

DEVELOPMENT PLAN REVIEW VTPM 38811-1
PARCEL 4 - Site 5
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 2.2 acres and 22,000 square feet warehouse building with 2 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 a low point in Perris Boulevard and the existing MDP Line "K" (earthen V-Channel) located about 2600 lineal feet east of Indian Avenue.

The site is in a relatively mild to flat sloping undeveloped terrain on a drainage area which drains easterly towards Indian Avenue; however, there are offsite flows that enter the site at Frontage Road on the westerly property boundary via an existing 6'x3' RCB, see Exhibit "B". This existing box traverses Caltrans right-of-way, it collects and conveys flows from the west side of the railroad tracks and the 215 freeway. All the developed storm flows continue to travel easterly through the property, to Indian Avenue and the vacant parcels to the east where it ultimately reaches a low point at Perris Boulevard; storm drain flows are intercepted by existing street inlets and the existing MDP Line "K". MDP Line "K" is an earthen "V" channel ($w=16'$, $H=8'$ & $z=1:1$) and planned as a future Trapezoidal Channel ($b=6'$, $d=8'$).

DEVELOPED CONDITIONS

No offsite flows will enter the project site. All onsite storm water runoff will be collected via onsite storm drain system and conveyed to a CDS unit for pretreatment and directed to an above ground bio-retention basin for water quality mitigation. However, the higher flow rates will be directed to an on-site underground pipe chamber which will mitigate the 100-year frequency storm event and release flows to be at or below the predeveloped conditions flow rates.

Onsite storm water mitigated flows will be directed to an offsite master storm drain system (backbone). The preliminary offsite design is shown on Exhibit G “Harvest Landing Industrial Phase 1 Offsite Master Storm Drain & Low Flow System”. The offsite master storm drain and low flow system (backbone) will be part of a separate report and therefore excluded. See the table below for the rational method results:

Description	Q ₁₀₀ Peak Flow Rates
Proposed	7.6
Existing	8.5
Onsite MDP	12.7

For purposes of this preliminary drainage report, the 100-year 24-hour peak flow rates for the post developed condition, predeveloped condition and proposed developed condition per the land use on the MDP were the only storm events analyzed for mitigation. The project storm mitigation is provided by utilizing the underground storm drain detention system and the outlet control structures. The total mitigation volume required was determined by selecting the flow rates from the recess limb of the proposed unit hydrograph runs for the 100-year 24-hour storm event that are equal or less than the flow rates from existing conditions. Smaller storm events were analyzed, however, since the storm volume demand to mitigate the storm flows from the 100-year 24hour event are considerably larger than volumes produced by the smaller storm events, thus a conservative approach.

MDP Condition Volume: 0.79 ac-ft; Q_{100-24hr}: 2.06 cfs
Proposed Condition Volume: 0.51 ac-ft; Q_{100-24hr}: 1.51 cfs
Underground Chamber Volume: *0.74 ac-ft

*Since the peak storm flows for the proposed condition hydrology are less than the existing MDP condition, no mitigation is required. Contech chambers were provided as a place holder in case the district wants us to provide mitigation. See the table below for the unit hydrograph results:

Storm Duration	SP Q _{peak}	SP V _{TOTAL}	MDP Q _{PEAK}	MDP V _{TOTAL}
1	9.50	0.2635	11.6	0.3196
3	5.44	0.3742	6.26	0.5022
6	4.38	0.3941	5.19	0.613
24	1.51	0.7674	2.06	1.192
Acreage	3.46		3.46	

METHODOLOGY

HYDROLOGY

Hydrologic calculations were performed using the Riverside County Rational Method from RCFC & 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”-24”. A more detailed 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 (RATIONAL METHOD)

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

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

100-YEAR PROPOSED OFF-SITE HYDROLOGY – E FRONTAGE ROAD (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: 08/22/23 File:100x5.out

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

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

20-001 HARVEST LANDING RETAIL CENTER BUSINESS PARK
EXISTING 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 = 365.000(Ft.)

Top (of initial area) elevation = 1473.200(Ft.)

Bottom (of initial area) elevation = 1465.200(Ft.)

Difference in elevation = 8.000(Ft.)

Slope = 0.02192 s(percent)= 2.19

$TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 12.051 min.
 Rainfall intensity = 2.459(In/Hr) for a 100.0 year storm
 UNDEVELOPED (poor cover) subarea
 Runoff Coefficient = 0.771
 Decimal fraction soil group A = 0.140
 Decimal fraction soil group B = 0.860
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 76.46
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 8.440(CFS)
 Total initial stream area = 4.450(Ac.)
 Pervious area fraction = 1.000
 End of computations, total study area = 4.45 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.

 Area averaged pervious area fraction(A_p) = 1.000
 Area averaged RI index number = 76.5

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/18/23 File:100x5.out

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

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

20-001 HARVEST LANDING RETAIL CEENTER & BUSINESS PARK
PROPOSED LANDUSE CONDITION
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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

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

Standard intensity-duration curves data (Plate D-4.1)

For the [Perris Valley] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.120(In/Hr)

Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 365.000(Ft.)

Top (of initial area) elevation = 1473.200(Ft.)

Bottom (of initial area) elevation = 1465.200(Ft.)

Difference in elevation = 8.000(Ft.)

Slope = 0.02192 s(percent)= 2.19

TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$

Initial area time of concentration = 6.821 min.
Rainfall intensity = 3.250(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.140
Decimal fraction soil group B = 0.860
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 52.64
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 12.666(CFS)
Total initial stream area = 4.450(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 4.45 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged RI index number = 52.6

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 09/30/24 File: P1005.out

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

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

Program License Serial Number 6405

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

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 = 336.000(Ft.)

Top (of initial area) elevation = 1471.400(Ft.)

Bottom (of initial area) elevation = 1467.600(Ft.)

Difference in elevation = 3.800(Ft.)

Slope = 0.01131 s(percent)= 1.13
TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.533 min.
Rainfall intensity = 3.096(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 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 = 1.738(CFS)
Total initial stream area = 0.640(Ac.)
Pervious area fraction = 0.100

++++
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 = 0.640(Ac.)
Runoff from this stream = 1.738(CFS)
Time of concentration = 7.53 min.
Rainfall intensity = 3.096(In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 10.100 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 267.000(Ft.)
Top (of initial area) elevation = 1473.400(Ft.)
Bottom (of initial area) elevation = 1467.600(Ft.)
Difference in elevation = 5.800(Ft.)
Slope = 0.02172 s(percent)= 2.17
TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 6.030 min.
Rainfall intensity = 3.453(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.669(CFS)
Total initial stream area = 0.550(Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 10.100 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 = 0.550(Ac.)

Runoff from this stream = 1.669(CFS)

Time of concentration = 6.03 min.

Rainfall intensity = 3.453(In/Hr)

Summary of stream data:

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

1	1.738	7.53	3.096
---	-------	------	-------

2	1.669	6.03	3.453
---	-------	------	-------

Largest stream flow has longer time of concentration

Qp = 1.738 + sum of
Qb Ia/Ib
1.669 * 0.897 = 1.497

Qp = 3.235

Total of 2 main streams to confluence:

Flow rates before confluence point:

1.738 1.669

Area of streams before confluence:

0.640 0.550

Results of confluence:

Total flow rate = 3.235(CFS)

Time of concentration = 7.533 min.

Effective stream area after confluence = 1.190(Ac.)

+++++

Process from Point/Station	11.000	to Point/Station	12.000
----------------------------	--------	------------------	--------

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

Upstream point/station elevation = 1464.090(Ft.)

Downstream point/station elevation = 1459.680(Ft.)

Pipe length = 239.00(Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 3.235(CFS)

Nearest computed pipe diameter = 12.00(In.)

Calculated individual pipe flow = 3.235(CFS)

Normal flow depth in pipe = 7.17(In.)

Flow top width inside pipe = 11.77(In.)

Critical Depth = 9.24(In.)

Pipe flow velocity = 6.60(Ft/s)

Travel time through pipe = 0.60 min.

Time of concentration (TC) = 8.14 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 = 1.190(Ac.)

Runoff from this stream = 3.235(CFS)

Time of concentration = 8.14 min.

Rainfall intensity = 2.981(In/Hr)

Program is now starting with Main Stream No. 2

++++++
Process from Point/Station 11.100 to Point/Station 11.200
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 125.000(Ft.)
Top (of initial area) elevation = 1470.900(Ft.)
Bottom (of initial area) elevation = 1469.200(Ft.)
Difference in elevation = 1.700(Ft.)
Slope = 0.01360 s(percent)= 1.36
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
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 = 0.879
Decimal fraction soil group A = 0.120
Decimal fraction soil group B = 0.880
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 53.12
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.696(CFS)
Total initial stream area = 0.510(Ac.)
Pervious area fraction = 0.100

++++++
Process from Point/Station 11.200 to Point/Station 12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1466.240(Ft.)
Downstream point/station elevation = 1459.680(Ft.)
Pipe length = 21.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.696(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 1.696(CFS)
Normal flow depth in pipe = 3.14(In.)
Flow top width inside pipe = 5.99(In.)
Critical depth could not be calculated.
Pipe flow velocity = 16.28(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 5.02 min.

++++++
Process from Point/Station 12.000 to Point/Station 12.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1 Acre Lot)
 Runoff Coefficient = 0.717
 Decimal fraction soil group A = 0.210
 Decimal fraction soil group B = 0.790
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 50.96
 Pervious area fraction = 0.800; Impervious fraction = 0.200
 Time of concentration = 5.02 min.
 Rainfall intensity = 3.777(In/Hr) for a 100.0 year storm
 Subarea runoff = 3.766(CFS) for 1.390(Ac.)
 Total runoff = 5.462(CFS) Total area = 1.900(Ac.)

++++++
 Process from Point/Station 12.000 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 = 1.900(Ac.)
 Runoff from this stream = 5.462(CFS)
 Time of concentration = 5.02 min.
 Rainfall intensity = 3.777(In/Hr)
 Summary of stream data:

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

1	3.235	8.14	2.981
2	5.462	5.02	3.777

Largest stream flow has longer or shorter time of concentration

Qp = 5.462 + sum of
 Qa Tb/Ta
 3.235 * 0.617 = 1.996
 Qp = 7.458

Total of 2 main streams to confluence:

Flow rates before confluence point:

3.235 5.462

Area of streams before confluence:

1.190 1.900

Results of confluence:

Total flow rate = 7.458(CFS)

Time of concentration = 5.021 min.

Effective stream area after confluence = 3.090(Ac.)

++++++
 Process from Point/Station 12.000 to Point/Station 14.000
 ***** PIPEFLOW TRAVEL TIME (Program estimated size) *****

Upstream point/station elevation = 1459.680(Ft.)

Downstream point/station elevation = 1457.700(Ft.)
Pipe length = 100.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.458(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 7.458(CFS)
Normal flow depth in pipe = 10.34(In.)
Flow top width inside pipe = 13.89(In.)
Critical Depth = 13.04(In.)
Pipe flow velocity = 8.27(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 5.22 min.

+++++
Process from Point/Station 12.000 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 = 3.090(Ac.)
Runoff from this stream = 7.458(CFS)
Time of concentration = 5.22 min.
Rainfall intensity = 3.704(In/Hr)
Program is now starting with Main Stream No. 2

+++++
Process from Point/Station 13.000 to Point/Station 13.100
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 475.000(Ft.)
Top (of initial area) elevation = 1472.300(Ft.)
Bottom (of initial area) elevation = 1464.700(Ft.)
Difference in elevation = 7.600(Ft.)
Slope = 0.01600 s(percent)= 1.60
 $TC = k(0.940)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 25.292 min.
Rainfall intensity = 1.710(In/Hr) for a 100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.495
Decimal fraction soil group A = 0.530
Decimal fraction soil group B = 0.470
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 48.81
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.322(CFS)
Total initial stream area = 0.380(Ac.)
Pervious area fraction = 1.000

+++++
Process from Point/Station 13.100 to Point/Station 14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1462.000(Ft.)
Downstream point/station elevation = 1457.700(Ft.)

Pipe length = 237.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.322(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.322(CFS)
 Normal flow depth in pipe = 2.74(In.)
 Flow top width inside pipe = 5.98(In.)
 Critical Depth = 3.45(In.)
 Pipe flow velocity = 3.70(Ft/s)
 Travel time through pipe = 1.07 min.
 Time of concentration (TC) = 26.36 min.

++++++
 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 = 0.380(Ac.)
 Runoff from this stream = 0.322(CFS)
 Time of concentration = 26.36 min.
 Rainfall intensity = 1.676(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.458	5.22	3.704
2	0.322	26.36	1.676

Largest stream flow has longer or shorter time of concentration

$Q_p = 7.458 + \text{sum of}$
 $Q_a \quad T_b/T_a$
 $0.322 * 0.198 = 0.064$
 $Q_p = 7.522$

Total of 2 main streams to confluence:

Flow rates before confluence point:

7.458 0.322

Area of streams before confluence:

3.090 0.380

Results of confluence:

Total flow rate = 7.522(CFS)

Time of concentration = 5.223 min.

Effective stream area after confluence = 3.470(Ac.)

End of computations, total study area = 3.47 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.479

Area averaged RI index number = 52.8

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/11/24
File:100pfrontage5.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 - OFFSITE - E FRONTAGE ROAD
100-YEAR STORM ANALYSIS

Program License Serial Number 6405

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

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

Standard intensity-duration curves data (Plate D-4.1)

For the [Perris Valley] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.120(In/Hr)

Slope of intensity duration curve = 0.4900

+++++
Process from Point/Station 20.000 to Point/Station 20.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 2.276(In/Hr) for a 100.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.872

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
 User specified values are as follows:
 TC = 14.12 min. Rain intensity = 2.28(In/Hr)
 Total area = 1.15(Ac.) Total runoff = 2.50(CFS)

++++++
 Process from Point/Station 20.000 to Point/Station 21.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1472.400(Ft.)
 End of street segment elevation = 1468.500(Ft.)
 Length of street segment = 778.000(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 = 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 = 0.0130
 Manning's N from gutter to grade break = 0.0130
 Manning's N from grade break to crown = 0.0130
 Estimated mean flow rate at midpoint of street = 3.341(CFS)
 Depth of flow = 0.371(Ft.), Average velocity = 2.062(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 12.222(Ft.)
 Flow velocity = 2.06(Ft/s)
 Travel time = 6.29 min. TC = 20.41 min.
 Adding area flow to street
 COMMERCIAL subarea type
 Runoff Coefficient = 0.868
 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 = 1.900(In/Hr) for a 100.0 year storm
 Subarea runoff = 1.616(CFS) for 0.980(Ac.)
 Total runoff = 4.116(CFS) Total area = 2.130(Ac.)
 Street flow at end of street = 4.116(CFS)
 Half street flow at end of street = 4.116(CFS)
 Depth of flow = 0.393(Ft.), Average velocity = 2.166(Ft/s)
 Flow width (from curb towards crown)= 13.316(Ft.)
 End of computations, total study area = 2.13 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged RI index number = 56.0

Unit Hydrograph Analysis

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Study date 10/10/23 File: 100XUH24100.out

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

Program License Serial Number 6405

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

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

English Units used in output format

Drainage Area = 3.46(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.46(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 365.00(Ft.)
Length along longest watercourse measured to centroid = 176.00(Ft.)
Length along longest watercourse = 0.069 Mi.
Length along longest watercourse measured to centroid = 0.033 Mi.
Difference in elevation = 8.00(Ft.)
Slope along watercourse = 115.7260 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.019 Hr.
Lag time = 1.16 Min.
25% of lag time = 0.29 Min.
40% of lag time = 0.46 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]
3.46	2.00	6.92

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.46	5.00	17.30

STORM EVENT (YEAR) = 100.00

Area Averaged 2-Year Rainfall = 2.000(In)

Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)

Areal adjustment factor = 100.00 %

Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.460	52.60	0.900
Total Area Entered = 3.46(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.6	52.6	0.545	0.900	0.104	1.000	0.104
Sum (F) =						0.104

Area averaged mean soil loss (F) (In/Hr) = 0.104

Minimum soil loss rate ((In/Hr)) = 0.052

(for 24 hour storm duration)

Soil loss rate (decimal) = 0.180

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	430.393	2.339
2	0.167	860.786	1.148
Sum = 100.000		Sum=	3.487

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)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.040	(0.184)	0.007	0.033
2	0.17	0.07	0.040	(0.183)	0.007	0.033
3	0.25	0.07	0.040	(0.182)	0.007	0.033
4	0.33	0.10	0.060	(0.182)	0.011	0.049
5	0.42	0.10	0.060	(0.181)	0.011	0.049
6	0.50	0.10	0.060	(0.180)	0.011	0.049
7	0.58	0.10	0.060	(0.179)	0.011	0.049
8	0.67	0.10	0.060	(0.179)	0.011	0.049
9	0.75	0.10	0.060	(0.178)	0.011	0.049
10	0.83	0.13	0.080	(0.177)	0.014	0.066
11	0.92	0.13	0.080	(0.177)	0.014	0.066
12	1.00	0.13	0.080	(0.176)	0.014	0.066
13	1.08	0.10	0.060	(0.175)	0.011	0.049
14	1.17	0.10	0.060	(0.175)	0.011	0.049
15	1.25	0.10	0.060	(0.174)	0.011	0.049
16	1.33	0.10	0.060	(0.173)	0.011	0.049
17	1.42	0.10	0.060	(0.173)	0.011	0.049
18	1.50	0.10	0.060	(0.172)	0.011	0.049
19	1.58	0.10	0.060	(0.171)	0.011	0.049
20	1.67	0.10	0.060	(0.170)	0.011	0.049
21	1.75	0.10	0.060	(0.170)	0.011	0.049
22	1.83	0.13	0.080	(0.169)	0.014	0.066
23	1.92	0.13	0.080	(0.168)	0.014	0.066
24	2.00	0.13	0.080	(0.168)	0.014	0.066
25	2.08	0.13	0.080	(0.167)	0.014	0.066
26	2.17	0.13	0.080	(0.166)	0.014	0.066
27	2.25	0.13	0.080	(0.166)	0.014	0.066
28	2.33	0.13	0.080	(0.165)	0.014	0.066
29	2.42	0.13	0.080	(0.164)	0.014	0.066
30	2.50	0.13	0.080	(0.164)	0.014	0.066
31	2.58	0.17	0.100	(0.163)	0.018	0.082
32	2.67	0.17	0.100	(0.162)	0.018	0.082
33	2.75	0.17	0.100	(0.162)	0.018	0.082
34	2.83	0.17	0.100	(0.161)	0.018	0.082
35	2.92	0.17	0.100	(0.160)	0.018	0.082
36	3.00	0.17	0.100	(0.160)	0.018	0.082
37	3.08	0.17	0.100	(0.159)	0.018	0.082
38	3.17	0.17	0.100	(0.158)	0.018	0.082
39	3.25	0.17	0.100	(0.158)	0.018	0.082
40	3.33	0.17	0.100	(0.157)	0.018	0.082
41	3.42	0.17	0.100	(0.156)	0.018	0.082
42	3.50	0.17	0.100	(0.156)	0.018	0.082
43	3.58	0.17	0.100	(0.155)	0.018	0.082
44	3.67	0.17	0.100	(0.154)	0.018	0.082
45	3.75	0.17	0.100	(0.154)	0.018	0.082

46	3.83	0.20	0.120	(0.153)	0.022	0.098
47	3.92	0.20	0.120	(0.152)	0.022	0.098
48	4.00	0.20	0.120	(0.152)	0.022	0.098
49	4.08	0.20	0.120	(0.151)	0.022	0.098
50	4.17	0.20	0.120	(0.151)	0.022	0.098
51	4.25	0.20	0.120	(0.150)	0.022	0.098
52	4.33	0.23	0.140	(0.149)	0.025	0.115
53	4.42	0.23	0.140	(0.149)	0.025	0.115
54	4.50	0.23	0.140	(0.148)	0.025	0.115
55	4.58	0.23	0.140	(0.147)	0.025	0.115
56	4.67	0.23	0.140	(0.147)	0.025	0.115
57	4.75	0.23	0.140	(0.146)	0.025	0.115
58	4.83	0.27	0.160	(0.145)	0.029	0.131
59	4.92	0.27	0.160	(0.145)	0.029	0.131
60	5.00	0.27	0.160	(0.144)	0.029	0.131
61	5.08	0.20	0.120	(0.144)	0.022	0.098
62	5.17	0.20	0.120	(0.143)	0.022	0.098
63	5.25	0.20	0.120	(0.142)	0.022	0.098
64	5.33	0.23	0.140	(0.142)	0.025	0.115
65	5.42	0.23	0.140	(0.141)	0.025	0.115
66	5.50	0.23	0.140	(0.140)	0.025	0.115
67	5.58	0.27	0.160	(0.140)	0.029	0.131
68	5.67	0.27	0.160	(0.139)	0.029	0.131
69	5.75	0.27	0.160	(0.139)	0.029	0.131
70	5.83	0.27	0.160	(0.138)	0.029	0.131
71	5.92	0.27	0.160	(0.137)	0.029	0.131
72	6.00	0.27	0.160	(0.137)	0.029	0.131
73	6.08	0.30	0.180	(0.136)	0.032	0.148
74	6.17	0.30	0.180	(0.136)	0.032	0.148
75	6.25	0.30	0.180	(0.135)	0.032	0.148
76	6.33	0.30	0.180	(0.134)	0.032	0.148
77	6.42	0.30	0.180	(0.134)	0.032	0.148
78	6.50	0.30	0.180	(0.133)	0.032	0.148
79	6.58	0.33	0.200	(0.133)	0.036	0.164
80	6.67	0.33	0.200	(0.132)	0.036	0.164
81	6.75	0.33	0.200	(0.131)	0.036	0.164
82	6.83	0.33	0.200	(0.131)	0.036	0.164
83	6.92	0.33	0.200	(0.130)	0.036	0.164
84	7.00	0.33	0.200	(0.130)	0.036	0.164
85	7.08	0.33	0.200	(0.129)	0.036	0.164
86	7.17	0.33	0.200	(0.128)	0.036	0.164
87	7.25	0.33	0.200	(0.128)	0.036	0.164
88	7.33	0.37	0.220	(0.127)	0.040	0.180
89	7.42	0.37	0.220	(0.127)	0.040	0.180
90	7.50	0.37	0.220	(0.126)	0.040	0.180
91	7.58	0.40	0.240	(0.126)	0.043	0.197
92	7.67	0.40	0.240	(0.125)	0.043	0.197
93	7.75	0.40	0.240	(0.124)	0.043	0.197
94	7.83	0.43	0.260	(0.124)	0.047	0.213
95	7.92	0.43	0.260	(0.123)	0.047	0.213

96	8.00	0.43	0.260	(0.123)	0.047	0.213
97	8.08	0.50	0.300	(0.122)	0.054	0.246
98	8.17	0.50	0.300	(0.122)	0.054	0.246
99	8.25	0.50	0.300	(0.121)	0.054	0.246
100	8.33	0.50	0.300	(0.120)	0.054	0.246
101	8.42	0.50	0.300	(0.120)	0.054	0.246
102	8.50	0.50	0.300	(0.119)	0.054	0.246
103	8.58	0.53	0.320	(0.119)	0.058	0.262
104	8.67	0.53	0.320	(0.118)	0.058	0.262
105	8.75	0.53	0.320	(0.118)	0.058	0.262
106	8.83	0.57	0.340	(0.117)	0.061	0.279
107	8.92	0.57	0.340	(0.116)	0.061	0.279
108	9.00	0.57	0.340	(0.116)	0.061	0.279
109	9.08	0.63	0.380	(0.115)	0.068	0.312
110	9.17	0.63	0.380	(0.115)	0.068	0.312
111	9.25	0.63	0.380	(0.114)	0.068	0.312
112	9.33	0.67	0.400	(0.114)	0.072	0.328
113	9.42	0.67	0.400	(0.113)	0.072	0.328
114	9.50	0.67	0.400	(0.113)	0.072	0.328
115	9.58	0.70	0.420	(0.112)	0.076	0.344
116	9.67	0.70	0.420	(0.112)	0.076	0.344
117	9.75	0.70	0.420	(0.111)	0.076	0.344
118	9.83	0.73	0.440	(0.111)	0.079	0.361
119	9.92	0.73	0.440	(0.110)	0.079	0.361
120	10.00	0.73	0.440	(0.109)	0.079	0.361
121	10.08	0.50	0.300	(0.109)	0.054	0.246
122	10.17	0.50	0.300	(0.108)	0.054	0.246
123	10.25	0.50	0.300	(0.108)	0.054	0.246
124	10.33	0.50	0.300	(0.107)	0.054	0.246
125	10.42	0.50	0.300	(0.107)	0.054	0.246
126	10.50	0.50	0.300	(0.106)	0.054	0.246
127	10.58	0.67	0.400	(0.106)	0.072	0.328
128	10.67	0.67	0.400	(0.105)	0.072	0.328
129	10.75	0.67	0.400	(0.105)	0.072	0.328
130	10.83	0.67	0.400	(0.104)	0.072	0.328
131	10.92	0.67	0.400	(0.104)	0.072	0.328
132	11.00	0.67	0.400	(0.103)	0.072	0.328
133	11.08	0.63	0.380	(0.103)	0.068	0.312
134	11.17	0.63	0.380	(0.102)	0.068	0.312
135	11.25	0.63	0.380	(0.102)	0.068	0.312
136	11.33	0.63	0.380	(0.101)	0.068	0.312
137	11.42	0.63	0.380	(0.101)	0.068	0.312
138	11.50	0.63	0.380	(0.100)	0.068	0.312
139	11.58	0.57	0.340	(0.100)	0.061	0.279
140	11.67	0.57	0.340	(0.099)	0.061	0.279
141	11.75	0.57	0.340	(0.099)	0.061	0.279
142	11.83	0.60	0.360	(0.098)	0.065	0.295
143	11.92	0.60	0.360	(0.098)	0.065	0.295
144	12.00	0.60	0.360	(0.097)	0.065	0.295
145	12.08	0.83	0.500	(0.097)	0.090	0.410

146	12.17	0.83	0.500	(0.096)	0.090	0.410
147	12.25	0.83	0.500	(0.096)	0.090	0.410
148	12.33	0.87	0.520	(0.095)	0.094	0.426
149	12.42	0.87	0.520	(0.095)	0.094	0.426
150	12.50	0.87	0.520	(0.094)	0.094	0.426
151	12.58	0.93	0.560	0.094	(0.101)	0.466
152	12.67	0.93	0.560	0.093	(0.101)	0.467
153	12.75	0.93	0.560	0.093	(0.101)	0.467
154	12.83	0.97	0.580	0.092	(0.104)	0.488
155	12.92	0.97	0.580	0.092	(0.104)	0.488
156	13.00	0.97	0.580	0.092	(0.104)	0.488
157	13.08	1.13	0.680	0.091	(0.122)	0.589
158	13.17	1.13	0.680	0.091	(0.122)	0.589
159	13.25	1.13	0.680	0.090	(0.122)	0.590
160	13.33	1.13	0.680	0.090	(0.122)	0.590
161	13.42	1.13	0.680	0.089	(0.122)	0.591
162	13.50	1.13	0.680	0.089	(0.122)	0.591
163	13.58	0.77	0.460	(0.088)	0.083	0.377
164	13.67	0.77	0.460	(0.088)	0.083	0.377
165	13.75	0.77	0.460	(0.087)	0.083	0.377
166	13.83	0.77	0.460	(0.087)	0.083	0.377
167	13.92	0.77	0.460	(0.087)	0.083	0.377
168	14.00	0.77	0.460	(0.086)	0.083	0.377
169	14.08	0.90	0.540	0.086	(0.097)	0.454
170	14.17	0.90	0.540	0.085	(0.097)	0.455
171	14.25	0.90	0.540	0.085	(0.097)	0.455
172	14.33	0.87	0.520	0.084	(0.094)	0.436
173	14.42	0.87	0.520	0.084	(0.094)	0.436
174	14.50	0.87	0.520	0.083	(0.094)	0.437
175	14.58	0.87	0.520	0.083	(0.094)	0.437
176	14.67	0.87	0.520	0.083	(0.094)	0.437
177	14.75	0.87	0.520	0.082	(0.094)	0.438
178	14.83	0.83	0.500	0.082	(0.090)	0.418
179	14.92	0.83	0.500	0.081	(0.090)	0.419
180	15.00	0.83	0.500	0.081	(0.090)	0.419
181	15.08	0.80	0.480	0.081	(0.086)	0.399
182	15.17	0.80	0.480	0.080	(0.086)	0.400
183	15.25	0.80	0.480	0.080	(0.086)	0.400
184	15.33	0.77	0.460	0.079	(0.083)	0.381
185	15.42	0.77	0.460	0.079	(0.083)	0.381
186	15.50	0.77	0.460	0.078	(0.083)	0.382
187	15.58	0.63	0.380	(0.078)	0.068	0.312
188	15.67	0.63	0.380	(0.078)	0.068	0.312
189	15.75	0.63	0.380	(0.077)	0.068	0.312
190	15.83	0.63	0.380	(0.077)	0.068	0.312
191	15.92	0.63	0.380	(0.077)	0.068	0.312
192	16.00	0.63	0.380	(0.076)	0.068	0.312
193	16.08	0.13	0.080	(0.076)	0.014	0.066
194	16.17	0.13	0.080	(0.075)	0.014	0.066
195	16.25	0.13	0.080	(0.075)	0.014	0.066

196	16.33	0.13	0.080	(0.075)	0.014	0.066
197	16.42	0.13	0.080	(0.074)	0.014	0.066
198	16.50	0.13	0.080	(0.074)	0.014	0.066
199	16.58	0.10	0.060	(0.073)	0.011	0.049
200	16.67	0.10	0.060	(0.073)	0.011	0.049
201	16.75	0.10	0.060	(0.073)	0.011	0.049
202	16.83	0.10	0.060	(0.072)	0.011	0.049
203	16.92	0.10	0.060	(0.072)	0.011	0.049
204	17.00	0.10	0.060	(0.072)	0.011	0.049
205	17.08	0.17	0.100	(0.071)	0.018	0.082
206	17.17	0.17	0.100	(0.071)	0.018	0.082
207	17.25	0.17	0.100	(0.071)	0.018	0.082
208	17.33	0.17	0.100	(0.070)	0.018	0.082
209	17.42	0.17	0.100	(0.070)	0.018	0.082
210	17.50	0.17	0.100	(0.069)	0.018	0.082
211	17.58	0.17	0.100	(0.069)	0.018	0.082
212	17.67	0.17	0.100	(0.069)	0.018	0.082
213	17.75	0.17	0.100	(0.068)	0.018	0.082
214	17.83	0.13	0.080	(0.068)	0.014	0.066
215	17.92	0.13	0.080	(0.068)	0.014	0.066
216	18.00	0.13	0.080	(0.067)	0.014	0.066
217	18.08	0.13	0.080	(0.067)	0.014	0.066
218	18.17	0.13	0.080	(0.067)	0.014	0.066
219	18.25	0.13	0.080	(0.066)	0.014	0.066
220	18.33	0.13	0.080	(0.066)	0.014	0.066
221	18.42	0.13	0.080	(0.066)	0.014	0.066
222	18.50	0.13	0.080	(0.065)	0.014	0.066
223	18.58	0.10	0.060	(0.065)	0.011	0.049
224	18.67	0.10	0.060	(0.065)	0.011	0.049
225	18.75	0.10	0.060	(0.065)	0.011	0.049
226	18.83	0.07	0.040	(0.064)	0.007	0.033
227	18.92	0.07	0.040	(0.064)	0.007	0.033
228	19.00	0.07	0.040	(0.064)	0.007	0.033
229	19.08	0.10	0.060	(0.063)	0.011	0.049
230	19.17	0.10	0.060	(0.063)	0.011	0.049
231	19.25	0.10	0.060	(0.063)	0.011	0.049
232	19.33	0.13	0.080	(0.062)	0.014	0.066
233	19.42	0.13	0.080	(0.062)	0.014	0.066
234	19.50	0.13	0.080	(0.062)	0.014	0.066
235	19.58	0.10	0.060	(0.062)	0.011	0.049
236	19.67	0.10	0.060	(0.061)	0.011	0.049
237	19.75	0.10	0.060	(0.061)	0.011	0.049
238	19.83	0.07	0.040	(0.061)	0.007	0.033
239	19.92	0.07	0.040	(0.060)	0.007	0.033
240	20.00	0.07	0.040	(0.060)	0.007	0.033
241	20.08	0.10	0.060	(0.060)	0.011	0.049
242	20.17	0.10	0.060	(0.060)	0.011	0.049
243	20.25	0.10	0.060	(0.059)	0.011	0.049
244	20.33	0.10	0.060	(0.059)	0.011	0.049
245	20.42	0.10	0.060	(0.059)	0.011	0.049

246	20.50	0.10	0.060	(0.059)	0.011	0.049
247	20.58	0.10	0.060	(0.058)	0.011	0.049
248	20.67	0.10	0.060	(0.058)	0.011	0.049
249	20.75	0.10	0.060	(0.058)	0.011	0.049
250	20.83	0.07	0.040	(0.058)	0.007	0.033
251	20.92	0.07	0.040	(0.057)	0.007	0.033
252	21.00	0.07	0.040	(0.057)	0.007	0.033
253	21.08	0.10	0.060	(0.057)	0.011	0.049
254	21.17	0.10	0.060	(0.057)	0.011	0.049
255	21.25	0.10	0.060	(0.057)	0.011	0.049
256	21.33	0.07	0.040	(0.056)	0.007	0.033
257	21.42	0.07	0.040	(0.056)	0.007	0.033
258	21.50	0.07	0.040	(0.056)	0.007	0.033
259	21.58	0.10	0.060	(0.056)	0.011	0.049
260	21.67	0.10	0.060	(0.055)	0.011	0.049
261	21.75	0.10	0.060	(0.055)	0.011	0.049
262	21.83	0.07	0.040	(0.055)	0.007	0.033
263	21.92	0.07	0.040	(0.055)	0.007	0.033
264	22.00	0.07	0.040	(0.055)	0.007	0.033
265	22.08	0.10	0.060	(0.055)	0.011	0.049
266	22.17	0.10	0.060	(0.054)	0.011	0.049
267	22.25	0.10	0.060	(0.054)	0.011	0.049
268	22.33	0.07	0.040	(0.054)	0.007	0.033
269	22.42	0.07	0.040	(0.054)	0.007	0.033
270	22.50	0.07	0.040	(0.054)	0.007	0.033
271	22.58	0.07	0.040	(0.054)	0.007	0.033
272	22.67	0.07	0.040	(0.053)	0.007	0.033
273	22.75	0.07	0.040	(0.053)	0.007	0.033
274	22.83	0.07	0.040	(0.053)	0.007	0.033
275	22.92	0.07	0.040	(0.053)	0.007	0.033
276	23.00	0.07	0.040	(0.053)	0.007	0.033
277	23.08	0.07	0.040	(0.053)	0.007	0.033
278	23.17	0.07	0.040	(0.053)	0.007	0.033
279	23.25	0.07	0.040	(0.052)	0.007	0.033
280	23.33	0.07	0.040	(0.052)	0.007	0.033
281	23.42	0.07	0.040	(0.052)	0.007	0.033
282	23.50	0.07	0.040	(0.052)	0.007	0.033
283	23.58	0.07	0.040	(0.052)	0.007	0.033
284	23.67	0.07	0.040	(0.052)	0.007	0.033
285	23.75	0.07	0.040	(0.052)	0.007	0.033
286	23.83	0.07	0.040	(0.052)	0.007	0.033
287	23.92	0.07	0.040	(0.052)	0.007	0.033
288	24.00	0.07	0.040	(0.052)	0.007	0.033

(Loss Rate Not Used)

Sum = 100.0

Sum = 49.6

Flood volume = Effective rainfall 4.13(In)

times area 3.5(Ac.)/[(In)/(Ft.)] = 1.2(Ac.Ft)

Total soil loss = 0.87(In)

Total soil loss = 0.250(Ac.Ft)

Total rainfall = 5.00(In)

Flood volume = 51922.7 Cubic Feet
 Total soil loss = 10875.9 Cubic Feet

 Peak flow rate of this hydrograph = 2.062(CFS)

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

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0005	0.08	Q				
0+10	0.0013	0.11	Q				
0+15	0.0021	0.11	Q				
0+20	0.0032	0.15	Q				
0+25	0.0043	0.17	Q				
0+30	0.0055	0.17	Q				
0+35	0.0067	0.17	Q				
0+40	0.0079	0.17	Q				
0+45	0.0091	0.17	Q				
0+50	0.0105	0.21	Q				
0+55	0.0121	0.23	Q				
1+ 0	0.0137	0.23	Q				
1+ 5	0.0150	0.19	Q				
1+10	0.0162	0.17	Q				
1+15	0.0173	0.17	Q				
1+20	0.0185	0.17	Q				
1+25	0.0197	0.17	Q				
1+30	0.0209	0.17	Q				
1+35	0.0221	0.17	Q				
1+40	0.0233	0.17	Q				
1+45	0.0244	0.17	Q				
1+50	0.0259	0.21	Q				
1+55	0.0275	0.23	Q				
2+ 0	0.0290	0.23	Q				
2+ 5	0.0306	0.23	QV				
2+10	0.0322	0.23	QV				
2+15	0.0338	0.23	QV				
2+20	0.0353	0.23	QV				
2+25	0.0369	0.23	QV				
2+30	0.0385	0.23	QV				
2+35	0.0403	0.27	Q				
2+40	0.0423	0.29	Q				
2+45	0.0443	0.29	Q				
2+50	0.0462	0.29	Q				
2+55	0.0482	0.29	Q				
3+ 0	0.0502	0.29	Q				

3+ 5	0.0522	0.29	Q				
3+10	0.0541	0.29	Q				
3+15	0.0561	0.29	Q				
3+20	0.0581	0.29	Q				
3+25	0.0600	0.29	QV				
3+30	0.0620	0.29	QV				
3+35	0.0640	0.29	QV				
3+40	0.0659	0.29	QV				
3+45	0.0679	0.29	QV				
3+50	0.0702	0.32	QV				
3+55	0.0725	0.34	QV				
4+ 0	0.0749	0.34	QV				
4+ 5	0.0772	0.34	QV				
4+10	0.0796	0.34	QV				
4+15	0.0820	0.34	QV				
4+20	0.0846	0.38	QV				
4+25	0.0874	0.40	QV				
4+30	0.0901	0.40	Q V				
4+35	0.0929	0.40	Q V				
4+40	0.0956	0.40	Q V				
4+45	0.0984	0.40	Q V				
4+50	0.1014	0.44	Q V				
4+55	0.1046	0.46	Q V				
5+ 0	0.1077	0.46	Q V				
5+ 5	0.1103	0.38	Q V				
5+10	0.1127	0.34	Q V				
5+15	0.1151	0.34	Q V				
5+20	0.1177	0.38	Q V				
5+25	0.1205	0.40	Q V				
5+30	0.1232	0.40	Q V				
5+35	0.1262	0.44	Q V				
5+40	0.1294	0.46	Q V				
5+45	0.1325	0.46	Q V				
5+50	0.1357	0.46	Q V				
5+55	0.1389	0.46	Q V				
6+ 0	0.1420	0.46	Q V				
6+ 5	0.1454	0.50	Q V				
6+10	0.1490	0.51	Q V				
6+15	0.1525	0.51	Q V				
6+20	0.1561	0.51	Q V				
6+25	0.1596	0.51	Q V				
6+30	0.1632	0.51	Q V				
6+35	0.1670	0.55	Q V				
6+40	0.1709	0.57	Q V				
6+45	0.1748	0.57	Q V				
6+50	0.1788	0.57	Q V				
6+55	0.1827	0.57	Q V				
7+ 0	0.1867	0.57	Q V				
7+ 5	0.1906	0.57	Q V				
7+10	0.1945	0.57	Q V				

7+15	0.1985	0.57	Q	V				
7+20	0.2027	0.61	Q	V				
7+25	0.2070	0.63	Q	V				
7+30	0.2114	0.63	Q	V				
7+35	0.2160	0.67	Q	V				
7+40	0.2207	0.69	Q	V				
7+45	0.2254	0.69	Q	V				
7+50	0.2304	0.72	Q	V				
7+55	0.2355	0.74	Q	V				
8+ 0	0.2407	0.74	Q	V				
8+ 5	0.2463	0.82	Q	V				
8+10	0.2522	0.86	Q	V				
8+15	0.2581	0.86	Q	V				
8+20	0.2640	0.86	Q	V				
8+25	0.2700	0.86	Q	V				
8+30	0.2759	0.86	Q	V				
8+35	0.2820	0.90	Q	V				
8+40	0.2883	0.92	Q	V				
8+45	0.2946	0.92	Q	V				
8+50	0.3012	0.95	Q	V				
8+55	0.3079	0.97	Q	V				
9+ 0	0.3146	0.97	Q	V				
9+ 5	0.3218	1.05	Q	V				
9+10	0.3293	1.09	Q	V				
9+15	0.3368	1.09	Q	V				
9+20	0.3446	1.13	Q	V				
9+25	0.3524	1.14	Q	V				
9+30	0.3603	1.14	Q	V				
9+35	0.3685	1.18	Q	V				
9+40	0.3767	1.20	Q	V				
9+45	0.3850	1.20	Q	V				
9+50	0.3936	1.24	Q	V				
9+55	0.4022	1.26	Q	V				
10+ 0	0.4109	1.26	Q	V				
10+ 5	0.4177	0.99	Q	V				
10+10	0.4236	0.86	Q	V				
10+15	0.4295	0.86	Q	V				
10+20	0.4355	0.86	Q	V				
10+25	0.4414	0.86	Q	V				
10+30	0.4473	0.86	Q	V				
10+35	0.4545	1.05	Q	V				
10+40	0.4624	1.14	Q	V				
10+45	0.4703	1.14	Q	V				
10+50	0.4781	1.14	Q	V				
10+55	0.4860	1.14	Q	V				
11+ 0	0.4939	1.14	Q	V				
11+ 5	0.5015	1.11	Q	V				
11+10	0.5090	1.09	Q	V				
11+15	0.5165	1.09	Q	V				
11+20	0.5240	1.09	Q	V				

11+25	0.5315	1.09	Q	V		
11+30	0.5390	1.09	Q	V		
11+35	0.5459	1.01	Q	V		
11+40	0.5526	0.97	Q	V		
11+45	0.5593	0.97	Q	V		
11+50	0.5663	1.01	Q	V		
11+55	0.5734	1.03	Q	V		
12+ 0	0.5805	1.03	Q	V		
12+ 5	0.5894	1.30	Q	V		
12+10	0.5993	1.43	Q	V		
12+15	0.6091	1.43	Q	V		
12+20	0.6192	1.47	Q	V		
12+25	0.6295	1.49	Q	V		
12+30	0.6397	1.49	Q	V		
12+35	0.6506	1.58	Q	V		
12+40	0.6618	1.63	Q	V		
12+45	0.6730	1.63	Q	V		
12+50	0.6846	1.68	Q	V		
12+55	0.6963	1.70	Q	V		
13+ 0	0.7080	1.70	Q	V		
13+ 5	0.7214	1.94	Q	V		
13+10	0.7356	2.06	Q	V		
13+15	0.7497	2.06	Q	V		
13+20	0.7639	2.06	Q	V		
13+25	0.7781	2.06	Q	V		
13+30	0.7923	2.06	Q	V		
13+35	0.8031	1.56	Q	V		
13+40	0.8121	1.32	Q	V		
13+45	0.8212	1.32	Q	V		
13+50	0.8302	1.32	Q	V		
13+55	0.8393	1.32	Q	V		
14+ 0	0.8484	1.32	Q	V		
14+ 5	0.8587	1.50	Q	V		
14+10	0.8696	1.59	Q	V		
14+15	0.8805	1.59	Q	V		
14+20	0.8912	1.54	Q	V		
14+25	0.9016	1.52	Q	V		
14+30	0.9121	1.52	Q	V		
14+35	0.9226	1.52	Q	V		
14+40	0.9331	1.53	Q	V		
14+45	0.9436	1.53	Q	V		
14+50	0.9538	1.48	Q	V		
14+55	0.9639	1.46	Q	V		
15+ 0	0.9740	1.46	Q	V		
15+ 5	0.9837	1.42	Q	V		
15+10	0.9933	1.39	Q	V		
15+15	1.0029	1.40	Q	V		
15+20	1.0122	1.35	Q	V		
15+25	1.0214	1.33	Q	V		
15+30	1.0306	1.33	Q	V		

15+35	1.0386	1.17		Q				V	
15+40	1.0461	1.09		Q				V	
15+45	1.0536	1.09		Q				V	
15+50	1.0611	1.09		Q				V	
15+55	1.0685	1.09		Q				V	
16+ 0	1.0760	1.09		Q				V	
16+ 5	1.0795	0.51		Q				V	
16+10	1.0811	0.23	Q					V	
16+15	1.0827	0.23	Q					V	
16+20	1.0843	0.23	Q					V	
16+25	1.0859	0.23	Q					V	
16+30	1.0874	0.23	Q					V	
16+35	1.0887	0.19	Q					V	
16+40	1.0899	0.17	Q					V	
16+45	1.0911	0.17	Q					V	
16+50	1.0923	0.17	Q					V	
16+55	1.0935	0.17	Q					V	
17+ 0	1.0947	0.17	Q					V	
17+ 5	1.0964	0.25	Q					V	
17+10	1.0983	0.29	Q					V	
17+15	1.1003	0.29	Q					V	
17+20	1.1023	0.29	Q					V	
17+25	1.1042	0.29	Q					V	
17+30	1.1062	0.29	Q					V	
17+35	1.1082	0.29	Q					V	
17+40	1.1102	0.29	Q					V	
17+45	1.1121	0.29	Q					V	
17+50	1.1138	0.25	Q					V	
17+55	1.1154	0.23	Q					V	
18+ 0	1.1170	0.23	Q					V	
18+ 5	1.1186	0.23	Q					V	
18+10	1.1201	0.23	Q					V	
18+15	1.1217	0.23	Q					V	
18+20	1.1233	0.23	Q					V	
18+25	1.1249	0.23	Q					V	
18+30	1.1264	0.23	Q					V	
18+35	1.1278	0.19	Q					V	
18+40	1.1289	0.17	Q					V	
18+45	1.1301	0.17	Q					V	
18+50	1.1310	0.13	Q					V	
18+55	1.1318	0.11	Q					V	
19+ 0	1.1326	0.11	Q					V	
19+ 5	1.1337	0.15	Q					V	
19+10	1.1348	0.17	Q					V	
19+15	1.1360	0.17	Q					V	
19+20	1.1375	0.21	Q					V	
19+25	1.1391	0.23	Q					V	
19+30	1.1406	0.23	Q					V	
19+35	1.1419	0.19	Q					V	
19+40	1.1431	0.17	Q					V	

19+45	1.1443	0.17	Q				V
19+50	1.1452	0.13	Q				V
19+55	1.1460	0.11	Q				V
20+ 0	1.1468	0.11	Q				V
20+ 5	1.1479	0.15	Q				V
20+10	1.1490	0.17	Q				V
20+15	1.1502	0.17	Q				V
20+20	1.1514	0.17	Q				V
20+25	1.1526	0.17	Q				V
20+30	1.1538	0.17	Q				V
20+35	1.1549	0.17	Q				V
20+40	1.1561	0.17	Q				V
20+45	1.1573	0.17	Q				V
20+50	1.1582	0.13	Q				V
20+55	1.1590	0.11	Q				V
21+ 0	1.1598	0.11	Q				V
21+ 5	1.1609	0.15	Q				V
21+10	1.1620	0.17	Q				V
21+15	1.1632	0.17	Q				V
21+20	1.1641	0.13	Q				V
21+25	1.1649	0.11	Q				V
21+30	1.1657	0.11	Q				V
21+35	1.1668	0.15	Q				V
21+40	1.1679	0.17	Q				V
21+45	1.1691	0.17	Q				V
21+50	1.1700	0.13	Q				V
21+55	1.1708	0.11	Q				V
22+ 0	1.1716	0.11	Q				V
22+ 5	1.1727	0.15	Q				V
22+10	1.1739	0.17	Q				V
22+15	1.1750	0.17	Q				V
22+20	1.1760	0.13	Q				V
22+25	1.1767	0.11	Q				V
22+30	1.1775	0.11	Q				V
22+35	1.1783	0.11	Q				V
22+40	1.1791	0.11	Q				V
22+45	1.1799	0.11	Q				V
22+50	1.1807	0.11	Q				V
22+55	1.1815	0.11	Q				V
23+ 0	1.1823	0.11	Q				V
23+ 5	1.1831	0.11	Q				V
23+10	1.1838	0.11	Q				V
23+15	1.1846	0.11	Q				V
23+20	1.1854	0.11	Q				V
23+25	1.1862	0.11	Q				V
23+30	1.1870	0.11	Q				V
23+35	1.1878	0.11	Q				V
23+40	1.1886	0.11	Q				V
23+45	1.1894	0.11	Q				V
23+50	1.1901	0.11	Q				V

23+55	1.1909	0.11	Q				V
24+ 0	1.1917	0.11	Q				V
24+ 5	1.1920	0.04	Q				V

Unit Hydrograph Analysis

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Study date 09/30/24 File: 100PUH24100.out

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

Program License Serial Number 6405

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

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

English Units used in output format

Drainage Area = 3.47(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.47(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 742.00(Ft.)
Length along longest watercourse measured to centroid = 624.00(Ft.)
Length along longest watercourse = 0.141 Mi.
Length along longest watercourse measured to centroid = 0.118 Mi.
Difference in elevation = 14.60(Ft.)
Slope along watercourse = 103.8922 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.031 Hr.
Lag time = 1.88 Min.
25% of lag time = 0.47 Min.
40% of lag time = 0.75 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]
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3.47

2.00

6.94

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.47	5.00	17.35

STORM EVENT (YEAR) = 100.00

Area Averaged 2-Year Rainfall = 2.000(In)

Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)

Areal adjustment factor = 100.00 %

Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.470	52.80	0.521
Total Area Entered = 3.47(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.8	52.8	0.543	0.521	0.289	1.000	0.289
Sum (F) =						0.289

Area averaged mean soil loss (F) (In/Hr) = 0.289

Minimum soil loss rate ((In/Hr)) = 0.144

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.483

Unit Hydrograph VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1 0.083	265.427	52.830	1.848
2 0.167	530.854	39.116	1.368
3 0.250	796.281	6.543	0.229
4 0.333	1061.708	1.510	0.053
Sum = 100.000		Sum=	3.497

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	(0.512)	0.019
2 0.17	0.07	0.040	(0.510)	0.019
3 0.25	0.07	0.040	(0.508)	0.019
4 0.33	0.10	0.060	(0.506)	0.029
				0.021
				0.021
				0.021
				0.031

5	0.42	0.10	0.060	(0.504)	0.029	0.031
6	0.50	0.10	0.060	(0.502)	0.029	0.031
7	0.58	0.10	0.060	(0.500)	0.029	0.031
8	0.67	0.10	0.060	(0.498)	0.029	0.031
9	0.75	0.10	0.060	(0.496)	0.029	0.031
10	0.83	0.13	0.080	(0.494)	0.039	0.041
11	0.92	0.13	0.080	(0.492)	0.039	0.041
12	1.00	0.13	0.080	(0.490)	0.039	0.041
13	1.08	0.10	0.060	(0.488)	0.029	0.031
14	1.17	0.10	0.060	(0.486)	0.029	0.031
15	1.25	0.10	0.060	(0.484)	0.029	0.031
16	1.33	0.10	0.060	(0.482)	0.029	0.031
17	1.42	0.10	0.060	(0.480)	0.029	0.031
18	1.50	0.10	0.060	(0.479)	0.029	0.031
19	1.58	0.10	0.060	(0.477)	0.029	0.031
20	1.67	0.10	0.060	(0.475)	0.029	0.031
21	1.75	0.10	0.060	(0.473)	0.029	0.031
22	1.83	0.13	0.080	(0.471)	0.039	0.041
23	1.92	0.13	0.080	(0.469)	0.039	0.041
24	2.00	0.13	0.080	(0.467)	0.039	0.041
25	2.08	0.13	0.080	(0.465)	0.039	0.041
26	2.17	0.13	0.080	(0.463)	0.039	0.041
27	2.25	0.13	0.080	(0.461)	0.039	0.041
28	2.33	0.13	0.080	(0.460)	0.039	0.041
29	2.42	0.13	0.080	(0.458)	0.039	0.041
30	2.50	0.13	0.080	(0.456)	0.039	0.041
31	2.58	0.17	0.100	(0.454)	0.048	0.052
32	2.67	0.17	0.100	(0.452)	0.048	0.052
33	2.75	0.17	0.100	(0.450)	0.048	0.052
34	2.83	0.17	0.100	(0.448)	0.048	0.052
35	2.92	0.17	0.100	(0.447)	0.048	0.052
36	3.00	0.17	0.100	(0.445)	0.048	0.052
37	3.08	0.17	0.100	(0.443)	0.048	0.052
38	3.17	0.17	0.100	(0.441)	0.048	0.052
39	3.25	0.17	0.100	(0.439)	0.048	0.052
40	3.33	0.17	0.100	(0.437)	0.048	0.052
41	3.42	0.17	0.100	(0.436)	0.048	0.052
42	3.50	0.17	0.100	(0.434)	0.048	0.052
43	3.58	0.17	0.100	(0.432)	0.048	0.052
44	3.67	0.17	0.100	(0.430)	0.048	0.052
45	3.75	0.17	0.100	(0.428)	0.048	0.052
46	3.83	0.20	0.120	(0.426)	0.058	0.062
47	3.92	0.20	0.120	(0.425)	0.058	0.062
48	4.00	0.20	0.120	(0.423)	0.058	0.062
49	4.08	0.20	0.120	(0.421)	0.058	0.062
50	4.17	0.20	0.120	(0.419)	0.058	0.062
51	4.25	0.20	0.120	(0.417)	0.058	0.062
52	4.33	0.23	0.140	(0.416)	0.068	0.072
53	4.42	0.23	0.140	(0.414)	0.068	0.072
54	4.50	0.23	0.140	(0.412)	0.068	0.072
55	4.58	0.23	0.140	(0.410)	0.068	0.072
56	4.67	0.23	0.140	(0.409)	0.068	0.072
57	4.75	0.23	0.140	(0.407)	0.068	0.072
58	4.83	0.27	0.160	(0.405)	0.077	0.083
59	4.92	0.27	0.160	(0.403)	0.077	0.083
60	5.00	0.27	0.160	(0.402)	0.077	0.083
61	5.08	0.20	0.120	(0.400)	0.058	0.062

62	5.17	0.20	0.120	(0.398)	0.058	0.062
63	5.25	0.20	0.120	(0.396)	0.058	0.062
64	5.33	0.23	0.140	(0.395)	0.068	0.072
65	5.42	0.23	0.140	(0.393)	0.068	0.072
66	5.50	0.23	0.140	(0.391)	0.068	0.072
67	5.58	0.27	0.160	(0.390)	0.077	0.083
68	5.67	0.27	0.160	(0.388)	0.077	0.083
69	5.75	0.27	0.160	(0.386)	0.077	0.083
70	5.83	0.27	0.160	(0.384)	0.077	0.083
71	5.92	0.27	0.160	(0.383)	0.077	0.083
72	6.00	0.27	0.160	(0.381)	0.077	0.083
73	6.08	0.30	0.180	(0.379)	0.087	0.093
74	6.17	0.30	0.180	(0.378)	0.087	0.093
75	6.25	0.30	0.180	(0.376)	0.087	0.093
76	6.33	0.30	0.180	(0.374)	0.087	0.093
77	6.42	0.30	0.180	(0.373)	0.087	0.093
78	6.50	0.30	0.180	(0.371)	0.087	0.093
79	6.58	0.33	0.200	(0.369)	0.097	0.103
80	6.67	0.33	0.200	(0.368)	0.097	0.103
81	6.75	0.33	0.200	(0.366)	0.097	0.103
82	6.83	0.33	0.200	(0.364)	0.097	0.103
83	6.92	0.33	0.200	(0.363)	0.097	0.103
84	7.00	0.33	0.200	(0.361)	0.097	0.103
85	7.08	0.33	0.200	(0.359)	0.097	0.103
86	7.17	0.33	0.200	(0.358)	0.097	0.103
87	7.25	0.33	0.200	(0.356)	0.097	0.103
88	7.33	0.37	0.220	(0.354)	0.106	0.114
89	7.42	0.37	0.220	(0.353)	0.106	0.114
90	7.50	0.37	0.220	(0.351)	0.106	0.114
91	7.58	0.40	0.240	(0.350)	0.116	0.124
92	7.67	0.40	0.240	(0.348)	0.116	0.124
93	7.75	0.40	0.240	(0.346)	0.116	0.124
94	7.83	0.43	0.260	(0.345)	0.126	0.134
95	7.92	0.43	0.260	(0.343)	0.126	0.134
96	8.00	0.43	0.260	(0.342)	0.126	0.134
97	8.08	0.50	0.300	(0.340)	0.145	0.155
98	8.17	0.50	0.300	(0.338)	0.145	0.155
99	8.25	0.50	0.300	(0.337)	0.145	0.155
100	8.33	0.50	0.300	(0.335)	0.145	0.155
101	8.42	0.50	0.300	(0.334)	0.145	0.155
102	8.50	0.50	0.300	(0.332)	0.145	0.155
103	8.58	0.53	0.320	(0.331)	0.155	0.165
104	8.67	0.53	0.320	(0.329)	0.155	0.165
105	8.75	0.53	0.320	(0.327)	0.155	0.165
106	8.83	0.57	0.340	(0.326)	0.164	0.176
107	8.92	0.57	0.340	(0.324)	0.164	0.176
108	9.00	0.57	0.340	(0.323)	0.164	0.176
109	9.08	0.63	0.380	(0.321)	0.184	0.196
110	9.17	0.63	0.380	(0.320)	0.184	0.196
111	9.25	0.63	0.380	(0.318)	0.184	0.196
112	9.33	0.67	0.400	(0.317)	0.193	0.207
113	9.42	0.67	0.400	(0.315)	0.193	0.207
114	9.50	0.67	0.400	(0.314)	0.193	0.207
115	9.58	0.70	0.420	(0.312)	0.203	0.217
116	9.67	0.70	0.420	(0.311)	0.203	0.217
117	9.75	0.70	0.420	(0.309)	0.203	0.217
118	9.83	0.73	0.440	(0.308)	0.213	0.227

119	9.92	0.73	0.440	(0.306)	0.213	0.227
120	10.00	0.73	0.440	(0.305)	0.213	0.227
121	10.08	0.50	0.300	(0.303)	0.145	0.155
122	10.17	0.50	0.300	(0.302)	0.145	0.155
123	10.25	0.50	0.300	(0.300)	0.145	0.155
124	10.33	0.50	0.300	(0.299)	0.145	0.155
125	10.42	0.50	0.300	(0.297)	0.145	0.155
126	10.50	0.50	0.300	(0.296)	0.145	0.155
127	10.58	0.67	0.400	(0.295)	0.193	0.207
128	10.67	0.67	0.400	(0.293)	0.193	0.207
129	10.75	0.67	0.400	(0.292)	0.193	0.207
130	10.83	0.67	0.400	(0.290)	0.193	0.207
131	10.92	0.67	0.400	(0.289)	0.193	0.207
132	11.00	0.67	0.400	(0.287)	0.193	0.207
133	11.08	0.63	0.380	(0.286)	0.184	0.196
134	11.17	0.63	0.380	(0.285)	0.184	0.196
135	11.25	0.63	0.380	(0.283)	0.184	0.196
136	11.33	0.63	0.380	(0.282)	0.184	0.196
137	11.42	0.63	0.380	(0.280)	0.184	0.196
138	11.50	0.63	0.380	(0.279)	0.184	0.196
139	11.58	0.57	0.340	(0.278)	0.164	0.176
140	11.67	0.57	0.340	(0.276)	0.164	0.176
141	11.75	0.57	0.340	(0.275)	0.164	0.176
142	11.83	0.60	0.360	(0.273)	0.174	0.186
143	11.92	0.60	0.360	(0.272)	0.174	0.186
144	12.00	0.60	0.360	(0.271)	0.174	0.186
145	12.08	0.83	0.500	(0.269)	0.242	0.258
146	12.17	0.83	0.500	(0.268)	0.242	0.258
147	12.25	0.83	0.500	(0.267)	0.242	0.258
148	12.33	0.87	0.520	(0.265)	0.251	0.269
149	12.42	0.87	0.520	(0.264)	0.251	0.269
150	12.50	0.87	0.520	(0.263)	0.251	0.269
151	12.58	0.93	0.560	0.261 (0.271)		0.299
152	12.67	0.93	0.560	0.260 (0.271)		0.300
153	12.75	0.93	0.560	0.259 (0.271)		0.301
154	12.83	0.97	0.580	0.257 (0.280)		0.323
155	12.92	0.97	0.580	0.256 (0.280)		0.324
156	13.00	0.97	0.580	0.255 (0.280)		0.325
157	13.08	1.13	0.680	0.254 (0.329)		0.426
158	13.17	1.13	0.680	0.252 (0.329)		0.428
159	13.25	1.13	0.680	0.251 (0.329)		0.429
160	13.33	1.13	0.680	0.250 (0.329)		0.430
161	13.42	1.13	0.680	0.248 (0.329)		0.432
162	13.50	1.13	0.680	0.247 (0.329)		0.433
163	13.58	0.77	0.460	(0.246)	0.222	0.238
164	13.67	0.77	0.460	(0.245)	0.222	0.238
165	13.75	0.77	0.460	(0.243)	0.222	0.238
166	13.83	0.77	0.460	(0.242)	0.222	0.238
167	13.92	0.77	0.460	(0.241)	0.222	0.238
168	14.00	0.77	0.460	(0.240)	0.222	0.238
169	14.08	0.90	0.540	0.239 (0.261)		0.301
170	14.17	0.90	0.540	0.237 (0.261)		0.303
171	14.25	0.90	0.540	0.236 (0.261)		0.304
172	14.33	0.87	0.520	0.235 (0.251)		0.285
173	14.42	0.87	0.520	0.234 (0.251)		0.286
174	14.50	0.87	0.520	0.232 (0.251)		0.288
175	14.58	0.87	0.520	0.231 (0.251)		0.289

176	14.67	0.87	0.520	0.230	(0.251)	0.290
177	14.75	0.87	0.520	0.229	(0.251)	0.291
178	14.83	0.83	0.500	0.228	(0.242)	0.272
179	14.92	0.83	0.500	0.227	(0.242)	0.273
180	15.00	0.83	0.500	0.225	(0.242)	0.275
181	15.08	0.80	0.480	0.224	(0.232)	0.256
182	15.17	0.80	0.480	0.223	(0.232)	0.257
183	15.25	0.80	0.480	0.222	(0.232)	0.258
184	15.33	0.77	0.460	0.221	(0.222)	0.239
185	15.42	0.77	0.460	0.220	(0.222)	0.240
186	15.50	0.77	0.460	0.219	(0.222)	0.241
187	15.58	0.63	0.380	(0.217)	0.184	0.196
188	15.67	0.63	0.380	(0.216)	0.184	0.196
189	15.75	0.63	0.380	(0.215)	0.184	0.196
190	15.83	0.63	0.380	(0.214)	0.184	0.196
191	15.92	0.63	0.380	(0.213)	0.184	0.196
192	16.00	0.63	0.380	(0.212)	0.184	0.196
193	16.08	0.13	0.080	(0.211)	0.039	0.041
194	16.17	0.13	0.080	(0.210)	0.039	0.041
195	16.25	0.13	0.080	(0.209)	0.039	0.041
196	16.33	0.13	0.080	(0.208)	0.039	0.041
197	16.42	0.13	0.080	(0.207)	0.039	0.041
198	16.50	0.13	0.080	(0.206)	0.039	0.041
199	16.58	0.10	0.060	(0.204)	0.029	0.031
200	16.67	0.10	0.060	(0.203)	0.029	0.031
201	16.75	0.10	0.060	(0.202)	0.029	0.031
202	16.83	0.10	0.060	(0.201)	0.029	0.031
203	16.92	0.10	0.060	(0.200)	0.029	0.031
204	17.00	0.10	0.060	(0.199)	0.029	0.031
205	17.08	0.17	0.100	(0.198)	0.048	0.052
206	17.17	0.17	0.100	(0.197)	0.048	0.052
207	17.25	0.17	0.100	(0.196)	0.048	0.052
208	17.33	0.17	0.100	(0.195)	0.048	0.052
209	17.42	0.17	0.100	(0.194)	0.048	0.052
210	17.50	0.17	0.100	(0.193)	0.048	0.052
211	17.58	0.17	0.100	(0.192)	0.048	0.052
212	17.67	0.17	0.100	(0.192)	0.048	0.052
213	17.75	0.17	0.100	(0.191)	0.048	0.052
214	17.83	0.13	0.080	(0.190)	0.039	0.041
215	17.92	0.13	0.080	(0.189)	0.039	0.041
216	18.00	0.13	0.080	(0.188)	0.039	0.041
217	18.08	0.13	0.080	(0.187)	0.039	0.041
218	18.17	0.13	0.080	(0.186)	0.039	0.041
219	18.25	0.13	0.080	(0.185)	0.039	0.041
220	18.33	0.13	0.080	(0.184)	0.039	0.041
221	18.42	0.13	0.080	(0.183)	0.039	0.041
222	18.50	0.13	0.080	(0.182)	0.039	0.041
223	18.58	0.10	0.060	(0.181)	0.029	0.031
224	18.67	0.10	0.060	(0.181)	0.029	0.031
225	18.75	0.10	0.060	(0.180)	0.029	0.031
226	18.83	0.07	0.040	(0.179)	0.019	0.021
227	18.92	0.07	0.040	(0.178)	0.019	0.021
228	19.00	0.07	0.040	(0.177)	0.019	0.021
229	19.08	0.10	0.060	(0.176)	0.029	0.031
230	19.17	0.10	0.060	(0.175)	0.029	0.031
231	19.25	0.10	0.060	(0.175)	0.029	0.031
232	19.33	0.13	0.080	(0.174)	0.039	0.041

233	19.42	0.13	0.080	(0.173)	0.039	0.041
234	19.50	0.13	0.080	(0.172)	0.039	0.041
235	19.58	0.10	0.060	(0.171)	0.029	0.031
236	19.67	0.10	0.060	(0.171)	0.029	0.031
237	19.75	0.10	0.060	(0.170)	0.029	0.031
238	19.83	0.07	0.040	(0.169)	0.019	0.021
239	19.92	0.07	0.040	(0.168)	0.019	0.021
240	20.00	0.07	0.040	(0.168)	0.019	0.021
241	20.08	0.10	0.060	(0.167)	0.029	0.031
242	20.17	0.10	0.060	(0.166)	0.029	0.031
243	20.25	0.10	0.060	(0.165)	0.029	0.031
244	20.33	0.10	0.060	(0.165)	0.029	0.031
245	20.42	0.10	0.060	(0.164)	0.029	0.031
246	20.50	0.10	0.060	(0.163)	0.029	0.031
247	20.58	0.10	0.060	(0.163)	0.029	0.031
248	20.67	0.10	0.060	(0.162)	0.029	0.031
249	20.75	0.10	0.060	(0.161)	0.029	0.031
250	20.83	0.07	0.040	(0.161)	0.019	0.021
251	20.92	0.07	0.040	(0.160)	0.019	0.021
252	21.00	0.07	0.040	(0.159)	0.019	0.021
253	21.08	0.10	0.060	(0.159)	0.029	0.031
254	21.17	0.10	0.060	(0.158)	0.029	0.031
255	21.25	0.10	0.060	(0.157)	0.029	0.031
256	21.33	0.07	0.040	(0.157)	0.019	0.021
257	21.42	0.07	0.040	(0.156)	0.019	0.021
258	21.50	0.07	0.040	(0.156)	0.019	0.021
259	21.58	0.10	0.060	(0.155)	0.029	0.031
260	21.67	0.10	0.060	(0.155)	0.029	0.031
261	21.75	0.10	0.060	(0.154)	0.029	0.031
262	21.83	0.07	0.040	(0.153)	0.019	0.021
263	21.92	0.07	0.040	(0.153)	0.019	0.021
264	22.00	0.07	0.040	(0.152)	0.019	0.021
265	22.08	0.10	0.060	(0.152)	0.029	0.031
266	22.17	0.10	0.060	(0.151)	0.029	0.031
267	22.25	0.10	0.060	(0.151)	0.029	0.031
268	22.33	0.07	0.040	(0.150)	0.019	0.021
269	22.42	0.07	0.040	(0.150)	0.019	0.021
270	22.50	0.07	0.040	(0.150)	0.019	0.021
271	22.58	0.07	0.040	(0.149)	0.019	0.021
272	22.67	0.07	0.040	(0.149)	0.019	0.021
273	22.75	0.07	0.040	(0.148)	0.019	0.021
274	22.83	0.07	0.040	(0.148)	0.019	0.021
275	22.92	0.07	0.040	(0.148)	0.019	0.021
276	23.00	0.07	0.040	(0.147)	0.019	0.021
277	23.08	0.07	0.040	(0.147)	0.019	0.021
278	23.17	0.07	0.040	(0.146)	0.019	0.021
279	23.25	0.07	0.040	(0.146)	0.019	0.021
280	23.33	0.07	0.040	(0.146)	0.019	0.021
281	23.42	0.07	0.040	(0.146)	0.019	0.021
282	23.50	0.07	0.040	(0.145)	0.019	0.021
283	23.58	0.07	0.040	(0.145)	0.019	0.021
284	23.67	0.07	0.040	(0.145)	0.019	0.021
285	23.75	0.07	0.040	(0.145)	0.019	0.021
286	23.83	0.07	0.040	(0.145)	0.019	0.021
287	23.92	0.07	0.040	(0.144)	0.019	0.021
288	24.00	0.07	0.040	(0.144)	0.019	0.021

(Loss Rate Not Used)

Sum = 100.0 Sum = 31.8
 Flood volume = Effective rainfall 2.65(In)
 times area 3.5(Ac.)/[(In)/(Ft.)] = 0.8(Ac.Ft)
 Total soil loss = 2.35(In)
 Total soil loss = 0.678(Ac.Ft)
 Total rainfall = 5.00(In)
 Flood volume = 33428.9 Cubic Feet
 Total soil loss = 29551.2 Cubic Feet

 Peak flow rate of this hydrograph = 1.512(CFS)

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

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0003	0.04	Q				
0+10	0.0007	0.07	Q				
0+15	0.0012	0.07	Q				
0+20	0.0018	0.09	Q				
0+25	0.0026	0.11	Q				
0+30	0.0033	0.11	Q				
0+35	0.0041	0.11	Q				
0+40	0.0048	0.11	Q				
0+45	0.0056	0.11	Q				
0+50	0.0064	0.13	Q				
0+55	0.0074	0.14	Q				
1+ 0	0.0084	0.14	Q				
1+ 5	0.0093	0.13	Q				
1+10	0.0100	0.11	Q				
1+15	0.0108	0.11	Q				
1+20	0.0115	0.11	Q				
1+25	0.0123	0.11	Q				
1+30	0.0130	0.11	Q				
1+35	0.0138	0.11	Q				
1+40	0.0145	0.11	Q				
1+45	0.0153	0.11	Q				
1+50	0.0161	0.13	Q				
1+55	0.0171	0.14	Q				
2+ 0	0.0181	0.14	Q				
2+ 5	0.0191	0.14	Q				
2+10	0.0201	0.14	QV				
2+15	0.0211	0.14	QV				
2+20	0.0221	0.14	QV				
2+25	0.0231	0.14	QV				
2+30	0.0241	0.14	QV				
2+35	0.0252	0.16	QV				
2+40	0.0264	0.18	QV				
2+45	0.0277	0.18	QV				
2+50	0.0289	0.18	QV				
2+55	0.0302	0.18	QV				
3+ 0	0.0314	0.18	QV				
3+ 5	0.0327	0.18	QV				

3+10	0.0339	0.18	QV				
3+15	0.0352	0.18	QV				
3+20	0.0364	0.18	QV				
3+25	0.0376	0.18	QV				
3+30	0.0389	0.18	Q V				
3+35	0.0401	0.18	Q V				
3+40	0.0414	0.18	Q V				
3+45	0.0426	0.18	Q V				
3+50	0.0440	0.20	Q V				
3+55	0.0455	0.21	Q V				
4+ 0	0.0470	0.22	Q V				
4+ 5	0.0485	0.22	Q V				
4+10	0.0500	0.22	Q V				
4+15	0.0515	0.22	Q V				
4+20	0.0531	0.24	Q V				
4+25	0.0548	0.25	QV				
4+30	0.0565	0.25	QV				
4+35	0.0583	0.25	Q V				
4+40	0.0600	0.25	Q V				
4+45	0.0618	0.25	Q V				
4+50	0.0637	0.27	Q V				
4+55	0.0656	0.29	Q V				
5+ 0	0.0676	0.29	Q V				
5+ 5	0.0693	0.25	Q V				
5+10	0.0709	0.22	Q V				
5+15	0.0724	0.22	Q V				
5+20	0.0740	0.24	Q V				
5+25	0.0757	0.25	Q V				
5+30	0.0775	0.25	Q V				
5+35	0.0793	0.27	Q V				
5+40	0.0813	0.29	Q V				
5+45	0.0833	0.29	Q V				
5+50	0.0853	0.29	Q V				
5+55	0.0873	0.29	Q V				
6+ 0	0.0893	0.29	Q V				
6+ 5	0.0914	0.31	Q V				
6+10	0.0936	0.32	Q V				
6+15	0.0959	0.32	Q V				
6+20	0.0981	0.33	Q V				
6+25	0.1003	0.33	Q V				
6+30	0.1026	0.33	Q V				
6+35	0.1050	0.34	Q V				
6+40	0.1074	0.36	Q V				
6+45	0.1099	0.36	Q V				
6+50	0.1124	0.36	Q V				
6+55	0.1149	0.36	Q V				
7+ 0	0.1174	0.36	Q V				
7+ 5	0.1199	0.36	Q V				
7+10	0.1224	0.36	Q V				
7+15	0.1249	0.36	Q V				
7+20	0.1275	0.38	Q V				
7+25	0.1302	0.39	Q V				
7+30	0.1329	0.40	Q V				
7+35	0.1358	0.42	Q V				
7+40	0.1388	0.43	Q V				
7+45	0.1418	0.43	Q V				
7+50	0.1449	0.45	Q V				

7+55	0.1481	0.47	Q	V				
8+ 0	0.1513	0.47	Q	V				
8+ 5	0.1548	0.51	Q	V				
8+10	0.1585	0.54	Q	V				
8+15	0.1623	0.54	Q	V				
8+20	0.1660	0.54	Q	V				
8+25	0.1697	0.54	Q	V				
8+30	0.1735	0.54	Q	V				
8+35	0.1773	0.56	Q	V				
8+40	0.1813	0.58	Q	V				
8+45	0.1853	0.58	Q	V				
8+50	0.1894	0.60	Q	V				
8+55	0.1936	0.61	Q	V				
9+ 0	0.1978	0.61	Q	V				
9+ 5	0.2023	0.65	Q	V				
9+10	0.2070	0.68	Q	V				
9+15	0.2118	0.69	Q	V				
9+20	0.2166	0.71	Q	V				
9+25	0.2216	0.72	Q	V				
9+30	0.2266	0.72	Q	V				
9+35	0.2317	0.74	Q	V				
9+40	0.2369	0.76	Q	V				
9+45	0.2421	0.76	Q	V				
9+50	0.2475	0.78	Q	V				
9+55	0.2529	0.79	Q	V				
10+ 0	0.2584	0.80	Q	V				
10+ 5	0.2630	0.66	Q	V				
10+10	0.2668	0.56	Q	V				
10+15	0.2706	0.55	Q	V				
10+20	0.2743	0.54	Q	V				
10+25	0.2781	0.54	Q	V				
10+30	0.2818	0.54	Q	V				
10+35	0.2862	0.64	Q	V				
10+40	0.2911	0.71	Q	V				
10+45	0.2961	0.72	Q	V				
10+50	0.3010	0.72	Q	V				
10+55	0.3060	0.72	Q	V				
11+ 0	0.3110	0.72	Q	V				
11+ 5	0.3158	0.70	Q	V				
11+10	0.3206	0.69	Q	V				
11+15	0.3253	0.69	Q	V				
11+20	0.3301	0.69	Q	V				
11+25	0.3348	0.69	Q	V				
11+30	0.3395	0.69	Q	V				
11+35	0.3440	0.65	Q	V				
11+40	0.3483	0.62	Q	V				
11+45	0.3525	0.62	Q	V				
11+50	0.3569	0.63	Q	V				
11+55	0.3613	0.65	Q	V				
12+ 0	0.3658	0.65	Q	V				
12+ 5	0.3712	0.78	Q	V				
12+10	0.3773	0.88	Q	V				
12+15	0.3835	0.90	Q	V				
12+20	0.3899	0.92	Q	V				
12+25	0.3963	0.94	Q	V				
12+30	0.4028	0.94	Q	V				
12+35	0.4097	1.00	Q	V				

12+40	0.4168	1.04	Q	V
12+45	0.4240	1.05	Q	V
12+50	0.4316	1.09	Q	V
12+55	0.4393	1.12	Q	V
13+ 0	0.4471	1.13	Q	V
13+ 5	0.4562	1.32	Q	V
13+10	0.4663	1.47	Q	V
13+15	0.4766	1.49	Q	V
13+20	0.4870	1.50	Q	V
13+25	0.4974	1.51	Q	V
13+30	0.5078	1.51	Q	V
13+35	0.5157	1.15	Q	V
13+40	0.5218	0.89	Q	V
13+45	0.5276	0.84	Q	V
13+50	0.5333	0.83	Q	V
13+55	0.5391	0.83	Q	V
14+ 0	0.5448	0.83	Q	V
14+ 5	0.5513	0.95	Q	V
14+10	0.5585	1.04	Q	V
14+15	0.5658	1.06	Q	V
14+20	0.5729	1.03	Q	V
14+25	0.5798	1.01	Q	V
14+30	0.5867	1.00	Q	V
14+35	0.5936	1.01	Q	V
14+40	0.6006	1.01	Q	V
14+45	0.6076	1.02	Q	V
14+50	0.6144	0.98	Q	V
14+55	0.6210	0.96	Q	V
15+ 0	0.6276	0.96	Q	V
15+ 5	0.6340	0.93	Q	V
15+10	0.6402	0.90	Q	V
15+15	0.6464	0.90	Q	V
15+20	0.6524	0.87	Q	V
15+25	0.6582	0.84	Q	V
15+30	0.6640	0.84	Q	V
15+35	0.6692	0.76	Q	V
15+40	0.6741	0.70	Q	V
15+45	0.6788	0.69	Q	V
15+50	0.6835	0.69	Q	V
15+55	0.6883	0.69	Q	V
16+ 0	0.6930	0.69	Q	V
16+ 5	0.6958	0.40	Q	V
16+10	0.6971	0.19	Q	V
16+15	0.6981	0.15	Q	V
16+20	0.6991	0.14	Q	V
16+25	0.7001	0.14	Q	V
16+30	0.7011	0.14	Q	V
16+35	0.7020	0.13	Q	V
16+40	0.7027	0.11	Q	V
16+45	0.7035	0.11	Q	V
16+50	0.7042	0.11	Q	V
16+55	0.7050	0.11	Q	V
17+ 0	0.7057	0.11	Q	V
17+ 5	0.7067	0.15	Q	V
17+10	0.7079	0.17	Q	V
17+15	0.7092	0.18	Q	V
17+20	0.7104	0.18	Q	V

17+25	0.7117	0.18	Q				V
17+30	0.7129	0.18	Q				V
17+35	0.7142	0.18	Q				V
17+40	0.7154	0.18	Q				V
17+45	0.7167	0.18	Q				V
17+50	0.7178	0.16	Q				V
17+55	0.7188	0.15	Q				V
18+ 0	0.7198	0.15	Q				V
18+ 5	0.7208	0.14	Q				V
18+10	0.7218	0.14	Q				V
18+15	0.7228	0.14	Q				V
18+20	0.7238	0.14	Q				V
18+25	0.7248	0.14	Q				V
18+30	0.7258	0.14	Q				V
18+35	0.7266	0.13	Q				V
18+40	0.7274	0.11	Q				V
18+45	0.7281	0.11	Q				V
18+50	0.7288	0.09	Q				V
18+55	0.7293	0.08	Q				V
19+ 0	0.7298	0.07	Q				V
19+ 5	0.7304	0.09	Q				V
19+10	0.7311	0.11	Q				V
19+15	0.7319	0.11	Q				V
19+20	0.7328	0.13	Q				V
19+25	0.7337	0.14	Q				V
19+30	0.7347	0.14	Q				V
19+35	0.7356	0.13	Q				V
19+40	0.7364	0.11	Q				V
19+45	0.7371	0.11	Q				V
19+50	0.7377	0.09	Q				V
19+55	0.7382	0.08	Q				V
20+ 0	0.7387	0.07	Q				V
20+ 5	0.7394	0.09	Q				V
20+10	0.7401	0.11	Q				V
20+15	0.7408	0.11	Q				V
20+20	0.7416	0.11	Q				V
20+25	0.7423	0.11	Q				V
20+30	0.7431	0.11	Q				V
20+35	0.7438	0.11	Q				V
20+40	0.7446	0.11	Q				V
20+45	0.7453	0.11	Q				V
20+50	0.7459	0.09	Q				V
20+55	0.7465	0.08	Q				V
21+ 0	0.7470	0.07	Q				V
21+ 5	0.7476	0.09	Q				V
21+10	0.7483	0.11	Q				V
21+15	0.7491	0.11	Q				V
21+20	0.7497	0.09	Q				V
21+25	0.7502	0.08	Q				V
21+30	0.7507	0.07	Q				V
21+35	0.7513	0.09	Q				V
21+40	0.7521	0.11	Q				V
21+45	0.7528	0.11	Q				V
21+50	0.7534	0.09	Q				V
21+55	0.7539	0.08	Q				V
22+ 0	0.7544	0.07	Q				V
22+ 5	0.7551	0.09	Q				V

22+10	0.7558	0.11	Q				V
22+15	0.7565	0.11	Q				V
22+20	0.7572	0.09	Q				V
22+25	0.7577	0.08	Q				V
22+30	0.7582	0.07	Q				V
22+35	0.7587	0.07	Q				V
22+40	0.7592	0.07	Q				V
22+45	0.7597	0.07	Q				V
22+50	0.7602	0.07	Q				V
22+55	0.7607	0.07	Q				V
23+ 0	0.7612	0.07	Q				V
23+ 5	0.7617	0.07	Q				V
23+10	0.7622	0.07	Q				V
23+15	0.7627	0.07	Q				V
23+20	0.7632	0.07	Q				V
23+25	0.7637	0.07	Q				V
23+30	0.7642	0.07	Q				V
23+35	0.7646	0.07	Q				V
23+40	0.7651	0.07	Q				V
23+45	0.7656	0.07	Q				V
23+50	0.7661	0.07	Q				V
23+55	0.7666	0.07	Q				V
24+ 0	0.7671	0.07	Q				V
24+ 5	0.7674	0.03	Q				V
24+10	0.7674	0.01	Q				V
24+15	0.7674	0.00	Q				V

Unit Hydrograph Analysis

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Study date 10/10/23 File: 100XUH6100.out

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

Program License Serial Number 6405

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

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

English Units used in output format

Drainage Area = 3.46(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.46(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 365.00(Ft.)
Length along longest watercourse measured to centroid = 176.00(Ft.)
Length along longest watercourse = 0.069 Mi.
Length along longest watercourse measured to centroid = 0.033 Mi.
Difference in elevation = 8.00(Ft.)
Slope along watercourse = 115.7260 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.019 Hr.
Lag time = 1.16 Min.
25% of lag time = 0.29 Min.
40% of lag time = 0.46 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]
3.46	1.20	4.15

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.46	2.50	8.65

STORM EVENT (YEAR) = 100.00

Area Averaged 2-Year Rainfall = 1.200(In)

Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)

Areal adjustment factor = 100.00 %

Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.460	52.60	0.900
Total Area Entered = 3.46(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.6	52.6	0.545	0.900	0.104	1.000	0.104
Sum (F) =						0.104

Area averaged mean soil loss (F) (In/Hr) = 0.104

Minimum soil loss rate ((In/Hr)) = 0.052

(for 24 hour storm duration)

Soil loss rate (decimal) = 0.180

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	430.393	2.339
2	0.167	860.786	1.148
Sum = 100.000		Sum=	3.487

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)		Effective (In/Hr)
				Max	Low	
1	0.08	0.50	0.150	(0.104)	0.027	0.123
2	0.17	0.60	0.180	(0.104)	0.032	0.148
3	0.25	0.60	0.180	(0.104)	0.032	0.148
4	0.33	0.60	0.180	(0.104)	0.032	0.148
5	0.42	0.60	0.180	(0.104)	0.032	0.148
6	0.50	0.70	0.210	(0.104)	0.038	0.172
7	0.58	0.70	0.210	(0.104)	0.038	0.172
8	0.67	0.70	0.210	(0.104)	0.038	0.172
9	0.75	0.70	0.210	(0.104)	0.038	0.172
10	0.83	0.70	0.210	(0.104)	0.038	0.172
11	0.92	0.70	0.210	(0.104)	0.038	0.172
12	1.00	0.80	0.240	(0.104)	0.043	0.197
13	1.08	0.80	0.240	(0.104)	0.043	0.197
14	1.17	0.80	0.240	(0.104)	0.043	0.197
15	1.25	0.80	0.240	(0.104)	0.043	0.197
16	1.33	0.80	0.240	(0.104)	0.043	0.197
17	1.42	0.80	0.240	(0.104)	0.043	0.197
18	1.50	0.80	0.240	(0.104)	0.043	0.197
19	1.58	0.80	0.240	(0.104)	0.043	0.197
20	1.67	0.80	0.240	(0.104)	0.043	0.197
21	1.75	0.80	0.240	(0.104)	0.043	0.197
22	1.83	0.80	0.240	(0.104)	0.043	0.197
23	1.92	0.80	0.240	(0.104)	0.043	0.197
24	2.00	0.90	0.270	(0.104)	0.049	0.221
25	2.08	0.80	0.240	(0.104)	0.043	0.197
26	2.17	0.90	0.270	(0.104)	0.049	0.221
27	2.25	0.90	0.270	(0.104)	0.049	0.221
28	2.33	0.90	0.270	(0.104)	0.049	0.221
29	2.42	0.90	0.270	(0.104)	0.049	0.221
30	2.50	0.90	0.270	(0.104)	0.049	0.221
31	2.58	0.90	0.270	(0.104)	0.049	0.221
32	2.67	0.90	0.270	(0.104)	0.049	0.221
33	2.75	1.00	0.300	(0.104)	0.054	0.246
34	2.83	1.00	0.300	(0.104)	0.054	0.246
35	2.92	1.00	0.300	(0.104)	0.054	0.246
36	3.00	1.00	0.300	(0.104)	0.054	0.246
37	3.08	1.00	0.300	(0.104)	0.054	0.246
38	3.17	1.10	0.330	(0.104)	0.059	0.271
39	3.25	1.10	0.330	(0.104)	0.059	0.271
40	3.33	1.10	0.330	(0.104)	0.059	0.271
41	3.42	1.20	0.360	(0.104)	0.065	0.295
42	3.50	1.30	0.390	(0.104)	0.070	0.320
43	3.58	1.40	0.420	(0.104)	0.076	0.344
44	3.67	1.40	0.420	(0.104)	0.076	0.344
45	3.75	1.50	0.450	(0.104)	0.081	0.369

46	3.83	1.50	0.450	(0.104)	0.081	0.369
47	3.92	1.60	0.480	(0.104)	0.086	0.394
48	4.00	1.60	0.480	(0.104)	0.086	0.394
49	4.08	1.70	0.510	(0.104)	0.092	0.418
50	4.17	1.80	0.540	(0.104)	0.097	0.443
51	4.25	1.90	0.570	(0.104)	0.103	0.467
52	4.33	2.00	0.600	0.104	(0.108)	0.496
53	4.42	2.10	0.630	0.104	(0.113)	0.526
54	4.50	2.10	0.630	0.104	(0.113)	0.526
55	4.58	2.20	0.660	0.104	(0.119)	0.556
56	4.67	2.30	0.690	0.104	(0.124)	0.586
57	4.75	2.40	0.720	0.104	(0.130)	0.616
58	4.83	2.40	0.720	0.104	(0.130)	0.616
59	4.92	2.50	0.750	0.104	(0.135)	0.646
60	5.00	2.60	0.780	0.104	(0.140)	0.676
61	5.08	3.10	0.930	0.104	(0.167)	0.826
62	5.17	3.60	1.080	0.104	(0.194)	0.976
63	5.25	3.90	1.170	0.104	(0.211)	1.066
64	5.33	4.20	1.260	0.104	(0.227)	1.156
65	5.42	4.70	1.410	0.104	(0.254)	1.306
66	5.50	5.60	1.680	0.104	(0.302)	1.576
67	5.58	1.90	0.570	(0.104)	0.103	0.467
68	5.67	0.90	0.270	(0.104)	0.049	0.221
69	5.75	0.60	0.180	(0.104)	0.032	0.148
70	5.83	0.50	0.150	(0.104)	0.027	0.123
71	5.92	0.30	0.090	(0.104)	0.016	0.074
72	6.00	0.20	0.060	(0.104)	0.011	0.049

(Loss Rate Not Used)

Sum = 100.0

Sum = 25.5

Flood volume = Effective rainfall 2.13(In)
times area 3.5(Ac.)/[(In)/(Ft.)] = 0.6(Ac.Ft)
Total soil loss = 0.37(In)
Total soil loss = 0.108(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 26703.0 Cubic Feet
Total soil loss = 4696.1 Cubic Feet

Peak flow rate of this hydrograph = 5.189(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0020	0.29	VQ				
0+10	0.0053	0.49	VQ				

0+15	0.0089	0.51	V Q				
0+20	0.0124	0.51	V Q				
0+25	0.0160	0.51	VQ				
0+30	0.0199	0.57	VQ				
0+35	0.0241	0.60	VQ				
0+40	0.0282	0.60	VQ				
0+45	0.0323	0.60	Q				
0+50	0.0365	0.60	Q				
0+55	0.0406	0.60	Q				
1+ 0	0.0451	0.66	Q				
1+ 5	0.0499	0.69	QV				
1+10	0.0546	0.69	QV				
1+15	0.0593	0.69	QV				
1+20	0.0641	0.69	Q V				
1+25	0.0688	0.69	Q V				
1+30	0.0735	0.69	Q V				
1+35	0.0782	0.69	Q V				
1+40	0.0830	0.69	Q V				
1+45	0.0877	0.69	Q V				
1+50	0.0924	0.69	Q V				
1+55	0.0972	0.69	Q V				
2+ 0	0.1023	0.74	Q V				
2+ 5	0.1072	0.71	Q V				
2+10	0.1123	0.74	Q V				
2+15	0.1176	0.77	Q V				
2+20	0.1230	0.77	Q V				
2+25	0.1283	0.77	Q V				
2+30	0.1336	0.77	Q V				
2+35	0.1389	0.77	Q V				
2+40	0.1442	0.77	Q V				
2+45	0.1500	0.83	Q V				
2+50	0.1559	0.86	Q V				
2+55	0.1618	0.86	Q V				
3+ 0	0.1677	0.86	Q V				
3+ 5	0.1736	0.86	Q V				
3+10	0.1799	0.92	Q V				
3+15	0.1864	0.94	Q V				
3+20	0.1929	0.94	Q V				
3+25	0.1998	1.00	Q V				
3+30	0.2073	1.09	Q V				
3+35	0.2154	1.17	Q V				
3+40	0.2237	1.20	Q V				
3+45	0.2323	1.26	Q V				
3+50	0.2412	1.29	Q V				
3+55	0.2505	1.34	Q V				
4+ 0	0.2599	1.37	Q V				
4+ 5	0.2698	1.43	Q V				
4+10	0.2802	1.52	Q V				
4+15	0.2912	1.60	Q V				
4+20	0.3029	1.70	Q V				

4+25	0.3154	1.80		Q		V		
4+30	0.3280	1.84		Q		V		
4+35	0.3411	1.91		Q		V		
4+40	0.3550	2.01		Q		V		
4+45	0.3696	2.12		Q		V		
4+50	0.3844	2.15		Q		V		
4+55	0.3997	2.22		Q		V		
5+ 0	0.4157	2.33		Q		V		
5+ 5	0.4343	2.71		Q		V		
5+10	0.4566	3.23			Q			
5+15	0.4815	3.62			Q			
5+20	0.5086	3.93			Q			
5+25	0.5388	4.39			Q			
5+30	0.5745	5.19			Q			
5+35	0.5945	2.90			Q			
5+40	0.6018	1.06		Q				
5+45	0.6059	0.60	Q					
5+50	0.6091	0.46	Q					
5+55	0.6113	0.31	Q					
6+ 0	0.6126	0.20	Q					
6+ 5	0.6130	0.06	Q					

Unit Hydrograph Analysis

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Study date 09/30/24 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 = 3.47(Ac.) = 0.005 Sq. Mi.
0.005 Sq. Mi. Drainage Area for Depth-Area Areal Adjustment = 3.47(Ac.) =
Length along longest watercourse = 742.00(Ft.)
Length along longest watercourse measured to centroid = 624.00(Ft.)
Length along longest watercourse = 0.141 Mi.
Length along longest watercourse measured to centroid = 0.118 Mi.
Difference in elevation = 14.60(Ft.)
Slope along watercourse = 103.8922 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.031 Hr.
Lag time = 1.88 Min.
25% of lag time = 0.47 Min.
40% of lag time = 0.75 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]
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3.47

1.20

4.16

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.47	2.50	8.68

STORM EVENT (YEAR) = 100.00

Area Averaged 2-Year Rainfall = 1.200(In)

Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)

Areal adjustment factor = 100.00 %

Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.470	52.80	0.521
Total Area Entered = 3.47(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.8	52.8	0.543	0.521	0.289	1.000	0.289
Sum (F) =						0.289

Area averaged mean soil loss (F) (In/Hr) = 0.289

Minimum soil loss rate ((In/Hr)) = 0.144

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.483

Unit Hydrograph VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1 0.083	265.427	52.830	1.848
2 0.167	530.854	39.116	1.368
3 0.250	796.281	6.543	0.229
4 0.333	1061.708	1.510	0.053
Sum = 100.000		Sum=	3.497

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	(0.289)	0.072 0.078
2 0.17	0.60	0.180	(0.289)	0.087 0.093
3 0.25	0.60	0.180	(0.289)	0.087 0.093
4 0.33	0.60	0.180	(0.289)	0.087 0.093

5	0.42	0.60	0.180	(0.289)	0.087	0.093
6	0.50	0.70	0.210	(0.289)	0.101	0.109
7	0.58	0.70	0.210	(0.289)	0.101	0.109
8	0.67	0.70	0.210	(0.289)	0.101	0.109
9	0.75	0.70	0.210	(0.289)	0.101	0.109
10	0.83	0.70	0.210	(0.289)	0.101	0.109
11	0.92	0.70	0.210	(0.289)	0.101	0.109
12	1.00	0.80	0.240	(0.289)	0.116	0.124
13	1.08	0.80	0.240	(0.289)	0.116	0.124
14	1.17	0.80	0.240	(0.289)	0.116	0.124
15	1.25	0.80	0.240	(0.289)	0.116	0.124
16	1.33	0.80	0.240	(0.289)	0.116	0.124
17	1.42	0.80	0.240	(0.289)	0.116	0.124
18	1.50	0.80	0.240	(0.289)	0.116	0.124
19	1.58	0.80	0.240	(0.289)	0.116	0.124
20	1.67	0.80	0.240	(0.289)	0.116	0.124
21	1.75	0.80	0.240	(0.289)	0.116	0.124
22	1.83	0.80	0.240	(0.289)	0.116	0.124
23	1.92	0.80	0.240	(0.289)	0.116	0.124
24	2.00	0.90	0.270	(0.289)	0.130	0.140
25	2.08	0.80	0.240	(0.289)	0.116	0.124
26	2.17	0.90	0.270	(0.289)	0.130	0.140
27	2.25	0.90	0.270	(0.289)	0.130	0.140
28	2.33	0.90	0.270	(0.289)	0.130	0.140
29	2.42	0.90	0.270	(0.289)	0.130	0.140
30	2.50	0.90	0.270	(0.289)	0.130	0.140
31	2.58	0.90	0.270	(0.289)	0.130	0.140
32	2.67	0.90	0.270	(0.289)	0.130	0.140
33	2.75	1.00	0.300	(0.289)	0.145	0.155
34	2.83	1.00	0.300	(0.289)	0.145	0.155
35	2.92	1.00	0.300	(0.289)	0.145	0.155
36	3.00	1.00	0.300	(0.289)	0.145	0.155
37	3.08	1.00	0.300	(0.289)	0.145	0.155
38	3.17	1.10	0.330	(0.289)	0.159	0.171
39	3.25	1.10	0.330	(0.289)	0.159	0.171
40	3.33	1.10	0.330	(0.289)	0.159	0.171
41	3.42	1.20	0.360	(0.289)	0.174	0.186
42	3.50	1.30	0.390	(0.289)	0.188	0.202
43	3.58	1.40	0.420	(0.289)	0.203	0.217
44	3.67	1.40	0.420	(0.289)	0.203	0.217
45	3.75	1.50	0.450	(0.289)	0.217	0.233
46	3.83	1.50	0.450	(0.289)	0.217	0.233
47	3.92	1.60	0.480	(0.289)	0.232	0.248
48	4.00	1.60	0.480	(0.289)	0.232	0.248
49	4.08	1.70	0.510	(0.289)	0.246	0.264
50	4.17	1.80	0.540	(0.289)	0.261	0.279
51	4.25	1.90	0.570	(0.289)	0.275	0.295
52	4.33	2.00	0.600	0.289	(0.290)	0.311
53	4.42	2.10	0.630	0.289	(0.304)	0.341
54	4.50	2.10	0.630	0.289	(0.304)	0.341
55	4.58	2.20	0.660	0.289	(0.319)	0.371
56	4.67	2.30	0.690	0.289	(0.333)	0.401
57	4.75	2.40	0.720	0.289	(0.348)	0.431
58	4.83	2.40	0.720	0.289	(0.348)	0.431
59	4.92	2.50	0.750	0.289	(0.362)	0.461
60	5.00	2.60	0.780	0.289	(0.377)	0.491
61	5.08	3.10	0.930	0.289	(0.449)	0.641

62	5.17	3.60	1.080	0.289	(0.522)	0.791
63	5.25	3.90	1.170	0.289	(0.565)	0.881
64	5.33	4.20	1.260	0.289	(0.609)	0.971
65	5.42	4.70	1.410	0.289	(0.681)	1.121
66	5.50	5.60	1.680	0.289	(0.812)	1.391
67	5.58	1.90	0.570	(0.289)	0.275	0.295
68	5.67	0.90	0.270	(0.289)	0.130	0.140
69	5.75	0.60	0.180	(0.289)	0.087	0.093
70	5.83	0.50	0.150	(0.289)	0.072	0.078
71	5.92	0.30	0.090	(0.289)	0.043	0.047
72	6.00	0.20	0.060	(0.289)	0.029	0.031

(Loss Rate Not Used)

Sum = 100.0

Sum = 17.8

Flood volume = Effective rainfall 1.48(In)
times area 3.5(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 1.02(In)
Total soil loss = 0.294(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 18683.3 Cubic Feet
Total soil loss = 12806.6 Cubic Feet

Peak flow rate of this hydrograph = 4.376(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0010	0.14	Q				
0+10	0.0029	0.28	VQ				
0+15	0.0051	0.32	VQ				
0+20	0.0073	0.32	VQ				
0+25	0.0096	0.33	VQ				
0+30	0.0120	0.35	Q				
0+35	0.0146	0.38	Q				
0+40	0.0172	0.38	Q				
0+45	0.0198	0.38	Q				
0+50	0.0224	0.38	QV				
0+55	0.0250	0.38	QV				
1+ 0	0.0279	0.41	QV				
1+ 5	0.0308	0.43	QV				
1+10	0.0338	0.43	Q V				
1+15	0.0368	0.43	Q V				
1+20	0.0398	0.43	Q V				
1+25	0.0428	0.43	Q V				
1+30	0.0458	0.43	Q V				
1+35	0.0487	0.43	Q V				
1+40	0.0517	0.43	Q V				
1+45	0.0547	0.43	Q V				
1+50	0.0577	0.43	Q V				
1+55	0.0607	0.43	Q V				
2+ 0	0.0639	0.46	Q V				
2+ 5	0.0670	0.46	Q V				

2+10	0.0702	0.47	Q	V							
2+15	0.0736	0.48	Q	V							
2+20	0.0769	0.49	Q	V							
2+25	0.0803	0.49	Q	V							
2+30	0.0836	0.49	Q	V							
2+35	0.0870	0.49	Q	V							
2+40	0.0904	0.49	Q	V							
2+45	0.0939	0.52	Q	V							
2+50	0.0976	0.54	Q	V							
2+55	0.1014	0.54	Q	V							
3+ 0	0.1051	0.54	Q	V							
3+ 5	0.1088	0.54	Q	V							
3+10	0.1128	0.57	Q	V							
3+15	0.1169	0.59	Q	V							
3+20	0.1210	0.60	Q	V							
3+25	0.1253	0.63	Q	V							
3+30	0.1299	0.68	Q	V							
3+35	0.1349	0.73	Q	V							
3+40	0.1401	0.75	Q	V							
3+45	0.1455	0.79	Q	V							
3+50	0.1511	0.81	Q	V							
3+55	0.1569	0.84	Q	V							
4+ 0	0.1629	0.86	Q	V							
4+ 5	0.1690	0.90	Q	V							
4+10	0.1756	0.95	Q	V							
4+15	0.1824	1.00	Q	V							
4+20	0.1897	1.06	Q	V							
4+25	0.1976	1.14	Q	V							
4+30	0.2057	1.19	Q	V							
4+35	0.2143	1.25	Q	V							
4+40	0.2236	1.35	Q	V							
4+45	0.2336	1.45	Q	V							
4+50	0.2439	1.50	Q	V							
4+55	0.2547	1.56	Q	V							
5+ 0	0.2661	1.66	Q	V							
5+ 5	0.2798	1.99	Q	V							
5+10	0.2969	2.48	Q	V							
5+15	0.3167	2.89	Q	V							
5+20	0.3389	3.22	Q	V							
5+25	0.3640	3.65	Q	V							
5+30	0.3941	4.38	Q	V							
5+35	0.4131	2.76	Q	V							
5+40	0.4203	1.04	Q	V							
5+45	0.4237	0.50	Q	V							
5+50	0.4259	0.32	Q	V							
5+55	0.4274	0.22	Q	V							
6+ 0	0.4284	0.14	Q	V							
6+ 5	0.4288	0.06	Q	V							
6+10	0.4289	0.01	Q	V							
6+15	0.4289	0.00	Q	V							

Unit Hydrograph Analysis

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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 = 3.46(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.46(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 365.00(Ft.)
Length along longest watercourse measured to centroid = 176.00(Ft.)
Length along longest watercourse = 0.069 Mi.
Length along longest watercourse measured to centroid = 0.033 Mi.
Difference in elevation = 8.00(Ft.)
Slope along watercourse = 115.7260 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.019 Hr.
Lag time = 1.16 Min.
25% of lag time = 0.29 Min.
40% of lag time = 0.46 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]
3.46	0.80	2.77

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.46	2.00	6.92

STORM EVENT (YEAR) = 100.00

Area Averaged 2-Year Rainfall = 0.800(In)

Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)

Areal adjustment factor = 100.00 %

Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.460	52.60	0.900
Total Area Entered = 3.46(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.6	52.6	0.545	0.900	0.104	1.000	0.104
Sum (F) =						0.104

Area averaged mean soil loss (F) (In/Hr) = 0.104

Minimum soil loss rate ((In/Hr)) = 0.052

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.180

Unit Hydrograph
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	430.393	67.069
2	0.167	860.786	32.931
		Sum = 100.000	Sum= 3.487

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)		Effective (In/Hr)
				Max	Low	
1	0.08	1.30	0.312	(0.104)	0.056	0.256
2	0.17	1.30	0.312	(0.104)	0.056	0.256
3	0.25	1.10	0.264	(0.104)	0.048	0.216
4	0.33	1.50	0.360	(0.104)	0.065	0.295
5	0.42	1.50	0.360	(0.104)	0.065	0.295
6	0.50	1.80	0.432	(0.104)	0.078	0.354
7	0.58	1.50	0.360	(0.104)	0.065	0.295
8	0.67	1.80	0.432	(0.104)	0.078	0.354
9	0.75	1.80	0.432	(0.104)	0.078	0.354
10	0.83	1.50	0.360	(0.104)	0.065	0.295
11	0.92	1.60	0.384	(0.104)	0.069	0.315
12	1.00	1.80	0.432	(0.104)	0.078	0.354
13	1.08	2.20	0.528	(0.104)	0.095	0.433
14	1.17	2.20	0.528	(0.104)	0.095	0.433
15	1.25	2.20	0.528	(0.104)	0.095	0.433
16	1.33	2.00	0.480	(0.104)	0.086	0.394
17	1.42	2.60	0.624	0.104	(0.112)	0.520
18	1.50	2.70	0.648	0.104	(0.117)	0.544
19	1.58	2.40	0.576	0.104	(0.104)	0.472
20	1.67	2.70	0.648	0.104	(0.117)	0.544
21	1.75	3.30	0.792	0.104	(0.143)	0.688
22	1.83	3.10	0.744	0.104	(0.134)	0.640
23	1.92	2.90	0.696	0.104	(0.125)	0.592
24	2.00	3.00	0.720	0.104	(0.130)	0.616
25	2.08	3.10	0.744	0.104	(0.134)	0.640
26	2.17	4.20	1.008	0.104	(0.181)	0.904
27	2.25	5.00	1.200	0.104	(0.216)	1.096
28	2.33	3.50	0.840	0.104	(0.151)	0.736
29	2.42	6.80	1.632	0.104	(0.294)	1.528
30	2.50	7.30	1.752	0.104	(0.315)	1.648
31	2.58	8.20	1.968	0.104	(0.354)	1.864
32	2.67	5.90	1.416	0.104	(0.255)	1.312
33	2.75	2.00	0.480	(0.104)	0.086	0.394
34	2.83	1.80	0.432	(0.104)	0.078	0.354
35	2.92	1.80	0.432	(0.104)	0.078	0.354
36	3.00	0.60	0.144	(0.104)	0.026	0.118

(Loss Rate Not Used)

Sum = 100.0

Sum = 20.9

Flood volume = Effective rainfall 1.74(In)

times area 3.5(Ac.)/[(In)/(Ft.)] = 0.5(Ac.Ft)

Total soil loss = 0.26(In)

Total soil loss = 0.074(Ac.Ft)

Total rainfall = 2.00(In)

Flood volume = 21878.0 Cubic Feet

Total soil loss = 3241.3 Cubic Feet

Peak flow rate of this hydrograph = 6.256(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0041	0.60	V Q					
0+10	0.0103	0.89	V Q					
0+15	0.0158	0.80	V Q					
0+20	0.0223	0.94	V Q					
0+25	0.0293	1.03	V Q					
0+30	0.0374	1.17	V Q					
0+35	0.0450	1.10	VQ					
0+40	0.0530	1.17	Q					
0+45	0.0615	1.24	Q					
0+50	0.0691	1.10	QV					
0+55	0.0765	1.08	Q V					
1+ 0	0.0847	1.19	Q V					
1+ 5	0.0945	1.42	Q V					
1+10	0.1049	1.51	Q V					
1+15	0.1153	1.51	Q V					
1+20	0.1250	1.42	Q V					
1+25	0.1365	1.67	Q V					
1+30	0.1494	1.87	Q V					
1+35	0.1613	1.73	Q V					
1+40	0.1738	1.82	Q V					
1+45	0.1892	2.24	Q V					
1+50	0.2050	2.29	Q V					
1+55	0.2196	2.12	Q V					
2+ 0	0.2342	2.12	Q V					
2+ 5	0.2494	2.21	Q V					
2+10	0.2691	2.85	Q V					
2+15	0.2939	3.60	Q V					
2+20	0.3144	2.98	Q V					
2+25	0.3449	4.42	Q V					
2+30	0.3836	5.61	Q V					
2+35	0.4266	6.26	Q V					
2+40	0.4625	5.21	Q V					
2+45	0.4793	2.43	Q V					
2+50	0.4881	1.28	Q V					
2+55	0.4966	1.24	Q V					
3+ 0	0.5013	0.68	Q V					
3+ 5	0.5022	0.14	Q V					

Unit Hydrograph Analysis

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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, STORM EVENT ANALYSIS

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

English Units used in output format

Drainage Area = 3.47(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.47(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 742.00(Ft.)
Length along longest watercourse measured to centroid = 624.00(Ft.)
Length along longest watercourse = 0.141 Mi.
Length along longest watercourse measured to centroid = 0.118 Mi.
Difference in elevation = 14.60(Ft.)
Slope along watercourse = 103.8922 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.031 Hr.
Lag time = 1.88 Min.
25% of lag time = 0.47 Min.
40% of lag time = 0.75 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]
3.47	0.80	2.78

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.47	2.00	6.94

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

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

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.470	52.80	0.521

Total Area Entered = 3.47(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.)	(In/Hr)	(Dec.)	(In/Hr)
52.8	52.8	0.543	0.521	0.289	1.000	0.289
Sum (F) =						0.289

Area averaged mean soil loss (F) (In/Hr) = 0.289
Minimum soil loss rate ((In/Hr)) = 0.144
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.483

Unit Hydrograph VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	265.427	52.830
2	0.167	530.854	39.116
3	0.250	796.281	6.543
4	0.333	1061.708	1.510
Sum =		100.000	Sum=
			3.497

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 (0.289)	0.151 0.161
2	0.17	1.30	0.312 (0.289)	0.151 0.161
3	0.25	1.10	0.264 (0.289)	0.128 0.136

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0021	0.30	VQ					
0+10	0.0056	0.52	V Q					
0+15	0.0091	0.51	V 0					

0+20	0.0131	0.58	VQ						
0+25	0.0175	0.64	VQ						
0+30	0.0224	0.72	Q						
0+35	0.0273	0.70	Q						
0+40	0.0323	0.73	QV						
0+45	0.0376	0.77	QV						
0+50	0.0425	0.71	Q V						
0+55	0.0472	0.68	Q V						
1+ 0	0.0523	0.74	Q V						
1+ 5	0.0583	0.87	Q V						
1+10	0.0647	0.94	Q V						
1+15	0.0713	0.95	Q V						
1+20	0.0775	0.91	Q V						
1+25	0.0847	1.04	Q V						
1+30	0.0929	1.19	Q V						
1+35	0.1007	1.13	Q V						
1+40	0.1088	1.17	Q V						
1+45	0.1192	1.51	Q V						
1+50	0.1304	1.63	Q V						
1+55	0.1408	1.51	Q V						
2+ 0	0.1510	1.49	Q V						
2+ 5	0.1617	1.55	Q V						
2+10	0.1760	2.07	Q V						
2+15	0.1952	2.80	Q V						
2+20	0.2121	2.46	Q V						
2+25	0.2361	3.48	Q V						
2+30	0.2686	4.72	Q V						
2+35	0.3061	5.44	Q V						
2+40	0.3391	4.79	Q V						
2+45	0.3561	2.46	Q V						
2+50	0.3636	1.10	Q V						
2+55	0.3694	0.83	Q V						
3+ 0	0.3729	0.51	Q V						
3+ 5	0.3740	0.16	Q V						
3+10	0.3742	0.03	Q V						
3+15	0.3742	0.00	Q V						

Unit Hydrograph Analysis

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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 = 3.46(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.46(Ac.) =
0.005 Sq. Mi.
Length along longest watercourse = 365.00(Ft.)
Length along longest watercourse measured to centroid = 176.00(Ft.)
Length along longest watercourse = 0.069 Mi.
Length along longest watercourse measured to centroid = 0.033 Mi.
Difference in elevation = 8.00(Ft.)
Slope along watercourse = 115.7260 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.019 Hr.
Lag time = 1.16 Min.
25% of lag time = 0.29 Min.
40% of lag time = 0.46 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]
3.46	0.50	1.73

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.46	1.21	4.19

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 = 100.00 %

Adjusted average point rain = 1.212(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.460	52.60	0.900
Total Area Entered = 3.46(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.6	52.6	0.545	0.900	0.104	1.000	0.104
Sum (F) =						0.104

Area averaged mean soil loss (F) (In/Hr) = 0.104

Minimum soil loss rate ((In/Hr)) = 0.052

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.180

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

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	430.393	2.339
2	0.167	860.786	1.148
Sum = 100.000		Sum=	3.487

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)		Effective (In/Hr)
				Max	Low	
1	0.08	4.20	0.611	0.104	(0.110)	0.507
2	0.17	4.30	0.625	0.104	(0.113)	0.522
3	0.25	5.00	0.727	0.104	(0.131)	0.624
4	0.33	5.00	0.727	0.104	(0.131)	0.624
5	0.42	5.80	0.844	0.104	(0.152)	0.740
6	0.50	6.50	0.945	0.104	(0.170)	0.842
7	0.58	7.40	1.076	0.104	(0.194)	0.973
8	0.67	8.60	1.251	0.104	(0.225)	1.147
9	0.75	12.30	1.789	0.104	(0.322)	1.685
10	0.83	29.10	4.232	0.104	(0.762)	4.129
11	0.92	6.80	0.989	0.104	(0.178)	0.885
12	1.00	5.00	0.727	0.104	(0.131)	0.624

(Loss Rate Not Used)

Sum = 100.0 Sum = 13.3

Flood volume = Effective rainfall 1.11(In)
times area 3.5(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.10(In)
Total soil loss = 0.030(Ac.Ft)
Total rainfall = 1.21(In)
Flood volume = 13920.3 Cubic Feet
Total soil loss = 1301.7 Cubic Feet

Peak flow rate of this hydrograph = 11.597(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	5.0	10.0	15.0	20.0
0+ 5	0.0082	1.19	VQ				
0+10	0.0206	1.80	VQ				
0+15	0.0348	2.06	Q				
0+20	0.0498	2.18	Q V				
0+25	0.0666	2.45	Q V				
0+30	0.0860	2.82	Q V				
0+35	0.1084	3.24	Q	V			
0+40	0.1345	3.80	Q	V			
0+45	0.1708	5.26		Q	V		
0+50	0.2506	11.60			Q	V	

0+55	0.2976	6.81				Q					V	
1+ 0	0.3146	2.48		Q							V	
1+ 5	0.3196	0.72		Q							V	

Unit Hydrograph Analysis

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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 EVEN ANALYSIS

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

English Units used in output format

Drainage Area = 3.47(Ac.) = 0.005 Sq. Mi.
0.005 Sq. Mi. Drainage Area for Depth-Area Areal Adjustment = 3.47(Ac.) =
Length along longest watercourse = 742.00(Ft.)
Length along longest watercourse measured to centroid = 624.00(Ft.)
Length along longest watercourse = 0.141 Mi.
Length along longest watercourse measured to centroid = 0.118 Mi.
Difference in elevation = 14.60(Ft.)
Slope along watercourse = 103.8922 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.031 Hr.
Lag time = 1.88 Min.
25% of lag time = 0.47 Min.
40% of lag time = 0.75 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]
--------------	-----------------	----------------

3.47 0.50 1.74

100 YEAR Area rainfall data:

Area(Ac.)[1] Rainfall(In)[2] Weighting[1*2]
3.47 1.20 4.16

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

Point rain (area averaged) = 1.200(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.200(In)

Sub-Area Data:

Area(Ac.) Runoff Index Impervious %
3.470 52.80 0.521
Total Area Entered = 3.47(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
52.8	52.8	0.543	0.521	0.289	1.000	0.289
						Sum (F) = 0.289

Area averaged mean soil loss (F) (In/Hr) = 0.289
Minimum soil loss rate ((In/Hr)) = 0.144
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.483

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	265.427	52.830	1.848
2 0.167	530.854	39.116	1.368
3 0.250	796.281	6.543	0.229
4 0.333	1061.708	1.510	0.053
		Sum = 100.000	Sum= 3.497

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max Low	Effective (In/Hr)
1 0.08	4.20	0.605	0.289 (0.292)	0.316
2 0.17	4.30	0.619	0.289 (0.299)	0.331

3	0.25	5.00	0.720	0.289	(0.348)	0.431
4	0.33	5.00	0.720	0.289	(0.348)	0.431
5	0.42	5.80	0.835	0.289	(0.404)	0.547
6	0.50	6.50	0.936	0.289	(0.452)	0.647
7	0.58	7.40	1.066	0.289	(0.515)	0.777
8	0.67	8.60	1.238	0.289	(0.598)	0.950
9	0.75	12.30	1.771	0.289	(0.856)	1.483
10	0.83	29.10	4.190	0.289	(2.025)	3.902
11	0.92	6.80	0.979	0.289	(0.473)	0.691
12	1.00	5.00	0.720	0.289	(0.348)	0.431

(Loss Rate Not Used)

Sum = 100.0

Sum = 10.9

Flood volume = Effective rainfall 0.91(In)
times area 3.5(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.083(Ac.Ft)
Total rainfall = 1.20(In)
Flood volume = 11479.3 Cubic Feet
Total soil loss = 3635.5 Cubic Feet

Peak flow rate of this hydrograph = 9.500(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	2.5	5.0	7.5	10.0
0+ 5	0.0040	0.58	V Q				
0+10	0.0112	1.04	V Q				
0+15	0.0203	1.32	V Q				
0+20	0.0305	1.48	V Q				
0+25	0.0423	1.72	Q				
0+30	0.0566	2.07	Q				
0+35	0.0736	2.47	Q V				
0+40	0.0942	3.00	Q V				
0+45	0.1235	4.25	Q V				
0+50	0.1889	9.50				V Q	
0+55	0.2372	7.01				Q	V
1+ 0	0.2559	2.71		Q			V
1+ 5	0.2624	0.95	Q				V
1+10	0.2634	0.14	Q				V
1+15	0.2635	0.02	Q				V

SECTION 3 - REFERENCE DATA

USGS SOILS REPORT

PLATE D-4.1

INFILTRATION REPORT (EXCERPT)

CONTECH UNDERGROUND CHAMBER SYSTEM

DCV CALCULATIONS (WQMP)

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



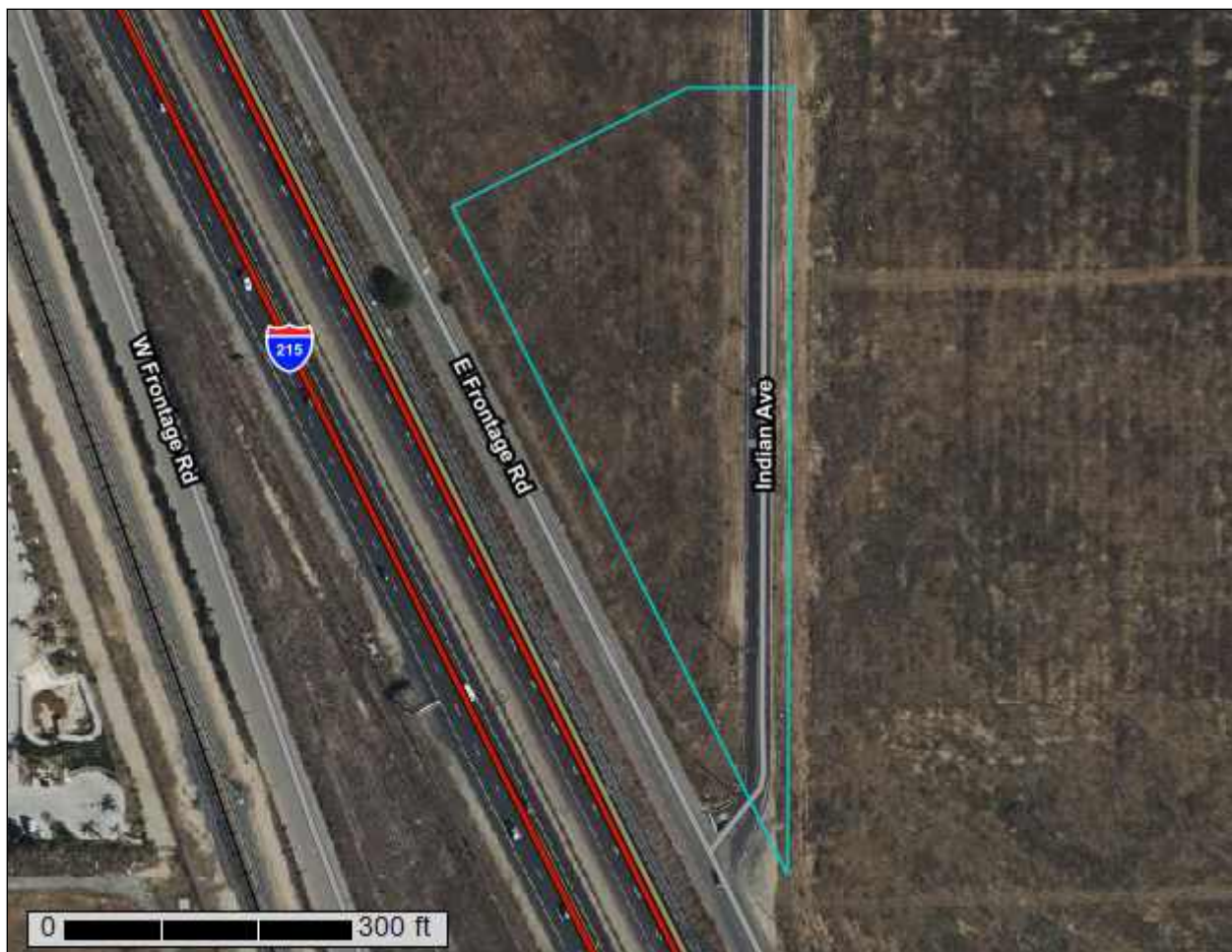
United States
Department of
Agriculture

NRCS

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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GyC2—Greenfield sandy loam, 2 to 8 percent slopes, eroded.....	13
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Hydrologic Soil Group.....	16
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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

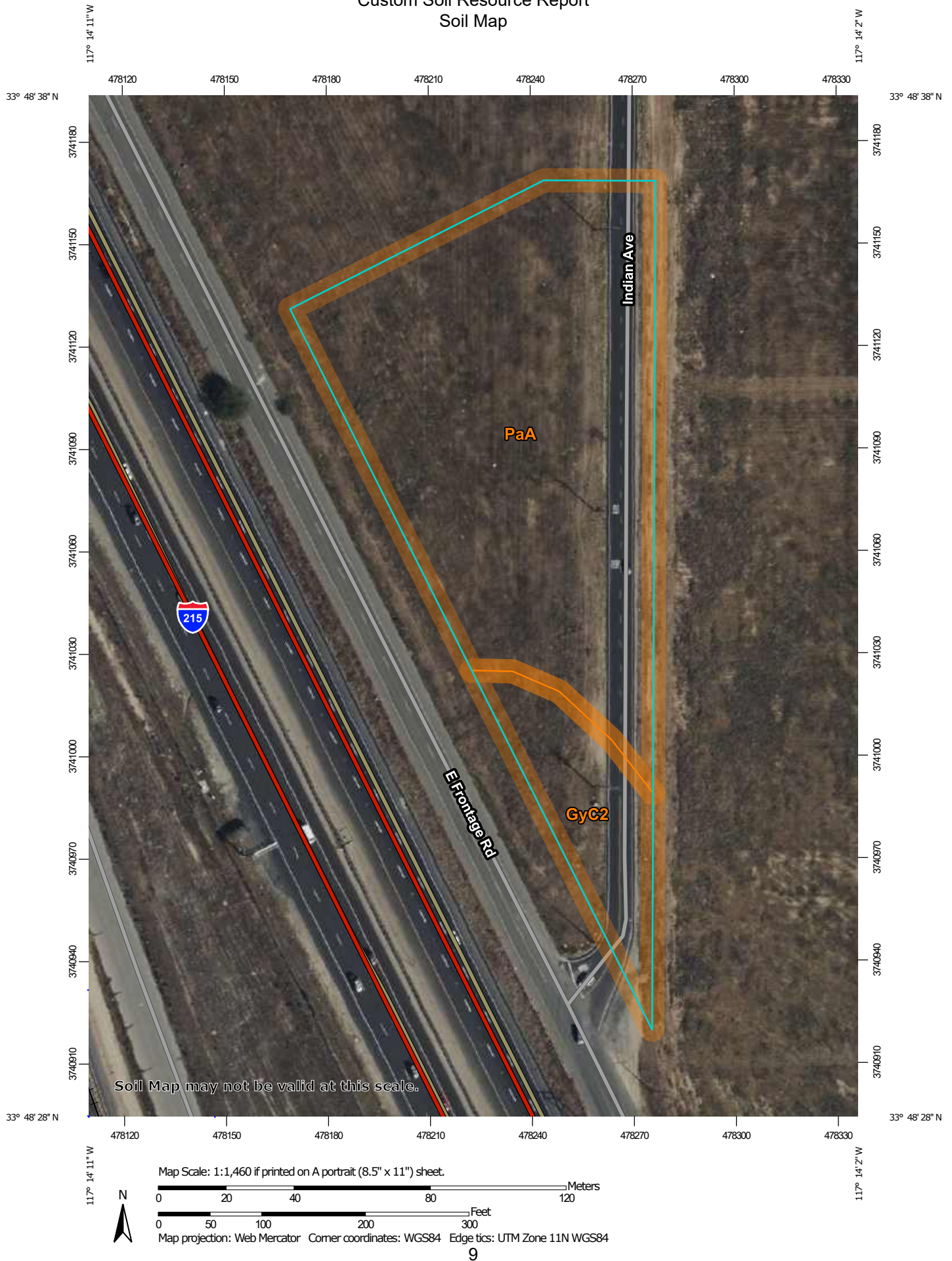
Custom Soil Resource Report

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



Custom Soil Resource Report

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
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	0.6	15.9%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	2.9	84.1%
Totals for Area of Interest		3.5	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,

Custom Soil Resource Report

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

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

Custom Soil Resource Report

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

Custom Soil Resource Report

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.

Custom Soil Resource Report

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



Custom Soil Resource Report

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
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	A	0.6	15.9%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	2.9	84.1%
Totals for Area of Interest			3.5	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

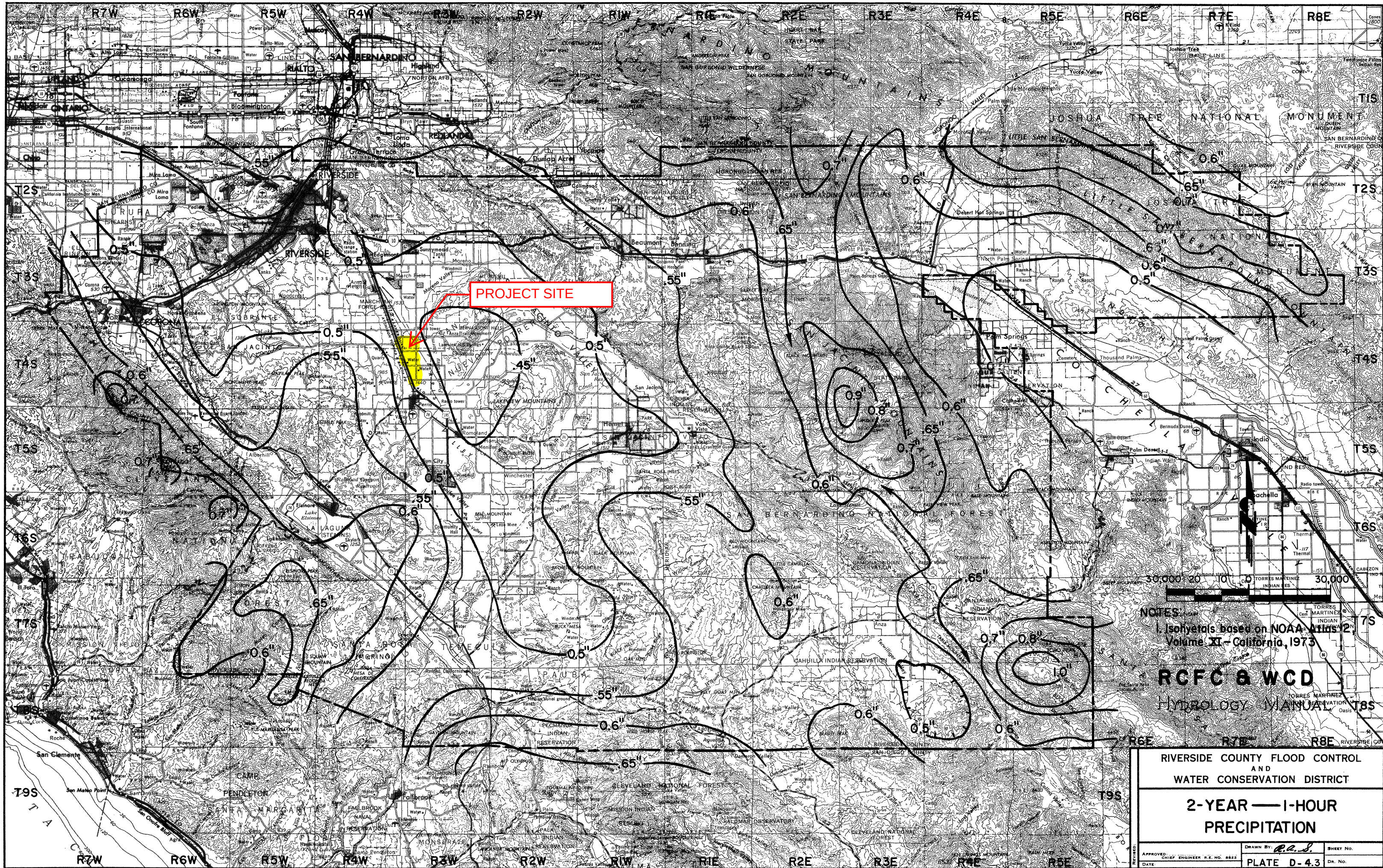
United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

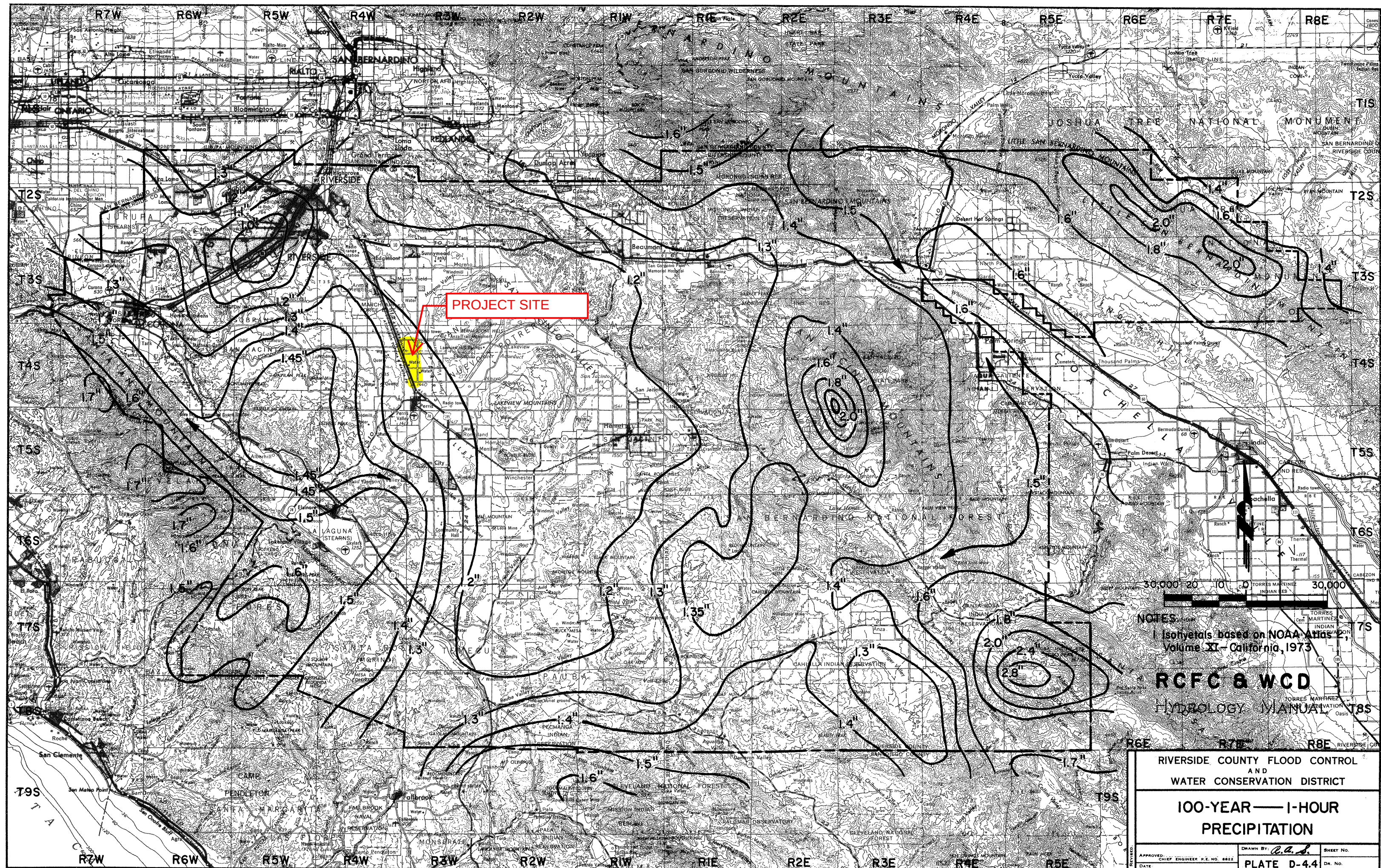
RAINFALL INTENSITY-INCHES PER HOUR

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		

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HYDROLOGY MANUAL

STANDARD
INTENSITY - DURATION
CURVES DATA





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 $2\pm$ 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" through 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 $7\pm$ feet below existing site grades and the dry wells will extend to a depth of $50\pm$ 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 $25\pm$ feet below the previously existing site grades. Native alluvium was encountered at each boring location, extending to at least the maximum depth explored of $25\pm$ 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 $25\pm$ 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:

<u>Infiltration Test No.</u>	<u>Depth (feet)</u>	<u>Soil Description</u>	<u>Measured Infiltration Rate (inches/hour)</u>
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.

<u>Infiltration Test No.</u>	<u>Depth (feet)</u>	<u>Measured Infiltration Rate (Inches per Hour)</u>
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:

<u>Infiltration Test No.</u>	<u>Infiltration System</u>	<u>Infiltration System Type</u>	<u>Depth (feet)</u>	<u>Location</u>	<u>Infiltration Rate (inches per hour)</u>
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

<u>Infiltration Test No.</u>	<u>Infiltration System</u>	<u>Infiltration System Type</u>	<u>Depth (feet)</u>	<u>Location</u>	<u>Infiltration Rate (inches per hour)</u>
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 were determined in accordance with the Riverside County guidelines and are considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grain size 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

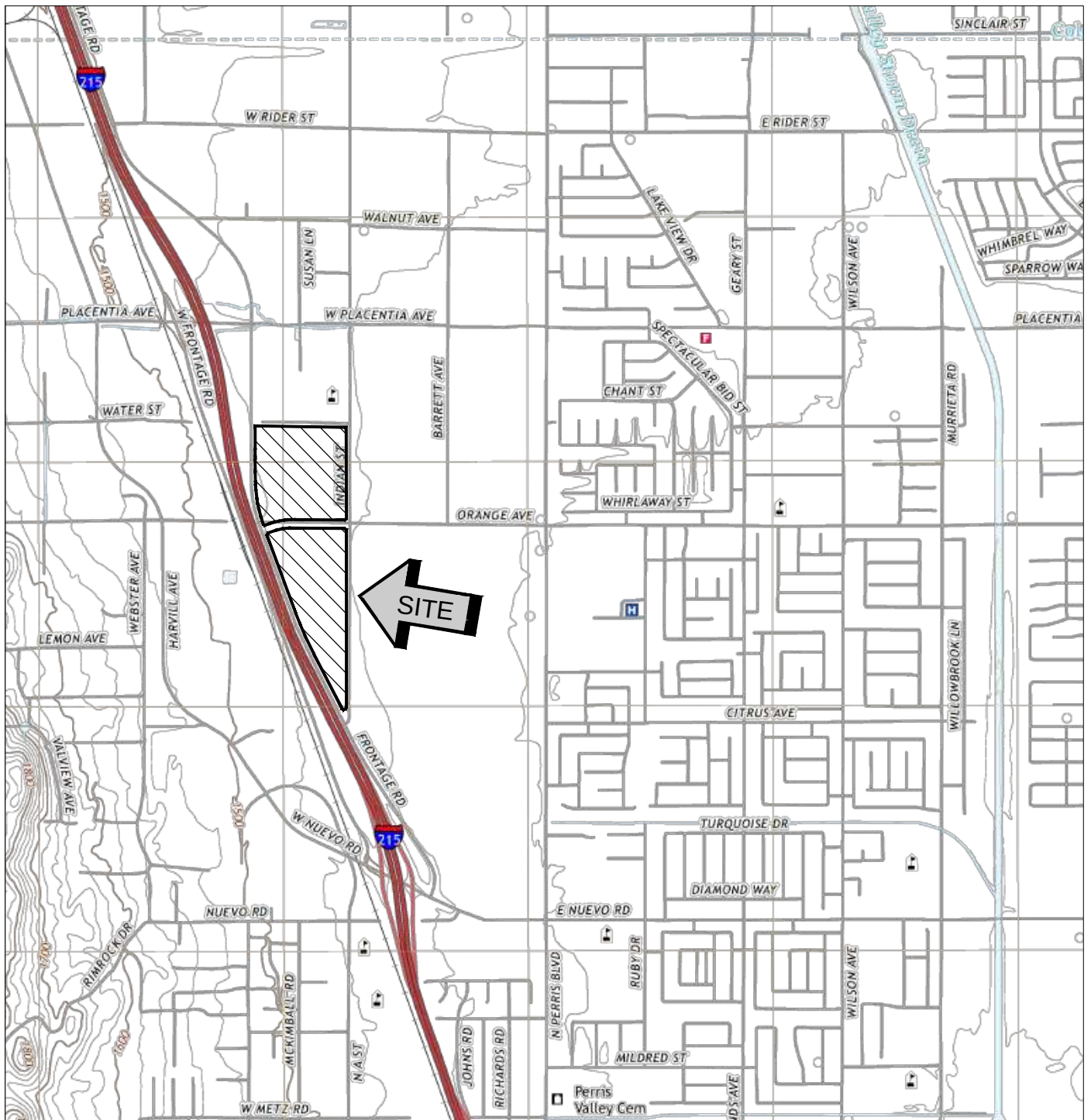


Robert G. Trazo, GE 2655
Principal Engineer



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

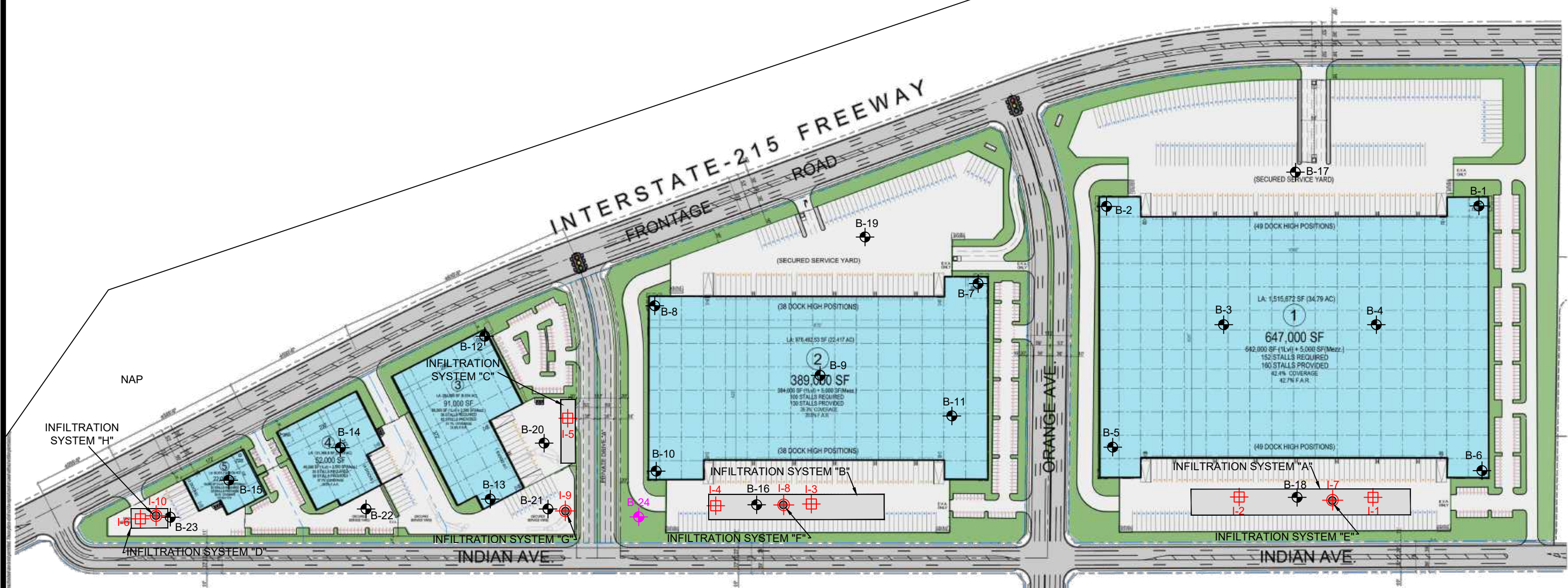
CHKD: RGT

SCG PROJECT
22G183-2

PLATE 1



SOUTHERN
CALIFORNIA
GEOTECHNICAL



GEOTECHNICAL LEGEND

-  APPROXIMATE SHALLOW-INFILTRATION TEST LOCATION (DOUBLE-RING INFILTRMETER)
-  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



NOTE: CONCEPTUAL PLAN PROVIDED BY AO ARCHITECTS

INFILTRATION TEST LOCATION PLAN	
HARVEST LANDING INDUSTRIAL DEVELOPMENT	
PERRIS, CALIFORNIA	
SCALE: 1" = 250'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: RB	
CHKD: RGT	
SCG PROJECT 22G183-2	
PLATE 2	

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 638 LF

STORAGE SUMMARY

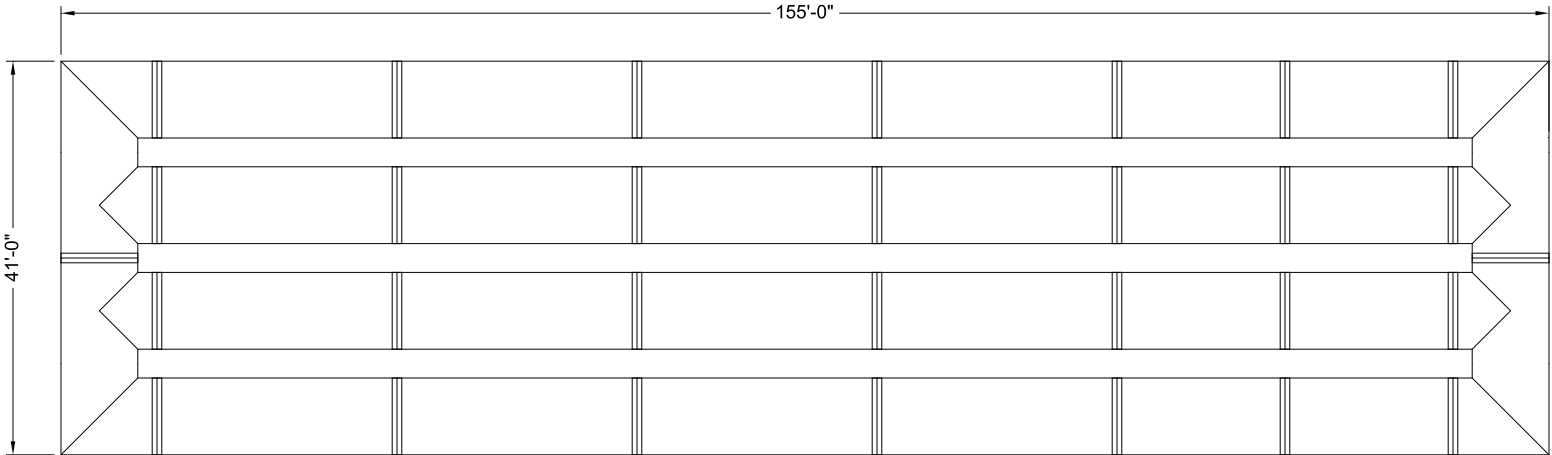
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 32,069 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 32,069 CF

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 2²/₃" x 1¹/₂" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

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CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO19782 20-001 Harvest Landing Site 5
Site 5 Chambers
Perris, CA
DETENTION SYSTEM

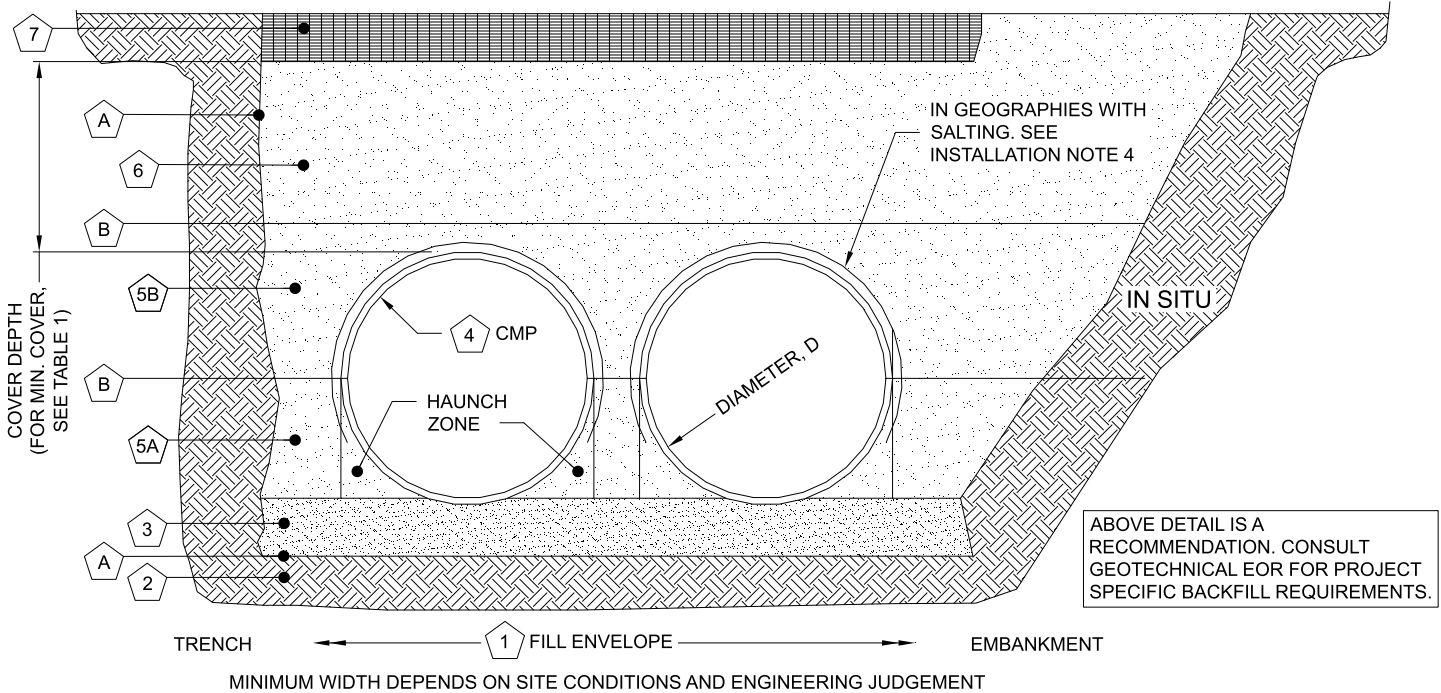
PROJECT No.: 12823	SEQ. No.: 19782	DATE: 10/1/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1

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TABLE 1:

DIAMETER, D	MIN. COVER	CORR. PROFILE
6"-10"	12"	1 1/2" x 1/4"
12"-48"	12"	2 2/3" x 1/2"
>48"-96"	12"	3" x 1", 5" x 1"
>96"	D/8	3" x 1", 5" x 1"

- STRUCTURAL BACKFILL MUST EXTEND TO LIMITS OF THE TABLE
- TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT
- ULTRAFLO ALSO AVAILABLE FOR SIZES 18" - 120" WITH 3/4"x 3/4"x 7 1/2" CORRUGATION



INSTALLATION NOTES

- 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.
- OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.
- BACKFILL USING CONTROLLED LOW-STRENGTH MATERIAL (CLSM, "FLASH FILL" OR "FLOWABLE FILL") MAY BE USED WHEN THE SPACING BETWEEN THE PIPES WILL NOT ALLOW FOR PLACEMENT AND ADEQUATE COMPACTION OF THE BACKFILL. CONTACT CONTECH FOR FURTHER EVALUATION.
- IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, A GEOMEMBRANE BARRIER IS RECOMMENDED OVER THE UPPER HALF OF THE PIPE. THE GEOMEMBRANE 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.

TABLE 2: SOLID STANDARD

	CMP DETENTION AND CMP DRAINAGE STANDARD BACKFILL SPECIFICATIONS				
	MATERIAL LOCATION	MATERIAL SPECIFICATION	DESCRIPTION		
1	FILL ENVELOPE WIDTH	PER ENGINEER OF RECORD	MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE. THE SUGGESTED MINIMUM TRENCH WIDTH, OR EOR RECOMMENDATION: PIPE ≤ 12": D + 16" PIPE > 12": 1.5D + 12"	MINIMUM EMBANKMENT WIDTH (IN FEET) FOR INITIAL FILL ENVELOPE: PIPE < 24": 3.0D PIPE 24" - 144": D + 4'0" PIPE > 144": D + 10'0"	
2	FOUNDATION	AASHTO 26.5.2 OR PER ENGINEER OF RECORD	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 FOUNDATION BROUGHT BACK TO GRADE WITH A FILL MATERIAL APPROVED BY THE ENGINEER OF RECORD.		
3	BEDDING	AASHTO M 43: 3, 357, 4, 467, 5, 56, 57 (APPROVED REGIONAL EQUIVALENTS INCLUDE CA-7)	ENGINEER OF RECORD TO DETERMINE IF BEDDING IS REQUIRED. PIPE MAY BE PLACED ON THE TRENCH BOTTOM OF A RELATIVELY LOOSE, NATIVE SUITABLE WELL GRADED GRANULAR MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 2" MIN DEPTH. THE BEDDING MATERIAL MAY BE SUITABLE FOUNDATION SOILS CONFORMING TO AASHTO SOIL CLASSIFICATIONS A1, A2, OR A3 WITH MAXIMUM PARTICLE SIZE OF 3" PER AASHTO 26.3.8.1		
4	CORRUGATED METAL PIPE				
5A	CRITICAL BACKFILL	AASHTO M 145: A-1, A-2, A-3 *	HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION WITHOUT SOFT SPOTS. BACKFILL SHALL BE PLACED IN 8" +/- LOOSE LIFTS AND COMPACTED TO 90% STANDARD PROCTOR PER AASHTO T 99. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A THREE LIFT (24") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHOULD BE ADVANCED ALONG THE LENGTH OF THE SYSTEM TO AVOID DIFFERENTIAL LOADING. GRADED GRANULAR MATERIAL WHICH MAY CONTAIN SMALL AMOUNTS OF SILT OR CLAY AND MAXIMUM PARTICLE SIZE OF 3" (PER AASHTO 26.3.8.1 AND 12.4-1.3).		
5B	BACKFILL	AASHTO M 145: A-1, A-2, A-3			
6	COVER MATERIAL	UP TO MIN. COVER - SEE 5A AND 5B ABOVE ABOVE MIN. COVER - PER ENGINEER OF RECORD	COVER MATERIAL MAY INCLUDE NON-BITUMINOUS, GRANULAR ROAD BASE MATERIAL WITHIN MIN COVER LIMITS		
7	RIGID OR FLEXIBLE PAVEMENT (IF APPLICABLE)	PER ENGINEER OF RECORD	FLEXIBLE PAVEMENT SHOULD NOT BE COUNTED AS PART OF THE FILL HEIGHT OVER THE CMP. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.		
A	OPTIONAL SIDE GEOTEXTILE	NONE	GEOTEXTILE LAYER IS RECOMMENDED ON SIDES OF EXCAVATION TO PREVENT SOIL MIGRATION.		
B	OPTIONAL GEOTEXTILE BETWEEN LAYERS	NONE	IF SOIL TYPES DIFFER AT ANY POINT ABOVE PIPE INVERT, A GEOTEXTILE LAYER IS RECOMMENDED TO BE PLACED BETWEEN THE LAYERS TO PREVENT SOIL MIGRATION.		

NOTES:

- FOR MULTIPLE BARREL INSTALLATIONS, THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE THE PIPE DIAMETER /2 BUT NO LESS THAN 12" FOR DIAMETERS <72". FOR 72" AND LARGER DIAMETERS, THE MINIMUM SPACING IS 36". CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.
- * APPROVED REGIONAL EQUIVALENTS FOR SECTION 5A INCLUDE CA-7, CODOT #67, MIDOT 2G, 34G, OR 21AA STONE OR GRAVEL; #8; #57; MIDOT 6A, 2G, 3G, 34G.

MANUFACTURER RECOMMENDED BACKFILL

NOT TO SCALE

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CONTECH
CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO19782 20-001 Harvest Landing Site 5

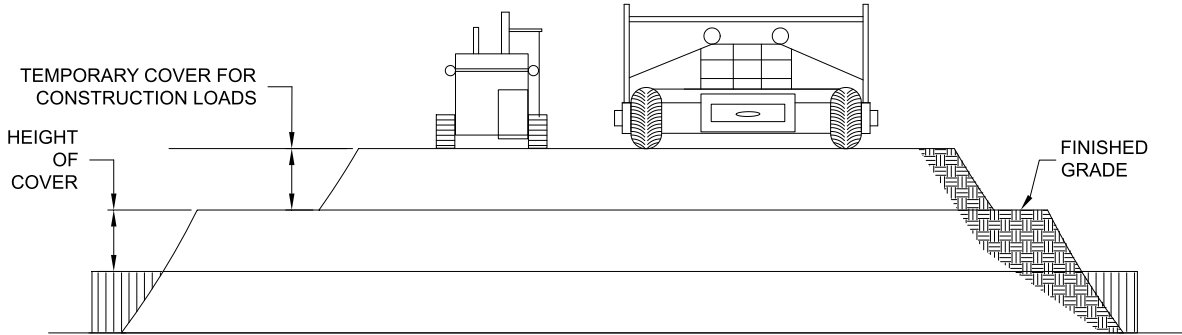
Site 5 Chambers

Perris, CA

DETENTION SYSTEM

PROJECT No.: 12823	SEQ. No.: 19782	DATE: 10/1/2024
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.

NOTE:

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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

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

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE

HANDLING AND ASSEMBLY

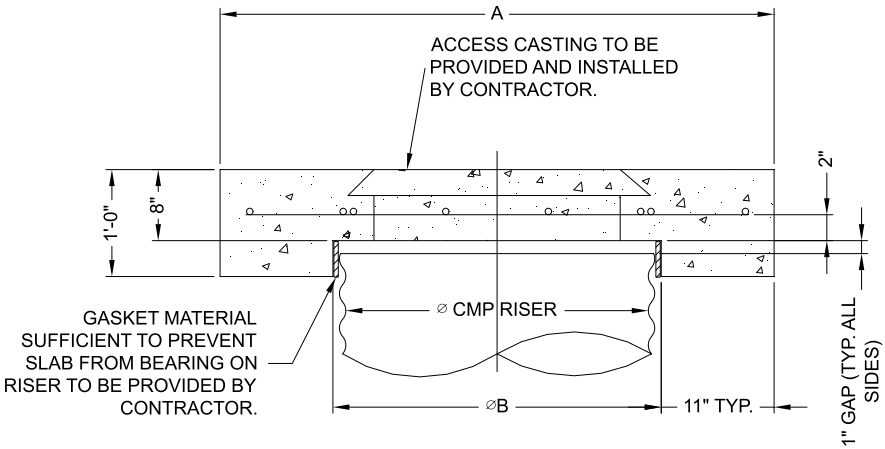
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

REQUIREMENTS

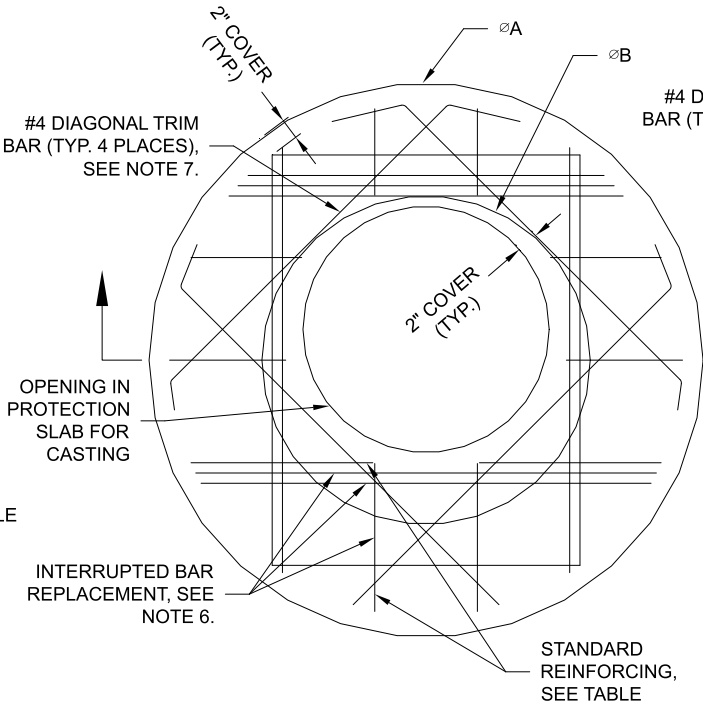
INSTALLATION

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.



SECTION VIEW



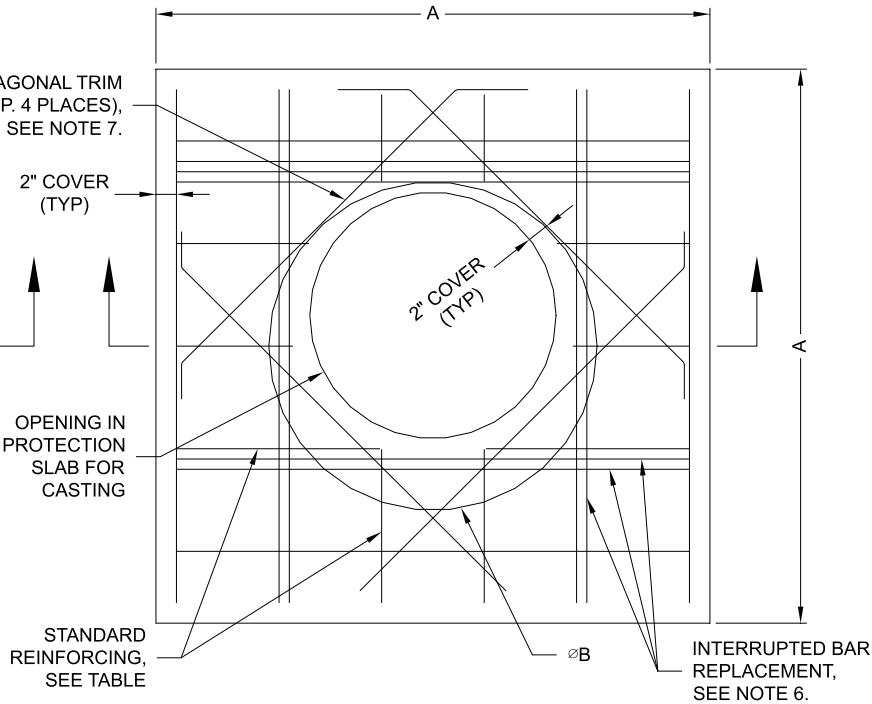
ROUND OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.

REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



SQUARE OPTION PLAN VIEW

- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

DYO19782 20-001 Harvest Landing Site 5
Site 5 Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12823	SEQ. No.: 19782	DATE: 10/1/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1

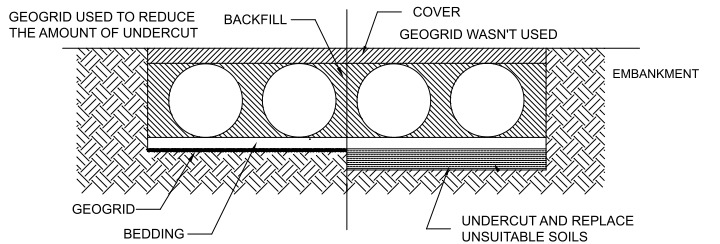
CMP DETENTION INSTALLATION GUIDE

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 SOIL 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.

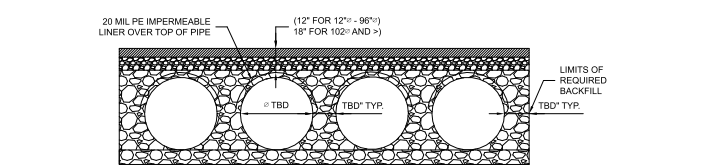


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

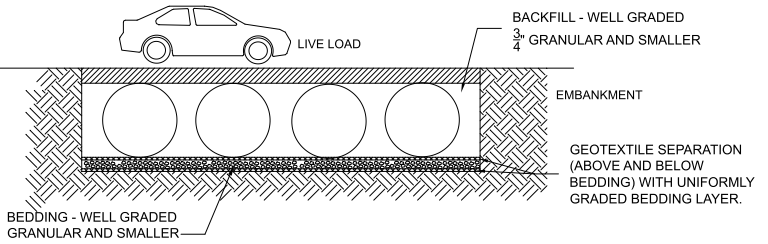
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

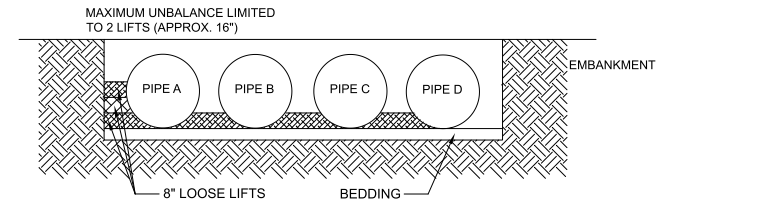
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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



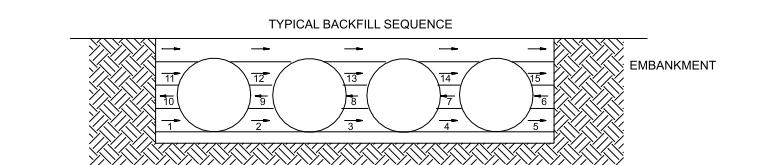
BACKFILL PLACEMENT

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

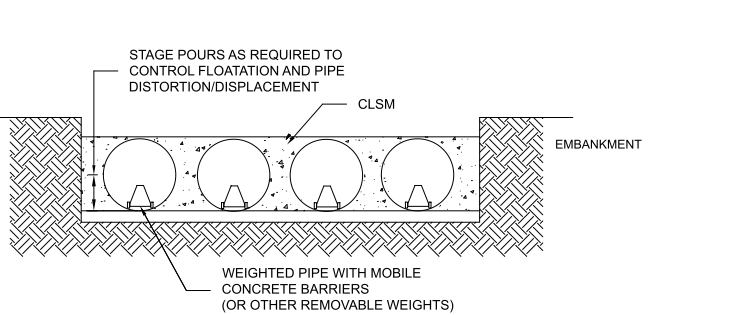


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

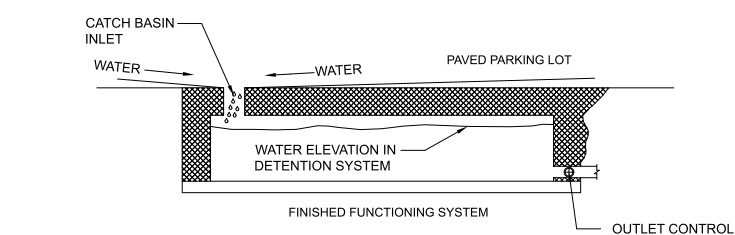


CONSTRUCTION LOADING

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

CAMP 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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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

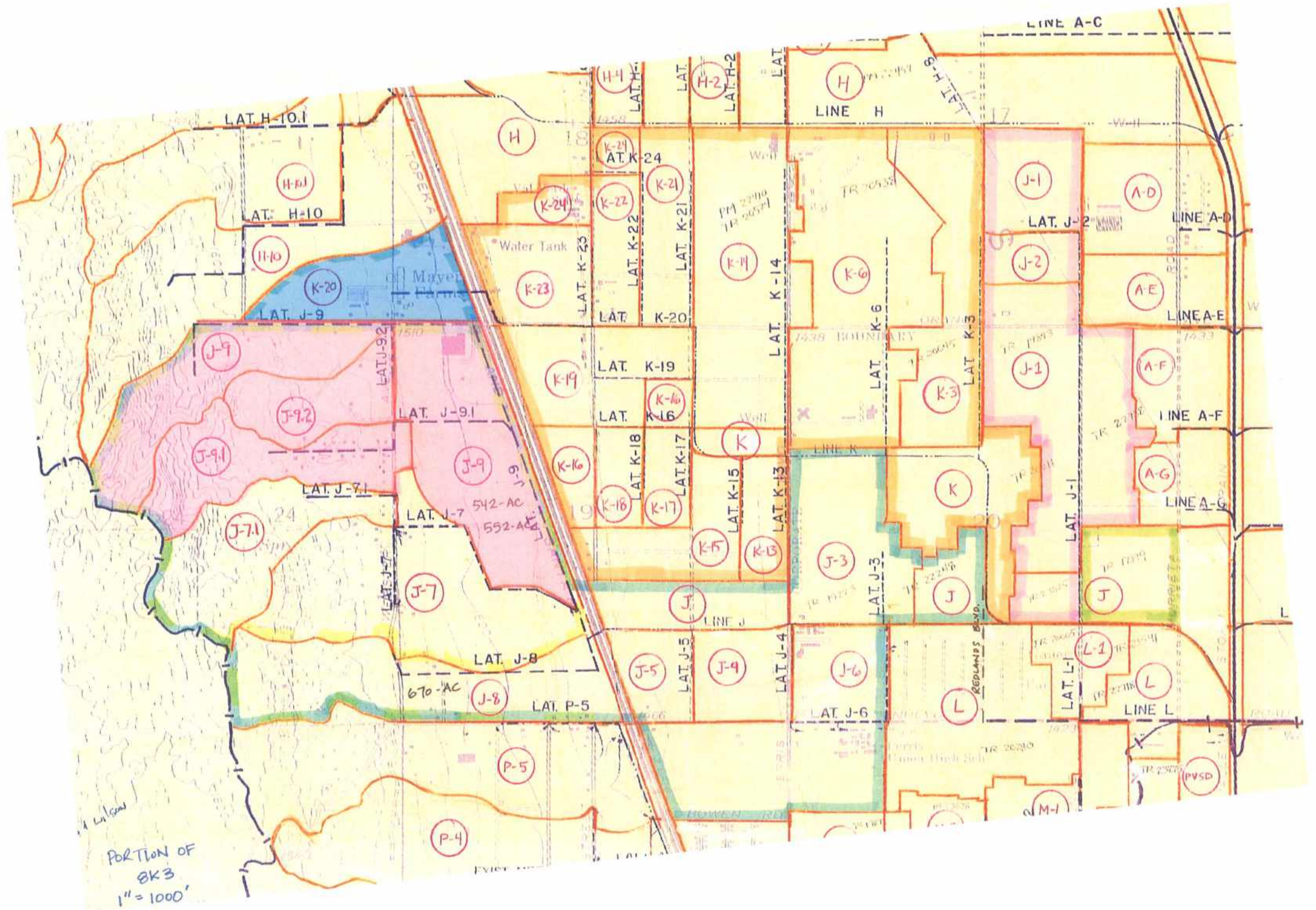
CONTECH
DYODS
DRAWING

DYO19782 20-001 Harvest Landing Site 5
Site 5 Chambers
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12823	SEQ. No.: 19782	DATE: 10/1/2024
DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.:		1

[illegible]

[illegible]



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



LATERAL No.	PRE-FEBRUARY 2006 REVISIONS	POST FEBRUARY 2006 REVISIONS	INCREASE/DECREASE (ACRES)
LAT J-8	114.1	165.0	+53.9
LAT J-9	609.8	555.9	-53.9

LEGEND

PROPOSED LATERAL, WATERSHED BOUNDARIES
AFTER FEBRUARY 2006 REVISION

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 OF THE PLANS, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

DATE	BY	MARK				APPR	DAT
ENGINEER			REVISIONS COUNTY				

COUNTY OF RIVERSIDE	
TRANSPORTATION DEPARTMENT	
APPROVED BY:	
ALAN D. FRENCH, P.E. CIVIL ENGINEER, R.C.E. NO. 45702	DATE
RECOMMENDED	DATE

[illegible]

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL	APPROVED BY:
PLANNING ENGINEER	CHIEF ENGINEER
DATE: _____	DATE: _____



**ENGINEERING
SOLUTIONS**

PREPARED BY:

ENGINEERING SOLUTIONS
ENGINEERING LAND PLANNING SURVEYING MAPPING

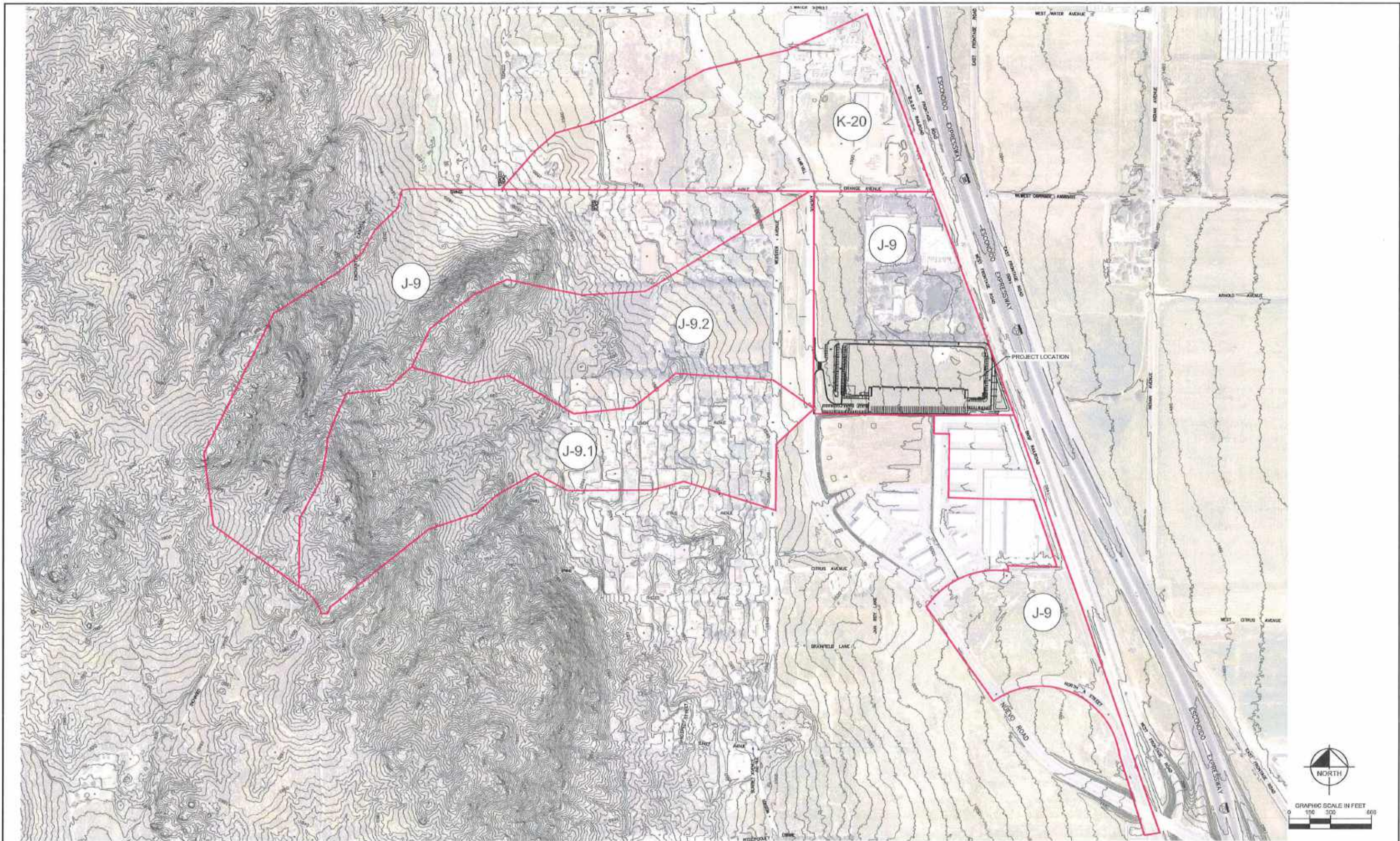
2185 CHICAGO AVENUE, STE. 101
RIVERSIDE, CA 92507
PHONE - (951) 704-0238
FAX - (951) 704-0237

DATE _____
EXP. 06-30-07

BENCHMARK
SCALE:

I.P. No. XXXXX COUNTY OF RIVERSIDE REVISED HYDROLOGY MAP PERRIS MASTER DRAINAGE PLAN LATERALS J-7, J-8, & J-9		
FOR:	W.O.	COUNTY FILE NO.:

SHEET NO.
1
OF 1 SHTS.



Kimley»Horn

400 N. STREET, SUITE 600, SAN DIEGO, CA 92101
 PHONE: 619-594-0451
 WWW.KIMLEY-HORN.COM

RCFC MDP DRAINAGE AREA MAP LINE J-9
 ROCKEFELLER HARVILL INDUSTRIAL PARK
 October 9, 2020

k:\and_id\rockefeller - rvc\mde_harvill\rcfc\2020.10.09 - mdp letter\2020.10.09 - mdp drainage area.dwg 10/9/2020

EXHIBITS

EXHIBIT A: VICINITY MAP

EXHIBIT B: EXISTING HYDROLOGY MAP

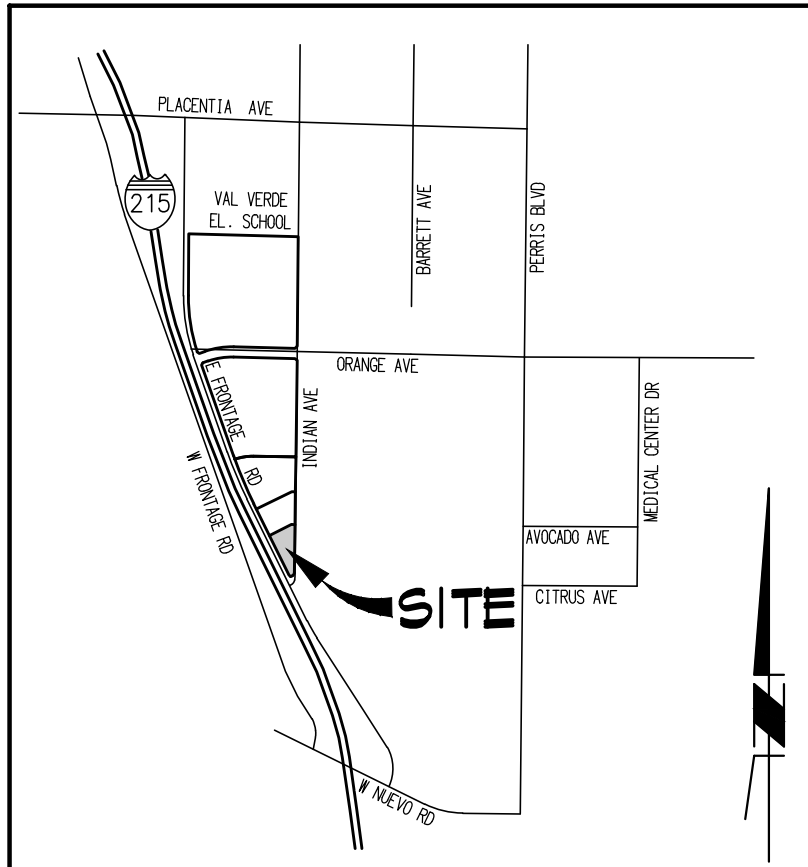
EXHIBIT C: PROPOSED HYDROLOGY MAP

EXHIBIT D: HYDROLOGIC SOILS GROUP MAP

EXHIBIT E: RCFC D MDP FACILITIES OVERLAY

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

EXHIBIT G: CONCEPTUAL GRADING



VICINITY MAP

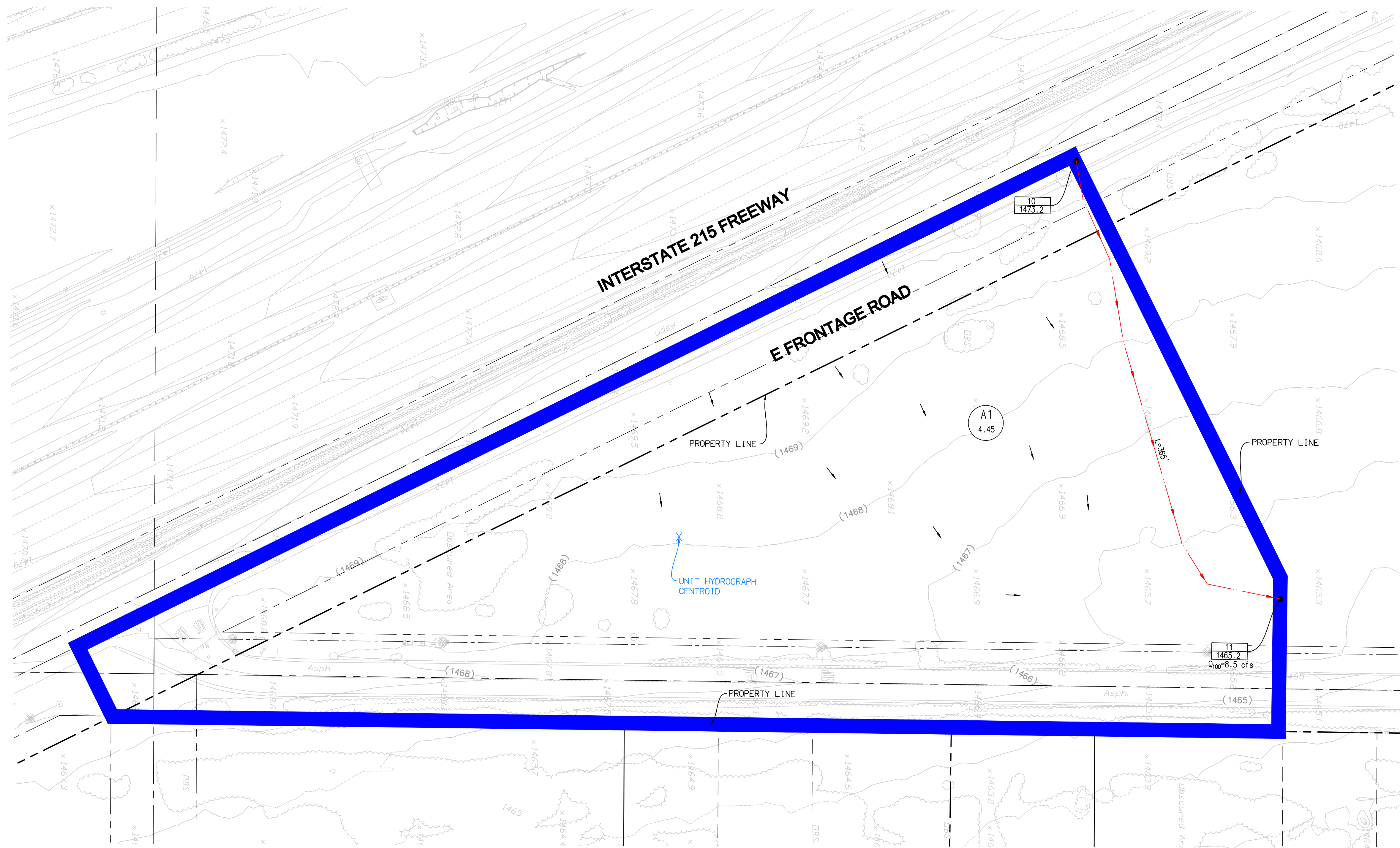
T4S, R3W, SEC 19
NOT TO SCALE

FMCIVIL
ENGINEERS INC.

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

HARVEST LANDING SITE 5

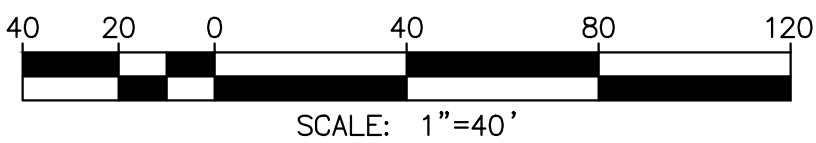
**FIGURE 1
VICINITY MAP**

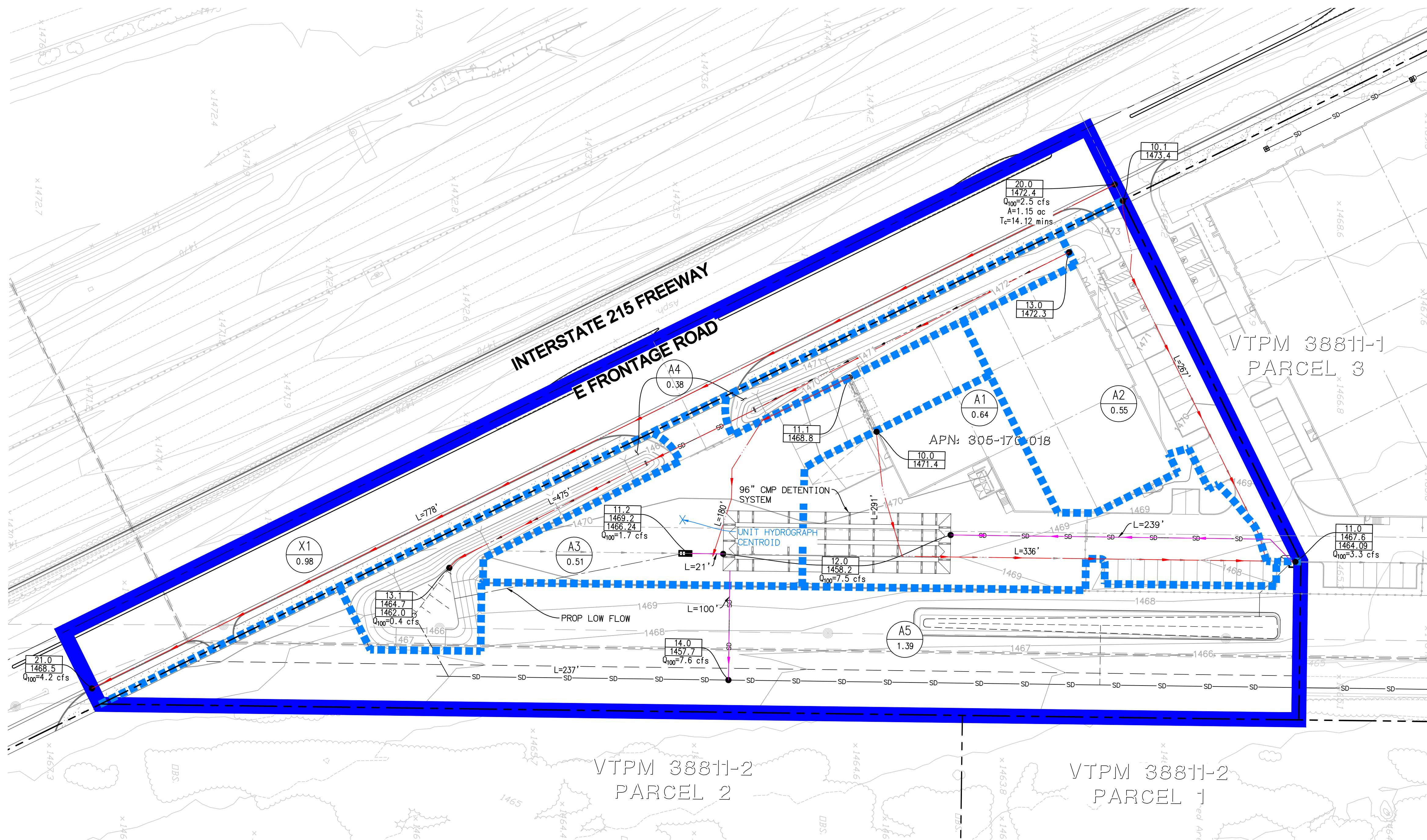


UNIT HYDROGRAPH PARAMETERS			
L_{WC} (FT)	L_C (FT)	Δ ELEV (FT)	N (-)
365	176	8.00	0.020

LEGEND

- DRAINAGE BASIN NAME
- DRAINAGE BASIN AREA(AC.)
- NODE I.D.
- ELEVATION
- WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- FLOW DIRECTION

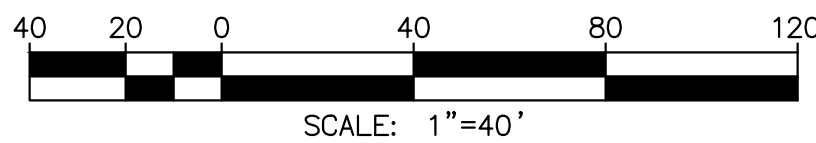


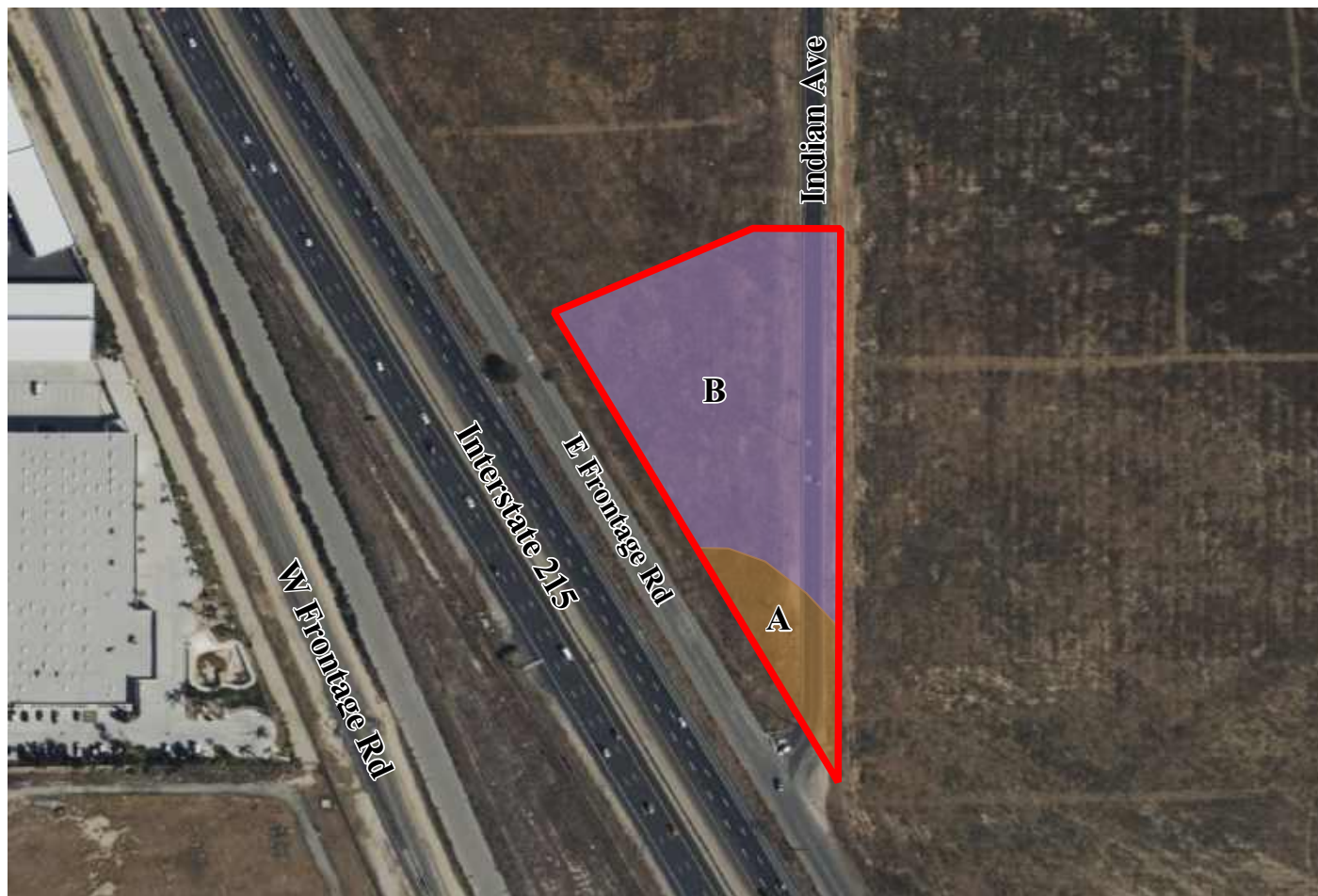


UNIT HYDROGRAPH PARAMETERS			
L _{WC} (FT)	L _C (FT)	Δ ELEV (FT)	N (-)
742	624	14.60	0.015

LEGEND

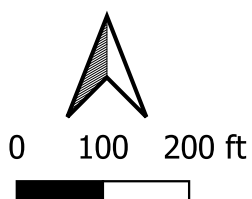
- D2 2.16 DRAINAGE BASIN NAME
- DRAINAGE BASIN AREA(AC.)
- 11 1027.0 NODE I.D.
- ELEVATION
- WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- FLOW DIRECTION
- PIPE FLOW DIRECTION

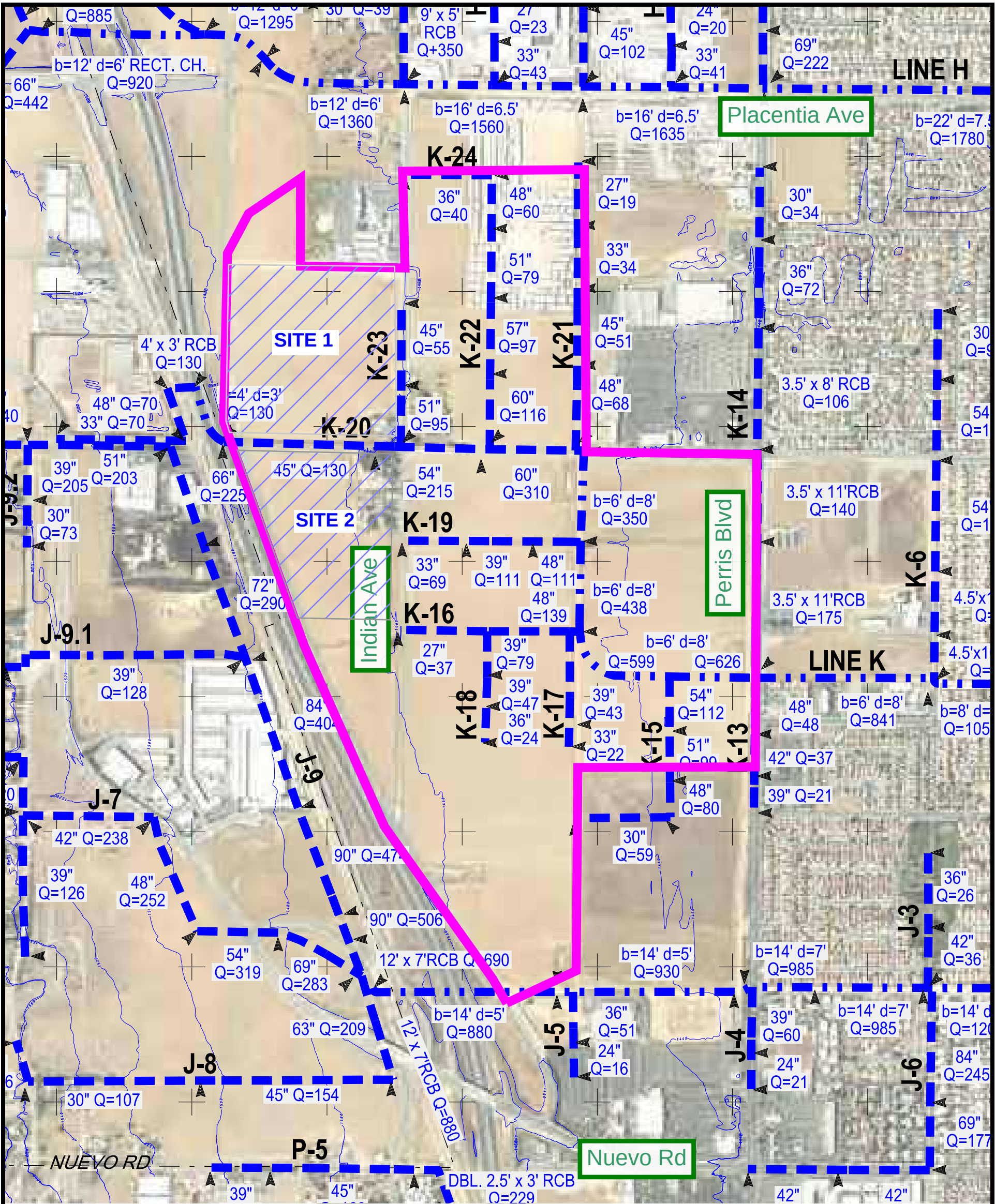




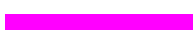
LEGEND

-  SITE 5 BOUNDARY
-  HYDROLOGIC SOIL A
-  HYDROLOGIC SOIL GROUP B



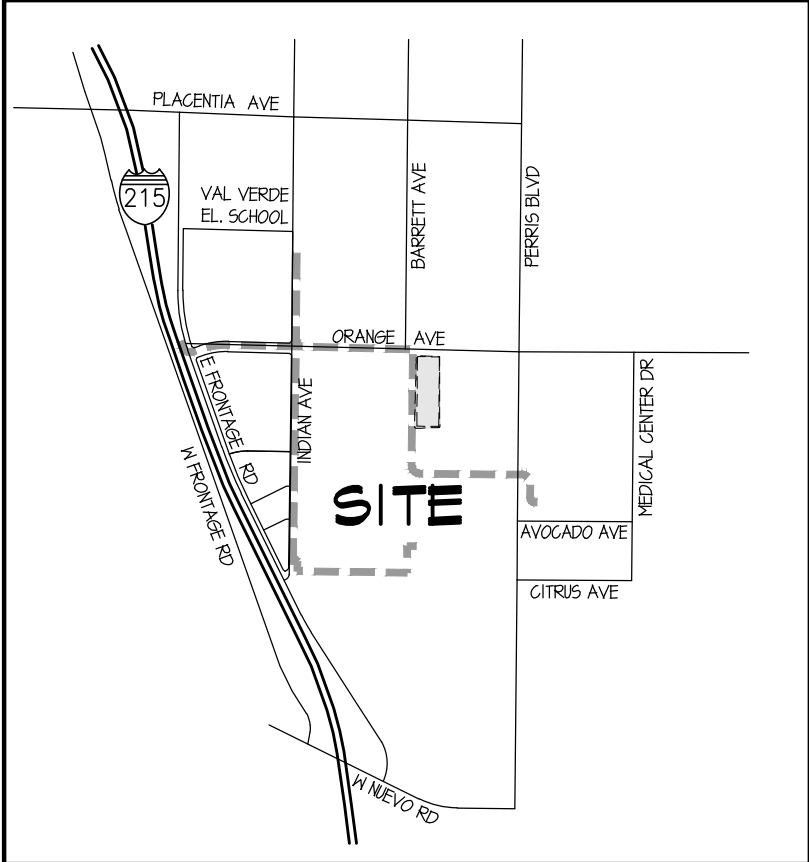


N.T.S.

-  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



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

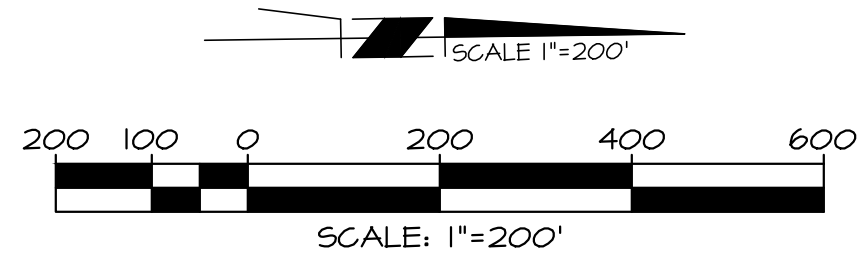
APPLICANT/OWNER
HOWARD INDUSTRIAL PARTNERS
1444 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92665
CONTACT: TIM HOWARD
(TEL) 714-764-4155

ENGINEER
FMCIVIL ENGINEERS INC.
24445 TECHNOLOGY DRIVE, SUITE 306
MURRIETA, CA 92563
CONTACT: FRANCISCO MARTINEZ
(TEL) 951-331-4073

ARCHITECT
AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92666
CONTACT: STEPHEN PRZYBYLOWSKI
(TEL) 714-634-9860



- LEGEND**
- RIGHT OF WAY
 - EXISTING CONTOUR
 - EASEMENT
 - PROP. ONSITE STORM DRAIN SYSTEM
 - SD --- PROP. OFFSITE STORM DRAIN SYSTEM
 - LFS --- PROP. STORM DRAIN LOW FLOW SYSTEM
 - UDS --- PROP. STORM DRAIN UNDER DRAIN SYSTEM
 - W --- EXISTING WATER LINE
 - W --- PROP. WATER LINE
 - SS --- EXISTING S.W.R. LINE
 - SS --- PROP. S.W.R. LINE
 - SD --- EXISTING STORM DRAIN PIPE
 - E --- EXISTING OVERHEAD LINES



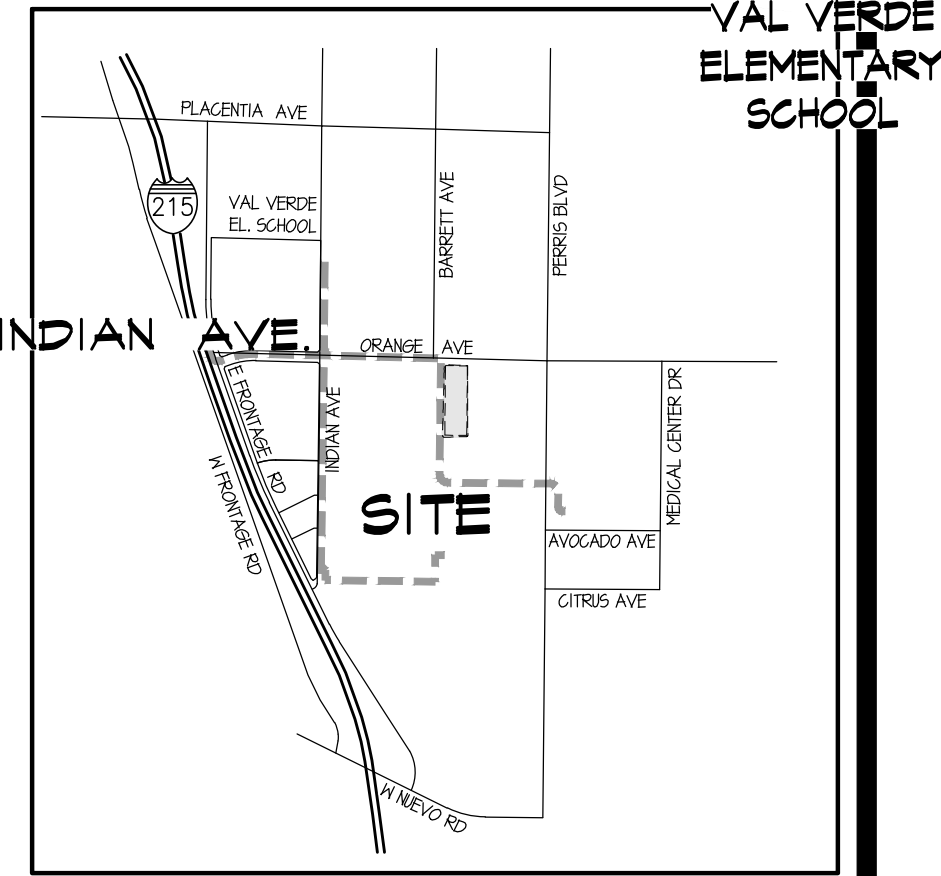
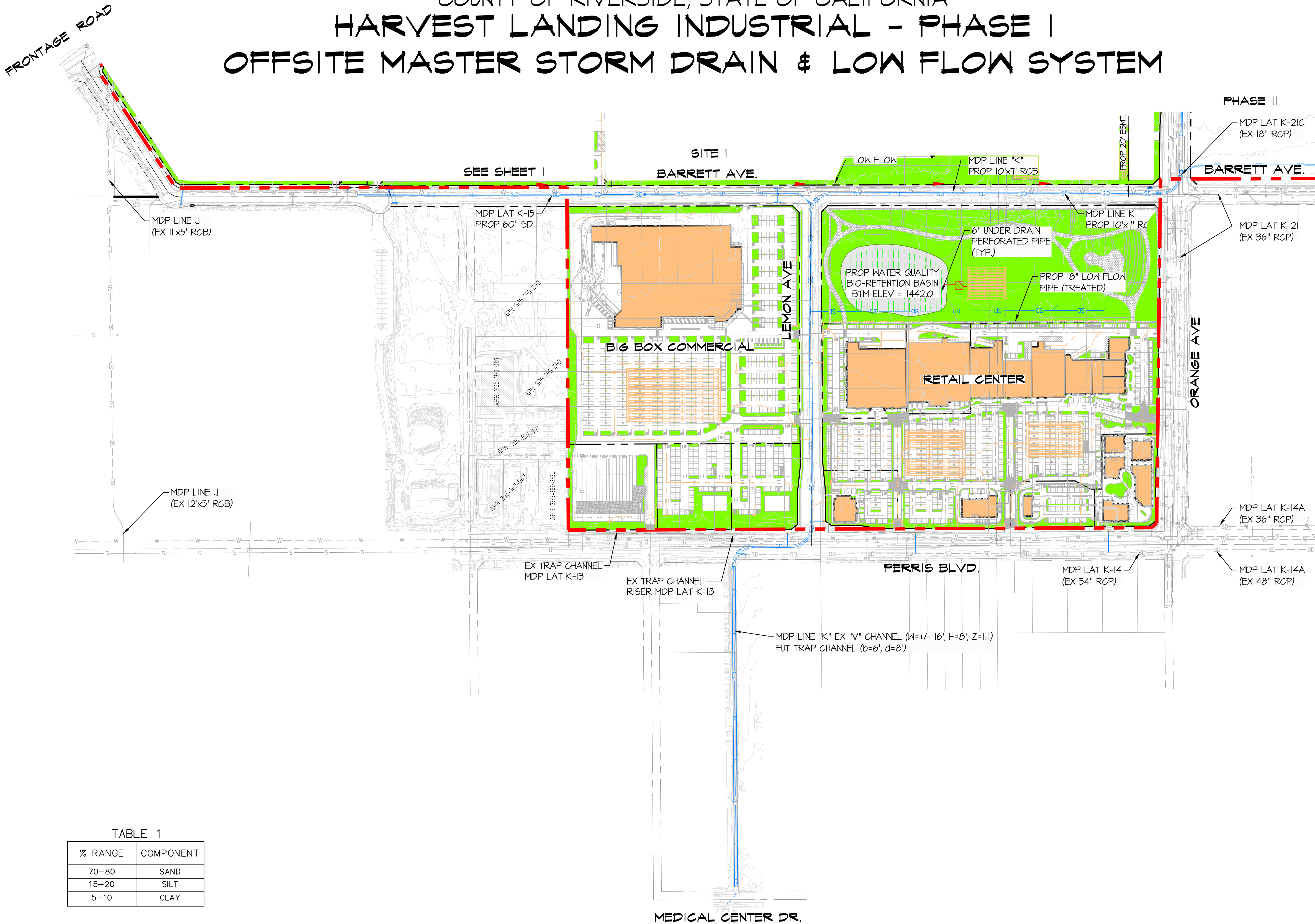
CITY OF PERRIS

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

SCALE: AS SHOWN	FMCIVIL ENGINEERS INC.	41810 KALMA STREET, SUITE 120 MURRIETA, CA 92562 951.913.0202 - FMCIVIL.COM
DATE: OCT. 2024		
DESIGNED: AJ		
CHECKED: FM		
PLN CK REF:		

OF 2 SHEETS

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
1444 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92665
CONTACT: TIM HOWARD
(TEL) 714-764-4155

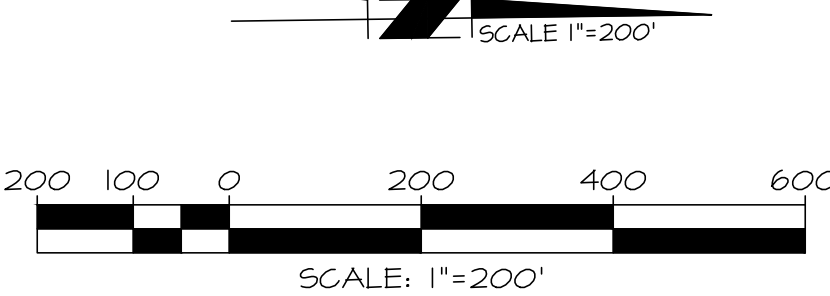
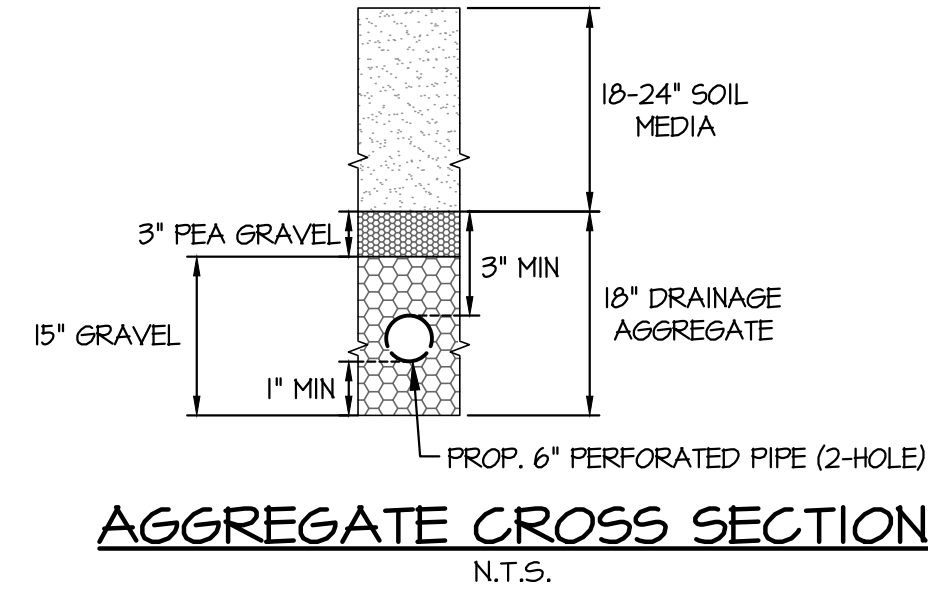
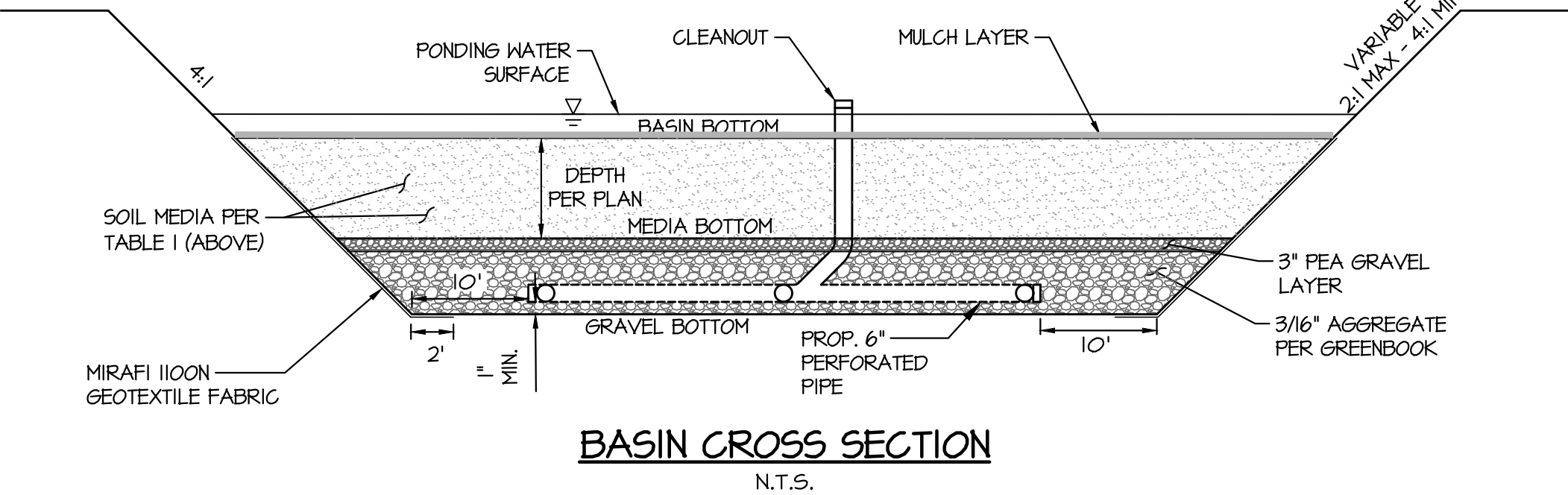
ENGINEER
FMCIVIL ENGINEERS INC.
24445 TECHNOLOGY DRIVE, SUITE 306
MURRIETA, CA 92563
CONTACT: FRANCISCO MARTINEZ
(TEL) 951-331-4073

ARCHITECT
AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92666
CONTACT: STEPHEN PRZYBYLOWSKI
(TEL) 714-634-9860

TABLE 1

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

- LEGEND**
- RIGHT OF WAY
 - EXISTING CONTOUR
 - EASEMENT
 - PROP. ONSITE STORM DRAIN SYSTEM
 - SD --- PROP. OFFSITE STORM DRAIN SYSTEM
 - SD --- PROP. STORM DRAIN LOW FLOW SYSTEM
 - SD --- PROP. STORM DRAIN UNDER DRAIN SYSTEM
 - W --- EXISTING WATER LINE
 - W --- PROP. WATER LINE
 - SS --- EXISTING S&W LINE
 - SS --- PROP. SEWER LINE
 - SD --- EXISTING STORM DRAIN PIPE
 - E --- EXISTING OVERHEAD LINES



CITY OF PERRIS

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

SCALE: AS SHOWN	41810 KALMIA STREET, SUITE 120 MURRIETA, CA 92562 951.913.0202 - FMCIVIL.COM	SHEET
DATE: OCT. 2024		2
DESIGNED: AJ		OF 2 SHEETS
CHECKED: FM		
PLN CK REF:		

FMCIVIL ENGINEERS INC.

LEGEND

- (1025) EXISTING CONTOUR
1025 PROPOSED CONTOUR
RETAINING WALL
FENCE
EDGE OF PAVEMENT
SIGN
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
PROPOSED WATER LINE
EXISTING SWR LINE
PROPOSED SEWER LINE
EXISTING STORM DRAIN PIPE
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, 305-110-018, 305-100-008, & 305-100-004

LEGAL DESCRIPTION

PARCELS 2-5:
(APNS:305-100-028, 305-110-018, 305-100-008, 305-100-004)

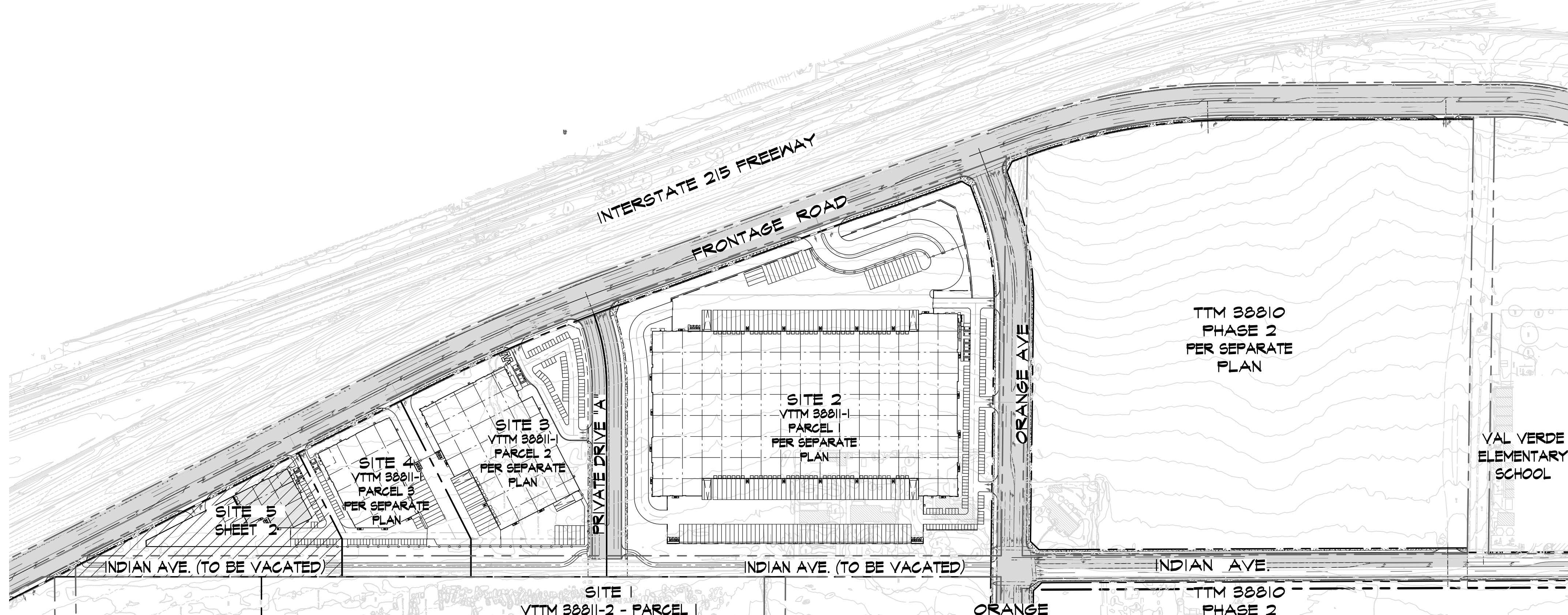
THAT PORTION OF THE NORTHWEST QUARTER OF SECTION 19, TOWNSHIP 4 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, WHICH LIES EASTERLY OF STATE HIGHWAY 345 AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED APRIL 28, 1952 AS INSTRUMENT NO. 18008.

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

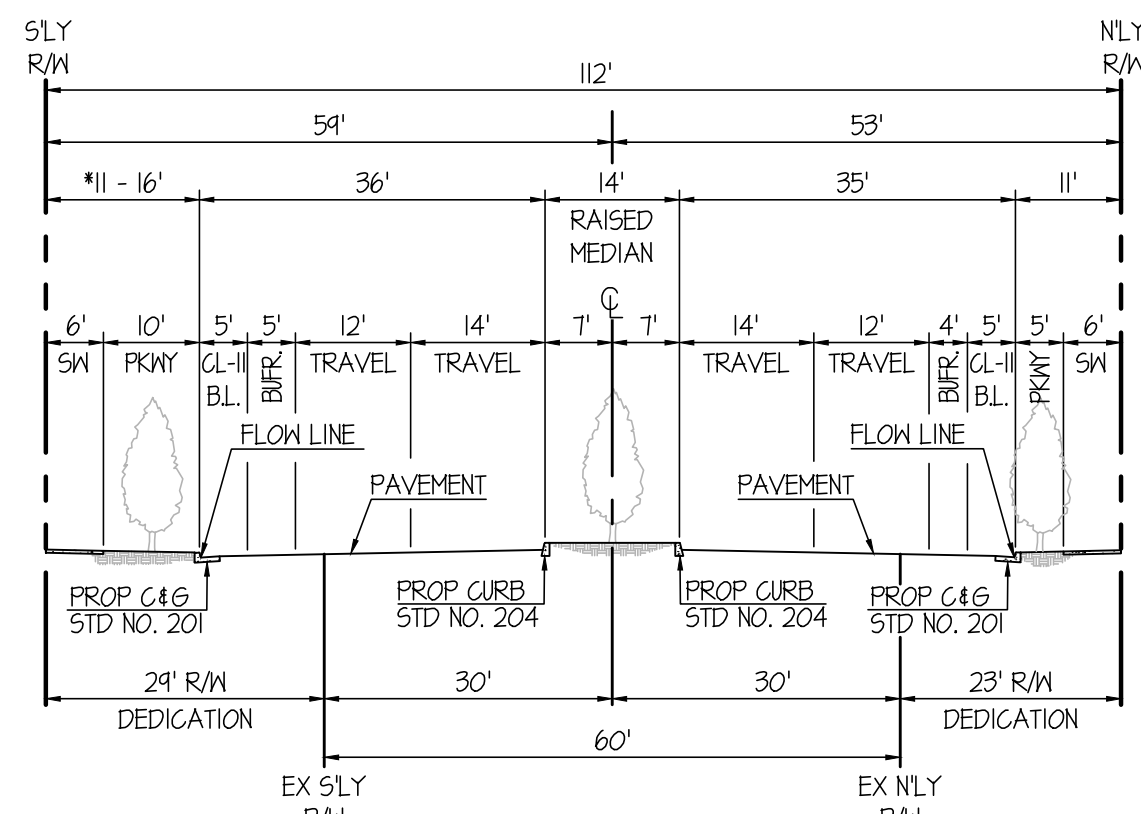
ALSO EXCEPTING THEREFROM THE PORTION DESCRIBED IN DEED RECORDED DECEMBER 21, 1965 AS INSTRUMENT NO. 142400 AND IN DEED RECORDED MARCH 13, 1964 AS INSTRUMENT NO. 24345, RECORDS OF RIVERSIDE COUNTY.

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

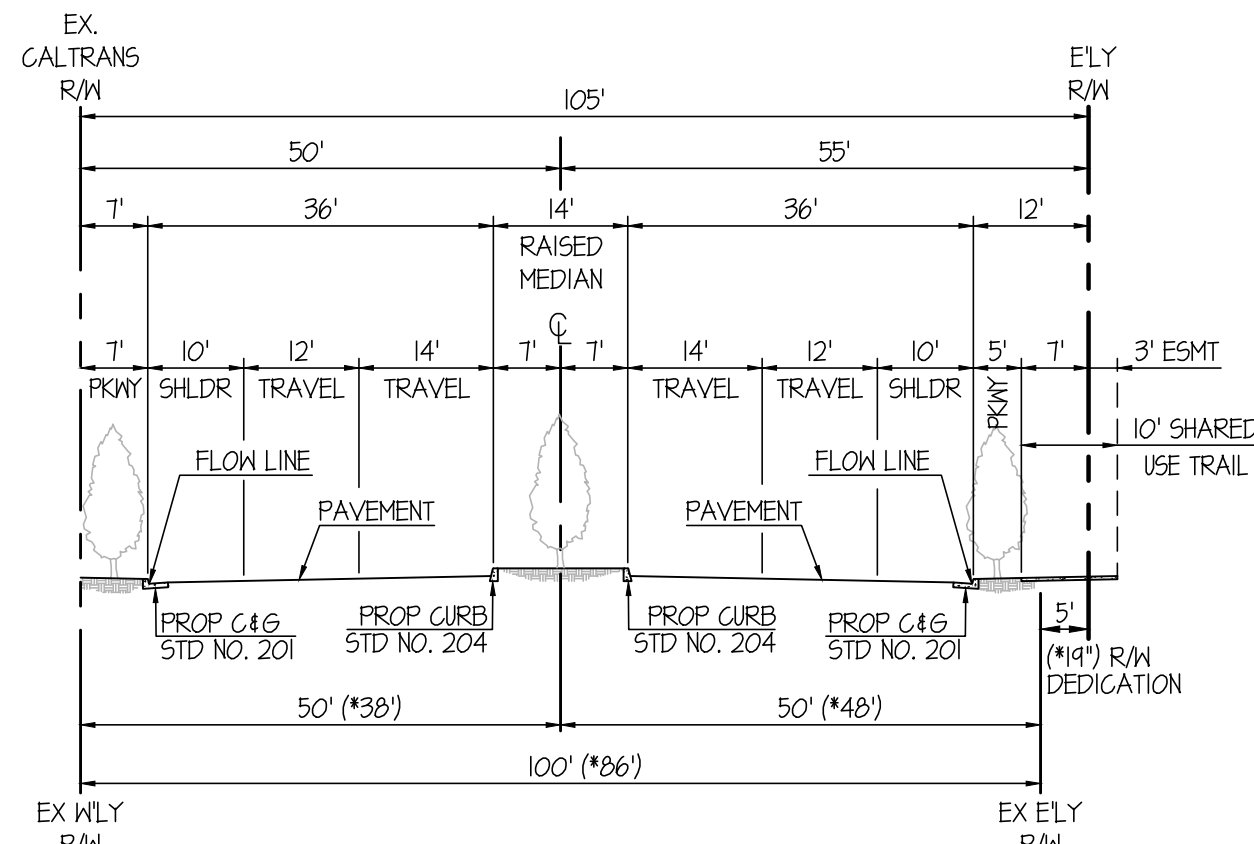
IN THE CITY OF PERRIS,
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #5 CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-I - PARCEL 4



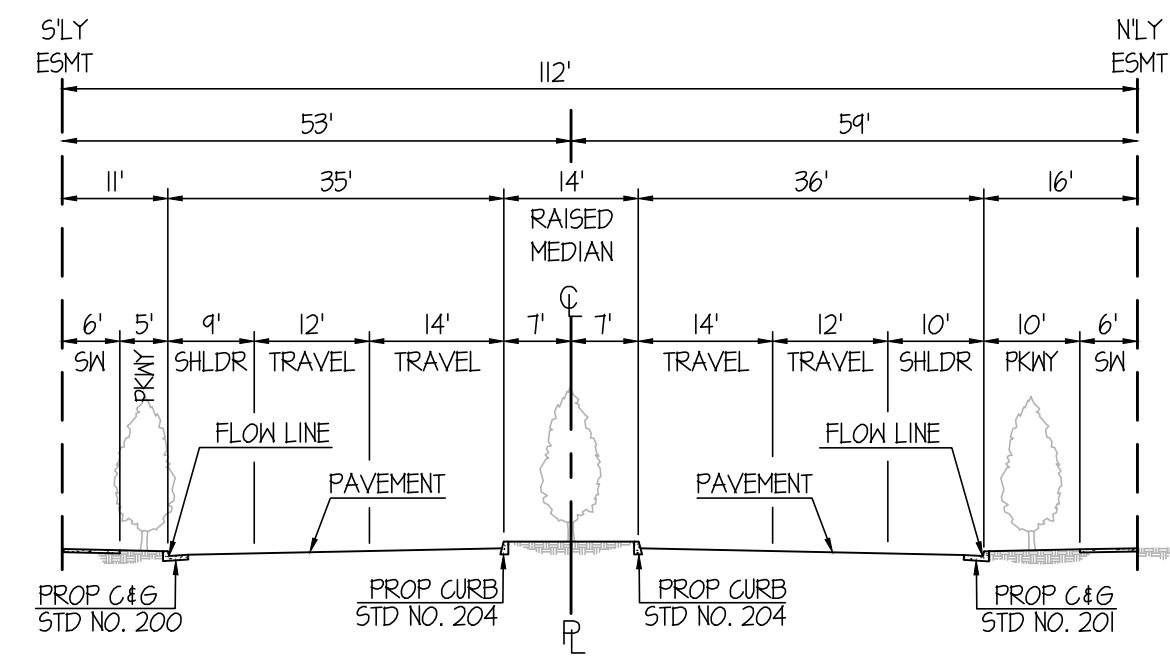
INDEX MAP



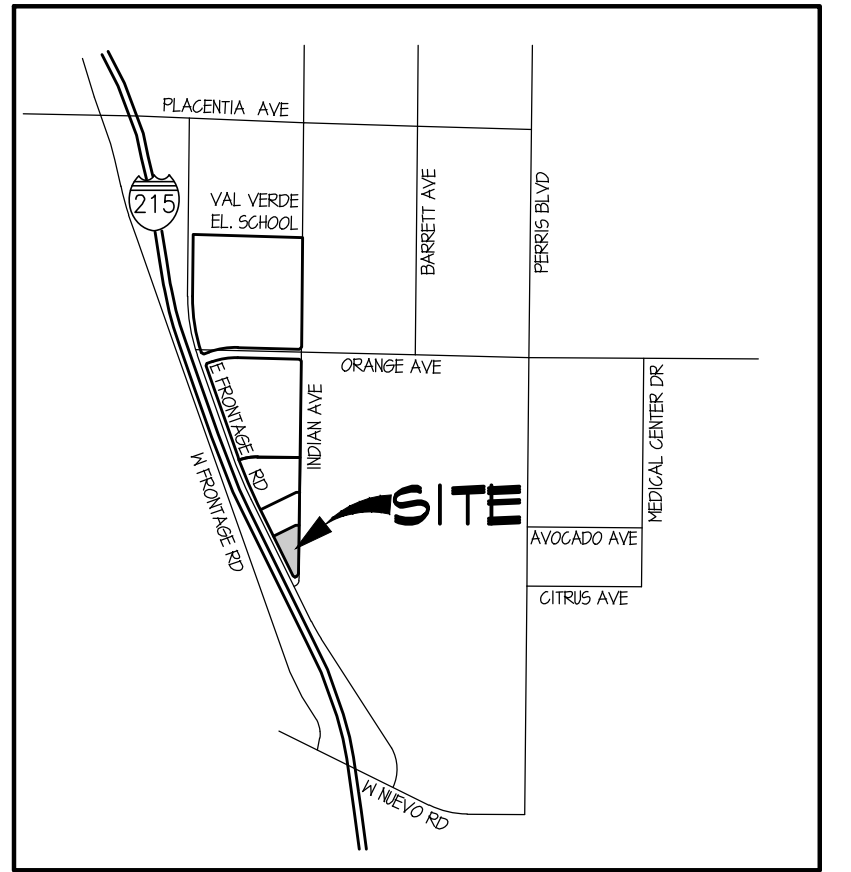
ORANGE AVENUE
(WEST OF BARRETT AVE)
SECONDARY ARTERIAL
(112/85)



FRONTAGE ROAD
SECONDARY ARTERIAL
(105/84)



PRIVATE DRIVE "A"
SECONDARY ARTERIAL
(112/85)



VICINITY MAP
T4S, R3W, SEC 19
NOT TO SCALE

APPLICANT/OWNER
HOWARD INDUSTRIAL PARTNERS
1944 NORTH TUSTIN STREET, SUITE 122
ORANGE, CA 92665
CONTACT: TIM HOWARD
(TEL)714-764-9155

ENGINEER
FMCIVIL ENGINEERS INC.
41810 KALMIA ST., SUITE 120
MURRIETA, CA 92562
CONTACT: FRANCISCO MARTINEZ
(TEL)951-913-0202

ARCHITECT
AO ARCHITECTURE
144 NORTH STREET
ORANGE, CA 92666
CONTACT: DAN MACDAVID
(TEL)714-634-9860

EARTHWORK ESTIMATE:
RAW CUT: 575 CY
RAW FILL: 9,075 CY
NET: 8,500 CY IMPORT
HAUL TRIPS:
ASSUMED (13 CY PER TRIP) = 654

CITY OF PERRIS

HARVEST LANDING RETAIL CENTER & BUSINESS PARK
SITE #5 CONCEPTUAL GRADING & DRAINAGE PLAN
VESTING TENTATIVE TRACT MAP 38811-I - PARCEL 4

SCALE: AS SHOWN	DATE: OCT. 2024	FMCIVIL ENGINEERS INC.	41810 KALMIA STREET, SUITE 120 MURRIETA, CA 92562 951.913.0202 - FMCIVIL.COM	SHEET
DESIGNED: AJ				1
CHECKED: FM				
PLN CK REF:				

