576	0.092	(0.104)	0.484
20	1.67	2.70	0.648	0.092	(0.117)	0.556
21	1.75	3.30	0.792	0.092	(0.143)	0.700
22	1.83	3.10	0.744	0.092	(0.134)	0.652
23	1.92	2.90	0.696	0.092	(0.125)	0.604
24	2.00	3.00	0.720	0.092	(0.130)	0.628
25	2.08	3.10	0.744	0.092	(0.134)	0.652
26	2.17	4.20	1.008	0.092	(0.181)	0.916
27	2.25	5.00	1.200	0.092	(0.216)	1.108
28	2.33	3.50	0.840	0.092	(0.151)	0.748
29	2.42	6.80	1.632	0.092	(0.294)	1.540
30	2.50	7.30	1.752	0.092	(0.315)	1.660
31	2.58	8.20	1.968	0.092	(0.354)	1.876
32	2.67	5.90	1.416	0.092	(0.255)	1.324
33	2.75	2.00	0.480	(0.092)	0.086	0.394
34	2.83	1.80	0.432	(0.092)	0.078	0.354
35	2.92	1.80	0.432	(0.092)	0.078	0.354
36	3.00	0.60	0.144	(0.092)	0.026	0.118
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	21.1

Flood volume = Effective rainfall 1.76(In)
times area 10.1(Ac.)/[(In)/(Ft.)] = 1.5(Ac.Ft)
Total soil loss = 0.24(In)
Total soil loss = 0.204(Ac.Ft)

Total rainfall = 2.00(In)
Flood volume = 64660.3 Cubic Feet
Total soil loss = 8880.3 Cubic Feet

Peak flow rate of this hydrograph = 17.112(CFS)

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3 - 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 5.0 10.0 15.0 20.0
0+ 5	0.0067	0.98	VQ
0+10	0.0216	2.17	V Q
0+15	0.0374	2.29	V Q
0+20	0.0547	2.51	V Q
0+25	0.0747	2.91	V Q
0+30	0.0967	3.20	V Q
0+35	0.1192	3.27	V Q
0+40	0.1420	3.30	V Q
0+45	0.1664	3.54	V Q
0+50	0.1896	3.37	VQ
0+55	0.2114	3.18	VQ
1+ 0	0.2347	3.37	Q
1+ 5	0.2613	3.86	Q
1+10	0.2908	4.28	VQ
1+15	0.3210	4.39	Q
1+20	0.3504	4.27	QV
1+25	0.3822	4.62	QV
1+30	0.4188	5.32	QV
1+35	0.4552	5.28	Q V
1+40	0.4917	5.29	Q V
1+45	0.5340	6.15	Q V
1+50	0.5801	6.69	Q V
1+55	0.6244	6.44	Q V
2+ 0	0.6681	6.34	Q V
2+ 5	0.7130	6.51	Q V
2+10	0.7654	7.62	Q V
2+15	0.8316	9.61	Q V
2+20	0.8965	9.42	Q V
2+25	0.9729	11.09	Q V
2+30	1.0762	15.01	VQ
2+35	1.1941	17.11	V Q
2+40	1.3070	16.40	Q V
2+45	1.3811	10.76	Q V
2+50	1.4212	5.82	Q V
2+55	1.4520	4.47	Q V

```
    3+ 0       1.4726      2.98  |    Q    |         |         |        V|
    3+ 5       1.4807      1.18  | Q       |         |         |        V|
    3+10       1.4832      0.37  Q         |         |         |        V|
    3+15       1.4842      0.14  Q         |         |         |        V|
    3+20       1.4844      0.03  Q         |         |         |        V|
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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

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED A
100 YEAR, 1 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.21(Ac.) = 0.018 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.21(Ac.) = 0.018 Sq. Mi.
Length along longest watercourse = 894.00(Ft.)
Length along longest watercourse measured to centroid = 600.00(Ft.)
Length along longest watercourse = 0.169 Mi.
Length along longest watercourse measured to centroid = 0.114 Mi.
Difference in elevation = 5.90(Ft.)
Slope along watercourse = 34.8456 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.054 Hr.
Lag time = 3.27 Min.
25% of lag time = 0.82 Min.
40% of lag time = 1.31 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	0.50	5.61

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.21	1.20	13.45

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.200(In)

Point rain (area averaged) = 1.200(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.200(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.210	64.40	0.500

Total Area Entered = 11.21(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
64.4	64.4	0.422	0.500	0.232	1.000	0.232
					Sum (F) =	0.232

Area averaged mean soil loss (F) (In/Hr) = 0.232
Minimum soil loss rate ((In/Hr)) = 0.116
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	152.961	33.884	3.828
2	0.167	305.923	46.792	5.286
3	0.250	458.884	11.012	1.244
4	0.333	611.845	4.794	0.542

```
          5   0.417        764.807          2.382              0.269
          6   0.500        917.768          1.136              0.128
                                    Sum = 100.000   Sum=      11.298
-----------------------------------------------------------------------
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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	4.20	0.605	0.232	(0.302)	0.372
2	0.17	4.30	0.619	0.232	(0.310)	0.387
3	0.25	5.00	0.720	0.232	(0.360)	0.488
4	0.33	5.00	0.720	0.232	(0.360)	0.488
5	0.42	5.80	0.835	0.232	(0.418)	0.603
6	0.50	6.50	0.936	0.232	(0.468)	0.704
7	0.58	7.40	1.065	0.232	(0.533)	0.833
8	0.67	8.60	1.238	0.232	(0.619)	1.006
9	0.75	12.30	1.771	0.232	(0.886)	1.539
10	0.83	29.10	4.190	0.232	(2.095)	3.958
11	0.92	6.80	0.979	0.232	(0.490)	0.747
12	1.00	5.00	0.720	0.232	(0.360)	0.488
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.6

```
   Flood volume = Effective rainfall      0.97(In)
    times area      11.2(Ac.)/[(In)/(Ft.)] =       0.9(Ac.Ft)
   Total soil loss =      0.23(In)
   Total soil loss =     0.217(Ac.Ft)
   Total rainfall =      1.20(In)
   Flood volume =       39370.4 Cubic Feet
   Total soil loss =        9455.4 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     26.567(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        1 - 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        7.5      15.0      22.5      30.0
 ------------------------------------------------------------------------
   0+ 5       0.0098      1.43  VQ        |         |         |         |
   0+10       0.0336      3.45  |V  Q     |         |         |         |
   0+15       0.0637      4.38  | V  Q    |         |         |         |
   0+20       0.0991      5.13  |   V Q   |         |         |         |
   0+25       0.1390      5.80  |     VQ  |         |         |         |
   0+30       0.1866      6.91  |       VQ|         |         |         |
```

```
    0+35       0.2424      8.11  |         Q         |         |         |
    0+40       0.3089      9.66  |         | QV      |         |         |
    0+45       0.3975     12.86  |         |      Q  |         |         |
    0+50       0.5715     25.27  |         |         |    V    |  Q      |
    0+55       0.7544     26.57  |         |         |         |  V Q    |
    1+ 0       0.8368     11.95  |         |    Q    |         |      V  |
    1+ 5       0.8795      6.20  |       Q |         |         |       V |
    1+10       0.8951      2.27  |  Q      |         |         |        V|
    1+15       0.9018      0.97  |Q        |         |         |        V|
    1+20       0.9034      0.23  Q         |         |         |        V|
    1+25       0.9038      0.06  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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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE CONDITION - WATERSHED B
100 YEAR, 1 HOUR STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 11.08(Ac.) = 0.017 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.08(Ac.) = 0.017 Sq. Mi.
Length along longest watercourse = 881.00(Ft.)
Length along longest watercourse measured to centroid = 378.00(Ft.)
Length along longest watercourse = 0.167 Mi.
Length along longest watercourse measured to centroid = 0.072 Mi.
Difference in elevation = 3.90(Ft.)
Slope along watercourse = 23.3734 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.049 Hr.
Lag time = 2.94 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	0.50	5.54

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.08	1.21	13.43

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.212(In)

Point rain (area averaged) = 1.212(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.212(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.080	58.19	0.500

Total Area Entered = 11.08(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.2	58.2	0.488	0.500	0.269	1.000	0.269
					Sum (F) =	0.269

Area averaged mean soil loss (F) (In/Hr) = 0.269
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.941	37.677	4.207
2	0.167	339.883	45.521	5.083
3	0.250	509.824	10.142	1.133
4	0.333	679.765	4.262	0.476

```
          5   0.417        849.706          2.398              0.268
                                      Sum = 100.000   Sum=      11.167
-----------------------------------------------------------------------
```

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	4.20	0.611	0.269	(0.305)	0.342
2	0.17	4.30	0.625	0.269	(0.313)	0.357
3	0.25	5.00	0.727	0.269	(0.364)	0.458
4	0.33	5.00	0.727	0.269	(0.364)	0.458
5	0.42	5.80	0.843	0.269	(0.422)	0.575
6	0.50	6.50	0.945	0.269	(0.473)	0.677
7	0.58	7.40	1.076	0.269	(0.538)	0.807
8	0.67	8.60	1.251	0.269	(0.625)	0.982
9	0.75	12.30	1.789	0.269	(0.894)	1.520
10	0.83	29.10	4.232	0.269	(2.116)	3.963
11	0.92	6.80	0.989	0.269	(0.494)	0.720
12	1.00	5.00	0.727	0.269	(0.364)	0.458
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.3

```
   Flood volume = Effective rainfall      0.94(In)
    times area      11.1(Ac.)/[(In)/(Ft.)] =       0.9(Ac.Ft)
   Total soil loss =      0.27(In)
   Total soil loss =     0.248(Ac.Ft)
   Total rainfall =      1.21(In)
   Flood volume =       37936.9 Cubic Feet
   Total soil loss =       10805.4 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     26.092(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       1 - 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        7.5      15.0      22.5      30.0
---------------------------------------------------------------------------
  0+ 5       0.0099      1.44  VQ        |         |         |         |
  0+10       0.0322      3.24  |V  Q     |         |         |         |
  0+15       0.0607      4.13  | V  Q    |         |         |         |
  0+20       0.0940      4.83  |   V Q   |         |         |         |
  0+25       0.1321      5.53  |     VQ  |         |         |         |
  0+30       0.1775      6.60  |       Q |         |         |         |
  0+35       0.2315      7.83  |         Q         |         |         |
```

```
    0+40       0.2962      9.40  |          | QV       |          |          |
    0+45       0.3843     12.78  |          |      Q   |          |          |
    0+50       0.5640     26.09  |          |          |    V     |   Q      |
    0+55       0.7403     25.59  |          |          |          |  VQ      |
    1+ 0       0.8165     11.07  |          |   Q      |          |       V  |
    1+ 5       0.8540      5.44  |       Q  |          |          |         V|
    1+10       0.8672      1.92  | Q        |          |          |         V|
    1+15       0.8701      0.41  Q          |          |          |         V|
    1+20       0.8709      0.12  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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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 1 HOUR STORM EVENT ANALYSIS - WATERSHED A

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

English Units used in output format

Drainage Area = 12.14(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.14(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 1286.00(Ft.)
Length along longest watercourse measured to centroid = 1036.00(Ft.)
Length along longest watercourse = 0.244 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 14.28(Ft.)
Slope along watercourse = 58.6302 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.052 Hr.
Lag time = 3.14 Min.
25% of lag time = 0.78 Min.
40% of lag time = 1.26 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	0.50	6.07

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.14	1.20	14.57

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.200(In)

Point rain (area averaged) = 1.200(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.200(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.140	65.50	0.900

Total Area Entered = 12.14(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.5	65.5	0.411	0.900	0.078	1.000	0.078
					Sum (F) =	0.078

Area averaged mean soil loss (F) (In/Hr) = 0.078
Minimum soil loss rate ((In/Hr)) = 0.039
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	159.336	35.360	4.326
2	0.167	318.671	46.318	5.667
3	0.250	478.007	10.666	1.305
4	0.333	637.342	4.600	0.563

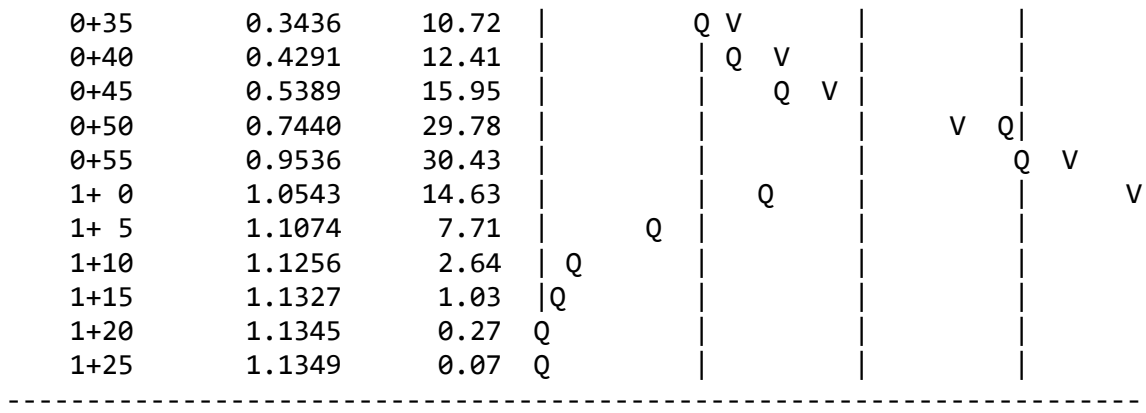
```
          5   0.417        796.678          2.225              0.272
          6   0.500        956.014          0.832              0.102
                                    Sum = 100.000   Sum=      12.235
-----------------------------------------------------------------------
```

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	4.20	0.605	0.078	(0.109)	0.527
2	0.17	4.30	0.619	0.078	(0.111)	0.541
3	0.25	5.00	0.720	0.078	(0.130)	0.642
4	0.33	5.00	0.720	0.078	(0.130)	0.642
5	0.42	5.80	0.835	0.078	(0.150)	0.757
6	0.50	6.50	0.936	0.078	(0.168)	0.858
7	0.58	7.40	1.065	0.078	(0.192)	0.987
8	0.67	8.60	1.238	0.078	(0.223)	1.160
9	0.75	12.30	1.771	0.078	(0.319)	1.693
10	0.83	29.10	4.190	0.078	(0.754)	4.112
11	0.92	6.80	0.979	0.078	(0.176)	0.901
12	1.00	5.00	0.720	0.078	(0.130)	0.642
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	13.5

```
   Flood volume = Effective rainfall      1.12(In)
    times area      12.1(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
   Total soil loss =      0.08(In)
   Total soil loss =     0.079(Ac.Ft)
   Total rainfall =      1.20(In)
   Flood volume =       49438.1 Cubic Feet
   Total soil loss =        3437.9 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     30.434(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       1 - 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       10.0      20.0      30.0      40.0
 ----------------------------------------------------------------------
   0+ 5       0.0157      2.28  V Q       |         |         |         |
   0+10       0.0524      5.33  |V   Q    |         |         |         |
   0+15       0.0974      6.53  |  V  Q   |         |         |         |
   0+20       0.1485      7.42  |    V Q  |         |         |         |
   0+25       0.2050      8.20  |      VQ |         |         |         |
   0+30       0.2698      9.41  |        Q|         |         |         |
```


0+35 0.3436 10.72
0+40 0.4291 12.41
0+45 0.5389 15.95
0+50 0.7440 29.78
0+55 0.9536 30.43
1+ 0 1.0543 14.63
1+ 5 1.1074 7.71
1+10 1.1256 2.64
1+15 1.1327 1.03
1+20 1.1345 0.27
1+25 1.1349 0.07

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

Program License Serial Number 6405

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION
100-YEAR, 1 HOUR STORM EVENT ANALYSIS - WATERSHED B

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

English Units used in output format

Drainage Area = 10.13(Ac.) = 0.016 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 10.13(Ac.) = 0.016 Sq. Mi.
Length along longest watercourse = 1196.00(Ft.)
Length along longest watercourse measured to centroid = 993.00(Ft.)
Length along longest watercourse = 0.227 Mi.
Length along longest watercourse measured to centroid = 0.188 Mi.
Difference in elevation = 14.05(Ft.)
Slope along watercourse = 62.0268 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.050 Hr.
Lag time = 2.97 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.19 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	0.50	5.07

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
10.13	1.12	11.35

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.120(In)

Point rain (area averaged) = 1.120(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.120(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.130	58.70	0.900

Total Area Entered = 10.13(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.900	0.092	1.000	0.092
					Sum (F) =	0.092

Area averaged mean soil loss (F) (In/Hr) = 0.092
Minimum soil loss rate ((In/Hr)) = 0.046
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	168.240	37.316	3.810
2	0.167	336.480	45.647	4.660
3	0.250	504.720	10.225	1.044
4	0.333	672.960	4.317	0.441

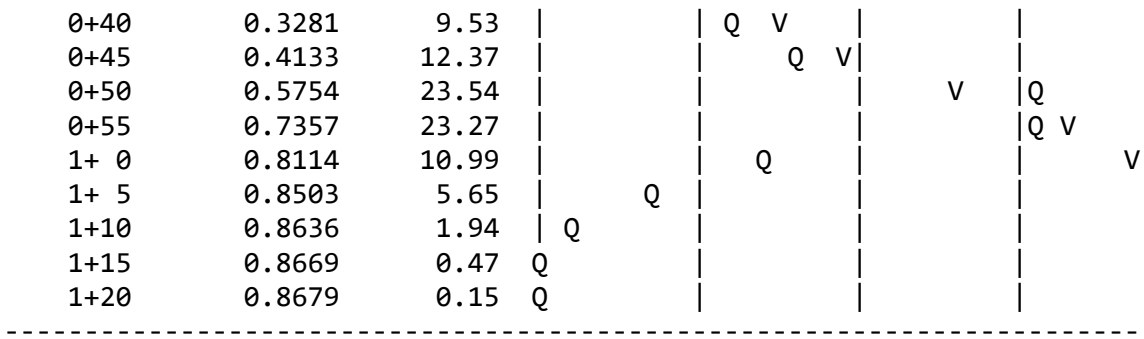
```
          5   0.417        841.200          2.495              0.255
                                      Sum = 100.000   Sum=      10.209
-----------------------------------------------------------------------
```

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	4.20	0.564	0.092	(0.102)	0.473
2	0.17	4.30	0.578	0.092	(0.104)	0.486
3	0.25	5.00	0.672	0.092	(0.121)	0.580
4	0.33	5.00	0.672	0.092	(0.121)	0.580
5	0.42	5.80	0.779	0.092	(0.140)	0.688
6	0.50	6.50	0.874	0.092	(0.157)	0.782
7	0.58	7.40	0.994	0.092	(0.179)	0.903
8	0.67	8.60	1.156	0.092	(0.208)	1.064
9	0.75	12.30	1.653	0.092	(0.298)	1.561
10	0.83	29.10	3.911	0.092	(0.704)	3.819
11	0.92	6.80	0.914	0.092	(0.164)	0.822
12	1.00	5.00	0.672	0.092	(0.121)	0.580
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	12.3

```
   Flood volume = Effective rainfall      1.03(In)
    times area      10.1(Ac.)/[(In)/(Ft.)] =       0.9(Ac.Ft)
   Total soil loss =      0.09(In)
   Total soil loss =     0.078(Ac.Ft)
   Total rainfall =      1.12(In)
   Flood volume =       37804.4 Cubic Feet
   Total soil loss =        3376.4 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     23.544(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       1 - 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        7.5      15.0      22.5      30.0
---------------------------------------------------------------------------
  0+ 5       0.0124      1.80  V Q       |         |         |         |
  0+10       0.0403      4.06  |V   Q    |         |         |         |
  0+15       0.0746      4.97  |  V  Q   |         |         |         |
  0+20       0.1134      5.63  |    V Q  |         |         |         |
  0+25       0.1565      6.27  |      VQ |         |         |         |
  0+30       0.2059      7.17  |        Q|         |         |         |
  0+35       0.2624      8.21  |         Q V       |         |         |
```


0+40 0.3281 9.53
0+45 0.4133 12.37
0+50 0.5754 23.54
0+55 0.7357 23.27
1+ 0 0.8114 10.99
1+ 5 0.8503 5.65
1+10 0.8636 1.94
1+15 0.8669 0.47
1+20 0.8679 0.15

SECTION 3 - REFERENCE DATA

USGS SOILS REPORT

PLATE D-4.1

INFILTRATION REPORT (EXCERPT)

CONTECH UNDERGROUND CHAMBER SYSTEM

DCV CALCULATIONS (WQMP)

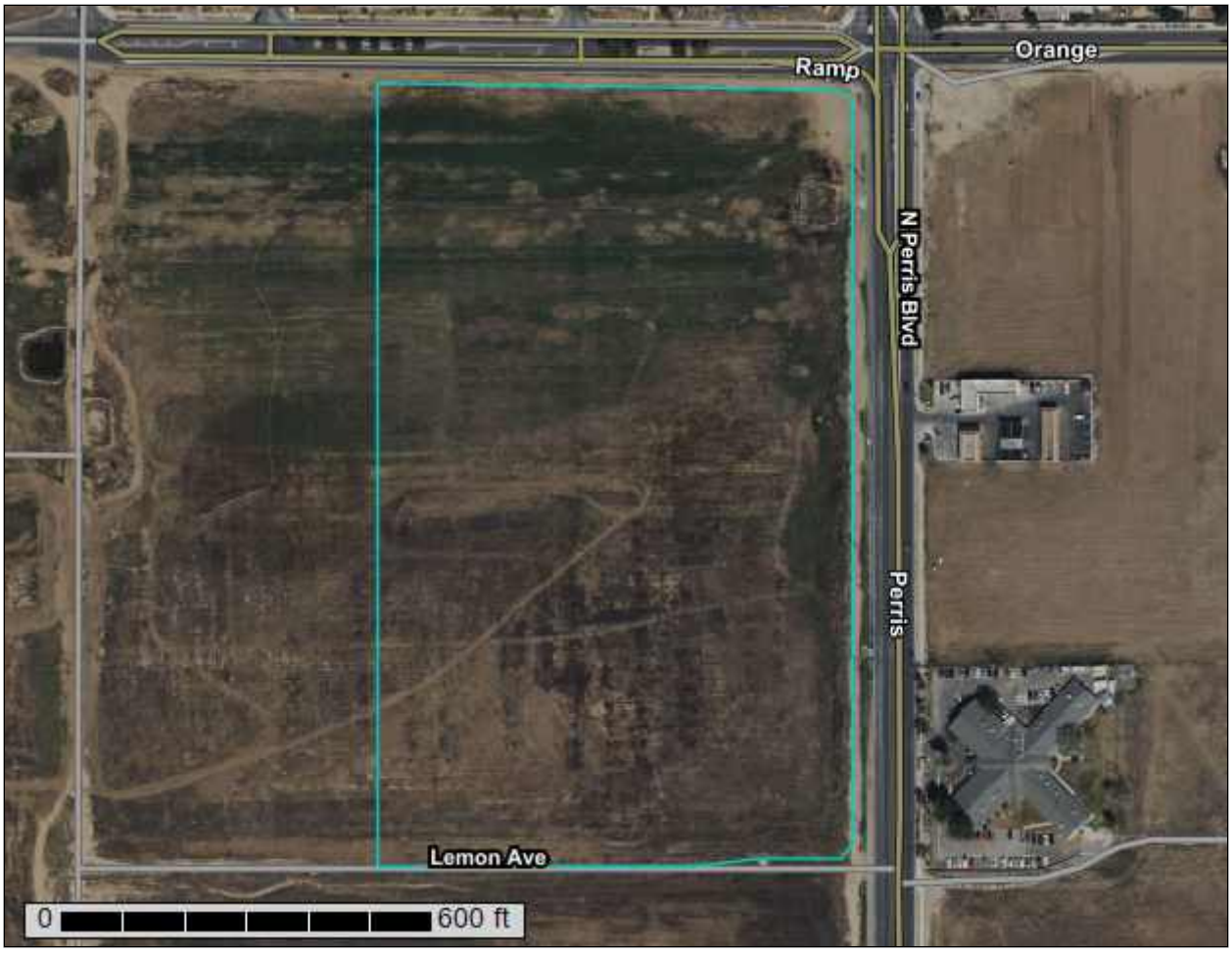
PP190005 – HARVILL DISTRIBUTION CENTER OFFSITE DRAINAGE IMPROVEMENTS (HYDROLOGY MAPS)

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Western Riverside Area, California



September 22, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,260 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 15, Sep 6, 2022

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Dv	Domino silt loam, saline-alkali	2.8	12.4%
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	6.7	29.9%
EyB	Exeter very fine sandy loam, deep, 0 to 5 percent slopes	0.0	0.0%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	12.9	57.7%
Totals for Area of Interest		**22.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

Dv—Domino silt loam, saline-alkali

Map Unit Setting

National map unit symbol: hct8
Elevation: 1,000 to 1,800 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Domino and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Domino

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 27 inches: silt loam
H3 - 27 to 36 inches: cemented
H4 - 36 to 63 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R019XD068CA - SILTY BASIN
Hydric soil rating: No

Minor Components

Chino
Percent of map unit: 10 percent
Hydric soil rating: No

Willows
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

EpA—Exeter sandy loam, deep, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: hctk
Elevation: 300 to 700 feet
Mean annual precipitation: 7 to 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Exeter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Exeter

Setting
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
H1 - 0 to 16 inches: sandy loam
H2 - 16 to 37 inches: sandy clay loam
H3 - 37 to 50 inches: indurated
H4 - 50 to 60 inches: stratified sandy loam to silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: 35 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups
Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Ramona
Percent of map unit: 5 percent
Hydric soil rating: No

Greenfield
Percent of map unit: 5 percent
Hydric soil rating: No

Monserate
Percent of map unit: 5 percent
Hydric soil rating: No

EyB—Exeter very fine sandy loam, deep, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: hctn
Elevation: 300 to 700 feet
Mean annual precipitation: 7 to 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Exeter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Exeter

Setting
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: fine sandy loam
H2 - 16 to 37 inches: sandy clay loam
H3 - 37 to 50 inches: indurated
H4 - 50 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 35 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Ramona

Percent of map unit: 5 percent
Hydric soil rating: No

Greenfield

Percent of map unit: 5 percent
Hydric soil rating: No

Monserate

Percent of map unit: 5 percent
Hydric soil rating: No

PaA—Pachappa fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcxn
Elevation: 1,000 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 270 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pachappa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pachappa

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 63 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Greenfield

Percent of map unit: 5 percent
Hydric soil rating: No

San emigdio

Percent of map unit: 5 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

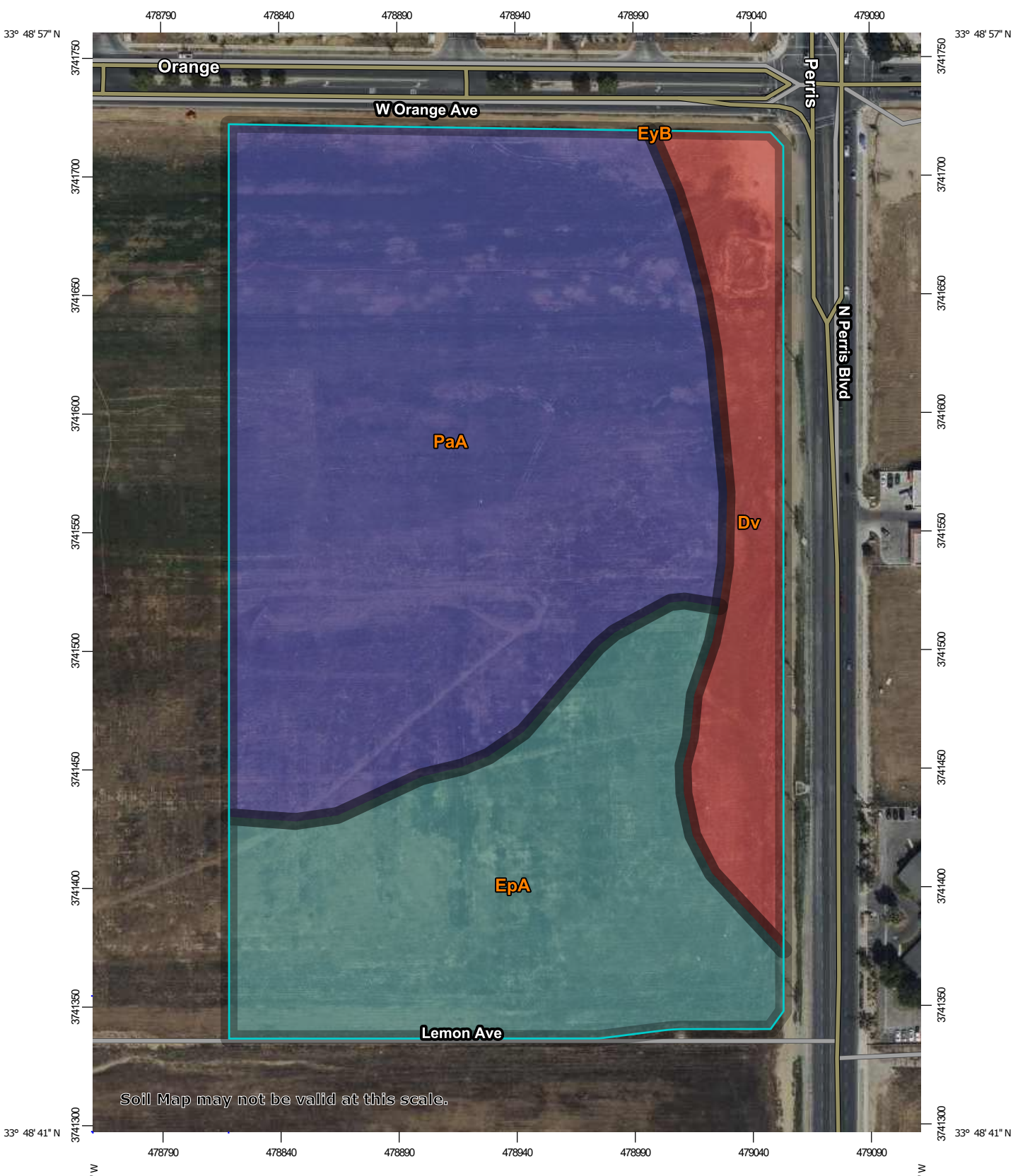
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



Map Scale: 1:2,260 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 15, Sep 6, 2022

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Dv	Domino silt loam, saline-alkali	D	2.8	12.4%
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	C	6.7	29.9%
EyB	Exeter very fine sandy loam, deep, 0 to 5 percent slopes	C	0.0	0.0%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	12.9	57.7%
Totals for Area of Interest			**22.3**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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RAINFALL INTENSITY–INCHES PER HOUR

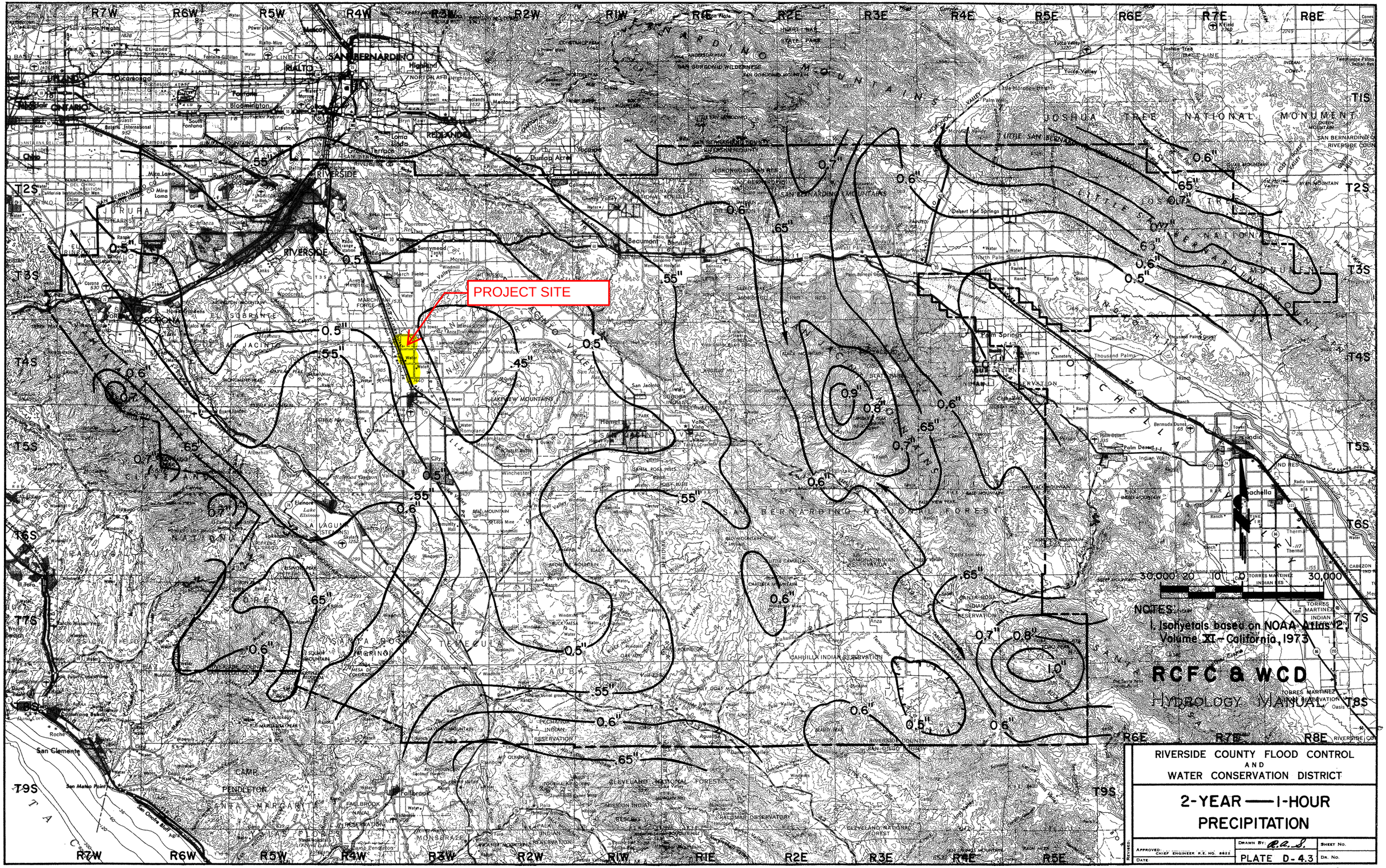
MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.81	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.24	3.30	11	1.87	2.80	11	2.67	4.28	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.64	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.48
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		

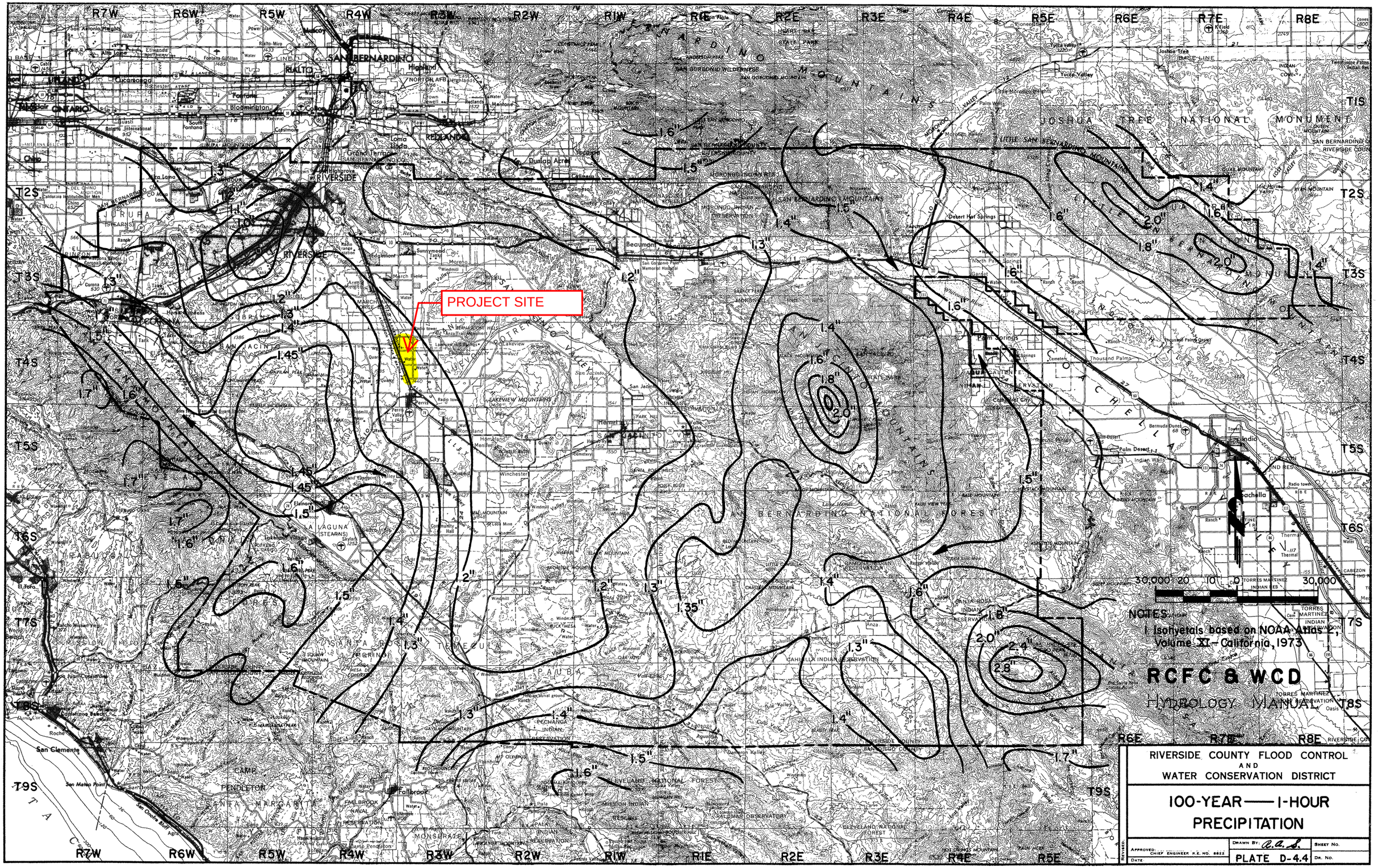
RCFC & WCD

HYDROLOGY MANUAL

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1 (4 of 6)


PROJECT SITE
0.5"
.55"
.45"
.65"
0.6"
0.7"
0.8"
0.9"
1.0"
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
DATE
DRAWN BY: R.A.S.
PLATE D-4.3
SHEET No.
DR. No.
REVISED:


PROJECT SITE
1.6"
1.5"
1.4"
1.3"
1.2"
1.45"
1.7"
2.0"
1.8"
2.4"
2.8"
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
DRAWN BY: A.A.S.
SHEET NO.
PLATE D-4.4
DR. NO.
APPROVED: CHIEF ENGINEER R.E. NO. 6822
DATE
REVISED

September 20, 2023

Howard Industrial Partners
1944 North Tustin Street, Suite 122
Orange, California 92865

Attention: Mr. Mike Tunney
Vice President

Project No.: **22G183-4**

Subject: **Results of Additional Infiltration Testing**
Harvest Landing Industrial Development
Indian Avenue and Orange Avenue
Perris, California

Reference: 1) Geotechnical Investigation, Proposed Harvest Landing Industrial Development, Indian Avenue and Orange Avenue, Perris, California, prepared for Howard Industrial Partners, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G183-1, dated June 13, 2022.

