Appendix I
Water Resources

SLOVER DISTRIBUTION CENTER

DRAFT

ENVIRONMENTAL IMPACT REPORT

PRELIMINARY HYDROLOGY REPORT

For

Bloomington Business Center

P201300504

PROJECT LOCATION

SEC Laurel Avenue & Slover Avenue
County of San Bernardino, CA

DEVELOPER

JM Realty Group, Inc
3535 Inland Empire Boulevard
Ontario, CA 91764
909-941-2520

PREPARED BY

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David White, P.E.
C52921, Exp 12/31/2014

PREPARATION DATE

May 28, 2014

HZ PROJECT NUMBER

30-2451-01

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List of Appendices

Introduction
This preliminary hydrology report has been prepared for the JM Realty Group, Inc. The project is a new development of an industrial warehouse facility located at the southeast corner of Laurel Ave and Slover Ave, in the County of San Bernardino. The proposed building is approximately 344,000 square feet in size on approximately 17.34 acres of partially developed land.

Purpose
The purpose of this report is to present the drainage concept for the project and to determine the design flow rates and estimate storm drain sizes that will be needed for the project site. The hydrology maps and calculations reflect the tributary areas and Q_{100} flows.

Existing Condition
The existing topography slopes from northwest to southeast at about 1.0 - 1.2%. Runoff sheet flows southeastly towards Locust Avenue. There are no existing storm drain facilities near the project site.

Discussion
Runoff on north side of the site will sheet flow to a proposed gutter and discharge to an on-site underground detention system. Overflow water will flow through the on-site storm drain to the on-site infiltration basin at southeast corner of the project site.

Runoff on the south side of the site will sheet flow southerly and discharge to proposed catch basins. These flows will be conveyed through the proposed storm drain and directed easterly to the on-site infiltration basin at southeast corner of the project site.

Runoff on the east & west sides of the site will sheet flow to the proposed gutter and flow southerly to a proposed catch basin. Flows will be conveyed through the proposed storm drain and directed easterly to the on-site infiltration basin at southeast corner of the project site.

Hydrologic Analysis
A hydrologic analysis was prepared using the methodology outlined in the San Bernardino County Flood Control District (SBCFCD) Hydrology Manual. A rational method analysis was completed for the existing and proposed 100-year return event using Civild software, version 7.1.

The 100-year, 1-hour rainfall rate was taken from the isohyetal maps in the Hydrology Manual. The hydrologic soils type for the site is "B" and was taken from the soil map in the Hydrology Manual (see Appendix E for reference maps). A "commercial" land use was used with an AMC of III for the proposed condition.

Detention Analysis
Unit Hydrograph analyses were run to determine the detention volume required to mitigate the increase in Q_{100}. The detention system was sized to hold the volume generated from a 24 hour, 100 year storm until the developed peak Q drops to 90% of the pre-developed Q. This occurs at hour 16+30 of the proposed unit hydrograph and results in a storage requirement of 7.70 ac-ft.

Results
All proposed drainage and storm drain facilities are sized adequately for Q_{100}. Additional calculations will be provided in final Drainage Report including storm drain hydraulics and catch basin sizing.

The triple 6' parkway culvert will release 90% of the existing Q100 runoff. The top slab of the culvert will act as an emergency spillway it the capacity of the culvert is exceeded or it becomes clogged.

Appendix A
Existing Condition Hydrology Map

SLOVER AVENUE

LAUREL AVENUE

LOCUST AVENUE

OTILLA STREET

1 1077.50 FS
Q100=21.01 CFS
TC=17.02 MIN

2 1069.40 FS
Q100=21.01 CFS
TC=17.02 MIN

3 1067.20 FS
Q100=30.57 CFS
TC=28.14 MIN

A=8.67 AC
L=662'

A=8.67 AC
L=697'

HV-105

HV-104

HV-101

HV-114

DIRT

CONC

ASPH

LEGEND

NO. — HYDROLOGY MODEL NODE NUMBER

A= XXX.X AC — TRIBUTARY AREA IN ACRES

L= XXX.X — LENGTH OF FLOW

DRAINAGE BOUNDARY

FLOW DIRECTION

SCALE: 1"=40'

N

GRAPHIC SCALE

40 0 40 80 120

(IN FEET)
1"=40'

NOTE: EXISTING LOTS TO BE CONSOLIDATED VIA LOT MERGER

AREA = 17.34 AC. GROSS & NET

REGISTERED PROFESSIONAL ENGINEER
MAURICE H. MURAD
No. 33366
Expiration
6-30-14
CIVIL
STATE OF CALIFORNIA

REV	DESCRIPTION	DATE

HYDROLOGY MAP - EXISTING CONDITION

BLOOMINGTON BUSINESS CENTER
SE CORNER LAUREL AVE. & SLOVER AVE.
COUNTY OF SAN BERNARDINO

HUITT-ZOLLARS

HUITT-ZOLLARS, INC.
3990 CONCOURS, SUITE 330 * ONTARIO, CALIFORNIA 91764 * (909) 941-7799

APPROVED BY MAURICE H. MURAD — R.C.E. 33366 — EXPIRES 6-30-14 — DATE

DESIGNED BY	J.M.
DRAWN BY	H-Z STAFF
CHECKED BY	M.H.M.
FIELD BOOK	

SHEET 1 OF 1 SHEETS

JOB NO.

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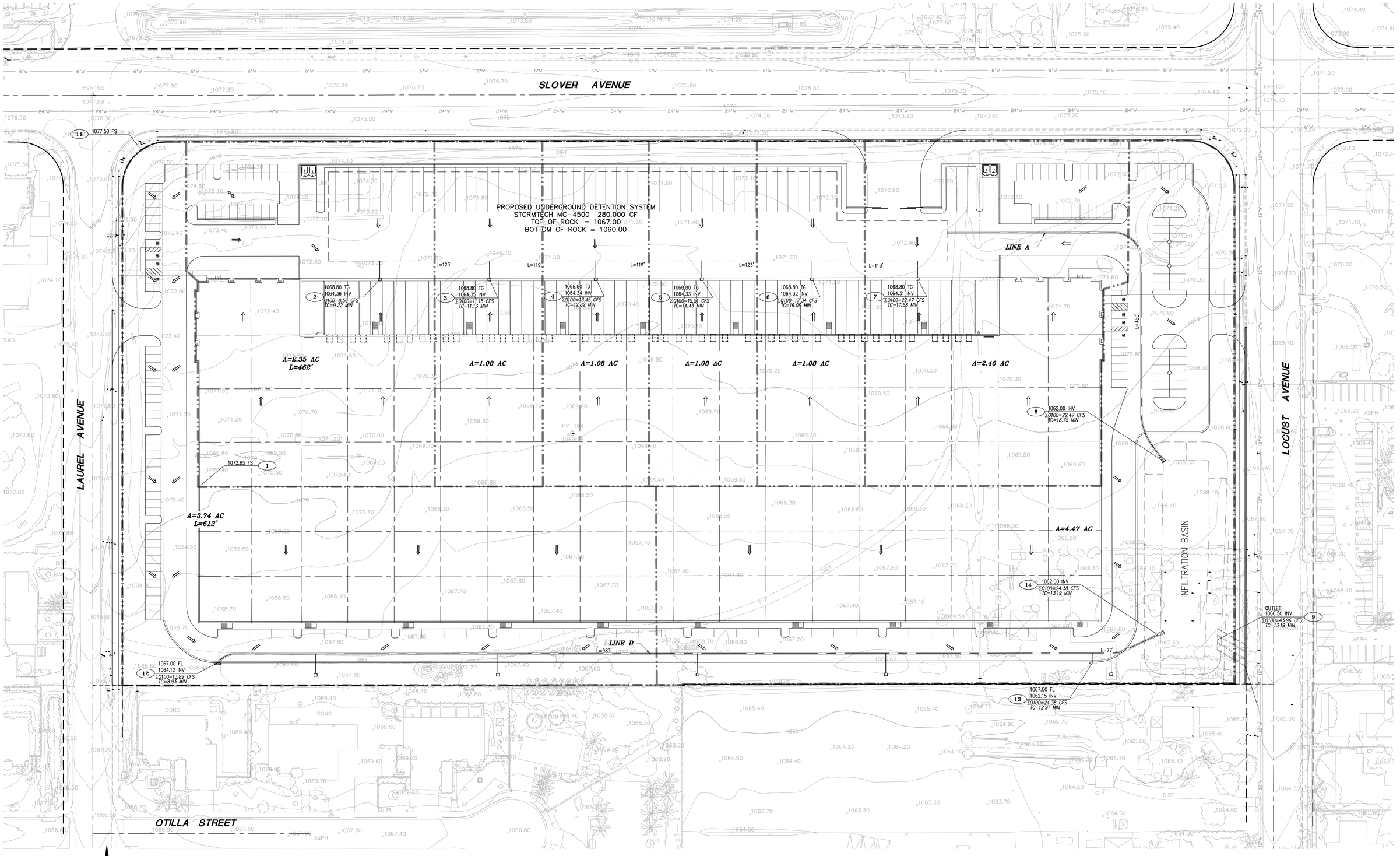
Appendix B
Proposed Condition Hydrology Map



SCALE: 1"=40'

LEGEND

- NO. — HYDROLOGY MODEL NODE NUMBER
- A= XXX.X AC — TRIBUTARY AREA IN ACRES
- L= XXX.X — LENGTH OF FLOW
- DRAINAGE BOUNDARY
- DRAINAGE INLET
- PROPOSED STORM DRAIN
- FLOW DIRECTION

GRAPHIC SCALE

40 0 40 80 120

(IN FEET)
1"=40'

NOTE: EXISTING LOTS TO BE CONSOLIDATED VIA LOT MERGER

AREA = 17.34 AC. GROSS & NET

REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD No. 33366 Expiration 6-30-14 CIVIL STATE OF CALIFORNIA

REV	DESCRIPTION	DATE

HYDROLOGY MAP - PROPOSED CONDITION

BLOOMINGTON BUSINESS CENTER
SE CORNER LAUREL AVE. & SLOVER AVE.
COUNTY OF SAN BERNARDINO

HUITT-ZOLLARS
HUITT-ZOLLARS, INC.
3990 CONCOURS, SUITE 330 • ONTARIO, CALIFORNIA 91764 • (909) 941-7799
APPROVED BY MAURICE H. MURAD R.C.E. 33366 EXPIRES 6-30-14 DATE

DESIGNED BY	J.M.
DRAWN BY	H-Z STAFF
CHECKED BY	M.H.M.
FIELD BOOK	
JOB NO.	

SHEET 1 OF 1 SHEETS

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Appendix C
100-year Rational Method Hydrologic Analysis

```
                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

      CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005
Version 7.1
           Rational Hydrology Study        Date: 05/28/14
      ---------------------------------------------------------------------
------
      BLOOMINGTON BUSINESS CENTER
      100 YEAR STORM EVENT
      ON-SITE EXISTING CONDITION

      ---------------------------------------------------------------------
------

      Program License Serial Number 6145

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

      ---------------------------------------------------------------------
------
      Rational hydrology study storm event year is   100.0
      Computed rainfall intensity:
      Storm year =   100.00   1 hour rainfall =     1.330 (In.)
      Slope used for rainfall intensity curve b =  0.6000
      Soil antecedent moisture condition (AMC) = 3

      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        1.000 to Point/Station
2.000
      **** INITIAL AREA EVALUATION ****
      ---------------------------------------------------------------------
____
      UNDEVELOPED (poor cover) subarea
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 78.00
      Adjusted SCS curve number for AMC 3 = 92.80
      Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.140
(In/Hr)
      Initial subarea data:
      Initial area flow distance =   662.000(Ft.)
      Top (of initial area) elevation =  1077.500(Ft.)
      Bottom (of initial area) elevation =  1069.400(Ft.)
      Difference in elevation =     8.100(Ft.)
      Slope =    0.01224  s(%)=       1.22
      TC = k(0.525)*[(length^3)/(elevation change)]^0.2
      Initial area time of concentration =   17.021 min.
      Rainfall intensity =      2.832(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.856
      Subarea runoff =     21.009(CFS)
      Total initial stream area =        8.670(Ac.)
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```
      Pervious area fraction = 1.000
      Initial area Fm value =    0.140(In/Hr)


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++++
      Process from Point/Station        2.000 to Point/Station
3.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ------------------------------------------------------------------------
----
      Upstream point elevation =  1069.400(Ft.)
      Downstream point elevation =  1067.200(Ft.)
      Channel length thru subarea  =   697.000(Ft.)
      Channel base width      =  100.000(Ft.)
      Slope or 'Z' of left channel bank = 100.000
      Slope or 'Z' of right channel bank = 100.000
      Estimated mean flow rate at midpoint of channel =     25.790(CFS)
      Manning's 'N'    = 0.025
      Maximum depth of channel  =    1.000(Ft.)
      Flow(q) thru subarea =     25.790(CFS)
      Depth of flow =   0.205(Ft.), Average velocity =   1.045(Ft/s)
      Channel flow top width =  140.966(Ft.)
      Flow Velocity =    1.05(Ft/s)
      Travel time  =   11.12 min.
      Time of concentration =   28.14 min.
      Critical depth =      0.122(Ft.)
       Adding area flow to channel
      UNDEVELOPED (poor cover) subarea
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 78.00
      Adjusted SCS curve number for AMC 3 = 92.80
      Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.140
(In/Hr)
      Rainfall intensity =      2.095(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.840
      Subarea runoff =      9.500(CFS) for    8.670(Ac.)
      Total runoff =     30.509(CFS)
      Effective area this stream =       17.34(Ac.)
      Total Study Area (Main Stream No. 1) =       17.34(Ac.)
      Area averaged Fm value =    0.140(In/Hr)
      Depth of flow =   0.225(Ft.), Average velocity =   1.105(Ft/s)
      Critical depth =      0.137(Ft.)
      End of computations, Total Study Area =           17.34 (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 =  78.0
```

```
                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

       CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005
Version 7.1
            Rational Hydrology Study        Date: 05/28/14
      ------------------------------------------------------------------------
------
      BLOOMINGTON BUSINESS CENTER
      100 YEAR STORM EVENT
      ON-SITE PROPOSED CONDITION

      ------------------------------------------------------------------------
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      Program License Serial Number 6145

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

      ------------------------------------------------------------------------
------
      Rational hydrology study storm event year is   100.0
      Computed rainfall intensity:
      Storm year =   100.00   1 hour rainfall =     1.330 (In.)
      Slope used for rainfall intensity curve b =  0.6000
      Soil antecedent moisture condition (AMC) = 3


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        1.000 to Point/Station
2.000
      **** INITIAL AREA EVALUATION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Initial subarea data:
      Initial area flow distance =   462.000(Ft.)
      Top (of initial area) elevation =  1072.650(Ft.)
      Bottom (of initial area) elevation =  1068.800(Ft.)
      Difference in elevation =     3.850(Ft.)
      Slope =    0.00833  s(%)=       0.83
      TC = k(0.304)*[(length^3)/(elevation change)]^0.2
      Initial area time of concentration =    9.217 min.
      Rainfall intensity =      4.093(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
      Subarea runoff =      8.563(CFS)
      Total initial stream area =        2.350(Ac.)
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      Pervious area fraction = 0.100
      Initial area Fm value =    0.044(In/Hr)


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++++
      Process from Point/Station        2.000 to Point/Station
3.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.360(Ft.)
      Downstream point/station elevation =  1064.350(Ft.)
      Pipe length  =   123.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     8.563(CFS)
      Nearest computed pipe diameter  =     42.00(In.)
      Calculated individual pipe flow  =     8.563(CFS)
      Normal flow depth in pipe =   32.48(In.)
      Flow top width inside pipe =   35.16(In.)
      Critical Depth =   10.60(In.)
      Pipe flow velocity =      1.07(Ft/s)
      Travel time through pipe =    1.91 min.
      Time of concentration (TC) =    11.13 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        3.000 to Point/Station
3.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    11.13 min.
      Rainfall intensity =      3.655(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.889
      Subarea runoff =      2.584(CFS) for    1.080(Ac.)
      Total runoff =     11.147(CFS)
      Effective area this stream =        3.43(Ac.)
      Total Study Area (Main Stream No. 1) =        3.43(Ac.)
      Area averaged Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        3.000 to Point/Station
4.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.350(Ft.)
```

```
      Downstream point/station elevation =  1064.340(Ft.)
      Pipe length  =   119.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    11.147(CFS)
      Nearest computed pipe diameter  =     48.00(In.)
      Calculated individual pipe flow  =    11.147(CFS)
      Normal flow depth in pipe =   33.89(In.)
      Flow top width inside pipe =   43.73(In.)
      Critical Depth =   11.66(In.)
      Pipe flow velocity =      1.18(Ft/s)
      Travel time through pipe =    1.69 min.
      Time of concentration (TC) =    12.82 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        4.000 to Point/Station
4.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    12.82 min.
      Rainfall intensity =      3.358(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.888
      Subarea runoff =      2.305(CFS) for    1.080(Ac.)
      Total runoff =     13.452(CFS)
      Effective area this stream =        4.51(Ac.)
      Total Study Area (Main Stream No. 1) =        4.51(Ac.)
      Area averaged Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        4.000 to Point/Station
5.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.340(Ft.)
      Downstream point/station elevation =  1064.330(Ft.)
      Pipe length  =   119.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    13.452(CFS)
      Nearest computed pipe diameter  =     51.00(In.)
      Calculated individual pipe flow  =    13.452(CFS)
      Normal flow depth in pipe =   36.75(In.)
      Flow top width inside pipe =   45.77(In.)
      Critical Depth =   12.63(In.)
      Pipe flow velocity =      1.23(Ft/s)
      Travel time through pipe =    1.61 min.
      Time of concentration (TC) =    14.43 min.
```

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      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        5.000 to Point/Station
5.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    14.43 min.
      Rainfall intensity =      3.127(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.887
      Subarea runoff =      2.061(CFS) for    1.080(Ac.)
      Total runoff =     15.513(CFS)
      Effective area this stream =        5.59(Ac.)
      Total Study Area (Main Stream No. 1) =        5.59(Ac.)
      Area averaged Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        5.000 to Point/Station
6.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.330(Ft.)
      Downstream point/station elevation =  1064.320(Ft.)
      Pipe length  =   123.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    15.513(CFS)
      Nearest computed pipe diameter  =     54.00(In.)
      Calculated individual pipe flow  =    15.513(CFS)
      Normal flow depth in pipe =   39.14(In.)
      Flow top width inside pipe =   48.23(In.)
      Critical Depth =   13.37(In.)
      Pipe flow velocity =      1.26(Ft/s)
      Travel time through pipe =    1.63 min.
      Time of concentration (TC) =    16.06 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        6.000 to Point/Station
6.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
```

```
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    16.06 min.
      Rainfall intensity =      2.933(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.887
      Subarea runoff =      1.829(CFS) for    1.080(Ac.)
      Total runoff =     17.342(CFS)
      Effective area this stream =        6.67(Ac.)
      Total Study Area (Main Stream No. 1) =        6.67(Ac.)
      Area averaged Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        6.000 to Point/Station
7.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
------
      Upstream point/station elevation =  1064.320(Ft.)
      Downstream point/station elevation =  1064.310(Ft.)
      Pipe length  =   118.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    17.342(CFS)
      Nearest computed pipe diameter  =     54.00(In.)
      Calculated individual pipe flow  =    17.342(CFS)
      Normal flow depth in pipe =   42.38(In.)
      Flow top width inside pipe =   44.39(In.)
      Critical depth could not be calculated.
      Pipe flow velocity =      1.30(Ft/s)
      Travel time through pipe =    1.52 min.
      Time of concentration (TC) =    17.58 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        7.000 to Point/Station
7.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
------
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    17.58 min.
      Rainfall intensity =      2.778(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.886
      Subarea runoff =      5.125(CFS) for    2.460(Ac.)
      Total runoff =     22.467(CFS)
```

```
      Effective area this stream =        9.13(Ac.)
      Total Study Area (Main Stream No. 1) =        9.13(Ac.)
      Area averaged Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        7.000 to Point/Station
8.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.310(Ft.)
      Downstream point/station elevation =  1062.000(Ft.)
      Pipe length  =   460.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    22.467(CFS)
      Nearest computed pipe diameter  =     30.00(In.)
      Calculated individual pipe flow  =    22.467(CFS)
      Normal flow depth in pipe =   19.80(In.)
      Flow top width inside pipe =   28.42(In.)
      Critical Depth =   19.34(In.)
      Pipe flow velocity =      6.54(Ft/s)
      Travel time through pipe =    1.17 min.
      Time of concentration (TC) =    18.75 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station        8.000 to Point/Station
9.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ------------------------------------------------------------------------
----
      Along Main Stream number: 1 in normal stream number 1
      Stream flow area =      9.130(Ac.)
      Runoff from this stream =     22.467(CFS)
      Time of concentration =   18.75 min.
      Rainfall intensity =     2.673(In/Hr)
      Area averaged loss rate (Fm) =    0.0440(In/Hr)
      Area averaged Pervious ratio (Ap) = 0.1000


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station       11.000 to Point/Station
12.000
      **** INITIAL AREA EVALUATION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Initial subarea data:
      Initial area flow distance =   612.000(Ft.)
      Top (of initial area) elevation =  1077.500(Ft.)
```

```
      Bottom (of initial area) elevation =  1067.000(Ft.)
      Difference in elevation =    10.500(Ft.)
      Slope =    0.01716  s(%)=       1.72
      TC = k(0.304)*[(length^3)/(elevation change)]^0.2
      Initial area time of concentration =    8.927 min.
      Rainfall intensity =      4.172(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
      Subarea runoff =     13.894(CFS)
      Total initial stream area =        3.740(Ac.)
      Pervious area fraction = 0.100
      Initial area Fm value =    0.044(In/Hr)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station       12.000 to Point/Station
13.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =  1064.120(Ft.)
      Downstream point/station elevation =  1062.150(Ft.)
      Pipe length  =   983.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    13.894(CFS)
      Nearest computed pipe diameter  =     30.00(In.)
      Calculated individual pipe flow  =    13.894(CFS)
      Normal flow depth in pipe =   19.50(In.)
      Flow top width inside pipe =   28.62(In.)
      Critical Depth =   15.06(In.)
      Pipe flow velocity =      4.11(Ft/s)
      Travel time through pipe =    3.98 min.
      Time of concentration (TC) =    12.91 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station       13.000 to Point/Station
13.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      COMMERCIAL subarea type
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 1.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      SCS curve number for soil(AMC 2)  = 56.00
      Adjusted SCS curve number for AMC 3 = 75.80
      Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044
(In/Hr)
      Time of concentration =    12.91 min.
      Rainfall intensity =      3.343(In/Hr) for a   100.0 year storm
      Effective runoff coefficient used for area,(total area with
modified
      rational method)(Q=KCIA) is C = 0.888
      Subarea runoff =     10.484(CFS) for    4.470(Ac.)
      Total runoff =     24.378(CFS)
      Effective area this stream =        8.21(Ac.)
      Total Study Area (Main Stream No. 1) =       17.34(Ac.)
      Area averaged Fm value =    0.044(In/Hr)
```

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station       13.000 to Point/Station
14.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
---
      Upstream point/station elevation =  1062.150(Ft.)
      Downstream point/station elevation =  1062.000(Ft.)
      Pipe length  =    77.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =    24.378(CFS)
      Nearest computed pipe diameter  =     36.00(In.)
      Calculated individual pipe flow  =    24.378(CFS)
      Normal flow depth in pipe =   24.98(In.)
      Flow top width inside pipe =   33.18(In.)
      Critical Depth =   19.10(In.)
      Pipe flow velocity =      4.65(Ft/s)
      Travel time through pipe =    0.28 min.
      Time of concentration (TC) =    13.19 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station       13.000 to Point/Station
9.000
      **** CONFLUENCE OF MINOR STREAMS ****
      ------------------------------------------------------------------------
---
      Along Main Stream number: 1 in normal stream number 2
      Stream flow area =      8.210(Ac.)
      Runoff from this stream =     24.378(CFS)
      Time of concentration =   13.19 min.
      Rainfall intensity =     3.301(In/Hr)
      Area averaged loss rate (Fm) =    0.0440(In/Hr)
      Area averaged Pervious ratio (Ap) = 0.1000
      Summary of stream data:

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


      1     22.47     9.130     18.75    0.044      2.673
      2     24.38     8.210     13.19    0.044      3.301
      Qmax(1) =
                1.000 *    1.000 *    22.467) +
                0.807 *    1.000 *    24.378) + =      42.141
      Qmax(2) =
                1.239 *    0.703 *    22.467) +
                1.000 *    1.000 *    24.378) + =      43.957

      Total of 2 streams to confluence:
      Flow rates before confluence point:
            22.467      24.378
      Maximum flow rates at confluence using above data:
             42.141       43.957
      Area of streams before confluence:
              9.130        8.210
      Effective area values after confluence:
             17.340       14.631
      Results of confluence:
```

Total flow rate = 43.957(CFS)
Time of concentration = 13.186 min.
Effective stream area after confluence = 14.631(Ac.)
Study area average Pervious fraction(Ap) = 0.100
Study area average soil loss rate(Fm) = 0.044(In/Hr)
Study area total (this main stream) = 17.34(Ac.)
End of computations, Total Study Area = 17.34 (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) = 0.100
Area averaged SCS curve number = 56.0

Appendix D
Unit Hydrograph Analysis

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

Study date 05/29/14

++

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

Program License Serial Number 6145

BLOOMINGTON BUSINESS CENTER
100 YEAR STORM EVENT
ON-SITE EXISTING CONDITION UNIT HYDROGRAPH

Storm Event Year = 100

Antecedent Moisture Condition = 3

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 100		
17.34	1	1.33
Rainfall data for year 100		
17.34	6	3.65
Rainfall data for year 100		
17.34	24	8.00

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
78.0	92.8	17.34	1.000	0.140	1.000	0.140

Area-averaged adjusted loss rate Fm (In/Hr) = 0.140

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
17.34	1.000	78.0	92.8	0.78	0.892

Area-averaged catchment yield fraction, Y = 0.892
Area-averaged low loss fraction, Yb = 0.108
Direct entry of lag time by user
++
Watershed area = 17.34(Ac.)
Catchment Lag time = 0.469 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 17.7683
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.140(In/Hr)
Average low loss rate fraction (Yb) = 0.108 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.470(In)
Specified peak 6-hour rainfall = 3.650(In)
Specified peak 24-hour rainfall = 8.000(In)

Rainfall depth area reduction factors:
Using a total area of 17.34(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.492(In)
30-minute factor = 0.999 Adjusted rainfall = 1.007(In)
1-hour factor = 0.999 Adjusted rainfall = 1.329(In)
3-hour factor = 1.000 Adjusted rainfall = 2.470(In)
6-hour factor = 1.000 Adjusted rainfall = 3.650(In)
24-hour factor = 1.000 Adjusted rainfall = 8.000(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 = 209.71 (CFS))	
1	1.554	3.259
2	5.772	8.845
3	12.987	15.129
4	23.289	21.604
5	35.578	25.771
6	48.125	26.311
7	57.871	20.439
8	64.636	14.187
9	69.603	10.415
10	73.215	7.574

11	76.012	5.866
12	78.504	5.226
13	80.632	4.463
14	82.487	3.890
15	84.172	3.533
16	85.697	3.199
17	87.007	2.748
18	88.157	2.410
19	89.223	2.236
20	90.276	2.208
21	91.127	1.785
22	91.909	1.639
23	92.665	1.586
24	93.262	1.251
25	93.830	1.192
26	94.391	1.175
27	94.926	1.122
28	95.459	1.118
29	95.939	1.008
30	96.332	0.823
31	96.722	0.820
32	97.075	0.739
33	97.394	0.671
34	97.712	0.667
35	97.982	0.566
36	98.231	0.522
37	98.473	0.509
38	98.663	0.398
39	98.841	0.373
40	99.018	0.373
41	99.196	0.373
42	99.374	0.373
43	99.552	0.373
44	99.729	0.373
45	99.907	0.373
46	100.000	0.195

Total soil rain loss = 0.81(In)
Total effective rainfall = 7.19(In)
Peak flow rate in flood hydrograph = 25.99(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

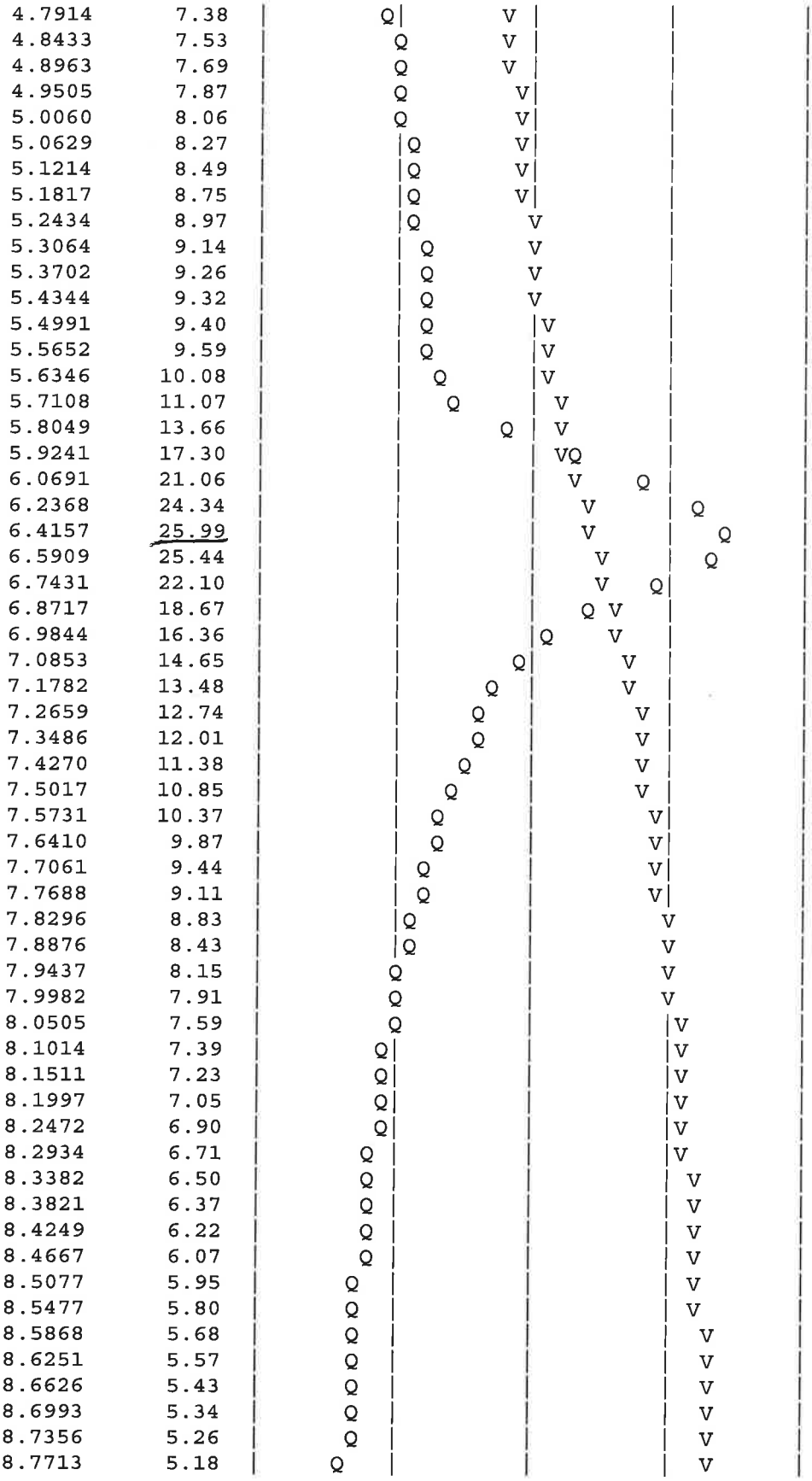
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0003	0.05	Q	|	|	|	|
0+10	0.0015	0.17	Q	|	|	|	|
0+15	0.0041	0.38	Q	|	|	|	|
0+20	0.0089	0.69	Q	|	|	|	|
0+25	0.0161	1.05	VQ	|	|	|	|

0+30	0.0259	1.42	VQ				
0+35	0.0377	1.71	V Q				
0+40	0.0509	1.92	V Q				
0+45	0.0651	2.07	V Q				
0+50	0.0801	2.18	V Q				
0+55	0.0957	2.26	V Q				
1+ 0	0.1118	2.34	V Q				
1+ 5	0.1284	2.41	V Q				
1+10	0.1454	2.47	V Q				
1+15	0.1628	2.53	V Q				
1+20	0.1806	2.58	V Q				
1+25	0.1986	2.62	V Q				
1+30	0.2170	2.66	V Q				
1+35	0.2356	2.70	V Q				
1+40	0.2544	2.74	V Q				
1+45	0.2735	2.77	|V Q				
1+50	0.2928	2.80	|V Q				
1+55	0.3123	2.83	|V Q				
2+ 0	0.3319	2.85	|V Q				
2+ 5	0.3517	2.88	|V Q				
2+10	0.3717	2.90	|V Q				
2+15	0.3918	2.92	|V Q				
2+20	0.4121	2.95	|V Q				
2+25	0.4326	2.97	|V Q				
2+30	0.4532	2.99	|V Q				
2+35	0.4739	3.01	|V Q				
2+40	0.4947	3.02	|V Q				
2+45	0.5156	3.04	|V Q				
2+50	0.5367	3.06	| V Q				
2+55	0.5579	3.08	| V Q				
3+ 0	0.5792	3.09	| V Q				
3+ 5	0.6006	3.11	| V Q				
3+10	0.6220	3.12	| V Q				
3+15	0.6436	3.13	| V Q				
3+20	0.6653	3.15	| V Q				
3+25	0.6871	3.16	| V Q				
3+30	0.7089	3.17	| V Q				
3+35	0.7309	3.19	| V Q				
3+40	0.7529	3.20	| V Q				
3+45	0.7751	3.22	| V Q				
3+50	0.7973	3.23	| VQ				
3+55	0.8196	3.24	| VQ				
4+ 0	0.8420	3.25	| VQ				
4+ 5	0.8644	3.26	| VQ				
4+10	0.8869	3.27	| VQ				
4+15	0.9095	3.27	| VQ				
4+20	0.9321	3.28	| VQ				
4+25	0.9548	3.29	| VQ				
4+30	0.9775	3.30	| VQ				
4+35	1.0003	3.31	| VQ				
4+40	1.0232	3.32	| VQ				
4+45	1.0462	3.33	| Q				
4+50	1.0692	3.34	| Q				
4+55	1.0923	3.35	| Q				
5+ 0	1.1155	3.36	| Q				
5+ 5	1.1387	3.37	| Q				
5+10	1.1620	3.39	| Q				

5+15	1.1854	3.40	Q				
5+20	1.2089	3.41	Q				
5+25	1.2324	3.42	Q				
5+30	1.2560	3.43	Q				
5+35	1.2797	3.44	Q				
5+40	1.3035	3.45	QV				
5+45	1.3273	3.46	QV				
5+50	1.3512	3.47	QV				
5+55	1.3752	3.49	QV				
6+ 0	1.3993	3.50	QV				
6+ 5	1.4235	3.51	QV				
6+10	1.4477	3.52	QV				
6+15	1.4721	3.53	QV				
6+20	1.4965	3.55	QV				
6+25	1.5210	3.56	QV				
6+30	1.5456	3.57	QV				
6+35	1.5702	3.58	Q V				
6+40	1.5950	3.60	Q V				
6+45	1.6199	3.61	Q V				
6+50	1.6448	3.62	Q V				
6+55	1.6698	3.64	Q V				
7+ 0	1.6950	3.65	Q V				
7+ 5	1.7202	3.66	Q V				
7+10	1.7455	3.68	Q V				
7+15	1.7709	3.69	Q V				
7+20	1.7964	3.70	Q V				
7+25	1.8220	3.72	Q V				
7+30	1.8478	3.73	Q V				
7+35	1.8736	3.75	Q V				
7+40	1.8995	3.76	Q V				
7+45	1.9255	3.78	Q V				
7+50	1.9516	3.79	Q V				
7+55	1.9779	3.81	Q V				
8+ 0	2.0042	3.82	Q V				
8+ 5	2.0306	3.84	Q V				
8+10	2.0572	3.86	Q V				
8+15	2.0839	3.87	Q V				
8+20	2.1107	3.89	Q V				
8+25	2.1376	3.91	Q V				
8+30	2.1646	3.92	Q V				
8+35	2.1918	3.94	Q V				
8+40	2.2190	3.96	Q V				
8+45	2.2464	3.98	Q V				
8+50	2.2739	4.00	Q V				
8+55	2.3016	4.01	Q V				
9+ 0	2.3293	4.03	Q V				
9+ 5	2.3572	4.05	Q V				
9+10	2.3853	4.07	Q V				
9+15	2.4134	4.09	Q V				
9+20	2.4418	4.11	Q V				
9+25	2.4702	4.13	Q V				
9+30	2.4988	4.15	Q V				
9+35	2.5275	4.17	Q V				
9+40	2.5564	4.19	Q V				
9+45	2.5855	4.22	Q V				
9+50	2.6146	4.24	Q V				
9+55	2.6440	4.26	Q V				

10+ 0	2.6735	4.28	Q V			
10+ 5	2.7031	4.31	Q V			
10+10	2.7330	4.33	Q V			
10+15	2.7629	4.35	Q V			
10+20	2.7931	4.38	Q V			
10+25	2.8234	4.40	Q V			
10+30	2.8539	4.43	Q V			
10+35	2.8846	4.46	Q |V			
10+40	2.9155	4.48	Q |V			
10+45	2.9466	4.51	Q |V			
10+50	2.9778	4.54	Q |V			
10+55	3.0093	4.57	Q |V			
11+ 0	3.0409	4.59	Q |V			
11+ 5	3.0728	4.62	Q |V			
11+10	3.1048	4.65	Q |V			
11+15	3.1371	4.69	Q | V			
11+20	3.1696	4.72	Q | V			
11+25	3.2023	4.75	Q | V			
11+30	3.2352	4.78	Q | V			
11+35	3.2684	4.82	Q | V			
11+40	3.3018	4.85	Q | V			
11+45	3.3354	4.89	Q | V			
11+50	3.3693	4.92	Q | V			
11+55	3.4035	4.96	Q | V			
12+ 0	3.4379	5.00	Q | V			
12+ 5	3.4726	5.04	Q | V			
12+10	3.5075	5.08	Q | V			
12+15	3.5428	5.11	Q | V			
12+20	3.5783	5.15	Q | V			
12+25	3.6140	5.20	Q | V			
12+30	3.6501	5.24	Q | V			
12+35	3.6865	5.28	Q | V			
12+40	3.7232	5.33	Q | V			
12+45	3.7602	5.38	Q | V			
12+50	3.7976	5.43	Q | V			
12+55	3.8353	5.48	Q | V			
13+ 0	3.8734	5.53	Q | V			
13+ 5	3.9118	5.59	Q | V			
13+10	3.9507	5.64	Q | V			
13+15	3.9900	5.70	Q | V			
13+20	4.0297	5.76	Q | V			
13+25	4.0698	5.83	Q | V			
13+30	4.1104	5.90	Q | V			
13+35	4.1515	5.96	Q | V			
13+40	4.1931	6.04	Q | V			
13+45	4.2352	6.11	Q | V			
13+50	4.2778	6.19	Q | V			
13+55	4.3210	6.27	Q | V			
14+ 0	4.3648	6.36	Q | V			
14+ 5	4.4092	6.45	Q | V			
14+10	4.4543	6.54	Q | V			
14+15	4.5000	6.64	Q | V			
14+20	4.5465	6.75	Q | V			
14+25	4.5938	6.86	Q| V			
14+30	4.6419	6.98	Q| V			
14+35	4.6908	7.10	Q| V			
14+40	4.7406	7.24	Q| V			

14+45	4.7914	7.38	
14+50	4.8433	7.53	
14+55	4.8963	7.69	
15+ 0	4.9505	7.87	
15+ 5	5.0060	8.06	
15+10	5.0629	8.27	
15+15	5.1214	8.49	
15+20	5.1817	8.75	
15+25	5.2434	8.97	
15+30	5.3064	9.14	
15+35	5.3702	9.26	
15+40	5.4344	9.32	
15+45	5.4991	9.40	
15+50	5.5652	9.59	
15+55	5.6346	10.08	
16+ 0	5.7108	11.07	
16+ 5	5.8049	13.66	
16+10	5.9241	17.30	
16+15	6.0691	21.06	
16+20	6.2368	24.34	
16+25	6.4157	25.99	
16+30	6.5909	25.44	
16+35	6.7431	22.10	
16+40	6.8717	18.67	
16+45	6.9844	16.36	
16+50	7.0853	14.65	
16+55	7.1782	13.48	
17+ 0	7.2659	12.74	
17+ 5	7.3486	12.01	
17+10	7.4270	11.38	
17+15	7.5017	10.85	
17+20	7.5731	10.37	
17+25	7.6410	9.87	
17+30	7.7061	9.44	
17+35	7.7688	9.11	
17+40	7.8296	8.83	
17+45	7.8876	8.43	
17+50	7.9437	8.15	
17+55	7.9982	7.91	
18+ 0	8.0505	7.59	
18+ 5	8.1014	7.39	
18+10	8.1511	7.23	
18+15	8.1997	7.05	
18+20	8.2472	6.90	
18+25	8.2934	6.71	
18+30	8.3382	6.50	
18+35	8.3821	6.37	
18+40	8.4249	6.22	
18+45	8.4667	6.07	
18+50	8.5077	5.95	
18+55	8.5477	5.80	
19+ 0	8.5868	5.68	
19+ 5	8.6251	5.57	
19+10	8.6626	5.43	
19+15	8.6993	5.34	
19+20	8.7356	5.26	
19+25	8.7713	5.18	

25.99 × 90% = 23.39 CFS

19+30	8.8064	5.11	Q			V
19+35	8.8411	5.03	Q			V
19+40	8.8751	4.95	Q			V
19+45	8.9086	4.86	Q			V
19+50	8.9409	4.70	Q			V
19+55	8.9723	4.55	Q			V
20+ 0	9.0031	4.48	Q			V
20+ 5	9.0336	4.42	Q			V
20+10	9.0637	4.37	Q			V
20+15	9.0934	4.32	Q			V
20+20	9.1228	4.26	Q			V
20+25	9.1518	4.22	Q			V
20+30	9.1805	4.17	Q			V
20+35	9.2089	4.12	Q			V
20+40	9.2370	4.08	Q			V
20+45	9.2649	4.04	Q			V
20+50	9.2924	4.00	Q			V
20+55	9.3197	3.96	Q			V
21+ 0	9.3468	3.93	Q			V
21+ 5	9.3736	3.89	Q			V
21+10	9.4002	3.86	Q			V
21+15	9.4265	3.82	Q			V
21+20	9.4526	3.79	Q			V
21+25	9.4785	3.76	Q			V
21+30	9.5042	3.73	Q			V
21+35	9.5297	3.70	Q			V
21+40	9.5550	3.67	Q			V
21+45	9.5801	3.64	Q			V
21+50	9.6050	3.62	Q			V
21+55	9.6297	3.59	Q			V
22+ 0	9.6543	3.56	Q			V
22+ 5	9.6786	3.54	Q			V
22+10	9.7028	3.51	Q			V
22+15	9.7269	3.49	Q			V
22+20	9.7507	3.47	Q			V
22+25	9.7745	3.44	Q			V
22+30	9.7980	3.42	Q			V
22+35	9.8214	3.40	Q			V
22+40	9.8447	3.38	Q			V
22+45	9.8678	3.36	Q			V
22+50	9.8908	3.34	Q			V
22+55	9.9136	3.32	Q			V
23+ 0	9.9363	3.30	Q			V
23+ 5	9.9589	3.28	Q			V
23+10	9.9813	3.26	Q			V
23+15	10.0036	3.24	Q			V
23+20	10.0258	3.22	Q			V
23+25	10.0478	3.20	Q			V
23+30	10.0698	3.18	Q			V
23+35	10.0916	3.17	Q			V
23+40	10.1133	3.15	Q			V
23+45	10.1349	3.13	Q			V
23+50	10.1563	3.12	Q			V
23+55	10.1777	3.10	Q			V
24+ 0	10.1989	3.09	Q			V
24+ 5	10.2198	3.02	Q			V
24+10	10.2396	2.89	Q			V

24+15	10.2580	2.66	| Q	|	|	|	V|
24+20	10.2741	2.34	| Q	|	|	|	V|
24+25	10.2877	1.97	| Q	|	|	|	V|
24+30	10.2986	1.59	| Q	|	|	|	V|
24+35	10.3075	1.30	|Q	|	|	|	V|
24+40	10.3151	1.09	|Q	|	|	|	V|
24+45	10.3215	0.94	|Q	|	|	|	V|
24+50	10.3272	0.83	|Q	|	|	|	V|
24+55	10.3323	0.74	Q	|	|	|	V|
25+ 0	10.3369	0.67	Q	|	|	|	V|
25+ 5	10.3411	0.60	Q	|	|	|	V|
25+10	10.3448	0.54	Q	|	|	|	V|
25+15	10.3482	0.49	Q	|	|	|	V|
25+20	10.3512	0.44	Q	|	|	|	V|
25+25	10.3540	0.40	Q	|	|	|	V|
25+30	10.3565	0.37	Q	|	|	|	V|
25+35	10.3588	0.33	Q	|	|	|	V|
25+40	10.3608	0.30	Q	|	|	|	V|
25+45	10.3627	0.27	Q	|	|	|	V|
25+50	10.3644	0.25	Q	|	|	|	V|
25+55	10.3660	0.23	Q	|	|	|	V|
26+ 0	10.3674	0.21	Q	|	|	|	V|
26+ 5	10.3687	0.19	Q	|	|	|	V|
26+10	10.3699	0.17	Q	|	|	|	V|
26+15	10.3709	0.15	Q	|	|	|	V|
26+20	10.3719	0.14	Q	|	|	|	V|
26+25	10.3728	0.12	Q	|	|	|	V|
26+30	10.3735	0.11	Q	|	|	|	V|
26+35	10.3742	0.10	Q	|	|	|	V|
26+40	10.3748	0.09	Q	|	|	|	V|
26+45	10.3754	0.08	Q	|	|	|	V|
26+50	10.3758	0.07	Q	|	|	|	V|
26+55	10.3763	0.06	Q	|	|	|	V|
27+ 0	10.3766	0.05	Q	|	|	|	V|
27+ 5	10.3769	0.05	Q	|	|	|	V|
27+10	10.3772	0.04	Q	|	|	|	V|
27+15	10.3775	0.03	Q	|	|	|	V|
27+20	10.3777	0.03	Q	|	|	|	V|
27+25	10.3778	0.02	Q	|	|	|	V|
27+30	10.3780	0.02	Q	|	|	|	V|
27+35	10.3780	0.01	Q	|	|	|	V|
27+40	10.3781	0.01	Q	|	|	|	V|
27+45	10.3781	0.00	Q	|	|	|	V

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

Study date 05/28/14

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

Program License Serial Number 6145

BLOOMINGTON BUSINESS CENTER
100 YEAR STORM EVENT
ON-SITE PROPOSED CONDITION UNIT HYDROGRAPH

Storm Event Year = 100

Antecedent Moisture Condition = 3

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 100		
17.34	1	1.33
Rainfall data for year 100		
17.34	6	3.65
Rainfall data for year 100		
17.34	24	8.00

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
56.0	75.8	17.34	1.000	0.440	0.100	0.044

Area-averaged adjusted loss rate Fm (In/Hr) = 0.044

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.73	0.100	56.0	75.8	3.19	0.642
15.61	0.900	98.0	98.0	0.20	0.970

Area-averaged catchment yield fraction, Y = 0.937
Area-averaged low loss fraction, Yb = 0.063
Direct entry of lag time by user
++
Watershed area = 17.34(Ac.)
Catchment Lag time = 0.220 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 37.8788
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.044(In/Hr)
Average low loss rate fraction (Yb) = 0.063 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.470(In)
Specified peak 6-hour rainfall = 3.650(In)
Specified peak 24-hour rainfall = 8.000(In)

Rainfall depth area reduction factors:
Using a total area of 17.34(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.492(In)
30-minute factor = 0.999 Adjusted rainfall = 1.007(In)
1-hour factor = 0.999 Adjusted rainfall = 1.329(In)
3-hour factor = 1.000 Adjusted rainfall = 2.470(In)
6-hour factor = 1.000 Adjusted rainfall = 3.650(In)
24-hour factor = 1.000 Adjusted rainfall = 8.000(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 = 209.71 (CFS))		
1	2.779	5.827
2	17.621	31.126
3	44.979	57.371
4	74.125	61.121
5	89.084	31.369
6	95.596	13.655
7	98.152	5.360
8	98.914	1.598
9	99.595	1.429

```
 10              100.000                    0.849
--------------------------------------------------------------------------
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Total soil rain loss =      0.46(In)
Total effective rainfall =      7.54(In)
Peak flow rate in flood hydrograph =     45.59(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       12.5       25.0       37.5       50.0
--------------------------------------------------------------------------
  0+ 5       0.0006       0.09  Q        |          |          |          |
  0+10       0.0043       0.55  Q        |          |          |          |
  0+15       0.0139       1.39  VQ       |          |          |          |
  0+20       0.0297       2.30  VQ       |          |          |          |
  0+25       0.0488       2.76  V Q      |          |          |          |
  0+30       0.0692       2.97  V Q      |          |          |          |
  0+35       0.0903       3.06  V Q      |          |          |          |
  0+40       0.1116       3.09  V Q      |          |          |          |
  0+45       0.1330       3.12  V Q      |          |          |          |
  0+50       0.1546       3.14  V Q      |          |          |          |
  0+55       0.1763       3.14  V Q      |          |          |          |
  1+ 0       0.1980       3.15  V Q      |          |          |          |
  1+ 5       0.2197       3.16  V Q      |          |          |          |
  1+10       0.2415       3.17  V Q      |          |          |          |
  1+15       0.2634       3.17  V Q      |          |          |          |
  1+20       0.2853       3.18  |VQ      |          |          |          |
  1+25       0.3073       3.19  |VQ      |          |          |          |
  1+30       0.3293       3.20  |VQ      |          |          |          |
  1+35       0.3513       3.20  |VQ      |          |          |          |
  1+40       0.3735       3.21  |VQ      |          |          |          |
  1+45       0.3956       3.22  |VQ      |          |          |          |
  1+50       0.4179       3.23  |VQ      |          |          |          |
  1+55       0.4402       3.24  |VQ      |          |          |          |
  2+ 0       0.4625       3.24  |VQ      |          |          |          |
  2+ 5       0.4849       3.25  |VQ      |          |          |          |
  2+10       0.5074       3.26  |VQ      |          |          |          |
  2+15       0.5299       3.27  |VQ      |          |          |          |
  2+20       0.5525       3.28  | Q      |          |          |          |
  2+25       0.5751       3.29  | Q      |          |          |          |
  2+30       0.5978       3.30  | Q      |          |          |          |
  2+35       0.6205       3.30  | Q      |          |          |          |
  2+40       0.6434       3.31  | Q      |          |          |          |
  2+45       0.6662       3.32  | Q      |          |          |          |
  2+50       0.6892       3.33  | Q      |          |          |          |
  2+55       0.7122       3.34  | Q      |          |          |          |
  3+ 0       0.7352       3.35  | Q      |          |          |          |
  3+ 5       0.7584       3.36  | Q      |          |          |          |
  3+10       0.7815       3.37  | Q      |          |          |          |
  3+15       0.8048       3.38  | Q      |          |          |          |
  3+20       0.8281       3.39  | QV     |          |          |          |
```

3+25	0.8515	3.39	QV			
3+30	0.8749	3.40	QV			
3+35	0.8984	3.41	QV			
3+40	0.9220	3.42	QV			
3+45	0.9457	3.43	QV			
3+50	0.9694	3.44	QV			
3+55	0.9932	3.45	QV			
4+ 0	1.0170	3.46	QV			
4+ 5	1.0410	3.47	QV			
4+10	1.0649	3.48	QV			
4+15	1.0890	3.49	Q V			
4+20	1.1132	3.51	Q V			
4+25	1.1374	3.52	Q V			
4+30	1.1617	3.53	Q V			
4+35	1.1860	3.54	Q V			
4+40	1.2105	3.55	Q V			
4+45	1.2350	3.56	Q V			
4+50	1.2596	3.57	Q V			
4+55	1.2842	3.58	Q V			
5+ 0	1.3090	3.59	Q V			
5+ 5	1.3338	3.61	Q V			
5+10	1.3587	3.62	Q V			
5+15	1.3837	3.63	Q V			
5+20	1.4088	3.64	Q V			
5+25	1.4340	3.65	Q V			
5+30	1.4592	3.66	Q V			
5+35	1.4845	3.68	Q V			
5+40	1.5099	3.69	Q V			
5+45	1.5354	3.70	Q V			
5+50	1.5610	3.72	Q V			
5+55	1.5867	3.73	Q V			
6+ 0	1.6125	3.74	Q V			
6+ 5	1.6383	3.75	Q V			
6+10	1.6643	3.77	Q V			
6+15	1.6903	3.78	Q V			
6+20	1.7164	3.79	Q V			
6+25	1.7427	3.81	Q V			
6+30	1.7690	3.82	Q V			
6+35	1.7954	3.84	Q V			
6+40	1.8219	3.85	Q V			
6+45	1.8486	3.87	Q V			
6+50	1.8753	3.88	Q V			
6+55	1.9021	3.90	Q V			
7+ 0	1.9290	3.91	Q V			
7+ 5	1.9561	3.93	Q V			
7+10	1.9832	3.94	Q V			
7+15	2.0105	3.96	Q V			
7+20	2.0378	3.97	Q V			
7+25	2.0653	3.99	Q V			
7+30	2.0929	4.01	Q V			
7+35	2.1206	4.02	Q V			
7+40	2.1484	4.04	Q V			
7+45	2.1763	4.06	Q V			
7+50	2.2044	4.07	Q V			
7+55	2.2326	4.09	Q V			
8+ 0	2.2609	4.11	Q V			
8+ 5	2.2893	4.13	Q V			

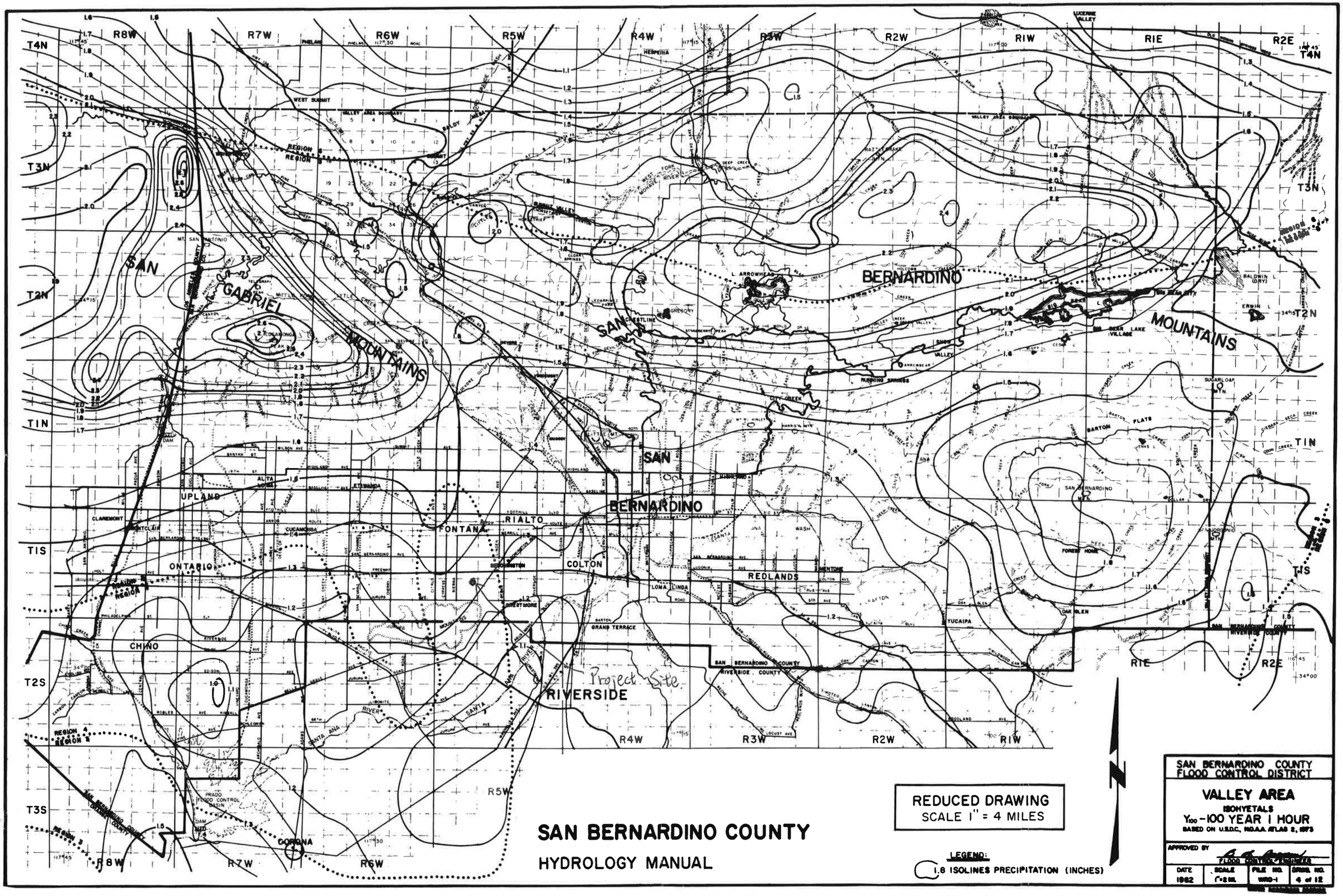
8+10	2.3178	4.14	Q	V			
8+15	2.3465	4.16	Q	V			
8+20	2.3753	4.18	Q	V			
8+25	2.4042	4.20	Q	V			
8+30	2.4333	4.22	Q	V			
8+35	2.4625	4.24	Q	V			
8+40	2.4919	4.26	Q	V			
8+45	2.5213	4.28	Q	V			
8+50	2.5510	4.30	Q	V			
8+55	2.5807	4.32	Q	V			
9+ 0	2.6107	4.34	Q	V			
9+ 5	2.6407	4.37	Q	V			
9+10	2.6709	4.39	Q	V			
9+15	2.7013	4.41	Q	V			
9+20	2.7318	4.43	Q	V			
9+25	2.7625	4.46	Q	V			
9+30	2.7934	4.48	Q	V			
9+35	2.8244	4.50	Q	V			
9+40	2.8556	4.53	Q	V			
9+45	2.8869	4.55	Q	V			
9+50	2.9185	4.58	Q	V			
9+55	2.9502	4.60	Q	V			
10+ 0	2.9821	4.63	Q	V			
10+ 5	3.0141	4.66	Q	V			
10+10	3.0464	4.68	Q	V			
10+15	3.0789	4.71	Q	V			
10+20	3.1115	4.74	Q	V			
10+25	3.1444	4.77	Q	V			
10+30	3.1774	4.80	Q	V			
10+35	3.2107	4.83	Q	V			
10+40	3.2442	4.86	Q	V			
10+45	3.2779	4.89	Q	V			
10+50	3.3118	4.92	Q	V			
10+55	3.3459	4.96	Q	V			
11+ 0	3.3803	4.99	Q	V			
11+ 5	3.4149	5.03	Q	V			
11+10	3.4498	5.06	Q	V			
11+15	3.4849	5.10	Q	V			
11+20	3.5202	5.13	Q	V			
11+25	3.5559	5.17	Q	V			
11+30	3.5917	5.21	Q	V			
11+35	3.6279	5.25	Q	V			
11+40	3.6644	5.29	Q	V			
11+45	3.7011	5.33	Q	V			
11+50	3.7381	5.38	Q	V			
11+55	3.7754	5.42	Q	V			
12+ 0	3.8131	5.47	Q	V			
12+ 5	3.8510	5.51	Q	V			
12+10	3.8893	5.56	Q	V			
12+15	3.9279	5.60	Q	V			
12+20	3.9667	5.64	Q	V			
12+25	4.0059	5.69	Q	V			
12+30	4.0455	5.74	Q	V			
12+35	4.0854	5.80	Q	V			
12+40	4.1257	5.86	Q	V			
12+45	4.1665	5.91	Q	V			
12+50	4.2076	5.98	Q	V			

12+55	4.2492	6.04	
13+ 0	4.2913	6.11	
13+ 5	4.3338	6.18	
13+10	4.3768	6.25	
13+15	4.4204	6.32	
13+20	4.4644	6.40	
13+25	4.5090	6.48	
13+30	4.5542	6.56	
13+35	4.6000	6.65	
13+40	4.6464	6.74	
13+45	4.6935	6.84	
13+50	4.7413	6.94	
13+55	4.7898	7.04	
14+ 0	4.8390	7.15	
14+ 5	4.8891	7.27	
14+10	4.9400	7.39	
14+15	4.9918	7.52	
14+20	5.0446	7.67	
14+25	5.0984	7.81	
14+30	5.1533	7.97	
14+35	5.2094	8.14	
14+40	5.2666	8.32	
14+45	5.3252	8.51	
14+50	5.3853	8.72	
14+55	5.4469	8.95	
15+ 0	5.5103	9.20	
15+ 5	5.5754	9.47	
15+10	5.6427	9.77	
15+15	5.7123	10.10	
15+20	5.7845	10.49	
15+25	5.8590	10.81	
15+30	5.9333	10.78	
15+35	6.0048	10.38	
15+40	6.0739	10.04	
15+45	6.1453	10.37	
15+50	6.2232	11.31	
15+55	6.3120	12.90	
16+ 0	6.4200	15.68	
16+ 5	6.5711	21.94	
16+10	6.8126	35.07	
16+15	7.1266	45.59	
16+20	7.4303	44.09	
16+25	7.6302	29.02	← 23.39 cfs
16+30	7.7622	19.17	
16+35	7.8610	14.34	
16+40	7.9450	12.20	
16+45	8.0235	11.40	
16+50	8.0956	10.47	
16+55	8.1612	9.52	
17+ 0	8.2230	8.97	
17+ 5	8.2818	8.54	
17+10	8.3380	8.16	
17+15	8.3919	7.83	
17+20	8.4438	7.54	
17+25	8.4939	7.28	
17+30	8.5425	7.05	
17+35	8.5896	6.84	

17+40	8.6354	6.65	Q			V
17+45	8.6800	6.48	Q			V
17+50	8.7236	6.32	Q			V
17+55	8.7661	6.18	Q			V
18+ 0	8.8077	6.04	Q			V
18+ 5	8.8484	5.92	Q			V
18+10	8.8884	5.80	Q			V
18+15	8.9276	5.70	Q			V
18+20	8.9662	5.60	Q			V
18+25	9.0041	5.51	Q			V
18+30	9.0415	5.42	Q			V
18+35	9.0782	5.33	Q			V
18+40	9.1143	5.25	Q			V
18+45	9.1499	5.17	Q			V
18+50	9.1850	5.10	Q			V
18+55	9.2196	5.02	Q			V
19+ 0	9.2538	4.96	Q			V
19+ 5	9.2874	4.89	Q			V
19+10	9.3207	4.83	Q			V
19+15	9.3535	4.77	Q			V
19+20	9.3860	4.71	Q			V
19+25	9.4180	4.66	Q			V
19+30	9.4497	4.60	Q			V
19+35	9.4811	4.55	Q			V
19+40	9.5121	4.50	Q			V
19+45	9.5428	4.45	Q			V
19+50	9.5731	4.41	Q			V
19+55	9.6032	4.36	Q			V
20+ 0	9.6330	4.32	Q			V
20+ 5	9.6624	4.28	Q			V
20+10	9.6916	4.24	Q			V
20+15	9.7205	4.20	Q			V
20+20	9.7492	4.16	Q			V
20+25	9.7776	4.13	Q			V
20+30	9.8058	4.09	Q			V
20+35	9.8337	4.05	Q			V
20+40	9.8614	4.02	Q			V
20+45	9.8889	3.99	Q			V
20+50	9.9161	3.96	Q			V
20+55	9.9431	3.92	Q			V
21+ 0	9.9700	3.89	Q			V
21+ 5	9.9966	3.86	Q			V
21+10	10.0230	3.84	Q			V
21+15	10.0492	3.81	Q			V
21+20	10.0752	3.78	Q			V
21+25	10.1011	3.75	Q			V
21+30	10.1268	3.73	Q			V
21+35	10.1522	3.70	Q			V
21+40	10.1776	3.68	Q			V
21+45	10.2027	3.65	Q			V
21+50	10.2277	3.63	Q			V
21+55	10.2525	3.60	Q			V
22+ 0	10.2772	3.58	Q			V
22+ 5	10.3017	3.56	Q			V
22+10	10.3260	3.54	Q			V
22+15	10.3502	3.51	Q			V
22+20	10.3743	3.49	Q			V

22+25	10.3982	3.47	Q				V
22+30	10.4220	3.45	Q				V
22+35	10.4457	3.43	Q				V
22+40	10.4692	3.41	Q				V
22+45	10.4925	3.39	Q				V
22+50	10.5158	3.38	Q				V
22+55	10.5389	3.36	Q				V
23+ 0	10.5619	3.34	Q				V
23+ 5	10.5848	3.32	Q				V
23+10	10.6075	3.30	Q				V
23+15	10.6301	3.29	Q				V
23+20	10.6526	3.27	Q				V
23+25	10.6750	3.25	Q				V
23+30	10.6973	3.24	Q				V
23+35	10.7195	3.22	Q				V
23+40	10.7416	3.20	Q				V
23+45	10.7635	3.19	Q				V
23+50	10.7854	3.17	Q				V
23+55	10.8071	3.16	Q				V
24+ 0	10.8288	3.14	Q				V
24+ 5	10.8497	3.04	Q				V
24+10	10.8674	2.57	Q				V
24+15	10.8792	1.71	Q				V
24+20	10.8847	0.81	Q				V
24+25	10.8871	0.34	Q				V
24+30	10.8880	0.14	Q				V
24+35	10.8884	0.06	Q				V
24+40	10.8887	0.03	Q				V
24+45	10.8887	0.01	Q				V

Appendix E
Soil Group Map and Isohyetal Map



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

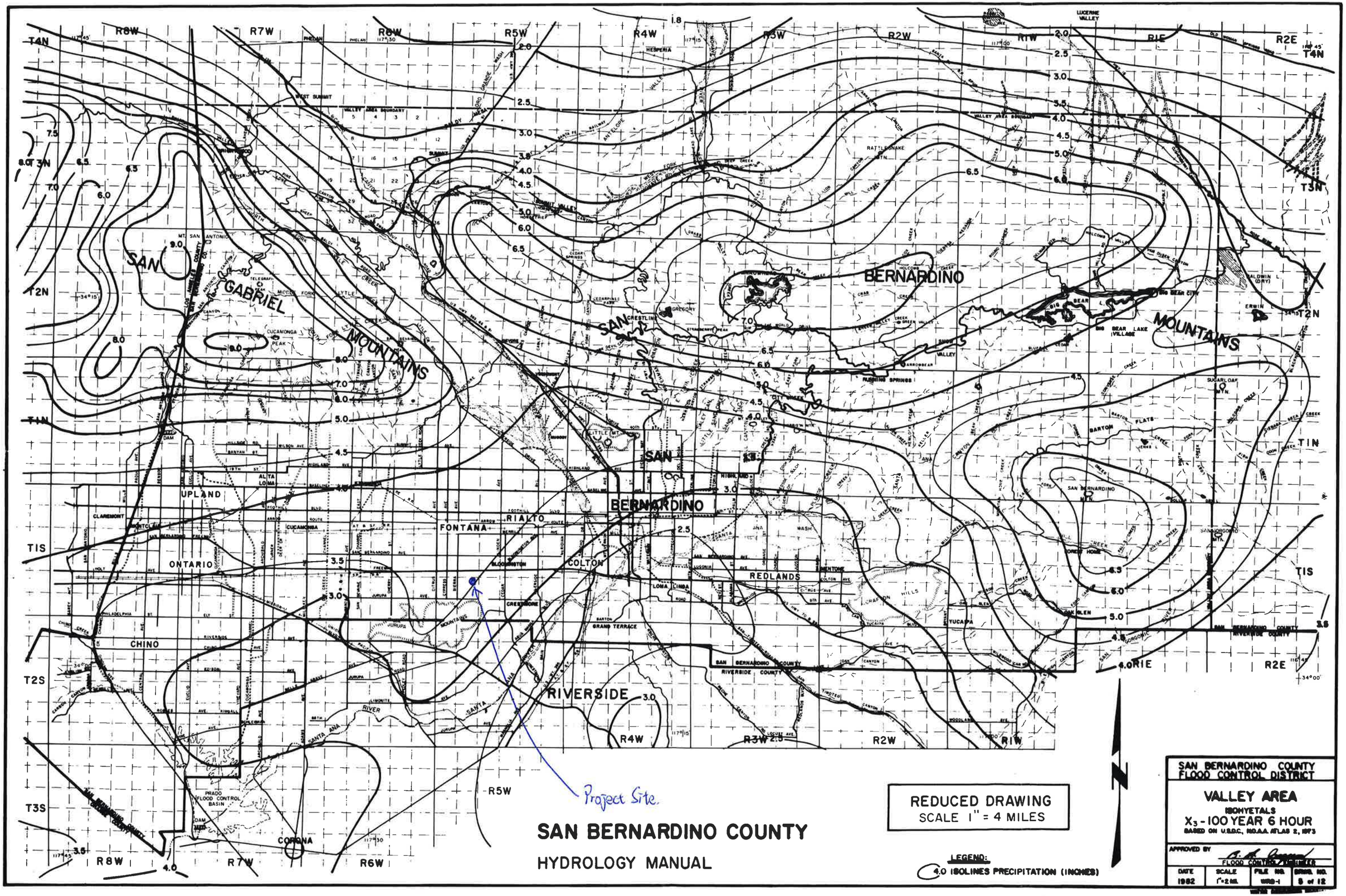
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

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

APPROVED BY			
DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	WRD-1	4 of 12

FIGURE B-4



SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)

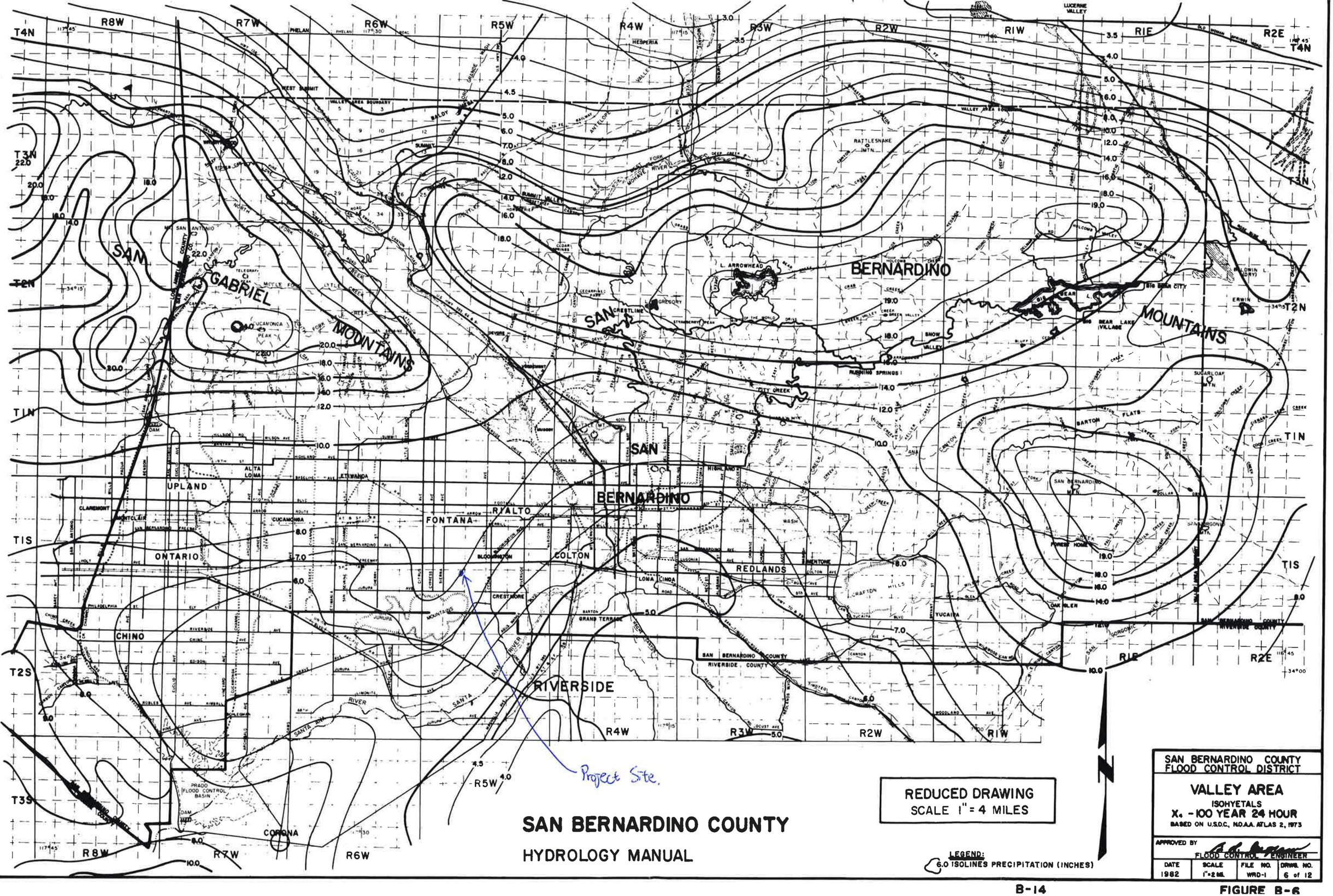
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
X_3 - 100 YEAR 6 HOUR
BASED ON U.S.B.C., NOAA ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	VAS-1	5 of 12

FIGURE B-5



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)

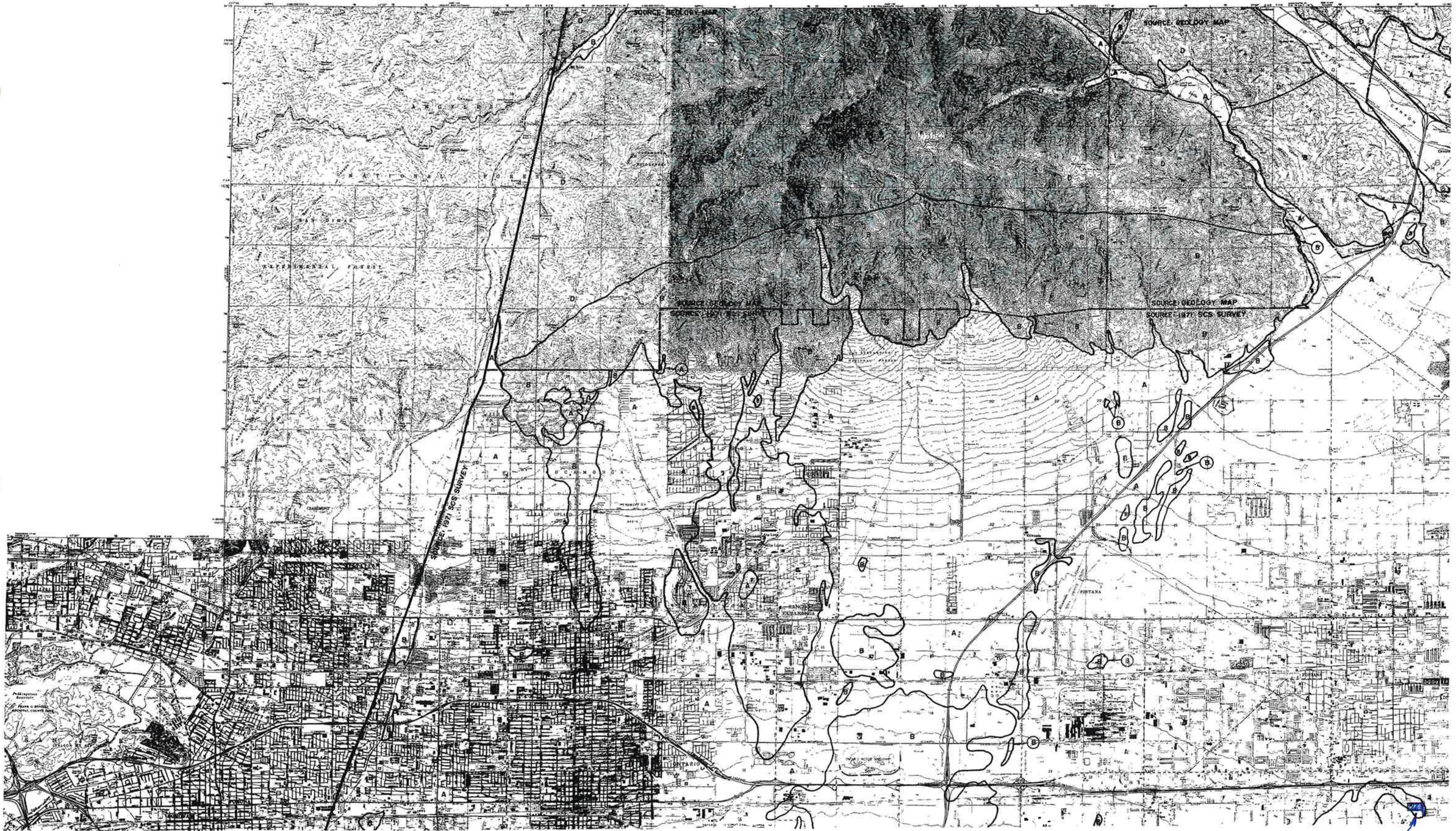
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

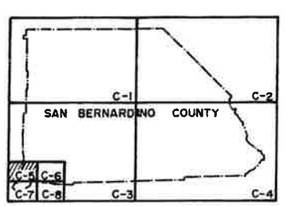
VALLEY AREA
ISOHYETALS
X_4 - 100 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	WRD-1	6 of 12

FIGURE B-6





INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

Preliminary
Water Quality Management Plan

For:

Bloomington Business Center

P201400241, APN:0256-041-01, 02, 03, 47 & 48

Prepared for:

JM Realty Group, Inc

3535 Inland Empire Boulevard

Ontario, CA 91764

909-941-2520

Prepared by:

Huitt-Zollars, Inc

3990 Concours, Suite 330

Ontario, CA 91764

909-941-7799

09/08/2014

Revised 04/13/2015

Approval Date:_____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Bloomington Business Center by Huitt-Zollars. The WQMP is intended to comply with the requirements of the County of San Bernardino and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

.

Project Data			
Permit/Application Number(s):	P201400241	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	N/A	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0256-041-01, 02, 03, 47 & 48

Owner's Signature			
Owner Name: Joe Mckay			
Title	Principal		
Company	JM Realty Group, Inc		
Address	3535 Inland Empire Boulevard. Ontario, CA 91764		
Email	jmckay@lee-assoc.com		
Telephone #	909-941-2520		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	P201400241	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	N/A	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0256-041-01, 02, 03, 47 & 48

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036."

Engineer: David White		PE Stamp Below
Title	Project Manager	
Company	Huitt-Zollars, Inc	
Address	3990 Concours, Suite 330 Ontario, CA 91764	
Email	dwhite@huitt-zollars.com	
Telephone #	909-941-7799	
Signature		
Date		

Table of Contents

Forms

Section 1 Discretionary Permit(s)

Form 1-1 Project Information

Project Name	Bloomington Business Center				
Project Owner Contact Name:	Joe Mckay				
Mailing Address:	3535 Inland Empire Boulevard Ontario, CA 91764	E-mail Address:	jmckay@lee-assoc.com	Telephone:	909-941-2520
Permit/Application Number(s):	P201400241		Tract/Parcel Map Number(s):	N/A	
Additional Information/ Comments:					
Description of Project:	The project is a new development of an industrial warehouse facility located at southeast corner of Laurel Avenue and Slover Avenue, in the County of San Bernardino. The proposed building is approximately 344,000 square feet, the proposed landscape area is about 146,775 square feet, the parking area is 97,270 square feet, and the driveway is approximately 166,649 square feet in size on approximately 17.33 acres.				
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	N/A				

Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project

1 Development Category (Select all that apply):

☐ Significant re-development involving the addition or replacement of 5,000 ft^2 or more of impervious surface on an already developed site	☒ New development involving the creation of 10,000 ft^2 or more of impervious surface collectively over entire site	☐ Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	☐ Restaurants (with SIC code 5812) where the land area of development is 5,000 ft^2 or more
☐ Hillside developments of 5,000 ft^2 or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	☐ Developments of 2,500 ft^2 of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	☒ Parking lots of 5,000 ft^2 or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft^2 or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements*.

2 Project Area (ft2):	755,268	**3** Number of Dwelling Units:	N/A	**4** SIC Code:	1541

5 Is Project going to be phased? Yes ☐ No ☒ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

6 Does Project include roads? Yes ☐ No ☒ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

The property is being developed by JM Realty Group, Inc. JM Realty Group, Inc will be the entity responsible for long term maintenance of WQMP Storm Water Facilities throughout the site.

Name: JM Realty Group, Inc

Address: 3535 Inland Empire Boulevard. Ontario, CA 91764

Contact Person: Joe Mckay

Phone: 909-941-2520

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern

Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	Pathogens are typically caused by the transport of animal or human fecal wastes from the watershed. Listed as an impairment to Santa Ana River Reach 3
Nutrients - Phosphorous	E ☒	N ☐	Primary sources of nutrients in urban runoff are fertilizers and eroded soils.
Nutrients - Nitrogen	E ☒	N ☐	Primary sources of nutrients in urban runoff are fertilizers and eroded soils.
Noxious Aquatic Plants	E ☒	N ☒	Noxious aquatic plants are tpyically from animals or vehicle transport that grow aggressively, multiply quickly without natural controls (native herbivores, soil chemistry, etc.), and adversely affect native habitats.
Sediment	E ☒	N ☐	Sediments are solid materials that are eroded from the land surface.
Metals	E ☒	N ☐	The primary source of metal pollution in stormwater is typically commercially available metals and metal products, as well as emissions from brake pad and tire tread wear associated with driving. Listed as an impairment to Santa Ana River Reach 3
Oil and Grease	E ☒	N ☐	Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids.
Trash/Debris	E ☒	N ☐	Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste from human or animals
Pesticides / Herbicides	E ☒	N ☐	Pesticides and herbicides can be washed off urban landscapes during storm events.
Organic Compounds	E ☒	N ☐	Sources of organic compounds may include waste handling areas and vehicle or landscape maintenance areas.
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

Other:	E ☐	N ☐	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits

1 Project Types that Qualify for Water Quality Credits: *Select all that apply*			
☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects ☐ Vertical density [20%] ☐ 7 units/ acre [5%]	☐ Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	☐ Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
☐ Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	☐ Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	☐ In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	☐ Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
2 Total Credit % 0 *(Total all credit percentages up to a maximum allowable credit of 50 percent)*			
Description of Water Quality Credit Eligibility (if applicable)	NOT APPLICIABLE		

Section 3 Site and Watershed Description

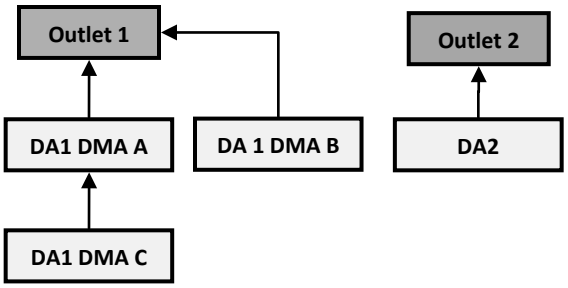
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34° 3'43.40"N	Longitude 117°24'42.48"W	Thomas Bros Map page 605

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Example only – modify for project specific WQMP using additional form

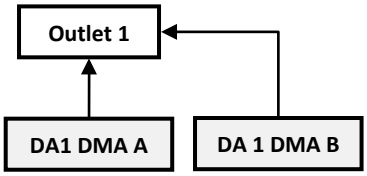
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 DMA C flows to DA1 DMA A	*Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property*
DA1 DMA A to Outlet 1	See next page for DA1 to Outlet 1
DA1 DMA B to Outlet 1	
DA2 to Outlet 2	

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34° 3'43.40"N	Longitude 117°24'42.48"W	Thomas Bros Map page 605

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA 1 DMA A to Outlet1	On-site north area water run-off will be directed to the proposed underground infiltration/detention system. When water fills up the underground detention system, water will overflow into the infiltration basin located at the southeast corner of the project site. The overflow from infiltration basin will discharge through the triple 6' parkway culvert into the existing street gutter on Locust Avenue (Outlet 1)
DA 1 DMA B to Outlet1	On-site west, east and south areas water run-off will be directed to the proposed storm drain system and flow into an on-site infiltration basin at the southeast corner of the project site. The overflow from infiltration basin will discharge through the triple 6' parkway culvert into the existing street gutter on Locust Avenue (Outlet 1)

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
1 DMA drainage area (ft^2)	397,359	357,335	N/A	N/A
2 Existing site impervious area (ft^2)	0	0	N/A	N/A
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	AMC I	AMC I	N/A	N/A
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP*	A	A	N/A	N/A
5 Longest flowpath length (ft)	386	613	N/A	N/A
6 Longest flowpath slope (ft/ft)	~1.2%	~1.2%	N/A	N/A
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Barren	Barren	N/A	N/A
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Poor	Poor	N/A	N/A

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA E	DMA F	DMA G	DMA H
1 DMA drainage area (ft^2)	N/A	N/A	N/A	N/A
2 Existing site impervious area (ft^2)	N/A	N/A	N/A	N/A
3 Antecedent moisture condition *For desert areas, use* http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf	N/A	N/A	N/A	N/A
4 Hydrologic soil group *Refer to Watershed Mapping Tool –* http://sbcounty.permitrack.com/WAP	N/A	N/A	N/A	N/A
5 Longest flowpath length (ft)	N/A	N/A	N/A	N/A
6 Longest flowpath slope (ft/ft)	N/A	N/A	N/A	N/A
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	N/A	N/A	N/A	N/A
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	N/A	N/A	N/A	N/A

Form 3-3 Watershed Description for Drainage Area

Receiving waters *Refer to Watershed Mapping Tool -* *http://sbcounty.permitrack.com/WAP* *See 'Drainage Facilities" link at this website*	Santa Ana River Reach 4, Prado Flood Control Basin, Santa Ana River Reach 3, 2, 1, Pacific Ocean.
Applicable TMDLs *Refer to Local Implementation Plan*	Per 2010 303(d) list, Santa Ana River Reach 3: TMDL still required. Prado Flood Control Basin: TMDL still required. Santa Ana River Reach 4: TMDL still Required.
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	The project expects to generate Pathogens, Nutrients and Metals (Copper & Lead) which are listed for downstream receiving waters on the latest CWA 303(d) list.
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	NO
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	Santa Ana River
Hydrologic Conditions of Concern	☐ Yes *Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal* ☒ No
Watershed–based BMP included in a RWQCB approved WAP	☐ Yes *Attach verification of regional BMP evaluation criteria in WAP* • *More Effective than On-site LID* • *Remaining Capacity for Project DCV* • *Upstream of any Water of the US* • *Operational at Project Completion* • *Long-Term Maintenance Plan* ☒ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	Property owners shall review and become familiar with the site specific WQMP. Additional educational materials for day to day operations are contained in Attachment B. Additional materials can be obtained from the local water pollution prevention program. Education of property owners begin with the review/preparation of the site specific WQMP and continues through the review of additional educational material as it applies to their project.
N2	Activity Restrictions	☒	☐	Activity restriction shall be stated in the owners lease terms prior to occupancy; o Fuelling areas, air/water supply areas, maintenance bays, vehicle washing areas, outdoor material storage areas, outdoor work areas, outdoor processing areas, wash water from food preparation areas within the project site will not be allowed on the project site. o Storage of hazardous materials will not be allowed on the project site. o All pesticide applications shall be performed by a licensed contractor certified by the California Department of Pesticide Regulation. o All dumpster lids shall be kept closed at all times. o Blowing, Sweeping or hosing of debris (leaf, litter, grass clippings, trash or debris) into the streets, underground stormdrain facilities or other storm water conveyance areas shall be strictly prohibited
N3	Landscape Management BMPs	☒	☐	A landscape architect will provide design plans for the on-site landscaping and irrigation system. The design shall incorporate the use of native and drought tolerant trees and shrubs throughout the project site.
N4	BMP Maintenance	☒	☐	Property owners shall maintain the designated on-site BMP areas, see Section 5 for self inspection and maintenance form

Form 4.1-1 Non-Structural Source Control BMPs				
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Industrial warehouse does not apply to Title 22 CCR (California Code of Regulations). CCR licensing in child care, residential and family child care.
N6	Local Water Quality Ordinances	☒	☐	Local Water Quality Ordinances will be addressed by implementation of this WQMP
N7	Spill Contingency Plan	☒	☐	Industrial Warehouse buildings and truck dock areas have potential for spills and therefore each tenant shall be required to prepare a spill contingency plan and it shall be implemented in accordance with section 6.95 of the California Health and Safety Code. The spill contingency plan shall identify responsible persons in the event of a spill, an action item list identifying how the spill should be contained, cleaned up and who should be contacted in the event of a spill. Documentation of any spill event and cleanup process shall be kept on site in perpetuity.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks are proposed for this site
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous materials are planned to be stored on this site.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	☒	☐	Underground fire protection service and fire sprinklers will be provided per the uniform fire code and the requirements of the County of San Bernardino Fire Department.
N11	Litter/Debris Control Program	☒	☐	Trash storage areas will be designed to have adjacent areas drain away from the trash storage areas as well as have a permanent roof over them. The trash storage areas shall be inspected and maintained on a monthly basis. Collection of trash from the trash storage areas shall occur on a regular basis to ensure that the trash receptacles are not overflowing. Documentation of such inspection/maintenance and trash collection shall be kept by the owner in perpetuity. See the WQMP site map in Attachment A for anticipated location of trash storage areas.
N12	Employee Training	☒	☐	The following requirements shall be stated in the owners lease terms; an Employee Training/Education program shall be provided annually to help educate employees about storm water quality management and practices that help prevent storm water pollution. Documentation of such training/education program implementation shall be kept by the owner for a minimum of ten years. Sample education materials have been provided in Attachment B. Additional educational materials can be obtained from the the County of San Bernardino storm water program.
N13	Housekeeping of Loading Docks	☒	☐	The project site will have truck docks. The truck docks shall be inspected on a weekly basis to help ensure that any trash and debris are collected prior to being washed into the underground storm drain system. All storm water runoff from the loading dock areas will be discharged into infiltration basins and/or underground infiltration chambers prior to conveyance to the public storm drain system. Documentation of such inspection/maintenance shall be kept by the owner in perpetuity.

N14	Catch Basin Inspection Program	☒	☐	The on-site catch basins shall be inspected on a quarterly basis. Inspection of the on-site catch basins shall consist of visual inspection of any sediment, trash or debris collected in the bottom of each catch basin. Any sediment, trash or debris found shall be removed from the catch basins and disposed of in a legal manner. Documentation of such inspection/maintenance shall be kept by the owner in perpetuity.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	The on-site parking lots, drive aisles, and loading dock areas shall be swept by vacuum truck on a monthly basis. Documentation of such sweeping shall be kept by the owner in perpetuity. Frequency of sweeping shall be adjusted as needed to maintain a clean site.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	None, proposed BMP's satisfy requirements
N17	Comply with all other applicable NPDES permits	☒	☐	General construction permit "SWRCB Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ" A SWPPP will be implemented during construction.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	The on-site storm drain catch basins shall be stenciled with the phrase "Drains to River" or other approved language. The signage shall be inspected on an annual basis. Missing or faded signage shall be replaced. Documentation of such inspection/maintenance shall be kept by the owner in perpetuity.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No outdoor material storage areas are proposed for this site
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Trash storage areas will be designed to have adjacent areas drain away from the trash storage areas as well as have a permanent roof over them. The trash storage areas shall be inspected and maintained on a monthly basis. Collection of trash from the trash storage areas shall occur on a regular basis to ensure that the trash receptacles are not overflowing. Documentation of such inspection/maintenance and trash collection shall be kept by the owner in perpetuity. See the WQMP site map in Attachment A for anticipated location of trash storage areas.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	The landscape architect will provide design plans for the on-site irrigation system. The irrigation system shall be inspected on a monthly basis to ensure proper operation. Any broken sprinkler heads shall be repaired immediately to ensure that the system continues to operate efficiently. Documentation of such inspection/maintenance shall be kept by the owner in perpetuity
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	The landscape architect will provide design plans for the on-site landscaping and irrigation system. The design shall incorporate that finish grade of landsapced areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement throughout the project site.

S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	All on-site slopes shall be designed with a minimum slope of 3 horizontal to 1 vertical to help ensure that erosion of the side slopes does not occur. The slopes will be landscaped appropriately to also help ensure that erosion of the slopes does not occur. Slopes will be inspected and maintained bi-annually. Documentation of such inspection/maintenance shall be kept by the owner in perpetuity.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	Truck docks are not covered. Runoff from dock areas will be treated by this underground infiltration system.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No maintenance bays are planned for this site.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No vehicle wash area are planned for this site.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No outdoor processing areas are planned for this site.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No equipment wash areas are planned for this site.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	No fueling areas are planned for this site.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillside landscaping are planned in this area.
S14	Wash water control for food preparation areas	☐	☒	Food preparation areas are not planned for this site.

S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No community car wash rack are planned for this site.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist

Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Explanation: To minimize impervious areas we have provided more than the minimum required landscaping (19%) as required by the County as well as designed the required drive aisles and sidewalks to the minimum width required per code.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: The entire site drains to underground infiltration system or infiltration basin thereby maximizing the natural infiltration capacity of the soil.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: The site runoff continues to drain towards Locust Ave via the proposed 3 - 6' parkway drains. The implementation of the UG. infiltration system and basin will lengthen the time of concentration thus mimicking the existing conditions.
Disconnect impervious areas: Yes ☒ No ☐ Explanation: The building roof drains are not directly connected to the storm drain system. The entire site drains to the underground infiltration/detention system or infiltration basin before leaving the site.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: The site has no existing vegetation to protect. The proposed development will provide 19% landscape coverage.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: All landscape areas will be vegetated for stablization.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Soil in proposed infiltration basin will be uncompacted native or loosely placed sandy soil. No machine compaction will be allowed.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation: Due to the site layout and grades, no vegetated drainage swale will be utilized in the proposed project site.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: All landscaped areas will be staked by designation of curb throughout the project site.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)

1 Project area DA 1 (ft^2): 754,694	**2** Imperviousness after applying preventative site design practices (Imp%): 0.82	**3** Runoff Coefficient (Rc): _0.65 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.533 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 0.79 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 1/12*[754,694 * 0.65 * 0.79 * 1.963] = 63,400 CF *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-2 Summary of HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☒

Go to: *http://sbcounty.permitrack.com/WAP*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** N/A *Form 4.2-3 Item 12*	**2** N/A *Form 4.2-4 Item 13*	**3** N/A *Form 4.2-5 Item 10*
Post-developed	**4** N/A *Form 4.2-3 Item 13*	**5** N/A *Form 4.2-4 Item 14*	**6** N/A *Form 4.2-5 Item 14*
Difference	**7** *N/A* *Item 4 – Item 1*	**8** *N/A* *Item 2 – Item 5*	**9** *N/A* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *N/A%* *Item 7 / Item 1*	**11** *N/A%* *Item 8 / Item 2*	**12** *N/A%* *Item 9 / Item 3*

Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2a Hydrologic Soil Group (HSG)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2b Hydrologic Soil Group (HSG)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5 Pre-Developed area-weighted CN: N/A	**7** Pre-developed soil storage capacity, S (in): N/A *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): N/A *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: N/A	**8** Post-developed soil storage capacity, S (in): N/A *S = (1000 / Item 6) - 10*	**10** Initial abstraction, I_a (in): N/A *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in): N/A
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): N/A
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 9)^2 / ((Item 11 – Item 9 + Item 7)*

13 Post-developed Volume (ft^3): N/A
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 10)^2 / ((Item 11 – Item 10 + Item 8)*

14 Volume Reduction needed to meet HCOC Requirement, (ft^3): N/A
*V_{HCOC} = (Item 13 * 0.95) – Item 12*

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

Compute time of concentration for pre and post developed conditions for each DA *(For projects using the Hydrology Manual complete the form below)*

Variables	Pre-developed DA1 *Use additional forms if there are more than 4 DMA*				Post-developed DA1 *Use additional forms if there are more than 4 DMA*			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) *Use Form 3-2 Item 5 for pre-developed condition*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 Change in elevation (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3 Slope (ft/ft), S_o *= Item 2 / Item 1*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4 Land cover	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7 Cross-sectional area of channel (ft^2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8 Wetted perimeter of channel (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9 Manning's roughness of channel (n)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 Channel flow velocity (ft/sec) V_{fps} *= (1.49 / Item 9) * (Item 7/Item 8)^0.67 * (Item 3)^0.5*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11 Travel time to outlet (min) T_t *= Item 6 / (Item 10 * 60)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12 Total time of concentration (min) T_c *= Item 5 + Item 11*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13 Pre-developed time of concentration (min): N/A *Minimum of Item 12 pre-developed DMA*								
14 Post-developed time of concentration (min): N/A *Minimum of Item 12 post-developed DMA*								
15 Additional time of concentration needed to meet HCOC requirement (min): N/A $T_{C\text{-}HCOC}$ *= (Item 13 * 0.95) – Item 14*								

Form 4.2-5 HCOC Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables		Pre-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*			Post-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*		
		DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration *I_{peak} = 10^(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)*		N/A	N/A	N/A	N/A	N/A	N/A
2 Drainage Area of each DMA (Acres) *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		N/A	N/A	N/A	N/A	N/A	N/A
3 Ratio of pervious area to total area *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		N/A	N/A	N/A	N/A	N/A	N/A
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*		N/A	N/A	N/A	N/A	N/A	N/A
5 Maximum loss rate (in/hr) *F_m = Item 3 * Item 4* *Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*		N/A	N/A	N/A	N/A	N/A	N/A
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		N/A	N/A	N/A	N/A	N/A	N/A
7 Time of concentration adjustment factor for other DMA to site discharge point *Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)*	DMA A	*n/a*	N/A	N/A	*n/a*	N/A	N/A
	DMA B	N/A	*n/a*	N/A	N/A	*n/a*	N/A
	DMA C	N/A	N/A	*n/a*	N/A	N/A	*n/a*

8 Pre-developed Q_p at T_c for DMA A: N/A *Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAA/2}$] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAA/3}$]*	**9** Pre-developed Q_p at T_c for DMA B: N/A *Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAB/1}$] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAB/3}$]*	**10** Pre-developed Q_p at T_c for DMA C: N/A *Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAC/1}$] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAC/2}$]*

10 Peak runoff from pre-developed condition confluence analysis (cfs): N/A *Maximum of Item 8, 9, and 10 (including additional forms as needed)*

11 Post-developed Q_p at T_c for DMA A: N/A *Same as Item 8 for post-developed values*	**12** Post-developed Q_p at T_c for DMA B: N/A *Same as Item 9 for post-developed values*	**13** Post-developed Q_p at T_c for DMA C: N/A *Same as Item 10 for post-developed values*

14 Peak runoff from post-developed condition confluence analysis (cfs): N/A *Maximum of Item 11, 12, and 13 (including additional forms as needed)*

15 Peak runoff reduction needed to meet HCOC Requirement (cfs): N/A *$Q_{p\text{-}HCOC}$ = (Item 14 * 0.95) – Item 10*

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). **Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment**.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

1 Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒

Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

3 Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

4 Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

5 Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

6 Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒

See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

7 Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒

If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

8 Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒

If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.
If no, then proceed to Item 9, below.

9 All answers to Item 1 through Item 6 are "No":

Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3): $V_{retention}$ *=Sum of Item 4 for all BMPs*			
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 0 $V_{retention}$ *=Sum of Item 12 for all BMPs*			

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) $V_{retention}$ *= Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): $V_{retention}$ *=Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) $V_{retention}$ *= Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): $V_{retention}$ *= Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes ☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) $V_{retention}$ *= Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): $V_{retention}$ *=Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

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Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 63,400 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 DMA A BMP Type U.G. Chambers	DA 1 DMA B BMP Type Infiltration Basin	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	15	2	
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	3	3	
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	5	0.67	
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48	48	
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	5	4.5	
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	5	2.67	
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	40,000	13,283	
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	0	0	
10 Amended soil porosity	0	0	
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	0	0	
12 Gravel porosity	0	0	
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3	3	
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	0	56,450	
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	280,000	0	
16 Total Retention Volume from LID Infiltration BMPs: 336,450 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 530% *Retention% = Item 16 / Form 4.2-1 Item 7*			
18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*			

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft^3): 0 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16*			
BMP Type(s) *Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft^3) *Volume of cistern*			
4 Landscaped area planned for use of harvested stormwater (ft^2)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft^3/day) *Item 4 * (Item 5 / 12)*			
7 Drawdown time (hrs) *Copy Item 6 from Form 4.2-1*			
8 Retention Volume (ft^3) *$V_{retention}$ = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))*			
9 Total Retention Volume (ft^3) from Harvest and Use BMP *Sum of Item 8 for all harvest and use BMP included in plan*			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest and use BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.*			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)

1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): 0 *Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	Volume-based biotreatment *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-8 to compute treated volume*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft^3): *Form 4.3-6 Item 15 + Form 4.3-7 Item 13*	**4** Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): *Item 1 – Item 3*	**5** Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*
6 Flow-based biotreatment BMP capacity provided (cfs): *Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)*		
7 Metrics for MEP determination: • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: ☐ *If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.*		

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type *(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*			
2 Amended soil infiltration rate *Typical ~ 5.0*			
3 Amended soil infiltration safety factor *Typical ~ 2.0*			
4 Amended soil design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*			
5 Ponded water drawdown time (hr) *Copy Item 6 from Form 4.2-1*			
6 Maximum ponding depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 4 * Item 5) or Item 6*			
8 Amended soil surface area (ft^2)			
9 Amended soil depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Amended soil porosity, *n*			
11 Gravel depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
12 Gravel porosity, *n*			
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
14 Biotreated Volume (ft^3) $V_{biotreated}$ *= Item 8 * [(Item 7/2) + (Item 9 * Item 10) +(Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: 0 *Sum of Item 14 for all volume-based BMPs included in this form*			

Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type *Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.*	DA DMA BMP Type		DA DMA BMP Type *(Use additional forms for more BMPs)*	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft^2) A_{bottom} = *Item 2 * Item 3*				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft^2) $A_{surface}$ =*(Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))*				
8 Storage volume (ft^3) *For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details* V =*Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]*				
9 Drawdown Time (hrs) *Copy Item 6 from Form 2.1*				
10 Outflow rate (cfs) Q_{BMP} = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) / (Item 9 * 3600)*				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft^3) $V_{biotreated}$ = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) +(Item 10 * Item 11 * 3600)*				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : 0 *(Sum of Item 12 for all BMP included in plan)*				

Form 4.3-8 Flow Based Biotreatment (DA 1)

Biotreatment BMP Type *Vegetated swale, vegetated filter strip, or other comparable proprietary BMP*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5*			
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
4 Manning's roughness coefficient			
5 Bottom width (ft) b_w *= (Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)*			
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Cross sectional area (ft^2) *A = (Item 5 * Item 2) + (Item 6 * Item 2^2)*			
8 Water quality flow velocity (ft/sec) *V = Form 4.3-5 Item 6 / Item 7*			
9 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Length of flow based BMP (ft) *L = Item 8 * Item 9 * 60*			
11 Water surface area at water quality flow depth (ft^2) SA_{top} *= (Item 5 + (2 * Item 2 * Item 6)) * Item 10*			

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 63,394 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 0 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 336,450 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☐
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☐
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs (DA 1)

1 Volume reduction needed for HCOC performance criteria (ft^3): 0 *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	**2** On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft^3): 336,450 *Sum of Form 4.3-9 Items 2, 3, and 4 Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction*
3 Remaining volume for HCOC volume capture (ft^3): 0 *Item 1 – Item 2*	**4** Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft^3): 0 *Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)*

5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification ☐ *Attach in-stream control BMP selection and evaluation to this WQMP*

6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☐

If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP ☐
  BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)
- Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities ☐
- Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐

7 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☐

If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs ☐
  BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)
- Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
UG Chambers	Owner	- Inspect/Maintain UG-Infiltration Basin Systems - Isolator Row for collected trash, sediments and/or debris. Remove trash, sediments and debris by jet-vac and pump and dispose of trash, sediments and debris in a legal manner. - Inspect system for standing water. If system has standing water, perform re-inspection within 48 hours. If system still has standing water then the system shall be jet-vacuumed and pumped and removed debris shall be disposed of in a legal manner.	Bi-monthly and Prior to storm event and 48 hours after storm has passed
Infilt. Basin	Owner	- Inspect infiltration basin bottom for debris, trash and sediments. Remove and dispose as required. -Inspect basin side slopes and basin bottom for erosion and repair/restore to normal conditions. - Apply preventative measures to help prevent similar erosion in future rain events.	Monthly / Prior to storm event / After storm has passed
Catch Basin Filter	Owner	- Inspect and maintain catch basin filters as required. - Inspect catch basin bottom for debris / remove debris and dispose as required.	Quarterly

Planting	Owner	Inspect helth of planting and erosion of landscape area. Trimming trees and bushes when needed.	Monthly
Efficient Irrigation	Owner	- Inspect irrigation system general operation and durations. - Repair damaged sprinkler and drip irrigation lines as needed. - reduce durations during the winter season to prevent over irrigation.	Monthly
Storm drain system signage	Owner	Inspect Catch basin signage for faded or lost signs / repair or replace as needed.	Annually
Trash Storage Areas and Litter Control (SD-32)	Owner	Inspect trash container, lids, screens and clean trash storage areas.	Weekly
Truck Dock	Owner	Inspect loading dock for trash debris and sediments. Inspect loading dock for evidence of spills and broken containers. Clean up spills and dispose of collected material in a legal manner.	Weekly / Daily

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements