HYDROLOGY STUDY

For

LYNX CAT MOUNAIN QUARRY OPERATIONS, LLC.

QUALITY ROCK PRODUCTS

HINKLEY, CA

October 25, 2024

Prepared by:

Merrell-Johnson Companies

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

Job No. 3104

E. Cary Packer, PE
Associate Engineer
R.C.E. 51752 Exp. 06/30/26

Mark D. Rowan
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 from the watershed tributary to the proposed expanded project site as delineated on the map contained in this study. This study also examines measures to intercept the runoff flows and to convey them through the project site to their historical flow locations. The development of the site is an expansion of the existing rock products mining operation.

PROJECT LOCATION

The project site is located southeast of Harper Dry Lake approximately four miles northwest of Hinkley and 13 miles west of Barstow, California in the unincorporated area of Hinkley in northwesterly San Bernardino County. The project site is highlighted on the attached vicinity map. Lynx Cat Mountain Quarry Mine I.D. # 91-36-0049, APN: 0496-011-75 and 0496-011-76, Section 1, Township 10 North, Range 4 West, (T10N, R4W) as indicated on the Hinkley, California 7.5' U.S.G.S. Quadrangle Topographical Map

METHODOLOGY

The method in determining these peak runoff flows was the rational method and the unit hydrograph method as specified in the 1986 San Bernardino County Hydrology Manual and the 2010 San Bernardino County Hydrology Manual Addendum for Arid Regions. The existing offsite flow was examined and delineated from U.S.G.S. Maps: Twelve Gage Lake and Hinkley and an examination of the project site.

Point rainfalls for the 100-year storms were obtained from the NOAA Atlas 14 per the 2010 Addendum to the County Hydrology Manual. The original hydrology analysis of the project, performed in 2009 incorporated a point rainfall of 1.2” and AMC II. Per the aforementioned 2010 addendum, the off-site unit hydrograph analysis was performed using a 100-year 1-hour point rainfall of 1.11” and AMC II. The soil type was determined to be Soil Type C in the off-site tributaries per the county hydrology manual. Rainfall and soils maps are included as exhibits in Section 3 of this report.

The parameters of the off-site tributary sub-areas examined in this study are shown

Table A

Sub-area	Elevation Difference (ft.)	Length (ft)	Area (Acres)	Avg. Slope (ft/ft)
Stream 1	345	1,841	61.9	0.1874
Stream 2	262	1,359	12.3	0.1928
Stream 3	7765	45,027	9,854	0.0172

EXISTING CONDITIONS

The project site is located south of Harper Dry Lake in an unincorporated area of San Bernardino County. The tributary watershed area to Parcel 1 is generally sloping at approximately 1.5% from south to north towards the dry lakebed. The tributary watershed areas to Parcel 2 are generally sloping at approximately 20% from the southeast towards the northwest and confluence as they approach the project site and the dry lake. Existing vegetation on the site consists of desert brush and vegetation in sandy surface soils.

There is evidence of minor runoff in the form of sheet flows across the project site. There is also some minor evidence of scour, within the tributary area, from larger storm events that generally follows the existing swales as indicated on the enclosed mapping. The 100-year flood plain has not been established for Harper Dry Lake.

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

Table B

Sub-Area	Q_{100} (cfs)
Stream 1	194
Stream 2	41
Off-site Unit Hydrograph	3,345

CONCLUSIONS AND RECOMMENDATIONS

During our field investigation of the site, we observed the existing conditions as stated previously. The calculated 100-year storm runoff flows enter the site along the southern and eastern boundaries of the project as indicated on the attached exhibits.

The existing drainage flows ae captured as they enter the project along the project boundaries. This storm runoff flows into the excavated quarry and is captured for infiltration. Excess runoff is recycled and used in the crushing process and for on-site dust control. The locations of mining equipment within the quarry are situated to allow separation from storm water storage areas. It's anticipated that captured storm water runoff will not leave the project site.

The blue line stream which crosses the southern project boundary at Node 33, isn't defined nor mapped north of that location. The flow spreads at this location due to the existing terrain. It's proposed to construct a drainage levee along the western, downstream side of this flow path to direct runoff flows into the quarry area. This runoff will supplement the captured runoff from Streams 1 and 2 and be infiltrated and used in the mining and dust control processes.

August 21, 2015

Joe Mathewson
MATCON CORPORATION
1807 Toyon Lane
Newport Beach, CA 92660

Facility Info: Lynx Cat Quarry, Hinkley, CA

SIC Code(s):

Waste Discharge Identification Number: **6B36NNA000059**

Date Processed: August 16, 2015

RECEIPT OF YOUR NOTICE OF INTENT (NOI)

The State Water Resources Control Board (State Water Board) received and processed the NOI to comply with the terms of the General Permit for Storm Water Discharges Associated with Industrial Activity Order 2014-0057-DWQ.

Waste Discharger Identification (WDID) number **6B36NNA000059** is assigned to the facility referenced above.

Accordingly, you are required to comply with all applicable permit requirements.

Notice of Termination (NOT) is required to be submitted to the State Water Board should the owner or operator of the facility change or upon closure of the facility. Until an NOT is submitted you will continue and are responsible to pay the annual fee invoiced each .

If you have any further questions, please contact your local Regional Water Board at 760-241-6583.

Please visit the storm water web page at www.waterboards.ca.gov/water_issues/programs/stormwater/industrial.shtml for storm water related information.

Sincerely,
Storm Water Program
Division of Water Quality

CALIFORNIA Water Boards

State Water Resources Control Board

NOTICE OF NON-APPLICABILITY

GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH INDUSTRIAL ACTIVITY (WQ ORDER No. 2014-0057-DWQ)
(Excluding Construction Activities)

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

NONA ID: 6B36NNA000059 Status: Active

Operator Information

Type: Private Business

Name: MATCON CORPORATION
Address: 1807 Toyon Lane
Address 2:
City/State/Zip: Newport Beach CA 92660
Contact Name: Joe Mathewson
Title: President
Phone Number: 949-500-0767
Email Address: matconcorp@yahoo.com

Facility Information

Contact Name: Joe Mathewson
Title: President
Site Name: Lynx Cat Quarry
Address: APN 0496-011-75:E 1/2 S/E1/4 SECTION 1, T10N R4W, S.B.B.M. APN O496-011--75: SOUTH 48.2 ACRES M/L,
City/State/Zip: Hinkley CA 92347
Site Phone #: 949-500-0767
County: San Bernardino
Email Address: matconcorp@yahoo.com
Latitude: 34.980454 Longitude: -117.246337
Site Size: 48.2 Acres

SIC Code Information

1. 1423 Crushed and Broken Granite
2.
3.

Reason For NONA

No discharge to Waters of the US because the facility does not discharge.

RWQCB Jurisdiction: Region 6B - Victorville
Phone: 760-241-6583
Email: r6b_stormwater@waterboards.ca.gov

Certification

Name: JOSEPH MATHEWSON
Date: August 16, 2015
Title: President

Attachments Meta Data Information:

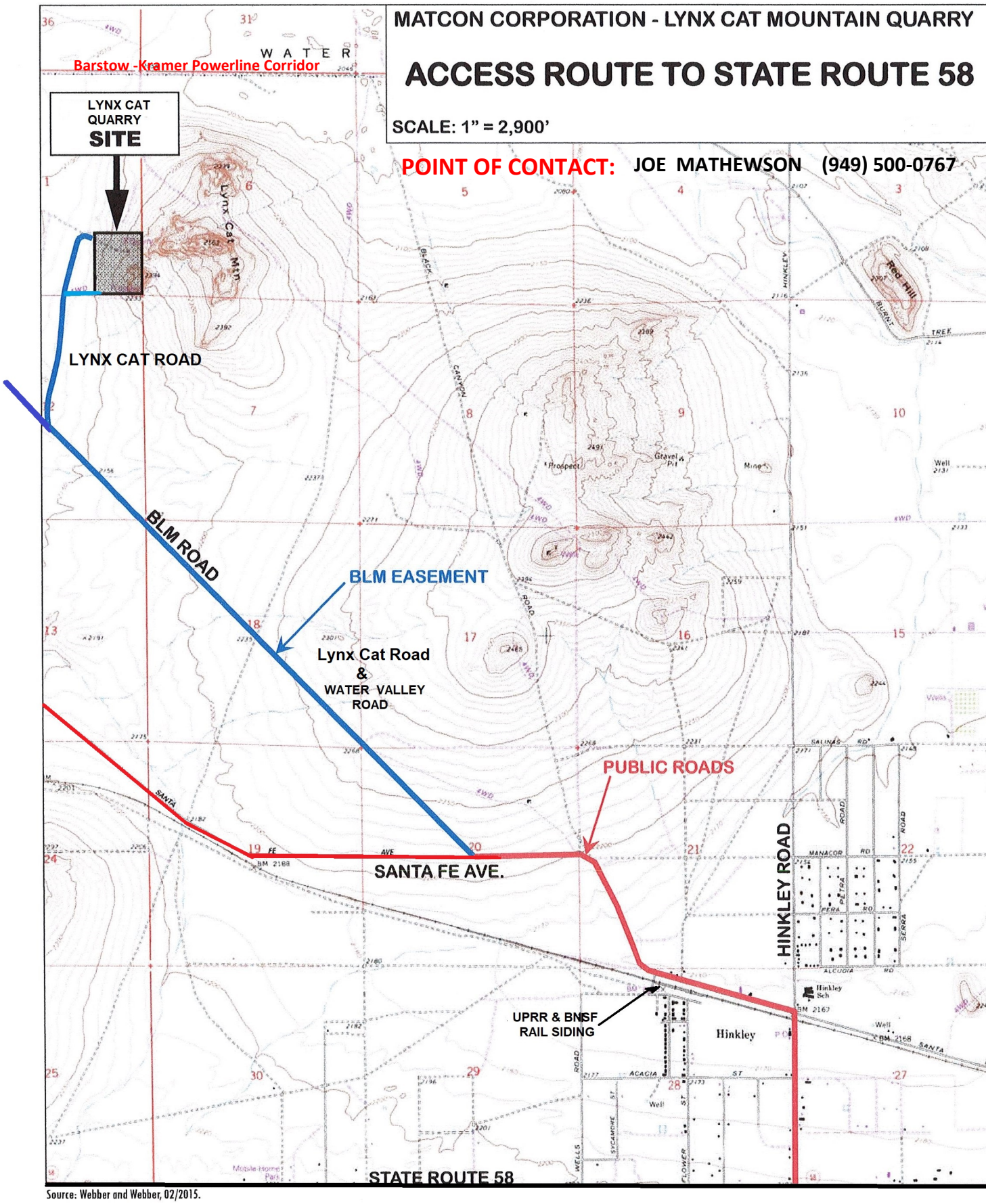
Attachment ID	File Name	File Description	File Hash	File Size	Date Attached	Attachment Type
1480702	NONA Technical Report	Technical Report describing engineering to contain a greater than a 100 year storm event on site	2f27c43dd7d9e8f5c4a1c36fac1bee5ef5d33c11c1bc0f4bd7915c120ee9e28	2630701	2015-08-02 13:34:59.0	No Discharge Technical Report
1480703	Lahontan RWB query regarding Nona Technical Report	Response from RWB to NONA technical report requesting additional information	8168659fde5b915f78148cbd4d4fdbf2d05572b6b97cf7dab953d4ee8c4ecf	87418	2015-08-02 13:35:00.0	E-mail Correspondence
1480704	Response to RWB query letter	Response to RWB query letter	eda939dbdba61b2bf9887f315f2b9e9625c398a2269e9693793f8c77a9cc1	117482	2015-08-02 13:35:02.0	E-mail Correspondence
1480705	Sachse, PE requested resume	Sachse, PE requested resume	d158b61fb942281485891f602a349792ecca971ae37c48e23180fcb911d43f	39101	2015-08-02 13:35:02.0	Other
1480706	Lynx Cat mine plan	Mine Plan and engineering drawings	b093fa5f509e3a76d3fd90535d9678c25b70a618ed78343ed5e195fbba899b6b	443438	2015-08-02 13:35:08.0	Facility/Site Map
1480707	Document providing poof of qualifications	M. H. Sachse Masters degree in Environmental Engineering	cada61be405d9db7c15de065c1518167c11d96e470527ce71e37a267813ab4	985107	2015-08-02 13:35:19.0	Other
1480708	EMail NFA	No further action letter from RWB	f48874fad7254e1fc81849afc3dbe695d8b634cc5c97c11874bc6e852e	361756	2015-08-02 13:35:24.0	E-mail Correspondence

SECTION 2

EXHIBITS

VICINITY MAP

KRAMER JUNCTION
PROJECT SITE
Barstow Bakersfield Hwy
58
BARSTOW
395
Barstow Fwy
© 2009 Tele Atlas
Image © 2009 DigitalGlobe
©2009 Google



Source: Webber and Webber, 02/2015.

