DEVELOPMENT PLAN REVIEW VTPM 38811-1
PARCEL 2 – SITE 3
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:

FM CIVIL ENGINEERS INC.

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 industrial development of approximately 5.7 acres and 91,000 square feet warehouse building with 10 truck docks, and 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 the proposed Private Drive "A" and the 215 freeway is to the west and Indian Avenue to the east and vacant undeveloped land to the south.

The primary objectives of this report are as follows:

1. Delineate the drainage areas tributary to the onsite above/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 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 existing 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 Indian Avenue; however, there are offsite flows that enter the site at Frontage Road on the westerly property boundary via an existing 6'x3' RCB, see Exhibit "B". This existing box traverses Caltrans right-of-way, it collects and conveys flows from the west side of the railroad tracks and the 215 freeway. All the developed storm flows continue to travel easterly through the property, to Indian Avenue and the vacant parcels to the east where it ultimately reaches a low point at Perris Boulevard; storm drain flows are intercepted by existing street inlets and 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 G "Harvest Landing Industrial Phase 1 Offsite Master Storm Drain & Low Flow System". The offsite master storm drain system (backbone) will be a part of a separate report and therefore excluded. The onsite storm water runoff will be collected and treated using proprietary devices to accommodate the water quality component of mitigation. The onsite storm water runoff will be conveyed to an underground chamber system to mitigate the increased storm runoff to be at or below the current MDP land use condition flow. See the table below for the rational method results:

Description	Q_{100} Peak Flow Rates
Proposed	16.2
Existing	11.0
Onsite MDP	13.8

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. 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 existing conditions. Smaller storm events were analyzed, however, since the storm volume demand to mitigate the storm flows from the 100-year 24hour event are considerably larger than volumes produced by the smaller storm events, thus a conservative approach.

MDP Condition Volume: 0.71 ac-ft; $Q_{100\text{-}24hr}$: 3.99 cfs
Proposed Condition Volume: 1.38 ac-ft; $Q_{100\text{-}24hr}$: 3.92 cfs
Underground Chamber Volume: *1.96 ac-ft

*Since this volume is greater than 1.38 ac-ft the underground chambers (collectively) have enough storage to mitigate the volume of the 100 year 24 hour storm. The peak storm flows will be mitigated to the existing MDP levels. See the table below for the unit hydrograph results:

Storm Duration	SP Q_{peak}	SP V_{TOTAL}	MDP Q_{PEAK}	MDP V_{TOTAL}
1	18.80	0.5734	19.61	0.6355
3	12.12	0.9409	12.04	0.9496
6	9.93	1.1167	9.89	1.1214
24	3.92	2.1039	3.99	2.1089
Acreage	7.18		7.18	

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 is primarily Group "B" soils, with smaller areas as "A". A USGS soils map for the project site is included as Exhibit E, 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"-24" 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 WITH OFFSITES (RATIONAL METHOD)

100-YEAR EXISTING ON-SITE HYDROLOGY NO OFFSITES (RATIONAL METHOD)

100-YEAR PROPOSED LAND USE MDP ON-SITE HYDROLOGY (RATIONAL METHOD)

100-YEAR EXISTING OFF-SITE HYDROLOGY E FRONTAGE ROAD AREA A (RATIONAL METHOD)

100-YEAR EXISTING OFF-SITE HYDROLOGY E FRONTAGE ROAD AREA B (RATIONAL METHOD)

100-YEAR PROPOSED ON-SITE HYDROLOGY WITH OFFSITES (RATIONAL METHOD)

100-YEAR PROPOSED OFF-SITE HYDROLOGY E FRONTAGE ROAD (RATIONAL METHOD)

100-YEAR PROPOSED ON-SITE HYDROLOGY NO OFFSITES (RATIONAL METHOD)

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

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

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

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

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

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

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

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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/18/23
File:X100OVERALL.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 - WITH OFFSITES
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 10.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 1.926(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.827
Decimal fraction soil group A = 0.540

```
Decimal fraction soil group B = 0.360
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  44.60
Pervious area fraction =  0.175; Impervious fraction =  0.825
User specified values are as follows:
TC =  19.84 min.  Rain intensity =       1.93(In/Hr)
Total area =        11.32(Ac.)  Total runoff =     17.00(CFS)


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Process from Point/Station       10.000 to Point/Station       11.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     17.548(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   1.824(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  =     17.548(CFS)
  '     '    flow top width =     62.040(Ft.)
  '     '    velocity=    1.824(Ft/s)
  '     '    area =      9.622(Sq.Ft)
  '     '    Froude number =     0.816

Upstream point elevation =  1470.000(Ft.)
Downstream point elevation =  1466.600(Ft.)
Flow length =   209.000(Ft.)
Travel time  =    1.91 min.
Time of concentration =   21.75 min.
Depth of flow =   0.310(Ft.)
Average velocity =   1.824(Ft/s)
Total irregular channel flow =    17.548(CFS)
Irregular channel normal depth above invert elev. =   0.310(Ft.)
Average velocity of channel(s) =   1.824(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.819
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)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.841(In/Hr) for a   100.0 year storm
Subarea runoff =      1.101(CFS) for      0.730(Ac.)
Total runoff =     18.101(CFS)      Total area =      12.050(Ac.)
Depth of flow =   0.314(Ft.), Average velocity =   1.838(Ft/s)


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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 =     21.824(CFS)
Depth of flow =   0.396(Ft.), Average velocity =   1.394(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  =     21.824(CFS)
  '     '    flow top width =     79.133(Ft.)
  '     '    velocity=    1.394(Ft/s)
  '     '    area =     15.655(Sq.Ft)
  '     '    Froude number =     0.552

Upstream point elevation =  1466.600(Ft.)
Downstream point elevation =  1462.800(Ft.)
Flow length =   553.000(Ft.)
Travel time  =    6.61 min.
Time of concentration =   28.36 min.
Depth of flow =   0.396(Ft.)
Average velocity =   1.394(Ft/s)
Total irregular channel flow =    21.824(CFS)
Irregular channel normal depth above invert elev. =   0.396(Ft.)
Average velocity of channel(s) =   1.394(Ft/s)
 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  64.90
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.617(In/Hr) for a   100.0 year storm
Subarea runoff =      7.387(CFS) for      7.340(Ac.)
Total runoff =     25.488(CFS)      Total area =      19.390(Ac.)
Depth of flow =   0.419(Ft.), Average velocity =   1.449(Ft/s)
End of computations, total study area =           19.39 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.518
Area averaged RI index number =  53.9
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/19/23 File:x100uh.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 - NO OFFSITES
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 = 209.000(Ft.)
Top (of initial area) elevation = 1470.000(Ft.)
Bottom (of initial area) elevation = 1466.600(Ft.)
Difference in elevation = 3.400(Ft.)
Slope = 0.01627 s(percent)= 1.63
TC = k(0.530)*[(length^3)/(elevation change)]^0.2

```
Initial area time of concentration =   10.235 min.
Rainfall intensity =      2.664(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.789
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 =      1.534(CFS)
Total initial stream area =        0.730(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 =      6.281(CFS)
Depth of flow =   0.248(Ft.), Average velocity =   1.021(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  =      6.281(CFS)
  '     '    flow top width =     49.604(Ft.)
  '     '    velocity=    1.021(Ft/s)
  '     '    area =      6.151(Sq.Ft)
  '     '    Froude number =     0.511

Upstream point elevation =  1466.600(Ft.)
Downstream point elevation =  1462.800(Ft.)
Flow length =   553.000(Ft.)
Travel time  =    9.03 min.
Time of concentration =   19.26 min.
Depth of flow =   0.248(Ft.)
Average velocity =   1.021(Ft/s)
Total irregular channel flow =     6.281(CFS)
Irregular channel normal depth above invert elev. =   0.248(Ft.)
Average velocity of channel(s) =   1.021(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.657
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  64.90
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.954(In/Hr) for a   100.0 year storm
Subarea runoff =      9.431(CFS) for      7.340(Ac.)
```

```
Total runoff =     10.965(CFS)      Total area =       8.070(Ac.)
Depth of flow =   0.306(Ft.), Average velocity =   1.174(Ft/s)
End of computations, total study area =            8.07 (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 =  66.1
```

Riverside County Rational Hydrology Program

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********* 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
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 = 209.000(Ft.)
Top (of initial area) elevation = 1470.000(Ft.)
Bottom (of initial area) elevation = 1466.600(Ft.)
Difference in elevation = 3.400(Ft.)
Slope = 0.01627 s(percent)= 1.63

```
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.531 min.
Rainfall intensity =      3.096(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.786
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 =      1.777(CFS)
Total initial stream area =       0.730(Ac.)
Pervious area fraction = 0.500


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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 =      7.822(CFS)
Depth of flow =   0.269(Ft.), Average velocity =   1.079(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  =      7.822(CFS)
  '     '    flow top width =     53.858(Ft.)
  '     '    velocity=    1.079(Ft/s)
  '     '    area =      7.252(Sq.Ft)
  '     '    Froude number =     0.518

Upstream point elevation =  1466.600(Ft.)
Downstream point elevation =  1462.800(Ft.)
Flow length =   553.000(Ft.)
Travel time  =    8.54 min.
Time of concentration =   16.08 min.
Depth of flow =   0.269(Ft.)
Average velocity =   1.079(Ft/s)
Total irregular channel flow =     7.822(CFS)
Irregular channel normal depth above invert elev. =   0.269(Ft.)
Average velocity of channel(s) =   1.079(Ft/s)
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.767
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  59.90
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.135(In/Hr) for a   100.0 year storm
```

Subarea runoff = 12.028(CFS) for 7.340(Ac.)
Total runoff = 13.805(CFS) Total area = 8.070(Ac.)
Depth of flow = 0.333(Ft.), Average velocity = 1.243(Ft/s)
End of computations, total study area = 8.07 (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 = 59.5

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 08/14/23 File:1.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 OFFSITES - SUB AREA -AX
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 = 979.000(Ft.)
Top (of initial area) elevation = 1493.800(Ft.)
Bottom (of initial area) elevation = 1486.400(Ft.)
Difference in elevation = 7.400(Ft.)
Slope = 0.00756 s(percent)= 0.76
TC = k(0.420)*[(length^3)/(elevation change)]^0.2

```
Initial area time of concentration =   17.534 min.
Rainfall intensity =      2.047(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.695
Decimal fraction soil group A = 0.440
Decimal fraction soil group B = 0.090
Decimal fraction soil group C = 0.470
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  51.55
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      2.219(CFS)
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       22.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      3.604(CFS)
Depth of flow =   0.582(Ft.), Average velocity =   2.156(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2              4.00              0.00
      3              6.00              0.00
      4              8.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      3.604(CFS)
  '     '    flow top width =      3.745(Ft.)
  '     '    velocity=    2.156(Ft/s)
  '     '    area =      1.671(Sq.Ft)
  '     '    Froude number =     0.569

Upstream point elevation =  1486.400(Ft.)
Downstream point elevation =  1479.000(Ft.)
Flow length =  1171.000(Ft.)
Travel time  =    9.05 min.
Time of concentration =   26.58 min.
Depth of flow =   0.582(Ft.)
Average velocity =   2.156(Ft/s)
Total irregular channel flow =     3.604(CFS)
Irregular channel normal depth above invert elev. =   0.582(Ft.)
Average velocity of channel(s) =   2.156(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.759
Decimal fraction soil group A = 0.650
Decimal fraction soil group B = 0.350
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  80.00
Pervious area fraction =  0.940; Impervious fraction =  0.060
Rainfall intensity =      1.669(In/Hr) for a   100.0 year storm
```

```
Subarea runoff =      2.686(CFS) for      2.120(Ac.)
Total runoff =      4.905(CFS)      Total area =       3.680(Ac.)
Depth of flow =   0.687(Ft.), Average velocity =   2.354(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1479.000(Ft.)
Downstream point/station elevation =  1473.000(Ft.)
Pipe length  =    82.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.905(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.905(CFS)
Normal flow depth in pipe =    6.06(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =   10.94(In.)
Pipe flow velocity =     12.33(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    26.70 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: 1
Stream flow area =      3.680(Ac.)
Runoff from this stream =      4.905(CFS)
Time of concentration =   26.70 min.
Rainfall intensity =     1.666(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.100 to Point/Station       22.200
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   951.000(Ft.)
Top (of initial area) elevation =  1492.000(Ft.)
Bottom (of initial area) elevation =  1483.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00873  s(percent)=       0.87
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.951 min.
Rainfall intensity =      2.374(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.570
Decimal fraction soil group B = 0.190
Decimal fraction soil group C = 0.240
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  45.44
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      3.340(CFS)
```

```
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.200 to Point/Station       23.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      6.204(CFS)
Depth of flow =   0.692(Ft.), Average velocity =   2.950(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2              4.00              0.00
      3              6.00              0.00
      4              8.00              2.00
Manning's 'N' friction factor =   0.030
----------------------------------------------------------------
Sub-Channel flow  =      6.204(CFS)
  '     '    flow top width =      4.077(Ft.)

  '     '    velocity=    2.950(Ft/s)
  '     '    area =      2.103(Sq.Ft)
  '     '    Froude number =     0.724

Upstream point elevation =  1483.700(Ft.)
Downstream point elevation =  1473.000(Ft.)
Flow length =  1086.000(Ft.)
Travel time  =    6.14 min.
Time of concentration =   19.09 min.
Depth of flow =   0.692(Ft.)
Average velocity =   2.950(Ft/s)
Total irregular channel flow =     6.204(CFS)
Irregular channel normal depth above invert elev. =   0.692(Ft.)
Average velocity of channel(s) =   2.950(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.440
Decimal fraction soil group B = 0.560
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  82.00
Pervious area fraction =  0.350; Impervious fraction =  0.650
Rainfall intensity =      1.963(In/Hr) for a   100.0 year storm
Subarea runoff =      5.667(CFS) for      3.360(Ac.)
Total runoff =      9.007(CFS)      Total area =       5.060(Ac.)
Depth of flow =   0.844(Ft.), Average velocity =   3.270(Ft/s)


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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: 2
Stream flow area =      5.060(Ac.)
Runoff from this stream =      9.007(CFS)
Time of concentration =   19.09 min.
Rainfall intensity =     1.963(In/Hr)
Summary of stream data:

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


1        4.905     26.70               1.666
2        9.007     19.09               1.963
Largest stream flow has longer or shorter time of concentration
Qp =      9.007 + sum of
        Qa          Tb/Ta
         4.905 *    0.715 =      3.507
Qp =     12.513

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.905       9.007
Area of streams before confluence:
        3.680        5.060


Results of confluence:
Total flow rate =     12.513(CFS)
Time of concentration =    19.087 min.
Effective stream area after confluence  =      8.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1473.000(Ft.)
Downstream point/station elevation =  1471.800(Ft.)
Pipe length  =   228.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.513(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.513(CFS)
Normal flow depth in pipe =   15.68(In.)
Flow top width inside pipe =   22.84(In.)
Critical Depth =   15.26(In.)
Pipe flow velocity =      5.75(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =    19.75 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: 1
Stream flow area =      8.740(Ac.)
```

```
Runoff from this stream =     12.513(CFS)
Time of concentration =   19.75 min.
Rainfall intensity =     1.931(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       23.100 to Point/Station       23.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   500.000(Ft.)
Top (of initial area) elevation =  1484.600(Ft.)
Bottom (of initial area) elevation =  1477.300(Ft.)
Difference in elevation =     7.300(Ft.)
Slope =    0.01460  s(percent)=       1.46
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.398 min.
Rainfall intensity =      2.778(In/Hr) for a   100.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.789
Decimal fraction soil group A = 0.960
Decimal fraction soil group B = 0.040
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.96
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =      1.994(CFS)
Total initial stream area =        0.910(Ac.)
Pervious area fraction = 0.250


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.200 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1477.300(Ft.)
Downstream point elevation =  1475.200(Ft.)
Channel length thru subarea  =   782.000(Ft.)
Channel base width      =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      3.605(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      3.605(CFS)
Depth of flow =   0.482(Ft.), Average velocity =   2.521(Ft/s)
Channel flow top width =    3.930(Ft.)
Flow Velocity =    2.52(Ft/s)
Travel time  =    5.17 min.
Time of concentration =   14.57 min.

Sub-Channel No. 1 Critical depth =      0.406(Ft.)
  '     '       '     Critical flow top width =      3.625(Ft.)
  '     '       '     Critical flow velocity=    3.155(Ft/s)
  '     '       '     Critical flow area =      1.143(Sq.Ft)

 Adding area flow to channel
```

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.420
Decimal fraction soil group B = 0.580
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  65.00
Pervious area fraction =  0.260; Impervious fraction =  0.740
Rainfall intensity =      2.241(In/Hr) for a   100.0 year storm
Subarea runoff =      3.156(CFS) for      1.670(Ac.)
Total runoff =      5.150(CFS)      Total area =       2.580(Ac.)
Depth of flow =   0.583(Ft.), Average velocity =   2.790(Ft/s)

Sub-Channel No. 1 Critical depth =      0.496(Ft.)
  '     '       '     Critical flow top width =      3.984(Ft.)
  '     '       '     Critical flow velocity=    3.469(Ft/s)
  '     '       '     Critical flow area =      1.484(Sq.Ft)



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Process from Point/Station       23.200 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 =      2.580(Ac.)
Runoff from this stream =      5.150(CFS)
Time of concentration =   14.57 min.
Rainfall intensity =     2.241(In/Hr)
Summary of stream data:

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


1       12.513     19.75               1.931
2        5.150     14.57               2.241
Largest stream flow has longer time of concentration
Qp =     12.513 + sum of
        Qb         Ia/Ib
         5.150 *    0.862 =      4.437
Qp =     16.950

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.513       5.150
Area of streams before confluence:
        8.740        2.580


Results of confluence:
Total flow rate =     16.950(CFS)
Time of concentration =    19.748 min.
Effective stream area after confluence  =     11.320(Ac.)
```

++
Process from Point/Station 24.000 to Point/Station 25.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1471.800(Ft.)
Downstream point/station elevation = 1470.000(Ft.)
Pipe length = 65.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.950(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 16.950(CFS)
Normal flow depth in pipe = 14.30(In.)
Flow top width inside pipe = 14.55(In.)
Critical depth could not be calculated.
Pipe flow velocity = 11.27(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 19.84 min.
End of computations, total study area = 11.32 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.451
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: 08/16/23 File:b.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 OFFSITES - SUB AREA - BX
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 = 883.000(Ft.)
Top (of initial area) elevation = 1488.600(Ft.)
Bottom (of initial area) elevation = 1484.000(Ft.)
Difference in elevation = 4.600(Ft.)
Slope = 0.00521 s(percent)= 0.52

```
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.946 min.
Rainfall intensity =      2.374(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.430
Decimal fraction soil group B = 0.340
Decimal fraction soil group C = 0.230
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  48.67
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.366(CFS)
Total initial stream area =        1.150(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1476.000(Ft.)
Downstream point/station elevation =  1475.800(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.366(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.366(CFS)
Normal flow depth in pipe =    9.33(In.)
Flow top width inside pipe =   14.55(In.)
Critical Depth =    7.38(In.)
Pipe flow velocity =      2.95(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    13.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.150(Ac.)
Runoff from this stream =      2.366(CFS)
Time of concentration =   13.37 min.
Rainfall intensity =     2.337(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.100 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   794.000(Ft.)
Top (of initial area) elevation =  1489.000(Ft.)
Bottom (of initial area) elevation =  1484.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00630  s(percent)=       0.63
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   11.946 min.
Rainfall intensity =      2.470(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.530
Decimal fraction soil group B = 0.270
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  45.88
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.307(CFS)
Total initial stream area =        1.080(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.100 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.080(Ac.)
Runoff from this stream =      2.307(CFS)
Time of concentration =   11.95 min.
Rainfall intensity =     2.470(In/Hr)
Summary of stream data:

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


1        2.366     13.37               2.337
2        2.307     11.95               2.470
Largest stream flow has longer time of concentration
Qp =      2.366 + sum of
        Qb         Ia/Ib
         2.307 *    0.946 =      2.183
Qp =      4.550

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.366       2.307
Area of streams before confluence:
        1.150        1.080


Results of confluence:
Total flow rate =      4.550(CFS)
Time of concentration =    13.370 min.
Effective stream area after confluence  =      2.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1475.800(Ft.)
```

```
Downstream point/station elevation =  1475.400(Ft.)
Pipe length  =    83.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.550(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.550(CFS)
Normal flow depth in pipe =   10.30(In.)
Flow top width inside pipe =   17.81(In.)
Critical Depth =    9.83(In.)
Pipe flow velocity =      4.35(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    13.69 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: 1
Stream flow area =      2.230(Ac.)
Runoff from this stream =      4.550(CFS)
Time of concentration =   13.69 min.
Rainfall intensity =     2.311(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   457.000(Ft.)
Top (of initial area) elevation =  1486.700(Ft.)
Bottom (of initial area) elevation =  1478.700(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.01751  s(percent)=       1.75
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.806 min.
Rainfall intensity =      3.042(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.730
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  49.52
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.202(CFS)
Total initial stream area =        0.830(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 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 =      0.830(Ac.)
Runoff from this stream =      2.202(CFS)
Time of concentration =    7.81 min.
Rainfall intensity =     3.042(In/Hr)
Summary of stream data:

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


1        4.550     13.69               2.311
2        2.202      7.81               3.042
Largest stream flow has longer time of concentration
Qp =      4.550 + sum of
        Qb          Ia/Ib
         2.202 *    0.759 =      1.673
Qp =      6.222

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.550       2.202
Area of streams before confluence:
        2.230        0.830


Results of confluence:
Total flow rate =      6.222(CFS)
Time of concentration =    13.688 min.
Effective stream area after confluence  =      3.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1475.400(Ft.)
Downstream point/station elevation =  1475.200(Ft.)
Pipe length  =    61.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.222(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.222(CFS)
Normal flow depth in pipe =   12.77(In.)
Flow top width inside pipe =   20.50(In.)
Critical Depth =   11.04(In.)
Pipe flow velocity =      4.06(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    13.94 min.
End of computations, total study area =            3.06 (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 =  47.9
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/30/24
File:100PONSITE3.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 - WITH OFFSITES
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

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Process from Point/Station 10.000 to Point/Station 10.300
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 744.000(Ft.)
Top (of initial area) elevation = 1471.300(Ft.)
Bottom (of initial area) elevation = 1463.100(Ft.)

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Difference in elevation =     8.200(Ft.)
Slope =    0.01102  s(percent)=       1.10
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.406 min.
Rainfall intensity =      2.643(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.950
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.65
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.850(CFS)
Total initial stream area =        2.530(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.000 to Point/Station       10.300
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.530(Ac.)
Runoff from this stream =      5.850(CFS)
Time of concentration =   10.41 min.
Rainfall intensity =     2.643(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.100 to Point/Station       10.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   281.000(Ft.)
Top (of initial area) elevation =  1467.800(Ft.)
Bottom (of initial area) elevation =  1461.600(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.02206  s(percent)=       2.21
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.567 min.
Rainfall intensity =      3.089(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.110
Decimal fraction soil group C = 0.890
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  67.57
Pervious area fraction =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      2.143(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.350


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Process from Point/Station       10.200 to Point/Station       10.200
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.706
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.010
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.13
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =     7.57 min.
Rainfall intensity =      3.089(In/Hr) for a   100.0 year storm
Subarea runoff =      1.527(CFS) for      0.700(Ac.)
Total runoff =      3.670(CFS)      Total area =       1.520(Ac.)


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Process from Point/Station       10.200 to Point/Station       10.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1459.300(Ft.)
Downstream point/station elevation =  1459.100(Ft.)
Pipe length  =     2.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.670(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.670(CFS)
Normal flow depth in pipe =    5.55(In.)
Flow top width inside pipe =    8.75(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.82(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     7.57 min.


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Process from Point/Station       10.200 to Point/Station       10.300
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.520(Ac.)
Runoff from this stream =      3.670(CFS)
Time of concentration =    7.57 min.
Rainfall intensity =     3.089(In/Hr)
Summary of stream data:

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


1        5.850     10.41               2.643
2        3.670      7.57               3.089
Largest stream flow has longer time of concentration
Qp =      5.850 + sum of
        Qb         Ia/Ib
         3.670 *    0.856 =      3.140
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Qp =      8.990

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.850       3.670
Area of streams before confluence:
        2.530        1.520


Results of confluence:
Total flow rate =      8.990(CFS)
Time of concentration =    10.406 min.
Effective stream area after confluence  =      4.050(Ac.)


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Process from Point/Station       10.300 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1459.100(Ft.)
Downstream point/station elevation =  1458.680(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.990(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.990(CFS)
Normal flow depth in pipe =   11.79(In.)
Flow top width inside pipe =   12.31(In.)
Critical Depth =   13.86(In.)
Pipe flow velocity =      8.69(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.44 min.


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Process from Point/Station       10.300 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.050(Ac.)
Runoff from this stream =      8.990(CFS)
Time of concentration =   10.44 min.
Rainfall intensity =     2.638(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       11.000 to Point/Station       11.300
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   416.000(Ft.)
Top (of initial area) elevation =  1476.800(Ft.)
Bottom (of initial area) elevation =  1467.300(Ft.)
Difference in elevation =     9.500(Ft.)
Slope =    0.02284  s(percent)=       2.28
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.676 min.
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Rainfall intensity =      3.068(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.670
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  60.29
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      5.065(CFS)
Total initial stream area =        1.920(Ac.)
Pervious area fraction = 0.200


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Process from Point/Station       11.300 to Point/Station       11.300
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.704
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
Time of concentration =     7.68 min.
Rainfall intensity =      3.068(In/Hr) for a   100.0 year storm
Subarea runoff =      0.583(CFS) for      0.270(Ac.)
Total runoff =      5.648(CFS)      Total area =       2.190(Ac.)


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Process from Point/Station       11.300 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1461.500(Ft.)
Downstream point/station elevation =  1458.680(Ft.)
Pipe length  =   265.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.648(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.648(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   13.66(In.)
Critical Depth =   11.54(In.)
Pipe flow velocity =      6.09(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =     8.40 min.


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Process from Point/Station       11.300 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.190(Ac.)
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Runoff from this stream =      5.648(CFS)
Time of concentration =    8.40 min.
Rainfall intensity =     2.935(In/Hr)
Summary of stream data:

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


1        8.990     10.44               2.638
2        5.648      8.40               2.935
Largest stream flow has longer time of concentration
Qp =      8.990 + sum of
        Qb         Ia/Ib
         5.648 *    0.899 =      5.077
Qp =     14.066

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.990       5.648
Area of streams before confluence:
        4.050        2.190


Results of confluence:
Total flow rate =     14.066(CFS)
Time of concentration =    10.445 min.
Effective stream area after confluence  =      6.240(Ac.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1458.680(Ft.)
Downstream point/station elevation =  1452.850(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =    8.71(In.)
Flow top width inside pipe =   14.80(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.06(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.49 min.


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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1452.850(Ft.)
Downstream point/station elevation =  1451.910(Ft.)
Pipe length  =   101.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     21.00(In.)
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Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =   15.87(In.)
Flow top width inside pipe =   18.05(In.)
Critical Depth =   16.72(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    10.72 min.


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Process from Point/Station       14.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1451.910(Ft.)
Downstream point/station elevation =  1448.600(Ft.)
Pipe length  =   261.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   16.72(In.)
Pipe flow velocity =      8.22(Ft/s)
Travel time through pipe =    0.53 min.
Time of concentration (TC) =    11.25 min.


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Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.240(Ac.)
Runoff from this stream =     14.066(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     2.543(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       15.200 to Point/Station       15.200
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Rainfall intensity =      1.926(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.540
Decimal fraction soil group B = 0.360
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  44.34
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  19.84 min.  Rain intensity =       1.93(In/Hr)
Total area =        11.32(Ac.)  Total runoff =     17.00(CFS)
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Process from Point/Station       15.200 to Point/Station       15.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1470.500(Ft.)
Downstream point/station elevation =  1450.800(Ft.)
Pipe length  =   977.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.000(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    17.000(CFS)
Normal flow depth in pipe =   13.64(In.)
Flow top width inside pipe =   20.04(In.)
Critical Depth =   18.13(In.)
Pipe flow velocity =     10.28(Ft/s)
Travel time through pipe =    1.58 min.
Time of concentration (TC) =    21.42 min.


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Process from Point/Station       15.200 to Point/Station       15.300
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     11.320(Ac.)
Runoff from this stream =     17.000(CFS)
Time of concentration =   21.42 min.
Rainfall intensity =     1.855(In/Hr)


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Process from Point/Station       15.000 to Point/Station       15.100
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   684.000(Ft.)
Top (of initial area) elevation =  1477.400(Ft.)
Bottom (of initial area) elevation =  1460.800(Ft.)
Difference in elevation =    16.600(Ft.)
Slope =    0.02427  s(percent)=       2.43
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.593 min.
Rainfall intensity =      2.903(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 = 0.250
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  65.75
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.408(CFS)
Total initial stream area =        0.940(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       15.100 to Point/Station       15.300
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1452.200(Ft.)
Downstream point/station elevation = 1450.800(Ft.)
Pipe length = 40.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.408(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 2.408(CFS)
Normal flow depth in pipe = 5.96(In.)
Flow top width inside pipe = 8.51(In.)
Critical Depth = 8.22(In.)
Pipe flow velocity = 7.74(Ft/s)
Travel time through pipe = 0.09 min.
Time of concentration (TC) = 8.68 min.

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Process from Point/Station 15.100 to Point/Station 15.300
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 0.940(Ac.)
Runoff from this stream = 2.408(CFS)
Time of concentration = 8.68 min.
Rainfall intensity = 2.888(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	17.000	21.42	1.855
2	2.408	8.68	2.888

Largest stream flow has longer time of concentration
Qp = 17.000 + sum of

Qb	Ia/Ib	
2.408 *	0.642 =	1.547

Qp = 18.547

Total of 2 streams to confluence:
Flow rates before confluence point:
17.000 2.408
Area of streams before confluence:
11.320 0.940
Results of confluence:
Total flow rate = 18.547(CFS)
Time of concentration = 21.424 min.
Effective stream area after confluence = 12.260(Ac.)

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Process from Point/Station 15.300 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1450.800(Ft.)
Downstream point/station elevation = 1448.600(Ft.)
Pipe length = 89.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =    18.547(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    18.547(CFS)
Normal flow depth in pipe =   13.50(In.)
Flow top width inside pipe =   20.12(In.)
Critical Depth =   18.72(In.)
Pipe flow velocity =     11.35(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    21.55 min.


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Process from Point/Station       15.300 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.260(Ac.)
Runoff from this stream =     18.547(CFS)
Time of concentration =   21.55 min.
Rainfall intensity =     1.850(In/Hr)
Summary of stream data:

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


1       14.066     11.25               2.543
2       18.547     21.55               1.850
Largest stream flow has longer time of concentration
Qp =     18.547 + sum of
        Qb         Ia/Ib
        14.066 *    0.727 =     10.229
Qp =     28.776

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.066      18.547
Area of streams before confluence:
        6.240       12.260


Results of confluence:
Total flow rate =     28.776(CFS)
Time of concentration =    21.554 min.
Effective stream area after confluence  =     18.500(Ac.)
End of computations, total study area =           18.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.169
Area averaged RI index number =  50.7
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/30/24
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********* Hydrology Study Control Information **********

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - OFFSITE E FRONTAGE ROAD
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 15.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 624.000(Ft.)
Top (of initial area) elevation = 1477.400(Ft.)
Bottom (of initial area) elevation = 1473.900(Ft.)

```
Difference in elevation =     3.500(Ft.)
Slope =    0.00561  s(percent)=       0.56
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.102 min.
Rainfall intensity =      2.560(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 =      1.656(CFS)
Total initial stream area =        0.740(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.74 (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 =  56.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
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English (in-lb) Units used in input data file

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED CONDITION - NO OFFSITES
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 10.300
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 744.000(Ft.)
Top (of initial area) elevation = 1471.300(Ft.)
Bottom (of initial area) elevation = 1463.100(Ft.)

```
Difference in elevation =     8.200(Ft.)
Slope =    0.01102  s(percent)=       1.10
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.406 min.
Rainfall intensity =      2.643(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.950
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.65
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.850(CFS)
Total initial stream area =        2.530(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.000 to Point/Station       10.300
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.530(Ac.)
Runoff from this stream =      5.850(CFS)
Time of concentration =   10.41 min.
Rainfall intensity =     2.643(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.100 to Point/Station       10.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   281.000(Ft.)
Top (of initial area) elevation =  1467.800(Ft.)
Bottom (of initial area) elevation =  1461.600(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.02206  s(percent)=       2.21
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.567 min.
Rainfall intensity =      3.089(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.110
Decimal fraction soil group C = 0.890
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  67.57
Pervious area fraction =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      2.143(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.350


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```

```
Process from Point/Station       10.200 to Point/Station       10.200
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.706
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.010
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.13
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =     7.57 min.
Rainfall intensity =      3.089(In/Hr) for a   100.0 year storm
Subarea runoff =      1.527(CFS) for      0.700(Ac.)
Total runoff =      3.670(CFS)      Total area =       1.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.200 to Point/Station       10.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1459.300(Ft.)
Downstream point/station elevation =  1459.100(Ft.)
Pipe length  =     2.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.670(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.670(CFS)
Normal flow depth in pipe =    5.55(In.)
Flow top width inside pipe =    8.75(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.82(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     7.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.200 to Point/Station       10.300
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.520(Ac.)
Runoff from this stream =      3.670(CFS)
Time of concentration =    7.57 min.
Rainfall intensity =     3.089(In/Hr)
Summary of stream data:

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


1        5.850     10.41               2.643
2        3.670      7.57               3.089
Largest stream flow has longer time of concentration
Qp =      5.850 + sum of
        Qb         Ia/Ib
         3.670 *    0.856 =      3.140
```

```
Qp =      8.990

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.850       3.670
Area of streams before confluence:
        2.530        1.520


Results of confluence:
Total flow rate =      8.990(CFS)
Time of concentration =    10.406 min.
Effective stream area after confluence  =      4.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.300 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1459.100(Ft.)
Downstream point/station elevation =  1458.680(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.990(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.990(CFS)
Normal flow depth in pipe =   11.79(In.)
Flow top width inside pipe =   12.31(In.)
Critical Depth =   13.86(In.)
Pipe flow velocity =      8.69(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.300 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.050(Ac.)
Runoff from this stream =      8.990(CFS)
Time of concentration =   10.44 min.
Rainfall intensity =     2.638(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       11.300
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   416.000(Ft.)
Top (of initial area) elevation =  1476.800(Ft.)
Bottom (of initial area) elevation =  1467.300(Ft.)
Difference in elevation =     9.500(Ft.)
Slope =    0.02284  s(percent)=       2.28
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.676 min.
```

```
Rainfall intensity =      3.068(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.670
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  60.29
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      5.065(CFS)
Total initial stream area =        1.920(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.300 to Point/Station       11.300
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.704
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
Time of concentration =     7.68 min.
Rainfall intensity =      3.068(In/Hr) for a   100.0 year storm
Subarea runoff =      0.583(CFS) for      0.270(Ac.)
Total runoff =      5.648(CFS)      Total area =       2.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.300 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1461.500(Ft.)
Downstream point/station elevation =  1458.680(Ft.)
Pipe length  =   265.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.648(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.648(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   13.66(In.)
Critical Depth =   11.54(In.)
Pipe flow velocity =      6.09(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =     8.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.300 to Point/Station       12.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.190(Ac.)
```

```
Runoff from this stream =      5.648(CFS)
Time of concentration =    8.40 min.
Rainfall intensity =     2.935(In/Hr)
Summary of stream data:

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


1        8.990     10.44               2.638
2        5.648      8.40               2.935
Largest stream flow has longer time of concentration
Qp =      8.990 + sum of
        Qb         Ia/Ib
         5.648 *    0.899 =      5.077
Qp =     14.066

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.990       5.648
Area of streams before confluence:
        4.050        2.190


Results of confluence:
Total flow rate =     14.066(CFS)
Time of concentration =    10.445 min.
Effective stream area after confluence  =      6.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1458.680(Ft.)
Downstream point/station elevation =  1452.850(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =    8.71(In.)
Flow top width inside pipe =   14.80(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.06(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1452.850(Ft.)
Downstream point/station elevation =  1451.910(Ft.)
Pipe length  =   101.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     21.00(In.)
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```
Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =   15.87(In.)
Flow top width inside pipe =   18.05(In.)
Critical Depth =   16.72(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    10.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1451.910(Ft.)
Downstream point/station elevation =  1448.600(Ft.)
Pipe length  =   261.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.066(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.066(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   16.72(In.)
Pipe flow velocity =      8.22(Ft/s)
Travel time through pipe =    0.53 min.
Time of concentration (TC) =    11.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.240(Ac.)
Runoff from this stream =     14.066(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     2.543(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.100
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   684.000(Ft.)
Top (of initial area) elevation =  1477.400(Ft.)
Bottom (of initial area) elevation =  1460.800(Ft.)
Difference in elevation =    16.600(Ft.)
Slope =    0.02427  s(percent)=       2.43
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.593 min.
Rainfall intensity =      2.903(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 = 0.250
Decimal fraction soil group C = 0.750
```

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Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  65.75
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.408(CFS)
Total initial stream area =        0.940(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.100 to Point/Station       15.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1452.200(Ft.)
Downstream point/station elevation =  1450.800(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.408(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.408(CFS)
Normal flow depth in pipe =    5.96(In.)
Flow top width inside pipe =    8.51(In.)
Critical Depth =    8.22(In.)
Pipe flow velocity =      7.74(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     8.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.300 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1450.800(Ft.)
Downstream point/station elevation =  1448.600(Ft.)
Pipe length  =    89.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.408(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.408(CFS)
Normal flow depth in pipe =    6.84(In.)
Flow top width inside pipe =    7.68(In.)
Critical Depth =    8.22(In.)
Pipe flow velocity =      6.68(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     8.90 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.300 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.940(Ac.)
Runoff from this stream =      2.408(CFS)
Time of concentration =    8.90 min.
Rainfall intensity =     2.853(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

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


1       14.066     11.25               2.543
2        2.408      8.90               2.853
Largest stream flow has longer time of concentration
Qp =     14.066 + sum of
        Qb         Ia/Ib
         2.408 *    0.892 =      2.147
Qp =     16.213

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.066       2.408
Area of streams before confluence:
        6.240        0.940


Results of confluence:
Total flow rate =     16.213(CFS)
Time of concentration =    11.251 min.
Effective stream area after confluence  =      7.180(Ac.)
End of computations, total study area =           7.18 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.277
Area averaged RI index number =  60.7
```

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 10/10/23 File: 100XUH24100.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
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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 762.00(Ft.)
Length along longest watercourse measured to centroid = 327.00(Ft.)
Length along longest watercourse = 0.144 Mi.
Length along longest watercourse measured to centroid = 0.062 Mi.
Difference in elevation = 7.20(Ft.)
Slope along watercourse = 49.8898 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.038 Hr.
Lag time = 2.28 Min.
25% of lag time = 0.57 Min.
40% of lag time = 0.91 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]
7.18	2.00	14.36

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	5.00	35.90

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 %
7.180	65.10	0.710

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.1	65.1	0.415	0.710	0.150	1.000	0.150
					Sum (F) =	0.150

Area averaged mean soil loss (F) (In/Hr) = 0.150
Minimum soil loss rate ((In/Hr)) = 0.075
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.332

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	219.144	46.524	3.367
2	0.167	438.289	42.054	3.043
3	0.250	657.433	8.069	0.584
4	0.333	876.578	3.353	0.243
		Sum = 100.000	Sum=	7.236

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	(0.266)	0.013	0.027
2	0.17	0.07	0.040	(0.265)	0.013	0.027
3	0.25	0.07	0.040	(0.263)	0.013	0.027
4	0.33	0.10	0.060	(0.262)	0.020	0.040
5	0.42	0.10	0.060	(0.261)	0.020	0.040
6	0.50	0.10	0.060	(0.260)	0.020	0.040
7	0.58	0.10	0.060	(0.259)	0.020	0.040
8	0.67	0.10	0.060	(0.258)	0.020	0.040
9	0.75	0.10	0.060	(0.257)	0.020	0.040
10	0.83	0.13	0.080	(0.256)	0.027	0.053
11	0.92	0.13	0.080	(0.255)	0.027	0.053
12	1.00	0.13	0.080	(0.254)	0.027	0.053
13	1.08	0.10	0.060	(0.253)	0.020	0.040
14	1.17	0.10	0.060	(0.252)	0.020	0.040
15	1.25	0.10	0.060	(0.251)	0.020	0.040
16	1.33	0.10	0.060	(0.250)	0.020	0.040
17	1.42	0.10	0.060	(0.249)	0.020	0.040
18	1.50	0.10	0.060	(0.248)	0.020	0.040
19	1.58	0.10	0.060	(0.247)	0.020	0.040
20	1.67	0.10	0.060	(0.246)	0.020	0.040
21	1.75	0.10	0.060	(0.245)	0.020	0.040
22	1.83	0.13	0.080	(0.244)	0.027	0.053
23	1.92	0.13	0.080	(0.243)	0.027	0.053
24	2.00	0.13	0.080	(0.242)	0.027	0.053
25	2.08	0.13	0.080	(0.241)	0.027	0.053
26	2.17	0.13	0.080	(0.240)	0.027	0.053
27	2.25	0.13	0.080	(0.239)	0.027	0.053
28	2.33	0.13	0.080	(0.239)	0.027	0.053
29	2.42	0.13	0.080	(0.238)	0.027	0.053
30	2.50	0.13	0.080	(0.237)	0.027	0.053
31	2.58	0.17	0.100	(0.236)	0.033	0.067
32	2.67	0.17	0.100	(0.235)	0.033	0.067
33	2.75	0.17	0.100	(0.234)	0.033	0.067
34	2.83	0.17	0.100	(0.233)	0.033	0.067
35	2.92	0.17	0.100	(0.232)	0.033	0.067
36	3.00	0.17	0.100	(0.231)	0.033	0.067
37	3.08	0.17	0.100	(0.230)	0.033	0.067
38	3.17	0.17	0.100	(0.229)	0.033	0.067
39	3.25	0.17	0.100	(0.228)	0.033	0.067
40	3.33	0.17	0.100	(0.227)	0.033	0.067
41	3.42	0.17	0.100	(0.226)	0.033	0.067
42	3.50	0.17	0.100	(0.225)	0.033	0.067
43	3.58	0.17	0.100	(0.224)	0.033	0.067

44	3.67	0.17	0.100	(0.223)	0.033	0.067
45	3.75	0.17	0.100	(0.222)	0.033	0.067
46	3.83	0.20	0.120	(0.221)	0.040	0.080
47	3.92	0.20	0.120	(0.220)	0.040	0.080
48	4.00	0.20	0.120	(0.219)	0.040	0.080
49	4.08	0.20	0.120	(0.219)	0.040	0.080
50	4.17	0.20	0.120	(0.218)	0.040	0.080
51	4.25	0.20	0.120	(0.217)	0.040	0.080
52	4.33	0.23	0.140	(0.216)	0.046	0.094
53	4.42	0.23	0.140	(0.215)	0.046	0.094
54	4.50	0.23	0.140	(0.214)	0.046	0.094
55	4.58	0.23	0.140	(0.213)	0.046	0.094
56	4.67	0.23	0.140	(0.212)	0.046	0.094
57	4.75	0.23	0.140	(0.211)	0.046	0.094
58	4.83	0.27	0.160	(0.210)	0.053	0.107
59	4.92	0.27	0.160	(0.209)	0.053	0.107
60	5.00	0.27	0.160	(0.208)	0.053	0.107
61	5.08	0.20	0.120	(0.208)	0.040	0.080
62	5.17	0.20	0.120	(0.207)	0.040	0.080
63	5.25	0.20	0.120	(0.206)	0.040	0.080
64	5.33	0.23	0.140	(0.205)	0.046	0.094
65	5.42	0.23	0.140	(0.204)	0.046	0.094
66	5.50	0.23	0.140	(0.203)	0.046	0.094
67	5.58	0.27	0.160	(0.202)	0.053	0.107
68	5.67	0.27	0.160	(0.201)	0.053	0.107
69	5.75	0.27	0.160	(0.200)	0.053	0.107
70	5.83	0.27	0.160	(0.199)	0.053	0.107
71	5.92	0.27	0.160	(0.199)	0.053	0.107
72	6.00	0.27	0.160	(0.198)	0.053	0.107
73	6.08	0.30	0.180	(0.197)	0.060	0.120
74	6.17	0.30	0.180	(0.196)	0.060	0.120
75	6.25	0.30	0.180	(0.195)	0.060	0.120
76	6.33	0.30	0.180	(0.194)	0.060	0.120
77	6.42	0.30	0.180	(0.193)	0.060	0.120
78	6.50	0.30	0.180	(0.192)	0.060	0.120
79	6.58	0.33	0.200	(0.192)	0.066	0.134
80	6.67	0.33	0.200	(0.191)	0.066	0.134
81	6.75	0.33	0.200	(0.190)	0.066	0.134
82	6.83	0.33	0.200	(0.189)	0.066	0.134
83	6.92	0.33	0.200	(0.188)	0.066	0.134
84	7.00	0.33	0.200	(0.187)	0.066	0.134
85	7.08	0.33	0.200	(0.186)	0.066	0.134
86	7.17	0.33	0.200	(0.186)	0.066	0.134
87	7.25	0.33	0.200	(0.185)	0.066	0.134
88	7.33	0.37	0.220	(0.184)	0.073	0.147
89	7.42	0.37	0.220	(0.183)	0.073	0.147
90	7.50	0.37	0.220	(0.182)	0.073	0.147
91	7.58	0.40	0.240	(0.181)	0.080	0.160
92	7.67	0.40	0.240	(0.181)	0.080	0.160
93	7.75	0.40	0.240	(0.180)	0.080	0.160

94	7.83	0.43	0.260	(0.179)	0.086	0.174
95	7.92	0.43	0.260	(0.178)	0.086	0.174
96	8.00	0.43	0.260	(0.177)	0.086	0.174
97	8.08	0.50	0.300	(0.176)	0.100	0.200
98	8.17	0.50	0.300	(0.176)	0.100	0.200
99	8.25	0.50	0.300	(0.175)	0.100	0.200
100	8.33	0.50	0.300	(0.174)	0.100	0.200
101	8.42	0.50	0.300	(0.173)	0.100	0.200
102	8.50	0.50	0.300	(0.172)	0.100	0.200
103	8.58	0.53	0.320	(0.172)	0.106	0.214
104	8.67	0.53	0.320	(0.171)	0.106	0.214
105	8.75	0.53	0.320	(0.170)	0.106	0.214
106	8.83	0.57	0.340	(0.169)	0.113	0.227
107	8.92	0.57	0.340	(0.168)	0.113	0.227
108	9.00	0.57	0.340	(0.168)	0.113	0.227
109	9.08	0.63	0.380	(0.167)	0.126	0.254
110	9.17	0.63	0.380	(0.166)	0.126	0.254
111	9.25	0.63	0.380	(0.165)	0.126	0.254
112	9.33	0.67	0.400	(0.164)	0.133	0.267
113	9.42	0.67	0.400	(0.164)	0.133	0.267
114	9.50	0.67	0.400	(0.163)	0.133	0.267
115	9.58	0.70	0.420	(0.162)	0.139	0.281
116	9.67	0.70	0.420	(0.161)	0.139	0.281
117	9.75	0.70	0.420	(0.160)	0.139	0.281
118	9.83	0.73	0.440	(0.160)	0.146	0.294
119	9.92	0.73	0.440	(0.159)	0.146	0.294
120	10.00	0.73	0.440	(0.158)	0.146	0.294
121	10.08	0.50	0.300	(0.157)	0.100	0.200
122	10.17	0.50	0.300	(0.157)	0.100	0.200
123	10.25	0.50	0.300	(0.156)	0.100	0.200
124	10.33	0.50	0.300	(0.155)	0.100	0.200
125	10.42	0.50	0.300	(0.154)	0.100	0.200
126	10.50	0.50	0.300	(0.154)	0.100	0.200
127	10.58	0.67	0.400	(0.153)	0.133	0.267
128	10.67	0.67	0.400	(0.152)	0.133	0.267
129	10.75	0.67	0.400	(0.151)	0.133	0.267
130	10.83	0.67	0.400	(0.151)	0.133	0.267
131	10.92	0.67	0.400	(0.150)	0.133	0.267
132	11.00	0.67	0.400	(0.149)	0.133	0.267
133	11.08	0.63	0.380	(0.148)	0.126	0.254
134	11.17	0.63	0.380	(0.148)	0.126	0.254
135	11.25	0.63	0.380	(0.147)	0.126	0.254
136	11.33	0.63	0.380	(0.146)	0.126	0.254
137	11.42	0.63	0.380	(0.146)	0.126	0.254
138	11.50	0.63	0.380	(0.145)	0.126	0.254
139	11.58	0.57	0.340	(0.144)	0.113	0.227
140	11.67	0.57	0.340	(0.143)	0.113	0.227
141	11.75	0.57	0.340	(0.143)	0.113	0.227
142	11.83	0.60	0.360	(0.142)	0.120	0.240
143	11.92	0.60	0.360	(0.141)	0.120	0.240

144	12.00	0.60	0.360	(0.141)	0.120	0.240
145	12.08	0.83	0.500	0.140	(0.166)	0.360
146	12.17	0.83	0.500	0.139	(0.166)	0.361
147	12.25	0.83	0.500	0.138	(0.166)	0.362
148	12.33	0.87	0.520	0.138	(0.173)	0.382
149	12.42	0.87	0.520	0.137	(0.173)	0.383
150	12.50	0.87	0.520	0.136	(0.173)	0.384
151	12.58	0.93	0.560	0.136	(0.186)	0.424
152	12.67	0.93	0.560	0.135	(0.186)	0.425
153	12.75	0.93	0.560	0.134	(0.186)	0.426
154	12.83	0.97	0.580	0.134	(0.193)	0.446
155	12.92	0.97	0.580	0.133	(0.193)	0.447
156	13.00	0.97	0.580	0.132	(0.193)	0.448
157	13.08	1.13	0.680	0.132	(0.226)	0.548
158	13.17	1.13	0.680	0.131	(0.226)	0.549
159	13.25	1.13	0.680	0.130	(0.226)	0.550
160	13.33	1.13	0.680	0.130	(0.226)	0.550
161	13.42	1.13	0.680	0.129	(0.226)	0.551
162	13.50	1.13	0.680	0.128	(0.226)	0.552
163	13.58	0.77	0.460	0.128	(0.153)	0.332
164	13.67	0.77	0.460	0.127	(0.153)	0.333
165	13.75	0.77	0.460	0.126	(0.153)	0.334
166	13.83	0.77	0.460	0.126	(0.153)	0.334
167	13.92	0.77	0.460	0.125	(0.153)	0.335
168	14.00	0.77	0.460	0.124	(0.153)	0.336
169	14.08	0.90	0.540	0.124	(0.179)	0.416
170	14.17	0.90	0.540	0.123	(0.179)	0.417
171	14.25	0.90	0.540	0.123	(0.179)	0.417
172	14.33	0.87	0.520	0.122	(0.173)	0.398
173	14.42	0.87	0.520	0.121	(0.173)	0.399
174	14.50	0.87	0.520	0.121	(0.173)	0.399
175	14.58	0.87	0.520	0.120	(0.173)	0.400
176	14.67	0.87	0.520	0.119	(0.173)	0.401
177	14.75	0.87	0.520	0.119	(0.173)	0.401
178	14.83	0.83	0.500	0.118	(0.166)	0.382
179	14.92	0.83	0.500	0.118	(0.166)	0.382
180	15.00	0.83	0.500	0.117	(0.166)	0.383
181	15.08	0.80	0.480	0.116	(0.159)	0.364
182	15.17	0.80	0.480	0.116	(0.159)	0.364
183	15.25	0.80	0.480	0.115	(0.159)	0.365
184	15.33	0.77	0.460	0.115	(0.153)	0.345
185	15.42	0.77	0.460	0.114	(0.153)	0.346
186	15.50	0.77	0.460	0.113	(0.153)	0.347
187	15.58	0.63	0.380	0.113	(0.126)	0.267
188	15.67	0.63	0.380	0.112	(0.126)	0.268
189	15.75	0.63	0.380	0.112	(0.126)	0.268
190	15.83	0.63	0.380	0.111	(0.126)	0.269
191	15.92	0.63	0.380	0.111	(0.126)	0.269
192	16.00	0.63	0.380	0.110	(0.126)	0.270
193	16.08	0.13	0.080	(0.109)	0.027	0.053

194	16.17	0.13	0.080	(0.109)	0.027	0.053
195	16.25	0.13	0.080	(0.108)	0.027	0.053
196	16.33	0.13	0.080	(0.108)	0.027	0.053
197	16.42	0.13	0.080	(0.107)	0.027	0.053
198	16.50	0.13	0.080	(0.107)	0.027	0.053
199	16.58	0.10	0.060	(0.106)	0.020	0.040
200	16.67	0.10	0.060	(0.106)	0.020	0.040
201	16.75	0.10	0.060	(0.105)	0.020	0.040
202	16.83	0.10	0.060	(0.105)	0.020	0.040
203	16.92	0.10	0.060	(0.104)	0.020	0.040
204	17.00	0.10	0.060	(0.103)	0.020	0.040
205	17.08	0.17	0.100	(0.103)	0.033	0.067
206	17.17	0.17	0.100	(0.102)	0.033	0.067
207	17.25	0.17	0.100	(0.102)	0.033	0.067
208	17.33	0.17	0.100	(0.101)	0.033	0.067
209	17.42	0.17	0.100	(0.101)	0.033	0.067
210	17.50	0.17	0.100	(0.100)	0.033	0.067
211	17.58	0.17	0.100	(0.100)	0.033	0.067
212	17.67	0.17	0.100	(0.099)	0.033	0.067
213	17.75	0.17	0.100	(0.099)	0.033	0.067
214	17.83	0.13	0.080	(0.098)	0.027	0.053
215	17.92	0.13	0.080	(0.098)	0.027	0.053
216	18.00	0.13	0.080	(0.097)	0.027	0.053
217	18.08	0.13	0.080	(0.097)	0.027	0.053
218	18.17	0.13	0.080	(0.096)	0.027	0.053
219	18.25	0.13	0.080	(0.096)	0.027	0.053
220	18.33	0.13	0.080	(0.096)	0.027	0.053
221	18.42	0.13	0.080	(0.095)	0.027	0.053
222	18.50	0.13	0.080	(0.095)	0.027	0.053
223	18.58	0.10	0.060	(0.094)	0.020	0.040
224	18.67	0.10	0.060	(0.094)	0.020	0.040
225	18.75	0.10	0.060	(0.093)	0.020	0.040
226	18.83	0.07	0.040	(0.093)	0.013	0.027
227	18.92	0.07	0.040	(0.092)	0.013	0.027
228	19.00	0.07	0.040	(0.092)	0.013	0.027
229	19.08	0.10	0.060	(0.091)	0.020	0.040
230	19.17	0.10	0.060	(0.091)	0.020	0.040
231	19.25	0.10	0.060	(0.091)	0.020	0.040
232	19.33	0.13	0.080	(0.090)	0.027	0.053
233	19.42	0.13	0.080	(0.090)	0.027	0.053
234	19.50	0.13	0.080	(0.089)	0.027	0.053
235	19.58	0.10	0.060	(0.089)	0.020	0.040
236	19.67	0.10	0.060	(0.089)	0.020	0.040
237	19.75	0.10	0.060	(0.088)	0.020	0.040
238	19.83	0.07	0.040	(0.088)	0.013	0.027
239	19.92	0.07	0.040	(0.087)	0.013	0.027
240	20.00	0.07	0.040	(0.087)	0.013	0.027
241	20.08	0.10	0.060	(0.087)	0.020	0.040
242	20.17	0.10	0.060	(0.086)	0.020	0.040
243	20.25	0.10	0.060	(0.086)	0.020	0.040

244	20.33	0.10	0.060	(0.085)	0.020	0.040
245	20.42	0.10	0.060	(0.085)	0.020	0.040
246	20.50	0.10	0.060	(0.085)	0.020	0.040
247	20.58	0.10	0.060	(0.084)	0.020	0.040
248	20.67	0.10	0.060	(0.084)	0.020	0.040
249	20.75	0.10	0.060	(0.084)	0.020	0.040
250	20.83	0.07	0.040	(0.083)	0.013	0.027
251	20.92	0.07	0.040	(0.083)	0.013	0.027
252	21.00	0.07	0.040	(0.083)	0.013	0.027
253	21.08	0.10	0.060	(0.082)	0.020	0.040
254	21.17	0.10	0.060	(0.082)	0.020	0.040
255	21.25	0.10	0.060	(0.082)	0.020	0.040
256	21.33	0.07	0.040	(0.081)	0.013	0.027
257	21.42	0.07	0.040	(0.081)	0.013	0.027
258	21.50	0.07	0.040	(0.081)	0.013	0.027
259	21.58	0.10	0.060	(0.080)	0.020	0.040
260	21.67	0.10	0.060	(0.080)	0.020	0.040
261	21.75	0.10	0.060	(0.080)	0.020	0.040
262	21.83	0.07	0.040	(0.080)	0.013	0.027
263	21.92	0.07	0.040	(0.079)	0.013	0.027
264	22.00	0.07	0.040	(0.079)	0.013	0.027
265	22.08	0.10	0.060	(0.079)	0.020	0.040
266	22.17	0.10	0.060	(0.079)	0.020	0.040
267	22.25	0.10	0.060	(0.078)	0.020	0.040
268	22.33	0.07	0.040	(0.078)	0.013	0.027
269	22.42	0.07	0.040	(0.078)	0.013	0.027
270	22.50	0.07	0.040	(0.078)	0.013	0.027
271	22.58	0.07	0.040	(0.077)	0.013	0.027
272	22.67	0.07	0.040	(0.077)	0.013	0.027
273	22.75	0.07	0.040	(0.077)	0.013	0.027
274	22.83	0.07	0.040	(0.077)	0.013	0.027
275	22.92	0.07	0.040	(0.077)	0.013	0.027
276	23.00	0.07	0.040	(0.076)	0.013	0.027
277	23.08	0.07	0.040	(0.076)	0.013	0.027
278	23.17	0.07	0.040	(0.076)	0.013	0.027
279	23.25	0.07	0.040	(0.076)	0.013	0.027
280	23.33	0.07	0.040	(0.076)	0.013	0.027
281	23.42	0.07	0.040	(0.076)	0.013	0.027
282	23.50	0.07	0.040	(0.075)	0.013	0.027
283	23.58	0.07	0.040	(0.075)	0.013	0.027
284	23.67	0.07	0.040	(0.075)	0.013	0.027
285	23.75	0.07	0.040	(0.075)	0.013	0.027
286	23.83	0.07	0.040	(0.075)	0.013	0.027
287	23.92	0.07	0.040	(0.075)	0.013	0.027
288	24.00	0.07	0.040	(0.075)	0.013	0.027

(Loss Rate Not Used)

Sum = 100.0 Sum = 42.3

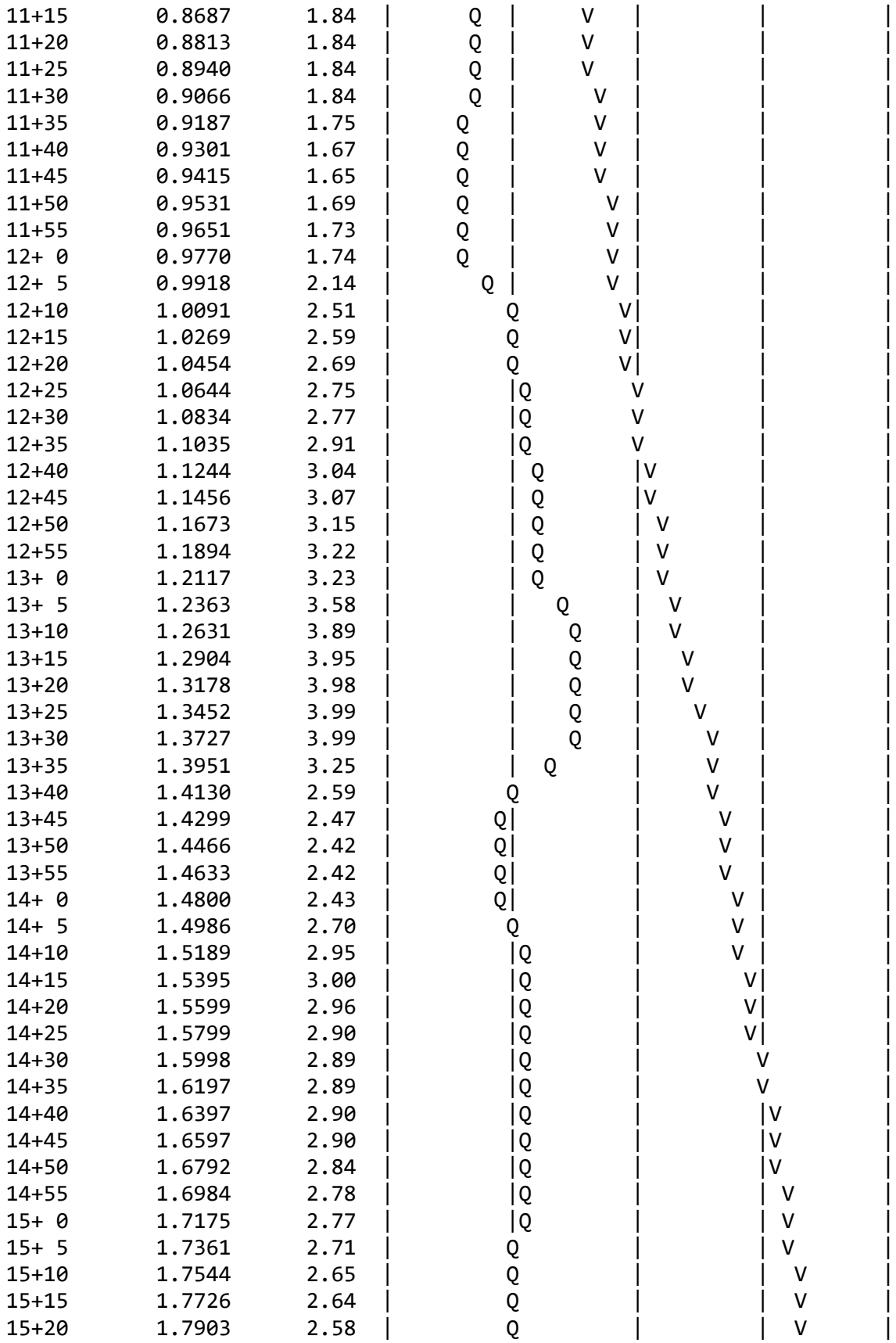
Flood volume = Effective rainfall 3.52(In)
times area 7.2(Ac.)/[(In)/(Ft.)] = 2.1(Ac.Ft)
Total soil loss = 1.48(In)

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      Total soil loss =     0.883(Ac.Ft)
      Total rainfall =      5.00(In)
      Flood volume =       91865.0 Cubic Feet
      Total soil loss =       38450.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.991(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      0.09  Q         |         |         |         |
  0+10       0.0018      0.17  Q         |         |         |         |
  0+15       0.0031      0.19  Q         |         |         |         |
  0+20       0.0047      0.24  Q         |         |         |         |
  0+25       0.0067      0.28  VQ        |         |         |         |
  0+30       0.0086      0.29  VQ        |         |         |         |
  0+35       0.0106      0.29  VQ        |         |         |         |
  0+40       0.0126      0.29  VQ        |         |         |         |
  0+45       0.0146      0.29  VQ        |         |         |         |
  0+50       0.0169      0.34  VQ        |         |         |         |
  0+55       0.0195      0.38  VQ        |         |         |         |
  1+ 0       0.0222      0.38  VQ        |         |         |         |
  1+ 5       0.0245      0.34  VQ        |         |         |         |
  1+10       0.0266      0.30  VQ        |         |         |         |
  1+15       0.0286      0.29  VQ        |         |         |         |
  1+20       0.0306      0.29  VQ        |         |         |         |
  1+25       0.0326      0.29  VQ        |         |         |         |
  1+30       0.0346      0.29  VQ        |         |         |         |
  1+35       0.0366      0.29  VQ        |         |         |         |
  1+40       0.0386      0.29  VQ        |         |         |         |
  1+45       0.0406      0.29  VQ        |         |         |         |
  1+50       0.0429      0.34  VQ        |         |         |         |
  1+55       0.0455      0.38  VQ        |         |         |         |
  2+ 0       0.0481      0.38  VQ        |         |         |         |
  2+ 5       0.0508      0.39  VQ        |         |         |         |
  2+10       0.0535      0.39  |Q        |         |         |         |
  2+15       0.0561      0.39  |Q        |         |         |         |
  2+20       0.0588      0.39  |Q        |         |         |         |
  2+25       0.0615      0.39  |Q        |         |         |         |
  2+30       0.0641      0.39  |Q        |         |         |         |
  2+35       0.0671      0.43  |Q        |         |         |         |
  2+40       0.0704      0.47  |Q        |         |         |         |
  2+45       0.0737      0.48  |Q        |         |         |         |
  2+50       0.0770      0.48  |Q        |         |         |         |
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2+55	0.0803	0.48	Q				
3+ 0	0.0837	0.48	Q				
3+ 5	0.0870	0.48	Q				
3+10	0.0903	0.48	Q				
3+15	0.0937	0.48	Q				
3+20	0.0970	0.48	Q				
3+25	0.1003	0.48	Q				
3+30	0.1036	0.48	Q				
3+35	0.1070	0.48	QV				
3+40	0.1103	0.48	QV				
3+45	0.1136	0.48	QV				
3+50	0.1173	0.53	Q				
3+55	0.1212	0.57	Q				
4+ 0	0.1252	0.58	Q				
4+ 5	0.1292	0.58	Q				
4+10	0.1332	0.58	Q				
4+15	0.1372	0.58	Q				
4+20	0.1415	0.63	Q				
4+25	0.1461	0.67	Q				
4+30	0.1507	0.67	Q				
4+35	0.1554	0.68	Q				
4+40	0.1600	0.68	QV				
4+45	0.1647	0.68	QV				
4+50	0.1697	0.72	QV				
4+55	0.1749	0.76	Q				
5+ 0	0.1802	0.77	Q				
5+ 5	0.1849	0.68	QV				
5+10	0.1891	0.60	QV				
5+15	0.1931	0.59	QV				
5+20	0.1974	0.63	QV				
5+25	0.2020	0.67	QV				
5+30	0.2067	0.67	QV				
5+35	0.2116	0.72	Q V				
5+40	0.2169	0.76	QV				
5+45	0.2222	0.77	QV				
5+50	0.2275	0.77	QV				
5+55	0.2328	0.77	QV				
6+ 0	0.2382	0.77	QV				
6+ 5	0.2438	0.82	QV				
6+10	0.2497	0.86	QV				
6+15	0.2557	0.87	QV				
6+20	0.2617	0.87	QV				
6+25	0.2677	0.87	Q V				
6+30	0.2737	0.87	Q V				
6+35	0.2800	0.92	Q V				
6+40	0.2866	0.96	Q V				
6+45	0.2932	0.96	Q V				
6+50	0.2999	0.97	Q V				
6+55	0.3065	0.97	Q V				
7+ 0	0.3132	0.97	Q V				

