



## HYDROLOGY STUDY

For

**RB Ritchie Bros  
APN 0516-101-01  
34550 Outer HWY 15  
Yermo, CA**

February 8, 2024

Prepared by:

### **Merrell-Johnson Companies**

22221 US Highway 18  
Apple Valley, CA 92307  
(760) 240-8000

Job No. 3625.001



2/15/2024

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**Associate Engineer**  
**R.C.E. 51752 Exp. 06/30/24**

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**Project Manager**

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## ***SECTION 1***

## ***DISCUSSION***

## ***INTRODUCTION***

The purpose of this study was to determine the impact, if any, of the 100-year storm runoff flow tributary to the project site as delineated on the map contained in this study. The project parcel encompasses approximately 167 acres of property located on the north side of Outer Hwy 15 N in the unincorporated area of Yermo, in San Bernardino County, California. Development of the existing, approximately 50-acre project site is being repurposed as a military surplus equipment auction site.

## ***METHODOLOGY***

The method in determining these peak runoff flows was the rational method as specified in the 1986 San Bernardino County Hydrology Manual and the 2010 San Bernardino County Hydrology Manual Addendum for Arid Regions. As the off-site tributary flows combine and transition to flood plain flow an additional unit hydrograph analysis was performed encompassing the combined tributary area. The existing off-site tributary areas were examined and delineated from U.S.G.S. Map: Nebo and an examination of the project site.

The tributary watershed areas examined extend westerly and northwesterly from the western property boundary. The westerly and northwesterly tributary areas encompass approximately 765 and 298 acres respectively. There is a blue line stream within the upper reaches of the westerly drainage area that flows beneath Ft. Irwin Road and then spreads and transitions to unmapped flood plain flow approximately 3,000 feet upstream of the western project boundary. The storm runoff flow from both tributary areas spreads to flood plain flow before crossing Old Yermo Cutoff, a graded dirt road, before entering the project site along the length of the western boundary. The runoff flows from the western and northwestern tributary areas were calculated at 765 cubic feet per second (cfs) and 445 cfs respectively. The calculated runoff flow from the Unit Hydrograph analysis was 1,315 cfs. This runoff flows as flood plain sheet flow crossing Old Yermo Cutoff across the length of the western property boundary.



Point rainfalls for the 100-year storm were obtained from the NOAA Atlas 14 per the 2010 Addendum to the County Hydrology Manual. The 100-year 1-hour point rainfall for the site, required for the rational method analysis, is 1.31". Per the aforementioned addendum, AMC I was used for the project site and the soil types were determined to be Soil Type C in the upper reaches of the tributary, west of Ft. Irwin Road and Soil Type A in the lower tributary areas primarily east of Ft. Irwin Road. Rainfall and maps are included as exhibits in Section 3 of this report.

The offsite tributary area examined in this study is shown in Table A.

**Table A**

<b>Sub-area</b>	<b>Elevation Difference (ft.)</b>	<b>Length (ft)</b>	<b>Area (Ac)</b>	<b>Avg. Slope (ft/ft)</b>
Node 11 – 18 (Western)	650	15,359	764.8	0.0423
Node 41 – 46 (Northwestern)	360	7,370	298.5	0.0488
Unit Hydrograph Analysis	650	15,359	1,063.3	0.0423

## ***EXISTING CONDITIONS***

The project parcel encompasses approximately 167 acres of property located on the north side of Outer Hwy 15 N in the unincorporated area of Yermo, in San Bernardino County, California. The property was previously developed as a commercial site for water well drilling and supplies and is currently being used as an auction site for surplus military equipment. Outer Hwy 15 N is an improved, paved road with dirt shoulders. Old Yermo Road is a graded, dirt road.

Tributary off-site flows come from the west as concentrated flows in the foothill area west of Ft. Irwin Road and spread out to sheet flows in the flood plain area downstream of Ft. Irwin Road. No defined flowlines or heavy scour from past storm runoff were observed crossing Old Yermo Road. Some evidence of sheet flow runoff was observed along the length of the western boundary. These runoff flows will continue to flow easterly, as sheet flows, toward Calico Dry Lake.

The results of the offsite flow analysis are summarized in Table B.

Table B

<b>Sub-Area</b>	<b>Q<sub>100</sub> (cfs)</b>
Node 11 – 18 (Western)	764.7
Node 41 – 46 (Northwestern)	445.3
Unit Hydrograph Analysis	1,315.0

## ***CONCLUSIONS AND RECOMMENDATIONS***

During our field investigation of the site, we observed the existing conditions as stated previously. Future development of the project is being performed in conjunction with engineered improvement plans. Off-site flows from the west and northwest will enter the project site along the western property boundary as flood plain sheet flow and flow across the project site then northeasterly towards Calico Dry Lake. Smaller storm flows from the north turn east before entering the project site and flow to Calico Dry Lake.

An existing San Bernardino County Flood Control District channel within Calico Dry Lake runs easterly from Ghost Town Road, at an elevation of 1,950' to beneath Interstate 15 and to the Mojave River. This channel serves to drain storm runoff from the dry lake bottom.

Storm runoff from the adjacent western tributary area will cross Old Yermo Cutoff as shallow, slow-moving sheet flow. The calculated depth of runoff flow is approximately 0.26' (3 inches) deep and flowing at approximately 1.8 feet per second. The storm runoff will flow across the project site from west to east as minor sheet flows.

There is no additional impervious area proposed in this project. The project site was previously permitted by San Bernardino County as a commercial site and occupied by a commercial water well drilling company. The site will remain a commercial site with no addition of impervious area. There will be no increased on-site runoff due to development of the project. Storm runoff from the site will follow historical flow paths to the northeast towards existing Calico Dry Lake.

## ***SECTION 2***

### ***EXHIBITS***

## ***VICINITY MAP***



**RB Ritchie Bros.**

Outer Hwy 15 N Site

**Legend**

 3625.001 Site



Google Earth

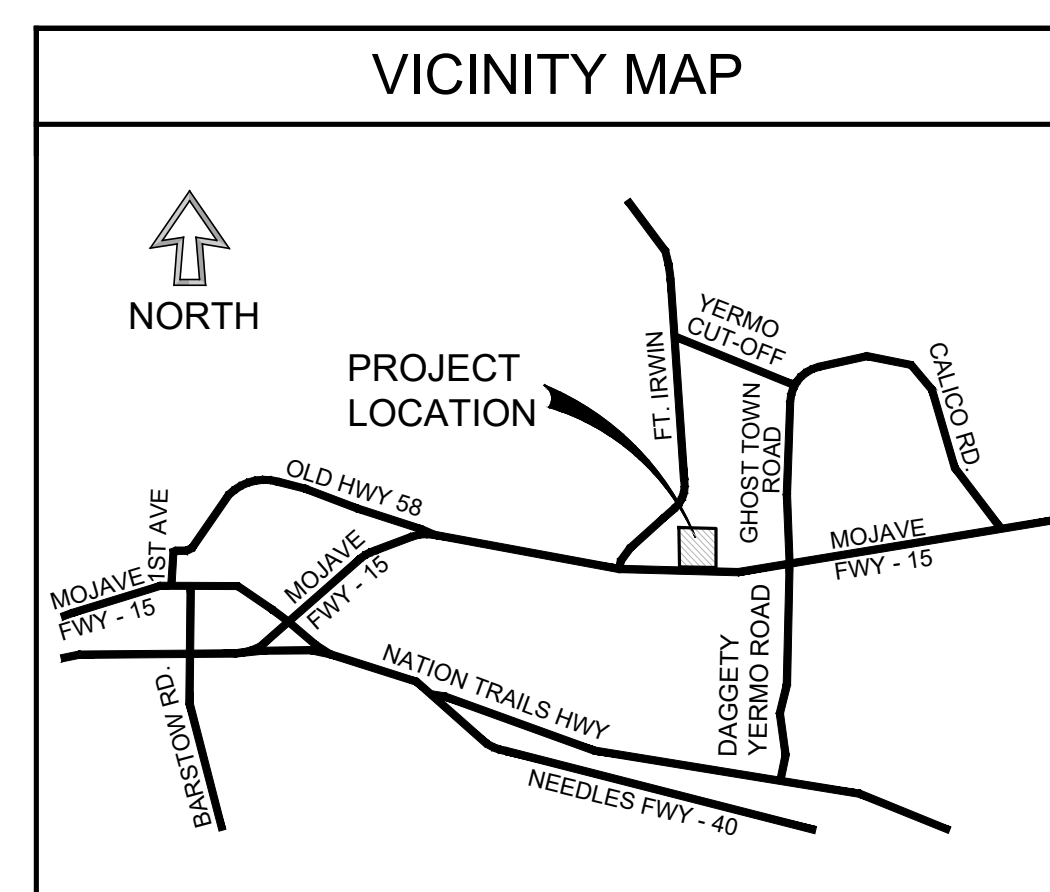
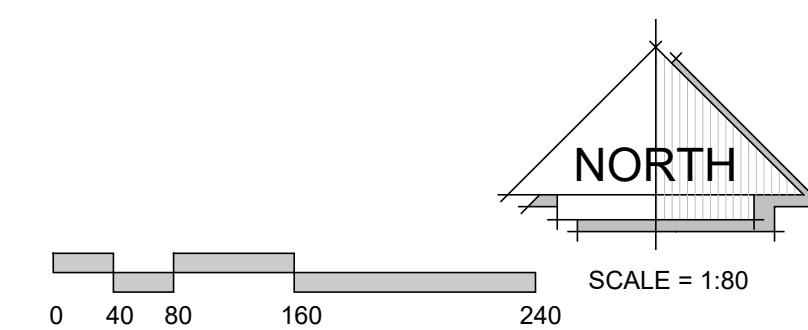
2000 ft







# ***PROPOSED DEVELOPMENT PLAN***



PROJECT DATA	
APPLICATION TYPE:	CUP
ZONE:	RC
OCCUPANCY'S:	B/H
CONSTRUCTION TYPE:	Ⅱ - B/Ⅱ
STORIES:	1
FIRE SPRINKLERS:	YES
OWNER:	ARCHITECT / REPRESENTATIVE
NORMAN HOWARD INC. P.O. BOX 64 ANGELUS OAKS, CA 92305	STEENO DESIGN STUDIO, INC. ARCHITECT: TOM STEENO 11774 HESPERIA RD. SUITE B-1 PH: 760.244.5001 FX: 760.244.1948
APPLICANT:	
IRON PLANET ACTION 34580 OUTER HWY 15 YERMO, CA 92398	

<p align="center"><b>SCOPE OF WORK</b></p> <p>CUP APPLICATION FOR EXISTING GOVERNMENT AND MILITARY SURPLUS EQUIPMENT ON-LINE SALES/ AUCTION BUSINESS OPERATION ON 50 ACRES OF 164 ACRE PARCEL. THERE IS ONE EXISTING 13,200 SQ. FT. ADMINISTRATION BUILDING USE FOR ADMINISTRATIVE PURPOSES.</p>
--

SITE DATA		
A.P.N.: 0516-101-01-0-000		
<u>LEGAL DESCRIPTION:</u> LOTS 1 AND 2 OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 9 NORTH, RANGE 1 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA		
SITE AREA		
AREA		SQ. FOOTAGE
GROSS LAND AREA - 167.26 ACRES		7,285,845 S.F.
EX. PROJECT AREA - 50.13 ACRES		2,183,726 S.F. - 30%
UNDEVELOPED AREA - 117.13 ACRES (NOT A PART)		5,102,119 S.F. - 70%
EX. LAND AREA COVERAGE (DEVELOPED AREA)		
AREA	SQ. FOOTAGE	% COVERAGE
BUILDING AREA (TOTAL)	10,140	0.5%
A/C PAVING	63,837	2.9%
CONCRETE HARDSCAPE & CURBING	666	0.03%
LANDSCAPED AREA	1,500	0.07%
DIRT AREA	2,107,583	96.5%
TOTAL NET LAND AREA COVERAGE (EX. PROJECT AREA) =	2,183,726 S.F.	100%

PARKING DATA			
REQUIRED PARKING PER G.F.A.:			
AREA	RATIO	S.F.	# SPACES
EX. STORAGE BUILDING	1:1000	9,189	10
EX. OFFICE	1:250	951	4
TOTAL REQUIRED			14
PROVIDED PARKING:			
9'x19' ACCESSIBLE PARKING STALLS		=	1 SPACE
9'x19' STANDARD PARKING STALLS		=	22 SPACES
TOTAL PROVIDED =			23 SPACES

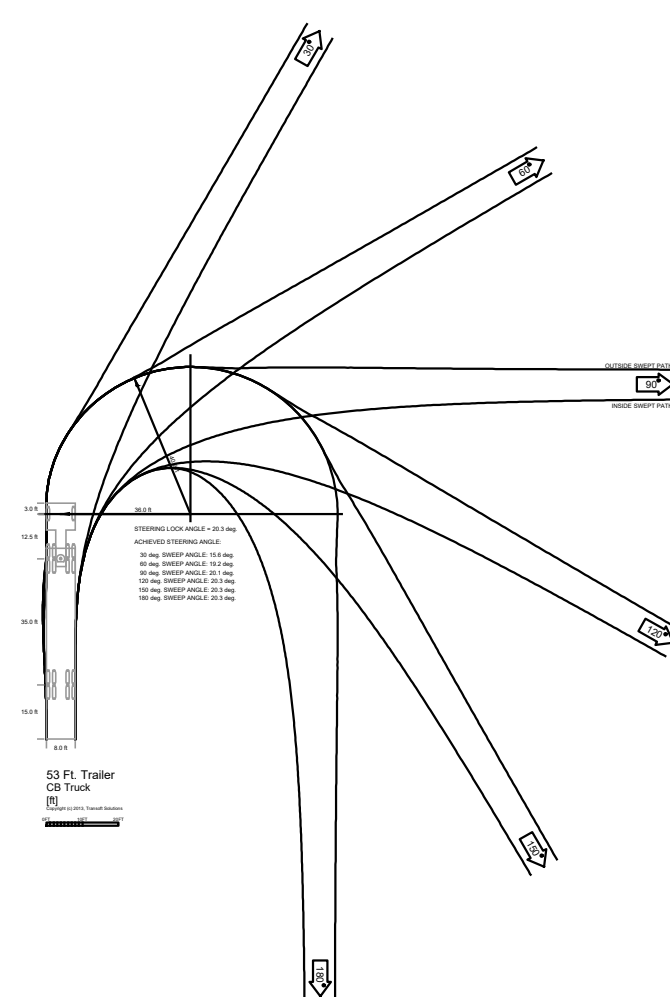
## FLOOR AREA RATIO

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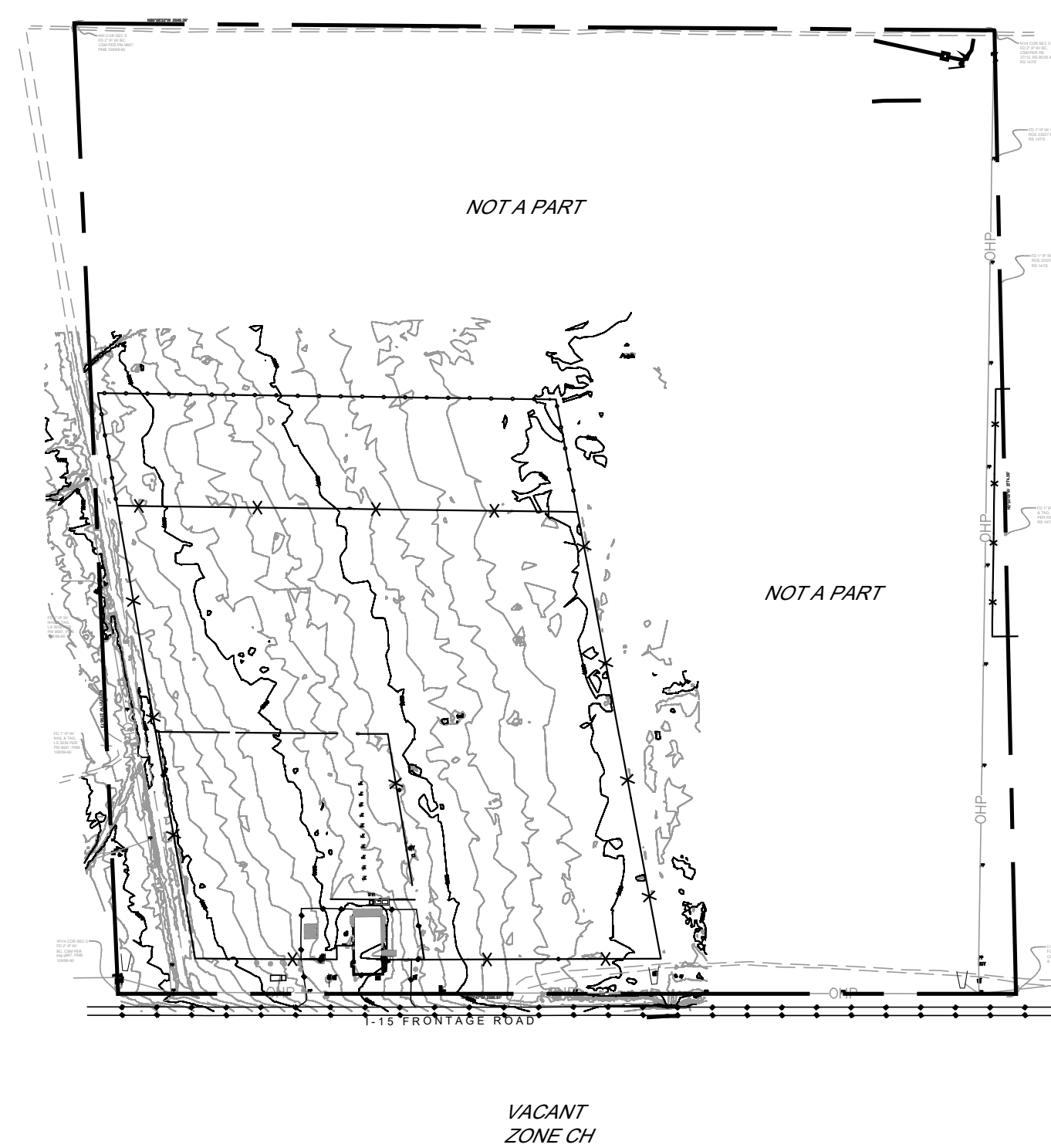
TOTAL BUILDING AREA = 13,200 S.F.  
TOTAL DEVELOPED LOT AREA = 2,183,726

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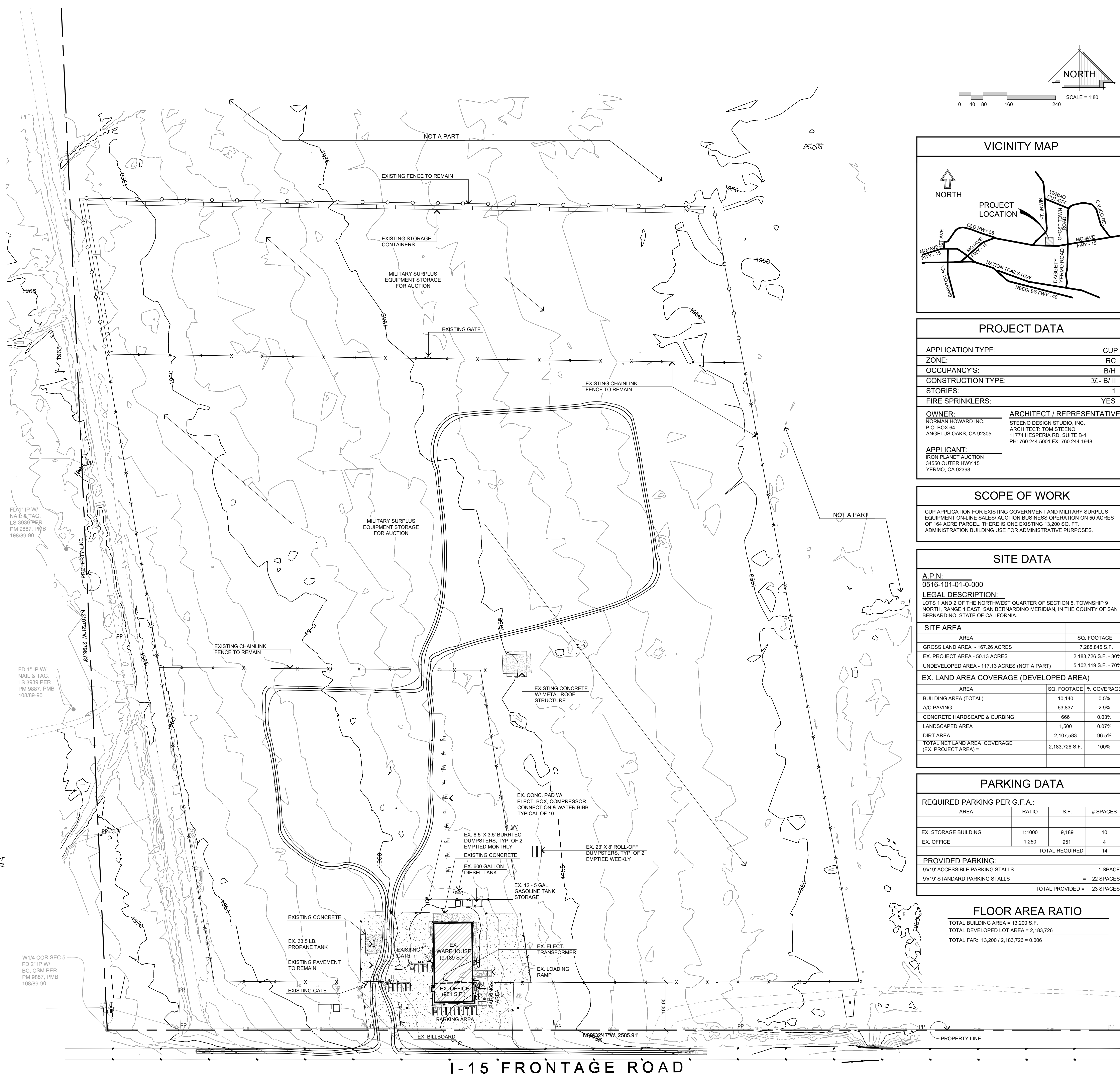
TOTAL FAR:  $13,200 / 2,183,726 = 0.006$



## TRUCK TURNING TEMPLATE



OVERALL SITE PLAN  
NOT TO SCALE



**SITE PLAN**  
SCALE: 1:80

DATE FINISHED  
APRIL 2023

REVISIONS

THESE PLANS SHALL COMPLY WITH THE 2022 CALIFORNIA BUILDING CODE WHICH ADAPTS THE 2018 CALIFORNIA CEC, 2022 CEC, 2022 CRC AND THE 2022 ENERGY STANDARDS

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PROJECT: AS BUILT SITE

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# IRON PLANET AUCTION

PROJECT LOCATION:  
34550 OUTER HWY 15  
YERMO, CA 92398

CONTACT INFO:  
TIMI KANDER  
TKANDER@IRBAUCTION.COM

JOB NO.

C23-Q22

## SITE PLAN

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## ***SECTION 3***

# ***HYDROLOGY CALCULATIONS***

## ***RATIONAL CALCULATIONS – Q<sub>100</sub>***

# ***OFF-SITE HYDROLOGY CALCULATIONS***

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 7.0  
Rational Hydrology Study Date: 05/19/23

-----  
RB RITCHIE BROS - JOB 3675.001  
OFF-SITE TRIBUTARY STORM RUNOFF FLOW  
NODE 11 - NODE 18  
100-YEAR STORM EVENT - AMC I  
-----

MERRELL JOHNSON COMPANIES  
22221 HIGHWAY 18  
APPLE VALLEY, CA 92307  
(760) 240-8000 FAX (760) 240-1400  
-----

\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
-----

Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.310 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 1

\*\*\*\*\*  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*  
-----

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Initial subarea data:  
Initial area flow distance = 985.000(Ft.)  
Top (of initial area) elevation = 2625.000(Ft.)  
Bottom (of initial area) elevation = 2474.000(Ft.)  
Difference in elevation = 151.000(Ft.)  
Slope = 0.15330 s(%)= 15.33  
 $TC = k(0.525)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 12.034 min.  
Rainfall intensity = 4.033(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.787  
Subarea runoff = 26.974(CFS)  
Total initial stream area = 8.500(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.507(In/Hr)

\*\*\*\*\*  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*  
-----

Depth of flow = 0.784(Ft.), Average velocity = 4.384(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*  
-----

Information entered for subchannel number 1 :  
 Point number        'X' coordinate        'Y' coordinate  
                     1                      0.00                      1.00  
                     2                      10.00                      0.00  
                     3                      20.00                      1.00  
 Manning's 'N' friction factor =    0.040

-----  
 Sub-Channel flow =        26.974(CFS)  
                     '                      flow top width =        15.687(Ft.)  
                     '                      velocity=        4.384(Ft/s)  
                     '                      area =        6.152(Sq.Ft)  
                     '                      Froude number =        1.234

Upstream point elevation =    2474.000(Ft.)  
 Downstream point elevation =    2419.000(Ft.)  
 Flow length =    1126.000(Ft.)  
 Travel time =        4.28 min.  
 Time of concentration =    16.31 min.  
 Depth of flow =        0.784(Ft.)  
 Average velocity =        4.384(Ft/s)  
 Total irregular channel flow =        26.974(CFS)  
 Irregular channel normal depth above invert elev. =    0.784(Ft.)  
 Average velocity of channel(s) =        4.384(Ft/s)

+++++  
 Process from Point/Station        12.000 to Point/Station        13.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

-----  
 UNDEVELOPED (poor cover) subarea  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 SCS curve number for soil(AMC 2) = 86.00  
 Adjusted SCS curve number for AMC 1 = 71.60  
 Pervious ratio(Ap) = 1.0000        Max loss rate(Fm)=        0.507(In/Hr)  
 Time of concentration =        16.31 min.  
 Rainfall intensity =        3.260(In/Hr) for a    100.0 year storm  
 Effective runoff coefficient used for area,(total area with modified  
 rational method)(Q=KCIA) is C = 0.760  
 Subarea runoff =        28.758(CFS) for    14.000(Ac.)  
 Total runoff =        55.732(CFS)  
 Effective area this stream =        22.50(Ac.)  
 Total Study Area (Main Stream No. 1) =        22.50(Ac.)  
 Area averaged Fm value =        0.507(In/Hr)

+++++  
 Process from Point/Station        13.000 to Point/Station        14.000  
 \*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

-----  
 Depth of flow =    0.749(Ft.), Average velocity =    5.411(Ft/s)  
                     \*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
 Information entered for subchannel number 1 :  
 Point number        'X' coordinate        'Y' coordinate  
                     1                      0.00                      2.00  
                     2                      10.00                      0.00  
                     3                      20.00                      0.00  
                     4                      30.00                      2.00  
 Manning's 'N' friction factor =    0.040

-----  
Sub-Channel flow = 55.732(CFS)  
' ' flow top width = 17.493(Ft.)  
' ' velocity= 5.411(Ft/s)  
' ' area = 10.300(Sq.Ft)  
' ' Froude number = 1.243

Upstream point elevation = 2419.000(Ft.)  
Downstream point elevation = 2320.000(Ft.)  
Flow length = 2277.000(Ft.)  
Travel time = 7.01 min.  
Time of concentration = 23.33 min.  
Depth of flow = 0.749(Ft.)  
Average velocity = 5.411(Ft/s)  
Total irregular channel flow = 55.732(CFS)  
Irregular channel normal depth above invert elev. = 0.749(Ft.)  
Average velocity of channel(s) = 5.411(Ft/s)

+++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

-----  
UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 23.33 min.  
Rainfall intensity = 2.538(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with modified  
rational method)(Q=KCIA) is C = 0.720  
Subarea runoff = 39.838(CFS) for 29.800(Ac.)  
Total runoff = 95.570(CFS)  
Effective area this stream = 52.30(Ac.)  
Total Study Area (Main Stream No. 1) = 52.30(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

+++++  
Process from Point/Station 14.000 to Point/Station 15.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

-----  
Depth of flow = 1.026(Ft.), Average velocity = 6.153(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 2.00  
2 10.00 0.00  
3 20.00 0.00  
4 30.00 2.00  
Manning's 'N' friction factor = 0.040  
-----

Sub-Channel flow = 95.570(CFS)  
' ' flow top width = 20.264(Ft.)  
' ' velocity= 6.153(Ft/s)  
' ' area = 15.532(Sq.Ft)  
' ' Froude number = 1.239

Upstream point elevation = 2320.000(Ft.)  
 Downstream point elevation = 2212.000(Ft.)  
 Flow length = 2725.000(Ft.)  
 Travel time = 7.38 min.  
 Time of concentration = 30.71 min.  
 Depth of flow = 1.026(Ft.)  
 Average velocity = 6.153(Ft/s)  
 Total irregular channel flow = 95.570(CFS)  
 Irregular channel normal depth above invert elev. = 1.026(Ft.)  
 Average velocity of channel(s) = 6.153(Ft/s)

++++++  
 Process from Point/Station 14.000 to Point/Station 15.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

UNDEVELOPED (poor cover) subarea  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 SCS curve number for soil(AMC 2) = 86.00  
 Adjusted SCS curve number for AMC 1 = 71.60  
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
 Time of concentration = 30.71 min.  
 Rainfall intensity = 2.094(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area,(total area with modified  
 rational method)(Q=KCIA) is C = 0.682  
 Subarea runoff = 66.454(CFS) for 61.200(Ac.)  
 Total runoff = 162.024(CFS)  
 Effective area this stream = 113.50(Ac.)  
 Total Study Area (Main Stream No. 1) = 113.50(Ac.)  
 Area averaged Fm value = 0.507(In/Hr)

++++++  
 Process from Point/Station 15.000 to Point/Station 16.000  
 \*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

Depth of flow = 1.238(Ft.), Average velocity = 6.175(Ft/s)  
 \*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
 Information entered for subchannel number 1 :  

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.00
2	15.00	0.00
3	30.00	0.00
4	45.00	3.00

 Manning's 'N' friction factor = 0.040  
 -----

Sub-Channel flow = 162.024(CFS)  
 ' ' flow top width = 27.382(Ft.)  
 ' ' velocity= 6.175(Ft/s)  
 ' ' area = 26.240(Sq.Ft)  
 ' ' Froude number = 1.112

Upstream point elevation = 2212.000(Ft.)  
 Downstream point elevation = 2105.000(Ft.)  
 Flow length = 3616.000(Ft.)  
 Travel time = 9.76 min.  
 Time of concentration = 40.47 min.

Depth of flow = 1.238(Ft.)  
Average velocity = 6.175(Ft/s)  
Total irregular channel flow = 162.024(CFS)  
Irregular channel normal depth above invert elev. = 1.238(Ft.)  
Average velocity of channel(s) = 6.175(Ft/s)

++++  
Process from Point/Station 15.000 to Point/Station 16.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 40.47 min.  
Rainfall intensity = 1.726(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.635  
Subarea runoff = 98.179(CFS) for 123.800(Ac.)  
Total runoff = 260.203(CFS)  
Effective area this stream = 237.30(Ac.)  
Total Study Area (Main Stream No. 1) = 237.30(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

++++  
Process from Point/Station 16.000 to Point/Station 17.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Depth of flow = 1.537(Ft.), Average velocity = 7.464(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 3.00  
2 15.00 0.00  
3 30.00 0.00  
4 45.00 3.00  
Manning's 'N' friction factor = 0.040  
-----

Sub-Channel flow = 260.203(CFS)  
' ' flow top width = 30.369(Ft.)  
' ' velocity= 7.464(Ft/s)  
' ' area = 34.863(Sq.Ft)  
' ' Froude number = 1.228

Upstream point elevation = 2105.000(Ft.)  
Downstream point elevation = 2020.000(Ft.)  
Flow length = 2498.000(Ft.)  
Travel time = 5.58 min.  
Time of concentration = 46.05 min.  
Depth of flow = 1.537(Ft.)  
Average velocity = 7.464(Ft/s)  
Total irregular channel flow = 260.203(CFS)  
Irregular channel normal depth above invert elev. = 1.537(Ft.)  
Average velocity of channel(s) = 7.464(Ft/s)



+++++  
Process from Point/Station        16.000 to Point/Station        17.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 67.00  
Adjusted SCS curve number for AMC 1 = 47.40  
Pervious ratio(Ap) = 1.0000        Max loss rate(Fm)=        0.840(In/Hr)  
Time of concentration =        46.05 min.  
Rainfall intensity =        1.577(In/Hr) for a        100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.567  
Subarea runoff =        14.627(CFS) for        70.100(Ac.)  
Total runoff =        274.830(CFS)  
Effective area this stream =        307.40(Ac.)  
Total Study Area (Main Stream No. 1) =        307.40(Ac.)  
Area averaged Fm value =        0.583(In/Hr)

+++++  
Process from Point/Station        17.000 to Point/Station        17.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area =        307.400(Ac.)  
Runoff from this stream =        274.830(CFS)  
Time of concentration =        46.05 min.  
Rainfall intensity =        1.577(In/Hr)  
Area averaged loss rate (Fm) =        0.5833(In/Hr)  
Area averaged Pervious ratio (Ap) = 1.0000

+++++  
Process from Point/Station        21.000 to Point/Station        22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000        Max loss rate(Fm)=        0.507(In/Hr)  
Initial subarea data:  
Initial area flow distance =        1000.000(Ft.)  
Top (of initial area) elevation =        2569.000(Ft.)  
Bottom (of initial area) elevation =        2374.000(Ft.)  
Difference in elevation =        195.000(Ft.)  
Slope =        0.19500    s(%)=        19.50  
TC = k(0.525)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration =        11.539 min.  
Rainfall intensity =        4.154(In/Hr) for a        100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790  
Subarea runoff =        27.896(CFS)  
Total initial stream area =        8.500(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value =        0.507(In/Hr)

```

+++++
Process from Point/Station      22.000 to Point/Station      23.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

---

```

Depth of flow = 0.758(Ft.), Average velocity = 4.860(Ft/s)
***** Irregular Channel Data *****

```

```

-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              1.00
      2             10.00              0.00
      3             20.00              1.00

```

```

Manning's 'N' friction factor = 0.040
-----

```

```

Sub-Channel flow = 27.896(CFS)
'      ' flow top width = 15.152(Ft.)
'      ' velocity= 4.860(Ft/s)
'      ' area = 5.740(Sq.Ft)
'      ' Froude number = 1.392

```

```

Upstream point elevation = 2374.000(Ft.)
Downstream point elevation = 2319.000(Ft.)
Flow length = 875.000(Ft.)
Travel time = 3.00 min.
Time of concentration = 14.54 min.
Depth of flow = 0.758(Ft.)
Average velocity = 4.860(Ft/s)
Total irregular channel flow = 27.896(CFS)
Irregular channel normal depth above invert elev. = 0.758(Ft.)
Average velocity of channel(s) = 4.860(Ft/s)

```

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+++++
Process from Point/Station      22.000 to Point/Station      23.000
**** SUBAREA FLOW ADDITION ****

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```

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Adjusted SCS curve number for AMC 1 = 71.60
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)= 0.507(In/Hr)
Time of concentration = 14.54 min.
Rainfall intensity = 3.533(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.771
Subarea runoff = 55.440(CFS) for 22.100(Ac.)
Total runoff = 83.336(CFS)
Effective area this stream = 30.60(Ac.)
Total Study Area (Main Stream No. 1) = 338.00(Ac.)
Area averaged Fm value = 0.507(In/Hr)

```

```

+++++
Process from Point/Station      23.000 to Point/Station      24.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

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```

Depth of flow = 0.905(Ft.), Average velocity = 6.340(Ft/s)
***** Irregular Channel Data *****

```

```

-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              0.00
      4             30.00              2.00
Manning's 'N' friction factor = 0.040
-----

```

```

Sub-Channel flow = 83.336(CFS)
'      ' flow top width = 19.050(Ft.)
'      ' velocity= 6.340(Ft/s)
'      ' area = 13.145(Sq.Ft)
'      ' Froude number = 1.345

```

```

Upstream point elevation = 2319.000(Ft.)
Downstream point elevation = 2260.000(Ft.)
Flow length = 1220.000(Ft.)
Travel time = 3.21 min.
Time of concentration = 17.75 min.
Depth of flow = 0.905(Ft.)
Average velocity = 6.340(Ft/s)
Total irregular channel flow = 83.336(CFS)
Irregular channel normal depth above invert elev. = 0.905(Ft.)
Average velocity of channel(s) = 6.340(Ft/s)

```

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+++++
Process from Point/Station      23.000 to Point/Station      24.000
**** SUBAREA FLOW ADDITION ****

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-----
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Adjusted SCS curve number for AMC 1 = 71.60
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)= 0.507(In/Hr)
Time of concentration = 17.75 min.
Rainfall intensity = 3.073(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.751
Subarea runoff = 91.241(CFS) for 45.000(Ac.)
Total runoff = 174.578(CFS)
Effective area this stream = 75.60(Ac.)
Total Study Area (Main Stream No. 1) = 383.00(Ac.)
Area averaged Fm value = 0.507(In/Hr)

```

```

+++++
Process from Point/Station      24.000 to Point/Station      25.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

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-----
Depth of flow = 1.355(Ft.), Average velocity = 7.680(Ft/s)
***** Irregular Channel Data *****
-----

```

```

Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              0.00

```

```

      4              30.00              2.00
Manning's 'N' friction factor = 0.040
-----
Sub-Channel flow = 174.578(CFS)
'      ' flow top width = 23.551(Ft.)
'      ' velocity= 7.680(Ft/s)
'      ' area = 22.732(Sq.Ft)
'      ' Froude number = 1.378

Upstream point elevation = 2260.000(Ft.)
Downstream point elevation = 2175.000(Ft.)
Flow length = 1869.000(Ft.)
Travel time = 4.06 min.
Time of concentration = 21.80 min.
Depth of flow = 1.355(Ft.)
Average velocity = 7.680(Ft/s)
Total irregular channel flow = 174.578(CFS)
Irregular channel normal depth above invert elev. = 1.355(Ft.)
Average velocity of channel(s) = 7.680(Ft/s)

+++++
Process from Point/Station 24.000 to Point/Station 25.000
**** SUBAREA FLOW ADDITION ****
-----
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Adjusted SCS curve number for AMC 1 = 71.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)
Time of concentration = 21.80 min.
Rainfall intensity = 2.661(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.728
Subarea runoff = 137.257(CFS) for 85.300(Ac.)
Total runoff = 311.835(CFS)
Effective area this stream = 160.90(Ac.)
Total Study Area (Main Stream No. 1) = 468.30(Ac.)
Area averaged Fm value = 0.507(In/Hr)

+++++
Process from Point/Station 25.000 to Point/Station 26.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
-----
Depth of flow = 1.667(Ft.), Average velocity = 8.015(Ft/s)
***** Irregular Channel Data *****
-----
Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 3.00
2 15.00 0.00
3 30.00 0.00
4 45.00 3.00
Manning's 'N' friction factor = 0.040
-----
Sub-Channel flow = 311.834(CFS)
'      ' flow top width = 31.672(Ft.)
'      ' velocity= 8.015(Ft/s)

```

```

'      '      area =      38.906(Sq.Ft)
'      '      Froude number =      1.274

Upstream point elevation = 2175.000(Ft.)
Downstream point elevation = 2103.000(Ft.)
Flow length = 2007.000(Ft.)
Travel time = 4.17 min.
Time of concentration = 25.98 min.
Depth of flow = 1.667(Ft.)
Average velocity = 8.015(Ft/s)
Total irregular channel flow = 311.835(CFS)
Irregular channel normal depth above invert elev. = 1.667(Ft.)
Average velocity of channel(s) = 8.015(Ft/s)

+++++
Process from Point/Station      25.000 to Point/Station      26.000
**** SUBAREA FLOW ADDITION ****

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```

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Adjusted SCS curve number for AMC 1 = 71.60
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)=      0.507(In/Hr)
Time of concentration = 25.98 min.
Rainfall intensity = 2.354(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.706
Subarea runoff = 26.332(CFS) for 42.600(Ac.)
Total runoff = 338.166(CFS)
Effective area this stream = 203.50(Ac.)
Total Study Area (Main Stream No. 1) = 510.90(Ac.)
Area averaged Fm value = 0.507(In/Hr)

+++++
Process from Point/Station      26.000 to Point/Station      17.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

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```

Depth of flow = 1.763(Ft.), Average velocity = 8.055(Ft/s)
***** Irregular Channel Data *****
-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              3.00
      2             15.00              0.00
      3             30.00              0.00
      4             45.00              3.00
Manning's 'N' friction factor = 0.040
-----
Sub-Channel flow = 338.166(CFS)
'      '      flow top width = 32.629(Ft.)
'      '      velocity= 8.055(Ft/s)
'      '      area = 41.983(Sq.Ft)
'      '      Froude number = 1.251