2) Results of Infiltration Testing, Proposed Harvest Landing Industrial Development, Indian Avenue and Orange Avenue, Perris, California, prepared by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G183-2, dated July 1, 2022.

3) Geotechnical Investigation, Harvest Landing Industrial Development, Indian Avenue and Orange Avenue, Perris, California, prepared for Howard Industrial Partners, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G183-3, dated September 21, 2023.

Mr. Tunney:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 23P306R, dated August 9, 2023. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with the guidelines published in Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A, prepared for the Riverside County Department of Environmental Health (RCDEH), dated December, 2013.

Site and Project Description

The site is located at the southwest corner of North Perris Boulevard and Orange Avenue in Perris, California. The site is bounded to the north by Orange Avenue, West Water Avenue, and vacant land, to the west by Interstate 215 Frontage Road and Freeway I-215, to the south by an existing commercial development and a vacant land, and to the east by an existing commercial development, North Perris Boulevard and Barrett Avenue. The western portion of the site is partially transected by Indian Avenue (trending north-south). Orange Avenue (trending east-west) separates the northern portion of the overall site (designated as Phase 2 on the site plans) from Phase 1 in the central to southern portions of the western portion of the overall site. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site consists of several parcels, which total 214.82± acres in size. The west-central area of the site, is developed with four (4) single-family residences (SFRs) which range from approximately 1,200 to 6,160 ft² in size. The residences are of wood-frame and stucco construction and are assumed to be supported on conventional shallow foundations, with slab-on-grade floors. Ground surface cover surrounding the SFRs includes asphaltic concrete with Portland cement concrete driveways, exposed soil, and trees. The remaining areas of the site are vacant and undeveloped. Ground surface cover consists of exposed soil with sparse to moderate native grass and weed growth and occasional trees. A water pump is present approximately 200 feet south of the intersection of Perris Boulevard and Orange Avenue, within the site's boundary. A 3- to 4-foot deep drainage rut is present in the central-eastern area of the site, trending east-west between a dirt road located and the east boundary of the site. Many small stockpiles of plant material and woodchips are located along the eastern side of Indian Avenue, approximately 2 to 4-feet in height. Based on historic aerial photographs obtained from Google Earth, the site was previously used for farming activities. Due to previous tilling activities, the ground surface throughout the site is generally hummocky.

Detailed topographic information was obtained from the Exhibit A-Infiltration Testing Locations plan, prepared by FM Civil Engineers, Inc. Based on this plan, the overall site topography slopes downward to the east at a gradient of 1.5± percent.

Proposed Development

Based on a site plan prepared by RGA, the site will be developed with the following industrial/commercial buildings, located throughout the site.

Building Type	Building Name	Location	Size (ft²)
Industrial	1	Northwest	380,000
Industrial	2	West-Central	88,400
Industrial	3	West-Central	50,000
Industrial	4	Southwest	18,800

Distribution	5	Central	440,000
Commercial	Big Box Retail	Southeast	165,000
Commercial	Shopping Center	Northeast	150,000
Retail	Pad 1	Northeast	6,500
Retail	Pad 2	Northeast	6,500
Restaurant	Pad 3	East	2,305
Retail	Pad 4	East	9,000
Restaurant	Pad 5	Southeast	3,172

Building Nos. 1 through 4 - Industrial Buildings

Dock-high doors will be constructed along a portion of at least one building wall for each of the industrial buildings. The buildings will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

Detailed structural information has not been provided. We assume the new industrial buildings will be single-story structures of tilt-up concrete construction, typically supported on conventional shallow foundation systems with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

Building No. 5 - Distribution Building

Dock-high doors will be constructed along portions of the east and west building walls. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout. Two ancillary buildings, 15,300± ft² and 3,300± ft² in size are located to the south of the main distribution building.

Detailed structural information has not been provided. We assume the new main distribution building will be a two-story structure of tilt-up concrete construction, typically supported on conventional shallow foundation system with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 700 to 900 kips and 4 to 7 kips per linear foot, respectively.

Commercial – Big Box Retail

Dock-high doors will be constructed along a portion of the east building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete in the loading dock areas, and limited areas of concrete flatwork and landscape planters

throughout. This commercial development will include an automobile service station located east of the building. The service station will include a canopy, five (5) fuel pump islands, and underground storage tanks (USTs).

Detailed structural information has not been provided. We assume that the commercial building will be a single-story structure of tilt-up concrete construction, typically supported on conventional shallow foundation system with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively. The new pump island canopy is expected to be a steel frame structure, typically supported on deepened shallow foundations. Maximum column loads for the canopy are expected to be in the range of 20 kips, with significant overturning and/or uplift loads.

Commercial – Shopping Center

The shopping center building will consist of eight (8) suites ranging from 2,400± ft² to 54,000± ft² in size. Dock-high doors will be constructed along a portion of the west building walls for four (4) of the suites of the shopping center building. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

Detailed structural information has not been provided. We assume that the new shopping center building will be a single-story structure of wood frame or masonry block construction, typically supported on conventional shallow foundation systems with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 50 kips and 2 to 3 kips per linear foot, respectively.

Retail and Restaurant Buildings

The two fast-food restaurant buildings will include drive-thru lanes. Pad 4 will contain four (4) suites. The buildings will be surrounded by asphaltic concrete pavements in the parking and drive lanes, concrete flatwork, and limited areas of landscape planters throughout.

Detailed structural information has not been provided. We assume that the new retail and restaurant buildings will be single-story structures of wood frame construction, typically supported on conventional shallow foundation systems with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 20 kips and 1 to 3 kips per linear foot, respectively.

Streets

Barrett Avenue and two access streets will be constructed at the site. It is assumed that the new streets will consist of asphaltic concrete pavements.

General

No significant amounts of below-grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 8 to 10± feet are expected to be necessary to achieve the proposed site grades

throughout the site.

Streets

Barrett Avenue and two access streets will be constructed at the site. It is assumed that the new streets will consist of asphaltic concrete pavements.

Previous Studies

Southern California Geotechnical (SCG) previously conducted a geotechnical investigation at the subject site (Reference No. 1). As a part of this study, twenty-three (23) borings (Identified as Boring Nos. B-1 through B-23) were advanced to depths of 15 to 25± feet below the existing site grades. Native alluvium was encountered at each boring locations, extending to at least the maximum depth explored of 25± feet below existing site grades. The alluvium generally consists of medium dense to very dense silty sands to sandy silts, with trace to little clay content. Free water was not encountered during the drilling of the borings. Based on the lack of water within the borings and the moisture contents of the recovered soil samples, the static groundwater is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

SCG also previously conducted infiltration testing at the subject site (Reference No. 2). The subsurface exploration performed for the infiltration testing consisted of six (6) shallow infiltration trenches (identified as Infiltration Trench Nos. I-1 through I-6) and four (4) deep infiltration borings (identified as Infiltration Boring Nos. I-7 through I-10). The infiltration trenches were excavated to a depth of 7± feet below existing site grades. The infiltration borings were extended to a depth of 50± feet below existing site grades. In addition, one (1) exploratory boring was extended to a depth of 60± feet below site grades. Artificial fill soils were encountered at the ground surface at Infiltration Test No. I-3, extending to a depth of 1± foot below existing site grades. The fill soils consisted of medium dense fine to medium sandy silts with trace quantities of clay and fine gravel. Native alluvium was encountered at the ground surface at all of the remaining boring and trench locations, extending to at least the maximum explored depth of 60± feet below existing site grades. The near-surface alluvium encountered at depths less than 25± feet below existing site grades consisted of medium dense to very dense fine to medium sandy silts, silty fine to medium sands, clayey fine to coarse sands, and hard fine to coarse sandy clays. At depths greater than 25± feet, the alluvium consisted of medium dense to very dense fine sandy silts, fine to medium sandy silts, silty fine to medium sands, and hard fine to medium sandy clays. Based on the results of the testing, SCG recommended infiltration rates of 0.9 to 3.6 inches per hour for the proposed chamber systems. Additionally, SCG did not recommend dry well infiltration at the subject site.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site (Reference No. 3). As a part of this study, forty-three (43) borings (identified as Boring Nos. B-25 through B-67) were advanced to depths of 10 to 50± feet below the existing site grades.

Younger native alluvium was encountered at the ground surface at Boring Nos. B-25, B-28, B-29, B-31, B-32, B-50, B-55 through B-58, B-60, B-64, and B-67, extending to depths of 2½ to 5½± feet below existing site grades. The alluvium generally consists of loose to medium dense silty

fine sands, silty fine to medium sands, fine sandy silts, clayey fine sands. Occasional layers of very stiff fine sandy clays and silty clays. The younger native alluvial soils are classified as "alluvium" on the boring logs. Native older alluvium was encountered beneath the younger native alluvial soils (at the boring locations listed above) and at the ground surface at the remaining boring locations. All of the borings were terminated within the older alluvium, and the older alluvial soils extend to at least the maximum depth explored of 50± feet below ground surface. The older alluvial soils generally consist of medium dense to very dense well- to poorly-graded silty sands with varying clay content, well-graded to poorly-graded sandy silts with varying clay content, well-graded to poorly-graded clayey sands with varying silt content, and clayey silts. Additionally, layers of very stiff to hard fine sandy clays and silty clays were encountered. The older alluvium generally possesses weak to moderate cementation, and occasionally possesses trace to extensive calcareous nodules and veining.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a depth greater than the maximum explored depth of 50± feet below existing site grades for this project.

Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located on the northeast corner of the site. Water level readings within this monitoring well indicates a groundwater level of 40± feet (March 2023) below the ground surface.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of thirty-seven (37) infiltration test borings, advanced to depths of 3 to 10½± feet below the existing site grades. The infiltration borings were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers and were logged during drilling by a member of our staff. The approximate locations of the infiltration test borings (identified as Infiltration Test Nos. I-11 through I-37) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of the infiltration borings, the bottom of each test boring was covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Native younger alluvium was encountered at the ground surface at Infiltration Test Nos. I-11, I-23, I-26 and I-39, extending to depths of 3 to 6± feet below the existing site grades. The younger alluvium generally consists of medium dense silty sands and sandy silts. Native older alluvium was encountered beneath the native younger alluvium and at the ground surface at the remaining

infiltration test locations, extending to at least the maximum depth explored of 10½± feet. The older alluvium generally consists of medium dense to very dense silty sands and sandy silts with trace to little clay content. The older alluvium occasionally possesses weak cementation. The Infiltration Boring Logs, which illustrate the conditions encountered at each of the borings, are included with this report.

Infiltration Testing

As previously mentioned, the infiltration testing was performed in general accordance with the Riverside County guidelines: Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A.

Pre-soaking

In accordance with the county infiltration standards all of the infiltration test borings were pre-soaked prior to the infiltration testing. The pre-soaking process consisted of filling the test borings by inverting a full 5-gallon bottle of clear water supported over each hole so that the water level reaches a level of at least 5 times the hole's radius above the gravel at the bottom of each hole. The pre-soaking was completed after all of the water had percolated through each test hole or after 15 hours since initiating the pre-soak. Based on the results of the pre-soaking process, 30-minute readings were utilized during all of the infiltration tests, except for Infiltration Test Nos. I-24 and I-45. For Infiltration Test Nos. I-24 and I-45, 10-minute readings were utilized during the infiltration tests.

Infiltration Testing

Following the pre-soaking process of the infiltration test borings, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of each test hole. In accordance with the Riverside County guidelines, in areas where "non-sandy soils" were encountered at the bottom of each infiltration test boring, (where 6 inches of water did not infiltrate into the surrounding soils in less than 25 minutes for two (2) consecutive readings), readings were taken at 30-minute intervals for a total of 6 hours at the test locations. At Infiltration Test Nos. I-24 and I-45, "sandy-soils" were encountered at the bottom of the test borings, (where 6 inches of water did infiltrate into the surrounding soils in less than 25 minutes for two (2) consecutive readings), therefore, readings were taken at 10-minute intervals for 1 hour at the test locations. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates from the test are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used as the design infiltration rate. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-11	4½	YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, trace Clay	0.2

I-12	4½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.2
I-13	5½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.2
I-14	7½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.2
I-15	10½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.0
I-16	9½	OLDER ALLUVIUM: Dark Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.2
I-17	10	OLDER ALLUVIUM: Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace to little Clay, trace coarse Sand	0.0
I-18	7½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace to little Clay, trace coarse Sand	0.0
I-19	3	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-20	3	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1
I-21	3½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, little coarse Sand	0.4
I-22	4½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, little coarse Sand	0.3
I-23	9	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1
I-24	9	OLDER ALLUVIUM: Brown Silty fine to coarse Sand	1.7
I-25	9	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-26	7½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.0
I-27	7	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand	0.1
I-28	5½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.0
I-29	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.0
I-30	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace Clay	0.1
I-31	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-32	6½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-33	6½	OLDER ALLUVIUM: Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace Clay	0.1
I-34	5	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-35	4½	OLDER ALLUVIUM: Light Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-36	5½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.0
I-37	6½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1

I-38	6½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1
I-39	7½	OLDER ALLUVIUM: Dark Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.0
I-40	7½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.1
I-41	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace Clay, trace coarse Sand	0.0
I-42	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace Clay, trace coarse Sand	0.0
I-43	6	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.0
I-44	4½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1
I-45	5	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.8
I-46	5½	OLDER ALLUVIUM: Brown Silty fine to medium Sand, little Clay, trace coarse Sand	0.1
I-47	7	OLDER ALLUVIUM: Brown fine to medium Sandy Silt, little Clay	0.1

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the bottom of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 through C-37 of this report.

Design Recommendations

Thirty-seven (37) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range between 0.0 and 1.7 inches per hour. The major factors affecting the lack of infiltration at these locations are the presence of very dense older alluvium with high contents of fine-grained soil. **Based on these conditions and the results of infiltration testing we recommend the following design infiltration rates to be utilized for the proposed infiltration systems:**

Infiltration System(s)	Infiltration Test Nos.	Infiltration Test Depth (ft)	Infiltration System Type	Infiltration System Location	Design Infiltration Rate (inches/hour)
"A"	I-11	4½	Bio-Retention Basin	West	Not Recommended
"B"	I-12	4½	Bio-Retention Basin	West	Not Recommended
"C"	I-13	5½	Below-Grade Chamber	West	Not Recommended
"D"	I-14	7½	Below-Grade Chamber	Northwest	Not Recommended
"E"	I-15 through I-17	9½ to 10½	Bio-Retention Basin	North	Not Recommended
"F"	I-18	7½	Below-Grade Chamber	North	Not Recommended
"G"	I-19 through I-22	3 to 4½	Bio-Retention Basin	South	Not Recommended
"H"	I-23, I-24	9	Bio-Retention Basin	South	Not Recommended
"I" & "J"	I-25 through I-33	5½ to 9	Bio-Retention Basin	Northeast	Not Recommended
"K"	I-34 through I-36	4½ to 5½	Below-Grade Chamber	Southeast	Not Recommended
"L"	I-37	6½	Below-Grade Chamber	Southeast	Not Recommended
"M"	I-38, I-39	6½ to 7½	Below-Grade Chamber	Southeast	Not Recommended
"N"	I-40	7½	Below-Grade Chamber	Northeast	Not Recommended
"O"	I-41	6	Below-Grade Chamber	Northeast	Not Recommended
"P"	I-42	6	Below-Grade Chamber	Northeast	Not Recommended
"Q"	I-43	6	Below-Grade Chamber	Northeast	Not Recommended
"R"	I-44	4½	Below-Grade Chamber	Northeast	Not Recommended*
"S"	I-45	5	Below-Grade Chamber	Northeast	Not Recommended
"T"	I-46	5½	Below-Grade Chamber	Northeast	Not Recommended
"U"	I-47	7	Below-Grade Chamber	Northeast	Not Recommended

*Although the test results indicate an infiltration rate of 0.8 in/hr at this location, the subsurface soil profile at this site includes many soil layers with low permeability. Soil layers with some capacity for infiltration, such as the silty sand layer encountered at Infiltration test-location I-44, are generally interbedded between low permeability soil layers, based on our review of the boring logs for the overall site. Therefore, long-term infiltration is not considered to feasible.

Although infiltration is not considered feasible, the client may desire to use storm water disposal systems that do not rely on infiltration at this site. The design of the proposed storm water

disposal systems should be performed by the project civil engineer, in accordance with the City of Perris, and/or County of Riverside guidelines. However, it is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system.

Infiltration Rate Considerations

The infiltration rates presented herein were determined in accordance with the Riverside County guidelines and are considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **Any proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically

apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

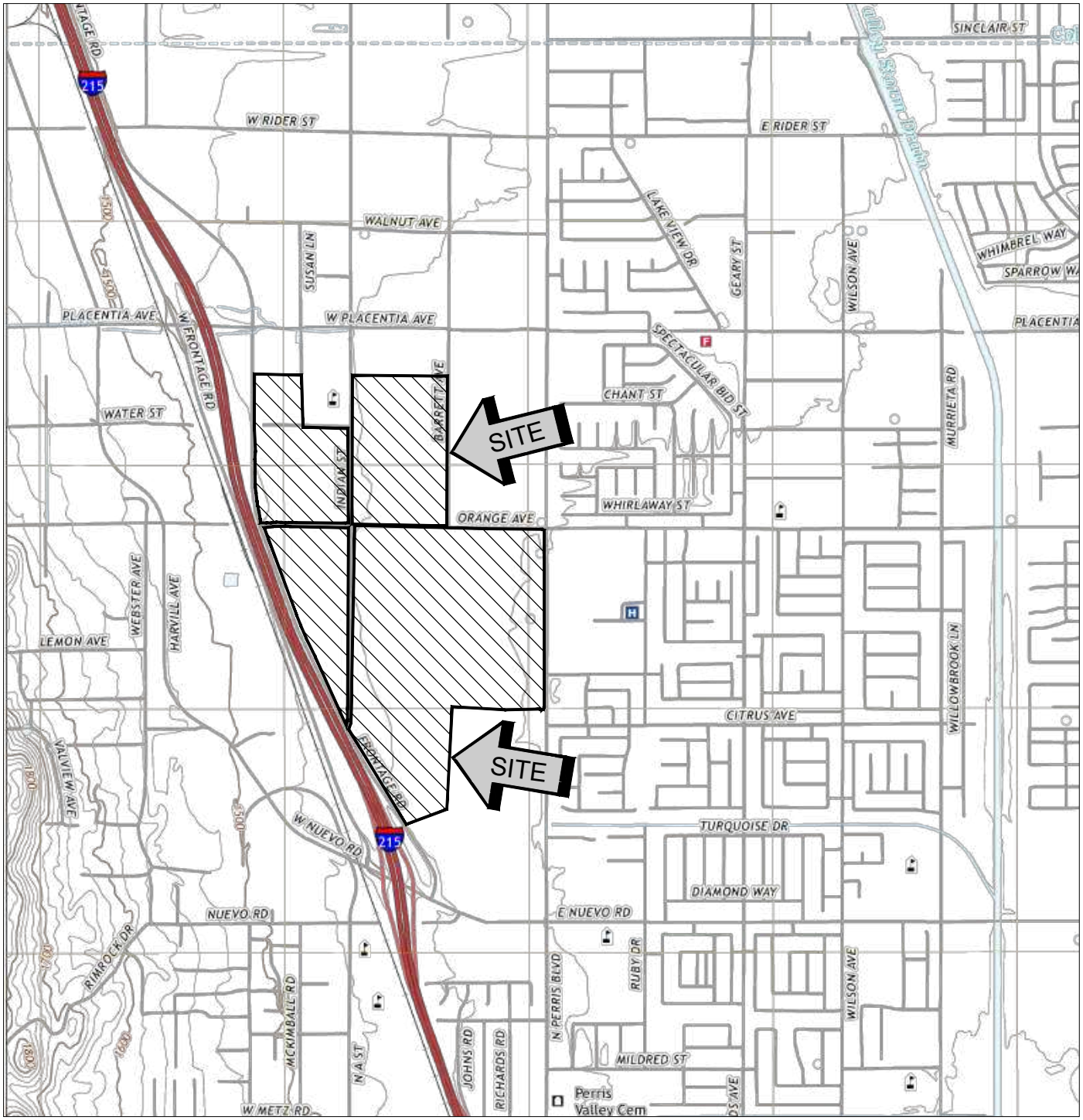
Ryan Bremer
Staff Geologist

Daniel W. Nielsen, GE 3166
Senior Engineer



Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (39 pages)
Infiltration Test Results Spreadsheets (37 pages)
Grain Size Distribution Graphs (37 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2021

SITE LOCATION MAP

HARVEST LANDING INDUSTRIAL DEVELOPMENT

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: RB CHKD: RGT	
SCG PROJECT 22G183-4	
PLATE 1	

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- CONCURRENT BORING LOCATION (SCG PROJECT NO. 22G183-3)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 22G183-1)
- PREVIOUS INFILTRATION LOCATION (SCG PROJECT NO. 22G183-2)
- PREVIOUS INFILTRATION LOCATION (SCG PROJECT NO. 22G183-2)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 22G183-2)
- PROPOSED BUILDING
- PROPOSED INFILTRATION SYSTEM LOCATION
- EXISTING STRUCTURE

NOTE: CONCEPTUAL GRADING PLAN PREPARED BY FMCIVIL ENGINEERING.

22885 Savi Ranch Parkway
Suite E
Yorba Linda, CA 92887
Phone: (714) 685-1115
Fax: (714) 685-1118
www.socalgeo.com

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

NORTH
SoCalGeo

SCALE: 1" = 200'
DRAWN: RB
CHKD: RGT
SCG PROJECT 22G183-4

INFILTRATION TEST LOCATION PLAN

HARVEST LANDING INDUSTRIAL DEVELOPMENT
PERRIS, CALIFORNIA

PLATE 2

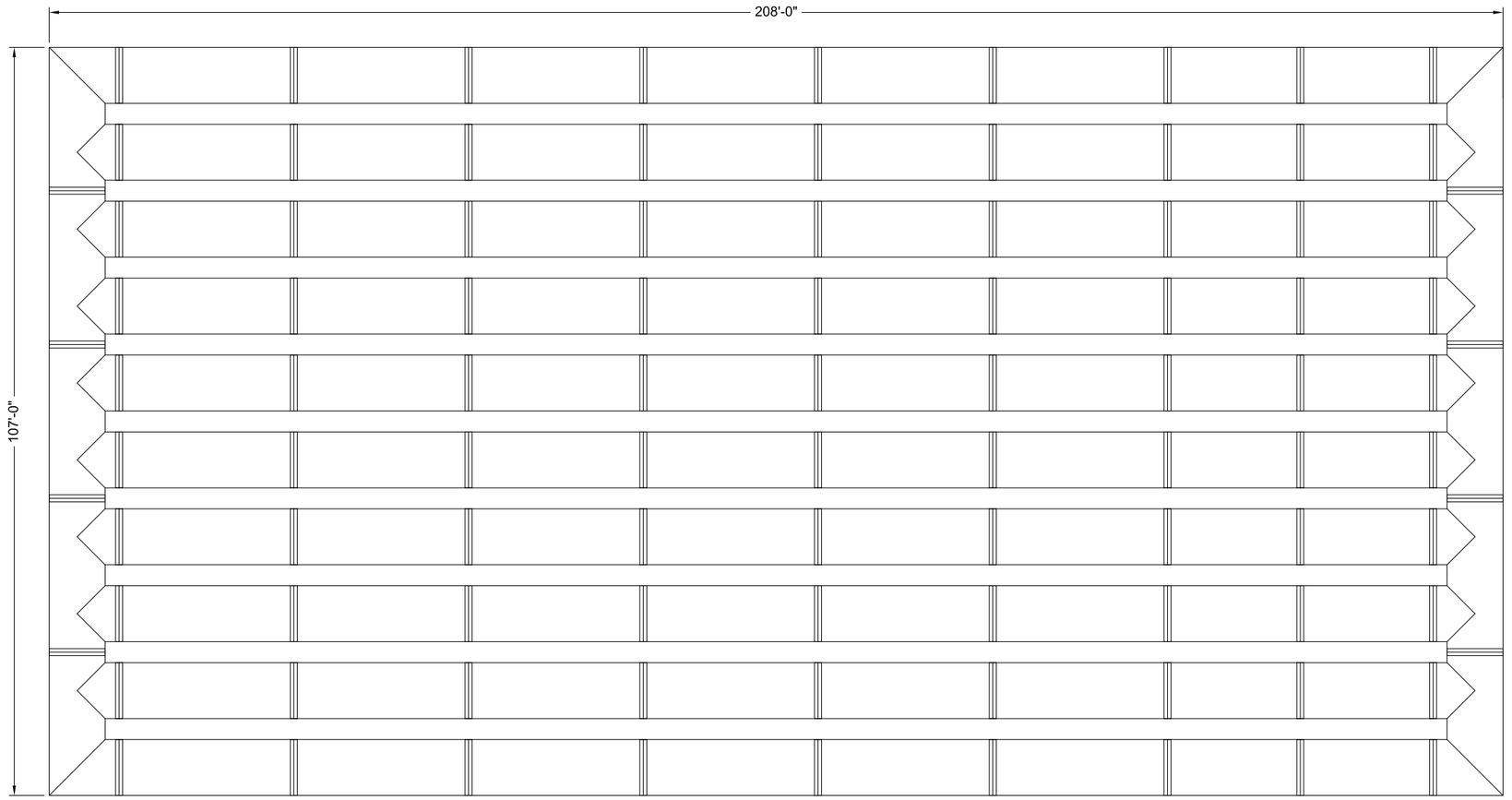
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 2,134 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 107,267 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 107,267 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

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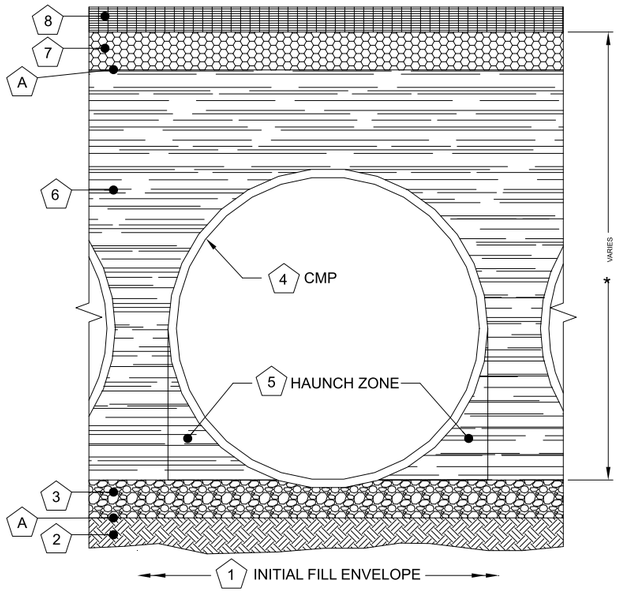
DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36317 20-001 Harvest Landing Retail Center and Business Park
Retail System - Northerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24648	36317	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



	DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

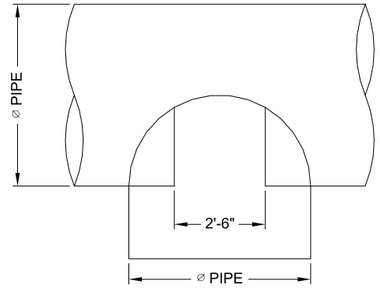
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

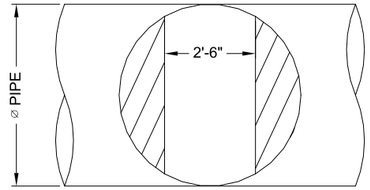
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

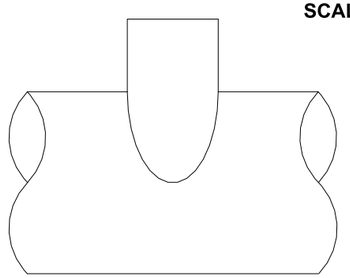


FRONT

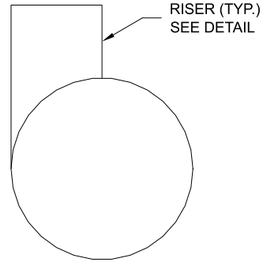
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

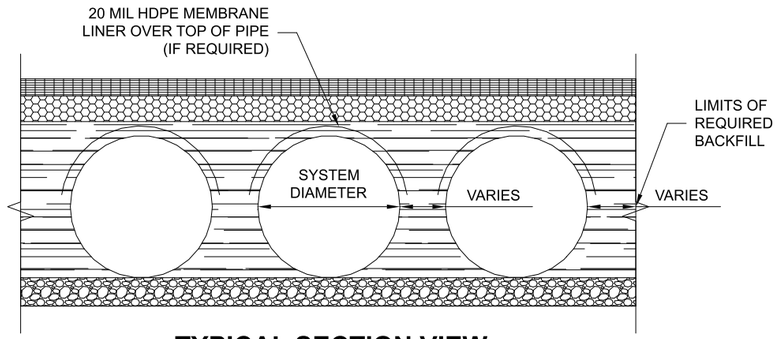


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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DATE	REVISION DESCRIPTION	BY

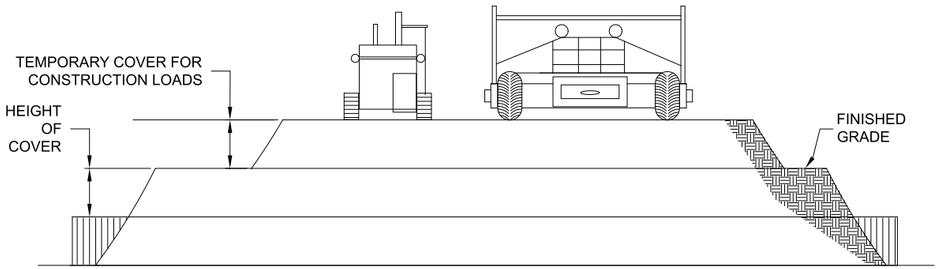
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CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36317 20-001 Harvest Landing Retail Center and Business Park
Retail System - Northerly Chambers
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DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24648	36317	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
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SHEET NO.: 1		

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CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

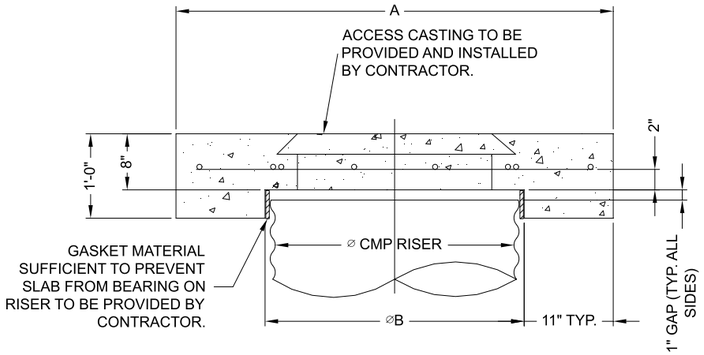
ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

REQUIREMENTS INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

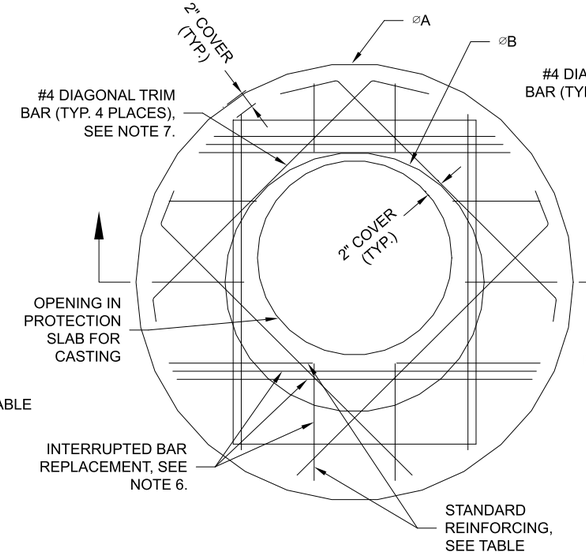
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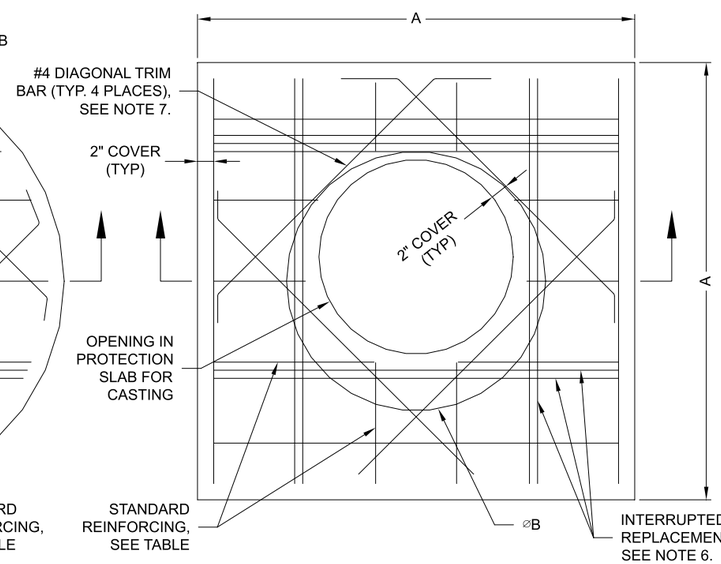
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36317 20-001 Harvest Landing Retail Center and Business Park
Retail System - Northerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24648	36317	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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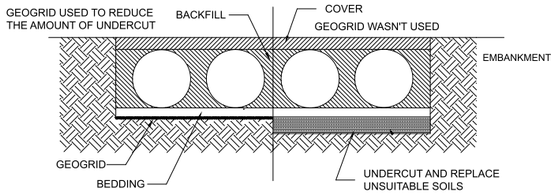
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

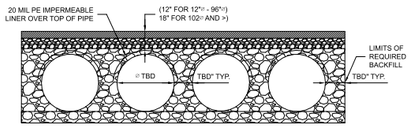


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

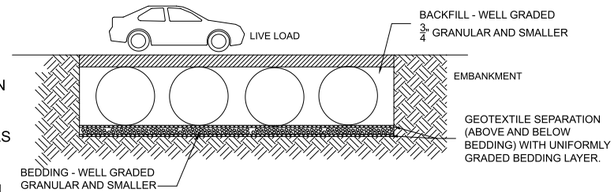
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

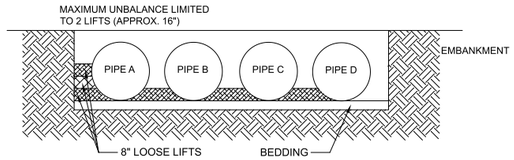
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



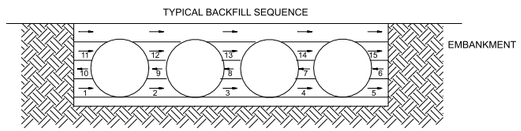
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

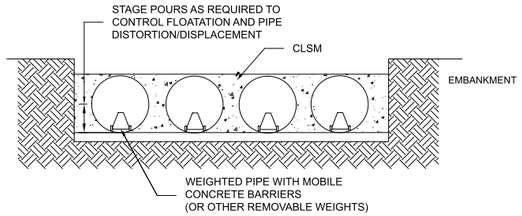


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

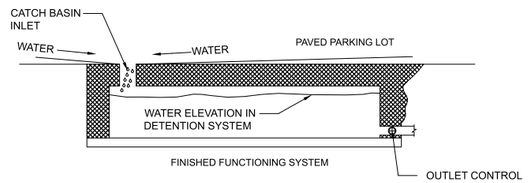


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO36317 20-001 Harvest Landing Retail Center and Business Park
Retail System - Northerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24648	36317	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

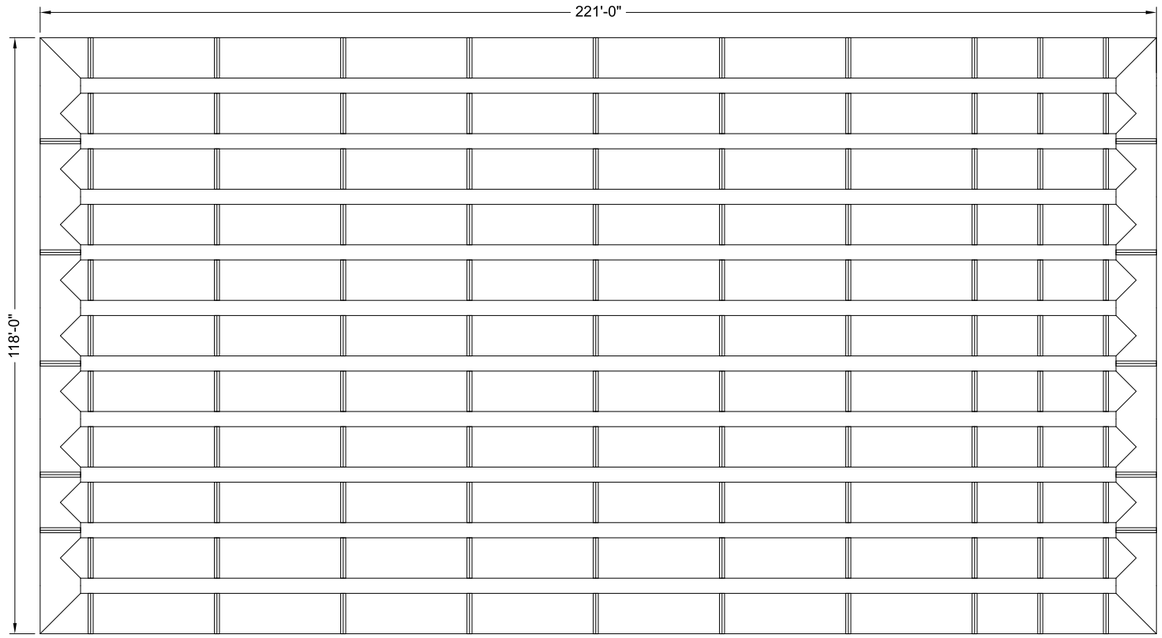
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 2,491 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 125,211 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 125,211 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY

SCALE: 1" = 30'

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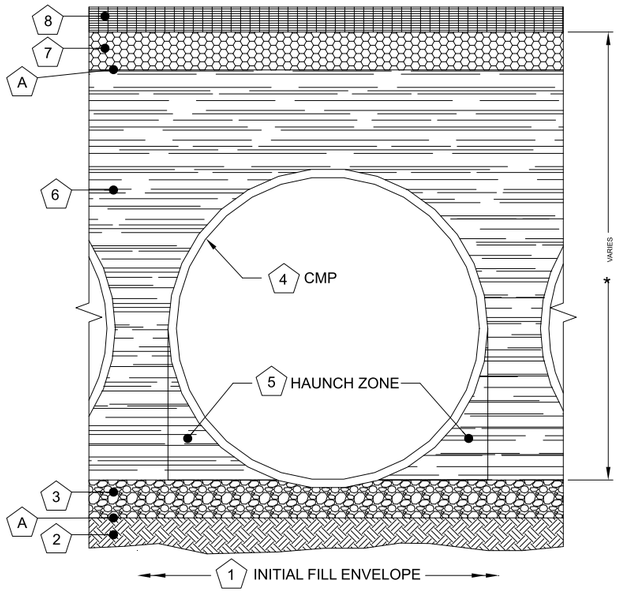
DATE	REVISION DESCRIPTION	BY

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CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36322 20-001 Harvest Landing Retail Center and Business Park
Retail System - Southerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24651	36322	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



	DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

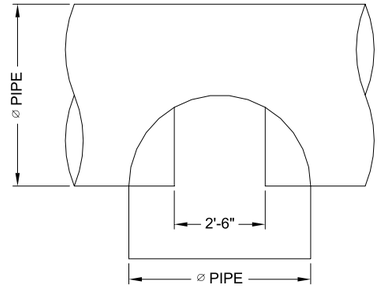
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

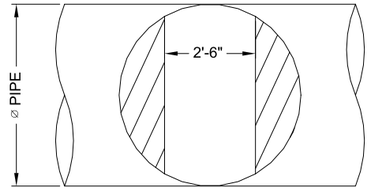
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

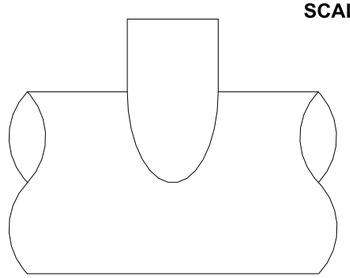


FRONT

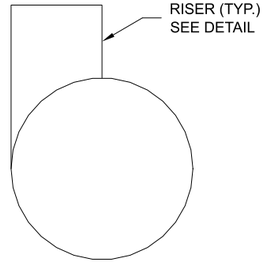
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

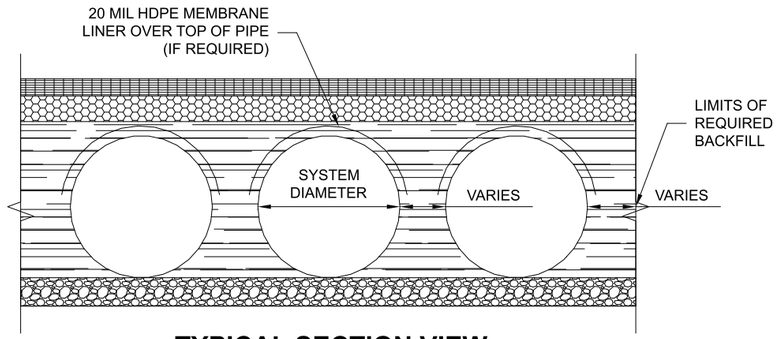


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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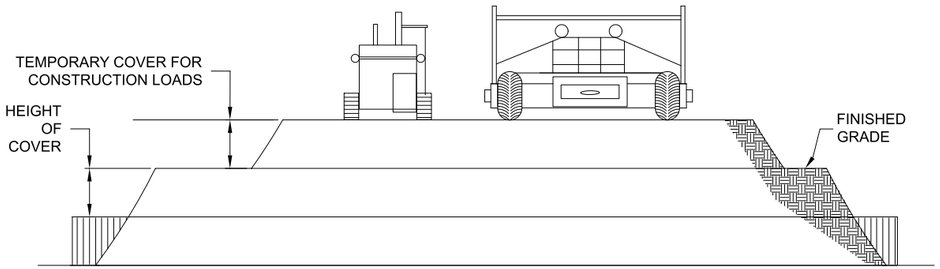
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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36322 20-001 Harvest Landing Retail Center and Business Park
Retail System - Southerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24651	36322	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

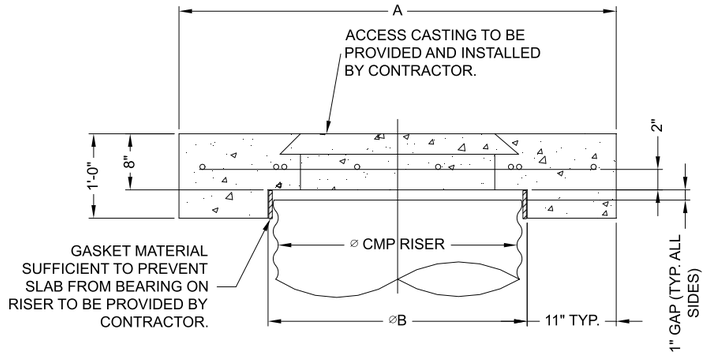
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

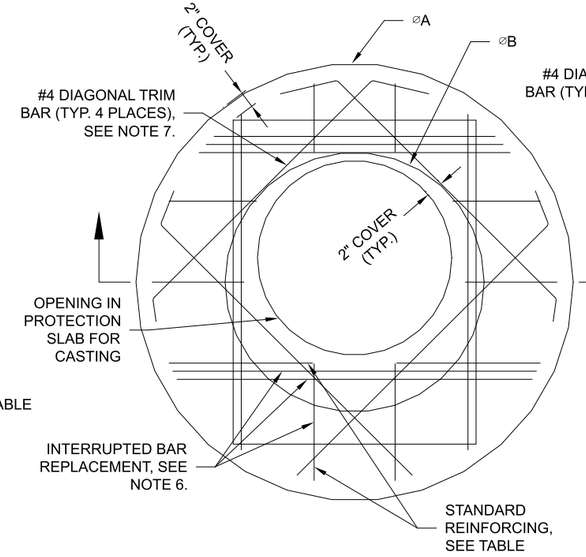
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



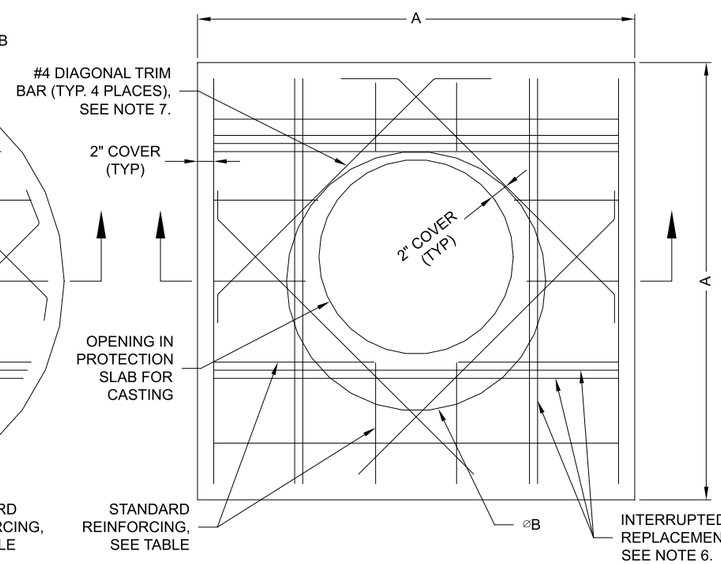
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO36322 20-001 Harvest Landing Retail Center and Business Park
Retail System - Southerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24651	36322	9/26/2023
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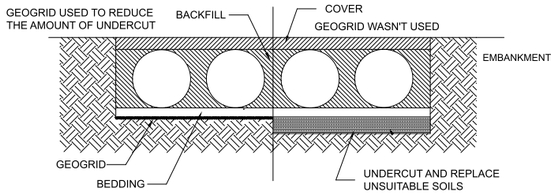
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

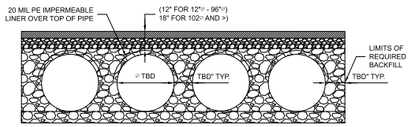


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

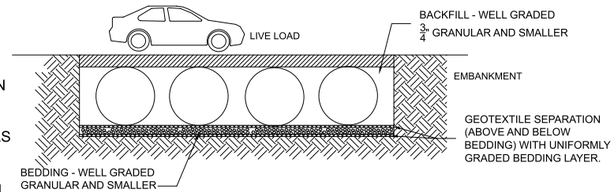
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

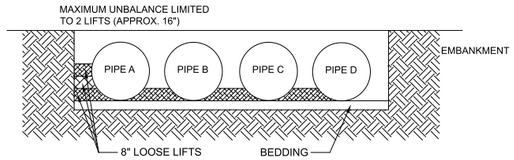
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



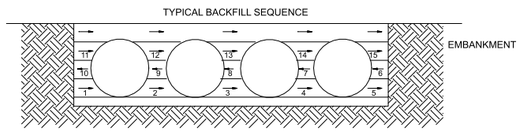
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

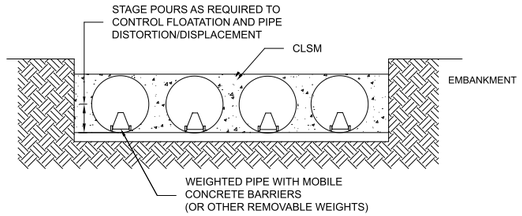


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

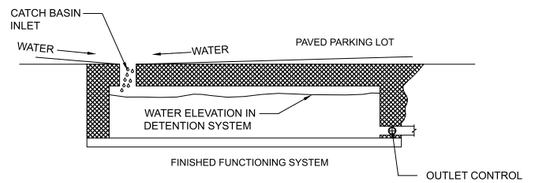


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO36322 20-001 Harvest Landing Retail Center and Business Park
Retail System - Southerly Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
24651	36322	9/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	FMCivil Engineers Inc	Date	10/5/2023
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 6		

BMP Identification

BMP NAME / ID: Offsite Sub-Regional Basin

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.60 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
6-1A	*249651.8*	*Roofs*	*1*	*0.89*	*222689.4*			
6-1B	*96768.42*	*Ornamental Landscaping*	*0.1*	*0.11*	*10688.8*			
6-1C	*624387.67*	*Concrete or Asphalt*	*1*	*0.89*	*556953.8*			

LINE A-C

LAT. H-10.1

H-10.1

AT. H-10

H-10

K-20

LAT. J-9

J-9

J-9.2

LAT. J-9.2

LAT. J-9.1

J-9.1

J-9

542-AC

552-AC

LAT. J-7.1

J-7.1

LAT. J-7

LAT. J-7

J-7

LAT. J-8

670-AC

J-8

LAT. P-5

P-5

P-4

PORTION OF
8K3
1" = 1000'

TOPEKA

H

H-1

LAT. H-1

H-2

LAT. H-2

LAT.

LINE H

H-3

LAT. H-3

K-24

AT. K-24

K-21

K-22

Water Tank

K-23

LAT. K-23

LAT. K-22

LAT. K-21

K-14

LAT. K-14

K-6

LAT. K-6

LAT. K-20

K-19

LAT. K-19

K-16

LAT. K-16

K-18

LAT. K-18

K-17

LAT. K-17

K-15

LAT. K-15

K-13

LAT. K-13

K-3

LAT. K-3

K

LINE K

J-1

LAT. J-1

J-2

LAT. J-2

J-3

LAT. J-3

J

LINE J

J-5

LAT. J-5

J-4

LAT. J-4

J-6

LAT. J-6

A-D

LINE A-D

A-E

LINE A-E

A-F

LINE A-F

A-G

LINE A-G

L-1

LAT. L-1

L

LINE L

REDLANDS BLVD.

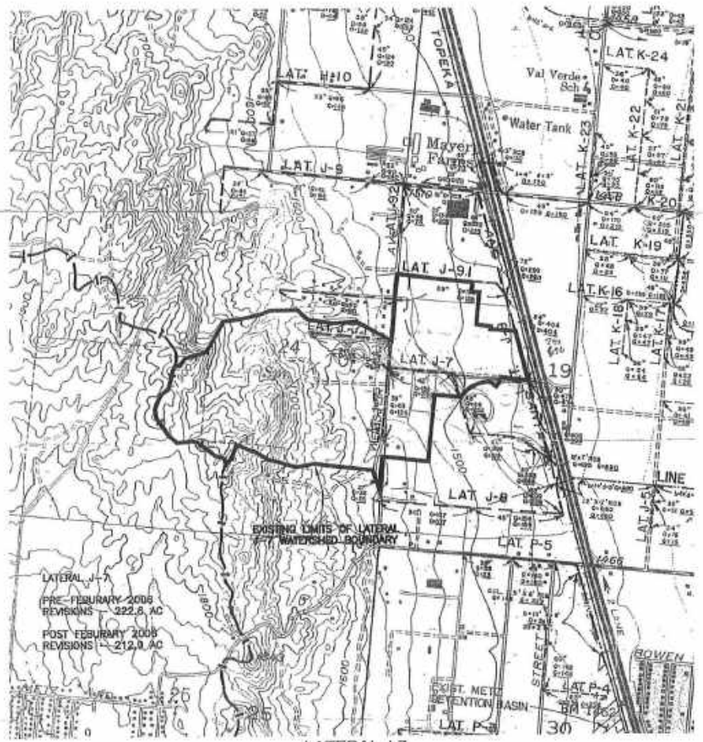
PVSD

M-1

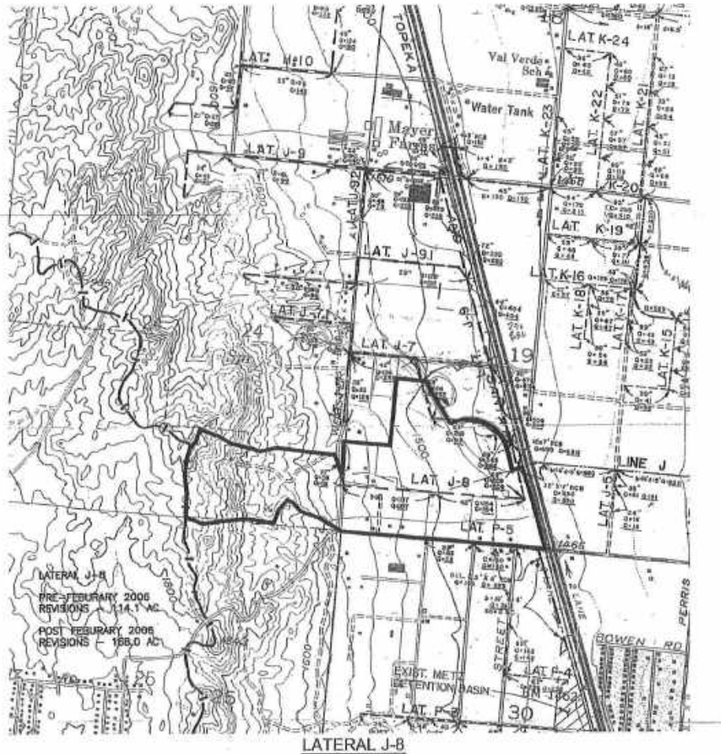
BROWN RD.

REVISED HYDROLOGY MAP
PERRIS MASTER DRAINAGE PLAN

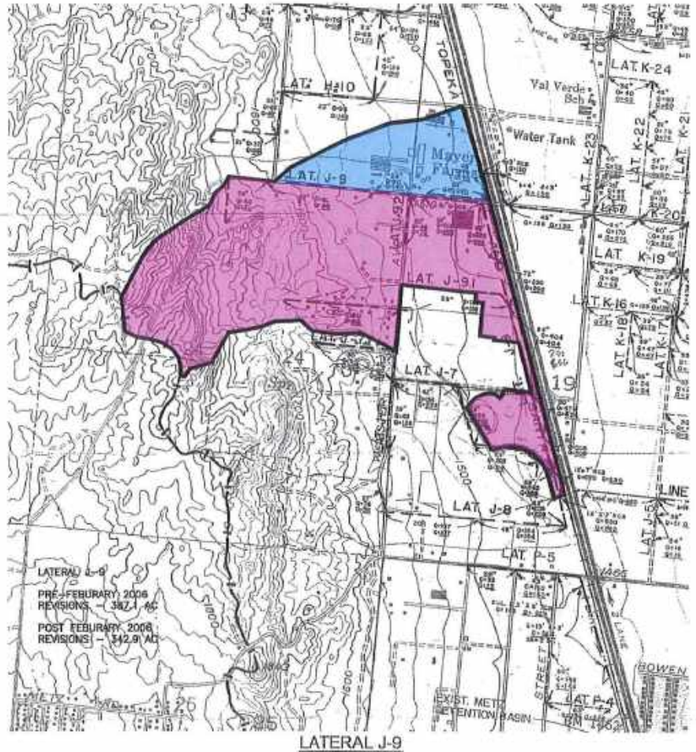
LATERALS J-7, J-8, & J-9



LATERAL J-7



LATERAL J-8



LATERAL J-9

LATERAL No.	PRE-FEBURARY 2006 REVISIONS	POST FEBURARY 2006 REVISIONS	INCREASE/DECREASE (ACRES)
LAT J-8	114.1	168.0	+53.9
LAT J-9	609.8	555.9	-53.9

LEGEND

PROPOSED LATERAL, WATERSHED BOUNDARIES AFTER FEBRUARY 2006 REVISION

N

SCALE: 1"=1000'

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

DATE	BY	MARK	REVISIONS	APPR	DATE
			COUNTY		
	ENGINEER				

SEAL—COUNTY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

ALAN D. FRENCH, P.E.
CIVIL ENGINEER, R.C.E. NO. 45702 — DATE

RECOMMENDED — DATE

SEAL—ENGINEER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL — APPROVED BY:

PLANNING ENGINEER — CHIEF ENGINEER

DATE: — DATE:

ENGINEERING SOLUTIONS
ENGINEERING LAND PLANNING SURVEYING MAPPING
3185 CHICAGO AVENUE, STE. 101
RIVERSIDE, CA. 92507
PHONE - (951) 784-0288
FAX - (951) 784-0287

PREPARED BY:

DATE
EXP. 06-30-07

BENCHMARK:

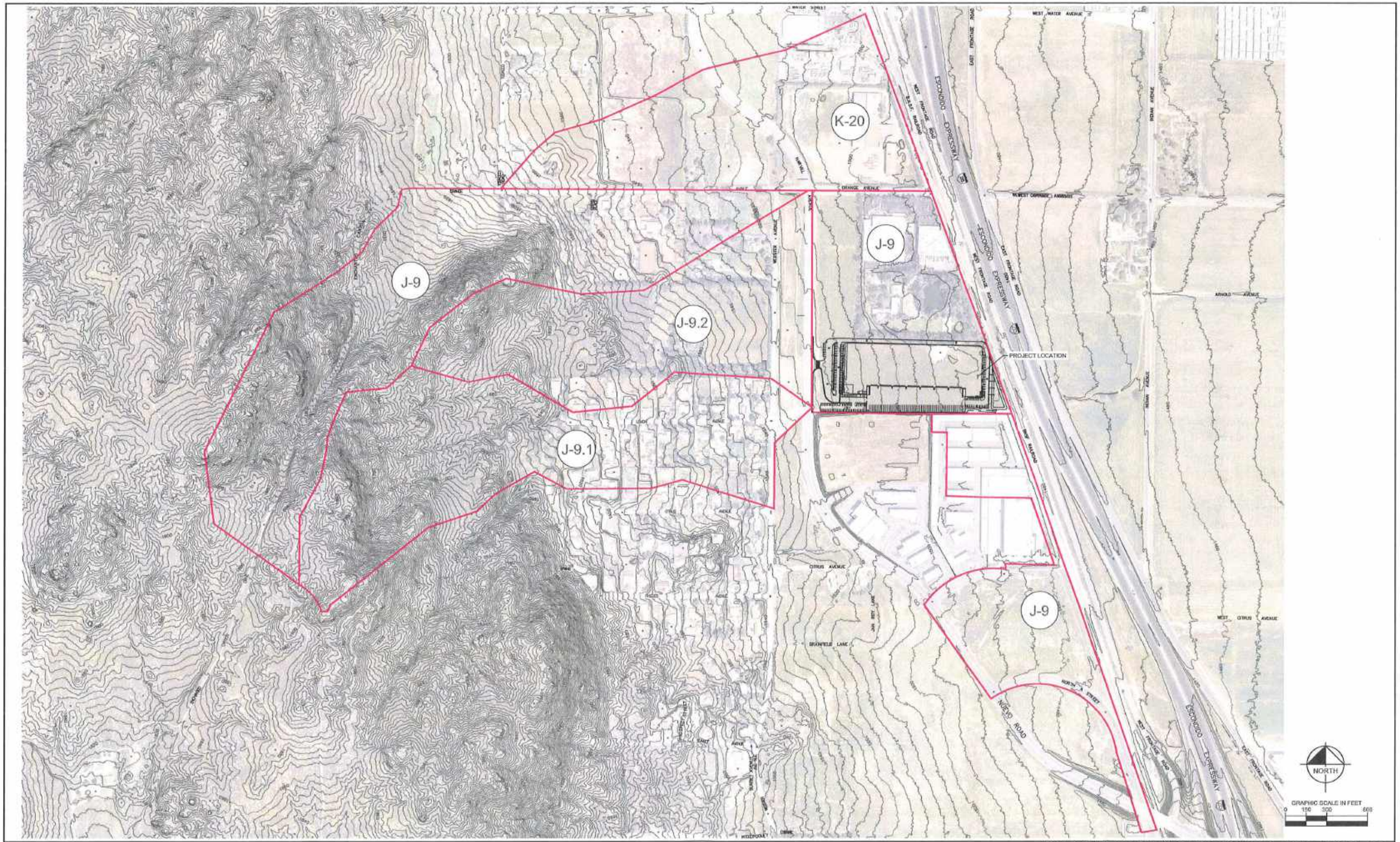
SCALE:

L.P. No. XXXXX
COUNTY OF RIVERSIDE
REVISED HYDROLOGY MAP
PERRIS MASTER DRAINAGE PLAN
LATERALS J-7, J-8, & J-9

SHEET NO. 1 OF 1 SHTS.

FOR: | W.O. | COUNTY FILE NO.:

B:\CAD\Nuevo Industrial Park - NV\PE\ExhibitsNV\P Perris MDP Hydrology map lat 7 and lat 8.dwg, 2/2/2007 1:10:03 PM, Donal Pearce



Kimley»Horn

RCFC MDP DRAINAGE AREA MAP LINE J-9
ROCKEFELLER HARVILL INDUSTRIAL PARK
October 9, 2020

k:\sd_ldev\rockefeller - riverside_harvill\lb\rcfc\2020.10.09 - mdp letter\2020.10.09 - mdp drainage area.dwg 10/9/2020

EXHIBITS

EXHIBIT A: VICINITY MAP

EXHIBIT B: EXISTING HYDROLOGY MAP

EXHIBIT C: EXISTING HYDROLOGY MAP - OFFSITE

EXHIBIT D: PROPOSED HYDROLOGY MAP

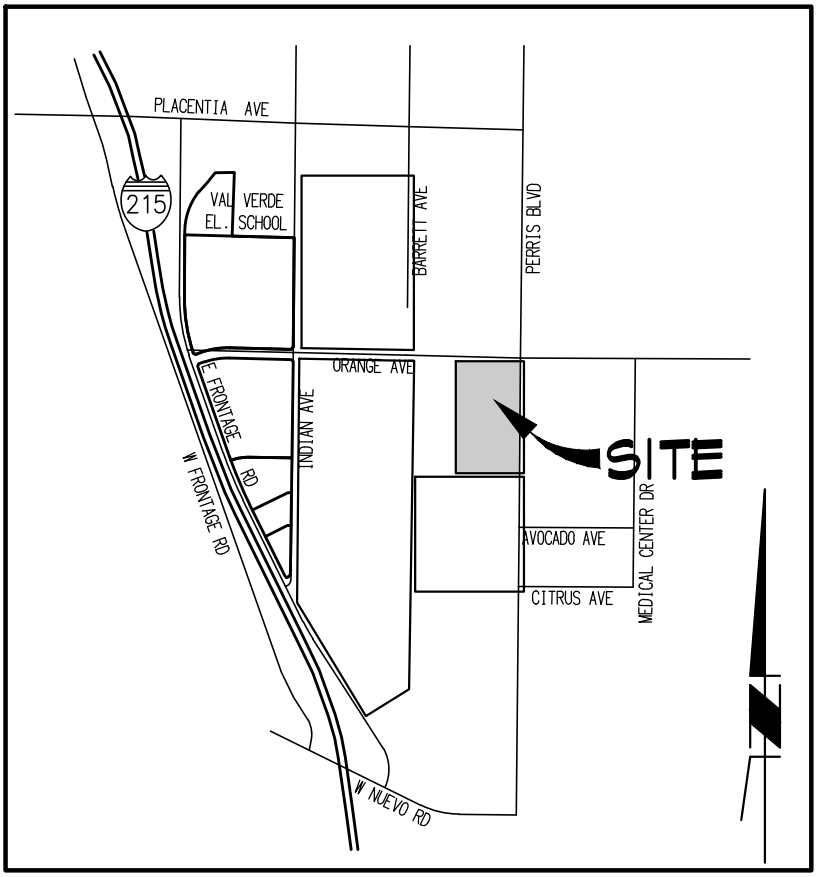
EXHIBIT E: PROPOSED HYDROLOGY MAP - OFFSITE

EXHIBIT F: HYDROLOGIC SOILS GROUP MAP

EXHIBIT G: RCFCD MDP FACILITIES OVERLAY

EXHIBIT H: PHASE 1 OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM

EXHIBIT I: CONCEPTUAL GRADING



VICINITY MAP

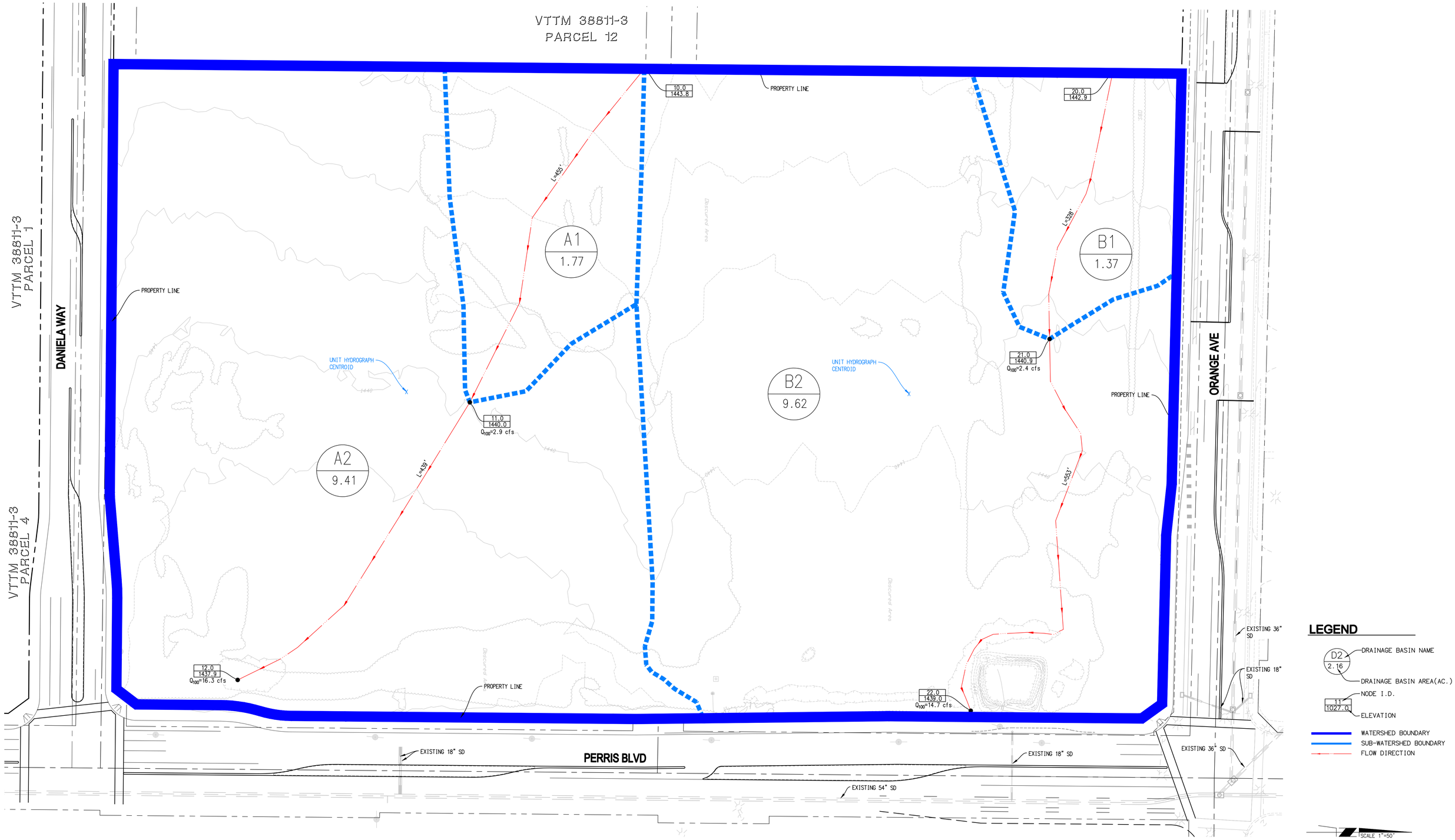
T4S, R3W, SEC 19
NOT TO SCALE

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29995 TECHNOLOGY DRIVE, SUITE 306 | MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

HARVEST LANDING SITE 1

FIGURE 1
VICINITY MAP

H:\PDATA\20-001 HARVEST LANDING\DWGS\EXHIBITS\20-001-VICINITY-MAP.DWG DANNY 10/11/2023 11:28 AM



UNIT HYDROGRAPH PARAMETERS - AREA A			
L_{MC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
894	600	5.90	0.02

UNIT HYDROGRAPH PARAMETERS - AREA B			
L_{MC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
881	483	3.90	0.02

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HARVEST LANDING

VTTM 38811-3, PARCELS 5-11 - EXISTING DRAINAGE

VTTM 38811-2
PARCEL 1

VTTM 38811-3
PARCEL J

BARRETT AVE

DANIELA WAY

ORANGE AVE

PROPERTY LINE

PROPERTY LINE

PROPERTY LINE

PROPERTY LINE

C1
6.36

C2
6.55

L=519'

L=496'

40.0
1449.3

41.0
1443.2
Q_{100}=11.0 cfs

42.0
1443.0
Q_{100}=11.1 cfs

VTTM 38811-3
PARCEL 5

VTTM 38811-3
PARCEL 6

VTTM 38811-3
PARCEL 5

LEGEND

D2
2.16
DRAINAGE BASIN NAME
DRAINAGE BASIN AREA(AC.)

11
1027.0
NODE I.D.
ELEVATION

WATERSHED BOUNDARY
SUB-WATERSHED BOUNDARY
FLOW DIRECTION

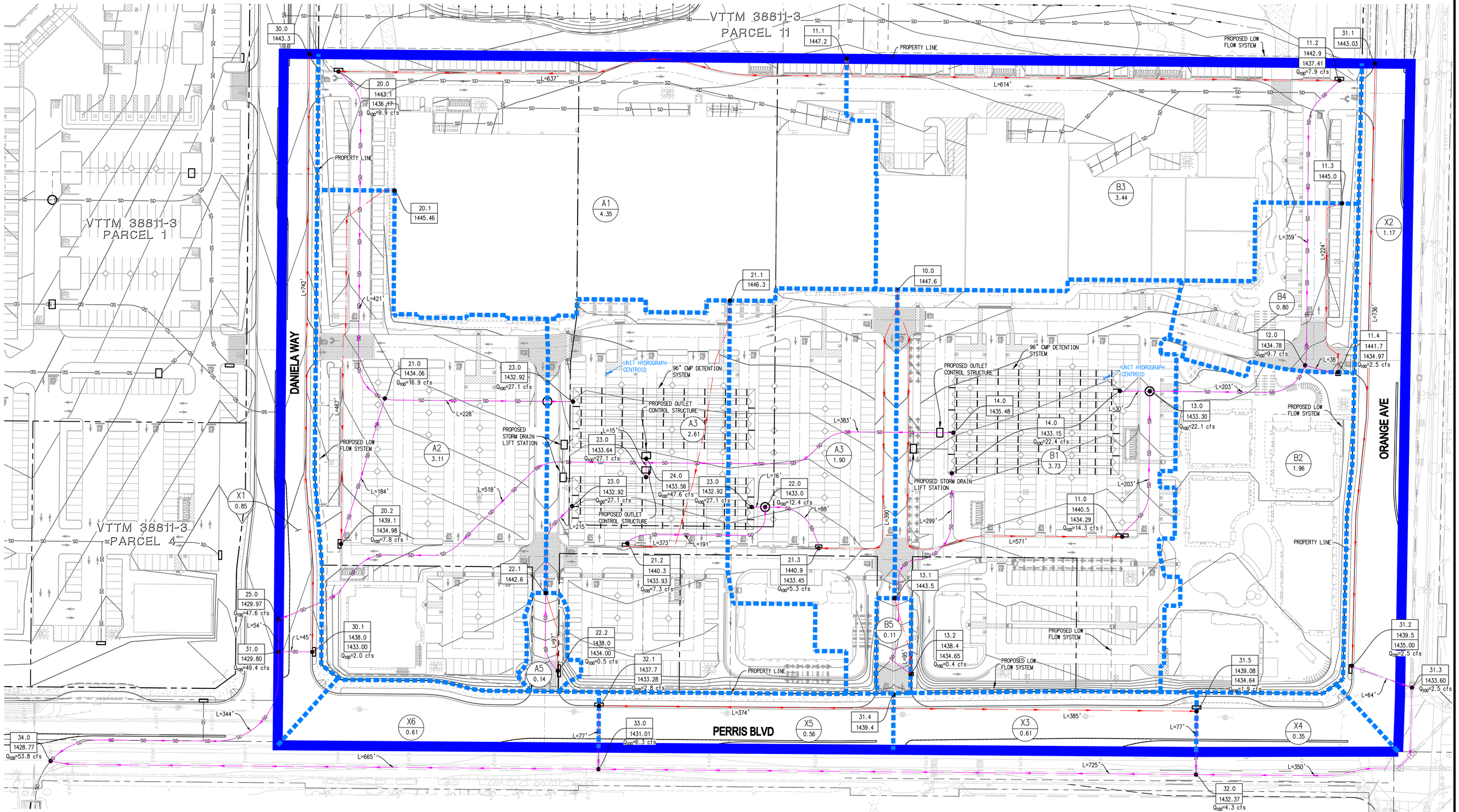
SCALE 1"=50'

50 25 0 50 100 150
SCALE: 1"=50'

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HARVEST LANDING

VTTM 38811-3, PARCEL 12 - EXISTING DRAINAGE



UNIT HYDROGRAPH PARAMETERS - AREA A			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
1,286	1,036	14.28	0.015

UNIT HYDROGRAPH PARAMETERS - AREA B			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
1,196	993	14.05	0.015

LEGEND

- D2 / 2.16 — DRAINAGE BASIN NAME / DRAINAGE BASIN AREA(AC.)
- 11 / 1027.0 — NODE I.D. / ELEVATION
- WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- FLOW DIRECTION
- PIPE FLOW DIRECTION

SCALE 1"=50'

50 25 0 50 100 150

SCALE: 1"=50'

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HARVEST LANDING

VTTM 38811-3, PARCELS 5-10 - PROPOSED DRAINAGE

VTTM 38811-2
PARCEL 1

VTTM 38811-3
PARCEL 1

VTTM 38811-2
PARCEL 5

VTTM 38811-2
PARCEL 6

VTTM 38811-2
PARCEL 5

BARRETT AVE

DANIELA WAY

ORANGE AVE

PROPERTY LINE

C1 3.07

C2 3.27

C3 4.49

C4 2.08

42.1 | 1450.5

41.1 | 1451.4

40.0 | 1451.2

42.2 | 1442.0 | 1434.28
Q_{100}=8.5 cfs

43.0 | 1433.23
Q_{100}=14.2 cfs

42.0 | 1437.11
Q_{100}=6.7 cfs

41.2 | 1442.9 | 1437.66
Q_{100}=3.8 cfs

41.0 | 1443.0 | 1438.12
Q_{100}=3.3 cfs

96" CMP DETENTION SYSTEM

STORM DRAIN LIFT STATION

PROP LOW FLOW SYSTEM

PROPERTY LINE

L=110'

L=776'

L=30'

L=202'

L=393'

L=445'

LEGEND

- D2 / 2.16 — DRAINAGE BASIN NAME / DRAINAGE BASIN AREA(AC.)
- 11 / 1027.0 — NODE I.D. / ELEVATION
- WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- FLOW DIRECTION
- PIPE FLOW DIRECTION

SCALE 1"=50'

50 25 0 50 100 150

SCALE: 1"=50'

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HARVEST LANDING

VTTM 38811-3, PARCELS 12 - PROPOSED DRAINAGE



LEGEND

- VTTM 3881-3, PARCELS 5-11 SITE BOUNDARY
- HYDROLOGIC SOIL B
- HYDROLOGIC SOIL C
- HYDROLOGIC SOIL D

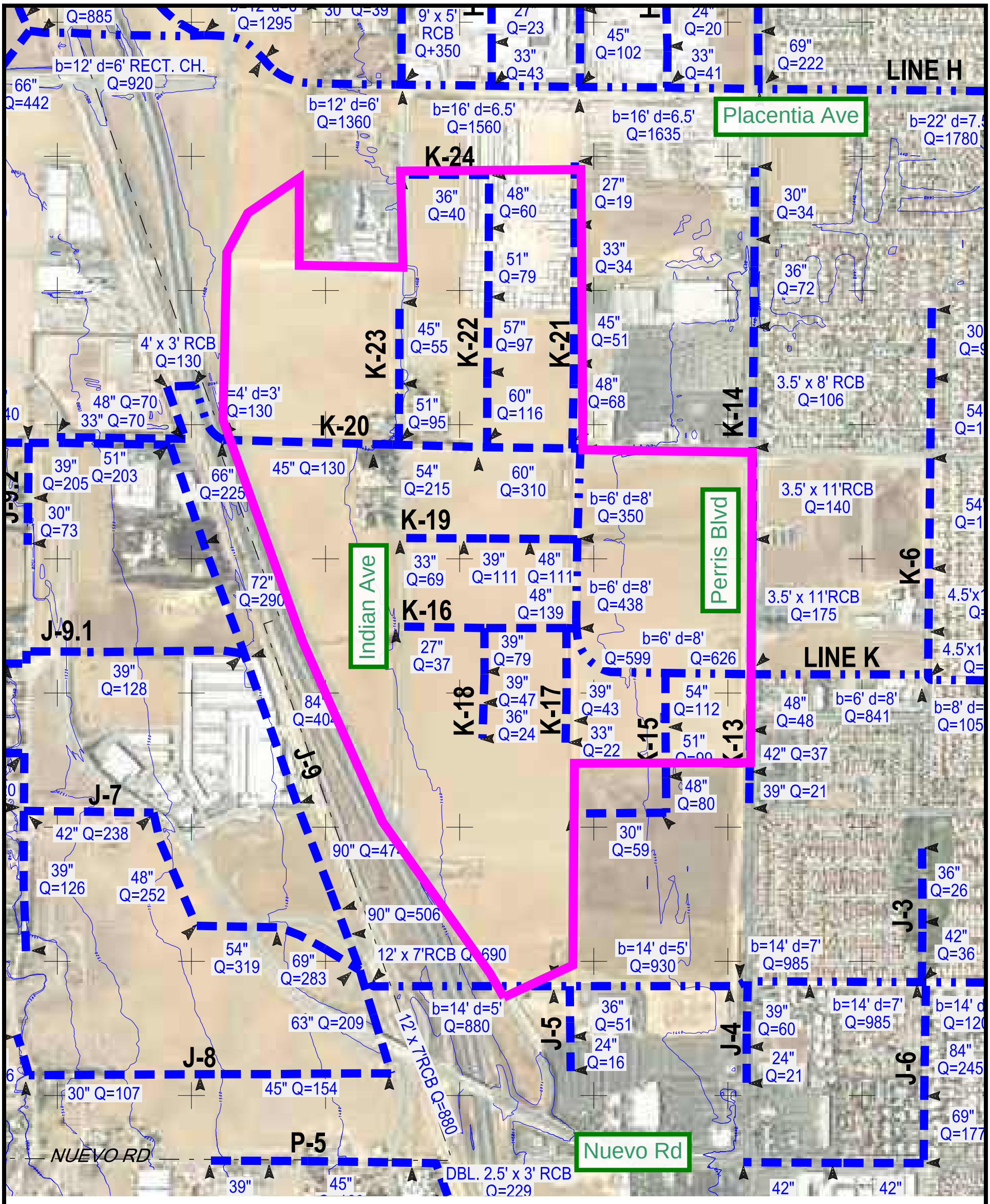
0 250 500 ft

FMCIVIL ENGINEERS INC.

Source: USDA Web Soil Survey

HARVEST LANDING

VTTM 38811-3, PARCELS 5-11 - HYDROLOGICAL SOIL GROUPS



N.T.S.

Site Boundary

MDP Facilities

Perris Harvest Landing MDP Exhibit

FMCIVIL ENGINEERS INC.

IN THE CITY OF PERRIS,
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

HARVEST LANDING INDUSTRIAL - PHASE I
OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM





VICINITY MAP

T4S, R3W, SEC 19
NOT TO SCALE

APPLICANT/OWNER

HOWARD INDUSTRIAL PARTNERS
1944 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92865
CONTACT: TIM HOWARD
(TEL)714-769-9155

ENGINEER

FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA, CA 92563
CONTACT: FRANCISCO MARTINEZ
(TEL)951-331-9813

ARCHITECT

AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92866
CONTACT: STEPHEN PRZYBYLOWSKI
(TEL)714-639-9860

LEGEND

- RIGHT OF WAY
- (1025) EXISTING CONTOUR
- EASEMENT
- SD PROP. ONSITE STORM DRAIN SYSTEM
- SD PROP. OFFSITE STORM DRAIN SYSTEM
- PROP. STORM DRAIN LOW FLOW SYSTEM
- PROP. STORM DRAIN UNDER DRAIN SYSTEM
- W EXISTING WATER LINE
- W PROP. WATER LINE
- SS EXISTING SWR LINE
- SS PROP. SEWER LINE
- SD EXISTING STORM DRAIN PIPE
- E EXISTING OVERHEAD LINES

SCALE 1"=200'

200 100 0 200 400 600

SCALE: 1"=200'

CITY OF PERRIS

HARVEST LANDING INDUSTRIAL - PHASE I
OFFSITE MASTER STORM DRAIN
& LOW FLOW SYSTEM EXHIBIT

SCALE:	AS SHOWN
DATE:	OCT. 2024
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

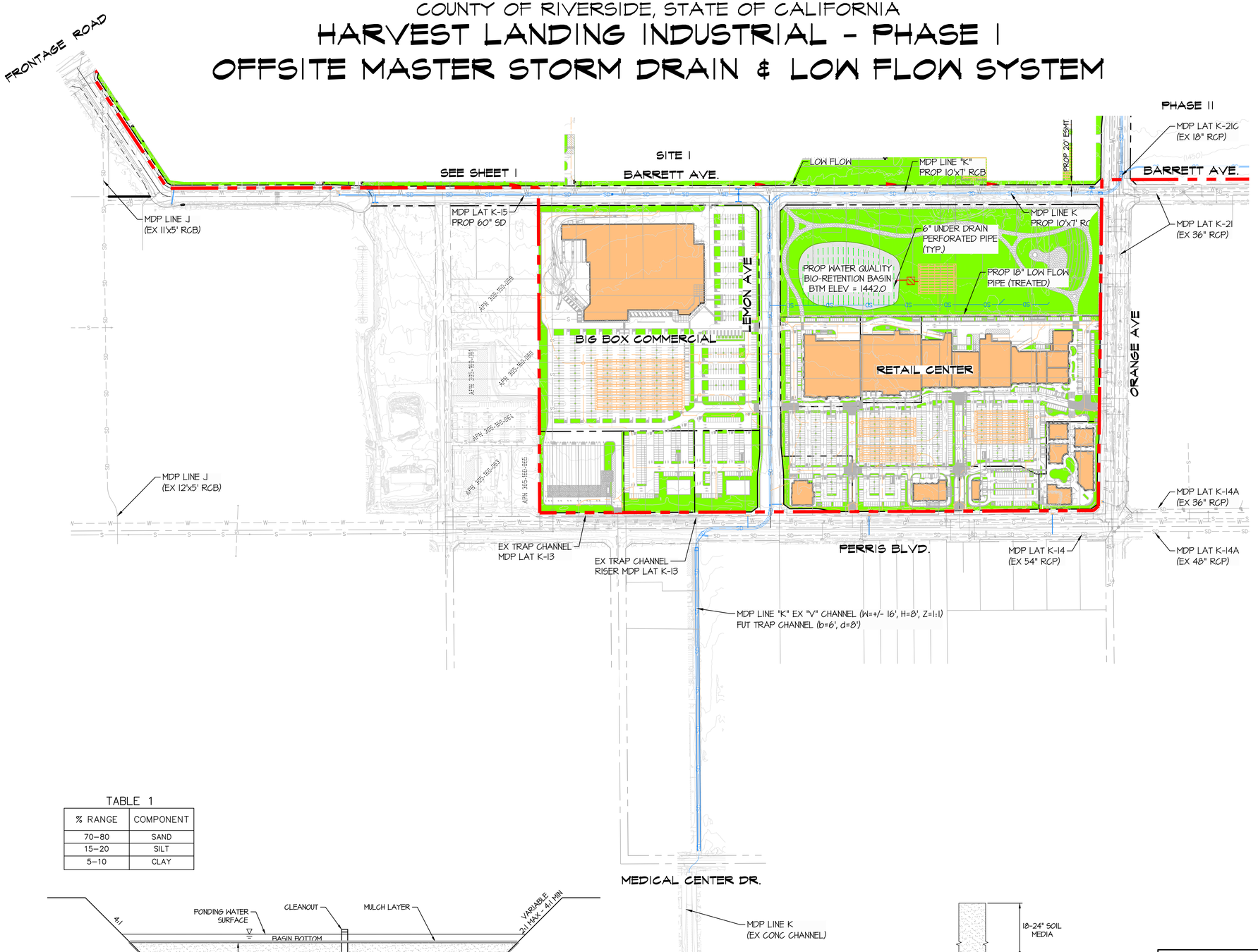
FMCIVIL ENGINEERS INC.
41870 KALMIA STREET, SUITE 120
MURRIETA | CA 92562
951.473.0202 - FMCIVIL.COM

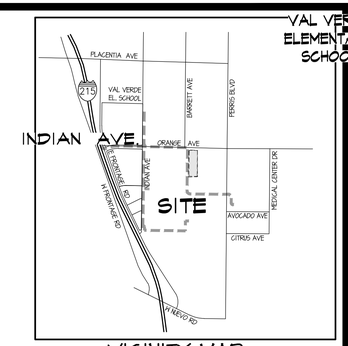
SHEET 1 OF 2 SHEETS

H:\PDATA\20-001 HARVEST LANDING\DWGS\PLOT\ENTITLEMENT\CUP\ALT-3\20-001-CUP_MSD3-01.DWG DANNY 10/7/2024 4:55 PM

COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

HARVEST LANDING INDUSTRIAL - PHASE I
OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM





VICINITY MAP

T4S, R3W, SEC 19
NOT TO SCALE

APPLICANT/OWNER

HOWARD INDUSTRIAL PARTNERS
1944 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92865
CONTACT: TIM HOWARD
(TEL)714-769-9155

ENGINEER

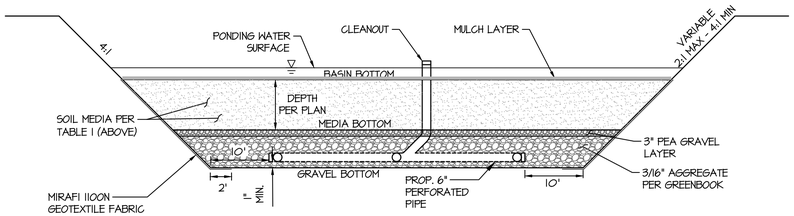
FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA, CA 92563
CONTACT: FRANCISCO MARTINEZ
(TEL)951-331-9873

ARCHITECT

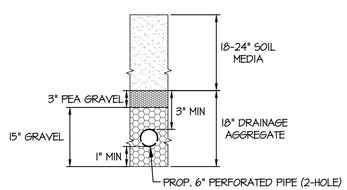
AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92866
CONTACT: STEPHEN PRZYBYLOWSKI
(TEL)714-639-9860

TABLE 1

% RANGE	COMPONENT
70-80	SAND
15-20	SILT
5-10	CLAY



BASIN CROSS SECTION
N.T.S.



AGGREGATE CROSS SECTION
N.T.S.

LEGEND

- RIGHT OF WAY
- (1025) EXISTING CONTOUR
- EASEMENT
- SD PROP. ONSITE STORM DRAIN SYSTEM
- SD PROP. OFFSITE STORM DRAIN SYSTEM
- PROP. STORM DRAIN LOW FLOW SYSTEM
- PROP. STORM DRAIN UNDER DRAIN SYSTEM
- W EXISTING WATER LINE
- W PROP. WATER LINE
- SS EXISTING SWR LINE
- SS PROP. SEWER LINE
- SD EXISTING STORM DRAIN PIPE
- E EXISTING OVERHEAD LINES

SCALE 1"=200'

200 100 0 200 400 600
SCALE: 1"=200'

CITY OF PERRIS

HARVEST LANDING INDUSTRIAL - PHASE I OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM EXHIBIT

SCALE:	AS SHOWN
DATE:	OCT. 2024
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF.:	

FMCIVIL ENGINEERS INC.
41870 KALMIA STREET, SUITE 120
MURRIETA | CA 92562
951.973.0202 - FMCIVIL.COM

SHEET 2 OF 2 SHEETS

H:\PDATA\20-001 HARVEST LANDING\DWGS\PLNCK\ENTITLEMENT\CUP\ALT-3\20-001-CUP_MSD3-01.DWG DANNY 10/8/2024 7:35 AM

LEGEND

- (1025) EXISTING CONTOUR
- 1025 PROPOSED CONTOUR
- A RETAINING WALL
- FENCE
- E SIGN
- MH MANHOLE
- RIGHT OF WAY
- EASEMENT
- PARCEL LINE
- PARCEL MAP BOUNDARY
- STREET CENTER LINE
- SCREEN WALL
- COMBINATION SCREEN/RETAINING WALL
- EXISTING LOT LINE
- RIDGE LINE
- RIBBON GUTTER
- FLOW ARROW
- PROPOSED EDGE OF PAVEMENT
- W EXISTING WATER LINE
- W PROPOSED WATER LINE
- SS EXISTING SWR LINE
- SS PROPOSED SEWER LINE
- SD EXISTING STORM DRAIN PIPE
- SD PROPOSED STORM DRAIN PIPE
- E EXISTING OVERHEAD LINES
- CUT/FILL LINE
- SLOPE SYMBOL

ZONING ORDINANCE

EXISTING ZONING:
HARVEST LANDING SPECIFIC PLANS - MULTIPLE BUSINESS USE (MBU)

PROPOSED ZONING:
HARVEST LANDING SPECIFIC PLANS - MULTIPLE BUSINESS USE (MBU)

ASSESSOR'S PARCEL NUMBERS:

305-110-015, 016, 022 thru 027, 032 thru 035, &
305-140-012, 024 thru 027, 031, 032, 034, 040, 041, 049 thru 050, 052 thru 061

LEGAL DESCRIPTION

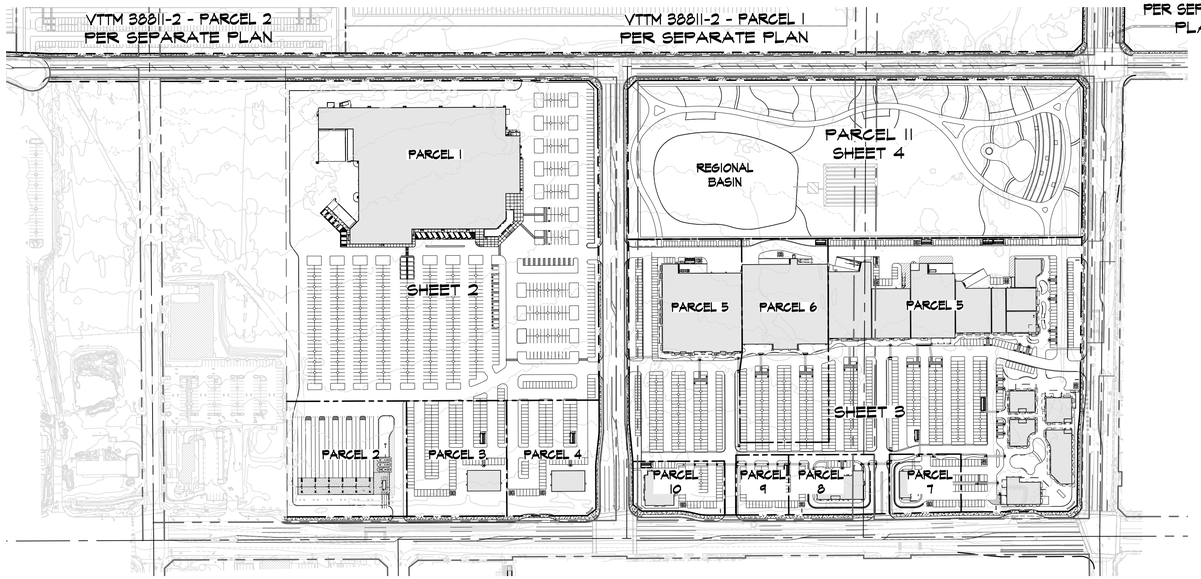
BLOCKS 1-3, 8-14, AND 19-20 OF FIGADOTA FARMS NO. 6 AS SHOWN BY MAP ON FILE IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, IN BOOK 16 OF MAPS, PAGE 77.

IN THE CITY OF PERRIS,
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

HARVEST LANDING RETAIL CENTER & BUSINESS PARK

CONCEPTUAL GRADING & DRAINAGE PLAN

VESTING TENTATIVE TRACT MAP 38811-3 - PARCELS 1-11

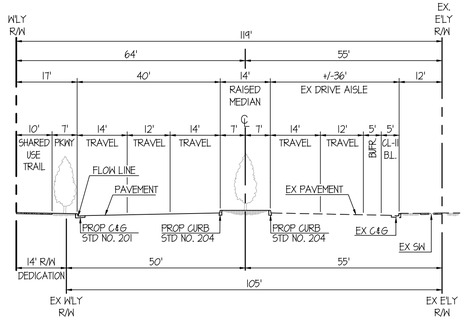


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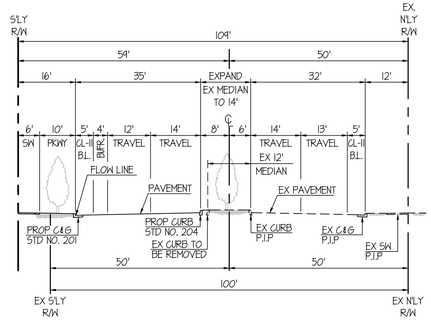
INDEX MAP

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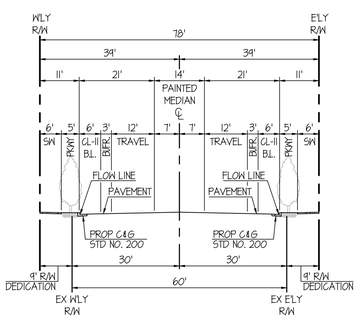
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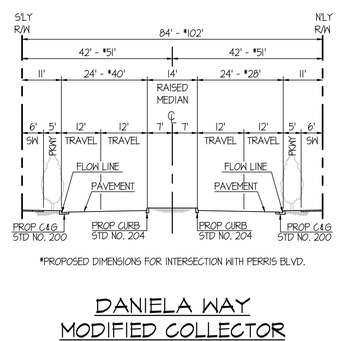
PERRIS BOULEVARD
PRIMARY ARTERIAL
(119'/90')



ORANGE AVENUE
(WEST OF PERRIS BLVD)
SECONDARY ARTERIAL
(109'/81')

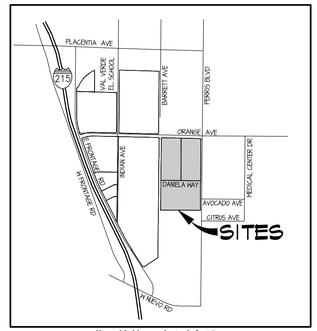


BARRETT AVE
(N'LY WALMART DWY - ORANGE AVE)
MAJOR COLLECTOR
(78'/56')



*PROPOSED DIMENSIONS FOR INTERSECTION WITH PERRIS BLVD.

DANIELA WAY
MODIFIED COLLECTOR
(84'/62')



VICINITY MAP
T4S, R3W, SEC 19
NOT TO SCALE

APPLICANT/OWNER

HOWARD INDUSTRIAL PARTNERS
2244 NORTH PACIFIC STREET
ORANGE, CA 92865
CONTACT: TIM HOWARD
(TEL)714-637-3333

ENGINEER

FMCIVIL ENGINEERS INC.
41870 KALMIA ST., SUITE 120
MURRIETA, CA 92562
CONTACT: FRANCISCO MARTINEZ
(TEL)951-973-0202

ARCHITECT

MMA ARCHITECTURE
120 WEST LIME AVE.
MONROVIA, CA 91016
CONTACT: DANIEL KIM
(TEL)626-583-8348

EARTHWORK ESTIMATE:

RAW CUT:	6,665 CY
RAW FILL:	261,405 CY
NET:	254,740 CY IMPORT

HAUL TRIPS:
ASSUMED (13 CY PER TRIP) = 19,595

CITY OF PERRIS

HARVEST LANDING RETAIL CENTER & BUSINESS PARK
CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-3 - PARCELS 1-12

SCALE:	AS SHOWN
DATE:	OCT. 2024
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

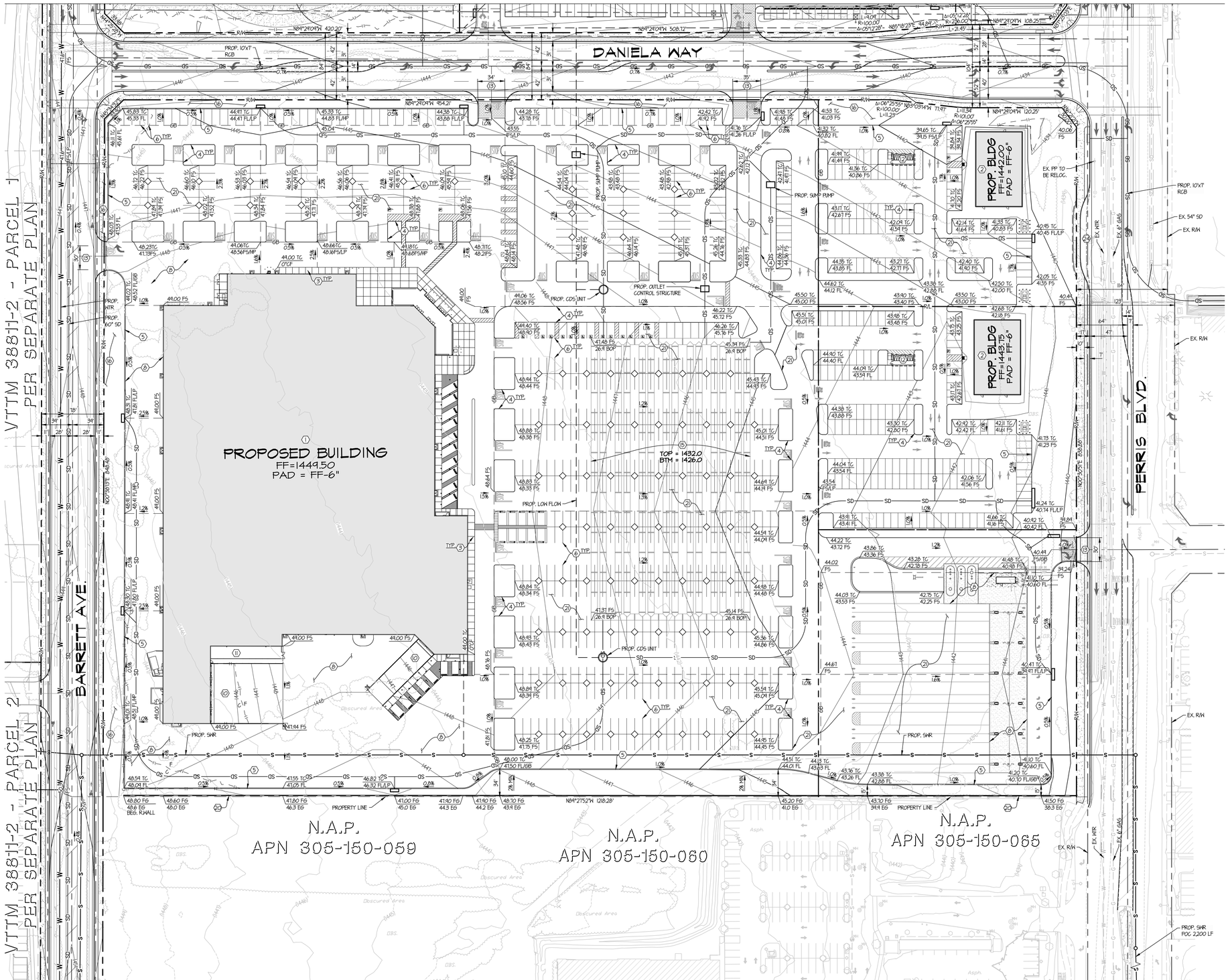
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SHEET 1 OF 4 SHEETS

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SEE SHEET 4

SEE SHEET 3



SITE PLAN KEYNOTES

1. PAINTED CONCRETE TILT-UP RETAIL / RESTAURANT FACILITY. BUILDING TO BE DESIGNED PER ARCHITECT'S PLANS
2. PAINTED STUCCO FRAMING RETAIL / RESTAURANT FACILITY. BUILDING TO BE DESIGNED PER ARCHITECT'S PLANS
3. ON SITE ACCESSIBLE SIDEWALK AND CURB RAMPS.
4. CONCRETE CURB
5. CONCRETE CURB & GUTTER
6. STANDARD PARKING STALL STRIPING PER STANDARDS SHOWN ON ARCHITECT'S PLANS
7. HANDICAP PARKING STALL STRIPING PER STANDARDS SHOWN ON ARCHITECT'S PLANS
8. PORTLAND CONC. CEMENT (PCC) PAVED TRUCK ACCESS PER ARCHITECT'S PLANS
9. PORTLAND CONC. CEMENT (PCC) PAVED PARKING PER ARCHITECT'S PLANS
10. DEPRESSED LOADING DOCK PER ARCHITECT'S PLANS
11. TRASH COMPACTOR PER ARCHITECT'S PLANS
12. TRASH ENCLOSURES WITH ROOF PER ARCHITECT'S PLANS
13. COMMERCIAL DRIVEWAY APPROACH PER RIVERSIDE COUNTY STD. 207A
14. DETENTION BASIN
15. UNDERGROUND DETENTION CHAMBER SYSTEM - 96" CMP - TOP AND BOTTOM OF PIPE (BOP) ELEVATION PER PLAN
16. LANDSCAPE AREA PER LANDSCAPE ARCHITECT'S PLANS
17. CHAIN LINK FENCE PER ARCHITECT'S PLANS
18. APPROXIMATE LOCATION OF MONUMENT PROJECT SIGNS PER ARCHITECT'S PLANS
19. APPROXIMATE LOCATION OF ELECTRIC TRANSFORMERS
20. RETAINING WALL PER ARCHITECT'S PLANS
21. ASPHALT CONCRETE (AC) PAVED PARKING ARCHITECT'S PLANS
22. PROPOSED CONCRETE RIBBON GUTTER
23. COMPACT PARKING STALL STRIPING PER STANDARDS SHOWN ON ARCHITECT'S PLANS
24. BUS TURNOUT PER RIVERSIDE COUNTY STD. 814

CITY OF PERRIS

HARVEST LANDING RETAIL CENTER & BUSINESS PARK
CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-3 - PARCELS 1-4

SCALE:	AS SHOWN
DATE:	OCT. 2024
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PLN CK REF:	

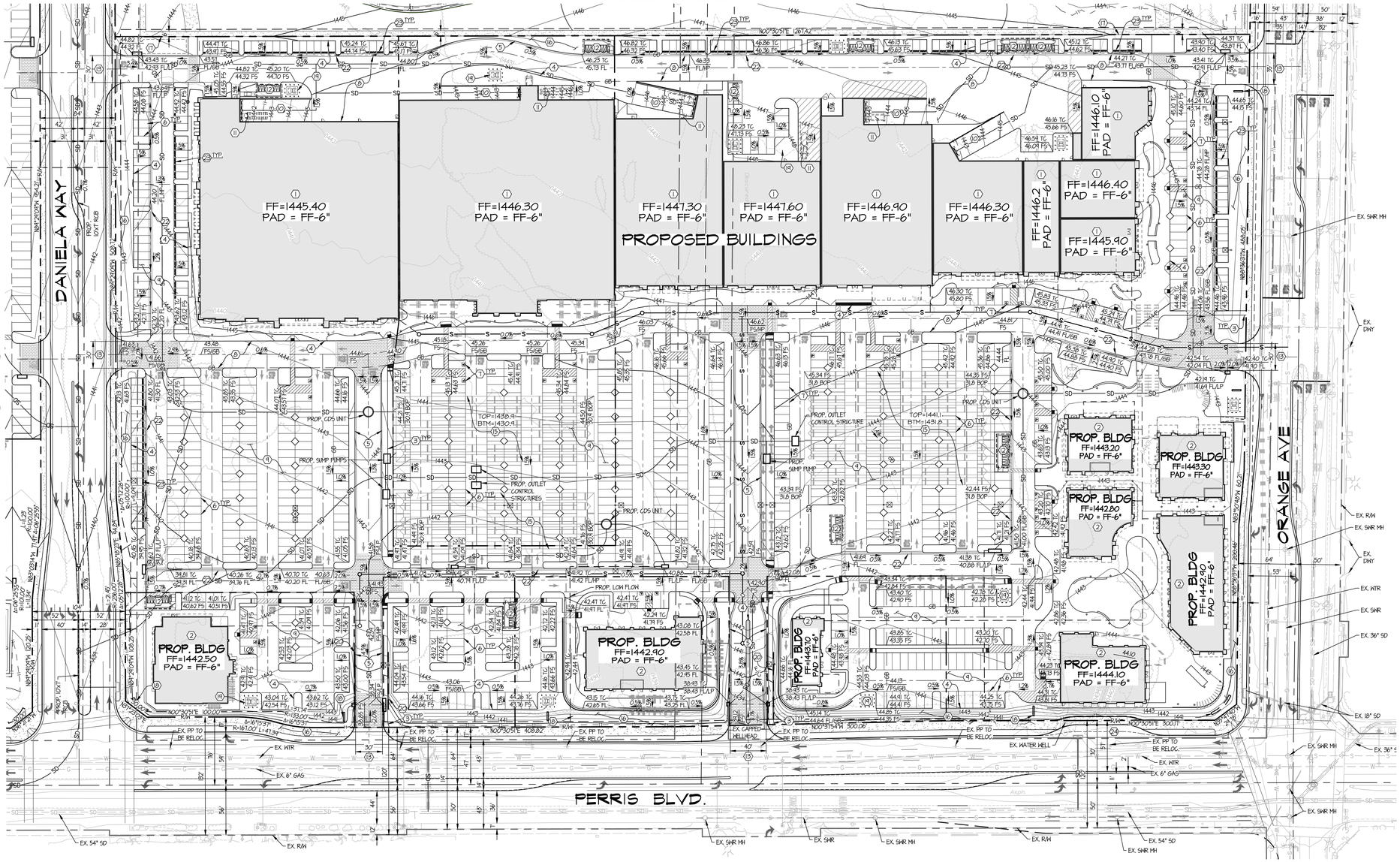
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SHEET 2 OF 4 SHEETS

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SEE SHEET 4

SEE SHEET 2



SITE PLAN KEYNOTES

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24. BUS TURNOUT PER RIVERSIDE COUNTY STD. 814

SCALE 1"=60'

60 30 0 60 120 180

SCALE: 1"=60'

CITY OF PERRIS

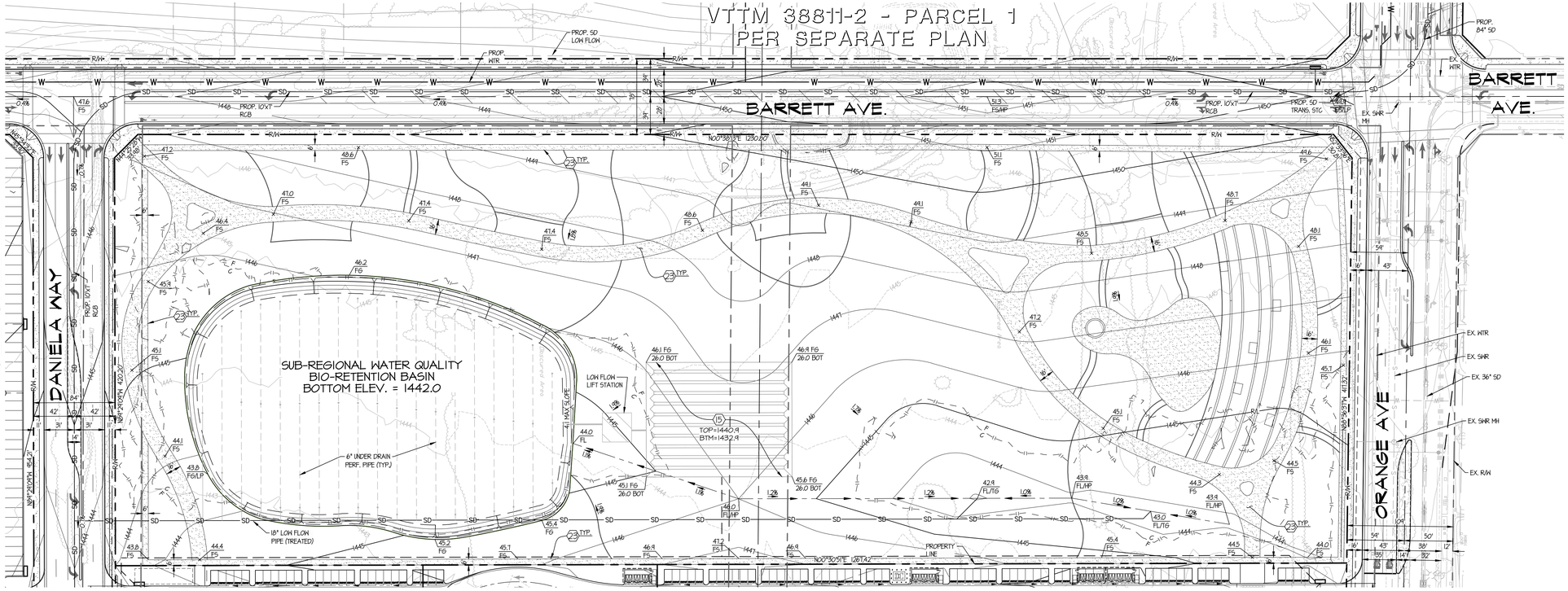
HARVEST LANDING RETAIL CENTER & BUSINESS PARK
CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-3 - PARCELS 5-10

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CHECKED:	FM
PLN CK REF.:	

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SHEET 3 OF 4 SHEETS

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24. BUS TURNOUT PER RIVERSIDE COUNTY STD. 814

SCALE 1"=60'

60 30 0 60 120 180

SCALE: 1"=60'

CITY OF PERRIS

HARVEST LANDING RETAIL CENTER & BUSINESS PARK
CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-3 - PARCEL 11

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