7+ 5	0.3199	0.97	Q V				
7+10	0.3265	0.97	Q V				
7+15	0.3332	0.97	Q V				
7+20	0.3402	1.01	Q V				
7+25	0.3474	1.05	Q V				
7+30	0.3547	1.06	Q V				
7+35	0.3623	1.11	Q V				
7+40	0.3703	1.15	Q V				
7+45	0.3782	1.16	Q V				
7+50	0.3865	1.21	Q V				
7+55	0.3951	1.25	Q V				
8+ 0	0.4038	1.25	Q V				
8+ 5	0.4130	1.35	Q V				
8+10	0.4229	1.43	Q V				
8+15	0.4328	1.44	Q V				
8+20	0.4428	1.45	Q V				
8+25	0.4528	1.45	Q V				
8+30	0.4628	1.45	Q V				
8+35	0.4731	1.50	Q V				
8+40	0.4837	1.54	Q V				
8+45	0.4943	1.54	Q V				
8+50	0.5053	1.59	Q V				
8+55	0.5165	1.63	Q V				
9+ 0	0.5278	1.64	Q V				
9+ 5	0.5398	1.73	Q V				
9+10	0.5523	1.82	Q V				
9+15	0.5649	1.83	Q V				
9+20	0.5779	1.88	Q V				
9+25	0.5911	1.92	Q V				
9+30	0.6044	1.93	Q V				
9+35	0.6181	1.98	Q V				
9+40	0.6320	2.02	Q V				
9+45	0.6459	2.03	Q V				
9+50	0.6602	2.08	Q V				
9+55	0.6748	2.12	Q V				
10+ 0	0.6894	2.12	Q V				
10+ 5	0.7019	1.81	Q V				
10+10	0.7124	1.53	Q V				
10+15	0.7226	1.47	Q V				
10+20	0.7326	1.45	Q V				
10+25	0.7426	1.45	Q V				
10+30	0.7526	1.45	Q V				
10+35	0.7641	1.68	Q V				
10+40	0.7771	1.88	Q V				
10+45	0.7903	1.92	Q V				
10+50	0.8036	1.93	Q V				
10+55	0.8169	1.93	Q V				
11+ 0	0.8302	1.93	Q V				
11+ 5	0.8433	1.89	Q V				
11+10	0.8560	1.85	Q V				



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15+25       1.8077      2.52  |          Q          |          |   V      |
15+30       1.8249      2.51  |          Q          |          |   V      |
15+35       1.8404      2.24  |        Q |          |          |   V      |
15+40       1.8542      2.00  |        Q |          |          |    V     |
15+45       1.8677      1.96  |       Q  |          |          |    V     |
15+50       1.8810      1.94  |       Q  |          |          |    V     |
15+55       1.8945      1.95  |       Q  |          |          |    V     |
16+ 0       1.9079      1.95  |       Q  |          |          |     V    |
16+ 5       1.9163      1.22  |    Q     |          |          |     V    |
16+10       1.9202      0.57  |  Q       |          |          |     V    |
16+15       1.9233      0.44  |Q         |          |          |     V    |
16+20       1.9259      0.39  |Q         |          |          |     V    |
16+25       1.9286      0.39  |Q         |          |          |     V    |
16+30       1.9313      0.39  |Q         |          |          |     V    |
16+35       1.9336      0.34  |Q         |          |          |     V    |
16+40       1.9357      0.30  |Q         |          |          |     V    |
16+45       1.9377      0.29  |Q         |          |          |     V    |
16+50       1.9397      0.29  |Q         |          |          |     V    |
16+55       1.9417      0.29  |Q         |          |          |     V    |
17+ 0       1.9437      0.29  |Q         |          |          |     V    |
17+ 5       1.9463      0.38  |Q         |          |          |     V    |
17+10       1.9495      0.46  |Q         |          |          |     V    |
17+15       1.9528      0.48  |Q         |          |          |      V   |
17+20       1.9561      0.48  |Q         |          |          |      V   |
17+25       1.9594      0.48  |Q         |          |          |      V   |
17+30       1.9628      0.48  |Q         |          |          |      V   |
17+35       1.9661      0.48  |Q         |          |          |      V   |
17+40       1.9694      0.48  |Q         |          |          |      V   |
17+45       1.9728      0.48  |Q         |          |          |      V   |
17+50       1.9758      0.44  |Q         |          |          |      V   |
17+55       1.9785      0.40  |Q         |          |          |      V   |
18+ 0       1.9812      0.39  |Q         |          |          |      V   |
18+ 5       1.9839      0.39  |Q         |          |          |      V   |
18+10       1.9865      0.39  |Q         |          |          |      V   |
18+15       1.9892      0.39  |Q         |          |          |      V   |
18+20       1.9919      0.39  |Q         |          |          |      V   |
18+25       1.9945      0.39  |Q         |          |          |      V   |
18+30       1.9972      0.39  |Q         |          |          |      V   |
18+35       1.9996      0.34  |Q         |          |          |      V   |
18+40       2.0016      0.30  |Q         |          |          |      V   |
18+45       2.0036      0.29  |Q         |          |          |       V  |
18+50       2.0053      0.25  Q          |          |          |       V  |
18+55       2.0067      0.20  Q          |          |          |       V  |
19+ 0       2.0081      0.20  Q          |          |          |       V  |
19+ 5       2.0097      0.24  Q          |          |          |       V  |
19+10       2.0117      0.28  |Q         |          |          |       V  |
19+15       2.0136      0.29  |Q         |          |          |       V  |
19+20       2.0159      0.34  |Q         |          |          |       V  |
19+25       2.0185      0.38  |Q         |          |          |       V  |
19+30       2.0212      0.38  |Q         |          |          |       V  |
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19+35	2.0235	0.34	|Q	|	|	|	V |
19+40	2.0256	0.30	|Q	|	|	|	V |
19+45	2.0276	0.29	|Q	|	|	|	V |
19+50	2.0293	0.25	Q	|	|	|	V |
19+55	2.0307	0.20	Q	|	|	|	V |
20+ 0	2.0321	0.20	Q	|	|	|	V |
20+ 5	2.0337	0.24	Q	|	|	|	V |
20+10	2.0356	0.28	|Q	|	|	|	V |
20+15	2.0376	0.29	|Q	|	|	|	V |
20+20	2.0396	0.29	|Q	|	|	|	V |
20+25	2.0416	0.29	|Q	|	|	|	V |
20+30	2.0436	0.29	|Q	|	|	|	V |
20+35	2.0456	0.29	|Q	|	|	|	V |
20+40	2.0476	0.29	|Q	|	|	|	V |
20+45	2.0496	0.29	|Q	|	|	|	V |
20+50	2.0513	0.25	Q	|	|	|	V |
20+55	2.0527	0.20	Q	|	|	|	V |
21+ 0	2.0541	0.20	Q	|	|	|	V |
21+ 5	2.0557	0.24	Q	|	|	|	V |
21+10	2.0576	0.28	|Q	|	|	|	V|
21+15	2.0596	0.29	|Q	|	|	|	V|
21+20	2.0613	0.25	Q	|	|	|	V|
21+25	2.0627	0.20	Q	|	|	|	V|
21+30	2.0641	0.20	Q	|	|	|	V|
21+35	2.0657	0.24	Q	|	|	|	V|
21+40	2.0676	0.28	|Q	|	|	|	V|
21+45	2.0696	0.29	|Q	|	|	|	V|
21+50	2.0713	0.25	Q	|	|	|	V|
21+55	2.0727	0.20	Q	|	|	|	V|
22+ 0	2.0740	0.20	Q	|	|	|	V|
22+ 5	2.0757	0.24	Q	|	|	|	V|
22+10	2.0776	0.28	|Q	|	|	|	V|
22+15	2.0796	0.29	|Q	|	|	|	V|
22+20	2.0813	0.25	Q	|	|	|	V|
22+25	2.0827	0.20	Q	|	|	|	V|
22+30	2.0840	0.20	Q	|	|	|	V|
22+35	2.0854	0.19	Q	|	|	|	V|
22+40	2.0867	0.19	Q	|	|	|	V|
22+45	2.0880	0.19	Q	|	|	|	V|
22+50	2.0894	0.19	Q	|	|	|	V|
22+55	2.0907	0.19	Q	|	|	|	V|
23+ 0	2.0920	0.19	Q	|	|	|	V|
23+ 5	2.0934	0.19	Q	|	|	|	V|
23+10	2.0947	0.19	Q	|	|	|	V|
23+15	2.0960	0.19	Q	|	|	|	V|
23+20	2.0974	0.19	Q	|	|	|	V|
23+25	2.0987	0.19	Q	|	|	|	V|
23+30	2.1000	0.19	Q	|	|	|	V|
23+35	2.1014	0.19	Q	|	|	|	V|
23+40	2.1027	0.19	Q	|	|	|	V|

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   23+45       2.1040      0.19  Q         |          |          |        V|
   23+50       2.1054      0.19  Q         |          |          |        V|
   23+55       2.1067      0.19  Q         |          |          |        V|
   24+ 0       2.1080      0.19  Q         |          |          |        V|
   24+ 5       2.1087      0.10  Q         |          |          |        V|
   24+10       2.1089      0.02  Q         |          |          |        V|
   24+15       2.1089      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 09/30/24 File: 100PUH24100.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, 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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 1187.00(Ft.)
Length along longest watercourse measured to centroid = 501.00(Ft.)
Length along longest watercourse = 0.225 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 28.80(Ft.)
Slope along watercourse = 128.1078 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.033 Hr.
Lag time = 1.99 Min.
25% of lag time = 0.50 Min.
40% of lag time = 0.80 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]

7.18	2.00	14.36

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	5.00	35.90

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 %
7.180	60.70	0.723

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
60.7	60.7	0.462	0.723	0.162	1.000	0.162
					Sum (F) =	0.162

Area averaged mean soil loss (F) (In/Hr) = 0.162
Minimum soil loss rate ((In/Hr)) = 0.081
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.322

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	251.147	51.045	3.694
2	0.167	502.294	39.983	2.893
3	0.250	753.441	6.982	0.505
4	0.333	1004.588	1.989	0.144
		Sum = 100.000	Sum=	7.236

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	(0.286)	0.013	0.027
2	0.17	0.07	0.040	(0.285)	0.013	0.027
3	0.25	0.07	0.040	(0.284)	0.013	0.027
4	0.33	0.10	0.060	(0.283)	0.019	0.041

5	0.42	0.10	0.060	(0.282)	0.019	0.041
6	0.50	0.10	0.060	(0.281)	0.019	0.041
7	0.58	0.10	0.060	(0.280)	0.019	0.041
8	0.67	0.10	0.060	(0.279)	0.019	0.041
9	0.75	0.10	0.060	(0.278)	0.019	0.041
10	0.83	0.13	0.080	(0.276)	0.026	0.054
11	0.92	0.13	0.080	(0.275)	0.026	0.054
12	1.00	0.13	0.080	(0.274)	0.026	0.054
13	1.08	0.10	0.060	(0.273)	0.019	0.041
14	1.17	0.10	0.060	(0.272)	0.019	0.041
15	1.25	0.10	0.060	(0.271)	0.019	0.041
16	1.33	0.10	0.060	(0.270)	0.019	0.041
17	1.42	0.10	0.060	(0.269)	0.019	0.041
18	1.50	0.10	0.060	(0.268)	0.019	0.041
19	1.58	0.10	0.060	(0.267)	0.019	0.041
20	1.67	0.10	0.060	(0.266)	0.019	0.041
21	1.75	0.10	0.060	(0.265)	0.019	0.041
22	1.83	0.13	0.080	(0.264)	0.026	0.054
23	1.92	0.13	0.080	(0.262)	0.026	0.054
24	2.00	0.13	0.080	(0.261)	0.026	0.054
25	2.08	0.13	0.080	(0.260)	0.026	0.054
26	2.17	0.13	0.080	(0.259)	0.026	0.054
27	2.25	0.13	0.080	(0.258)	0.026	0.054
28	2.33	0.13	0.080	(0.257)	0.026	0.054
29	2.42	0.13	0.080	(0.256)	0.026	0.054
30	2.50	0.13	0.080	(0.255)	0.026	0.054
31	2.58	0.17	0.100	(0.254)	0.032	0.068
32	2.67	0.17	0.100	(0.253)	0.032	0.068
33	2.75	0.17	0.100	(0.252)	0.032	0.068
34	2.83	0.17	0.100	(0.251)	0.032	0.068
35	2.92	0.17	0.100	(0.250)	0.032	0.068
36	3.00	0.17	0.100	(0.249)	0.032	0.068
37	3.08	0.17	0.100	(0.248)	0.032	0.068
38	3.17	0.17	0.100	(0.247)	0.032	0.068
39	3.25	0.17	0.100	(0.246)	0.032	0.068
40	3.33	0.17	0.100	(0.245)	0.032	0.068
41	3.42	0.17	0.100	(0.244)	0.032	0.068
42	3.50	0.17	0.100	(0.243)	0.032	0.068
43	3.58	0.17	0.100	(0.242)	0.032	0.068
44	3.67	0.17	0.100	(0.241)	0.032	0.068
45	3.75	0.17	0.100	(0.240)	0.032	0.068
46	3.83	0.20	0.120	(0.239)	0.039	0.081
47	3.92	0.20	0.120	(0.238)	0.039	0.081
48	4.00	0.20	0.120	(0.237)	0.039	0.081
49	4.08	0.20	0.120	(0.236)	0.039	0.081
50	4.17	0.20	0.120	(0.235)	0.039	0.081
51	4.25	0.20	0.120	(0.234)	0.039	0.081
52	4.33	0.23	0.140	(0.233)	0.045	0.095
53	4.42	0.23	0.140	(0.232)	0.045	0.095
54	4.50	0.23	0.140	(0.231)	0.045	0.095
55	4.58	0.23	0.140	(0.230)	0.045	0.095
56	4.67	0.23	0.140	(0.229)	0.045	0.095
57	4.75	0.23	0.140	(0.228)	0.045	0.095
58	4.83	0.27	0.160	(0.227)	0.051	0.109
59	4.92	0.27	0.160	(0.226)	0.051	0.109
60	5.00	0.27	0.160	(0.225)	0.051	0.109
61	5.08	0.20	0.120	(0.224)	0.039	0.081

62	5.17	0.20	0.120	(0.223)	0.039	0.081
63	5.25	0.20	0.120	(0.222)	0.039	0.081
64	5.33	0.23	0.140	(0.221)	0.045	0.095
65	5.42	0.23	0.140	(0.220)	0.045	0.095
66	5.50	0.23	0.140	(0.219)	0.045	0.095
67	5.58	0.27	0.160	(0.218)	0.051	0.109
68	5.67	0.27	0.160	(0.217)	0.051	0.109
69	5.75	0.27	0.160	(0.216)	0.051	0.109
70	5.83	0.27	0.160	(0.215)	0.051	0.109
71	5.92	0.27	0.160	(0.214)	0.051	0.109
72	6.00	0.27	0.160	(0.213)	0.051	0.109
73	6.08	0.30	0.180	(0.212)	0.058	0.122
74	6.17	0.30	0.180	(0.211)	0.058	0.122
75	6.25	0.30	0.180	(0.210)	0.058	0.122
76	6.33	0.30	0.180	(0.209)	0.058	0.122
77	6.42	0.30	0.180	(0.209)	0.058	0.122
78	6.50	0.30	0.180	(0.208)	0.058	0.122
79	6.58	0.33	0.200	(0.207)	0.064	0.136
80	6.67	0.33	0.200	(0.206)	0.064	0.136
81	6.75	0.33	0.200	(0.205)	0.064	0.136
82	6.83	0.33	0.200	(0.204)	0.064	0.136
83	6.92	0.33	0.200	(0.203)	0.064	0.136
84	7.00	0.33	0.200	(0.202)	0.064	0.136
85	7.08	0.33	0.200	(0.201)	0.064	0.136
86	7.17	0.33	0.200	(0.200)	0.064	0.136
87	7.25	0.33	0.200	(0.199)	0.064	0.136
88	7.33	0.37	0.220	(0.198)	0.071	0.149
89	7.42	0.37	0.220	(0.197)	0.071	0.149
90	7.50	0.37	0.220	(0.197)	0.071	0.149
91	7.58	0.40	0.240	(0.196)	0.077	0.163
92	7.67	0.40	0.240	(0.195)	0.077	0.163
93	7.75	0.40	0.240	(0.194)	0.077	0.163
94	7.83	0.43	0.260	(0.193)	0.084	0.176
95	7.92	0.43	0.260	(0.192)	0.084	0.176
96	8.00	0.43	0.260	(0.191)	0.084	0.176
97	8.08	0.50	0.300	(0.190)	0.096	0.204
98	8.17	0.50	0.300	(0.189)	0.096	0.204
99	8.25	0.50	0.300	(0.189)	0.096	0.204
100	8.33	0.50	0.300	(0.188)	0.096	0.204
101	8.42	0.50	0.300	(0.187)	0.096	0.204
102	8.50	0.50	0.300	(0.186)	0.096	0.204
103	8.58	0.53	0.320	(0.185)	0.103	0.217
104	8.67	0.53	0.320	(0.184)	0.103	0.217
105	8.75	0.53	0.320	(0.183)	0.103	0.217
106	8.83	0.57	0.340	(0.182)	0.109	0.231
107	8.92	0.57	0.340	(0.182)	0.109	0.231
108	9.00	0.57	0.340	(0.181)	0.109	0.231
109	9.08	0.63	0.380	(0.180)	0.122	0.258
110	9.17	0.63	0.380	(0.179)	0.122	0.258
111	9.25	0.63	0.380	(0.178)	0.122	0.258
112	9.33	0.67	0.400	(0.177)	0.129	0.271
113	9.42	0.67	0.400	(0.176)	0.129	0.271
114	9.50	0.67	0.400	(0.176)	0.129	0.271
115	9.58	0.70	0.420	(0.175)	0.135	0.285
116	9.67	0.70	0.420	(0.174)	0.135	0.285
117	9.75	0.70	0.420	(0.173)	0.135	0.285
118	9.83	0.73	0.440	(0.172)	0.142	0.298

119	9.92	0.73	0.440	(0.171)	0.142	0.298
120	10.00	0.73	0.440	(0.171)	0.142	0.298
121	10.08	0.50	0.300	(0.170)	0.096	0.204
122	10.17	0.50	0.300	(0.169)	0.096	0.204
123	10.25	0.50	0.300	(0.168)	0.096	0.204
124	10.33	0.50	0.300	(0.167)	0.096	0.204
125	10.42	0.50	0.300	(0.166)	0.096	0.204
126	10.50	0.50	0.300	(0.166)	0.096	0.204
127	10.58	0.67	0.400	(0.165)	0.129	0.271
128	10.67	0.67	0.400	(0.164)	0.129	0.271
129	10.75	0.67	0.400	(0.163)	0.129	0.271
130	10.83	0.67	0.400	(0.162)	0.129	0.271
131	10.92	0.67	0.400	(0.162)	0.129	0.271
132	11.00	0.67	0.400	(0.161)	0.129	0.271
133	11.08	0.63	0.380	(0.160)	0.122	0.258
134	11.17	0.63	0.380	(0.159)	0.122	0.258
135	11.25	0.63	0.380	(0.158)	0.122	0.258
136	11.33	0.63	0.380	(0.158)	0.122	0.258
137	11.42	0.63	0.380	(0.157)	0.122	0.258
138	11.50	0.63	0.380	(0.156)	0.122	0.258
139	11.58	0.57	0.340	(0.155)	0.109	0.231
140	11.67	0.57	0.340	(0.155)	0.109	0.231
141	11.75	0.57	0.340	(0.154)	0.109	0.231
142	11.83	0.60	0.360	(0.153)	0.116	0.244
143	11.92	0.60	0.360	(0.152)	0.116	0.244
144	12.00	0.60	0.360	(0.152)	0.116	0.244
145	12.08	0.83	0.500	0.151	(0.161)	0.349
146	12.17	0.83	0.500	0.150	(0.161)	0.350
147	12.25	0.83	0.500	0.149	(0.161)	0.351
148	12.33	0.87	0.520	0.149	(0.167)	0.371
149	12.42	0.87	0.520	0.148	(0.167)	0.372
150	12.50	0.87	0.520	0.147	(0.167)	0.373
151	12.58	0.93	0.560	0.146	(0.180)	0.414
152	12.67	0.93	0.560	0.146	(0.180)	0.414
153	12.75	0.93	0.560	0.145	(0.180)	0.415
154	12.83	0.97	0.580	0.144	(0.187)	0.436
155	12.92	0.97	0.580	0.143	(0.187)	0.437
156	13.00	0.97	0.580	0.143	(0.187)	0.437
157	13.08	1.13	0.680	0.142	(0.219)	0.538
158	13.17	1.13	0.680	0.141	(0.219)	0.539
159	13.25	1.13	0.680	0.140	(0.219)	0.540
160	13.33	1.13	0.680	0.140	(0.219)	0.540
161	13.42	1.13	0.680	0.139	(0.219)	0.541
162	13.50	1.13	0.680	0.138	(0.219)	0.542
163	13.58	0.77	0.460	0.138	(0.148)	0.322
164	13.67	0.77	0.460	0.137	(0.148)	0.323
165	13.75	0.77	0.460	0.136	(0.148)	0.324
166	13.83	0.77	0.460	0.136	(0.148)	0.324
167	13.92	0.77	0.460	0.135	(0.148)	0.325
168	14.00	0.77	0.460	0.134	(0.148)	0.326
169	14.08	0.90	0.540	0.133	(0.174)	0.407
170	14.17	0.90	0.540	0.133	(0.174)	0.407
171	14.25	0.90	0.540	0.132	(0.174)	0.408
172	14.33	0.87	0.520	0.131	(0.167)	0.389
173	14.42	0.87	0.520	0.131	(0.167)	0.389
174	14.50	0.87	0.520	0.130	(0.167)	0.390
175	14.58	0.87	0.520	0.129	(0.167)	0.391

176	14.67	0.87	0.520	0.129	(0.167)	0.391
177	14.75	0.87	0.520	0.128	(0.167)	0.392
178	14.83	0.83	0.500	0.127	(0.161)	0.373
179	14.92	0.83	0.500	0.127	(0.161)	0.373
180	15.00	0.83	0.500	0.126	(0.161)	0.374
181	15.08	0.80	0.480	0.126	(0.154)	0.354
182	15.17	0.80	0.480	0.125	(0.154)	0.355
183	15.25	0.80	0.480	0.124	(0.154)	0.356
184	15.33	0.77	0.460	0.124	(0.148)	0.336
185	15.42	0.77	0.460	0.123	(0.148)	0.337
186	15.50	0.77	0.460	0.122	(0.148)	0.338
187	15.58	0.63	0.380	0.122	(0.122)	0.258
188	15.67	0.63	0.380	0.121	(0.122)	0.259
189	15.75	0.63	0.380	0.120	(0.122)	0.260
190	15.83	0.63	0.380	0.120	(0.122)	0.260
191	15.92	0.63	0.380	0.119	(0.122)	0.261
192	16.00	0.63	0.380	0.119	(0.122)	0.261
193	16.08	0.13	0.080	(0.118)	0.026	0.054
194	16.17	0.13	0.080	(0.117)	0.026	0.054
195	16.25	0.13	0.080	(0.117)	0.026	0.054
196	16.33	0.13	0.080	(0.116)	0.026	0.054
197	16.42	0.13	0.080	(0.116)	0.026	0.054
198	16.50	0.13	0.080	(0.115)	0.026	0.054
199	16.58	0.10	0.060	(0.114)	0.019	0.041
200	16.67	0.10	0.060	(0.114)	0.019	0.041
201	16.75	0.10	0.060	(0.113)	0.019	0.041
202	16.83	0.10	0.060	(0.113)	0.019	0.041
203	16.92	0.10	0.060	(0.112)	0.019	0.041
204	17.00	0.10	0.060	(0.112)	0.019	0.041
205	17.08	0.17	0.100	(0.111)	0.032	0.068
206	17.17	0.17	0.100	(0.110)	0.032	0.068
207	17.25	0.17	0.100	(0.110)	0.032	0.068
208	17.33	0.17	0.100	(0.109)	0.032	0.068
209	17.42	0.17	0.100	(0.109)	0.032	0.068
210	17.50	0.17	0.100	(0.108)	0.032	0.068
211	17.58	0.17	0.100	(0.108)	0.032	0.068
212	17.67	0.17	0.100	(0.107)	0.032	0.068
213	17.75	0.17	0.100	(0.107)	0.032	0.068
214	17.83	0.13	0.080	(0.106)	0.026	0.054
215	17.92	0.13	0.080	(0.106)	0.026	0.054
216	18.00	0.13	0.080	(0.105)	0.026	0.054
217	18.08	0.13	0.080	(0.105)	0.026	0.054
218	18.17	0.13	0.080	(0.104)	0.026	0.054
219	18.25	0.13	0.080	(0.104)	0.026	0.054
220	18.33	0.13	0.080	(0.103)	0.026	0.054
221	18.42	0.13	0.080	(0.103)	0.026	0.054
222	18.50	0.13	0.080	(0.102)	0.026	0.054
223	18.58	0.10	0.060	(0.102)	0.019	0.041
224	18.67	0.10	0.060	(0.101)	0.019	0.041
225	18.75	0.10	0.060	(0.101)	0.019	0.041
226	18.83	0.07	0.040	(0.100)	0.013	0.027
227	18.92	0.07	0.040	(0.100)	0.013	0.027
228	19.00	0.07	0.040	(0.099)	0.013	0.027
229	19.08	0.10	0.060	(0.099)	0.019	0.041
230	19.17	0.10	0.060	(0.098)	0.019	0.041
231	19.25	0.10	0.060	(0.098)	0.019	0.041
232	19.33	0.13	0.080	(0.097)	0.026	0.054

233	19.42	0.13	0.080	(0.097)	0.026	0.054
234	19.50	0.13	0.080	(0.096)	0.026	0.054
235	19.58	0.10	0.060	(0.096)	0.019	0.041
236	19.67	0.10	0.060	(0.096)	0.019	0.041
237	19.75	0.10	0.060	(0.095)	0.019	0.041
238	19.83	0.07	0.040	(0.095)	0.013	0.027
239	19.92	0.07	0.040	(0.094)	0.013	0.027
240	20.00	0.07	0.040	(0.094)	0.013	0.027
241	20.08	0.10	0.060	(0.093)	0.019	0.041
242	20.17	0.10	0.060	(0.093)	0.019	0.041
243	20.25	0.10	0.060	(0.093)	0.019	0.041
244	20.33	0.10	0.060	(0.092)	0.019	0.041
245	20.42	0.10	0.060	(0.092)	0.019	0.041
246	20.50	0.10	0.060	(0.091)	0.019	0.041
247	20.58	0.10	0.060	(0.091)	0.019	0.041
248	20.67	0.10	0.060	(0.091)	0.019	0.041
249	20.75	0.10	0.060	(0.090)	0.019	0.041
250	20.83	0.07	0.040	(0.090)	0.013	0.027
251	20.92	0.07	0.040	(0.090)	0.013	0.027
252	21.00	0.07	0.040	(0.089)	0.013	0.027
253	21.08	0.10	0.060	(0.089)	0.019	0.041
254	21.17	0.10	0.060	(0.088)	0.019	0.041
255	21.25	0.10	0.060	(0.088)	0.019	0.041
256	21.33	0.07	0.040	(0.088)	0.013	0.027
257	21.42	0.07	0.040	(0.087)	0.013	0.027
258	21.50	0.07	0.040	(0.087)	0.013	0.027
259	21.58	0.10	0.060	(0.087)	0.019	0.041
260	21.67	0.10	0.060	(0.086)	0.019	0.041
261	21.75	0.10	0.060	(0.086)	0.019	0.041
262	21.83	0.07	0.040	(0.086)	0.013	0.027
263	21.92	0.07	0.040	(0.086)	0.013	0.027
264	22.00	0.07	0.040	(0.085)	0.013	0.027
265	22.08	0.10	0.060	(0.085)	0.019	0.041
266	22.17	0.10	0.060	(0.085)	0.019	0.041
267	22.25	0.10	0.060	(0.084)	0.019	0.041
268	22.33	0.07	0.040	(0.084)	0.013	0.027
269	22.42	0.07	0.040	(0.084)	0.013	0.027
270	22.50	0.07	0.040	(0.084)	0.013	0.027
271	22.58	0.07	0.040	(0.083)	0.013	0.027
272	22.67	0.07	0.040	(0.083)	0.013	0.027
273	22.75	0.07	0.040	(0.083)	0.013	0.027
274	22.83	0.07	0.040	(0.083)	0.013	0.027
275	22.92	0.07	0.040	(0.083)	0.013	0.027
276	23.00	0.07	0.040	(0.082)	0.013	0.027
277	23.08	0.07	0.040	(0.082)	0.013	0.027
278	23.17	0.07	0.040	(0.082)	0.013	0.027
279	23.25	0.07	0.040	(0.082)	0.013	0.027
280	23.33	0.07	0.040	(0.082)	0.013	0.027
281	23.42	0.07	0.040	(0.081)	0.013	0.027
282	23.50	0.07	0.040	(0.081)	0.013	0.027
283	23.58	0.07	0.040	(0.081)	0.013	0.027
284	23.67	0.07	0.040	(0.081)	0.013	0.027
285	23.75	0.07	0.040	(0.081)	0.013	0.027
286	23.83	0.07	0.040	(0.081)	0.013	0.027
287	23.92	0.07	0.040	(0.081)	0.013	0.027
288	24.00	0.07	0.040	(0.081)	0.013	0.027

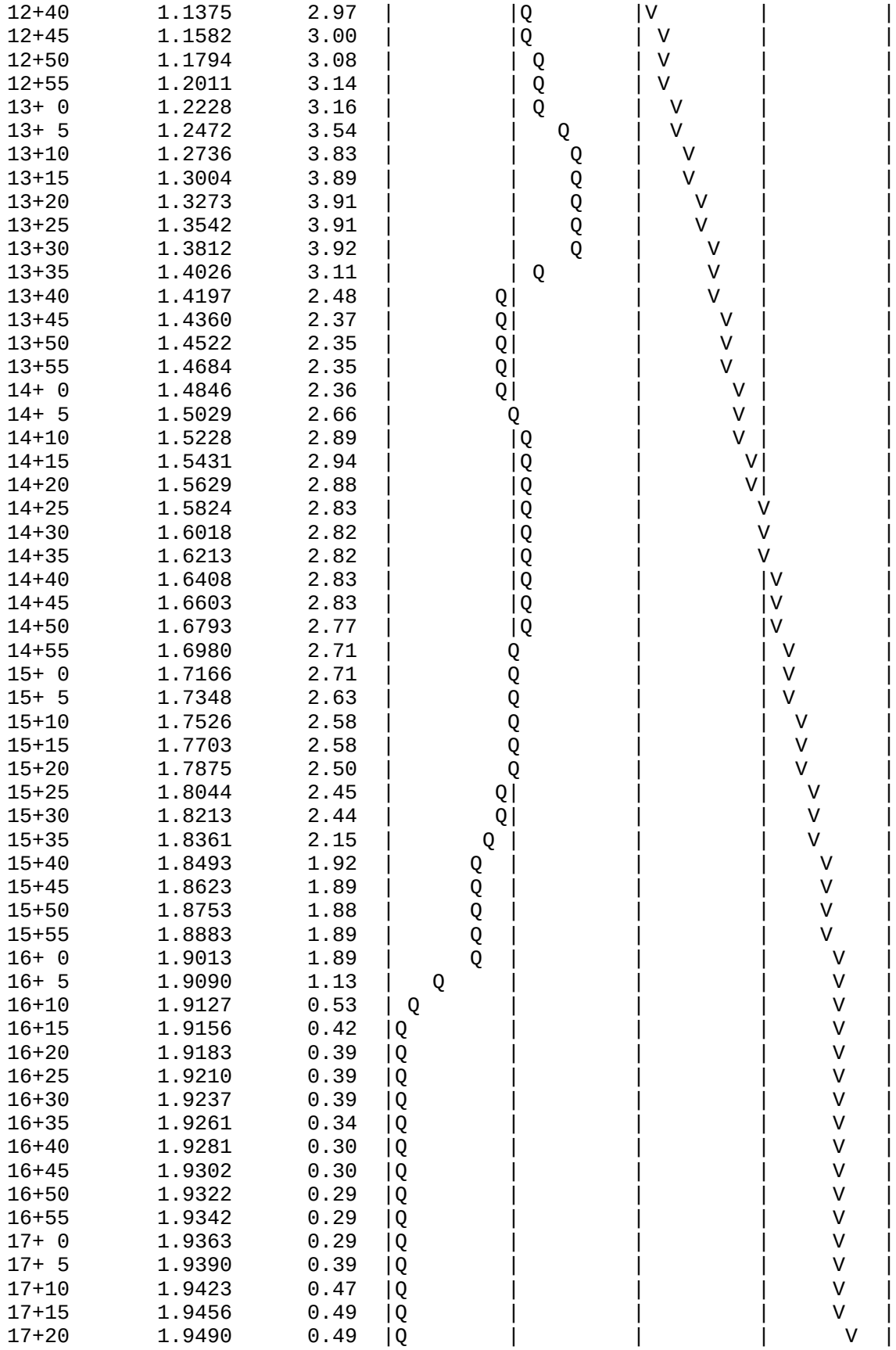
(Loss Rate Not Used)

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   Sum =     100.0                                        Sum =    42.2
    Flood volume = Effective rainfall      3.52(In)
     times area       7.2(Ac.)/[(In)/(Ft.)] =       2.1(Ac.Ft)
    Total soil loss =      1.48(In)
    Total soil loss =     0.888(Ac.Ft)
    Total rainfall =      5.00(In)
    Flood volume =       91646.5 Cubic Feet
    Total soil loss =       38668.6 Cubic Feet
    ---------------------------------------------------------------------
     Peak flow rate of this hydrograph =      3.918(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       0.0007      0.10  Q         |         |         |         |
  0+10       0.0019      0.18  Q         |         |         |         |
  0+15       0.0032      0.19  Q         |         |         |         |
  0+20       0.0049      0.25  Q         |         |         |         |
  0+25       0.0069      0.29  VQ        |         |         |         |
  0+30       0.0089      0.29  VQ        |         |         |         |
  0+35       0.0110      0.29  VQ        |         |         |         |
  0+40       0.0130      0.29  VQ        |         |         |         |
  0+45       0.0150      0.29  VQ        |         |         |         |
  0+50       0.0174      0.34  VQ        |         |         |         |
  0+55       0.0200      0.38  VQ        |         |         |         |
  1+ 0       0.0227      0.39  VQ        |         |         |         |
  1+ 5       0.0251      0.34  VQ        |         |         |         |
  1+10       0.0272      0.30  VQ        |         |         |         |
  1+15       0.0292      0.30  VQ        |         |         |         |
  1+20       0.0313      0.29  VQ        |         |         |         |
  1+25       0.0333      0.29  VQ        |         |         |         |
  1+30       0.0353      0.29  VQ        |         |         |         |
  1+35       0.0373      0.29  VQ        |         |         |         |
  1+40       0.0394      0.29  VQ        |         |         |         |
  1+45       0.0414      0.29  VQ        |         |         |         |
  1+50       0.0438      0.34  VQ        |         |         |         |
  1+55       0.0464      0.38  VQ        |         |         |         |
  2+ 0       0.0491      0.39  VQ        |         |         |         |
  2+ 5       0.0518      0.39  VQ        |         |         |         |
  2+10       0.0545      0.39  |Q        |         |         |         |
  2+15       0.0572      0.39  |Q        |         |         |         |
  2+20       0.0599      0.39  |Q        |         |         |         |
  2+25       0.0626      0.39  |Q        |         |         |         |
  2+30       0.0654      0.39  |Q        |         |         |         |
  2+35       0.0684      0.44  |Q        |         |         |         |
  2+40       0.0717      0.48  |Q        |         |         |         |
  2+45       0.0751      0.49  |Q        |         |         |         |
  2+50       0.0785      0.49  |Q        |         |         |         |
  2+55       0.0819      0.49  |Q        |         |         |         |
  3+ 0       0.0852      0.49  |Q        |         |         |         |
  3+ 5       0.0886      0.49  |Q        |         |         |         |
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3+10	0.0920	0.49	|Q	|	|	|	|
3+15	0.0954	0.49	|Q	|	|	|	|
3+20	0.0988	0.49	|Q	|	|	|	|
3+25	0.1022	0.49	|Q	|	|	|	|
3+30	0.1055	0.49	|QV	|	|	|	|
3+35	0.1089	0.49	|QV	|	|	|	|
3+40	0.1123	0.49	|QV	|	|	|	|
3+45	0.1157	0.49	|QV	|	|	|	|
3+50	0.1194	0.54	| Q	|	|	|	|
3+55	0.1234	0.58	| Q	|	|	|	|
4+ 0	0.1275	0.59	| Q	|	|	|	|
4+ 5	0.1315	0.59	| Q	|	|	|	|
4+10	0.1356	0.59	| Q	|	|	|	|
4+15	0.1396	0.59	| Q	|	|	|	|
4+20	0.1440	0.64	| Q	|	|	|	|
4+25	0.1487	0.68	| Q	|	|	|	|
4+30	0.1534	0.69	| Q	|	|	|	|
4+35	0.1582	0.69	| QV	|	|	|	|
4+40	0.1629	0.69	| QV	|	|	|	|
4+45	0.1676	0.69	| QV	|	|	|	|
4+50	0.1727	0.74	| QV	|	|	|	|
4+55	0.1781	0.78	| Q	|	|	|	|
5+ 0	0.1835	0.78	| Q	|	|	|	|
5+ 5	0.1882	0.69	| QV	|	|	|	|
5+10	0.1924	0.61	| QV	|	|	|	|
5+15	0.1965	0.59	| QV	|	|	|	|
5+20	0.2009	0.64	| QV	|	|	|	|
5+25	0.2055	0.68	| QV	|	|	|	|
5+30	0.2103	0.69	| QV	|	|	|	|
5+35	0.2153	0.74	| Q V	|	|	|	|
5+40	0.2207	0.78	| QV	|	|	|	|
5+45	0.2261	0.78	| QV	|	|	|	|
5+50	0.2315	0.79	| QV	|	|	|	|
5+55	0.2369	0.79	| QV	|	|	|	|
6+ 0	0.2423	0.79	| QV	|	|	|	|
6+ 5	0.2481	0.84	| QV	|	|	|	|
6+10	0.2541	0.88	| QV	|	|	|	|
6+15	0.2602	0.88	| QV	|	|	|	|
6+20	0.2663	0.88	| Q V	|	|	|	|
6+25	0.2724	0.88	| Q V	|	|	|	|
6+30	0.2785	0.88	| Q V	|	|	|	|
6+35	0.2849	0.93	| Q V	|	|	|	|
6+40	0.2916	0.97	| Q V	|	|	|	|
6+45	0.2983	0.98	| Q V	|	|	|	|
6+50	0.3051	0.98	| Q V	|	|	|	|
6+55	0.3119	0.98	| Q V	|	|	|	|
7+ 0	0.3186	0.98	| Q V	|	|	|	|
7+ 5	0.3254	0.98	| Q V	|	|	|	|
7+10	0.3322	0.98	| Q V	|	|	|	|
7+15	0.3389	0.98	| Q V	|	|	|	|
7+20	0.3460	1.03	| Q V	|	|	|	|
7+25	0.3534	1.07	| Q V	|	|	|	|
7+30	0.3609	1.08	| Q V	|	|	|	|
7+35	0.3686	1.13	| Q V	|	|	|	|
7+40	0.3767	1.17	| Q V	|	|	|	|
7+45	0.3848	1.18	| Q V	|	|	|	|
7+50	0.3933	1.23	| Q V	|	|	|	|

7+55	0.4020	1.27	Q V				
8+ 0	0.4108	1.28	Q V				
8+ 5	0.4203	1.38	Q V				
8+10	0.4303	1.46	Q V				
8+15	0.4404	1.47	Q V				
8+20	0.4506	1.47	Q V				
8+25	0.4607	1.47	Q V				
8+30	0.4709	1.47	Q V				
8+35	0.4813	1.52	Q V				
8+40	0.4921	1.56	Q V				
8+45	0.5029	1.57	Q V				
8+50	0.5141	1.62	Q V				
8+55	0.5255	1.66	Q V				
9+ 0	0.5370	1.67	Q V				
9+ 5	0.5492	1.77	Q V				
9+10	0.5619	1.85	Q V				
9+15	0.5748	1.86	Q V				
9+20	0.5880	1.92	Q V				
9+25	0.6014	1.96	Q V				
9+30	0.6150	1.96	Q V				
9+35	0.6288	2.01	Q V				
9+40	0.6430	2.05	Q V				
9+45	0.6572	2.06	Q V				
9+50	0.6717	2.11	Q V				
9+55	0.6865	2.15	Q V				
10+ 0	0.7014	2.16	Q V				
10+ 5	0.7139	1.81	Q V				
10+10	0.7245	1.54	Q V				
10+15	0.7347	1.49	Q V				
10+20	0.7448	1.47	Q V				
10+25	0.7550	1.47	Q V				
10+30	0.7651	1.47	Q V				
10+35	0.7770	1.72	Q V				
10+40	0.7902	1.92	Q V				
10+45	0.8037	1.95	Q V				
10+50	0.8172	1.96	Q V				
10+55	0.8308	1.96	Q V				
11+ 0	0.8443	1.96	Q V				
11+ 5	0.8575	1.91	Q V				
11+10	0.8704	1.88	Q V				
11+15	0.8833	1.87	Q V				
11+20	0.8961	1.87	Q V				
11+25	0.9090	1.87	Q V				
11+30	0.9218	1.87	Q V				
11+35	0.9340	1.77	Q V				
11+40	0.9456	1.69	Q V				
11+45	0.9571	1.67	Q V				
11+50	0.9690	1.72	Q V				
11+55	0.9811	1.76	Q V				
12+ 0	0.9933	1.77	Q V				
12+ 5	1.0081	2.16	Q V				
12+10	1.0251	2.46	Q V				
12+15	1.0424	2.52	Q V				
12+20	1.0604	2.62	Q V				
12+25	1.0789	2.68	Q V				
12+30	1.0974	2.69	Q V				
12+35	1.1171	2.85	Q V				



17+25	1.9524	0.49	|Q	|	|	|	V |
17+30	1.9558	0.49	|Q	|	|	|	V |
17+35	1.9591	0.49	|Q	|	|	|	V |
17+40	1.9625	0.49	|Q	|	|	|	V |
17+45	1.9659	0.49	|Q	|	|	|	V |
17+50	1.9689	0.44	|Q	|	|	|	V |
17+55	1.9717	0.40	|Q	|	|	|	V |
18+ 0	1.9744	0.39	|Q	|	|	|	V |
18+ 5	1.9771	0.39	|Q	|	|	|	V |
18+10	1.9798	0.39	|Q	|	|	|	V |
18+15	1.9826	0.39	|Q	|	|	|	V |
18+20	1.9853	0.39	|Q	|	|	|	V |
18+25	1.9880	0.39	|Q	|	|	|	V |
18+30	1.9907	0.39	|Q	|	|	|	V |
18+35	1.9930	0.34	|Q	|	|	|	V |
18+40	1.9951	0.30	|Q	|	|	|	V |
18+45	1.9972	0.30	|Q	|	|	|	V |
18+50	1.9988	0.24	Q	|	|	|	V |
18+55	2.0003	0.21	Q	|	|	|	V |
19+ 0	2.0016	0.20	Q	|	|	|	V |
19+ 5	2.0033	0.25	Q	|	|	|	V |
19+10	2.0053	0.29	|Q	|	|	|	V |
19+15	2.0073	0.29	|Q	|	|	|	V |
19+20	2.0097	0.34	|Q	|	|	|	V |
19+25	2.0123	0.38	|Q	|	|	|	V |
19+30	2.0150	0.39	|Q	|	|	|	V |
19+35	2.0174	0.34	|Q	|	|	|	V |
19+40	2.0195	0.30	|Q	|	|	|	V |
19+45	2.0215	0.30	|Q	|	|	|	V |
19+50	2.0232	0.24	Q	|	|	|	V |
19+55	2.0246	0.21	Q	|	|	|	V |
20+ 0	2.0260	0.20	Q	|	|	|	V |
20+ 5	2.0277	0.25	Q	|	|	|	V |
20+10	2.0296	0.29	|Q	|	|	|	V |
20+15	2.0317	0.29	|Q	|	|	|	V |
20+20	2.0337	0.29	|Q	|	|	|	V |
20+25	2.0357	0.29	|Q	|	|	|	V |
20+30	2.0378	0.29	|Q	|	|	|	V |
20+35	2.0398	0.29	|Q	|	|	|	V |
20+40	2.0418	0.29	|Q	|	|	|	V |
20+45	2.0438	0.29	|Q	|	|	|	V |
20+50	2.0455	0.24	Q	|	|	|	V |
20+55	2.0469	0.21	Q	|	|	|	V |
21+ 0	2.0483	0.20	Q	|	|	|	V |
21+ 5	2.0500	0.25	Q	|	|	|	V |
21+10	2.0520	0.29	|Q	|	|	|	V|
21+15	2.0540	0.29	|Q	|	|	|	V|
21+20	2.0557	0.24	Q	|	|	|	V|
21+25	2.0571	0.21	Q	|	|	|	V|
21+30	2.0585	0.20	Q	|	|	|	V|
21+35	2.0602	0.25	Q	|	|	|	V|
21+40	2.0621	0.29	|Q	|	|	|	V|
21+45	2.0641	0.29	|Q	|	|	|	V|
21+50	2.0658	0.24	Q	|	|	|	V|
21+55	2.0672	0.21	Q	|	|	|	V|
22+ 0	2.0686	0.20	Q	|	|	|	V|
22+ 5	2.0703	0.25	Q	|	|	|	V|

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  22+10       2.0723      0.29  |Q        |         |         |        V|
  22+15       2.0743      0.29  |Q        |         |         |        V|
  22+20       2.0760      0.24  Q         |         |         |        V|
  22+25       2.0774      0.21  Q         |         |         |        V|
  22+30       2.0788      0.20  Q         |         |         |        V|
  22+35       2.0801      0.20  Q         |         |         |        V|
  22+40       2.0815      0.20  Q         |         |         |        V|
  22+45       2.0828      0.20  Q         |         |         |        V|
  22+50       2.0842      0.20  Q         |         |         |        V|
  22+55       2.0855      0.20  Q         |         |         |        V|
  23+ 0       2.0869      0.20  Q         |         |         |        V|
  23+ 5       2.0882      0.20  Q         |         |         |        V|
  23+10       2.0896      0.20  Q         |         |         |        V|
  23+15       2.0909      0.20  Q         |         |         |        V|
  23+20       2.0923      0.20  Q         |         |         |        V|
  23+25       2.0936      0.20  Q         |         |         |        V|
  23+30       2.0950      0.20  Q         |         |         |        V|
  23+35       2.0963      0.20  Q         |         |         |        V|
  23+40       2.0977      0.20  Q         |         |         |        V|
  23+45       2.0990      0.20  Q         |         |         |        V|
  23+50       2.1004      0.20  Q         |         |         |        V|
  23+55       2.1018      0.20  Q         |         |         |        V|
  24+ 0       2.1031      0.20  Q         |         |         |        V|
  24+ 5       2.1038      0.10  Q         |         |         |        V|
  24+10       2.1039      0.02  Q         |         |         |        V|
  24+15       2.1039      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 10/10/23 File: 100XUH6100.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
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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 762.00(Ft.)
Length along longest watercourse measured to centroid = 327.00(Ft.)
Length along longest watercourse = 0.144 Mi.
Length along longest watercourse measured to centroid = 0.062 Mi.
Difference in elevation = 7.20(Ft.)
Slope along watercourse = 49.8898 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.038 Hr.
Lag time = 2.28 Min.
25% of lag time = 0.57 Min.
40% of lag time = 0.91 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]
7.18	1.20	8.62

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	2.50	17.95

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 %
7.180	65.10	0.710

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.1	65.1	0.415	0.710	0.150	1.000	0.150
					Sum (F) =	0.150

Area averaged mean soil loss (F) (In/Hr) = 0.150
Minimum soil loss rate ((In/Hr)) = 0.075
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.332

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	219.144	46.524	3.367
2	0.167	438.289	42.054	3.043
3	0.250	657.433	8.069	0.584
4	0.333	876.578	3.353	0.243
			Sum = 100.000 Sum=	7.236

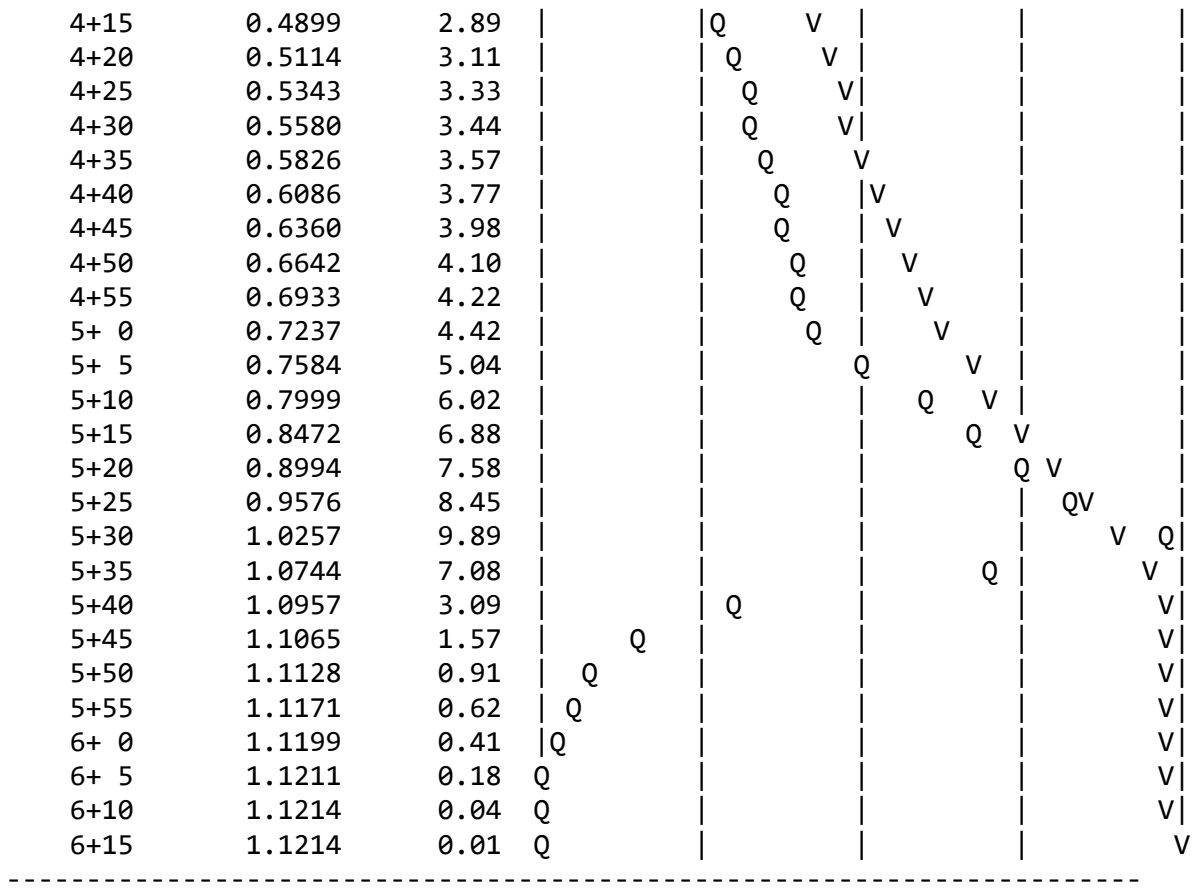
The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

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	(0.150)	0.050	0.100
2	0.17	0.60	0.180	(0.150)	0.060	0.120
3	0.25	0.60	0.180	(0.150)	0.060	0.120
4	0.33	0.60	0.180	(0.150)	0.060	0.120
5	0.42	0.60	0.180	(0.150)	0.060	0.120
6	0.50	0.70	0.210	(0.150)	0.070	0.140
7	0.58	0.70	0.210	(0.150)	0.070	0.140
8	0.67	0.70	0.210	(0.150)	0.070	0.140
9	0.75	0.70	0.210	(0.150)	0.070	0.140
10	0.83	0.70	0.210	(0.150)	0.070	0.140
11	0.92	0.70	0.210	(0.150)	0.070	0.140
12	1.00	0.80	0.240	(0.150)	0.080	0.160
13	1.08	0.80	0.240	(0.150)	0.080	0.160
14	1.17	0.80	0.240	(0.150)	0.080	0.160
15	1.25	0.80	0.240	(0.150)	0.080	0.160
16	1.33	0.80	0.240	(0.150)	0.080	0.160
17	1.42	0.80	0.240	(0.150)	0.080	0.160
18	1.50	0.80	0.240	(0.150)	0.080	0.160
19	1.58	0.80	0.240	(0.150)	0.080	0.160
20	1.67	0.80	0.240	(0.150)	0.080	0.160
21	1.75	0.80	0.240	(0.150)	0.080	0.160
22	1.83	0.80	0.240	(0.150)	0.080	0.160
23	1.92	0.80	0.240	(0.150)	0.080	0.160
24	2.00	0.90	0.270	(0.150)	0.090	0.180
25	2.08	0.80	0.240	(0.150)	0.080	0.160
26	2.17	0.90	0.270	(0.150)	0.090	0.180
27	2.25	0.90	0.270	(0.150)	0.090	0.180
28	2.33	0.90	0.270	(0.150)	0.090	0.180
29	2.42	0.90	0.270	(0.150)	0.090	0.180
30	2.50	0.90	0.270	(0.150)	0.090	0.180
31	2.58	0.90	0.270	(0.150)	0.090	0.180
32	2.67	0.90	0.270	(0.150)	0.090	0.180
33	2.75	1.00	0.300	(0.150)	0.100	0.200
34	2.83	1.00	0.300	(0.150)	0.100	0.200
35	2.92	1.00	0.300	(0.150)	0.100	0.200
36	3.00	1.00	0.300	(0.150)	0.100	0.200
37	3.08	1.00	0.300	(0.150)	0.100	0.200
38	3.17	1.10	0.330	(0.150)	0.110	0.220
39	3.25	1.10	0.330	(0.150)	0.110	0.220
40	3.33	1.10	0.330	(0.150)	0.110	0.220
41	3.42	1.20	0.360	(0.150)	0.120	0.240
42	3.50	1.30	0.390	(0.150)	0.129	0.261
43	3.58	1.40	0.420	(0.150)	0.139	0.281

```
44   3.67     1.40      0.420       (  0.150)       0.139        0.281
45   3.75     1.50      0.450       (  0.150)       0.149        0.301
46   3.83     1.50      0.450       (  0.150)       0.149        0.301
47   3.92     1.60      0.480          0.150    (  0.159)        0.330
48   4.00     1.60      0.480          0.150    (  0.159)        0.330
49   4.08     1.70      0.510          0.150    (  0.169)        0.360
50   4.17     1.80      0.540          0.150    (  0.179)        0.390
51   4.25     1.90      0.570          0.150    (  0.189)        0.420
52   4.33     2.00      0.600          0.150    (  0.199)        0.450
53   4.42     2.10      0.630          0.150    (  0.209)        0.480
54   4.50     2.10      0.630          0.150    (  0.209)        0.480
55   4.58     2.20      0.660          0.150    (  0.219)        0.510
56   4.67     2.30      0.690          0.150    (  0.229)        0.540
57   4.75     2.40      0.720          0.150    (  0.239)        0.570
58   4.83     2.40      0.720          0.150    (  0.239)        0.570
59   4.92     2.50      0.750          0.150    (  0.249)        0.600
60   5.00     2.60      0.780          0.150    (  0.259)        0.630
61   5.08     3.10      0.930          0.150    (  0.309)        0.780
62   5.17     3.60      1.080          0.150    (  0.359)        0.930
63   5.25     3.90      1.170          0.150    (  0.388)        1.020
64   5.33     4.20      1.260          0.150    (  0.418)        1.110
65   5.42     4.70      1.410          0.150    (  0.468)        1.260
66   5.50     5.60      1.680          0.150    (  0.558)        1.530
67   5.58     1.90      0.570          0.150    (  0.189)        0.420
68   5.67     0.90      0.270       (  0.150)       0.090        0.180
69   5.75     0.60      0.180       (  0.150)       0.060        0.120
70   5.83     0.50      0.150       (  0.150)       0.050        0.100
71   5.92     0.30      0.090       (  0.150)       0.030        0.060
72   6.00     0.20      0.060       (  0.150)       0.020        0.040
               (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    22.5
      Flood volume = Effective rainfall      1.87(In)
       times area       7.2(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
      Total soil loss =      0.63(In)
      Total soil loss =     0.374(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =       48850.1 Cubic Feet
      Total soil loss =       16306.7 Cubic Feet
      ---------------------------------------------------------------
       Peak flow rate of this hydrograph =      9.887(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        2.5       5.0       7.5      10.0
-------------------------------------------------------------------
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```
0+ 5       0.0023      0.34  VQ        |         |         |         |
0+10       0.0072      0.71  V Q       |         |         |         |
0+15       0.0129      0.83  V  Q      |         |         |         |
0+20       0.0189      0.87  V  Q      |         |         |         |
0+25       0.0249      0.87  V  Q      |         |         |         |
0+30       0.0313      0.94  |V Q      |         |         |         |
0+35       0.0382      1.00  |V Q      |         |         |         |
0+40       0.0452      1.01  |V  Q     |         |         |         |
0+45       0.0522      1.02  |V  Q     |         |         |         |
0+50       0.0592      1.02  | V Q     |         |         |         |
0+55       0.0662      1.02  | V Q     |         |         |         |
1+ 0       0.0736      1.08  | V Q     |         |         |         |
1+ 5       0.0815      1.14  | V Q     |         |         |         |
1+10       0.0895      1.16  |  VQ     |         |         |         |
1+15       0.0975      1.16  |  VQ     |         |         |         |
1+20       0.1055      1.16  |  VQ     |         |         |         |
1+25       0.1134      1.16  |   Q     |         |         |         |
1+30       0.1214      1.16  |   Q     |         |         |         |
1+35       0.1294      1.16  |   Q     |         |         |         |
1+40       0.1374      1.16  |   Q     |         |         |         |
1+45       0.1454      1.16  |   QV    |         |         |         |
1+50       0.1534      1.16  |   QV    |         |         |         |
1+55       0.1614      1.16  |   QV    |         |         |         |
2+ 0       0.1699      1.23  |   Q V   |         |         |         |
2+ 5       0.1783      1.22  |   Q V   |         |         |         |
2+10       0.1868      1.24  |   Q V   |         |         |         |
2+15       0.1957      1.29  |    QV   |         |         |         |
2+20       0.2047      1.30  |    Q V  |         |         |         |
2+25       0.2137      1.31  |    Q V  |         |         |         |
2+30       0.2227      1.31  |    Q V  |         |         |         |
2+35       0.2317      1.31  |    Q  V |         |         |         |
2+40       0.2407      1.31  |    Q  V |         |         |         |
2+45       0.2501      1.37  |    Q  V |         |         |         |
2+50       0.2600      1.43  |    Q   V|         |         |         |
2+55       0.2700      1.45  |    Q   V|         |         |         |
3+ 0       0.2799      1.45  |    Q   V|         |         |         |
3+ 5       0.2899      1.45  |    Q    V         |         |         |
3+10       0.3004      1.52  |     Q   V         |         |         |
3+15       0.3113      1.58  |     Q   |V        |         |         |
3+20       0.3222      1.59  |     Q   |V        |         |         |
3+25       0.3337      1.66  |     Q   |V        |         |         |
3+30       0.3460      1.79  |      Q  | V       |         |         |
3+35       0.3593      1.93  |      Q  | V       |         |         |
3+40       0.3732      2.01  |       Q |  V      |         |         |
3+45       0.3876      2.09  |       Q |  V      |         |         |
3+50       0.4025      2.16  |       Q |   V     |         |         |
3+55       0.4181      2.27  |        Q|   V     |         |         |
4+ 0       0.4344      2.37  |        Q|    V    |         |         |
4+ 5       0.4515      2.48  |        Q|     V   |         |         |
4+10       0.4700      2.68  |         Q     V   |         |         |
```


4+15 0.4899 2.89
4+20 0.5114 3.11
4+25 0.5343 3.33
4+30 0.5580 3.44
4+35 0.5826 3.57
4+40 0.6086 3.77
4+45 0.6360 3.98
4+50 0.6642 4.10
4+55 0.6933 4.22
5+ 0 0.7237 4.42
5+ 5 0.7584 5.04
5+10 0.7999 6.02
5+15 0.8472 6.88
5+20 0.8994 7.58
5+25 0.9576 8.45
5+30 1.0257 9.89
5+35 1.0744 7.08
5+40 1.0957 3.09
5+45 1.1065 1.57
5+50 1.1128 0.91
5+55 1.1171 0.62
6+ 0 1.1199 0.41
6+ 5 1.1211 0.18
6+10 1.1214 0.04
6+15 1.1214 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 CONDITION
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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 1187.00(Ft.)
Length along longest watercourse measured to centroid = 501.00(Ft.)
Length along longest watercourse = 0.225 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 28.80(Ft.)
Slope along watercourse = 128.1078 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.033 Hr.
Lag time = 1.99 Min.
25% of lag time = 0.50 Min.
40% of lag time = 0.80 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]

```
        7.18             1.20                    8.62

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        7.18              2.50                  17.95

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 %
     7.180           60.70         0.723
 Total Area Entered =      7.18(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
60.7  60.7      0.462     0.723        0.162       1.000      0.162
                                                   Sum (F) =   0.162
Area averaged mean soil loss (F) (In/Hr) =  0.162
Minimum soil loss rate ((In/Hr)) =  0.081
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.322
------------------------------------------------------------------------

            U n i t  H y d r o g r a p h
                  VALLEY S-Curve
------------------------------------------------------------------------
            Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
------------------------------------------------------------------------
       1   0.083        251.147         51.045             3.694
       2   0.167        502.294         39.983             2.893
       3   0.250        753.441          6.982             0.505
       4   0.333       1004.588          1.989             0.144
                                Sum = 100.000   Sum=       7.236
------------------------------------------------------------------------

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

 Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
  1   0.08     0.50      0.150       (  0.162)       0.048        0.102
  2   0.17     0.60      0.180       (  0.162)       0.058        0.122
  3   0.25     0.60      0.180       (  0.162)       0.058        0.122
  4   0.33     0.60      0.180       (  0.162)       0.058        0.122
```

5	0.42	0.60	0.180	(0.162)	0.058	0.122
6	0.50	0.70	0.210	(0.162)	0.068	0.142
7	0.58	0.70	0.210	(0.162)	0.068	0.142
8	0.67	0.70	0.210	(0.162)	0.068	0.142
9	0.75	0.70	0.210	(0.162)	0.068	0.142
10	0.83	0.70	0.210	(0.162)	0.068	0.142
11	0.92	0.70	0.210	(0.162)	0.068	0.142
12	1.00	0.80	0.240	(0.162)	0.077	0.163
13	1.08	0.80	0.240	(0.162)	0.077	0.163
14	1.17	0.80	0.240	(0.162)	0.077	0.163
15	1.25	0.80	0.240	(0.162)	0.077	0.163
16	1.33	0.80	0.240	(0.162)	0.077	0.163
17	1.42	0.80	0.240	(0.162)	0.077	0.163
18	1.50	0.80	0.240	(0.162)	0.077	0.163
19	1.58	0.80	0.240	(0.162)	0.077	0.163
20	1.67	0.80	0.240	(0.162)	0.077	0.163
21	1.75	0.80	0.240	(0.162)	0.077	0.163
22	1.83	0.80	0.240	(0.162)	0.077	0.163
23	1.92	0.80	0.240	(0.162)	0.077	0.163
24	2.00	0.90	0.270	(0.162)	0.087	0.183
25	2.08	0.80	0.240	(0.162)	0.077	0.163
26	2.17	0.90	0.270	(0.162)	0.087	0.183
27	2.25	0.90	0.270	(0.162)	0.087	0.183
28	2.33	0.90	0.270	(0.162)	0.087	0.183
29	2.42	0.90	0.270	(0.162)	0.087	0.183
30	2.50	0.90	0.270	(0.162)	0.087	0.183
31	2.58	0.90	0.270	(0.162)	0.087	0.183
32	2.67	0.90	0.270	(0.162)	0.087	0.183
33	2.75	1.00	0.300	(0.162)	0.096	0.204
34	2.83	1.00	0.300	(0.162)	0.096	0.204
35	2.92	1.00	0.300	(0.162)	0.096	0.204
36	3.00	1.00	0.300	(0.162)	0.096	0.204
37	3.08	1.00	0.300	(0.162)	0.096	0.204
38	3.17	1.10	0.330	(0.162)	0.106	0.224
39	3.25	1.10	0.330	(0.162)	0.106	0.224
40	3.33	1.10	0.330	(0.162)	0.106	0.224
41	3.42	1.20	0.360	(0.162)	0.116	0.244
42	3.50	1.30	0.390	(0.162)	0.125	0.265
43	3.58	1.40	0.420	(0.162)	0.135	0.285
44	3.67	1.40	0.420	(0.162)	0.135	0.285
45	3.75	1.50	0.450	(0.162)	0.145	0.305
46	3.83	1.50	0.450	(0.162)	0.145	0.305
47	3.92	1.60	0.480	(0.162)	0.154	0.326
48	4.00	1.60	0.480	(0.162)	0.154	0.326
49	4.08	1.70	0.510	0.162	(0.164)	0.348
50	4.17	1.80	0.540	0.162	(0.174)	0.378
51	4.25	1.90	0.570	0.162	(0.183)	0.408
52	4.33	2.00	0.600	0.162	(0.193)	0.438
53	4.42	2.10	0.630	0.162	(0.203)	0.468
54	4.50	2.10	0.630	0.162	(0.203)	0.468
55	4.58	2.20	0.660	0.162	(0.212)	0.498
56	4.67	2.30	0.690	0.162	(0.222)	0.528
57	4.75	2.40	0.720	0.162	(0.232)	0.558
58	4.83	2.40	0.720	0.162	(0.232)	0.558
59	4.92	2.50	0.750	0.162	(0.241)	0.588
60	5.00	2.60	0.780	0.162	(0.251)	0.618
61	5.08	3.10	0.930	0.162	(0.299)	0.768

62	5.17	3.60	1.080	0.162	(0.347)		0.918
63	5.25	3.90	1.170	0.162	(0.376)		1.008
64	5.33	4.20	1.260	0.162	(0.405)		1.098
65	5.42	4.70	1.410	0.162	(0.453)		1.248
66	5.50	5.60	1.680	0.162	(0.540)		1.518
67	5.58	1.90	0.570	0.162	(0.183)		0.408
68	5.67	0.90	0.270	(0.162)	0.087		0.183
69	5.75	0.60	0.180	(0.162)	0.058		0.122
70	5.83	0.50	0.150	(0.162)	0.048		0.102
71	5.92	0.30	0.090	(0.162)	0.029		0.061
72	6.00	0.20	0.060	(0.162)	0.019		0.041

(Loss Rate Not Used)

Sum = 100.0 Sum = 22.4

Flood volume = Effective rainfall 1.87(In)
times area 7.2(Ac.)/[(In)/(Ft.)] = 1.1(Ac.Ft)
Total soil loss = 0.63(In)
Total soil loss = 0.379(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 48642.4 Cubic Feet
Total soil loss = 16514.5 Cubic Feet

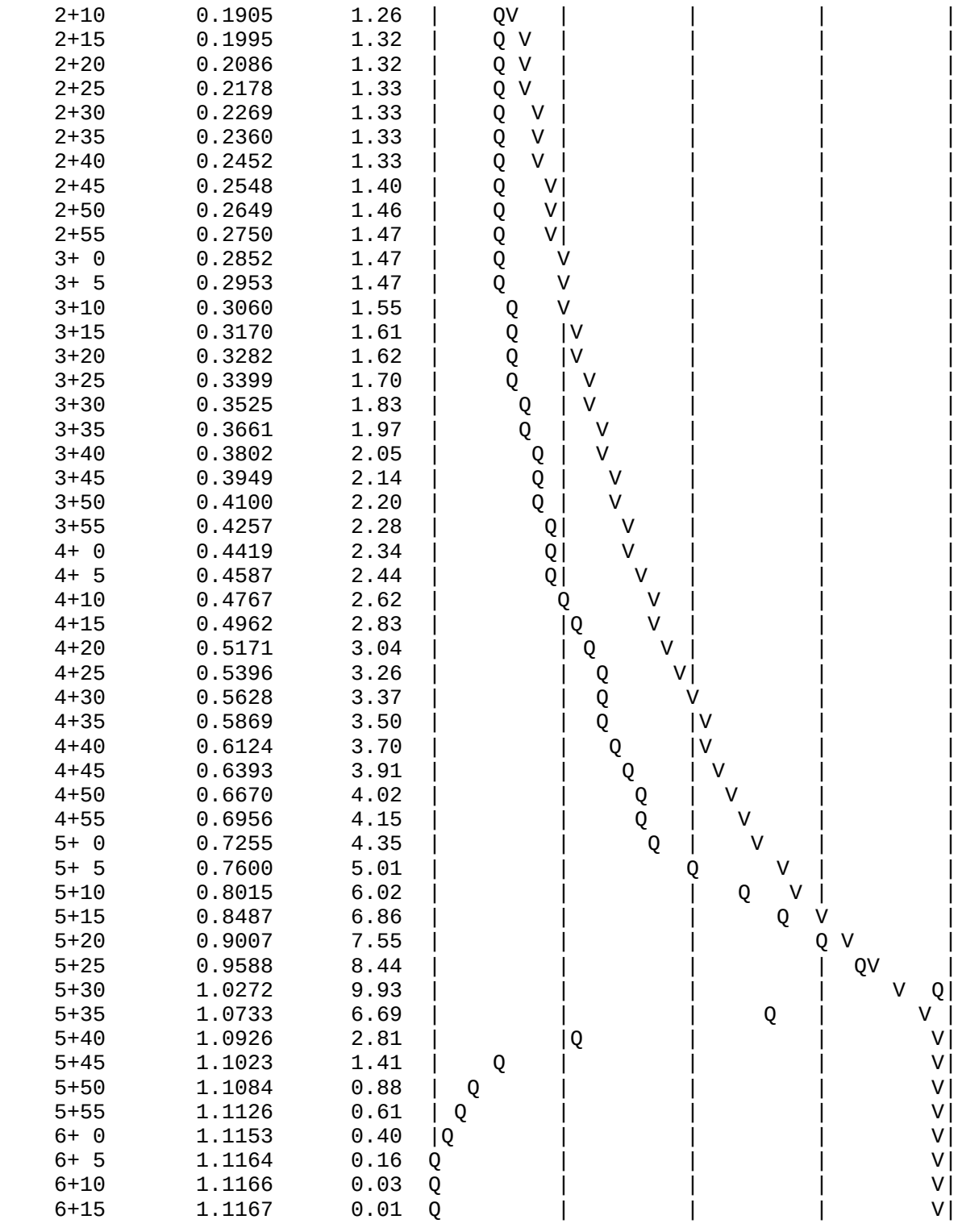
Peak flow rate of this hydrograph = 9.926(CFS)

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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	2.5	5.0	7.5	10.0
0+ 5	0.0026	0.38	VQ				
0+10	0.0077	0.75	V Q				
0+15	0.0136	0.86	V Q				
0+20	0.0197	0.88	V Q				
0+25	0.0258	0.88	V Q				
0+30	0.0324	0.96	|V Q				
0+35	0.0394	1.02	|V Q				
0+40	0.0465	1.03	|V Q				
0+45	0.0536	1.03	|V Q				
0+50	0.0607	1.03	| V Q				
0+55	0.0678	1.03	| V Q				
1+ 0	0.0754	1.11	| V Q				
1+ 5	0.0834	1.17	| V Q				
1+10	0.0915	1.18	| VQ				
1+15	0.0997	1.18	| VQ				
1+20	0.1078	1.18	| VQ				
1+25	0.1159	1.18	| Q				
1+30	0.1240	1.18	| Q				
1+35	0.1321	1.18	| Q				
1+40	0.1402	1.18	| QV				
1+45	0.1484	1.18	| QV				
1+50	0.1565	1.18	| QV				
1+55	0.1646	1.18	| QV				
2+ 0	0.1732	1.25	| QV				
2+ 5	0.1818	1.24	| 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
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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 762.00(Ft.)
Length along longest watercourse measured to centroid = 327.00(Ft.)
Length along longest watercourse = 0.144 Mi.
Length along longest watercourse measured to centroid = 0.062 Mi.
Difference in elevation = 7.20(Ft.)
Slope along watercourse = 49.8898 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.038 Hr.
Lag time = 2.28 Min.
25% of lag time = 0.57 Min.
40% of lag time = 0.91 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]
7.18	0.80	5.74

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	2.00	14.36

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 %
7.180	65.10	0.710

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.1	65.1	0.415	0.710	0.150	1.000	0.150
					Sum (F) =	0.150

Area averaged mean soil loss (F) (In/Hr) = 0.150
Minimum soil loss rate ((In/Hr)) = 0.075
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.332

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	219.144	46.524	3.367
2	0.167	438.289	42.054	3.043
3	0.250	657.433	8.069	0.584
4	0.333	876.578	3.353	0.243
		Sum = 100.000	Sum=	7.236

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	(0.150)	0.104	0.208
2	0.17	1.30	0.312	(0.150)	0.104	0.208
3	0.25	1.10	0.264	(0.150)	0.088	0.176
4	0.33	1.50	0.360	(0.150)	0.120	0.240
5	0.42	1.50	0.360	(0.150)	0.120	0.240
6	0.50	1.80	0.432	(0.150)	0.143	0.289
7	0.58	1.50	0.360	(0.150)	0.120	0.240
8	0.67	1.80	0.432	(0.150)	0.143	0.289
9	0.75	1.80	0.432	(0.150)	0.143	0.289
10	0.83	1.50	0.360	(0.150)	0.120	0.240
11	0.92	1.60	0.384	(0.150)	0.127	0.257
12	1.00	1.80	0.432	(0.150)	0.143	0.289
13	1.08	2.20	0.528	0.150	(0.175)	0.378
14	1.17	2.20	0.528	0.150	(0.175)	0.378
15	1.25	2.20	0.528	0.150	(0.175)	0.378
16	1.33	2.00	0.480	0.150	(0.159)	0.330
17	1.42	2.60	0.624	0.150	(0.207)	0.474
18	1.50	2.70	0.648	0.150	(0.215)	0.498
19	1.58	2.40	0.576	0.150	(0.191)	0.426
20	1.67	2.70	0.648	0.150	(0.215)	0.498
21	1.75	3.30	0.792	0.150	(0.263)	0.642
22	1.83	3.10	0.744	0.150	(0.247)	0.594
23	1.92	2.90	0.696	0.150	(0.231)	0.546
24	2.00	3.00	0.720	0.150	(0.239)	0.570
25	2.08	3.10	0.744	0.150	(0.247)	0.594
26	2.17	4.20	1.008	0.150	(0.335)	0.858
27	2.25	5.00	1.200	0.150	(0.398)	1.050
28	2.33	3.50	0.840	0.150	(0.279)	0.690
29	2.42	6.80	1.632	0.150	(0.542)	1.482
30	2.50	7.30	1.752	0.150	(0.582)	1.602
31	2.58	8.20	1.968	0.150	(0.653)	1.818
32	2.67	5.90	1.416	0.150	(0.470)	1.266
33	2.75	2.00	0.480	0.150	(0.159)	0.330
34	2.83	1.80	0.432	(0.150)	0.143	0.289
35	2.92	1.80	0.432	(0.150)	0.143	0.289
36	3.00	0.60	0.144	(0.150)	0.048	0.096
		(Loss Rate Not Used)				
	Sum =	100.0			Sum =	19.0

Flood volume = Effective rainfall 1.59(In)
times area 7.2(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 0.41(In)
Total soil loss = 0.247(Ac.Ft)
Total rainfall = 2.00(In)

Flood volume = 41364.9 Cubic Feet
Total soil loss = 10760.2 Cubic Feet

Peak flow rate of this hydrograph = 12.035(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	0.0048	0.70	VQ | | | |
0+10	0.0140	1.34	V Q | | | |
0+15	0.0233	1.35	V Q | | | |
0+20	0.0338	1.52	|V Q | | | |
0+25	0.0455	1.70	|V Q | | | |
0+30	0.0585	1.89	| VQ | | | |
0+35	0.0715	1.89	| Q | | | |
0+40	0.0848	1.93	| Q | | | |
0+45	0.0990	2.06	| Q | | | |
0+50	0.1122	1.92	| QV | | | |
0+55	0.1248	1.83	| Q V | | | |
1+ 0	0.1383	1.96	| Q V | | | |
1+ 5	0.1546	2.36	| Q V | | | |
1+10	0.1729	2.66	| Q V | | | |
1+15	0.1916	2.72	| Q V | | | |
1+20	0.2093	2.58	| Q V | | | |
1+25	0.2294	2.92	| Q V| | | |
1+30	0.2529	3.41	| Q V | | |
1+35	0.2757	3.31	| Q |V | | |
1+40	0.2989	3.38	| Q | V | | |
1+45	0.3268	4.05	| Q | V | | |
1+50	0.3568	4.35	| Q | V | | |
1+55	0.3854	4.14	| Q | V | | |
2+ 0	0.4135	4.09	| Q | V | | |
2+ 5	0.4424	4.20	| Q | V | | |
2+10	0.4780	5.17	| Q V | | |
2+15	0.5237	6.64	| | Q | V | | |
2+20	0.5662	6.17	| | Q | V | | |
2+25	0.6207	7.92	| | Q | V | |
2+30	0.6935	10.57	| | | Q V| |
2+35	0.7764	12.04	| | | Q | V |
2+40	0.8528	11.10	| | | Q | V |
2+45	0.8970	6.42	| | Q | | V |
2+50	0.9187	3.16	| Q | | | V |
2+55	0.9349	2.35	| Q | | | V|
3+ 0	0.9449	1.45	| Q | | | V|

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    3+ 5       0.9486      0.53  |Q        |         |         |        V|
    3+10       0.9494      0.13  Q         |         |         |        V|
    3+15       0.9496      0.02  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

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

English Units used in output format

Drainage Area = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 1187.00(Ft.)
Length along longest watercourse measured to centroid = 501.00(Ft.)
Length along longest watercourse = 0.225 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 28.80(Ft.)
Slope along watercourse = 128.1078 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.033 Hr.
Lag time = 1.99 Min.
25% of lag time = 0.50 Min.
40% of lag time = 0.80 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]

7.18 0.80 5.74

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	2.00	14.36

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 %
7.180	60.70	0.723

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
60.7	60.7	0.462	0.723	0.162	1.000	0.162
					Sum (F) =	0.162

Area averaged mean soil loss (F) (In/Hr) = 0.162
Minimum soil loss rate ((In/Hr)) = 0.081
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.322

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	251.147	51.045	3.694
2	0.167	502.294	39.983	2.893
3	0.250	753.441	6.982	0.505
4	0.333	1004.588	1.989	0.144
		Sum = 100.000	Sum=	7.236

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	(0.162)	0.100	0.212
2	0.17	1.30	0.312	(0.162)	0.100	0.212
3	0.25	1.10	0.264	(0.162)	0.085	0.179
4	0.33	1.50	0.360	(0.162)	0.116	0.244

5	0.42	1.50	0.360	(0.162)	0.116	0.244
6	0.50	1.80	0.432	(0.162)	0.139	0.293
7	0.58	1.50	0.360	(0.162)	0.116	0.244
8	0.67	1.80	0.432	(0.162)	0.139	0.293
9	0.75	1.80	0.432	(0.162)	0.139	0.293
10	0.83	1.50	0.360	(0.162)	0.116	0.244
11	0.92	1.60	0.384	(0.162)	0.123	0.260
12	1.00	1.80	0.432	(0.162)	0.139	0.293
13	1.08	2.20	0.528	0.162	(0.170)	0.366
14	1.17	2.20	0.528	0.162	(0.170)	0.366
15	1.25	2.20	0.528	0.162	(0.170)	0.366
16	1.33	2.00	0.480	(0.162)	0.154	0.326
17	1.42	2.60	0.624	0.162	(0.201)	0.462
18	1.50	2.70	0.648	0.162	(0.208)	0.486
19	1.58	2.40	0.576	0.162	(0.185)	0.414
20	1.67	2.70	0.648	0.162	(0.208)	0.486
21	1.75	3.30	0.792	0.162	(0.255)	0.630
22	1.83	3.10	0.744	0.162	(0.239)	0.582
23	1.92	2.90	0.696	0.162	(0.224)	0.534
24	2.00	3.00	0.720	0.162	(0.232)	0.558
25	2.08	3.10	0.744	0.162	(0.239)	0.582
26	2.17	4.20	1.008	0.162	(0.324)	0.846
27	2.25	5.00	1.200	0.162	(0.386)	1.038
28	2.33	3.50	0.840	0.162	(0.270)	0.678
29	2.42	6.80	1.632	0.162	(0.525)	1.470
30	2.50	7.30	1.752	0.162	(0.563)	1.590
31	2.58	8.20	1.968	0.162	(0.633)	1.806
32	2.67	5.90	1.416	0.162	(0.455)	1.254
33	2.75	2.00	0.480	(0.162)	0.154	0.326
34	2.83	1.80	0.432	(0.162)	0.139	0.293
35	2.92	1.80	0.432	(0.162)	0.139	0.293
36	3.00	0.60	0.144	(0.162)	0.046	0.098

(Loss Rate Not Used)

Sum = 100.0 Sum = 18.9

Flood volume = Effective rainfall 1.57(In)
times area 7.2(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 0.43(In)
Total soil loss = 0.256(Ac.Ft)
Total rainfall = 2.00(In)
Flood volume = 40983.4 Cubic Feet
Total soil loss = 11141.7 Cubic Feet

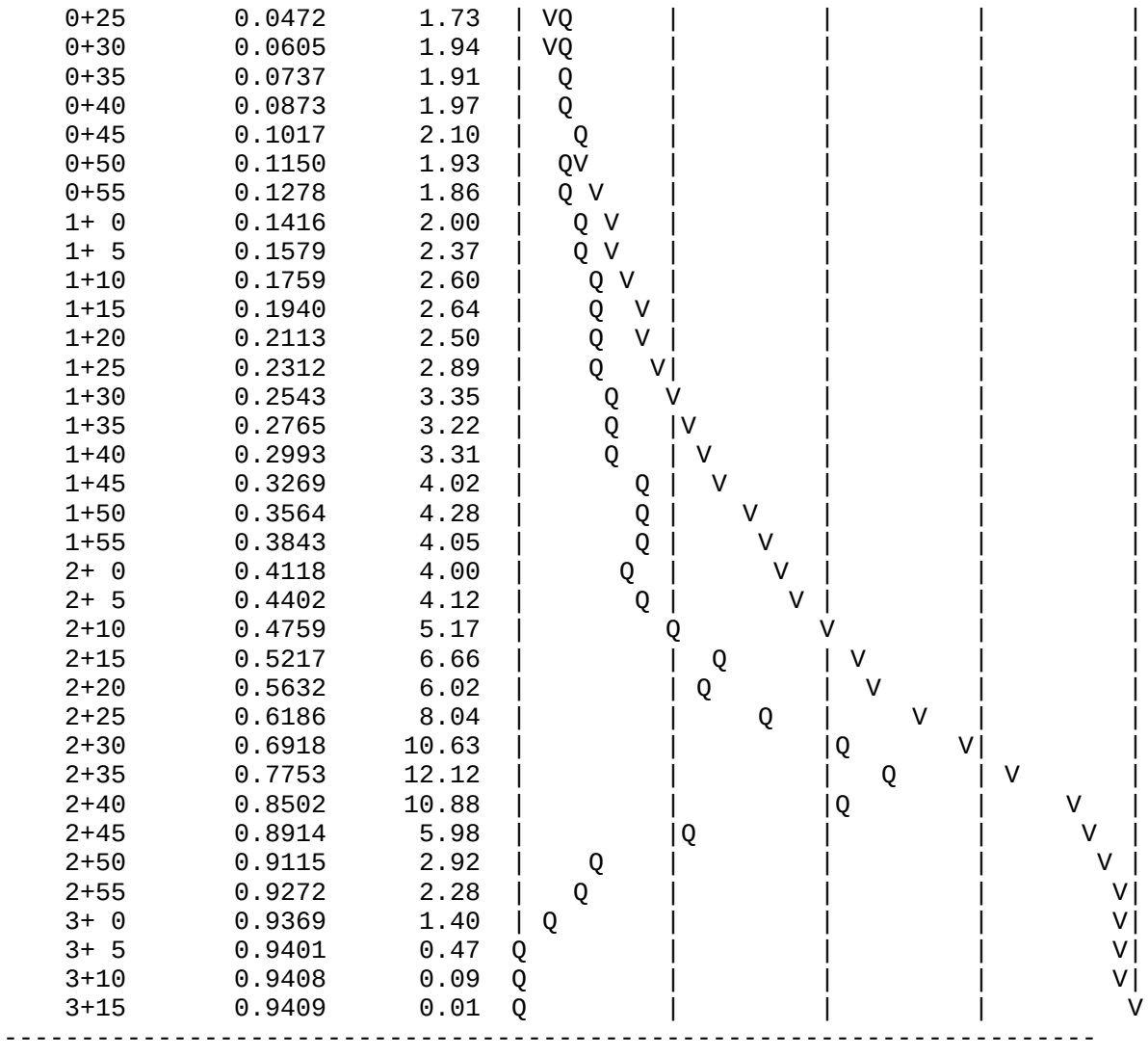
Peak flow rate of this hydrograph = 12.121(CFS)

++

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	0.0054	0.78	VQ	|	|	|	|
0+10	0.0150	1.39	V Q	|	|	|	|
0+15	0.0245	1.38	|VQ	|	|	|	|
0+20	0.0352	1.56	|V Q	|	|	|	|


0+25 0.0472 1.73
0+30 0.0605 1.94
0+35 0.0737 1.91
0+40 0.0873 1.97
0+45 0.1017 2.10
0+50 0.1150 1.93
0+55 0.1278 1.86
1+ 0 0.1416 2.00
1+ 5 0.1579 2.37
1+10 0.1759 2.60
1+15 0.1940 2.64
1+20 0.2113 2.50
1+25 0.2312 2.89
1+30 0.2543 3.35
1+35 0.2765 3.22
1+40 0.2993 3.31
1+45 0.3269 4.02
1+50 0.3564 4.28
1+55 0.3843 4.05
2+ 0 0.4118 4.00
2+ 5 0.4402 4.12
2+10 0.4759 5.17
2+15 0.5217 6.66
2+20 0.5632 6.02
2+25 0.6186 8.04
2+30 0.6918 10.63
2+35 0.7753 12.12
2+40 0.8502 10.88
2+45 0.8914 5.98
2+50 0.9115 2.92
2+55 0.9272 2.28
3+ 0 0.9369 1.40
3+ 5 0.9401 0.47
3+10 0.9408 0.09
3+15 0.9409 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
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 = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 762.00(Ft.)
Length along longest watercourse measured to centroid = 327.00(Ft.)
Length along longest watercourse = 0.144 Mi.
Length along longest watercourse measured to centroid = 0.062 Mi.
Difference in elevation = 7.20(Ft.)
Slope along watercourse = 49.8898 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.038 Hr.
Lag time = 2.28 Min.
25% of lag time = 0.57 Min.
40% of lag time = 0.91 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]
7.18	0.50	3.59

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	1.21	8.70

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 %
7.180	65.10	0.710

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
65.1	65.1	0.415	0.710	0.150	1.000	0.150
					Sum (F) =	0.150

Area averaged mean soil loss (F) (In/Hr) = 0.150
Minimum soil loss rate ((In/Hr)) = 0.075
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.332

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	219.144	46.524	3.367
2	0.167	438.289	42.054	3.043
3	0.250	657.433	8.069	0.584
4	0.333	876.578	3.353	0.243

```
                                    Sum = 100.000   Sum=       7.236
-----------------------------------------------------------------------
```

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	0.150	(0.203)	0.461
2	0.17	4.30	0.625	0.150	(0.208)	0.476
3	0.25	5.00	0.727	0.150	(0.241)	0.577
4	0.33	5.00	0.727	0.150	(0.241)	0.577
5	0.42	5.80	0.843	0.150	(0.280)	0.694
6	0.50	6.50	0.945	0.150	(0.314)	0.796
7	0.58	7.40	1.076	0.150	(0.357)	0.926
8	0.67	8.60	1.251	0.150	(0.415)	1.101
9	0.75	12.30	1.789	0.150	(0.594)	1.639
10	0.83	29.10	4.232	0.150	(1.405)	4.082
11	0.92	6.80	0.989	0.150	(0.328)	0.839
12	1.00	5.00	0.727	0.150	(0.241)	0.577

(Loss Rate Not Used)

Sum = 100.0 Sum = 12.7

```
   Flood volume = Effective rainfall      1.06(In)
    times area       7.2(Ac.)/[(In)/(Ft.)] =       0.6(Ac.Ft)
   Total soil loss =      0.15(In)
   Total soil loss =     0.090(Ac.Ft)
   Total rainfall =      1.21(In)
   Flood volume =       27682.8 Cubic Feet
   Total soil loss =        3903.9 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     19.608(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 5.0 10.0 15.0 20.0
0+ 5	0.0107	1.55	V Q | | | |
0+10	0.0314	3.01	|V Q | | | |
0+15	0.0566	3.66	| V Q | | | |
0+20	0.0848	4.09	| V Q | | | |
0+25	0.1161	4.55	| V Q| | | |
0+30	0.1524	5.27	| VQ | | |
0+35	0.1943	6.09	| | Q | | |
0+40	0.2437	7.16	| | QV | | |

```
    0+45       0.3098      9.61  |         |        Q|         |         |
    0+50       0.4449     19.61  |         |         |       V |        Q|
    0+55       0.5584     16.48  |         |         |         | Q  V    |
    1+ 0       0.6085      7.28  |         |   Q     |         |       V |
    1+ 5       0.6308      3.24  |     Q   |         |         |        V|
    1+10       0.6345      0.54  |Q        |         |         |        V|
    1+15       0.6355      0.14  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

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

English Units used in output format

Drainage Area = 7.18(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.18(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 1187.00(Ft.)
Length along longest watercourse measured to centroid = 501.00(Ft.)
Length along longest watercourse = 0.225 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 28.80(Ft.)
Slope along watercourse = 128.1078 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.033 Hr.
Lag time = 1.99 Min.
25% of lag time = 0.50 Min.
40% of lag time = 0.80 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]

7.18 0.50 3.59

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.18	1.12	8.04

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 %
7.180	60.70	0.723

Total Area Entered = 7.18(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
60.7	60.7	0.462	0.723	0.162	1.000	0.162
					Sum (F) =	0.162

Area averaged mean soil loss (F) (In/Hr) = 0.162
Minimum soil loss rate ((In/Hr)) = 0.081
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.322

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	251.147	51.045	3.694
2	0.167	502.294	39.983	2.893
3	0.250	753.441	6.982	0.505
4	0.333	1004.588	1.989	0.144
		Sum = 100.000	Sum=	7.236

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	0.162	(0.182)	0.403
2	0.17	4.30	0.578	0.162	(0.186)	0.416

```
 3   0.25     5.00      0.672          0.162    (  0.216)        0.510
 4   0.33     5.00      0.672          0.162    (  0.216)        0.510
 5   0.42     5.80      0.779          0.162    (  0.251)        0.618
 6   0.50     6.50      0.874          0.162    (  0.281)        0.712
 7   0.58     7.40      0.994          0.162    (  0.320)        0.833
 8   0.67     8.60      1.156          0.162    (  0.372)        0.994
 9   0.75    12.30      1.653          0.162    (  0.532)        1.491
10   0.83    29.10      3.911          0.162    (  1.258)        3.749
11   0.92     6.80      0.914          0.162    (  0.294)        0.752
12   1.00     5.00      0.672          0.162    (  0.216)        0.510
          (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    11.5
    Flood volume = Effective rainfall      0.96(In)
     times area       7.2(Ac.)/[(In)/(Ft.)] =       0.6(Ac.Ft)
    Total soil loss =      0.16(In)
    Total soil loss =     0.097(Ac.Ft)
    Total rainfall =      1.12(In)
    Flood volume =       24979.1 Cubic Feet
    Total soil loss =        4210.0 Cubic Feet
    ---------------------------------------------------------------------
     Peak flow rate of this hydrograph =     18.796(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        5.0      10.0      15.0      20.0
 ---------------------------------------------------------------------------
   0+ 5       0.0103      1.49  V Q       |         |         |         |
   0+10       0.0289      2.70  | V  Q    |         |         |         |
   0+15       0.0516      3.30  |  V  Q   |         |         |         |
   0+20       0.0766      3.63  |    V Q  |         |         |         |
   0+25       0.1047      4.08  |      VQ |         |         |         |
   0+30       0.1374      4.75  |        Q|         |         |         |
   0+35       0.1755      5.53  |         |QV       |         |         |
   0+40       0.2205      6.53  |         |  Q V    |         |         |
   0+45       0.2819      8.91  |         |      Q V|         |         |
   0+50       0.4113     18.80  |         |         |       V |      Q  |
   0+55       0.5114     14.53  |         |         |        Q|    V    |
   1+ 0       0.5539      6.17  |         | Q       |         |       V |
   1+ 5       0.5704      2.40  |   Q     |         |         |        V|
   1+10       0.5729      0.37  Q         |         |         |        V|
   1+15       0.5734      0.07  Q         |         |         |         V
-----------------------------------------------------------------------
```

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



August 9, 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: 1:1,520 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	2.2	30.6%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	5.0	69.4%
Totals for Area of Interest		**7.1**	**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

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

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.

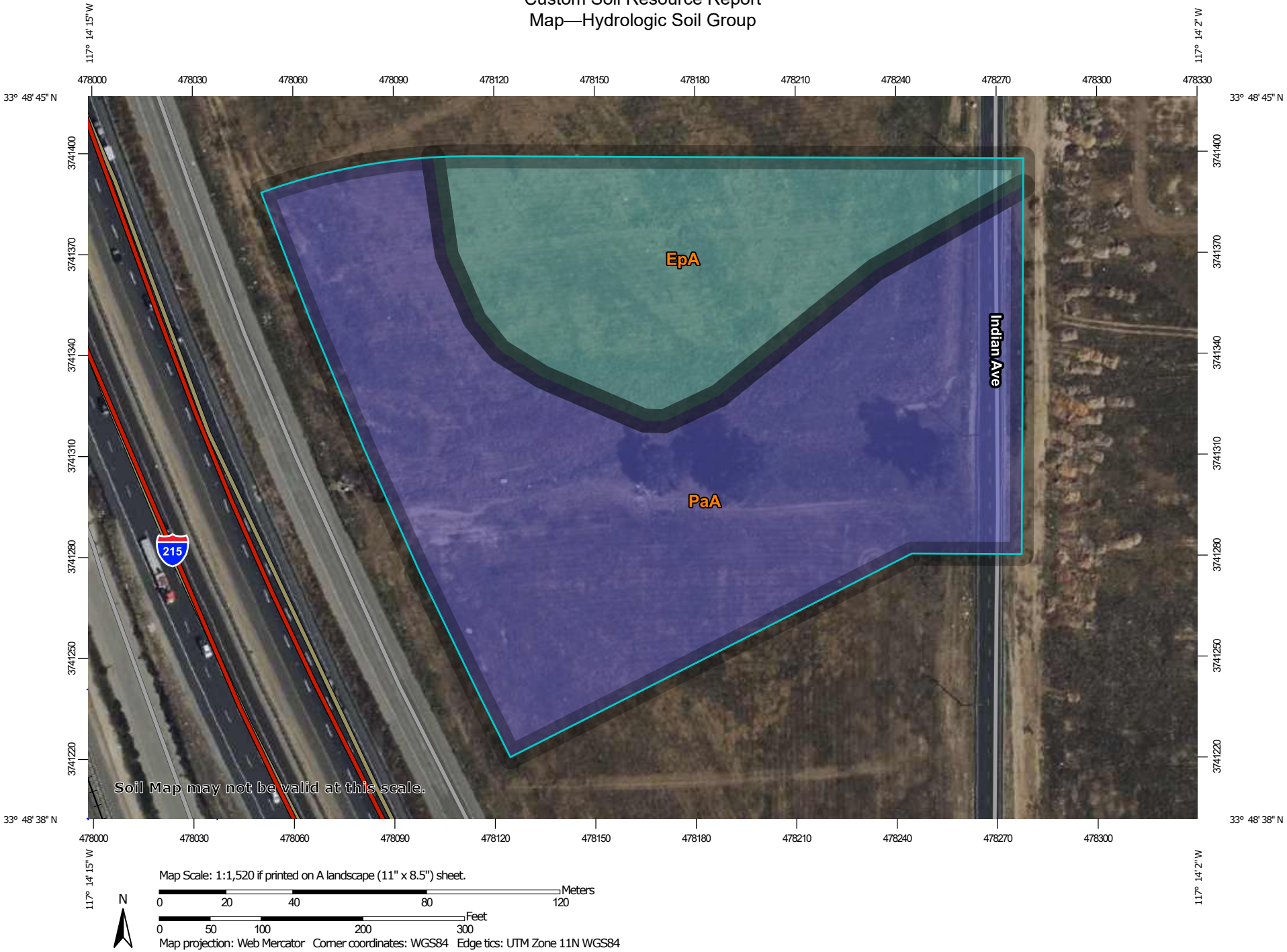
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:1,520 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	C	2.2	30.6%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	5.0	69.4%
Totals for Area of Interest			**7.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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RAINFALL INTENSITY–INCHES PER HOUR

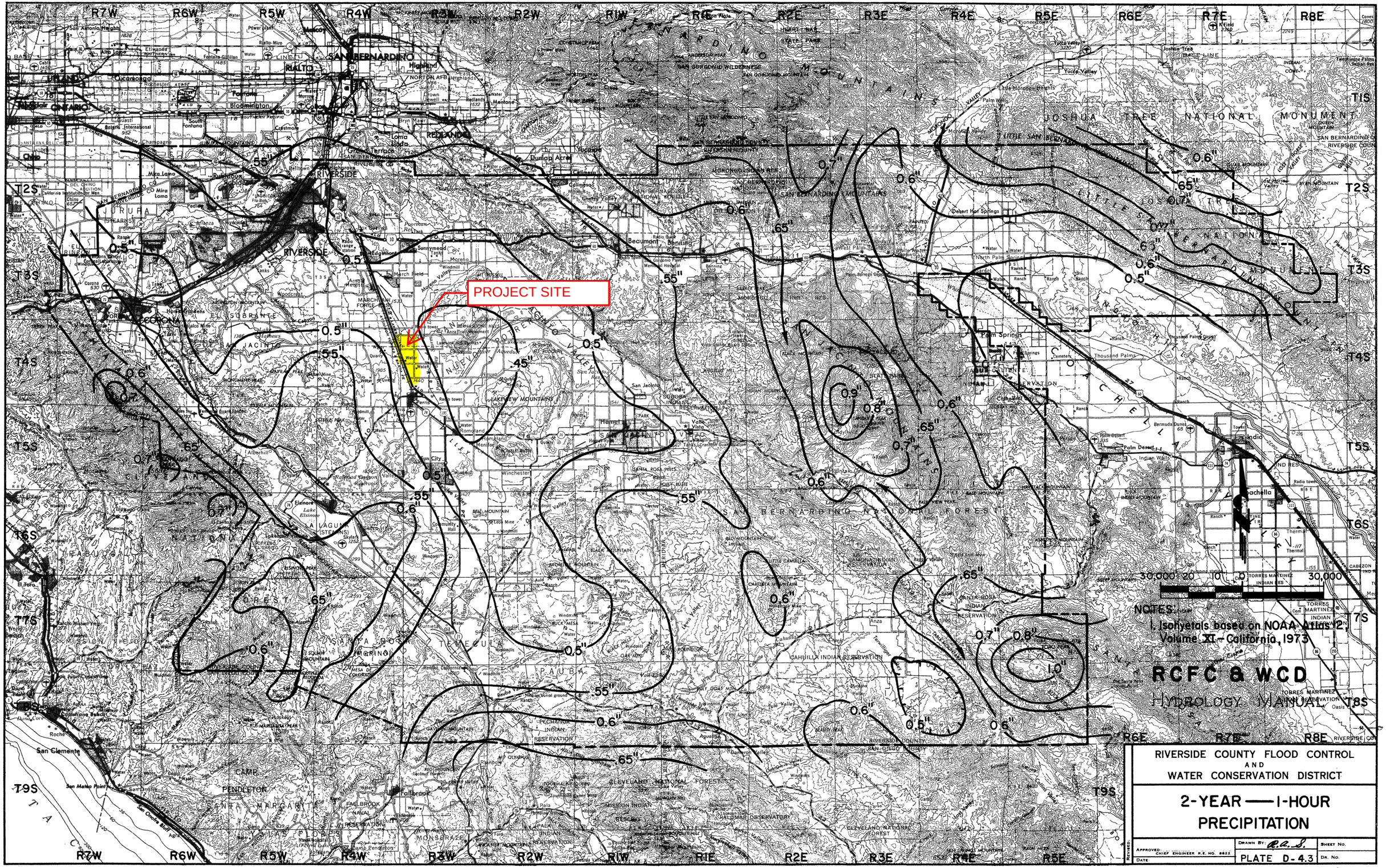
MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		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		

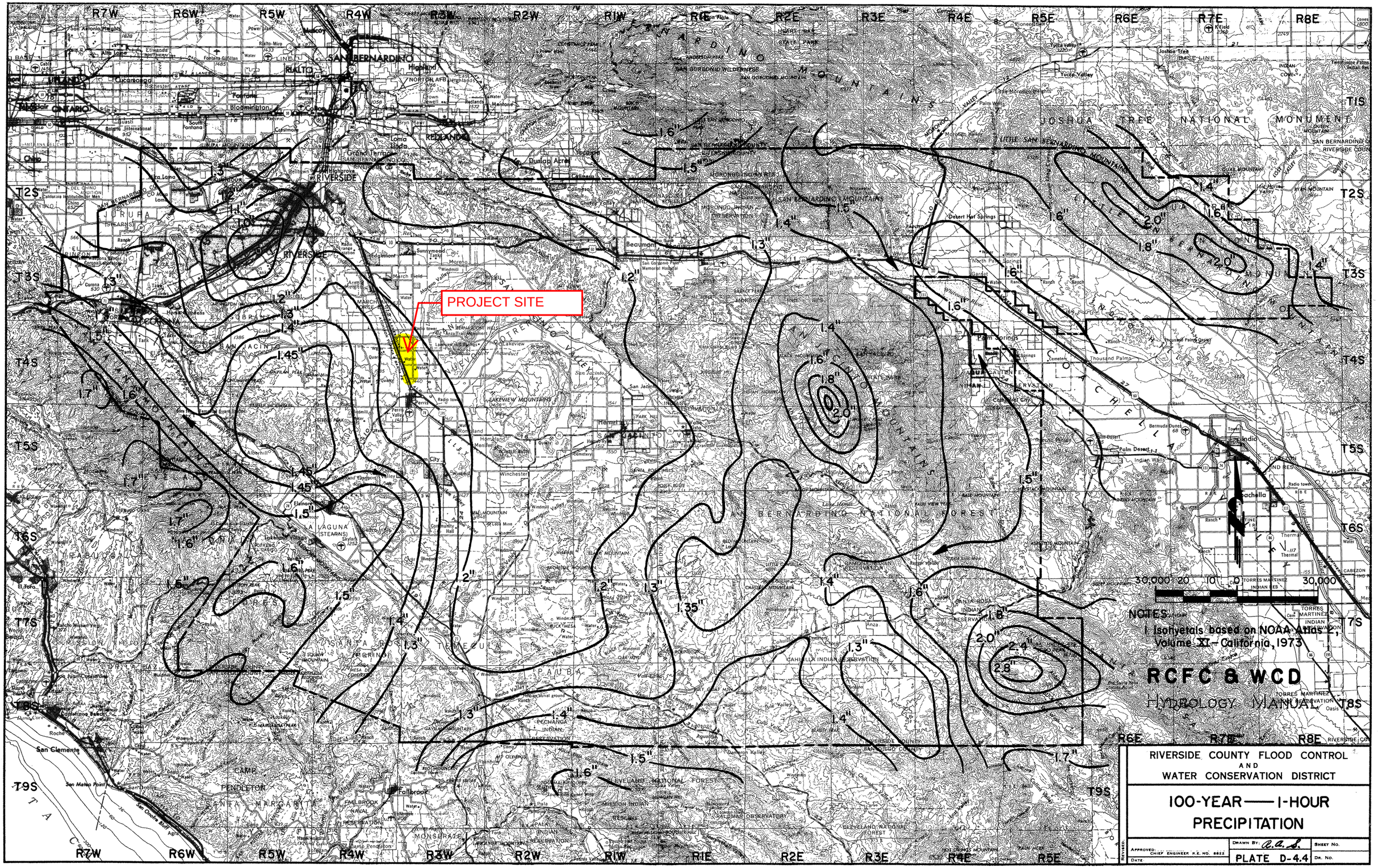
RCFC & WCD

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

July 1, 2022

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

Attention: Mr. Mike Tunney
Vice President

Project No.: **22G183-2**

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

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

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. 22P206R, dated April 28, 2022 and Change Order No. 22G183-CO, dated June 8, 2022. The scope of services included visual site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils for the stormwater disposal systems. The infiltration borings were tested using a modified constant-head infiltration test as requested by the project civil engineer. The double ring infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The site is located at the northwest and southwest corners of Indian Avenue and Orange Avenue in Perris, California. The site is bounded to the north by Val Verde Elementary School, to the west and south by Interstate 215 Frontage Road, and to the east by Indian Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 of this report.

The site consists of several parcels, which total 73.68± acres in size. The east-central area of the site is developed with four (4) single-family residences. These residences are assumed to be single-story structures of wood frame and stucco construction and supported on conventional

shallow foundations with concrete slab-on-grade floors. The residences are surrounded by concrete flatwork, turf grass, exposed soil, and trees. The remaining areas of the site are vacant and undeveloped. The ground surface in these areas consists of exposed soil with sparse to moderate native grass and weed growth.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography is generally flat and moderately slopes to the east at a gradient of approximately 2± percent.

Proposed Development

Based on the conceptual site plan provided to our office by the client, the site will be developed with five (5) industrial buildings:

Building No.	Location	Size (ft²)
1	North	647,000
2	North-Central	389,000
3	Central	91,000
4	South-Central	52,000
5	South	22,000

Each building includes a mezzanine and dock-high doors will be constructed along a portion of at least one building wall for each of the buildings. The building is anticipated to 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.

The proposed development will include on-site infiltration for stormwater disposal. Based on the information provided by representatives of FMCivil Engineers, Inc., the project civil engineer, the infiltration systems will consist of four (4) shallow below-grade chamber systems (identified as Infiltration System "A" through Infiltration System "D") and/or four (4) deep dry-well systems (identified as Infiltration System "E" thought Infiltration System "H"). The infiltration systems will be located in the eastern area of the site. The bottoms of the below-grade chamber systems will extend to depths of 7± feet below existing site grades and the dry wells will extend to a depth of 50± feet below existing site grades.

Concurrent Studies

SCG performed a geotechnical investigation at the subject site, referenced above. As a part of this investigation, twenty-three (23) borings were advanced to depths of 15 to 25± feet below the previously existing site grades. Native alluvium was encountered at each boring location, 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. 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 approximately 0.5 miles east from the site. Water level readings within this monitoring well indicates a groundwater level of 44± feet below the ground surface in March 2022.

Subsurface Exploration

Scope of Exploration

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 using a rubber-tire backhoe to a depth of 7± feet. The infiltration borings were extended to a depth of 50± feet below existing site grades. In addition to the infiltration testing, one (1) exploratory boring was extended to a depth of 60± feet below site grades to confirm the underlying soil types and verify that groundwater was at a depth greater than 10± feet below the bottom of the proposed dry well infiltration systems. The 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 boring, infiltration borings, and infiltration trenches are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

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 consist 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 consists 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 consists 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. The Boring Logs and Trench Logs, which illustrate the conditions encountered at each of the borings, are included with this report.

Free water was not encountered during drilling of any of the borings. Based on the lack of water within the borings, the static groundwater table was considered to have existed at a depth in excess of 60± feet at the time of our subsurface exploration.

Shallow Infiltration Testing – Double Ring Infiltration

The infiltration testing for the proposed shallow infiltration chambers was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter

and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at all of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 10-minute intervals at Infiltration Trench No I-3 and 15-minute increments at the remaining trench locations. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-1	7	Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	0.8
I-2	7	Brown Silty fine to medium Sand, trace coarse Sand, trace Clay	1.0
I-3	7	Brown Silty fine to medium Sand, little coarse Sand	6.8
I-4	7	Brown Silty fine to medium Sand, trace to little coarse Sand, trace Clay	0.3
I-5	7	Brown Silty fine to medium Sand, trace coarse Sand, trace Clay	0.9
I-6	7	Brown Silty fine to medium Sand, trace Clay, trace coarse Sand	1.3

Percolation Testing – Dry Wells

The dry well infiltration testing was performed in accordance with a modified constant-head infiltration test as requested by the project civil engineer, the designer of the proposed dry well system.

Upon the completion of the drilling for the infiltration borings, 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 installed in the annulus surrounding the PVC casing.

Pre-soaking

The pre-soaking process consisted of filling the test borings with water to approximately 10± feet below the ground surface. The pre-soaking was completed after all of the water had percolated through the test hole, at least 15 hours since initiating the pre-soak.

Infiltration Testing Procedure

Following the pre-soaking process, the constant-head infiltration test method was utilized to test the infiltration rates of deeper soils. This method consisted of filling the borings to a maximum water level of 10± feet below the ground surface, based on the soil conditions encountered. Once the hole was filled, the inflow of water was controlled via a ball valve in order to maintain the water level constant below ground surface. It was necessary to constantly monitor this depth due to varying inflows from the water source and the change in infiltration rate with time. Readings were taken every ten minutes using a water level meter. The ball valve was used to make adjustments by increasing or decreasing the inflow of water when slight changes in depth occurred. 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 deep infiltration tests are tabulated in gallons per square foot per day.

Infiltration Test No.	Depth (feet)	Measured Infiltration Rate (Inches per Hour)
I-7	51	<0.1
I-8	49	0.2
I-9	51	0.1
I-10	51	0.3

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 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-41 of this report.

Design Recommendations

A total of ten (10) total infiltration tests were performed at the subject site. As noted above, the double ring infiltration testing resulted in measured infiltration rates ranging from 0.3 to 6.8 inches per hour. The dry well infiltration testing resulted in measured infiltration rates ranging from 0.0 to 0.3 inches per hour. The primary factors affecting the infiltration rates are the silt content of the encountered soils, which vary at different depths and locations at the subject site. Based on the results of the infiltration testing, we recommend the following infiltration rates to be utilized for the design of the proposed infiltration systems:

Infiltration Test No.	Infiltration System	Infiltration System Type	Depth (feet)	Location	Infiltration Rate (inches per hour)
I-1 and I-2*	A	Chamber System	7	Northeast	0.9
I-3 and I-4*	B	Chamber System	7	Central-East	3.6
I-5	C	Chamber System	7	South-Central	0.9
I-6	D	Chamber System	7	Southeast	1.3

Infiltration Test No.	Infiltration System	Infiltration System Type	Depth (feet)	Location	Infiltration Rate (inches per hour)
I-7	E	Dry Well	50	Northeast	0.0
I-8	F	Dry Well	50	Central-East	0.2
I-9	G	Dry Well	50	Central-East	0.1
I-10	H	Dry Well	50	Southeast	0.3

NOTE: *Indicates an average infiltration rate was used in the design infiltration rate.

Due to the low infiltration rates for the deep dry well infiltration systems, dry well infiltration is not recommended for this project.

The design of the proposed storm water infiltration system 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. The presence of such materials would decrease the effective infiltration rate. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rates recommended above are based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rates.** It should be noted that the recommended infiltration rates are based on infiltration testing at ten (10) discrete locations and the overall infiltration rates of the storm water infiltration systems could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein was 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.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the basins. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Infiltration Chamber Maintenance

The proposed project may include infiltration chambers. Water flowing into chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the chamber subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

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. **The 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 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 rates 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 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 trench 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

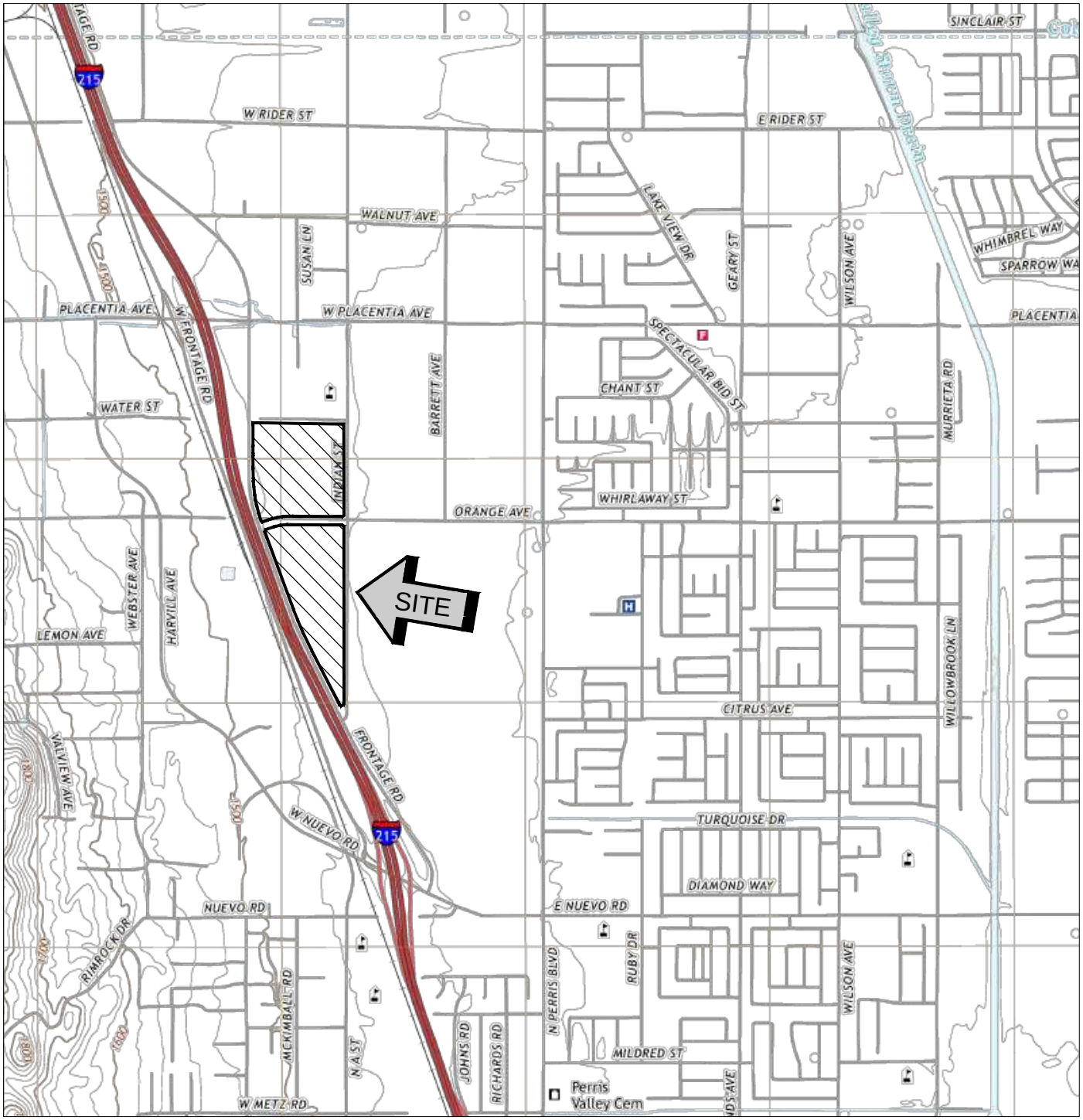




Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Log Legend and Logs (8 pages)
Boring Log Legend and Logs (12 pages)
Infiltration Test Results Spreadsheets (10 pages)
Grain Size Distribution Graphs (41 pages)



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

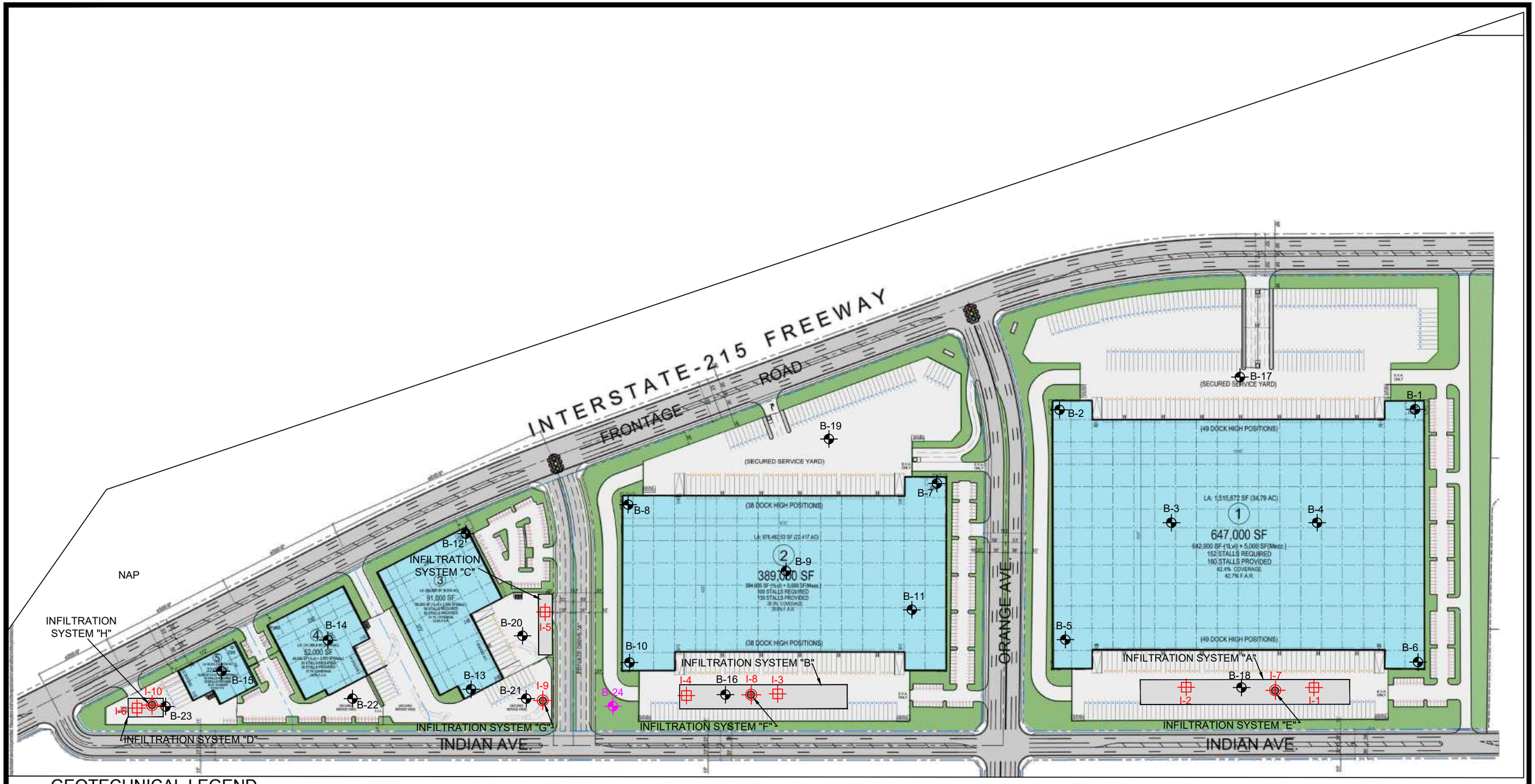
SITE LOCATION MAP

HARVEST LANDING INDUSTRIAL DEVELOPMENT

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: OS CHKD: RGT	
SCG PROJECT 22G183-2	
PLATE 1	

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE SHALLOW-INFILTRATION TEST LOCATION (DOUBLE-RING INFILTROMETER)
- APPROXIMATE DEEP-INFILTRATION TEST LOCATION (CONSTANT-HEAD)
- APPROXIMATE BORING LOCATION
- APPROXIMATE BORING LOCATION (SCG PROJECT NO. 22G183-1)
- APPROXIMATE BELOW-GRADE CHAMBER LOCATION
- APPROXIMATE DRY WELL SYSTEM LOCATION

NORTH

SoCalGeo

NOTE: CONCEPTUAL PLAN PROVIDED BY AO ARCHITECTS

INFILTRATION TEST LOCATION PLAN

HARVEST LANDING INDUSTRIAL DEVELOPMENT

PERRIS, CALIFORNIA

SCALE: 1" = 250'	
DRAWN: RB CHKD: RGT	
SCG PROJECT 22G183-2	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

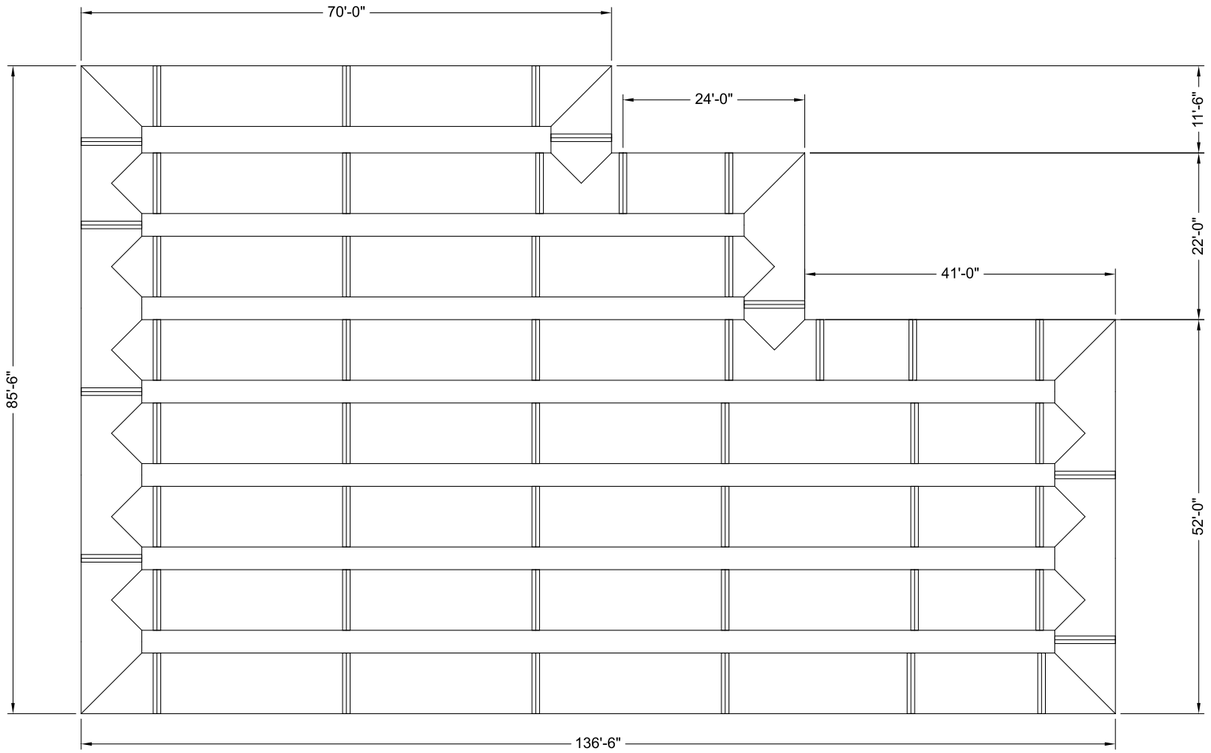
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 986 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 49,574 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 49,574 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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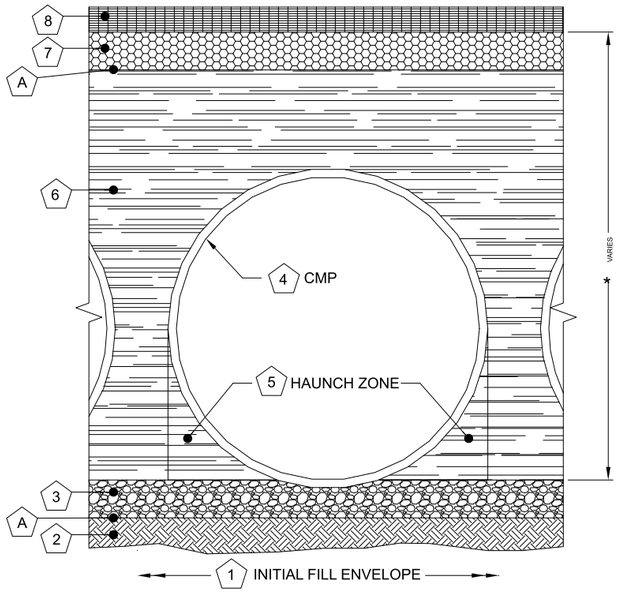
DATE	REVISION DESCRIPTION	BY

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

DYO19773 20-001 Harvest Landing Site 3
Easterly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12816	19773	8/16/2022
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

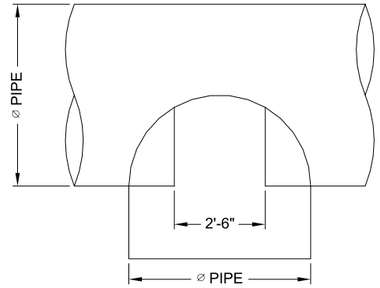
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

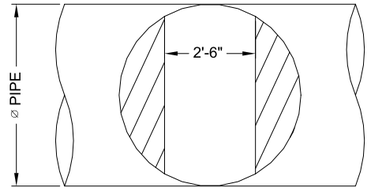
BACKFILL

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

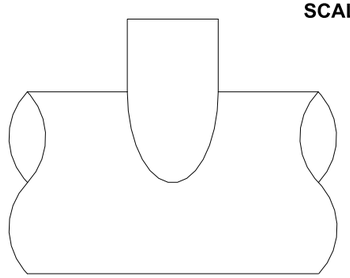


FRONT

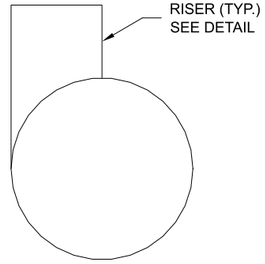
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

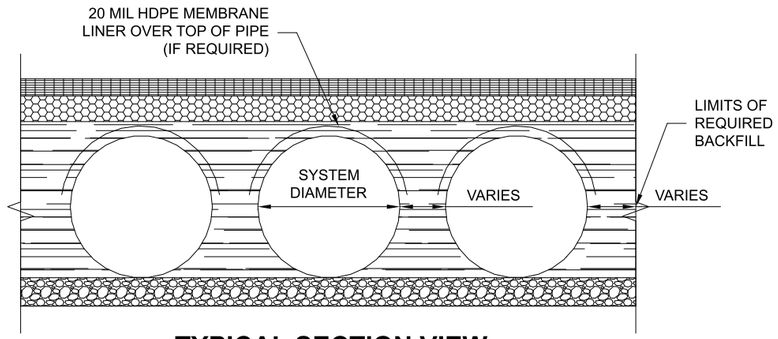


END

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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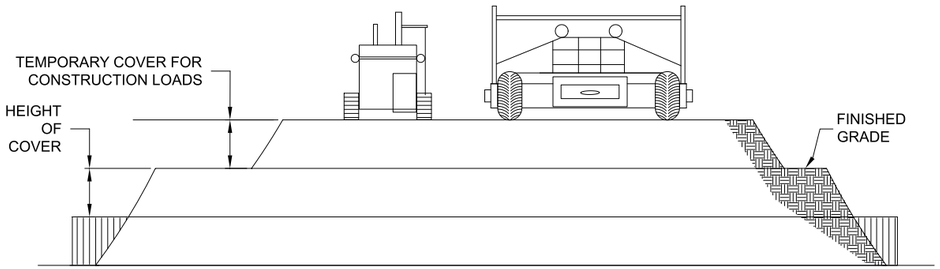
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www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19773 20-001 Harvest Landing Site 3
Easterly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12816	19773	8/16/2022
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

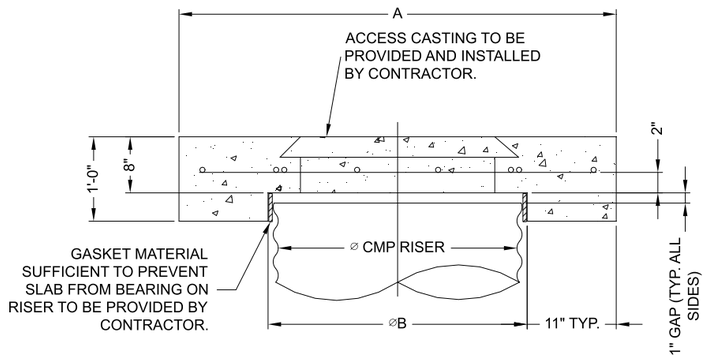
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

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.

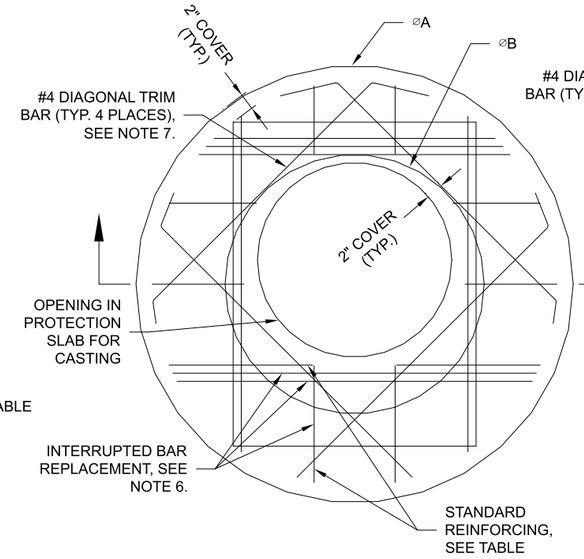
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



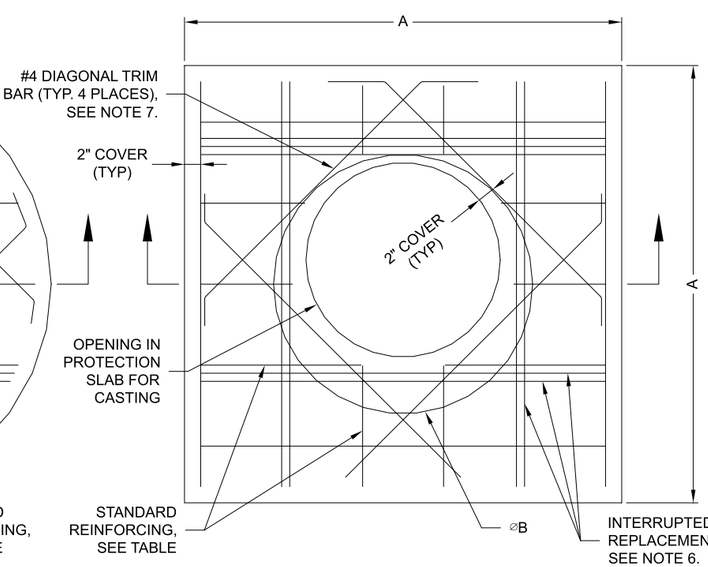
SECTION VIEW

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

DYO19773 20-001 Harvest Landing Site 3
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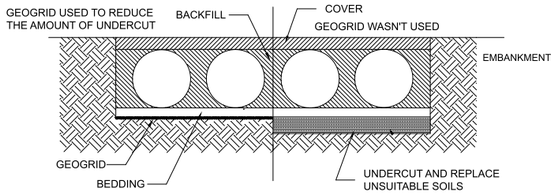
CMP DETENTION INSTALLATION GUIDE

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.

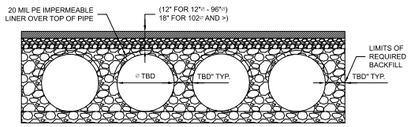


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING 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.

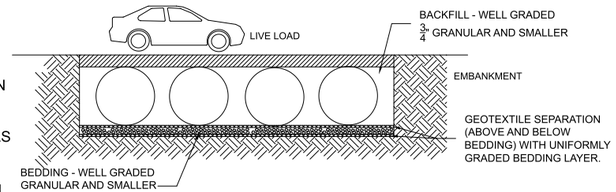
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

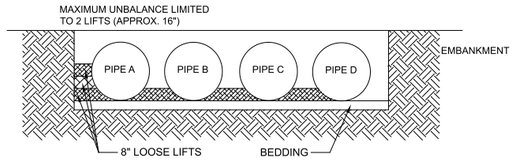
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION 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.



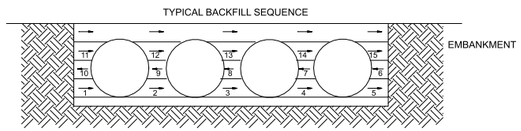
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

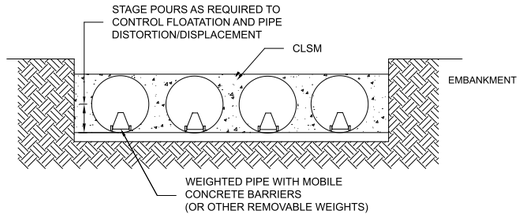


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE 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.

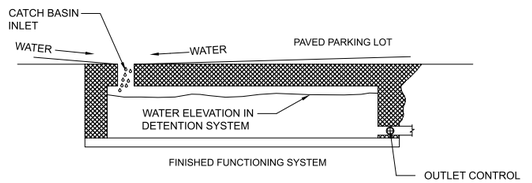


CONSTRUCTION LOADING

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

DYO19773 20-001 Harvest Landing Site 3
Easterly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12816	19773	8/16/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 714 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 35,890 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 35,890 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 2⅔" x ½" 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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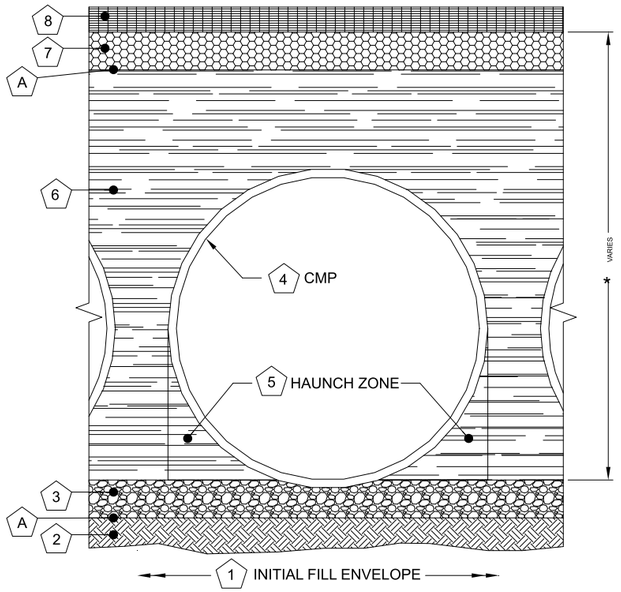
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CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO19755 20-001 Harvest Landing Site 3
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12801	19755	8/16/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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	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

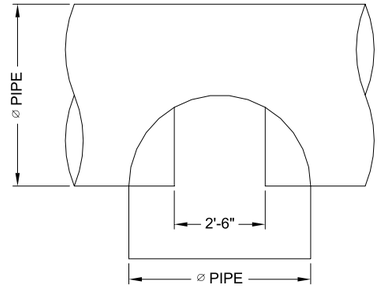
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

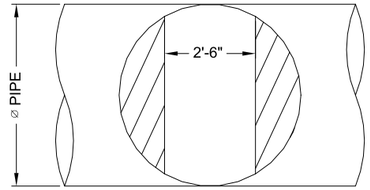
BACKFILL

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

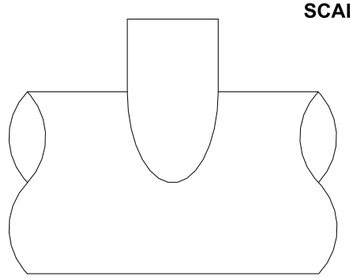


FRONT

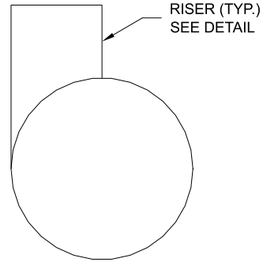
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

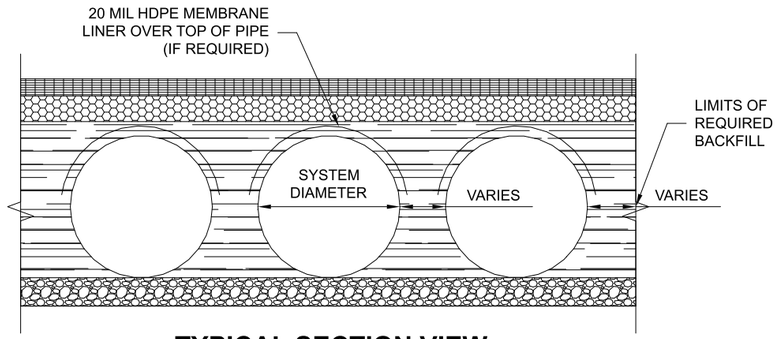


END

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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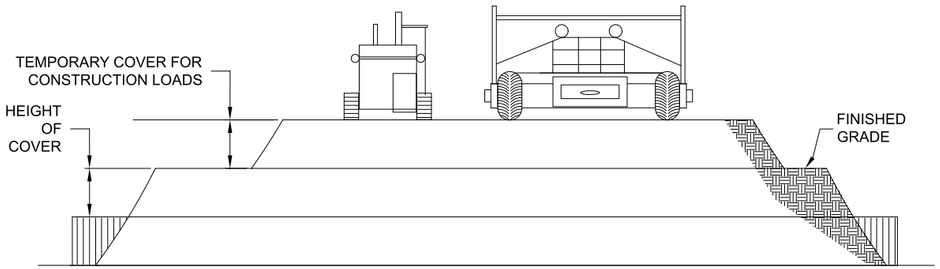
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CONTECH DYODS DRAWING

DYO19755 20-001 Harvest Landing Site 3
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12801	19755	8/16/2022
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

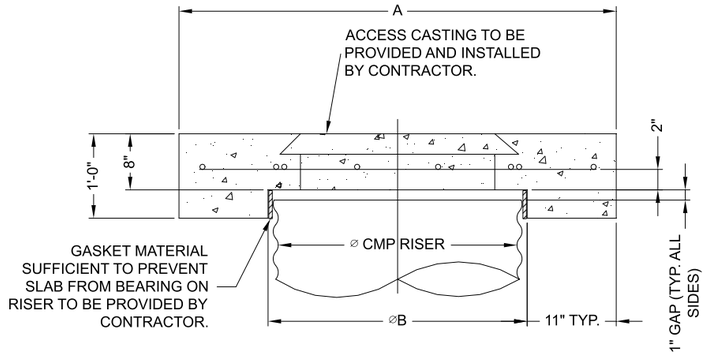
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

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.

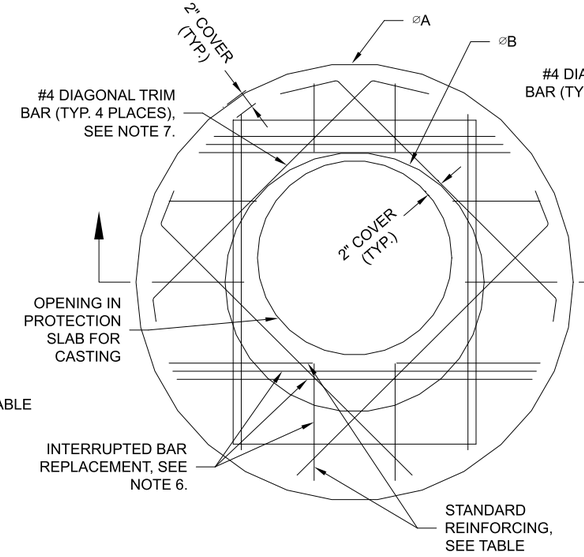
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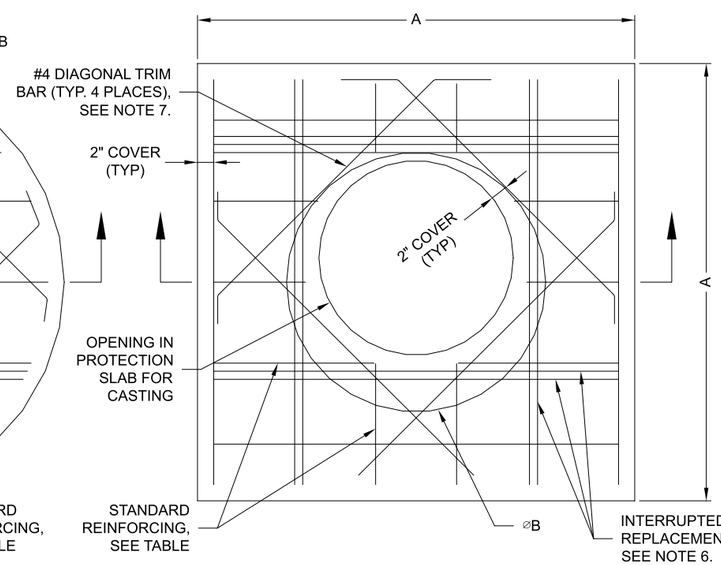
SECTION VIEW

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
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DYO19755 20-001 Harvest Landing Site 3
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12801	19755	8/16/2022
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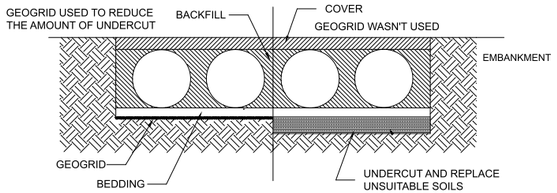
CMP DETENTION INSTALLATION GUIDE

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.

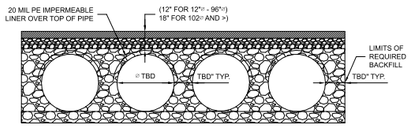


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING 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.

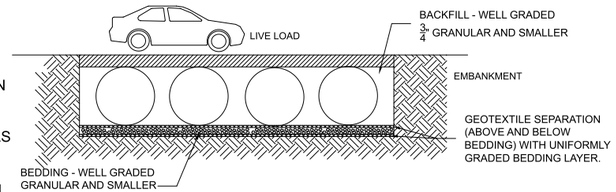
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

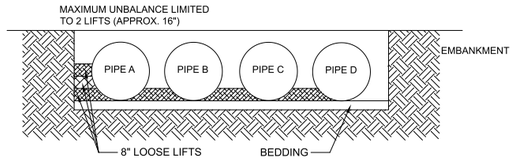
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION 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.



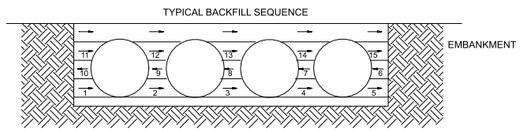
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

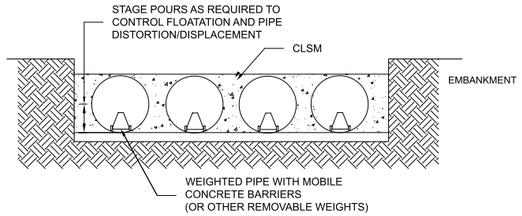


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE 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.

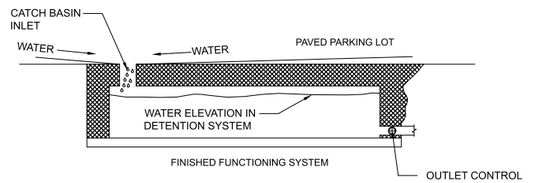


CONSTRUCTION LOADING

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.

C:\EXPORTS\TEMPLATES\CMP_V8.DWG 10/18/2019 10:02 AM

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DATE	REVISION DESCRIPTION	BY

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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

DYO19755 20-001 Harvest Landing Site 3
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12801	19755	8/16/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Santa Ana Watershed - BMP Design Flow Rate, Q_{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	10/4/2024
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 3		

BMP Identification

BMP NAME / ID: S3-1 Modular Wetlands

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
S3-1A	*82323.47*	*Roofs*	*1*	*0.89*	*73432.5*			
S3-1C	*49531.63*	*Concrete or Asphalt*	*1*	*0.892*	*44182.2*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{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	10/4/2024
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 3		

BMP Identification

BMP NAME / ID: S3-2 Modular Wetlands

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
S3-2A	*28787.68*	*Roofs*	*1*	*0.89*	*25678.6*			
S3-2C	*43453.31*	*Concrete or Asphalt*	*1*	*0.892*	*38760.4*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{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	10/4/2024
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 3		

BMP Identification

BMP NAME / ID: S3-3 Modular Wetlands

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
S3-3A	*0*	*Roofs*	*1*	*0.89*	*0*			
S3-3C	*116.28*	*Concrete or Asphalt*	*1*	*0.892*	*103.7*			
	116.28	***Total***			**103.7**	**0.20**	***0.00***	***0***

Proposed Volume must be greater than the Design Capture Volume

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{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	10/4/2024
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 3		

BMP Identification

BMP NAME / ID: S3-4 Modular Wetlands

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
S3-4A	*0*	*Roofs*	*1*	*0.89*	*0*			
S3-4C	*4363.5*	*Concrete or Asphalt*	*1*	*0.892*	*3892.2*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{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	10/4/2024
Designed by	Hector Paez	Case No	
Company Project Number/Name	20-001 - Site 3		

BMP Identification

BMP NAME / ID: S3-5 Modular Wetlands

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
S3-5A	*0*	*Roofs*	*1*	*0.89*	*0*			
S3-5C	*28679.95*	*Concrete or Asphalt*	*1*	*0.892*	*25582.5*			

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.

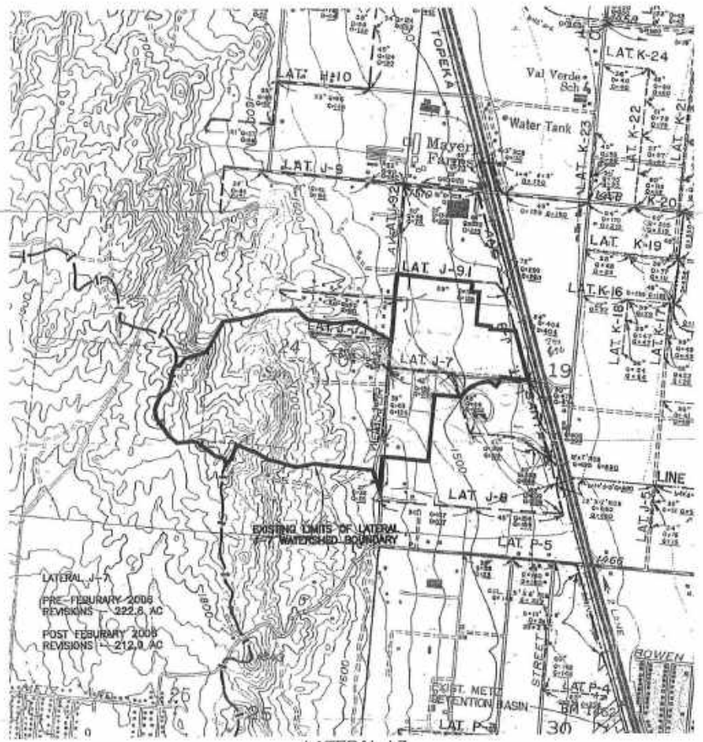
PVSD

M-1

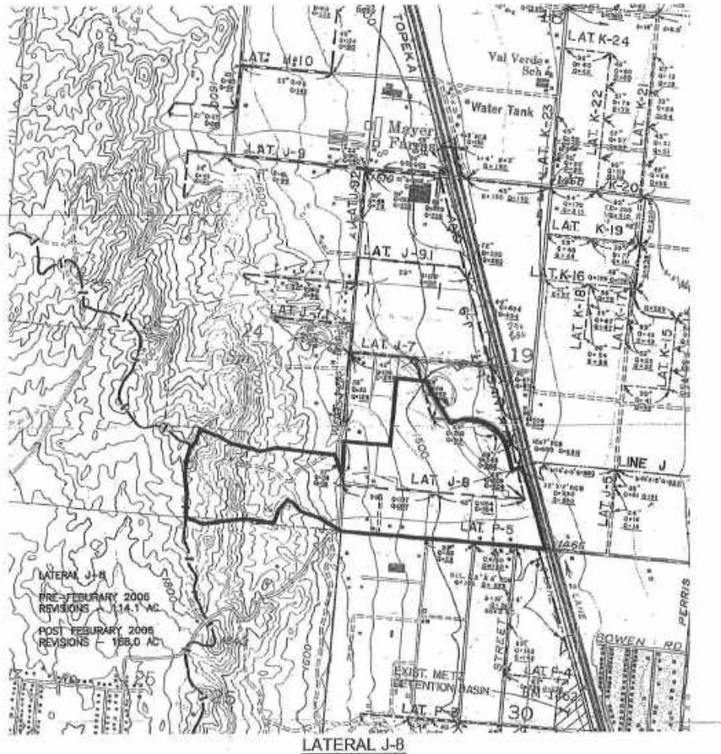
BROWN RD.

REVISED HYDROLOGY MAP
PERRIS MASTER DRAINAGE PLAN

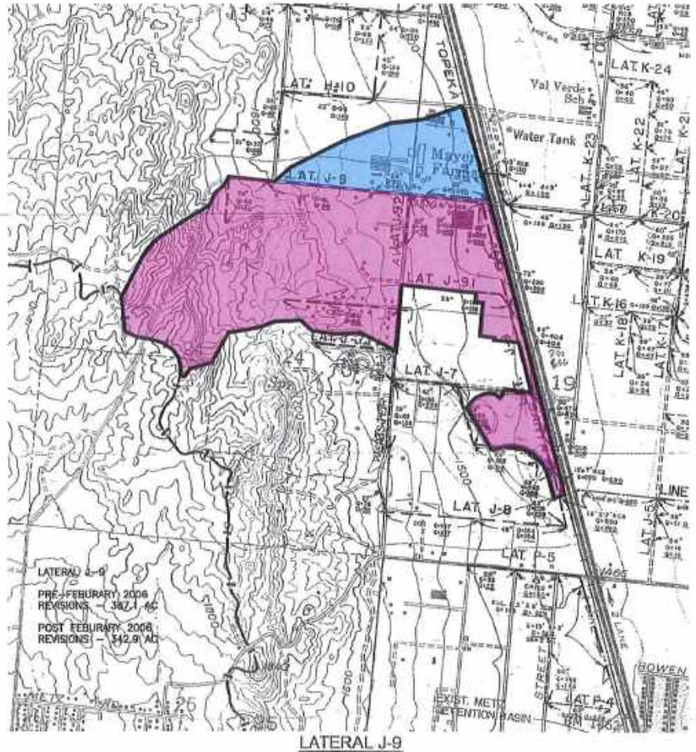
LATERALS J-7, J-8, & J-9



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:

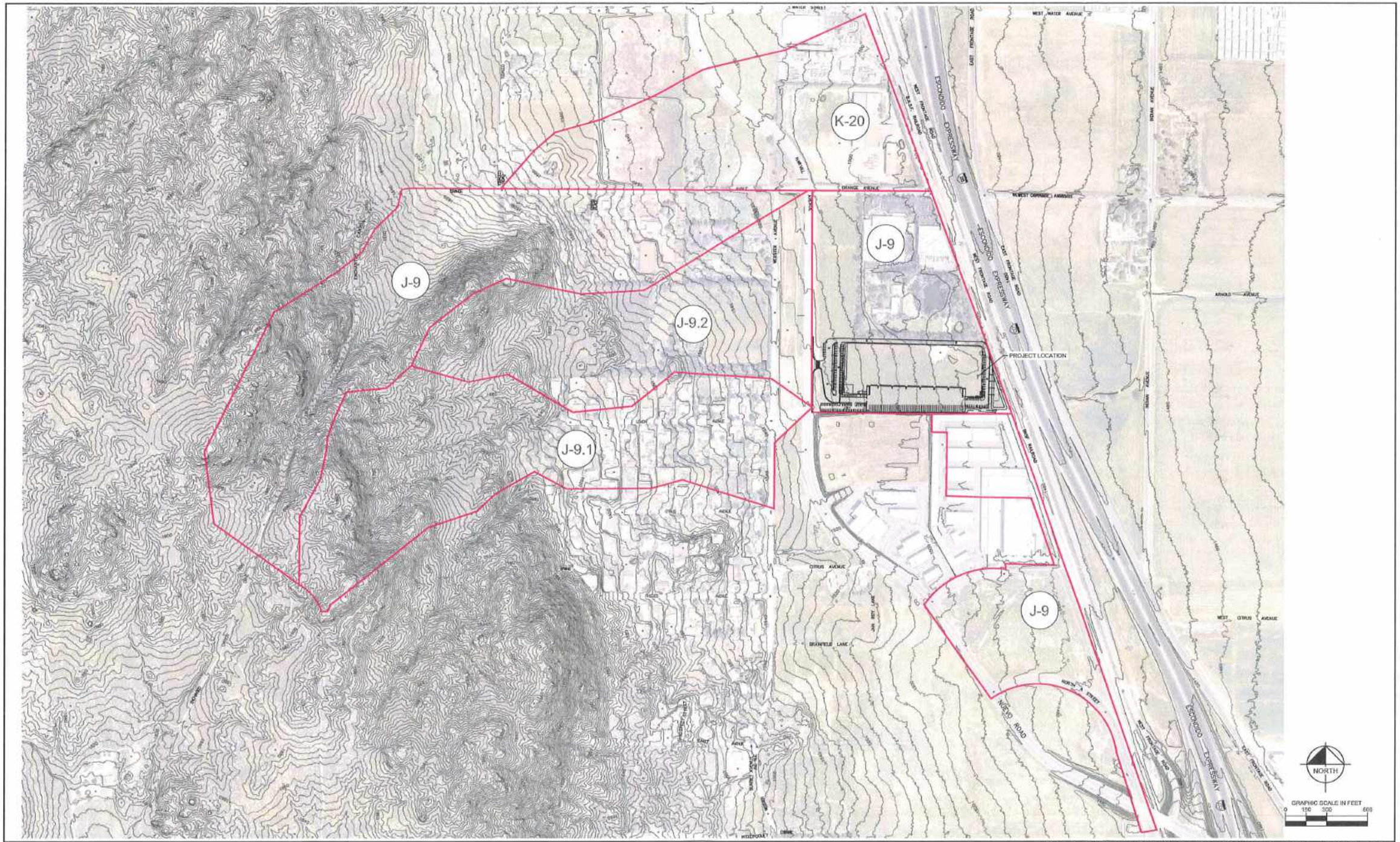
SCALE:

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 OFFSITE HYDROLOGY MAP

EXHIBIT C: EXISTING HYDROLOGY MAP

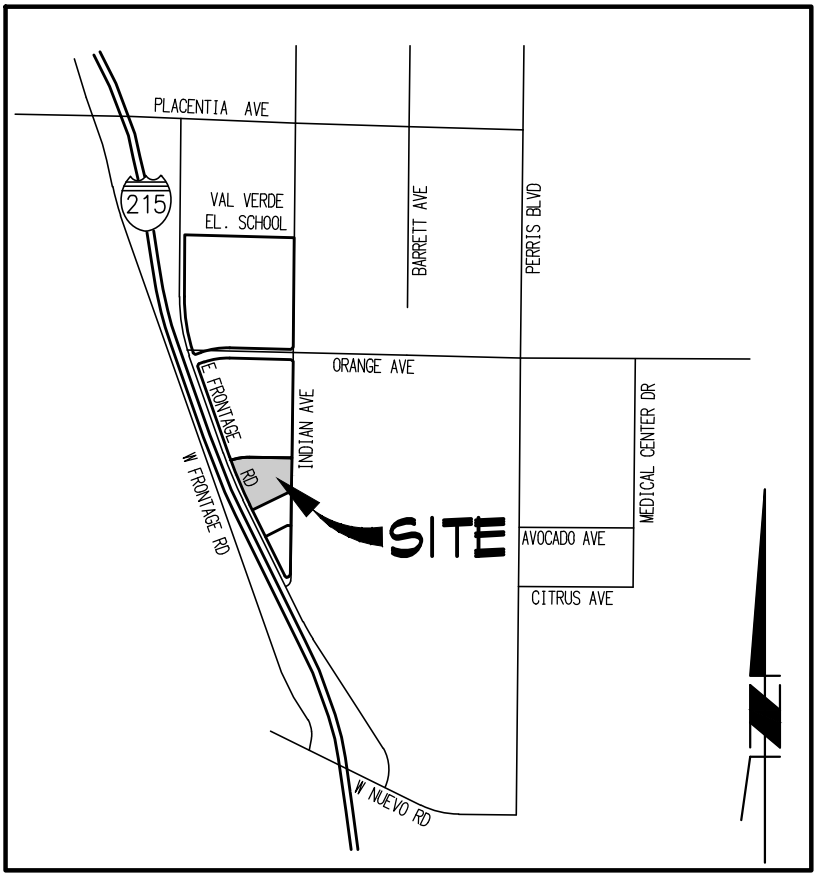
EXHIBIT D: PROPOSED HYDROLOGY MAP

EXHIBIT E: HYDROLOGIC SOILS GROUP MAP

EXHIBIT F: RCFCD MDP FACILITIES OVERLAY

EXHIBIT G: PHASE 1 OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM

EXHIBIT H: CONCEPTUAL GRADING



VICINITY MAP

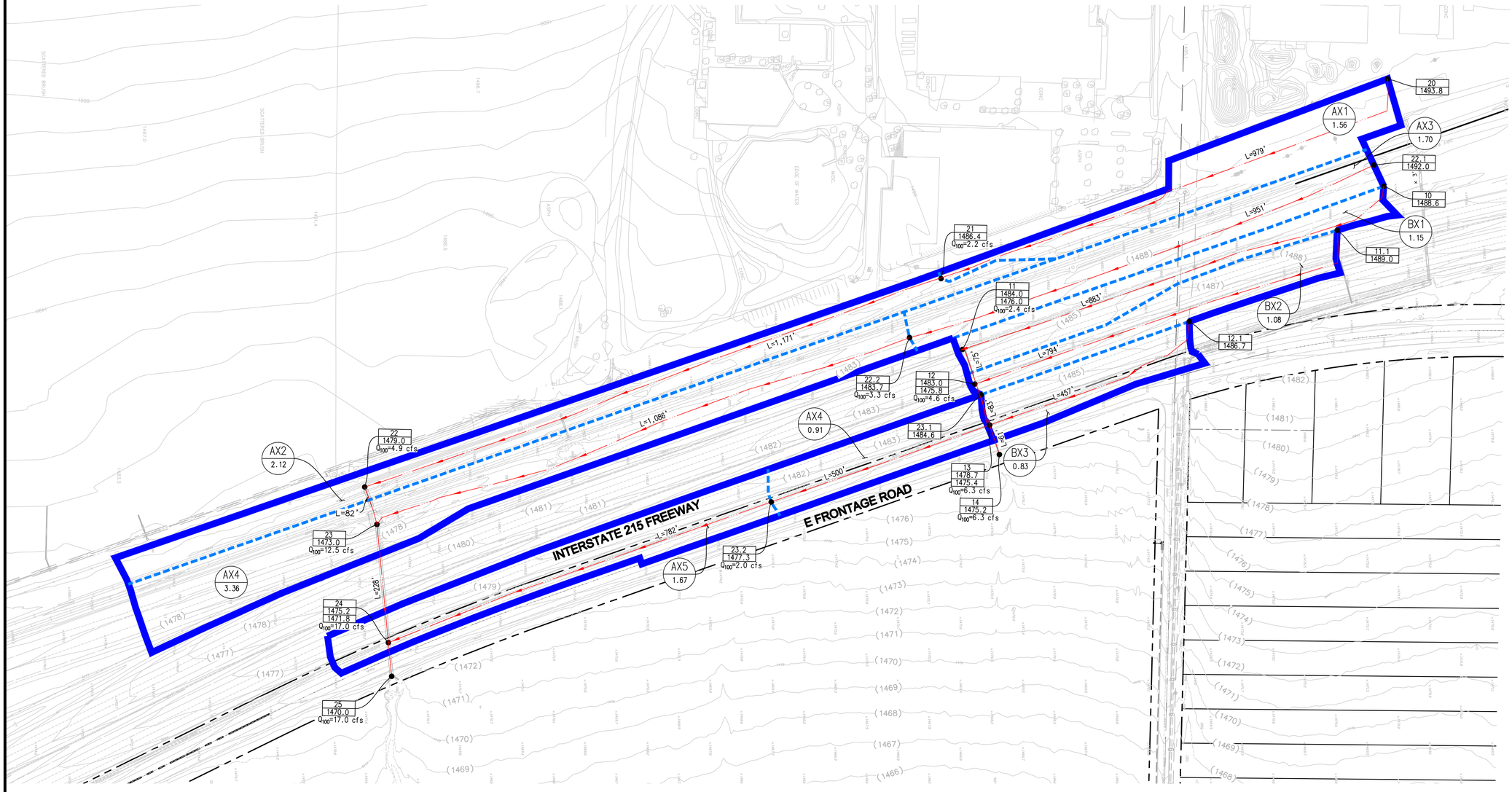
T4S, R3W, SEC 19
NOT TO SCALE

FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306 | MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

HARVEST LANDING SITE 3

FIGURE 1
VICINITY MAP

H:\PDATA\20-001 HARVEST LANDING\DWGS\EXHIBITS\20-001-VICINITY-MAP.DWG HECTOR 8/7/2022 11:37 PM



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"=100'

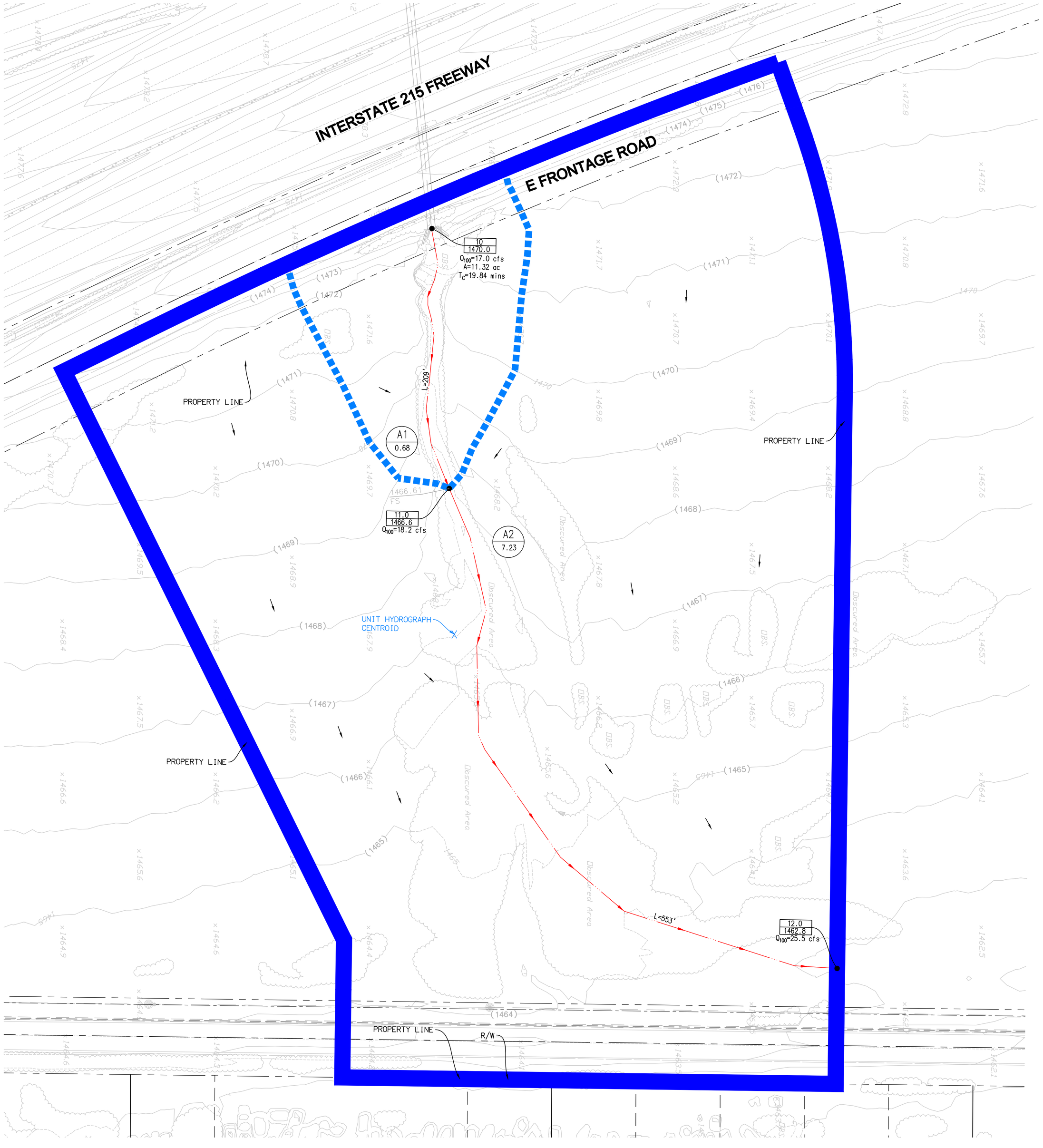
100 50 0 100 200 300

SCALE: 1"=100'

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HARVEST LANDING

SITE 2 - OFFSITE HYDROLOGY



UNIT HYDROGRAPH PARAMETERS			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
762	327	7.20	0.020

LEGEND

- D2 / 2.16 — DRAINAGE BASIN NAME / DRAINAGE BASIN AREA(AC.)
- 11 / 1027.0 — NODE I.D. / ELEVATION
- WATERSHED BOUNDARY
- FLOW DIRECTION

SCALE 1"=40'

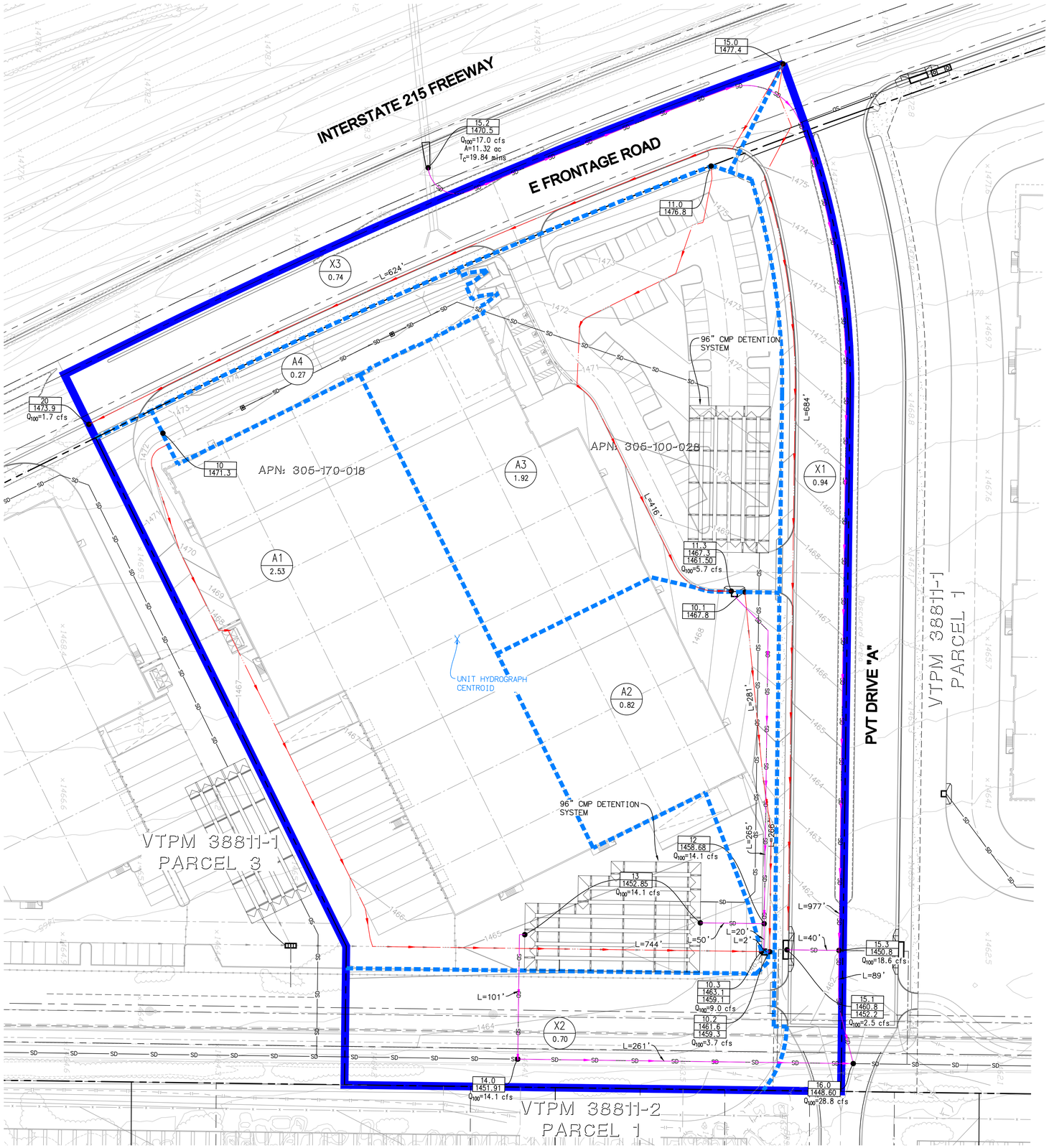
40 20 0 40 80 120

SCALE: 1"=40'

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HARVEST LANDING

SITE 3 - EXISTING HYDROLOGY



UNIT HYDROGRAPH PARAMETERS			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
1,187	501	28.8	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"=40'

40 20 0 40 80 120

SCALE: 1"=40'

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MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

HARVEST LANDING

SITE 3 - PROPOSED HYDROLOGY



LEGEND

- SITE 3 BOUNDARY
- HYDROLOGIC SOIL B
- HYDROLOGIC SOIL C

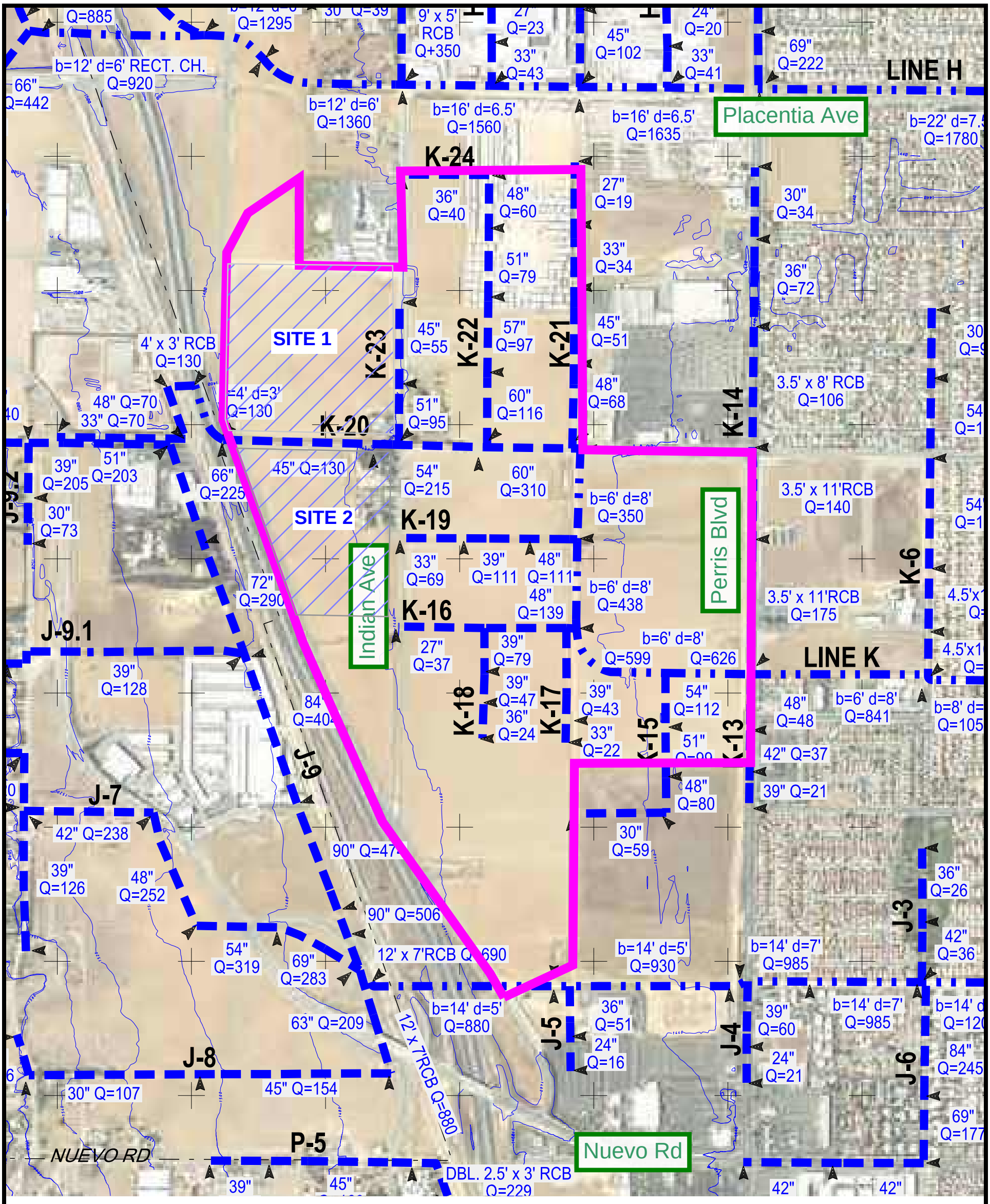
0 100 200 ft

FMCIVIL ENGINEERS INC.

Source: USDA Web Soil Survey

HARVEST LANDING

SITE 3 HYDROLOGICAL SOIL GROUPS



N.T.S.

Limits of master planned development - Howard Industrial

RCFC&WCD Master Drainage Plan Facilities for the Perris Valley Area, as shown in the digital exhibit map dated July 2014.

Site 1 and Site 2

RCFCD MDP FACILITIES OVERLAY

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:	

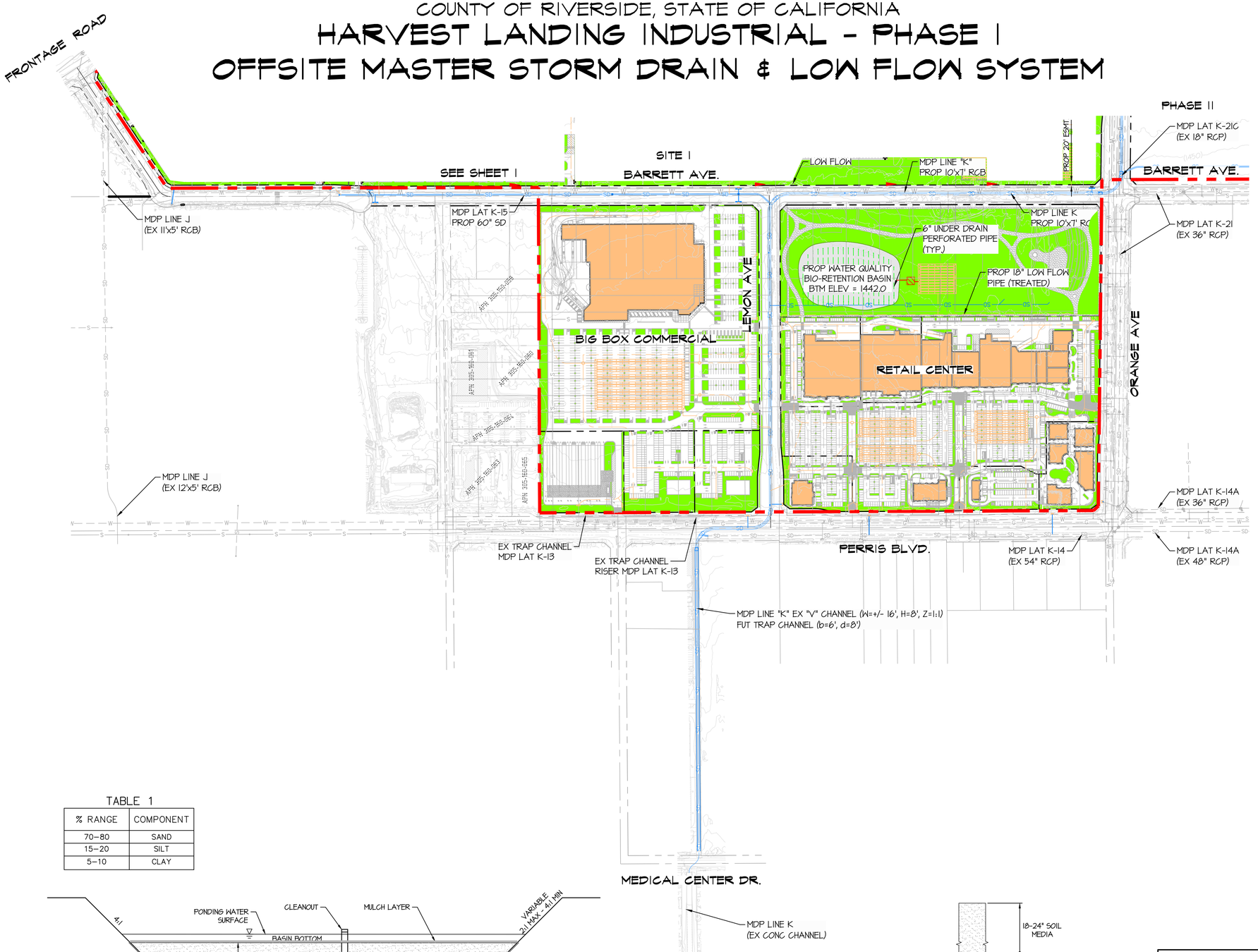
FMCIVIL ENGINEERS INC.
41870 KALMIA STREET, SUITE 120
MURRIETA | CA 92562
951.473.0202 - FMCIVIL.COM

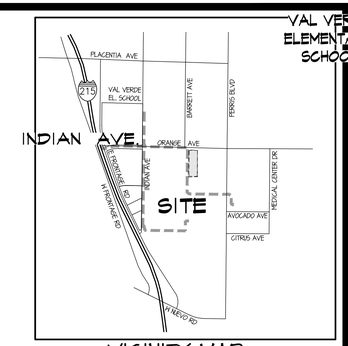
SHEET 1 OF 2 SHEETS

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

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1944 NORTH TUSTIN STREET, SUITE 122
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CONTACT: TIM HOWARD
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ENGINEER

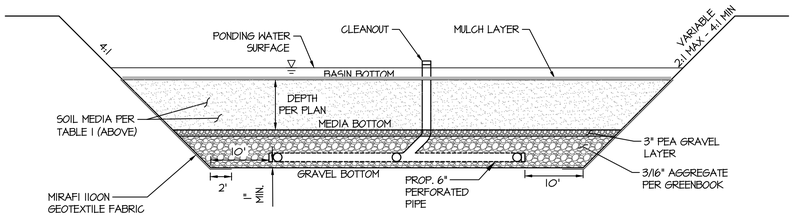
FMCIVIL ENGINEERS INC.
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MURRIETA, CA 92563
CONTACT: FRANCISCO MARTINEZ
(TEL)951-331-9873

ARCHITECT

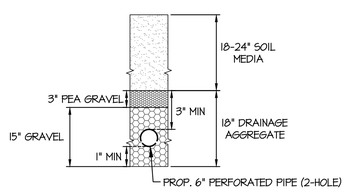
AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92866
CONTACT: STEPHEN PRZYBYLOWSKI
(TEL)714-639-9860

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.:	

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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

IN THE CITY OF PERRIS,
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #3 CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-1 - PARCEL 2

LEGEND

- (1025) EXISTING CONTOUR
- 1025 PROPOSED CONTOUR
- RETAINING WALL
- FENCE
- EDGE OF PAVEMENT
- 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
- EXISTING WATER LINE
- W PROPOSED WATER LINE
- EXISTING SWR LINE
- SS PROPOSED SEWER LINE
- 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:

305-100-028, 305-170-018, 305-100-008, & 305-100-009

LEGAL DESCRIPTION

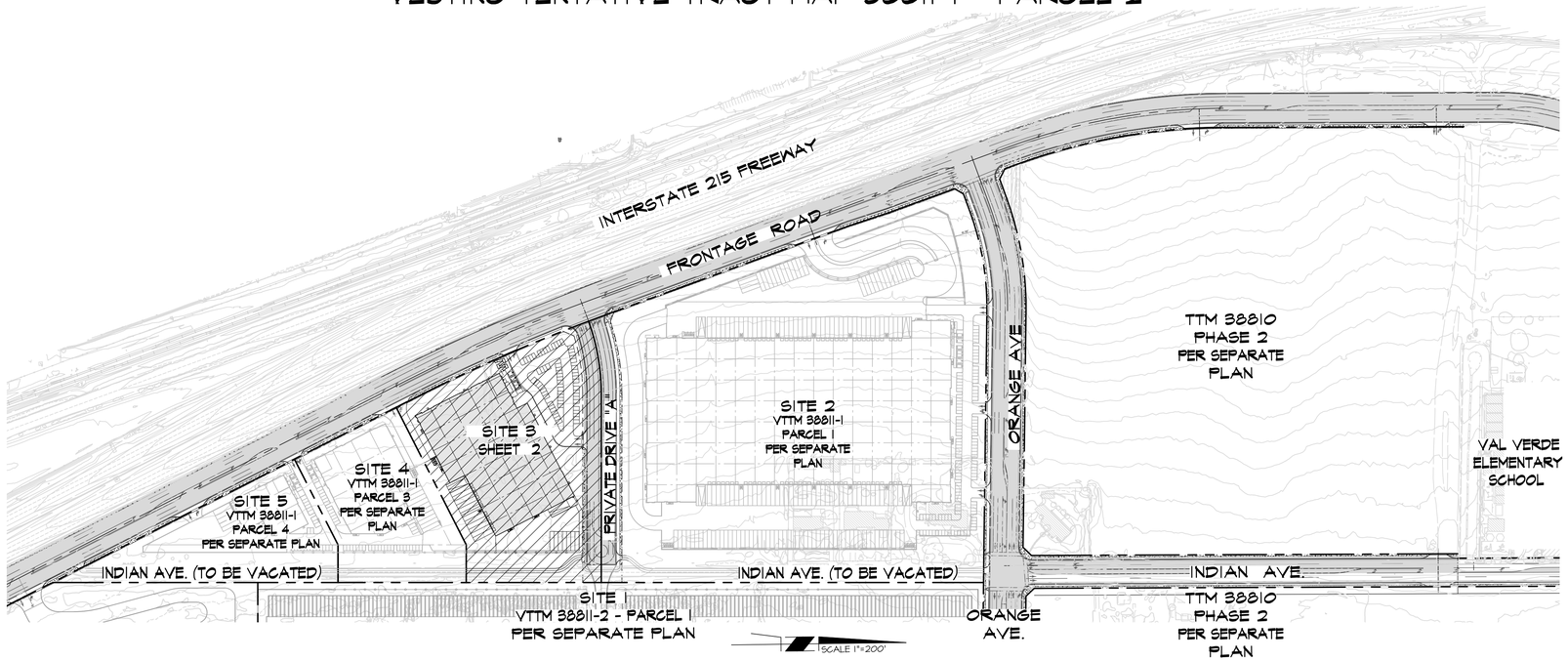
PARCELS 2-5:
(APNS:305-100-028, 305-170-018, 305-100-008, 305-100-009)

THAT PORTION OF THE NORTHWEST QUARTER OF SECTION 19, TOWNSHIP 4 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, WHICH LIES EASTERLY OF STATE HIGHWAY 395 AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED APRIL 28, 1952 AS INSTRUMENT NO. 18008.

EXCEPTING THE NORTH 30 FEET IN ORANGE AVENUE, THE EAST 30 FEET IN INDIAN AVENUE AND THE SOUTH 30 FEET IN CITRUS AVENUE.

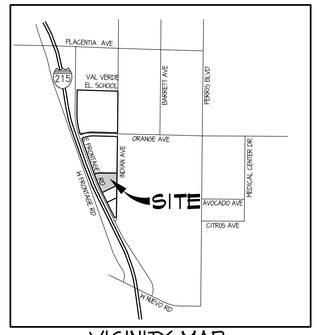
ALSO EXCEPTING THEREFROM THE PORTION DESCRIBED IN DEED RECORDED DECEMBER 21, 1965 AS INSTRUMENT NO. 142400 AND IN DEED RECORDED MARCH 13, 1969 AS INSTRUMENT NO. 24345, RECORDS OF RIVERSIDE COUNTY.

ALSO EXCEPTING THEREFROM THOSE PORTIONS CONVEYED TO THE STATE OF CALIFORNIA BY DEEDS RECORDED MARCH 22, 1992, AS INSTRUMENT NOS. 94602 AND 94603.



INDEX MAP

200 100 0 200 400 600
SCALE: 1"=200'



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.
41870 KALMIA ST., SUITE 120
MURRIETA, CA 92562
CONTACT: FRANCISCO MARTINEZ
(TEL)951-973-0202

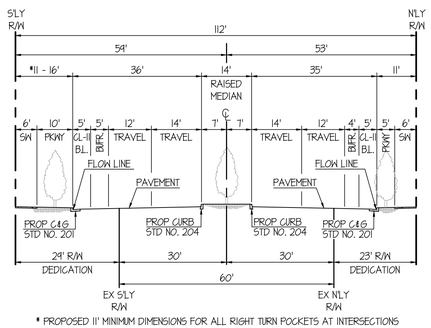
ARCHITECT

AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92866
CONTACT: DAN MACDAVID
(TEL)714-639-9860

EARTHWORK ESTIMATE:

RAW CUT:	640 CY
RAW FILL:	18,850 CY
NET:	18,210 CY IMPORT

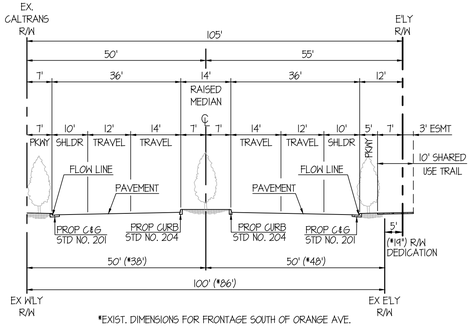
HAUL TRIPS:
ASSUMED (13 CY PER TRIP) = 1,401



* PROPOSED 11' MINIMUM DIMENSIONS FOR ALL RIGHT TURN POCKETS AT INTERSECTIONS

ORANGE AVENUE
(WEST OF BARRETT AVE)
SECONDARY ARTERIAL

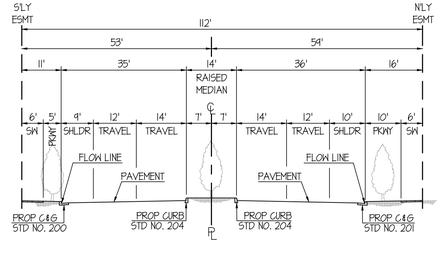
(112'/85')



*EXIST. DIMENSIONS FOR FRONTAGE SOUTH OF ORANGE AVE.

FRONTAGE ROAD
SECONDARY ARTERIAL

(105'/84')



PRIVATE DRIVE "A"
SECONDARY ARTERIAL

(112'/85')

CITY OF PERRIS

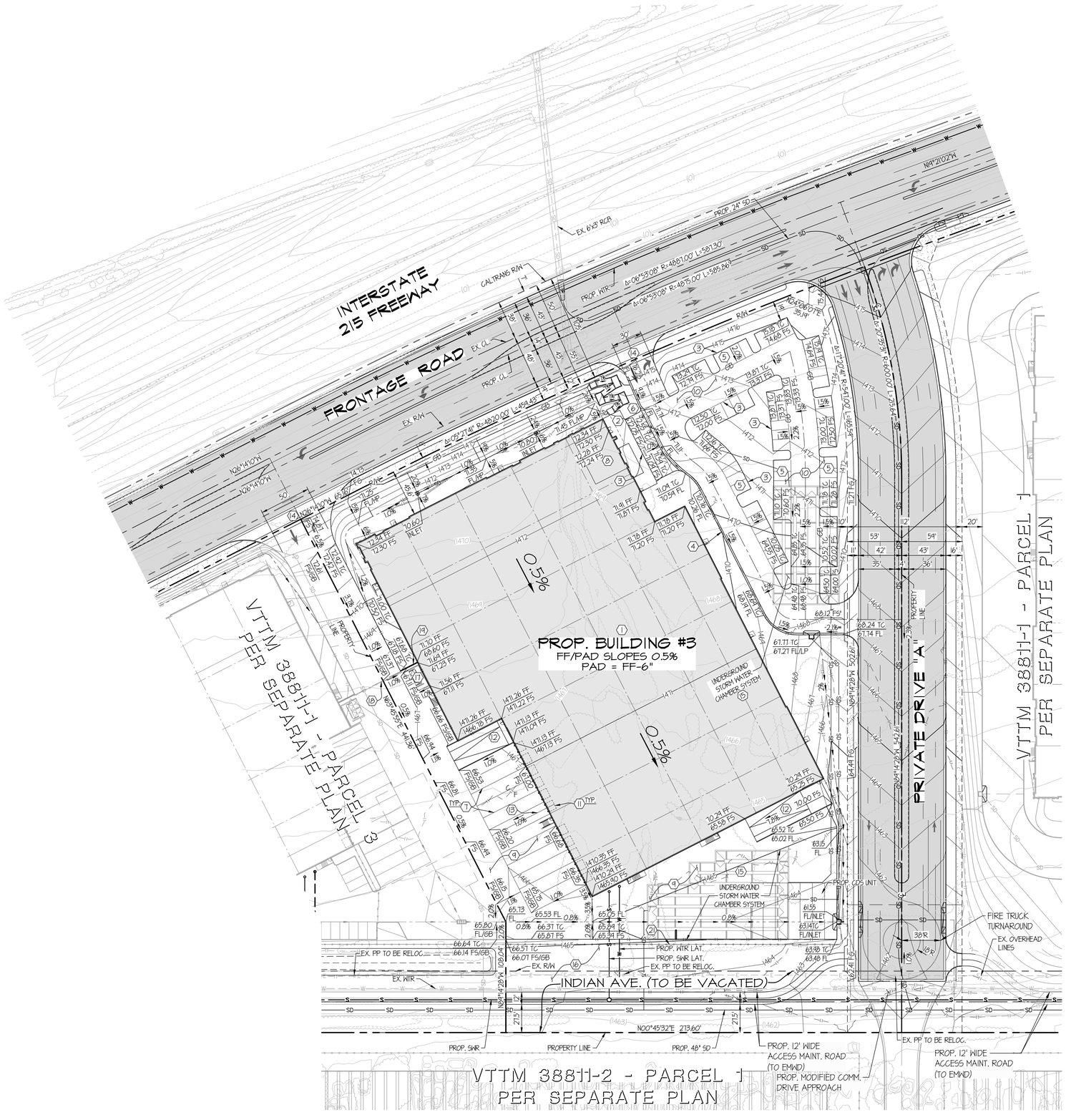
HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #3 CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-1 - PARCEL 2

SCALE:	AS SHOWN
DATE:	OCT. 2024
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

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MURRIETA | CA 92562
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SHEET 1 OF 2 SHEETS

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SITE PLAN KEYNOTES

1. PAINTED CONCRETE TILT-UP WAREHOUSE / OFFICE / MANUFACTURING FACILITY. BUILDING TO BE DESIGNED PER ARCHITECT'S PLANS
2. ON SITE ACCESSIBLE SIDEWALK AND CURB RAMPS.
3. CONCRETE CURB
4. CONCRETE CURB & GUTTER
5. STANDARD PARKING STALLS - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
6. HANDICAP PARKING STALLS - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
7. TRAILER / TRACTOR PARKING STALLS - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
8. ACCESSIBLE BUILDING ENTRY WITH ADJACENT BICYCLE RACKS PER ARCHITECT'S PLANS
9. PORTLAND CONC. CEMENT (PCC) PAVED TRUCK YARD ARCHITECT'S PLANS
10. PORTLAND CONC. CEMENT (PCC) PAVED AUTO PARKING ARCHITECT'S PLANS
11. DOCK HIGH TRUCK DOOR PER ARCHITECT'S PLANS
12. GRADE LEVEL RAMP DOOR PER ARCHITECT'S PLANS
13. EXTERIOR MAN DOOR AND STAIRS W/GUARD POST PER ARCHITECT'S PLANS
14. COMMERCIAL DRIVEWAY APPROACH PER RIVERSIDE COUNTY STD.207A, WITH DECORATIVE CONCRETE PAVING PER ARCHITECT'S PLANS
15. UNDERGROUND STORM WATER CHAMBER SYSTEM
16. LANDSCAPE AREA PER LANDSCAPE ARCHITECT'S PLANS
17. APPROXIMATE LOCATION OF TRASH ENCLOSURE
18. ENTRY GATE PER ARCHITECT'S PLANS
19. SCREEN WALL PER ARCHITECT'S PLANS (COMBO RETAINING)
20. CONCRETE RIBBON GUTTER/SWALE

SCALE 1"=50'

50 25 0 50 100 150

SCALE: 1"=50'

CITY OF PERRIS

HARVEST LANDING RETAIL CENTER & BUSINESS PARK SITE #3 CONCEPTUAL GRADING & DRAINAGE PLAN VESTING TENTATIVE TRACT MAP 38811-1 - PARCEL 2

SCALE:	AS SHOWN
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DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

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41870 KALMIA STREET, SUITE 120
MURRIETA | CA 92562
951.973.0202 - FMCIVIL.COM

SHEET 2 OF 2 SHEETS

H:\PDATA\26-001 HARVEST LANDING\DWGS\PLNG\ENTITLEMENT\CUP\ALT-3\BLDG-3\26-001-CUP_BLDG3-GC-01.DWG TOM BURNSIDE 10/2/2024 9:03 AM

DEVELOPMENT PLAN REVIEW – VTPM 38811-1
PARCEL 3 - SITE 4
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:

FM CIVIL ENGINEERS INC.

29995 Technology Drive, Suite 306
Murrieta, CA 92563

Engineer of Work/Contacts:

Francisco Martinez, Jr.

April 12, 2024
Revised: October 4, 2024