LILBURN CORPORATION

ACCESS ROUTE

LYNX CAT MOUNTAIN QUARRY - MATCON CORPORATION

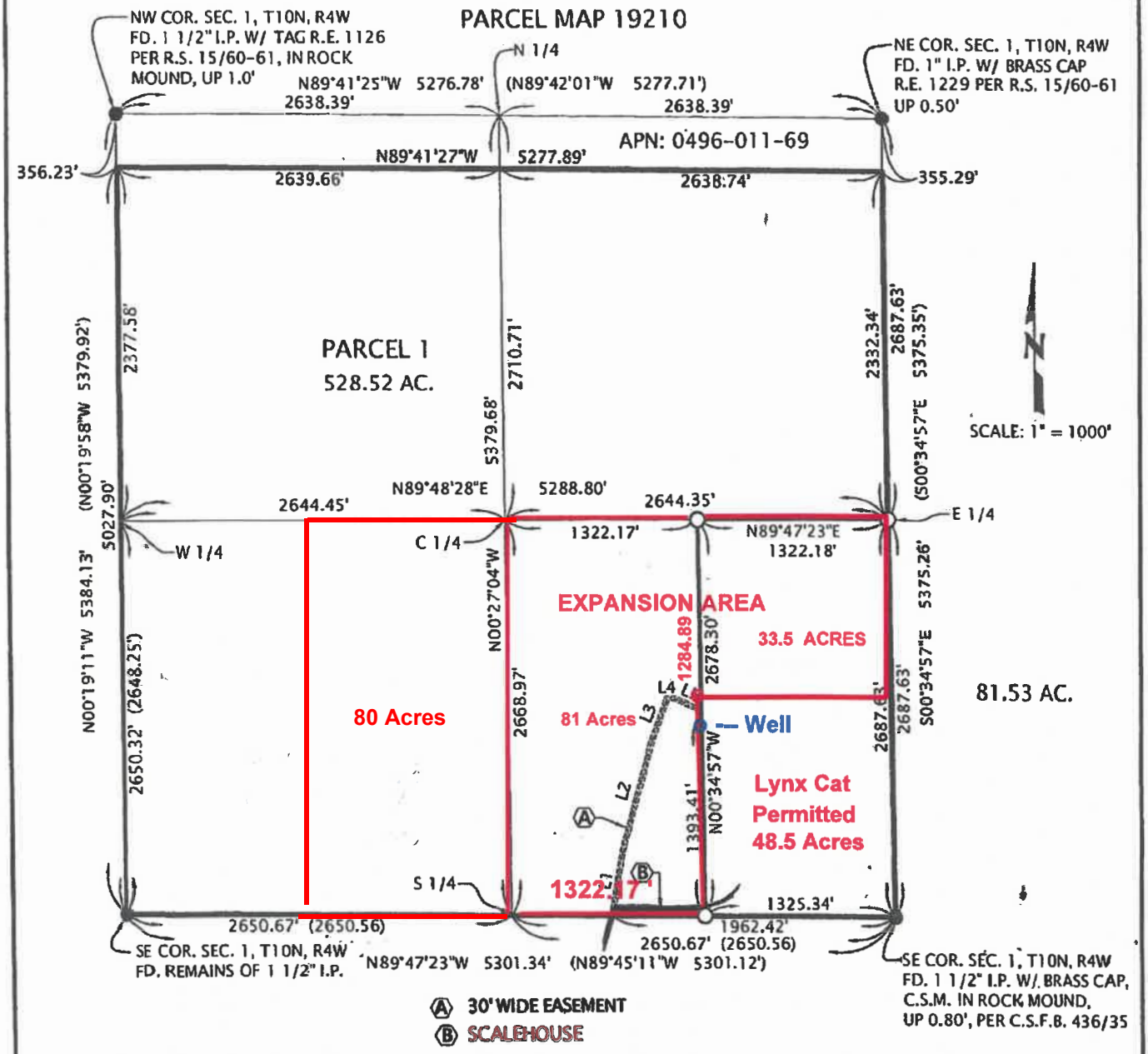
County of San Bernardino, California

FIGURE 4

PROPOSED DEVELOPMENT PLAN

EXHIBIT "A"

PARCEL MAP 19210



APPLICANT NAME: MATCON CORPORATION PHONE: 949-500-0767 PROPOSED # OF NEW LOTS: 2

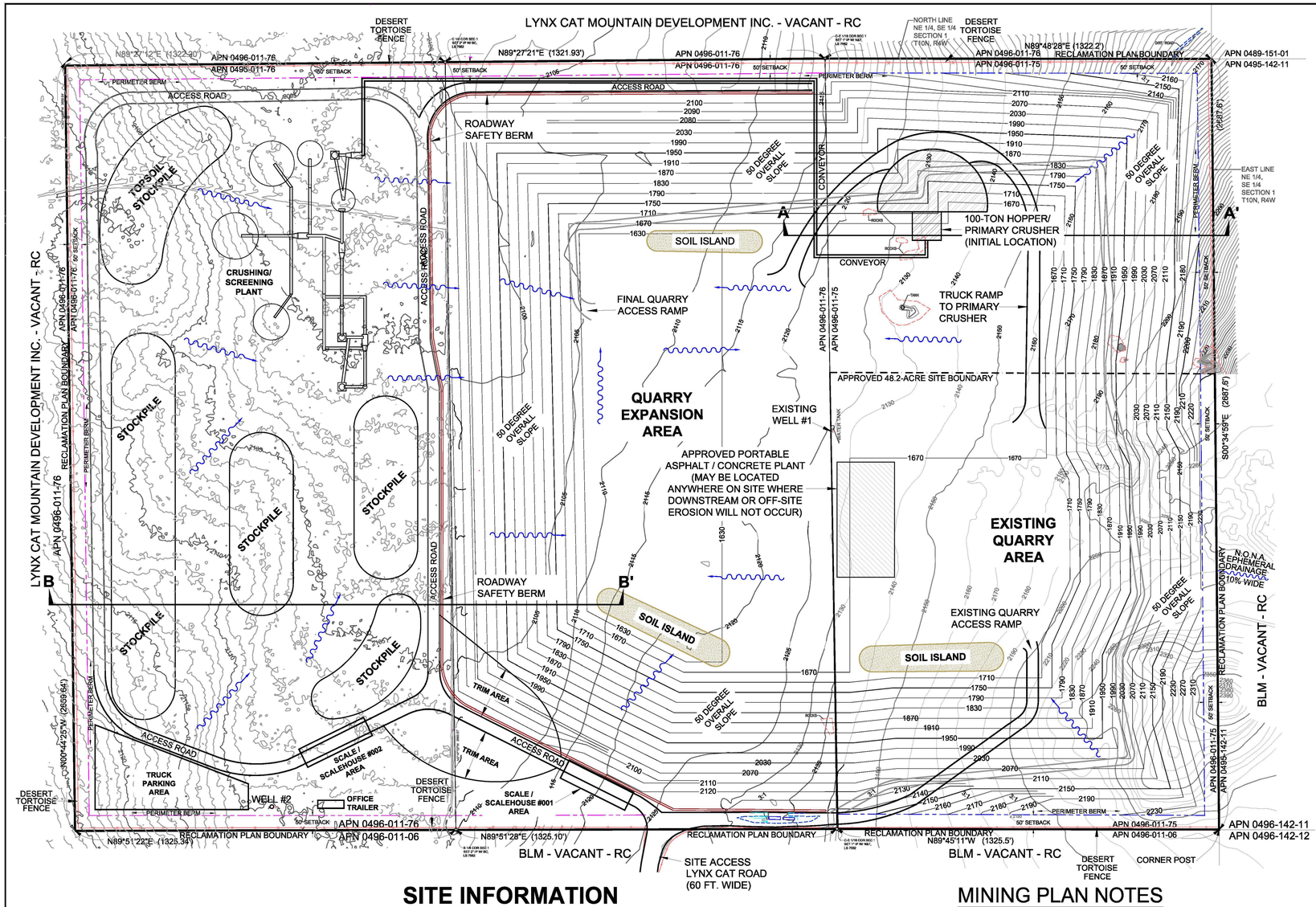
ASSESSOR PARCEL NUMBER(S): 0496-011-76-00 and 0496-011-75-00 EASEMENT MAP

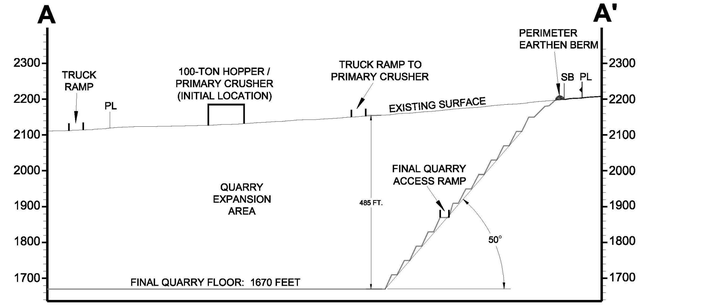
TOWNSHIP: 10 N RANGE: 3 W SECTION: 1 NW NE SW (SE) (CIRCLE ONE)

STAFF ONLY:

FILE INDEX: LAND USE DISTRICT: OVERLAY: RD. BK.

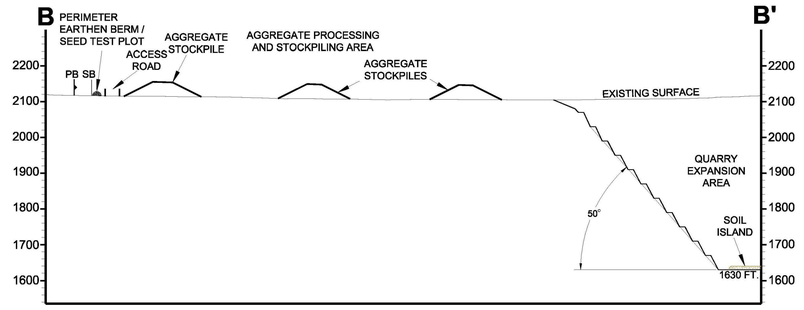
APPROVED BY: X





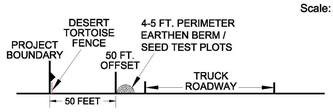
CROSS SECTION A - A'

Scale: 1" = 200'



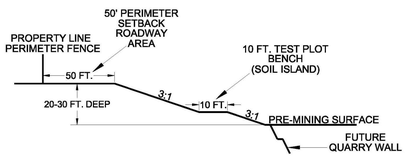
CROSS SECTION B - B'

Scale: 1" = 200'



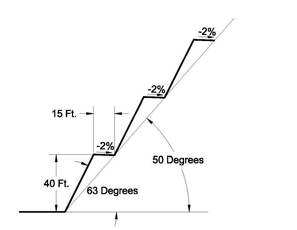
PROJECT BOUNDARY DETAIL

Scale: N.T.S.



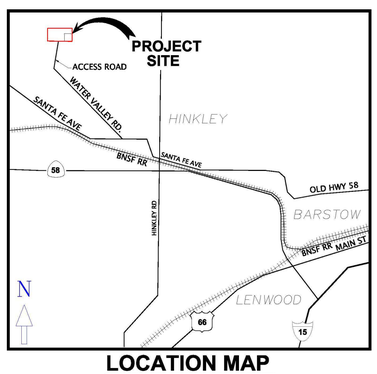
TYPICAL QUARRY SLOPE

Scale: N.T.S.



TYPICAL QUARRY BENCH

Scale: 1" = 50'



LOCATION MAP

NOT TO SCALE

SITE INFORMATION

TOTAL PROPERTY HOLDING:	609.8 Acres
EXISTING PROJECT AREA:	48.2 Acres
PROPOSED PROJECT AREA:	241.7 Acres
ASSESSOR'S PARCEL NUMBER(s):	0496-011-75, 0496-011-76

LEGAL DESCRIPTION (PROPOSED PROJECT AREA):

APN 0496-011-75: E 1/2, SE 1/4 SECTION 1, T10N, R4W, S.B.B.M., TOTALING 81.7 ACRES M/L

APN 0496-011-76: W 1/2, SE 1/4 AND THE E 1/2, SW 1/4, SECTION 1, T10N, R4W, S.B.B.M., TOTALING 160 ACRES M/L

SITE ADDRESS: 19120 Lynx Cat Road, Hinkley, CA 92347

EXISTING/PROPOSED LAND USE CATEGORY:
RLM (Resource/Land Management)

EXISTING/PROPOSED LAND USE DISTRICT:
RC (Resource Conservation)

IMPROVEMENT LEVEL: 5

EXISTING/PROPOSED ZONING:
RC (Resource Conservation)

UTILITIES
Water - Private Well, Imported Bottle Potable Water for Drinking
Sewer - Portable Toilets
Electricity - Diesel Generator, Gas (if needed), Future Solar/Battery
Gas - None
Telephone - Wireless Service
Cable Television - None

MINING PLAN NOTES

1) This proposal is for expanding the existing Lynx Cat Mountain Quarry from 48.2 acres to 241.7 acres utilizing private surrounding land owned by the proponent.
2) The site will consist of an expanded quarry area and a processing/product stockpiling area to support large upcoming construction projects in the high desert. Due to the size of these projects, large amounts of aggregates must be produced, staged and made ready for transport by both truck and by rail prior to the beginning of the planned construction operations in the high desert.
3) Lynx Cat Mountain Operations LLC (Leasee and Operator of Lynx Cat Montain Quarry) has tentative commitments from various custormers to produce large amounts of aggregates for delivery by both truck and rail prior to the start of construction to meet customer requirements and schedules.
4) The plan for this Lynx Cat Mountain Quarry expansion is to continue mining and production of high quality construction aggregates needed to meet the expanding demand for these products in the Barstow area and to support the ongoing construction projects in the high desert for the next 50 years of quarry operations.
5) During peak construction schedules, up to 4 million tons of stockpiled aggregates may be exported from the site on an annual basis to supply the upcoming construction projects.
6) The maximum height of the aggregate product stockpiles will be 40 feet. The location and size of the aggregate product stockpiles may vary from what is shown on this map in size and location.
7) The project site will be carefully prepared and cleared of any desert tortoises discovered and a desert tortoise exclusion fence will be installed along the entire perimeter of the project area.
8) A second portable scale and scalehouse will be installed as shown (Scale #002) in the south central portion of the project site. Parking will be provided for any employees and a truck staging area will be provided southwest of the scale. A truck load trim area will also be placed in an area between the two scales to ensure proper highway legal loaded weights leaving the site.
9) Water will be used for dust suppression activities on the project site as needed. All water needed for the project will be provided by the existing permitted well located within the approved Lynx Cat Mountain Quarry boundary.
10) Stormwater drainage on and across the project site will be as shown. Currently, the quarry has a Water Quality Board NONA Identification number of 6B36NNA000059.
11) A continuous 4-5 ft. perimeter offset earthen berm consisting of topsoil and surface material will be installed to minimize flows from entering the site and to collect and retain flows that occur within the site boundary and prevent stormwater flows into the site. Water flows will only occur during localized storm events. There are no blueline streams, swales or drainage areas that will be impacted by this project.

REGISTERED PROFESSIONAL ENGINEER
ROBERT Y. KANG
C-81217
Exp. 9/30/25
CIVIL
STATE OF CALIFORNIA

LYNX CAT MTN. QUARRY

RECLAMATION PLAN 90M-10
CA MINE ID: 91-36-0049

MINE PLAN

MINERAL: Gray Granite	
APPLICANT: OPERATOR:	MATCON CORP. 1807 Toyon Lane Newport Beach, California 92660 (949) 500-0767
MINERAL RIGHTS: LANDOWNER:	MATCON CORP. 1807 Toyon Lane Newport Beach, California 92660 (949) 500-0767
MINING ENGINEER: MAP PREPARER: REPRESENTATIVE:	Webber & Webber Mining Consultants, Inc. 101 E. Redlands Blvd., Ste. 240 Redlands, California 92373 (909) 793-3416
MAP SOURCE:	Merrell-Johnson Engineering, Inc. - Feb. 2023, Aug. 2023
CONTOUR INTERVAL:	1, 5, 10 Feet

LEGEND

	DRAINAGE FLOW		EXISTING QUARRY BNDRY.
PB	PROJECT BOUNDARY		RECLAMATION PLAN BNDRY.
PL	PROPERTY LINE		EXISTING CONTOUR
SB	SETBACK		PERIMETER EARTHEN BERM

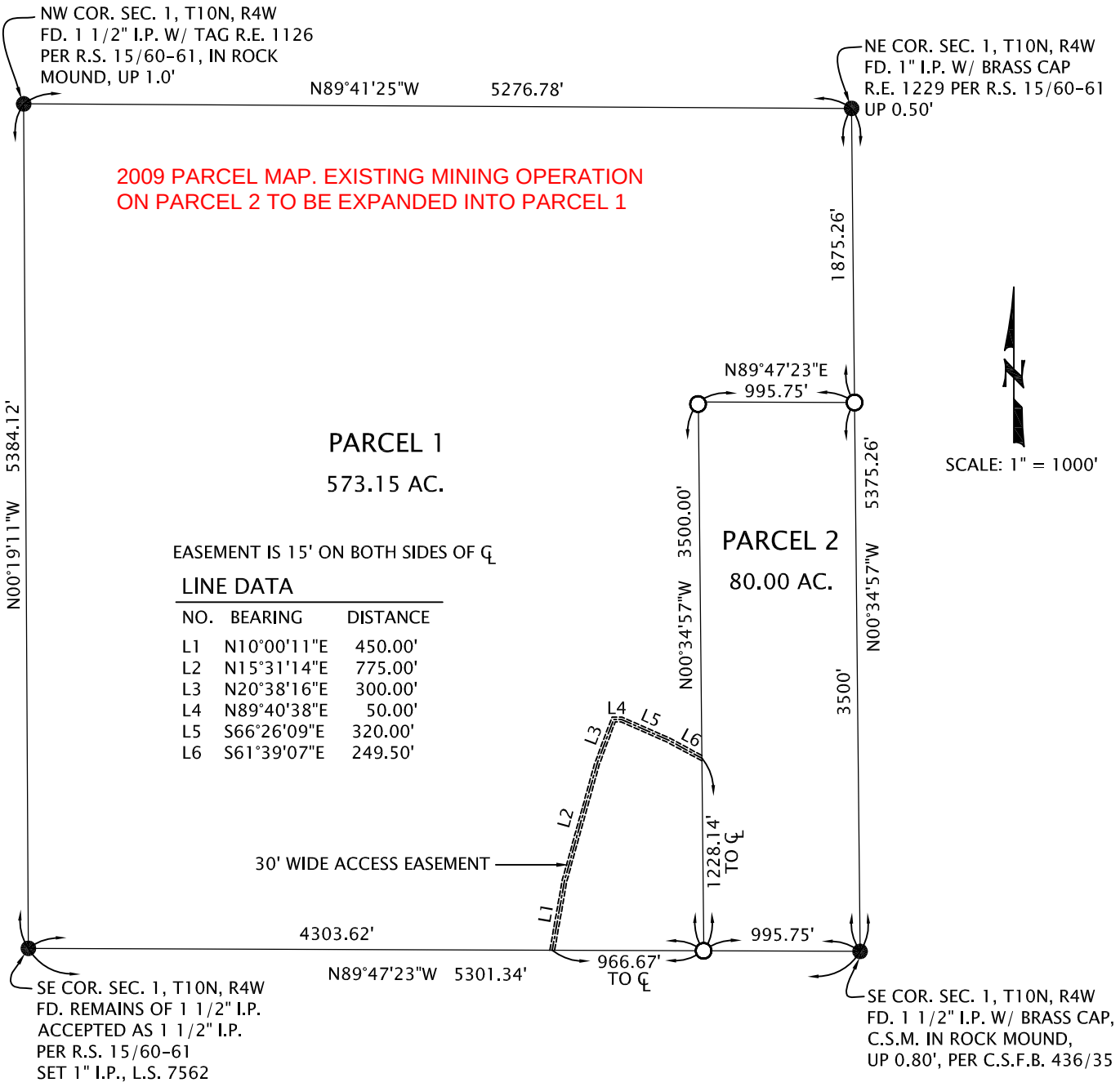
NO.	DATE	REVISION	BY
0	--/--/--	None	GAW

WEBBER & WEBBER
MINING CONSULTANTS, INC.
101 East Redlands Blvd., Ste. 240
Redlands, California 92373
(909) 793-3416

Scale:	1" = 200'
Date:	October 11, 2024
Drawn by:	L. Richtmyer
Designed by:	G. Webber

REVISION REFERENCE		
NO.	DATE	BY
0	--/--/--	GAW

SHEET 1 of 2



APPLICANT NAME: _____ PHONE: _____ PROPOSED # OF NEW LOTS: _____

ASSESSOR PARCEL NUMBER(S): _____

TOWNSHIP: _____ RANGE: _____ SECTION: _____ NW NE SW SE (CIRCLE ONE)

PLANNING STAFF ONLY:

FILE INDEX: _____ LAND USE DISTRICT: _____ OVERLAY: _____ RD. BK. _____

APPROVAL DATE): _____

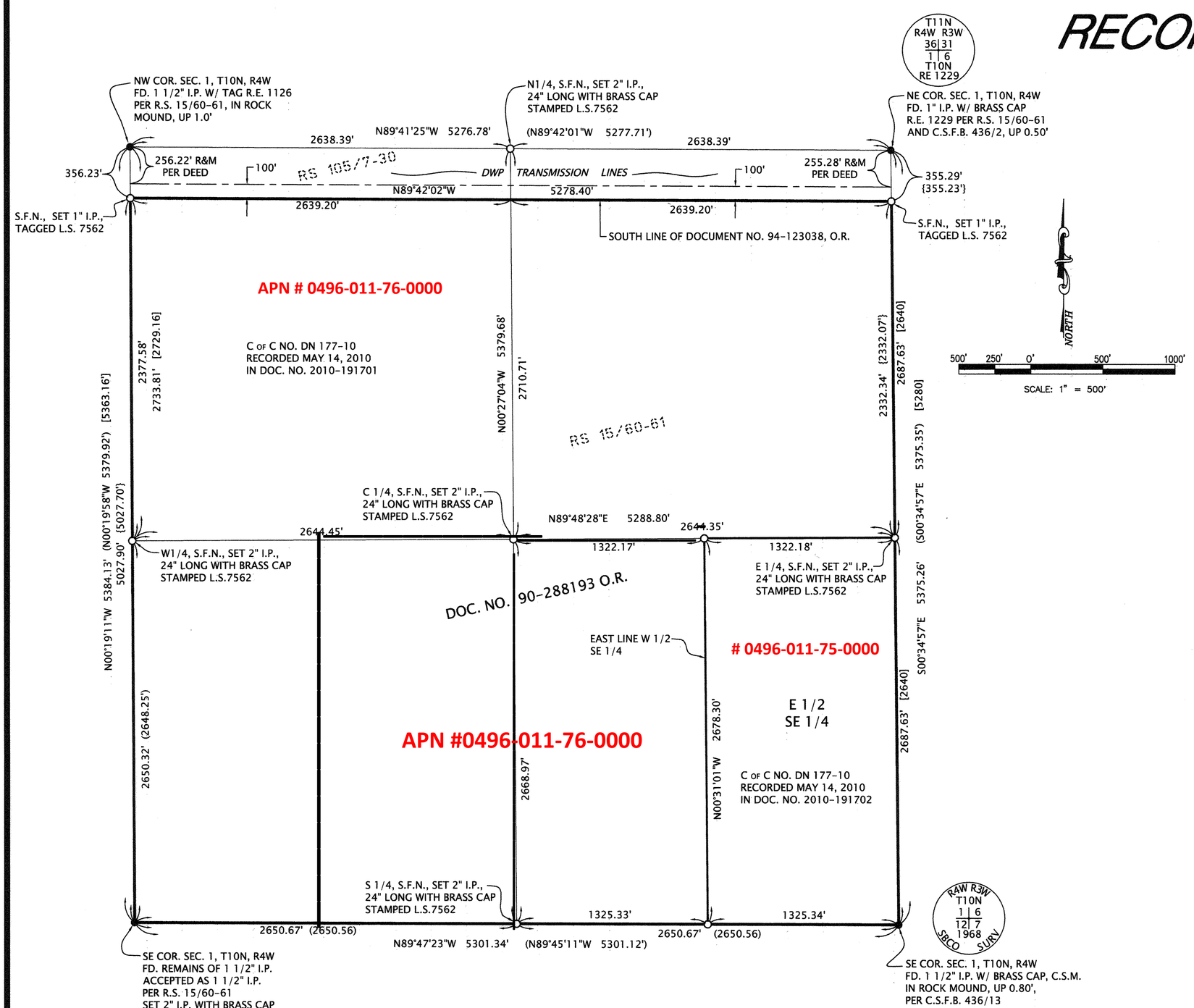
APPROVED BY: _____ X _____

07/31/20

RECORD OF SURVEY 10-059

BEING A PORTION OF SECTION 1,
TOWNSHIP 10 NORTH, RANGE 4 WEST, S.B.M.
IN THE COUNTY OF SAN BERNARDINO
STATE OF CALIFORNIA

MERRELL-JOHNSON ENGINEERING, INC.
APRIL 2010



NOTES:

1. BASIS OF BEARINGS: TAKEN FROM THE EAST LINE OF SECTION 1, T10N, R4W, S.B.M. PER RECORD OF SURVEY 15/60-61 BEING: N00°34'57"W
2. ● INDICATES MONUMENTS FOUND AS NOTED.
3. ○ INDICATES 1" IRON PIPE, 18" LONG, TAGGED L.S. 7562, SET, UNLESS NOTED OTHERWISE.
4. ( ) INDICATES RECORD INFORMATION PER RECORD OF SURVEY 15/60-61
5. [ ] INDICATES RECORD INFORMATION PER GOVERNMENT PLAT RECORDED NOVEMBER 1906
6. { } INDICATES RECORD INFORMATION PER RECORD OF SURVEY 105/7-30. DISTANCES FOR THIS ARE GRID.
7. C.S.F.B. INDICATES COUNTY SURVEYOR FIELD BOOK
8. C.S.M. INDICATES COUNTY SURVEYOR MONUMENT
9. R&M INDICATES INDICATES RECORD AND MEASURED
10. S.F.N. INDICATES INDICATES SEARCHED FOUND NOTHING

SURVEYOR'S STATEMENT:

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT AT THE REQUEST OF MATCON CORP. IN APRIL 2010.

LICENSED LAND SURVEYOR
CRAIG JOHNSON
EXP. 12/31/11
LS 7562
STATE OF CALIFORNIA

CRAIG JOHNSON L.S. 7562
EXP.: 12/31/11

COUNTY SURVEYOR'S STATEMENT:

THIS MAP HAS BEEN EXAMINED IN ACCORDANCE WITH SECTION 8766 OF THE PROFESSIONAL LAND SURVEYORS' ACT THIS 16TH DAY OF JUNE, 2010.

MICHAEL W. RAIHLE, COUNTY SURVEYOR
COUNTY OF SAN BERNARDINO

PROFESSIONAL LAND SURVEYOR
W M V SCRIBNER
PLS No. 4675
Exp. 9-30-11
STATE OF CALIFORNIA

BY: _____ DEPUTY

L.S. NO. 4675 EXPIRATION DATE: 9-30-11

SAN BERNARDINO COUNTY RECORDER'S CERTIFICATE

THIS MAP HAS BEEN FILED UNDER DOCUMENT NUMBER 2010-0247297,
THIS 21ST DAY OF JUNE, 20 10, AT 4:06 P.M. IN
BOOK 143 OF RECORDS OF SURVEY AT PAGE 20,
AT THE REQUEST OF MATCON CORP
IN THE AMOUNT OF $ 10.00.

LARRY WALKER
AUDITOR/CONTROLLER-RECORDER
COUNTY OF SAN BERNARDINO

BY: _____
DEPUTY RECORDER

143/20

BARSTOW - KRAMER POWER CORRIDOR

Roy St

Roy Rd

Roy Rd

Roy Rd

Roy Rd

SoCAL Edison Power Line to Quarry

SECTION 1 -

FUTURE DEVELOPMENT OR STORAGE AREA

368 ACRES

EXPANSION AREA #3
80-Acres

EXPANSION AREA #1
80-Acres

EXPANSION AREA #2
33.5 - Acres

LYNX CAT MOUNTAIN CLAIM PROPERTY

Lynx Cat Mountain Quarry

Permitted Quarry and Crushing Area

Scalehouse #002

Scalehouse #001

LYNX CAT MOUNTAIN QUARRY

2055 ft

1985

Google Earth

Imagery Date: 9/4/2015 lat 34.987707° lon -117.245913° elev 2124 ft eye alt 11120 ft

SECTION 3

HYDROLOGY CALCULATIONS

OFF-SITE HYDROLOGY CALCULATIONS

UNIT HYDROGRAPH AND RATIONAL CALCULATIONS

100-YEAR STORM

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: 07/16/09

MATCON CORPORATION - JOB NO. 3104
OFF-SITE TRIBUTARY AREA - PARCEL 2
NODE 11 - NODE 13
100-YEAR STORM EVENT - AMC II

MERRELL-JOHNSON ENGINEERING, INC.
12138 INDUSTRIAL BOULEVARD, SUITE 240
VICTORVILLE, CA 92395
(760) 241-6146 * FAX (760) 241-0566

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.200 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++
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
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 765.000(Ft.)
Top (of initial area) elevation = 2531.000(Ft.)
Bottom (of initial area) elevation = 2311.000(Ft.)
Difference in elevation = 220.000(Ft.)
Slope = 0.28758 s(%)= 28.76
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.591 min.
Rainfall intensity = 4.331(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.845
Subarea runoff = 33.299(CFS)
Total initial stream area = 9.100(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

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

Depth of flow = 0.648(Ft.), Average velocity = 7.936(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 =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     33.299(CFS)
  '     '    flow top width =     12.955(Ft.)
  '     '    velocity=    7.936(Ft/s)
  '     '    area =      4.196(Sq.Ft)
  '     '    Froude number =     2.457

Upstream point elevation =  2311.000(Ft.)
Downstream point elevation =  2186.000(Ft.)
Flow length =  1076.000(Ft.)
Travel time  =    2.26 min.
Time of concentration =   11.85 min.
Depth of flow =   0.648(Ft.)
Average velocity =   7.936(Ft/s)
Total irregular channel flow =    33.299(CFS)
Irregular channel normal depth above invert elev. =   0.648(Ft.)
Average velocity of channel(s) =   7.936(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
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    11.85 min. Tc
Rainfall intensity =      3.735(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.836
Subarea runoff =    159.995(CFS) for   52.800(Ac.)
Total runoff =    193.294(CFS) Q100
Effective area this stream =       61.90(Ac.)
Total Study Area (Main Stream No. 1) =       61.90(Ac.)
Area averaged Fm value =    0.265(In/Hr)
End of computations, Total Study Area =           61.90 (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(Ap) = 1.000
Area averaged SCS curve number =  86.0
```

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: 07/16/09

MATCON CORPORATION - JOB NO. 3104
OFF-SITE TRIBUTARY FLOW - PARCEL 2
NODE 21 - NODE 23
100-YEAR STORM EVENT - AMC II

MERRELL-JOHNSON ENGINEERING, INC.
12138 INDUSTRIAL BOULEVARD, SUITE 240
VICTORVILLE, CA 92395
(760) 241-6146 * FAX (760) 241-0566

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.200 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 629.000(Ft.)
Top (of initial area) elevation = 2504.000(Ft.)
Bottom (of initial area) elevation = 2302.000(Ft.)
Difference in elevation = 202.000(Ft.)
Slope = 0.32114 s(%)= 32.11
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.675 min.
Rainfall intensity = 4.646(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.849
Subarea runoff = 9.857(CFS)
Total initial stream area = 2.500(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

++

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

Depth of flow = 0.438(Ft.), Average velocity = 5.141(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 =   0.030
-------------------------------------------------------------------
Sub-Channel flow  =      9.857(CFS)
  '     '    flow top width =      8.757(Ft.)
  '     '    velocity=    5.141(Ft/s)
  '     '    area =      1.917(Sq.Ft)
  '     '    Froude number =     1.936

Upstream point elevation =  2302.000(Ft.)
Downstream point elevation =  2242.000(Ft.)
Flow length =   730.000(Ft.)
Travel time  =    2.37 min.
Time of concentration =   11.04 min.
Depth of flow =   0.438(Ft.)
Average velocity =   5.141(Ft/s)
Total irregular channel flow =     9.857(CFS)
Irregular channel normal depth above invert elev. =   0.438(Ft.)
Average velocity of channel(s) =   5.141(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** 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
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    11.04 min. Tc
Rainfall intensity =      3.924(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.839
Subarea runoff =     30.650(CFS) for    9.800(Ac.)
Total runoff =     40.508(CFS) Q100
Effective area this stream =       12.30(Ac.)
Total Study Area (Main Stream No. 1) =       12.30(Ac.)
Area averaged Fm value =    0.265(In/Hr)
End of computations, Total Study Area =           12.30 (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(Ap) = 1.000
Area averaged SCS curve number =  86.0
```

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

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Study date 10/25/24

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

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

LYNX CAN MINE SITE - MATCON
OFF-SITE STORM RUNOFF FLOW
UNIT HYDROGRAPH ANALYSIS
100-YEAR STORM EVENT - AMC I

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		
9854.00	1	0.64
Rainfall data for year 2		
9854.00	6	0.70
Rainfall data for year 2		
9854.00	24	1.07

```
Rainfall data for year 100
          9854.00            1           1.11
------------------------------------------------------------------------
Rainfall data for year 100
          9854.00            6           1.90
------------------------------------------------------------------------
Rainfall data for year 100
          9854.00           24           2.99
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 1)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      68.6       9854.00      1.000     0.554    1.000    0.554

Area-averaged adjusted loss rate Fm (In/Hr) =  0.554

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC1)           Yield Fr
  9854.00   1.000         84.0      68.6       4.58     0.216

Area-averaged catchment yield fraction, Y =  0.216
Area-averaged low loss fraction, Yb =  0.784
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   45027.00(Ft.)
Length from concentration point to centroid =   21159.00(Ft.)
Elevation difference along watercourse =     776.00(Ft.)
Mannings friction factor along watercourse =  0.030
Watershed area =    9854.00(Ac.)
Catchment Lag time =   1.169 hours
Unit interval =  10.000 minutes
Unit interval percentage of lag time = 14.2536
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.784 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.527(In)
Computed peak 30-minute rainfall =  0.902(In)
Specified peak 1-hour rainfall =  1.110(In)
Computed peak 3-hour rainfall =  1.543(In)
Specified peak 6-hour rainfall =  1.900(In)
Specified peak 24-hour rainfall =  2.990(In)


Rainfall depth area reduction factors:
```

Using a total area of 9854.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.678 Adjusted rainfall = 0.357(In)
30-minute factor = 0.688 Adjusted rainfall = 0.621(In)
1-hour factor = 0.691 Adjusted rainfall = 0.767(In)
3-hour factor = 0.946 Adjusted rainfall = 1.459(In)
6-hour factor = 0.973 Adjusted rainfall = 1.849(In)
24-hour factor = 0.985 Adjusted rainfall = 2.945(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 59585.91 (CFS))	
1	0.636	378.840
2	2.626	1186.139
3	5.923	1964.093
4	10.987	3017.579
5	20.586	5719.654
6	34.124	8066.699
7	45.265	6638.736
8	53.578	4952.995
9	59.797	3705.567
10	64.505	2805.561
11	68.372	2304.308
12	71.738	2005.278
13	74.545	1672.704
14	77.026	1478.364
15	79.181	1284.275
16	81.055	1116.556
17	82.700	980.141
18	84.221	906.449
19	85.614	830.169
20	86.926	781.415
21	88.076	685.299
22	89.087	602.367
23	89.941	509.107
24	90.758	486.521
25	91.545	468.894
26	92.246	418.143
27	92.917	399.563
28	93.547	375.321
29	94.111	336.422
30	94.596	288.936
31	95.081	288.767
32	95.555	282.514
33	95.944	231.897

34	96.315	220.821
35	96.685	220.821
36	97.008	191.996
37	97.265	153.088
38	97.521	152.876
39	97.768	147.075
40	97.930	96.627
41	98.073	84.931
42	98.215	84.931
43	98.369	91.893
44	98.540	101.842
45	98.711	101.918
46	98.882	101.918
47	99.054	101.918
48	99.225	101.918
49	99.396	101.918
50	99.534	82.594
51	99.624	53.380
52	99.713	53.082
53	99.802	53.082
54	99.891	53.082
55	100.000	26.541

Total soil rain loss = 2.06(In)
Total effective rainfall = 0.88(In)
Peak flow rate in flood hydrograph = 3344.63(CFS)

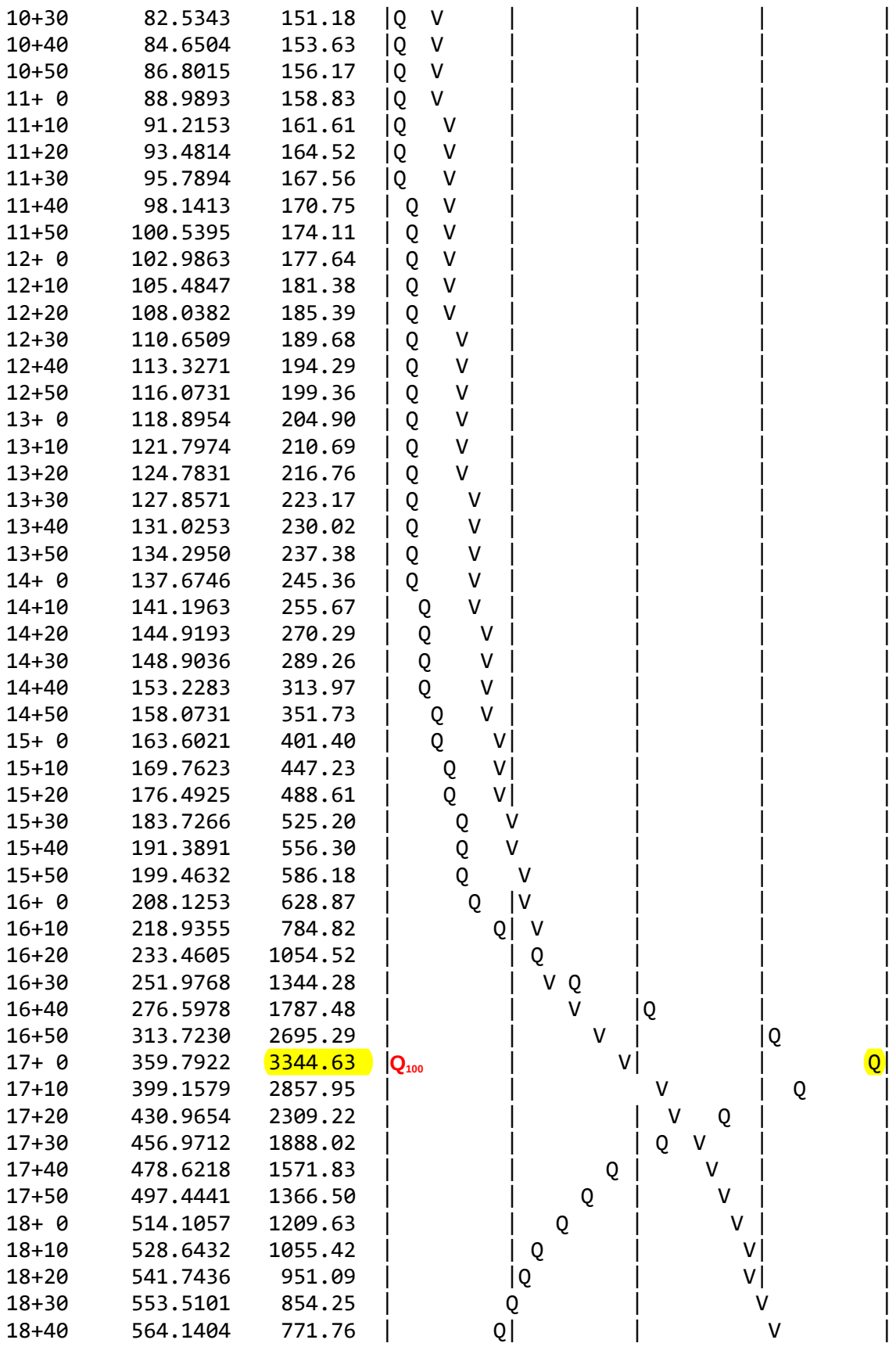
++

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 10 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	850.0	1700.0	2550.0	3400.0
0+10	0.0078	0.56	Q	|	|	|	|
0+20	0.0399	2.33	Q	|	|	|	|
0+30	0.1126	5.28	Q	|	|	|	|
0+40	0.2477	9.81	Q	|	|	|	|
0+50	0.5010	18.39	Q	|	|	|	|
1+ 0	0.9217	30.54	Q	|	|	|	|
1+10	1.4814	40.64	Q	|	|	|	|
1+20	2.1468	48.31	Q	|	|	|	|
1+30	2.8930	54.17	Q	|	|	|	|
1+40	3.7021	58.74	Q	|	|	|	|
1+50	4.5643	62.60	Q	|	|	|	|
2+ 0	5.4741	66.05	Q	|	|	|	|

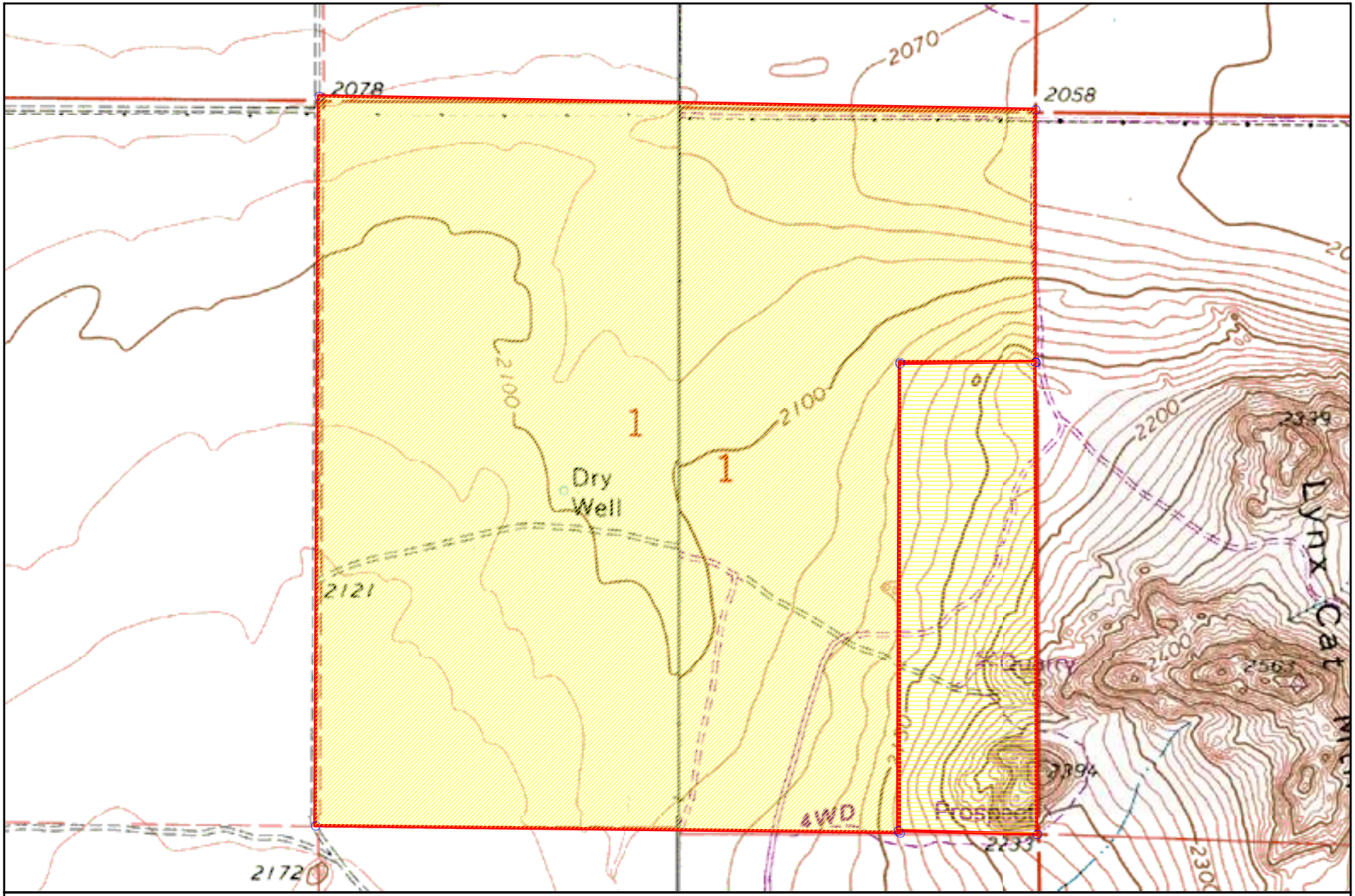
2+10	6.4249	69.03	Q	|	|	|	|
2+20	7.4131	71.75	Q	|	|	|	|
2+30	8.4351	74.20	Q	|	|	|	|
2+40	9.4878	76.43	Q	|	|	|	|
2+50	10.5688	78.47	Q	|	|	|	|
3+ 0	11.6767	80.43	Q	|	|	|	|
3+10	12.8103	82.30	Q	|	|	|	|
3+20	13.9690	84.12	Q	|	|	|	|
3+30	15.1509	85.81	VQ	|	|	|	|
3+40	16.3548	87.40	VQ	|	|	|	|
3+50	17.5790	88.88	VQ	|	|	|	|
4+ 0	18.8233	90.34	|Q	|	|	|	|
4+10	20.0876	91.79	|Q	|	|	|	|
4+20	21.3712	93.19	|Q	|	|	|	|
4+30	22.6740	94.58	|Q	|	|	|	|
4+40	23.9958	95.96	|Q	|	|	|	|
4+50	25.3360	97.30	|Q	|	|	|	|
5+ 0	26.6941	98.60	|Q	|	|	|	|
5+10	28.0703	99.91	|Q	|	|	|	|
5+20	29.4649	101.24	|Q	|	|	|	|
5+30	30.8770	102.52	|Q	|	|	|	|
5+40	32.3069	103.81	|Q	|	|	|	|
5+50	33.7549	105.12	|Q	|	|	|	|
6+ 0	35.2207	106.42	|Q	|	|	|	|
6+10	36.7039	107.68	|QV	|	|	|	|
6+20	38.2049	108.97	|QV	|	|	|	|
6+30	39.7239	110.28	|QV	|	|	|	|
6+40	41.2604	111.55	|QV	|	|	|	|
6+50	42.8145	112.83	|QV	|	|	|	|
7+ 0	44.3867	114.14	|QV	|	|	|	|
7+10	45.9775	115.49	|QV	|	|	|	|
7+20	47.5876	116.89	|QV	|	|	|	|
7+30	49.2175	118.33	|QV	|	|	|	|
7+40	50.8678	119.81	|QV	|	|	|	|
7+50	52.5389	121.32	|QV	|	|	|	|
8+ 0	54.2315	122.88	|QV	|	|	|	|
8+10	55.9461	124.48	|Q V	|	|	|	|
8+20	57.6829	126.10	|Q V	|	|	|	|
8+30	59.4421	127.71	|Q V	|	|	|	|
8+40	61.2242	129.38	|Q V	|	|	|	|
8+50	63.0300	131.10	|Q V	|	|	|	|
9+ 0	64.8603	132.88	|Q V	|	|	|	|
9+10	66.7153	134.67	|Q V	|	|	|	|
9+20	68.5952	136.48	|Q V	|	|	|	|
9+30	70.5009	138.36	|Q V	|	|	|	|
9+40	72.4335	140.30	|Q V	|	|	|	|
9+50	74.3938	142.32	|Q V	|	|	|	|
10+ 0	76.3829	144.41	|Q V	|	|	|	|
10+10	78.4019	146.58	|Q V	|	|	|	|
10+20	80.4520	148.83	|Q V	|	|	|	|


10+30 82.5343 151.18
10+40 84.6504 153.63
10+50 86.8015 156.17
11+ 0 88.9893 158.83
11+10 91.2153 161.61
11+20 93.4814 164.52
11+30 95.7894 167.56
11+40 98.1413 170.75
11+50 100.5395 174.11
12+ 0 102.9863 177.64
12+10 105.4847 181.38
12+20 108.0382 185.39
12+30 110.6509 189.68
12+40 113.3271 194.29
12+50 116.0731 199.36
13+ 0 118.8954 204.90
13+10 121.7974 210.69
13+20 124.7831 216.76
13+30 127.8571 223.17
13+40 131.0253 230.02
13+50 134.2950 237.38
14+ 0 137.6746 245.36
14+10 141.1963 255.67
14+20 144.9193 270.29
14+30 148.9036 289.26
14+40 153.2283 313.97
14+50 158.0731 351.73
15+ 0 163.6021 401.40
15+10 169.7623 447.23
15+20 176.4925 488.61
15+30 183.7266 525.20
15+40 191.3891 556.30
15+50 199.4632 586.18
16+ 0 208.1253 628.87
16+10 218.9355 784.82
16+20 233.4605 1054.52
16+30 251.9768 1344.28
16+40 276.5978 1787.48
16+50 313.7230 2695.29
17+ 0 359.7922 3344.63
17+10 399.1579 2857.95
17+20 430.9654 2309.22
17+30 456.9712 1888.02
17+40 478.6218 1571.83
17+50 497.4441 1366.50
18+ 0 514.1057 1209.63
18+10 528.6432 1055.42
18+20 541.7436 951.09
18+30 553.5101 854.25
18+40 564.1404 771.76
Q100

18+50	573.8409	704.26	| Q |	|	|	|V |
19+ 0	582.8987	657.59	| Q |	|	|	| V |
19+10	591.3532	613.80	| Q |	|	|	| V |
19+20	599.3167	578.15	| Q |	|	|	| V |
19+30	606.6200	530.22	| Q |	|	|	| V |
19+40	613.3391	487.80	| Q |	|	|	| V |
19+50	619.4838	446.11	| Q |	|	|	| V |
20+ 0	625.3563	426.34	| Q |	|	|	| V |
20+10	630.9700	407.55	| Q |	|	|	| V |
20+20	636.2202	381.17	| Q |	|	|	| V |
20+30	641.2462	364.89	| Q |	|	|	| V |
20+40	646.0215	346.69	| Q |	|	|	| V |
20+50	650.4982	325.00	| Q |	|	|	| V |
21+ 0	654.6712	302.96	| Q |	|	|	| V |
21+10	658.7331	294.90	| Q |	|	|	| V |
21+20	662.6446	283.98	| Q |	|	|	| V |
21+30	666.2541	262.05	| Q |	|	|	| V |
21+40	669.7328	252.55	| Q |	|	|	| V |
21+50	673.1128	245.39	| Q |	|	|	| V |
22+ 0	676.2827	230.14	| Q |	|	|	| V |
22+10	679.2257	213.66	| Q |	|	|	| V |
22+20	682.0960	208.38	| Q |	|	|	| V |
22+30	684.8501	199.95	| Q |	|	|	| V |
22+40	687.3297	180.02	| Q |	|	|	| V |
22+50	689.7042	172.39	| Q |	|	|	| V |
23+ 0	692.0275	168.67	|Q |	|	|	| V |
23+10	694.3325	167.34	|Q |	|	|	| V |
23+20	696.6270	166.58	|Q |	|	|	| V |
23+30	698.8726	163.03	|Q |	|	|	| V |
23+40	701.0754	159.92	|Q |	|	|	| V |
23+50	703.2388	157.07	|Q |	|	|	| V |
24+ 0	705.3618	154.13	|Q |	|	|	| V|
24+10	707.4253	149.81	|Q |	|	|	| V|
24+20	709.3294	138.24	|Q |	|	|	| V|
24+30	711.0367	123.95	|Q |	|	|	| V|
24+40	712.6471	116.92	|Q |	|	|	| V|
24+50	714.1052	105.86	|Q |	|	|	| V|
25+ 0	715.3518	90.50	|Q |	|	|	| V|
25+10	716.3117	69.69	Q |	|	|	| V|
25+20	717.0382	52.74	Q |	|	|	| V|
25+30	717.6687	45.77	Q |	|	|	| V|
25+40	718.2227	40.22	Q |	|	|	| V|
25+50	718.7130	35.60	Q |	|	|	| V|
26+ 0	719.1477	31.56	Q |	|	|	| V|
26+10	719.5366	28.24	Q |	|	|	| V|
26+20	719.8866	25.41	Q |	|	|	| V|
26+30	720.2027	22.95	Q |	|	|	| V|
26+40	720.4893	20.80	Q |	|	|	| V|
26+50	720.7497	18.91	Q |	|	|	| V|
27+ 0	720.9862	17.17	Q |	|	|	| V|

