DEVELOPMENT PLAN REVIEW - VTPM 38811-1
PARCEL 1 – SITE 2
CITY OF PERRIS
RIVERSIDE COUNTY, CALIFORNIA

Drainage Study Report

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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 25.5 acres and 389,000 square feet warehouse building with 38 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 Orange Avenue 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 future MDP Line "K-16 and K-19" which extends about 2600 lineal feet between Perris Boulevard at the existing MDP Line K and Indian Avenue.

The site is in a relatively mild to flat sloping undeveloped terrain on a drainage area which drains easterly towards Indian Avenue; developed flows continue to travel easterly through vacant parcels where it ultimately reaches Perris Boulevard; storm drain flows are collected by an existing MDP Lateral K-14 which connects to existing MDP Line "K". Line "K" is an existing "V" channel (w= 16', H=8' & z=1:1), and planned for a new Trapezoidal Channel (b=6, d=8').

DEVELOPED CONDITIONS

The preliminary offsite design is shown on Exhibit H "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
Onsite Proposed	51.1
Onsite Existing	24.1
Onsite MDP	37.6

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: 1.69 ac-ft; $Q_{100\text{-}24hr}$: 12.00 cfs
Proposed Condition Volume: 5.21 ac-ft; $Q_{100\text{-}24hr}$: 14.46 cfs
Underground Chamber Volume: *7.80 ac-ft

*Since this volume is greater than 5.38 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	67.48	2.3651	66.19	2.1254
3	41.55	3.5683	39.12	2.9505
6	32.36	4.2622	29.78	3.3571
24	14.46	8.07	12	5.96
Acreage	27.32		27.32	

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" and "C". 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"-36" 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 OFF-SITE HYDROLOGY WATERSHED A (RATIONAL METHOD)

100-YEAR OFF-SITE HYDROLOGY WATERSHED B (RATIONAL METHOD)

100-YEAR OFF-SITE HYDROLOGY WATERSHED X (RATIONAL METHOD)

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

100-YEAR PROPOSED ON-SITE HYDROLOGY WITH 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: 10/10/23 File:12.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 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 868.000(Ft.)
Top (of initial area) elevation = 1481.500(Ft.)
Bottom (of initial area) elevation = 1464.800(Ft.)

```
Difference in elevation =    16.700(Ft.)
Slope =    0.01924  s(percent)=       1.92
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   31.024 min.
Rainfall intensity =      1.547(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.578
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  60.77
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.470(CFS)
Total initial stream area =        2.760(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station       11.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      4.659(CFS)
Depth of flow =   0.222(Ft.), Average velocity =   0.943(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  =      4.659(CFS)
  '     '        flow top width =     44.466(Ft.)
  '     '    velocity=    0.943(Ft/s)
  '     '        area =      4.943(Sq.Ft)
  '     '        Froude number =     0.498

Upstream point elevation =  1464.800(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   856.000(Ft.)
Travel time  =   15.14 min.
Time of concentration =   46.16 min.
Depth of flow =   0.222(Ft.)
Average velocity =   0.943(Ft/s)
Total irregular channel flow =     4.659(CFS)
Irregular channel normal depth above invert elev. =   0.222(Ft.)
Average velocity of channel(s) =   0.943(Ft/s)
 Adding area flow to channel
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USER INPUT of soil data for subarea
Runoff Coefficient = 0.635
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)  =  60.77
Pervious area fraction =  0.730; Impervious fraction =  0.270
Rainfall intensity =      1.274(In/Hr) for a   100.0 year storm
Subarea runoff =      4.319(CFS) for      5.340(Ac.)
Total runoff =      6.789(CFS)  Total area =       8.100(Ac.)
Depth of flow =   0.256(Ft.), Average velocity =   1.036(Ft/s)


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Process from Point/Station       11.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.100(Ac.)
Runoff from this stream =      6.789(CFS)
Time of concentration =   46.16 min.
Rainfall intensity =     1.274(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   970.000(Ft.)
Top (of initial area) elevation =  1481.100(Ft.)
Bottom (of initial area) elevation =  1464.300(Ft.)
Difference in elevation =    16.800(Ft.)
Slope =    0.01732  s(percent)=       1.73
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   33.123 min.
Rainfall intensity =      1.498(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.574
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.865(CFS)
Total initial stream area =        2.170(Ac.)
Pervious area fraction = 1.000
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Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.170(Ac.)
Runoff from this stream =      1.865(CFS)
Time of concentration =   33.12 min.
Rainfall intensity =     1.498(In/Hr)


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Process from Point/Station       12.100 to Point/Station       12.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
________________________________________________________________________
Rainfall intensity =      2.290(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.420
Decimal fraction soil group B = 0.420
Decimal fraction soil group C = 0.160
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  47.90
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  13.94 min.  Rain intensity =       2.29(In/Hr)
Total area =         3.06(Ac.)  Total runoff =      6.30(CFS)


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Process from Point/Station       12.100 to Point/Station       13.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      7.422(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   1.529(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  =      7.422(CFS)
  '     '        flow top width =     44.070(Ft.)
  '     '    velocity=    1.529(Ft/s)
  '     '        area =      4.856(Sq.Ft)
```

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  '     '        Froude number =     0.812

Upstream point elevation =  1478.600(Ft.)
Downstream point elevation =  1464.300(Ft.)
Flow length =   793.000(Ft.)
Travel time  =    8.65 min.
Time of concentration =   22.59 min.
Depth of flow =   0.220(Ft.)
Average velocity =   1.529(Ft/s)
Total irregular channel flow =     7.422(CFS)
Irregular channel normal depth above invert elev. =   0.220(Ft.)
Average velocity of channel(s) =   1.529(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.532
Decimal fraction soil group A = 0.020
Decimal fraction soil group B = 0.980
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  47.00
Pervious area fraction =  0.900; Impervious fraction =  0.100
Rainfall intensity =      1.808(In/Hr) for a   100.0 year storm
Subarea runoff =      2.165(CFS) for      2.250(Ac.)
Total runoff =      8.465(CFS)  Total area =       5.310(Ac.)
Depth of flow =   0.231(Ft.), Average velocity =   1.580(Ft/s)


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Process from Point/Station       12.100 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.310(Ac.)
Runoff from this stream =      8.465(CFS)
Time of concentration =   22.59 min.
Rainfall intensity =     1.808(In/Hr)
Summary of stream data:

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


1        1.865     33.12                1.498
2        8.465     22.59                1.808
Largest stream flow has longer or shorter time of concentration
Qp =      8.465 + sum of
          Qa          Tb/Ta
           1.865 *    0.682 =      1.272
Qp =      9.737
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       1.865       8.465
Area of streams before confluence:
        2.170        5.310
Results of confluence:
Total flow rate =      9.737(CFS)
Time of concentration =    22.586 min.
Effective stream area after confluence =      7.480(Ac.)


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Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     14.696(CFS)
Depth of flow =   0.326(Ft.), Average velocity =   1.385(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  =     14.696(CFS)
  '     '        flow top width =     65.150(Ft.)
  '     '    velocity=    1.385(Ft/s)
  '     '        area =     10.611(Sq.Ft)
  '     '        Froude number =     0.605

Upstream point elevation =  1464.300(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   603.000(Ft.)
Travel time  =    7.26 min.
Time of concentration =   29.84 min.
Depth of flow =   0.326(Ft.)
Average velocity =   1.385(Ft/s)
Total irregular channel flow =    14.696(CFS)
Irregular channel normal depth above invert elev. =   0.326(Ft.)
Average velocity of channel(s) =   1.385(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.240
Decimal fraction soil group B = 0.680
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  90.00
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Pervious area fraction =  0.900; Impervious fraction =  0.100
Rainfall intensity =      1.577(In/Hr) for a   100.0 year storm
Subarea runoff =      9.979(CFS) for      7.620(Ac.)
Total runoff =     19.716(CFS)  Total area =      15.100(Ac.)
Depth of flow =   0.364(Ft.), Average velocity =   1.491(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     15.100(Ac.)
Runoff from this stream =     19.716(CFS)
Time of concentration =   29.84 min.
Rainfall intensity =     1.577(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.100 to Point/Station       13.100
**** 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       13.100 to Point/Station       13.200
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     20.334(CFS)
Depth of flow =   0.363(Ft.), Average velocity =   1.543(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  =     20.334(CFS)
  '     '        flow top width =     72.595(Ft.)
  '     '    velocity=    1.543(Ft/s)
  '     '        area =     13.175(Sq.Ft)
  '     '        Froude number =     0.638

Upstream point elevation =  1470.000(Ft.)
Downstream point elevation =  1462.800(Ft.)
Flow length =   762.000(Ft.)
Travel time  =    8.23 min.
Time of concentration =   28.07 min.
Depth of flow =   0.363(Ft.)
Average velocity =   1.543(Ft/s)
Total irregular channel flow =    20.334(CFS)
Irregular channel normal depth above invert elev. =   0.363(Ft.)
Average velocity of channel(s) =   1.543(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.704
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.630
Decimal fraction soil group C = 0.370
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  72.00
Pervious area fraction =  0.900; Impervious fraction =  0.100
Rainfall intensity =      1.625(In/Hr) for a   100.0 year storm
Subarea runoff =      6.602(CFS) for      5.770(Ac.)
Total runoff =     23.602(CFS)  Total area =      17.090(Ac.)
Depth of flow =   0.384(Ft.), Average velocity =   1.602(Ft/s)


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Process from Point/Station       13.200 to Point/Station       13.400
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     25.851(CFS)
Depth of flow =   0.447(Ft.), Average velocity =   1.294(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  =     25.852(CFS)
```

```
  '     '        flow top width =     89.408(Ft.)
  '     '    velocity=    1.294(Ft/s)
  '     '        area =     19.985(Sq.Ft)
  '     '        Froude number =     0.482

Upstream point elevation =  1462.800(Ft.)
Downstream point elevation =  1461.000(Ft.)
Flow length =   358.000(Ft.)
Travel time  =    4.61 min.
Time of concentration =   32.68 min.
Depth of flow =   0.447(Ft.)
Average velocity =   1.294(Ft/s)
Total irregular channel flow =    25.851(CFS)
Irregular channel normal depth above invert elev. =   0.447(Ft.)
Average velocity of channel(s) =   1.294(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.693
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.220
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  72.00
Pervious area fraction =  0.900; Impervious fraction =  0.100
Rainfall intensity =      1.508(In/Hr) for a   100.0 year storm
Subarea runoff =      4.410(CFS) for      4.220(Ac.)
Total runoff =     28.012(CFS)  Total area =      21.310(Ac.)
Depth of flow =   0.461(Ft.), Average velocity =   1.320(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =     21.310(Ac.)
Runoff from this stream =     28.012(CFS)
Time of concentration =   32.68 min.
Rainfall intensity =     1.508(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.300 to Point/Station       13.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =  1478.400(Ft.)
Bottom (of initial area) elevation =  1461.000(Ft.)
Difference in elevation =    17.400(Ft.)
Slope =    0.01933  s(percent)=       1.93
```

```
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   31.446 min.
Rainfall intensity =      1.537(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.533
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  55.70
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.423(CFS)
Total initial stream area =        2.960(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.300 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      2.960(Ac.)
Runoff from this stream =      2.423(CFS)
Time of concentration =   31.45 min.
Rainfall intensity =     1.537(In/Hr)
Summary of stream data:

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


1       28.012     32.68                1.508
2        2.423     31.45                1.537
Largest stream flow has longer time of concentration
Qp =     28.012 + sum of
          Qb         Ia/Ib
           2.423 *    0.981 =      2.378
Qp =     30.390

Total of 2 streams to confluence:
Flow rates before confluence point:
      28.012       2.423
Area of streams before confluence:
       21.310        2.960
Results of confluence:
Total flow rate =     30.390(CFS)
Time of concentration =    32.681 min.
Effective stream area after confluence =     24.270(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.400 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.378(Ft.), Average velocity =   2.131(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  =     30.390(CFS)
  '     '        flow top width =     75.521(Ft.)
  '     '    velocity=    2.131(Ft/s)
  '     '        area =     14.259(Sq.Ft)
  '     '        Froude number =     0.864

Upstream point elevation =  1461.000(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   117.000(Ft.)
Travel time  =    0.91 min.
Time of concentration =   33.60 min.
Depth of flow =   0.378(Ft.)
Average velocity =   2.131(Ft/s)
Total irregular channel flow =    30.390(CFS)
Irregular channel normal depth above invert elev. =   0.378(Ft.)
Average velocity of channel(s) =   2.131(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.400 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     24.270(Ac.)
Runoff from this stream =     30.390(CFS)
Time of concentration =   33.60 min.
Rainfall intensity =     1.488(In/Hr)
Summary of stream data:

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


1        6.789     46.16                1.274
2       19.716     29.84                1.577
```

```
3       30.390     33.60                  1.488
Largest stream flow has longer or shorter time of concentration
Qp =     30.390 + sum of
          Qa          Tb/Ta
           6.789 *    0.728 =      4.941
          Qb         Ia/Ib
          19.716 *    0.944 =     18.604
Qp =     53.935

Total of 3 main streams to confluence:
Flow rates before confluence point:
       6.789      19.716      30.390
Area of streams before confluence:
        8.100       15.100       24.270


Results of confluence:
Total flow rate =     53.935(CFS)
Time of concentration =    33.596 min.
Effective stream area after confluence  =     47.470(Ac.)
End of computations, total study area =           47.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.673
Area averaged RI index number =  62.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/10/23 File:12.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 = 868.000(Ft.)
Top (of initial area) elevation = 1481.500(Ft.)
Bottom (of initial area) elevation = 1464.800(Ft.)

```
Difference in elevation =    16.700(Ft.)
Slope =    0.01924  s(percent)=       1.92
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   31.024 min.
Rainfall intensity =      1.547(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.578
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  60.77
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.470(CFS)
Total initial stream area =        2.760(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      4.659(CFS)
Depth of flow =   0.222(Ft.), Average velocity =   0.943(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  =      4.659(CFS)
  '     '        flow top width =     44.466(Ft.)
  '     '    velocity=    0.943(Ft/s)
  '     '        area =      4.943(Sq.Ft)
  '     '        Froude number =     0.498

Upstream point elevation =  1464.800(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   856.000(Ft.)
Travel time  =   15.14 min.
Time of concentration =   46.16 min.
Depth of flow =   0.222(Ft.)
Average velocity =   0.943(Ft/s)
Total irregular channel flow =     4.659(CFS)
Irregular channel normal depth above invert elev. =   0.222(Ft.)
Average velocity of channel(s) =   0.943(Ft/s)
 Adding area flow to channel
```

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.635
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)  =  60.77
Pervious area fraction =  0.730; Impervious fraction =  0.270
Rainfall intensity =      1.274(In/Hr) for a   100.0 year storm
Subarea runoff =      4.319(CFS) for      5.340(Ac.)
Total runoff =      6.789(CFS)  Total area =       8.100(Ac.)
Depth of flow =   0.256(Ft.), Average velocity =   1.036(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.100(Ac.)
Runoff from this stream =      6.789(CFS)
Time of concentration =   46.16 min.
Rainfall intensity =     1.274(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   970.000(Ft.)
Top (of initial area) elevation =  1481.100(Ft.)
Bottom (of initial area) elevation =  1464.300(Ft.)
Difference in elevation =    16.800(Ft.)
Slope =    0.01732  s(percent)=       1.73
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   33.123 min.
Rainfall intensity =      1.498(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.574
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.865(CFS)
Total initial stream area =        2.170(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.170(Ac.)
Runoff from this stream =      1.865(CFS)
Time of concentration =   33.12 min.
Rainfall intensity =     1.498(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   793.000(Ft.)
Top (of initial area) elevation =  1478.600(Ft.)
Bottom (of initial area) elevation =  1464.300(Ft.)
Difference in elevation =    14.300(Ft.)
Slope =    0.01803  s(percent)=       1.80
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   30.313 min.
Rainfall intensity =      1.565(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.579
Decimal fraction soil group A = 0.020
Decimal fraction soil group B = 0.980
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  60.54
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.038(CFS)
Total initial stream area =        2.250(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.250(Ac.)
Runoff from this stream =      2.038(CFS)
Time of concentration =   30.31 min.
Rainfall intensity =     1.565(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

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


1        1.865     33.12                 1.498
2        2.038     30.31                 1.565
Largest stream flow has longer or shorter time of concentration
Qp =      2.038 + sum of
          Qa          Tb/Ta
           1.865 *    0.915 =      1.707
Qp =      3.745

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.865       2.038
Area of streams before confluence:
        2.170        2.250
Results of confluence:
Total flow rate =      3.745(CFS)
Time of concentration =    30.313 min.
Effective stream area after confluence =      4.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.053(CFS)
Depth of flow =   0.260(Ft.), Average velocity =   1.192(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.00
        3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      8.053(CFS)
  '     '        flow top width =     51.992(Ft.)
  '     '    velocity=    1.192(Ft/s)
  '     '        area =      6.758(Sq.Ft)
  '     '        Froude number =     0.582

Upstream point elevation =  1464.300(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   603.000(Ft.)
Travel time  =    8.43 min.
Time of concentration =   38.75 min.
Depth of flow =   0.260(Ft.)
Average velocity =   1.192(Ft/s)
```

```
Total irregular channel flow =     8.053(CFS)
Irregular channel normal depth above invert elev. =   0.260(Ft.)
Average velocity of channel(s) =   1.192(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.240
Decimal fraction soil group B = 0.680
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  90.00
Pervious area fraction =  0.900; Impervious fraction =  0.100
Rainfall intensity =      1.388(In/Hr) for a   100.0 year storm
Subarea runoff =      8.690(CFS) for      7.620(Ac.)
Total runoff =     12.435(CFS)  Total area =      12.040(Ac.)
Depth of flow =   0.306(Ft.), Average velocity =   1.328(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.040(Ac.)
Runoff from this stream =     12.435(CFS)
Time of concentration =   38.75 min.
Rainfall intensity =     1.388(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       13.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   358.000(Ft.)
Top (of initial area) elevation =  1462.800(Ft.)
Bottom (of initial area) elevation =  1461.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00503  s(percent)=       0.50
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   28.471 min.
Rainfall intensity =      1.614(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.674
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.220
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  71.14
```

```
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.591(CFS)
Total initial stream area =        4.220(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      4.220(Ac.)
Runoff from this stream =      4.591(CFS)
Time of concentration =   28.47 min.
Rainfall intensity =     1.614(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.300 to Point/Station       13.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =  1478.400(Ft.)
Bottom (of initial area) elevation =  1461.000(Ft.)
Difference in elevation =    17.400(Ft.)
Slope =    0.01933  s(percent)=       1.93
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   31.446 min.
Rainfall intensity =      1.537(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.533
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  55.70
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.423(CFS)
Total initial stream area =        2.960(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.300 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      2.960(Ac.)
Runoff from this stream =      2.423(CFS)
Time of concentration =   31.45 min.
```

```
Rainfall intensity =     1.537(In/Hr)
Summary of stream data:

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


1        4.591     28.47                 1.614
2        2.423     31.45                 1.537
Largest stream flow has longer or shorter time of concentration
Qp =      4.591 + sum of
          Qa          Tb/Ta
           2.423 *    0.905 =      2.194
Qp =      6.785

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.591       2.423
Area of streams before confluence:
        4.220        2.960
Results of confluence:
Total flow rate =      6.785(CFS)
Time of concentration =    28.471 min.
Effective stream area after confluence =      7.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.400 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.215(Ft.), Average velocity =   1.465(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  =      6.785(CFS)
  '     '        flow top width =     43.040(Ft.)
  '     '    velocity=    1.465(Ft/s)
  '     '        area =      4.631(Sq.Ft)
  '     '        Froude number =     0.787

Upstream point elevation =  1461.000(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   117.000(Ft.)
Travel time  =    1.33 min.
```

```
Time of concentration =   29.80 min.
Depth of flow =   0.215(Ft.)
Average velocity =   1.465(Ft/s)
Total irregular channel flow =     6.785(CFS)
Irregular channel normal depth above invert elev. =   0.215(Ft.)
Average velocity of channel(s) =   1.465(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.400 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      7.180(Ac.)
Runoff from this stream =      6.785(CFS)
Time of concentration =   29.80 min.
Rainfall intensity =     1.578(In/Hr)
Summary of stream data:

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


1        6.789     46.16                1.274
2       12.435     38.75                1.388
3        6.785     29.80                1.578
Largest stream flow has longer or shorter time of concentration
Qp =     12.435 + sum of
          Qa          Tb/Ta
           6.789 *    0.839 =      5.698
          Qb         Ia/Ib
           6.785 *    0.879 =      5.966
Qp =     24.099

Total of 3 main streams to confluence:
Flow rates before confluence point:
       6.789      12.435       6.785
Area of streams before confluence:
        8.100       12.040        7.180


Results of confluence:
Total flow rate =     24.099(CFS)
Time of concentration =    38.747 min.
Effective stream area after confluence  =     27.320(Ac.)
End of computations, total study area =           27.32 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Area averaged pervious area fraction(Ap) = 0.919
Area averaged RI index number = 70.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/10/23 File:12.out

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

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

20-001 HARVEST LANDING RETAIL CENTER AND BUSINESS PARK
PROPOSED LAND USE 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 = 868.000(Ft.)
Top (of initial area) elevation = 1481.500(Ft.)
Bottom (of initial area) elevation = 1464.800(Ft.)
Difference in elevation = 16.700(Ft.)

```
Slope =    0.01924  s(percent)=       1.92
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.872 min.
Rainfall intensity =      2.381(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.762
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  55.76
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.005(CFS)
Total initial stream area =        2.760(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.313(CFS)
Depth of flow =   0.276(Ft.), Average velocity =   1.089(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.00
        3            200.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      8.313(CFS)
  '     '        flow top width =     55.248(Ft.)
  '     '    velocity=    1.089(Ft/s)
  '     '        area =      7.631(Sq.Ft)
  '     '        Froude number =     0.517

Upstream point elevation =  1464.800(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   856.000(Ft.)
Travel time  =   13.10 min.
Time of concentration =   25.97 min.
Depth of flow =   0.276(Ft.)
Average velocity =   1.089(Ft/s)
Total irregular channel flow =     8.313(CFS)
Irregular channel normal depth above invert elev. =   0.276(Ft.)
Average velocity of channel(s) =   1.089(Ft/s)
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
```

```
Runoff Coefficient = 0.728
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
Rainfall intensity =      1.688(In/Hr) for a   100.0 year storm
Subarea runoff =      6.560(CFS) for      5.340(Ac.)
Total runoff =     11.566(CFS)  Total area =       8.100(Ac.)
Depth of flow =   0.313(Ft.), Average velocity =   1.183(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.100(Ac.)
Runoff from this stream =     11.566(CFS)
Time of concentration =   25.97 min.
Rainfall intensity =     1.688(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   970.000(Ft.)
Top (of initial area) elevation =  1481.100(Ft.)
Bottom (of initial area) elevation =  1464.300(Ft.)
Difference in elevation =    16.800(Ft.)
Slope =    0.01732  s(percent)=       1.73
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.743 min.
Rainfall intensity =      2.306(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.759
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.800(CFS)
Total initial stream area =        2.170(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.170(Ac.)
Runoff from this stream =      3.800(CFS)
Time of concentration =   13.74 min.
Rainfall intensity =     2.306(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   793.000(Ft.)
Top (of initial area) elevation =  1478.600(Ft.)
Bottom (of initial area) elevation =  1464.300(Ft.)
Difference in elevation =    14.300(Ft.)
Slope =    0.01803  s(percent)=       1.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.577 min.
Rainfall intensity =      2.408(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.762
Decimal fraction soil group A = 0.020
Decimal fraction soil group B = 0.980
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  55.52
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.128(CFS)
Total initial stream area =        2.250(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.250(Ac.)
Runoff from this stream =      4.128(CFS)
Time of concentration =   12.58 min.
Rainfall intensity =     2.408(In/Hr)
Summary of stream data:

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

```
1        3.800     13.74                 2.306
2        4.128     12.58                 2.408
Largest stream flow has longer or shorter time of concentration
Qp =      4.128 + sum of
          Qa          Tb/Ta
           3.800 *    0.915 =      3.478
Qp =      7.606

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.800       4.128
Area of streams before confluence:
        2.170        2.250
Results of confluence:
Total flow rate =      7.606(CFS)
Time of concentration =    12.577 min.
Effective stream area after confluence =      4.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     12.910(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   1.341(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  =     12.910(CFS)
  '     '        flow top width =     62.060(Ft.)
  '     '    velocity=    1.341(Ft/s)
  '     '        area =      9.629(Sq.Ft)
  '     '        Froude number =     0.600

Upstream point elevation =  1464.300(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   603.000(Ft.)
Travel time  =    7.50 min.
Time of concentration =   20.07 min.
Depth of flow =   0.310(Ft.)
Average velocity =   1.341(Ft/s)
Total irregular channel flow =    12.910(CFS)
```

```
Irregular channel normal depth above invert elev. =   0.310(Ft.)
Average velocity of channel(s) =   1.341(Ft/s)
 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.721
Decimal fraction soil group A = 0.240
Decimal fraction soil group B = 0.680
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  51.28
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.915(In/Hr) for a   100.0 year storm
Subarea runoff =     10.521(CFS) for      7.620(Ac.)
Total runoff =     18.126(CFS)  Total area =      12.040(Ac.)
Depth of flow =   0.352(Ft.), Average velocity =   1.460(Ft/s)


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Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.040(Ac.)
Runoff from this stream =     18.126(CFS)
Time of concentration =   20.07 min.
Rainfall intensity =     1.915(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.200 to Point/Station       13.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   358.000(Ft.)
Top (of initial area) elevation =  1462.800(Ft.)
Bottom (of initial area) elevation =  1461.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00503  s(percent)=       0.50
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.812 min.
Rainfall intensity =      2.484(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.803
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.220
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  66.14
Pervious area fraction =  0.500; Impervious fraction =  0.500
```

```
Initial subarea runoff =      8.416(CFS)
Total initial stream area =        4.220(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       13.200 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      4.220(Ac.)
Runoff from this stream =      8.416(CFS)
Time of concentration =   11.81 min.
Rainfall intensity =     2.484(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.300 to Point/Station       13.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =  1478.400(Ft.)
Bottom (of initial area) elevation =  1461.000(Ft.)
Difference in elevation =    17.400(Ft.)
Slope =    0.01933  s(percent)=       1.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.047 min.
Rainfall intensity =      2.365(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.739
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  50.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.175(CFS)
Total initial stream area =        2.960(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       13.300 to Point/Station       13.400
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      2.960(Ac.)
Runoff from this stream =      5.175(CFS)
Time of concentration =   13.05 min.
Rainfall intensity =     2.365(In/Hr)
```

```
Summary of stream data:

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


1        8.416     11.81                  2.484
2        5.175     13.05                  2.365
Largest stream flow has longer or shorter time of concentration
Qp =      8.416 + sum of
          Qa          Tb/Ta
           5.175 *    0.905 =      4.685
Qp =     13.101

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.416       5.175
Area of streams before confluence:
        4.220        2.960
Results of confluence:
Total flow rate =     13.101(CFS)
Time of concentration =    11.812 min.
Effective stream area after confluence =      7.180(Ac.)


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Process from Point/Station       13.400 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.275(Ft.), Average velocity =   1.727(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  =     13.101(CFS)
  '     '        flow top width =     55.085(Ft.)
  '     '    velocity=    1.727(Ft/s)
  '     '        area =      7.586(Sq.Ft)
  '     '        Froude number =     0.820

Upstream point elevation =  1461.000(Ft.)
Downstream point elevation =  1459.000(Ft.)
Flow length =   117.000(Ft.)
Travel time  =    1.13 min.
Time of concentration =   12.94 min.
```

```
Depth of flow =   0.275(Ft.)
Average velocity =   1.727(Ft/s)
Total irregular channel flow =    13.101(CFS)
Irregular channel normal depth above invert elev. =   0.275(Ft.)
Average velocity of channel(s) =   1.727(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.400 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      7.180(Ac.)
Runoff from this stream =     13.101(CFS)
Time of concentration =   12.94 min.
Rainfall intensity =     2.375(In/Hr)
Summary of stream data:

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


1       11.566     25.97                1.688
2       18.126     20.07                1.915
3       13.101     12.94                2.375
Largest stream flow has longer or shorter time of concentration
Qp =     18.126 + sum of
          Qa          Tb/Ta
          11.566 *    0.773 =      8.940
          Qb         Ia/Ib
          13.101 *    0.806 =     10.566
Qp =     37.632

Total of 3 main streams to confluence:
Flow rates before confluence point:
      11.566      18.126      13.101
Area of streams before confluence:
        8.100       12.040        7.180


Results of confluence:
Total flow rate =     37.632(CFS)
Time of concentration =    20.072 min.
Effective stream area after confluence  =     27.320(Ac.)
End of computations, total study area =           27.32 (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 = 55.6

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


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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 =  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: 08/18/23 File:21.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 - AREA X
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

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

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

Initial area flow distance = 478.000(Ft.)
Top (of initial area) elevation = 1497.500(Ft.)
Bottom (of initial area) elevation = 1495.000(Ft.)
Difference in elevation = 2.500(Ft.)
Slope = 0.00523 s(percent)= 0.52
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.120 min.
Rainfall intensity = 2.679(In/Hr) for a 100.0 year storm

```
COMMERCIAL subarea type
Runoff Coefficient = 0.854
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.761(CFS)
Total initial stream area =        0.770(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.965(CFS)
Depth of flow =   0.392(Ft.), Average velocity =   1.543(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             50.00              0.00
      3             10.00              5.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      2.965(CFS)
  '     '    flow top width =      9.801(Ft.)
  '     '    velocity=    1.543(Ft/s)
  '     '    area =      1.921(Sq.Ft)
  '     '    Froude number =     0.614

Upstream point elevation =  1495.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Flow length =   556.000(Ft.)
Travel time  =    6.00 min.
Time of concentration =   16.12 min.
Depth of flow =   0.392(Ft.)
Average velocity =   1.543(Ft/s)
Total irregular channel flow =     2.965(CFS)
Irregular channel normal depth above invert elev. =   0.392(Ft.)
Average velocity of channel(s) =   1.543(Ft/s)
 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.270
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.132(In/Hr) for a   100.0 year storm
Subarea runoff =      2.344(CFS) for      1.240(Ac.)
Total runoff =      4.105(CFS)      Total area =       2.010(Ac.)
Depth of flow =   0.443(Ft.), Average velocity =   1.674(Ft/s)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1490.000(Ft.)
Downstream point/station elevation =  1486.000(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.105(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.105(CFS)
Normal flow depth in pipe =    6.54(In.)
Flow top width inside pipe =    8.02(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.95(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    16.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Depth of flow =   0.608(Ft.), Average velocity =   5.555(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              8.00              2.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      4.105(CFS)
  '     '    flow top width =      2.431(Ft.)
  '     '    velocity=    5.555(Ft/s)
  '     '    area =      0.739(Sq.Ft)
  '     '    Froude number =     1.776

Upstream point elevation =  1486.000(Ft.)
Downstream point elevation =  1484.000(Ft.)
Flow length =    28.000(Ft.)
Travel time  =    0.08 min.
Time of concentration =   16.28 min.
Depth of flow =   0.608(Ft.)
Average velocity =   5.555(Ft/s)
Total irregular channel flow =     4.105(CFS)
Irregular channel normal depth above invert elev. =   0.608(Ft.)
Average velocity of channel(s) =   5.555(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
```

```
In Main Stream number: 1
Stream flow area =      2.010(Ac.)
Runoff from this stream =      4.105(CFS)
Time of concentration =   16.28 min.
Rainfall intensity =     2.122(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.100 to Point/Station       14.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   802.000(Ft.)
Top (of initial area) elevation =  1495.000(Ft.)
Bottom (of initial area) elevation =  1484.000(Ft.)
Difference in elevation =    11.000(Ft.)
Slope =    0.01372  s(percent)=       1.37
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.344 min.
Rainfall intensity =      2.339(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.712
Decimal fraction soil group A = 0.670
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  44.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.364(CFS)
Total initial stream area =        2.020(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.100 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.020(Ac.)
Runoff from this stream =      3.364(CFS)
Time of concentration =   13.34 min.
Rainfall intensity =     2.339(In/Hr)
Summary of stream data:

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


1        4.105     16.28               2.122
2        3.364     13.34               2.339
Largest stream flow has longer time of concentration
Qp =      4.105 + sum of
        Qb         Ia/Ib
         3.364 *    0.907 =      3.051
Qp =      7.156
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.105       3.364
Area of streams before confluence:
        2.010        2.020


Results of confluence:
Total flow rate =      7.156(CFS)
Time of concentration =    16.278 min.
Effective stream area after confluence  =      4.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1484.000(Ft.)
Downstream point/station elevation =  1483.500(Ft.)
Pipe length  =    62.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.156(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.156(CFS)
Normal flow depth in pipe =   11.72(In.)
Flow top width inside pipe =   17.16(In.)
Critical Depth =   12.43(In.)
Pipe flow velocity =      5.87(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    16.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.030(Ac.)
Runoff from this stream =      7.156(CFS)
Time of concentration =   16.45 min.
Rainfall intensity =     2.111(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.100 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   598.000(Ft.)
Top (of initial area) elevation =  1493.000(Ft.)
Bottom (of initial area) elevation =  1487.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01003  s(percent)=       1.00
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.984 min.
Rainfall intensity =      2.466(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
```

```
Runoff Coefficient = 0.783
Decimal fraction soil group A = 0.570
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.430
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  47.91
Pervious area fraction =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      2.666(CFS)
Total initial stream area =        1.380(Ac.)
Pervious area fraction = 0.350


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.100 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.380(Ac.)
Runoff from this stream =      2.666(CFS)
Time of concentration =   11.98 min.
Rainfall intensity =     2.466(In/Hr)
Summary of stream data:

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


1        7.156     16.45               2.111
2        2.666     11.98               2.466
Largest stream flow has longer time of concentration
Qp =      7.156 + sum of
        Qb         Ia/Ib
         2.666 *    0.856 =      2.282
Qp =      9.439

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.156       2.666
Area of streams before confluence:
        4.030        1.380


Results of confluence:
Total flow rate =      9.439(CFS)
Time of concentration =    16.454 min.
Effective stream area after confluence  =      5.410(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1483.500(Ft.)
Downstream point/station elevation =  1482.000(Ft.)
Pipe length  =   171.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.439(CFS)
```

```
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.439(CFS)
Normal flow depth in pipe =   14.13(In.)
Flow top width inside pipe =   14.79(In.)
Critical Depth =   14.25(In.)
Pipe flow velocity =      6.34(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    16.90 min.


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Process from Point/Station       16.000 to Point/Station       17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1482.000(Ft.)
Downstream point elevation =  1480.600(Ft.)
Channel length thru subarea  =   157.000(Ft.)
Channel base width      =    0.000(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 =      9.849(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      9.849(CFS)
Depth of flow =   0.961(Ft.), Average velocity =   5.329(Ft/s)
Channel flow top width =    3.845(Ft.)
Flow Velocity =    5.33(Ft/s)
Travel time  =    0.49 min.
Time of concentration =   17.39 min.

Sub-Channel No. 1 Critical depth =      1.086(Ft.)
  '     '       '     Critical flow top width =      4.344(Ft.)
  '     '       '     Critical flow velocity=    4.176(Ft/s)
  '     '       '     Critical flow area =      2.359(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.798
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.054(In/Hr) for a   100.0 year storm
Subarea runoff =      0.771(CFS) for      0.470(Ac.)
Total runoff =     10.210(CFS)      Total area =       5.880(Ac.)
Depth of flow =   0.974(Ft.), Average velocity =   5.377(Ft/s)

Sub-Channel No. 1 Critical depth =      1.102(Ft.)
  '     '       '     Critical flow top width =      4.406(Ft.)
  '     '       '     Critical flow velocity=    4.207(Ft/s)
  '     '       '     Critical flow area =      2.427(Sq.Ft)



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Process from Point/Station       16.000 to Point/Station       17.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.880(Ac.)
Runoff from this stream =     10.210(CFS)
Time of concentration =   17.39 min.
Rainfall intensity =     2.054(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.100 to Point/Station       16.200
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------------
Initial area flow distance =   703.000(Ft.)
Top (of initial area) elevation =  1491.500(Ft.)
Bottom (of initial area) elevation =  1488.000(Ft.)
Difference in elevation =     3.500(Ft.)
Slope =    0.00498  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.926 min.
Rainfall intensity =      2.472(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.250
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  59.75
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.620(CFS)
Total initial stream area =        1.210(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.200 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =  1488.000(Ft.)
Downstream point/station elevation =  1480.600(Ft.)
Pipe length  =    85.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.620(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.620(CFS)
Normal flow depth in pipe =    4.69(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    8.41(In.)
Pipe flow velocity =     11.24(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    12.05 min.


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Process from Point/Station       16.200 to Point/Station       17.000
```

**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 1.210(Ac.)
Runoff from this stream = 2.620(CFS)
Time of concentration = 12.05 min.
Rainfall intensity = 2.459(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.210	17.39	2.054
2	2.620	12.05	2.459

Largest stream flow has longer time of concentration
Qp = 10.210 + sum of

Qb	Ia/Ib	
2.620 *	0.835 =	2.189

Qp = 12.399

Total of 2 main streams to confluence:
Flow rates before confluence point:
10.210 2.620
Area of streams before confluence:
5.880 1.210

Results of confluence:
Total flow rate = 12.399(CFS)
Time of concentration = 17.395 min.
Effective stream area after confluence = 7.090(Ac.)

++
Process from Point/Station 17.000 to Point/Station 18.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1480.600(Ft.)
Downstream point elevation = 1478.000(Ft.)
Channel length thru subarea = 308.000(Ft.)
Channel base width = 0.000(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 = 13.037(CFS)
Manning's 'N' = 0.015
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 13.037(CFS)
Depth of flow = 1.079(Ft.), Average velocity = 5.599(Ft/s)
Channel flow top width = 4.316(Ft.)
Flow Velocity = 5.60(Ft/s)
Travel time = 0.92 min.
Time of concentration = 18.31 min.

Sub-Channel No. 1 Critical depth = 1.219(Ft.)
' ' ' Critical flow top width = 4.875(Ft.)

```
  '     '       '     Critical flow velocity=    4.389(Ft/s)
  '     '       '     Critical flow area =      2.971(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.430
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.570
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  53.09
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.003(In/Hr) for a   100.0 year storm
Subarea runoff =      1.268(CFS) for      0.730(Ac.)
Total runoff =     13.666(CFS)      Total area =       7.820(Ac.)
Depth of flow =   1.098(Ft.), Average velocity =   5.666(Ft/s)

Sub-Channel No. 1 Critical depth =      1.234(Ft.)
  '     '       '     Critical flow top width =      4.938(Ft.)
  '     '       '     Critical flow velocity=    4.485(Ft/s)
  '     '       '     Critical flow area =      3.047(Sq.Ft)

End of computations, total study area =            7.82 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.271
Area averaged RI index number =  53.7
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/30/24 File:12.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

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

Initial area flow distance = 600.000(Ft.)
Top (of initial area) elevation = 1479.800(Ft.)
Bottom (of initial area) elevation = 1471.300(Ft.)
Difference in elevation = 8.500(Ft.)

```
Slope =    0.01417  s(percent)=       1.42
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.200 min.
Rainfall intensity =      2.549(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.070
Decimal fraction soil group B = 0.930
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  54.32
Pervious area fraction =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      6.803(CFS)
Total initial stream area =        3.320(Ac.)
Pervious area fraction = 0.350


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
Runoff from this stream =      6.803(CFS)
Time of concentration =   11.20 min.
Rainfall intensity =     2.549(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.100 to Point/Station       10.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   539.000(Ft.)
Top (of initial area) elevation =  1479.700(Ft.)
Bottom (of initial area) elevation =  1471.400(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.01540  s(percent)=       1.54
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.122 min.
Rainfall intensity =      2.558(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.695
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.270
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  38.48
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.188(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       10.200 to Point/Station       10.400
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1465.900(Ft.)
Downstream point/station elevation =  1463.700(Ft.)
Pipe length  =   178.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.188(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.188(CFS)
Normal flow depth in pipe =    6.37(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    7.58(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    0.57 min.
Time of concentration (TC) =    11.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.200 to Point/Station       10.400
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      2.188(CFS)
Time of concentration =   11.70 min.
Rainfall intensity =     2.496(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.300 to Point/Station       10.400
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   146.000(Ft.)
Top (of initial area) elevation =  1474.000(Ft.)
Bottom (of initial area) elevation =  1471.300(Ft.)
Difference in elevation =     2.700(Ft.)
Slope =    0.01849  s(percent)=       1.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.880
Decimal fraction soil group B = 0.120
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  34.88
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.388(CFS)
Total initial stream area =        0.730(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.300 to Point/Station       10.400
**** CONFLUENCE OF MINOR STREAMS ****
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```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.730(Ac.)
Runoff from this stream =      2.388(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     3.785(In/Hr)
Summary of stream data:

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


1        2.188     11.70                2.496
2        2.388      5.00                3.785
Largest stream flow has longer or shorter time of concentration
Qp =      2.388 + sum of
        Qa          Tb/Ta
         2.188 *    0.427 =      0.935
Qp =      3.323

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.188       2.388
Area of streams before confluence:
        1.230        0.730
Results of confluence:
Total flow rate =      3.323(CFS)
Time of concentration =     5.000 min.
Effective stream area after confluence =      1.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.400 to Point/Station       10.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1463.700(Ft.)
Downstream point/station elevation =  1461.400(Ft.)
Pipe length  =   180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.323(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.323(CFS)
Normal flow depth in pipe =    8.31(In.)
Flow top width inside pipe =   11.08(In.)
Critical Depth =    9.37(In.)
Pipe flow velocity =      5.73(Ft/s)
Travel time through pipe =    0.52 min.
Time of concentration (TC) =     5.52 min.


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Process from Point/Station       10.400 to Point/Station       10.600
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.960(Ac.)
Runoff from this stream =      3.323(CFS)
Time of concentration =    5.52 min.
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Rainfall intensity =     3.604(In/Hr)


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Process from Point/Station       10.500 to Point/Station       10.600
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   167.000(Ft.)
Top (of initial area) elevation =  1479.700(Ft.)
Bottom (of initial area) elevation =  1471.300(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.05030  s(percent)=       5.03
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.250
Decimal fraction soil group B = 0.750
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  50.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.886(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.500 to Point/Station       10.600
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.870(Ac.)
Runoff from this stream =      2.886(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     3.785(In/Hr)
Summary of stream data:

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


1        3.323      5.52                3.604
2        2.886      5.00                3.785
Largest stream flow has longer time of concentration
Qp =      3.323 + sum of
        Qb         Ia/Ib
         2.886 *    0.952 =      2.749
Qp =      6.072

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.323       2.886
Area of streams before confluence:
```

```
        1.960        0.870
Results of confluence:
Total flow rate =      6.072(CFS)
Time of concentration =     5.524 min.
Effective stream area after confluence =      2.830(Ac.)


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Process from Point/Station       10.600 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1461.400(Ft.)
Downstream point/station elevation =  1459.100(Ft.)
Pipe length  =   183.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.072(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.072(CFS)
Normal flow depth in pipe =   10.51(In.)
Flow top width inside pipe =   13.74(In.)
Critical Depth =   11.94(In.)
Pipe flow velocity =      6.61(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =     5.99 min.


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Process from Point/Station       10.600 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.830(Ac.)
Runoff from this stream =      6.072(CFS)
Time of concentration =    5.99 min.
Rainfall intensity =     3.465(In/Hr)
Summary of stream data:

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


1        6.803     11.20               2.549
2        6.072      5.99               3.465
Largest stream flow has longer time of concentration
Qp =      6.803 + sum of
        Qb         Ia/Ib
         6.072 *    0.736 =      4.467
Qp =     11.269

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.803       6.072
Area of streams before confluence:
        3.320        2.830


Results of confluence:
```

```
Total flow rate =     11.269(CFS)
Time of concentration =    11.200 min.
Effective stream area after confluence  =      6.150(Ac.)


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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 =  1459.100(Ft.)
Downstream point/station elevation =  1458.400(Ft.)
Pipe length  =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.269(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.269(CFS)
Normal flow depth in pipe =   13.66(In.)
Flow top width inside pipe =   15.39(In.)
Critical Depth =   15.40(In.)
Pipe flow velocity =      7.83(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    11.31 min.


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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 =  1458.400(Ft.)
Downstream point/station elevation =  1455.500(Ft.)
Pipe length  =   407.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.269(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.269(CFS)
Normal flow depth in pipe =   14.77(In.)
Flow top width inside pipe =   19.19(In.)
Critical Depth =   15.01(In.)
Pipe flow velocity =      6.23(Ft/s)
Travel time through pipe =    1.09 min.
Time of concentration (TC) =    12.40 min.


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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 =      6.150(Ac.)
Runoff from this stream =     11.269(CFS)
Time of concentration =   12.40 min.
Rainfall intensity =     2.425(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       12.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
```

```
Rainfall intensity =      2.004(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.811
Decimal fraction soil group A = 0.430
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.570
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  53.70
Pervious area fraction =  0.271; Impervious fraction =  0.729
User specified values are as follows:
TC =  18.31 min.  Rain intensity =       2.00(In/Hr)
Total area =         7.82(Ac.)  Total runoff =     13.70(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       12.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1478.000(Ft.)
Downstream point/station elevation =  1458.500(Ft.)
Pipe length  =   173.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.700(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    13.700(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.69(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    18.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.100 to Point/Station       12.300
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.820(Ac.)
Runoff from this stream =     13.700(CFS)
Time of concentration =   18.46 min.
Rainfall intensity =     1.995(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.200 to Point/Station       12.200
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------------
Rainfall intensity =      2.290(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.250
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  47.90
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
User specified values are as follows:
TC =  13.94 min.  Rain intensity =       2.29(In/Hr)
Total area =         3.06(Ac.)  Total runoff =      6.22(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.200 to Point/Station       12.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1479.500(Ft.)
Downstream point/station elevation =  1458.500(Ft.)
Pipe length  =   294.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.220(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.220(CFS)
Normal flow depth in pipe =    7.07(In.)
Flow top width inside pipe =   11.81(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.92(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    14.32 min.


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Process from Point/Station       12.200 to Point/Station       12.300
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.060(Ac.)
Runoff from this stream =      6.220(CFS)
Time of concentration =   14.32 min.
Rainfall intensity =     2.260(In/Hr)
Summary of stream data:

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


1       13.700     18.46                 1.995
2        6.220     14.32                 2.260
Largest stream flow has longer time of concentration
Qp =     13.700 + sum of
        Qb         Ia/Ib
         6.220 *    0.883 =      5.491
Qp =     19.191

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.700       6.220
Area of streams before confluence:
        7.820        3.060
Results of confluence:
Total flow rate =     19.191(CFS)
Time of concentration =    18.464 min.
Effective stream area after confluence =     10.880(Ac.)
```

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Process from Point/Station       12.300 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1458.500(Ft.)
Downstream point/station elevation =  1455.500(Ft.)
Pipe length  =   430.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.191(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.191(CFS)
Normal flow depth in pipe =   20.02(In.)
Flow top width inside pipe =   17.86(In.)
Critical Depth =   18.92(In.)
Pipe flow velocity =      6.85(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    19.51 min.


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Process from Point/Station       12.300 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 =     10.880(Ac.)
Runoff from this stream =     19.191(CFS)
Time of concentration =   19.51 min.
Rainfall intensity =     1.942(In/Hr)
Summary of stream data:

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


1       11.269     12.40               2.425
2       19.191     19.51               1.942
Largest stream flow has longer time of concentration
Qp =     19.191 + sum of
        Qb         Ia/Ib
        11.269 *    0.801 =      9.024
Qp =     28.216

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.269      19.191
Area of streams before confluence:
        6.150       10.880


Results of confluence:
Total flow rate =     28.216(CFS)
Time of concentration =    19.510 min.
Effective stream area after confluence  =     17.030(Ac.)


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Process from Point/Station       13.000 to Point/Station       21.000
```

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1455.500(Ft.)
Downstream point/station elevation = 1449.300(Ft.)
Pipe length = 623.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.216(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 28.216(CFS)
Normal flow depth in pipe = 20.27(In.)
Flow top width inside pipe = 23.36(In.)
Critical Depth = 22.17(In.)
Pipe flow velocity = 8.81(Ft/s)
Travel time through pipe = 1.18 min.
Time of concentration (TC) = 20.69 min.

++

Process from Point/Station 13.000 to Point/Station 21.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 17.030(Ac.)
Runoff from this stream = 28.216(CFS)
Time of concentration = 20.69 min.
Rainfall intensity = 1.887(In/Hr)
Program is now starting with Main Stream No. 2

++

Process from Point/Station 14.000 to Point/Station 15.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 469.000(Ft.)
Top (of initial area) elevation = 1473.700(Ft.)
Bottom (of initial area) elevation = 1468.400(Ft.)
Difference in elevation = 5.300(Ft.)
Slope = 0.01130 s(percent)= 1.13
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.609 min.
Rainfall intensity = 2.900(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.570
Decimal fraction soil group C = 0.420
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.22
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 13.010(CFS)
Total initial stream area = 5.100(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```
Upstream point/station elevation =  1453.100(Ft.)
Downstream point/station elevation =  1451.900(Ft.)
Pipe length  =   244.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.010(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.010(CFS)
Normal flow depth in pipe =   16.55(In.)
Flow top width inside pipe =   22.21(In.)
Critical Depth =   15.58(In.)
Pipe flow velocity =      5.64(Ft/s)
Travel time through pipe =    0.72 min.
Time of concentration (TC) =     9.33 min.


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Process from Point/Station       15.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.100(Ac.)
Runoff from this stream =     13.010(CFS)
Time of concentration =    9.33 min.
Rainfall intensity =     2.788(In/Hr)


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Process from Point/Station       15.100 to Point/Station       15.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   333.000(Ft.)
Top (of initial area) elevation =  1470.700(Ft.)
Bottom (of initial area) elevation =  1467.800(Ft.)
Difference in elevation =     2.900(Ft.)
Slope =    0.00871  s(percent)=       0.87
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.754 min.
Rainfall intensity =      2.728(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.813
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 =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      6.495(CFS)
Total initial stream area =        2.930(Ac.)
Pervious area fraction = 0.350


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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 =  1454.300(Ft.)
Downstream point/station elevation =  1452.400(Ft.)
```

```
Pipe length  =   384.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.495(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.495(CFS)
Normal flow depth in pipe =   13.10(In.)
Flow top width inside pipe =   16.02(In.)
Critical Depth =   11.83(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    1.36 min.
Time of concentration (TC) =    11.11 min.


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Process from Point/Station       15.300 to Point/Station       15.300
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
CONDOMINIUM subarea type
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.310
Decimal fraction soil group C = 0.690
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  64.97
Pervious area fraction =  0.350; Impervious fraction =  0.650
Time of concentration =    11.11 min.
Rainfall intensity =      2.559(In/Hr) for a   100.0 year storm
Subarea runoff =      5.614(CFS) for      2.640(Ac.)
Total runoff =     12.108(CFS)      Total area =       5.570(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 =  1452.400(Ft.)
Downstream point/station elevation =  1451.900(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.108(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.108(CFS)
Normal flow depth in pipe =   15.73(In.)
Flow top width inside pipe =   22.81(In.)
Critical Depth =   15.00(In.)
Pipe flow velocity =      5.55(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    11.42 min.


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Process from Point/Station       15.300 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.570(Ac.)
Runoff from this stream =     12.108(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     2.525(In/Hr)
```

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	13.010	9.33	2.788
2	12.108	11.42	2.525

Largest stream flow has longer or shorter time of concentration
Qp = 13.010 + sum of
Qa Tb/Ta
12.108 * 0.817 = 9.896
Qp = 22.906

Total of 2 streams to confluence:
Flow rates before confluence point:
13.010 12.108
Area of streams before confluence:
5.100 5.570
Results of confluence:
Total flow rate = 22.906(CFS)
Time of concentration = 9.331 min.
Effective stream area after confluence = 10.670(Ac.)

++
Process from Point/Station 16.000 to Point/Station 20.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1451.900(Ft.)
Downstream point/station elevation = 1451.700(Ft.)
Pipe length = 35.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 22.906(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 22.906(CFS)
Normal flow depth in pipe = 21.61(In.)
Flow top width inside pipe = 21.59(In.)
Critical Depth = 20.10(In.)
Pipe flow velocity = 6.71(Ft/s)
Travel time through pipe = 0.09 min.
Time of concentration (TC) = 9.42 min.

++
Process from Point/Station 16.000 to Point/Station 20.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 10.670(Ac.)
Runoff from this stream = 22.906(CFS)
Time of concentration = 9.42 min.
Rainfall intensity = 2.775(In/Hr)

++
Process from Point/Station 17.000 to Point/Station 18.000
**** INITIAL AREA EVALUATION ****

```
Initial area flow distance =   642.000(Ft.)
Top (of initial area) elevation =  1474.000(Ft.)
Bottom (of initial area) elevation =  1464.700(Ft.)
Difference in elevation =     9.300(Ft.)
Slope =    0.01449  s(percent)=       1.45
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.289 min.
Rainfall intensity =      2.794(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 = 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 =     14.578(CFS)
Total initial stream area =        5.960(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       18.000 to Point/Station       20.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1458.000(Ft.)
Downstream point/station elevation =  1451.700(Ft.)
Pipe length  =   223.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.578(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    14.578(CFS)
Normal flow depth in pipe =   12.47(In.)
Flow top width inside pipe =   16.61(In.)
Critical Depth =   16.75(In.)
Pipe flow velocity =     11.16(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     9.62 min.


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Process from Point/Station       18.000 to Point/Station       20.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.960(Ac.)
Runoff from this stream =     14.578(CFS)
Time of concentration =    9.62 min.
Rainfall intensity =     2.746(In/Hr)
Summary of stream data:

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


1       22.906      9.42                2.775
2       14.578      9.62                2.746
```

```
Largest stream flow has longer or shorter time of concentration
Qp =     22.906 + sum of
        Qa          Tb/Ta
        14.578 *    0.979 =     14.270
Qp =     37.176

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.906      14.578
Area of streams before confluence:
       10.670        5.960
Results of confluence:
Total flow rate =     37.176(CFS)
Time of concentration =     9.418 min.
Effective stream area after confluence =     16.630(Ac.)


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Process from Point/Station       20.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1451.700(Ft.)
Downstream point/station elevation =  1449.300(Ft.)
Pipe length  =   343.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.176(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    37.176(CFS)
Normal flow depth in pipe =   23.16(In.)
Flow top width inside pipe =   30.20(In.)
Critical Depth =   24.36(In.)
Pipe flow velocity =      8.34(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    10.10 min.


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Process from Point/Station       20.000 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     16.630(Ac.)
Runoff from this stream =     37.176(CFS)
Time of concentration =   10.10 min.
Rainfall intensity =     2.681(In/Hr)
Summary of stream data:

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


1       28.216     20.69               1.887
2       37.176     10.10               2.681
Largest stream flow has longer or shorter time of concentration
Qp =     37.176 + sum of
        Qa          Tb/Ta
        28.216 *    0.488 =     13.779
```

```
Qp =     50.954

Total of 2 main streams to confluence:
Flow rates before confluence point:
      28.216      37.176
Area of streams before confluence:
       17.030       16.630


Results of confluence:
Total flow rate =     50.954(CFS)
Time of concentration =    10.103 min.
Effective stream area after confluence  =     33.660(Ac.)


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Process from Point/Station       21.000 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1449.300(Ft.)
Downstream point/station elevation =  1449.000(Ft.)
Pipe length  =    54.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.954(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    50.954(CFS)
Normal flow depth in pipe =   30.38(In.)
Flow top width inside pipe =   26.14(In.)
Critical Depth =   27.87(In.)
Pipe flow velocity =      8.01(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    10.22 min.


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Process from Point/Station       21.000 to Point/Station       22.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     33.660(Ac.)
Runoff from this stream =     50.954(CFS)
Time of concentration =   10.22 min.
Rainfall intensity =     2.667(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       21.100 to Point/Station       21.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   695.000(Ft.)
Top (of initial area) elevation =  1482.000(Ft.)
Bottom (of initial area) elevation =  1469.200(Ft.)
Difference in elevation =    12.800(Ft.)
Slope =    0.01842  s(percent)=       1.84
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.138 min.
```

```
Rainfall intensity =      2.816(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.145(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.200 to Point/Station       21.300
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1469.200(Ft.)
End of street segment elevation =  1461.800(Ft.)
Length of street segment  =   426.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  16.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.152(CFS)
Depth of flow =   0.321(Ft.), Average velocity =   2.937(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.729(Ft.)
Flow velocity =   2.94(Ft/s)
Travel time =    2.42 min.     TC =   11.56  min.
 Adding area flow to street
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
Rainfall intensity =      2.510(In/Hr) for a   100.0 year storm
Subarea runoff =      1.952(CFS) for      0.890(Ac.)
Total runoff =      4.097(CFS)      Total area =       1.760(Ac.)
Street flow at end of street =      4.097(CFS)
Half street flow at end of street =      4.097(CFS)
Depth of flow =   0.345(Ft.), Average velocity =   3.119(Ft/s)
Flow width (from curb towards crown)=  10.894(Ft.)
```

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Process from Point/Station       21.300 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1456.000(Ft.)
Downstream point/station elevation =  1449.000(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.097(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.097(CFS)
Normal flow depth in pipe =    5.68(In.)
Flow top width inside pipe =    8.68(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.94(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.63 min.


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Process from Point/Station       21.300 to Point/Station       22.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.760(Ac.)
Runoff from this stream =      4.097(CFS)
Time of concentration =   11.63 min.
Rainfall intensity =     2.503(In/Hr)
Summary of stream data:

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


1       50.954     10.22               2.667
2        4.097     11.63               2.503
Largest stream flow has longer or shorter time of concentration
Qp =     50.954 + sum of
        Qa          Tb/Ta
         4.097 *    0.879 =      3.599
Qp =     54.554

Total of 2 main streams to confluence:
Flow rates before confluence point:
      50.954       4.097
Area of streams before confluence:
       33.660        1.760


Results of confluence:
Total flow rate =     54.554(CFS)
Time of concentration =    10.215 min.
Effective stream area after confluence  =     35.420(Ac.)


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Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1449.000(Ft.)
Downstream point/station elevation =  1441.790(Ft.)
Pipe length  =   120.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    54.554(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    54.554(CFS)
Normal flow depth in pipe =   19.31(In.)
Flow top width inside pipe =   19.03(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.12(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    10.31 min.


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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 =     35.420(Ac.)
Runoff from this stream =     54.554(CFS)
Time of concentration =   10.31 min.
Rainfall intensity =     2.654(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.100 to Point/Station       22.100
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   603.000(Ft.)
Top (of initial area) elevation =  1482.000(Ft.)
Bottom (of initial area) elevation =  1478.300(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00614  s(percent)=       0.61
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.757 min.
Rainfall intensity =      2.600(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 =      1.727(CFS)
Total initial stream area =        0.760(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       22.100 to Point/Station       22.200
```

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**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1478.300(Ft.)
End of street segment elevation =  1475.800(Ft.)
Length of street segment  =   545.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  12.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.533(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.717(Ft.)
Flow velocity =   1.43(Ft/s)
Travel time =    6.36 min.     TC =   17.12  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.870
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
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
Subarea runoff =      1.423(CFS) for      0.790(Ac.)
Total runoff =      3.150(CFS)      Total area =       1.550(Ac.)
Street flow at end of street =      3.150(CFS)
Half street flow at end of street =      1.575(CFS)
Depth of flow =   0.319(Ft.), Average velocity =   1.500(Ft/s)
Flow width (from curb towards crown)=   9.610(Ft.)


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Process from Point/Station       22.200 to Point/Station       22.300
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1475.800(Ft.)
End of street segment elevation =  1460.800(Ft.)
Length of street segment  =   659.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  16.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
```

```
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.235(CFS)
Depth of flow =   0.279(Ft.), Average velocity =   2.990(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.625(Ft.)
Flow velocity =   2.99(Ft/s)
Travel time =    3.67 min.     TC =   20.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.883(In/Hr) for a   100.0 year storm
Subarea runoff =      2.050(CFS) for      1.240(Ac.)
Total runoff =      5.201(CFS)      Total area =       2.790(Ac.)
Street flow at end of street =      5.201(CFS)
Half street flow at end of street =      2.600(CFS)
Depth of flow =   0.295(Ft.), Average velocity =   3.125(Ft/s)
Flow width (from curb towards crown)=   8.399(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.300 to Point/Station       22.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1455.000(Ft.)
Downstream point/station elevation =  1451.700(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.201(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.201(CFS)
Normal flow depth in pipe =    6.32(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =   11.12(In.)
Pipe flow velocity =     12.41(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    20.85 min.


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Process from Point/Station       22.300 to Point/Station       22.500
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.790(Ac.)
Runoff from this stream =      5.201(CFS)
Time of concentration =   20.85 min.
Rainfall intensity =     1.880(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.400 to Point/Station       22.400
**** 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 = 0.792
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  65.50
Pervious area fraction =  0.451; Impervious fraction =  0.549
User specified values are as follows:
TC =  19.84 min.  Rain intensity =       1.93(In/Hr)
Total area =        11.32(Ac.)  Total runoff =     16.95(CFS)


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Process from Point/Station       22.400 to Point/Station       22.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1470.500(Ft.)
Downstream point/station elevation =  1450.900(Ft.)
Pipe length  =  1011.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.950(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.950(CFS)
Normal flow depth in pipe =   13.80(In.)
Flow top width inside pipe =   19.93(In.)
Critical Depth =   18.13(In.)
Pipe flow velocity =     10.11(Ft/s)
Travel time through pipe =    1.67 min.
Time of concentration (TC) =    21.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.400 to Point/Station       22.500
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =     11.320(Ac.)
Runoff from this stream =     16.950(CFS)
Time of concentration =   21.51 min.
Rainfall intensity =     1.852(In/Hr)
Summary of stream data:

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


1        5.201     20.85                1.880
2       16.950     21.51                1.852
Largest stream flow has longer time of concentration
Qp =     16.950 + sum of
        Qb         Ia/Ib
```

```
         5.201 *    0.985 =      5.122
Qp =     22.072

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.201      16.950
Area of streams before confluence:
        2.790       11.320
Results of confluence:
Total flow rate =     22.072(CFS)
Time of concentration =    21.506 min.
Effective stream area after confluence =     14.110(Ac.)


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Process from Point/Station       22.500 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1451.700(Ft.)
Downstream point/station elevation =  1441.790(Ft.)
Pipe length  =  1259.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.072(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.072(CFS)
Normal flow depth in pipe =   18.33(In.)
Flow top width inside pipe =   25.21(In.)
Critical Depth =   19.72(In.)
Pipe flow velocity =      7.68(Ft/s)
Travel time through pipe =    2.73 min.
Time of concentration (TC) =    24.24 min.


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Process from Point/Station       22.500 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 =     14.110(Ac.)
Runoff from this stream =     22.072(CFS)
Time of concentration =   24.24 min.
Rainfall intensity =     1.746(In/Hr)
Summary of stream data:

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


1       54.554     10.31              2.654
2       22.072     24.24              1.746
Largest stream flow has longer or shorter time of concentration
Qp =     54.554 + sum of
        Qa          Tb/Ta
        22.072 *    0.426 =      9.394
Qp =     63.947

Total of 2 main streams to confluence:
```

```
Flow rates before confluence point:
      54.554      22.072
Area of streams before confluence:
       35.420       14.110


Results of confluence:
Total flow rate =     63.947(CFS)
Time of concentration =    10.315 min.
Effective stream area after confluence  =     49.530(Ac.)
End of computations, total study area =           49.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.262
Area averaged RI index number =  57.7
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/30/24 File:12.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 - 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 = 600.000(Ft.)
Top (of initial area) elevation = 1479.800(Ft.)
Bottom (of initial area) elevation = 1471.300(Ft.)
Difference in elevation = 8.500(Ft.)
Slope = 0.01417 s(percent)= 1.42

```
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.200 min.
Rainfall intensity =      2.549(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.070
Decimal fraction soil group B = 0.930
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  54.32
Pervious area fraction =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      6.803(CFS)
Total initial stream area =        3.320(Ac.)
Pervious area fraction = 0.350


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Process from Point/Station       10.000 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
Runoff from this stream =      6.803(CFS)
Time of concentration =   11.20 min.
Rainfall intensity =     2.549(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.100 to Point/Station       10.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   539.000(Ft.)
Top (of initial area) elevation =  1479.700(Ft.)
Bottom (of initial area) elevation =  1471.400(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.01540  s(percent)=       1.54
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.122 min.
Rainfall intensity =      2.558(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.695
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.270
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  38.48
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.188(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       10.200 to Point/Station       10.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =  1465.900(Ft.)
Downstream point/station elevation =  1463.700(Ft.)
Pipe length  =   178.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.188(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.188(CFS)
Normal flow depth in pipe =    6.37(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    7.58(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    0.57 min.
Time of concentration (TC) =    11.70 min.


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Process from Point/Station       10.200 to Point/Station       10.400
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      2.188(CFS)
Time of concentration =   11.70 min.
Rainfall intensity =     2.496(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.300 to Point/Station       10.400
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   146.000(Ft.)
Top (of initial area) elevation =  1474.000(Ft.)
Bottom (of initial area) elevation =  1471.300(Ft.)
Difference in elevation =     2.700(Ft.)
Slope =    0.01849  s(percent)=       1.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.880
Decimal fraction soil group B = 0.120
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  34.88
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.388(CFS)
Total initial stream area =        0.730(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.300 to Point/Station       10.400
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
```

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.730(Ac.)
Runoff from this stream =      2.388(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     3.785(In/Hr)
Summary of stream data:

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


1        2.188     11.70                2.496
2        2.388      5.00                3.785
Largest stream flow has longer or shorter time of concentration
Qp =      2.388 + sum of
        Qa          Tb/Ta
         2.188 *    0.427 =      0.935
Qp =      3.323

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.188       2.388
Area of streams before confluence:
        1.230        0.730
Results of confluence:
Total flow rate =      3.323(CFS)
Time of concentration =     5.000 min.
Effective stream area after confluence =      1.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.400 to Point/Station       10.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1463.700(Ft.)
Downstream point/station elevation =  1461.400(Ft.)
Pipe length  =   180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.323(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.323(CFS)
Normal flow depth in pipe =    8.31(In.)
Flow top width inside pipe =   11.08(In.)
Critical Depth =    9.37(In.)
Pipe flow velocity =      5.73(Ft/s)
Travel time through pipe =    0.52 min.
Time of concentration (TC) =     5.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.400 to Point/Station       10.600
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.960(Ac.)
Runoff from this stream =      3.323(CFS)
Time of concentration =    5.52 min.
Rainfall intensity =     3.604(In/Hr)
```

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Process from Point/Station       10.500 to Point/Station       10.600
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   167.000(Ft.)
Top (of initial area) elevation =  1479.700(Ft.)
Bottom (of initial area) elevation =  1471.300(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.05030  s(percent)=       5.03
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.250
Decimal fraction soil group B = 0.750
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  50.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.886(CFS)
Total initial stream area =       0.870(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.500 to Point/Station       10.600
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.870(Ac.)
Runoff from this stream =      2.886(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     3.785(In/Hr)
Summary of stream data:

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


1        3.323      5.52                 3.604
2        2.886      5.00                 3.785
Largest stream flow has longer time of concentration
Qp =      3.323 + sum of
        Qb         Ia/Ib
         2.886 *    0.952 =      2.749
Qp =      6.072

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.323       2.886
Area of streams before confluence:
        1.960        0.870
```

```
Results of confluence:
Total flow rate =      6.072(CFS)
Time of concentration =     5.524 min.
Effective stream area after confluence =      2.830(Ac.)


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Process from Point/Station       10.600 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1461.400(Ft.)
Downstream point/station elevation =  1459.100(Ft.)
Pipe length  =   183.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.072(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.072(CFS)
Normal flow depth in pipe =   10.51(In.)
Flow top width inside pipe =   13.74(In.)
Critical Depth =   11.94(In.)
Pipe flow velocity =      6.61(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =     5.99 min.


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Process from Point/Station       10.600 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.830(Ac.)
Runoff from this stream =      6.072(CFS)
Time of concentration =    5.99 min.
Rainfall intensity =     3.465(In/Hr)
Summary of stream data:

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


1        6.803     11.20               2.549
2        6.072      5.99               3.465
Largest stream flow has longer time of concentration
Qp =      6.803 + sum of
        Qb         Ia/Ib
         6.072 *    0.736 =      4.467
Qp =     11.269

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.803       6.072
Area of streams before confluence:
        3.320        2.830


Results of confluence:
Total flow rate =     11.269(CFS)
```

```
Time of concentration =    11.200 min.
Effective stream area after confluence  =      6.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1459.100(Ft.)
Downstream point/station elevation =  1458.400(Ft.)
Pipe length  =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.269(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.269(CFS)
Normal flow depth in pipe =   13.66(In.)
Flow top width inside pipe =   15.39(In.)
Critical Depth =   15.40(In.)
Pipe flow velocity =      7.83(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    11.31 min.


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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 =  1458.400(Ft.)
Downstream point/station elevation =  1455.500(Ft.)
Pipe length  =   407.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.269(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.269(CFS)
Normal flow depth in pipe =   14.77(In.)
Flow top width inside pipe =   19.19(In.)
Critical Depth =   15.01(In.)
Pipe flow velocity =      6.23(Ft/s)
Travel time through pipe =    1.09 min.
Time of concentration (TC) =    12.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1455.500(Ft.)
Downstream point/station elevation =  1449.300(Ft.)
Pipe length  =   623.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.269(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.269(CFS)
Normal flow depth in pipe =   13.10(In.)
Flow top width inside pipe =   20.35(In.)
Critical Depth =   15.01(In.)
Pipe flow velocity =      7.14(Ft/s)
Travel time through pipe =    1.45 min.
Time of concentration (TC) =    13.85 min.
```

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Process from Point/Station       13.000 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.150(Ac.)
Runoff from this stream =     11.269(CFS)
Time of concentration =   13.85 min.
Rainfall intensity =     2.297(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   469.000(Ft.)
Top (of initial area) elevation =  1473.700(Ft.)
Bottom (of initial area) elevation =  1468.400(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.01130  s(percent)=       1.13
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.609 min.
Rainfall intensity =      2.900(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.570
Decimal fraction soil group C = 0.420
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.22
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     13.010(CFS)
Total initial stream area =        5.100(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1453.100(Ft.)
Downstream point/station elevation =  1451.900(Ft.)
Pipe length  =   244.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.010(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.010(CFS)
Normal flow depth in pipe =   16.55(In.)
Flow top width inside pipe =   22.21(In.)
Critical Depth =   15.58(In.)
Pipe flow velocity =      5.64(Ft/s)
Travel time through pipe =    0.72 min.
Time of concentration (TC) =     9.33 min.
```

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Process from Point/Station       15.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.100(Ac.)
Runoff from this stream =     13.010(CFS)
Time of concentration =    9.33 min.
Rainfall intensity =     2.788(In/Hr)


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Process from Point/Station       15.100 to Point/Station       15.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   333.000(Ft.)
Top (of initial area) elevation =  1470.700(Ft.)
Bottom (of initial area) elevation =  1467.800(Ft.)
Difference in elevation =     2.900(Ft.)
Slope =    0.00871  s(percent)=       0.87
TC = k(0.370)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.754 min.
Rainfall intensity =      2.728(In/Hr) for a   100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.813
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 =  0.350; Impervious fraction =  0.650
Initial subarea runoff =      6.495(CFS)
Total initial stream area =        2.930(Ac.)
Pervious area fraction = 0.350


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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 =  1454.300(Ft.)
Downstream point/station elevation =  1452.400(Ft.)
Pipe length  =   384.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.495(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.495(CFS)
Normal flow depth in pipe =   13.10(In.)
Flow top width inside pipe =   16.02(In.)
Critical Depth =   11.83(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    1.36 min.
Time of concentration (TC) =    11.11 min.


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Process from Point/Station       15.300 to Point/Station       15.300
**** SUBAREA FLOW ADDITION ****
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CONDOMINIUM subarea type
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.310
Decimal fraction soil group C = 0.690
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  64.97
Pervious area fraction =  0.350; Impervious fraction =  0.650
Time of concentration =    11.11 min.
Rainfall intensity =      2.559(In/Hr) for a   100.0 year storm
Subarea runoff =      5.614(CFS) for      2.640(Ac.)
Total runoff =     12.108(CFS)      Total area =       5.570(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 =  1452.400(Ft.)
Downstream point/station elevation =  1451.900(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.108(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.108(CFS)
Normal flow depth in pipe =   15.73(In.)
Flow top width inside pipe =   22.81(In.)
Critical Depth =   15.00(In.)
Pipe flow velocity =      5.55(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    11.42 min.


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Process from Point/Station       15.300 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.570(Ac.)
Runoff from this stream =     12.108(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     2.525(In/Hr)
Summary of stream data:

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


1       13.010      9.33                2.788
2       12.108     11.42                2.525
Largest stream flow has longer or shorter time of concentration
Qp =     13.010 + sum of
        Qa          Tb/Ta
        12.108 *    0.817 =      9.896
Qp =     22.906

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      13.010      12.108
Area of streams before confluence:
        5.100        5.570
Results of confluence:
Total flow rate =     22.906(CFS)
Time of concentration =     9.331 min.
Effective stream area after confluence =     10.670(Ac.)


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Process from Point/Station       16.000 to Point/Station       20.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1451.900(Ft.)
Downstream point/station elevation =  1451.700(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.906(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.906(CFS)
Normal flow depth in pipe =   21.61(In.)
Flow top width inside pipe =   21.59(In.)
Critical Depth =   20.10(In.)
Pipe flow velocity =      6.71(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     9.42 min.


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Process from Point/Station       16.000 to Point/Station       20.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     10.670(Ac.)
Runoff from this stream =     22.906(CFS)
Time of concentration =    9.42 min.
Rainfall intensity =     2.775(In/Hr)


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Process from Point/Station       17.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   642.000(Ft.)
Top (of initial area) elevation =  1474.000(Ft.)
Bottom (of initial area) elevation =  1464.700(Ft.)
Difference in elevation =     9.300(Ft.)
Slope =    0.01449  s(percent)=       1.45
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.289 min.
Rainfall intensity =      2.794(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 = 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 =     14.578(CFS)
Total initial stream area =        5.960(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       18.000 to Point/Station       20.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1458.000(Ft.)
Downstream point/station elevation =  1451.700(Ft.)
Pipe length  =   223.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.578(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    14.578(CFS)
Normal flow depth in pipe =   12.47(In.)
Flow top width inside pipe =   16.61(In.)
Critical Depth =   16.75(In.)
Pipe flow velocity =     11.16(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     9.62 min.


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Process from Point/Station       18.000 to Point/Station       20.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.960(Ac.)
Runoff from this stream =     14.578(CFS)
Time of concentration =    9.62 min.
Rainfall intensity =     2.746(In/Hr)
Summary of stream data:

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


1       22.906      9.42                2.775
2       14.578      9.62                2.746
Largest stream flow has longer or shorter time of concentration
Qp =     22.906 + sum of
        Qa          Tb/Ta
        14.578 *    0.979 =     14.270
Qp =     37.176

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.906      14.578
Area of streams before confluence:
       10.670        5.960
Results of confluence:
Total flow rate =     37.176(CFS)
Time of concentration =     9.418 min.
Effective stream area after confluence =     16.630(Ac.)
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Process from Point/Station       20.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1451.700(Ft.)
Downstream point/station elevation =  1449.300(Ft.)
Pipe length  =   343.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.176(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    37.176(CFS)
Normal flow depth in pipe =   23.16(In.)
Flow top width inside pipe =   30.20(In.)
Critical Depth =   24.36(In.)
Pipe flow velocity =      8.34(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    10.10 min.


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Process from Point/Station       20.000 to Point/Station       21.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     16.630(Ac.)
Runoff from this stream =     37.176(CFS)
Time of concentration =   10.10 min.
Rainfall intensity =     2.681(In/Hr)
Summary of stream data:

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


1       11.269     13.85               2.297
2       37.176     10.10               2.681
Largest stream flow has longer or shorter time of concentration
Qp =     37.176 + sum of
        Qa          Tb/Ta
        11.269 *    0.729 =      8.218
Qp =     45.394

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.269      37.176
Area of streams before confluence:
        6.150       16.630


Results of confluence:
Total flow rate =     45.394(CFS)
Time of concentration =    10.103 min.
Effective stream area after confluence  =     22.780(Ac.)
```

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Process from Point/Station       21.000 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1449.300(Ft.)
Downstream point/station elevation =  1449.000(Ft.)
Pipe length  =    54.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    45.394(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    45.394(CFS)
Normal flow depth in pipe =   27.05(In.)
Flow top width inside pipe =   31.12(In.)
Critical Depth =   26.35(In.)
Pipe flow velocity =      7.97(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    10.22 min.


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Process from Point/Station       21.000 to Point/Station       22.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.780(Ac.)
Runoff from this stream =     45.394(CFS)
Time of concentration =   10.22 min.
Rainfall intensity =     2.667(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       21.100 to Point/Station       21.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   695.000(Ft.)
Top (of initial area) elevation =  1482.000(Ft.)
Bottom (of initial area) elevation =  1469.200(Ft.)
Difference in elevation =    12.800(Ft.)
Slope =    0.01842  s(percent)=       1.84
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.138 min.
Rainfall intensity =      2.816(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.145(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.200 to Point/Station       21.300
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =  1469.200(Ft.)
End of street segment elevation =  1461.800(Ft.)
Length of street segment  =   426.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  16.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.152(CFS)
Depth of flow =   0.321(Ft.), Average velocity =   2.937(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.729(Ft.)
Flow velocity =   2.94(Ft/s)
Travel time =    2.42 min.     TC =   11.56  min.
 Adding area flow to street
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
Rainfall intensity =      2.510(In/Hr) for a   100.0 year storm
Subarea runoff =      1.952(CFS) for      0.890(Ac.)
Total runoff =      4.097(CFS)      Total area =       1.760(Ac.)
Street flow at end of street =      4.097(CFS)
Half street flow at end of street =      4.097(CFS)
Depth of flow =   0.345(Ft.), Average velocity =   3.119(Ft/s)
Flow width (from curb towards crown)=  10.894(Ft.)


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Process from Point/Station       21.300 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1456.000(Ft.)
Downstream point/station elevation =  1449.000(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.097(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.097(CFS)
Normal flow depth in pipe =    5.68(In.)
Flow top width inside pipe =    8.68(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.94(Ft/s)
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Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.63 min.


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Process from Point/Station       21.300 to Point/Station       22.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.760(Ac.)
Runoff from this stream =      4.097(CFS)
Time of concentration =   11.63 min.
Rainfall intensity =     2.503(In/Hr)
Summary of stream data:

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


1       45.394     10.22               2.667
2        4.097     11.63               2.503
Largest stream flow has longer or shorter time of concentration
Qp =     45.394 + sum of
        Qa          Tb/Ta
         4.097 *    0.879 =      3.600
Qp =     48.994

Total of 2 main streams to confluence:
Flow rates before confluence point:
      45.394       4.097
Area of streams before confluence:
       22.780        1.760


Results of confluence:
Total flow rate =     48.994(CFS)
Time of concentration =    10.216 min.
Effective stream area after confluence  =     24.540(Ac.)


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Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1449.000(Ft.)
Downstream point/station elevation =  1441.790(Ft.)
Pipe length  =   120.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    48.994(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    48.994(CFS)
Normal flow depth in pipe =   17.53(In.)
Flow top width inside pipe =   21.30(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.93(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    10.32 min.
```

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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 =     24.540(Ac.)
Runoff from this stream =     48.994(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     2.654(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       21.100 to Point/Station       22.100
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   603.000(Ft.)
Top (of initial area) elevation =  1482.000(Ft.)
Bottom (of initial area) elevation =  1478.300(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00614  s(percent)=       0.61
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.757 min.
Rainfall intensity =      2.600(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 =      1.727(CFS)
Total initial stream area =        0.760(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       22.100 to Point/Station       22.200
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1478.300(Ft.)
End of street segment elevation =  1475.800(Ft.)
Length of street segment  =   545.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  12.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
```

```
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.533(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.717(Ft.)
Flow velocity =   1.43(Ft/s)
Travel time =    6.36 min.     TC =   17.12  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.870
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
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
Subarea runoff =      1.423(CFS) for      0.790(Ac.)
Total runoff =      3.150(CFS)      Total area =       1.550(Ac.)
Street flow at end of street =      3.150(CFS)
Half street flow at end of street =      1.575(CFS)
Depth of flow =   0.319(Ft.), Average velocity =   1.500(Ft/s)
Flow width (from curb towards crown)=   9.610(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.200 to Point/Station       22.300
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1475.800(Ft.)
End of street segment elevation =  1460.800(Ft.)
Length of street segment  =   659.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  43.000(Ft.)
Distance from crown to crossfall grade break  =  41.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  16.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.235(CFS)
Depth of flow =   0.279(Ft.), Average velocity =   2.990(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.625(Ft.)
Flow velocity =   2.99(Ft/s)
Travel time =    3.67 min.     TC =   20.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.883(In/Hr) for a   100.0 year storm
Subarea runoff =      2.050(CFS) for      1.240(Ac.)
Total runoff =      5.201(CFS)      Total area =       2.790(Ac.)
Street flow at end of street =      5.201(CFS)
Half street flow at end of street =      2.600(CFS)
Depth of flow =   0.295(Ft.), Average velocity =   3.125(Ft/s)
Flow width (from curb towards crown)=   8.399(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.300 to Point/Station       22.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1455.000(Ft.)
Downstream point/station elevation =  1451.700(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.201(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.201(CFS)
Normal flow depth in pipe =    6.32(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =   11.12(In.)
Pipe flow velocity =     12.41(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    20.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.500 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1451.700(Ft.)
Downstream point/station elevation =  1441.790(Ft.)
Pipe length  =  1259.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.201(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.201(CFS)
Normal flow depth in pipe =   11.20(In.)
Flow top width inside pipe =   13.04(In.)
Critical Depth =   11.10(In.)
Pipe flow velocity =      5.29(Ft/s)
Travel time through pipe =    3.97 min.
Time of concentration (TC) =    24.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.500 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 =      2.790(Ac.)
```

Runoff from this stream = 5.201(CFS)
Time of concentration = 24.82 min.
Rainfall intensity = 1.726(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	48.994	10.32	2.654
2	5.201	24.82	1.726

Largest stream flow has longer or shorter time of concentration
Qp = 48.994 + sum of

Qa		Tb/Ta	
5.201	*	0.416	= 2.162

Qp = 51.155

Total of 2 main streams to confluence:
Flow rates before confluence point:
48.994 5.201
Area of streams before confluence:
24.540 2.790

Results of confluence:
Total flow rate = 51.155(CFS)
Time of concentration = 10.316 min.
Effective stream area after confluence = 27.330(Ac.)
End of computations, total study area = 27.33 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.199
Area averaged RI index number = 56.7

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: Q100UHEX24100.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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 1724.00(Ft.)
Length along longest watercourse measured to centroid = 1620.00(Ft.)
Length along longest watercourse = 0.327 Mi.
Length along longest watercourse measured to centroid = 0.307 Mi.
Difference in elevation = 22.50(Ft.)
Slope along watercourse = 68.9095 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.090 Hr.
Lag time = 5.38 Min.
25% of lag time = 1.34 Min.
40% of lag time = 2.15 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]
27.32	2.00	54.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	5.00	136.60

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 = 99.99 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	56.50	0.500

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.5	56.5	0.506	0.500	0.278	1.000	0.278
					Sum (F) =	0.278

Area averaged mean soil loss (F) (In/Hr) = 0.278
Minimum soil loss rate ((In/Hr)) = 0.139
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.015	17.076	4.702
2	0.167	186.030	47.610	13.109
3	0.250	279.045	16.820	4.631
4	0.333	372.060	7.458	2.053
5	0.417	465.074	4.278	1.178
6	0.500	558.089	2.760	0.760

7	0.583	651.104	1.826		0.503
8	0.667	744.119	1.150		0.317
9	0.750	837.134	1.024		0.282
			Sum = 100.000	Sum=	27.533

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	(0.493)	0.020	0.020
2	0.17	0.07	0.040	(0.491)	0.020	0.020
3	0.25	0.07	0.040	(0.489)	0.020	0.020
4	0.33	0.10	0.060	(0.487)	0.030	0.030
5	0.42	0.10	0.060	(0.485)	0.030	0.030
6	0.50	0.10	0.060	(0.484)	0.030	0.030
7	0.58	0.10	0.060	(0.482)	0.030	0.030
8	0.67	0.10	0.060	(0.480)	0.030	0.030
9	0.75	0.10	0.060	(0.478)	0.030	0.030
10	0.83	0.13	0.080	(0.476)	0.040	0.040
11	0.92	0.13	0.080	(0.474)	0.040	0.040
12	1.00	0.13	0.080	(0.472)	0.040	0.040
13	1.08	0.10	0.060	(0.470)	0.030	0.030
14	1.17	0.10	0.060	(0.469)	0.030	0.030
15	1.25	0.10	0.060	(0.467)	0.030	0.030
16	1.33	0.10	0.060	(0.465)	0.030	0.030
17	1.42	0.10	0.060	(0.463)	0.030	0.030
18	1.50	0.10	0.060	(0.461)	0.030	0.030
19	1.58	0.10	0.060	(0.459)	0.030	0.030
20	1.67	0.10	0.060	(0.457)	0.030	0.030
21	1.75	0.10	0.060	(0.456)	0.030	0.030
22	1.83	0.13	0.080	(0.454)	0.040	0.040
23	1.92	0.13	0.080	(0.452)	0.040	0.040
24	2.00	0.13	0.080	(0.450)	0.040	0.040
25	2.08	0.13	0.080	(0.448)	0.040	0.040
26	2.17	0.13	0.080	(0.447)	0.040	0.040
27	2.25	0.13	0.080	(0.445)	0.040	0.040
28	2.33	0.13	0.080	(0.443)	0.040	0.040
29	2.42	0.13	0.080	(0.441)	0.040	0.040
30	2.50	0.13	0.080	(0.439)	0.040	0.040
31	2.58	0.17	0.100	(0.437)	0.050	0.050
32	2.67	0.17	0.100	(0.436)	0.050	0.050
33	2.75	0.17	0.100	(0.434)	0.050	0.050
34	2.83	0.17	0.100	(0.432)	0.050	0.050
35	2.92	0.17	0.100	(0.430)	0.050	0.050
36	3.00	0.17	0.100	(0.429)	0.050	0.050
37	3.08	0.17	0.100	(0.427)	0.050	0.050
38	3.17	0.17	0.100	(0.425)	0.050	0.050

39	3.25	0.17	0.100	(0.423)	0.050	0.050
40	3.33	0.17	0.100	(0.421)	0.050	0.050
41	3.42	0.17	0.100	(0.420)	0.050	0.050
42	3.50	0.17	0.100	(0.418)	0.050	0.050
43	3.58	0.17	0.100	(0.416)	0.050	0.050
44	3.67	0.17	0.100	(0.414)	0.050	0.050
45	3.75	0.17	0.100	(0.413)	0.050	0.050
46	3.83	0.20	0.120	(0.411)	0.060	0.060
47	3.92	0.20	0.120	(0.409)	0.060	0.060
48	4.00	0.20	0.120	(0.407)	0.060	0.060
49	4.08	0.20	0.120	(0.406)	0.060	0.060
50	4.17	0.20	0.120	(0.404)	0.060	0.060
51	4.25	0.20	0.120	(0.402)	0.060	0.060
52	4.33	0.23	0.140	(0.401)	0.070	0.070
53	4.42	0.23	0.140	(0.399)	0.070	0.070
54	4.50	0.23	0.140	(0.397)	0.070	0.070
55	4.58	0.23	0.140	(0.395)	0.070	0.070
56	4.67	0.23	0.140	(0.394)	0.070	0.070
57	4.75	0.23	0.140	(0.392)	0.070	0.070
58	4.83	0.27	0.160	(0.390)	0.080	0.080
59	4.92	0.27	0.160	(0.389)	0.080	0.080
60	5.00	0.27	0.160	(0.387)	0.080	0.080
61	5.08	0.20	0.120	(0.385)	0.060	0.060
62	5.17	0.20	0.120	(0.384)	0.060	0.060
63	5.25	0.20	0.120	(0.382)	0.060	0.060
64	5.33	0.23	0.140	(0.380)	0.070	0.070
65	5.42	0.23	0.140	(0.379)	0.070	0.070
66	5.50	0.23	0.140	(0.377)	0.070	0.070
67	5.58	0.27	0.160	(0.375)	0.080	0.080
68	5.67	0.27	0.160	(0.374)	0.080	0.080
69	5.75	0.27	0.160	(0.372)	0.080	0.080
70	5.83	0.27	0.160	(0.370)	0.080	0.080
71	5.92	0.27	0.160	(0.369)	0.080	0.080
72	6.00	0.27	0.160	(0.367)	0.080	0.080
73	6.08	0.30	0.180	(0.366)	0.090	0.090
74	6.17	0.30	0.180	(0.364)	0.090	0.090
75	6.25	0.30	0.180	(0.362)	0.090	0.090
76	6.33	0.30	0.180	(0.361)	0.090	0.090
77	6.42	0.30	0.180	(0.359)	0.090	0.090
78	6.50	0.30	0.180	(0.357)	0.090	0.090
79	6.58	0.33	0.200	(0.356)	0.100	0.100
80	6.67	0.33	0.200	(0.354)	0.100	0.100
81	6.75	0.33	0.200	(0.353)	0.100	0.100
82	6.83	0.33	0.200	(0.351)	0.100	0.100
83	6.92	0.33	0.200	(0.349)	0.100	0.100
84	7.00	0.33	0.200	(0.348)	0.100	0.100
85	7.08	0.33	0.200	(0.346)	0.100	0.100
86	7.17	0.33	0.200	(0.345)	0.100	0.100
87	7.25	0.33	0.200	(0.343)	0.100	0.100
88	7.33	0.37	0.220	(0.342)	0.110	0.110

89	7.42	0.37	0.220	(0.340)	0.110	0.110
90	7.50	0.37	0.220	(0.338)	0.110	0.110
91	7.58	0.40	0.240	(0.337)	0.120	0.120
92	7.67	0.40	0.240	(0.335)	0.120	0.120
93	7.75	0.40	0.240	(0.334)	0.120	0.120
94	7.83	0.43	0.260	(0.332)	0.130	0.130
95	7.92	0.43	0.260	(0.331)	0.130	0.130
96	8.00	0.43	0.260	(0.329)	0.130	0.130
97	8.08	0.50	0.300	(0.328)	0.150	0.150
98	8.17	0.50	0.300	(0.326)	0.150	0.150
99	8.25	0.50	0.300	(0.325)	0.150	0.150
100	8.33	0.50	0.300	(0.323)	0.150	0.150
101	8.42	0.50	0.300	(0.322)	0.150	0.150
102	8.50	0.50	0.300	(0.320)	0.150	0.150
103	8.58	0.53	0.320	(0.319)	0.160	0.160
104	8.67	0.53	0.320	(0.317)	0.160	0.160
105	8.75	0.53	0.320	(0.316)	0.160	0.160
106	8.83	0.57	0.340	(0.314)	0.170	0.170
107	8.92	0.57	0.340	(0.313)	0.170	0.170
108	9.00	0.57	0.340	(0.311)	0.170	0.170
109	9.08	0.63	0.380	(0.310)	0.190	0.190
110	9.17	0.63	0.380	(0.308)	0.190	0.190
111	9.25	0.63	0.380	(0.307)	0.190	0.190
112	9.33	0.67	0.400	(0.305)	0.200	0.200
113	9.42	0.67	0.400	(0.304)	0.200	0.200
114	9.50	0.67	0.400	(0.302)	0.200	0.200
115	9.58	0.70	0.420	(0.301)	0.210	0.210
116	9.67	0.70	0.420	(0.299)	0.210	0.210
117	9.75	0.70	0.420	(0.298)	0.210	0.210
118	9.83	0.73	0.440	(0.297)	0.220	0.220
119	9.92	0.73	0.440	(0.295)	0.220	0.220
120	10.00	0.73	0.440	(0.294)	0.220	0.220
121	10.08	0.50	0.300	(0.292)	0.150	0.150
122	10.17	0.50	0.300	(0.291)	0.150	0.150
123	10.25	0.50	0.300	(0.289)	0.150	0.150
124	10.33	0.50	0.300	(0.288)	0.150	0.150
125	10.42	0.50	0.300	(0.287)	0.150	0.150
126	10.50	0.50	0.300	(0.285)	0.150	0.150
127	10.58	0.67	0.400	(0.284)	0.200	0.200
128	10.67	0.67	0.400	(0.282)	0.200	0.200
129	10.75	0.67	0.400	(0.281)	0.200	0.200
130	10.83	0.67	0.400	(0.280)	0.200	0.200
131	10.92	0.67	0.400	(0.278)	0.200	0.200
132	11.00	0.67	0.400	(0.277)	0.200	0.200
133	11.08	0.63	0.380	(0.276)	0.190	0.190
134	11.17	0.63	0.380	(0.274)	0.190	0.190
135	11.25	0.63	0.380	(0.273)	0.190	0.190
136	11.33	0.63	0.380	(0.272)	0.190	0.190
137	11.42	0.63	0.380	(0.270)	0.190	0.190
138	11.50	0.63	0.380	(0.269)	0.190	0.190

139	11.58	0.57	0.340	(0.268)	0.170	0.170
140	11.67	0.57	0.340	(0.266)	0.170	0.170
141	11.75	0.57	0.340	(0.265)	0.170	0.170
142	11.83	0.60	0.360	(0.264)	0.180	0.180
143	11.92	0.60	0.360	(0.262)	0.180	0.180
144	12.00	0.60	0.360	(0.261)	0.180	0.180
145	12.08	0.83	0.500	(0.260)	0.250	0.250
146	12.17	0.83	0.500	(0.258)	0.250	0.250
147	12.25	0.83	0.500	(0.257)	0.250	0.250
148	12.33	0.87	0.520	0.256	(0.260)	0.264
149	12.42	0.87	0.520	0.254	(0.260)	0.266
150	12.50	0.87	0.520	0.253	(0.260)	0.267
151	12.58	0.93	0.560	0.252	(0.280)	0.308
152	12.67	0.93	0.560	0.251	(0.280)	0.309
153	12.75	0.93	0.560	0.249	(0.280)	0.311
154	12.83	0.97	0.580	0.248	(0.290)	0.332
155	12.92	0.97	0.580	0.247	(0.290)	0.333
156	13.00	0.97	0.580	0.246	(0.290)	0.334
157	13.08	1.13	0.680	0.244	(0.340)	0.436
158	13.17	1.13	0.680	0.243	(0.340)	0.437
159	13.25	1.13	0.680	0.242	(0.340)	0.438
160	13.33	1.13	0.680	0.241	(0.340)	0.439
161	13.42	1.13	0.680	0.239	(0.340)	0.441
162	13.50	1.13	0.680	0.238	(0.340)	0.442
163	13.58	0.77	0.460	(0.237)	0.230	0.230
164	13.67	0.77	0.460	(0.236)	0.230	0.230
165	13.75	0.77	0.460	(0.235)	0.230	0.230
166	13.83	0.77	0.460	(0.233)	0.230	0.230
167	13.92	0.77	0.460	(0.232)	0.230	0.230
168	14.00	0.77	0.460	(0.231)	0.230	0.230
169	14.08	0.90	0.540	0.230	(0.270)	0.310
170	14.17	0.90	0.540	0.229	(0.270)	0.311
171	14.25	0.90	0.540	0.228	(0.270)	0.312
172	14.33	0.87	0.520	0.226	(0.260)	0.294
173	14.42	0.87	0.520	0.225	(0.260)	0.295
174	14.50	0.87	0.520	0.224	(0.260)	0.296
175	14.58	0.87	0.520	0.223	(0.260)	0.297
176	14.67	0.87	0.520	0.222	(0.260)	0.298
177	14.75	0.87	0.520	0.221	(0.260)	0.299
178	14.83	0.83	0.500	0.219	(0.250)	0.280
179	14.92	0.83	0.500	0.218	(0.250)	0.282
180	15.00	0.83	0.500	0.217	(0.250)	0.283
181	15.08	0.80	0.480	0.216	(0.240)	0.264
182	15.17	0.80	0.480	0.215	(0.240)	0.265
183	15.25	0.80	0.480	0.214	(0.240)	0.266
184	15.33	0.77	0.460	0.213	(0.230)	0.247
185	15.42	0.77	0.460	0.212	(0.230)	0.248
186	15.50	0.77	0.460	0.211	(0.230)	0.249
187	15.58	0.63	0.380	(0.210)	0.190	0.190
188	15.67	0.63	0.380	(0.208)	0.190	0.190

189	15.75	0.63	0.380	(0.207)	0.190	0.190
190	15.83	0.63	0.380	(0.206)	0.190	0.190
191	15.92	0.63	0.380	(0.205)	0.190	0.190
192	16.00	0.63	0.380	(0.204)	0.190	0.190
193	16.08	0.13	0.080	(0.203)	0.040	0.040
194	16.17	0.13	0.080	(0.202)	0.040	0.040
195	16.25	0.13	0.080	(0.201)	0.040	0.040
196	16.33	0.13	0.080	(0.200)	0.040	0.040
197	16.42	0.13	0.080	(0.199)	0.040	0.040
198	16.50	0.13	0.080	(0.198)	0.040	0.040
199	16.58	0.10	0.060	(0.197)	0.030	0.030
200	16.67	0.10	0.060	(0.196)	0.030	0.030
201	16.75	0.10	0.060	(0.195)	0.030	0.030
202	16.83	0.10	0.060	(0.194)	0.030	0.030
203	16.92	0.10	0.060	(0.193)	0.030	0.030
204	17.00	0.10	0.060	(0.192)	0.030	0.030
205	17.08	0.17	0.100	(0.191)	0.050	0.050
206	17.17	0.17	0.100	(0.190)	0.050	0.050
207	17.25	0.17	0.100	(0.189)	0.050	0.050
208	17.33	0.17	0.100	(0.188)	0.050	0.050
209	17.42	0.17	0.100	(0.187)	0.050	0.050
210	17.50	0.17	0.100	(0.186)	0.050	0.050
211	17.58	0.17	0.100	(0.185)	0.050	0.050
212	17.67	0.17	0.100	(0.185)	0.050	0.050
213	17.75	0.17	0.100	(0.184)	0.050	0.050
214	17.83	0.13	0.080	(0.183)	0.040	0.040
215	17.92	0.13	0.080	(0.182)	0.040	0.040
216	18.00	0.13	0.080	(0.181)	0.040	0.040
217	18.08	0.13	0.080	(0.180)	0.040	0.040
218	18.17	0.13	0.080	(0.179)	0.040	0.040
219	18.25	0.13	0.080	(0.178)	0.040	0.040
220	18.33	0.13	0.080	(0.177)	0.040	0.040
221	18.42	0.13	0.080	(0.177)	0.040	0.040
222	18.50	0.13	0.080	(0.176)	0.040	0.040
223	18.58	0.10	0.060	(0.175)	0.030	0.030
224	18.67	0.10	0.060	(0.174)	0.030	0.030
225	18.75	0.10	0.060	(0.173)	0.030	0.030
226	18.83	0.07	0.040	(0.172)	0.020	0.020
227	18.92	0.07	0.040	(0.171)	0.020	0.020
228	19.00	0.07	0.040	(0.171)	0.020	0.020
229	19.08	0.10	0.060	(0.170)	0.030	0.030
230	19.17	0.10	0.060	(0.169)	0.030	0.030
231	19.25	0.10	0.060	(0.168)	0.030	0.030
232	19.33	0.13	0.080	(0.167)	0.040	0.040
233	19.42	0.13	0.080	(0.167)	0.040	0.040
234	19.50	0.13	0.080	(0.166)	0.040	0.040
235	19.58	0.10	0.060	(0.165)	0.030	0.030
236	19.67	0.10	0.060	(0.164)	0.030	0.030
237	19.75	0.10	0.060	(0.164)	0.030	0.030
238	19.83	0.07	0.040	(0.163)	0.020	0.020

239	19.92	0.07	0.040	(0.162)	0.020	0.020
240	20.00	0.07	0.040	(0.162)	0.020	0.020
241	20.08	0.10	0.060	(0.161)	0.030	0.030
242	20.17	0.10	0.060	(0.160)	0.030	0.030
243	20.25	0.10	0.060	(0.159)	0.030	0.030
244	20.33	0.10	0.060	(0.159)	0.030	0.030
245	20.42	0.10	0.060	(0.158)	0.030	0.030
246	20.50	0.10	0.060	(0.157)	0.030	0.030
247	20.58	0.10	0.060	(0.157)	0.030	0.030
248	20.67	0.10	0.060	(0.156)	0.030	0.030
249	20.75	0.10	0.060	(0.155)	0.030	0.030
250	20.83	0.07	0.040	(0.155)	0.020	0.020
251	20.92	0.07	0.040	(0.154)	0.020	0.020
252	21.00	0.07	0.040	(0.154)	0.020	0.020
253	21.08	0.10	0.060	(0.153)	0.030	0.030
254	21.17	0.10	0.060	(0.152)	0.030	0.030
255	21.25	0.10	0.060	(0.152)	0.030	0.030
256	21.33	0.07	0.040	(0.151)	0.020	0.020
257	21.42	0.07	0.040	(0.151)	0.020	0.020
258	21.50	0.07	0.040	(0.150)	0.020	0.020
259	21.58	0.10	0.060	(0.149)	0.030	0.030
260	21.67	0.10	0.060	(0.149)	0.030	0.030
261	21.75	0.10	0.060	(0.148)	0.030	0.030
262	21.83	0.07	0.040	(0.148)	0.020	0.020
263	21.92	0.07	0.040	(0.147)	0.020	0.020
264	22.00	0.07	0.040	(0.147)	0.020	0.020
265	22.08	0.10	0.060	(0.146)	0.030	0.030
266	22.17	0.10	0.060	(0.146)	0.030	0.030
267	22.25	0.10	0.060	(0.145)	0.030	0.030
268	22.33	0.07	0.040	(0.145)	0.020	0.020
269	22.42	0.07	0.040	(0.145)	0.020	0.020
270	22.50	0.07	0.040	(0.144)	0.020	0.020
271	22.58	0.07	0.040	(0.144)	0.020	0.020
272	22.67	0.07	0.040	(0.143)	0.020	0.020
273	22.75	0.07	0.040	(0.143)	0.020	0.020
274	22.83	0.07	0.040	(0.143)	0.020	0.020
275	22.92	0.07	0.040	(0.142)	0.020	0.020
276	23.00	0.07	0.040	(0.142)	0.020	0.020
277	23.08	0.07	0.040	(0.141)	0.020	0.020
278	23.17	0.07	0.040	(0.141)	0.020	0.020
279	23.25	0.07	0.040	(0.141)	0.020	0.020
280	23.33	0.07	0.040	(0.141)	0.020	0.020
281	23.42	0.07	0.040	(0.140)	0.020	0.020
282	23.50	0.07	0.040	(0.140)	0.020	0.020
283	23.58	0.07	0.040	(0.140)	0.020	0.020
284	23.67	0.07	0.040	(0.140)	0.020	0.020
285	23.75	0.07	0.040	(0.139)	0.020	0.020
286	23.83	0.07	0.040	(0.139)	0.020	0.020
287	23.92	0.07	0.040	(0.139)	0.020	0.020
288	24.00	0.07	0.040	(0.139)	0.020	0.020

(Loss Rate Not Used)
Sum = 100.0 Sum = 31.4
Flood volume = Effective rainfall 2.62(In)
times area 27.3(Ac.)/[(In)/(Ft.)] = 6.0(Ac.Ft)
Total soil loss = 2.38(In)
Total soil loss = 5.427(Ac.Ft)
Total rainfall = 5.00(In)
Flood volume = 259434.0 Cubic Feet
Total soil loss = 236397.5 Cubic Feet

Peak flow rate of this hydrograph = 12.004(CFS)

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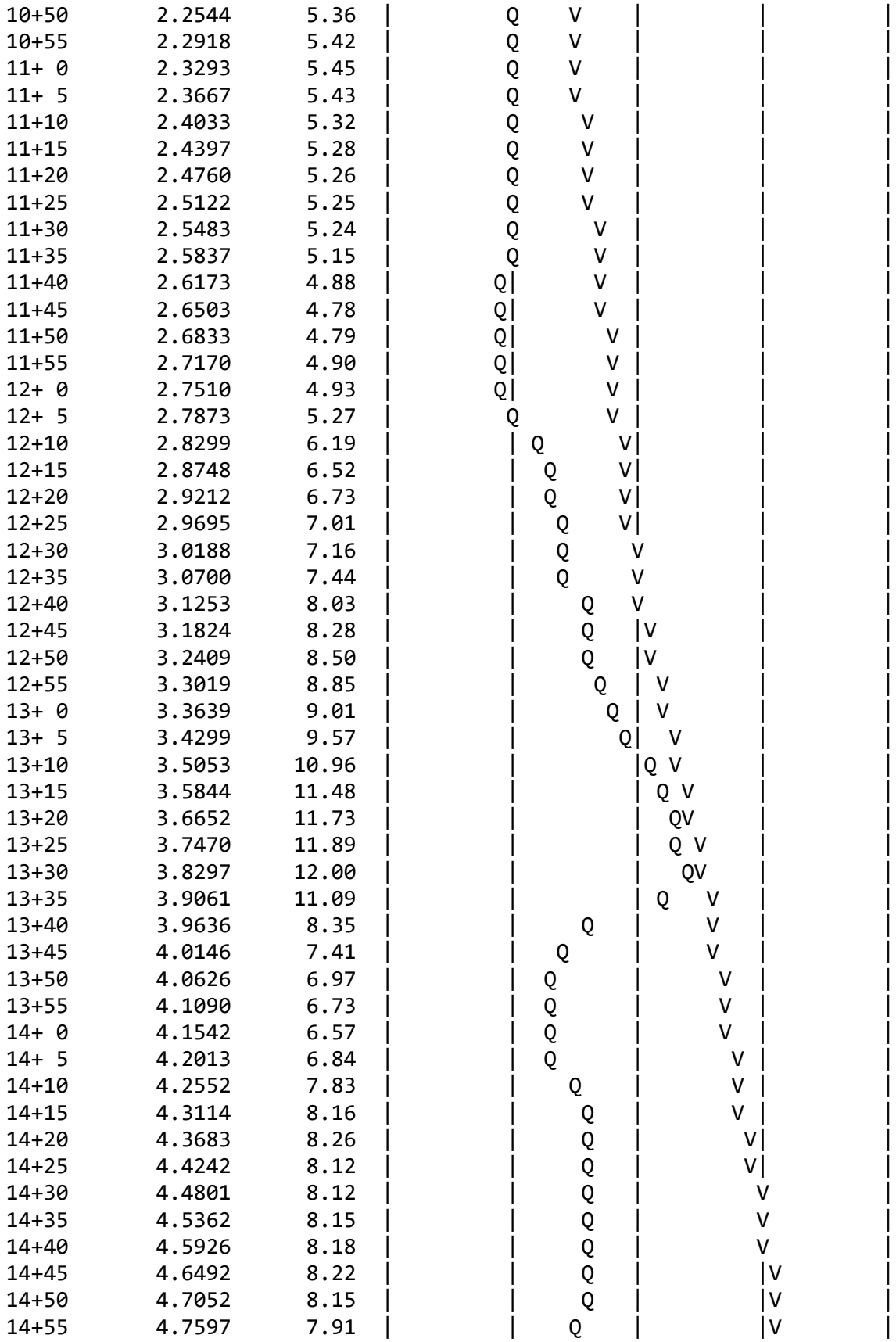
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

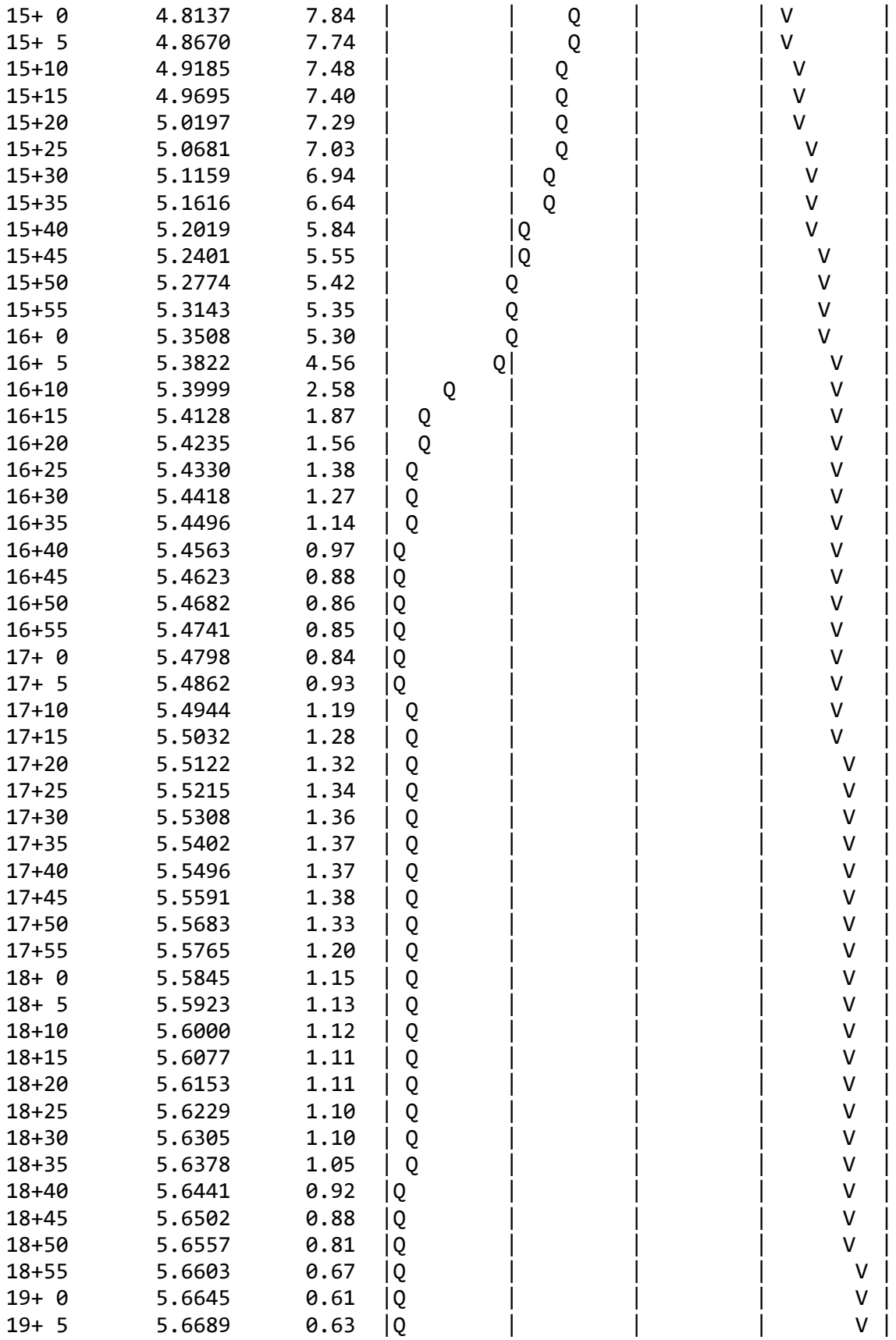
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0006	0.09	Q				
0+10	0.0031	0.36	Q				
0+15	0.0062	0.45	Q				
0+20	0.0099	0.54	VQ				
0+25	0.0147	0.69	VQ				
0+30	0.0198	0.75	VQ				
0+35	0.0252	0.78	VQ				
0+40	0.0308	0.80	VQ				
0+45	0.0364	0.82	VQ				
0+50	0.0424	0.87	VQ				
0+55	0.0493	1.00	V Q				
1+ 0	0.0565	1.05	V Q				
1+ 5	0.0636	1.02	V Q				
1+10	0.0698	0.91	VQ				
1+15	0.0758	0.87	VQ				
1+20	0.0816	0.85	VQ				
1+25	0.0874	0.84	VQ				
1+30	0.0932	0.84	VQ				
1+35	0.0989	0.83	VQ				
1+40	0.1046	0.83	VQ				
1+45	0.1103	0.83	VQ				
1+50	0.1163	0.87	VQ				
1+55	0.1232	1.00	V Q				
2+ 0	0.1305	1.05	V Q				
2+ 5	0.1379	1.07	V Q				
2+10	0.1453	1.08	V Q				
2+15	0.1528	1.09	|VQ				
2+20	0.1604	1.10	|VQ				
2+25	0.1680	1.10	|VQ				

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2+30       0.1755      1.10  |VQ       |          |          |          |
2+35       0.1835      1.15  |VQ       |          |          |          |
2+40       0.1923      1.28  |VQ       |          |          |          |
2+45       0.2014      1.33  |VQ       |          |          |          |
2+50       0.2107      1.35  |VQ       |          |          |          |
2+55       0.2200      1.36  |VQ       |          |          |          |
3+ 0       0.2294      1.37  |VQ       |          |          |          |
3+ 5       0.2389      1.37  |VQ       |          |          |          |
3+10       0.2484      1.37  |VQ       |          |          |          |
3+15       0.2578      1.38  |VQ       |          |          |          |
3+20       0.2673      1.38  |VQ       |          |          |          |
3+25       0.2768      1.38  |VQ       |          |          |          |
3+30       0.2863      1.38  |VQ       |          |          |          |
3+35       0.2958      1.38  |VQ       |          |          |          |
3+40       0.3053      1.38  | Q       |          |          |          |
3+45       0.3148      1.38  | Q       |          |          |          |
3+50       0.3246      1.42  | Q       |          |          |          |
3+55       0.3353      1.56  | VQ      |          |          |          |
4+ 0       0.3463      1.60  | VQ      |          |          |          |
4+ 5       0.3575      1.62  | VQ      |          |          |          |
4+10       0.3687      1.63  | VQ      |          |          |          |
4+15       0.3800      1.64  | VQ      |          |          |          |
4+20       0.3917      1.69  | VQ      |          |          |          |
4+25       0.4043      1.83  | VQ      |          |          |          |
4+30       0.4172      1.88  | VQ      |          |          |          |
4+35       0.4303      1.90  | VQ      |          |          |          |
4+40       0.4435      1.91  | VQ      |          |          |          |
4+45       0.4567      1.92  |  Q      |          |          |          |
4+50       0.4702      1.97  |  Q      |          |          |          |
4+55       0.4847      2.10  |  VQ     |          |          |          |
5+ 0       0.4995      2.15  |  VQ     |          |          |          |
5+ 5       0.5139      2.08  |  VQ     |          |          |          |
5+10       0.5264      1.83  |  Q      |          |          |          |
5+15       0.5385      1.74  |  Q      |          |          |          |
5+20       0.5505      1.75  |  Q      |          |          |          |
5+25       0.5634      1.87  |  Q      |          |          |          |
5+30       0.5765      1.90  |  Q      |          |          |          |
5+35       0.5899      1.96  |  Q      |          |          |          |
5+40       0.6044      2.09  |   Q     |          |          |          |
5+45       0.6191      2.14  |   Q     |          |          |          |
5+50       0.6340      2.17  |   Q     |          |          |          |
5+55       0.6491      2.18  |   Q     |          |          |          |
6+ 0       0.6642      2.19  |   Q     |          |          |          |
6+ 5       0.6796      2.24  |   Q     |          |          |          |
6+10       0.6960      2.38  |   Q     |          |          |          |
6+15       0.7127      2.43  |   Q     |          |          |          |
6+20       0.7296      2.45  |   Q     |          |          |          |
6+25       0.7465      2.46  |   QV    |          |          |          |
6+30       0.7635      2.47  |   QV    |          |          |          |
6+35       0.7809      2.52  |    Q    |          |          |          |
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6+40	0.7992	2.65	Q				
6+45	0.8178	2.70	Q				
6+50	0.8366	2.72	Q				
6+55	0.8554	2.74	Q				
7+ 0	0.8743	2.74	Q				
7+ 5	0.8932	2.75	Q				
7+10	0.9122	2.75	QV				
7+15	0.9312	2.75	QV				
7+20	0.9505	2.80	QV				
7+25	0.9707	2.93	QV				
7+30	0.9912	2.98	QV				
7+35	1.0122	3.05	Q				
7+40	1.0341	3.19	Q				
7+45	1.0565	3.24	QV				
7+50	1.0793	3.32	QV				
7+55	1.1031	3.46	QV				
8+ 0	1.1274	3.52	Q				
8+ 5	1.1524	3.64	Q				
8+10	1.1794	3.92	Q				
8+15	1.2071	4.02	Q				
8+20	1.2351	4.07	Q				
8+25	1.2633	4.09	Q				
8+30	1.2916	4.11	Q				
8+35	1.3203	4.17	Q				
8+40	1.3499	4.30	QV				
8+45	1.3799	4.36	QV				
8+50	1.4104	4.42	QV				
8+55	1.4418	4.57	Q				
9+ 0	1.4737	4.62	Q				
9+ 5	1.5063	4.74	QV				
9+10	1.5409	5.02	Q				
9+15	1.5761	5.12	Q				
9+20	1.6120	5.21	Q				
9+25	1.6490	5.37	QV				
9+30	1.6865	5.44	QV				
9+35	1.7245	5.51	Q				
9+40	1.7635	5.66	Q				
9+45	1.8029	5.72	QV				
9+50	1.8428	5.80	QV				
9+55	1.8837	5.94	QV				
10+ 0	1.9250	6.00	QV				
10+ 5	1.9642	5.69	Q V				
10+10	1.9972	4.79	Q V				
10+15	2.0281	4.48	Q V				
10+20	2.0579	4.34	Q V				
10+25	2.0873	4.26	Q V				
10+30	2.1163	4.21	Q V				
10+35	2.1466	4.41	Q V				
10+40	2.1814	5.04	Q V				
10+45	2.2176	5.25	Q V				





19+10	5.6741	0.75	Q				V
19+15	5.6795	0.79	Q				V
19+20	5.6853	0.85	Q				V
19+25	5.6922	0.99	Q				V
19+30	5.6993	1.04	Q				V
19+35	5.7063	1.02	Q				V
19+40	5.7125	0.90	Q				V
19+45	5.7185	0.87	Q				V
19+50	5.7240	0.80	Q				V
19+55	5.7286	0.66	Q				V
20+ 0	5.7328	0.61	Q				V
20+ 5	5.7372	0.63	Q				V
20+10	5.7424	0.75	Q				V
20+15	5.7478	0.79	Q				V
20+20	5.7533	0.80	Q				V
20+25	5.7589	0.81	Q				V
20+30	5.7645	0.82	Q				V
20+35	5.7702	0.82	Q				V
20+40	5.7758	0.82	Q				V
20+45	5.7815	0.83	Q				V
20+50	5.7869	0.78	Q				V
20+55	5.7914	0.65	Q				V
21+ 0	5.7955	0.60	Q				V
21+ 5	5.7998	0.63	Q				V
21+10	5.8050	0.75	Q				V
21+15	5.8104	0.79	Q				V
21+20	5.8156	0.75	Q				V
21+25	5.8200	0.63	Q				V
21+30	5.8240	0.59	Q				V
21+35	5.8283	0.62	Q				V
21+40	5.8334	0.74	Q				V
21+45	5.8389	0.79	Q				V
21+50	5.8441	0.75	Q				V
21+55	5.8484	0.63	Q				V
22+ 0	5.8525	0.59	Q				V
22+ 5	5.8568	0.62	Q				V
22+10	5.8619	0.74	Q				V
22+15	5.8673	0.79	Q				V
22+20	5.8725	0.75	Q				V
22+25	5.8769	0.63	Q				V
22+30	5.8809	0.59	Q				V
22+35	5.8849	0.58	Q				V
22+40	5.8888	0.57	Q				V
22+45	5.8927	0.56	Q				V
22+50	5.8965	0.56	Q				V
22+55	5.9003	0.55	Q				V
23+ 0	5.9041	0.55	Q				V
23+ 5	5.9079	0.55	Q				V
23+10	5.9117	0.55	Q				V
23+15	5.9155	0.55	Q				V

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   23+20       5.9193      0.55  |Q        |         |         |        V|
   23+25       5.9231      0.55  |Q        |         |         |        V|
   23+30       5.9269      0.55  |Q        |         |         |        V|
   23+35       5.9307      0.55  |Q        |         |         |        V|
   23+40       5.9345      0.55  |Q        |         |         |        V|
   23+45       5.9383      0.55  |Q        |         |         |        V|
   23+50       5.9421      0.55  |Q        |         |         |        V|
   23+55       5.9459      0.55  |Q        |         |         |        V|
   24+ 0       5.9496      0.55  |Q        |         |         |        V|
   24+ 5       5.9528      0.46  Q         |         |         |        V|
   24+10       5.9541      0.19  Q         |         |         |        V|
   24+15       5.9548      0.10  Q         |         |         |        V|
   24+20       5.9553      0.06  Q         |         |         |        V|
   24+25       5.9555      0.04  Q         |         |         |        V|
   24+30       5.9557      0.02  Q         |         |         |        V|
   24+35       5.9557      0.01  Q         |         |         |        V|
   24+40       5.9558      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 10/10/23 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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 3139.00(Ft.)
Length along longest watercourse measured to centroid = 2535.00(Ft.)
Length along longest watercourse = 0.595 Mi.
Length along longest watercourse measured to centroid = 0.480 Mi.
Difference in elevation = 39.71(Ft.)
Slope along watercourse = 66.7948 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.101 Hr.
Lag time = 6.04 Min.
25% of lag time = 1.51 Min.
40% of lag time = 2.41 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]
27.32	2.00	54.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	5.00	136.60

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 = 99.99 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	54.50	0.746

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.5	54.5	0.526	0.746	0.173	1.000	0.173
					Sum (F) =	0.173

Area averaged mean soil loss (F) (In/Hr) = 0.173
Minimum soil loss rate ((In/Hr)) = 0.086
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.303

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	82.818	14.093	3.880
2	0.167	165.637	45.327	12.480
3	0.250	248.455	19.148	5.272
4	0.333	331.274	8.063	2.220
5	0.417	414.092	4.819	1.327
6	0.500	496.910	3.000	0.826

7	0.583	579.729	2.172		0.598
8	0.667	662.547	1.461		0.402
9	0.750	745.366	0.957		0.264
10	0.833	828.184	0.960		0.264
			Sum = 100.000	Sum=	27.533

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	(0.306)	0.012	0.028
2	0.17	0.07	0.040	(0.305)	0.012	0.028
3	0.25	0.07	0.040	(0.304)	0.012	0.028
4	0.33	0.10	0.060	(0.303)	0.018	0.042
5	0.42	0.10	0.060	(0.302)	0.018	0.042
6	0.50	0.10	0.060	(0.301)	0.018	0.042
7	0.58	0.10	0.060	(0.299)	0.018	0.042
8	0.67	0.10	0.060	(0.298)	0.018	0.042
9	0.75	0.10	0.060	(0.297)	0.018	0.042
10	0.83	0.13	0.080	(0.296)	0.024	0.056
11	0.92	0.13	0.080	(0.295)	0.024	0.056
12	1.00	0.13	0.080	(0.294)	0.024	0.056
13	1.08	0.10	0.060	(0.292)	0.018	0.042
14	1.17	0.10	0.060	(0.291)	0.018	0.042
15	1.25	0.10	0.060	(0.290)	0.018	0.042
16	1.33	0.10	0.060	(0.289)	0.018	0.042
17	1.42	0.10	0.060	(0.288)	0.018	0.042
18	1.50	0.10	0.060	(0.287)	0.018	0.042
19	1.58	0.10	0.060	(0.285)	0.018	0.042
20	1.67	0.10	0.060	(0.284)	0.018	0.042
21	1.75	0.10	0.060	(0.283)	0.018	0.042
22	1.83	0.13	0.080	(0.282)	0.024	0.056
23	1.92	0.13	0.080	(0.281)	0.024	0.056
24	2.00	0.13	0.080	(0.280)	0.024	0.056
25	2.08	0.13	0.080	(0.279)	0.024	0.056
26	2.17	0.13	0.080	(0.278)	0.024	0.056
27	2.25	0.13	0.080	(0.276)	0.024	0.056
28	2.33	0.13	0.080	(0.275)	0.024	0.056
29	2.42	0.13	0.080	(0.274)	0.024	0.056
30	2.50	0.13	0.080	(0.273)	0.024	0.056
31	2.58	0.17	0.100	(0.272)	0.030	0.070
32	2.67	0.17	0.100	(0.271)	0.030	0.070
33	2.75	0.17	0.100	(0.270)	0.030	0.070
34	2.83	0.17	0.100	(0.269)	0.030	0.070
35	2.92	0.17	0.100	(0.267)	0.030	0.070
36	3.00	0.17	0.100	(0.266)	0.030	0.070
37	3.08	0.17	0.100	(0.265)	0.030	0.070

38	3.17	0.17	0.100	(0.264)	0.030	0.070
39	3.25	0.17	0.100	(0.263)	0.030	0.070
40	3.33	0.17	0.100	(0.262)	0.030	0.070
41	3.42	0.17	0.100	(0.261)	0.030	0.070
42	3.50	0.17	0.100	(0.260)	0.030	0.070
43	3.58	0.17	0.100	(0.259)	0.030	0.070
44	3.67	0.17	0.100	(0.258)	0.030	0.070
45	3.75	0.17	0.100	(0.257)	0.030	0.070
46	3.83	0.20	0.120	(0.255)	0.036	0.084
47	3.92	0.20	0.120	(0.254)	0.036	0.084
48	4.00	0.20	0.120	(0.253)	0.036	0.084
49	4.08	0.20	0.120	(0.252)	0.036	0.084
50	4.17	0.20	0.120	(0.251)	0.036	0.084
51	4.25	0.20	0.120	(0.250)	0.036	0.084
52	4.33	0.23	0.140	(0.249)	0.042	0.098
53	4.42	0.23	0.140	(0.248)	0.042	0.098
54	4.50	0.23	0.140	(0.247)	0.042	0.098
55	4.58	0.23	0.140	(0.246)	0.042	0.098
56	4.67	0.23	0.140	(0.245)	0.042	0.098
57	4.75	0.23	0.140	(0.244)	0.042	0.098
58	4.83	0.27	0.160	(0.243)	0.049	0.111
59	4.92	0.27	0.160	(0.242)	0.049	0.111
60	5.00	0.27	0.160	(0.241)	0.049	0.111
61	5.08	0.20	0.120	(0.240)	0.036	0.084
62	5.17	0.20	0.120	(0.238)	0.036	0.084
63	5.25	0.20	0.120	(0.237)	0.036	0.084
64	5.33	0.23	0.140	(0.236)	0.042	0.098
65	5.42	0.23	0.140	(0.235)	0.042	0.098
66	5.50	0.23	0.140	(0.234)	0.042	0.098
67	5.58	0.27	0.160	(0.233)	0.049	0.111
68	5.67	0.27	0.160	(0.232)	0.049	0.111
69	5.75	0.27	0.160	(0.231)	0.049	0.111
70	5.83	0.27	0.160	(0.230)	0.049	0.111
71	5.92	0.27	0.160	(0.229)	0.049	0.111
72	6.00	0.27	0.160	(0.228)	0.049	0.111
73	6.08	0.30	0.180	(0.227)	0.055	0.125
74	6.17	0.30	0.180	(0.226)	0.055	0.125
75	6.25	0.30	0.180	(0.225)	0.055	0.125
76	6.33	0.30	0.180	(0.224)	0.055	0.125
77	6.42	0.30	0.180	(0.223)	0.055	0.125
78	6.50	0.30	0.180	(0.222)	0.055	0.125
79	6.58	0.33	0.200	(0.221)	0.061	0.139
80	6.67	0.33	0.200	(0.220)	0.061	0.139
81	6.75	0.33	0.200	(0.219)	0.061	0.139
82	6.83	0.33	0.200	(0.218)	0.061	0.139
83	6.92	0.33	0.200	(0.217)	0.061	0.139
84	7.00	0.33	0.200	(0.216)	0.061	0.139
85	7.08	0.33	0.200	(0.215)	0.061	0.139
86	7.17	0.33	0.200	(0.214)	0.061	0.139
87	7.25	0.33	0.200	(0.213)	0.061	0.139

88	7.33	0.37	0.220	(0.212)	0.067	0.153
89	7.42	0.37	0.220	(0.211)	0.067	0.153
90	7.50	0.37	0.220	(0.210)	0.067	0.153
91	7.58	0.40	0.240	(0.209)	0.073	0.167
92	7.67	0.40	0.240	(0.208)	0.073	0.167
93	7.75	0.40	0.240	(0.207)	0.073	0.167
94	7.83	0.43	0.260	(0.207)	0.079	0.181
95	7.92	0.43	0.260	(0.206)	0.079	0.181
96	8.00	0.43	0.260	(0.205)	0.079	0.181
97	8.08	0.50	0.300	(0.204)	0.091	0.209
98	8.17	0.50	0.300	(0.203)	0.091	0.209
99	8.25	0.50	0.300	(0.202)	0.091	0.209
100	8.33	0.50	0.300	(0.201)	0.091	0.209
101	8.42	0.50	0.300	(0.200)	0.091	0.209
102	8.50	0.50	0.300	(0.199)	0.091	0.209
103	8.58	0.53	0.320	(0.198)	0.097	0.223
104	8.67	0.53	0.320	(0.197)	0.097	0.223
105	8.75	0.53	0.320	(0.196)	0.097	0.223
106	8.83	0.57	0.340	(0.195)	0.103	0.237
107	8.92	0.57	0.340	(0.194)	0.103	0.237
108	9.00	0.57	0.340	(0.193)	0.103	0.237
109	9.08	0.63	0.380	(0.192)	0.115	0.265
110	9.17	0.63	0.380	(0.192)	0.115	0.265
111	9.25	0.63	0.380	(0.191)	0.115	0.265
112	9.33	0.67	0.400	(0.190)	0.121	0.279
113	9.42	0.67	0.400	(0.189)	0.121	0.279
114	9.50	0.67	0.400	(0.188)	0.121	0.279
115	9.58	0.70	0.420	(0.187)	0.127	0.293
116	9.67	0.70	0.420	(0.186)	0.127	0.293
117	9.75	0.70	0.420	(0.185)	0.127	0.293
118	9.83	0.73	0.440	(0.184)	0.133	0.307
119	9.92	0.73	0.440	(0.183)	0.133	0.307
120	10.00	0.73	0.440	(0.183)	0.133	0.307
121	10.08	0.50	0.300	(0.182)	0.091	0.209
122	10.17	0.50	0.300	(0.181)	0.091	0.209
123	10.25	0.50	0.300	(0.180)	0.091	0.209
124	10.33	0.50	0.300	(0.179)	0.091	0.209
125	10.42	0.50	0.300	(0.178)	0.091	0.209
126	10.50	0.50	0.300	(0.177)	0.091	0.209
127	10.58	0.67	0.400	(0.176)	0.121	0.279
128	10.67	0.67	0.400	(0.176)	0.121	0.279
129	10.75	0.67	0.400	(0.175)	0.121	0.279
130	10.83	0.67	0.400	(0.174)	0.121	0.279
131	10.92	0.67	0.400	(0.173)	0.121	0.279
132	11.00	0.67	0.400	(0.172)	0.121	0.279
133	11.08	0.63	0.380	(0.171)	0.115	0.265
134	11.17	0.63	0.380	(0.170)	0.115	0.265
135	11.25	0.63	0.380	(0.170)	0.115	0.265
136	11.33	0.63	0.380	(0.169)	0.115	0.265
137	11.42	0.63	0.380	(0.168)	0.115	0.265

138	11.50	0.63	0.380	(0.167)	0.115	0.265
139	11.58	0.57	0.340	(0.166)	0.103	0.237
140	11.67	0.57	0.340	(0.165)	0.103	0.237
141	11.75	0.57	0.340	(0.165)	0.103	0.237
142	11.83	0.60	0.360	(0.164)	0.109	0.251
143	11.92	0.60	0.360	(0.163)	0.109	0.251
144	12.00	0.60	0.360	(0.162)	0.109	0.251
145	12.08	0.83	0.500	(0.161)	0.152	0.348
146	12.17	0.83	0.500	(0.161)	0.152	0.348
147	12.25	0.83	0.500	(0.160)	0.152	0.348
148	12.33	0.87	0.520	(0.159)	0.158	0.362
149	12.42	0.87	0.520	(0.158)	0.158	0.362
150	12.50	0.87	0.520	0.157	(0.158)	0.363
151	12.58	0.93	0.560	0.157	(0.170)	0.403
152	12.67	0.93	0.560	0.156	(0.170)	0.404
153	12.75	0.93	0.560	0.155	(0.170)	0.405
154	12.83	0.97	0.580	0.154	(0.176)	0.426
155	12.92	0.97	0.580	0.153	(0.176)	0.427
156	13.00	0.97	0.580	0.153	(0.176)	0.427
157	13.08	1.13	0.680	0.152	(0.206)	0.528
158	13.17	1.13	0.680	0.151	(0.206)	0.529
159	13.25	1.13	0.680	0.150	(0.206)	0.530
160	13.33	1.13	0.680	0.150	(0.206)	0.530
161	13.42	1.13	0.680	0.149	(0.206)	0.531
162	13.50	1.13	0.680	0.148	(0.206)	0.532
163	13.58	0.77	0.460	(0.147)	0.139	0.321
164	13.67	0.77	0.460	(0.147)	0.139	0.321
165	13.75	0.77	0.460	(0.146)	0.139	0.321
166	13.83	0.77	0.460	(0.145)	0.139	0.321
167	13.92	0.77	0.460	(0.144)	0.139	0.321
168	14.00	0.77	0.460	(0.144)	0.139	0.321
169	14.08	0.90	0.540	0.143	(0.164)	0.397
170	14.17	0.90	0.540	0.142	(0.164)	0.398
171	14.25	0.90	0.540	0.141	(0.164)	0.399
172	14.33	0.87	0.520	0.141	(0.158)	0.379
173	14.42	0.87	0.520	0.140	(0.158)	0.380
174	14.50	0.87	0.520	0.139	(0.158)	0.381
175	14.58	0.87	0.520	0.139	(0.158)	0.381
176	14.67	0.87	0.520	0.138	(0.158)	0.382
177	14.75	0.87	0.520	0.137	(0.158)	0.383
178	14.83	0.83	0.500	0.136	(0.152)	0.364
179	14.92	0.83	0.500	0.136	(0.152)	0.364
180	15.00	0.83	0.500	0.135	(0.152)	0.365
181	15.08	0.80	0.480	0.134	(0.146)	0.346
182	15.17	0.80	0.480	0.134	(0.146)	0.346
183	15.25	0.80	0.480	0.133	(0.146)	0.347
184	15.33	0.77	0.460	0.132	(0.139)	0.328
185	15.42	0.77	0.460	0.132	(0.139)	0.328
186	15.50	0.77	0.460	0.131	(0.139)	0.329
187	15.58	0.63	0.380	(0.130)	0.115	0.265

188	15.67	0.63	0.380	(0.130)	0.115	0.265
189	15.75	0.63	0.380	(0.129)	0.115	0.265
190	15.83	0.63	0.380	(0.128)	0.115	0.265
191	15.92	0.63	0.380	(0.128)	0.115	0.265
192	16.00	0.63	0.380	(0.127)	0.115	0.265
193	16.08	0.13	0.080	(0.126)	0.024	0.056
194	16.17	0.13	0.080	(0.126)	0.024	0.056
195	16.25	0.13	0.080	(0.125)	0.024	0.056
196	16.33	0.13	0.080	(0.124)	0.024	0.056
197	16.42	0.13	0.080	(0.124)	0.024	0.056
198	16.50	0.13	0.080	(0.123)	0.024	0.056
199	16.58	0.10	0.060	(0.122)	0.018	0.042
200	16.67	0.10	0.060	(0.122)	0.018	0.042
201	16.75	0.10	0.060	(0.121)	0.018	0.042
202	16.83	0.10	0.060	(0.121)	0.018	0.042
203	16.92	0.10	0.060	(0.120)	0.018	0.042
204	17.00	0.10	0.060	(0.119)	0.018	0.042
205	17.08	0.17	0.100	(0.119)	0.030	0.070
206	17.17	0.17	0.100	(0.118)	0.030	0.070
207	17.25	0.17	0.100	(0.118)	0.030	0.070
208	17.33	0.17	0.100	(0.117)	0.030	0.070
209	17.42	0.17	0.100	(0.116)	0.030	0.070
210	17.50	0.17	0.100	(0.116)	0.030	0.070
211	17.58	0.17	0.100	(0.115)	0.030	0.070
212	17.67	0.17	0.100	(0.115)	0.030	0.070
213	17.75	0.17	0.100	(0.114)	0.030	0.070
214	17.83	0.13	0.080	(0.114)	0.024	0.056
215	17.92	0.13	0.080	(0.113)	0.024	0.056
216	18.00	0.13	0.080	(0.112)	0.024	0.056
217	18.08	0.13	0.080	(0.112)	0.024	0.056
218	18.17	0.13	0.080	(0.111)	0.024	0.056
219	18.25	0.13	0.080	(0.111)	0.024	0.056
220	18.33	0.13	0.080	(0.110)	0.024	0.056
221	18.42	0.13	0.080	(0.110)	0.024	0.056
222	18.50	0.13	0.080	(0.109)	0.024	0.056
223	18.58	0.10	0.060	(0.109)	0.018	0.042
224	18.67	0.10	0.060	(0.108)	0.018	0.042
225	18.75	0.10	0.060	(0.108)	0.018	0.042
226	18.83	0.07	0.040	(0.107)	0.012	0.028
227	18.92	0.07	0.040	(0.107)	0.012	0.028
228	19.00	0.07	0.040	(0.106)	0.012	0.028
229	19.08	0.10	0.060	(0.106)	0.018	0.042
230	19.17	0.10	0.060	(0.105)	0.018	0.042
231	19.25	0.10	0.060	(0.105)	0.018	0.042
232	19.33	0.13	0.080	(0.104)	0.024	0.056
233	19.42	0.13	0.080	(0.104)	0.024	0.056
234	19.50	0.13	0.080	(0.103)	0.024	0.056
235	19.58	0.10	0.060	(0.103)	0.018	0.042
236	19.67	0.10	0.060	(0.102)	0.018	0.042
237	19.75	0.10	0.060	(0.102)	0.018	0.042

238	19.83	0.07	0.040	(0.101)	0.012	0.028
239	19.92	0.07	0.040	(0.101)	0.012	0.028
240	20.00	0.07	0.040	(0.100)	0.012	0.028
241	20.08	0.10	0.060	(0.100)	0.018	0.042
242	20.17	0.10	0.060	(0.100)	0.018	0.042
243	20.25	0.10	0.060	(0.099)	0.018	0.042
244	20.33	0.10	0.060	(0.099)	0.018	0.042
245	20.42	0.10	0.060	(0.098)	0.018	0.042
246	20.50	0.10	0.060	(0.098)	0.018	0.042
247	20.58	0.10	0.060	(0.097)	0.018	0.042
248	20.67	0.10	0.060	(0.097)	0.018	0.042
249	20.75	0.10	0.060	(0.097)	0.018	0.042
250	20.83	0.07	0.040	(0.096)	0.012	0.028
251	20.92	0.07	0.040	(0.096)	0.012	0.028
252	21.00	0.07	0.040	(0.095)	0.012	0.028
253	21.08	0.10	0.060	(0.095)	0.018	0.042
254	21.17	0.10	0.060	(0.095)	0.018	0.042
255	21.25	0.10	0.060	(0.094)	0.018	0.042
256	21.33	0.07	0.040	(0.094)	0.012	0.028
257	21.42	0.07	0.040	(0.094)	0.012	0.028
258	21.50	0.07	0.040	(0.093)	0.012	0.028
259	21.58	0.10	0.060	(0.093)	0.018	0.042
260	21.67	0.10	0.060	(0.093)	0.018	0.042
261	21.75	0.10	0.060	(0.092)	0.018	0.042
262	21.83	0.07	0.040	(0.092)	0.012	0.028
263	21.92	0.07	0.040	(0.092)	0.012	0.028
264	22.00	0.07	0.040	(0.091)	0.012	0.028
265	22.08	0.10	0.060	(0.091)	0.018	0.042
266	22.17	0.10	0.060	(0.091)	0.018	0.042
267	22.25	0.10	0.060	(0.090)	0.018	0.042
268	22.33	0.07	0.040	(0.090)	0.012	0.028
269	22.42	0.07	0.040	(0.090)	0.012	0.028
270	22.50	0.07	0.040	(0.090)	0.012	0.028
271	22.58	0.07	0.040	(0.089)	0.012	0.028
272	22.67	0.07	0.040	(0.089)	0.012	0.028
273	22.75	0.07	0.040	(0.089)	0.012	0.028
274	22.83	0.07	0.040	(0.089)	0.012	0.028
275	22.92	0.07	0.040	(0.088)	0.012	0.028
276	23.00	0.07	0.040	(0.088)	0.012	0.028
277	23.08	0.07	0.040	(0.088)	0.012	0.028
278	23.17	0.07	0.040	(0.088)	0.012	0.028
279	23.25	0.07	0.040	(0.088)	0.012	0.028
280	23.33	0.07	0.040	(0.087)	0.012	0.028
281	23.42	0.07	0.040	(0.087)	0.012	0.028
282	23.50	0.07	0.040	(0.087)	0.012	0.028
283	23.58	0.07	0.040	(0.087)	0.012	0.028
284	23.67	0.07	0.040	(0.087)	0.012	0.028
285	23.75	0.07	0.040	(0.087)	0.012	0.028
286	23.83	0.07	0.040	(0.087)	0.012	0.028
287	23.92	0.07	0.040	(0.087)	0.012	0.028

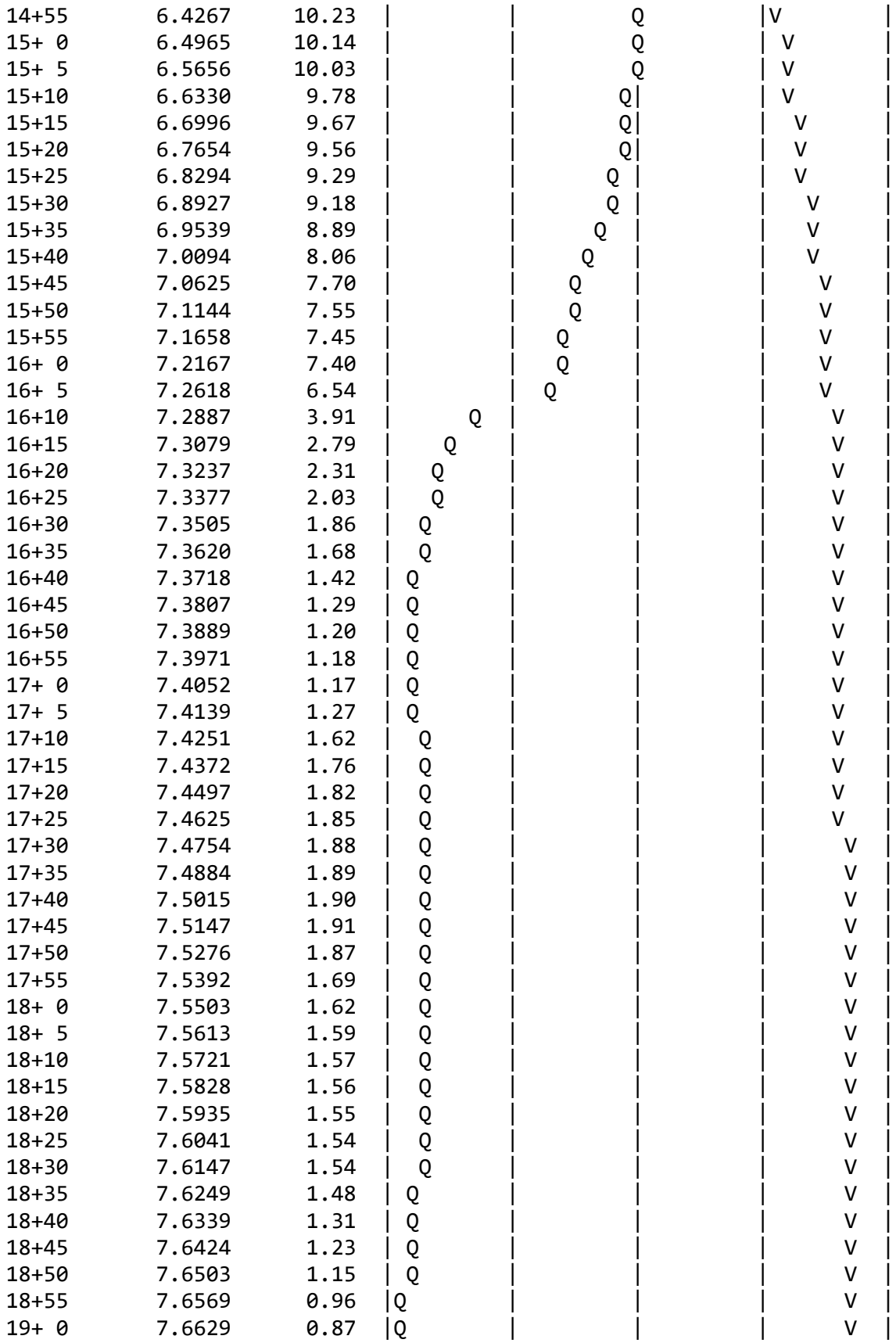
```
288  24.00     0.07      0.040       (  0.086)       0.012        0.028
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    42.5
       Flood volume = Effective rainfall      3.54(In)
        times area      27.3(Ac.)/[(In)/(Ft.)] =       8.1(Ac.Ft)
       Total soil loss =      1.46(In)
       Total soil loss =     3.313(Ac.Ft)
       Total rainfall =      5.00(In)
       Flood volume =      351534.9 Cubic Feet
       Total soil loss =      144296.6 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =     14.456(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        5.0      10.0      15.0      20.0
 ----------------------------------------------------------------------
   0+ 5       0.0007      0.11  Q         |         |         |         |
   0+10       0.0039      0.46  Q         |         |         |         |
   0+15       0.0080      0.60  VQ        |         |         |         |
   0+20       0.0130      0.72  VQ        |         |         |         |
   0+25       0.0194      0.93  VQ        |         |         |         |
   0+30       0.0265      1.03  V Q       |         |         |         |
   0+35       0.0339      1.07  V Q       |         |         |         |
   0+40       0.0415      1.10  V Q       |         |         |         |
   0+45       0.0492      1.12  V Q       |         |         |         |
   0+50       0.0574      1.19  V Q       |         |         |         |
   0+55       0.0669      1.37  V Q       |         |         |         |
   1+ 0       0.0769      1.45  V Q       |         |         |         |
   1+ 5       0.0867      1.43  V Q       |         |         |         |
   1+10       0.0955      1.27  V Q       |         |         |         |
   1+15       0.1038      1.21  V Q       |         |         |         |
   1+20       0.1120      1.19  V Q       |         |         |         |
   1+25       0.1201      1.18  V Q       |         |         |         |
   1+30       0.1282      1.17  V Q       |         |         |         |
   1+35       0.1362      1.16  V Q       |         |         |         |
   1+40       0.1442      1.16  V Q       |         |         |         |
   1+45       0.1522      1.16  V Q       |         |         |         |
   1+50       0.1605      1.21  V Q       |         |         |         |
   1+55       0.1700      1.38  V Q       |         |         |         |
   2+ 0       0.1800      1.45  V Q       |         |         |         |
   2+ 5       0.1902      1.48  V Q       |         |         |         |
   2+10       0.2005      1.50  V  Q      |         |         |         |
   2+15       0.2110      1.51  |V Q      |         |         |         |
   2+20       0.2215      1.52  |V Q      |         |         |         |
```

2+25	0.2320	1.53	V Q				
2+30	0.2425	1.53	V Q				
2+35	0.2535	1.59	V Q				
2+40	0.2656	1.76	V Q				
2+45	0.2783	1.84	V Q				
2+50	0.2911	1.87	V Q				
2+55	0.3041	1.89	V Q				
3+ 0	0.3172	1.90	V Q				
3+ 5	0.3303	1.91	V Q				
3+10	0.3435	1.91	V Q				
3+15	0.3567	1.92	V Q				
3+20	0.3699	1.92	V Q				
3+25	0.3831	1.92	V Q				
3+30	0.3964	1.92	V Q				
3+35	0.4096	1.92	VQ				
3+40	0.4228	1.92	VQ				
3+45	0.4360	1.92	VQ				
3+50	0.4496	1.97	VQ				
3+55	0.4644	2.15	V Q				
4+ 0	0.4797	2.22	V Q				
4+ 5	0.4952	2.25	V Q				
4+10	0.5108	2.27	V Q				
4+15	0.5266	2.28	V Q				
4+20	0.5427	2.34	V Q				
4+25	0.5601	2.52	V Q				
4+30	0.5780	2.60	V Q				
4+35	0.5962	2.64	V Q				
4+40	0.6144	2.65	V Q				
4+45	0.6328	2.67	V Q				
4+50	0.6516	2.73	V Q				
4+55	0.6716	2.91	V Q				
5+ 0	0.6922	2.99	V Q				
5+ 5	0.7122	2.91	V Q				
5+10	0.7300	2.58	V Q				
5+15	0.7469	2.45	VQ				
5+20	0.7637	2.45	VQ				
5+25	0.7815	2.59	V Q				
5+30	0.7997	2.64	V Q				
5+35	0.8185	2.72	VQ				
5+40	0.8384	2.90	VQ				
5+45	0.8589	2.97	VQ				
5+50	0.8796	3.01	V Q				
5+55	0.9005	3.03	V Q				
6+ 0	0.9215	3.05	V Q				
6+ 5	0.9429	3.11	V Q				
6+10	0.9656	3.29	V Q				
6+15	0.9888	3.37	V Q				
6+20	1.0122	3.40	VQ				
6+25	1.0358	3.42	VQ				
6+30	1.0594	3.43	VQ				

6+35	1.0835	3.50	VQ				
6+40	1.1088	3.68	V Q				
6+45	1.1347	3.75	V Q				
6+50	1.1607	3.79	V Q				
6+55	1.1870	3.81	V Q				
7+ 0	1.2132	3.82	VQ				
7+ 5	1.2396	3.83	VQ				
7+10	1.2660	3.83	VQ				
7+15	1.2924	3.84	VQ				
7+20	1.3192	3.89	VQ				
7+25	1.3472	4.07	V Q				
7+30	1.3757	4.14	V Q				
7+35	1.4048	4.23	V Q				
7+40	1.4353	4.42	VQ				
7+45	1.4663	4.50	V Q				
7+50	1.4979	4.60	V Q				
7+55	1.5309	4.79	V Q				
8+ 0	1.5646	4.88	V Q				
8+ 5	1.5993	5.03	V Q				
8+10	1.6365	5.41	V Q				
8+15	1.6748	5.57	V Q				
8+20	1.7137	5.64	V Q				
8+25	1.7529	5.69	V Q				
8+30	1.7922	5.71	V Q				
8+35	1.8320	5.79	V Q				
8+40	1.8732	5.97	V Q				
8+45	1.9149	6.05	V Q				
8+50	1.9572	6.14	V Q				
8+55	2.0008	6.34	V Q				
9+ 0	2.0451	6.42	V Q				
9+ 5	2.0903	6.57	V Q				
9+10	2.1381	6.94	V Q				
9+15	2.1870	7.10	V Q				
9+20	2.2368	7.23	V Q				
9+25	2.2881	7.45	V Q				
9+30	2.3401	7.55	V Q				
9+35	2.3929	7.65	V Q				
9+40	2.4470	7.86	V Q				
9+45	2.5017	7.95	V Q				
9+50	2.5572	8.05	V Q				
9+55	2.6140	8.25	V Q				
10+ 0	2.6714	8.34	V Q				
10+ 5	2.7265	8.00	V Q				
10+10	2.7734	6.81	Q				
10+15	2.8169	6.31	QV				
10+20	2.8589	6.10	Q V				
10+25	2.9001	5.98	Q V				
10+30	2.9408	5.90	Q V				
10+35	2.9829	6.12	Q V				
10+40	3.0308	6.95	Q V				

10+45	3.0810	7.29	|	| QV |	|	|
10+50	3.1321	7.42	|	| QV |	|	|
10+55	3.1839	7.51	|	| Q |	|	|
11+ 0	3.2360	7.57	|	| QV |	|	|
11+ 5	3.2881	7.56	|	| QV |	|	|
11+10	3.3391	7.41	|	| Q V |	|	|
11+15	3.3898	7.36	|	| Q V |	|	|
11+20	3.4404	7.35	|	| Q V |	|	|
11+25	3.4908	7.33	|	| Q V |	|	|
11+30	3.5412	7.32	|	| Q V |	|	|
11+35	3.5908	7.20	|	| Q V |	|	|
11+40	3.6379	6.84	|	| Q V |	|	|
11+45	3.6840	6.69	|	| Q V |	|	|
11+50	3.7301	6.68	|	| Q V |	|	|
11+55	3.7770	6.82	|	| Q V |	|	|
12+ 0	3.8243	6.87	|	| Q V |	|	|
12+ 5	3.8744	7.26	|	| Q V|	|	|
12+10	3.9328	8.49	|	| Q V|	|	|
12+15	3.9949	9.01	|	| QV|	|	|
12+20	4.0588	9.28	|	| Q V	|	|
12+25	4.1248	9.59	|	| QV	|	|
12+30	4.1919	9.75	|	| QV	|	|
12+35	4.2608	10.00	|	| QV	|	|
12+40	4.3336	10.57	|	| |Q	|	|
12+45	4.4083	10.84	|	| |Q	|	|
12+50	4.4844	11.06	|	| | Q	|	|
12+55	4.5629	11.39	|	| | Q	|	|
13+ 0	4.6424	11.55	|	| | Q	|	|
13+ 5	4.7253	12.03	|	| | VQ	|	|
13+10	4.8172	13.34	|	| | V Q	|	|
13+15	4.9130	13.92	|	| | V Q	|	|
13+20	5.0107	14.19	|	| | V Q	|	|
13+25	5.1096	14.35	|	| | V Q	|	|
13+30	5.2091	14.46	|	| | V Q	|	|
13+35	5.3036	13.72	|	| | VQ	|	|
13+40	5.3802	11.13	|	| | Q V	|	|
13+45	5.4494	10.04	|	| Q V	|	|
13+50	5.5155	9.60	|	| Q| V	|	|
13+55	5.5798	9.32	|	| Q | V	|	|
14+ 0	5.6428	9.15	|	| Q | V	|	|
14+ 5	5.7070	9.32	|	| Q | V	|	|
14+10	5.7772	10.20	|	| Q V	|	|
14+15	5.8499	10.56	|	| |Q V	|	|
14+20	5.9230	10.61	|	| |Q V|	|	|
14+25	5.9952	10.48	|	| Q V|	|	|
14+30	6.0672	10.46	|	| Q V	|	|
14+35	6.1393	10.48	|	| Q V	|	|
14+40	6.2116	10.50	|	| Q V	|	|
14+45	6.2841	10.52	|	| |Q |V	|	|
14+50	6.3562	10.47	|	| Q |V	|	|



19+ 5	7.6690	0.89	Q				V
19+10	7.6761	1.04	Q				V
19+15	7.6837	1.09	Q				V
19+20	7.6917	1.17	Q				V
19+25	7.7010	1.35	Q				V
19+30	7.7109	1.44	Q				V
19+35	7.7207	1.42	Q				V
19+40	7.7294	1.27	Q				V
19+45	7.7377	1.21	Q				V
19+50	7.7456	1.14	Q				V
19+55	7.7521	0.95	Q				V
20+ 0	7.7581	0.87	Q				V
20+ 5	7.7642	0.89	Q				V
20+10	7.7713	1.04	Q				V
20+15	7.7788	1.09	Q				V
20+20	7.7865	1.11	Q				V
20+25	7.7943	1.13	Q				V
20+30	7.8021	1.13	Q				V
20+35	7.8099	1.14	Q				V
20+40	7.8178	1.14	Q				V
20+45	7.8257	1.15	Q				V
20+50	7.8333	1.10	Q				V
20+55	7.8396	0.92	Q				V
21+ 0	7.8455	0.85	Q				V
21+ 5	7.8515	0.87	Q				V
21+10	7.8586	1.03	Q				V
21+15	7.8661	1.09	Q				V
21+20	7.8734	1.06	Q				V
21+25	7.8796	0.90	Q				V
21+30	7.8853	0.83	Q				V
21+35	7.8912	0.86	Q				V
21+40	7.8983	1.02	Q				V
21+45	7.9058	1.09	Q				V
21+50	7.9130	1.06	Q				V
21+55	7.9192	0.90	Q				V
22+ 0	7.9250	0.83	Q				V
22+ 5	7.9309	0.86	Q				V
22+10	7.9379	1.02	Q				V
22+15	7.9454	1.09	Q				V
22+20	7.9527	1.06	Q				V
22+25	7.9589	0.90	Q				V
22+30	7.9646	0.83	Q				V
22+35	7.9702	0.81	Q				V
22+40	7.9756	0.79	Q				V
22+45	7.9810	0.79	Q				V
22+50	7.9864	0.78	Q				V
22+55	7.9918	0.78	Q				V
23+ 0	7.9971	0.77	Q				V
23+ 5	8.0024	0.77	Q				V
23+10	8.0077	0.77	Q				V

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   23+15       8.0129      0.77  |Q        |         |         |        V|
   23+20       8.0182      0.77  |Q        |         |         |        V|
   23+25       8.0235      0.77  |Q        |         |         |        V|
   23+30       8.0288      0.77  |Q        |         |         |        V|
   23+35       8.0341      0.77  |Q        |         |         |        V|
   23+40       8.0394      0.77  |Q        |         |         |        V|
   23+45       8.0447      0.77  |Q        |         |         |        V|
   23+50       8.0500      0.77  |Q        |         |         |        V|
   23+55       8.0552      0.77  |Q        |         |         |        V|
   24+ 0       8.0605      0.77  |Q        |         |         |        V|
   24+ 5       8.0651      0.66  |Q        |         |         |        V|
   24+10       8.0672      0.31  Q         |         |         |        V|
   24+15       8.0683      0.16  Q         |         |         |        V|
   24+20       8.0691      0.10  Q         |         |         |        V|
   24+25       8.0695      0.07  Q         |         |         |        V|
   24+30       8.0698      0.04  Q         |         |         |        V|
   24+35       8.0700      0.03  Q         |         |         |        V|
   24+40       8.0701      0.01  Q         |         |         |        V|
   24+45       8.0701      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 10/10/23 File: Q100UHEX6100.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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 1724.00(Ft.)
Length along longest watercourse measured to centroid = 1620.00(Ft.)
Length along longest watercourse = 0.327 Mi.
Length along longest watercourse measured to centroid = 0.307 Mi.
Difference in elevation = 22.50(Ft.)
Slope along watercourse = 68.9095 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.090 Hr.
Lag time = 5.38 Min.
25% of lag time = 1.34 Min.
40% of lag time = 2.15 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]
27.32	1.20	32.78

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	2.50	68.30

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 = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	56.50	0.500

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.5	56.5	0.506	0.500	0.278	1.000	0.278
					Sum (F) =	0.278

Area averaged mean soil loss (F) (In/Hr) = 0.278
Minimum soil loss rate ((In/Hr)) = 0.139
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.015	17.076	4.702
2	0.167	186.030	47.610	13.109
3	0.250	279.045	16.820	4.631
4	0.333	372.060	7.458	2.053
5	0.417	465.074	4.278	1.178
6	0.500	558.089	2.760	0.760

7	0.583	651.104	1.826		0.503
8	0.667	744.119	1.150		0.317
9	0.750	837.134	1.024		0.282
			Sum = 100.000	Sum=	27.533

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	(0.278)	0.075	0.075
2	0.17	0.60	0.180	(0.278)	0.090	0.090
3	0.25	0.60	0.180	(0.278)	0.090	0.090
4	0.33	0.60	0.180	(0.278)	0.090	0.090
5	0.42	0.60	0.180	(0.278)	0.090	0.090
6	0.50	0.70	0.210	(0.278)	0.105	0.105
7	0.58	0.70	0.210	(0.278)	0.105	0.105
8	0.67	0.70	0.210	(0.278)	0.105	0.105
9	0.75	0.70	0.210	(0.278)	0.105	0.105
10	0.83	0.70	0.210	(0.278)	0.105	0.105
11	0.92	0.70	0.210	(0.278)	0.105	0.105
12	1.00	0.80	0.240	(0.278)	0.120	0.120
13	1.08	0.80	0.240	(0.278)	0.120	0.120
14	1.17	0.80	0.240	(0.278)	0.120	0.120
15	1.25	0.80	0.240	(0.278)	0.120	0.120
16	1.33	0.80	0.240	(0.278)	0.120	0.120
17	1.42	0.80	0.240	(0.278)	0.120	0.120
18	1.50	0.80	0.240	(0.278)	0.120	0.120
19	1.58	0.80	0.240	(0.278)	0.120	0.120
20	1.67	0.80	0.240	(0.278)	0.120	0.120
21	1.75	0.80	0.240	(0.278)	0.120	0.120
22	1.83	0.80	0.240	(0.278)	0.120	0.120
23	1.92	0.80	0.240	(0.278)	0.120	0.120
24	2.00	0.90	0.270	(0.278)	0.135	0.135
25	2.08	0.80	0.240	(0.278)	0.120	0.120
26	2.17	0.90	0.270	(0.278)	0.135	0.135
27	2.25	0.90	0.270	(0.278)	0.135	0.135
28	2.33	0.90	0.270	(0.278)	0.135	0.135
29	2.42	0.90	0.270	(0.278)	0.135	0.135
30	2.50	0.90	0.270	(0.278)	0.135	0.135
31	2.58	0.90	0.270	(0.278)	0.135	0.135
32	2.67	0.90	0.270	(0.278)	0.135	0.135
33	2.75	1.00	0.300	(0.278)	0.150	0.150
34	2.83	1.00	0.300	(0.278)	0.150	0.150
35	2.92	1.00	0.300	(0.278)	0.150	0.150
36	3.00	1.00	0.300	(0.278)	0.150	0.150
37	3.08	1.00	0.300	(0.278)	0.150	0.150
38	3.17	1.10	0.330	(0.278)	0.165	0.165

39	3.25	1.10	0.330	(0.278)	0.165	0.165
40	3.33	1.10	0.330	(0.278)	0.165	0.165
41	3.42	1.20	0.360	(0.278)	0.180	0.180
42	3.50	1.30	0.390	(0.278)	0.195	0.195
43	3.58	1.40	0.420	(0.278)	0.210	0.210
44	3.67	1.40	0.420	(0.278)	0.210	0.210
45	3.75	1.50	0.450	(0.278)	0.225	0.225
46	3.83	1.50	0.450	(0.278)	0.225	0.225
47	3.92	1.60	0.480	(0.278)	0.240	0.240
48	4.00	1.60	0.480	(0.278)	0.240	0.240
49	4.08	1.70	0.510	(0.278)	0.255	0.255
50	4.17	1.80	0.540	(0.278)	0.270	0.270
51	4.25	1.90	0.570	0.278	(0.285)	0.292
52	4.33	2.00	0.600	0.278	(0.300)	0.322
53	4.42	2.10	0.630	0.278	(0.315)	0.352
54	4.50	2.10	0.630	0.278	(0.315)	0.352
55	4.58	2.20	0.660	0.278	(0.330)	0.382
56	4.67	2.30	0.690	0.278	(0.345)	0.412
57	4.75	2.40	0.720	0.278	(0.360)	0.442
58	4.83	2.40	0.720	0.278	(0.360)	0.442
59	4.92	2.50	0.750	0.278	(0.375)	0.472
60	5.00	2.60	0.780	0.278	(0.390)	0.502
61	5.08	3.10	0.930	0.278	(0.465)	0.652
62	5.17	3.60	1.080	0.278	(0.540)	0.802
63	5.25	3.90	1.170	0.278	(0.585)	0.892
64	5.33	4.20	1.260	0.278	(0.630)	0.982
65	5.42	4.70	1.410	0.278	(0.705)	1.132
66	5.50	5.60	1.680	0.278	(0.840)	1.402
67	5.58	1.90	0.570	0.278	(0.285)	0.292
68	5.67	0.90	0.270	(0.278)	0.135	0.135
69	5.75	0.60	0.180	(0.278)	0.090	0.090
70	5.83	0.50	0.150	(0.278)	0.075	0.075
71	5.92	0.30	0.090	(0.278)	0.045	0.045
72	6.00	0.20	0.060	(0.278)	0.030	0.030

(Loss Rate Not Used)

Sum = 100.0 Sum = 17.7

Flood volume = Effective rainfall 1.47(In)
times area 27.3(Ac.)/[(In)/(Ft.)] = 3.4(Ac.Ft)
Total soil loss = 1.03(In)
Total soil loss = 2.334(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 146233.5 Cubic Feet
Total soil loss = 101672.2 Cubic Feet

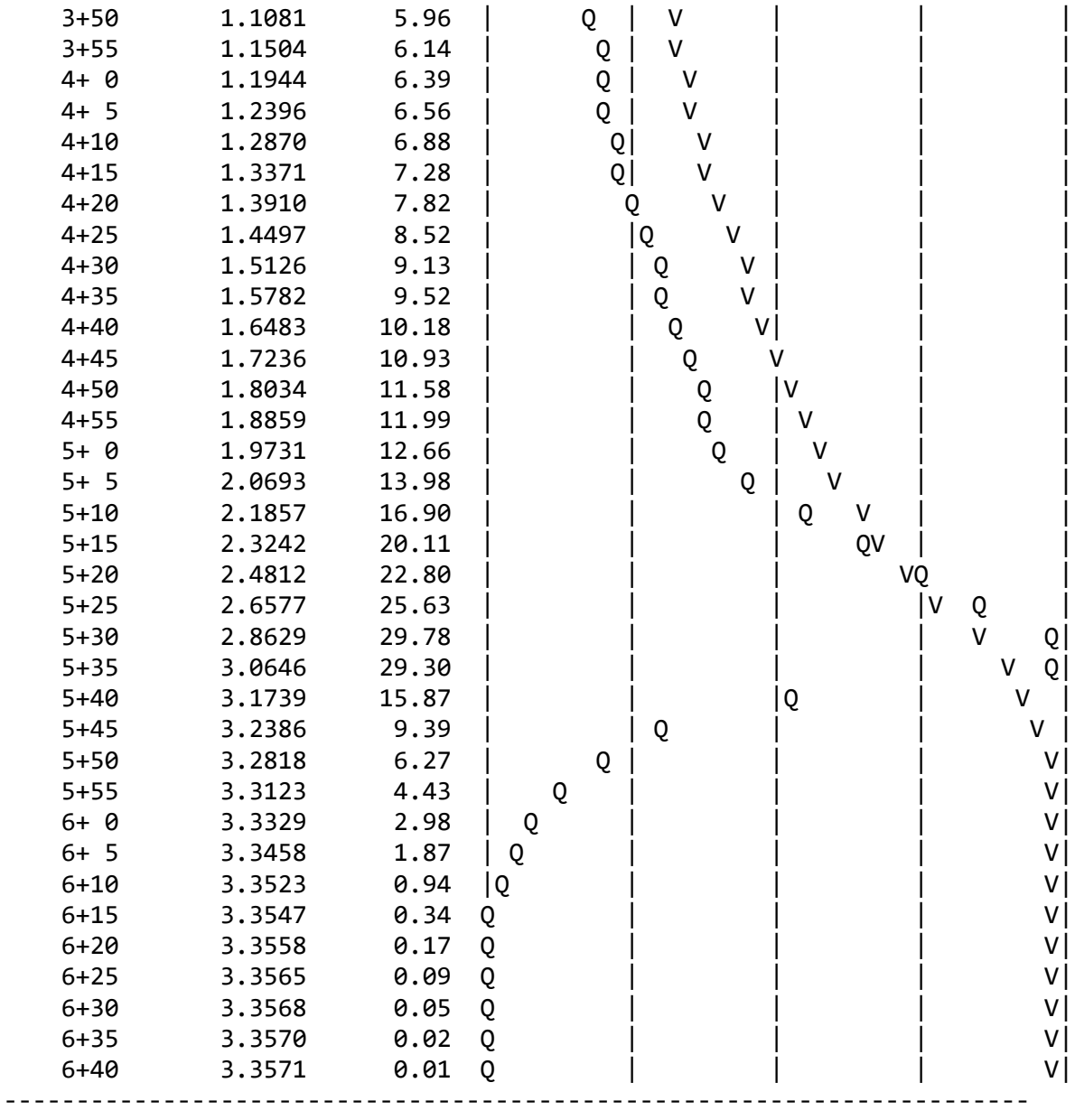
Peak flow rate of this hydrograph = 29.784(CFS)

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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	7.5	15.0	22.5	30.0
0+ 5	0.0024	0.35	Q				
0+10	0.0121	1.41	VQ				
0+15	0.0256	1.95	V Q				
0+20	0.0405	2.17	V Q				
0+25	0.0563	2.29	V Q				
0+30	0.0731	2.44	V Q				
0+35	0.0916	2.68	V Q				
0+40	0.1108	2.79	V Q				
0+45	0.1304	2.84	V Q				
0+50	0.1501	2.86	V Q				
0+55	0.1699	2.88	VQ				
1+ 0	0.1903	2.95	VQ				
1+ 5	0.2120	3.16	V Q				
1+10	0.2342	3.23	V Q				
1+15	0.2567	3.26	VQ				
1+20	0.2792	3.28	VQ				
1+25	0.3019	3.29	VQ				
1+30	0.3246	3.30	VQ				
1+35	0.3473	3.30	Q				
1+40	0.3701	3.31	Q				
1+45	0.3929	3.31	Q				
1+50	0.4156	3.31	Q				
1+55	0.4384	3.31	QV				
2+ 0	0.4616	3.38	QV				
2+ 5	0.4858	3.50	QV				
2+10	0.5095	3.45	Q V				
2+15	0.5343	3.60	Q V				
2+20	0.5595	3.66	Q V				
2+25	0.5849	3.68	Q V				
2+30	0.6104	3.70	Q V				
2+35	0.6359	3.71	Q V				
2+40	0.6615	3.71	Q V				
2+45	0.6875	3.78	Q V				
2+50	0.7150	3.99	Q V				
2+55	0.7429	4.06	Q V				
3+ 0	0.7711	4.09	Q V				
3+ 5	0.7993	4.10	Q V				
3+10	0.8281	4.19	Q V				
3+15	0.8584	4.39	Q V				
3+20	0.8891	4.46	Q V				
3+25	0.9206	4.57	Q V				
3+30	0.9540	4.85	Q V				
3+35	0.9899	5.20	Q V				
3+40	1.0278	5.51	Q V				
3+45	1.0671	5.70	Q V				



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

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Study date 10/10/23 File: 100PUH6100.out

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

Program License Serial Number 6405

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

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

English Units used in output format

Drainage Area = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 3139.00(Ft.)
Length along longest watercourse measured to centroid = 2535.00(Ft.)
Length along longest watercourse = 0.595 Mi.
Length along longest watercourse measured to centroid = 0.480 Mi.
Difference in elevation = 39.71(Ft.)
Slope along watercourse = 66.7948 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.101 Hr.
Lag time = 6.04 Min.
25% of lag time = 1.51 Min.
40% of lag time = 2.41 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]
27.32	1.20	32.78

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	2.50	68.30

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 = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	54.50	0.746

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.5	54.5	0.526	0.746	0.173	1.000	0.173
					Sum (F) =	0.173

Area averaged mean soil loss (F) (In/Hr) = 0.173
Minimum soil loss rate ((In/Hr)) = 0.086
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.303

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	82.818	14.093	3.880
2	0.167	165.637	45.327	12.480
3	0.250	248.455	19.148	5.272
4	0.333	331.274	8.063	2.220
5	0.417	414.092	4.819	1.327
6	0.500	496.910	3.000	0.826

7	0.583	579.729	2.172	0.598
8	0.667	662.547	1.461	0.402
9	0.750	745.366	0.957	0.264
10	0.833	828.184	0.960	0.264
			Sum = 100.000 Sum=	27.533

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	(0.173)	0.045	0.105
2	0.17	0.60	0.180	(0.173)	0.055	0.125
3	0.25	0.60	0.180	(0.173)	0.055	0.125
4	0.33	0.60	0.180	(0.173)	0.055	0.125
5	0.42	0.60	0.180	(0.173)	0.055	0.125
6	0.50	0.70	0.210	(0.173)	0.064	0.146
7	0.58	0.70	0.210	(0.173)	0.064	0.146
8	0.67	0.70	0.210	(0.173)	0.064	0.146
9	0.75	0.70	0.210	(0.173)	0.064	0.146
10	0.83	0.70	0.210	(0.173)	0.064	0.146
11	0.92	0.70	0.210	(0.173)	0.064	0.146
12	1.00	0.80	0.240	(0.173)	0.073	0.167
13	1.08	0.80	0.240	(0.173)	0.073	0.167
14	1.17	0.80	0.240	(0.173)	0.073	0.167
15	1.25	0.80	0.240	(0.173)	0.073	0.167
16	1.33	0.80	0.240	(0.173)	0.073	0.167
17	1.42	0.80	0.240	(0.173)	0.073	0.167
18	1.50	0.80	0.240	(0.173)	0.073	0.167
19	1.58	0.80	0.240	(0.173)	0.073	0.167
20	1.67	0.80	0.240	(0.173)	0.073	0.167
21	1.75	0.80	0.240	(0.173)	0.073	0.167
22	1.83	0.80	0.240	(0.173)	0.073	0.167
23	1.92	0.80	0.240	(0.173)	0.073	0.167
24	2.00	0.90	0.270	(0.173)	0.082	0.188
25	2.08	0.80	0.240	(0.173)	0.073	0.167
26	2.17	0.90	0.270	(0.173)	0.082	0.188
27	2.25	0.90	0.270	(0.173)	0.082	0.188
28	2.33	0.90	0.270	(0.173)	0.082	0.188
29	2.42	0.90	0.270	(0.173)	0.082	0.188
30	2.50	0.90	0.270	(0.173)	0.082	0.188
31	2.58	0.90	0.270	(0.173)	0.082	0.188
32	2.67	0.90	0.270	(0.173)	0.082	0.188
33	2.75	1.00	0.300	(0.173)	0.091	0.209
34	2.83	1.00	0.300	(0.173)	0.091	0.209
35	2.92	1.00	0.300	(0.173)	0.091	0.209
36	3.00	1.00	0.300	(0.173)	0.091	0.209
37	3.08	1.00	0.300	(0.173)	0.091	0.209

38	3.17	1.10	0.330	(0.173)	0.100		0.230
39	3.25	1.10	0.330	(0.173)	0.100		0.230
40	3.33	1.10	0.330	(0.173)	0.100		0.230
41	3.42	1.20	0.360	(0.173)	0.109		0.251
42	3.50	1.30	0.390	(0.173)	0.118		0.272
43	3.58	1.40	0.420	(0.173)	0.127		0.293
44	3.67	1.40	0.420	(0.173)	0.127		0.293
45	3.75	1.50	0.450	(0.173)	0.136		0.314
46	3.83	1.50	0.450	(0.173)	0.136		0.314
47	3.92	1.60	0.480	(0.173)	0.146		0.334
48	4.00	1.60	0.480	(0.173)	0.146		0.334
49	4.08	1.70	0.510	(0.173)	0.155		0.355
50	4.17	1.80	0.540	(0.173)	0.164		0.376
51	4.25	1.90	0.570	(0.173)	0.173		0.397
52	4.33	2.00	0.600	0.173	(0.182)		0.427
53	4.42	2.10	0.630	0.173	(0.191)		0.457
54	4.50	2.10	0.630	0.173	(0.191)		0.457
55	4.58	2.20	0.660	0.173	(0.200)		0.487
56	4.67	2.30	0.690	0.173	(0.209)		0.517
57	4.75	2.40	0.720	0.173	(0.218)		0.547
58	4.83	2.40	0.720	0.173	(0.218)		0.547
59	4.92	2.50	0.750	0.173	(0.227)		0.577
60	5.00	2.60	0.780	0.173	(0.236)		0.607
61	5.08	3.10	0.930	0.173	(0.282)		0.757
62	5.17	3.60	1.080	0.173	(0.327)		0.907
63	5.25	3.90	1.170	0.173	(0.355)		0.997
64	5.33	4.20	1.260	0.173	(0.382)		1.087
65	5.42	4.70	1.410	0.173	(0.427)		1.237
66	5.50	5.60	1.680	0.173	(0.509)		1.507
67	5.58	1.90	0.570	(0.173)	0.173		0.397
68	5.67	0.90	0.270	(0.173)	0.082		0.188
69	5.75	0.60	0.180	(0.173)	0.055		0.125
70	5.83	0.50	0.150	(0.173)	0.045		0.105
71	5.92	0.30	0.090	(0.173)	0.027		0.063
72	6.00	0.20	0.060	(0.173)	0.018		0.042

(Loss Rate Not Used)

Sum = 100.0 Sum = 22.5

Flood volume = Effective rainfall 1.87(In)
times area 27.3(Ac.)/[(In)/(Ft.)] = 4.3(Ac.Ft)
Total soil loss = 0.63(In)
Total soil loss = 1.429(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 185660.6 Cubic Feet
Total soil loss = 62245.1 Cubic Feet

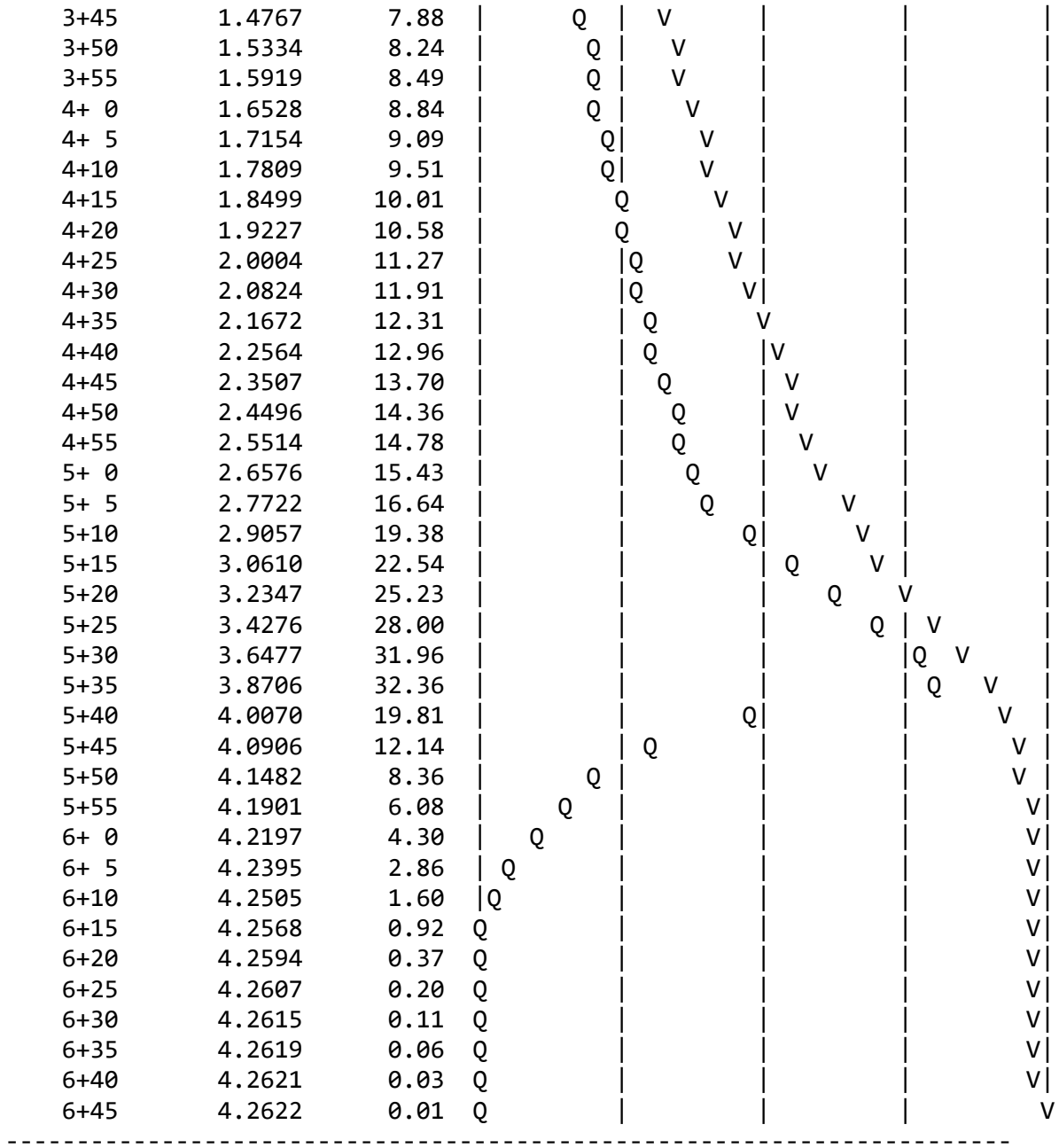
Peak flow rate of this hydrograph = 32.365(CFS)

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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	10.0	20.0	30.0	40.0
0+ 5	0.0028	0.41	Q				
0+10	0.0151	1.79	VQ				
0+15	0.0331	2.60	V Q				
0+20	0.0534	2.95	V Q				
0+25	0.0749	3.13	V Q				
0+30	0.0978	3.33	V Q				
0+35	0.1231	3.67	V Q				
0+40	0.1495	3.83	V Q				
0+45	0.1765	3.91	V Q				
0+50	0.2038	3.98	V Q				
0+55	0.2314	4.00	VQ				
1+ 0	0.2596	4.09	V Q				
1+ 5	0.2896	4.36	V Q				
1+10	0.3204	4.48	VQ				
1+15	0.3516	4.53	VQ				
1+20	0.3830	4.56	VQ				
1+25	0.4145	4.57	VQ				
1+30	0.4461	4.59	Q				
1+35	0.4778	4.60	Q				
1+40	0.5095	4.60	Q				
1+45	0.5412	4.61	QV				
1+50	0.5729	4.61	QV				
1+55	0.6046	4.61	QV				
2+ 0	0.6369	4.69	QV				
2+ 5	0.6704	4.87	Q V				
2+10	0.7035	4.80	Q V				
2+15	0.7379	4.99	Q V				
2+20	0.7729	5.09	Q V				
2+25	0.8082	5.12	Q V				
2+30	0.8436	5.15	Q V				
2+35	0.8792	5.16	Q V				
2+40	0.9147	5.17	Q V				
2+45	0.9510	5.26	Q V				
2+50	0.9890	5.52	Q V				
2+55	1.0278	5.63	Q V				
3+ 0	1.0669	5.68	Q V				
3+ 5	1.1062	5.71	Q V				
3+10	1.1462	5.81	Q V				
3+15	1.1881	6.08	Q V				
3+20	1.2308	6.20	Q V				
3+25	1.2744	6.33	Q V				
3+30	1.3206	6.71	Q V				
3+35	1.3700	7.18	Q V				
3+40	1.4224	7.61	Q V				



3+45	1.4767	7.88	
3+50	1.5334	8.24	
3+55	1.5919	8.49	
4+ 0	1.6528	8.84	
4+ 5	1.7154	9.09	
4+10	1.7809	9.51	
4+15	1.8499	10.01	
4+20	1.9227	10.58	
4+25	2.0004	11.27	
4+30	2.0824	11.91	
4+35	2.1672	12.31	
4+40	2.2564	12.96	
4+45	2.3507	13.70	
4+50	2.4496	14.36	
4+55	2.5514	14.78	
5+ 0	2.6576	15.43	
5+ 5	2.7722	16.64	
5+10	2.9057	19.38	
5+15	3.0610	22.54	
5+20	3.2347	25.23	
5+25	3.4276	28.00	
5+30	3.6477	31.96	
5+35	3.8706	32.36	
5+40	4.0070	19.81	
5+45	4.0906	12.14	
5+50	4.1482	8.36	
5+55	4.1901	6.08	
6+ 0	4.2197	4.30	
6+ 5	4.2395	2.86	
6+10	4.2505	1.60	
6+15	4.2568	0.92	
6+20	4.2594	0.37	
6+25	4.2607	0.20	
6+30	4.2615	0.11	
6+35	4.2619	0.06	
6+40	4.2621	0.03	
6+45	4.2622	0.01	

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

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Study date 10/10/23 File: Q100UHEX3100.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, 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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 1724.00(Ft.)
Length along longest watercourse measured to centroid = 1620.00(Ft.)
Length along longest watercourse = 0.327 Mi.
Length along longest watercourse measured to centroid = 0.307 Mi.
Difference in elevation = 22.50(Ft.)
Slope along watercourse = 68.9095 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.090 Hr.
Lag time = 5.38 Min.
25% of lag time = 1.34 Min.
40% of lag time = 2.15 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]
27.32	0.80	21.86

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	2.00	54.64

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

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

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	56.50	0.500

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.5	56.5	0.506	0.500	0.278	1.000	0.278
					Sum (F) =	0.278

Area averaged mean soil loss (F) (In/Hr) = 0.278
Minimum soil loss rate ((In/Hr)) = 0.139
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.015	17.076	4.702
2	0.167	186.030	47.610	13.109
3	0.250	279.045	16.820	4.631
4	0.333	372.060	7.458	2.053
5	0.417	465.074	4.278	1.178
6	0.500	558.089	2.760	0.760

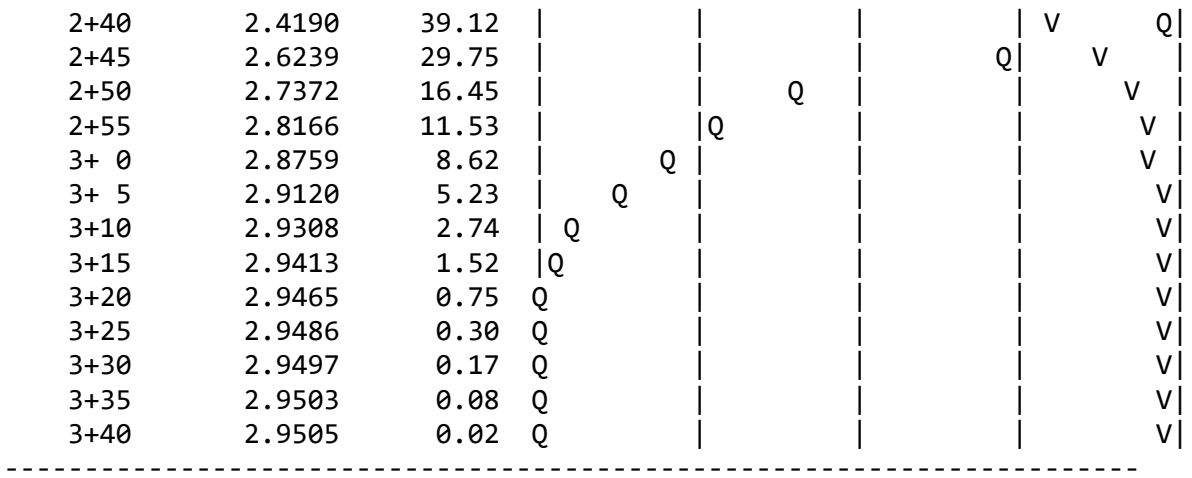
7	0.583	651.104	1.826		0.503
8	0.667	744.119	1.150		0.317
9	0.750	837.134	1.024		0.282
			Sum = 100.000	Sum=	27.533

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	(0.278)	0.156	0.156
2	0.17	1.30	0.312	(0.278)	0.156	0.156
3	0.25	1.10	0.264	(0.278)	0.132	0.132
4	0.33	1.50	0.360	(0.278)	0.180	0.180
5	0.42	1.50	0.360	(0.278)	0.180	0.180
6	0.50	1.80	0.432	(0.278)	0.216	0.216
7	0.58	1.50	0.360	(0.278)	0.180	0.180
8	0.67	1.80	0.432	(0.278)	0.216	0.216
9	0.75	1.80	0.432	(0.278)	0.216	0.216
10	0.83	1.50	0.360	(0.278)	0.180	0.180
11	0.92	1.60	0.384	(0.278)	0.192	0.192
12	1.00	1.80	0.432	(0.278)	0.216	0.216
13	1.08	2.20	0.528	(0.278)	0.264	0.264
14	1.17	2.20	0.528	(0.278)	0.264	0.264
15	1.25	2.20	0.528	(0.278)	0.264	0.264
16	1.33	2.00	0.480	(0.278)	0.240	0.240
17	1.42	2.60	0.624	0.278	(0.312)	0.346
18	1.50	2.70	0.648	0.278	(0.324)	0.370
19	1.58	2.40	0.576	0.278	(0.288)	0.298
20	1.67	2.70	0.648	0.278	(0.324)	0.370
21	1.75	3.30	0.792	0.278	(0.396)	0.514
22	1.83	3.10	0.744	0.278	(0.372)	0.466
23	1.92	2.90	0.696	0.278	(0.348)	0.418
24	2.00	3.00	0.720	0.278	(0.360)	0.442
25	2.08	3.10	0.744	0.278	(0.372)	0.466
26	2.17	4.20	1.008	0.278	(0.504)	0.730
27	2.25	5.00	1.200	0.278	(0.600)	0.922
28	2.33	3.50	0.840	0.278	(0.420)	0.562
29	2.42	6.80	1.632	0.278	(0.816)	1.354
30	2.50	7.30	1.752	0.278	(0.876)	1.474
31	2.58	8.20	1.968	0.278	(0.984)	1.690
32	2.67	5.90	1.416	0.278	(0.708)	1.138
33	2.75	2.00	0.480	(0.278)	0.240	0.240
34	2.83	1.80	0.432	(0.278)	0.216	0.216
35	2.92	1.80	0.432	(0.278)	0.216	0.216
36	3.00	0.60	0.144	(0.278)	0.072	0.072
		(Loss Rate Not Used)				
	Sum =	100.0			Sum =	15.6

```
      Flood volume = Effective rainfall      1.30(In)
       times area      27.3(Ac.)/[(In)/(Ft.)] =       3.0(Ac.Ft)
      Total soil loss =      0.70(In)
      Total soil loss =     1.602(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =      128521.8 Cubic Feet
      Total soil loss =       69797.7 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     39.123(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       10.0      20.0      30.0      40.0
-------------------------------------------------------------------------
  0+ 5       0.0051      0.73  Q         |         |         |         |
  0+10       0.0242      2.78  V Q       |         |         |         |
  0+15       0.0475      3.39  V  Q      |         |         |         |
  0+20       0.0725      3.62  V  Q      |         |         |         |
  0+25       0.1022      4.32  |V  Q     |         |         |         |
  0+30       0.1352      4.78  |V  Q     |         |         |         |
  0+35       0.1713      5.24  | V  Q    |         |         |         |
  0+40       0.2070      5.19  | V  Q    |         |         |         |
  0+45       0.2458      5.63  |  V Q    |         |         |         |
  0+50       0.2845      5.62  |  V Q    |         |         |         |
  0+55       0.3208      5.27  |   VQ    |         |         |         |
  1+ 0       0.3581      5.42  |   VQ    |         |         |         |
  1+ 5       0.3991      5.96  |    Q    |         |         |         |
  1+10       0.4453      6.70  |     Q   |         |         |         |
  1+15       0.4932      6.96  |     Q   |         |         |         |
  1+20       0.5413      6.98  |     QV  |         |         |         |
  1+25       0.5911      7.23  |      QV |         |         |         |
  1+30       0.6507      8.66  |       Q |         |         |         |
  1+35       0.7135      9.11  |        Q|         |         |         |
  1+40       0.7743      8.83  |       Q V         |         |         |
  1+45       0.8451     10.29  |         QV        |         |         |
  1+50       0.9294     12.23  |         | Q       |         |         |
  1+55       1.0132     12.17  |         | QV      |         |         |
  2+ 0       1.0944     11.80  |         |Q  V     |         |         |
  2+ 5       1.1780     12.13  |         | Q  V    |         |         |
  2+10       1.2728     13.77  |         |  Q   V  |         |         |
  2+15       1.3987     18.28  |         |       Q |         |         |
  2+20       1.5393     20.41  |         |         Q         |         |
  2+25       1.6831     20.89  |         |         Q V       |         |
  2+30       1.8958     30.88  |         |         |    V    Q         |
  2+35       2.1495     36.83  |         |         |        V|     Q   |
```


2+40 2.4190 39.12
2+45 2.6239 29.75
2+50 2.7372 16.45
2+55 2.8166 11.53
3+ 0 2.8759 8.62
3+ 5 2.9120 5.23
3+10 2.9308 2.74
3+15 2.9413 1.52
3+20 2.9465 0.75
3+25 2.9486 0.30
3+30 2.9497 0.17
3+35 2.9503 0.08
3+40 2.9505 0.02

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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 3139.00(Ft.)
Length along longest watercourse measured to centroid = 2535.00(Ft.)
Length along longest watercourse = 0.595 Mi.
Length along longest watercourse measured to centroid = 0.480 Mi.
Difference in elevation = 39.71(Ft.)
Slope along watercourse = 66.7948 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.101 Hr.
Lag time = 6.04 Min.
25% of lag time = 1.51 Min.
40% of lag time = 2.41 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]
27.32	0.80	21.86

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	2.00	54.64

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

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

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	54.50	0.746

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.5	54.5	0.526	0.746	0.173	1.000	0.173
					Sum (F) =	0.173

Area averaged mean soil loss (F) (In/Hr) = 0.173
Minimum soil loss rate ((In/Hr)) = 0.086
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.303

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	82.818	14.093	3.880
2	0.167	165.637	45.327	12.480
3	0.250	248.455	19.148	5.272
4	0.333	331.274	8.063	2.220
5	0.417	414.092	4.819	1.327
6	0.500	496.910	3.000	0.826

7	0.583	579.729	2.172	0.598
8	0.667	662.547	1.461	0.402
9	0.750	745.366	0.957	0.264
10	0.833	828.184	0.960	0.264
			Sum = 100.000 Sum=	27.533

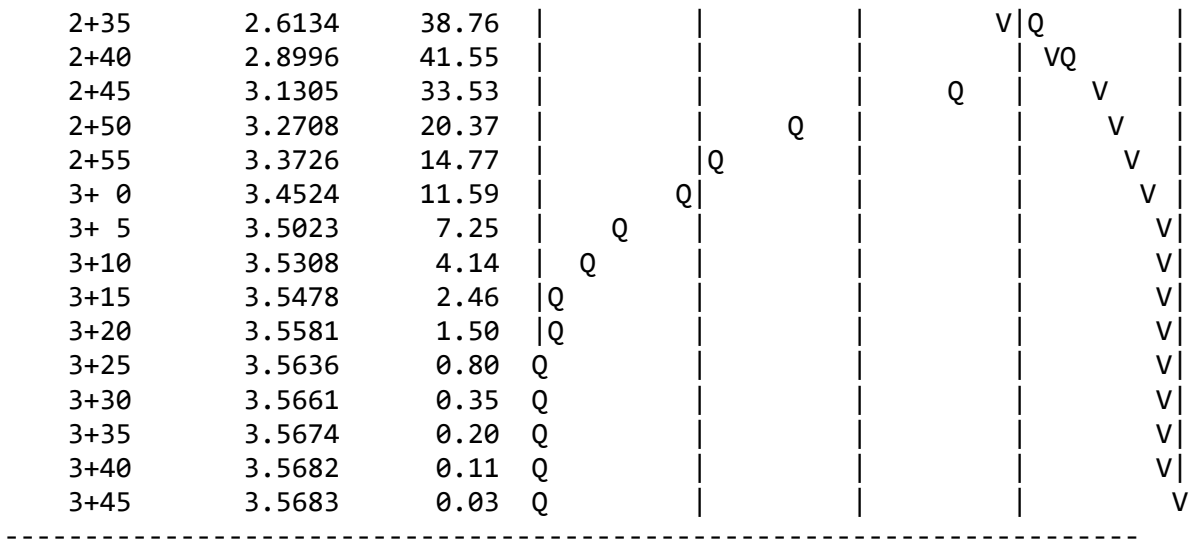
The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

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	(0.173)	0.095	0.217
2	0.17	1.30	0.312	(0.173)	0.095	0.217
3	0.25	1.10	0.264	(0.173)	0.080	0.184
4	0.33	1.50	0.360	(0.173)	0.109	0.251
5	0.42	1.50	0.360	(0.173)	0.109	0.251
6	0.50	1.80	0.432	(0.173)	0.131	0.301
7	0.58	1.50	0.360	(0.173)	0.109	0.251
8	0.67	1.80	0.432	(0.173)	0.131	0.301
9	0.75	1.80	0.432	(0.173)	0.131	0.301
10	0.83	1.50	0.360	(0.173)	0.109	0.251
11	0.92	1.60	0.384	(0.173)	0.116	0.268
12	1.00	1.80	0.432	(0.173)	0.131	0.301
13	1.08	2.20	0.528	(0.173)	0.160	0.368
14	1.17	2.20	0.528	(0.173)	0.160	0.368
15	1.25	2.20	0.528	(0.173)	0.160	0.368
16	1.33	2.00	0.480	(0.173)	0.146	0.334
17	1.42	2.60	0.624	0.173	(0.189)	0.451
18	1.50	2.70	0.648	0.173	(0.196)	0.475
19	1.58	2.40	0.576	0.173	(0.175)	0.403
20	1.67	2.70	0.648	0.173	(0.196)	0.475
21	1.75	3.30	0.792	0.173	(0.240)	0.619
22	1.83	3.10	0.744	0.173	(0.226)	0.571
23	1.92	2.90	0.696	0.173	(0.211)	0.523
24	2.00	3.00	0.720	0.173	(0.218)	0.547
25	2.08	3.10	0.744	0.173	(0.226)	0.571
26	2.17	4.20	1.008	0.173	(0.306)	0.835
27	2.25	5.00	1.200	0.173	(0.364)	1.027
28	2.33	3.50	0.840	0.173	(0.255)	0.667
29	2.42	6.80	1.632	0.173	(0.495)	1.459
30	2.50	7.30	1.752	0.173	(0.531)	1.579
31	2.58	8.20	1.968	0.173	(0.597)	1.795
32	2.67	5.90	1.416	0.173	(0.429)	1.243
33	2.75	2.00	0.480	(0.173)	0.146	0.334
34	2.83	1.80	0.432	(0.173)	0.131	0.301
35	2.92	1.80	0.432	(0.173)	0.131	0.301
36	3.00	0.60	0.144	(0.173)	0.044	0.100

(Loss Rate Not Used)

```
  Sum =     100.0                                        Sum =    18.8
     Flood volume = Effective rainfall      1.57(In)
      times area      27.3(Ac.)/[(In)/(Ft.)] =       3.6(Ac.Ft)
     Total soil loss =      0.43(In)
     Total soil loss =     0.984(Ac.Ft)
     Total rainfall =      2.00(In)
     Flood volume =      155436.8 Cubic Feet
     Total soil loss =       42882.7 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =     41.553(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       12.5      25.0      37.5      50.0
-------------------------------------------------------------------------
  0+ 5       0.0058      0.84  Q         |         |         |         |
  0+10       0.0303      3.56  V Q       |         |         |         |
  0+15       0.0618      4.57  V  Q      |         |         |         |
  0+20       0.0956      4.90  |V Q      |         |         |         |
  0+25       0.1358      5.85  |V  Q     |         |         |         |
  0+30       0.1806      6.50  | V  Q    |         |         |         |
  0+35       0.2300      7.17  | V  Q    |         |         |         |
  0+40       0.2792      7.15  |  V Q    |         |         |         |
  0+45       0.3323      7.71  |  V  Q   |         |         |         |
  0+50       0.3862      7.82  |   V Q   |         |         |         |
  0+55       0.4369      7.37  |   VQ    |         |         |         |
  1+ 0       0.4886      7.50  |    VQ   |         |         |         |
  1+ 5       0.5451      8.21  |     Q   |         |         |         |
  1+10       0.6085      9.21  |     VQ  |         |         |         |
  1+15       0.6749      9.64  |      Q  |         |         |         |
  1+20       0.7416      9.69  |      QV |         |         |         |
  1+25       0.8094      9.84  |      Q V|         |         |         |
  1+30       0.8871     11.28  |        Q|         |         |         |
  1+35       0.9690     11.89  |        QV         |         |         |
  1+40       1.0493     11.65  |        Q|V        |         |         |
  1+45       1.1383     12.94  |         Q V       |         |         |
  1+50       1.2409     14.89  |         |Q V      |         |         |
  1+55       1.3443     15.01  |         | Q  V    |         |         |
  2+ 0       1.4452     14.66  |         |Q    V   |         |         |
  2+ 5       1.5480     14.93  |         |Q     V  |         |         |
  2+10       1.6608     16.38  |         |  Q    V |         |         |
  2+15       1.8027     20.60  |         |     Q   V         |         |
  2+20       1.9616     23.07  |         |       Q |V        |         |
  2+25       2.1221     23.31  |         |       Q |  V      |         |
  2+30       2.3465     32.58  |         |         |     Q   |         |
```


2+35 2.6134 38.76
2+40 2.8996 41.55
2+45 3.1305 33.53
2+50 3.2708 20.37
2+55 3.3726 14.77
3+ 0 3.4524 11.59
3+ 5 3.5023 7.25
3+10 3.5308 4.14
3+15 3.5478 2.46
3+20 3.5581 1.50
3+25 3.5636 0.80
3+30 3.5661 0.35
3+35 3.5674 0.20
3+40 3.5682 0.11
3+45 3.5683 0.03

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: Q100UHEX1100.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, 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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 1724.00(Ft.)
Length along longest watercourse measured to centroid = 1620.00(Ft.)
Length along longest watercourse = 0.327 Mi.
Length along longest watercourse measured to centroid = 0.307 Mi.
Difference in elevation = 22.50(Ft.)
Slope along watercourse = 68.9095 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.090 Hr.
Lag time = 5.38 Min.
25% of lag time = 1.34 Min.
40% of lag time = 2.15 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]
27.32	0.50	13.66

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	1.21	33.11

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 = 99.98 %
Adjusted average point rain = 1.212(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	56.50	0.500

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.5	56.5	0.506	0.500	0.278	1.000	0.278
					Sum (F) =	0.278

Area averaged mean soil loss (F) (In/Hr) = 0.278
Minimum soil loss rate ((In/Hr)) = 0.139
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

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

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.015	17.076	4.702
2	0.167	186.030	47.610	13.109
3	0.250	279.045	16.820	4.631
4	0.333	372.060	7.458	2.053

5	0.417	465.074	4.278	1.178
6	0.500	558.089	2.760	0.760
7	0.583	651.104	1.826	0.503
8	0.667	744.119	1.150	0.317
9	0.750	837.134	1.024	0.282
		Sum = 100.000	Sum=	27.533

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	0.278	(0.305)	0.333
2	0.17	4.30	0.625	0.278	(0.313)	0.347
3	0.25	5.00	0.727	0.278	(0.364)	0.449
4	0.33	5.00	0.727	0.278	(0.364)	0.449
5	0.42	5.80	0.843	0.278	(0.422)	0.565
6	0.50	6.50	0.945	0.278	(0.473)	0.667
7	0.58	7.40	1.076	0.278	(0.538)	0.798
8	0.67	8.60	1.250	0.278	(0.625)	0.972
9	0.75	12.30	1.788	0.278	(0.894)	1.510
10	0.83	29.10	4.231	0.278	(2.116)	3.953
11	0.92	6.80	0.989	0.278	(0.494)	0.711
12	1.00	5.00	0.727	0.278	(0.364)	0.449
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.2

Flood volume = Effective rainfall 0.93(In)
times area 27.3(Ac.)/[(In)/(Ft.)] = 2.1(Ac.Ft)
Total soil loss = 0.28(In)
Total soil loss = 0.633(Ac.Ft)
Total rainfall = 1.21(In)
Flood volume = 92583.1 Cubic Feet
Total soil loss = 27583.1 Cubic Feet

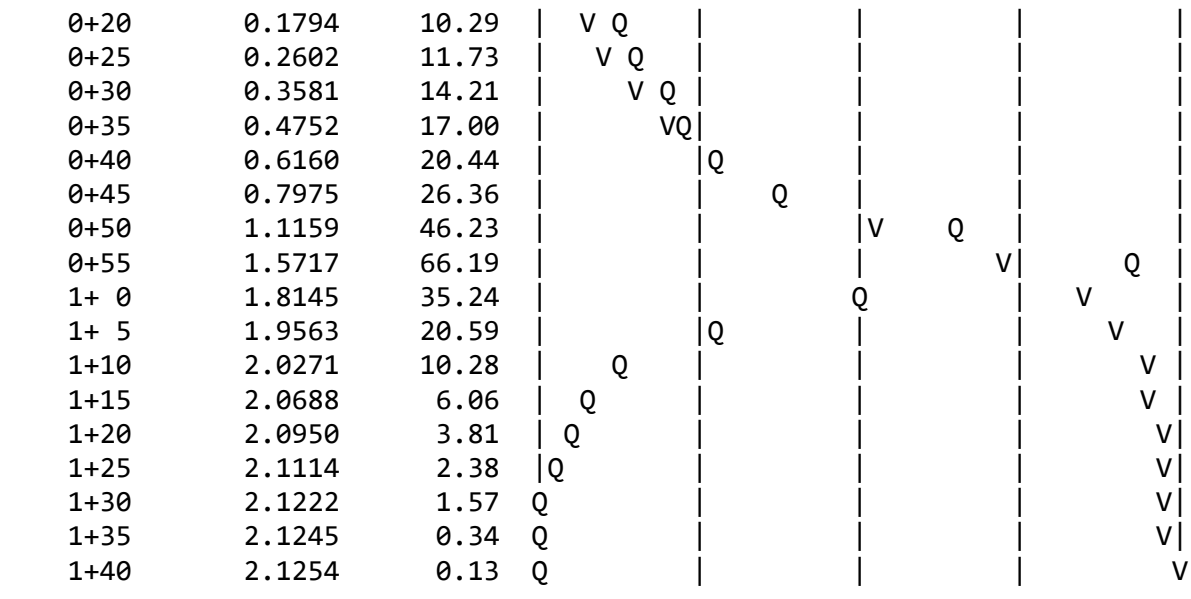
Peak flow rate of this hydrograph = 66.185(CFS)

++

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	17.5	35.0	52.5	70.0
0+ 5	0.0108	1.56	Q	|	|	|	|
0+10	0.0521	5.99	V Q	|	|	|	|
0+15	0.1086	8.20	| V Q	|	|	|	|


0+20 0.1794 10.29
0+25 0.2602 11.73
0+30 0.3581 14.21
0+35 0.4752 17.00
0+40 0.6160 20.44
0+45 0.7975 26.36
0+50 1.1159 46.23
0+55 1.5717 66.19
1+ 0 1.8145 35.24
1+ 5 1.9563 20.59
1+10 2.0271 10.28
1+15 2.0688 6.06
1+20 2.0950 3.81
1+25 2.1114 2.38
1+30 2.1222 1.57
1+35 2.1245 0.34
1+40 2.1254 0.13

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: 100PUH1100.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, 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 = 27.32(Ac.) = 0.043 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 27.32(Ac.) = 0.043 Sq. Mi.
Length along longest watercourse = 3139.00(Ft.)
Length along longest watercourse measured to centroid = 2535.00(Ft.)
Length along longest watercourse = 0.595 Mi.
Length along longest watercourse measured to centroid = 0.480 Mi.
Difference in elevation = 39.71(Ft.)
Slope along watercourse = 66.7948 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.101 Hr.
Lag time = 6.04 Min.
25% of lag time = 1.51 Min.
40% of lag time = 2.41 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]
27.32	0.80	21.86

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
27.32	1.21	33.11

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 1.212(In)

Point rain (area averaged) = 1.212(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 1.212(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
27.320	54.50	0.746

Total Area Entered = 27.32(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.5	54.5	0.526	0.746	0.173	1.000	0.173
					Sum (F) =	0.173

Area averaged mean soil loss (F) (In/Hr) = 0.173
Minimum soil loss rate ((In/Hr)) = 0.086
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.303

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	82.818	14.093	3.880
2	0.167	165.637	45.327	12.480
3	0.250	248.455	19.148	5.272
4	0.333	331.274	8.063	2.220

5	0.417	414.092	4.819	1.327
6	0.500	496.910	3.000	0.826
7	0.583	579.729	2.172	0.598
8	0.667	662.547	1.461	0.402
9	0.750	745.366	0.957	0.264
10	0.833	828.184	0.960	0.264
			Sum = 100.000	Sum= 27.533

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	0.173	(0.185)	0.438
2	0.17	4.30	0.625	0.173	(0.190)	0.452
3	0.25	5.00	0.727	0.173	(0.220)	0.554
4	0.33	5.00	0.727	0.173	(0.220)	0.554
5	0.42	5.80	0.843	0.173	(0.256)	0.670
6	0.50	6.50	0.945	0.173	(0.287)	0.772
7	0.58	7.40	1.076	0.173	(0.326)	0.903
8	0.67	8.60	1.250	0.173	(0.379)	1.078
9	0.75	12.30	1.788	0.173	(0.542)	1.616
10	0.83	29.10	4.231	0.173	(1.283)	4.058
11	0.92	6.80	0.989	0.173	(0.300)	0.816
12	1.00	5.00	0.727	0.173	(0.220)	0.554
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	12.5

Flood volume = Effective rainfall 1.04(In)
times area 27.3(Ac.)/[(In)/(Ft.)] = 2.4(Ac.Ft)
Total soil loss = 0.17(In)
Total soil loss = 0.394(Ac.Ft)
Total rainfall = 1.21(In)
Flood volume = 103021.8 Cubic Feet
Total soil loss = 17144.4 Cubic Feet

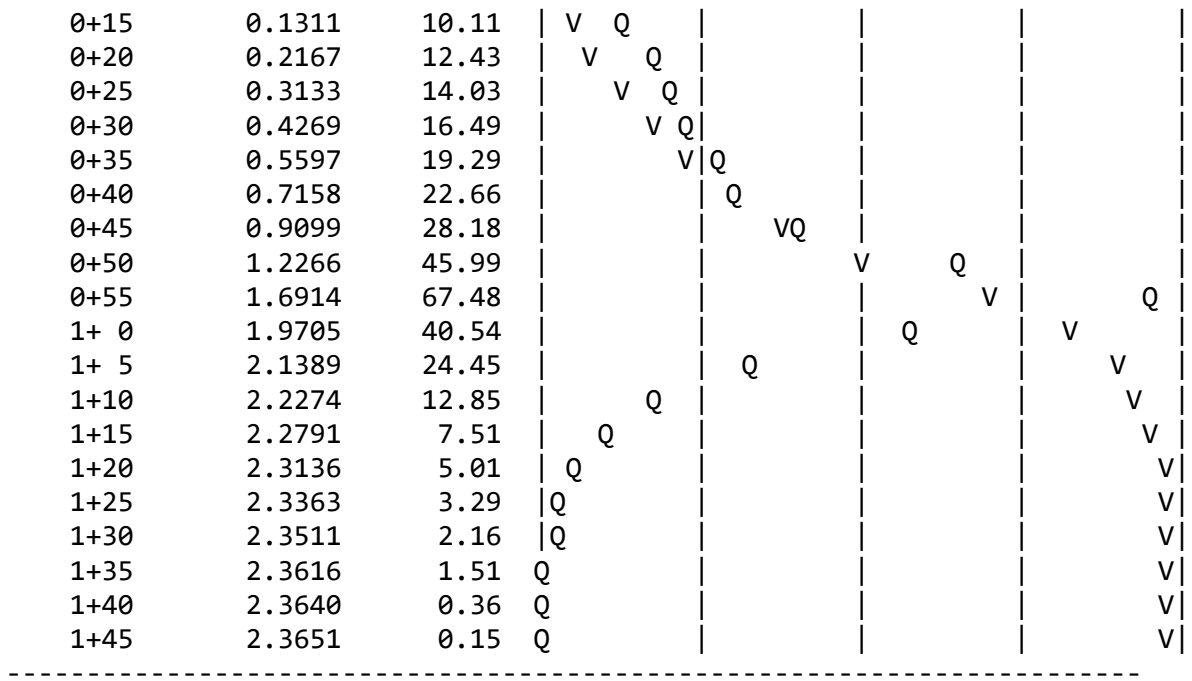
Peak flow rate of this hydrograph = 67.485(CFS)

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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	17.5	35.0	52.5	70.0
0+ 5	0.0117	1.70	Q	|	|	|	|
0+10	0.0615	7.22	|V Q	|	|	|	|


0+15 0.1311 10.11
0+20 0.2167 12.43
0+25 0.3133 14.03
0+30 0.4269 16.49
0+35 0.5597 19.29
0+40 0.7158 22.66
0+45 0.9099 28.18
0+50 1.2266 45.99
0+55 1.6914 67.48
1+ 0 1.9705 40.54
1+ 5 2.1389 24.45
1+10 2.2274 12.85
1+15 2.2791 7.51
1+20 2.3136 5.01
1+25 2.3363 3.29
1+30 2.3511 2.16
1+35 2.3616 1.51
1+40 2.3640 0.36
1+45 2.3651 0.15

SECTION 3 - REFERENCE DATA

USGS SOILS REPORT

PLATE D-4.1

INFILTRATION REPORT (EXCERPT)

CONTECH UNDERGROUND CHAMBER SYSTEM

DCV CALCULATIONS (WQMP)

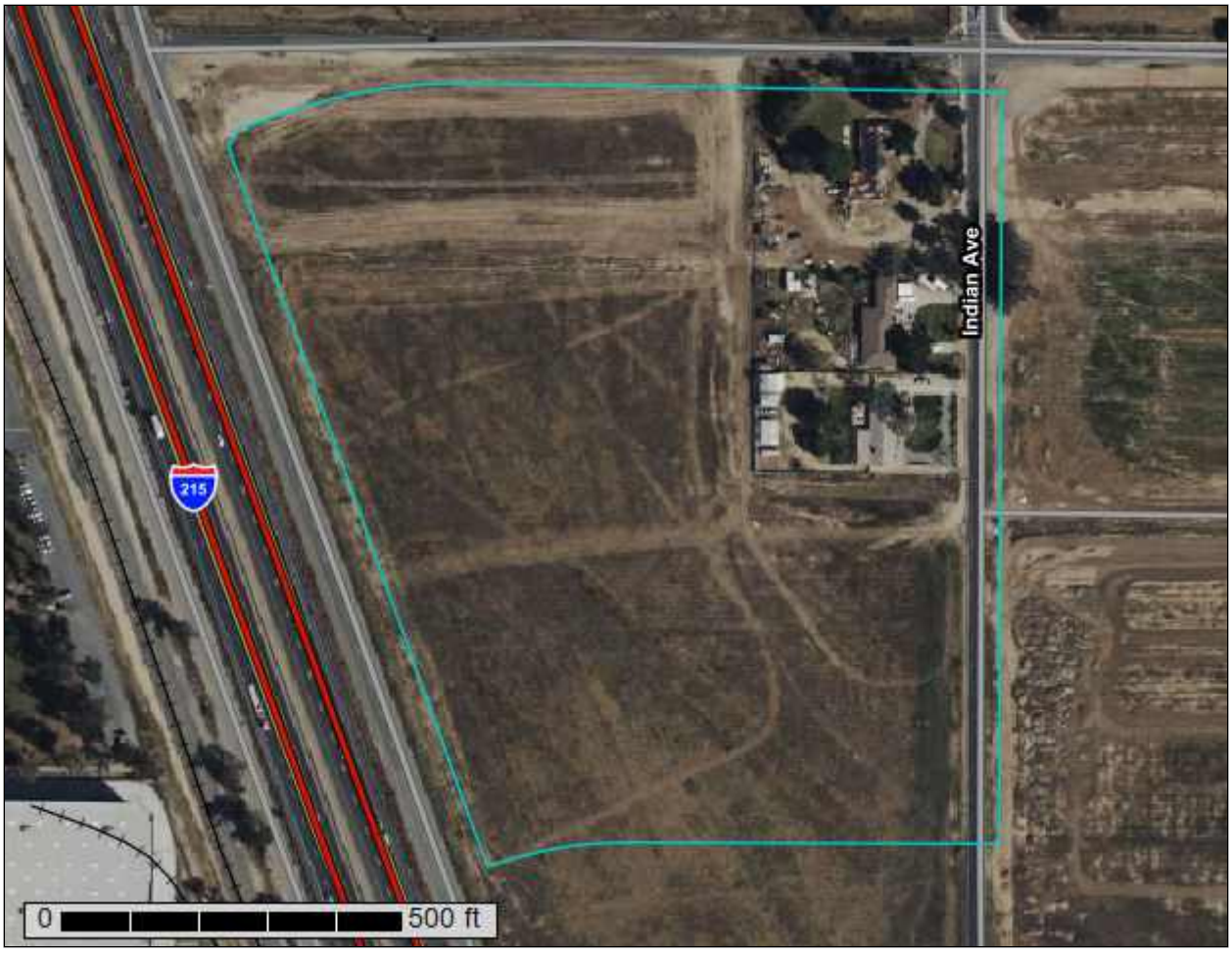
PP190005 – HARVILL DISTRIBUTION CENTER OFFSITE DRAINAGE IMPROVEMENTS (HYDROLOGY MAPS)

United States Department of Agriculture

Natural Resources Conservation Service

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

Custom Soil Resource Report for Western Riverside Area, California



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.

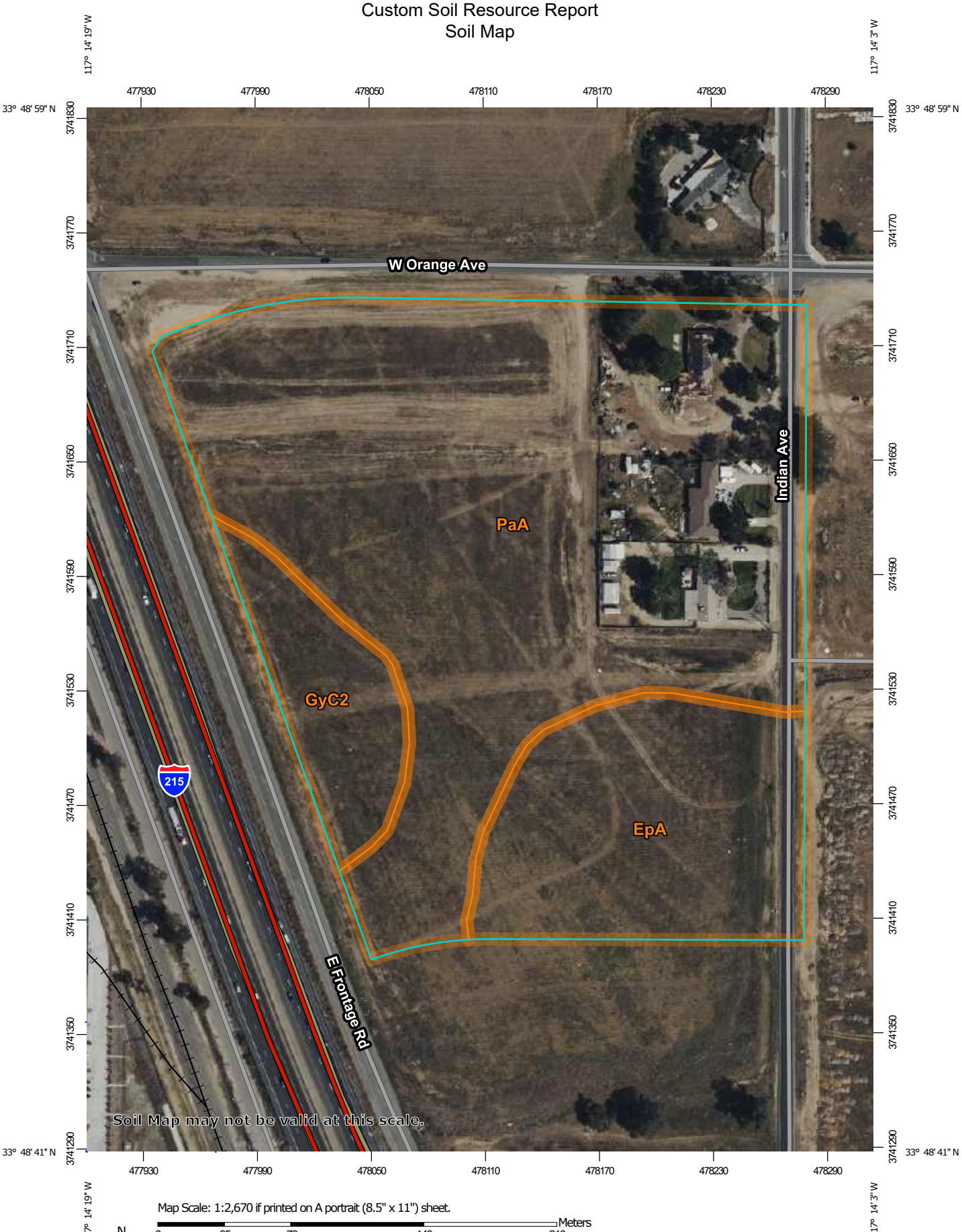
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:2,670 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	5.0	20.5%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	2.0	8.4%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	17.2	71.0%
Totals for Area of Interest		**24.2**	**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

GyC2—Greenfield sandy loam, 2 to 8 percent slopes, eroded

Map Unit Setting
National map unit symbol: hcvw
Elevation: 100 to 3,500 feet
Mean annual precipitation: 9 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

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

Description of Greenfield

Setting
Landform: Terraces, 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 26 inches: sandy loam
H2 - 26 to 43 inches: fine sandy loam
H3 - 43 to 60 inches: loam
H4 - 60 to 72 inches: stratified loamy sand to sandy loam

Properties and qualities
Slope: 2 to 8 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: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

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

Minor Components

Pachappa

Percent of map unit: 3 percent
Hydric soil rating: No

Arlington

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Ramona

Percent of map unit: 3 percent
Hydric soil rating: No

Hanford

Percent of map unit: 3 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.

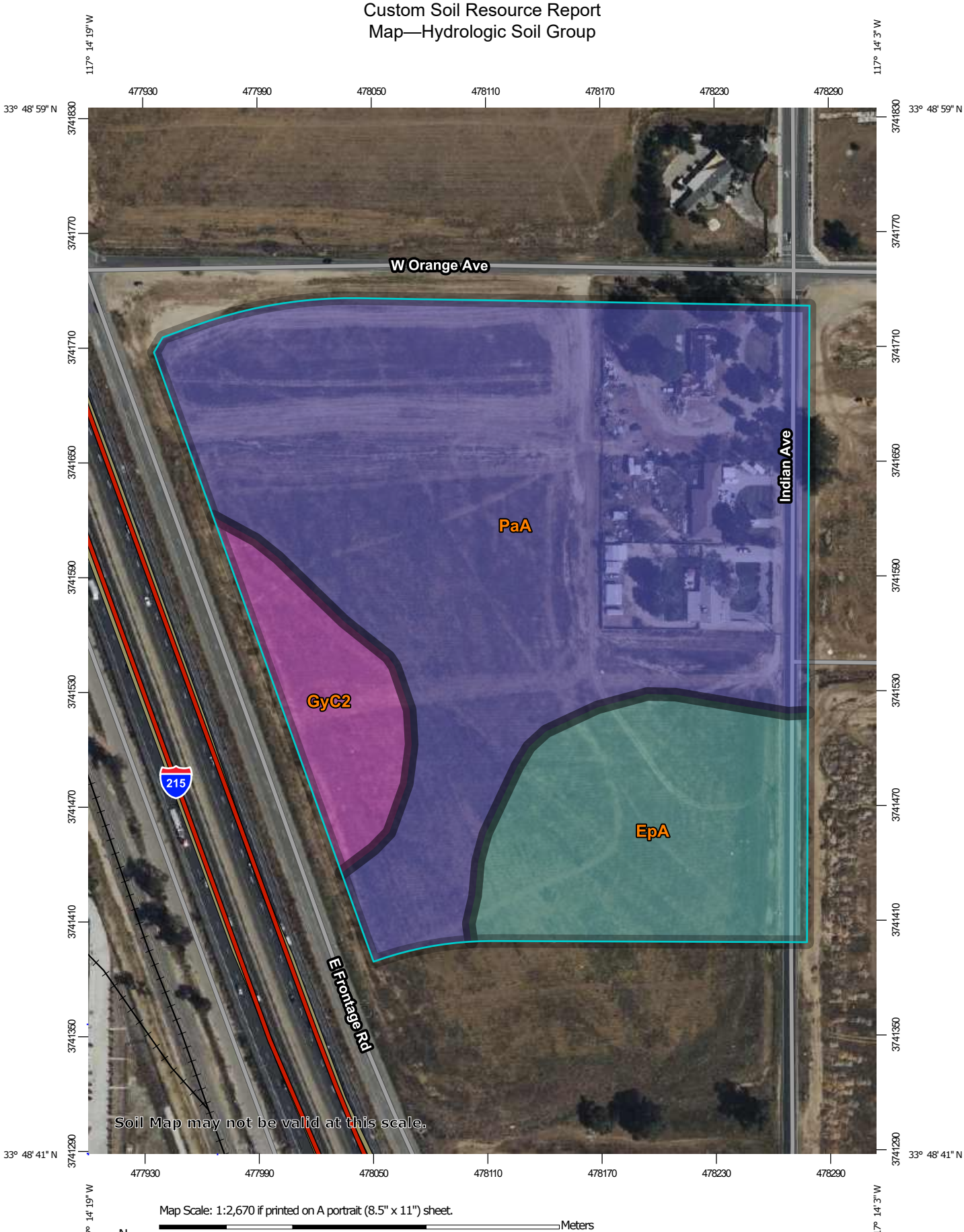
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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: 1:2,670 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	C	5.0	20.5%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	A	2.0	8.4%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	17.2	71.0%
Totals for Area of Interest			**24.2**	**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

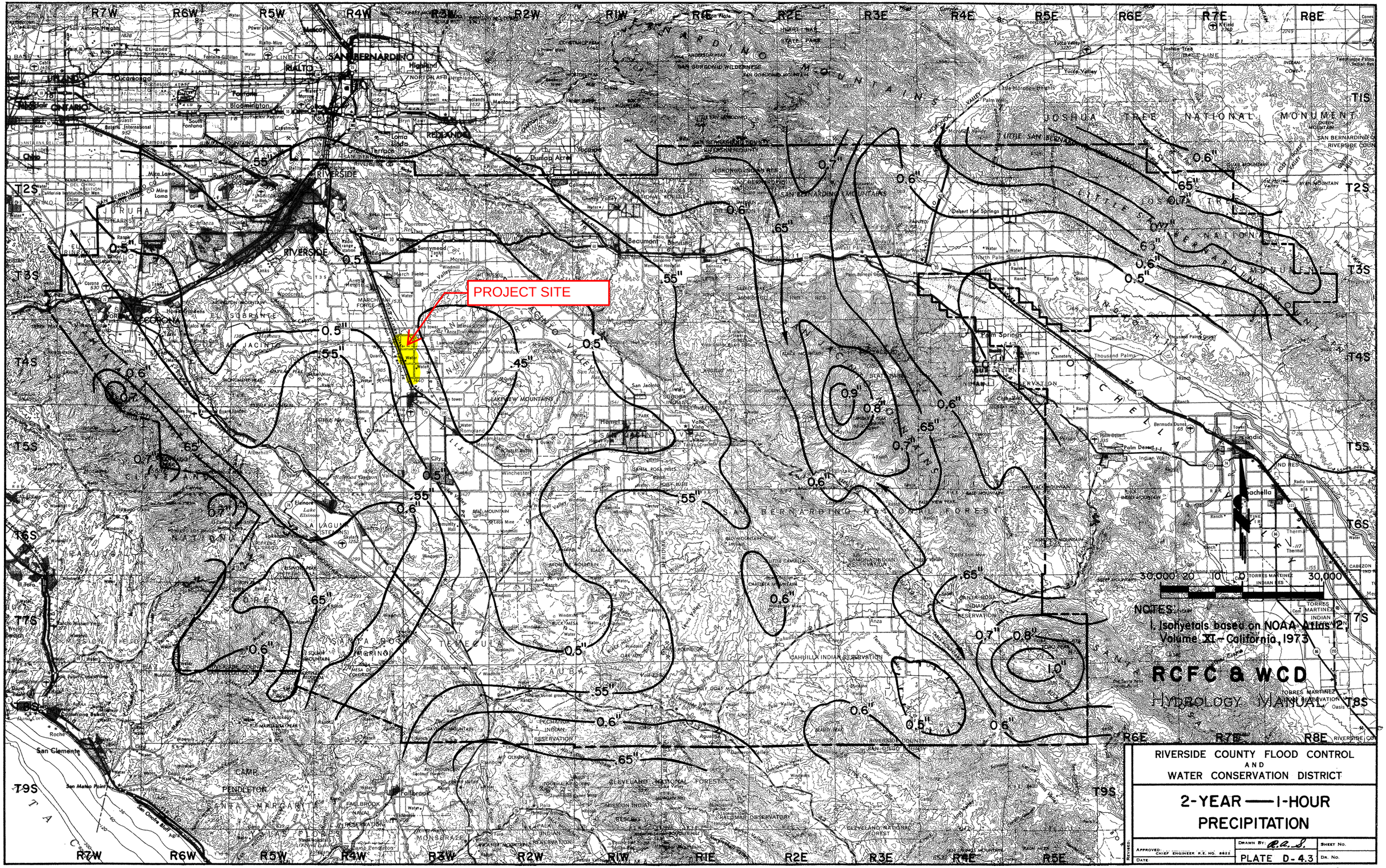
MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR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

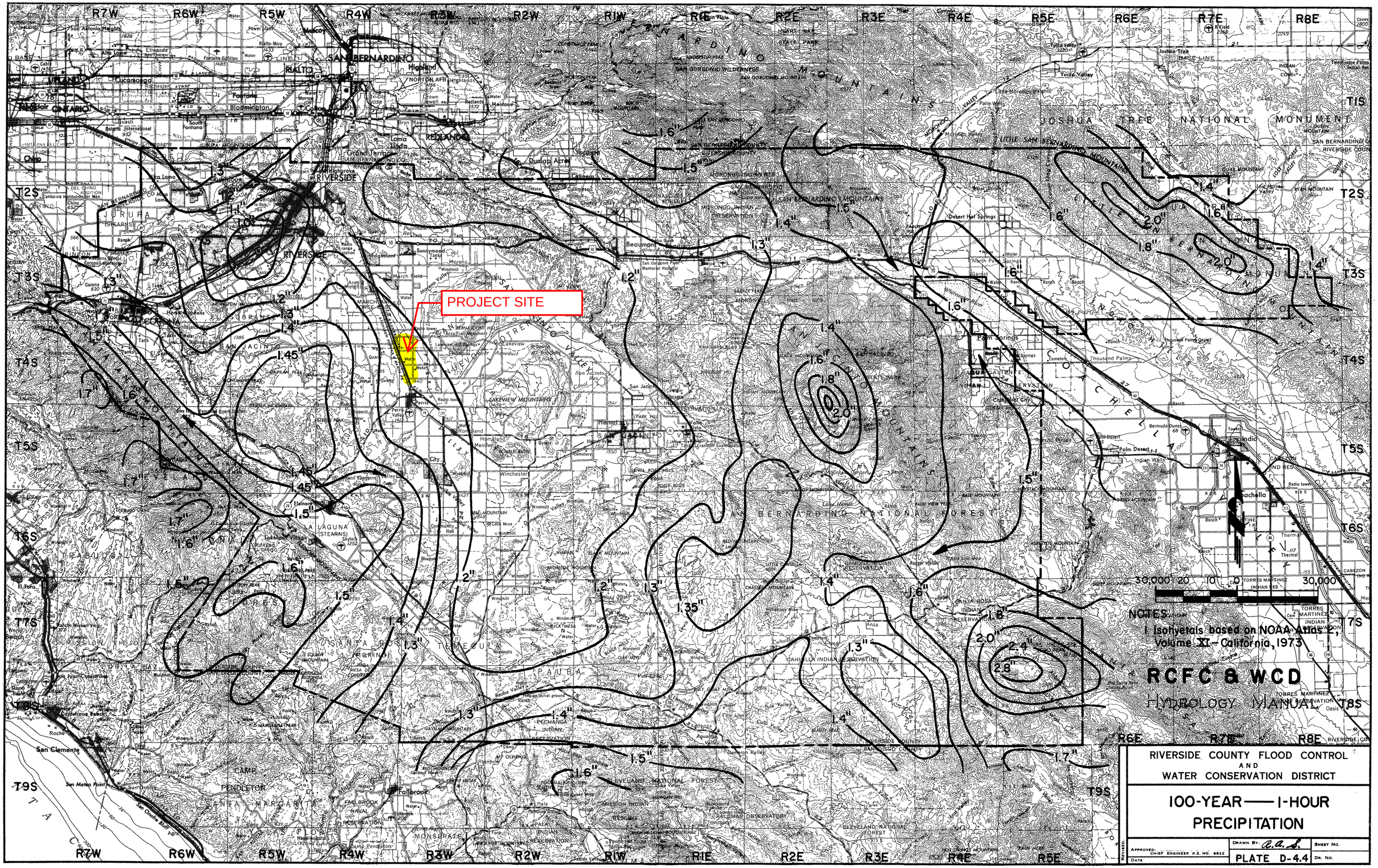
RCFC & WCD

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

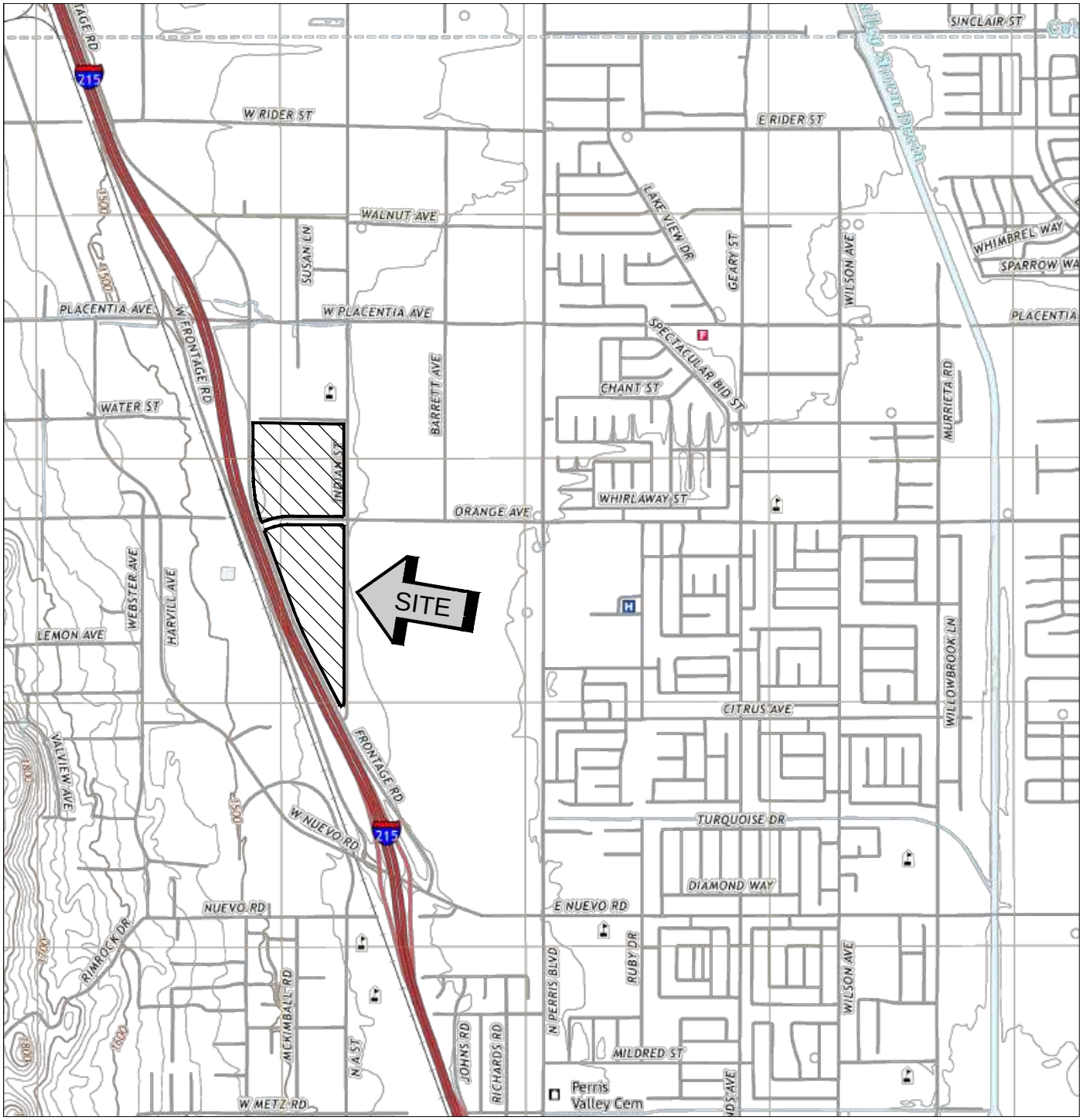




Robert G. Trazo, GE 2655
Principal Engineer

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

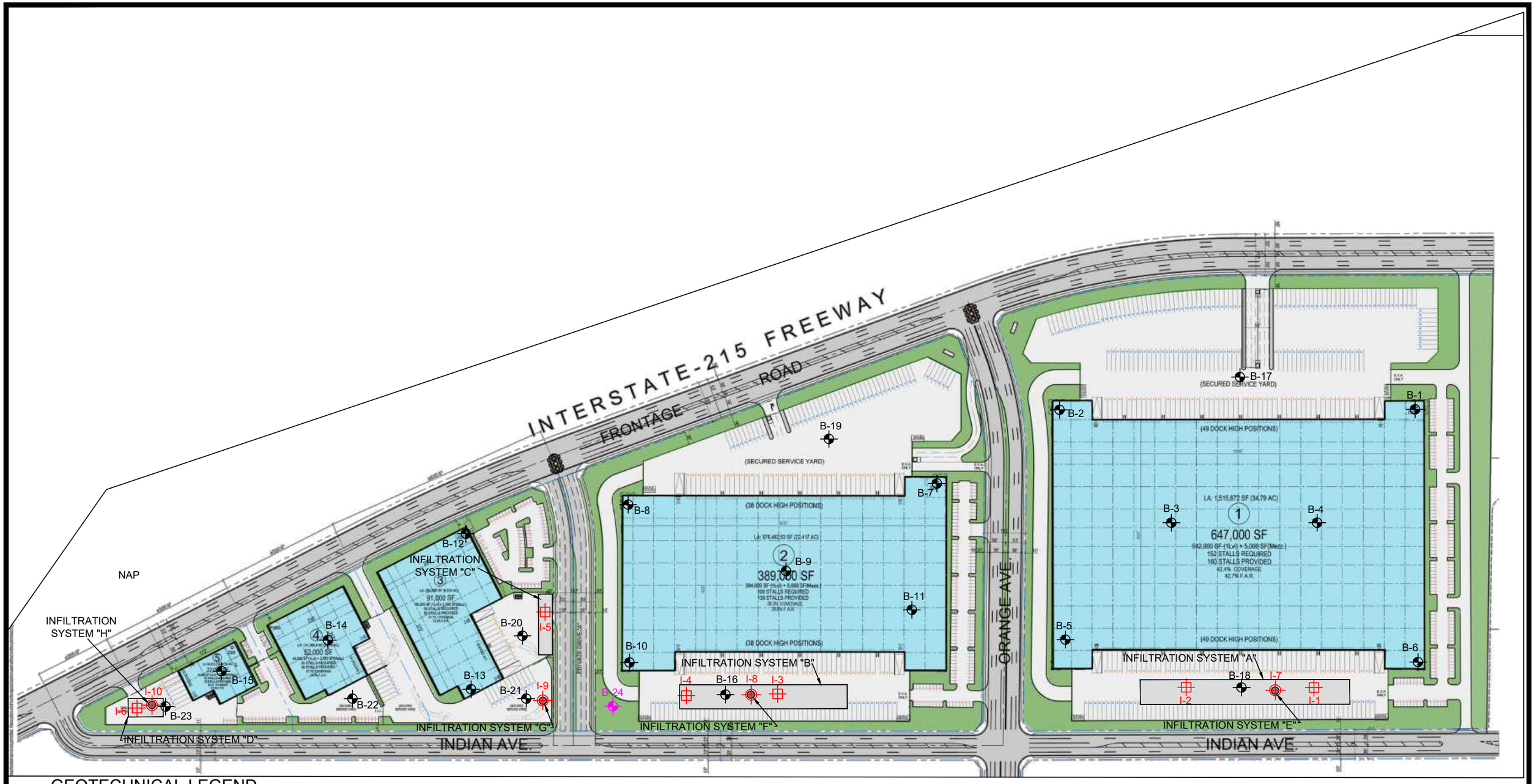
SITE LOCATION MAP

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

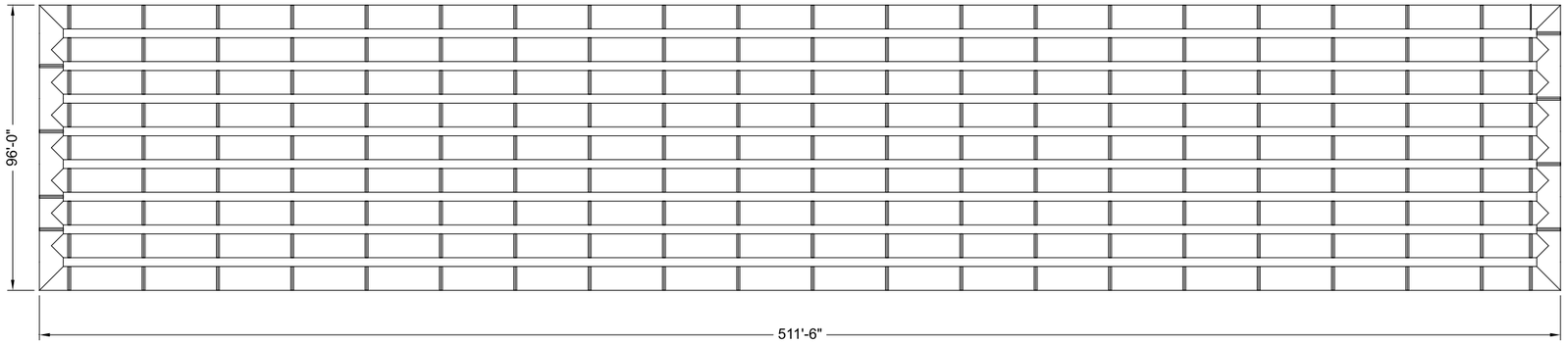
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 4,651 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 233,785 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 233,785 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" = 50'

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The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

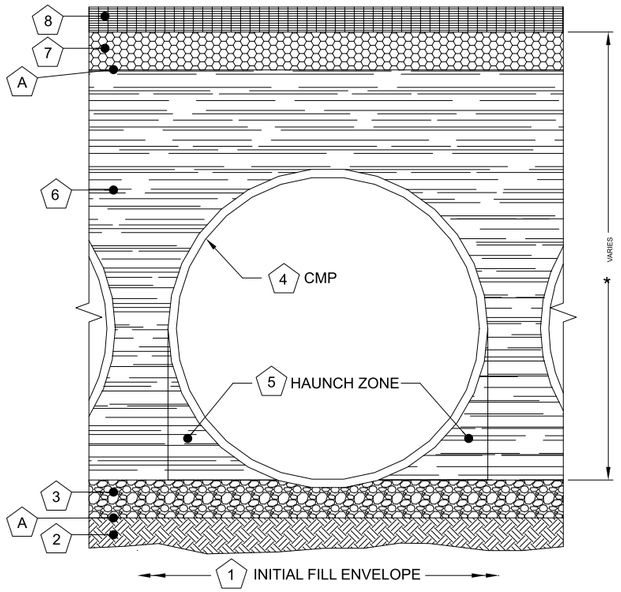
DATE	REVISION DESCRIPTION	BY

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

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19813 20-001 Harvest Landing Site 2
Easterly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12847	19813	8/14/2022
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

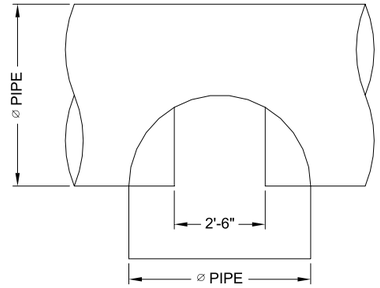
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

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

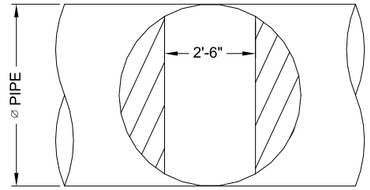
BACKFILL

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

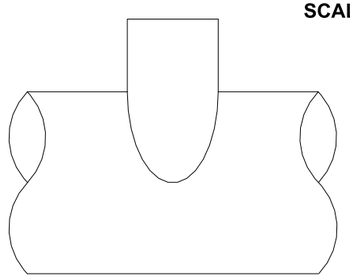


FRONT

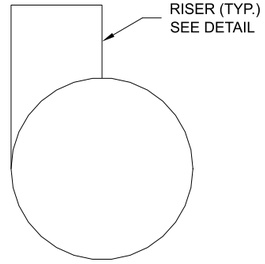
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

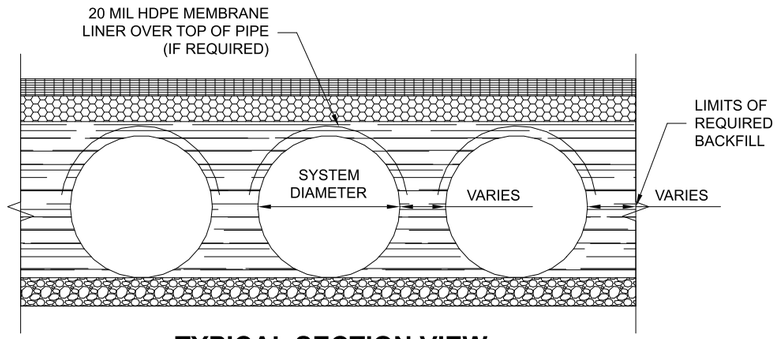


END

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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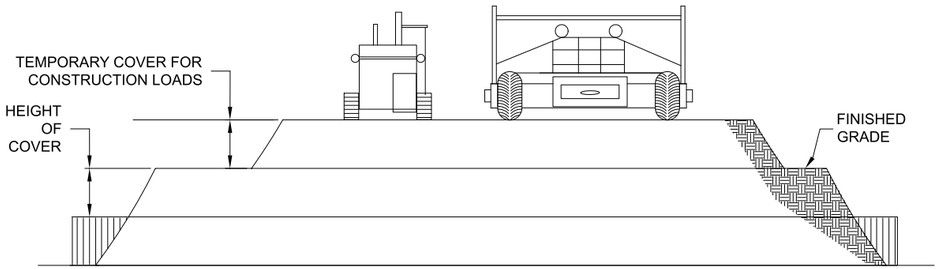
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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19813 20-001 Harvest Landing Site 2
Easterly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
12847	19813	8/14/2022
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

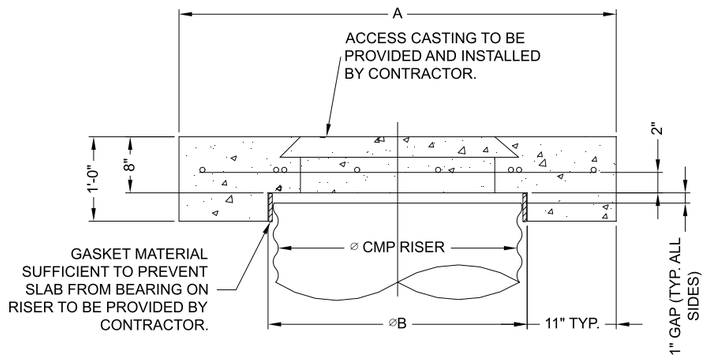
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

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.

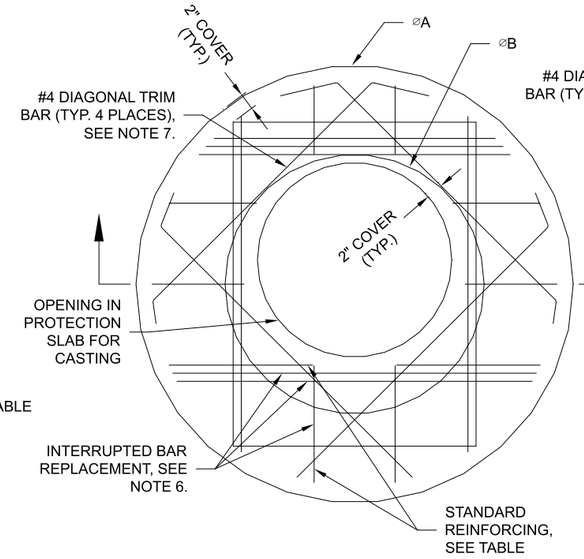
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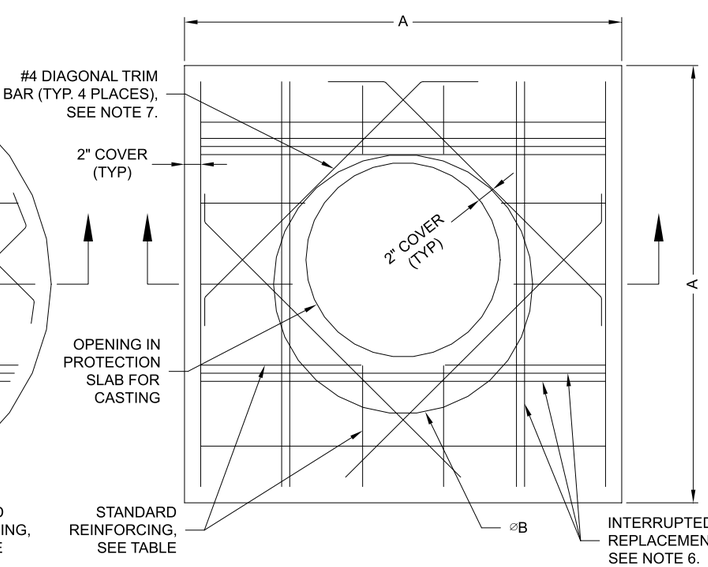
SECTION VIEW

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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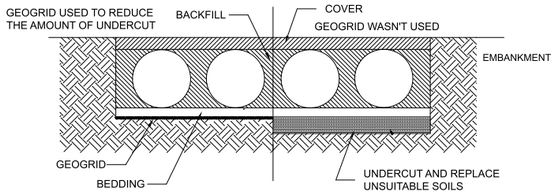
CMP DETENTION INSTALLATION GUIDE

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.

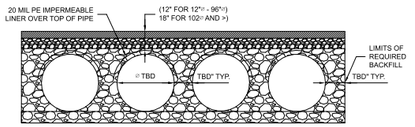


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

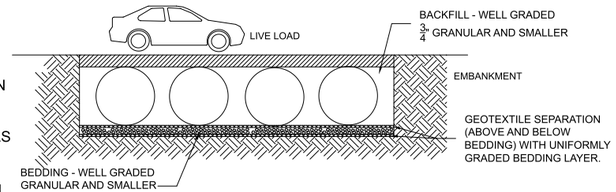
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

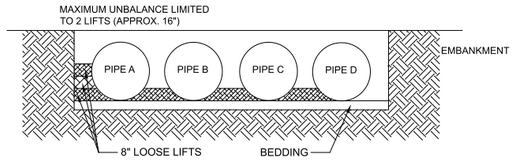
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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



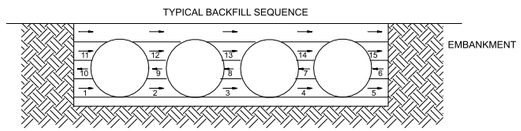
BACKFILL PLACEMENT

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

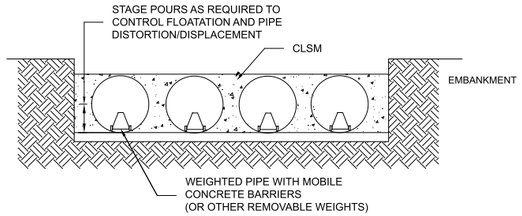


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

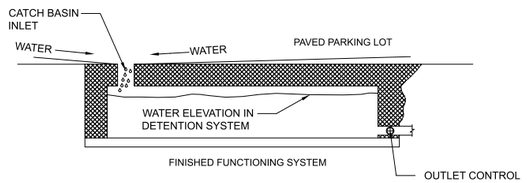


CONSTRUCTION LOADING

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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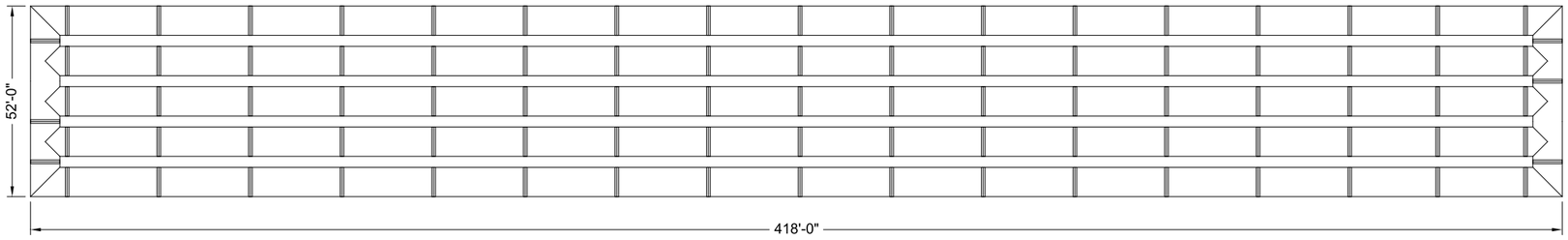
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 2,114 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 106,261 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 106,261 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.
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ASSEMBLY

SCALE: 1" = 40'

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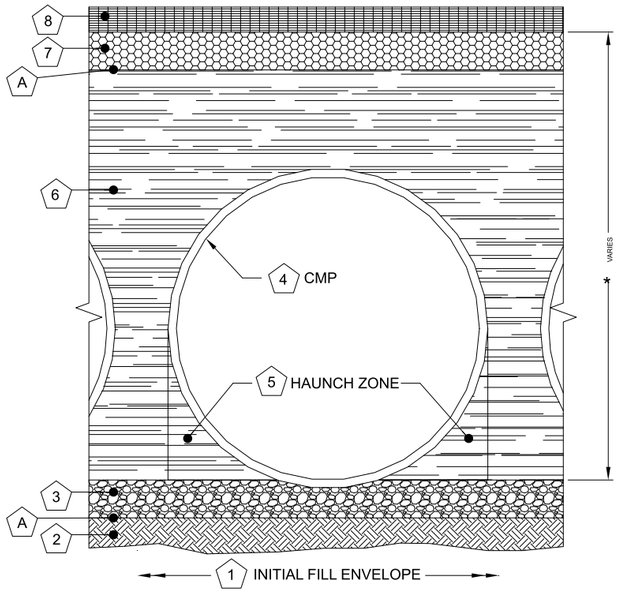
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CONTECH® CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO20080 20-001 Harvest Landing Site 2
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13032	20080	8/9/2022
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

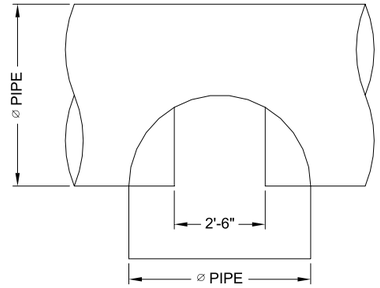
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

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

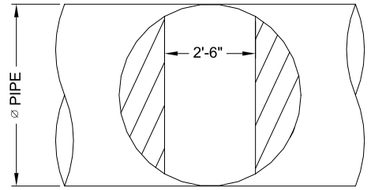
BACKFILL

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

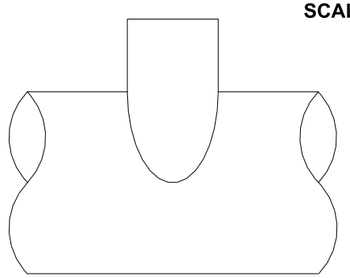


FRONT

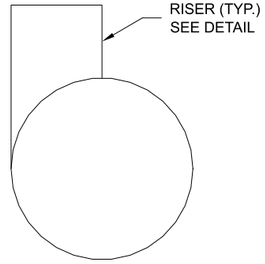
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

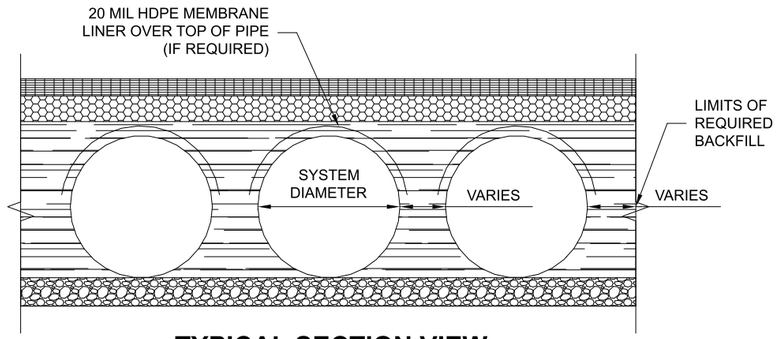


END

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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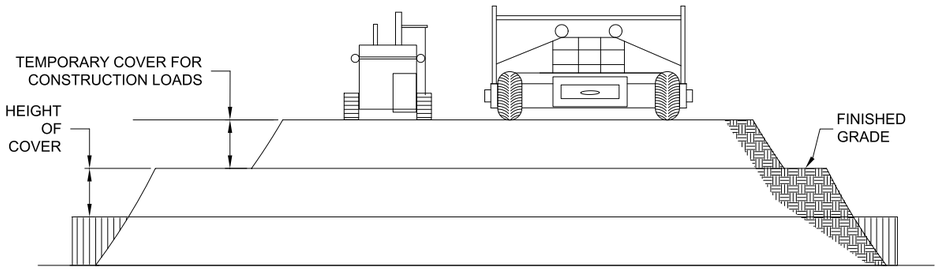
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CONTECH CMP DETENTION SYSTEMS
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DYO20080 20-001 Harvest Landing Site 2
Westerly System
Perris, CA
DETENTION SYSTEM

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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

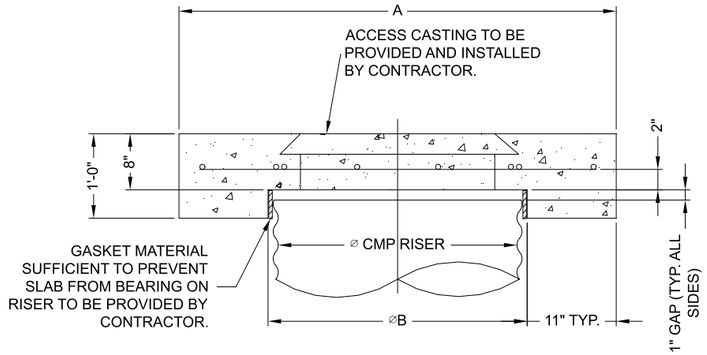
ALUMINUM: AASHTO M-196 OR ASTM B-745

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.

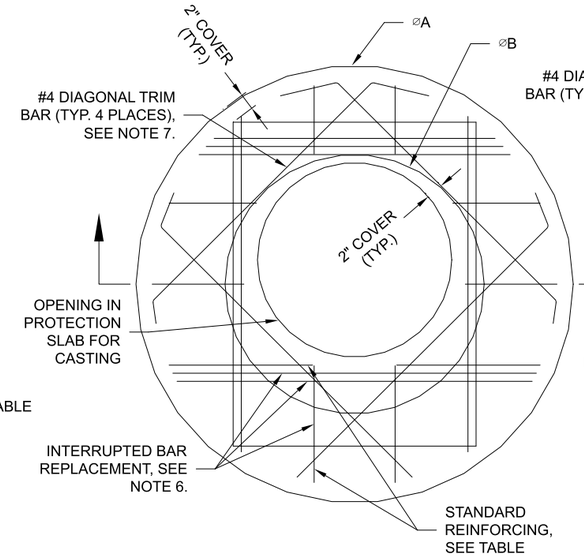
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



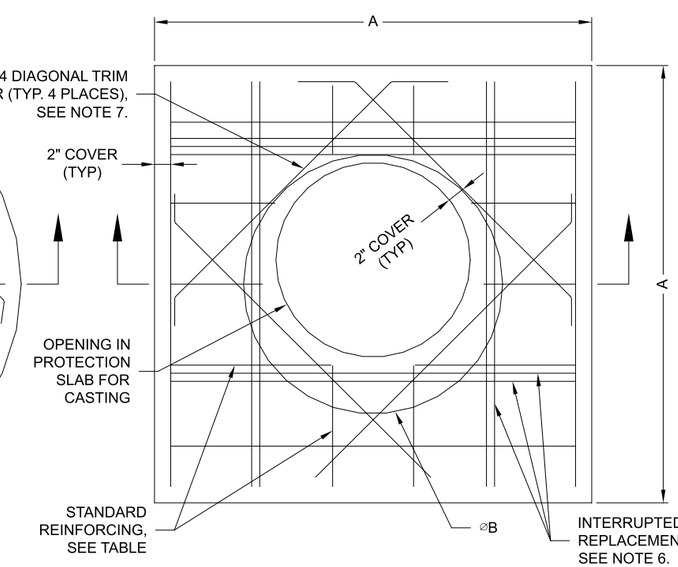
SECTION VIEW

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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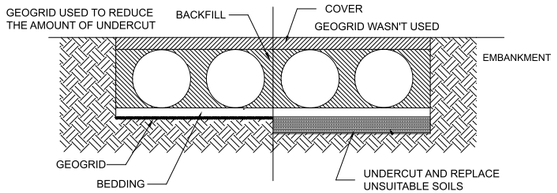
CMP DETENTION INSTALLATION GUIDE

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.

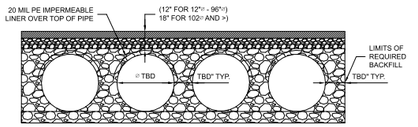


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

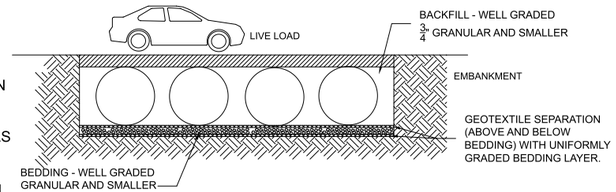
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

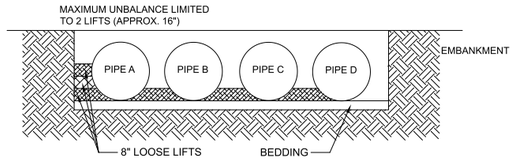
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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



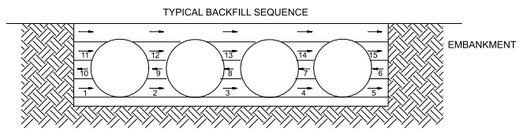
BACKFILL PLACEMENT

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

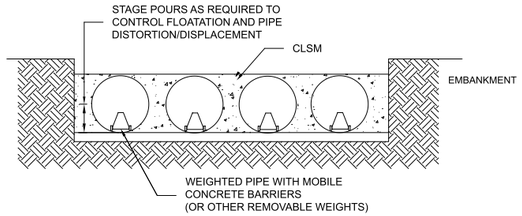


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

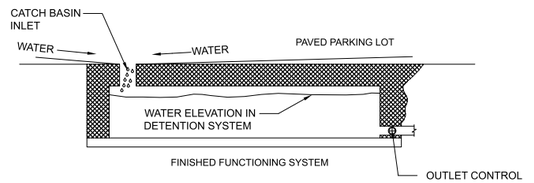


CONSTRUCTION LOADING

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

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

DYO20080 20-001 Harvest Landing Site 2
Westerly System
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13032	20080	8/9/2022
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 2

BMP Identification

BMP NAME / ID: S2-1 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)*
S2-1A	*0*	*Roofs*	*1*	*0.89*	*0*			
S2-1C	*186366.61*	*Concrete or Asphalt*	*1*	*0.892*	*166239*			

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 2		

BMP Identification

BMP NAME / ID: S2-2 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)*
S2-2A	*190057.62*	*Roofs*	*1*	*0.89*	*169531.4*			
S2-2C	*23066.2*	*Concrete or Asphalt*	*1*	*0.892*	*20575.1*			
	213123.82		***Total***		**190106.5**	**0.20**	***0.87***	***0.924***

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 2		

BMP Identification

BMP NAME / ID: S2-3 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)*
S2-3A	*194209.17*	*Roofs*	*1*	*0.89*	*173234.6*			
S2-3C	*44222.67*	*Concrete or Asphalt*	*1*	*0.892*	*39446.6*			

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 2		

BMP Identification

BMP NAME / ID: S2-4 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)*
S2-4A	*0*	*Roofs*	*1*	*0.89*	*0*			
S2-4C	*129874.52*	*Concrete or Asphalt*	*1*	*0.892*	*115848.1*			

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 2		

BMP Identification

BMP NAME / ID: S2-5 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)*
S2-25	*0*	*Roofs*	*1*	*0.89*	*0*			
S2-5C	*17428.74*	*Concrete or Asphalt*	*1*	*0.892*	*15546.4*			

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 2		

BMP Identification

BMP NAME / ID: S2-6 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)*
S2-6A	*0*	*Roofs*	*1*	*0.89*	*0*			
S2-6C	*31142.53*	*Concrete or Asphalt*	*1*	*0.892*	*27779.1*			

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.

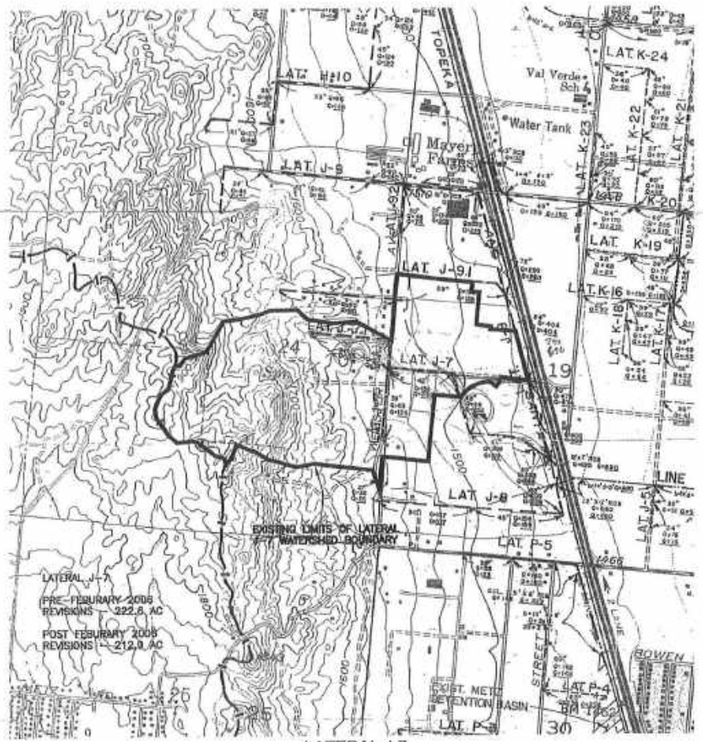
PVSD

M-1

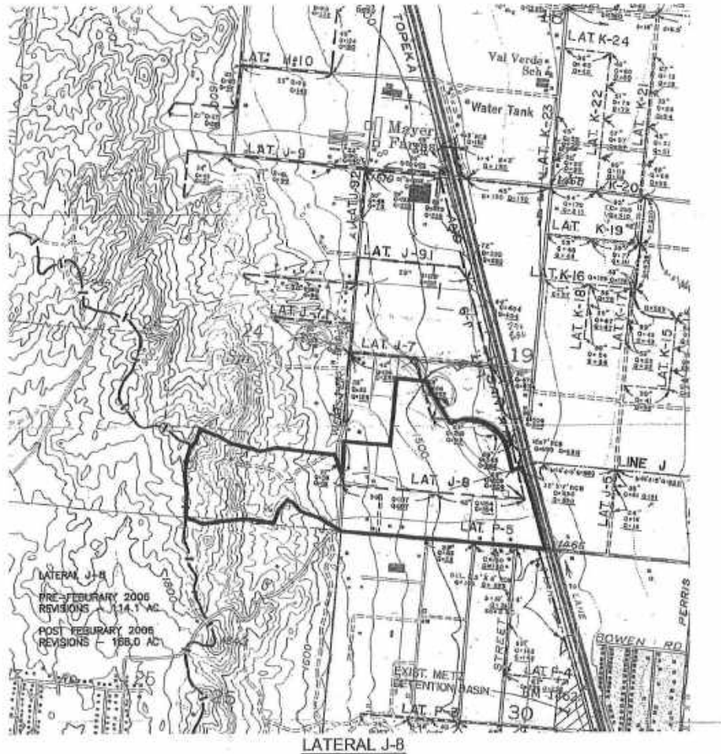
BROWN RD.

REVISED HYDROLOGY MAP
PERRIS MASTER DRAINAGE PLAN

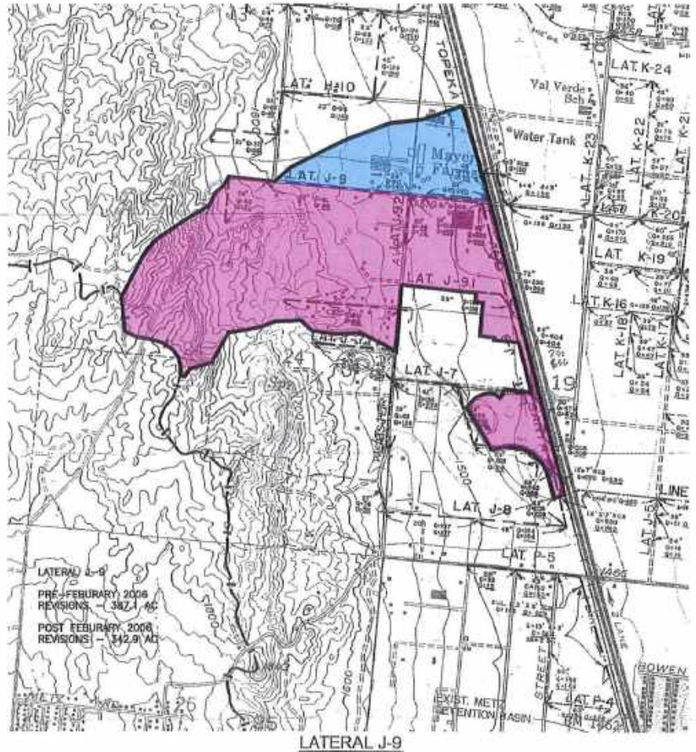
LATERALS J-7, J-8, & J-9



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:

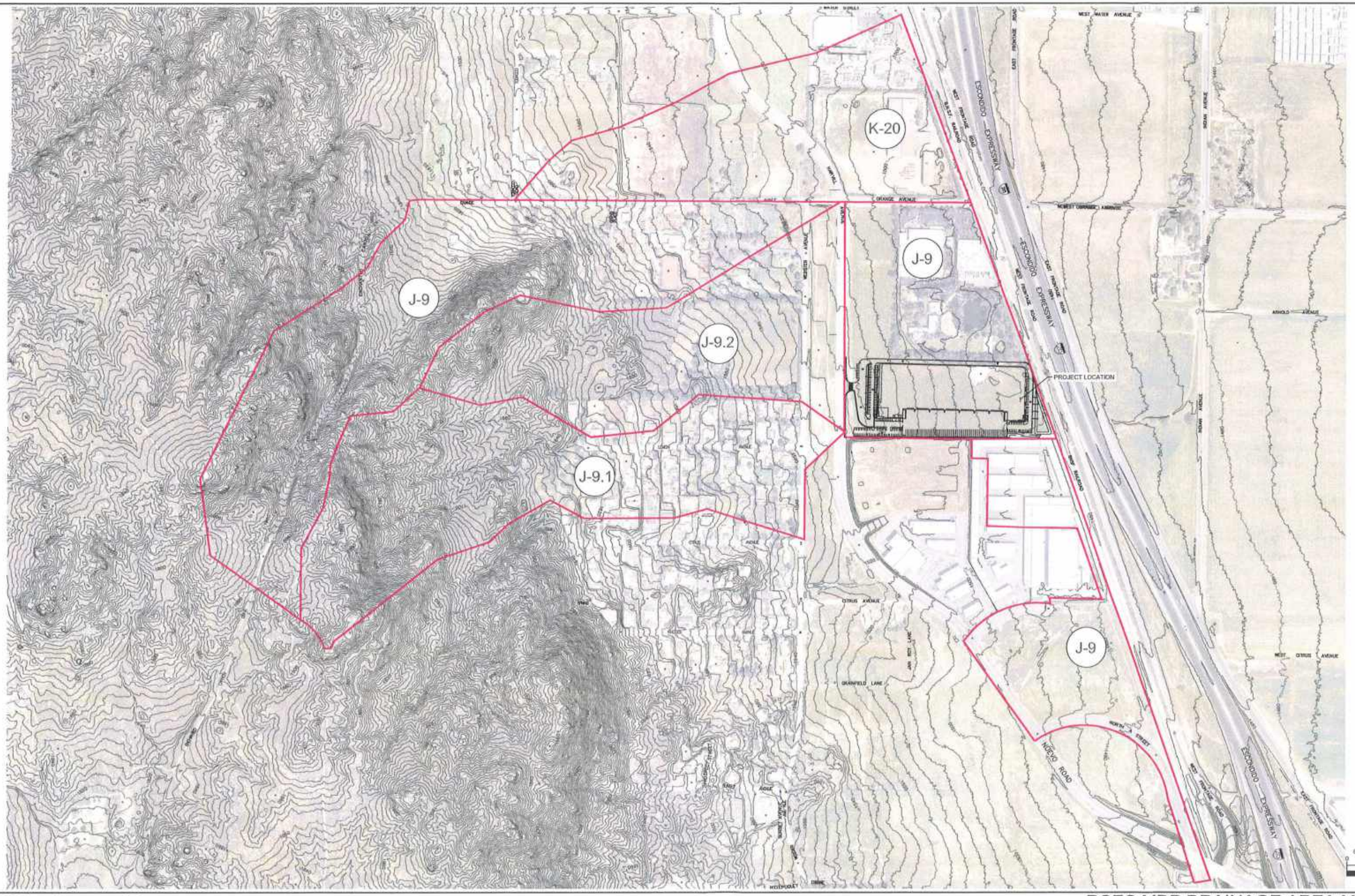
SCALE:

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:\srd_life\rockefeller - riverside_harvill\rcfc\2020.10.08 - mdp letter\2020.10.09 - mdp drainage area.dwg 10/8/2020

EXHIBITS

EXHIBIT A: VICINITY MAP

EXHIBIT B: EXISTING OFFSITE HYDROLOGY MAP

EXHIBIT C: EXISTING HYDROLOGY MAP

EXHIBIT D: EXISTING HYDROLOGY MAP

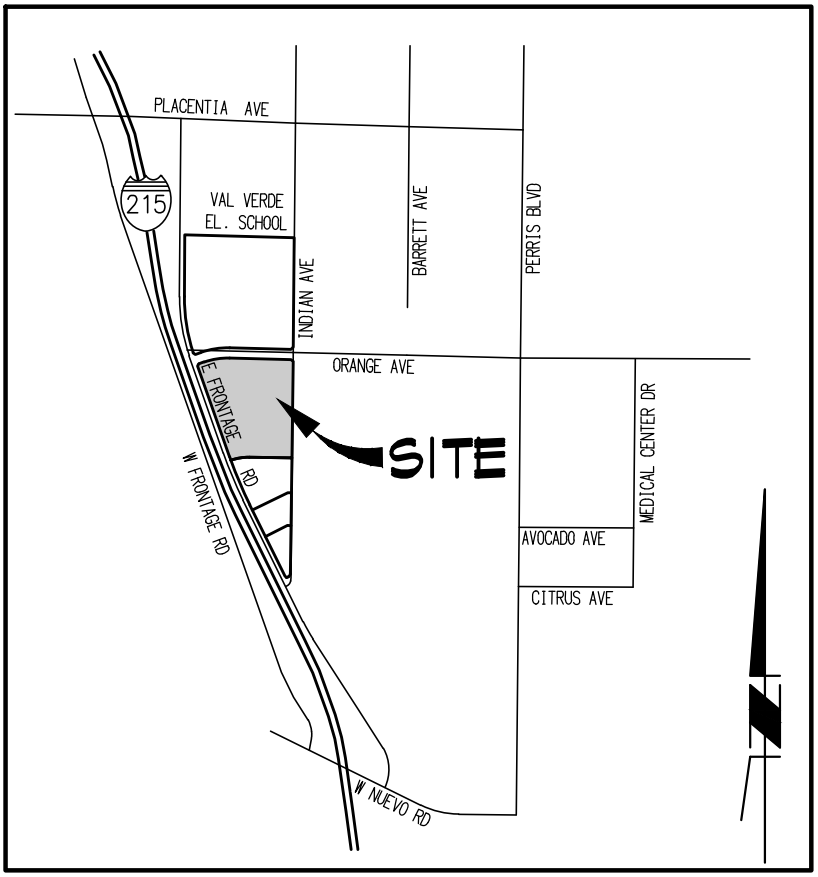
EXHIBIT E: PROPOSED HYDROLOGY MAP

EXHIBIT F: HYDROLOGIC SOILS GROUP MAP

EXHIBIT G: RCFCD MDP FACILITIES OVERLAY

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

EXHIBIT I: CONCEPTUAL GRADING



VICINITY MAP

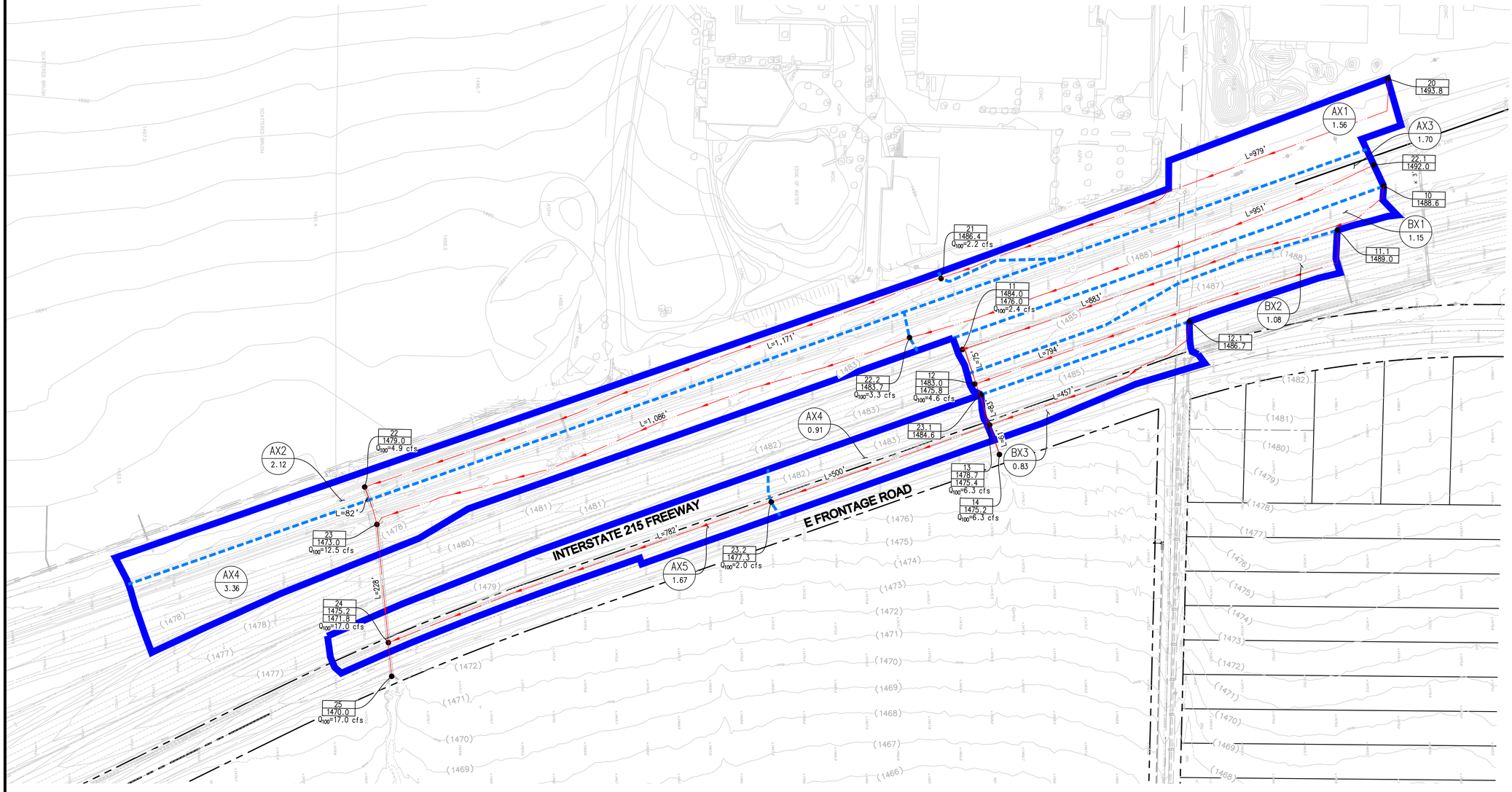
T4S, R3W, SEC 19
NOT TO SCALE

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951.331.9873 - FMCIVIL.COM

HARVEST LANDING SITE 2

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'

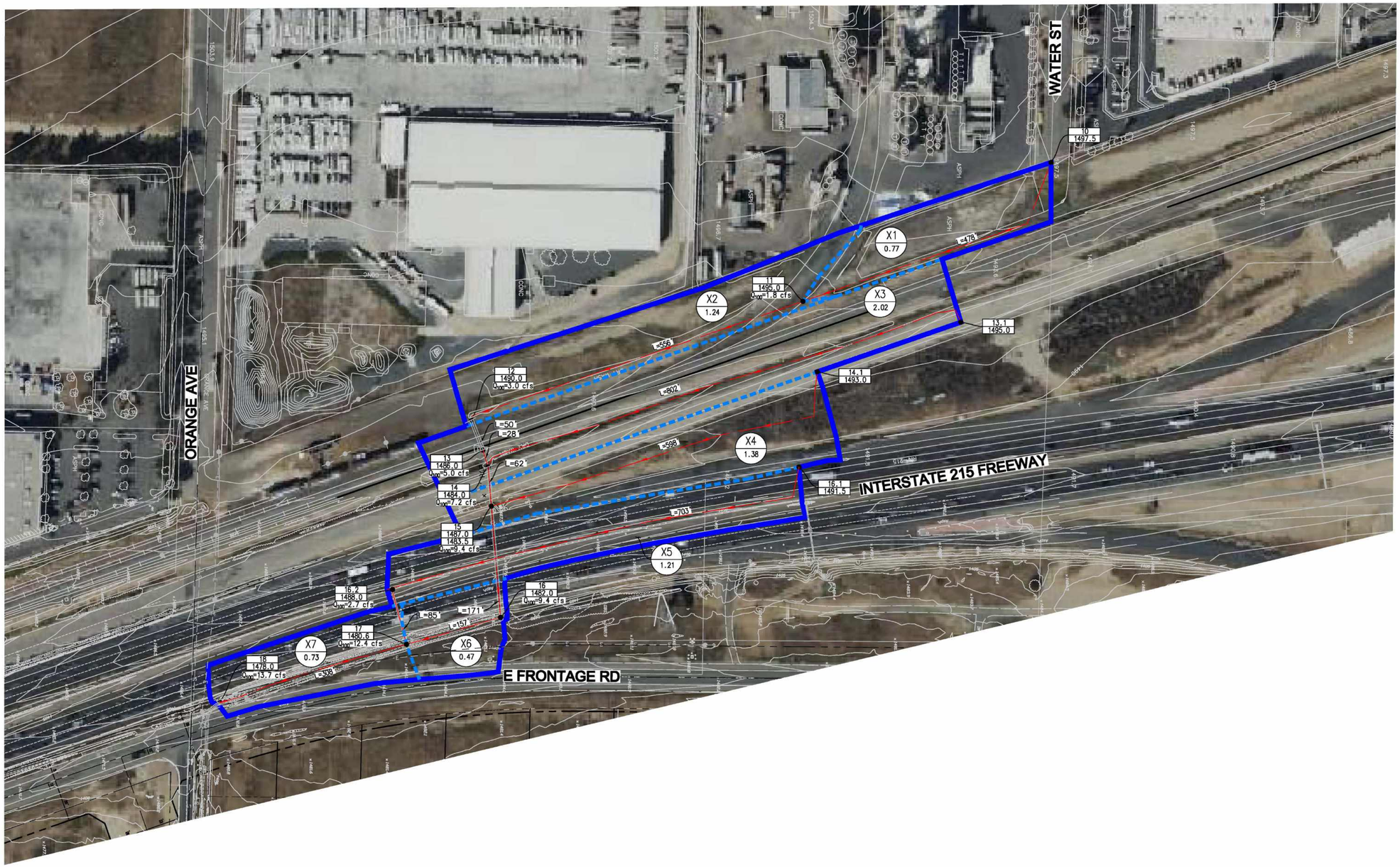
100 50 0 100 200 300

SCALE: 1"=100'

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HARVEST LANDING

SITE 2 - OFFSITE HYDROLOGY



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"=80'

80 40 0 80 160 240

SCALE: 1"=80'

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HARVEST LANDING

SITE 2 - PIPE OFFSITE FLOWS

W FRONTAGE ROAD

INTERSTATE 215 FREEWAY

E FRONTAGE ROAD

ORANGE AVE

APN 305-100-056

APN 305-100-028

APN 305-100-009

APN 305-100-008

APN 305-120-020

APN 305-110-001

PROPERTY LINE

R/W

UNIT HYDROGRAPH CENTROID

13.1
1470.0
Q_{100}=17.0 cfs
A=11.32 ac
T_c=19.84 mins

13.3
1478.4

12.1
1478.6
Q_{100}=6.3 cfs
A=3.06 ac
T_c=13.94 mins

12
1481.1

10
1481.5

13
1464.3
Q_{100}=9.8 cfs

11
1464.8
Q_{100}=2.5 cfs

13.2
1462.8
Q_{100}=23.6 cfs

13.4
1461.0
Q_{100}=30.4 cfs

14
1459.0
Q_{100}=54.0 cfs

A1 2.76
A2 5.34
A3 2.17
A4 2.25
A5 7.62
A6 5.79
A7 4.22
A8 2.96

L=762'
L=358'
L=1177'
L=603'
L=900'
L=856'
L=970'
L=793'
L=868'

UNIT HYDROGRAPH PARAMETERS			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
1,724	1,620	22.50	0.020

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"=60'

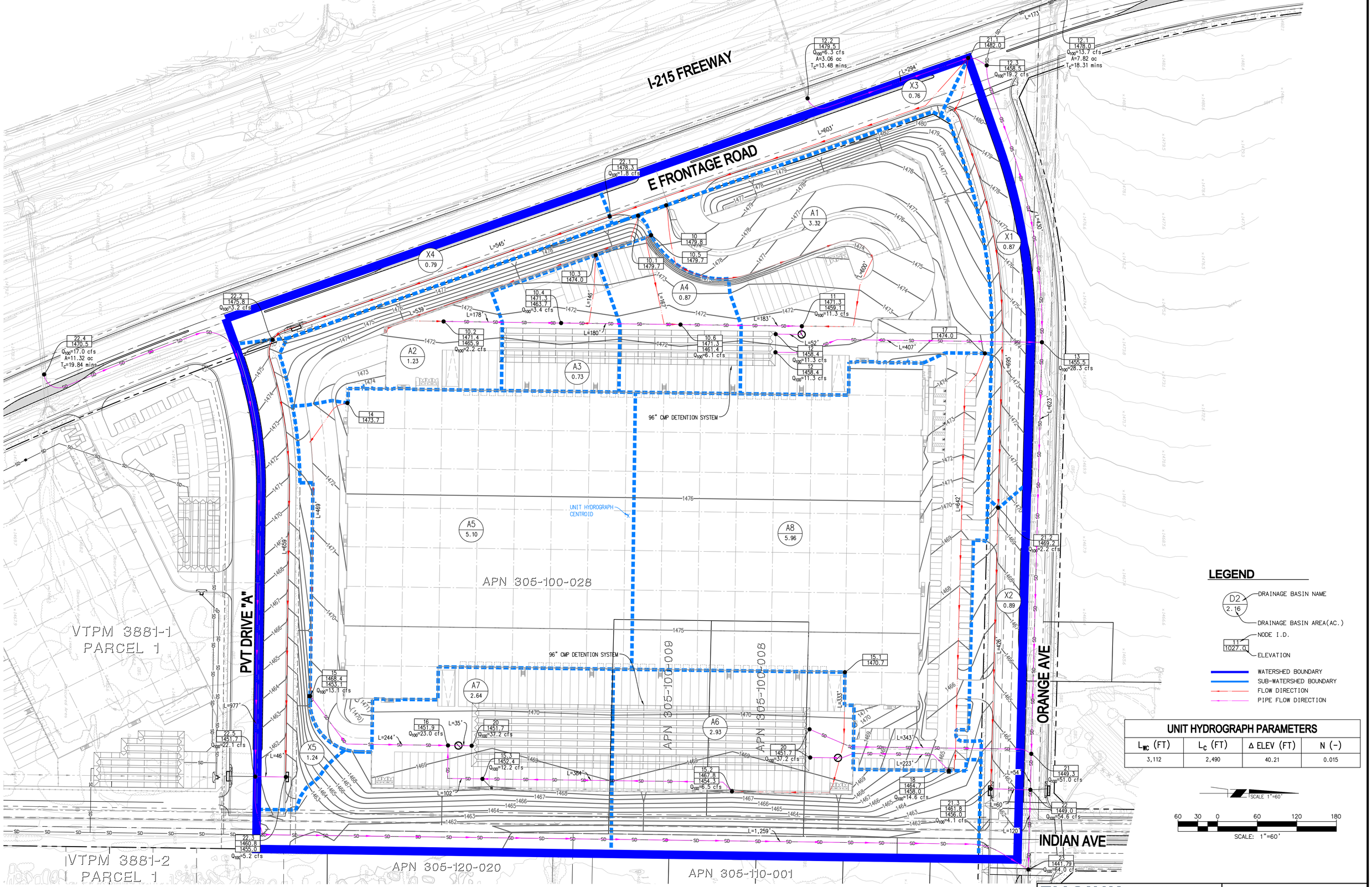
60 30 0 60 120 180

SCALE: 1"=60'

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HARVEST LANDING

SITE 2 - EXISTING HYDROLOGY



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

UNIT HYDROGRAPH PARAMETERS			
L_{MC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
3,112	2,490	40.21	0.015

SCALE 1"=60'

60 30 0 60 120 180

SCALE: 1"=60'

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HARVEST LANDING

SITE 2 - PROPOSED DRAINAGE



LEGEND

- SITE 2 BOUNDARY
- HYDROLOGIC SOIL A
- HYDROLOGIC SOIL B
- HYDROLOGIC SOIL C

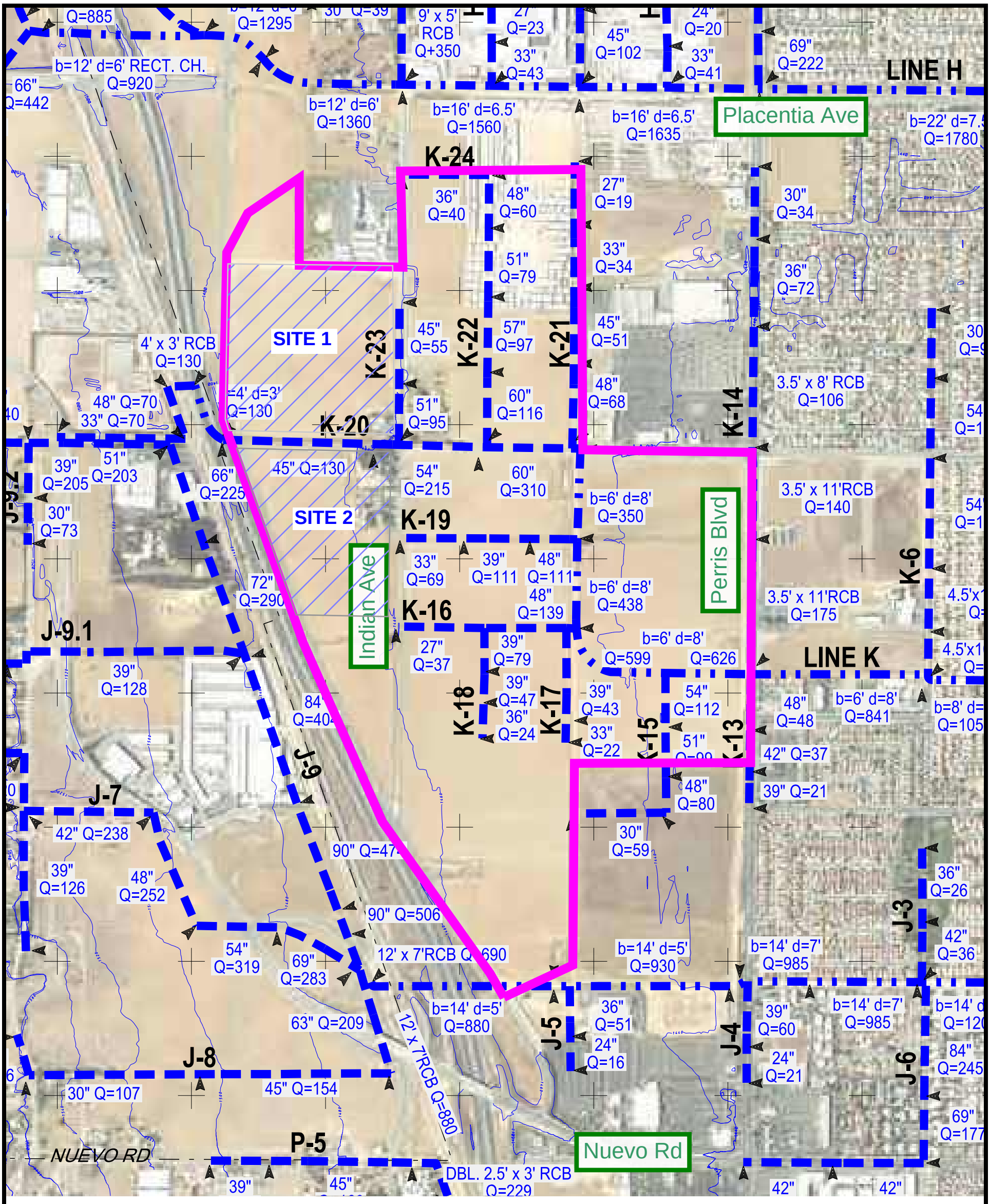
0 100 200 ft

FMCIVIL ENGINEERS INC.

Source: USDA Web Soil Survey

HARVEST LANDING

SITE 2 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:	

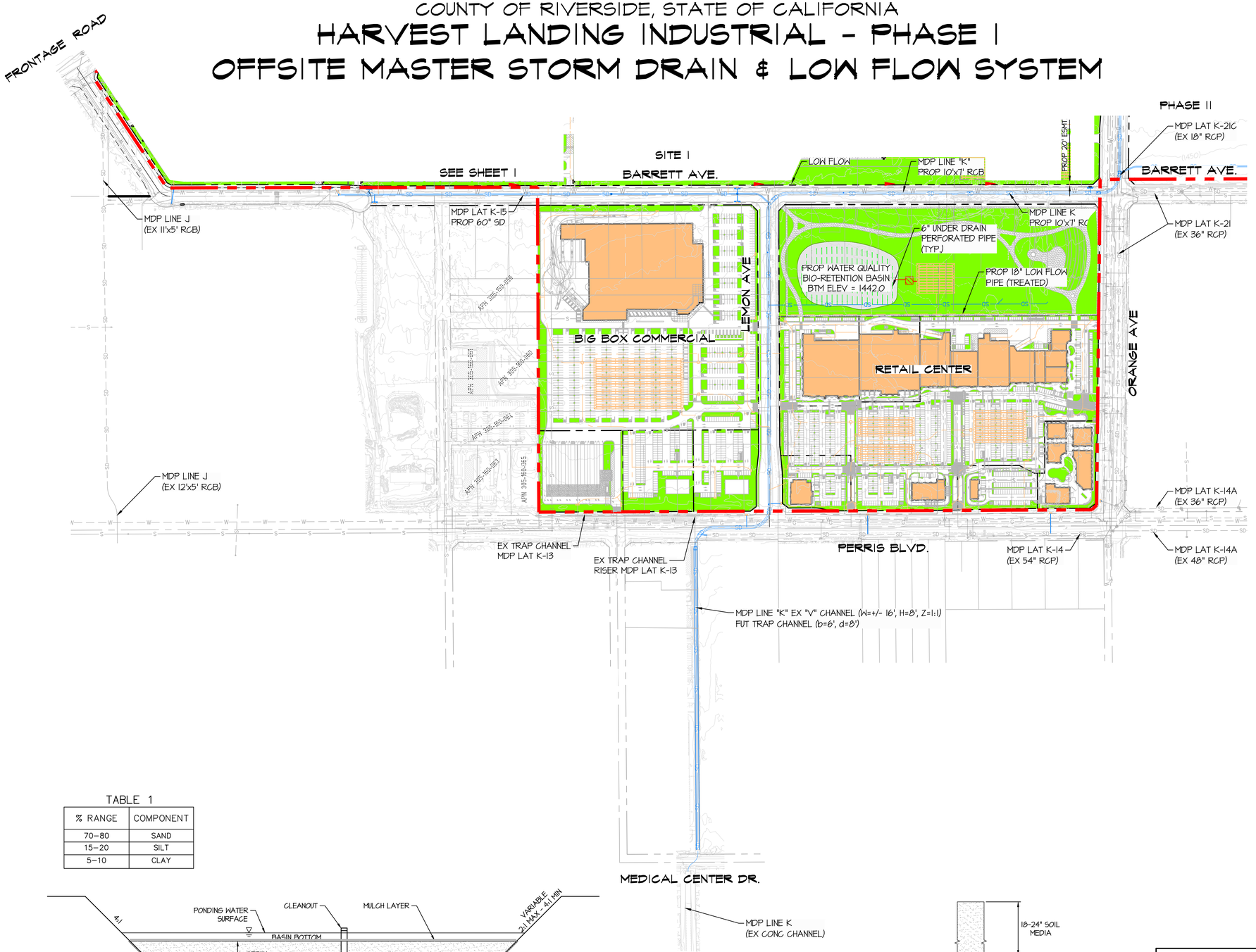
FMCIVIL ENGINEERS INC.
41870 KALMIA STREET, SUITE 120
MURRIETA | CA 92562
951.473.0202 - FMCIVIL.COM

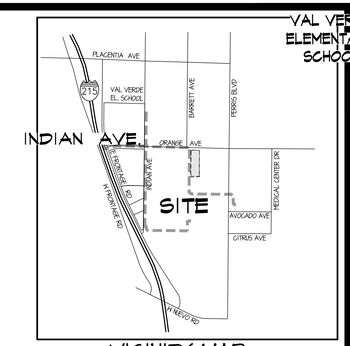
SHEET 1 OF 2 SHEETS

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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

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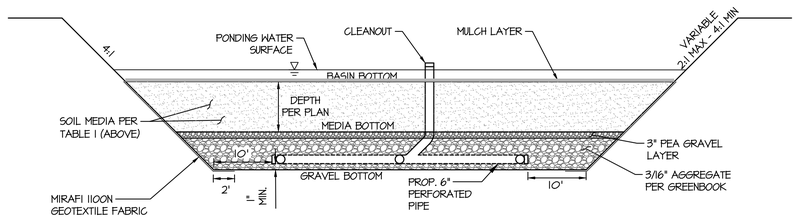
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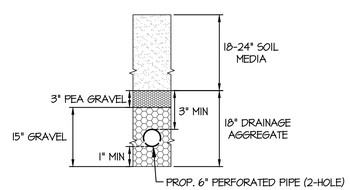
TABLE 1

% RANGE	COMPONENT
70-80	SAND
15-20	SILT
5-10	CLAY

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



BASIN CROSS SECTION
N.T.S.



AGGREGATE CROSS SECTION
N.T.S.





CITY OF PERRIS

HARVEST LANDING INDUSTRIAL - PHASE I OFFSITE MASTER STORM DRAIN & LOW FLOW SYSTEM EXHIBIT

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PLN CK REF.:	

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

SHEET 2 OF 2 SHEETS

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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
- 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.

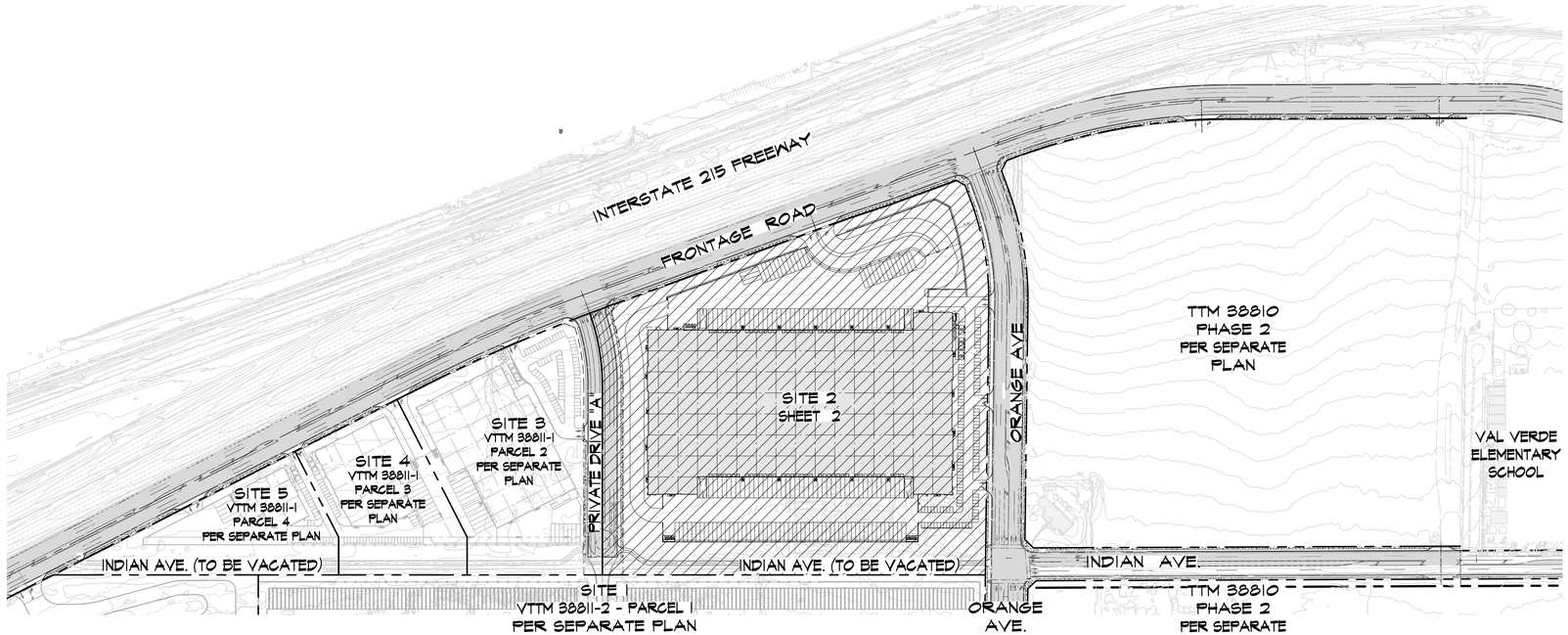
ALSO EXCEPTING THEREFROM THE PORTION DESCRIBED IN DEED RECORDED DECEMBER 21, 1965 AS INSTRUMENT NO. 142400 AND IN DEED RECORDED MARCH 13, 1969 AS INSTRUMENT NO. 24345, RECORDS OF RIVERSIDE COUNTY.

ALSO EXCEPTING THEREFROM THOSE PORTIONS CONVEYED TO THE STATE OF CALIFORNIA BY DEEDS RECORDED MARCH 22, 1982, AS INSTRUMENT NOS. 94602 AND 94603.

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

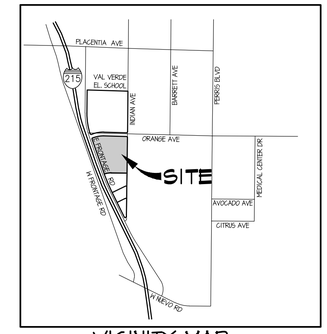
HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #2 CONCEPTUAL GRADING & DRAINAGE PLAN

VESTING TENTATIVE TRACT MAP 38811-1 - PARCEL 1



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
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ENGINEER

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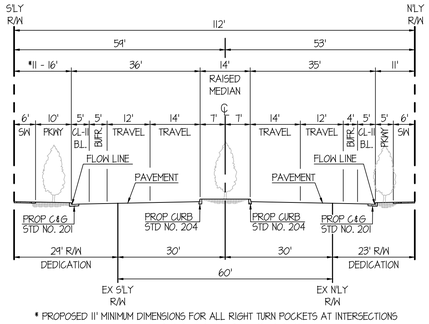
ARCHITECT

AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92866
CONTACT: DAN MACDAVID
(TEL)714-634-9860

EARTHWORK ESTIMATE:

RAW CUT:	2,780 CY
RAW FILL:	192,100 CY
NET:	189,320 CY IMPORT

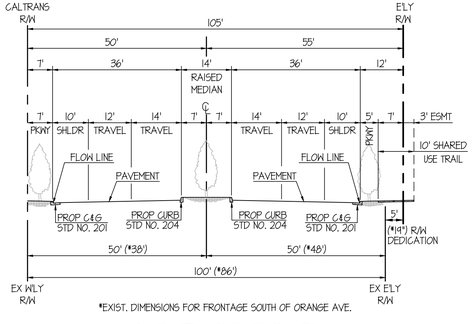
HAUL TRIPS:
ASSUMED (13 CY PER TRIP) = 14,564



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

ORANGE AVENUE
(WEST OF BARRETT AVE)
SECONDARY ARTERIAL

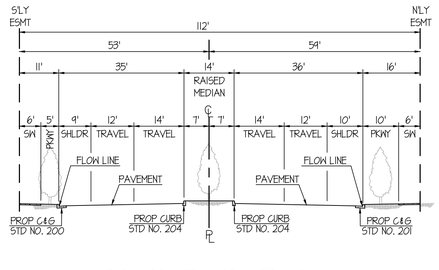
(112'/85')



*EXIST. DIMENSIONS FOR FRONTAGE SOUTH OF ORANGE AVE.

FRONTAGE ROAD
SECONDARY ARTERIAL

(105'/84')



PRIVATE DRIVE "A"
SECONDARY ARTERIAL

(112'/85')

CITY OF PERRIS

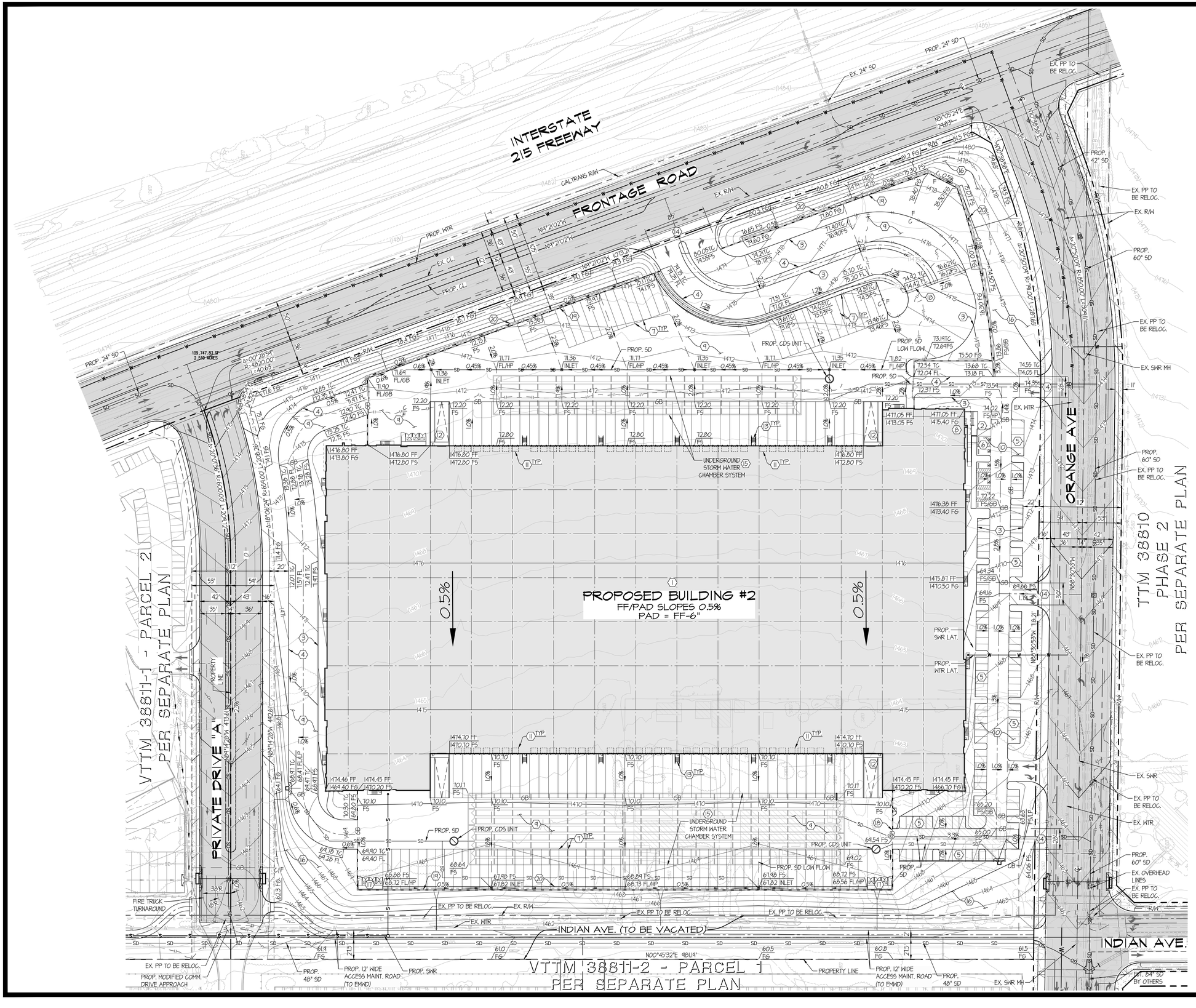
HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #2 CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-1 - PARCEL 1

SCALE:	AS SHOWN
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CHECKED:	FM
PLN CK REF:	

FMCIVIL ENGINEERS INC.
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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"=60'

60 30 0 60 120 180

SCALE: 1"=60'

CITY OF PERRIS

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

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SHEET 2 OF 2 SHEETS

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