Upstream point elevation = 2103.000(Ft.)
Downstream point elevation = 2020.000(Ft.)
Flow length = 2436.000(Ft.)

```

Travel time = 5.04 min.  
 Time of concentration = 31.02 min.  
 Depth of flow = 1.763(Ft.)  
 Average velocity = 8.055(Ft/s)  
 Total irregular channel flow = 338.166(CFS)  
 Irregular channel normal depth above invert elev. = 1.763(Ft.)  
 Average velocity of channel(s) = 8.055(Ft/s)

++++++  
 Process from Point/Station 26.000 to Point/Station 17.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

UNDEVELOPED (poor cover) subarea  
 Decimal fraction soil group A = 1.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 SCS curve number for soil(AMC 2) = 67.00  
 Adjusted SCS curve number for AMC 1 = 47.40  
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)  
 The area added to the existing stream causes a  
 a lower flow rate of Q = 313.599(CFS)  
 therefore the upstream flow rate of Q = 338.166(CFS) is being used  
 Time of concentration = 31.02 min.  
 Rainfall intensity = 2.079(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area,(total area with modified  
 rational method)(Q=KCIA) is C = 0.666  
 Subarea runoff = 0.000(CFS) for 23.100(Ac.)  
 Total runoff = 338.166(CFS)  
 Effective area this stream = 226.60(Ac.)  
 Total Study Area (Main Stream No. 1) = 534.00(Ac.)  
 Area averaged Fm value = 0.541(In/Hr)

++++++  
 Process from Point/Station 17.000 to Point/Station 17.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 226.600(Ac.)  
 Runoff from this stream = 338.166(CFS)  
 Time of concentration = 31.02 min.  
 Rainfall intensity = 2.079(In/Hr)  
 Area averaged loss rate (Fm) = 0.5413(In/Hr)  
 Area averaged Pervious ratio (Ap) = 1.0000  
 Summary of stream data:

Stream No.	Area (Ac.)	Flow rate (CFS)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	274.83	307.400	46.05	0.583	1.577
2	338.17	226.600	31.02	0.541	2.079
Qmax(1) =					
	1.000 *	1.000 *	274.830)	+	
	0.673 *	1.000 *	338.166)	+	502.511
Qmax(2) =					
	1.506 *	0.674 *	274.830)	+	
	1.000 *	1.000 *	338.166)	+	616.908

Total of 2 streams to confluence:

Flow rates before confluence point:

274.830 338.166

Maximum flow rates at confluence using above data:

502.511 616.908

Area of streams before confluence:

307.400 226.600

Effective area values after confluence:

534.000 433.657

Results of confluence:

Total flow rate = 616.908(CFS)

Time of concentration = 31.016 min.

Effective stream area after confluence = 433.657(Ac.)

Study area average Pervious fraction(Ap) = 1.000

Study area average soil loss rate(Fm) = 0.565(In/Hr)

Study area total (this main stream) = 534.00(Ac.)

+++++  
Process from Point/Station 17.000 to Point/Station 18.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Depth of flow = 2.442(Ft.), Average velocity = 7.843(Ft/s)

\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	4.00
2	20.00	0.00
3	40.00	0.00
4	60.00	4.00

Manning's 'N' friction factor = 0.040

-----  
Sub-Channel flow = 616.908(CFS)  
' ' flow top width = 44.420(Ft.)  
' ' velocity = 7.843(Ft/s)  
' ' area = 78.658(Sq.Ft)  
' ' Froude number = 1.039

Upstream point elevation = 2020.000(Ft.)

Downstream point elevation = 1975.000(Ft.)

Flow length = 2132.000(Ft.)

Travel time = 4.53 min.

Time of concentration = 35.55 min.

Depth of flow = 2.442(Ft.)

Average velocity = 7.843(Ft/s)

Total irregular channel flow = 616.908(CFS)

Irregular channel normal depth above invert elev. = 2.442(Ft.)

Average velocity of channel(s) = 7.843(Ft/s)

+++++  
Process from Point/Station 17.000 to Point/Station 18.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea

Decimal fraction soil group A = 1.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

SCS curve number for soil(AMC 2) = 67.00

Adjusted SCS curve number for AMC 1 = 47.40

Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)

The area added to the existing stream causes a  
a lower flow rate of Q = 577.348(CFS)  
therefore the upstream flow rate of Q = 616.908(CFS) is being used  
Time of concentration = 35.55 min.  
Rainfall intensity = 1.890(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with modified  
rational method)(Q=KCIA) is C = 0.614  
Subarea runoff = 0.000(CFS) for 64.000(Ac.)  
Total runoff = 616.908(CFS)  
Effective area this stream = 497.66(Ac.)  
Total Study Area (Main Stream No. 1) = 598.00(Ac.)  
Area averaged Fm value = 0.601(In/Hr)

```

+++++
Process from Point/Station      18.000 to Point/Station      18.000
**** CONFLUENCE OF MAIN STREAMS ****

```

---

The following data inside Main Stream is listed:

In Main Stream number: 1  
Stream flow area = 497.657(Ac.)  
Runoff from this stream = 616.908(CFS)  
Time of concentration = 35.55 min.  
Rainfall intensity = 1.890(In/Hr)  
Area averaged loss rate (Fm) = 0.6008(In/Hr)  
Area averaged Pervious ratio (Ap) = 1.0000  
Program is now starting with Main Stream No. 2

```

+++++
Process from Point/Station      31.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****

```

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)= 0.507(In/Hr)  
Initial subarea data:  
Initial area flow distance = 935.000(Ft.)  
Top (of initial area) elevation = 2359.000(Ft.)  
Bottom (of initial area) elevation = 2179.000(Ft.)  
Difference in elevation = 180.000(Ft.)  
Slope = 0.19251 s(%)= 19.25  
TC = k(0.525)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 11.261 min.  
Rainfall intensity = 4.225(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.792  
Subarea runoff = 33.461(CFS)  
Total initial stream area = 10.000(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.507(In/Hr)

```

+++++
Process from Point/Station      32.000 to Point/Station      33.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

---

Depth of flow = 0.916(Ft.), Average velocity = 3.987(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*



```

-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              1.00
      2             10.00              0.00
      3             20.00              1.00
Manning's 'N' friction factor =    0.040

```

```

-----
Sub-Channel flow =    33.461(CFS)
'      '      flow top width =    18.322(Ft.)
'      '      velocity=    3.987(Ft/s)
'      '      area =    8.392(Sq.Ft)
'      '      Froude number =    1.038

```

```

Upstream point elevation = 2179.000(Ft.)
Downstream point elevation = 2137.000(Ft.)
Flow length = 1279.000(Ft.)
Travel time = 5.35 min.
Time of concentration = 16.61 min.
Depth of flow = 0.916(Ft.)
Average velocity = 3.987(Ft/s)
Total irregular channel flow = 33.461(CFS)
Irregular channel normal depth above invert elev. = 0.916(Ft.)
Average velocity of channel(s) = 3.987(Ft/s)

```

```

+++++
Process from Point/Station      32.000 to Point/Station      33.000
**** SUBAREA FLOW ADDITION ****

```

```

-----
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Adjusted SCS curve number for AMC 1 = 71.60
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)=    0.507(In/Hr)
Time of concentration = 16.61 min.
Rainfall intensity = 3.219(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.758
Subarea runoff = 45.616(CFS) for 22.400(Ac.)
Total runoff = 79.077(CFS)
Effective area this stream = 32.40(Ac.)
Total Study Area (Main Stream No. 2) = 630.40(Ac.)
Area averaged Fm value = 0.507(In/Hr)

```

```

+++++
Process from Point/Station      33.000 to Point/Station      34.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

```

```

-----
Depth of flow = 1.091(Ft.), Average velocity = 4.688(Ft/s)
***** Irregular Channel Data *****

```

```

-----
Information entered for subchannel number 1 :
Point number      'X' coordinate      'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              0.00
      4             30.00              2.00

```

Manning's 'N' friction factor = 0.040

---

Sub-Channel flow = 79.077(CFS)  
' ' flow top width = 20.914(Ft.)  
' ' velocity= 4.688(Ft/s)  
' ' area = 16.869(Sq.Ft)  
' ' Froude number = 0.920

Upstream point elevation = 2137.000(Ft.)  
Downstream point elevation = 2061.000(Ft.)  
Flow length = 3535.000(Ft.)  
Travel time = 12.57 min.  
Time of concentration = 29.18 min.  
Depth of flow = 1.091(Ft.)  
Average velocity = 4.688(Ft/s)  
Total irregular channel flow = 79.077(CFS)  
Irregular channel normal depth above invert elev. = 1.091(Ft.)  
Average velocity of channel(s) = 4.688(Ft/s)

\*\*\*\*\*  
Process from Point/Station 33.000 to Point/Station 34.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 29.18 min.  
Rainfall intensity = 2.170(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.690  
Subarea runoff = 43.320(CFS) for 49.400(Ac.)  
Total runoff = 122.397(CFS)  
Effective area this stream = 81.80(Ac.)  
Total Study Area (Main Stream No. 2) = 679.80(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

\*\*\*\*\*  
Process from Point/Station 34.000 to Point/Station 18.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Depth of flow = 1.023(Ft.), Average velocity = 4.763(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

---

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	4.00
2	20.00	0.00
3	40.00	0.00
4	60.00	4.00

Manning's 'N' friction factor = 0.040

---

Sub-Channel flow = 122.397(CFS)  
' ' flow top width = 30.231(Ft.)  
' ' velocity= 4.763(Ft/s)  
' ' area = 25.697(Sq.Ft)

```

      Froude number =      0.910

Upstream point elevation = 2061.000(Ft.)
Downstream point elevation = 1975.000(Ft.)
Flow length = 4175.000(Ft.)
Travel time = 14.61 min.
Time of concentration = 43.78 min.
Depth of flow = 1.023(Ft.)
Average velocity = 4.763(Ft/s)
Total irregular channel flow = 122.397(CFS)
Irregular channel normal depth above invert elev. = 1.023(Ft.)
Average velocity of channel(s) = 4.763(Ft/s)

```

```

+++++
Process from Point/Station      34.000 to Point/Station      18.000
**** SUBAREA FLOW ADDITION ****

```

---

```

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000      Max loss rate(Fm)=      0.840(In/Hr)
Time of concentration = 43.78 min.
Rainfall intensity = 1.633(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.527
Subarea runoff = 21.176(CFS) for 85.000(Ac.)
Total runoff = 143.573(CFS)
Effective area this stream = 166.80(Ac.)
Total Study Area (Main Stream No. 2) = 764.80(Ac.)
Area averaged Fm value = 0.677(In/Hr)

```

```

+++++
Process from Point/Station      18.000 to Point/Station      18.000
**** CONFLUENCE OF MAIN STREAMS ****

```

---

The following data inside Main Stream is listed:

```

In Main Stream number: 2
Stream flow area = 166.800(Ac.)
Runoff from this stream = 143.573(CFS)
Time of concentration = 43.78 min.
Rainfall intensity = 1.633(In/Hr)
Area averaged loss rate (Fm) = 0.6769(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

```

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

1	616.91	497.657	35.55	0.601	1.890
2	143.57	166.800	43.78	0.677	1.633

```

Qmax(1) =
1.000 * 1.000 * 616.908) +
1.268 * 0.812 * 143.573) + = 764.736
Qmax(2) =
0.801 * 1.000 * 616.908) +

```

$$1.000 * 1.000 * 143.573) + = 637.701$$

Total of 2 main streams to confluence:

Flow rates before confluence point:

617.908 144.573

Maximum flow rates at confluence using above data:

764.736 637.701

Area of streams before confluence:

497.657 166.800

Effective area values after confluence:

633.076 664.457

Results of confluence:

Total flow rate = 764.736(CFS)  $Q_{100}$

Time of concentration = 35.547 min.  $T_c$

Effective stream area after confluence = 633.076(Ac.)

Study area average Pervious fraction( $A_p$ ) = 1.000

Study area average soil loss rate( $F_m$ ) = 0.620(In/Hr)

Study area total = 664.46(Ac.)

End of computations, Total Study Area = 764.80 (Ac.)

The following figures may

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

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 1.000

Area averaged SCS curve number = 80.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 7.0  
Rational Hydrology Study Date: 05/17/23

-----  
RB RITCHIE BROS. - JOB 3625.001  
OFF-SITE TRIBUTARY STORM RUNOFF FLOWS  
NODE 41 - NODE 46  
100-YEAR STORM EVENT - AMC I  
-----

MERRELL JOHNSON COMPANIES  
22221 HIGHWAY 18  
APPLE VALLEY, CA 92307  
(760) 240-8000 \* FAX (760) 240-1400  
-----

\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
-----

Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.310 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 1

\*\*\*\*\*  
Process from Point/Station 41.000 to Point/Station 42.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*  
-----

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Initial subarea data:  
Initial area flow distance = 750.000(Ft.)  
Top (of initial area) elevation = 2331.000(Ft.)  
Bottom (of initial area) elevation = 2234.000(Ft.)  
Difference in elevation = 97.000(Ft.)  
Slope = 0.12933 s(%)= 12.93  
TC =  $k(0.525)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 11.165 min.  
Rainfall intensity = 4.251(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.793  
Subarea runoff = 33.692(CFS)  
Total initial stream area = 10.000(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.507(In/Hr)

\*\*\*\*\*  
Process from Point/Station 42.000 to Point/Station 43.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*  
-----

Depth of flow = 1.085(Ft.), Average velocity = 5.723(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*  
-----

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	2.00
2	10.00	0.00
3	20.00	2.00

Manning's 'N' friction factor = 0.040

-----  
Sub-Channel flow = 33.692(CFS)  
' ' flow top width = 10.851(Ft.)  
' ' velocity= 5.723(Ft/s)  
' ' area = 5.887(Sq.Ft)  
' ' Froude number = 1.369

Upstream point elevation = 2234.000(Ft.)  
Downstream point elevation = 2192.000(Ft.)  
Flow length = 763.000(Ft.)  
Travel time = 2.22 min.  
Time of concentration = 13.39 min.  
Depth of flow = 1.085(Ft.)  
Average velocity = 5.723(Ft/s)  
Total irregular channel flow = 33.692(CFS)  
Irregular channel normal depth above invert elev. = 1.085(Ft.)  
Average velocity of channel(s) = 5.723(Ft/s)

+++++  
Process from Point/Station 42.000 to Point/Station 43.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

-----  
UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 13.39 min.  
Rainfall intensity = 3.744(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.778  
Subarea runoff = 58.349(CFS) for 21.600(Ac.)  
Total runoff = 92.040(CFS)  
Effective area this stream = 31.60(Ac.)  
Total Study Area (Main Stream No. 1) = 31.60(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

+++++  
Process from Point/Station 43.000 to Point/Station 44.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

-----  
Depth of flow = 0.890(Ft.), Average velocity = 7.158(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	2.00
2	10.00	0.00
3	20.00	0.00
4	30.00	2.00

Manning's 'N' friction factor = 0.040

-----  
Sub-Channel flow = 92.041(CFS)  
' ' flow top width = 18.899(Ft.)  
' ' velocity= 7.158(Ft/s)  
' ' area = 12.858(Sq.Ft)  
' ' Froude number = 1.529

Upstream point elevation = 2192.000(Ft.)  
Downstream point elevation = 2131.000(Ft.)  
Flow length = 971.000(Ft.)  
Travel time = 2.26 min.  
Time of concentration = 15.65 min.  
Depth of flow = 0.890(Ft.)  
Average velocity = 7.158(Ft/s)  
Total irregular channel flow = 92.040(CFS)  
Irregular channel normal depth above invert elev. = 0.890(Ft.)  
Average velocity of channel(s) = 7.158(Ft/s)

+++++  
Process from Point/Station 43.000 to Point/Station 44.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

-----  
UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 15.65 min.  
Rainfall intensity = 3.356(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.764  
Subarea runoff = 106.158(CFS) for 45.700(Ac.)  
Total runoff = 198.198(CFS)  
Effective area this stream = 77.30(Ac.)  
Total Study Area (Main Stream No. 1) = 77.30(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

+++++  
Process from Point/Station 44.000 to Point/Station 45.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

-----  
Depth of flow = 1.307(Ft.), Average velocity = 7.044(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 3.00  
2 15.00 0.00  
3 30.00 0.00  
4 45.00 3.00  
Manning's 'N' friction factor = 0.040  
-----

Sub-Channel flow = 198.198(CFS)  
' ' flow top width = 28.067(Ft.)  
' ' velocity= 7.044(Ft/s)  
' ' area = 28.138(Sq.Ft)  
' ' Froude number = 1.240

Upstream point elevation = 2131.000(Ft.)  
Downstream point elevation = 2047.000(Ft.)  
Flow length = 2316.000(Ft.)  
Travel time = 5.48 min.  
Time of concentration = 21.13 min.  
Depth of flow = 1.307(Ft.)  
Average velocity = 7.044(Ft/s)  
Total irregular channel flow = 198.198(CFS)  
Irregular channel normal depth above invert elev. = 1.307(Ft.)  
Average velocity of channel(s) = 7.044(Ft/s)

+++++  
Process from Point/Station 44.000 to Point/Station 45.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 86.00  
Adjusted SCS curve number for AMC 1 = 71.60  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.507(In/Hr)  
Time of concentration = 21.13 min.  
Rainfall intensity = 2.720(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.732  
Subarea runoff = 146.510(CFS) for 95.800(Ac.)  
Total runoff = 344.709(CFS)  
Effective area this stream = 173.10(Ac.)  
Total Study Area (Main Stream No. 1) = 173.10(Ac.)  
Area averaged Fm value = 0.507(In/Hr)

+++++  
Process from Point/Station 45.000 to Point/Station 46.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Depth of flow = 1.852(Ft.), Average velocity = 7.671(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 3.00  
2 15.00 0.00  
3 30.00 0.00  
4 45.00 3.00  
Manning's 'N' friction factor = 0.040  
-----

Sub-Channel flow = 344.709(CFS)  
' ' flow top width = 33.523(Ft.)  
' ' velocity= 7.671(Ft/s)  
' ' area = 44.939(Sq.Ft)  
' ' Froude number = 1.168

Upstream point elevation = 2047.000(Ft.)  
Downstream point elevation = 1971.000(Ft.)  
Flow length = 2597.000(Ft.)  
Travel time = 5.64 min.  
Time of concentration = 26.77 min.



Depth of flow = 1.852(Ft.)  
Average velocity = 7.671(Ft/s)  
Total irregular channel flow = 344.709(CFS)  
Irregular channel normal depth above invert elev. = 1.852(Ft.)  
Average velocity of channel(s) = 7.671(Ft/s)

+++++  
Process from Point/Station 45.000 to Point/Station 46.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 67.00  
Adjusted SCS curve number for AMC 1 = 47.40  
Pervious ratio( $A_p$ ) = 1.0000 Max loss rate( $F_m$ ) = 0.840(In/Hr)  
Time of concentration = 26.77 min.  $T_c$   
Rainfall intensity = 2.305(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with modified rational method)( $Q=KCIA$ ) is  $C = 0.647$   
Subarea runoff = 100.614(CFS) for 125.400(Ac.)  
Total runoff = 445.323(CFS)  $Q_{100}$   
Effective area this stream = 298.50(Ac.)  
Total Study Area (Main Stream No. 1) = 298.50(Ac.)  
Area averaged  $F_m$  value = 0.647(In/Hr)  
End of computations, Total Study Area = 298.50 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.  
Note: These figures do not consider reduced effective area  
effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged SCS curve number = 78.0

## ***UNIT HYDROGRAPH CALCULATIONS: 100-YEAR STORM***

# Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 01/26/24

+++++

San Bernardino County Synthetic Unit Hydrology Method  
Manual date - August 1986

Program License Serial Number 5006

-----  
RB RITCHIE BROS - JOB 3625.001  
OFF-SITE TRIBUTARY RUNOFF  
UNIT HYDROGRAPH ANALYSIS  
100-YEAR STORM EVENT - AMC 1  
-----

Storm Event Year = 100

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
1063.30	1	0.74

-----

Rainfall data for year 2		
0.00	6	0.01
0.00	6	0.01
1063.30	6	0.70

-----

Rainfall data for year 2		
1063.30	24	1.00

-----  
Rainfall data for year 100

1063.30                      1                      1.31

-----  
Rainfall data for year 100

1063.30                      6                      1.89

-----  
Rainfall data for year 100

1063.30                      24                      2.71

-----  
+++++

\*\*\*\*\* Area-averaged max loss rate, Fm \*\*\*\*\*

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	68.6	696.30	0.655	0.554	1.000	0.554
70.0	51.0	367.00	0.345	0.797	1.000	0.797

Area-averaged adjusted loss rate Fm (In/Hr) = 0.638

\*\*\*\*\* Area-Averaged low loss rate fraction, Yb \*\*\*\*\*

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
696.30	0.655	84.0	68.6	4.58	0.186
367.00	0.345	70.0	51.0	9.61	0.022

Area-averaged catchment yield fraction, Y = 0.130

Area-averaged low loss fraction, Yb = 0.870

+++++

Watercourse length = 15359.00(Ft.)

Length from concentration point to centroid = 4630.00(Ft.)

Elevation difference along watercourse = 650.00(Ft.)

Mannings friction factor along watercourse = 0.040

Watershed area = 1063.30(Ac.)

Catchment Lag time = 0.490 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 16.9963

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.638(In/Hr)

Average low loss rate fraction (Yb) = 0.870 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.622(In)

Computed peak 30-minute rainfall = 1.064(In)

Specified peak 1-hour rainfall = 1.310(In)

Computed peak 3-hour rainfall = 1.640(In)

Specified peak 6-hour rainfall = 1.890(In)

Specified peak 24-hour rainfall = 2.710(In)

Rainfall depth area reduction factors:

Using a total area of 1063.30(Ac.) (Ref: fig. E-4)

5-minute factor = 0.950	Adjusted rainfall = 0.591(In)
30-minute factor = 0.950	Adjusted rainfall = 1.011(In)
1-hour factor = 0.950	Adjusted rainfall = 1.245(In)
3-hour factor = 0.994	Adjusted rainfall = 1.630(In)
6-hour factor = 0.997	Adjusted rainfall = 1.884(In)
24-hour factor = 0.999	Adjusted rainfall = 2.706(In)

U n i t   H y d r o g r a p h		
+++++		
Interval	'S' Graph	Unit Hydrograph
Number	Mean values	((CFS))
-----		
	(K = 12859.28 (CFS))	
1	0.795	102.285
2	3.473	344.369
3	8.018	584.342
4	16.912	1143.731
5	32.327	1982.262
6	45.773	1729.096
7	55.280	1222.521
8	61.995	863.450
9	67.030	647.560
10	71.186	534.411
11	74.591	437.886
12	77.520	376.643
13	79.944	311.667
14	82.069	273.277
15	83.908	236.423
16	85.591	216.411
17	87.131	198.060
18	88.474	172.750
19	89.566	140.395
20	90.560	127.765
21	91.501	121.008
22	92.340	107.980
23	93.126	101.076
24	93.856	93.816
25	94.458	77.432
26	95.036	74.311
27	95.595	71.913
28	96.052	58.809
29	96.494	56.826

30	96.913	53.865
31	97.231	40.869
32	97.537	39.341
33	97.815	35.759
34	97.994	22.988
35	98.164	21.856
36	98.342	22.922
37	98.544	26.028
38	98.748	26.227
39	98.952	26.227
40	99.156	26.227
41	99.360	26.227
42	99.532	22.057
43	99.640	13.876
44	99.746	13.660
45	99.852	13.660
46	100.000	6.830

-----  
 -----  
 -----  
 Total soil rain loss = 1.79(In)

Total effective rainfall = 0.92(In)

Peak flow rate in flood hydrograph = 1314.55(CFS)

-----  
 ++++++

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

-----  
 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	350.0	700.0	1050.0	1400.0
-----								
0+ 5	0.0002	0.03	Q					
0+10	0.0012	0.14	Q					
0+15	0.0035	0.33	Q					
0+20	0.0083	0.70	Q					
0+25	0.0174	1.33	Q					
0+30	0.0304	1.89	Q					
0+35	0.0462	2.28	Q					
0+40	0.0638	2.57	Q					
0+45	0.0830	2.79	Q					
0+50	0.1035	2.97	Q					
0+55	0.1249	3.12	Q					
1+ 0	0.1473	3.25	Q					
1+ 5	0.1705	3.36	Q					
1+10	0.1943	3.46	Q					
1+15	0.2188	3.55	Q					
1+20	0.2438	3.64	Q					
1+25	0.2694	3.71	Q					

1+30	0.2955	3.78	Q
1+35	0.3220	3.84	Q
1+40	0.3488	3.90	Q
1+45	0.3761	3.96	Q
1+50	0.4037	4.01	Q
1+55	0.4316	4.06	Q
2+ 0	0.4598	4.10	Q
2+ 5	0.4884	4.14	Q
2+10	0.5172	4.19	Q
2+15	0.5463	4.23	Q
2+20	0.5757	4.26	Q
2+25	0.6053	4.30	Q
2+30	0.6352	4.34	Q
2+35	0.6652	4.37	Q
2+40	0.6955	4.40	Q
2+45	0.7260	4.43	Q
2+50	0.7567	4.46	Q
2+55	0.7876	4.48	Q
3+ 0	0.8187	4.51	Q
3+ 5	0.8500	4.54	Q
3+10	0.8814	4.57	Q
3+15	0.9131	4.60	Q
3+20	0.9450	4.63	Q
3+25	0.9770	4.66	Q
3+30	1.0093	4.69	Q
3+35	1.0418	4.71	Q
3+40	1.0744	4.74	Q
3+45	1.1072	4.77	Q
3+50	1.1402	4.79	Q
3+55	1.1734	4.81	Q
4+ 0	1.2067	4.84	Q
4+ 5	1.2402	4.86	Q
4+10	1.2738	4.88	Q
4+15	1.3076	4.91	Q
4+20	1.3416	4.93	Q
4+25	1.3757	4.96	Q
4+30	1.4100	4.98	Q
4+35	1.4445	5.01	Q
4+40	1.4792	5.03	Q
4+45	1.5140	5.06	Q
4+50	1.5490	5.08	Q
4+55	1.5842	5.11	Q
5+ 0	1.6196	5.14	Q
5+ 5	1.6552	5.16	Q
5+10	1.6909	5.19	Q
5+15	1.7269	5.22	Q
5+20	1.7630	5.25	Q
5+25	1.7994	5.28	Q
5+30	1.8359	5.31	Q
5+35	1.8727	5.33	Q

5+40	1.9096	5.36	Q
5+45	1.9468	5.39	Q
5+50	1.9841	5.42	Q
5+55	2.0217	5.46	Q
6+ 0	2.0595	5.49	QV
6+ 5	2.0975	5.52	QV
6+10	2.1357	5.55	QV
6+15	2.1742	5.58	QV
6+20	2.2128	5.62	QV
6+25	2.2518	5.65	QV
6+30	2.2909	5.68	QV
6+35	2.3303	5.72	QV
6+40	2.3699	5.75	QV
6+45	2.4098	5.79	QV
6+50	2.4499	5.82	QV
6+55	2.4902	5.86	QV
7+ 0	2.5309	5.90	QV
7+ 5	2.5717	5.94	QV
7+10	2.6129	5.97	QV
7+15	2.6543	6.01	QV
7+20	2.6960	6.05	QV
7+25	2.7379	6.09	QV
7+30	2.7802	6.13	QV
7+35	2.8227	6.17	QV
7+40	2.8655	6.22	QV
7+45	2.9086	6.26	QV
7+50	2.9520	6.30	QV
7+55	2.9957	6.35	QV
8+ 0	3.0397	6.39	QV
8+ 5	3.0840	6.44	QV
8+10	3.1286	6.48	QV
8+15	3.1736	6.53	QV
8+20	3.2189	6.58	QV
8+25	3.2645	6.62	QV
8+30	3.3105	6.67	QV
8+35	3.3568	6.72	QV
8+40	3.4035	6.78	QV
8+45	3.4505	6.83	QV
8+50	3.4979	6.88	QV
8+55	3.5456	6.94	QV
9+ 0	3.5938	6.99	QV
9+ 5	3.6423	7.05	QV
9+10	3.6913	7.10	QV
9+15	3.7406	7.16	QV
9+20	3.7903	7.22	QV
9+25	3.8405	7.28	QV
9+30	3.8911	7.35	QV
9+35	3.9421	7.41	QV
9+40	3.9936	7.47	QV
9+45	4.0455	7.54	QV



9+50	4.0979	7.61	Q V
9+55	4.1507	7.68	Q V
10+ 0	4.2041	7.75	Q V
10+ 5	4.2579	7.82	Q V
10+10	4.3123	7.89	Q V
10+15	4.3671	7.97	Q V
10+20	4.4225	8.04	Q V
10+25	4.4785	8.12	Q V
10+30	4.5350	8.20	Q V
10+35	4.5920	8.28	Q V
10+40	4.6496	8.37	Q V
10+45	4.7079	8.45	Q V
10+50	4.7667	8.54	Q V
10+55	4.8262	8.63	Q V
11+ 0	4.8863	8.73	Q V
11+ 5	4.9470	8.82	Q V
11+10	5.0085	8.92	Q V
11+15	5.0706	9.02	Q V
11+20	5.1334	9.12	Q V
11+25	5.1970	9.23	Q V
11+30	5.2613	9.34	Q V
11+35	5.3264	9.45	Q V
11+40	5.3923	9.57	Q V
11+45	5.4590	9.69	Q V
11+50	5.5266	9.81	Q V
11+55	5.5950	9.94	Q V
12+ 0	5.6643	10.07	Q V
12+ 5	5.7345	10.18	Q V
12+10	5.8051	10.26	Q V
12+15	5.8760	10.30	Q V
12+20	5.9465	10.24	Q V
12+25	6.0156	10.03	Q V
12+30	6.0836	9.87	Q V
12+35	6.1512	9.81	Q V
12+40	6.2187	9.81	Q V
12+45	6.2866	9.85	Q V
12+50	6.3549	9.92	Q V
12+55	6.4239	10.01	Q V
13+ 0	6.4936	10.12	Q V
13+ 5	6.5642	10.25	Q V
13+10	6.6357	10.39	Q V
13+15	6.7083	10.54	Q V
13+20	6.7821	10.71	Q V
13+25	6.8571	10.89	Q V
13+30	6.9334	11.08	Q V
13+35	7.0112	11.29	Q V
13+40	7.0905	11.52	Q V
13+45	7.1714	11.75	Q V
13+50	7.2541	12.01	Q V
13+55	7.3387	12.28	Q V

14+ 0	7.4252	12.57	Q	V					
14+ 5	7.5140	12.90	Q	V					
14+10	7.6056	13.30	Q	V					
14+15	7.7006	13.78	Q	V					
14+20	7.7998	14.41	Q	V					
14+25	7.9048	15.25	Q	V					
14+30	8.0156	16.08	Q	V					
14+35	8.1316	16.85	Q	V					
14+40	8.2528	17.58	Q	V					
14+45	8.3790	18.33	Q	V					
14+50	8.5105	19.10	Q	V					
14+55	8.6478	19.92	Q	V					
15+ 0	8.7910	20.80	Q	V					
15+ 5	8.9408	21.75	Q	V					
15+10	9.0977	22.78	Q	V					
15+15	9.2626	23.94	Q	V					
15+20	9.4363	25.22	Q	V					
15+25	9.6205	26.76	Q	V					
15+30	9.8181	28.68	Q	V					
15+35	10.0322	31.09	Q	V					
15+40	10.2683	34.29	Q	V					
15+45	10.5349	38.71	Q	V					
15+50	10.8369	43.84	Q	V					
15+55	11.2023	53.06	Q	V					
16+ 0	11.7197	75.13	Q	V					
16+ 5	12.8416	162.90	Q	V					
16+10	15.1578	336.32		V	Q				
16+15	18.8847	541.14		V	Q				
16+20	25.0696	898.06		V		Q			
16+25	34.1230	1314.55		V				Q	
16+30	41.9755	1140.18		V				Q	
16+35	47.6936	830.26			Q				
16+40	51.8755	607.22			Q				
16+45	55.1089	469.49			Q				
16+50	57.8035	391.25			Q				
16+55	60.0543	326.81			Q				
17+ 0	62.0014	282.73			Q				
17+ 5	63.6531	239.82			Q				
17+10	65.1133	212.02			Q				
17+15	66.4015	187.04			Q				
17+20	67.5797	171.08			Q				
17+25	68.6512	155.59			Q				
17+30	69.5937	136.85			Q				
17+35	70.3944	116.25			Q				
17+40	71.1278	106.49			Q				
17+45	71.8166	100.02			Q				
17+50	72.4427	90.91			Q				
17+55	73.0267	84.79			Q				
18+ 0	73.5666	78.40			Q				
18+ 5	74.0369	68.29			Q				

18+10	74.4840	64.91	Q				V
18+15	74.9094	61.76	Q				V
18+20	75.2806	53.90	Q				V
18+25	75.6360	51.61	Q				V
18+30	75.9705	48.56	Q				V
18+35	76.2524	40.93	Q				V
18+40	76.5195	38.78	Q				V
18+45	76.7634	35.41	Q				V
18+50	76.9571	28.13	Q				V
18+55	77.1440	27.14	Q				V
19+ 0	77.3338	27.56	Q				V
19+ 5	77.5328	28.89	Q				V
19+10	77.7305	28.71	Q				V
19+15	77.9259	28.37	Q				V
19+20	78.1179	27.88	Q				V
19+25	78.3036	26.95	Q				V
19+30	78.4673	23.77	Q				V
19+35	78.5982	19.01	Q				V
19+40	78.7237	18.21	Q				V
19+45	78.8418	17.15	Q				V
19+50	78.9294	12.73	Q				V
19+55	78.9897	8.75	Q				V
20+ 0	79.0477	8.42	Q				V
20+ 5	79.1042	8.20	Q				V
20+10	79.1593	8.01	Q				V
20+15	79.2134	7.84	Q				V
20+20	79.2663	7.68	Q				V
20+25	79.3182	7.54	Q				V
20+30	79.3691	7.40	Q				V
20+35	79.4191	7.26	Q				V
20+40	79.4683	7.14	Q				V
20+45	79.5166	7.02	Q				V
20+50	79.5642	6.90	Q				V
20+55	79.6110	6.80	Q				V
21+ 0	79.6571	6.69	Q				V
21+ 5	79.7025	6.59	Q				V
21+10	79.7472	6.50	Q				V
21+15	79.7913	6.41	Q				V
21+20	79.8349	6.32	Q				V
21+25	79.8778	6.23	Q				V
21+30	79.9201	6.15	Q				V
21+35	79.9620	6.07	Q				V
21+40	80.0032	5.99	Q				V
21+45	80.0439	5.92	Q				V
21+50	80.0842	5.84	Q				V
21+55	80.1239	5.77	Q				V
22+ 0	80.1631	5.70	Q				V
22+ 5	80.2019	5.63	Q				V
22+10	80.2402	5.56	Q				V
22+15	80.2780	5.49	Q				V

22+20	80.3154	5.43	Q				V
22+25	80.3524	5.37	Q				V
22+30	80.3889	5.31	Q				V
22+35	80.4251	5.25	Q				V
22+40	80.4609	5.19	Q				V
22+45	80.4963	5.14	Q				V
22+50	80.5313	5.08	Q				V
22+55	80.5659	5.03	Q				V
23+ 0	80.6002	4.98	Q				V
23+ 5	80.6342	4.93	Q				V
23+10	80.6678	4.88	Q				V
23+15	80.7011	4.83	Q				V
23+20	80.7341	4.79	Q				V
23+25	80.7667	4.74	Q				V
23+30	80.7991	4.70	Q				V
23+35	80.8311	4.65	Q				V
23+40	80.8629	4.61	Q				V
23+45	80.8943	4.57	Q				V
23+50	80.9255	4.53	Q				V
23+55	80.9564	4.49	Q				V
24+ 0	80.9871	4.45	Q				V
24+ 5	81.0172	4.38	Q				V
24+10	81.0464	4.23	Q				V
24+15	81.0740	4.01	Q				V
24+20	81.0989	3.61	Q				V
24+25	81.1192	2.95	Q				V
24+30	81.1355	2.38	Q				V
24+35	81.1491	1.97	Q				V
24+40	81.1606	1.68	Q				V
24+45	81.1706	1.45	Q				V
24+50	81.1794	1.27	Q				V
24+55	81.1871	1.12	Q				V
25+ 0	81.1940	0.99	Q				V
25+ 5	81.2001	0.88	Q				V
25+10	81.2055	0.79	Q				V
25+15	81.2104	0.71	Q				V
25+20	81.2148	0.63	Q				V
25+25	81.2187	0.57	Q				V
25+30	81.2221	0.51	Q				V
25+35	81.2253	0.46	Q				V
25+40	81.2281	0.41	Q				V
25+45	81.2307	0.37	Q				V
25+50	81.2329	0.33	Q				V
25+55	81.2350	0.30	Q				V
26+ 0	81.2368	0.26	Q				V
26+ 5	81.2385	0.24	Q				V
26+10	81.2399	0.21	Q				V
26+15	81.2412	0.19	Q				V
26+20	81.2424	0.17	Q				V
26+25	81.2434	0.15	Q				V

26+30	81.2443	0.13	Q				V
26+35	81.2451	0.12	Q				V
26+40	81.2458	0.10	Q				V
26+45	81.2464	0.09	Q				V
26+50	81.2470	0.08	Q				V
26+55	81.2475	0.07	Q				V
27+ 0	81.2479	0.07	Q				V
27+ 5	81.2483	0.06	Q				V
27+10	81.2487	0.05	Q				V
27+15	81.2489	0.04	Q				V
27+20	81.2492	0.03	Q				V
27+25	81.2493	0.02	Q				V
27+30	81.2494	0.02	Q				V
27+35	81.2495	0.01	Q				V
27+40	81.2495	0.01	Q				V
27+45	81.2496	0.00	Q				V

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**RB RITCHIE BROS**  
**OFF-SITE FLOOD PLAIN FLOW @ S=0.011**  
**FLOOD PLAIN FLOW**  
**OFF-SITE FLOOD PLAIN Q100 = 1,315 CFS**

Channel

d	0.26
m (left side)	10
m (right side)	10
b	2744
A	722.36369
Rn	0.2627459

n	0.035	Natural Earth
S	0.011	
V	1.83	
Q	1319.55	
desired Q	1,315.0	
delta	4.55	

**d = 0.26**

**v = 1.83 F/S**

**m = 10 (left)**

**m = 10 (right)**

**b = 2744**

**A = 722.4**

**n = 0.035**

**s = 0.011**

d

v

m

m

b

A

n

S

Flow depth

Velocity (feet per second)

Side slope (run) as in rise over run w/ rise =1  
if side is vertical enter a zero for m

base width

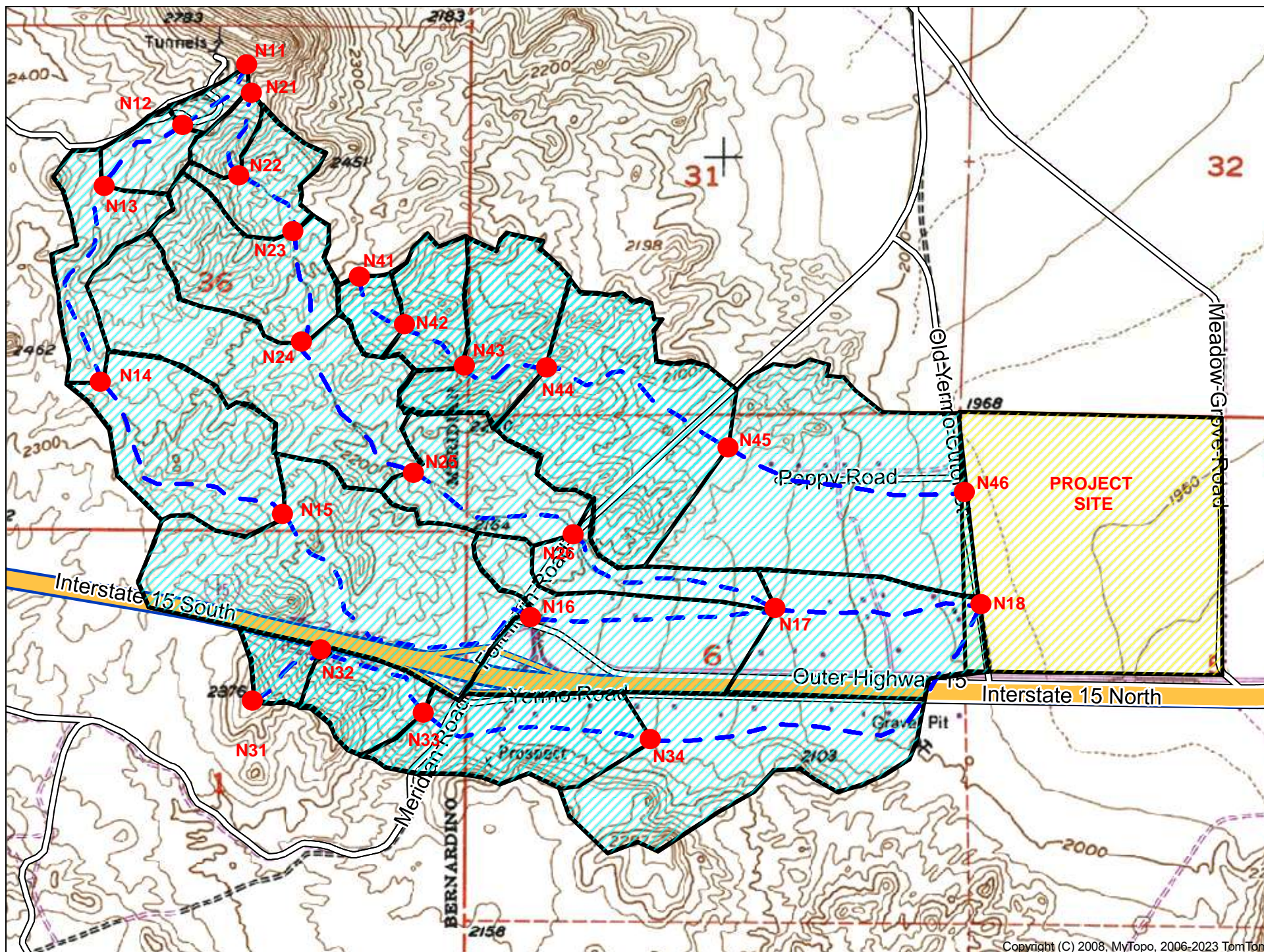
Cross sectional area

manning coef.

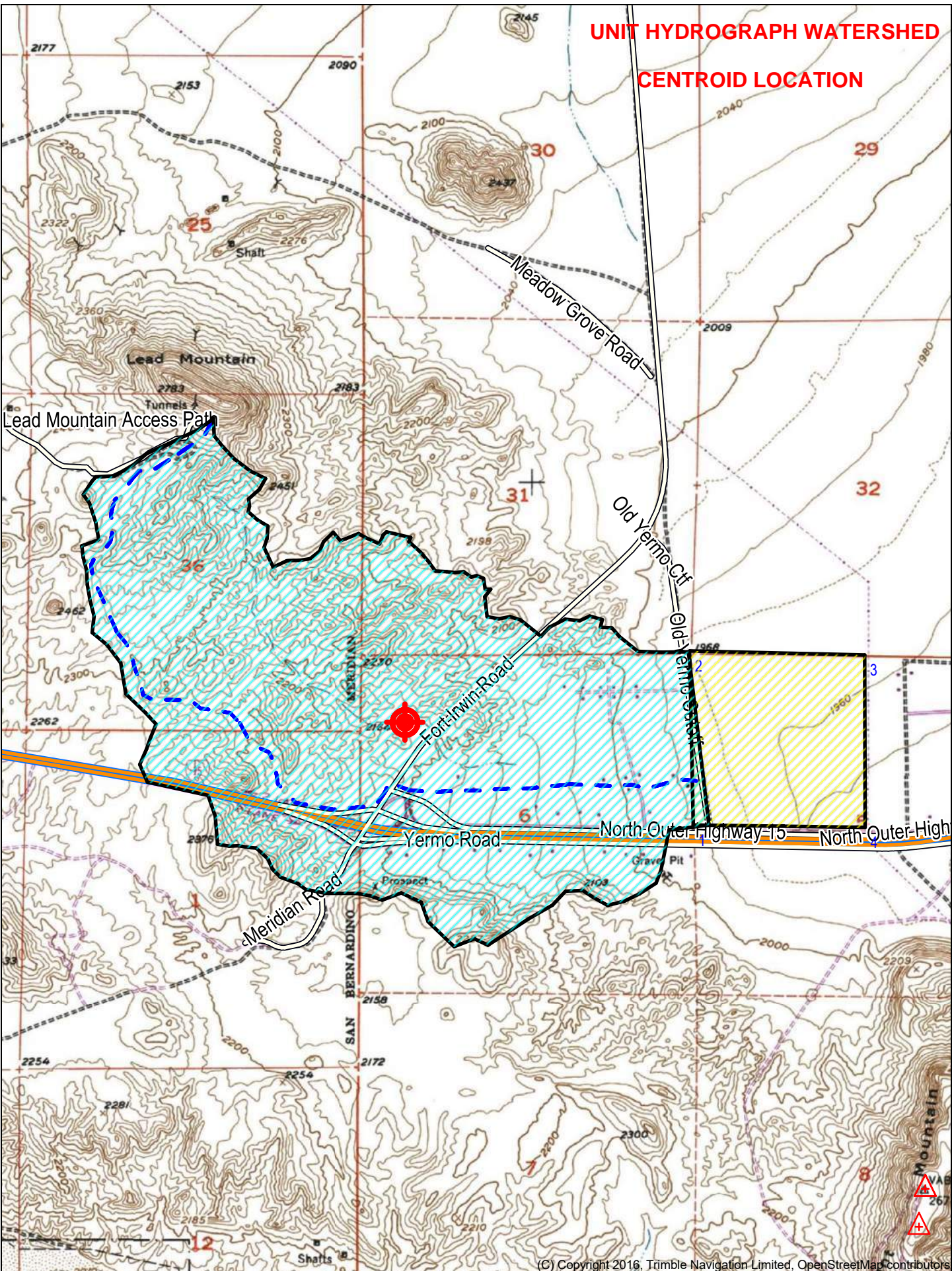
Channel Slope

## ***TRIBUTARY DRAINAGE MAP***



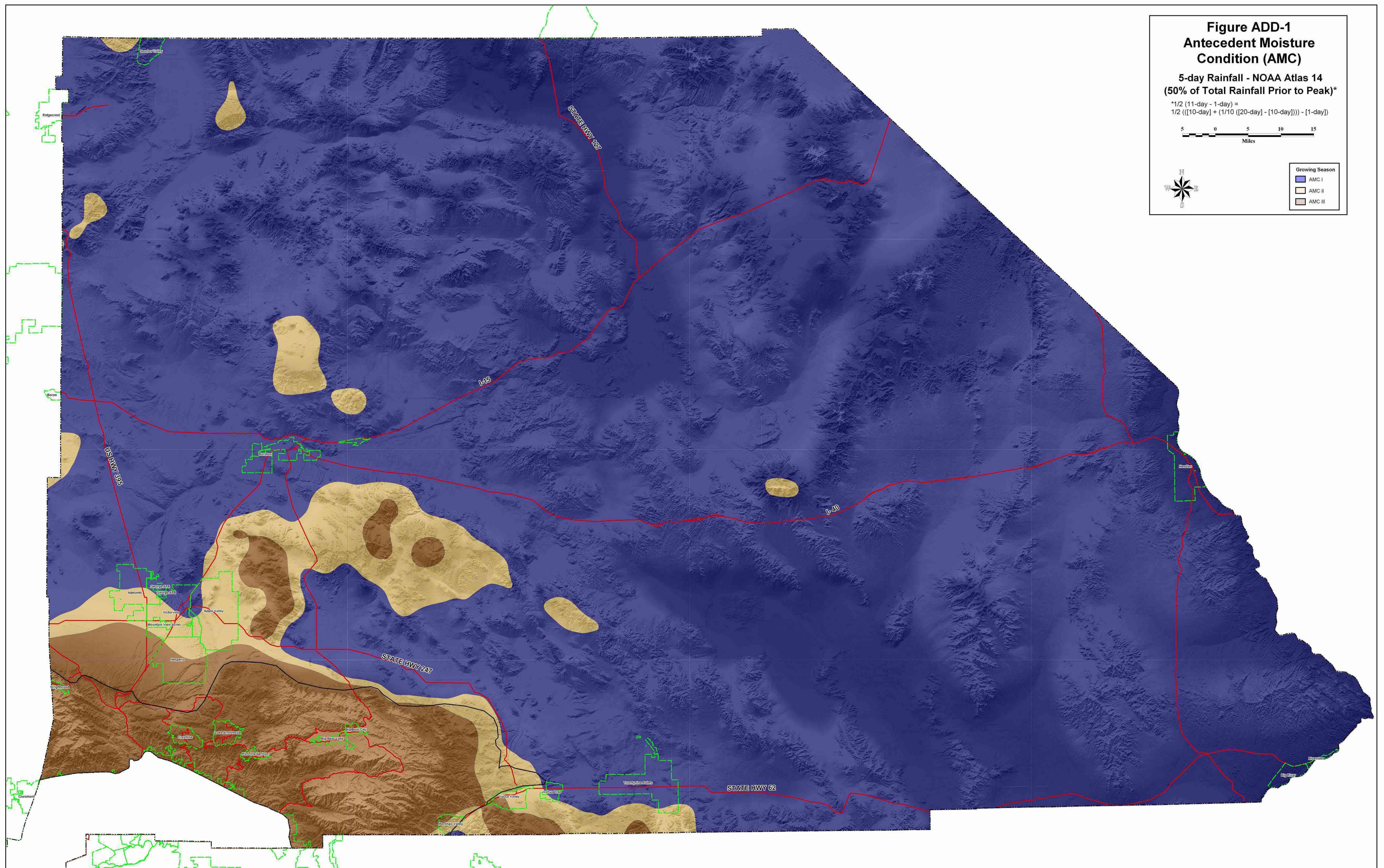






***2010 ANTECEDENT MOISTURE CONDITION (AMC) MAP***







# RB Ritchie Bros

Antecedent Moisture Condition I

## Legend

 3625.001 Site

Fort Irwin Rd

Poppy Rd

Yermo Cutoff

Old Yermo Cutoff

**PROJECT  
SITE**

Outer Hwy 15 N

Mojave Fwy

Outer Hwy 15 N

Google Earth



2000 ft

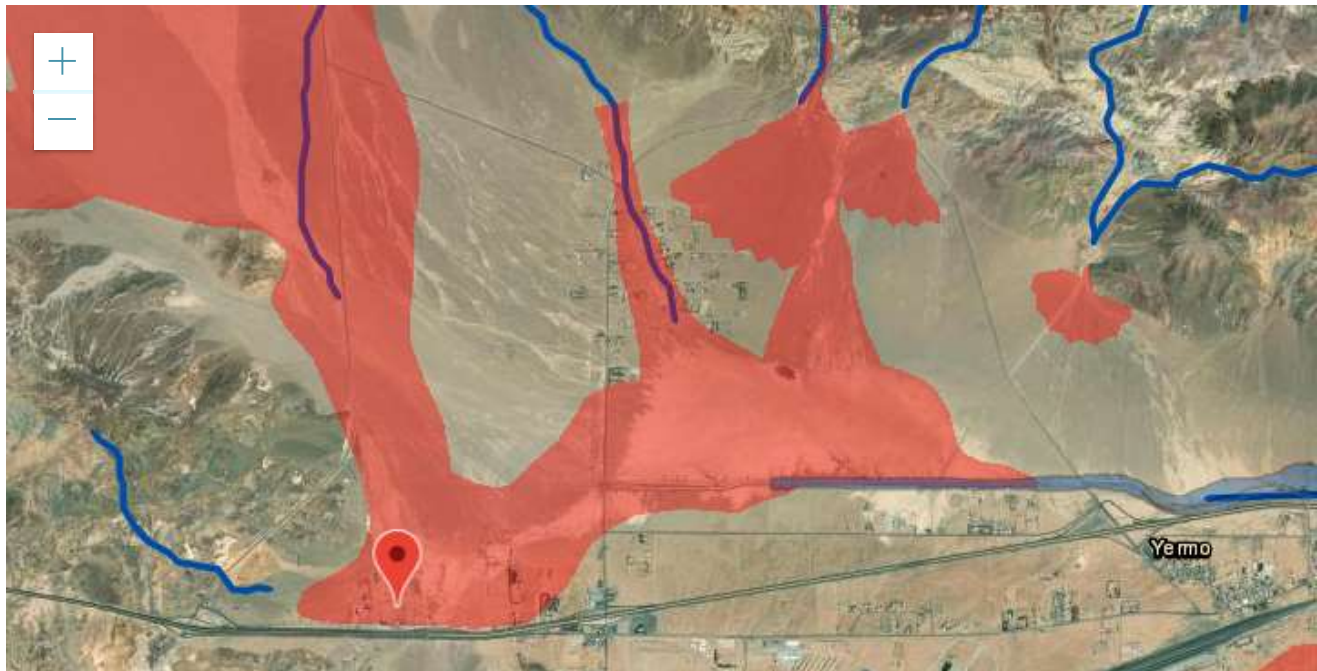




# CALIFORNIA DEPARTMENT OF WATER RESOURCES

## Floodplain Information

Latitude: 34.92334, Longitude: -116.90973



Earthstar Geographics | Esri, HERE, Garmin

Powered by Esri

County: San Bernardino (34.92334, -116.90973)

Floodplain Layer	100-YR	200-YR	500-YR
FEMA Effective	N ✓	N/A	N
DWR Awareness	Y ✓	N/A	N/A
Regional/Special Studies	N ✓	N/A	N
USACE Comp. Study	N ✓	N	N

Y: The location is within the floodplain  
N: The location is not within the floodplain  
N/A: Data not available  
✓ = Active Layer(s)

Floodplains are displayed using semi transparent colors. When viewing overlapping floodplains, the combination of multiple semi transparent colors will not match the legend colors. For accurate color representation, view floodplains individually.

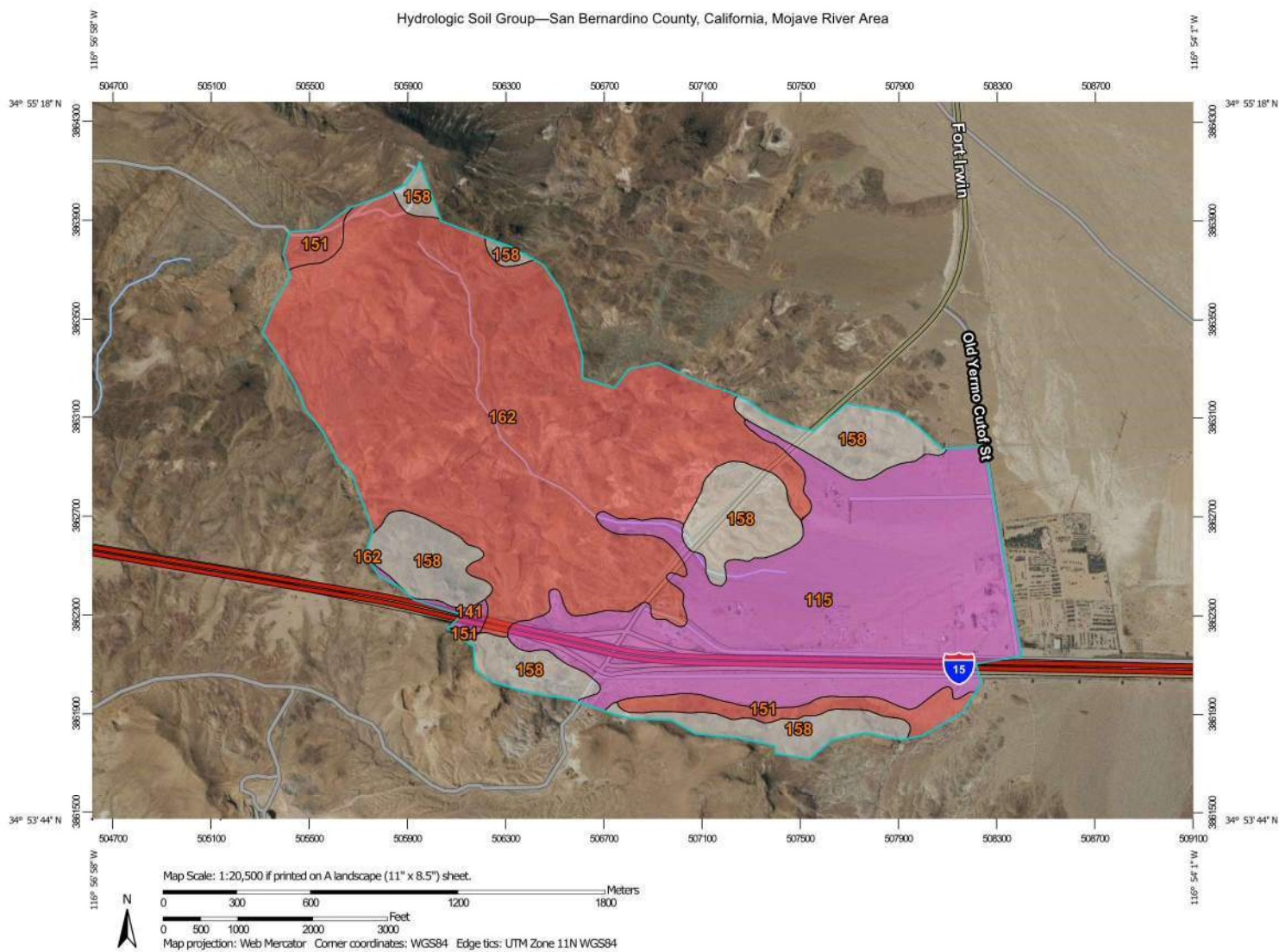


## ***EXHIBITS***

## ***SOILS MAP***




# Hydrologic Soil Group—San Bernardino County, California, Mojave River Area



## 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 1:24,000.

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: San Bernardino County, California, Mojave River Area  
Survey Area Data: Version 14, Sep 1, 2022

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

Date(s) aerial images were photographed: Feb 27, 2021—May 27, 2021

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.



## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
115	CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES	A	317.6	32.1%
141	LOVELACE LOAMY SAND, 5 TO 9 PERCENT SLOPES	A	4.5	0.4%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	33.4	3.4%
158	ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*		155.3	15.7%
162	SPARKHULE-ROCK OUTCROP COMPLEX, 15 TO 50 PERCENT SLOPES*	D	480.0	48.4%
<b>Totals for Area of Interest</b>			<b>990.8</b>	<b>100.0%</b>

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

## ***NOAA ATLAS 14 POINT RAINFALLS***



## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.082 (0.067-0.101)	0.123 (0.101-0.152)	0.179 (0.146-0.222)	0.226 (0.183-0.282)	0.292 (0.229-0.376)	0.345 (0.265-0.454)	0.401 (0.301-0.539)	0.460 (0.337-0.636)	0.544 (0.383-0.782)	0.612 (0.416-0.909)
10-min	0.118 (0.096-0.145)	0.176 (0.144-0.218)	0.256 (0.209-0.318)	0.324 (0.262-0.404)	0.419 (0.328-0.540)	0.495 (0.380-0.650)	0.575 (0.432-0.773)	0.660 (0.482-0.911)	0.780 (0.548-1.12)	0.877 (0.597-1.30)
15-min	0.142 (0.116-0.176)	0.213 (0.174-0.264)	0.310 (0.253-0.384)	0.391 (0.317-0.489)	0.506 (0.397-0.653)	0.598 (0.460-0.786)	0.695 (0.522-0.935)	0.798 (0.583-1.10)	0.943 (0.663-1.36)	1.06 (0.722-1.58)
30-min	0.198 (0.162-0.245)	0.298 (0.243-0.368)	0.432 (0.353-0.536)	0.546 (0.442-0.682)	0.707 (0.554-0.910)	0.835 (0.642-1.10)	0.969 (0.728-1.30)	1.11 (0.814-1.54)	1.32 (0.925-1.89)	1.48 (1.01-2.20)
60-min	0.267 (0.219-0.330)	0.401 (0.328-0.496)	0.583 (0.475-0.722)	0.736 (0.595-0.919)	0.952 (0.746-1.23)	1.12 (0.864-1.48)	1.31 (0.981-1.76)	1.50 (1.10-2.07)	1.77 (1.25-2.55)	1.99 (1.36-2.96)
2-hr	0.363 (0.297-0.448)	0.509 (0.416-0.629)	0.707 (0.576-0.876)	0.873 (0.706-1.09)	1.11 (0.868-1.43)	1.29 (0.993-1.70)	1.49 (1.12-2.00)	1.69 (1.24-2.34)	1.98 (1.40-2.85)	2.22 (1.51-3.29)
3-hr	0.426 (0.349-0.526)	0.584 (0.478-0.722)	0.798 (0.651-0.989)	0.978 (0.791-1.22)	1.23 (0.964-1.59)	1.43 (1.10-1.88)	1.64 (1.23-2.20)	1.86 (1.36-2.57)	2.17 (1.52-3.12)	2.42 (1.64-3.59)
6-hr	0.524 (0.429-0.647)	0.705 (0.576-0.871)	0.948 (0.773-1.17)	1.15 (0.931-1.44)	1.44 (1.13-1.85)	1.66 (1.27-2.18)	1.89 (1.42-2.55)	2.14 (1.56-2.95)	2.48 (1.74-3.56)	2.75 (1.87-4.09)
12-hr	0.599 (0.490-0.739)	0.806 (0.659-0.996)	1.08 (0.884-1.34)	1.32 (1.06-1.64)	1.64 (1.28-2.11)	1.89 (1.45-2.49)	2.15 (1.62-2.90)	2.43 (1.78-3.36)	2.81 (1.98-4.04)	3.12 (2.12-4.63)
24-hr	0.736 (0.653-0.847)	1.00 (0.890-1.16)	1.36 (1.20-1.57)	1.66 (1.45-1.93)	2.06 (1.75-2.48)	2.38 (1.98-2.93)	2.71 (2.19-3.41)	3.05 (2.40-3.95)	3.52 (2.66-4.75)	3.89 (2.84-5.43)
2-day	0.845 (0.750-0.972)	1.16 (1.03-1.33)	1.57 (1.39-1.82)	1.92 (1.68-2.23)	2.38 (2.02-2.87)	2.75 (2.28-3.38)	3.12 (2.53-3.93)	3.51 (2.77-4.54)	4.04 (3.06-5.46)	4.46 (3.26-6.23)
3-day	0.902 (0.801-1.04)	1.24 (1.10-1.43)	1.69 (1.49-1.95)	2.05 (1.80-2.39)	2.55 (2.16-3.07)	2.93 (2.44-3.61)	3.33 (2.70-4.19)	3.74 (2.94-4.84)	4.29 (3.25-5.80)	4.73 (3.46-6.61)
4-day	0.936 (0.831-1.08)	1.29 (1.14-1.49)	1.75 (1.55-2.02)	2.13 (1.87-2.48)	2.64 (2.24-3.17)	3.03 (2.52-3.72)	3.43 (2.78-4.31)	3.84 (3.02-4.97)	4.39 (3.32-5.93)	4.82 (3.52-6.74)
7-day	1.01 (0.895-1.16)	1.39 (1.23-1.60)	1.88 (1.66-2.17)	2.27 (1.99-2.64)	2.79 (2.36-3.35)	3.17 (2.64-3.90)	3.56 (2.89-4.49)	3.96 (3.12-5.12)	4.48 (3.39-6.05)	4.88 (3.56-6.81)
10-day	1.08 (0.960-1.24)	1.49 (1.32-1.72)	2.01 (1.78-2.32)	2.42 (2.13-2.82)	2.96 (2.51-3.56)	3.36 (2.79-4.13)	3.76 (3.05-4.73)	4.15 (3.27-5.38)	4.67 (3.53-6.31)	5.07 (3.70-7.08)
20-day	1.26 (1.12-1.45)	1.76 (1.56-2.02)	2.38 (2.10-2.75)	2.87 (2.51-3.34)	3.50 (2.97-4.22)	3.97 (3.30-4.88)	4.43 (3.59-5.58)	4.89 (3.85-6.33)	5.48 (4.15-7.40)	5.93 (4.33-8.28)
30-day	1.42 (1.26-1.63)	1.99 (1.77-2.29)	2.72 (2.40-3.14)	3.29 (2.88-3.82)	4.03 (3.42-4.85)	4.58 (3.81-5.63)	5.13 (4.16-6.46)	5.67 (4.47-7.35)	6.39 (4.83-8.62)	6.92 (5.06-9.67)
45-day	1.60 (1.42-1.85)	2.27 (2.01-2.61)	3.12 (2.75-3.60)	3.79 (3.32-4.41)	4.68 (3.97-5.63)	5.35 (4.44-6.58)	6.02 (4.88-7.58)	6.69 (5.27-8.66)	7.58 (5.73-10.2)	8.26 (6.03-11.5)
60-day	1.76 (1.56-2.02)	2.49 (2.21-2.87)	3.44 (3.04-3.97)	4.20 (3.68-4.89)	5.22 (4.43-6.28)	6.00 (4.98-7.37)	6.78 (5.49-8.54)	7.58 (5.97-9.81)	8.65 (6.54-11.7)	9.47 (6.92-13.2)

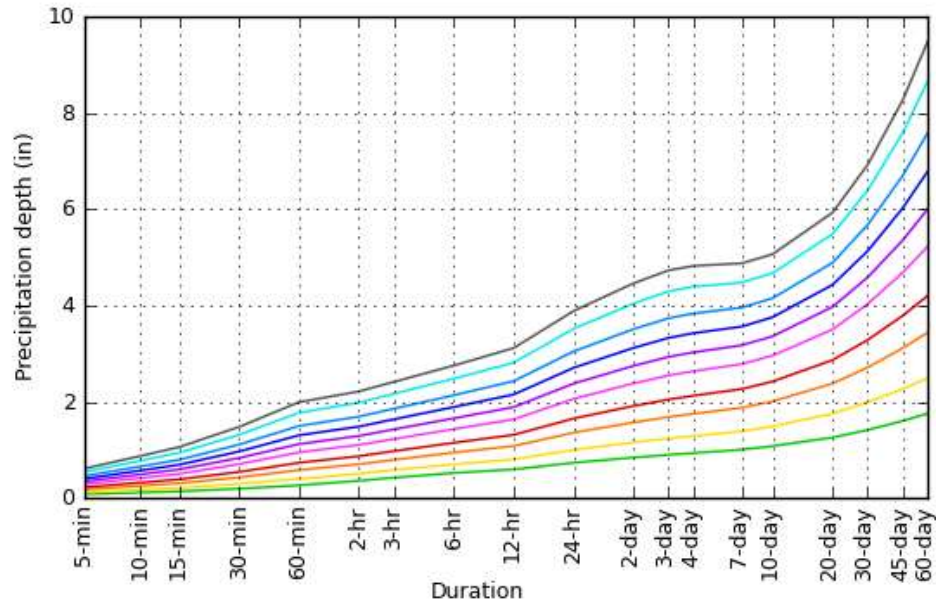
<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).  
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.  
Please refer to NOAA Atlas 14 document for more information.

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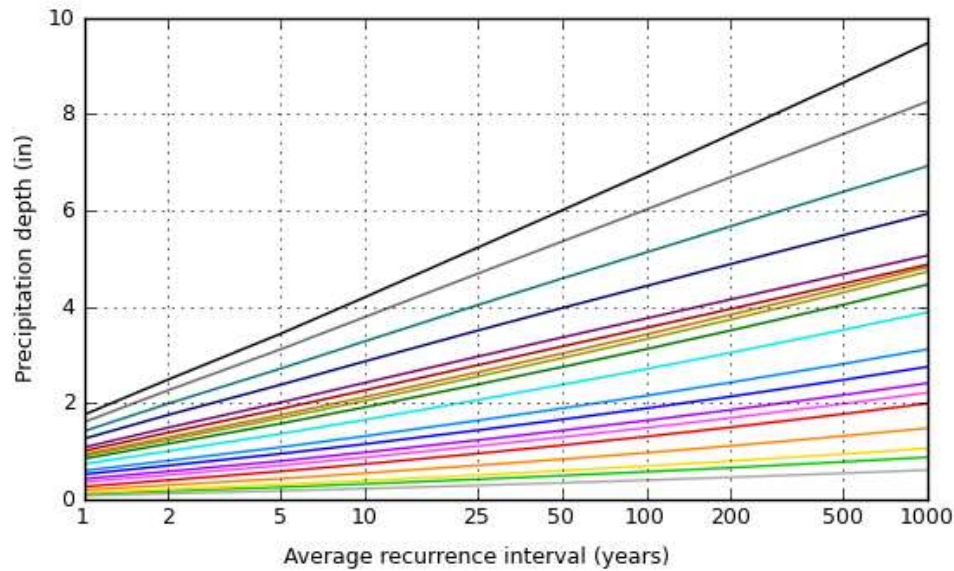
PF graphical



PDS-based depth-duration-frequency (DDF) curves  
Latitude: 34.9062°, Longitude: -116.9270°



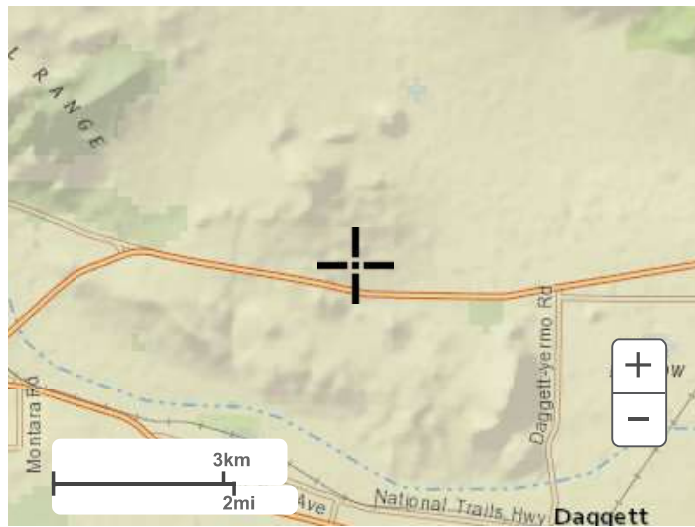
Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

## Maps & aerials

Small scale terrain



Large scale terrain

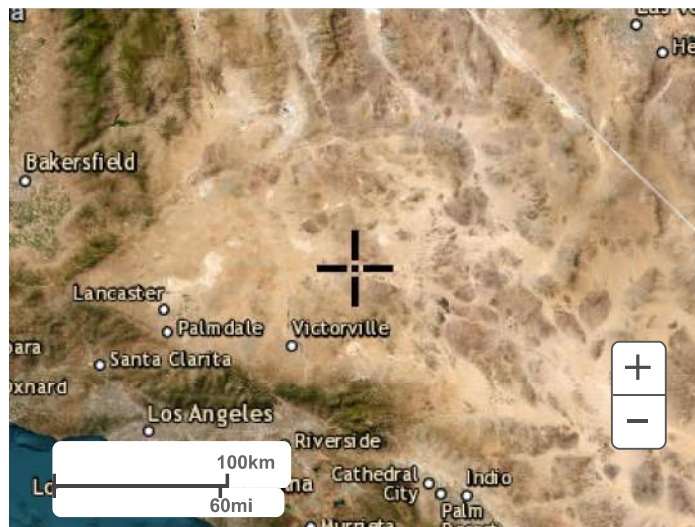


Large scale map



Large scale aerial





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