27+10	721.2009	15.59	Q	|	|	|	V|
27+20	721.3954	14.12	Q	|	|	|	V|
27+30	721.5720	12.82	Q	|	|	|	V|
27+40	721.7329	11.68	Q	|	|	|	V|
27+50	721.8803	10.70	Q	|	|	|	V|
28+ 0	722.0150	9.78	Q	|	|	|	V|
28+10	722.1376	8.90	Q	|	|	|	V|
28+20	722.2493	8.11	Q	|	|	|	V|
28+30	722.3509	7.37	Q	|	|	|	V|
28+40	722.4429	6.68	Q	|	|	|	V|
28+50	722.5265	6.06	Q	|	|	|	V|
29+ 0	722.6026	5.53	Q	|	|	|	V|
29+10	722.6716	5.00	Q	|	|	|	V|
29+20	722.7335	4.50	Q	|	|	|	V|
29+30	722.7897	4.08	Q	|	|	|	V|
29+40	722.8404	3.68	Q	|	|	|	V|
29+50	722.8857	3.29	Q	|	|	|	V|
30+ 0	722.9264	2.95	Q	|	|	|	V|
30+10	722.9632	2.68	Q	|	|	|	V|
30+20	722.9964	2.41	Q	|	|	|	V|
30+30	723.0260	2.15	Q	|	|	|	V|
30+40	723.0531	1.97	Q	|	|	|	V|
30+50	723.0781	1.81	Q	|	|	|	V|
31+ 0	723.1010	1.66	Q	|	|	|	V|
31+10	723.1216	1.50	Q	|	|	|	V|
31+20	723.1399	1.32	Q	|	|	|	V|
31+30	723.1558	1.15	Q	|	|	|	V|
31+40	723.1693	0.99	Q	|	|	|	V|
31+50	723.1806	0.82	Q	|	|	|	V|
32+ 0	723.1897	0.66	Q	|	|	|	V|
32+10	723.1966	0.50	Q	|	|	|	V|
32+20	723.2016	0.37	Q	|	|	|	V|
32+30	723.2055	0.28	Q	|	|	|	V|
32+40	723.2083	0.20	Q	|	|	|	V|
32+50	723.2100	0.12	Q	|	|	|	V|
33+ 0	723.2105	0.04	Q	|	|	|	V

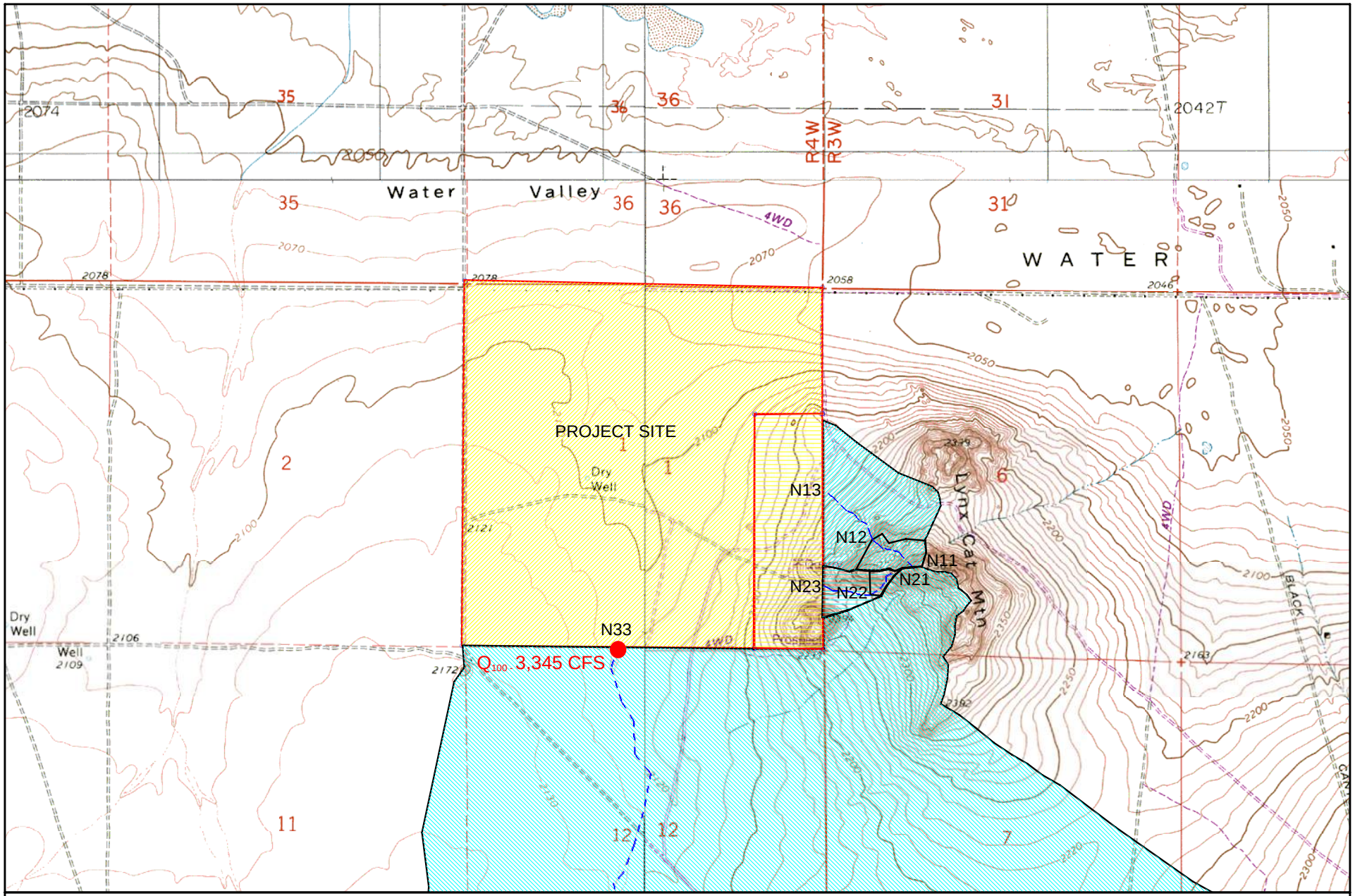
TRIBUTARY DRAINAGE MAP



Name: HINKLEY
Date: 8/4/2009
Scale: 1 inch equals 1000 feet

Location: 034° 59' 19.27" N 117° 15' 03.36" W NAD83
Caption: MATCON CORPORATION U.S.G.S. TOPOGRAPHY

Copyright (C) 1997, Maptech, Inc.



Name: HINKLEY
Date: 8/3/2009
Scale: 1 inch equals 2000 feet

Location: 034° 59' 20.49" N 117° 14' 57.30" W NAD83
Caption: MATCON CORPORATION - APN 04969-011-70

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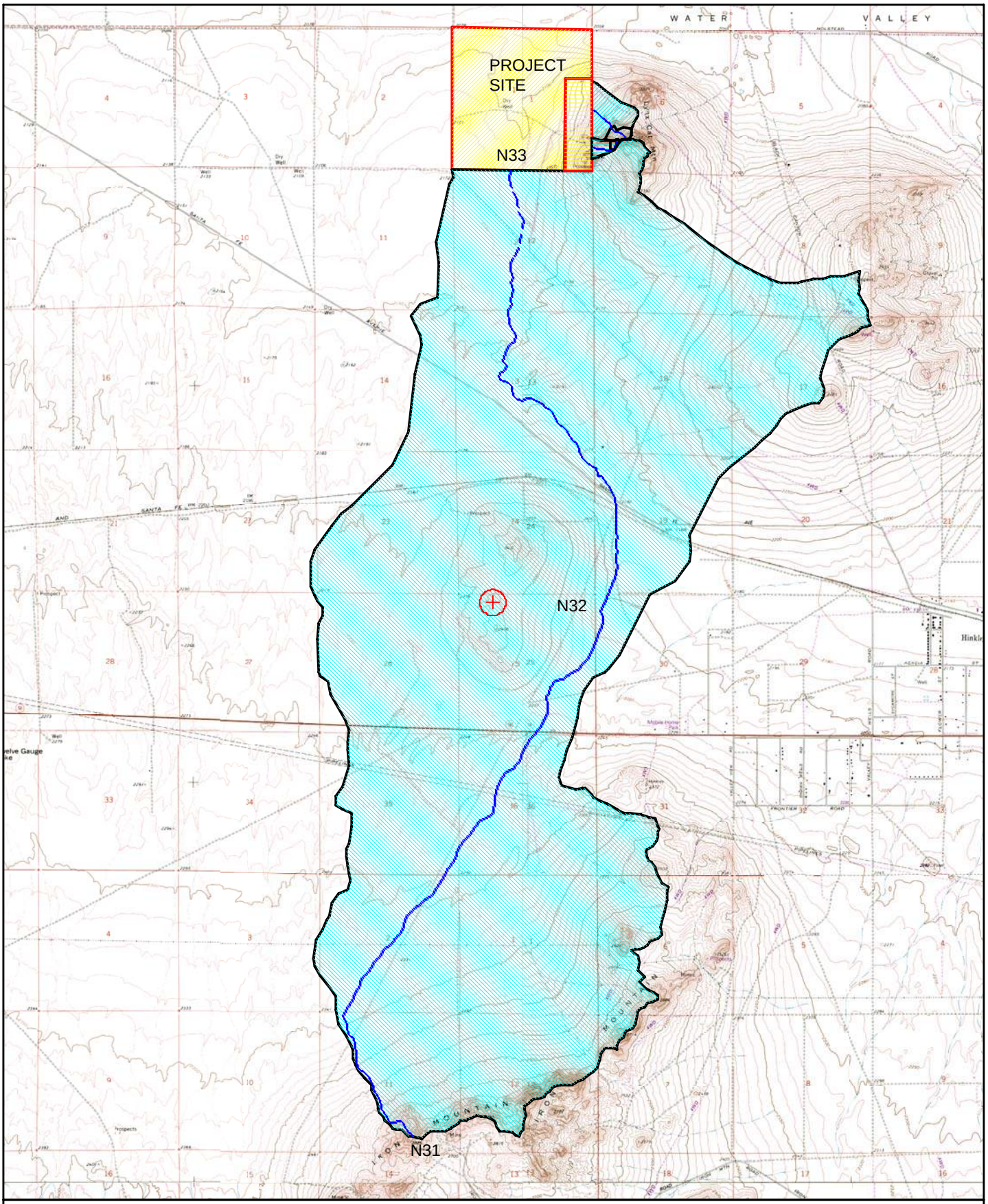

Name: TWELVE GAUGE LAKE
Date: 8/3/2009
Scale: 1 inch equals 5000 feet

Location: 034° 56' 08.27" N 117° 15' 16.54" W NAD83
Caption: MATCON CORPORATION - APN 04969-011-70

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2010 ANTECEDENT MOISTURE CONDITION (AMC) MAP

Figure ADD-1
Antecedent Moisture Condition (AMC)

5-day Rainfall - NOAA Atlas 14
(50% of Total Rainfall Prior to Peak)*

*1/2 (11-day - 1-day) =
1/2 (([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])

5 0 5 10 15
Miles

N
W E
S

Growing Season
- AMC I
- AMC II
- AMC III

STATE HWY 127
I-15
US HWY 395
I-40
STATE HWY 247
STATE HWY 62
Death Valley
Ridgecrest
Barstow
Boron
Adelanto
George AFB
George Field
Victorville
Apple Valley
Mountain View Acres
Hesperia
Wrightwood
Crestline
Lake Arrowhead
Running Springs
Big Bear City
Big Bear Lake
Yucca Valley
Morongo Valley
Joshua Tree
Twentynine Palms
Needles
Bloomington
Big Pines
Claremont

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
CHANNEL SECTIONS

Merrell-Johnson Engineering, Inc.
CIVIL ENGINEERING ♦ SURVEYING

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
DESIGN CRITERIA

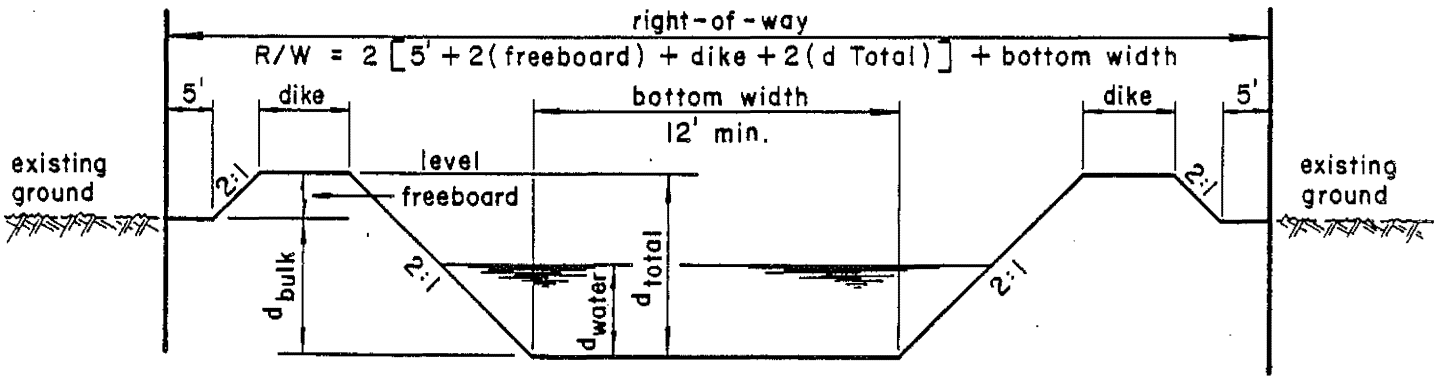
1) Hydrology calculations shall adhere to the San Bernardino County Hydrology Manual.

2) Structural calculations shall adhere to the Los Angeles County Flood Control District Structural Design Manual and to the State of California Department of Transportation Bridge Planning and Design Manuals and the Standard Plans.

3) Basin structural design shall adhere to the Los Angeles County Flood Control District Design Manual for Debris Dams and Basins.

4) Hydraulic design shall adhere to the Los Angeles County Flood Control District Hydraulic Design Manual and to the State of California Department of Transportation Highway Design Manual. Lined drainage facilities shall be designed with a bulking factor of 50% increase in water depth when there are no facilities to remove debris.
Closed conduit systems shall be designed with a surface backup system to handle a Q_{100} frequency storm, a bulking factor of 50% increase in Q_{100} and a debris basin system to remove debris. Culverts under roadways, except when connected to lined open channels, shall be designed in accordance with Caltrans Highway Design Manual.

5) Earth channel design shall adhere to the following:
   a) Bulk depth
      i) For graded earth channels, use $d_{bulk} = 1.5 d_{water}$
      ii) For natural drainage courses, compute d_{bulk} based upon $Q_{bulk} = 2\ Q_{100}$
   b) For total depth use $*d_{total} = d_{bulk}$ + freeboard
      * When "V" < 6 f.p.s. - use d_{water} + 2' freeboard
        8 f.p.s. > "V" ≥ 6 f.p.s. use d_{bulk} + 2' freeboard "V" = velocity
        "V" ≥ 8 f.p.s. use d_{bulk} + 3' freeboard
   c) Dike width
      When bottom width = 12' to 40' use dike width + 15'
      bottom width = 40' or more use dike width = 18'



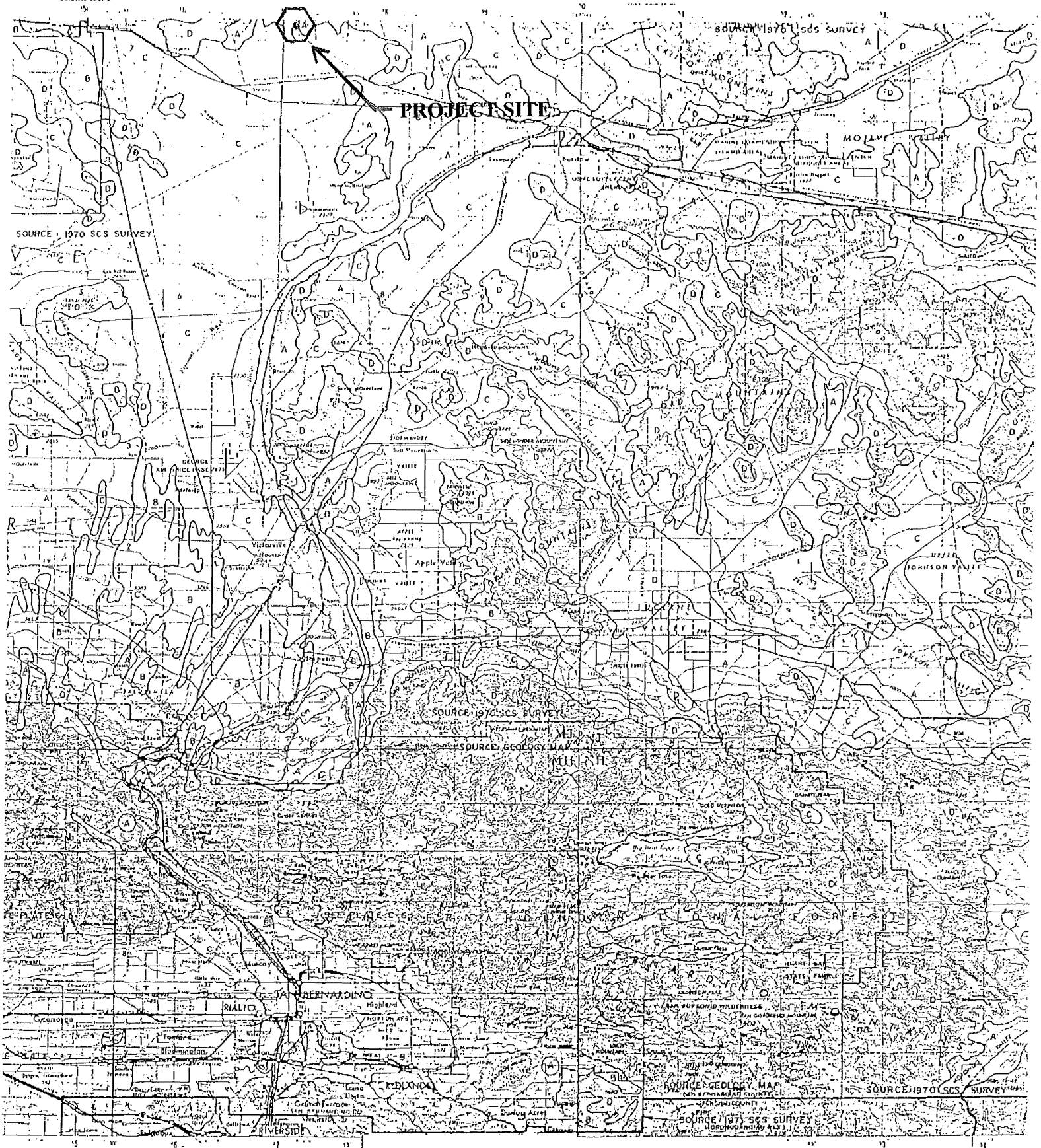
EARTH CHANNEL SECTION

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT		
REVISIONS	DWN. BY	DATE
	FILE NO.	
	S.P. 100	

DIETERICH-POST CLEARPRINT 1020-10

EXHIBITS

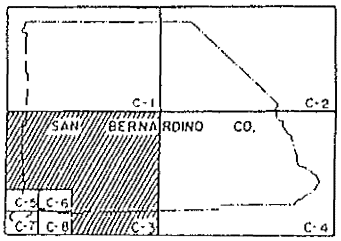
SOILS MAP



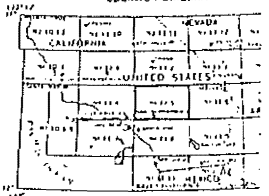
SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP FOR SOUTHCENTRAL AREA



INDEX MAP



NOAA ATLAS 14 POINT RAINFALLS

NOAA Atlas 14, Volume 6, Version 2
Location name: Hinkley, California, USA*
Latitude: 34.9455°, Longitude: -117.2462°
Elevation: 2233 ft**
* source: ESRI Maps
** source: USGS

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)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.080 (0.065-0.098)	0.113 (0.092-0.139)	0.158 (0.129-0.195)	0.196 (0.159-0.245)	0.251 (0.197-0.324)	0.296 (0.227-0.389)	0.343 (0.257-0.461)	0.393 (0.288-0.544)	0.466 (0.327-0.669)	0.524 (0.356-0.779)
10-min	0.114 (0.094-0.141)	0.161 (0.132-0.199)	0.226 (0.185-0.280)	0.282 (0.228-0.351)	0.360 (0.283-0.464)	0.424 (0.326-0.557)	0.491 (0.369-0.661)	0.564 (0.412-0.779)	0.667 (0.469-0.959)	0.752 (0.511-1.12)
15-min	0.138 (0.113-0.170)	0.195 (0.160-0.241)	0.274 (0.223-0.339)	0.340 (0.276-0.425)	0.436 (0.342-0.561)	0.513 (0.394-0.674)	0.594 (0.446-0.799)	0.682 (0.499-0.942)	0.807 (0.567-1.16)	0.909 (0.618-1.35)
30-min	0.191 (0.157-0.236)	0.270 (0.221-0.334)	0.379 (0.309-0.469)	0.472 (0.382-0.589)	0.604 (0.473-0.778)	0.710 (0.546-0.933)	0.823 (0.618-1.11)	0.945 (0.691-1.30)	1.12 (0.785-1.61)	1.26 (0.856-1.87)
60-min	0.258 (0.211-0.318)	0.364 (0.298-0.450)	0.510 (0.416-0.632)	0.635 (0.514-0.792)	0.813 (0.637-1.05)	0.956 (0.735-1.26)	1.11 (0.832-1.49)	1.27 (0.930-1.76)	1.50 (1.06-2.16)	1.70 (1.15-2.52)
2-hr	0.351 (0.287-0.433)	0.478 (0.391-0.590)	0.652 (0.532-0.808)	0.800 (0.648-0.999)	1.01 (0.793-1.30)	1.18 (0.907-1.55)	1.36 (1.02-1.83)	1.55 (1.13-2.14)	1.82 (1.28-2.62)	2.04 (1.39-3.03)
3-hr	0.412 (0.338-0.509)	0.556 (0.455-0.687)	0.752 (0.614-0.931)	0.919 (0.743-1.15)	1.16 (0.905-1.49)	1.34 (1.03-1.77)	1.54 (1.16-2.08)	1.76 (1.28-2.43)	2.06 (1.44-2.96)	2.30 (1.56-3.42)
6-hr	0.521 (0.427-0.643)	0.699 (0.571-0.863)	0.940 (0.767-1.16)	1.14 (0.926-1.43)	1.43 (1.12-1.84)	1.66 (1.28-2.18)	1.90 (1.43-2.56)	2.16 (1.58-2.98)	2.51 (1.77-3.61)	2.80 (1.90-4.16)
12-hr	0.616 (0.504-0.760)	0.837 (0.685-1.03)	1.14 (0.927-1.41)	1.39 (1.12-1.73)	1.74 (1.36-2.24)	2.01 (1.55-2.65)	2.30 (1.73-3.10)	2.61 (1.91-3.60)	3.03 (2.13-4.36)	3.37 (2.29-5.00)
24-hr	0.772 (0.685-0.888)	1.07 (0.949-1.23)	1.47 (1.30-1.70)	1.80 (1.58-2.10)	2.26 (1.92-2.72)	2.62 (2.17-3.22)	2.99 (2.42-3.76)	3.38 (2.66-4.37)	3.91 (2.95-5.28)	4.33 (3.16-6.06)
2-day	0.902 (0.801-1.04)	1.26 (1.12-1.45)	1.74 (1.54-2.01)	2.13 (1.87-2.48)	2.67 (2.26-3.21)	3.09 (2.56-3.79)	3.51 (2.85-4.43)	3.96 (3.12-5.13)	4.56 (3.45-6.16)	5.04 (3.68-7.04)
3-day	0.972 (0.863-1.12)	1.37 (1.21-1.57)	1.88 (1.67-2.18)	2.31 (2.02-2.69)	2.89 (2.45-3.47)	3.33 (2.76-4.09)	3.78 (3.07-4.77)	4.25 (3.35-5.51)	4.89 (3.70-6.61)	5.39 (3.94-7.54)
4-day	1.02 (0.906-1.17)	1.44 (1.27-1.65)	1.98 (1.75-2.29)	2.43 (2.13-2.82)	3.03 (2.57-3.64)	3.49 (2.90-4.29)	3.96 (3.21-4.98)	4.44 (3.50-5.75)	5.09 (3.85-6.88)	5.60 (4.09-7.83)
7-day	1.10 (0.981-1.27)	1.55 (1.37-1.78)	2.13 (1.88-2.46)	2.60 (2.28-3.02)	3.22 (2.73-3.88)	3.70 (3.07-4.55)	4.18 (3.39-5.27)	4.68 (3.68-6.06)	5.34 (4.03-7.21)	5.84 (4.26-8.17)
10-day	1.16 (1.03-1.34)	1.63 (1.45-1.88)	2.24 (1.98-2.58)	2.73 (2.39-3.17)	3.38 (2.87-4.07)	3.88 (3.22-4.76)	4.38 (3.54-5.51)	4.88 (3.84-6.32)	5.56 (4.20-7.51)	6.08 (4.43-8.49)
20-day	1.34 (1.19-1.54)	1.90 (1.68-2.18)	2.62 (2.32-3.02)	3.20 (2.81-3.72)	3.98 (3.38-4.79)	4.58 (3.80-5.62)	5.17 (4.19-6.52)	5.78 (4.55-7.49)	6.58 (4.98-8.89)	7.20 (5.25-10.1)
30-day	1.51 (1.34-1.74)	2.15 (1.91-2.48)	2.99 (2.64-3.45)	3.67 (3.22-4.27)	4.59 (3.90-5.53)	5.30 (4.40-6.51)	6.00 (4.86-7.56)	6.73 (5.30-8.71)	7.69 (5.81-10.4)	8.42 (6.15-11.8)
45-day	1.74 (1.54-2.00)	2.49 (2.20-2.86)	3.48 (3.08-4.02)	4.30 (3.77-5.00)	5.41 (4.59-6.51)	6.27 (5.21-7.71)	7.14 (5.79-9.00)	8.04 (6.33-10.4)	9.24 (6.98-12.5)	10.2 (7.42-14.2)
60-day	1.91 (1.69-2.19)	2.74 (2.43-3.16)	3.85 (3.41-4.45)	4.77 (4.18-5.55)	6.04 (5.12-7.27)	7.02 (5.83-8.63)	8.04 (6.51-10.1)	9.08 (7.15-11.8)	10.5 (7.93-14.2)	11.6 (8.46-16.2)

[1] 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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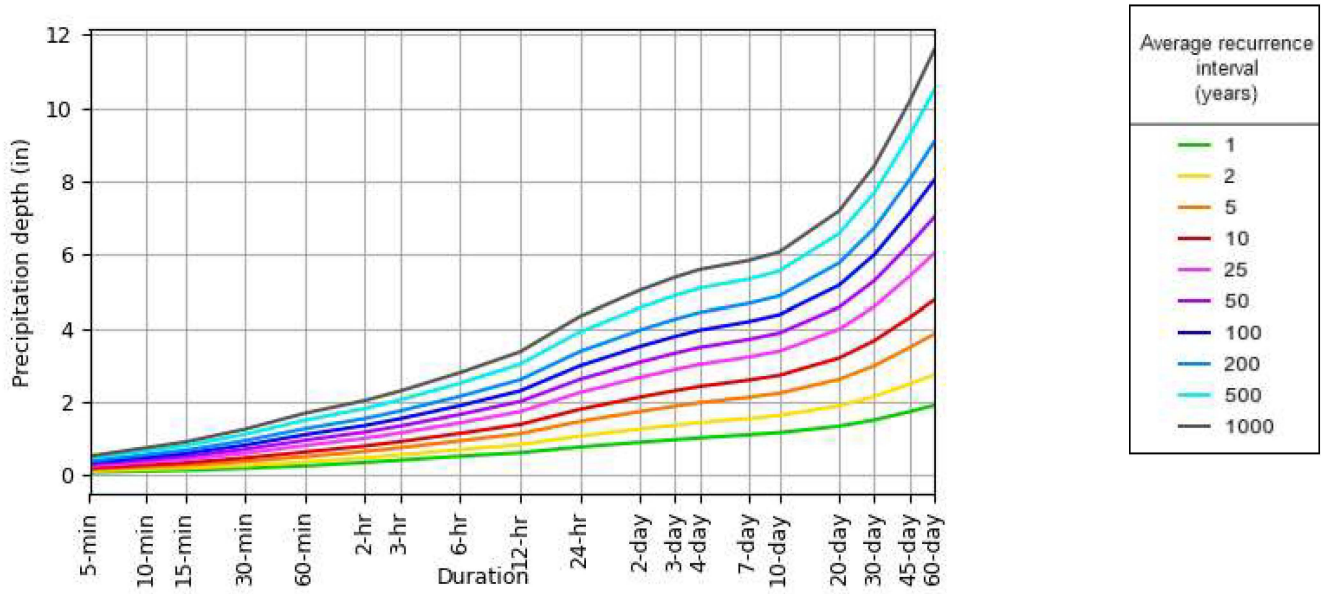
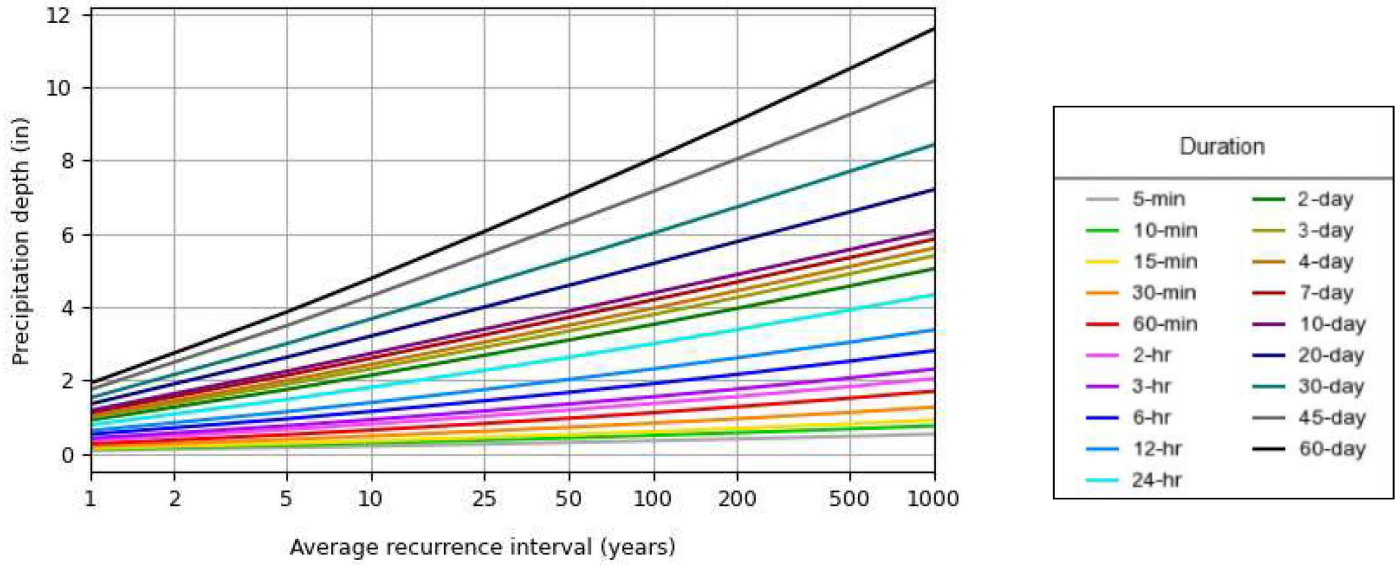
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.9455°, Longitude: -117.2462°





NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Jan 25 19:48:17 2024

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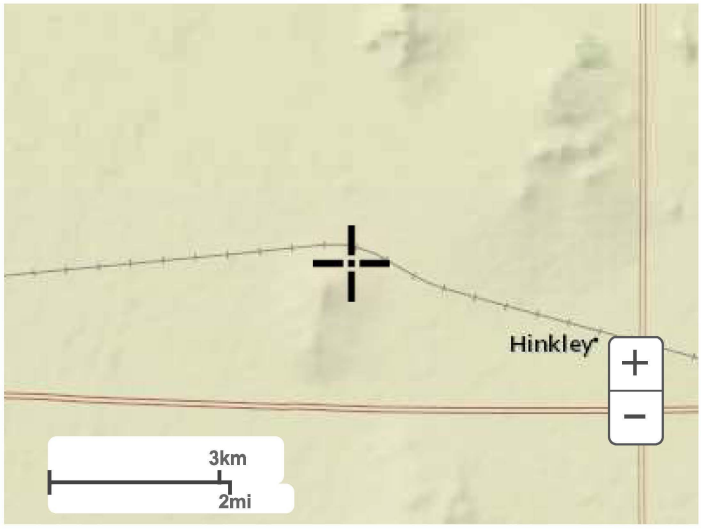
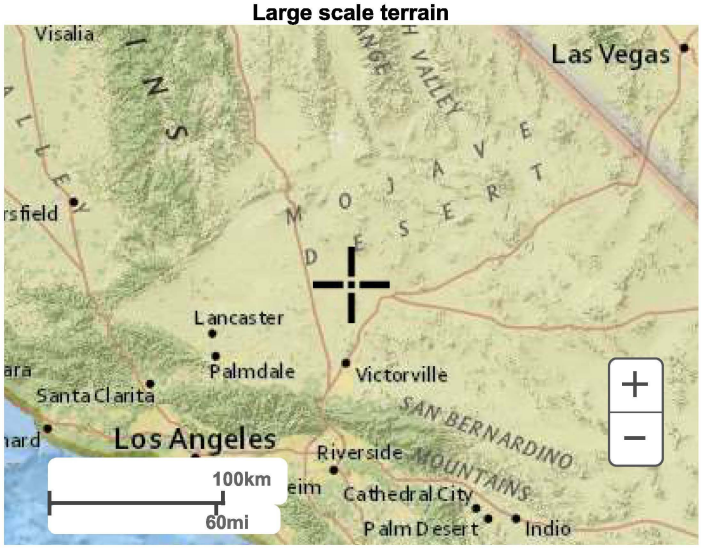
Maps & aerials

Small scale terrain

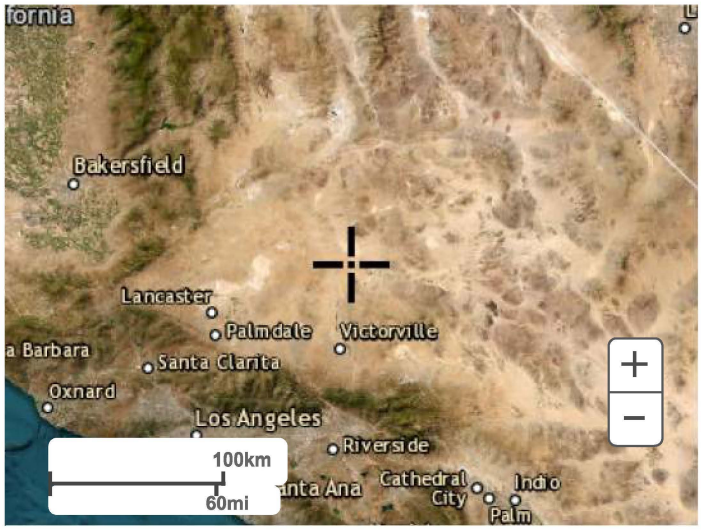


Large scale terrain



Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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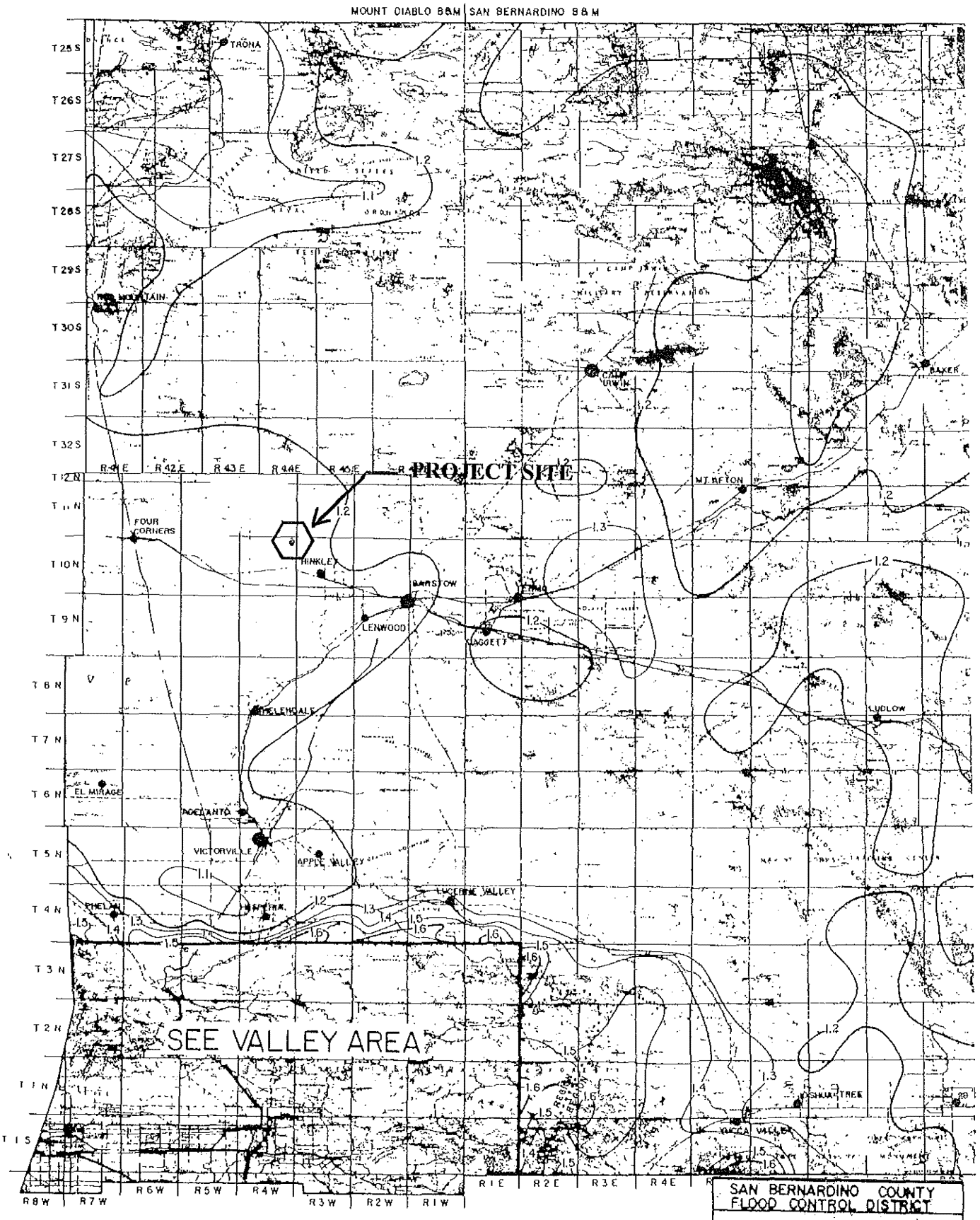

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

DESERT AREA
ISOHYETALS
Y_{100} - 100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRAWING NO.

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL