Appendix F:
Hydrology and Water Quality Supporting Information

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F.1 - Preliminary Hydrology Report

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PRELIMINARY HYDROLOGY STUDY

For:

Seefried Perris Brennan Ave Industrial Warehouse

Project Site Location/Address:
SWC Ramona Expressway and Brennan Ave
Perris, CA

Prepared For:
Seefried Industrial Properties, Inc.
2301 Rosecrans Avenue, Suite 3165
El Segundo, CA 90245

Lead Agency:
City of Perris
101 N. D Street
Perris, CA 92570

Prepared by:
DRC Engineering, Inc.
160 S. Old Springs Road, Suite 210
Anaheim, CA 92808
(714) 685-6860
Jay Brander, P.E.

March 15, 2022

Project No. 21-162

TABLE OF CONTENTS

Section I Introduction

The following hydrology study has been prepared for the development of the Seefried Perris Brennan Ave Industrial Warehouse Building. The project consists of a 165,371± SF warehouse building with associated parking and landscape. The site is located at the southwest corner of the intersection of Brennan Ave and Ramona Expressway in Perris, California. The overall project is approximately 7.58 acres. The general location of the site is illustrated on the Vicinity Map (see Appendix A of this report).

Section II Methodology

For both the existing and proposed conditions, the peak storm discharge for the drainage area was calculated using the Riverside County Hydrology Manual. The Riverside County Unit Hydrograph was used to develop hydrographs for the 100-year 24-hour storm event for the 7.58 acres being developed (see calculations in Appendix C). A soil type of B was assigned to the project site based on the Riverside County Flood Control and Water Conservation District Hydrology Manual Hydrologic Soils Group Map Plate C-1.30 (see portion of map in Appendix A). Soil group B is defined as soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have moderate rate of water transmission.

Section III Project Description

Existing Site Conditions

The pre-development conditions consist of relatively flat barren ground with existing buildings and paved areas. A majority of the site is pervious grass and brush. The entire site sheet flows east to the existing westerly curb and gutter on Brennan Ave. Stormwater in the curb and gutter flows north and is intercepted by a curb opening catch basin that connects to an existing 60” storm drain line in Brennan Ave. The storm drain connects to a storm drain pump station that discharges to an existing concrete channel flowing east along the southerly Ramona Expressway R/W. The concrete channel ultimately discharges to RCFCD facilities (Perris Valley MDP Line E), and ultimately to the Perris Valley Storm Drain and downstream receiving waters.

Offsite runoff from the adjacent undeveloped lots to the west sheet flows across the project site. Offsite street runoff from southerly half of Ramona Expressway drain to an existing concrete channel that traverses the site. The concrete channel flows east along the northerly P/L and drains to existing storm drain facilities on Brennan Ave.

Refer to ”Existing Hydrology Map” in Appendix B.

Proposed Site Conditions

In the post-development condition, stormwater will be conveyed away from the proposed building and will be routed via storm drain to a proposed 60" diameter underground solid-wall HDPE pipe detention basin. The basin will have 13,716 CF of storage to detain the design capture volume for water quality mitigation only. Flows that exceed the basin capacity will bypass the basin via a diversion weir and will enter a proposed public storm drain catch basin on Ramona Expressway.

The existing concrete channel along the northerly P/L of the site will be replaced by a proposed 30" RCP storm drain. Per proposed street improvements on Ramona Expressway, public storm drain catch basins will accept offsite street runoff from the southerly half of Ramona Expressway and will connect to the 30" RCP storm drain. Offsite runoff from the adjacent undeveloped lots to the west will be intercepted by a proposed concrete gutter along the westerly P/L. The concrete gutter drains north and connects to the proposed 30" RCP storm drain in Ramona Expressway.

Onsite runoff and offsite runoff will confluence in the proposed public storm drain in Ramona Expressway. Per the direction of City of Perris, the storm drain will bypass the existing storm drain facilities on Brennan Ave and connect to an existing 90" RCP storm drain in Ramona Expressway (Perris Valley MDP Line E). This storm drain continues east to match existing condition drainage patterns.

Refer to "Proposed Hydrology Map" in Appendix C.

Section IV Conclusion

The following calculations summarize the data and results for the design storm in the existing and proposed conditions using the Riverside County Unit Hydrograph.

100-YEAR STORM HYDROGRAPH TABLE

Storm Duration	Existing Flowrate	Proposed Flowrate	Percent Change
24 hours	4.27 cfs	4.29 cfs	0.47% increase

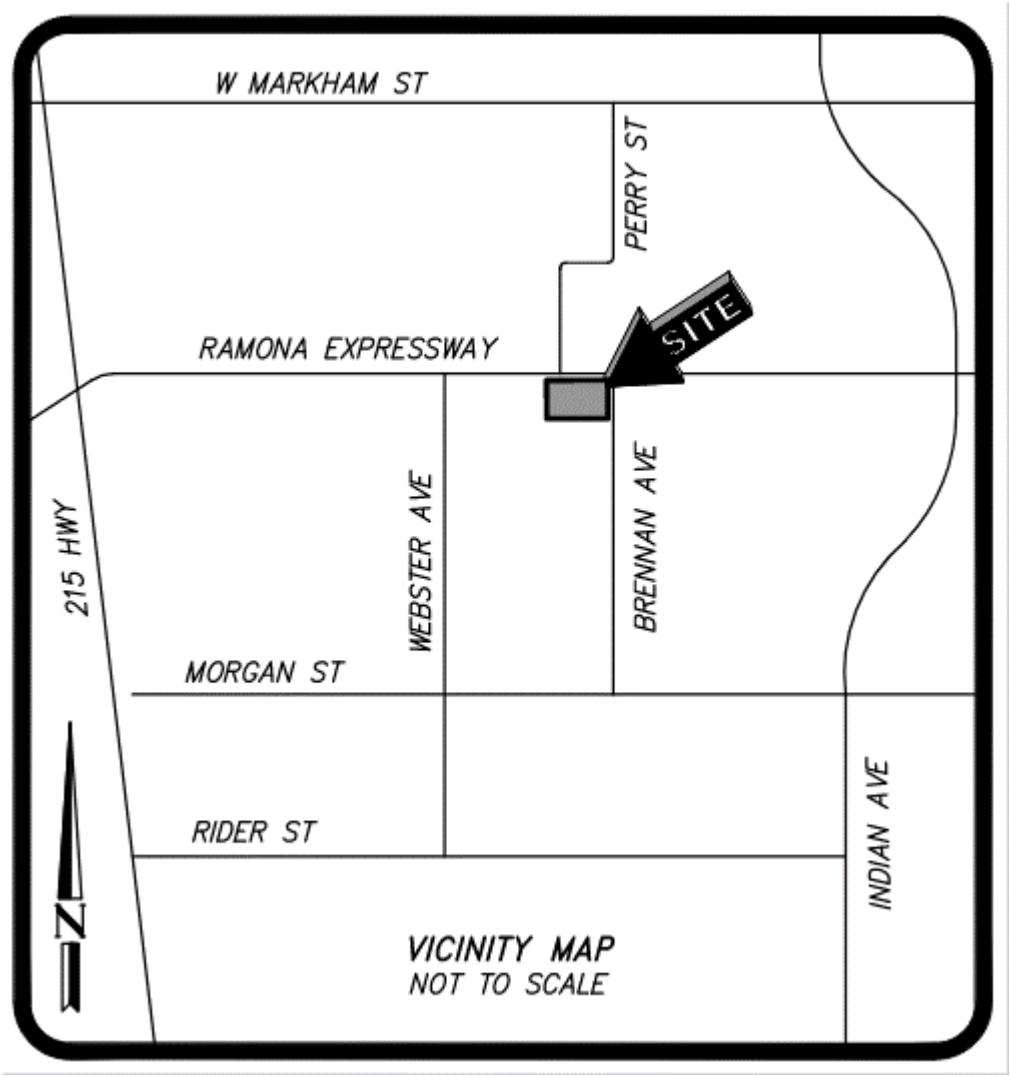
The proposed flow rate increases 0.47% from the existing flowrate. Therefore, it is determined that the proposed stormwater detention is not required to mitigate the design storm peak flow since the difference between existing and proposed peak flow is negligible.

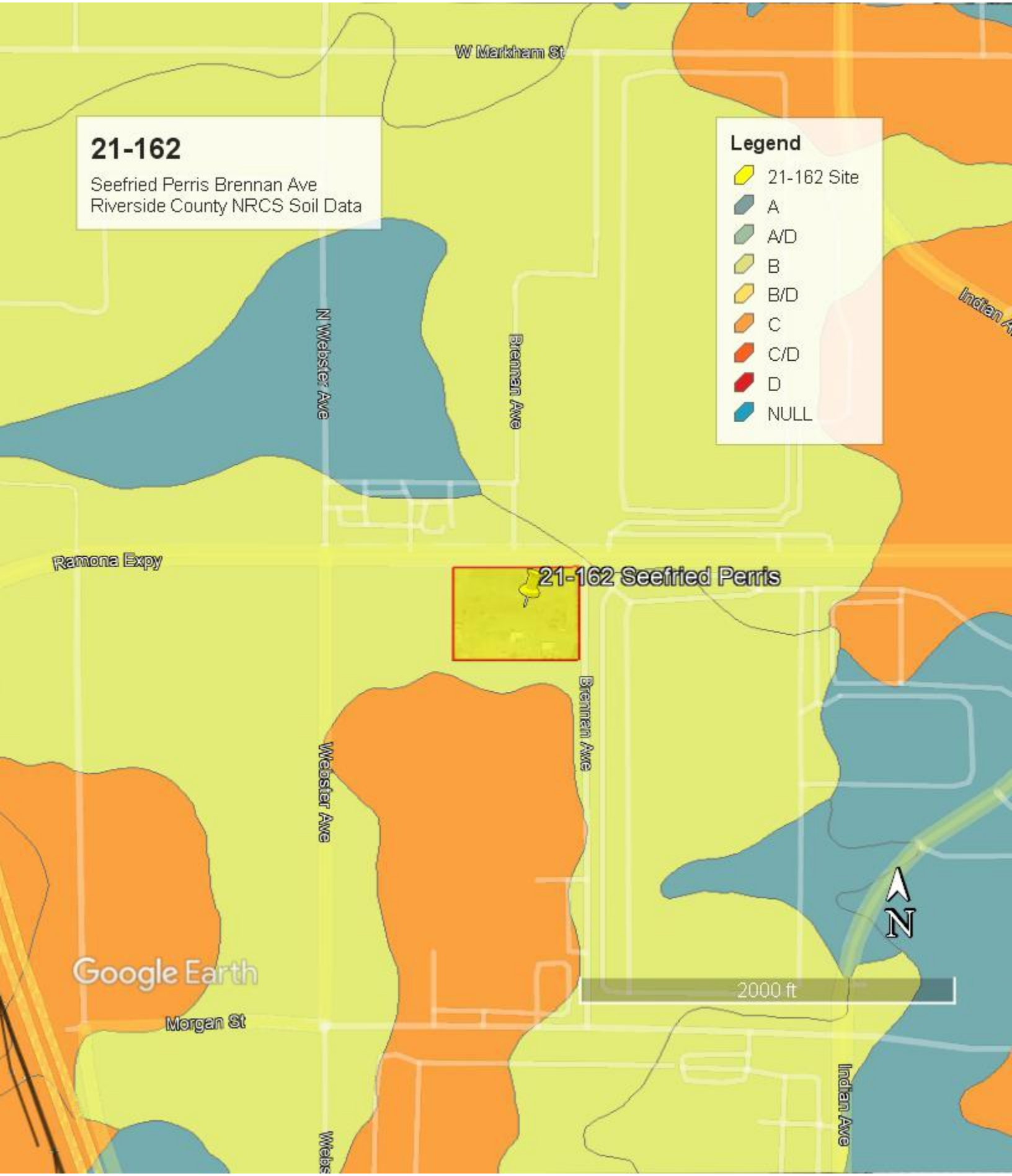
Per the proposed unit hydrograph results for the 100-year 24-hour storm event in Appendix C, stormwater will fill the proposed detention basin at approximately 390 minutes, prior to the hydrograph peak discharge. Therefore, without a detention analysis it can be assumed that the proposed detention basin will not attenuate the proposed hydrograph peak flow.

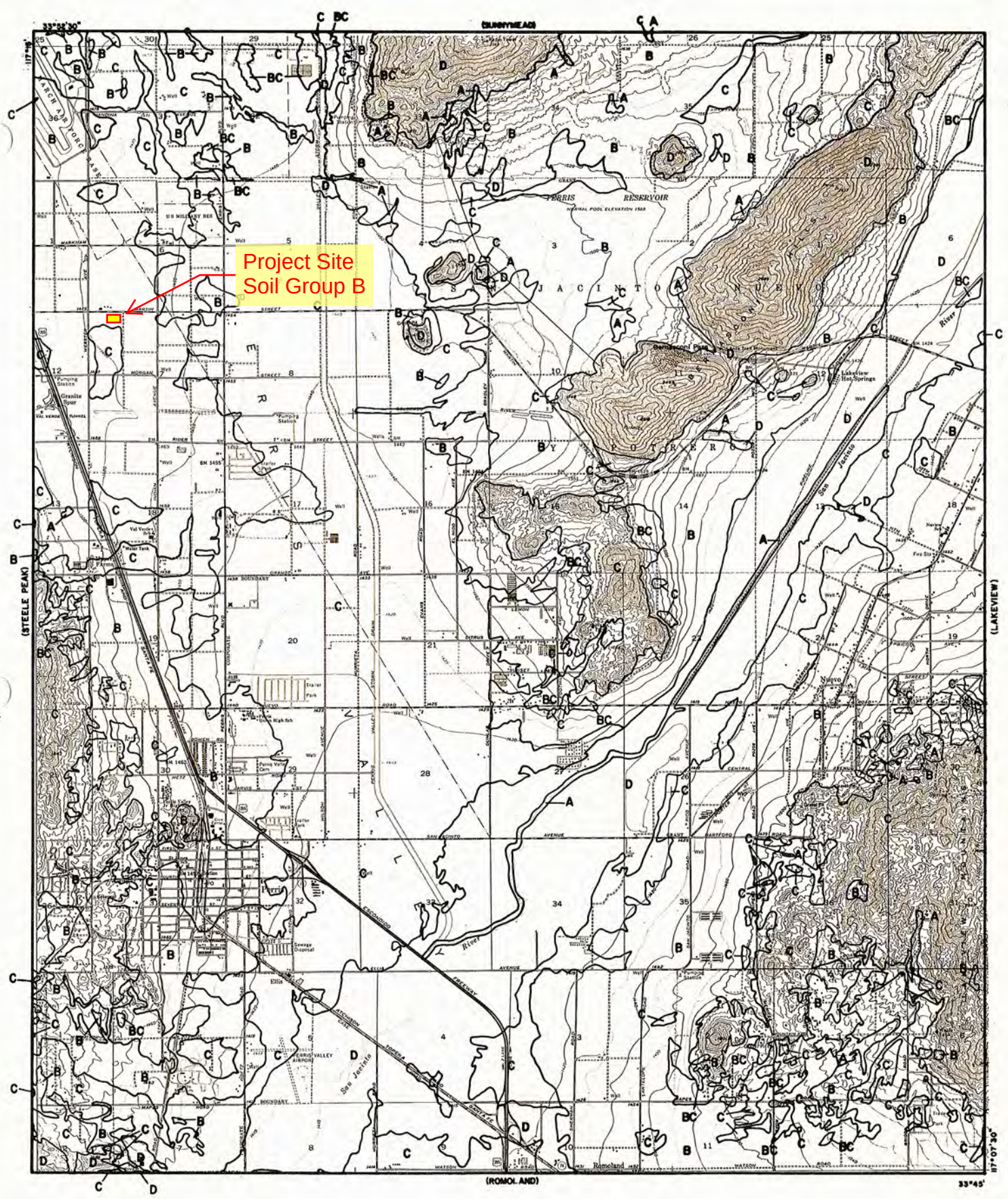
In conclusion, the peak flow resulting from the proposed development closely resembles peak flows resulting from the existing condition. Since the peak flow increase is negligible, detention for hydrologic mitigation is not required. The proposed development will improve storm drain facilities and maintain existing downstream drainage patterns.

APPENDIX A

Vicinity Map
NRCS Soil Map
Plate C-1.30 Soil Map
Plate E-5.5 2-Year 24-Hour Isohyetal Map
Plate E-5.5 100-Year 24-Hour Isohyetal Map


W MARKHAM ST
PERRY ST
SITE
RAMONA EXPRESSWAY
215 HWY
WEBSTER AVE
BRENNAN AVE
MORGAN ST
RIDER ST
INDIAN AVE
N
VICINITY MAP
NOT TO SCALE


21-162
Seefried Perris Brennan Ave
Riverside County NRCS Soil Data
Legend
21-162 Site
A
A/D
B
B/D
C
C/D
D
NULL
W Markham St
N Webster Ave
Brennan Ave
Ramona Expy
21-162 Seefried Perris
Webster Ave
Brennan Ave
Google Earth
Morgan St
2000 ft
N
Indian Ave



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—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

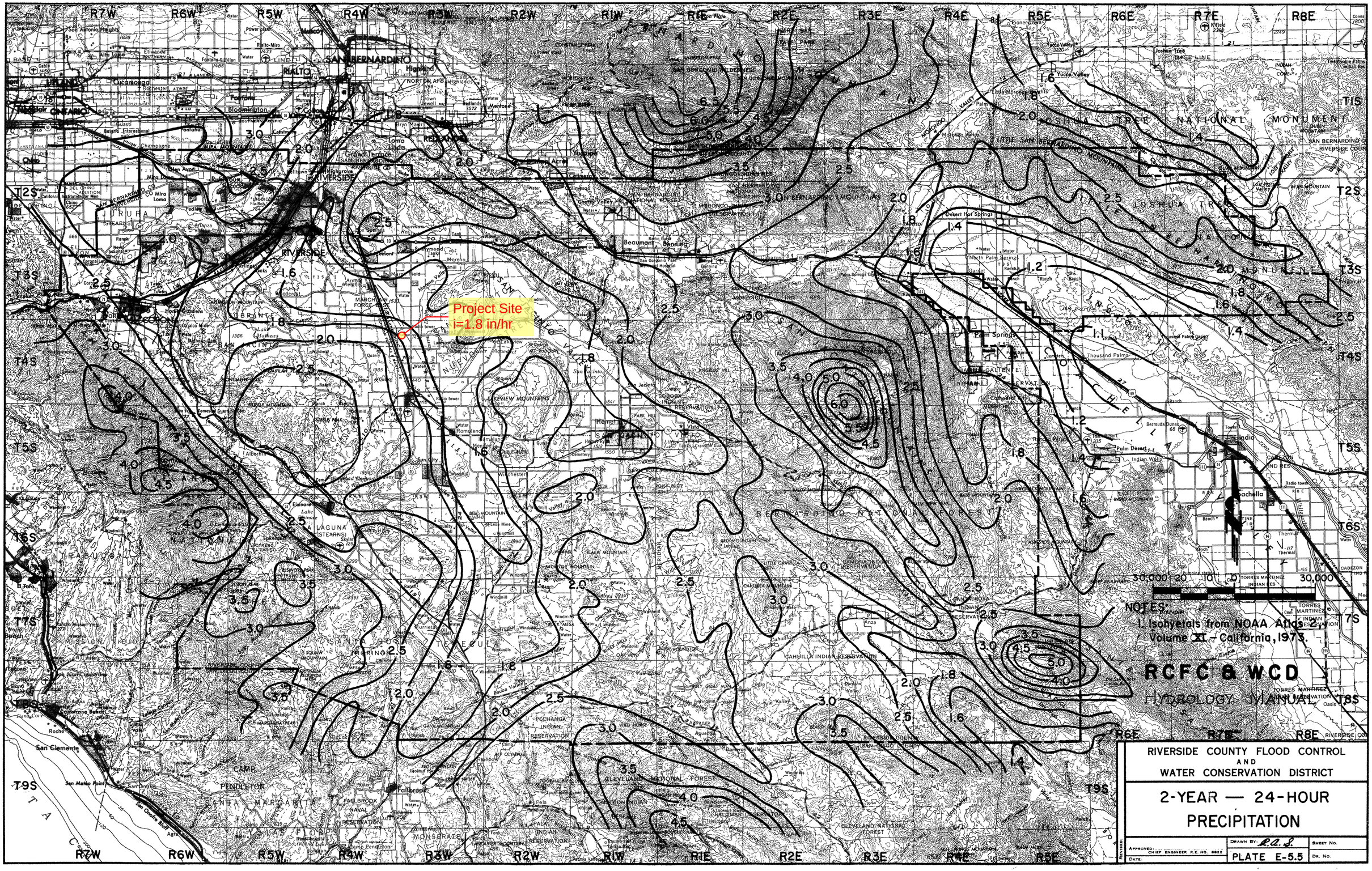
RCFC&WCD

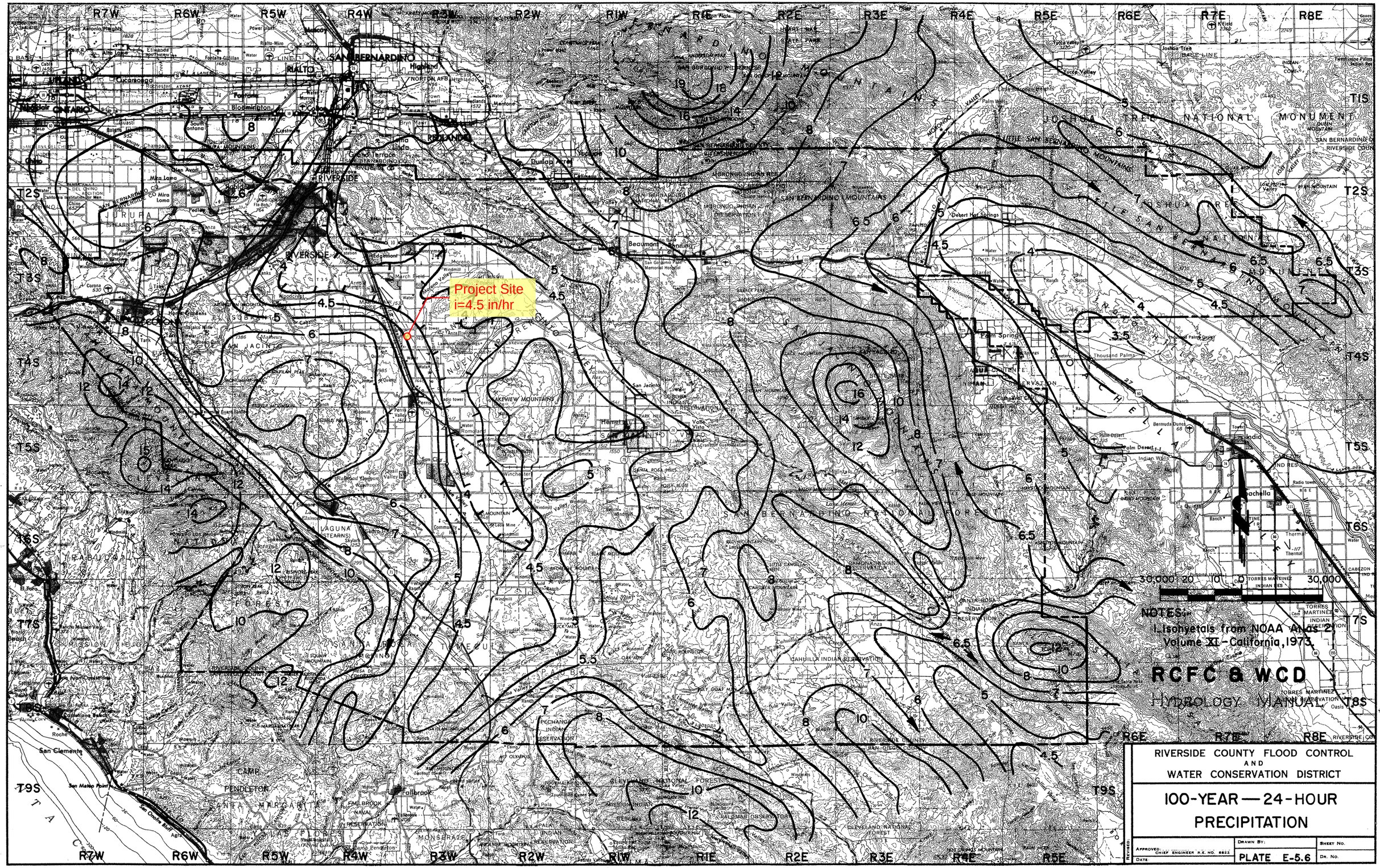
HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30


Project Site
i=1.8 in/hr
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
DRAWN BY: R.A.S.
PLATE E-5.5
SHEET NO.
DR. NO.
APPROVED CHIEF ENGINEER R.E. NO. 8822
DATE
REVISED


Project Site
i=4.5 in/hr
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8822
DATE
REVISED
DRAWN BY:
PLATE E-5.6
SHEET NO.
DR. NO.

APPENDIX B

Existing Hydrology Map
Proposed Hydrology Map

RAMONA EXPRESSWAY

BRENNAN AVENUE

EXISTING CONCRETE DRAINAGE CHANNEL

EXISTING CATCH BASIN

EXISTING 60" STORM DRAIN

EXISTING CATCH BASIN

A
7.58

CENTROID

L_c=327'

L=775
S=0.0076

EXISTING BUILDING

EXISTING BUILDING

100 (1476.36) NG

101 (1470.50) FL

EXISTING SITE INFO:

PROJECT AREA: 7.58 ACRES (TOTAL PARCEL AREA)

PRE-DEVELOPMENT
IMPERVIOUS AREA: 1.27 ACRES
PERVIOUS AREA: 6.31 ACRES

LEGEND

- A / 2.62 — SUBAREA DESIGNATION / SUBAREA IN ACRES
- 100 — NODE NUMBER
- PERVIOUS AREA
- RUNOFF FLOW
- OFFSITE RUNOFF FLOW
- SUBAREA BOUNDARY
- FLOWPATH

AREA:	7.58 ACRES
SOIL GROUP:	B [PLATE C1.30]
AMC II RUNOFF INDEX NUMBER:	86 [BARREN (ROCKLAND, ERODED AND GRADED LAND)]
IMPERVIOUS PERCENTAGE:	16.8%
LENGTH:	775'
LENGTH FROM CENTROID:	327'
CHANGE IN ELEVATION:	5.9'

30' 0' 30' 60' 90'
GRAPHIC SCALE: 1"=30'

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: EXISTING HYDROLOGY MAP

ISSUE:	HYDROLOGY
DATE:	3/8/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162HMEX
PROJECT NO.:	21-162
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

FILENAME: M:\2021\21-162 Seefried Perris Brennan Ave\HM\CAD\21-162_HM-EX.dwg, LAST SAVED ON: Mar 14 2022 11:41am PLOTTED BY: NICHOLAS, ON: Mar 14 2022 11:41am, CFG:

RAMONA EXPRESSWAY

BRENNAN AVENUE

EXISTING CONCRETE DRAINAGE CHANNEL

PROPOSED 30" RCP STORM DRAIN

EXISTING 90" RCP STORM DRAIN

PROPOSED 24" RCP STORM DRAIN

101 1462.50 INV

EXISTING CATCH BASIN

PROPOSED CONCRETE GUTTER ALONG ℄

PROPOSED UNDERGROUND DETENTION BASIN

A 7.58

CENTROID

L_c=916'

L=1303'
S=0.0103

PROPOSED CONCRETE GUTTER ALONG ℄

100 1476.00 FS

PROPOSED SITE INFO:

PROJECT AREA: 7.58 ACRES (TOTAL PARCEL AREA)

POST-DEVELOPMENT
IMPERVIOUS AREA: 6.80 ACRES
PERVIOUS AREA: 0.78 ACRES

LEGEND

- A / 2.62 — SUBAREA DESIGNATION / SUBAREA IN ACRES
- 100 — NODE NUMBER
- PERVIOUS AREA
- RUNOFF FLOW
- OFFSITE RUNOFF FLOW
- SUBAREA BOUNDARY
- FLOWPATH

AREA:	7.58 ACRES
SOIL GROUP:	B [PLATE C1.30]
AMC II RUNOFF INDEX NUMBER:	56 [COMMERCIAL L/S (LAWN, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	89.7%
LENGTH:	1303'
LENGTH FROM CENTROID:	916'
CHANGE IN ELEVATION:	13.5'

30' 0' 30' 60' 90'
GRAPHIC SCALE: 1"=30'

NOT FOR CONSTRUCTION

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
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DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NO.:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: PROPOSED HYDROLOGY MAP

ISSUE:	HYDROLOGY
DATE:	3/8/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162HMPR
PROJECT NO.:	21-162
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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APPENDIX C

Existing Condition Hydrographs (Unit Riverside)
Proposed Condition Hydrographs (Unit Riverside)

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

Study date 03/14/22 File: 21162EXA24100.out

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

Program License Serial Number 6310

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

English Units used in output format

21-162 SEEFRIED PERRIS
EXISTING CONDITION
SUBAREA A
100-YEAR 24-HOUR STORM

Drainage Area = 7.58(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.58(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 775.00(Ft.)
Length along longest watercourse measured to centroid = 327.00(Ft.)
Length along longest watercourse = 0.147 Mi.
Length along longest watercourse measured to centroid = 0.062 Mi.
Difference in elevation = 5.90(Ft.)
Slope along watercourse = 40.1961 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.060 Hr.
Lag time = 3.59 Min.
25% of lag time = 0.90 Min.
40% of lag time = 1.44 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.58	1.80	13.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.58	4.50	34.11

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.800(In)
Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 4.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 4.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.580	86.00	0.168

Total Area Entered = 7.58(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
86.0	94.4	0.073	0.168	0.062	1.000	0.062
					Sum (F) =	0.062

Area averaged mean soil loss (F) (In/Hr) = 0.062
Minimum soil loss rate ((In/Hr)) = 0.031
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	139.322	30.502	2.330
2	0.167	278.644	47.751	3.648
3	0.250	417.967	11.847	0.905
4	0.333	557.289	5.227	0.399
5	0.417	696.611	2.793	0.213
6	0.500	835.933	1.880	0.144
			Sum = 100.000	Sum= 7.639

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.110)	0.032	0.004
2	0.17	0.07	0.036	(0.109)	0.032	0.004
3	0.25	0.07	0.036	(0.109)	0.032	0.004
4	0.33	0.10	0.054	(0.108)	0.049	0.005
5	0.42	0.10	0.054	(0.108)	0.049	0.005
6	0.50	0.10	0.054	(0.107)	0.049	0.005
7	0.58	0.10	0.054	(0.107)	0.049	0.005
8	0.67	0.10	0.054	(0.107)	0.049	0.005
9	0.75	0.10	0.054	(0.106)	0.049	0.005
10	0.83	0.13	0.072	(0.106)	0.065	0.007
11	0.92	0.13	0.072	(0.105)	0.065	0.007
12	1.00	0.13	0.072	(0.105)	0.065	0.007
13	1.08	0.10	0.054	(0.105)	0.049	0.005
14	1.17	0.10	0.054	(0.104)	0.049	0.005
15	1.25	0.10	0.054	(0.104)	0.049	0.005
16	1.33	0.10	0.054	(0.103)	0.049	0.005
17	1.42	0.10	0.054	(0.103)	0.049	0.005
18	1.50	0.10	0.054	(0.102)	0.049	0.005
19	1.58	0.10	0.054	(0.102)	0.049	0.005
20	1.67	0.10	0.054	(0.102)	0.049	0.005
21	1.75	0.10	0.054	(0.101)	0.049	0.005
22	1.83	0.13	0.072	(0.101)	0.065	0.007
23	1.92	0.13	0.072	(0.100)	0.065	0.007
24	2.00	0.13	0.072	(0.100)	0.065	0.007
25	2.08	0.13	0.072	(0.100)	0.065	0.007
26	2.17	0.13	0.072	(0.099)	0.065	0.007
27	2.25	0.13	0.072	(0.099)	0.065	0.007
28	2.33	0.13	0.072	(0.098)	0.065	0.007
29	2.42	0.13	0.072	(0.098)	0.065	0.007
30	2.50	0.13	0.072	(0.098)	0.065	0.007
31	2.58	0.17	0.090	(0.097)	0.081	0.009
32	2.67	0.17	0.090	(0.097)	0.081	0.009
33	2.75	0.17	0.090	(0.096)	0.081	0.009
34	2.83	0.17	0.090	(0.096)	0.081	0.009

35	2.92	0.17	0.090	(	0.096)	0.081	0.009
36	3.00	0.17	0.090	(	0.095)	0.081	0.009
37	3.08	0.17	0.090	(	0.095)	0.081	0.009
38	3.17	0.17	0.090	(	0.094)	0.081	0.009
39	3.25	0.17	0.090	(	0.094)	0.081	0.009
40	3.33	0.17	0.090	(	0.094)	0.081	0.009
41	3.42	0.17	0.090	(	0.093)	0.081	0.009
42	3.50	0.17	0.090	(	0.093)	0.081	0.009
43	3.58	0.17	0.090	(	0.092)	0.081	0.009
44	3.67	0.17	0.090	(	0.092)	0.081	0.009
45	3.75	0.17	0.090	(	0.092)	0.081	0.009
46	3.83	0.20	0.108		0.091	(0.097)	0.017
47	3.92	0.20	0.108		0.091	(0.097)	0.017
48	4.00	0.20	0.108		0.091	(0.097)	0.017
49	4.08	0.20	0.108		0.090	(0.097)	0.018
50	4.17	0.20	0.108		0.090	(0.097)	0.018
51	4.25	0.20	0.108		0.089	(0.097)	0.019
52	4.33	0.23	0.126		0.089	(0.113)	0.037
53	4.42	0.23	0.126		0.089	(0.113)	0.037
54	4.50	0.23	0.126		0.088	(0.113)	0.038
55	4.58	0.23	0.126		0.088	(0.113)	0.038
56	4.67	0.23	0.126		0.087	(0.113)	0.039
57	4.75	0.23	0.126		0.087	(0.113)	0.039
58	4.83	0.27	0.144		0.087	(0.130)	0.057
59	4.92	0.27	0.144		0.086	(0.130)	0.058
60	5.00	0.27	0.144		0.086	(0.130)	0.058
61	5.08	0.20	0.108		0.086	(0.097)	0.022
62	5.17	0.20	0.108		0.085	(0.097)	0.023
63	5.25	0.20	0.108		0.085	(0.097)	0.023
64	5.33	0.23	0.126		0.084	(0.113)	0.042
65	5.42	0.23	0.126		0.084	(0.113)	0.042
66	5.50	0.23	0.126		0.084	(0.113)	0.042
67	5.58	0.27	0.144		0.083	(0.130)	0.061
68	5.67	0.27	0.144		0.083	(0.130)	0.061
69	5.75	0.27	0.144		0.083	(0.130)	0.061
70	5.83	0.27	0.144		0.082	(0.130)	0.062
71	5.92	0.27	0.144		0.082	(0.130)	0.062
72	6.00	0.27	0.144		0.082	(0.130)	0.062
73	6.08	0.30	0.162		0.081	(0.146)	0.081
74	6.17	0.30	0.162		0.081	(0.146)	0.081
75	6.25	0.30	0.162		0.080	(0.146)	0.082
76	6.33	0.30	0.162		0.080	(0.146)	0.082
77	6.42	0.30	0.162		0.080	(0.146)	0.082
78	6.50	0.30	0.162		0.079	(0.146)	0.083
79	6.58	0.33	0.180		0.079	(0.162)	0.101
80	6.67	0.33	0.180		0.079	(0.162)	0.101
81	6.75	0.33	0.180		0.078	(0.162)	0.102
82	6.83	0.33	0.180		0.078	(0.162)	0.102
83	6.92	0.33	0.180		0.078	(0.162)	0.102
84	7.00	0.33	0.180		0.077	(0.162)	0.103
85	7.08	0.33	0.180		0.077	(0.162)	0.103
86	7.17	0.33	0.180		0.077	(0.162)	0.103
87	7.25	0.33	0.180		0.076	(0.162)	0.104
88	7.33	0.37	0.198		0.076	(0.178)	0.122
89	7.42	0.37	0.198		0.076	(0.178)	0.122
90	7.50	0.37	0.198		0.075	(0.178)	0.123
91	7.58	0.40	0.216		0.075	(0.194)	0.141
92	7.67	0.40	0.216		0.074	(0.194)	0.141
93	7.75	0.40	0.216		0.074	(0.194)	0.142
94	7.83	0.43	0.234		0.074	(0.211)	0.160
95	7.92	0.43	0.234		0.073	(0.211)	0.161
96	8.00	0.43	0.234		0.073	(0.211)	0.161
97	8.08	0.50	0.270		0.073	(0.243)	0.197
98	8.17	0.50	0.270		0.072	(0.243)	0.198
99	8.25	0.50	0.270		0.072	(0.243)	0.198
100	8.33	0.50	0.270		0.072	(0.243)	0.198
101	8.42	0.50	0.270		0.071	(0.243)	0.199
102	8.50	0.50	0.270		0.071	(0.243)	0.199
103	8.58	0.53	0.288		0.071	(0.259)	0.217
104	8.67	0.53	0.288		0.070	(0.259)	0.218

105	8.75	0.53	0.288	0.070	(	0.259)	0.218
106	8.83	0.57	0.306	0.070	(	0.275)	0.236
107	8.92	0.57	0.306	0.069	(	0.275)	0.237
108	9.00	0.57	0.306	0.069	(	0.275)	0.237
109	9.08	0.63	0.342	0.069	(	0.308)	0.273
110	9.17	0.63	0.342	0.068	(	0.308)	0.274
111	9.25	0.63	0.342	0.068	(	0.308)	0.274
112	9.33	0.67	0.360	0.068	(	0.324)	0.292
113	9.42	0.67	0.360	0.067	(	0.324)	0.293
114	9.50	0.67	0.360	0.067	(	0.324)	0.293
115	9.58	0.70	0.378	0.067	(	0.340)	0.311
116	9.67	0.70	0.378	0.067	(	0.340)	0.311
117	9.75	0.70	0.378	0.066	(	0.340)	0.312
118	9.83	0.73	0.396	0.066	(	0.356)	0.330
119	9.92	0.73	0.396	0.066	(	0.356)	0.330
120	10.00	0.73	0.396	0.065	(	0.356)	0.331
121	10.08	0.50	0.270	0.065	(	0.243)	0.205
122	10.17	0.50	0.270	0.065	(	0.243)	0.205
123	10.25	0.50	0.270	0.064	(	0.243)	0.206
124	10.33	0.50	0.270	0.064	(	0.243)	0.206
125	10.42	0.50	0.270	0.064	(	0.243)	0.206
126	10.50	0.50	0.270	0.063	(	0.243)	0.207
127	10.58	0.67	0.360	0.063	(	0.324)	0.297
128	10.67	0.67	0.360	0.063	(	0.324)	0.297
129	10.75	0.67	0.360	0.062	(	0.324)	0.298
130	10.83	0.67	0.360	0.062	(	0.324)	0.298
131	10.92	0.67	0.360	0.062	(	0.324)	0.298
132	11.00	0.67	0.360	0.062	(	0.324)	0.298
133	11.08	0.63	0.342	0.061	(	0.308)	0.281
134	11.17	0.63	0.342	0.061	(	0.308)	0.281
135	11.25	0.63	0.342	0.061	(	0.308)	0.281
136	11.33	0.63	0.342	0.060	(	0.308)	0.282
137	11.42	0.63	0.342	0.060	(	0.308)	0.282
138	11.50	0.63	0.342	0.060	(	0.308)	0.282
139	11.58	0.57	0.306	0.059	(	0.275)	0.247
140	11.67	0.57	0.306	0.059	(	0.275)	0.247
141	11.75	0.57	0.306	0.059	(	0.275)	0.247
142	11.83	0.60	0.324	0.059	(	0.292)	0.265
143	11.92	0.60	0.324	0.058	(	0.292)	0.266
144	12.00	0.60	0.324	0.058	(	0.292)	0.266
145	12.08	0.83	0.450	0.058	(	0.405)	0.392
146	12.17	0.83	0.450	0.057	(	0.405)	0.393
147	12.25	0.83	0.450	0.057	(	0.405)	0.393
148	12.33	0.87	0.468	0.057	(	0.421)	0.411
149	12.42	0.87	0.468	0.057	(	0.421)	0.411
150	12.50	0.87	0.468	0.056	(	0.421)	0.412
151	12.58	0.93	0.504	0.056	(	0.454)	0.448
152	12.67	0.93	0.504	0.056	(	0.454)	0.448
153	12.75	0.93	0.504	0.055	(	0.454)	0.449
154	12.83	0.97	0.522	0.055	(	0.470)	0.467
155	12.92	0.97	0.522	0.055	(	0.470)	0.467
156	13.00	0.97	0.522	0.055	(	0.470)	0.467
157	13.08	1.13	0.612	0.054	(	0.551)	0.558
158	13.17	1.13	0.612	0.054	(	0.551)	0.558
159	13.25	1.13	0.612	0.054	(	0.551)	0.558
160	13.33	1.13	0.612	0.053	(	0.551)	0.559
161	13.42	1.13	0.612	0.053	(	0.551)	0.559
162	13.50	1.13	0.612	0.053	(	0.551)	0.559
163	13.58	0.77	0.414	0.053	(	0.373)	0.361
164	13.67	0.77	0.414	0.052	(	0.373)	0.362
165	13.75	0.77	0.414	0.052	(	0.373)	0.362
166	13.83	0.77	0.414	0.052	(	0.373)	0.362
167	13.92	0.77	0.414	0.052	(	0.373)	0.362
168	14.00	0.77	0.414	0.051	(	0.373)	0.363
169	14.08	0.90	0.486	0.051	(	0.437)	0.435
170	14.17	0.90	0.486	0.051	(	0.437)	0.435
171	14.25	0.90	0.486	0.051	(	0.437)	0.435
172	14.33	0.87	0.468	0.050	(	0.421)	0.418
173	14.42	0.87	0.468	0.050	(	0.421)	0.418
174	14.50	0.87	0.468	0.050	(	0.421)	0.418

175	14.58	0.87	0.468	0.050	(	0.421)	0.418
176	14.67	0.87	0.468	0.049	(	0.421)	0.419
177	14.75	0.87	0.468	0.049	(	0.421)	0.419
178	14.83	0.83	0.450	0.049	(	0.405)	0.401
179	14.92	0.83	0.450	0.049	(	0.405)	0.401
180	15.00	0.83	0.450	0.048	(	0.405)	0.402
181	15.08	0.80	0.432	0.048	(	0.389)	0.384
182	15.17	0.80	0.432	0.048	(	0.389)	0.384
183	15.25	0.80	0.432	0.048	(	0.389)	0.384
184	15.33	0.77	0.414	0.047	(	0.373)	0.367
185	15.42	0.77	0.414	0.047	(	0.373)	0.367
186	15.50	0.77	0.414	0.047	(	0.373)	0.367
187	15.58	0.63	0.342	0.047	(	0.308)	0.295
188	15.67	0.63	0.342	0.046	(	0.308)	0.296
189	15.75	0.63	0.342	0.046	(	0.308)	0.296
190	15.83	0.63	0.342	0.046	(	0.308)	0.296
191	15.92	0.63	0.342	0.046	(	0.308)	0.296
192	16.00	0.63	0.342	0.045	(	0.308)	0.297
193	16.08	0.13	0.072	0.045	(	0.065)	0.027
194	16.17	0.13	0.072	0.045	(	0.065)	0.027
195	16.25	0.13	0.072	0.045	(	0.065)	0.027
196	16.33	0.13	0.072	0.044	(	0.065)	0.028
197	16.42	0.13	0.072	0.044	(	0.065)	0.028
198	16.50	0.13	0.072	0.044	(	0.065)	0.028
199	16.58	0.10	0.054	0.044	(	0.049)	0.010
200	16.67	0.10	0.054	0.044	(	0.049)	0.010
201	16.75	0.10	0.054	0.043	(	0.049)	0.011
202	16.83	0.10	0.054	0.043	(	0.049)	0.011
203	16.92	0.10	0.054	0.043	(	0.049)	0.011
204	17.00	0.10	0.054	0.043	(	0.049)	0.011
205	17.08	0.17	0.090	0.042	(	0.081)	0.048
206	17.17	0.17	0.090	0.042	(	0.081)	0.048
207	17.25	0.17	0.090	0.042	(	0.081)	0.048
208	17.33	0.17	0.090	0.042	(	0.081)	0.048
209	17.42	0.17	0.090	0.042	(	0.081)	0.048
210	17.50	0.17	0.090	0.041	(	0.081)	0.049
211	17.58	0.17	0.090	0.041	(	0.081)	0.049
212	17.67	0.17	0.090	0.041	(	0.081)	0.049
213	17.75	0.17	0.090	0.041	(	0.081)	0.049
214	17.83	0.13	0.072	0.041	(	0.065)	0.031
215	17.92	0.13	0.072	0.040	(	0.065)	0.032
216	18.00	0.13	0.072	0.040	(	0.065)	0.032
217	18.08	0.13	0.072	0.040	(	0.065)	0.032
218	18.17	0.13	0.072	0.040	(	0.065)	0.032
219	18.25	0.13	0.072	0.040	(	0.065)	0.032
220	18.33	0.13	0.072	0.039	(	0.065)	0.033
221	18.42	0.13	0.072	0.039	(	0.065)	0.033
222	18.50	0.13	0.072	0.039	(	0.065)	0.033
223	18.58	0.10	0.054	0.039	(	0.049)	0.015
224	18.67	0.10	0.054	0.039	(	0.049)	0.015
225	18.75	0.10	0.054	0.038	(	0.049)	0.016
226	18.83	0.07	0.036	(0.038)		0.032	0.004
227	18.92	0.07	0.036	(0.038)		0.032	0.004
228	19.00	0.07	0.036	(0.038)		0.032	0.004
229	19.08	0.10	0.054	0.038	(	0.049)	0.016
230	19.17	0.10	0.054	0.038	(	0.049)	0.016
231	19.25	0.10	0.054	0.037	(	0.049)	0.017
232	19.33	0.13	0.072	0.037	(	0.065)	0.035
233	19.42	0.13	0.072	0.037	(	0.065)	0.035
234	19.50	0.13	0.072	0.037	(	0.065)	0.035
235	19.58	0.10	0.054	0.037	(	0.049)	0.017
236	19.67	0.10	0.054	0.037	(	0.049)	0.017
237	19.75	0.10	0.054	0.036	(	0.049)	0.018
238	19.83	0.07	0.036	(0.036)		0.032	0.004
239	19.92	0.07	0.036	(0.036)		0.032	0.004
240	20.00	0.07	0.036	(0.036)		0.032	0.004
241	20.08	0.10	0.054	0.036	(	0.049)	0.018
242	20.17	0.10	0.054	0.036	(	0.049)	0.018
243	20.25	0.10	0.054	0.035	(	0.049)	0.019
244	20.33	0.10	0.054	0.035	(	0.049)	0.019

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245  20.42     0.10      0.054          0.035    (  0.049)        0.019
246  20.50     0.10      0.054          0.035    (  0.049)        0.019
247  20.58     0.10      0.054          0.035    (  0.049)        0.019
248  20.67     0.10      0.054          0.035    (  0.049)        0.019
249  20.75     0.10      0.054          0.035    (  0.049)        0.019
250  20.83     0.07      0.036       (  0.034)       0.032        0.004
251  20.92     0.07      0.036       (  0.034)       0.032        0.004
252  21.00     0.07      0.036       (  0.034)       0.032        0.004
253  21.08     0.10      0.054          0.034    (  0.049)        0.020
254  21.17     0.10      0.054          0.034    (  0.049)        0.020
255  21.25     0.10      0.054          0.034    (  0.049)        0.020
256  21.33     0.07      0.036       (  0.034)       0.032        0.004
257  21.42     0.07      0.036       (  0.033)       0.032        0.004
258  21.50     0.07      0.036       (  0.033)       0.032        0.004
259  21.58     0.10      0.054          0.033    (  0.049)        0.021
260  21.67     0.10      0.054          0.033    (  0.049)        0.021
261  21.75     0.10      0.054          0.033    (  0.049)        0.021
262  21.83     0.07      0.036       (  0.033)       0.032        0.004
263  21.92     0.07      0.036       (  0.033)       0.032        0.004
264  22.00     0.07      0.036       (  0.033)       0.032        0.004
265  22.08     0.10      0.054          0.033    (  0.049)        0.021
266  22.17     0.10      0.054          0.032    (  0.049)        0.022
267  22.25     0.10      0.054          0.032    (  0.049)        0.022
268  22.33     0.07      0.036          0.032    (  0.032)        0.004
269  22.42     0.07      0.036          0.032    (  0.032)        0.004
270  22.50     0.07      0.036          0.032    (  0.032)        0.004
271  22.58     0.07      0.036          0.032    (  0.032)        0.004
272  22.67     0.07      0.036          0.032    (  0.032)        0.004
273  22.75     0.07      0.036          0.032    (  0.032)        0.004
274  22.83     0.07      0.036          0.032    (  0.032)        0.004
275  22.92     0.07      0.036          0.032    (  0.032)        0.004
276  23.00     0.07      0.036          0.032    (  0.032)        0.004
277  23.08     0.07      0.036          0.031    (  0.032)        0.005
278  23.17     0.07      0.036          0.031    (  0.032)        0.005
279  23.25     0.07      0.036          0.031    (  0.032)        0.005
280  23.33     0.07      0.036          0.031    (  0.032)        0.005
281  23.42     0.07      0.036          0.031    (  0.032)        0.005
282  23.50     0.07      0.036          0.031    (  0.032)        0.005
283  23.58     0.07      0.036          0.031    (  0.032)        0.005
284  23.67     0.07      0.036          0.031    (  0.032)        0.005
285  23.75     0.07      0.036          0.031    (  0.032)        0.005
286  23.83     0.07      0.036          0.031    (  0.032)        0.005
287  23.92     0.07      0.036          0.031    (  0.032)        0.005
288  24.00     0.07      0.036          0.031    (  0.032)        0.005
            (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    37.9
      Flood volume = Effective rainfall      3.16(In)
       times area       7.6(Ac.)/[(In)/(Ft.)] =       2.0(Ac.Ft)
      Total soil loss =      1.34(In)
      Total soil loss =     0.846(Ac.Ft)
      Total rainfall =      4.50(In)
      Flood volume =       86984.4 Cubic Feet
      Total soil loss =       36833.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      4.271(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        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0004      0.02  Q         |         |         |         |
   0+20       0.0006      0.03  Q         |         |         |         |
   0+25       0.0008      0.04  Q         |         |         |         |
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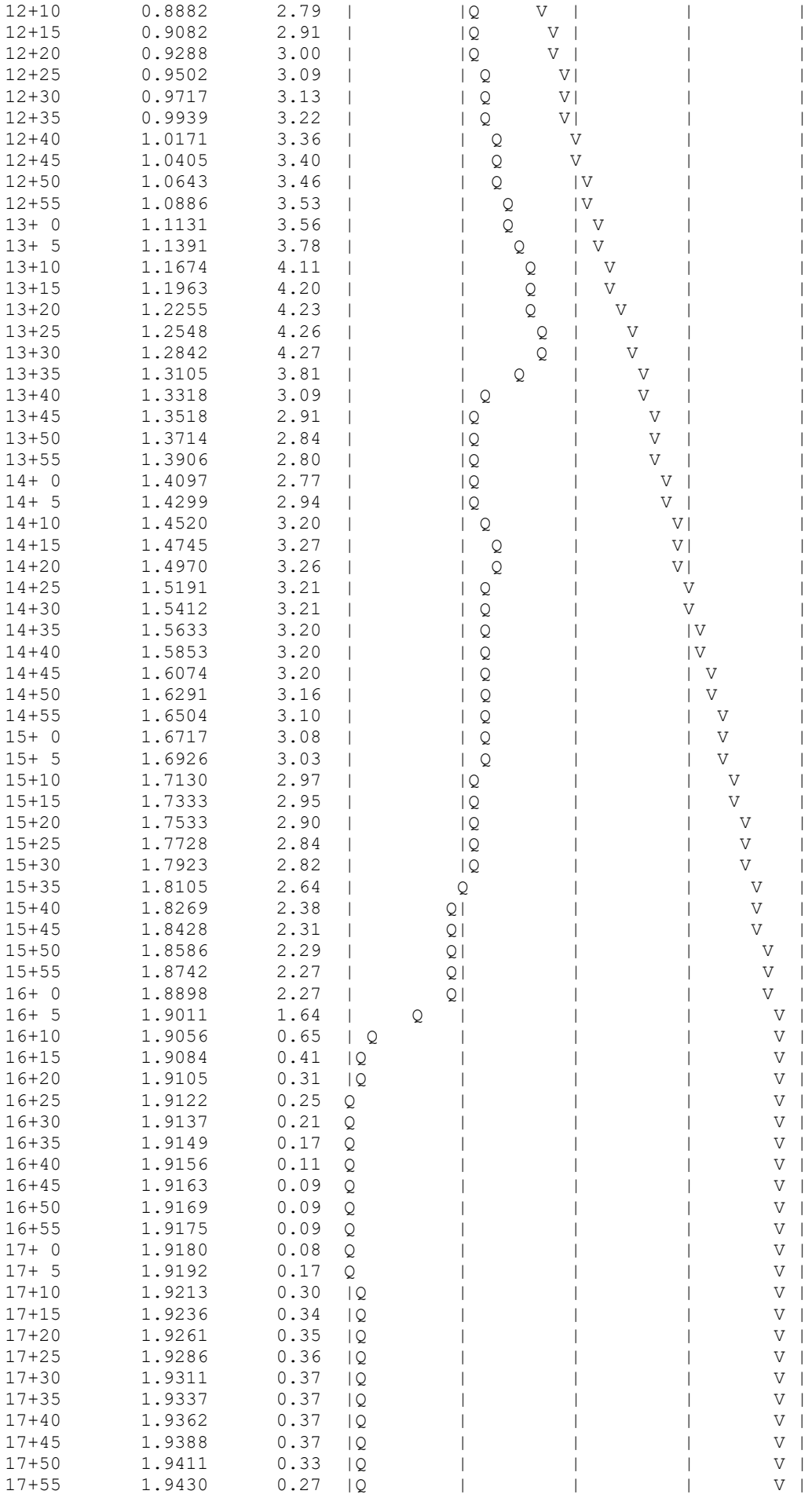
0+30	0.0011	0.04	Q				
0+35	0.0014	0.04	Q				
0+40	0.0017	0.04	Q				
0+45	0.0020	0.04	Q				
0+50	0.0023	0.05	Q				
0+55	0.0026	0.05	Q				
1+ 0	0.0030	0.05	Q				
1+ 5	0.0034	0.05	Q				
1+10	0.0037	0.04	Q				
1+15	0.0040	0.04	Q				
1+20	0.0042	0.04	Q				
1+25	0.0045	0.04	Q				
1+30	0.0048	0.04	Q				
1+35	0.0051	0.04	Q				
1+40	0.0054	0.04	Q				
1+45	0.0057	0.04	Q				
1+50	0.0060	0.05	Q				
1+55	0.0063	0.05	Q				
2+ 0	0.0067	0.05	Q				
2+ 5	0.0071	0.05	Q				
2+10	0.0075	0.05	Q				
2+15	0.0078	0.06	Q				
2+20	0.0082	0.06	Q				
2+25	0.0086	0.06	Q				
2+30	0.0090	0.06	Q				
2+35	0.0094	0.06	Q				
2+40	0.0098	0.07	Q				
2+45	0.0103	0.07	Q				
2+50	0.0108	0.07	Q				
2+55	0.0112	0.07	Q				
3+ 0	0.0117	0.07	Q				
3+ 5	0.0122	0.07	Q				
3+10	0.0127	0.07	Q				
3+15	0.0131	0.07	Q				
3+20	0.0136	0.07	Q				
3+25	0.0141	0.07	Q				
3+30	0.0146	0.07	Q				
3+35	0.0150	0.07	Q				
3+40	0.0155	0.07	Q				
3+45	0.0160	0.07	Q				
3+50	0.0166	0.09	Q				
3+55	0.0174	0.12	Q				
4+ 0	0.0182	0.12	Q				
4+ 5	0.0191	0.13	Q				
4+10	0.0201	0.14	Q				
4+15	0.0210	0.14	Q				
4+20	0.0223	0.18	Q				
4+25	0.0240	0.25	VQ				
4+30	0.0259	0.27	VQ				
4+35	0.0278	0.28	VQ				
4+40	0.0298	0.29	VQ				
4+45	0.0319	0.29	VQ				
4+50	0.0342	0.34	VQ				
4+55	0.0370	0.41	VQ				
5+ 0	0.0399	0.43	VQ				
5+ 5	0.0424	0.35	VQ				
5+10	0.0439	0.23	Q				
5+15	0.0453	0.20	Q				
5+20	0.0469	0.23	Q				
5+25	0.0489	0.29	VQ				
5+30	0.0510	0.31	|Q				
5+35	0.0535	0.36	|Q				
5+40	0.0565	0.43	|Q				
5+45	0.0596	0.45	|Q				
5+50	0.0628	0.46	|Q				
5+55	0.0660	0.47	|Q				
6+ 0	0.0693	0.47	|Q				
6+ 5	0.0728	0.52	|VQ				
6+10	0.0769	0.59	|VQ				
6+15	0.0811	0.61	|VQ				

6+20	0.0853	0.62	VQ				
6+25	0.0896	0.62	VQ				
6+30	0.0939	0.63	VQ				
6+35	0.0986	0.67	VQ				
6+40	0.1037	0.74	Q				
6+45	0.1089	0.76	VQ				
6+50	0.1142	0.77	VQ				
6+55	0.1196	0.78	VQ				
7+ 0	0.1249	0.78	VQ				
7+ 5	0.1303	0.78	VQ				
7+10	0.1358	0.79	VQ				
7+15	0.1412	0.79	VQ				
7+20	0.1470	0.83	VQ				
7+25	0.1532	0.90	Q				
7+30	0.1595	0.92	Q				
7+35	0.1662	0.97	Q				
7+40	0.1734	1.05	VQ				
7+45	0.1808	1.07	VQ				
7+50	0.1885	1.12	VQ				
7+55	0.1967	1.19	VQ				
8+ 0	0.2051	1.21	Q				
8+ 5	0.2141	1.31	VQ				
8+10	0.2240	1.44	VQ				
8+15	0.2342	1.48	VQ				
8+20	0.2446	1.50	VQ				
8+25	0.2550	1.51	VQ				
8+30	0.2654	1.52	VQ				
8+35	0.2762	1.56	VQ				
8+40	0.2874	1.63	VQ				
8+45	0.2987	1.65	VQ				
8+50	0.3105	1.70	Q				
8+55	0.3227	1.77	VQ				
9+ 0	0.3350	1.79	VQ				
9+ 5	0.3480	1.89	VQ				
9+10	0.3620	2.03	VQ				
9+15	0.3762	2.06	VQ				
9+20	0.3908	2.12	VQ				
9+25	0.4059	2.20	Q				
9+30	0.4212	2.22	Q				
9+35	0.4369	2.27	VQ				
9+40	0.4530	2.35	Q				
9+45	0.4693	2.37	Q				
9+50	0.4860	2.42	Q				
9+55	0.5032	2.49	QV				
10+ 0	0.5205	2.51	Q				
10+ 5	0.5358	2.23	Q V				
10+10	0.5480	1.77	Q V				
10+15	0.5595	1.66	Q V				
10+20	0.5706	1.62	Q V				
10+25	0.5816	1.59	Q V				
10+30	0.5924	1.58	Q V				
10+35	0.6048	1.79	Q V				
10+40	0.6194	2.12	Q V				
10+45	0.6345	2.20	Q V				
10+50	0.6500	2.24	Q V				
10+55	0.6656	2.26	Q V				
11+ 0	0.6813	2.28	Q V				
11+ 5	0.6967	2.24	Q V				
11+10	0.7117	2.18	Q V				
11+15	0.7265	2.16	Q V				
11+20	0.7414	2.16	Q V				
11+25	0.7562	2.16	Q V				
11+30	0.7711	2.15	Q V				
11+35	0.7854	2.07	Q V				
11+40	0.7987	1.94	Q V				
11+45	0.8119	1.91	Q V				
11+50	0.8253	1.94	Q V				
11+55	0.8391	2.00	Q V				
12+ 0	0.8530	2.02	Q V				
12+ 5	0.8690	2.32	Q V				



18+ 0	1.9447	0.26	|Q	|	|	|	V |
18+ 5	1.9465	0.25	Q	|	|	|	V |
18+10	1.9482	0.25	Q	|	|	|	V|
18+15	1.9498	0.25	Q	|	|	|	V|
18+20	1.9516	0.25	Q	|	|	|	V|
18+25	1.9533	0.25	Q	|	|	|	V|
18+30	1.9550	0.25	|Q	|	|	|	V|
18+35	1.9564	0.21	Q	|	|	|	V|
18+40	1.9574	0.15	Q	|	|	|	V|
18+45	1.9583	0.13	Q	|	|	|	V|
18+50	1.9590	0.10	Q	|	|	|	V|
18+55	1.9593	0.05	Q	|	|	|	V|
19+ 0	1.9596	0.04	Q	|	|	|	V|
19+ 5	1.9600	0.06	Q	|	|	|	V|
19+10	1.9607	0.11	Q	|	|	|	V|
19+15	1.9615	0.12	Q	|	|	|	V|
19+20	1.9627	0.16	Q	|	|	|	V|
19+25	1.9643	0.23	Q	|	|	|	V|
19+30	1.9660	0.25	|Q	|	|	|	V|
19+35	1.9676	0.22	Q	|	|	|	V|
19+40	1.9687	0.16	Q	|	|	|	V|
19+45	1.9697	0.15	Q	|	|	|	V|
19+50	1.9704	0.11	Q	|	|	|	V|
19+55	1.9708	0.05	Q	|	|	|	V|
20+ 0	1.9710	0.04	Q	|	|	|	V|
20+ 5	1.9715	0.07	Q	|	|	|	V|
20+10	1.9723	0.12	Q	|	|	|	V|
20+15	1.9732	0.13	Q	|	|	|	V|
20+20	1.9741	0.14	Q	|	|	|	V|
20+25	1.9751	0.14	Q	|	|	|	V|
20+30	1.9761	0.14	Q	|	|	|	V|
20+35	1.9771	0.15	Q	|	|	|	V|
20+40	1.9781	0.15	Q	|	|	|	V|
20+45	1.9791	0.15	Q	|	|	|	V|
20+50	1.9799	0.11	Q	|	|	|	V|
20+55	1.9803	0.05	Q	|	|	|	V|
21+ 0	1.9805	0.04	Q	|	|	|	V|
21+ 5	1.9810	0.07	Q	|	|	|	V|
21+10	1.9819	0.13	Q	|	|	|	V|
21+15	1.9829	0.14	Q	|	|	|	V|
21+20	1.9837	0.11	Q	|	|	|	V|
21+25	1.9840	0.05	Q	|	|	|	V|
21+30	1.9843	0.04	Q	|	|	|	V|
21+35	1.9848	0.07	Q	|	|	|	V|
21+40	1.9857	0.13	Q	|	|	|	V|
21+45	1.9867	0.15	Q	|	|	|	V|
21+50	1.9875	0.11	Q	|	|	|	V|
21+55	1.9879	0.05	Q	|	|	|	V|
22+ 0	1.9882	0.04	Q	|	|	|	V|
22+ 5	1.9887	0.08	Q	|	|	|	V|
22+10	1.9896	0.14	Q	|	|	|	V|
22+15	1.9907	0.15	Q	|	|	|	V|
22+20	1.9915	0.12	Q	|	|	|	V|
22+25	1.9919	0.06	Q	|	|	|	V|
22+30	1.9922	0.04	Q	|	|	|	V|
22+35	1.9924	0.04	Q	|	|	|	V|
22+40	1.9927	0.03	Q	|	|	|	V|
22+45	1.9929	0.03	Q	|	|	|	V|
22+50	1.9931	0.03	Q	|	|	|	V|
22+55	1.9933	0.03	Q	|	|	|	V|
23+ 0	1.9936	0.03	Q	|	|	|	V|
23+ 5	1.9938	0.03	Q	|	|	|	V|
23+10	1.9940	0.03	Q	|	|	|	V|
23+15	1.9943	0.04	Q	|	|	|	V|
23+20	1.9945	0.04	Q	|	|	|	V|
23+25	1.9948	0.04	Q	|	|	|	V|
23+30	1.9950	0.04	Q	|	|	|	V|
23+35	1.9953	0.04	Q	|	|	|	V|
23+40	1.9955	0.04	Q	|	|	|	V|
23+45	1.9958	0.04	Q	|	|	|	V|

23+50	1.9961	0.04	Q	|	|	|	V|
23+55	1.9963	0.04	Q	|	|	|	V|
24+ 0	1.9966	0.04	Q	|	|	|	V|
24+ 5	1.9968	0.03	Q	|	|	|	V|
24+10	1.9968	0.01	Q	|	|	|	V|
24+15	1.9969	0.00	Q	|	|	|	V|
24+20	1.9969	0.00	Q	|	|	|	V|
24+25	1.9969	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 03/14/22 File: 21162PRA24100.out

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

Program License Serial Number 6310

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

English Units used in output format

21-162 SEEFRIED PERRIS
PROPOSED CONDITION
SUBAREA A
100-YEAR 24-HOUR STORM

Drainage Area = 7.58(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.58(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1303.00(Ft.)
Length along longest watercourse measured to centroid = 916.00(Ft.)
Length along longest watercourse = 0.247 Mi.
Length along longest watercourse measured to centroid = 0.173 Mi.
Difference in elevation = 13.50(Ft.)
Slope along watercourse = 54.7045 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.051 Hr.
Lag time = 3.05 Min.
25% of lag time = 0.76 Min.
40% of lag time = 1.22 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.58	1.80	13.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.58	4.50	34.11

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.800(In)
Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 4.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 4.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.580	56.00	0.897

Total Area Entered = 7.58(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.897	0.059	1.000	0.059
					Sum (F) =	0.059

Area averaged mean soil loss (F) (In/Hr) = 0.059
Minimum soil loss rate ((In/Hr)) = 0.029
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.182

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	163.962	36.391	2.780
2	0.167	327.924	45.969	3.512
3	0.250	491.886	10.432	0.797
4	0.333	655.848	4.456	0.340
5	0.417	819.810	2.752	0.210
			Sum = 100.000	Sum= 7.639

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.036	(0.104)	0.007	0.029
2	0.17	0.07	0.036	(0.104)	0.007	0.029
3	0.25	0.07	0.036	(0.104)	0.007	0.029
4	0.33	0.10	0.054	(0.103)	0.010	0.044
5	0.42	0.10	0.054	(0.103)	0.010	0.044
6	0.50	0.10	0.054	(0.102)	0.010	0.044
7	0.58	0.10	0.054	(0.102)	0.010	0.044
8	0.67	0.10	0.054	(0.102)	0.010	0.044
9	0.75	0.10	0.054	(0.101)	0.010	0.044
10	0.83	0.13	0.072	(0.101)	0.013	0.059
11	0.92	0.13	0.072	(0.100)	0.013	0.059
12	1.00	0.13	0.072	(0.100)	0.013	0.059
13	1.08	0.10	0.054	(0.100)	0.010	0.044
14	1.17	0.10	0.054	(0.099)	0.010	0.044
15	1.25	0.10	0.054	(0.099)	0.010	0.044
16	1.33	0.10	0.054	(0.098)	0.010	0.044
17	1.42	0.10	0.054	(0.098)	0.010	0.044
18	1.50	0.10	0.054	(0.098)	0.010	0.044
19	1.58	0.10	0.054	(0.097)	0.010	0.044
20	1.67	0.10	0.054	(0.097)	0.010	0.044
21	1.75	0.10	0.054	(0.096)	0.010	0.044
22	1.83	0.13	0.072	(0.096)	0.013	0.059
23	1.92	0.13	0.072	(0.096)	0.013	0.059
24	2.00	0.13	0.072	(0.095)	0.013	0.059
25	2.08	0.13	0.072	(0.095)	0.013	0.059
26	2.17	0.13	0.072	(0.094)	0.013	0.059
27	2.25	0.13	0.072	(0.094)	0.013	0.059
28	2.33	0.13	0.072	(0.094)	0.013	0.059
29	2.42	0.13	0.072	(0.093)	0.013	0.059
30	2.50	0.13	0.072	(0.093)	0.013	0.059
31	2.58	0.17	0.090	(0.093)	0.016	0.074
32	2.67	0.17	0.090	(0.092)	0.016	0.074
33	2.75	0.17	0.090	(0.092)	0.016	0.074
34	2.83	0.17	0.090	(0.091)	0.016	0.074
35	2.92	0.17	0.090	(0.091)	0.016	0.074

36	3.00	0.17	0.090	(0.091)	0.016	0.074
37	3.08	0.17	0.090	(0.090)	0.016	0.074
38	3.17	0.17	0.090	(0.090)	0.016	0.074
39	3.25	0.17	0.090	(0.090)	0.016	0.074
40	3.33	0.17	0.090	(0.089)	0.016	0.074
41	3.42	0.17	0.090	(0.089)	0.016	0.074
42	3.50	0.17	0.090	(0.088)	0.016	0.074
43	3.58	0.17	0.090	(0.088)	0.016	0.074
44	3.67	0.17	0.090	(0.088)	0.016	0.074
45	3.75	0.17	0.090	(0.087)	0.016	0.074
46	3.83	0.20	0.108	(0.087)	0.020	0.088
47	3.92	0.20	0.108	(0.087)	0.020	0.088
48	4.00	0.20	0.108	(0.086)	0.020	0.088
49	4.08	0.20	0.108	(0.086)	0.020	0.088
50	4.17	0.20	0.108	(0.085)	0.020	0.088
51	4.25	0.20	0.108	(0.085)	0.020	0.088
52	4.33	0.23	0.126	(0.085)	0.023	0.103
53	4.42	0.23	0.126	(0.084)	0.023	0.103
54	4.50	0.23	0.126	(0.084)	0.023	0.103
55	4.58	0.23	0.126	(0.084)	0.023	0.103
56	4.67	0.23	0.126	(0.083)	0.023	0.103
57	4.75	0.23	0.126	(0.083)	0.023	0.103
58	4.83	0.27	0.144	(0.083)	0.026	0.118
59	4.92	0.27	0.144	(0.082)	0.026	0.118
60	5.00	0.27	0.144	(0.082)	0.026	0.118
61	5.08	0.20	0.108	(0.082)	0.020	0.088
62	5.17	0.20	0.108	(0.081)	0.020	0.088
63	5.25	0.20	0.108	(0.081)	0.020	0.088
64	5.33	0.23	0.126	(0.080)	0.023	0.103
65	5.42	0.23	0.126	(0.080)	0.023	0.103
66	5.50	0.23	0.126	(0.080)	0.023	0.103
67	5.58	0.27	0.144	(0.079)	0.026	0.118
68	5.67	0.27	0.144	(0.079)	0.026	0.118
69	5.75	0.27	0.144	(0.079)	0.026	0.118
70	5.83	0.27	0.144	(0.078)	0.026	0.118
71	5.92	0.27	0.144	(0.078)	0.026	0.118
72	6.00	0.27	0.144	(0.078)	0.026	0.118
73	6.08	0.30	0.162	(0.077)	0.030	0.132
74	6.17	0.30	0.162	(0.077)	0.030	0.132
75	6.25	0.30	0.162	(0.077)	0.030	0.132
76	6.33	0.30	0.162	(0.076)	0.030	0.132
77	6.42	0.30	0.162	(0.076)	0.030	0.132
78	6.50	0.30	0.162	(0.076)	0.030	0.132
79	6.58	0.33	0.180	(0.075)	0.033	0.147
80	6.67	0.33	0.180	(0.075)	0.033	0.147
81	6.75	0.33	0.180	(0.075)	0.033	0.147
82	6.83	0.33	0.180	(0.074)	0.033	0.147
83	6.92	0.33	0.180	(0.074)	0.033	0.147
84	7.00	0.33	0.180	(0.074)	0.033	0.147
85	7.08	0.33	0.180	(0.073)	0.033	0.147
86	7.17	0.33	0.180	(0.073)	0.033	0.147
87	7.25	0.33	0.180	(0.073)	0.033	0.147
88	7.33	0.37	0.198	(0.072)	0.036	0.162
89	7.42	0.37	0.198	(0.072)	0.036	0.162
90	7.50	0.37	0.198	(0.072)	0.036	0.162
91	7.58	0.40	0.216	(0.071)	0.039	0.177
92	7.67	0.40	0.216	(0.071)	0.039	0.177
93	7.75	0.40	0.216	(0.071)	0.039	0.177
94	7.83	0.43	0.234	(0.070)	0.043	0.191
95	7.92	0.43	0.234	(0.070)	0.043	0.191
96	8.00	0.43	0.234	(0.070)	0.043	0.191
97	8.08	0.50	0.270	(0.069)	0.049	0.221
98	8.17	0.50	0.270	(0.069)	0.049	0.221
99	8.25	0.50	0.270	(0.069)	0.049	0.221
100	8.33	0.50	0.270	(0.068)	0.049	0.221
101	8.42	0.50	0.270	(0.068)	0.049	0.221
102	8.50	0.50	0.270	(0.068)	0.049	0.221
103	8.58	0.53	0.288	(0.067)	0.053	0.235
104	8.67	0.53	0.288	(0.067)	0.053	0.235
105	8.75	0.53	0.288	(0.067)	0.053	0.235

106	8.83	0.57	0.306	(	0.066)		0.056	0.250
107	8.92	0.57	0.306	(	0.066)		0.056	0.250
108	9.00	0.57	0.306	(	0.066)		0.056	0.250
109	9.08	0.63	0.342	(	0.066)		0.062	0.280
110	9.17	0.63	0.342	(	0.065)		0.062	0.280
111	9.25	0.63	0.342	(	0.065)		0.062	0.280
112	9.33	0.67	0.360		0.065	(	0.066)	0.295
113	9.42	0.67	0.360		0.064	(	0.066)	0.296
114	9.50	0.67	0.360		0.064	(	0.066)	0.296
115	9.58	0.70	0.378		0.064	(	0.069)	0.314
116	9.67	0.70	0.378		0.063	(	0.069)	0.315
117	9.75	0.70	0.378		0.063	(	0.069)	0.315
118	9.83	0.73	0.396		0.063	(	0.072)	0.333
119	9.92	0.73	0.396		0.062	(	0.072)	0.334
120	10.00	0.73	0.396		0.062	(	0.072)	0.334
121	10.08	0.50	0.270	(	0.062)		0.049	0.221
122	10.17	0.50	0.270	(	0.062)		0.049	0.221
123	10.25	0.50	0.270	(	0.061)		0.049	0.221
124	10.33	0.50	0.270	(	0.061)		0.049	0.221
125	10.42	0.50	0.270	(	0.061)		0.049	0.221
126	10.50	0.50	0.270	(	0.060)		0.049	0.221
127	10.58	0.67	0.360		0.060	(	0.066)	0.300
128	10.67	0.67	0.360		0.060	(	0.066)	0.300
129	10.75	0.67	0.360		0.059	(	0.066)	0.301
130	10.83	0.67	0.360		0.059	(	0.066)	0.301
131	10.92	0.67	0.360		0.059	(	0.066)	0.301
132	11.00	0.67	0.360		0.059	(	0.066)	0.301
133	11.08	0.63	0.342		0.058	(	0.062)	0.284
134	11.17	0.63	0.342		0.058	(	0.062)	0.284
135	11.25	0.63	0.342		0.058	(	0.062)	0.284
136	11.33	0.63	0.342		0.057	(	0.062)	0.285
137	11.42	0.63	0.342		0.057	(	0.062)	0.285
138	11.50	0.63	0.342		0.057	(	0.062)	0.285
139	11.58	0.57	0.306	(	0.057)		0.056	0.250
140	11.67	0.57	0.306	(	0.056)		0.056	0.250
141	11.75	0.57	0.306	(	0.056)		0.056	0.250
142	11.83	0.60	0.324		0.056	(	0.059)	0.268
143	11.92	0.60	0.324		0.055	(	0.059)	0.269
144	12.00	0.60	0.324		0.055	(	0.059)	0.269
145	12.08	0.83	0.450		0.055	(	0.082)	0.395
146	12.17	0.83	0.450		0.055	(	0.082)	0.395
147	12.25	0.83	0.450		0.054	(	0.082)	0.396
148	12.33	0.87	0.468		0.054	(	0.085)	0.414
149	12.42	0.87	0.468		0.054	(	0.085)	0.414
150	12.50	0.87	0.468		0.054	(	0.085)	0.414
151	12.58	0.93	0.504		0.053	(	0.092)	0.451
152	12.67	0.93	0.504		0.053	(	0.092)	0.451
153	12.75	0.93	0.504		0.053	(	0.092)	0.451
154	12.83	0.97	0.522		0.052	(	0.095)	0.470
155	12.92	0.97	0.522		0.052	(	0.095)	0.470
156	13.00	0.97	0.522		0.052	(	0.095)	0.470
157	13.08	1.13	0.612		0.052	(	0.112)	0.560
158	13.17	1.13	0.612		0.051	(	0.112)	0.561
159	13.25	1.13	0.612		0.051	(	0.112)	0.561
160	13.33	1.13	0.612		0.051	(	0.112)	0.561
161	13.42	1.13	0.612		0.051	(	0.112)	0.561
162	13.50	1.13	0.612		0.050	(	0.112)	0.562
163	13.58	0.77	0.414		0.050	(	0.076)	0.364
164	13.67	0.77	0.414		0.050	(	0.076)	0.364
165	13.75	0.77	0.414		0.050	(	0.076)	0.364
166	13.83	0.77	0.414		0.049	(	0.076)	0.365
167	13.92	0.77	0.414		0.049	(	0.076)	0.365
168	14.00	0.77	0.414		0.049	(	0.076)	0.365
169	14.08	0.90	0.486		0.049	(	0.089)	0.437
170	14.17	0.90	0.486		0.048	(	0.089)	0.438
171	14.25	0.90	0.486		0.048	(	0.089)	0.438
172	14.33	0.87	0.468		0.048	(	0.085)	0.420
173	14.42	0.87	0.468		0.048	(	0.085)	0.420
174	14.50	0.87	0.468		0.047	(	0.085)	0.421
175	14.58	0.87	0.468		0.047	(	0.085)	0.421

176	14.67	0.87	0.468	0.047	(	0.085)	0.421
177	14.75	0.87	0.468	0.047	(	0.085)	0.421
178	14.83	0.83	0.450	0.046	(	0.082)	0.404
179	14.92	0.83	0.450	0.046	(	0.082)	0.404
180	15.00	0.83	0.450	0.046	(	0.082)	0.404
181	15.08	0.80	0.432	0.046	(	0.079)	0.386
182	15.17	0.80	0.432	0.045	(	0.079)	0.387
183	15.25	0.80	0.432	0.045	(	0.079)	0.387
184	15.33	0.77	0.414	0.045	(	0.076)	0.369
185	15.42	0.77	0.414	0.045	(	0.076)	0.369
186	15.50	0.77	0.414	0.045	(	0.076)	0.369
187	15.58	0.63	0.342	0.044	(	0.062)	0.298
188	15.67	0.63	0.342	0.044	(	0.062)	0.298
189	15.75	0.63	0.342	0.044	(	0.062)	0.298
190	15.83	0.63	0.342	0.044	(	0.062)	0.298
191	15.92	0.63	0.342	0.043	(	0.062)	0.299
192	16.00	0.63	0.342	0.043	(	0.062)	0.299
193	16.08	0.13	0.072	(0.043)		0.013	0.059
194	16.17	0.13	0.072	(0.043)		0.013	0.059
195	16.25	0.13	0.072	(0.043)		0.013	0.059
196	16.33	0.13	0.072	(0.042)		0.013	0.059
197	16.42	0.13	0.072	(0.042)		0.013	0.059
198	16.50	0.13	0.072	(0.042)		0.013	0.059
199	16.58	0.10	0.054	(0.042)		0.010	0.044
200	16.67	0.10	0.054	(0.041)		0.010	0.044
201	16.75	0.10	0.054	(0.041)		0.010	0.044
202	16.83	0.10	0.054	(0.041)		0.010	0.044
203	16.92	0.10	0.054	(0.041)		0.010	0.044
204	17.00	0.10	0.054	(0.041)		0.010	0.044
205	17.08	0.17	0.090	(0.040)		0.016	0.074
206	17.17	0.17	0.090	(0.040)		0.016	0.074
207	17.25	0.17	0.090	(0.040)		0.016	0.074
208	17.33	0.17	0.090	(0.040)		0.016	0.074
209	17.42	0.17	0.090	(0.040)		0.016	0.074
210	17.50	0.17	0.090	(0.039)		0.016	0.074
211	17.58	0.17	0.090	(0.039)		0.016	0.074
212	17.67	0.17	0.090	(0.039)		0.016	0.074
213	17.75	0.17	0.090	(0.039)		0.016	0.074
214	17.83	0.13	0.072	(0.039)		0.013	0.059
215	17.92	0.13	0.072	(0.038)		0.013	0.059
216	18.00	0.13	0.072	(0.038)		0.013	0.059
217	18.08	0.13	0.072	(0.038)		0.013	0.059
218	18.17	0.13	0.072	(0.038)		0.013	0.059
219	18.25	0.13	0.072	(0.038)		0.013	0.059
220	18.33	0.13	0.072	(0.038)		0.013	0.059
221	18.42	0.13	0.072	(0.037)		0.013	0.059
222	18.50	0.13	0.072	(0.037)		0.013	0.059
223	18.58	0.10	0.054	(0.037)		0.010	0.044
224	18.67	0.10	0.054	(0.037)		0.010	0.044
225	18.75	0.10	0.054	(0.037)		0.010	0.044
226	18.83	0.07	0.036	(0.036)		0.007	0.029
227	18.92	0.07	0.036	(0.036)		0.007	0.029
228	19.00	0.07	0.036	(0.036)		0.007	0.029
229	19.08	0.10	0.054	(0.036)		0.010	0.044
230	19.17	0.10	0.054	(0.036)		0.010	0.044
231	19.25	0.10	0.054	(0.036)		0.010	0.044
232	19.33	0.13	0.072	(0.035)		0.013	0.059
233	19.42	0.13	0.072	(0.035)		0.013	0.059
234	19.50	0.13	0.072	(0.035)		0.013	0.059
235	19.58	0.10	0.054	(0.035)		0.010	0.044
236	19.67	0.10	0.054	(0.035)		0.010	0.044
237	19.75	0.10	0.054	(0.035)		0.010	0.044
238	19.83	0.07	0.036	(0.034)		0.007	0.029
239	19.92	0.07	0.036	(0.034)		0.007	0.029
240	20.00	0.07	0.036	(0.034)		0.007	0.029
241	20.08	0.10	0.054	(0.034)		0.010	0.044
242	20.17	0.10	0.054	(0.034)		0.010	0.044
243	20.25	0.10	0.054	(0.034)		0.010	0.044
244	20.33	0.10	0.054	(0.034)		0.010	0.044
245	20.42	0.10	0.054	(0.033)		0.010	0.044

246	20.50	0.10	0.054	(	0.033)	0.010	0.044
247	20.58	0.10	0.054	(	0.033)	0.010	0.044
248	20.67	0.10	0.054	(	0.033)	0.010	0.044
249	20.75	0.10	0.054	(	0.033)	0.010	0.044
250	20.83	0.07	0.036	(	0.033)	0.007	0.029
251	20.92	0.07	0.036	(	0.033)	0.007	0.029
252	21.00	0.07	0.036	(	0.032)	0.007	0.029
253	21.08	0.10	0.054	(	0.032)	0.010	0.044
254	21.17	0.10	0.054	(	0.032)	0.010	0.044
255	21.25	0.10	0.054	(	0.032)	0.010	0.044
256	21.33	0.07	0.036	(	0.032)	0.007	0.029
257	21.42	0.07	0.036	(	0.032)	0.007	0.029
258	21.50	0.07	0.036	(	0.032)	0.007	0.029
259	21.58	0.10	0.054	(	0.032)	0.010	0.044
260	21.67	0.10	0.054	(	0.032)	0.010	0.044
261	21.75	0.10	0.054	(	0.031)	0.010	0.044
262	21.83	0.07	0.036	(	0.031)	0.007	0.029
263	21.92	0.07	0.036	(	0.031)	0.007	0.029
264	22.00	0.07	0.036	(	0.031)	0.007	0.029
265	22.08	0.10	0.054	(	0.031)	0.010	0.044
266	22.17	0.10	0.054	(	0.031)	0.010	0.044
267	22.25	0.10	0.054	(	0.031)	0.010	0.044
268	22.33	0.07	0.036	(	0.031)	0.007	0.029
269	22.42	0.07	0.036	(	0.031)	0.007	0.029
270	22.50	0.07	0.036	(	0.030)	0.007	0.029
271	22.58	0.07	0.036	(	0.030)	0.007	0.029
272	22.67	0.07	0.036	(	0.030)	0.007	0.029
273	22.75	0.07	0.036	(	0.030)	0.007	0.029
274	22.83	0.07	0.036	(	0.030)	0.007	0.029
275	22.92	0.07	0.036	(	0.030)	0.007	0.029
276	23.00	0.07	0.036	(	0.030)	0.007	0.029
277	23.08	0.07	0.036	(	0.030)	0.007	0.029
278	23.17	0.07	0.036	(	0.030)	0.007	0.029
279	23.25	0.07	0.036	(	0.030)	0.007	0.029
280	23.33	0.07	0.036	(	0.030)	0.007	0.029
281	23.42	0.07	0.036	(	0.030)	0.007	0.029
282	23.50	0.07	0.036	(	0.030)	0.007	0.029
283	23.58	0.07	0.036	(	0.030)	0.007	0.029
284	23.67	0.07	0.036	(	0.030)	0.007	0.029
285	23.75	0.07	0.036	(	0.030)	0.007	0.029
286	23.83	0.07	0.036	(	0.029)	0.007	0.029
287	23.92	0.07	0.036	(	0.029)	0.007	0.029
288	24.00	0.07	0.036	(	0.029)	0.007	0.029

(Loss Rate Not Used)

Sum = 100.0 Sum = 46.0

Flood volume = Effective rainfall 3.83(In)
times area 7.6(Ac.)/[(In)/(Ft.)] = 2.4(Ac.Ft)
Total soil loss = 0.67(In)
Total soil loss = 0.422(Ac.Ft)
Total rainfall = 4.50(In)
Flood volume = 105430.7 Cubic Feet
Total soil loss = 18386.8 Cubic Feet

Peak flow rate of this hydrograph = 4.291(CFS)

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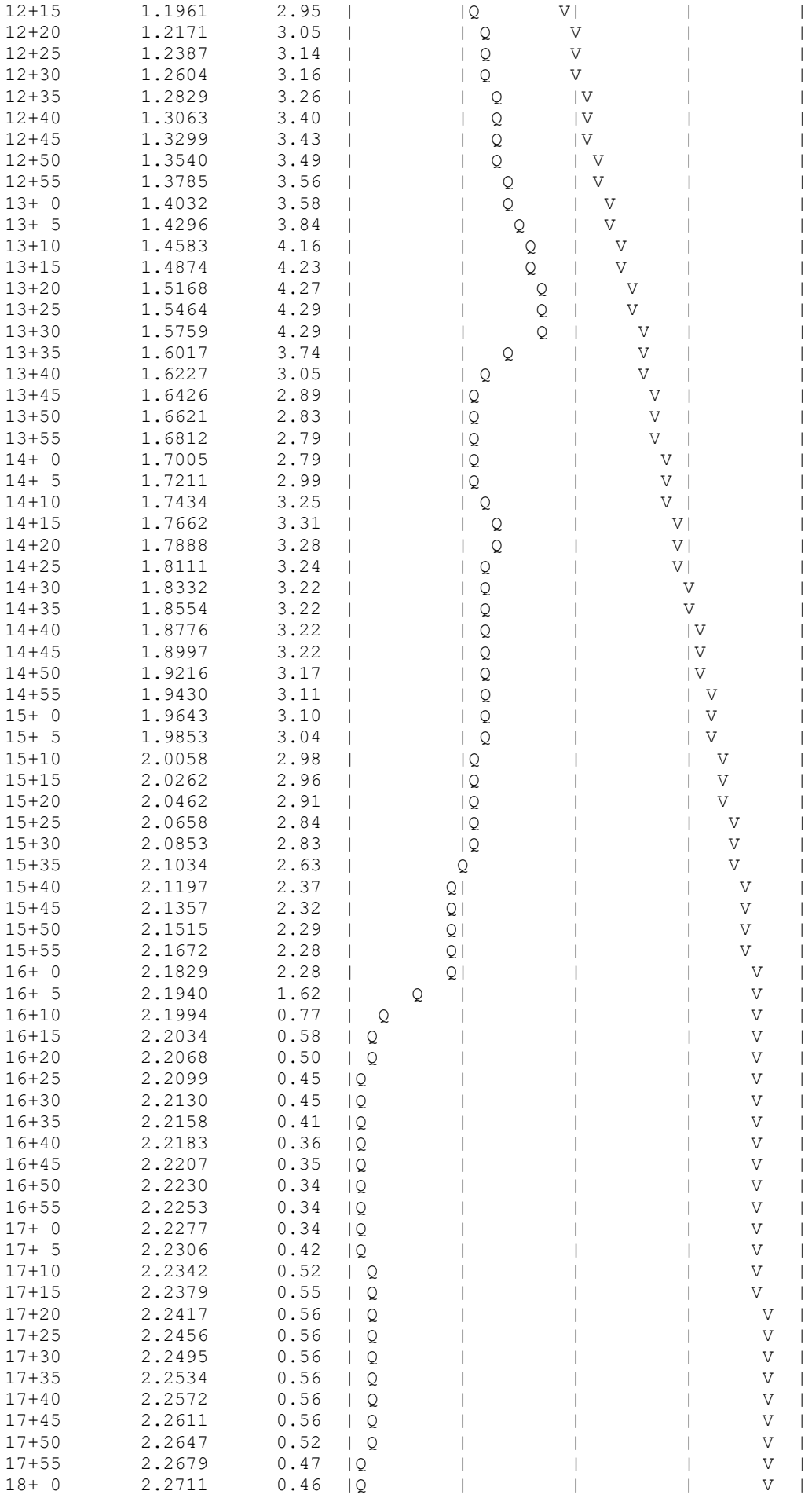
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0006	0.08	Q	|	|	|	|
0+10	0.0018	0.19	Q	|	|	|	|
0+15	0.0033	0.21	Q	|	|	|	|
0+20	0.0051	0.26	VQ	|	|	|	|
0+25	0.0073	0.32	VQ	|	|	|	|
0+30	0.0095	0.33	VQ	|	|	|	|

0+35	0.0118	0.33	VQ	|	|	|	|
0+40	0.0141	0.34	VQ	|	|	|	|
0+45	0.0165	0.34	VQ	|	|	|	|
0+50	0.0191	0.38	VQ	|	|	|	|
0+55	0.0220	0.43	VQ	|	|	|	|
1+ 0	0.0251	0.44	VQ	|	|	|	|
1+ 5	0.0279	0.41	VQ	|	|	|	|
1+10	0.0303	0.36	VQ	|	|	|	|
1+15	0.0327	0.35	VQ	|	|	|	|
1+20	0.0351	0.34	VQ	|	|	|	|
1+25	0.0374	0.34	VQ	|	|	|	|
1+30	0.0397	0.34	VQ	|	|	|	|
1+35	0.0420	0.34	VQ	|	|	|	|
1+40	0.0444	0.34	VQ	|	|	|	|
1+45	0.0467	0.34	VQ	|	|	|	|
1+50	0.0493	0.38	VQ	|	|	|	|
1+55	0.0523	0.43	VQ	|	|	|	|
2+ 0	0.0553	0.44	VQ	|	|	|	|
2+ 5	0.0584	0.45	VQ	|	|	|	|
2+10	0.0615	0.45	|Q	|	|	|	|
2+15	0.0646	0.45	|Q	|	|	|	|
2+20	0.0677	0.45	|Q	|	|	|	|
2+25	0.0708	0.45	|Q	|	|	|	|
2+30	0.0739	0.45	|Q	|	|	|	|
2+35	0.0772	0.49	|Q	|	|	|	|
2+40	0.0810	0.54	|VQ	|	|	|	|
2+45	0.0848	0.55	|VQ	|	|	|	|
2+50	0.0887	0.56	|VQ	|	|	|	|
2+55	0.0925	0.56	|VQ	|	|	|	|
3+ 0	0.0964	0.56	|VQ	|	|	|	|
3+ 5	0.1003	0.56	|VQ	|	|	|	|
3+10	0.1041	0.56	|VQ	|	|	|	|
3+15	0.1080	0.56	|VQ	|	|	|	|
3+20	0.1119	0.56	|VQ	|	|	|	|
3+25	0.1158	0.56	|VQ	|	|	|	|
3+30	0.1196	0.56	|VQ	|	|	|	|
3+35	0.1235	0.56	| Q	|	|	|	|
3+40	0.1274	0.56	| Q	|	|	|	|
3+45	0.1313	0.56	| Q	|	|	|	|
3+50	0.1354	0.60	| Q	|	|	|	|
3+55	0.1399	0.66	| Q	|	|	|	|
4+ 0	0.1445	0.67	| Q	|	|	|	|
4+ 5	0.1491	0.67	| Q	|	|	|	|
4+10	0.1538	0.67	| Q	|	|	|	|
4+15	0.1584	0.67	| Q	|	|	|	|
4+20	0.1634	0.72	| Q	|	|	|	|
4+25	0.1687	0.77	| VQ	|	|	|	|
4+30	0.1740	0.78	| VQ	|	|	|	|
4+35	0.1794	0.78	| VQ	|	|	|	|
4+40	0.1848	0.79	| Q	|	|	|	|
4+45	0.1903	0.79	| Q	|	|	|	|
4+50	0.1960	0.83	| Q	|	|	|	|
4+55	0.2020	0.88	| Q	|	|	|	|
5+ 0	0.2082	0.89	| Q	|	|	|	|
5+ 5	0.2138	0.81	| Q	|	|	|	|
5+10	0.2187	0.71	| QV	|	|	|	|
5+15	0.2235	0.69	| QV	|	|	|	|
5+20	0.2284	0.72	| QV	|	|	|	|
5+25	0.2337	0.77	| Q	|	|	|	|
5+30	0.2391	0.78	| Q	|	|	|	|
5+35	0.2448	0.83	| QV	|	|	|	|
5+40	0.2508	0.88	| QV	|	|	|	|
5+45	0.2570	0.89	| QV	|	|	|	|
5+50	0.2632	0.90	| QV	|	|	|	|
5+55	0.2694	0.90	| QV	|	|	|	|
6+ 0	0.2756	0.90	| QV	|	|	|	|
6+ 5	0.2820	0.94	| QV	|	|	|	|
6+10	0.2889	0.99	| QV	|	|	|	|
6+15	0.2958	1.00	| Q	|	|	|	|
6+20	0.3027	1.01	| QV	|	|	|	|

6+25	0.3097	1.01	QV				
6+30	0.3167	1.01	QV				
6+35	0.3239	1.05	QV				
6+40	0.3315	1.10	QV				
6+45	0.3392	1.12	QV				
6+50	0.3470	1.12	QV				
6+55	0.3547	1.12	QV				
7+ 0	0.3624	1.12	QV				
7+ 5	0.3702	1.12	Q V				
7+10	0.3779	1.12	Q V				
7+15	0.3857	1.12	Q V				
7+20	0.3937	1.17	Q V				
7+25	0.4021	1.22	Q V				
7+30	0.4106	1.23	Q V				
7+35	0.4193	1.28	QV				
7+40	0.4285	1.33	Q V				
7+45	0.4377	1.34	Q V				
7+50	0.4473	1.39	Q V				
7+55	0.4572	1.44	Q V				
8+ 0	0.4673	1.45	Q V				
8+ 5	0.4779	1.54	QV				
8+10	0.4892	1.65	Q V				
8+15	0.5007	1.67	Q V				
8+20	0.5123	1.68	Q V				
8+25	0.5239	1.69	Q V				
8+30	0.5355	1.69	Q V				
8+35	0.5474	1.73	Q V				
8+40	0.5597	1.78	Q V				
8+45	0.5720	1.79	Q V				
8+50	0.5847	1.84	Q V				
8+55	0.5977	1.89	Q V				
9+ 0	0.6108	1.90	Q V				
9+ 5	0.6246	1.99	Q V				
9+10	0.6390	2.10	Q V				
9+15	0.6536	2.12	Q V				
9+20	0.6686	2.17	Q V				
9+25	0.6840	2.24	Q V				
9+30	0.6995	2.25	Q V				
9+35	0.7154	2.31	Q V				
9+40	0.7318	2.38	Q V				
9+45	0.7483	2.40	Q V				
9+50	0.7652	2.45	Q V				
9+55	0.7826	2.52	Q V				
10+ 0	0.8001	2.54	Q V				
10+ 5	0.8154	2.23	Q V				
10+10	0.8281	1.84	Q V				
10+15	0.8401	1.75	Q V				
10+20	0.8519	1.71	Q V				
10+25	0.8635	1.69	Q V				
10+30	0.8752	1.69	Q V				
10+35	0.8883	1.91	Q V				
10+40	0.9034	2.19	Q V				
10+45	0.9189	2.25	Q V				
10+50	0.9346	2.28	Q V				
10+55	0.9504	2.30	Q V				
11+ 0	0.9663	2.30	Q V				
11+ 5	0.9818	2.25	Q V				
11+10	0.9969	2.19	Q V				
11+15	1.0119	2.18	Q V				
11+20	1.0269	2.18	Q V				
11+25	1.0419	2.18	Q V				
11+30	1.0569	2.18	Q V				
11+35	1.0712	2.08	Q V				
11+40	1.0847	1.96	Q V				
11+45	1.0980	1.93	Q V				
11+50	1.1116	1.97	Q V				
11+55	1.1255	2.03	Q V				
12+ 0	1.1396	2.04	Q V				
12+ 5	1.1561	2.40	Q V				
12+10	1.1758	2.85	Q V				



18+ 5	2.2742	0.45	|Q	|	|	|	V |
18+10	2.2773	0.45	|Q	|	|	|	V |
18+15	2.2804	0.45	|Q	|	|	|	V |
18+20	2.2835	0.45	|Q	|	|	|	V |
18+25	2.2866	0.45	|Q	|	|	|	V |
18+30	2.2897	0.45	|Q	|	|	|	V |
18+35	2.2925	0.41	|Q	|	|	|	V |
18+40	2.2950	0.36	|Q	|	|	|	V |
18+45	2.2974	0.35	|Q	|	|	|	V |
18+50	2.2994	0.30	|Q	|	|	|	V |
18+55	2.3011	0.24	Q	|	|	|	V |
19+ 0	2.3027	0.23	Q	|	|	|	V |
19+ 5	2.3046	0.27	|Q	|	|	|	V |
19+10	2.3068	0.32	|Q	|	|	|	V |
19+15	2.3090	0.33	|Q	|	|	|	V |
19+20	2.3116	0.38	|Q	|	|	|	V |
19+25	2.3146	0.43	|Q	|	|	|	V |
19+30	2.3176	0.44	|Q	|	|	|	V |
19+35	2.3204	0.41	|Q	|	|	|	V |
19+40	2.3229	0.36	|Q	|	|	|	V |
19+45	2.3253	0.35	|Q	|	|	|	V |
19+50	2.3273	0.30	|Q	|	|	|	V |
19+55	2.3290	0.24	Q	|	|	|	V |
20+ 0	2.3306	0.23	Q	|	|	|	V |
20+ 5	2.3325	0.27	|Q	|	|	|	V |
20+10	2.3346	0.32	|Q	|	|	|	V |
20+15	2.3369	0.33	|Q	|	|	|	V |
20+20	2.3392	0.33	|Q	|	|	|	V |
20+25	2.3415	0.34	|Q	|	|	|	V |
20+30	2.3439	0.34	|Q	|	|	|	V |
20+35	2.3462	0.34	|Q	|	|	|	V |
20+40	2.3485	0.34	|Q	|	|	|	V |
20+45	2.3508	0.34	|Q	|	|	|	V |
20+50	2.3529	0.30	|Q	|	|	|	V |
20+55	2.3546	0.24	Q	|	|	|	V |
21+ 0	2.3562	0.23	Q	|	|	|	V |
21+ 5	2.3580	0.27	|Q	|	|	|	V |
21+10	2.3602	0.32	|Q	|	|	|	V|
21+15	2.3625	0.33	|Q	|	|	|	V|
21+20	2.3645	0.29	|Q	|	|	|	V|
21+25	2.3662	0.24	Q	|	|	|	V|
21+30	2.3678	0.23	Q	|	|	|	V|
21+35	2.3696	0.27	|Q	|	|	|	V|
21+40	2.3718	0.32	|Q	|	|	|	V|
21+45	2.3741	0.33	|Q	|	|	|	V|
21+50	2.3761	0.29	|Q	|	|	|	V|
21+55	2.3778	0.24	Q	|	|	|	V|
22+ 0	2.3794	0.23	Q	|	|	|	V|
22+ 5	2.3813	0.27	|Q	|	|	|	V|
22+10	2.3835	0.32	|Q	|	|	|	V|
22+15	2.3857	0.33	|Q	|	|	|	V|
22+20	2.3877	0.29	|Q	|	|	|	V|
22+25	2.3894	0.24	Q	|	|	|	V|
22+30	2.3910	0.23	Q	|	|	|	V|
22+35	2.3926	0.23	Q	|	|	|	V|
22+40	2.3942	0.22	Q	|	|	|	V|
22+45	2.3957	0.22	Q	|	|	|	V|
22+50	2.3973	0.22	Q	|	|	|	V|
22+55	2.3988	0.22	Q	|	|	|	V|
23+ 0	2.4004	0.22	Q	|	|	|	V|
23+ 5	2.4019	0.22	Q	|	|	|	V|
23+10	2.4034	0.22	Q	|	|	|	V|
23+15	2.4050	0.22	Q	|	|	|	V|
23+20	2.4065	0.22	Q	|	|	|	V|
23+25	2.4081	0.22	Q	|	|	|	V|
23+30	2.4096	0.22	Q	|	|	|	V|
23+35	2.4112	0.22	Q	|	|	|	V|
23+40	2.4127	0.22	Q	|	|	|	V|
23+45	2.4143	0.22	Q	|	|	|	V|
23+50	2.4158	0.22	Q	|	|	|	V|

```
   23+55       2.4174      0.22  Q         |         |         |        V|
   24+ 0       2.4189      0.22  Q         |         |         |        V|
   24+ 5       2.4199      0.14  Q         |         |         |        V|
   24+10       2.4202      0.04  Q         |         |         |        V|
   24+15       2.4203      0.02  Q         |         |         |        V|
   24+20       2.4204      0.01  Q         |         |         |         V
-------------------------------------------------------------------------
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F.2 - Preliminary Water Quality Management Plan

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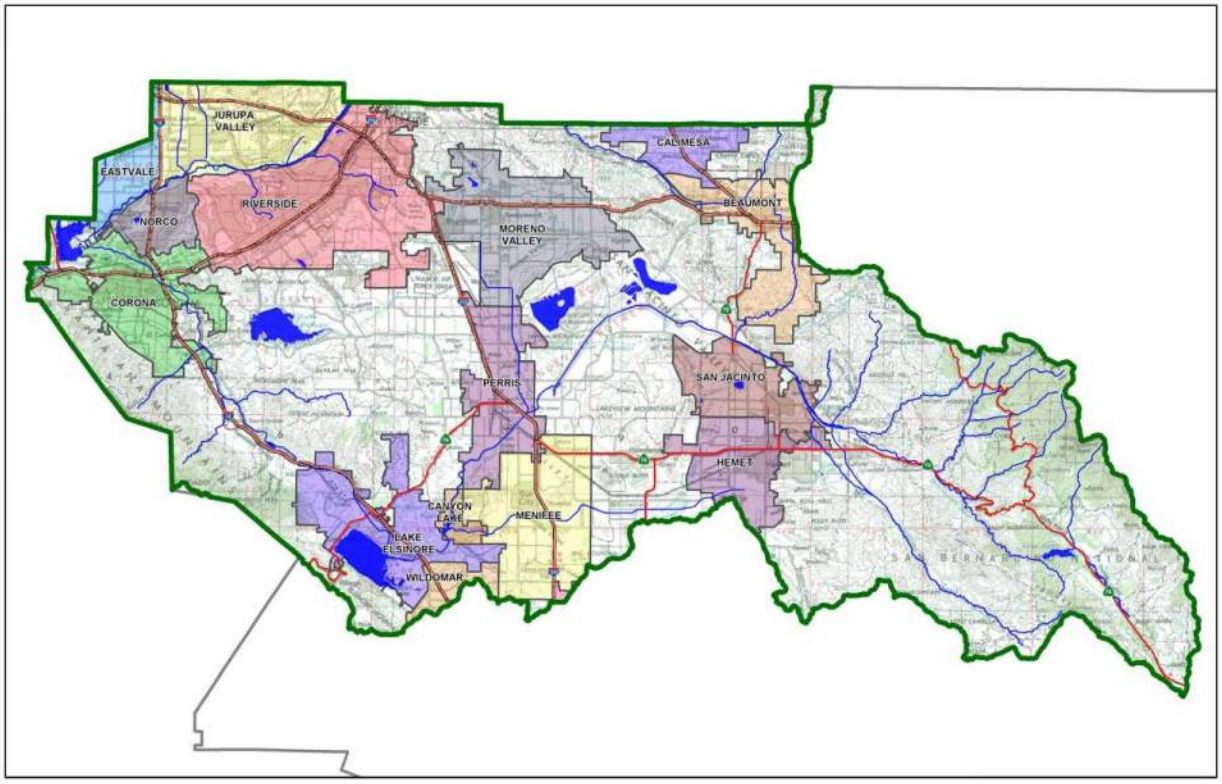
Master Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Seefried Perris Brennan Ave Industrial Warehouse

Development No: TBD

Design Review/Case No: TBD



☒ **Preliminary**
☐ **Final**

Original Date Prepared: March 14, 2022

Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Contact Information:

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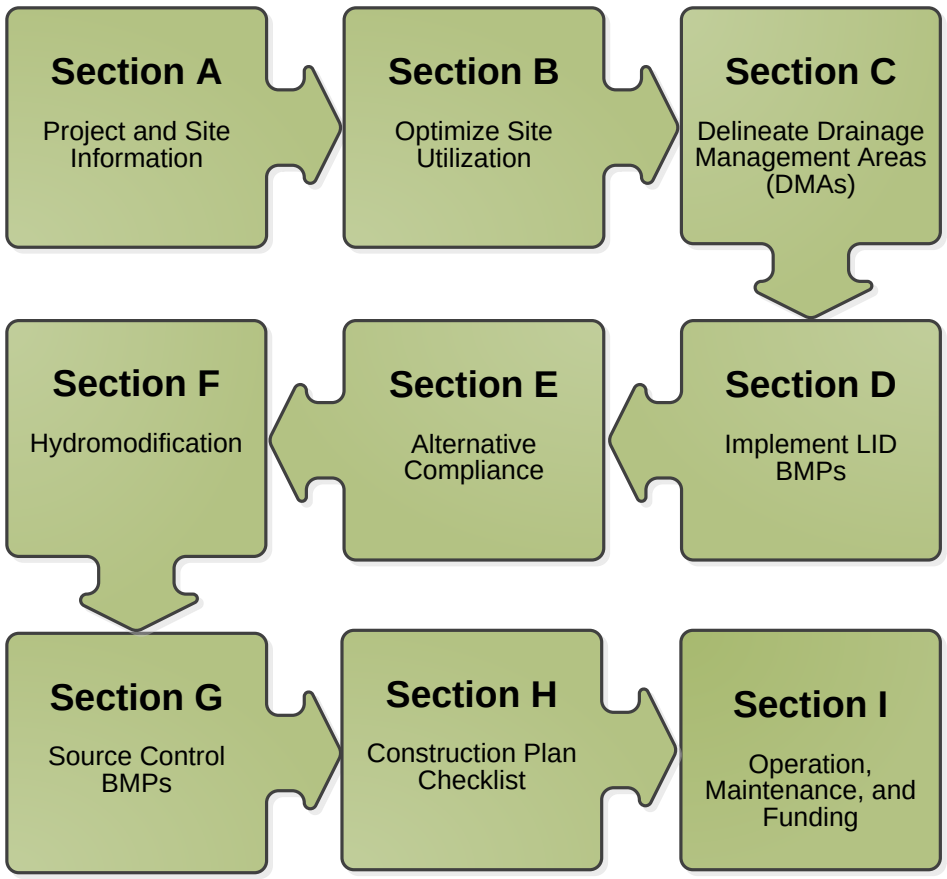
Anaheim Hills, CA 92808
(714) 685-6860

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well-prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Master Project-Specific Water Quality Management Plan (WQMP) has been prepared for Seefried Properties by DRC Engineering, Inc. for the Seefried Perris Brennan Ave Industrial Warehouse.

This WQMP is intended to comply with the requirements of City of Perris Ordinance 1194 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Perris Ordinance (Municipal Code Section 1194).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Dan Bick	Sr. Vice President, Development
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Jay Brander	Project Manager
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

This WQMP is prepared for the proposed Seefried Perris Brennan Ave Industrial Warehouse development. The project site is approximately 7.58 acres of APNs 303-020-005, 303-020-022, 303-020-023, 303-020-024, and 303-020-025. The site is located at the southwest corner of the intersection of Ramona Expressway and Brennan Ave. The existing site is a wooden pallet supplier with a couple small buildings/sheds and paved areas. A majority of the site is flat and pervious and is used for outdoor storage. The entire site sheet-flows east towards the existing westerly curb and gutter on Brennan Ave and drains to existing storm drain facilities on Brennan Ave.

The proposed development consists of an industrial warehouse building (approximately 165,371 SF), paved parking areas, drive aisles, utilities and associated landscaping areas. The site will drain to an underground detention system north of the proposed building. The detention system consists of 685 LF of 60" solid-wall detention pipe, providing a total volume of 13,716 CF. A biofiltration unit (Modular Wetlands System L-8-12-V) will be located downstream of the detention system and provide treatment for a design capture volume of 15,109 CF. The proposed biofiltration unit will outlet via pipe to a proposed storm drain lateral connecting to a proposed storm drain catch basin on Ramona Expressway. The storm drain catch basin will convey onsite and offsite flows to an existing 90" RCP storm drain (RCFCD DWG. 4-1117) on Ramona Expressway.

A Vicinity Map and Downstream Receiving Waters Map as well as the WQMP Post-Construction BMP Plans are included in Appendix 1. The pertinent conceptual grading and utility plans are included in Appendix 2. There are no jurisdictional areas within the project limits. The project location is HCOC exempt per Riverside County HCOC Applicability Map (See Appendix 7).

PROJECT INFORMATION	
Type of Project:	Industrial
Planning Area:	N/A
Community Name:	N/A
Development Name:	Seefried Perris Brennan Ave

PROJECT LOCATION
Latitude & Longitude (DMS): 33°50'37.68"N, 117°14'25.33"W
Project Watershed and Sub-Watershed: Santa Ana River Watershed
Total Acres: 7.58 acres
APN(s): 303-020-005, -022, -023, -024, -025
Map Book and Page No.: Parcel 1 & 2 Book 17 Page 22

PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial
Proposed or Potential SIC Code(s)	4225
Area of Impervious Project Footprint (SF)	0 SF (0 AC)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	296,379 SF (6.80 AC)
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	54,492 SF (1.25 AC)
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B
What is the Water Quality Design Storm Depth for the project?	0.62 inches

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris Valley Storm Drain	N/A	None	N/A
San Jacinto River (HU# 802.21)	N/A	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
Canyon Lake	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
Lake Elsinore	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Sediment Toxicity, Unknown Toxicity	WARM, REC1, REC2, WILD	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage (as needed by individual case)	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* City of Perris Precise Grading Permit	☒ Y	☐ N

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. As mentioned previously, poor soils at the project site do not allow for infiltration BMPs. Reclaimed water will be used for the non-potable water demands for the project; therefore, Harvest and Use BMPs need not be assessed for the project site. New recycled water lines will be constructed along Coyote Bush Road, Krameria Avenue, Street T, Street P, Street U, Street Y and Street Z.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes. The existing site is generally drains east and enters an existing 60" RCP storm drain on Brennan Ave. The storm drain connects to a pump station that discharges to an existing concrete channel flowing east along the southerly Ramona Expressway R/W. The concrete channel ultimately discharges to RCFCD facilities (Perris Valley MDP Line E) at the intersection of Ramona Expressway and Perris Blvd and ultimately Perris Valley Storm Drain and downstream receiving waters shown in Appendix 1.

In the proposed condition, site drainage is conveyed away from the building and enters the proposed detention basin via storm drain. The proposed storm drain system will bypass the 60" RCP storm drain and pump station on Brennan Ave and connect directly to RCFCD Perris Valley MDP Line E on Ramona Expressway, maintaining existing drainage patterns.

Did you identify and protect existing vegetation? If so, how? If not, why?

The site is an existing barren lot with sparse vegetation and will be fully developed and new landscaping installed.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Per the geotechnical report in Appendix 3, the site has overall low infiltration rates.

Did you identify and minimize impervious area? If so, how? If not, why?

Yes, the site has minimized the parking area, drive aisles, and sidewalks thereby providing for maximum amount of landscape.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, in all places where practicably possible.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
A1	Roof	162,841	Area Draining to BMP
A2	Asphalt/Concrete	75,542	Area Draining to BMP
A3	Asphalt/Concrete	6,309	Area Draining to BMP
A4	Asphalt/Concrete	1,540	Area Draining to BMP
A5	Asphalt/Concrete	2,573	Area Draining to BMP
A6	Asphalt/Concrete	755	Area Draining to BMP
A7	Asphalt/Concrete	91	Area Draining to BMP
A8	Asphalt/Concrete	61	Area Draining to BMP
A9	Asphalt/Concrete	36,705	Area Draining to BMP
A10	Asphalt/Concrete	2,457	Area Draining to BMP
A11	Asphalt/Concrete	211	Area Draining to BMP
A12	Decomposed Granite	810	Area Draining to BMP
A13	Decomposed Granite	1,575	Area Draining to BMP
A14	Landscaping	1,838	Area Draining to BMP
A15	Landscaping	3,365	Area Draining to BMP
A16	Landscaping	2,677	Area Draining to BMP
A17	Landscaping	2,702	Area Draining to BMP
A18	Landscaping	12,951	Area Draining to BMP
A19	Landscaping	3,025	Area Draining to BMP
A20	Landscaping	2,510	Area Draining to BMP
A21	Landscaping	423	Area Draining to BMP
A22	Landscaping	6,684	Area Draining to BMP
A23	Asphalt/Concrete	1,509	Area Draining to BMP

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) D=B+(B*C/A) [D]
N/A						

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
A1	BIO A
A2	BIO A
A3	BIO A
A4	BIO A
A5	BIO A
A6	BIO A
A7	BIO A
A8	BIO A
A9	BIO A
A10	BIO A
A11	BIO A
A12	BIO A
A13	BIO A
A14	BIO A
A15	BIO A
A16	BIO A
A17	BIO A
A18	BIO A
A19	BIO A
A20	BIO A
A21	BIO A

A22	BIO A
A23	BIO A

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Percolation testing yielded infiltration rates of 0.11 and 0.09 inches/hour. These are below the acceptable rates per Riverside County.	X	

If you answered “Yes” to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

- ☐ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 33,869 SF

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 296,379 SF (6.80 AC)

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 0.89

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 263,777 SF

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
263,777 SF	33,869 SF

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 100 tu

Project Type: Industrial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 296,379 SF (6.80 AC)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 177 tu/ac

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 1204 tu

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
1204 tu	100 tu

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

No industrial uses currently expected.

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

☐ None of the above.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A1	☐	☐	☐	☒	☐
A2	☐	☐	☐	☒	☐
A3	☐	☐	☐	☒	☐
A4	☐	☐	☐	☒	☐
A5	☐	☐	☐	☒	☐
A6	☐	☐	☐	☒	☐
A7	☐	☐	☐	☒	☐
A8	☐	☐	☐	☒	☐
A9	☐	☐	☐	☒	☐
A10	☐	☐	☐	☒	☐
A11	☐	☐	☐	☒	☐
A12	☐	☐	☐	☒	☐
A13	☐	☐	☐	☒	☐
A14	☐	☐	☐	☒	☐
A15	☐	☐	☐	☒	☐
A16	☐	☐	☐	☒	☐
A17	☐	☐	☐	☒	☐
A18	☐	☐	☐	☒	☐
A19	☐	☐	☐	☒	☐
A20	☐	☐	☐	☒	☐
A21	☐	☐	☐	☒	☐
A22	☐	☐	☐	☒	☐
A23	☐	☐	☐	☒	☐

Based on poor percolation test results encountered at the project site (as seen in the project specific soils report located in Appendix 3), infiltration is deemed infeasible. Additionally harvest and use BMPs are also deemed as infeasible.

The design capture volume for the site of 13,675 is treated by a Modular Wetland Unit MWS-L-8-12-V (BIO A) which has a treatment capacity VBMP of 15,109 CF for a drawdown time of approximately 48 hours.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Co-permittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Co-permittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *Detention System A (DET 'A')* *Modular Wetland Unit (BMP 'A')*		
	[A]		[B]	[C]	[A] x [C]			
A1	*162,841*	*Roofs*	*1*	0.89	145254.2			
A2	*75,542*	*Concrete or Asphalt*	*1*	0.89	67383.5			
A3	*6,309*	*Concrete or Asphalt*	*1*	0.89	5627.6			
A4	*1,540*	*Concrete or Asphalt*	*1*	0.89	1373.7			
A5	*2,573*	*Concrete or Asphalt*	*1*	0.89	2295.1			
A6	*755*	*Concrete or Asphalt*	*1*	0.89	673.5			
A7	*91*	*Concrete or Asphalt*	*1*	0.89	81.2			
A8	*61*	*Concrete or Asphalt*	*1*	0.89	54.4			
A9	*36,705*	*Concrete or Asphalt*	*1*	0.89	32740.9			
A10	*2,457*	*Concrete or Asphalt*	*1*	0.89	2191.6			
A11	*211*	*Concrete or Asphalt*	*1*	0.89	188.2			
A12	*810*	*Concrete or Asphalt*	*1*	0.89	722.5			
A13	*1,575*	*Decomposed Granite*	*0.4*	0.28	440.5			
A14	*1,838*	*Decomposed Granite*	*0.4*	0.28	514.1			
A15	*3,365*	*Ornamental Landscaping*	*0.1*	0.11	371.7			
A16	*2,677*	*Ornamental Landscaping*	*0.1*	0.11	295.7			
A17	*2,702*	*Ornamental Landscaping*	*0.1*	0.11	298.5			
A18	*12,951*	*Ornamental Landscaping*	*0.1*	0.11	1430.5			
A19	*3,025*	*Ornamental Landscaping*	*0.1*	0.11	334.1			
A20	*2,510*	*Ornamental Landscaping*	*0.1*	0.11	277.2			
A21	*423*	*Ornamental Landscaping*	*0.1*	0.11	46.7			
A22	*6,684*	*Ornamental Landscaping*	*0.1*	0.11	738.3			
A23	*1,509*	*Concrete or Asphalt*	*1*	0.89	1346.0			
	A_T = Σ[A] =329154				Σ= [D] =264679.7	*Design Storm Depth (in)* [E] = 0.62	*Design Capture Volume,* V_{BMP} *(cubic feet)* $[F] = \frac{[D]x[E]}{43,560}$ = 13675.1	*Proposed Treated Volume on Plans (cubic feet)* [G] =13,716

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

All runoff from the DMAs are being treated by LID BMPs.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☒ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☒	☐	☒	☒	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Proprietary Biotreatment System (Modular Wetlands Unit BIO A)	Oil & Grease, Metals, Trash & Debris	Oil & Grease - 95% (High) Metals - 38%-69% (Med.) TSS - 85% (High)

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration			
Volume (Cubic Feet)			

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

See Appendix 7 for the Riverside County HCOC Applicability Map, which determines areas that are HCOC exempt. Per the map the proposed project is located in an area where HCOC does not apply. Thus, this project will not have to address or mitigate for HCOC's. The HCOC Applicability Map was approved April 20, 2017.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners, lessees, and operators.
On-site storm drain inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riversdie County Flood Control and Water Conservation District, call 951.955.1200 to verify. **(CASQQ BMP SD-13, "Storm Drain Signage")**	Maintain and periodically repaint or replace markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-74 "Drainage System Maintenance" Storm drain inlets should be inspected monthly and before any rain event. Catch basins should be cleaned before the sump is 40% full.

Landscape/Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following. Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. **(CASQA BMP SD-10, "Site Design and Landscape Planning" and SD-12, "Efficient Irrigation")**	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. Provide IPM information to new owners, lessees and operators Applicable operational BMPS in "What you should know for…Landscape and Gardening": • Never apply pesticides or fertilizers when rain is predicted within the next 48 hours. • Do not overwater. • Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Dispose of green waste by composting hauling it to a permitted landfill, or recycling it through city's program.
Refuse Areas	State how site refuse will be handled and provide supporting detail to what is shown on plans. State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. Trash enclosures shall have a solid impermeable roof with a minimum clearance height to allow the bin lid to completely open. Trash enclosures to be constructed of reinforced masonry without wooden gates. Walls shall be at least 6' high.	State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

	Trash enclosures shall have a concrete slab floor. The concrete slab shall be graded to collect any spill within the enclosure. All trash bins in the trash enclosure shall be leak free and shall have a lid and be continuously closed. The enclosure area shall be protected from receiving direct rainfall or run-on from collateral surfaces. Method to handle site refuse: • Waste will be hauled by either public or commercial carriers. **(CASQA BMP SD-32, "Trash Storage Areas")**	Any Standing liquids must be cleaned up and disposed of property using a mop and a bucket or a wet/dry vacuum machine. All non-hazardous liquids without solid trash may be put in the sanitary sewer. Waste management area shall be kept clean at all times by sweeping and cleaning up spills immediately. Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded or otherwise deteriorating.
Loading Docks	Design loading docks to prevent stormwater run-on. Pave loading areas with concrete instead of asphalt. Catch basin is connected to onsite storm drain system. Install door skirts (cowling) at each bay that enclose the end of the trailer to prevent spills from entering loading dock. **(CASQA BMP SD-31, "Maintenance Bays and Docks")**	Move loaded and unloaded items indoors as soon as possible. See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Additional Operational BMPs suggested on Fact Sheet SC-30: • Check equipment regularly for leaks. • Conduct loading and unloading in dry weather if possible. • Loading or unloading of liquid should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Additional Operational BMPs suggested on Fact Sheet SC-41: • Do not allow discharge of fire sprinkler line flushing to storm drain or infiltration due to the potential high levels of pollutants in fire sprinkler line water.
Miscellaneous drain or Wash Water or Other Sources	• Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. • Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. • Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. • Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. • Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. **(CASQA BMP SD-10, "Site Design and Landscape Planning" and SD-11,"Roof Runoff Controls")**	Additional Operational BMPs suggested on Fact Sheet SC-10: • Train employees to identify non-stormwater discharges and report them to the appropriate departments.
Plazas, sidewalks, and parking lots	None.	Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing

		to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.
Roof Drains	Roof drains to discharge to splash block or curb face and sheet flow to designated treatment BMP.	Clear roof drains and gutters of debris to prevent redirection of flow.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
BIO A	Proprietary Biofiltration Unit (MWS L-8-12-V)	WQMP Post-Construction BMP Site Plan Conceptual Utility Plan
DET A	60" HDPE Detention System	WQMP Post-Construction BMP Site Plan Conceptual Utility Plan

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: The property owner will record an agreement with the County of Riverside to maintain the BMPs outlined in this report.

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

The maintenance of the proposed structural BMPs will be done by the property owner through site maintenance workers. The property owners will be responsible for funding of all onsite BMPs through its operating budget. The following party is responsible for the operation and maintenance of all Structural Source Control and Treatment Control BMPs until such time that the permanent sale of the parcels and transfer of ownership occurs:

Seefried
2321 Rosecrans Ave. Suite 2220
El Segundo, CA 90245
Contact: Dan Bick
danbick@seefriedproperties.com
(310) 536-7900

The owner will be responsible for ensuring that all personnel involved in the routine inspection, routine and non-routine maintenance, and record keeping tasks required by the O&M Plan are familiar with the contents of the WQMP and the requirements for the routine inspection as well as routine and non-routine tasks as described in Appendix 9. Corresponding fact sheets for source control BMPs and treatment control BMPs, as well as other educational materials, can be found in Appendix 10.

The owner will be responsible for ensuring that individuals involved in O&M activities, including but not limited to contractors, will be trained by the responsible party/trainer according to the training program herein.

Each proposed BMP for the feature developments will be maintained by the property owner.

The owner shall be responsible for documenting all training activities and for maintaining records related to training. At a minimum, training documentation shall include:

- Certification of Receipt and Review of the O&M Plan completed by trainees and owner
- Logging of all training activities at the same time that all training is complete.

Forms for documentation of training are included in Appendix 10. Training records must be maintained for a minimum period of 3 years.

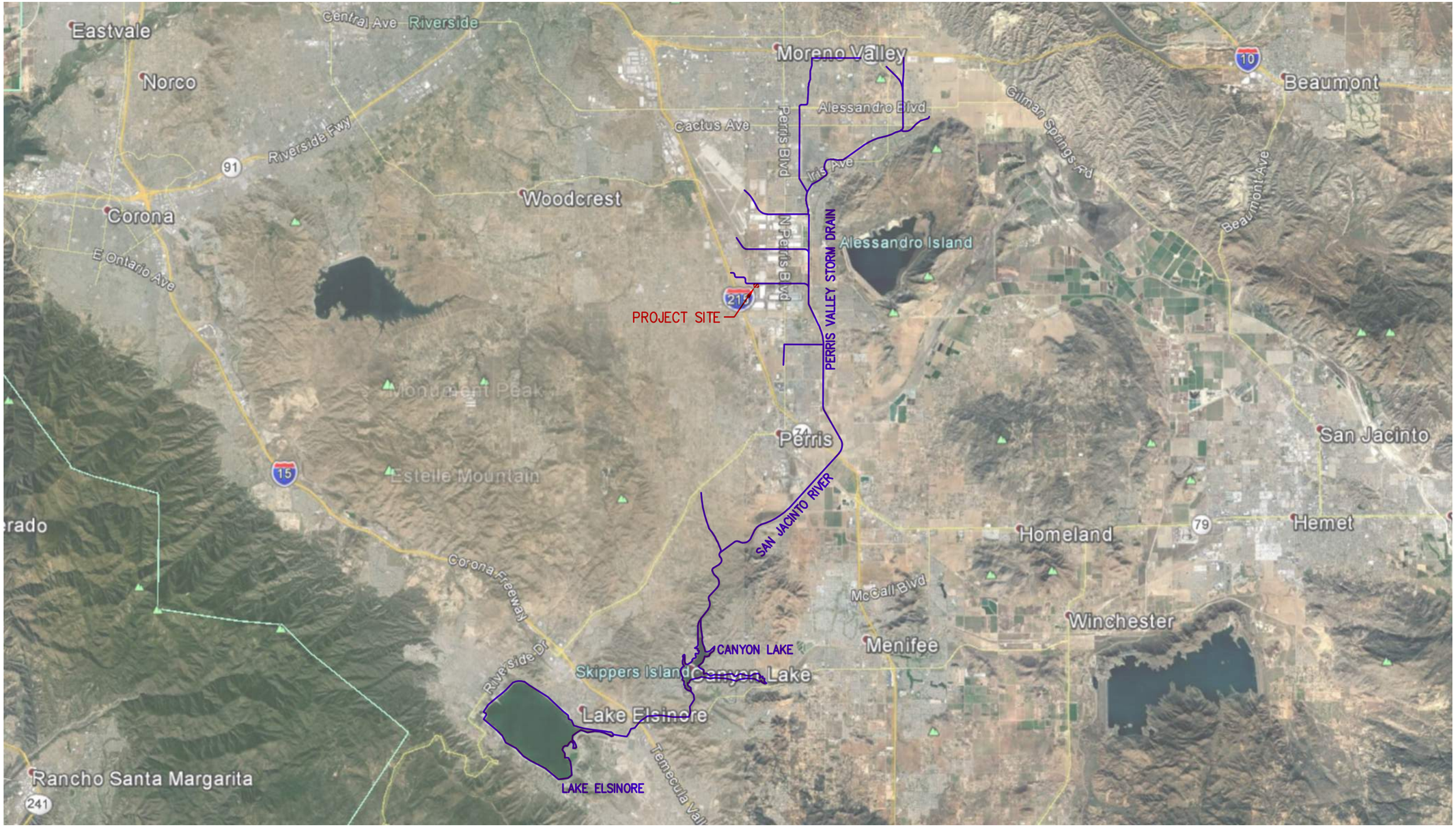
			Maintenance Responsibility				Funding Mechanism for Maintenance			Maintenance Costs	
BMP	Used	Not Used	Owner **	City	County	Flood District	Owner	Developer	Public *	1-year ($)	2-year ($)
Hydro seeding & Mulching	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Landscape Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Landscape Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Lawns	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Impervious permanent cover (concrete/ asphalt) Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Impervious permanent cover (concrete/ asphalt) Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Pervious permanent cover (gravel)	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Down drains	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Ribbon Gutter Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Ribbon Gutter Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Curb & gutter Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Curb & gutter Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Storm Drain	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Detention Basin	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Biotreatment (Modular Wetlands System)	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Education Materials	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Vehicle Wash Area	☐	☐	☐	☐	☐	☐	☐	☐	☐		

* Provide annual costs (1-year and 2-year) for all publicly maintained BMPs. Specifically include the costs for all public landscaping and treatment control that are responsibility of the City of Landscape Maintenance District.

** Maintenance funding contact information for each privately maintained (by owner, POA or HOA) BMP must be included.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



N

SCALE IN MILES

0 1.5 3 6 9

SCALE: 1" = 3 MILES

SEEFRIED PERRIS BRENNAN AVE

DOWNSTREAM RECEIVING WATERS

PERRIS, CA

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road, Ste. 210
Anaheim Hills, California 92808
(714) 685-6860

FILENAME: M:\2021\21-162 Seefried Perris Brennan Ave\WQMP\CAD\21-162 WQMP_Receiving Waters Exhibit.dwg, Mar 14 2022 2:59pm

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S | T 02 S | T 03 S | T 04 S | T 05 S | T 06 S | T 07 S | T 08 S

0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
Project Site 0.62 in
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | HEMET | CANYON LAKE | LAKE ELSINORE | MENIFEE | WILDOMAR | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

RAMONA EXPRESSWAY

BRENNAN AVENUE

DMA A15
100% PERVIOUS
ORNAMENTAL LANDSCAPING
3,365 SF (0.08 AC)

DMA A14
100% PERVIOUS
DECOMPOSED GRANITE
1,838 SF (0.04 AC)

DMA A16
100% PERVIOUS
ORNAMENTAL LANDSCAPING
2,677 SF (0.06 AC)

DMA A17
100% PERVIOUS
ORNAMENTAL LANDSCAPING
2,702 SF (0.06 AC)

DMA A13
100% PERVIOUS
DECOMPOSED GRANITE
1,575 SF (0.04 AC)

PROPOSED
CONCRETE GUTTER
ALONG ℄

DMA A12
100% IMPERVIOUS
CONCRETE
810 SF (0.02 AC)

DMA A11
100% IMPERVIOUS
CONCRETE
211 SF (0.00 AC)

DMA A9
0% IMPERVIOUS
CONCRETE
36,705 SF (0.84 AC)

DMA A19
100% PERVIOUS
ORNAMENTAL LANDSCAPING
3,025 SF (0.07 AC)

DMA A18
100% PERVIOUS
ORNAMENTAL LANDSCAPING
12,951 SF (0.30 AC)

DMA A10
100% IMPERVIOUS
CONCRETE
2,457 SF (0.06 AC)

DMA A23
100% IMPERVIOUS
CONCRETE
1,509 SF (0.03 AC)

DMA A20
100% PERVIOUS
ORNAMENTAL LANDSCAPING
2,510 SF (0.06 AC)

DMA A1
100% IMPERVIOUS
ROOF
162,841 SF (3.74 AC)

DMA A8
100% IMPERVIOUS
CONCRETE
61 SF (0.00 AC)

DMA A7
100% IMPERVIOUS
CONCRETE
91 SF (0.00 AC)

DMA A4
100% IMPERVIOUS
CONCRETE
1,540 SF (0.04 AC)

DMA A5
100% IMPERVIOUS
CONCRETE
2,573 SF (0.06 AC)

PROPOSED
CONCRETE GUTTER
ALONG ℄

DMA A6
100% IMPERVIOUS
CONCRETE
755 SF (0.02 AC)

DMA A21
100% PERVIOUS
ORNAMENTAL LANDSCAPING
423 SF (0.01 AC)

DMA A2
100% IMPERVIOUS
CONCRETE
75,542 SF (1.73 AC)

DMA A3
100% IMPERVIOUS
CONCRETE
6,309 SF (0.14 AC)

DMA A22
100% PERVIOUS
ORNAMENTAL LANDSCAPING
6,684 SF (0.15 AC)

LEGEND

- PERVIOUS AREA
- SUBAREA BOUNDARY
- OFFSITE RUNOFF FLOW

NOTE:
OFFSITE RUN-ON IS ANTICIPATED FOP THE PROJECT SITE. OFFSITE RUN-ON WILL BE INTERCEPTED BY A PROPOSED CONCRETE GUTTER ALONG THE WESTERLY P/L TO EXISTING OFFSITE DRAINAGE FACILITIES.

GRAPHIC SCALE: 1"=30'

NOT FOR CONSTRUCTION

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NO.:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: WQMP DRAINAGE AREA MAP

ISSUE:	WQMP
DATE:	3/15/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162WQMP
PROJECT NO.:	21-162
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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RAMONA EXPRESSWAY

BRENNAN AVENUE

LEGEND

- PROPRIETARY BIOFILTRATION UNIT
- DETENTION SYSTEM
- STORM DRAIN
- STORM DRAIN CATCH BASIN

PROPOSED DETENTION BASIN (DET A) 13,716 CF STORAGE.

PROPOSED MODULAR WETLANDS UNIT (BIO A) MWS-L-8-12

PROPOSED CONCRETE GUTTER ALONG ℄

477.44 - 474.56 FF
476.44 - 473.56 PAD
[ASSUMED 1' TOTAL SLAB SECTION]
*ASSUME ALL ROOF DRAINS DISCHARGE TO CURB FACE

GRAPHIC SCALE: 1"=30'

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NOT FOR CONSTRUCTION

NO:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: WQMP POST-CONSTRUCTION BMP SITE PLAN

ISSUE:	WQMP
DATE:	3/15/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162WQMP
PROJECT NO.:	21-162
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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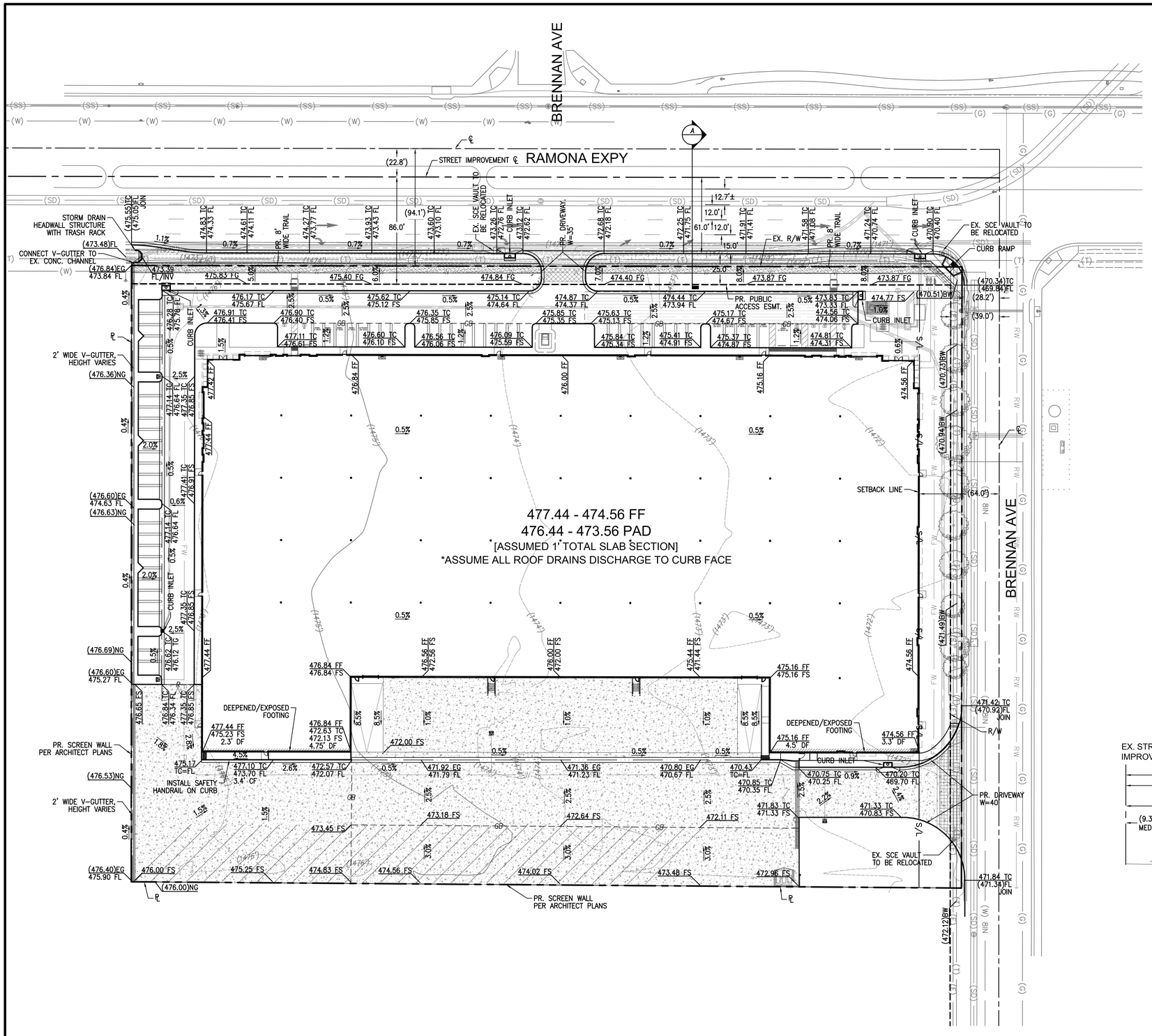
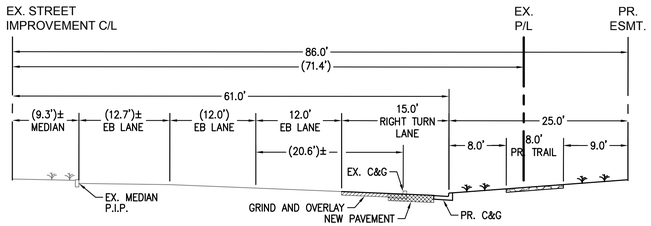
Appendix 2: Construction Plans

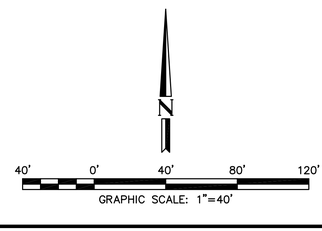
Grading and Drainage Plans





RAMONA EXPY. 1/2 WIDTH SECTION (A)
N.T.S.

NOTE:
ADD 1000' TO ALL ELEVATIONS SHOWN HEREON.



160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NOT FOR CONSTRUCTION

NO:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: CONCEPTUAL GRADING PLAN

ISSUE:	CONCEPTUAL
DATE:	03/02/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162CGMA
PROJECT NO.:	21-162
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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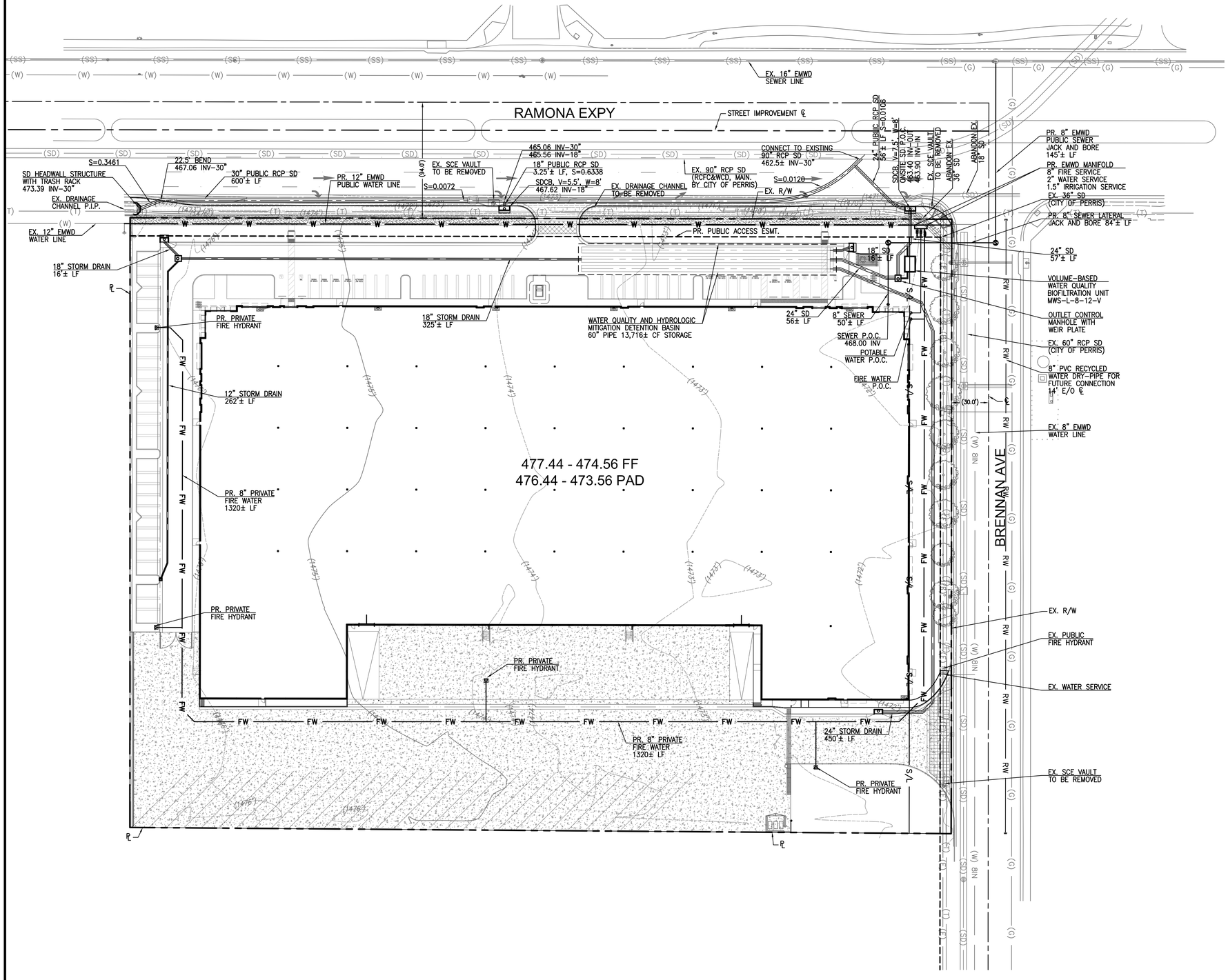

NOTE:

ON-SITE SOILS ARE CONSIDERED SLIGHTLY TO MODERATELY CORROSIVE. THEREFORE, POLYETHYLENE ENCASEMENT OR OTHER APPROPRIATE METHOD OF PROTECTION MAY BE REQUIRED FOR METAL PIPES. RESISTIVITY VALUE 1160 OHM-CH PH VALUE 7.2.

N

40' 0' 40' 80' 120'

GRAPHIC SCALE: 1"=40'

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

NOT FOR CONSTRUCTION

NO:	REVISION:	DATE:

PROJECT: SEEFRIED PERRIS BRENNAN AVE
RAMONA EXPY & BRENNAN AVE
PERRIS, CALIFORNIA

DRAWING NAME: CONCEPTUAL UTILITY PLAN

ISSUE:	CONCEPTUAL
DATE:	03/01/2022
CHECKED: JB	DRAWN: NS
DRAWING FILE:	21162CGMA
PROJECT NO.:	~~21-162~~
SHEET NUMBER:	1
OF	1 SHEETS
SCALE:	AS SHOWN

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Appendix 3: Soils Information

Geotechnical Study

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE

3931 Brennan Avenue
Perris, California
for
Seefried Industrial Properties, Inc.

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

December 15, 2021

Seefried Industrial Properties, Inc.
2301 Rosecrans Avenue, Suite 1365
El Segundo, California 90245

Attention: Mr. Dan Bick
Senior Vice President

Project No.: **21G270-1**

Subject: **Geotechnical Investigation**
Proposed Warehouse
3931 Brennan Avenue
Perris, California

Dear Mr. Bick:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Ricardo Frias, RCE 91772
Project Engineer

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- Artificial fill soils were encountered at Boring No. B-4, extending from the ground surface to a depth of 2½± feet. The existing fill soils are considered to represent undocumented fill.
- Older alluvial soils were encountered at the ground surface and beneath the artificial fill soils and generally consist of silty sands and clayey sands, which possess variable strength.
- The undocumented fill soils and upper-portion of the older alluvial soils generally possess varying strengths and unfavorable consolidation/collapse characteristics. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structures.
- Remedial grading will be necessary to remove the undocumented fill soils in their entirety and the upper portion of the older alluvial soils and replace these materials as compacted structural fill soils.
- Laboratory testing, performed by SCG, indicates that the near-surface soils possess very low expansive potential.
- The results of the corrosivity testing indicate that the near surface soils are corrosive to buried metallic improvements such as ductile iron pipe and to copper tubing.

Site Preparation Recommendation

- Demolition of the existing structures and pavements will be required in order to facilitate construction of the new building. Demolition should also include all utilities and any other subsurface improvements that will not remain in place for use with the new development. Debris resultant from demolition should be disposed of offsite. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2-inch particle size, well mixed with the on-site sandy soils, and incorporated into new structural fills.
- Initial site preparation should include removal of all vegetation, including tree root masses and any organic topsoil.
- Remedial grading is recommended within the proposed building pad area to remove the undocumented fill soils, which extend to a depth of 2½± feet at the boring locations, in their entirety. At a minimum, the building pad area should be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 3 feet below proposed pad grade, whichever is greater. Overexcavation within the foundation areas is recommended to extend to a depth of at least 3 feet below proposed foundation bearing grade.
- After overexcavation has been completed, the subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be overexcavated. The resulting subgrade should then be scarified to a depth of 12 inches, moisture conditioned or air dried to 0 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure.
- Maximum, net allowable soil bearing pressure: 1,500 lbs/ft^2 if the full recommended lateral extent of remedial grading cannot be achieved.
- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Reinforcement consisting of at least two (2) No. 5 rebars (1 top and 1 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab Design Recommendations

- Conventional Slab-on-Grade: minimum 6 inches thick.
- Modulus of Subgrade Reaction: k = 150 psi/in.
- Reinforcement is not expected to be necessary for geotechnical considerations. The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

Pavement Design Recommendations

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 21P475, dated November 3, 2021. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the currently proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the address of 3931 Brennan Avenue in Perris, California. The site is bounded to the north by Ramona Expressway, to the east by Brennan Avenue, and to the west and south by vacant lots. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site consists of a rectangular-shaped parcel, 7.6± acres in size. Based on the aerial photographs obtained from Google Earth and visual observations, the site is currently developed as truck storage yard, but was previously utilized as a pallet storage yard. A one-story structure is located in the southeastern area of the site, and is 1,800± ft² in size. The structure is of wood-frame construction, presumably supported on conventional shallow foundations with concrete slab-on-grade floors. Additionally, several large freight containers are stored in this area of the subject site. The ground surface cover surrounding the structures and containers consists of asphaltic concrete (AC) and exposed soil. The pavements are in poor condition with moderate cracking throughout. In addition, a v-gutter trends east-to-west along the entire northern perimeter.

The southcentral region of the site currently contains a one to two-story shed of sheet metal-frame construction, presumably supported on conventional shallow foundations. The ground surface cover surrounding the structures consists of exposed soil.

The remainder of the site that spans the western and northern areas is clear of any structures and generally consists of a few medium-sized trees and other miscellaneous objects. Ground surface cover in these areas consists of exposed soil with some areas of aggregate base.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the site slopes downward towards the west at a gradient of less than 1± percent. The overall site possesses 3 to 4± feet topographic relief.

3.2 Proposed Development

A preliminary site plan (Scheme 1) for the proposed development was provided by the client. Based on this plan, the site will be developed with one industrial building. The building will be 164,430± ft² in size and will be located in the central area of the site. Dock-high doors will be constructed along a portion of the south building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the truck court areas, and limited areas of concrete flatwork and landscape planters throughout.

Detailed structural information was not available at the time of this proposal. It is assumed that

the new buildings will be single-story structures of tilt-up concrete construction, typically supported on conventional shallow foundations with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of four (4) borings and were advanced to a depth of 25± feet below the existing site grades. Both of the borings were logged during the drilling and excavation by members of our staff.

The borings were advanced with hollow-stem augers, by a truck-mounted drilling rig. Representative bulk and undisturbed soil samples were taken during drilling. Relatively undisturbed samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. Samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Pavements

Asphaltic concrete (AC) pavements were encountered at the ground surface at Boring No. B-4. The pavement section at this location generally consists of 1± inch of AC, underlain by 4± inches of aggregate base.

Artificial Fill

Artificial fill soils were encountered beneath the pavements at Boring No. B-4, extending to a depth of 2½± feet below the existing site grades. The artificial fill soils generally consist of medium dense silty fine sands, with trace amounts of coarse sands. The fill soils possess a disturbed and mottled appearance, resulting in their classification as artificial fill.

Older Alluvium

Older alluvial soils were encountered at the ground surface or beneath the fill soils at all of the boring locations, extending to the maximum depth explored of 25± feet below the existing site

grades. The older alluvium generally consists of medium dense to very dense silty sands, clayey sands, and sands with varying amounts of silts, clays, and sands. The older alluvium possesses some calcareous nodule and veining, and is micaceous. Boring No. B-4 encountered a layer of very stiff sandy clays at a depth of 4½ feet, as well as a layer of loose silty sands at a depth of 17± feet below the existing site grades.

Groundwater

Groundwater was not encountered at any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet below existing site grades, at the time of the subsurface investigation.

As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well on record is located approximately ½± mile northeast of the site. Water level readings within this monitoring well indicate a groundwater level of 56± feet below the ground surface in November 2020.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Consolidation

Selected soil samples were tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-3 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample has been tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-4 in Appendix C of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch-diameter, 1-inch-high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water,

and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-4 @ 0 to 5 feet	2	Very Low

Soluble Sulfates

A representative sample of the near-surface soil was submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-4 @ 0 to 5 feet	0.006	Not Applicable (S0)

Corrosivity Testing

A representative sample of the near-surface soils was submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, chloride, and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-4 @ 0 to 5 feet	1,160	7.2	74	295

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site-specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2019 edition of the California Building Code (CBC), which was adopted on January 1, 2020.

The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The tables below were created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report.

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception to the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." **Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structure at this site. However, the structural engineer should verify that this exception is applicable to the proposed structure.** Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.571
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.987
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.658

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1 obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed building at this site.

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Riverside County GIS website indicates that the subject site is not located within a zone of liquefaction susceptibility. Additionally, the subsurface conditions encountered at the boring locations are not considered to be conducive to liquefaction. These conditions consist of moderate to high strength older alluvium and no evidence of a long-term groundwater table within the depths explored by the borings. Based on these considerations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

All of the borings encountered older alluvium which possesses moderate consolidation/collapse characteristics to a depth of 4± feet below the existing site grades. Therefore, remedial grading is considered warranted within the proposed building area in order to remove the upper portion of the near-surface native alluvial soils, and replace these materials as compacted structural fill soils. It should be noted that based on the results of corrosivity testing, the on-site soils are considered to be slightly to moderately corrosive to ductile iron pipe and copper tubing.

Settlement

The recommended remedial grading will remove all the undocumented fill soils and a portion of the near-surface native alluvium, including collapsible/compressible soils, and replace these soils as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant load increases from the foundations of the new structure. Provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structure are expected to be within tolerable limits.

Expansion

The near-surface soils generally consist of silty sands, clayey sands, and occasional sandy clays. Laboratory testing indicates that these materials have a very low expansion potential (EI = 2). Based on these conditions, no design considerations related to expansive soils are considered warranted for this site. It is recommended that additional expansion index testing be conducted during subsequent geotechnical investigation and at the completion of rough grading to verify the expansion potential of the as-graded building pad**.**

Soluble Sulfates

The results of the soluble sulfate testing indicated a sulfate concentration of approximately 0.006 percent for the selected samples of the near-surface soils. This concentration is considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possesses a saturated resistivity value of 1,160 ohm-cm, and a pH value of 7.2. The test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Sulfides, and redox potential are factors that are also used in the evaluation procedure. We have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH, and moisture content. Based on these factors, and utilizing the DIPRA procedure, **the on-site soils are considered to be slightly to moderately corrosive to ductile iron pipe. Therefore, polyethylene encasement or some other appropriate method of protection may be required for iron pipes.**

Based on American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary, reinforced concrete that is exposed to external sources of chlorides requires corrosion protection for the steel reinforcement contained within the concrete. ACI 318 defines concrete exposed to moisture and an external source of chlorides as "severe" or exposure category C2. ACI 318 does not clearly define a specific chloride concentration at which contact with the adjacent soil will constitute a "C2" or severe exposure. However, the Caltrans Memo to Designers 10-5, Protection of Reinforcement Against Corrosion Due to Chlorides, Acids and Sulfates, dated June 2010, indicates that soils possessing chloride concentrations greater than 500 mg/kg are considered to be corrosive to reinforced concrete. The results of the laboratory testing indicate a chloride concentration of 74 mg/kg. Although the soils contain some chlorides, we do not expect that the chloride concentrations of the tested soils are high enough to constitute a "severe" or C2 chloride exposure. Therefore, a chloride exposure category of C1 is considered appropriate for this site.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested sample possesses a nitrate concentration of 295 mg/kg. **Based on this test result, the on-site soils are considered to be corrosive to copper pipe.**

It should be noted that SCG does not practice in the field of corrosion engineering. Therefore, the client may wish to contact a corrosion engineer to provide a more thorough evaluation.

Shrinkage/Subsidence

Removal and recompaction of the existing fill soils and near-surface alluvium is estimated to result in an average shrinkage of 0 to 10 percent. It should be noted that the potential shrinkage estimate is based on our experience with similar projects at nearby sites. It was not practical to obtain undisturbed samples based on the gravel, cobble, and boulder content of the onsite soils. Therefore, the actual amount of shrinkage could vary considerably from these estimates. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience and the subsurface conditions encountered at the trench locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

Grading and foundation plans were not available at the time of this report. It is recommended that we be provided with copies of the preliminary grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the trench locations and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping and Demolition

Demolition of the existing structures, pavements and any associated improvements will be necessary to facilitate the construction of the proposed development. Demolition of the existing

structures should include all foundations, floor slabs, and any associated utilities. Any septic systems encountered during demolition and/or rough grading (if present) should be removed in their entirety. Any associated leach fields or other existing underground improvements should also be removed in their entirety. Debris resultant from demolition should be disposed of off-site in accordance with local regulations. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2-inch particle size and mixed with sandy soils, or it may be crushed and made into crushed miscellaneous base (CMB), if desired.

Initial site preparation should include stripping of any surficial vegetation from the site. This should include any weeds, grasses, shrubs, and trees. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Treatment of Existing Soils: Building Pad

Remedial grading is recommended within the proposed building pad area to remove the undocumented fill soils, which extend to a depth of 2½± feet at the boring locations, in their entirety. At a minimum, the building pad area should be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 3 feet below proposed pad grade, whichever is greater. Overexcavation within the foundation areas is recommended to extend to a depth of at least 3 feet below proposed foundation bearing grade.

The overexcavation areas should extend at least 5 feet beyond the building perimeters, and to an extent equal to the depth of fill below the new foundations. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the area of overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This evaluation should include proofrolling and probing to identify any soft, loose, or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if additional loose, porous, overly moist, dry, or low-density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture conditioned or air dried to achieve a moisture content of 0 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

The building pad area may then be raised to grade with previously excavated soils or imported, very low expansive structural fill. All structural fill soils present within the proposed building area should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of any proposed retaining walls and site walls should be overexcavated to a depth of 3 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pad. Any undocumented fill soils or

disturbed native alluvium within any of these foundation areas should be removed in their entirety. Any erection pads for tilt-up concrete walls are considered to be part of the foundation system. Therefore, these overexcavation recommendations are applicable to erection pads. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning to within 0 to 4 percent above the optimum moisture content, and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

If the full lateral recommended remedial grading cannot be completed for the proposed retaining walls and site walls located along property lines, the foundations for those walls should be designed using a reduced allowable bearing pressure. Furthermore, the contractor should take necessary precautions to protect the adjacent improvements during rough grading. Specialized grading techniques, such as A-B-C slot cuts, will likely be required during remedial grading. The geotechnical engineer of record should be contacted if additional recommendations, such as shoring design recommendations, are required during grading.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing soils in the new flatwork, parking, and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new flatwork, parking, and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to at least 0 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed flatwork and parking areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork and parking areas. The grading recommendations presented above do not completely mitigate the extent of the existing fill soils and low strength alluvium in the flatwork and parking areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the flatwork, parking, and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the removed soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.

- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the City of Perris and/or the County of Riverside.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the City of Perris and/or the County of Riverside. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near-surface soils generally consist of moderate strength silty sands and clayey sands. These materials may be subject to minor to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 2h:1v. Temporary excavations into older alluvium may be laid back at a 1.5h:1v, at the discretion of the geotechnical engineer. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will

improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

Most of the near-surface soils possess appreciable silt and clay content and will become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. In addition, based on their granular content, some of the on-site soils will be susceptible to erosion. Therefore, the site should be graded to prevent ponding of surface water and to prevent water from running into excavations.

Groundwater

The static groundwater table at this site is considered to exist at a depth in excess of 25± feet. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils. These new structural fill soils are expected to extend to depths of at least 3 feet below proposed pad grade. Based on this subsurface profile, the proposed structure may be supported on shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Maximum, net allowable soil bearing pressure: 1,500 lbs/ft^2 if the full recommended lateral extent of remedial grading cannot be achieved.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom). Additional reinforcement may be necessary for structural considerations.
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on standard geotechnical practice. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively, under static conditions. Differential movements are expected to occur over a 60-foot span, thereby resulting in an angular distortion of less than 0.001 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill. The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report.

Based on the anticipated grading which will occur at this site, the floor of the proposed structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill, extending to a depth of at least 3 feet below finished pad grade. Based on geotechnical considerations, the floor-slab may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 150 psi/in.

- Reinforcement is not expected to be necessary for geotechnical considerations. The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab where such moisture floor coverings will be used. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades as well as in the dock-high portions of the building. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring and trench locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The near surface soils generally consist of silty sands and clayey sands. Based on their classifications, the silty sand materials are expected to possess a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-site Silty Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		136 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	46 lbs/ft^3
	Active Condition (2h:1v backfill)	73 lbs/ft^3
	At-Rest Condition (level backfill)	68 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 3 feet below proposed foundation bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. Some sorting and/or crushing operations may be required. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls be used. If the drainage composite material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The drainage composite should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

6.8 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The on-site soils generally consist of silty sands and clayey sands. Based on their classification, these materials are expected to possess fair to good pavement support characteristics, with R-values in the range of 40 to 50. Since R-value testing was not included in the scope of services for this project, the subsequent pavement design is based upon a conservatively assumed R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed after completion of rough grading.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20 year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35
9.0	93

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as determined by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Any reinforcement within the PCC pavements should be determined by the project structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness.

Alternative Portland Cement Concrete Pavement Design: Compressive Strength Increase

As requested by HSA & Associates, Inc., the project structural engineer, we are providing an alternative PCC pavement design which is based on an increase in the 28-day compressive strength of concrete of at least 3,500 psi. If a different compressive strength is required by the tenant/owner, SCG should be contacted to provide revised pavement design recommendations.

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40, f_c' = 3500 psi)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 5.0 to 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5	6	7½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

As directed by the client, the concrete should have a 28-day compressive strength of at least 3,500 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

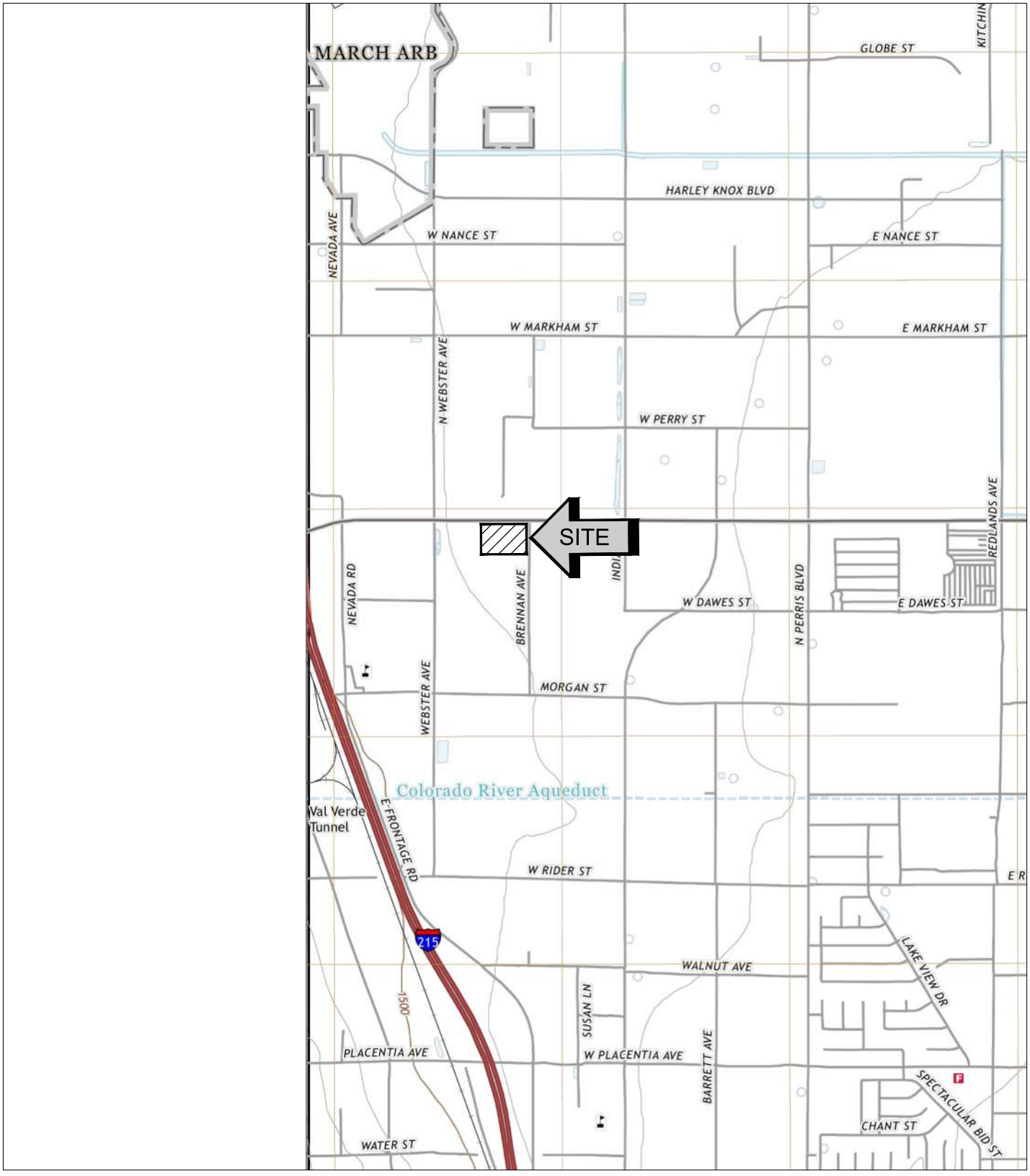
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAPS OF THE PERRIS AND STEELE PEAK QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JAZ CHKD: RF	
SCG PROJECT 21G270-1	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

REMOVE

RAMONA EXPY.

RAMONA EXPY.

35'

26'

20'

51'

26'

PROJECT LIMITS

B-1

B-2

65'

567'

25'

265'

BUILDING AREA
164,430 S.F.

B-3

22 DOCK DOORS

B-4

165'

EXISTING STRUCTURES

40'

AVENUE

BRENNAN AVENUE

BRENNAN

NORTH

SoCalGeo

GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

NOTES: SITE PREPARED BY HPA

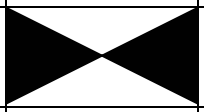
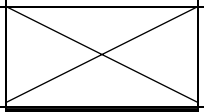
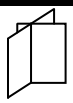
BORING LOCATION PLAN
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA
SCALE: 1" = 60'
DRAWN: JAZ CHKD: RF
SCG PROJECT 21G270-1
PLATE 2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

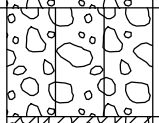
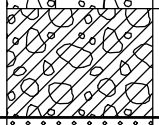
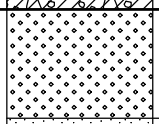
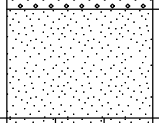
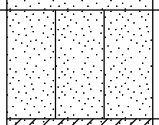
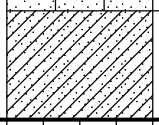
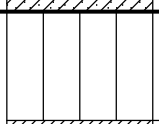
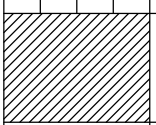
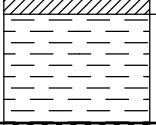
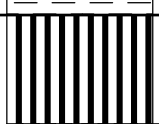
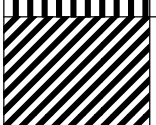
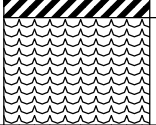
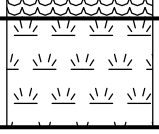
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G270-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 11/8/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace calcureous veining, medium dense to dense-damp							
		55				117	3					
		38					5					Disturbed Sample
5		38			Red Brown Clayey fine Sand, trace to little medium Sand, trace coarse Sand, trace calcareous veining, medium dense to very dense-damp to moist	124	6					
		66				129	8					
		50/5"				126	7					
10												
		64					9					
15												
					Red Brown Silty fine to medium Sand, micaceous, medium dense-damp to moist							
		21					9					
20												
		22					4					
25					Boring Terminated at 25'							

TBL 21G270-1.GPJ SOCALGEO.GDT 12/17/21

TEST BORING LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 21G270-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 11/8/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		14			OLDER ALLUVIUM: Red Brown Clayey fine Sand, trace medium to coarse Sand, trace Silt, medium dense-damp		5					
		27					8					
5		24			Red Brown to Brown Silty fine to medium Sand, medium dense-damp to moist		6					
		50/5"			@ 8½ feet, trace Clay, very dense		9					
10												
		50/4"			@ 13½ feet, very dense		7					
15												
		13			@ 18½ to 25 feet, micaceous		7					
20												
		29					9					
25					Boring Terminated at 25'							

TBL 21G270-1.GPJ SOCALGEO.GDT 12/17/21

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 21G270-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 11/8/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		31			OLDER ALLUVIUM: Red Brown Clayey fine to medium Sand, trace calcareous veining, dense-damp		7					
		33			Red Brown Silty fine to medium Sand, trace Clay, dense-moist		8					
5		22			Red Brown Clayey fine Sand, trace Silt, medium dense-moist		11					
		26			Red Brown Silty fine to medium Sand, trace Clay, medium dense-moist		10					
10												
		33			Light Brown Silty fine to coarse Sand, little Clay, little calcareous veining, dense-moist		10					
15												
		20			Gray Brown fine to coarse Sand, little Silt, micaceous, medium dense-damp		5					
20												
		20			Red Brown Silty fine to medium Sand, trace coarse Sand, trace Clay, micaceous, medium dense-moist		8					
25					Boring Terminated at 25'							

TBL 21G270-1.GPJ SOCALGEO.GDT 12/17/21

TEST BORING LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 21G270-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 11/8/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

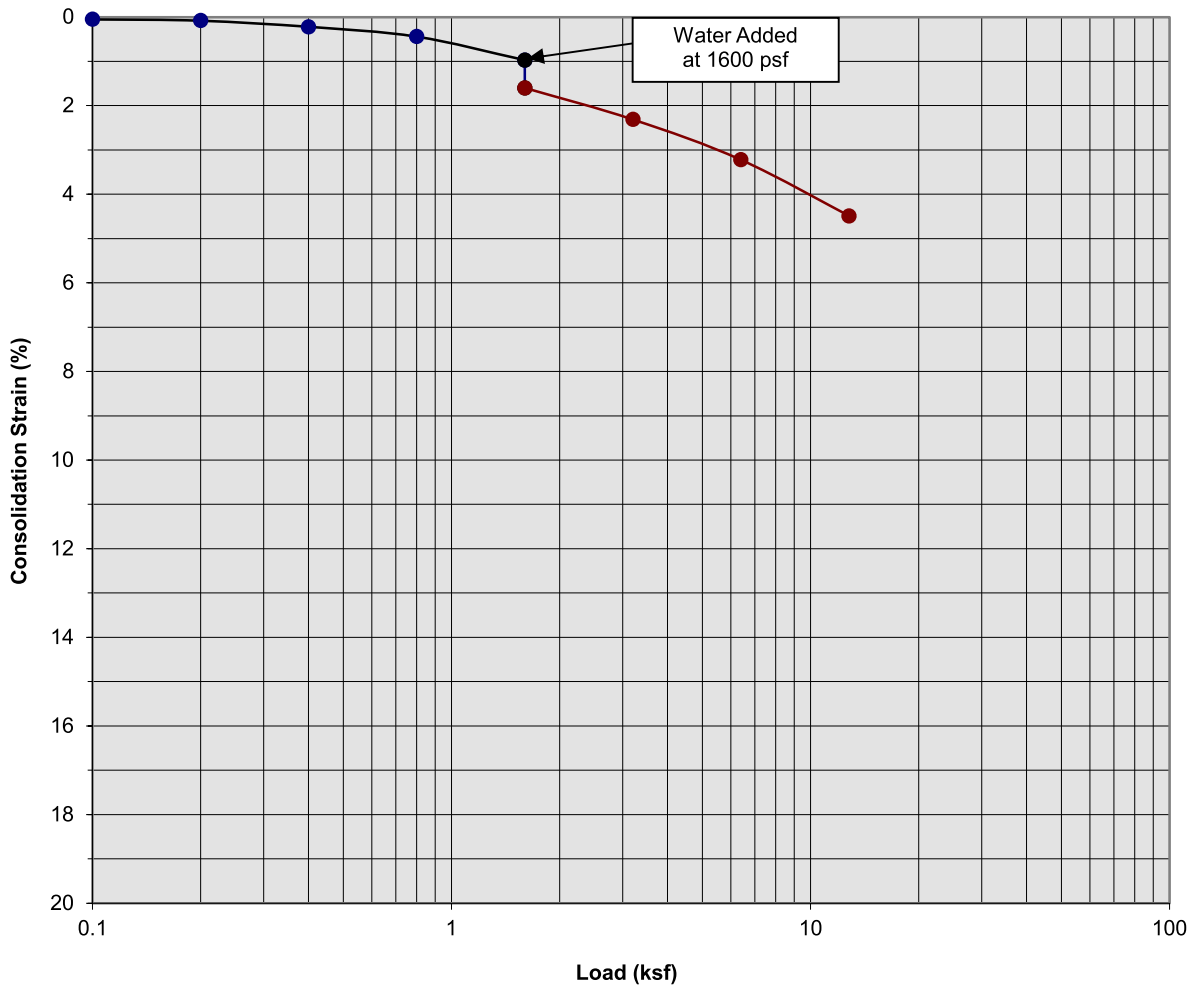
FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ASPHALTIC CONCRETE: 1± inch Asphaltic Concrete, 4± inches Aggregate Base							
		16			FILL: Brown Silty fine to medium Sand, trace coarse Sand, mottled, medium dense-moist	116	8					EI = 2 @ 0 to 5'
		26			OLDER ALLUVIUM: Red Brown Clayey fine to medium Sand, trace coarse Sand, trace Silt, little calcareous veining, medium dense-damp	129	8					
5		36	4.5		Red Brown fine Sandy Clay, trace Silt, trace medium to coarse Sand, very stiff-moist	121	13					
		52			Red Brown Silty fine to medium Sand, trace Clay, cemented, trace calcaerous veining, dense-moist	118	8					
		31/10"			Red Brown Clayey fine Sand, trace Silt, trace to little medium to coarse Sand, cemented, little calcareous veining, dense to very dense-damp to moist	135	8					
10												
		35					9					
15												
		9			Gray Brown Silty fine to medium Sand, trace coarse Sand, loose to medium dense-damp to moist		10					
20												
		20					7					
25					Boring Terminated at 25'							

TBL 21G270-1.GPJ SOCALGEO.GDT 12/17/21

TEST BORING LOG **PLATE B-4**

APPENDIX C

Consolidation/Collapse Test Results



Classification: Red Brown Clayey fine to medium Sand, trace coarse Sand, trace Silt

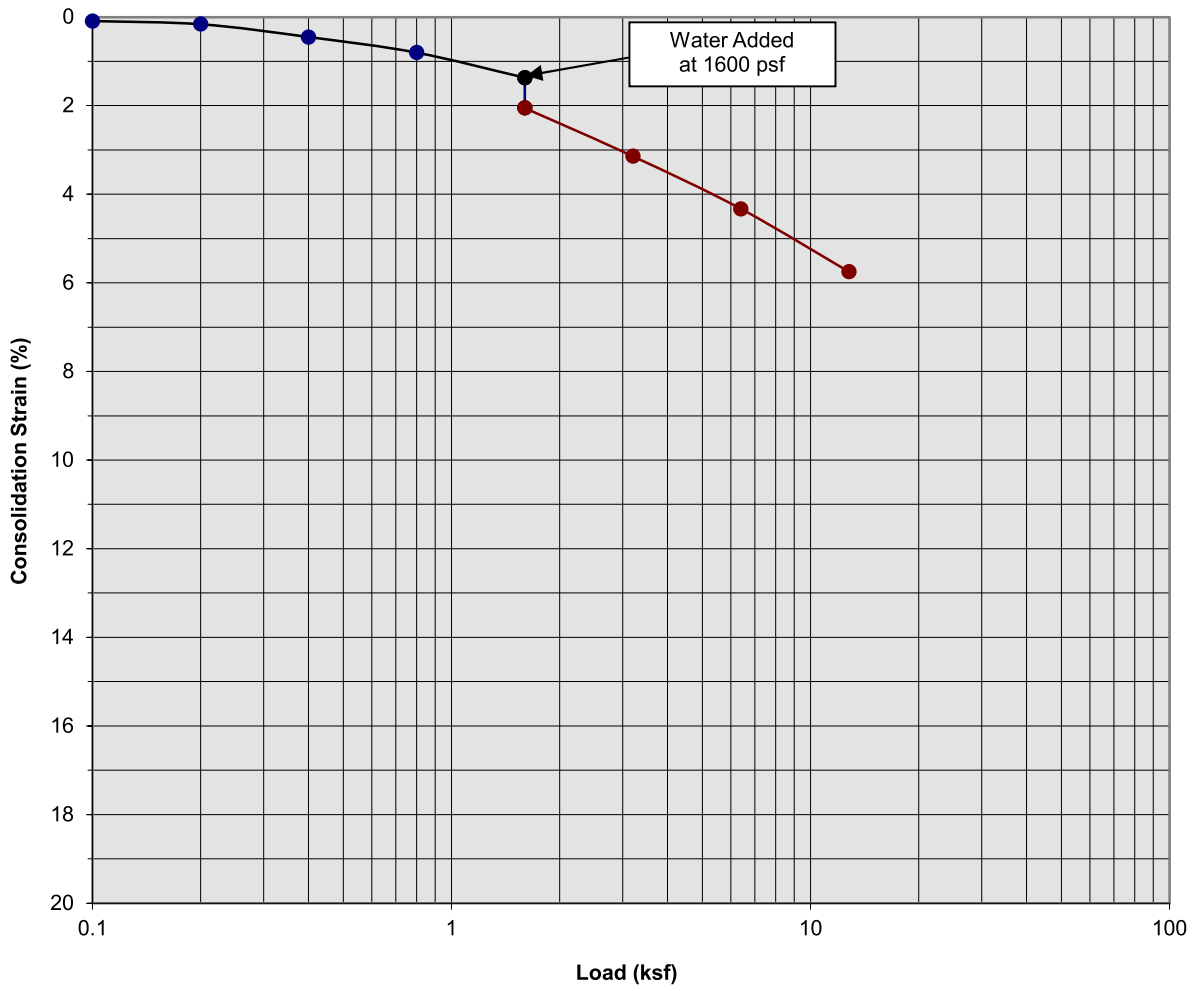
Boring Number:	B-4	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	10
Depth (ft)	3 to 4	Initial Dry Density (pcf)	129.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	135.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.63

Proposed Warehouse
Perris, California
Project No. 21G270-1

PLATE C-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Red Brown fine Sandy Clay, trace Silt, trace medium to coarse Sand

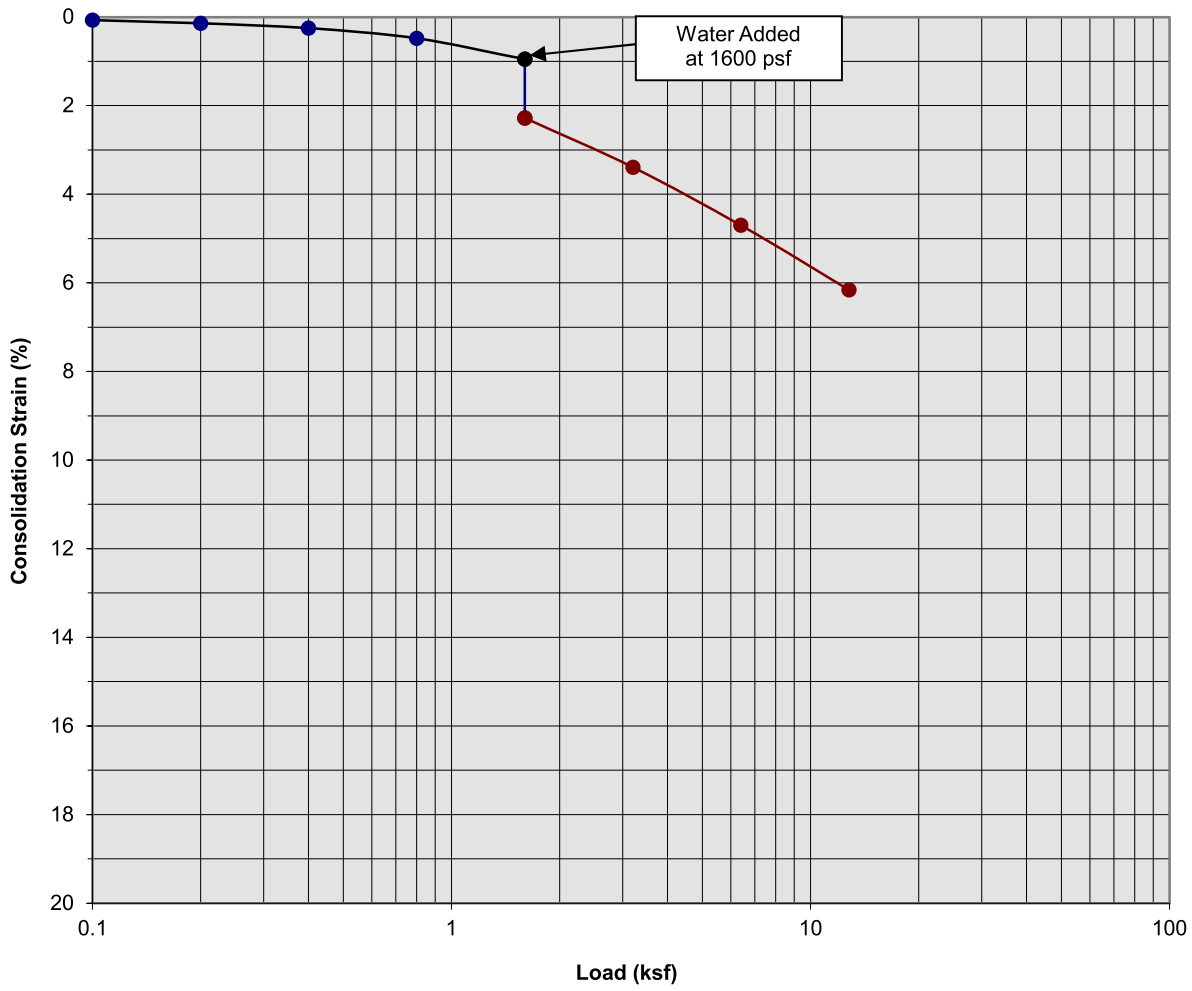
Boring Number:	B-4	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	5 to 6	Initial Dry Density (pcf)	121.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	128.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.68

Proposed Warehouse
Perris, California
Project No. 21G270-1

PLATE C-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Red Brown Clayey fine Sand, trace Silt, trace to little medium to coarse Sand

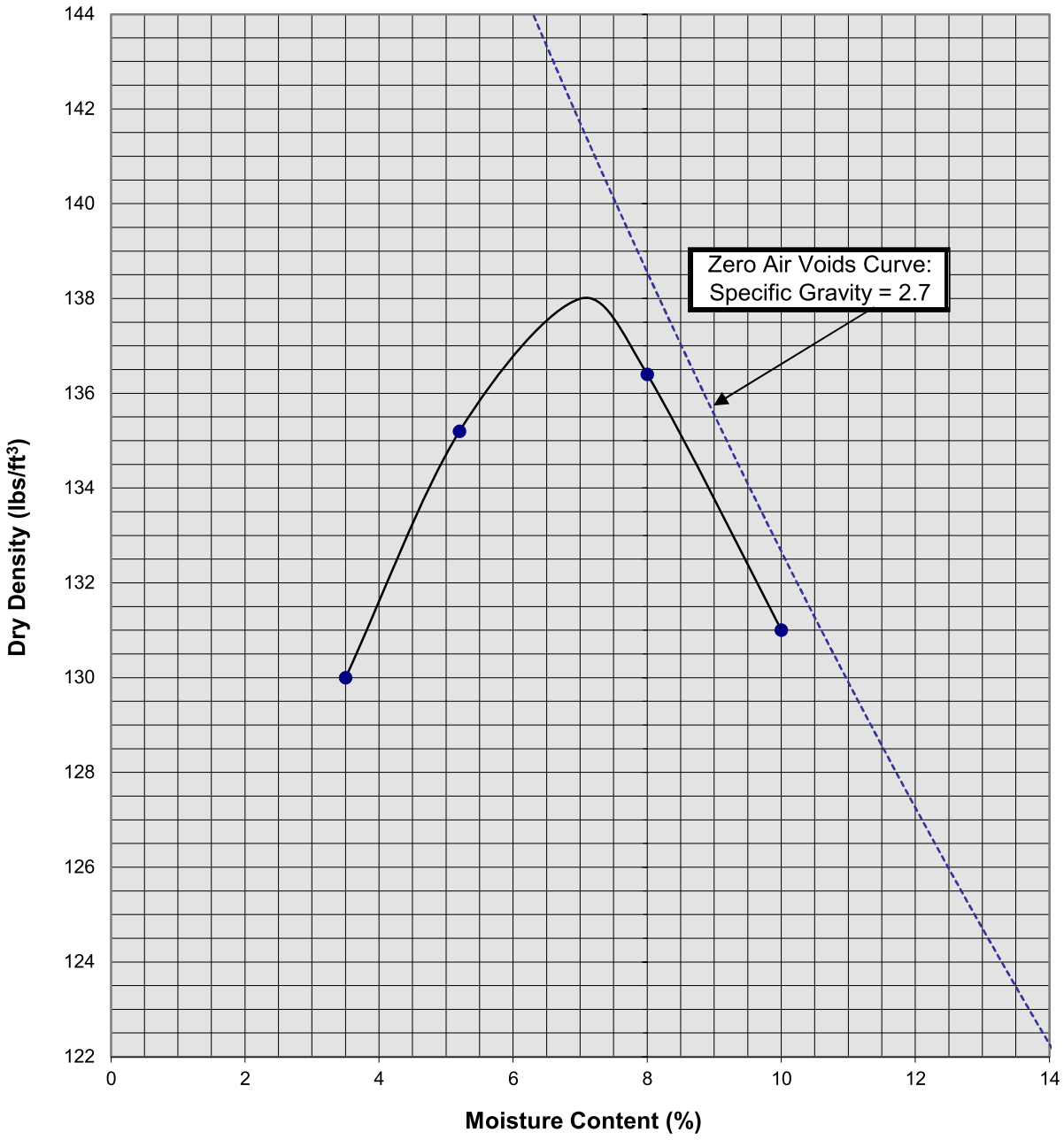
Boring Number:	B-4	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	11
Depth (ft)	9 to 10	Initial Dry Density (pcf)	135.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	144.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.33

Proposed Warehouse
Perris, California
Project No. 21G270-1

PLATE C-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-4 @ 0-5'
Optimum Moisture (%)	7
Maximum Dry Density (pcf)	138
Soil Classification	Red Brown Clayey fine to coarse Sand, little Silt

Proposed Warehouse
Perris, California
Project No. 21G270-1
PLATE C-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as "contaminated," and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

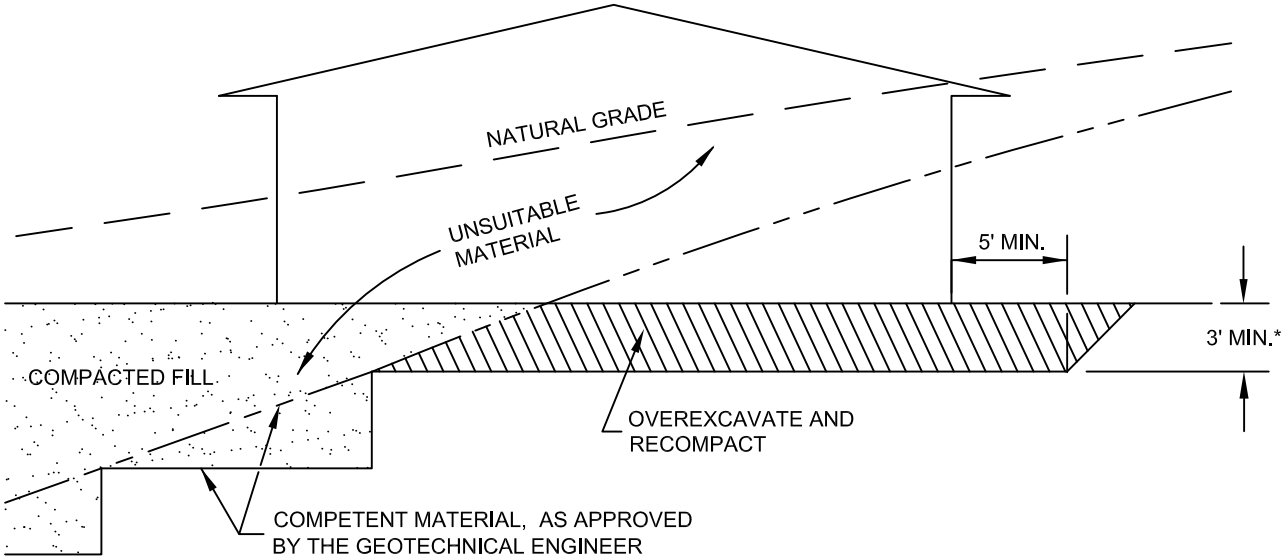
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

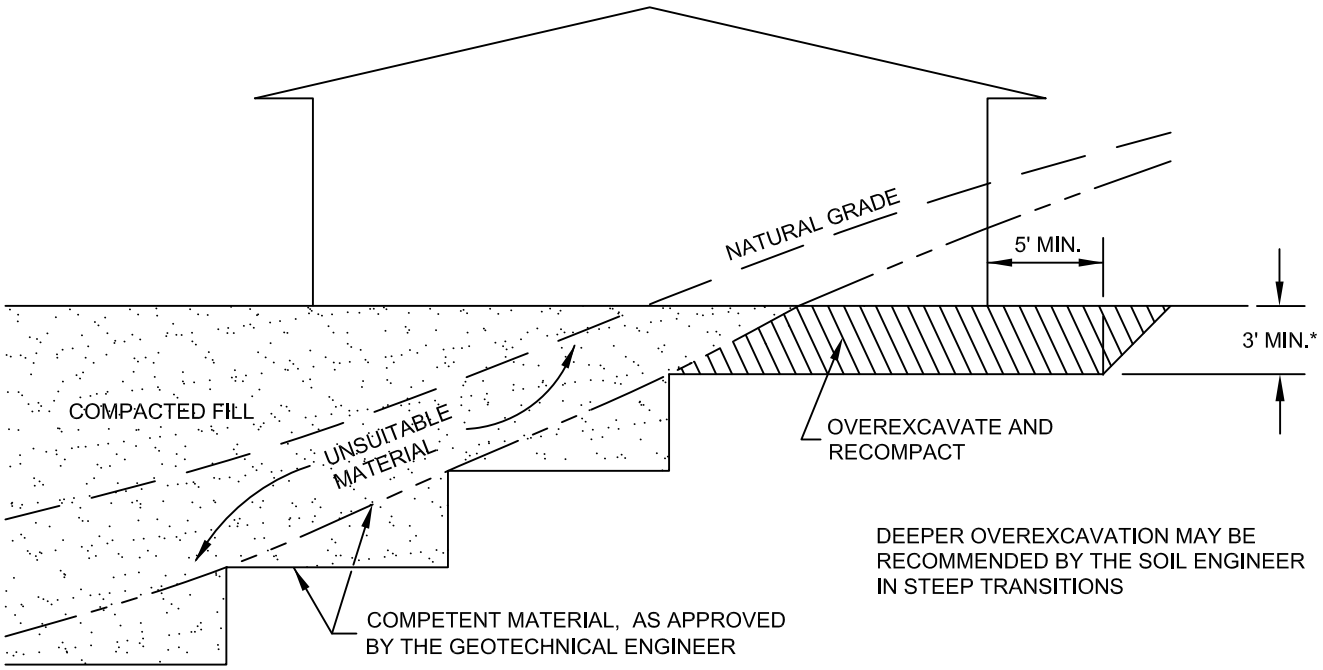
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

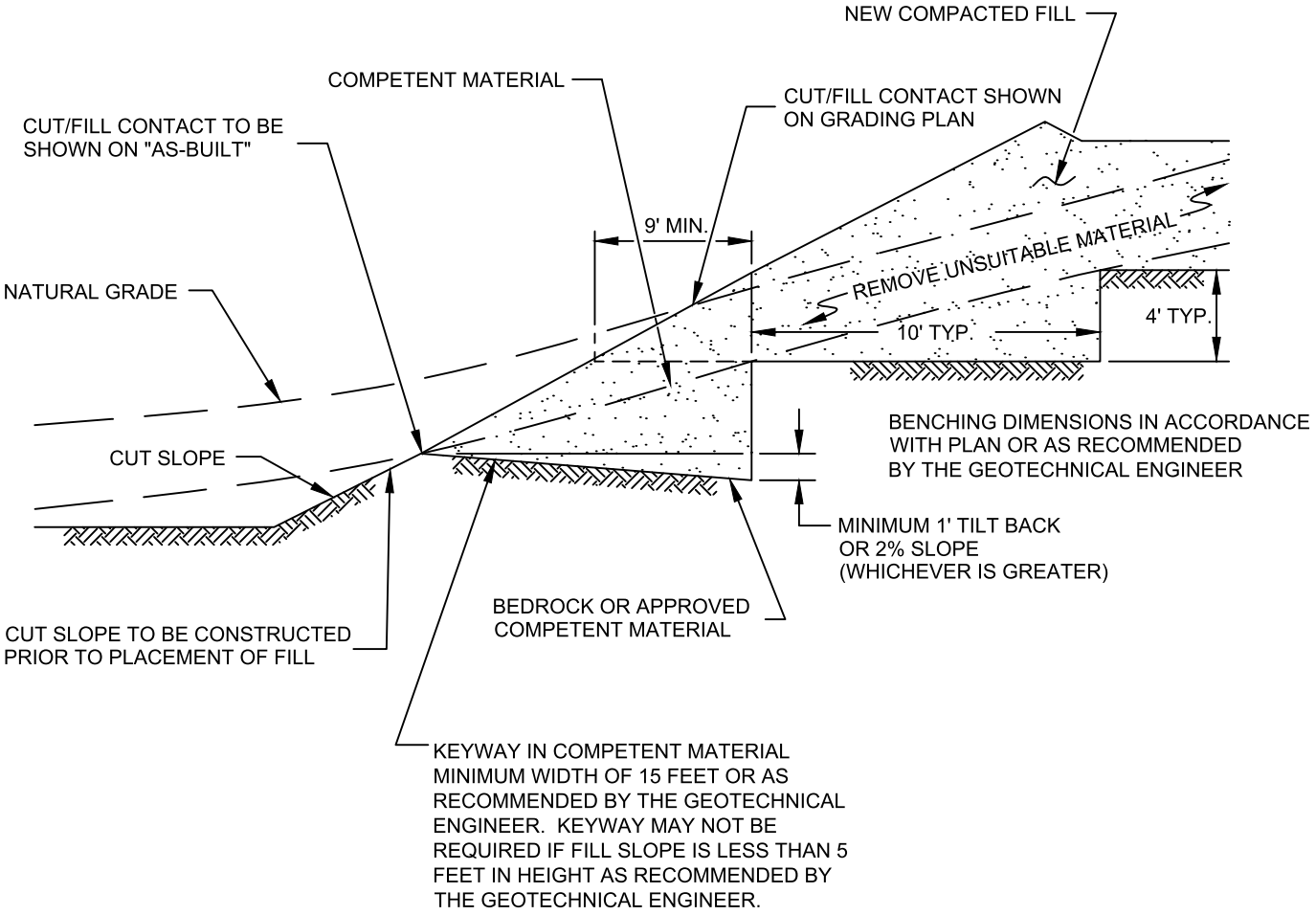
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

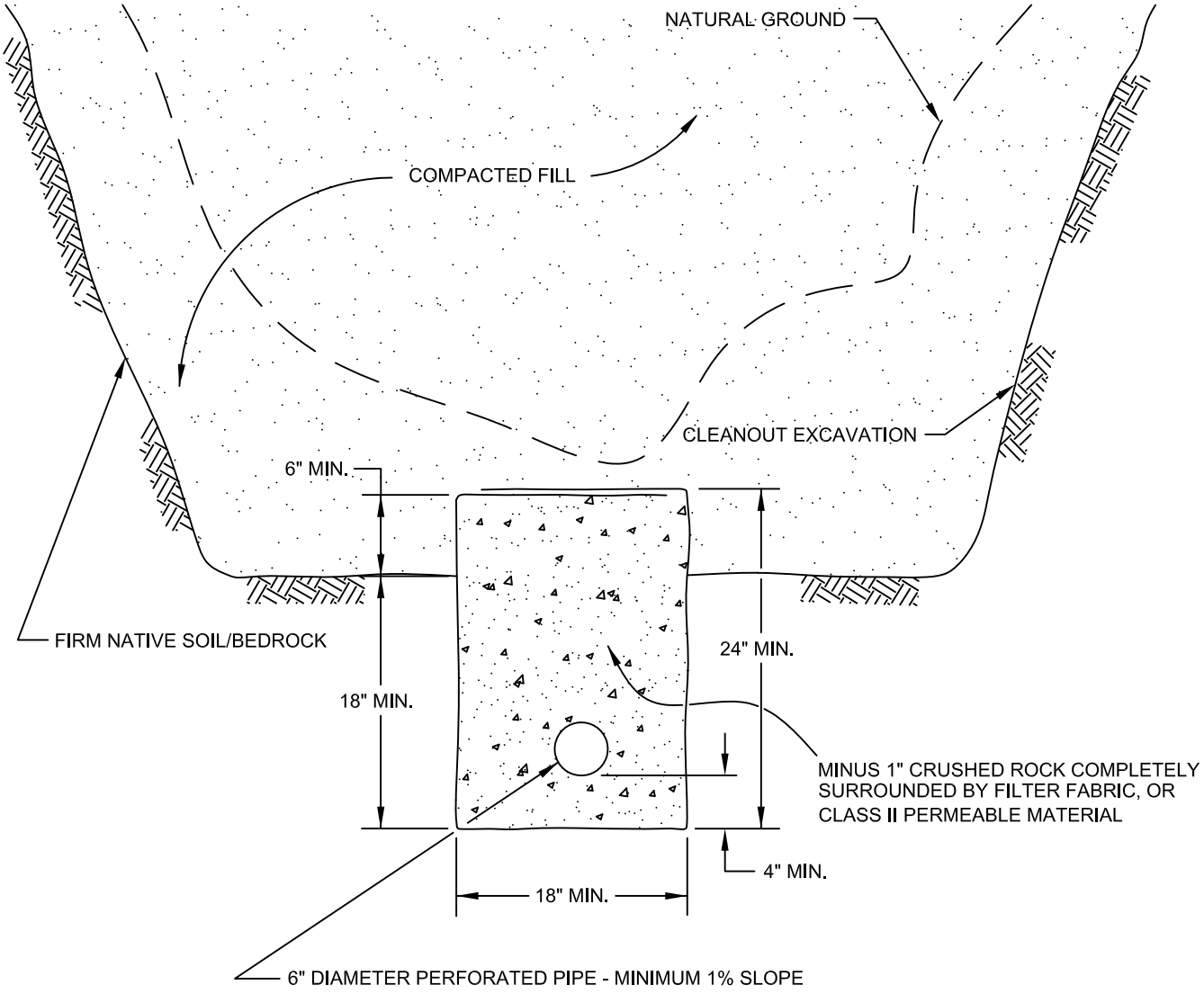
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

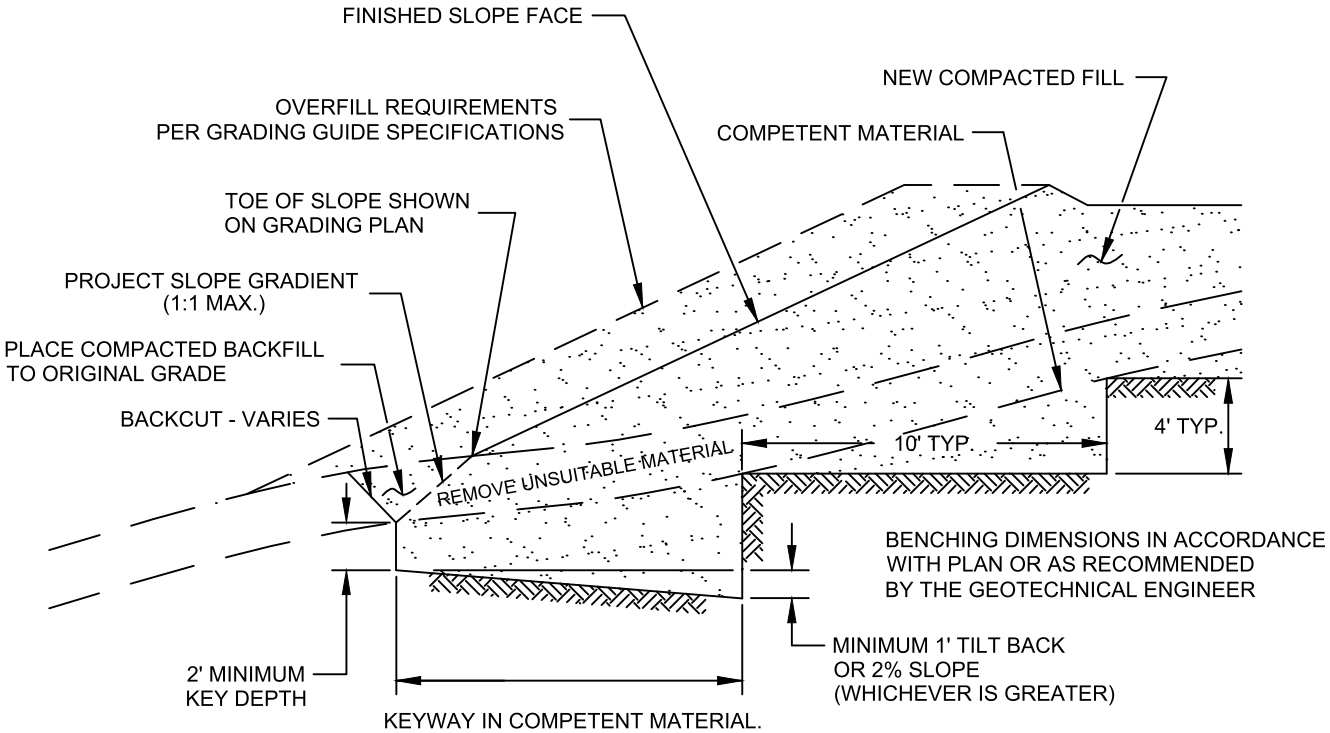
SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE
DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

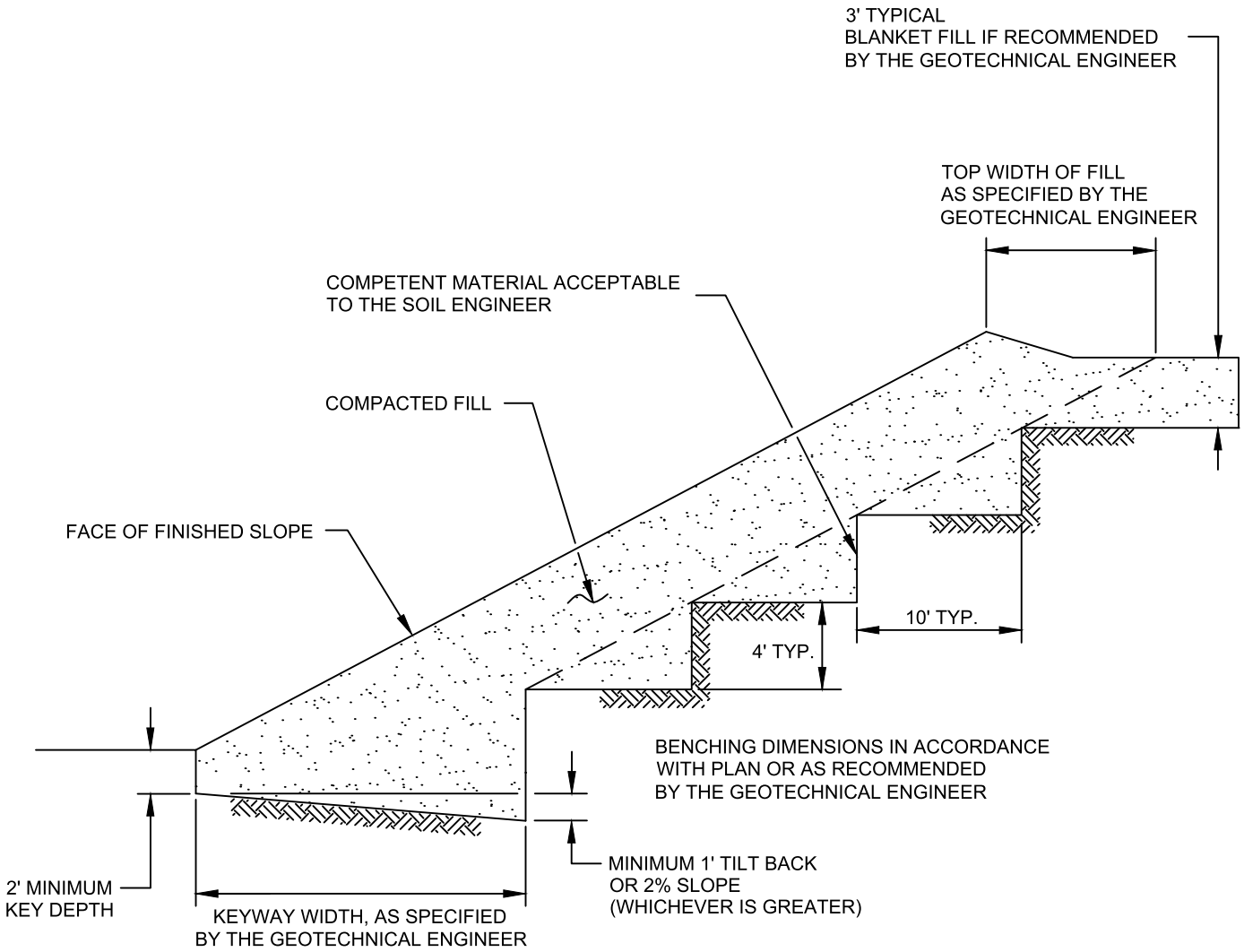
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

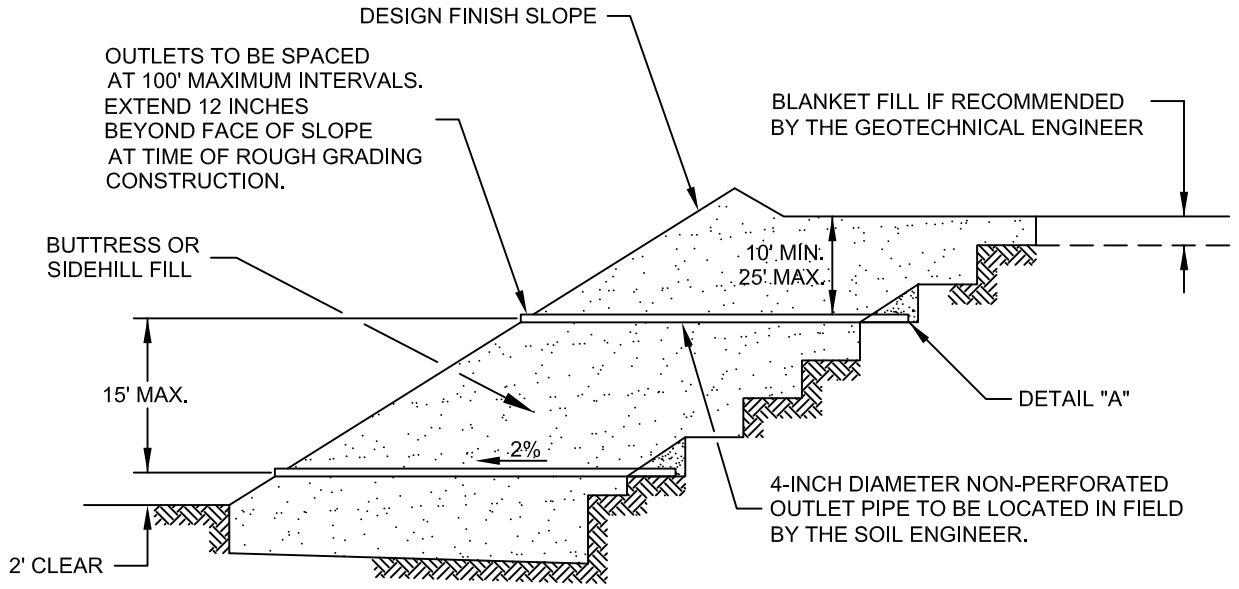
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



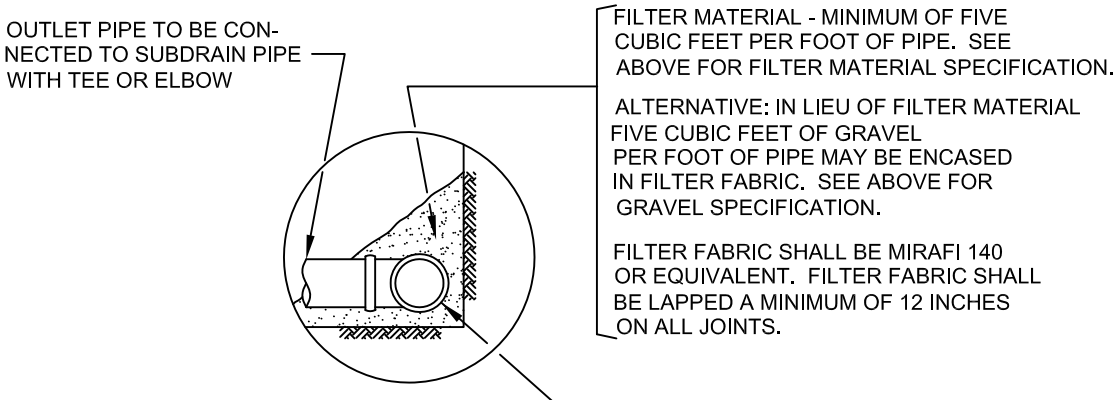
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

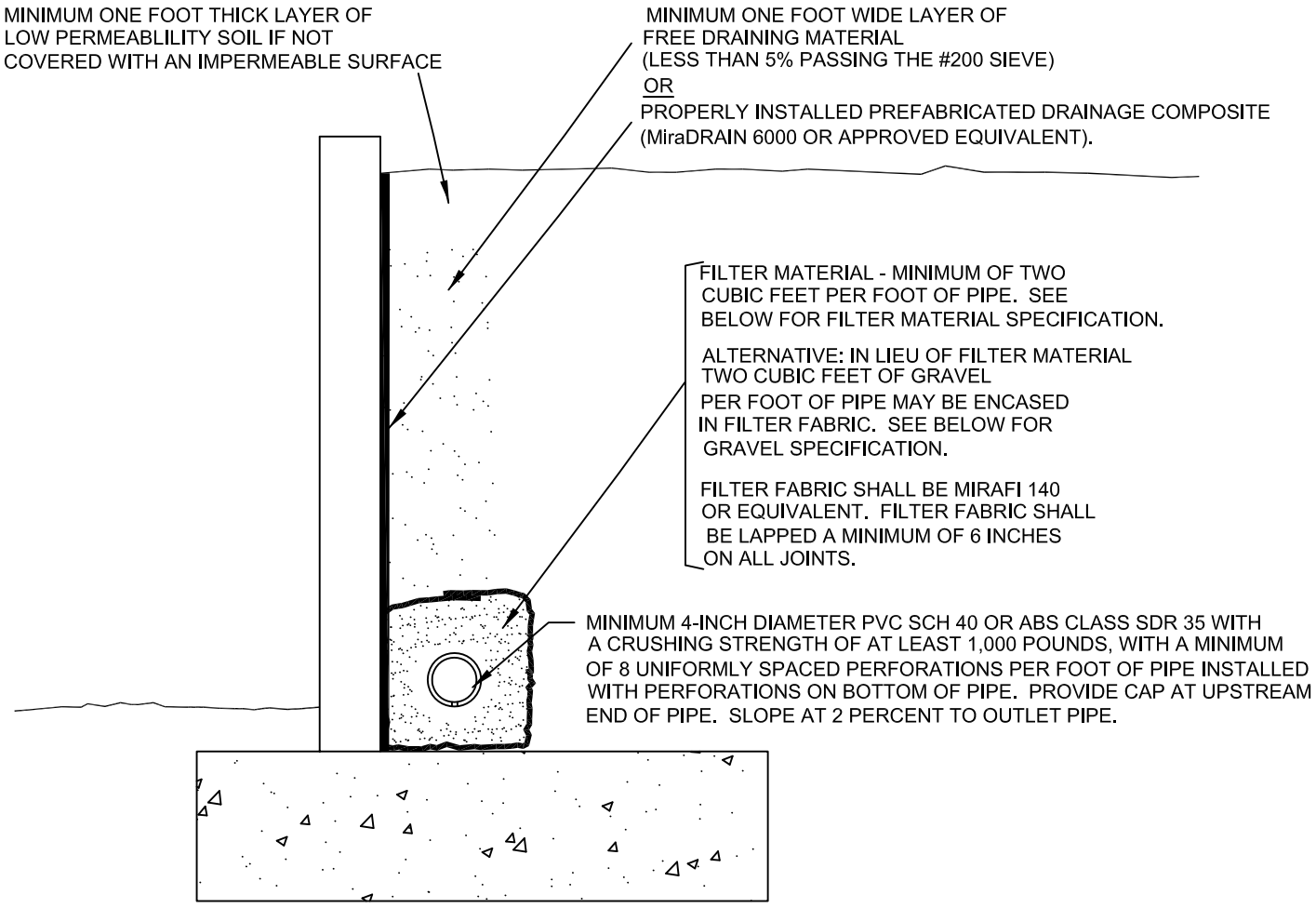
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

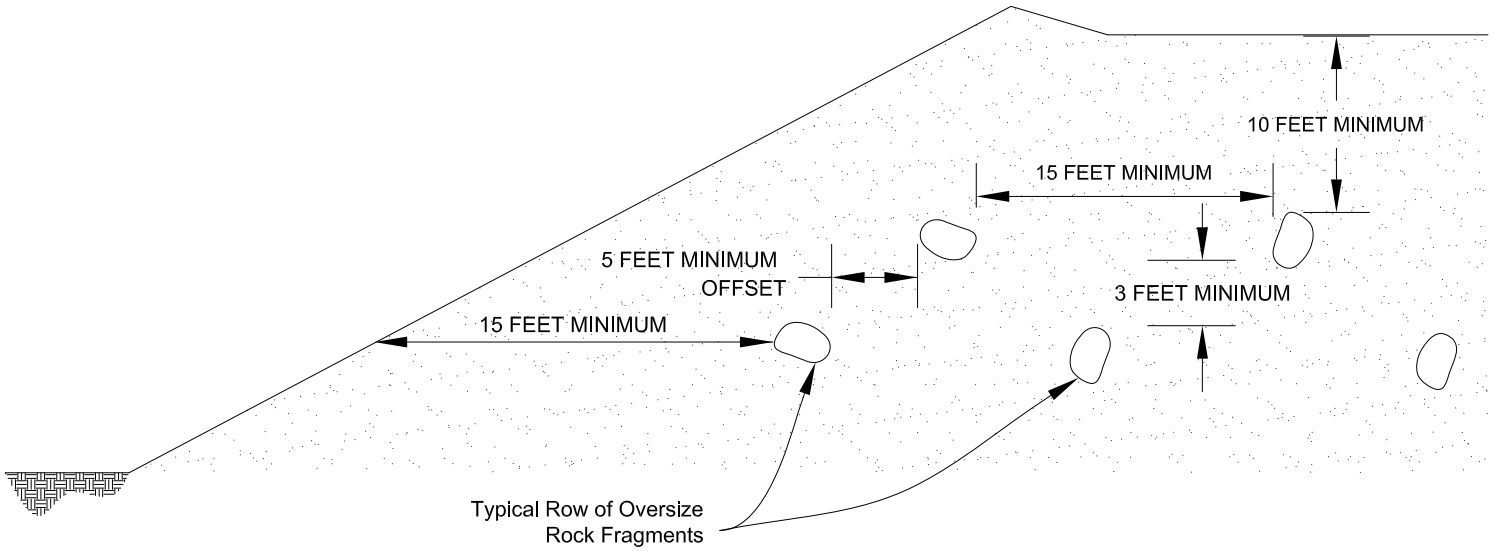
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

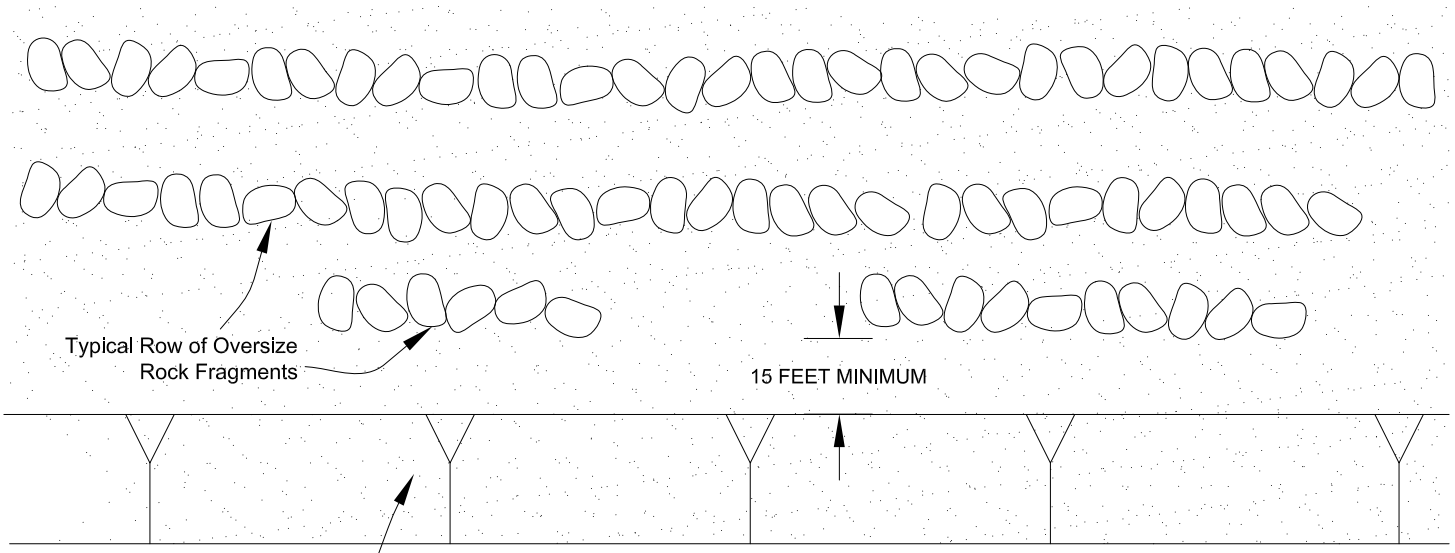
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

Latitude, Longitude: 33.844113, -117.240455

Date	11/18/2021, 2:04:50 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.571	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.55	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.531	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.638	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.571	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.625	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.935	Mapped value of the risk coefficient at short periods
C_{R1}	0.913	Mapped value of the risk coefficient at a period of 1 s

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

DRAWN: JAZ
CHKD: RF

SCG PROJECT
21G270-1

PLATE E-1

SOUTHERN CALIFORNIA GEOTECHNICAL

Appendix 4: Historical Site Conditions

N/A

Appendix 5: LID Infeasibility

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: DRC Engineering, Inc. | Date: 3/14/2022

Designed by: Nick Saludo | Case No:

Company Project Number/Name: 21-162 Seefried Perris

BMP Identification

BMP NAME / ID: DMA A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.62 inches

Drainage Management Area Tabulation

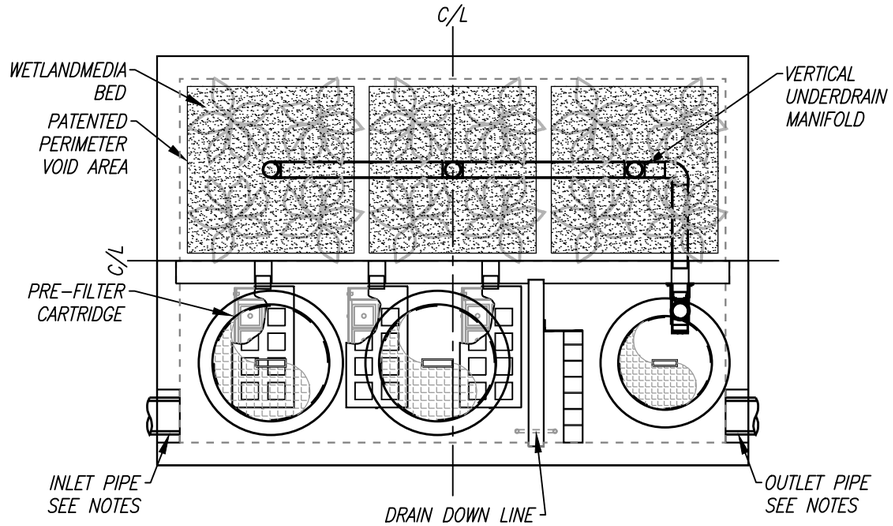
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
A1	*162,841*	*Roofs*	*1*	*0.89*	*145254.2*			
A2	*75,542*	*Concrete or Asphalt*	*1*	*0.89*	*67383.5*			
A3	*6,309*	*Concrete or Asphalt*	*1*	*0.89*	*5627.6*			
A4	*1,540*	*Concrete or Asphalt*	*1*	*0.89*	*1373.7*			
A5	*2,573*	*Concrete or Asphalt*	*1*	*0.89*	*2295.1*			
A6	*755*	*Concrete or Asphalt*	*1*	*0.89*	*673.5*			
A7	*91*	*Concrete or Asphalt*	*1*	*0.89*	*81.2*			
A8	*61*	*Concrete or Asphalt*	*1*	*0.89*	*54.4*			
A9	*36705*	*Concrete or Asphalt*	*1*	*0.89*	*32740.9*			
A10	*2,457*	*Concrete or Asphalt*	*1*	*0.89*	*2191.6*			
A11	*211*	*Concrete or Asphalt*	*1*	*0.89*	*188.2*			
A12	*810*	*Concrete or Asphalt*	*1*	*0.89*	*722.5*			
A13	*1575*	*Decomposed Granite*	*0.4*	*0.28*	*440.5*			
A14	*1838*	*Decomposed Granite*	*0.4*	*0.28*	*514.1*			
A15	*3365*	*Ornamental Landscaping*	*0.1*	*0.11*	*371.7*			
A16	*2,677*	*Ornamental Landscaping*	*0.1*	*0.11*	*295.7*			
A17	*2702*	*Ornamental Landscaping*	*0.1*	*0.11*	*298.5*			
A18	*12951*	*Ornamental Landscaping*	*0.1*	*0.11*	*1430.5*			
A19	*3,025*	*Ornamental Landscaping*	*0.1*	*0.11*	*334.1*			
A20	*2,510*	*Ornamental Landscaping*	*0.1*	*0.11*	*277.2*			
A21	*423*	*Ornamental Landscaping*	*0.1*	*0.11*	*46.7*			
A22	*6684*	*Ornamental Landscaping*	*0.1*	*0.11*	*738.3*			
A23	*1509*	*Concrete or Asphalt*	*1*	*0.89*	*1346*			
	329154	***Total***			**264679.7**	**0.62**	***13675.1***	***13716***

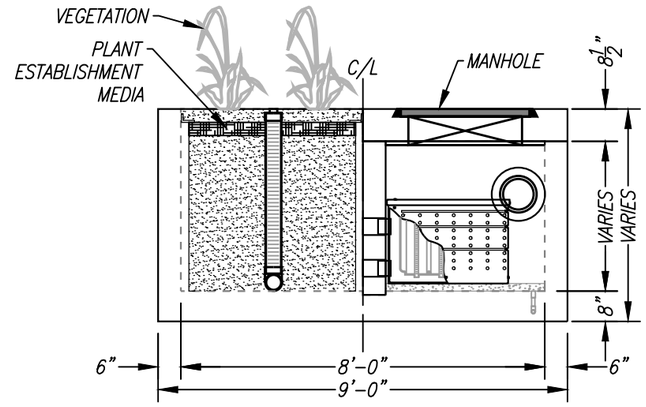
Notes:

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



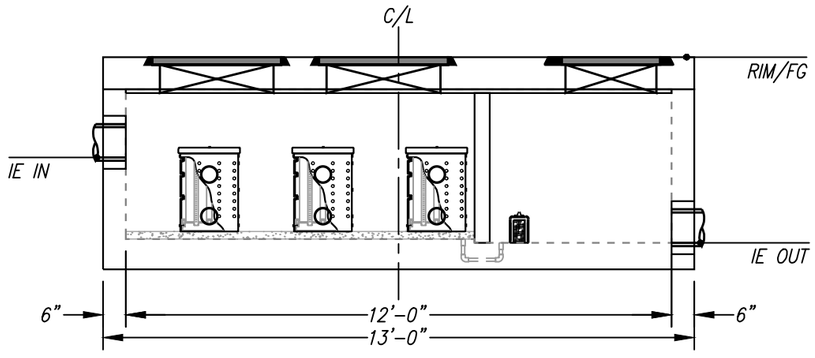
LEFT END VIEW

INSTALLATION NOTES

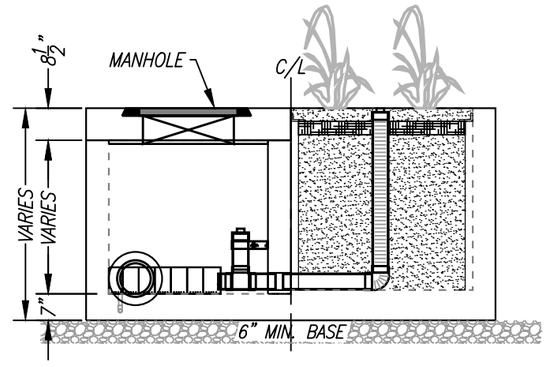
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

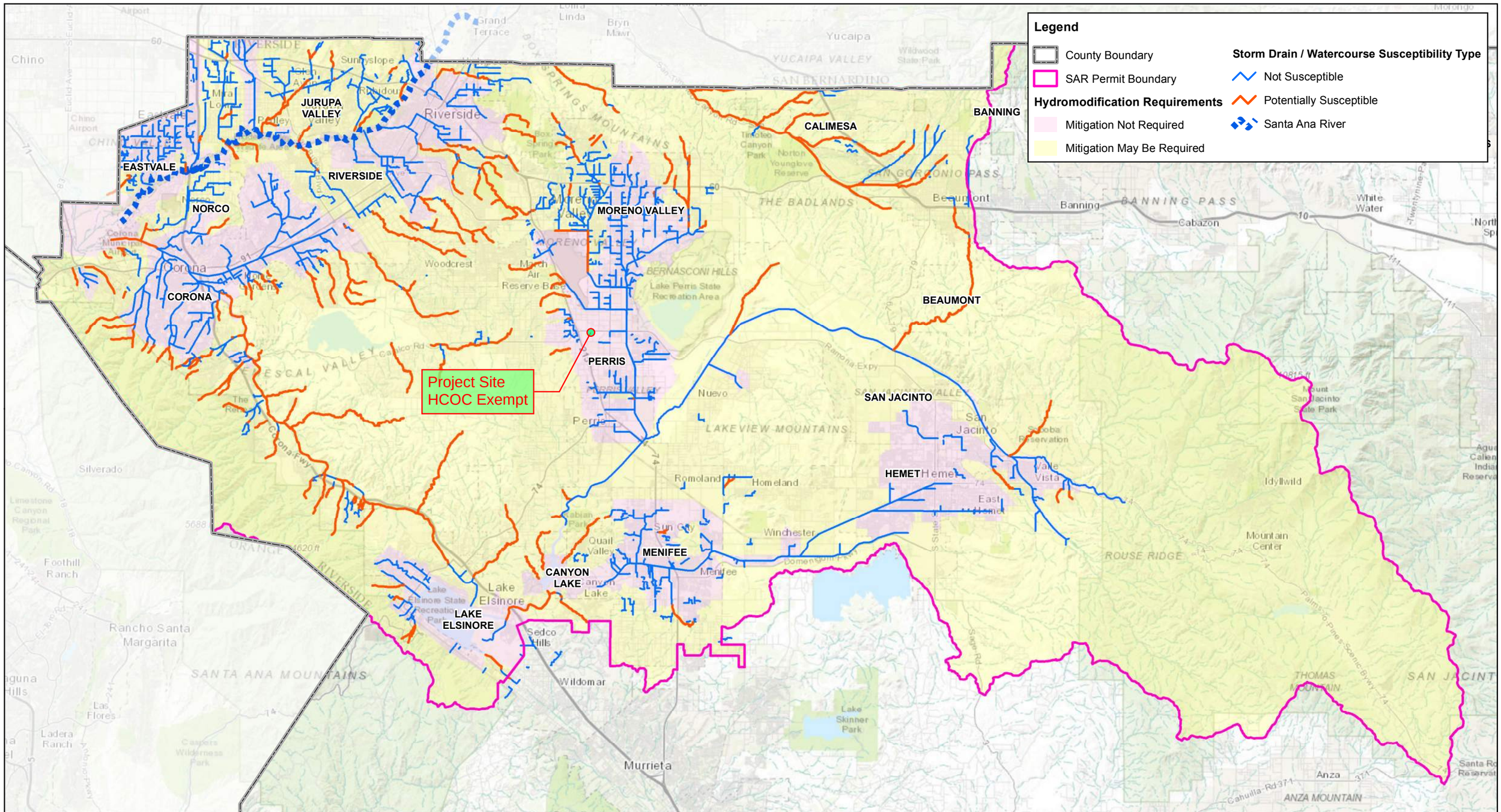
Bio Clean
A Forterra Company

MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



HCOC Applicability Map
SAR Permittees

Map 2

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

This section to be completed with FWQMP submittal.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

This section to be completed with FWQMP submittal.

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

This section to be completed with FWQMP submittal.