Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-8
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-8
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
	2		Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			43	HD: 57 SA:21 SI: 22 CL
			C-1	22-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	5	120		
1421	5										
			C-2	25-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	4	118		
1416	10										
			S-1	15-21-26		47	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-9
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-9
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			32	HD: 68 SA :12 SI : 20 CL
	2		C-1	24-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	4	118		
1421	5		C-2	27-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	3	116		
1416	10		S-1	15-18-21		39	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-10
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-10
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	30-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	7	121		
1421	5		C-2	29-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	6	120		
1416	10		S-1	165-19-23		42	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	4	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

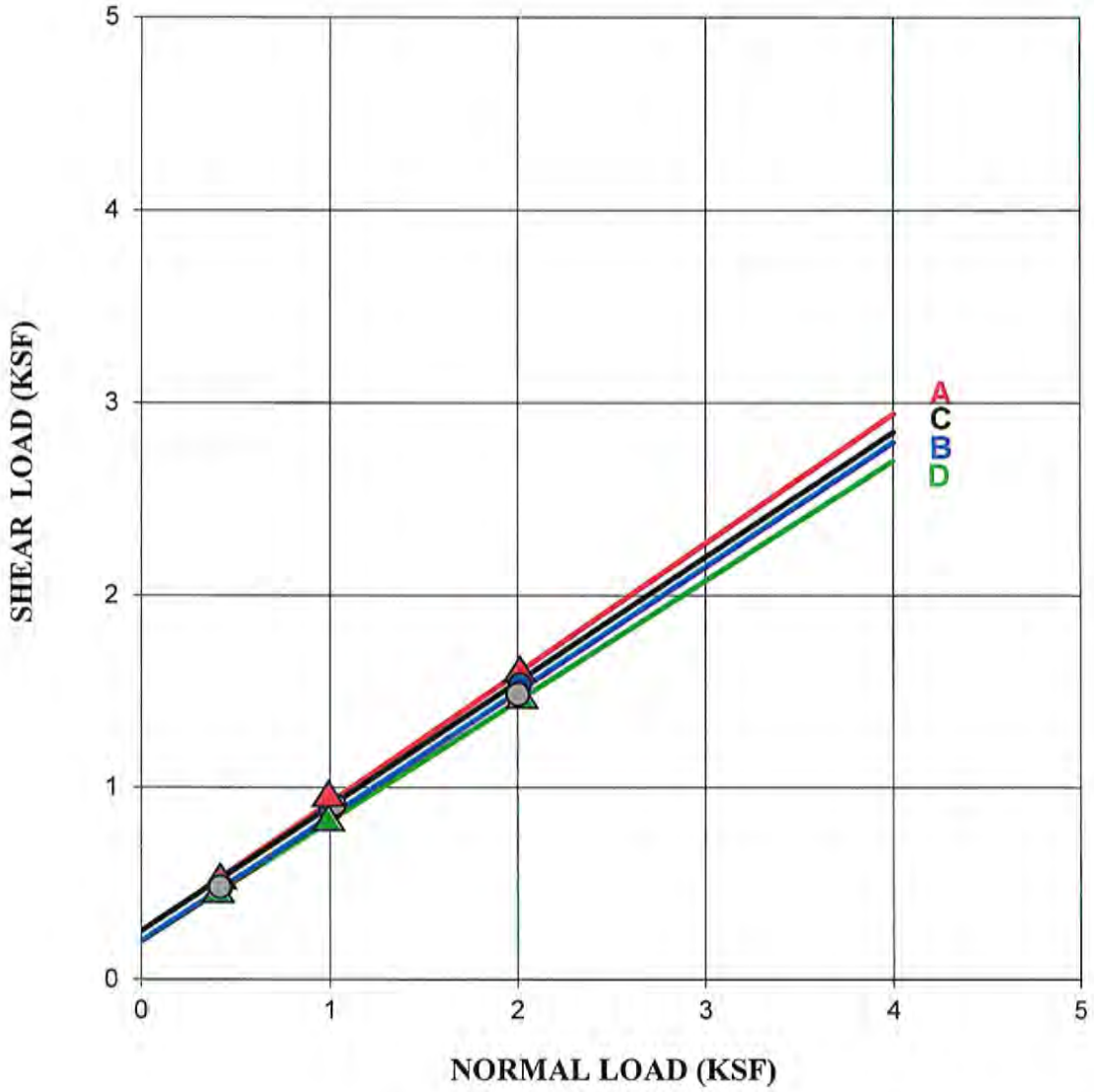
Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-11
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-11
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Penetration Resistance, Blows / 6"	SAMPLES: Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry grass**				
	2						Older Alluvium: Clayey Sand (SC), light brown, dry				
			C-1	32-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	122		
1421	5										
			C-2	31-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	5	121		
1416	10						@10': Same as above			10	HD: 90(SA) : 8(SI) : 2(CL)
							End of Boring = 10 feet 2" of Gravel on Bottom Drilled to 10 feet for Percolation Test Backfilled w/ cuttings after the Test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

DIRECT SHEAR

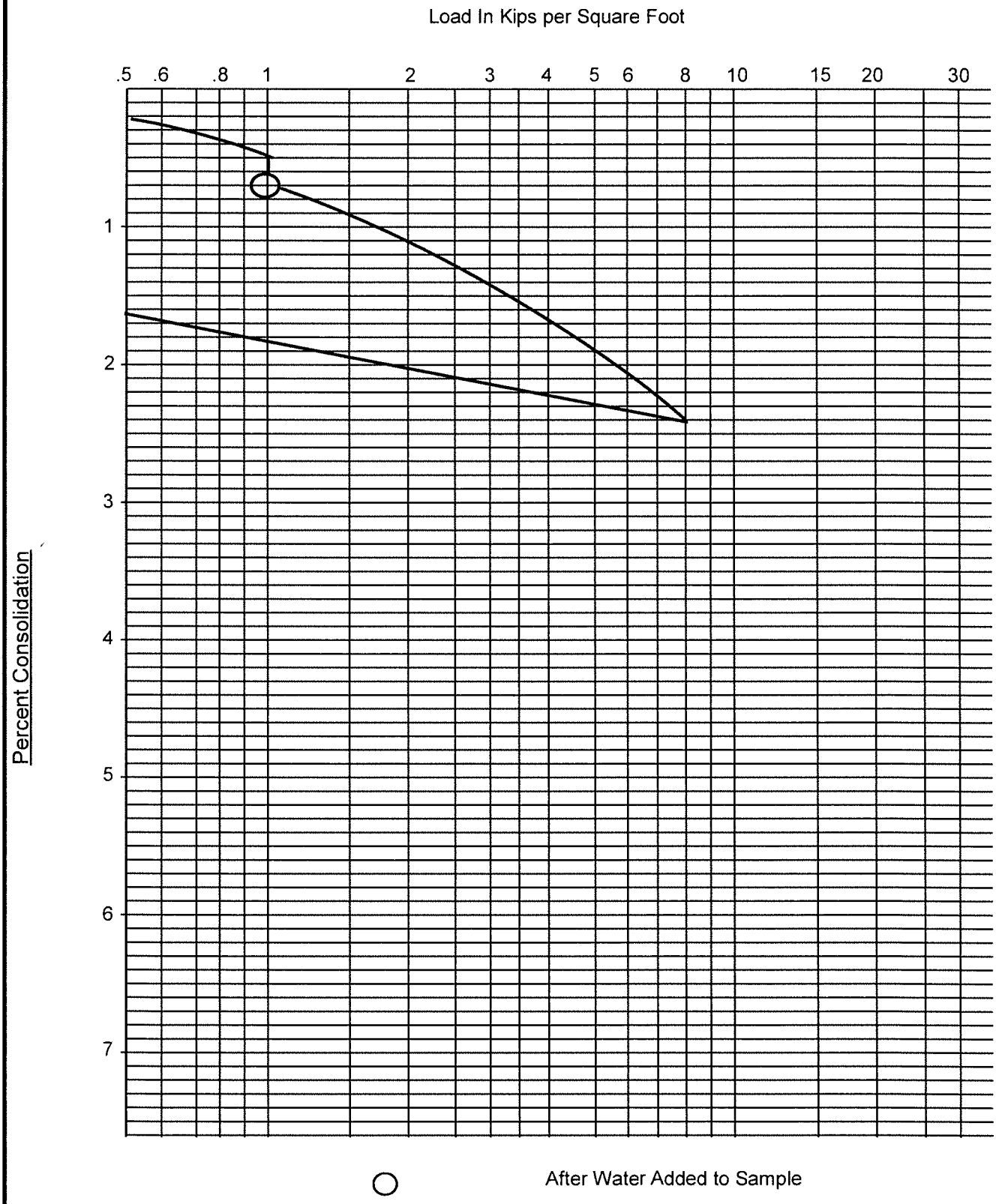


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION		COHESION (PSF)	FRICTION (DEG)
A	B-2	10'	Saturated - Drained	Peak	250	34
B	B-2	10'	Saturated - Drained	Ultimate	200	33
C	B-6	5'	Saturated - Drained	Peak	250	33
D	B-6	5'	Saturated - Drained	Ultimate	200	32

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	J

Geotechnical Solutions, Inc.

CONSOLIDATION



B-2 @ 10'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	K

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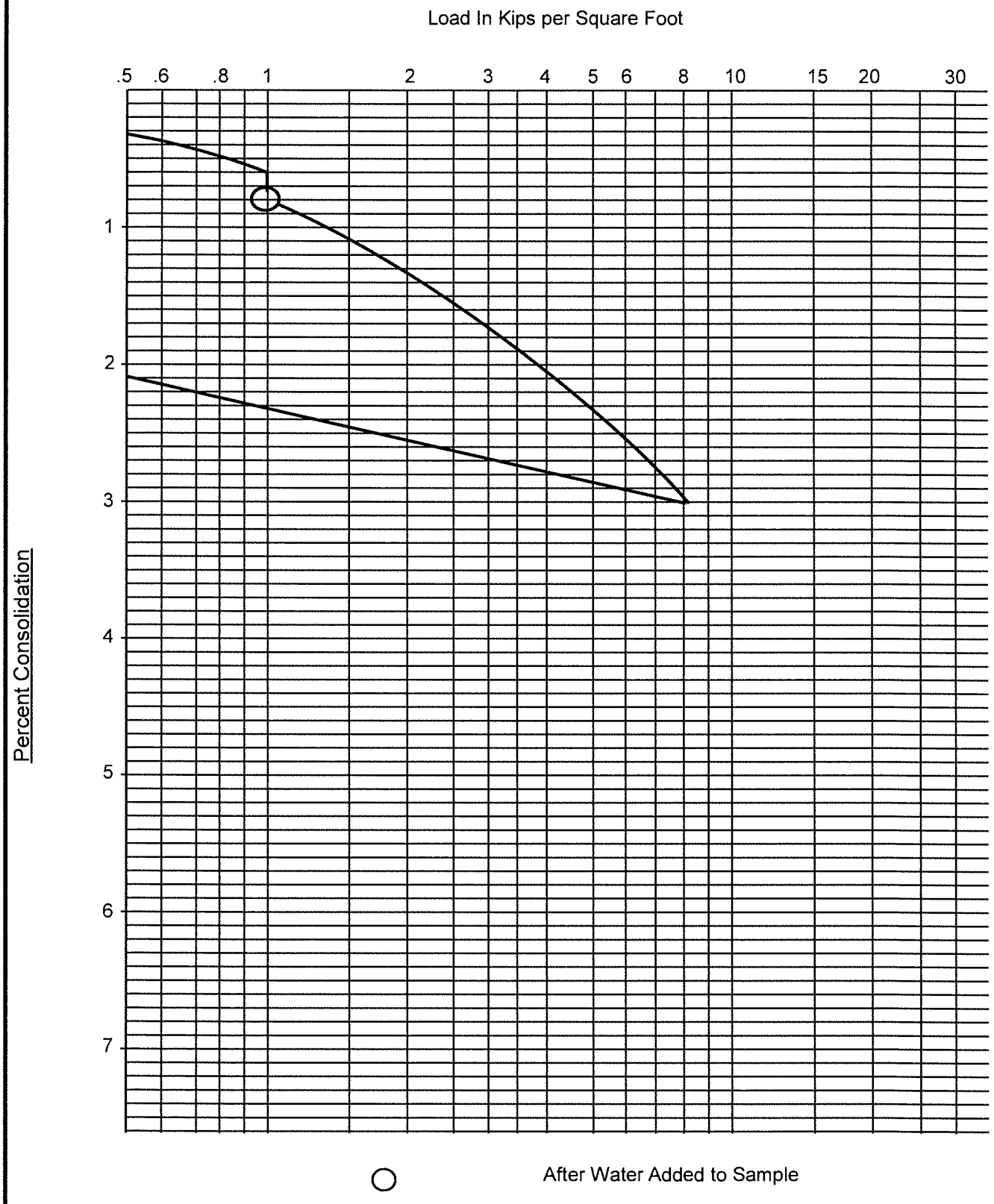
CONSOLIDATION



B-6 @ 5'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	L

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Appendix B

Seismic Data

- Table 1 - Faults Table
- Unified Hazard Tool – Hazard Curve
- U.S. Seismic Design Maps Summary & Detailed Report (SEAOC / OSHPD)

Table - 1
2008 National Seismic Hazard Maps - Source Parameters
Travel Plaza - Perris

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
9.56	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
9.56	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
10.22	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
10.22	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
10.22	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
10.22	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
10.22	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
10.37	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
10.37	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
10.37	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
10.37	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
10.37	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
10.37	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
10.63	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
10.63	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
10.63	Elsinore;T	CA	5	90	V	strike slip	0	14	52
11.45	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
11.45	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
11.45	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
11.45	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
11.45	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
11.45	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
11.45	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
11.45	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
11.45	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196

11.45	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
12.01	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
12.01	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
19.04	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
22.54	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
23.98	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
24.79	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
24.79	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
24.79	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
24.79	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
24.79	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
24.79	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
24.79	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
24.79	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136

24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
24.79	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
24.79	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
24.79	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
24.79	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
24.79	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
24.79	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
26.4	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
26.4	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
28.06	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
28.06	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
28.06	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
28.06	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
28.06	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
28.06	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170

28.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
29.62	Elsinore;J	CA	3	84	NE	strike slip	0	19	75
29.62	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17	118
29.9	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
33.36	Cucamonga	CA	5	45	N	thrust	0	8	28
34.27	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
36.79	Cleghorn	CA	3	90	V	strike slip	0	16	25
37.33	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
37.33	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
37.33	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
38.59	San Jose	CA	0.5	74	NW	strike slip	0	15	20
39.78	North Frontal (West)	CA	1	49	S	reverse	0	16	50
40.6	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
41.18	Sierra Madre	CA	2	53	N	reverse	0	14	57
41.18	Sierra Madre Connected	CA	2	51		reverse	0	14	76
41.65	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77
41.65	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
41.65	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43
42.56	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
44.04	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65
44.6	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
44.6	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
44.6	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
44.6	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
44.6	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
44.6	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
44.97	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
45.34	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
46.48	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27

47.6	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
49.55	Puente Hills (Santa Fe Springs)	CA	0.7	29	N	thrust	2.8	15	11

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

475 Travel Plaza Perris

Longitude

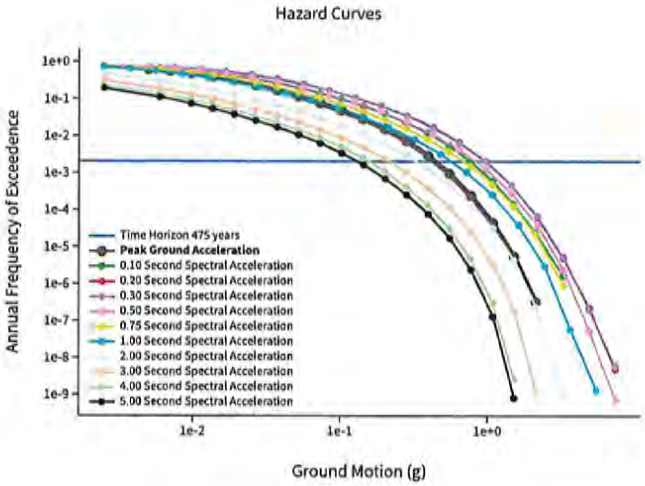
Decimal degrees, negative values for western longitudes

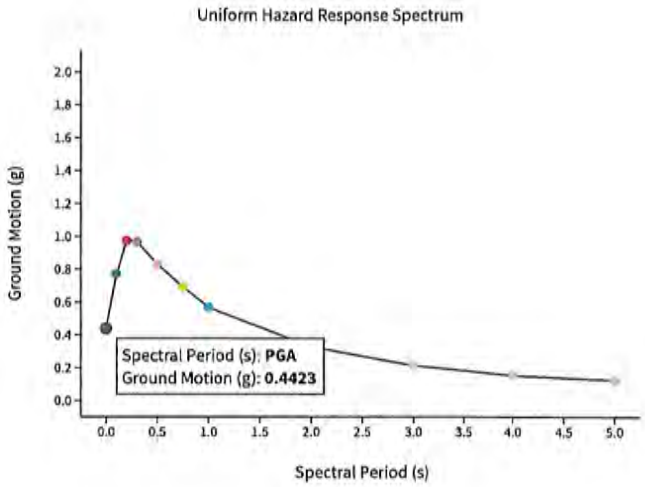
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





View Raw Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

975 Travel Plaza Perris

Longitude

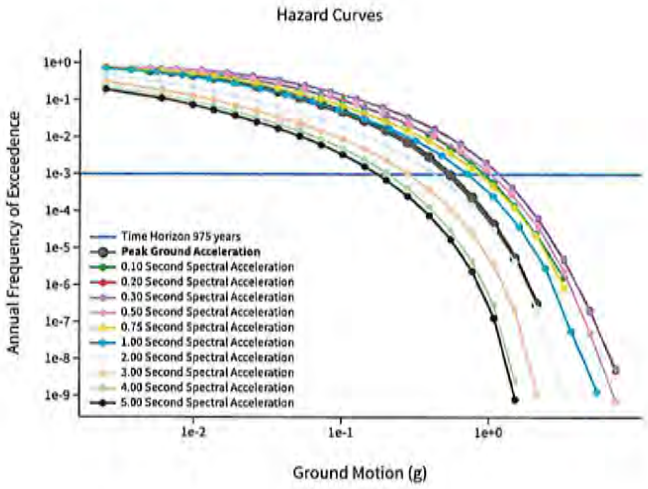
Decimal degrees, negative values for western longitudes

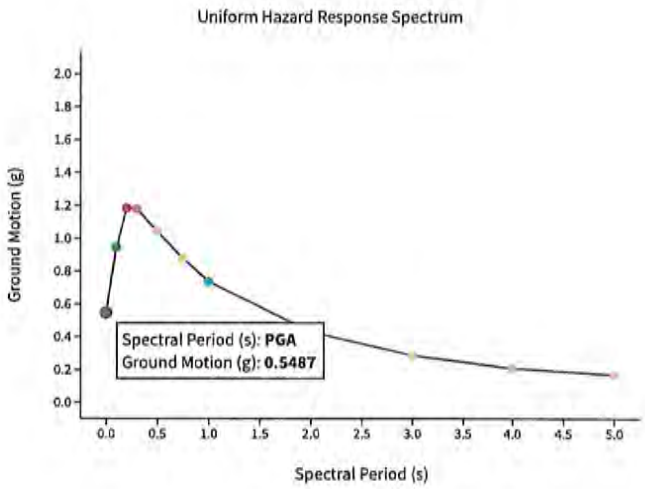
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





View Raw Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

2475 Travel Plaza Perris

Longitude

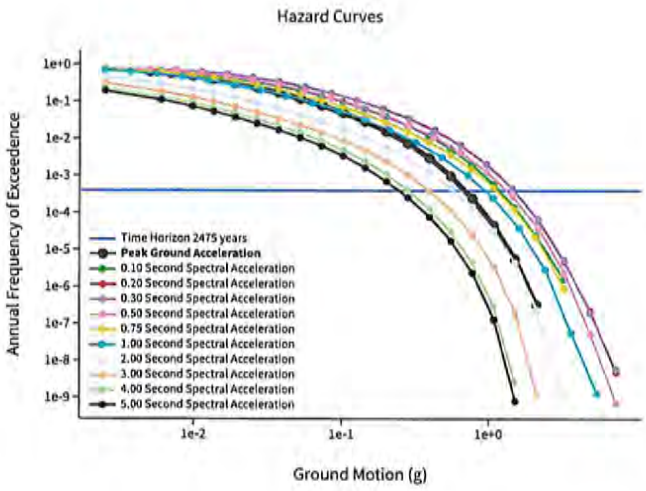
Decimal degrees, negative values for western longitudes

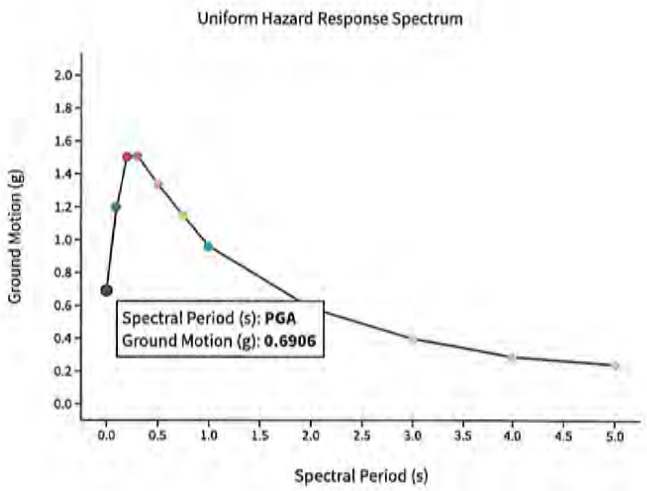
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve

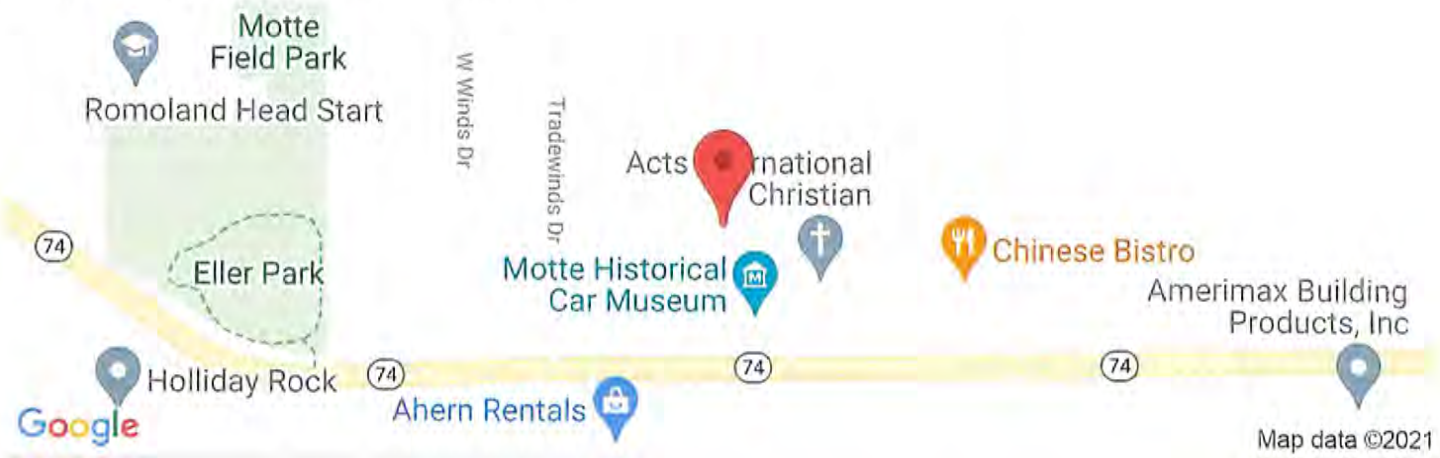




View Raw Data

Travel Plaza Perris

Latitude, Longitude: 33.7441, -117.1658



Date	5/28/2021, 10:30:36 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.428	MCE_R ground motion. (for 0.2 second period)
S_1	0.532	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.714	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.143	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	1.2	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}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.428	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.531	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.532	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.581	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}	0.933	Mapped value of the risk coefficient at short periods
C_{R1}	0.915	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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Appendix C

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

GEOTECHNICAL ADDENDUM REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD &
ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
WEST PACIFIC AVENUE
HENDERSON, NEVADA, 89015

PROJECT NO: G-5908-01

JUNE 11, 2021

PREPARED BY:

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL
ENGINEERING

Geotechnical Solutions, Inc.
Geotechnical, Structural & Environmental Engineering

June 11, 2021

Project No: G-5908-01

Broadbent, Inc.
8 West Pacific Avenue
Henderson, Nevada, 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelskis@broadbentinc.com

Re: Geotechnical Engineering Addendum Report
Travel Plaza - Perris
Corner of Trumble Road &
Ethanac Road
Perris, California 92570

Gentlemen:

Submitted herewith is the addendum report to our geotechnical engineering report dated June 11, 2021 conducted by this office for Travel Plaza Perris at the referenced project site.

Recommendations regarding over excavation have been included in this addendum report for the Travel Plaza Perris located just northwest of the intersection of Trumble Road and Ethanac Road, just west of Trumble Road in Perris, San Bernardino County, California as shown on Vicinity Map (Plate A) and Google Map (Plate C).

Site Clearing

Prior to grading, all debris, grass, weeds including construction materials should entirely be removed from the site and disposed of off-site. Existing any undesirable materials

should also be removed and hauled off-site. Existing utilities (if Any) should be removed and relocated as required. Any construction debris or ant buried or other contaminated exposed during site clearance should be removed and hauled away from the site. The resulting excavation from any removal should be cleared of loose material then backfilled with compacted soil. Oversized rocks greater than 6 inches should be removed.

Excavation

Excavations into the on-site soils may encounter a variety of challenges for example, very firm and dense to very dense alluvial soils. Some Caving on clean sands may be encountered. The contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides. All excavations should be sloped or shored in the interest of safety following local and federal regulations including current OSHA excavation and trench safety standards.

Heavy equipments for breaking the very dense alluvial materials may be required for the excavations for shallow foundations, drilled shafts, and utility trenches for the proposed construction. The speed and ease of excavation are dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator.

Building Pad Over-excavation (Above Ground Storage Tanks, AST's)

After removal of existing debris, the above ground storage tank areas should be over-excavated at least 3 feet below the lowest grade or 24 inches below the bottom of the footings whichever is greater. Excavation should be extended 3-feet outside building perimeters. Over-excavation may be hard due to the presence of very dense alluviums, therefore heavy equipments may be required. Remove and replace any loose or disturbed soils prior to placing any additional fill materials required to reach the finished subgrade elevations. The over-excavation should be backfilled to the foundation base elevation with the compacted engineering fill in accordance with the recommendations presented in this report.

Compliance

Recommendations for foundations and slabs-on-grade supported on compacted fills or prepared subgrade depend upon compliance with the General Grading and Recommended Earthwork Specifications in Appendix B.

To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer. Please contact us to provide observation and testing services.

Backfill Materials

On-site clean, low-expansive potential soils, or imported materials may be used as fill material for the following:

- Foundation Areas
- Interior Slab Areas
- Pavement Areas
- Backfill

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material. Also, rocks of sizes bigger than 3 inches should be discarded for the site material to be used for backfill.

Gradation (as per ASTM C136) should be as follows:

Size	% by Weight
6"	100

4"	85-100
¾"	70-100
No 4 Sieve	50-100
No. 200 Sieve	15 (max)

Any import material should have an expansion Index, EI less than 20. Import material should also meet the following criteria:

Soil Properties	**Values**
Liquid Limit	35 (Max)
Plastic Limit	6 (Max)

Placement and Compaction

Place and compact approved fill material in nearly horizontal layers that when compacted should not exceed 6 inches in thickness.

Use appropriate equipment and procedures that will produce recommended densities and water contents throughout the lift. Moisture condition, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at or above optimum moisture.

Uncompacted fill lifts should not exceed 8 inches.

Materials should be compacted to the following:

On-site or imported soil, reworked and fill:	Minimum % (ASTM D-1557 Laboratory Standard)
Subgrade Below Footings	90
Subgrade Below Slab-on Grade	90
Subgrade Below Pavement	90
Crush Rock Below Slab-on-Grade	95
Aggregate Base below pavement	95

Excavations at Pavement Areas

Subgrade Preparation

After removing the existing deleterious materials, dense to very dense alluvial materials on the pavement areas and hauled offsite, all surficial deposits of loose soil material should be removed and excavate 12 inches below the base and recompacted as recommended. The bottom is further scarified to a depth of at least 6 inches; moisture conditioned as necessary and compacted to 90 percent of the maximum laboratory density as determined by ASTM Test Method D-1557.

Deleterious material, excessively wet or dry pockets, and any other unsuitable materials encountered during excavation or grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement. The subgrade should be proof-rolled in order to ensure a uniform, firm and unyielding surface. All grading and fill placement should be observed by the project soils engineer and/or his representative.

Aggregate Base

Compaction and rolling are required for the recommended base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM Test Designation D-1557. Aggregate base should be in accordance with 200-2.2 crushed Aggregate base Class II base (minimum R-value=78) and sample should be brought for testing and approval prior to delivery to the site. No crushed miscellaneous base (CMB) should be accepted.

Asphalt Concrete Pavement

Asphalt concrete pavement should be Performance Grade PG 64-10 1/2" maximum aggregate size and should be placed and compacted in two layers. Asphalt concrete shall be compacted to 95 percent of the Hveem Laboratory Standard.

Earthwork Observations:

Relative compaction of all fill materials placed on site should be tested in accordance with ASTM D6938. All new fill shall be brought to near optimum moisture, placed in layers not exceeding six inches in thickness, and compacted to at least 90 percent relative compaction for subgrade and 95 percent relative compaction for aggregate base. No jetting or water tamping of fill soils shall be permitted. All imported soil for engineered fill should be pre-approved by the Geotechnical Engineer and consist of clean, granular, non-expansive soil, free of vegetation and other debris with an Expansion Index of 20 or less.

At all times, the contractor should have a responsible field superintendent on the project in full charge of the work, with authority to make decisions. He should cooperate fully with the Geotechnical Engineer in carrying out the work.

All footing trenches for continuous and spread footings and subgrade for the slab areas should be observed by the project Geotechnical Engineer to verify that over-excavation and re-compaction operations of adequate depth, thickness, and compaction have been performed as specified. All footing excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed and replaced with properly compacted soil.

General Grading

All grading should conform to the guidelines presented in the California Building Code (CBC, 2019), the City of Perris, San Bernardino County, International Conference of Building Officials (ICBO, 2018), and Appendix B in this report, except where specifically superceded in the text of this report. When code references are not equivalent, the more stringent code should be followed. During earthwork construction, all site preparation and the general grading procedures of the contractor should be observed, and the fill selectively tested by a representative (s) of Geotechnical Solutions, Inc. (GSI). If unusual or unexpected conditions are exposed in the field, they should be

reviewed by this office and if warranted, modified and /or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act and the construction Safety Act should be met.

Closure

The Conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. It is not unusual to find conditions between and beyond such locations, which differ from the conditions encountered. If conditions are encountered during construction, which appear to differ from those previously disclosed, this office should be notified so as to consider the need for modifications. On-site construction observations and wherever appropriate, tests should be performed during the course of construction by a representative of this office to evaluate compliance with the design concepts, specifications, and recommendations contained herein.

This report has been compiled for the exclusive use of our client, it shall not be transferred to, or used by, other parties, or applied to any project on this site other than described herein without consent and /or thorough review by this office.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary under the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully Submitted,

Geotechnical Solutions, Inc.

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

Abraham S. Baha, PE, M. ASCE
Sr. Principal

Distribution: (3+pdf) Addressee

References

Geotechnical Solutions, Inc., 2021, "Geotechnical Evaluation Report for Travel Plaza Perris, Located at the corner of Trumble Road and Ethanac Road, Perris, California", Project Number G-5908-01, dated June 11.

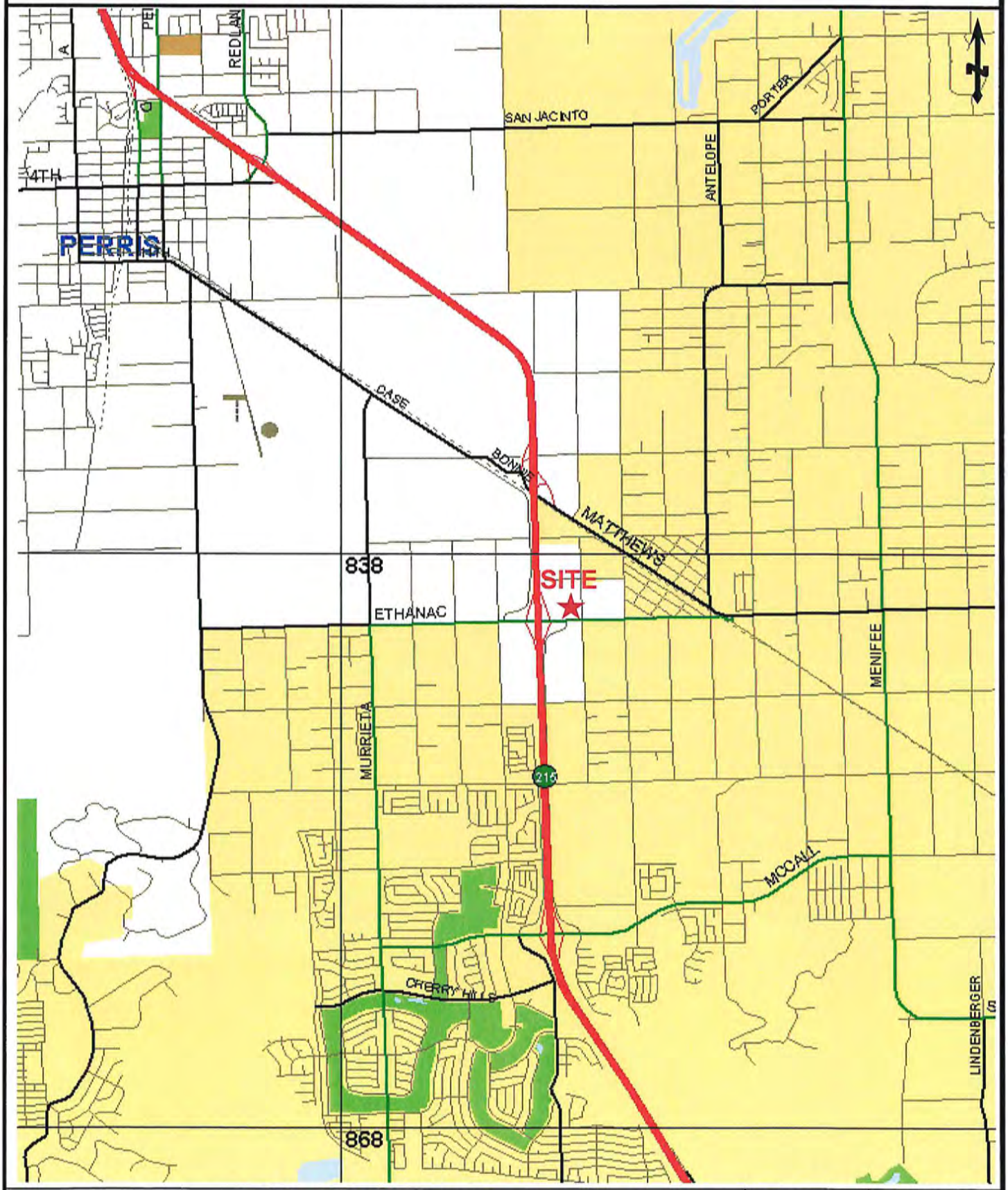
International Conference of Building Officials (ICBO), 2019, California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2.

Appendix A

Plates

- **Vicinity Map**
- **Plot Plan**
- **Google Map**

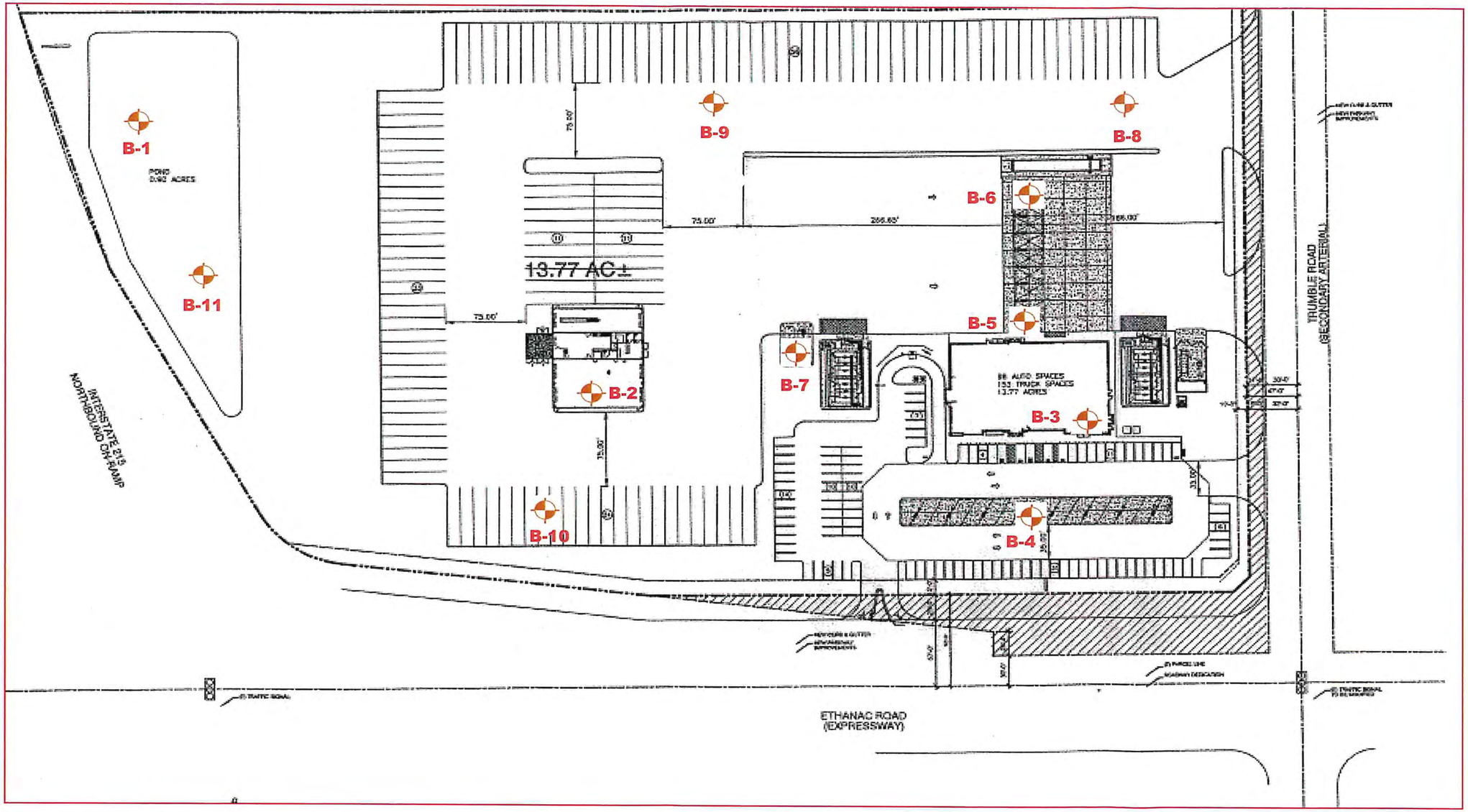
VICINITY MAP



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & BORING LOCATION MAP



B-11 HSA Borings (2021)

INTERSTATE 215
NORTHBOUND OFF-RAMP

APPROX. SCALE: 1" = 100'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

GOOGLE MAP

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C

Geotechnical Solutions, Inc.

Appendix B

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

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1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

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1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

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The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

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 Riverside North
0.54 Riverside South
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

PROJECT SITE
Pilot Perris
D85=0.604

Santa Ana River Watershed
Santa Margarita Watershed

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

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Santa Ana Watershed

V_{BMP} and Q_{BMP} worksheets

These worksheets are to be used to determine the required

Design Capture Volume (V_{BMP})
or the
Design Flow Rate (Q_{BMP})

for BMPs in the Santa Ana Watershed

To verify which watershed your project is located within, visit

www.rcflood.org/npdes

and use the 'Locate my Watershed' tool

If your project is not located in the Santa Ana Watershed,

Do not use these worksheets! Instead visit

www.rcflood.org/npdes/developers.aspx

To access worksheets applicable to your watershed

Use the tabs across the bottom
to access the worksheets for the Santa Ana Watershed

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: Kimley-Horn — Date: 3/9/2022

Designed by: XO — Case No:

Company Project Number/Name: Pilot Perris

BMP Identification

BMP NAME / ID: BMP-1

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}= 0.60 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)*
1A	*395,859*	*Concrete or Asphalt*	*1*	*0.89*	*353106.2*			
1B	*152,078*	*Ornamental Landscaping*	*0.1*	*0.11*	*16798.2*			
	547937	***Total***			**369904.4**	**0.60**	***18618.5***	***48,658***

Notes:

Effective Impervious Fraction

Developed Cover Types	Effective Impervious Fraction
Roofs	1.00
Concrete or Asphalt	1.00
Grouted or Gapless Paving Blocks	1.00
Compacted Soil (e.g. unpaved parking)	0.40
Decomposed Granite	0.40
Permeable Paving Blocks w/ Sand Filled Gap	0.25
Class 2 Base	0.30
Gravel or Class 2 Permeable Base	0.10
Pervious Concrete / Porous Asphalt	0.10
Open and Porous Pavers	0.10
Turf block	0.10
Ornamental Landscaping	0.10
Natural (A Soil)	0.03
Natural (B Soil)	0.15
Natural (C Soil)	0.30
Natural (D Soil)	0.40
Mixed Surface Types	

Use this table to determine the effective impervious fraction for the V_{BMP} and Q_{BMP} calculation sheets

Bioretention Facility - Design Procedure	BMP ID: BMP-1	Legend:	Required Entries / Calculated Cells

Company Name:	Kimley-Horn	Date:	3/9/2022
Designed by:	XO	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T =	12.58	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	18,619	ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	100.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.34	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	13,864	ft^2
Proposed Surface Area	A=	36,312	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:	Other		

Notes: Dual purpose Bioretention Basin for stormwater treatment and mitigation.Water quality ponding depth is 6" from basin bottom and basin top is at least 3.5' beyond that. There will be a riser outlet structure with an orifice and a grated top. The basin width varies but 100' was used as an average.

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

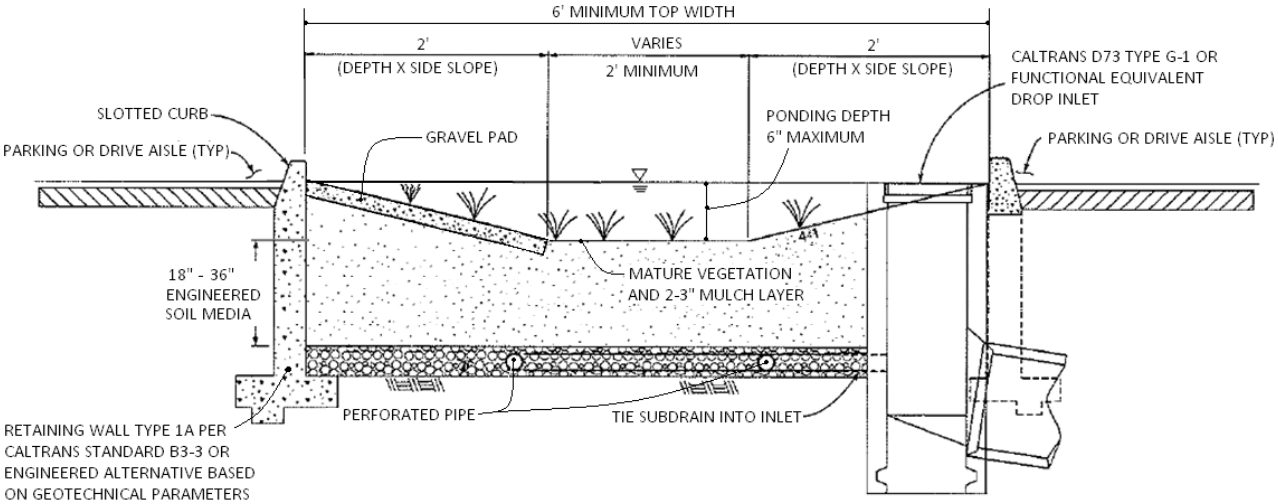
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

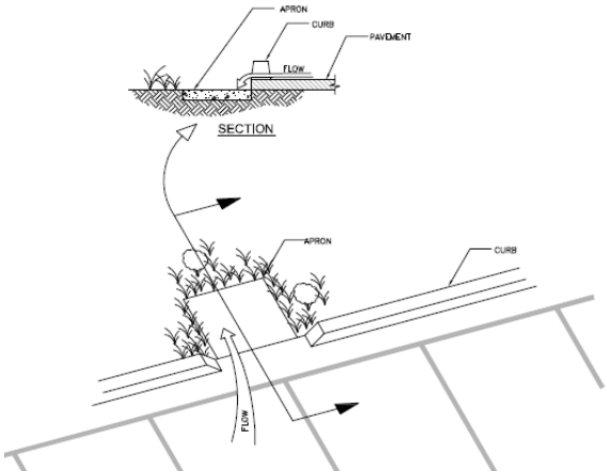


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

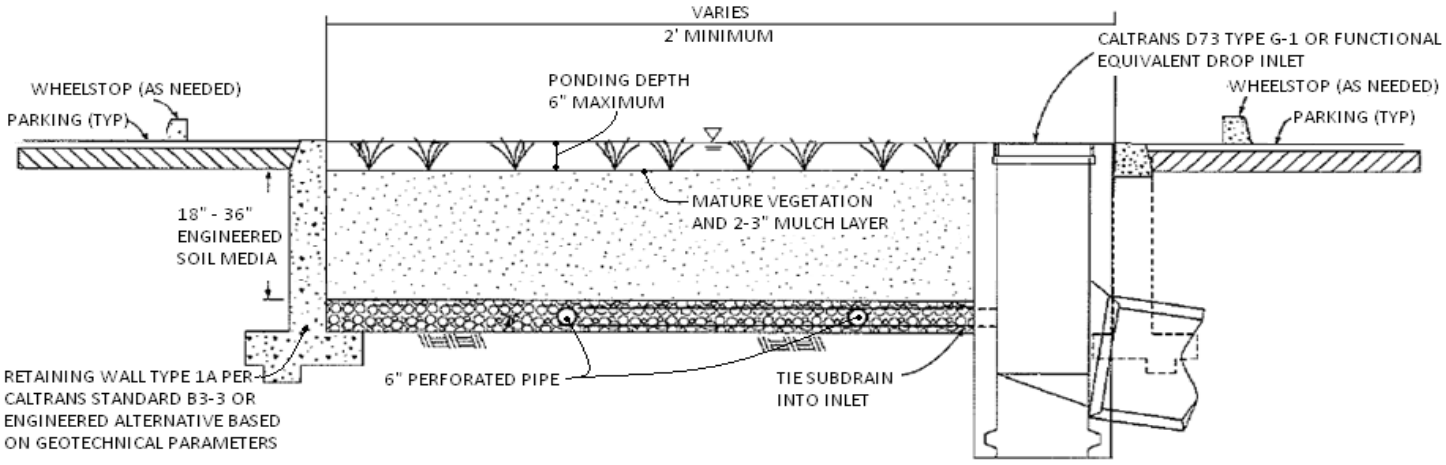
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

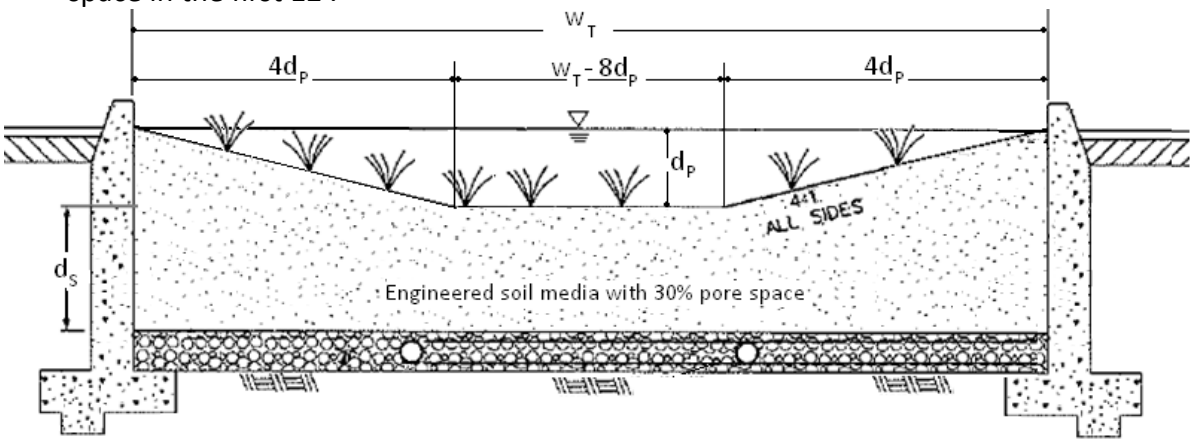
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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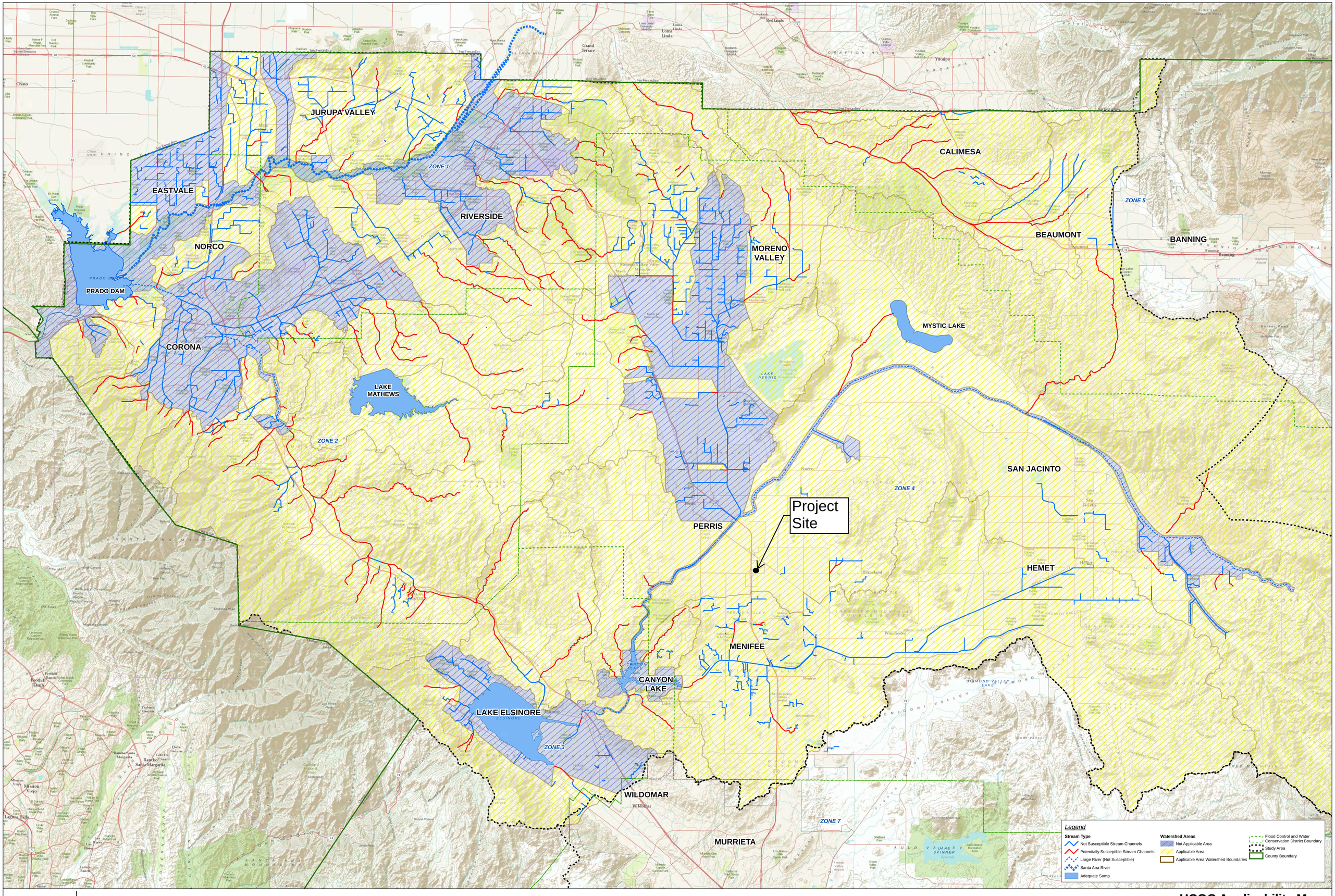
Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



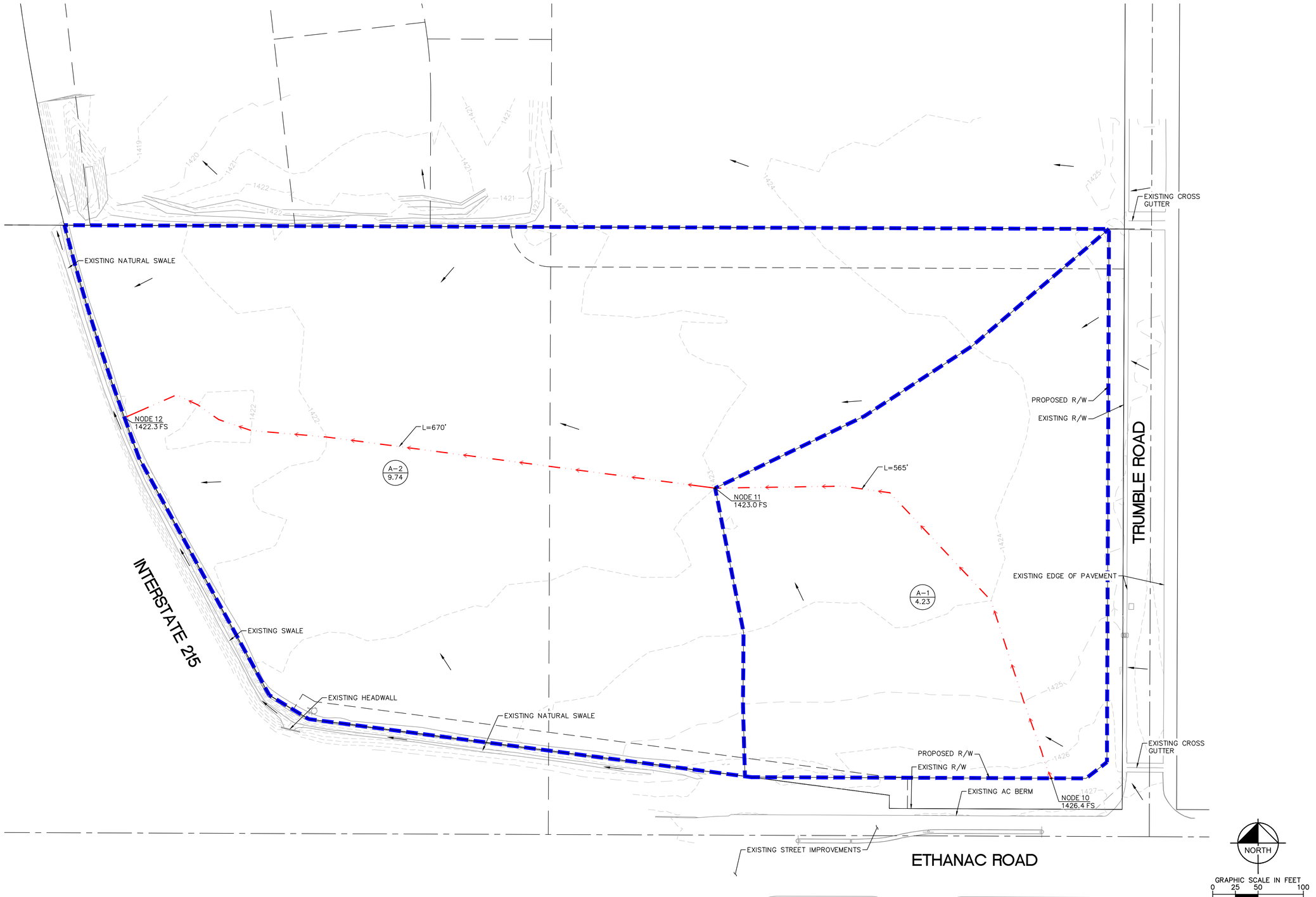
HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

LEGEND

- (1695) — EXISTING CONTOUR
- PROPERTY LINE
- DMA BOUNDARY
- FLOW PATH
- FLOW ARROW
- NODE 10 / 50.00 FS — NODE ID AND ELEVATION
- X / XX — DA NAME / DA AREA (IN ACRES)
- RIGHT OF WAY



Kimley»Horn

EXISTING DRAINAGE EXHIBIT

PILOT PERRIS

12/7/2021

LEGEND

1695	PROPOSED CONTOUR
(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	PROPOSED STORM DRAIN
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY

PROPOSED OFFSITE CHANNEL
PROPOSED PUMP
EXISTING NATURAL SWALE
PROPOSED OUTLET STRUCTURE
NODE 16 1416.3 FS
NODE 15 1416.4 IE
NODE 52 1419.5 FS 1416.5 IE
L=25'
L=11'
A-9 2.23
PROPOSED BIO-RETENTION BASIN
A-12 0.38
PROPOSED CHANNEL
INTERSTATE 215
EXISTING NATURAL SWALE
NODE 103 1417.9 FS
A-11 0.56
EXISTING HEADWALL
EXISTING NATURAL SWALE
PROPOSED DITCH L=553'
NODE 102 1422.6 FS
PROPOSED CULVERT L=58'
L=963'
A-6 7.14
L=399'
L=112'
NODE 14 1419.3 IE
NODE 13 1419.9 IE
L=57'
NODE 31 1424.4 FS 1421.4 IE
A-4 0.90
L=487'
L=228'
A-2 0.58
A-3 0.16
L=360'
L=180'
A-1 0.30
A-13 0.02
NODE 101 1422.8 FS
PROPOSED DITCH L=293'
EXISTING AC BERM
PROPOSED SIDEWALK, CURB AND GUTTER
EXISTING STREET IMPROVEMENTS
ETHANAC ROAD
A-7 0.07
A-8 0.32
NODE 50 1426.8 FS
PROPOSED BLDG
NODE 20 1426.8 FS
NODE 51 1425.0 FS
A-14 0.06
EXISTING CROSS GUTTER
PROPOSED SIDEWALK, CURB AND GUTTER
PROPOSED R/W
EXISTING R/W
L=237'
A-5 0.87
EXISTING EDGE OF PAVEMENT
NODE 21 1425.6 FS 1422.6 IE
L=40'
NODE 12 1422.3 IE
L=70'
NODE 11 1425.7 FS 1422.7 IE
NODE 10 1427.4 FS
A-10 0.37
EXISTING CROSS GUTTER
PROPOSED R/W
EXISTING R/W
NODE 100 1424.3 FS
PROPOSED SIDEWALK, CURB AND GUTTER
TRUMBLE ROAD

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100
1" = 60'
WHEN PRINTED AT FULL SIZE (24" BY 36")

Kimley»Horn

PROPOSED DRAINAGE EXHIBIT

PILOT PERRIS

3/9/2022

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 12/07/21 File:PP2E.out

PILOT PERRIS
EXIST 2-YR
XO 12/7/21

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

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

Program License Serial Number 6443

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.542(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 565.000(Ft.)
Top (of initial area) elevation = 26.400(Ft.)
Bottom (of initial area) elevation = 23.000(Ft.)
Difference in elevation = 3.400(Ft.)
Slope = 0.00602 s(percent)= 0.60
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.587 min.
Rainfall intensity = 0.963(In/Hr) for a 2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.630
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1) = 76.40
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.568(CFS)
Total initial stream area = 4.230(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station 11.000 to Point/Station 12.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

```
Top of natural channel elevation =     23.000(Ft.)
End of natural channel elevation =     22.300(Ft.)
Length of natural channel  =   670.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.525(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.70(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0010
Corrected/adjusted channel slope =  0.0010
Travel time =   15.99 min.     TC =   34.58  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.570
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.710(In/Hr) for a     2.0 year storm
Subarea runoff =      3.943(CFS) for      9.740(Ac.)
Total runoff =      6.511(CFS)  Total area =      13.970(Ac.)
End of computations, total study area =           13.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
Rational Hydrology Study Date: 03/22/22 File:PP2P.out

PILOT PERRIS
PROP 2-YR
XO 3/22/22

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

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

Program License Serial Number 6443

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.542(In/Hr)
Slope of intensity duration curve = 0.4900

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

```
Initial area flow distance =   180.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    25.700(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00944  s(percent)=       0.94
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.551 min.
Rainfall intensity =      1.605(In/Hr) for a     2.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AM 1)  =  57.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      0.400(CFS)
Total initial stream area =        0.300(Ac.)
Pervious area fraction = 0.200
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    22.700(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.400(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.400(CFS)
Normal flow depth in pipe =    4.34(In.)
Flow top width inside pipe =    5.37(In.)
Critical Depth =    3.86(In.)
Pipe flow velocity =      2.64(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     6.99 min.
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.300(Ac.)
Runoff from this stream =      0.400(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     1.555(In/Hr)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.600(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00526  s(percent)=       0.53
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.419 min.
Rainfall intensity =      1.420(In/Hr) for a     2.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.807
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =      0.664(CFS)
Total initial stream area =        0.580(Ac.)
Pervious area fraction = 0.250
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    22.600(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.664(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.664(CFS)
Normal flow depth in pipe =    4.11(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    4.44(In.)
Pipe flow velocity =      3.38(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     8.62 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.580(Ac.)
Runoff from this stream =      0.664(CFS)
Time of concentration =    8.62 min.
```

```
Rainfall intensity =     1.404(In/Hr)
Summary of stream data:

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


1        0.400      6.99                 1.555
2        0.664      8.62                 1.404
Largest stream flow has longer time of concentration
Qp =      0.664 + sum of
          Qb         Ia/Ib
           0.400 *    0.903 =      0.361
Qp =      1.025

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.400       0.664
Area of streams before confluence:
        0.300        0.580
Results of confluence:
Total flow rate =      1.025(CFS)
Time of concentration =     8.616 min.
Effective stream area after confluence =      0.880(Ac.)
```

↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.300(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =   487.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.025(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.025(CFS)
Normal flow depth in pipe =    6.18(In.)
Flow top width inside pipe =    8.35(In.)
Critical Depth =    5.58(In.)
Pipe flow velocity =      3.17(Ft/s)
Travel time through pipe =    2.56 min.
Time of concentration (TC) =    11.17 min.
```

↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.17 min.
Rainfall intensity =      1.236(In/Hr) for a     2.0 year storm
Subarea runoff =      0.170(CFS) for      0.160(Ac.)
Total runoff =      1.195(CFS)  Total area =       1.040(Ac.)
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.040(Ac.)
Runoff from this stream =      1.195(CFS)
Time of concentration =   11.17 min.
Rainfall intensity =     1.236(In/Hr)
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   360.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    24.400(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00833  s(percent)=       0.83
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.863 min.
Rainfall intensity =      1.384(In/Hr) for a     2.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.824
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      1.027(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.200
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    21.400(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =    57.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.027(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.027(CFS)
Normal flow depth in pipe =    3.69(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    5.58(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     9.02 min.
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.027(CFS)
Time of concentration =    9.02 min.
Rainfall intensity =     1.372(In/Hr)
Summary of stream data:

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


1        1.195     11.17                 1.236
2        1.027      9.02                 1.372
Largest stream flow has longer time of concentration
Qp =      1.195 + sum of
          Qb         Ia/Ib
           1.027 *    0.900 =      0.925
Qp =      2.120

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.195       1.027
Area of streams before confluence:
        1.040        0.900
Results of confluence:
Total flow rate =      2.120(CFS)
Time of concentration =    11.173 min.
Effective stream area after confluence =      1.940(Ac.)
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    19.900(Ft.)
Downstream point/station elevation =    19.300(Ft.)
Pipe length  =   112.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.120(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.120(CFS)
Normal flow depth in pipe =    7.76(In.)
Flow top width inside pipe =   11.47(In.)
Critical Depth =    7.46(In.)
Pipe flow velocity =      3.95(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    11.65 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.65 min.
Rainfall intensity =      1.211(In/Hr) for a     2.0 year storm
Subarea runoff =      0.073(CFS) for      0.070(Ac.)
Total runoff =      2.193(CFS)  Total area =       2.010(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.65 min.
Rainfall intensity =      1.211(In/Hr) for a     2.0 year storm
Subarea runoff =      0.333(CFS) for      0.320(Ac.)
Total runoff =      2.526(CFS)  Total area =       2.330(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    19.300(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =   399.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.526(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.526(CFS)
Normal flow depth in pipe =    7.89(In.)
Flow top width inside pipe =   11.39(In.)
Critical Depth =    8.17(In.)
Pipe flow velocity =      4.62(Ft/s)
Travel time through pipe =    1.44 min.
Time of concentration (TC) =    13.09 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.330(Ac.)
Runoff from this stream =      2.526(CFS)
Time of concentration =   13.09 min.
Rainfall intensity =     1.144(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   237.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00759  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.094 min.
Rainfall intensity =      1.544(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
Initial subarea runoff =      1.161(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =    25.000(Ft.)
Downstream point elevation =    19.500(Ft.)
Channel length thru subarea  =   963.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      4.165(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      4.165(CFS)
Depth of flow =   0.170(Ft.), Average velocity =   1.446(Ft/s)
Channel flow top width =   33.946(Ft.)
Flow Velocity =    1.45(Ft/s)
Travel time  =   11.10 min.
Time of concentration =   18.20 min.

Sub-Channel No. 1 Critical depth =      0.161(Ft.)
  '     '       '     Critical flow top width =     32.227(Ft.)
  '     '       '     Critical flow velocity=    1.604(Ft/s)
  '     '       '     Critical flow area =      2.596(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      0.973(In/Hr) for a     2.0 year storm
Subarea runoff =      5.936(CFS) for      7.140(Ac.)
Total runoff =      7.097(CFS)  Total area =       8.010(Ac.)
Depth of flow =   0.207(Ft.), Average velocity =   1.652(Ft/s)

Sub-Channel No. 1 Critical depth =      0.199(Ft.)
  '     '       '     Critical flow top width =     39.844(Ft.)
  '     '       '     Critical flow velocity=    1.788(Ft/s)
  '     '       '     Critical flow area =      3.969(Sq.Ft)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    16.500(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.097(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.097(CFS)
Normal flow depth in pipe =   10.62(In.)
Flow top width inside pipe =   17.71(In.)
Critical Depth =   12.37(In.)
Pipe flow velocity =      6.55(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    18.22 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.010(Ac.)
Runoff from this stream =      7.097(CFS)
Time of concentration =   18.22 min.
Rainfall intensity =     0.972(In/Hr)
Summary of stream data:

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


1        2.526     13.09                  1.144
2        7.097     18.22                  0.972
Largest stream flow has longer time of concentration
Qp =      7.097 + sum of
          Qb         Ia/Ib
           2.526 *    0.850 =      2.148
Qp =      9.244

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.526       7.097
Area of streams before confluence:
        2.330        8.010
Results of confluence:
Total flow rate =      9.244(CFS)
Time of concentration =    18.224 min.
Effective stream area after confluence =     10.340(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =    16.400(Ft.)
Downstream point/station elevation =    16.300(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     9.244(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.244(CFS)
Normal flow depth in pipe =   14.88(In.)
Flow top width inside pipe =   19.08(In.)
Critical Depth =   13.57(In.)
Pipe flow velocity =      5.07(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    18.31 min.
```

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```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       16.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.498
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  63.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.31 min.
Rainfall intensity =      0.970(In/Hr) for a     2.0 year storm
Subarea runoff =      1.078(CFS) for      2.230(Ac.)
Total runoff =     10.322(CFS)  Total area =      12.570(Ac.)
```

↟

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     12.570(Ac.)
Runoff from this stream =     10.322(CFS)
Time of concentration =   18.31 min.
Rainfall intensity =     0.970(In/Hr)
```

↟

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
```

```
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   293.000(Ft.)
Top (of initial area) elevation =    24.300(Ft.)
Bottom (of initial area) elevation =    22.800(Ft.)
Difference in elevation =     1.500(Ft.)
Slope =    0.00512  s(percent)=       0.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.763 min.
Rainfall intensity =      1.078(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.260(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    22.800(Ft.)
Downstream point/station elevation =    22.600(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.260(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.260(CFS)
Normal flow depth in pipe =    3.80(In.)
Flow top width inside pipe =    5.78(In.)
Critical Depth =    3.08(In.)
Pipe flow velocity =      1.98(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =    15.25 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =    22.600(Ft.)
Downstream point elevation =    17.900(Ft.)
Channel length thru subarea  =   553.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
```

```
Estimated mean flow rate at midpoint of channel =      0.430(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.430(CFS)
Depth of flow =   0.453(Ft.), Average velocity =   1.050(Ft/s)
Channel flow top width =    1.811(Ft.)
Flow Velocity =    1.05(Ft/s)
Travel time  =    8.78 min.
Time of concentration =   24.03 min.

Sub-Channel No. 1 Critical depth =      0.311(Ft.)
  '     '       '     Critical flow top width =      1.242(Ft.)
  '     '       '     Critical flow velocity=    2.231(Ft/s)
  '     '       '     Critical flow area =      0.193(Sq.Ft)

 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.606
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.849(In/Hr) for a     2.0 year storm
Subarea runoff =      0.288(CFS) for      0.560(Ac.)
Total runoff =      0.548(CFS)  Total area =       0.930(Ac.)
Depth of flow =   0.496(Ft.), Average velocity =   1.115(Ft/s)

Sub-Channel No. 1 Critical depth =      0.342(Ft.)
  '     '       '     Critical flow top width =      1.367(Ft.)
  '     '       '     Critical flow velocity=    2.345(Ft/s)
  '     '       '     Critical flow area =      0.234(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      0.548(CFS)
Time of concentration =   24.03 min.
Rainfall intensity =     0.849(In/Hr)
Summary of stream data:

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


1       10.322     18.31                 0.970
```

```
2        0.548     24.03                  0.849
Largest stream flow has longer or shorter time of concentration
Qp =     10.322 + sum of
          Qa          Tb/Ta
           0.548 *    0.762 =      0.417
Qp =     10.740

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.322       0.548
Area of streams before confluence:
       12.570        0.930
Results of confluence:
Total flow rate =     10.740(CFS)
Time of concentration =    18.306 min.
Effective stream area after confluence =     13.500(Ac.)
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.671
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    18.31 min.
Rainfall intensity =      0.970(In/Hr) for a     2.0 year storm
Subarea runoff =      0.247(CFS) for      0.380(Ac.)
Total runoff =     10.987(CFS)  Total area =      13.880(Ac.)
End of computations, total study area =           13.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.331
Area averaged RI index number =  76.7
```

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

Study date 12/07/21 File: PP1EUH242.out

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

Program License Serial Number 6443

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

English Units used in output format

PILOT PERRIS
EXIST 2-YR
XO 12/7/21

Drainage Area = 13.97(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.97(Ac.) = 0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time = 0.461 Hr.
Lag time = 27.66 Min.
25% of lag time = 6.92 Min.
40% of lag time = 11.07 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]
13.97	2.05	28.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	5.33	74.46

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.050(In)
Area Averaged 100-Year Rainfall = 5.330(In)

Point rain (area averaged) = 2.050(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.050(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.970	89.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
89.0	76.4	0.286	0.000	0.286	1.000	0.286
					Sum (F) =	0.286

Area averaged mean soil loss (F) (In/Hr) = 0.286
Minimum soil loss rate ((In/Hr)) = 0.143

(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	18.074	1.584	0.223
2	0.167	36.148	4.339	0.611
3	0.250	54.222	7.448	1.049
4	0.333	72.296	10.625	1.496
5	0.417	90.370	12.568	1.769
6	0.500	108.443	12.628	1.778
7	0.583	126.517	9.581	1.349
8	0.667	144.591	6.576	0.926
9	0.750	162.665	4.850	0.683
10	0.833	180.739	3.515	0.495
11	0.917	198.813	2.773	0.390
12	1.000	216.887	2.454	0.346
13	1.083	234.961	2.115	0.298
14	1.167	253.035	1.841	0.259
15	1.250	271.109	1.666	0.235
16	1.333	289.182	1.501	0.211
17	1.417	307.256	1.291	0.182
18	1.500	325.330	1.123	0.158
19	1.583	343.404	1.084	0.153
20	1.667	361.478	1.026	0.144
21	1.750	379.552	0.815	0.115
22	1.833	397.626	0.795	0.112
23	1.917	415.700	0.713	0.100
24	2.000	433.774	0.580	0.082
25	2.083	451.848	0.578	0.081
26	2.167	469.921	0.557	0.078
27	2.250	487.995	0.542	0.076
28	2.333	506.069	0.534	0.075
29	2.417	524.143	0.430	0.060
30	2.500	542.217	0.398	0.056
31	2.583	560.291	0.386	0.054
32	2.667	578.365	0.332	0.047
33	2.750	596.439	0.325	0.046
34	2.833	614.513	0.302	0.043
35	2.917	632.587	0.254	0.036
36	3.000	650.660	0.253	0.036
37	3.083	668.734	0.214	0.030
38	3.167	686.808	0.181	0.025
39	3.250	704.882	0.181	0.025
40	3.333	722.956	0.181	0.025
41	3.417	741.030	0.181	0.025
42	3.500	759.104	0.181	0.025
43	3.583	777.178	0.181	0.025
44	3.667	795.252	0.181	0.025
45	3.750	813.326	0.138	0.019
			Sum = 100.000	Sum= 14.079

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	0.016	(0.508)	0.015	0.002
2	0.17	0.07	0.016	(0.506)	0.015	0.002
3	0.25	0.07	0.016	(0.504)	0.015	0.002
4	0.33	0.10	0.025	(0.502)	0.022	0.002
5	0.42	0.10	0.025	(0.500)	0.022	0.002
6	0.50	0.10	0.025	(0.498)	0.022	0.002
7	0.58	0.10	0.025	(0.496)	0.022	0.002

8	0.67	0.10	0.025	(0.494)	0.022	0.002
9	0.75	0.10	0.025	(0.492)	0.022	0.002
10	0.83	0.13	0.033	(0.490)	0.030	0.003
11	0.92	0.13	0.033	(0.488)	0.030	0.003
12	1.00	0.13	0.033	(0.486)	0.030	0.003
13	1.08	0.10	0.025	(0.485)	0.022	0.002
14	1.17	0.10	0.025	(0.483)	0.022	0.002
15	1.25	0.10	0.025	(0.481)	0.022	0.002
16	1.33	0.10	0.025	(0.479)	0.022	0.002
17	1.42	0.10	0.025	(0.477)	0.022	0.002
18	1.50	0.10	0.025	(0.475)	0.022	0.002
19	1.58	0.10	0.025	(0.473)	0.022	0.002
20	1.67	0.10	0.025	(0.471)	0.022	0.002
21	1.75	0.10	0.025	(0.469)	0.022	0.002
22	1.83	0.13	0.033	(0.467)	0.030	0.003
23	1.92	0.13	0.033	(0.466)	0.030	0.003
24	2.00	0.13	0.033	(0.464)	0.030	0.003
25	2.08	0.13	0.033	(0.462)	0.030	0.003
26	2.17	0.13	0.033	(0.460)	0.030	0.003
27	2.25	0.13	0.033	(0.458)	0.030	0.003
28	2.33	0.13	0.033	(0.456)	0.030	0.003
29	2.42	0.13	0.033	(0.454)	0.030	0.003
30	2.50	0.13	0.033	(0.452)	0.030	0.003
31	2.58	0.17	0.041	(0.451)	0.037	0.004
32	2.67	0.17	0.041	(0.449)	0.037	0.004
33	2.75	0.17	0.041	(0.447)	0.037	0.004
34	2.83	0.17	0.041	(0.445)	0.037	0.004
35	2.92	0.17	0.041	(0.443)	0.037	0.004
36	3.00	0.17	0.041	(0.441)	0.037	0.004
37	3.08	0.17	0.041	(0.440)	0.037	0.004
38	3.17	0.17	0.041	(0.438)	0.037	0.004
39	3.25	0.17	0.041	(0.436)	0.037	0.004
40	3.33	0.17	0.041	(0.434)	0.037	0.004
41	3.42	0.17	0.041	(0.432)	0.037	0.004
42	3.50	0.17	0.041	(0.430)	0.037	0.004
43	3.58	0.17	0.041	(0.429)	0.037	0.004
44	3.67	0.17	0.041	(0.427)	0.037	0.004
45	3.75	0.17	0.041	(0.425)	0.037	0.004
46	3.83	0.20	0.049	(0.423)	0.044	0.005
47	3.92	0.20	0.049	(0.422)	0.044	0.005
48	4.00	0.20	0.049	(0.420)	0.044	0.005
49	4.08	0.20	0.049	(0.418)	0.044	0.005
50	4.17	0.20	0.049	(0.416)	0.044	0.005
51	4.25	0.20	0.049	(0.414)	0.044	0.005
52	4.33	0.23	0.057	(0.413)	0.052	0.006
53	4.42	0.23	0.057	(0.411)	0.052	0.006
54	4.50	0.23	0.057	(0.409)	0.052	0.006
55	4.58	0.23	0.057	(0.407)	0.052	0.006
56	4.67	0.23	0.057	(0.406)	0.052	0.006
57	4.75	0.23	0.057	(0.404)	0.052	0.006
58	4.83	0.27	0.066	(0.402)	0.059	0.007
59	4.92	0.27	0.066	(0.400)	0.059	0.007
60	5.00	0.27	0.066	(0.399)	0.059	0.007
61	5.08	0.20	0.049	(0.397)	0.044	0.005
62	5.17	0.20	0.049	(0.395)	0.044	0.005
63	5.25	0.20	0.049	(0.393)	0.044	0.005
64	5.33	0.23	0.057	(0.392)	0.052	0.006
65	5.42	0.23	0.057	(0.390)	0.052	0.006
66	5.50	0.23	0.057	(0.388)	0.052	0.006
67	5.58	0.27	0.066	(0.387)	0.059	0.007
68	5.67	0.27	0.066	(0.385)	0.059	0.007
69	5.75	0.27	0.066	(0.383)	0.059	0.007
70	5.83	0.27	0.066	(0.382)	0.059	0.007
71	5.92	0.27	0.066	(0.380)	0.059	0.007
72	6.00	0.27	0.066	(0.378)	0.059	0.007
73	6.08	0.30	0.074	(0.376)	0.066	0.007
74	6.17	0.30	0.074	(0.375)	0.066	0.007
75	6.25	0.30	0.074	(0.373)	0.066	0.007
76	6.33	0.30	0.074	(0.371)	0.066	0.007
77	6.42	0.30	0.074	(0.370)	0.066	0.007
78	6.50	0.30	0.074	(0.368)	0.066	0.007
79	6.58	0.33	0.082	(0.366)	0.074	0.008
80	6.67	0.33	0.082	(0.365)	0.074	0.008

81	6.75	0.33	0.082	(0.363)	0.074	0.008
82	6.83	0.33	0.082	(0.362)	0.074	0.008
83	6.92	0.33	0.082	(0.360)	0.074	0.008
84	7.00	0.33	0.082	(0.358)	0.074	0.008
85	7.08	0.33	0.082	(0.357)	0.074	0.008
86	7.17	0.33	0.082	(0.355)	0.074	0.008
87	7.25	0.33	0.082	(0.353)	0.074	0.008
88	7.33	0.37	0.090	(0.352)	0.081	0.009
89	7.42	0.37	0.090	(0.350)	0.081	0.009
90	7.50	0.37	0.090	(0.349)	0.081	0.009
91	7.58	0.40	0.098	(0.347)	0.089	0.010
92	7.67	0.40	0.098	(0.345)	0.089	0.010
93	7.75	0.40	0.098	(0.344)	0.089	0.010
94	7.83	0.43	0.107	(0.342)	0.096	0.011
95	7.92	0.43	0.107	(0.341)	0.096	0.011
96	8.00	0.43	0.107	(0.339)	0.096	0.011
97	8.08	0.50	0.123	(0.337)	0.111	0.012
98	8.17	0.50	0.123	(0.336)	0.111	0.012
99	8.25	0.50	0.123	(0.334)	0.111	0.012
100	8.33	0.50	0.123	(0.333)	0.111	0.012
101	8.42	0.50	0.123	(0.331)	0.111	0.012
102	8.50	0.50	0.123	(0.330)	0.111	0.012
103	8.58	0.53	0.131	(0.328)	0.118	0.013
104	8.67	0.53	0.131	(0.327)	0.118	0.013
105	8.75	0.53	0.131	(0.325)	0.118	0.013
106	8.83	0.57	0.139	(0.323)	0.125	0.014
107	8.92	0.57	0.139	(0.322)	0.125	0.014
108	9.00	0.57	0.139	(0.320)	0.125	0.014
109	9.08	0.63	0.156	(0.319)	0.140	0.016
110	9.17	0.63	0.156	(0.317)	0.140	0.016
111	9.25	0.63	0.156	(0.316)	0.140	0.016
112	9.33	0.67	0.164	(0.314)	0.148	0.016
113	9.42	0.67	0.164	(0.313)	0.148	0.016
114	9.50	0.67	0.164	(0.311)	0.148	0.016
115	9.58	0.70	0.172	(0.310)	0.155	0.017
116	9.67	0.70	0.172	(0.308)	0.155	0.017
117	9.75	0.70	0.172	(0.307)	0.155	0.017
118	9.83	0.73	0.180	(0.305)	0.162	0.018
119	9.92	0.73	0.180	(0.304)	0.162	0.018
120	10.00	0.73	0.180	(0.303)	0.162	0.018
121	10.08	0.50	0.123	(0.301)	0.111	0.012
122	10.17	0.50	0.123	(0.300)	0.111	0.012
123	10.25	0.50	0.123	(0.298)	0.111	0.012
124	10.33	0.50	0.123	(0.297)	0.111	0.012
125	10.42	0.50	0.123	(0.295)	0.111	0.012
126	10.50	0.50	0.123	(0.294)	0.111	0.012
127	10.58	0.67	0.164	(0.292)	0.148	0.016
128	10.67	0.67	0.164	(0.291)	0.148	0.016
129	10.75	0.67	0.164	(0.290)	0.148	0.016
130	10.83	0.67	0.164	(0.288)	0.148	0.016
131	10.92	0.67	0.164	(0.287)	0.148	0.016
132	11.00	0.67	0.164	(0.285)	0.148	0.016
133	11.08	0.63	0.156	(0.284)	0.140	0.016
134	11.17	0.63	0.156	(0.282)	0.140	0.016
135	11.25	0.63	0.156	(0.281)	0.140	0.016
136	11.33	0.63	0.156	(0.280)	0.140	0.016
137	11.42	0.63	0.156	(0.278)	0.140	0.016
138	11.50	0.63	0.156	(0.277)	0.140	0.016
139	11.58	0.57	0.139	(0.276)	0.125	0.014
140	11.67	0.57	0.139	(0.274)	0.125	0.014
141	11.75	0.57	0.139	(0.273)	0.125	0.014
142	11.83	0.60	0.148	(0.271)	0.133	0.015
143	11.92	0.60	0.148	(0.270)	0.133	0.015
144	12.00	0.60	0.148	(0.269)	0.133	0.015
145	12.08	0.83	0.205	(0.267)	0.184	0.020
146	12.17	0.83	0.205	(0.266)	0.184	0.020
147	12.25	0.83	0.205	(0.265)	0.184	0.020
148	12.33	0.87	0.213	(0.263)	0.192	0.021
149	12.42	0.87	0.213	(0.262)	0.192	0.021
150	12.50	0.87	0.213	(0.261)	0.192	0.021
151	12.58	0.93	0.230	(0.259)	0.207	0.023
152	12.67	0.93	0.230	(0.258)	0.207	0.023
153	12.75	0.93	0.230	(0.257)	0.207	0.023

154	12.83	0.97	0.238	(	0.256)	0.214	0.024
155	12.92	0.97	0.238	(	0.254)	0.214	0.024
156	13.00	0.97	0.238	(	0.253)	0.214	0.024
157	13.08	1.13	0.279	(	0.252)	0.251	0.028
158	13.17	1.13	0.279		0.250	(0.251)	0.028
159	13.25	1.13	0.279		0.249	(0.251)	0.030
160	13.33	1.13	0.279		0.248	(0.251)	0.031
161	13.42	1.13	0.279		0.247	(0.251)	0.032
162	13.50	1.13	0.279		0.245	(0.251)	0.033
163	13.58	0.77	0.189	(	0.244)	0.170	0.019
164	13.67	0.77	0.189	(	0.243)	0.170	0.019
165	13.75	0.77	0.189	(	0.242)	0.170	0.019
166	13.83	0.77	0.189	(	0.240)	0.170	0.019
167	13.92	0.77	0.189	(	0.239)	0.170	0.019
168	14.00	0.77	0.189	(	0.238)	0.170	0.019
169	14.08	0.90	0.221	(	0.237)	0.199	0.022
170	14.17	0.90	0.221	(	0.236)	0.199	0.022
171	14.25	0.90	0.221	(	0.234)	0.199	0.022
172	14.33	0.87	0.213	(	0.233)	0.192	0.021
173	14.42	0.87	0.213	(	0.232)	0.192	0.021
174	14.50	0.87	0.213	(	0.231)	0.192	0.021
175	14.58	0.87	0.213	(	0.230)	0.192	0.021
176	14.67	0.87	0.213	(	0.228)	0.192	0.021
177	14.75	0.87	0.213	(	0.227)	0.192	0.021
178	14.83	0.83	0.205	(	0.226)	0.184	0.020
179	14.92	0.83	0.205	(	0.225)	0.184	0.020
180	15.00	0.83	0.205	(	0.224)	0.184	0.020
181	15.08	0.80	0.197	(	0.223)	0.177	0.020
182	15.17	0.80	0.197	(	0.221)	0.177	0.020
183	15.25	0.80	0.197	(	0.220)	0.177	0.020
184	15.33	0.77	0.189	(	0.219)	0.170	0.019
185	15.42	0.77	0.189	(	0.218)	0.170	0.019
186	15.50	0.77	0.189	(	0.217)	0.170	0.019
187	15.58	0.63	0.156	(	0.216)	0.140	0.016
188	15.67	0.63	0.156	(	0.215)	0.140	0.016
189	15.75	0.63	0.156	(	0.214)	0.140	0.016
190	15.83	0.63	0.156	(	0.213)	0.140	0.016
191	15.92	0.63	0.156	(	0.211)	0.140	0.016
192	16.00	0.63	0.156	(	0.210)	0.140	0.016
193	16.08	0.13	0.033	(	0.209)	0.030	0.003
194	16.17	0.13	0.033	(	0.208)	0.030	0.003
195	16.25	0.13	0.033	(	0.207)	0.030	0.003
196	16.33	0.13	0.033	(	0.206)	0.030	0.003
197	16.42	0.13	0.033	(	0.205)	0.030	0.003
198	16.50	0.13	0.033	(	0.204)	0.030	0.003
199	16.58	0.10	0.025	(	0.203)	0.022	0.002
200	16.67	0.10	0.025	(	0.202)	0.022	0.002
201	16.75	0.10	0.025	(	0.201)	0.022	0.002
202	16.83	0.10	0.025	(	0.200)	0.022	0.002
203	16.92	0.10	0.025	(	0.199)	0.022	0.002
204	17.00	0.10	0.025	(	0.198)	0.022	0.002
205	17.08	0.17	0.041	(	0.197)	0.037	0.004
206	17.17	0.17	0.041	(	0.196)	0.037	0.004
207	17.25	0.17	0.041	(	0.195)	0.037	0.004
208	17.33	0.17	0.041	(	0.194)	0.037	0.004
209	17.42	0.17	0.041	(	0.193)	0.037	0.004
210	17.50	0.17	0.041	(	0.192)	0.037	0.004
211	17.58	0.17	0.041	(	0.191)	0.037	0.004
212	17.67	0.17	0.041	(	0.190)	0.037	0.004
213	17.75	0.17	0.041	(	0.189)	0.037	0.004
214	17.83	0.13	0.033	(	0.188)	0.030	0.003
215	17.92	0.13	0.033	(	0.187)	0.030	0.003
216	18.00	0.13	0.033	(	0.186)	0.030	0.003
217	18.08	0.13	0.033	(	0.185)	0.030	0.003
218	18.17	0.13	0.033	(	0.185)	0.030	0.003
219	18.25	0.13	0.033	(	0.184)	0.030	0.003
220	18.33	0.13	0.033	(	0.183)	0.030	0.003
221	18.42	0.13	0.033	(	0.182)	0.030	0.003
222	18.50	0.13	0.033	(	0.181)	0.030	0.003
223	18.58	0.10	0.025	(	0.180)	0.022	0.002
224	18.67	0.10	0.025	(	0.179)	0.022	0.002
225	18.75	0.10	0.025	(	0.178)	0.022	0.002
226	18.83	0.07	0.016	(	0.177)	0.015	0.002

227	18.92	0.07	0.016	(0.177)	0.015	0.002
228	19.00	0.07	0.016	(0.176)	0.015	0.002
229	19.08	0.10	0.025	(0.175)	0.022	0.002
230	19.17	0.10	0.025	(0.174)	0.022	0.002
231	19.25	0.10	0.025	(0.173)	0.022	0.002
232	19.33	0.13	0.033	(0.173)	0.030	0.003
233	19.42	0.13	0.033	(0.172)	0.030	0.003
234	19.50	0.13	0.033	(0.171)	0.030	0.003
235	19.58	0.10	0.025	(0.170)	0.022	0.002
236	19.67	0.10	0.025	(0.169)	0.022	0.002
237	19.75	0.10	0.025	(0.169)	0.022	0.002
238	19.83	0.07	0.016	(0.168)	0.015	0.002
239	19.92	0.07	0.016	(0.167)	0.015	0.002
240	20.00	0.07	0.016	(0.166)	0.015	0.002
241	20.08	0.10	0.025	(0.166)	0.022	0.002
242	20.17	0.10	0.025	(0.165)	0.022	0.002
243	20.25	0.10	0.025	(0.164)	0.022	0.002
244	20.33	0.10	0.025	(0.163)	0.022	0.002
245	20.42	0.10	0.025	(0.163)	0.022	0.002
246	20.50	0.10	0.025	(0.162)	0.022	0.002
247	20.58	0.10	0.025	(0.161)	0.022	0.002
248	20.67	0.10	0.025	(0.161)	0.022	0.002
249	20.75	0.10	0.025	(0.160)	0.022	0.002
250	20.83	0.07	0.016	(0.159)	0.015	0.002
251	20.92	0.07	0.016	(0.159)	0.015	0.002
252	21.00	0.07	0.016	(0.158)	0.015	0.002
253	21.08	0.10	0.025	(0.157)	0.022	0.002
254	21.17	0.10	0.025	(0.157)	0.022	0.002
255	21.25	0.10	0.025	(0.156)	0.022	0.002
256	21.33	0.07	0.016	(0.156)	0.015	0.002
257	21.42	0.07	0.016	(0.155)	0.015	0.002
258	21.50	0.07	0.016	(0.155)	0.015	0.002
259	21.58	0.10	0.025	(0.154)	0.022	0.002
260	21.67	0.10	0.025	(0.153)	0.022	0.002
261	21.75	0.10	0.025	(0.153)	0.022	0.002
262	21.83	0.07	0.016	(0.152)	0.015	0.002
263	21.92	0.07	0.016	(0.152)	0.015	0.002
264	22.00	0.07	0.016	(0.151)	0.015	0.002
265	22.08	0.10	0.025	(0.151)	0.022	0.002
266	22.17	0.10	0.025	(0.150)	0.022	0.002
267	22.25	0.10	0.025	(0.150)	0.022	0.002
268	22.33	0.07	0.016	(0.149)	0.015	0.002
269	22.42	0.07	0.016	(0.149)	0.015	0.002
270	22.50	0.07	0.016	(0.148)	0.015	0.002
271	22.58	0.07	0.016	(0.148)	0.015	0.002
272	22.67	0.07	0.016	(0.148)	0.015	0.002
273	22.75	0.07	0.016	(0.147)	0.015	0.002
274	22.83	0.07	0.016	(0.147)	0.015	0.002
275	22.92	0.07	0.016	(0.146)	0.015	0.002
276	23.00	0.07	0.016	(0.146)	0.015	0.002
277	23.08	0.07	0.016	(0.146)	0.015	0.002
278	23.17	0.07	0.016	(0.145)	0.015	0.002
279	23.25	0.07	0.016	(0.145)	0.015	0.002
280	23.33	0.07	0.016	(0.145)	0.015	0.002
281	23.42	0.07	0.016	(0.145)	0.015	0.002
282	23.50	0.07	0.016	(0.144)	0.015	0.002
283	23.58	0.07	0.016	(0.144)	0.015	0.002
284	23.67	0.07	0.016	(0.144)	0.015	0.002
285	23.75	0.07	0.016	(0.144)	0.015	0.002
286	23.83	0.07	0.016	(0.143)	0.015	0.002
287	23.92	0.07	0.016	(0.143)	0.015	0.002
288	24.00	0.07	0.016	(0.143)	0.015	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.5

Flood volume = Effective rainfall 0.21(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 1.84(In)
Total soil loss = 2.146(Ac.Ft)
Total rainfall = 2.05(In)
Flood volume = 10459.3 Cubic Feet
Total soil loss = 93495.7 Cubic Feet

Peak flow rate of this hydrograph = 0.371(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	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0001	0.01	Q				
0+25	0.0001	0.01	Q				
0+30	0.0002	0.01	Q				
0+35	0.0003	0.02	Q				
0+40	0.0005	0.02	Q				
0+45	0.0006	0.02	Q				
0+50	0.0008	0.02	Q				
0+55	0.0010	0.03	Q				
1+ 0	0.0012	0.03	Q				
1+ 5	0.0014	0.03	Q				
1+10	0.0016	0.03	Q				
1+15	0.0018	0.03	Q				
1+20	0.0020	0.03	Q				
1+25	0.0023	0.03	Q				
1+30	0.0025	0.03	Q				
1+35	0.0027	0.03	Q				
1+40	0.0029	0.03	Q				
1+45	0.0032	0.03	Q				
1+50	0.0034	0.03	Q				
1+55	0.0036	0.03	Q				
2+ 0	0.0038	0.03	Q				
2+ 5	0.0041	0.04	Q				
2+10	0.0043	0.04	Q				
2+15	0.0046	0.04	Q				
2+20	0.0049	0.04	Q				
2+25	0.0052	0.04	Q				
2+30	0.0055	0.04	Q				
2+35	0.0058	0.04	Q				
2+40	0.0061	0.04	QV				
2+45	0.0064	0.04	QV				
2+50	0.0067	0.05	QV				
2+55	0.0070	0.05	QV				
3+ 0	0.0074	0.05	QV				
3+ 5	0.0077	0.05	QV				
3+10	0.0081	0.05	QV				
3+15	0.0084	0.05	QV				
3+20	0.0088	0.05	QV				
3+25	0.0092	0.05	QV				
3+30	0.0095	0.05	QV				
3+35	0.0099	0.05	QV				
3+40	0.0103	0.05	QV				
3+45	0.0107	0.06	QV				
3+50	0.0111	0.06	QV				
3+55	0.0114	0.06	QV				
4+ 0	0.0118	0.06	QV				
4+ 5	0.0122	0.06	Q V				
4+10	0.0127	0.06	Q V				
4+15	0.0131	0.06	Q V				
4+20	0.0135	0.06	Q V				
4+25	0.0140	0.06	Q V				
4+30	0.0144	0.07	Q V				
4+35	0.0149	0.07	Q V				
4+40	0.0154	0.07	Q V				
4+45	0.0159	0.07	Q V				
4+50	0.0164	0.07	Q V				
4+55	0.0169	0.07	Q V				
5+ 0	0.0174	0.08	Q V				
5+ 5	0.0180	0.08	Q V				
5+10	0.0185	0.08	Q V				
5+15	0.0191	0.08	Q V				

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 5+20       0.0196      0.08  Q  V      |          |          |          |
 5+25       0.0201      0.08  Q  V      |          |          |          |
 5+30       0.0207      0.08  Q  V      |          |          |          |
 5+35       0.0212      0.08  Q  V      |          |          |          |
 5+40       0.0217      0.08  Q  V      |          |          |          |
 5+45       0.0223      0.08  Q  V      |          |          |          |
 5+50       0.0228      0.08  Q  V      |          |          |          |
 5+55       0.0234      0.08  Q  V      |          |          |          |
 6+ 0       0.0240      0.08  Q  V      |          |          |          |
 6+ 5       0.0246      0.09  Q   V     |          |          |          |
 6+10       0.0252      0.09  Q   V     |          |          |          |
 6+15       0.0258      0.09  Q   V     |          |          |          |
 6+20       0.0264      0.09  Q   V     |          |          |          |
 6+25       0.0270      0.09  Q   V     |          |          |          |
 6+30       0.0277      0.09  Q   V     |          |          |          |
 6+35       0.0284      0.10  Q   V     |          |          |          |
 6+40       0.0290      0.10  Q   V     |          |          |          |
 6+45       0.0297      0.10  Q   V     |          |          |          |
 6+50       0.0304      0.10  Q    V    |          |          |          |
 6+55       0.0311      0.10  Q    V    |          |          |          |
 7+ 0       0.0318      0.11  Q    V    |          |          |          |
 7+ 5       0.0326      0.11  Q    V    |          |          |          |
 7+10       0.0333      0.11  Q    V    |          |          |          |
 7+15       0.0341      0.11  Q    V    |          |          |          |
 7+20       0.0348      0.11  Q    V    |          |          |          |
 7+25       0.0356      0.11  Q    V    |          |          |          |
 7+30       0.0364      0.11  Q     V   |          |          |          |
 7+35       0.0372      0.11  Q     V   |          |          |          |
 7+40       0.0380      0.12  Q     V   |          |          |          |
 7+45       0.0388      0.12  Q     V   |          |          |          |
 7+50       0.0396      0.12  Q     V   |          |          |          |
 7+55       0.0405      0.13  Q     V   |          |          |          |
 8+ 0       0.0414      0.13  Q     V   |          |          |          |
 8+ 5       0.0423      0.13  Q      V  |          |          |          |
 8+10       0.0432      0.14  Q      V  |          |          |          |
 8+15       0.0442      0.14  Q      V  |          |          |          |
 8+20       0.0452      0.14  Q      V  |          |          |          |
 8+25       0.0462      0.15  Q      V  |          |          |          |
 8+30       0.0472      0.15  Q      V  |          |          |          |
 8+35       0.0483      0.16  Q       V |          |          |          |
 8+40       0.0494      0.16  Q       V |          |          |          |
 8+45       0.0505      0.16  Q       V |          |          |          |
 8+50       0.0517      0.16  Q       V |          |          |          |
 8+55       0.0528      0.17  Q       V |          |          |          |
 9+ 0       0.0540      0.17  Q       V |          |          |          |
 9+ 5       0.0552      0.17  Q        V|          |          |          |
 9+10       0.0564      0.18  Q        V|          |          |          |
 9+15       0.0577      0.18  Q        V|          |          |          |
 9+20       0.0590      0.19  Q        V|          |          |          |
 9+25       0.0603      0.19  Q         V          |          |          |
 9+30       0.0617      0.20  Q         V          |          |          |
 9+35       0.0631      0.20  Q         V          |          |          |
 9+40       0.0645      0.21  Q         V          |          |          |
 9+45       0.0659      0.21  Q         V          |          |          |
 9+50       0.0674      0.22  Q         |V         |          |          |
 9+55       0.0689      0.22  Q         |V         |          |          |
10+ 0       0.0705      0.22  Q         |V         |          |          |
10+ 5       0.0721      0.23  Q         | V        |          |          |
10+10       0.0736      0.23  Q         | V        |          |          |
10+15       0.0752      0.22  Q         | V        |          |          |
10+20       0.0767      0.22  Q         | V        |          |          |
10+25       0.0781      0.21  Q         |  V       |          |          |
10+30       0.0795      0.20  Q         |  V       |          |          |
10+35       0.0808      0.20  Q         |  V       |          |          |
10+40       0.0822      0.19  Q         |  V       |          |          |
10+45       0.0835      0.20  Q         |  V       |          |          |
10+50       0.0849      0.20  Q         |   V      |          |          |
10+55       0.0863      0.21  Q         |   V      |          |          |
11+ 0       0.0878      0.21  Q         |   V      |          |          |
11+ 5       0.0892      0.22  Q         |   V      |          |          |
11+10       0.0907      0.22  Q         |    V     |          |          |
11+15       0.0923      0.22  Q         |    V     |          |          |
11+20       0.0938      0.22  Q         |    V     |          |          |
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11+25       0.0953      0.22  Q         |    V    |         |         |
11+30       0.0968      0.22  Q         |     V   |         |         |
11+35       0.0983      0.22  Q         |     V   |         |         |
11+40       0.0998      0.22  Q         |     V   |         |         |
11+45       0.1013      0.22  Q         |     V   |         |         |
11+50       0.1027      0.21  Q         |      V  |         |         |
11+55       0.1042      0.21  Q         |      V  |         |         |
12+ 0       0.1056      0.21  Q         |      V  |         |         |
12+ 5       0.1071      0.21  Q         |      V  |         |         |
12+10       0.1085      0.21  Q         |       V |         |         |
12+15       0.1100      0.22  Q         |       V |         |         |
12+20       0.1116      0.23  Q         |       V |         |         |
12+25       0.1133      0.24  Q         |       V |         |         |
12+30       0.1150      0.25  |Q        |        V|         |         |
12+35       0.1168      0.26  |Q        |        V|         |         |
12+40       0.1186      0.27  |Q        |        V|         |         |
12+45       0.1205      0.27  |Q        |         V         |         |
12+50       0.1224      0.28  |Q        |         V         |         |
12+55       0.1244      0.29  |Q        |         V         |         |
13+ 0       0.1264      0.29  |Q        |         |V        |         |
13+ 5       0.1285      0.30  |Q        |         |V        |         |
13+10       0.1306      0.31  |Q        |         |V        |         |
13+15       0.1328      0.32  |Q        |         | V       |         |
13+20       0.1351      0.33  |Q        |         | V       |         |
13+25       0.1374      0.34  |Q        |         | V       |         |
13+30       0.1398      0.35  |Q        |         |  V      |         |
13+35       0.1424      0.37  |Q        |         |  V      |         |
13+40       0.1449      0.37  |Q        |         |   V     |         |
13+45       0.1475      0.37  |Q        |         |   V     |         |
13+50       0.1499      0.36  |Q        |         |   V     |         |
13+55       0.1523      0.34  |Q        |         |    V    |         |
14+ 0       0.1545      0.32  |Q        |         |    V    |         |
14+ 5       0.1566      0.31  |Q        |         |     V   |         |
14+10       0.1587      0.30  |Q        |         |     V   |         |
14+15       0.1607      0.30  |Q        |         |     V   |         |
14+20       0.1628      0.30  |Q        |         |      V  |         |
14+25       0.1649      0.30  |Q        |         |      V  |         |
14+30       0.1670      0.31  |Q        |         |      V  |         |
14+35       0.1691      0.31  |Q        |         |       V |         |
14+40       0.1712      0.31  |Q        |         |       V |         |
14+45       0.1733      0.31  |Q        |         |       V |         |
14+50       0.1754      0.30  |Q        |         |        V|         |
14+55       0.1775      0.30  |Q        |         |        V|         |
15+ 0       0.1796      0.30  |Q        |         |        V|         |
15+ 5       0.1817      0.30  |Q        |         |         V         |
15+10       0.1837      0.30  |Q        |         |         V         |
15+15       0.1858      0.30  |Q        |         |         V         |
15+20       0.1878      0.29  |Q        |         |         |V        |
15+25       0.1898      0.29  |Q        |         |         |V        |
15+30       0.1918      0.29  |Q        |         |         |V        |
15+35       0.1937      0.28  |Q        |         |         | V       |
15+40       0.1956      0.28  |Q        |         |         | V       |
15+45       0.1975      0.27  |Q        |         |         | V       |
15+50       0.1994      0.27  |Q        |         |         |  V      |
15+55       0.2012      0.26  |Q        |         |         |  V      |
16+ 0       0.2029      0.25  |Q        |         |         |  V      |
16+ 5       0.2046      0.24  Q         |         |         |   V     |
16+10       0.2062      0.23  Q         |         |         |   V     |
16+15       0.2077      0.22  Q         |         |         |   V     |
16+20       0.2090      0.20  Q         |         |         |   V     |
16+25       0.2102      0.17  Q         |         |         |    V    |
16+30       0.2113      0.15  Q         |         |         |    V    |
16+35       0.2122      0.13  Q         |         |         |    V    |
16+40       0.2130      0.12  Q         |         |         |    V    |
16+45       0.2137      0.11  Q         |         |         |    V    |
16+50       0.2144      0.10  Q         |         |         |    V    |
16+55       0.2150      0.09  Q         |         |         |    V    |
17+ 0       0.2156      0.09  Q         |         |         |    V    |
17+ 5       0.2162      0.08  Q         |         |         |     V   |
17+10       0.2167      0.08  Q         |         |         |     V   |
17+15       0.2172      0.07  Q         |         |         |     V   |
17+20       0.2177      0.07  Q         |         |         |     V   |
17+25       0.2182      0.07  Q         |         |         |     V   |
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17+30	0.2187	0.07	Q	|	|	|	V |
17+35	0.2192	0.07	Q	|	|	|	V |
17+40	0.2197	0.07	Q	|	|	|	V |
17+45	0.2202	0.07	Q	|	|	|	V |
17+50	0.2206	0.07	Q	|	|	|	V |
17+55	0.2211	0.07	Q	|	|	|	V |
18+ 0	0.2216	0.07	Q	|	|	|	V |
18+ 5	0.2220	0.06	Q	|	|	|	V |
18+10	0.2224	0.06	Q	|	|	|	V |
18+15	0.2228	0.06	Q	|	|	|	V |
18+20	0.2232	0.06	Q	|	|	|	V |
18+25	0.2236	0.06	Q	|	|	|	V |
18+30	0.2240	0.05	Q	|	|	|	V |
18+35	0.2244	0.05	Q	|	|	|	V |
18+40	0.2247	0.05	Q	|	|	|	V |
18+45	0.2251	0.05	Q	|	|	|	V |
18+50	0.2254	0.05	Q	|	|	|	V |
18+55	0.2257	0.05	Q	|	|	|	V |
19+ 0	0.2260	0.04	Q	|	|	|	V |
19+ 5	0.2263	0.04	Q	|	|	|	V |
19+10	0.2265	0.04	Q	|	|	|	V |
19+15	0.2268	0.04	Q	|	|	|	V |
19+20	0.2270	0.04	Q	|	|	|	V |
19+25	0.2273	0.04	Q	|	|	|	V |
19+30	0.2275	0.04	Q	|	|	|	V |
19+35	0.2278	0.04	Q	|	|	|	V |
19+40	0.2281	0.04	Q	|	|	|	V |
19+45	0.2284	0.04	Q	|	|	|	V |
19+50	0.2286	0.04	Q	|	|	|	V |
19+55	0.2289	0.04	Q	|	|	|	V |
20+ 0	0.2291	0.04	Q	|	|	|	V |
20+ 5	0.2294	0.03	Q	|	|	|	V |
20+10	0.2296	0.03	Q	|	|	|	V |
20+15	0.2298	0.03	Q	|	|	|	V |
20+20	0.2301	0.03	Q	|	|	|	V |
20+25	0.2303	0.03	Q	|	|	|	V |
20+30	0.2305	0.03	Q	|	|	|	V |
20+35	0.2307	0.03	Q	|	|	|	V |
20+40	0.2310	0.03	Q	|	|	|	V |
20+45	0.2312	0.03	Q	|	|	|	V |
20+50	0.2315	0.03	Q	|	|	|	V |
20+55	0.2317	0.03	Q	|	|	|	V |
21+ 0	0.2319	0.03	Q	|	|	|	V |
21+ 5	0.2321	0.03	Q	|	|	|	V |
21+10	0.2323	0.03	Q	|	|	|	V |
21+15	0.2326	0.03	Q	|	|	|	V |
21+20	0.2328	0.03	Q	|	|	|	V |
21+25	0.2330	0.03	Q	|	|	|	V |
21+30	0.2332	0.03	Q	|	|	|	V |
21+35	0.2334	0.03	Q	|	|	|	V |
21+40	0.2336	0.03	Q	|	|	|	V |
21+45	0.2338	0.03	Q	|	|	|	V |
21+50	0.2340	0.03	Q	|	|	|	V |
21+55	0.2342	0.03	Q	|	|	|	V|
22+ 0	0.2344	0.03	Q	|	|	|	V|
22+ 5	0.2346	0.03	Q	|	|	|	V|
22+10	0.2348	0.03	Q	|	|	|	V|
22+15	0.2350	0.03	Q	|	|	|	V|
22+20	0.2352	0.03	Q	|	|	|	V|
22+25	0.2354	0.03	Q	|	|	|	V|
22+30	0.2356	0.03	Q	|	|	|	V|
22+35	0.2358	0.03	Q	|	|	|	V|
22+40	0.2360	0.03	Q	|	|	|	V|
22+45	0.2362	0.03	Q	|	|	|	V|
22+50	0.2364	0.03	Q	|	|	|	V|
22+55	0.2366	0.03	Q	|	|	|	V|
23+ 0	0.2368	0.03	Q	|	|	|	V|
23+ 5	0.2369	0.03	Q	|	|	|	V|
23+10	0.2371	0.02	Q	|	|	|	V|
23+15	0.2373	0.02	Q	|	|	|	V|
23+20	0.2374	0.02	Q	|	|	|	V|
23+25	0.2376	0.02	Q	|	|	|	V|
23+30	0.2378	0.02	Q	|	|	|	V|

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  23+35       0.2379      0.02  Q         |         |         |         V|
  23+40       0.2381      0.02  Q         |         |         |         V|
  23+45       0.2383      0.02  Q         |         |         |         V|
  23+50       0.2384      0.02  Q         |         |         |         V|
  23+55       0.2386      0.02  Q         |         |         |         V|
  24+ 0       0.2388      0.02  Q         |         |         |         V|
  24+ 5       0.2389      0.02  Q         |         |         |         V|
  24+10       0.2391      0.02  Q         |         |         |         V|
  24+15       0.2392      0.02  Q         |         |         |         V|
  24+20       0.2393      0.02  Q         |         |         |         V|
  24+25       0.2394      0.02  Q         |         |         |         V|
  24+30       0.2395      0.01  Q         |         |         |         V|
  24+35       0.2396      0.01  Q         |         |         |         V|
  24+40       0.2396      0.01  Q         |         |         |         V|
  24+45       0.2397      0.01  Q         |         |         |         V|
  24+50       0.2397      0.01  Q         |         |         |         V|
  24+55       0.2398      0.01  Q         |         |         |         V|
  25+ 0       0.2398      0.01  Q         |         |         |         V|
  25+ 5       0.2398      0.00  Q         |         |         |         V|
  25+10       0.2399      0.00  Q         |         |         |         V|
  25+15       0.2399      0.00  Q         |         |         |         V|
  25+20       0.2399      0.00  Q         |         |         |         V|
  25+25       0.2399      0.00  Q         |         |         |         V|
  25+30       0.2400      0.00  Q         |         |         |         V|
  25+35       0.2400      0.00  Q         |         |         |         V|
  25+40       0.2400      0.00  Q         |         |         |         V|
  25+45       0.2400      0.00  Q         |         |         |         V|
  25+50       0.2400      0.00  Q         |         |         |         V|
  25+55       0.2400      0.00  Q         |         |         |         V|
  26+ 0       0.2400      0.00  Q         |         |         |         V|
  26+ 5       0.2400      0.00  Q         |         |         |         V|
  26+10       0.2401      0.00  Q         |         |         |         V|
  26+15       0.2401      0.00  Q         |         |         |         V|
  26+20       0.2401      0.00  Q         |         |         |         V|
  26+25       0.2401      0.00  Q         |         |         |         V|
  26+30       0.2401      0.00  Q         |         |         |         V|
  26+35       0.2401      0.00  Q         |         |         |         V|
  26+40       0.2401      0.00  Q         |         |         |         V|
  26+45       0.2401      0.00  Q         |         |         |         V|
  26+50       0.2401      0.00  Q         |         |         |         V|
  26+55       0.2401      0.00  Q         |         |         |         V|
  27+ 0       0.2401      0.00  Q         |         |         |         V|
  27+ 5       0.2401      0.00  Q         |         |         |         V|
  27+10       0.2401      0.00  Q         |         |         |         V|
  27+15       0.2401      0.00  Q         |         |         |         V|
  27+20       0.2401      0.00  Q         |         |         |         V|
  27+25       0.2401      0.00  Q         |         |         |         V|
  27+30       0.2401      0.00  Q         |         |         |         V|
  27+35       0.2401      0.00  Q         |         |         |         V|
  27+40       0.2401      0.00  Q         |         |         |          V
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U n i t H y d r o g r a p h A n a l y s i s

Study date 03/22/22 File: PP1PUH242.out

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

Program License Serial Number 6443

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

English Units used in output format

PILOT PERRIS
PROP 2-YR
XO 3/22/22

Drainage Area = 13.97(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.97(Ac.) = 0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time = 0.244 Hr.
Lag time = 14.64 Min.
25% of lag time = 3.66 Min.
40% of lag time = 5.86 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]
13.97	2.05	28.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	5.33	74.46

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.050(In)
Area Averaged 100-Year Rainfall = 5.330(In)

Point rain (area averaged) = 2.050(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.050(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.190	75.00	0.900
3.780	87.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	57.0	0.501	0.900	0.095	0.729	0.069
87.0	73.2	0.324	0.000	0.324	0.271	0.088
					Sum (F) =	0.157

Area averaged mean soil loss (F) (In/Hr) = 0.157
Minimum soil loss rate ((In/Hr)) = 0.079
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

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	34.153	3.465	0.488
2	0.167	68.306	13.463	1.895
3	0.250	102.459	22.544	3.174
4	0.333	136.612	19.842	2.794
5	0.417	170.765	10.757	1.514
6	0.500	204.918	6.115	0.861
7	0.583	239.071	4.397	0.619
8	0.667	273.224	3.439	0.484
9	0.750	307.377	2.771	0.390
10	0.833	341.530	2.176	0.306
11	0.917	375.683	1.895	0.267
12	1.000	409.836	1.503	0.212
13	1.083	443.989	1.197	0.168
14	1.167	478.142	1.070	0.151
15	1.250	512.295	1.008	0.142
16	1.333	546.448	0.807	0.114

17	1.417	580.601	0.697		0.098
18	1.500	614.754	0.603		0.085
19	1.583	648.907	0.500		0.070
20	1.667	683.060	0.414		0.058
21	1.750	717.213	0.342		0.048
22	1.833	751.366	0.342		0.048
23	1.917	785.519	0.342		0.048
24	2.000	819.672	0.316		0.044
			Sum = 100.000	Sum=	14.079

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	0.016	(0.279)	0.006	0.010
2	0.17	0.07	0.016	(0.277)	0.006	0.010
3	0.25	0.07	0.016	(0.276)	0.006	0.010
4	0.33	0.10	0.025	(0.275)	0.009	0.016
5	0.42	0.10	0.025	(0.274)	0.009	0.016
6	0.50	0.10	0.025	(0.273)	0.009	0.016
7	0.58	0.10	0.025	(0.272)	0.009	0.016
8	0.67	0.10	0.025	(0.271)	0.009	0.016
9	0.75	0.10	0.025	(0.270)	0.009	0.016
10	0.83	0.13	0.033	(0.269)	0.012	0.021
11	0.92	0.13	0.033	(0.268)	0.012	0.021
12	1.00	0.13	0.033	(0.267)	0.012	0.021
13	1.08	0.10	0.025	(0.266)	0.009	0.016
14	1.17	0.10	0.025	(0.265)	0.009	0.016
15	1.25	0.10	0.025	(0.264)	0.009	0.016
16	1.33	0.10	0.025	(0.263)	0.009	0.016
17	1.42	0.10	0.025	(0.262)	0.009	0.016
18	1.50	0.10	0.025	(0.260)	0.009	0.016
19	1.58	0.10	0.025	(0.259)	0.009	0.016
20	1.67	0.10	0.025	(0.258)	0.009	0.016
21	1.75	0.10	0.025	(0.257)	0.009	0.016
22	1.83	0.13	0.033	(0.256)	0.012	0.021
23	1.92	0.13	0.033	(0.255)	0.012	0.021
24	2.00	0.13	0.033	(0.254)	0.012	0.021
25	2.08	0.13	0.033	(0.253)	0.012	0.021
26	2.17	0.13	0.033	(0.252)	0.012	0.021
27	2.25	0.13	0.033	(0.251)	0.012	0.021
28	2.33	0.13	0.033	(0.250)	0.012	0.021
29	2.42	0.13	0.033	(0.249)	0.012	0.021
30	2.50	0.13	0.033	(0.248)	0.012	0.021
31	2.58	0.17	0.041	(0.247)	0.015	0.026
32	2.67	0.17	0.041	(0.246)	0.015	0.026
33	2.75	0.17	0.041	(0.245)	0.015	0.026
34	2.83	0.17	0.041	(0.244)	0.015	0.026

35	2.92	0.17	0.041	(0.243)	0.015	0.026
36	3.00	0.17	0.041	(0.242)	0.015	0.026
37	3.08	0.17	0.041	(0.241)	0.015	0.026
38	3.17	0.17	0.041	(0.240)	0.015	0.026
39	3.25	0.17	0.041	(0.239)	0.015	0.026
40	3.33	0.17	0.041	(0.238)	0.015	0.026
41	3.42	0.17	0.041	(0.237)	0.015	0.026
42	3.50	0.17	0.041	(0.236)	0.015	0.026
43	3.58	0.17	0.041	(0.235)	0.015	0.026
44	3.67	0.17	0.041	(0.234)	0.015	0.026
45	3.75	0.17	0.041	(0.233)	0.015	0.026
46	3.83	0.20	0.049	(0.232)	0.018	0.031
47	3.92	0.20	0.049	(0.231)	0.018	0.031
48	4.00	0.20	0.049	(0.230)	0.018	0.031
49	4.08	0.20	0.049	(0.229)	0.018	0.031
50	4.17	0.20	0.049	(0.228)	0.018	0.031
51	4.25	0.20	0.049	(0.227)	0.018	0.031
52	4.33	0.23	0.057	(0.226)	0.021	0.037
53	4.42	0.23	0.057	(0.225)	0.021	0.037
54	4.50	0.23	0.057	(0.224)	0.021	0.037
55	4.58	0.23	0.057	(0.223)	0.021	0.037
56	4.67	0.23	0.057	(0.222)	0.021	0.037
57	4.75	0.23	0.057	(0.221)	0.021	0.037
58	4.83	0.27	0.066	(0.221)	0.024	0.042
59	4.92	0.27	0.066	(0.220)	0.024	0.042
60	5.00	0.27	0.066	(0.219)	0.024	0.042
61	5.08	0.20	0.049	(0.218)	0.018	0.031
62	5.17	0.20	0.049	(0.217)	0.018	0.031
63	5.25	0.20	0.049	(0.216)	0.018	0.031
64	5.33	0.23	0.057	(0.215)	0.021	0.037
65	5.42	0.23	0.057	(0.214)	0.021	0.037
66	5.50	0.23	0.057	(0.213)	0.021	0.037
67	5.58	0.27	0.066	(0.212)	0.024	0.042
68	5.67	0.27	0.066	(0.211)	0.024	0.042
69	5.75	0.27	0.066	(0.210)	0.024	0.042
70	5.83	0.27	0.066	(0.209)	0.024	0.042
71	5.92	0.27	0.066	(0.208)	0.024	0.042
72	6.00	0.27	0.066	(0.207)	0.024	0.042
73	6.08	0.30	0.074	(0.206)	0.027	0.047
74	6.17	0.30	0.074	(0.206)	0.027	0.047
75	6.25	0.30	0.074	(0.205)	0.027	0.047
76	6.33	0.30	0.074	(0.204)	0.027	0.047
77	6.42	0.30	0.074	(0.203)	0.027	0.047
78	6.50	0.30	0.074	(0.202)	0.027	0.047
79	6.58	0.33	0.082	(0.201)	0.030	0.052
80	6.67	0.33	0.082	(0.200)	0.030	0.052
81	6.75	0.33	0.082	(0.199)	0.030	0.052
82	6.83	0.33	0.082	(0.198)	0.030	0.052
83	6.92	0.33	0.082	(0.197)	0.030	0.052
84	7.00	0.33	0.082	(0.196)	0.030	0.052
85	7.08	0.33	0.082	(0.196)	0.030	0.052
86	7.17	0.33	0.082	(0.195)	0.030	0.052
87	7.25	0.33	0.082	(0.194)	0.030	0.052

88	7.33	0.37	0.090	(0.193)	0.033	0.057
89	7.42	0.37	0.090	(0.192)	0.033	0.057
90	7.50	0.37	0.090	(0.191)	0.033	0.057
91	7.58	0.40	0.098	(0.190)	0.036	0.063
92	7.67	0.40	0.098	(0.189)	0.036	0.063
93	7.75	0.40	0.098	(0.189)	0.036	0.063
94	7.83	0.43	0.107	(0.188)	0.039	0.068
95	7.92	0.43	0.107	(0.187)	0.039	0.068
96	8.00	0.43	0.107	(0.186)	0.039	0.068
97	8.08	0.50	0.123	(0.185)	0.045	0.078
98	8.17	0.50	0.123	(0.184)	0.045	0.078
99	8.25	0.50	0.123	(0.183)	0.045	0.078
100	8.33	0.50	0.123	(0.182)	0.045	0.078
101	8.42	0.50	0.123	(0.182)	0.045	0.078
102	8.50	0.50	0.123	(0.181)	0.045	0.078
103	8.58	0.53	0.131	(0.180)	0.048	0.083
104	8.67	0.53	0.131	(0.179)	0.048	0.083
105	8.75	0.53	0.131	(0.178)	0.048	0.083
106	8.83	0.57	0.139	(0.177)	0.051	0.089
107	8.92	0.57	0.139	(0.177)	0.051	0.089
108	9.00	0.57	0.139	(0.176)	0.051	0.089
109	9.08	0.63	0.156	(0.175)	0.057	0.099
110	9.17	0.63	0.156	(0.174)	0.057	0.099
111	9.25	0.63	0.156	(0.173)	0.057	0.099
112	9.33	0.67	0.164	(0.172)	0.060	0.104
113	9.42	0.67	0.164	(0.172)	0.060	0.104
114	9.50	0.67	0.164	(0.171)	0.060	0.104
115	9.58	0.70	0.172	(0.170)	0.063	0.110
116	9.67	0.70	0.172	(0.169)	0.063	0.110
117	9.75	0.70	0.172	(0.168)	0.063	0.110
118	9.83	0.73	0.180	(0.168)	0.066	0.115
119	9.92	0.73	0.180	(0.167)	0.066	0.115
120	10.00	0.73	0.180	(0.166)	0.066	0.115
121	10.08	0.50	0.123	(0.165)	0.045	0.078
122	10.17	0.50	0.123	(0.164)	0.045	0.078
123	10.25	0.50	0.123	(0.164)	0.045	0.078
124	10.33	0.50	0.123	(0.163)	0.045	0.078
125	10.42	0.50	0.123	(0.162)	0.045	0.078
126	10.50	0.50	0.123	(0.161)	0.045	0.078
127	10.58	0.67	0.164	(0.160)	0.060	0.104
128	10.67	0.67	0.164	(0.160)	0.060	0.104
129	10.75	0.67	0.164	(0.159)	0.060	0.104
130	10.83	0.67	0.164	(0.158)	0.060	0.104
131	10.92	0.67	0.164	(0.157)	0.060	0.104
132	11.00	0.67	0.164	(0.156)	0.060	0.104
133	11.08	0.63	0.156	(0.156)	0.057	0.099
134	11.17	0.63	0.156	(0.155)	0.057	0.099
135	11.25	0.63	0.156	(0.154)	0.057	0.099
136	11.33	0.63	0.156	(0.153)	0.057	0.099
137	11.42	0.63	0.156	(0.153)	0.057	0.099
138	11.50	0.63	0.156	(0.152)	0.057	0.099
139	11.58	0.57	0.139	(0.151)	0.051	0.089
140	11.67	0.57	0.139	(0.150)	0.051	0.089

141	11.75	0.57	0.139	(0.150)	0.051	0.089
142	11.83	0.60	0.148	(0.149)	0.054	0.094
143	11.92	0.60	0.148	(0.148)	0.054	0.094
144	12.00	0.60	0.148	(0.147)	0.054	0.094
145	12.08	0.83	0.205	(0.147)	0.075	0.130
146	12.17	0.83	0.205	(0.146)	0.075	0.130
147	12.25	0.83	0.205	(0.145)	0.075	0.130
148	12.33	0.87	0.213	(0.144)	0.078	0.136
149	12.42	0.87	0.213	(0.144)	0.078	0.136
150	12.50	0.87	0.213	(0.143)	0.078	0.136
151	12.58	0.93	0.230	(0.142)	0.084	0.146
152	12.67	0.93	0.230	(0.142)	0.084	0.146
153	12.75	0.93	0.230	(0.141)	0.084	0.146
154	12.83	0.97	0.238	(0.140)	0.087	0.151
155	12.92	0.97	0.238	(0.139)	0.087	0.151
156	13.00	0.97	0.238	(0.139)	0.087	0.151
157	13.08	1.13	0.279	(0.138)	0.101	0.177
158	13.17	1.13	0.279	(0.137)	0.101	0.177
159	13.25	1.13	0.279	(0.137)	0.101	0.177
160	13.33	1.13	0.279	(0.136)	0.101	0.177
161	13.42	1.13	0.279	(0.135)	0.101	0.177
162	13.50	1.13	0.279	(0.135)	0.101	0.177
163	13.58	0.77	0.189	(0.134)	0.069	0.120
164	13.67	0.77	0.189	(0.133)	0.069	0.120
165	13.75	0.77	0.189	(0.133)	0.069	0.120
166	13.83	0.77	0.189	(0.132)	0.069	0.120
167	13.92	0.77	0.189	(0.131)	0.069	0.120
168	14.00	0.77	0.189	(0.131)	0.069	0.120
169	14.08	0.90	0.221	(0.130)	0.081	0.141
170	14.17	0.90	0.221	(0.129)	0.081	0.141
171	14.25	0.90	0.221	(0.129)	0.081	0.141
172	14.33	0.87	0.213	(0.128)	0.078	0.136
173	14.42	0.87	0.213	(0.127)	0.078	0.136
174	14.50	0.87	0.213	(0.127)	0.078	0.136
175	14.58	0.87	0.213	(0.126)	0.078	0.136
176	14.67	0.87	0.213	(0.125)	0.078	0.136
177	14.75	0.87	0.213	(0.125)	0.078	0.136
178	14.83	0.83	0.205	(0.124)	0.075	0.130
179	14.92	0.83	0.205	(0.123)	0.075	0.130
180	15.00	0.83	0.205	(0.123)	0.075	0.130
181	15.08	0.80	0.197	(0.122)	0.072	0.125
182	15.17	0.80	0.197	(0.121)	0.072	0.125
183	15.25	0.80	0.197	(0.121)	0.072	0.125
184	15.33	0.77	0.189	(0.120)	0.069	0.120
185	15.42	0.77	0.189	(0.120)	0.069	0.120
186	15.50	0.77	0.189	(0.119)	0.069	0.120
187	15.58	0.63	0.156	(0.118)	0.057	0.099
188	15.67	0.63	0.156	(0.118)	0.057	0.099
189	15.75	0.63	0.156	(0.117)	0.057	0.099
190	15.83	0.63	0.156	(0.117)	0.057	0.099
191	15.92	0.63	0.156	(0.116)	0.057	0.099
192	16.00	0.63	0.156	(0.115)	0.057	0.099
193	16.08	0.13	0.033	(0.115)	0.012	0.021

194	16.17	0.13	0.033	(0.114)	0.012	0.021
195	16.25	0.13	0.033	(0.114)	0.012	0.021
196	16.33	0.13	0.033	(0.113)	0.012	0.021
197	16.42	0.13	0.033	(0.112)	0.012	0.021
198	16.50	0.13	0.033	(0.112)	0.012	0.021
199	16.58	0.10	0.025	(0.111)	0.009	0.016
200	16.67	0.10	0.025	(0.111)	0.009	0.016
201	16.75	0.10	0.025	(0.110)	0.009	0.016
202	16.83	0.10	0.025	(0.110)	0.009	0.016
203	16.92	0.10	0.025	(0.109)	0.009	0.016
204	17.00	0.10	0.025	(0.109)	0.009	0.016
205	17.08	0.17	0.041	(0.108)	0.015	0.026
206	17.17	0.17	0.041	(0.107)	0.015	0.026
207	17.25	0.17	0.041	(0.107)	0.015	0.026
208	17.33	0.17	0.041	(0.106)	0.015	0.026
209	17.42	0.17	0.041	(0.106)	0.015	0.026
210	17.50	0.17	0.041	(0.105)	0.015	0.026
211	17.58	0.17	0.041	(0.105)	0.015	0.026
212	17.67	0.17	0.041	(0.104)	0.015	0.026
213	17.75	0.17	0.041	(0.104)	0.015	0.026
214	17.83	0.13	0.033	(0.103)	0.012	0.021
215	17.92	0.13	0.033	(0.103)	0.012	0.021
216	18.00	0.13	0.033	(0.102)	0.012	0.021
217	18.08	0.13	0.033	(0.102)	0.012	0.021
218	18.17	0.13	0.033	(0.101)	0.012	0.021
219	18.25	0.13	0.033	(0.101)	0.012	0.021
220	18.33	0.13	0.033	(0.100)	0.012	0.021
221	18.42	0.13	0.033	(0.100)	0.012	0.021
222	18.50	0.13	0.033	(0.099)	0.012	0.021
223	18.58	0.10	0.025	(0.099)	0.009	0.016
224	18.67	0.10	0.025	(0.098)	0.009	0.016
225	18.75	0.10	0.025	(0.098)	0.009	0.016
226	18.83	0.07	0.016	(0.097)	0.006	0.010
227	18.92	0.07	0.016	(0.097)	0.006	0.010
228	19.00	0.07	0.016	(0.096)	0.006	0.010
229	19.08	0.10	0.025	(0.096)	0.009	0.016
230	19.17	0.10	0.025	(0.096)	0.009	0.016
231	19.25	0.10	0.025	(0.095)	0.009	0.016
232	19.33	0.13	0.033	(0.095)	0.012	0.021
233	19.42	0.13	0.033	(0.094)	0.012	0.021
234	19.50	0.13	0.033	(0.094)	0.012	0.021
235	19.58	0.10	0.025	(0.093)	0.009	0.016
236	19.67	0.10	0.025	(0.093)	0.009	0.016
237	19.75	0.10	0.025	(0.092)	0.009	0.016
238	19.83	0.07	0.016	(0.092)	0.006	0.010
239	19.92	0.07	0.016	(0.092)	0.006	0.010
240	20.00	0.07	0.016	(0.091)	0.006	0.010
241	20.08	0.10	0.025	(0.091)	0.009	0.016
242	20.17	0.10	0.025	(0.090)	0.009	0.016
243	20.25	0.10	0.025	(0.090)	0.009	0.016
244	20.33	0.10	0.025	(0.090)	0.009	0.016
245	20.42	0.10	0.025	(0.089)	0.009	0.016
246	20.50	0.10	0.025	(0.089)	0.009	0.016

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247  20.58     0.10      0.025       (  0.089)       0.009        0.016
248  20.67     0.10      0.025       (  0.088)       0.009        0.016
249  20.75     0.10      0.025       (  0.088)       0.009        0.016
250  20.83     0.07      0.016       (  0.087)       0.006        0.010
251  20.92     0.07      0.016       (  0.087)       0.006        0.010
252  21.00     0.07      0.016       (  0.087)       0.006        0.010
253  21.08     0.10      0.025       (  0.086)       0.009        0.016
254  21.17     0.10      0.025       (  0.086)       0.009        0.016
255  21.25     0.10      0.025       (  0.086)       0.009        0.016
256  21.33     0.07      0.016       (  0.085)       0.006        0.010
257  21.42     0.07      0.016       (  0.085)       0.006        0.010
258  21.50     0.07      0.016       (  0.085)       0.006        0.010
259  21.58     0.10      0.025       (  0.084)       0.009        0.016
260  21.67     0.10      0.025       (  0.084)       0.009        0.016
261  21.75     0.10      0.025       (  0.084)       0.009        0.016
262  21.83     0.07      0.016       (  0.084)       0.006        0.010
263  21.92     0.07      0.016       (  0.083)       0.006        0.010
264  22.00     0.07      0.016       (  0.083)       0.006        0.010
265  22.08     0.10      0.025       (  0.083)       0.009        0.016
266  22.17     0.10      0.025       (  0.082)       0.009        0.016
267  22.25     0.10      0.025       (  0.082)       0.009        0.016
268  22.33     0.07      0.016       (  0.082)       0.006        0.010
269  22.42     0.07      0.016       (  0.082)       0.006        0.010
270  22.50     0.07      0.016       (  0.081)       0.006        0.010
271  22.58     0.07      0.016       (  0.081)       0.006        0.010
272  22.67     0.07      0.016       (  0.081)       0.006        0.010
273  22.75     0.07      0.016       (  0.081)       0.006        0.010
274  22.83     0.07      0.016       (  0.081)       0.006        0.010
275  22.92     0.07      0.016       (  0.080)       0.006        0.010
276  23.00     0.07      0.016       (  0.080)       0.006        0.010
277  23.08     0.07      0.016       (  0.080)       0.006        0.010
278  23.17     0.07      0.016       (  0.080)       0.006        0.010
279  23.25     0.07      0.016       (  0.080)       0.006        0.010
280  23.33     0.07      0.016       (  0.079)       0.006        0.010
281  23.42     0.07      0.016       (  0.079)       0.006        0.010
282  23.50     0.07      0.016       (  0.079)       0.006        0.010
283  23.58     0.07      0.016       (  0.079)       0.006        0.010
284  23.67     0.07      0.016       (  0.079)       0.006        0.010
285  23.75     0.07      0.016       (  0.079)       0.006        0.010
286  23.83     0.07      0.016       (  0.079)       0.006        0.010
287  23.92     0.07      0.016       (  0.079)       0.006        0.010
288  24.00     0.07      0.016       (  0.079)       0.006        0.010
                (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    15.6
       Flood volume = Effective rainfall      1.30(In)
        times area      14.0(Ac.)/[(In)/(Ft.)] =       1.5(Ac.Ft)
       Total soil loss =      0.75(In)
       Total soil loss =     0.869(Ac.Ft)
       Total rainfall =      2.05(In)
       Flood volume =       66115.3 Cubic Feet
       Total soil loss =       37839.6 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =      2.374(CFS)
```

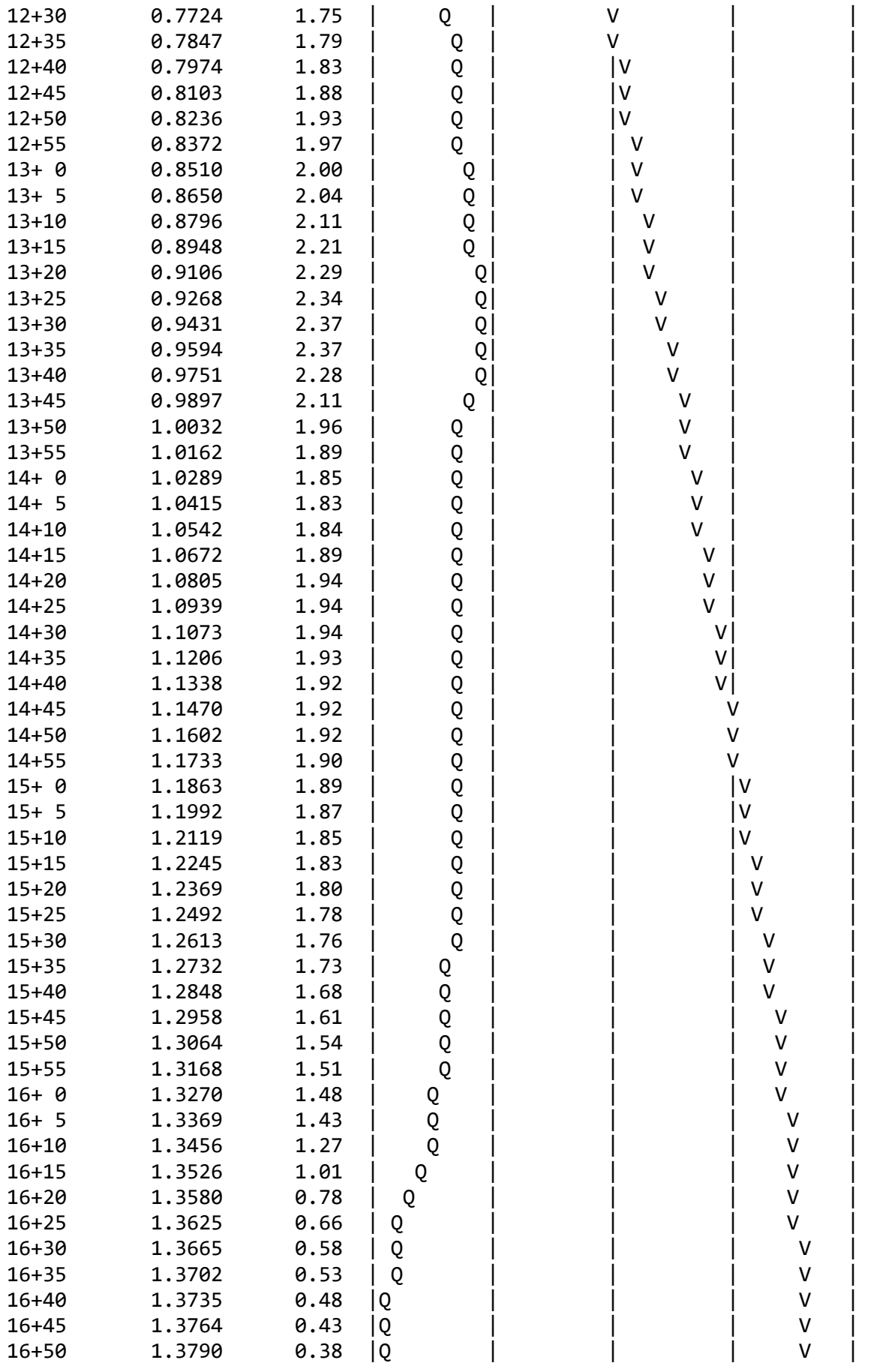
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

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	0.0000	0.01	Q				
0+10	0.0002	0.02	Q				
0+15	0.0006	0.06	Q				
0+20	0.0012	0.09	Q				
0+25	0.0020	0.12	Q				
0+30	0.0030	0.14	Q				
0+35	0.0041	0.16	Q				
0+40	0.0053	0.17	Q				
0+45	0.0066	0.18	Q				
0+50	0.0079	0.19	Q				
0+55	0.0093	0.21	Q				
1+ 0	0.0109	0.23	Q				
1+ 5	0.0126	0.24	Q				
1+10	0.0143	0.24	Q				
1+15	0.0159	0.24	Q				
1+20	0.0174	0.23	Q				
1+25	0.0190	0.22	Q				
1+30	0.0205	0.22	Q				
1+35	0.0220	0.22	Q				
1+40	0.0236	0.22	Q				
1+45	0.0251	0.22	Q				
1+50	0.0266	0.22	Q				
1+55	0.0282	0.23	Q				
2+ 0	0.0300	0.25	VQ				
2+ 5	0.0318	0.27	VQ				
2+10	0.0337	0.27	VQ				
2+15	0.0356	0.28	VQ				
2+20	0.0375	0.28	VQ				
2+25	0.0395	0.28	|Q				
2+30	0.0414	0.29	|Q				
2+35	0.0434	0.29	|Q				
2+40	0.0455	0.30	|Q				
2+45	0.0477	0.32	|Q				
2+50	0.0500	0.33	|Q				
2+55	0.0523	0.34	|Q				
3+ 0	0.0547	0.35	|Q				
3+ 5	0.0571	0.35	|Q				
3+10	0.0596	0.35	|Q				
3+15	0.0620	0.36	|Q				
3+20	0.0645	0.36	|Q				
3+25	0.0670	0.36	|Q				
3+30	0.0694	0.36	|Q				
3+35	0.0719	0.36	|Q				

3+40	0.0744	0.36	Q				
3+45	0.0769	0.36	QV				
3+50	0.0795	0.37	QV				
3+55	0.0821	0.38	QV				
4+ 0	0.0848	0.39	QV				
4+ 5	0.0876	0.41	QV				
4+10	0.0905	0.42	QV				
4+15	0.0934	0.42	QV				
4+20	0.0964	0.43	QV				
4+25	0.0994	0.44	QV				
4+30	0.1026	0.46	QV				
4+35	0.1058	0.48	QV				
4+40	0.1092	0.49	QV				
4+45	0.1126	0.49	QV				
4+50	0.1160	0.50	Q V				
4+55	0.1195	0.51	QV				
5+ 0	0.1232	0.53	QV				
5+ 5	0.1269	0.54	QV				
5+10	0.1306	0.53	QV				
5+15	0.1340	0.50	QV				
5+20	0.1374	0.48	Q V				
5+25	0.1407	0.48	Q V				
5+30	0.1441	0.49	Q V				
5+35	0.1475	0.50	QV				
5+40	0.1511	0.52	QV				
5+45	0.1548	0.54	Q V				
5+50	0.1586	0.55	Q V				
5+55	0.1625	0.56	Q V				
6+ 0	0.1664	0.57	Q V				
6+ 5	0.1704	0.57	Q V				
6+10	0.1744	0.59	Q V				
6+15	0.1786	0.61	Q V				
6+20	0.1829	0.62	Q V				
6+25	0.1872	0.63	Q V				
6+30	0.1916	0.64	Q V				
6+35	0.1960	0.64	Q V				
6+40	0.2006	0.66	Q V				
6+45	0.2052	0.68	Q V				
6+50	0.2100	0.69	Q V				
6+55	0.2149	0.70	Q V				
7+ 0	0.2197	0.71	Q V				
7+ 5	0.2247	0.71	Q V				
7+10	0.2296	0.72	Q V				
7+15	0.2346	0.72	Q V				
7+20	0.2396	0.73	Q V				
7+25	0.2447	0.74	Q V				
7+30	0.2499	0.76	Q V				
7+35	0.2552	0.77	Q V				
7+40	0.2607	0.79	Q V				
7+45	0.2663	0.82	Q V				
7+50	0.2720	0.84	Q V				
7+55	0.2780	0.86	Q V				
8+ 0	0.2840	0.88	Q V				

8+ 5	0.2903	0.91	Q V				
8+10	0.2967	0.94	Q V				
8+15	0.3035	0.98	Q V				
8+20	0.3105	1.01	Q V				
8+25	0.3176	1.04	Q V				
8+30	0.3248	1.05	Q V				
8+35	0.3321	1.06	Q V				
8+40	0.3395	1.08	Q V				
8+45	0.3471	1.10	Q V				
8+50	0.3549	1.12	Q V				
8+55	0.3627	1.15	Q V				
9+ 0	0.3708	1.17	Q V				
9+ 5	0.3790	1.20	Q V				
9+10	0.3875	1.23	Q V				
9+15	0.3963	1.27	Q V				
9+20	0.4053	1.31	Q V				
9+25	0.4145	1.34	Q V				
9+30	0.4239	1.37	Q V				
9+35	0.4336	1.40	Q V				
9+40	0.4434	1.42	Q V				
9+45	0.4534	1.45	Q V				
9+50	0.4635	1.48	Q V				
9+55	0.4739	1.50	Q V				
10+ 0	0.4844	1.53	Q V				
10+ 5	0.4950	1.53	Q V				
10+10	0.5051	1.48	Q V				
10+15	0.5146	1.37	Q V				
10+20	0.5234	1.28	Q V				
10+25	0.5318	1.23	Q V				
10+30	0.5401	1.20	Q V				
10+35	0.5483	1.20	Q V				
10+40	0.5568	1.23	Q V				
10+45	0.5658	1.30	Q V				
10+50	0.5752	1.37	Q V				
10+55	0.5848	1.40	Q V				
11+ 0	0.5946	1.42	Q V				
11+ 5	0.6044	1.42	Q V				
11+10	0.6142	1.42	Q V				
11+15	0.6239	1.41	Q V				
11+20	0.6336	1.40	Q V				
11+25	0.6432	1.40	Q V				
11+30	0.6528	1.40	Q V				
11+35	0.6624	1.39	Q V				
11+40	0.6718	1.37	Q V				
11+45	0.6810	1.34	Q V				
11+50	0.6900	1.31	Q V				
11+55	0.6990	1.30	Q V				
12+ 0	0.7080	1.31	Q V				
12+ 5	0.7172	1.34	Q V				
12+10	0.7270	1.41	Q V				
12+15	0.7375	1.53	Q V				
12+20	0.7487	1.63	Q V				
12+25	0.7604	1.70	Q V				



16+55	1.3815	0.35	|Q	|	|	|	V |
17+ 0	1.3837	0.33	|Q	|	|	|	V |
17+ 5	1.3859	0.32	|Q	|	|	|	V |
17+10	1.3881	0.32	|Q	|	|	|	V |
17+15	1.3905	0.34	|Q	|	|	|	V |
17+20	1.3929	0.36	|Q	|	|	|	V |
17+25	1.3954	0.36	|Q	|	|	|	V |
17+30	1.3979	0.36	|Q	|	|	|	V |
17+35	1.4004	0.36	|Q	|	|	|	V |
17+40	1.4029	0.36	|Q	|	|	|	V |
17+45	1.4054	0.36	|Q	|	|	|	V |
17+50	1.4079	0.36	|Q	|	|	|	V |
17+55	1.4103	0.35	|Q	|	|	|	V |
18+ 0	1.4125	0.33	|Q	|	|	|	V |
18+ 5	1.4147	0.32	|Q	|	|	|	V |
18+10	1.4168	0.31	|Q	|	|	|	V |
18+15	1.4189	0.31	|Q	|	|	|	V |
18+20	1.4210	0.30	|Q	|	|	|	V |
18+25	1.4231	0.30	|Q	|	|	|	V |
18+30	1.4252	0.30	|Q	|	|	|	V |
18+35	1.4272	0.30	|Q	|	|	|	V |
18+40	1.4292	0.29	|Q	|	|	|	V |
18+45	1.4310	0.27	|Q	|	|	|	V |
18+50	1.4328	0.25	|Q	|	|	|	V |
18+55	1.4344	0.23	Q	|	|	|	V |
19+ 0	1.4358	0.21	Q	|	|	|	V |
19+ 5	1.4372	0.20	Q	|	|	|	V |
19+10	1.4385	0.20	Q	|	|	|	V |
19+15	1.4399	0.20	Q	|	|	|	V |
19+20	1.4414	0.22	Q	|	|	|	V |
19+25	1.4430	0.23	Q	|	|	|	V |
19+30	1.4447	0.25	Q	|	|	|	V |
19+35	1.4465	0.26	|Q	|	|	|	V |
19+40	1.4483	0.26	|Q	|	|	|	V |
19+45	1.4500	0.25	Q	|	|	|	V |
19+50	1.4516	0.23	Q	|	|	|	V |
19+55	1.4531	0.22	Q	|	|	|	V |
20+ 0	1.4545	0.20	Q	|	|	|	V |
20+ 5	1.4557	0.18	Q	|	|	|	V |
20+10	1.4570	0.19	Q	|	|	|	V |
20+15	1.4584	0.20	Q	|	|	|	V |
20+20	1.4598	0.21	Q	|	|	|	V |
20+25	1.4612	0.21	Q	|	|	|	V |
20+30	1.4627	0.21	Q	|	|	|	V |
20+35	1.4642	0.22	Q	|	|	|	V |
20+40	1.4657	0.22	Q	|	|	|	V |
20+45	1.4672	0.22	Q	|	|	|	V |
20+50	1.4687	0.22	Q	|	|	|	V |
20+55	1.4701	0.21	Q	|	|	|	V |
21+ 0	1.4714	0.19	Q	|	|	|	V |
21+ 5	1.4726	0.18	Q	|	|	|	V |
21+10	1.4739	0.18	Q	|	|	|	V |
21+15	1.4752	0.19	Q	|	|	|	V |

21+20	1.4766	0.20	Q	|	|	|	V |
21+25	1.4779	0.20	Q	|	|	|	V |
21+30	1.4792	0.18	Q	|	|	|	V |
21+35	1.4804	0.17	Q	|	|	|	V|
21+40	1.4816	0.18	Q	|	|	|	V|
21+45	1.4829	0.19	Q	|	|	|	V|
21+50	1.4843	0.20	Q	|	|	|	V|
21+55	1.4856	0.19	Q	|	|	|	V|
22+ 0	1.4868	0.18	Q	|	|	|	V|
22+ 5	1.4880	0.17	Q	|	|	|	V|
22+10	1.4892	0.17	Q	|	|	|	V|
22+15	1.4905	0.19	Q	|	|	|	V|
22+20	1.4919	0.20	Q	|	|	|	V|
22+25	1.4932	0.19	Q	|	|	|	V|
22+30	1.4945	0.18	Q	|	|	|	V|
22+35	1.4956	0.17	Q	|	|	|	V|
22+40	1.4967	0.16	Q	|	|	|	V|
22+45	1.4978	0.16	Q	|	|	|	V|
22+50	1.4989	0.16	Q	|	|	|	V|
22+55	1.5000	0.15	Q	|	|	|	V|
23+ 0	1.5010	0.15	Q	|	|	|	V|
23+ 5	1.5021	0.15	Q	|	|	|	V|
23+10	1.5031	0.15	Q	|	|	|	V|
23+15	1.5041	0.15	Q	|	|	|	V|
23+20	1.5052	0.15	Q	|	|	|	V|
23+25	1.5062	0.15	Q	|	|	|	V|
23+30	1.5072	0.15	Q	|	|	|	V|
23+35	1.5082	0.15	Q	|	|	|	V|
23+40	1.5093	0.15	Q	|	|	|	V|
23+45	1.5103	0.15	Q	|	|	|	V|
23+50	1.5113	0.15	Q	|	|	|	V|
23+55	1.5123	0.15	Q	|	|	|	V|
24+ 0	1.5133	0.15	Q	|	|	|	V|
24+ 5	1.5143	0.14	Q	|	|	|	V|
24+10	1.5152	0.12	Q	|	|	|	V|
24+15	1.5158	0.09	Q	|	|	|	V|
24+20	1.5162	0.06	Q	|	|	|	V|
24+25	1.5165	0.04	Q	|	|	|	V|
24+30	1.5167	0.03	Q	|	|	|	V|
24+35	1.5169	0.03	Q	|	|	|	V|
24+40	1.5171	0.02	Q	|	|	|	V|
24+45	1.5172	0.02	Q	|	|	|	V|
24+50	1.5173	0.02	Q	|	|	|	V|
24+55	1.5174	0.01	Q	|	|	|	V|
25+ 0	1.5175	0.01	Q	|	|	|	V|
25+ 5	1.5176	0.01	Q	|	|	|	V|
25+10	1.5176	0.01	Q	|	|	|	V|
25+15	1.5177	0.01	Q	|	|	|	V|
25+20	1.5177	0.01	Q	|	|	|	V|
25+25	1.5177	0.00	Q	|	|	|	V|
25+30	1.5177	0.00	Q	|	|	|	V|
25+35	1.5178	0.00	Q	|	|	|	V|
25+40	1.5178	0.00	Q	|	|	|	V|

```
   25+45       1.5178      0.00  Q         |         |         |        V|
   25+50       1.5178      0.00  Q         |         |         |        V|
   25+55       1.5178      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
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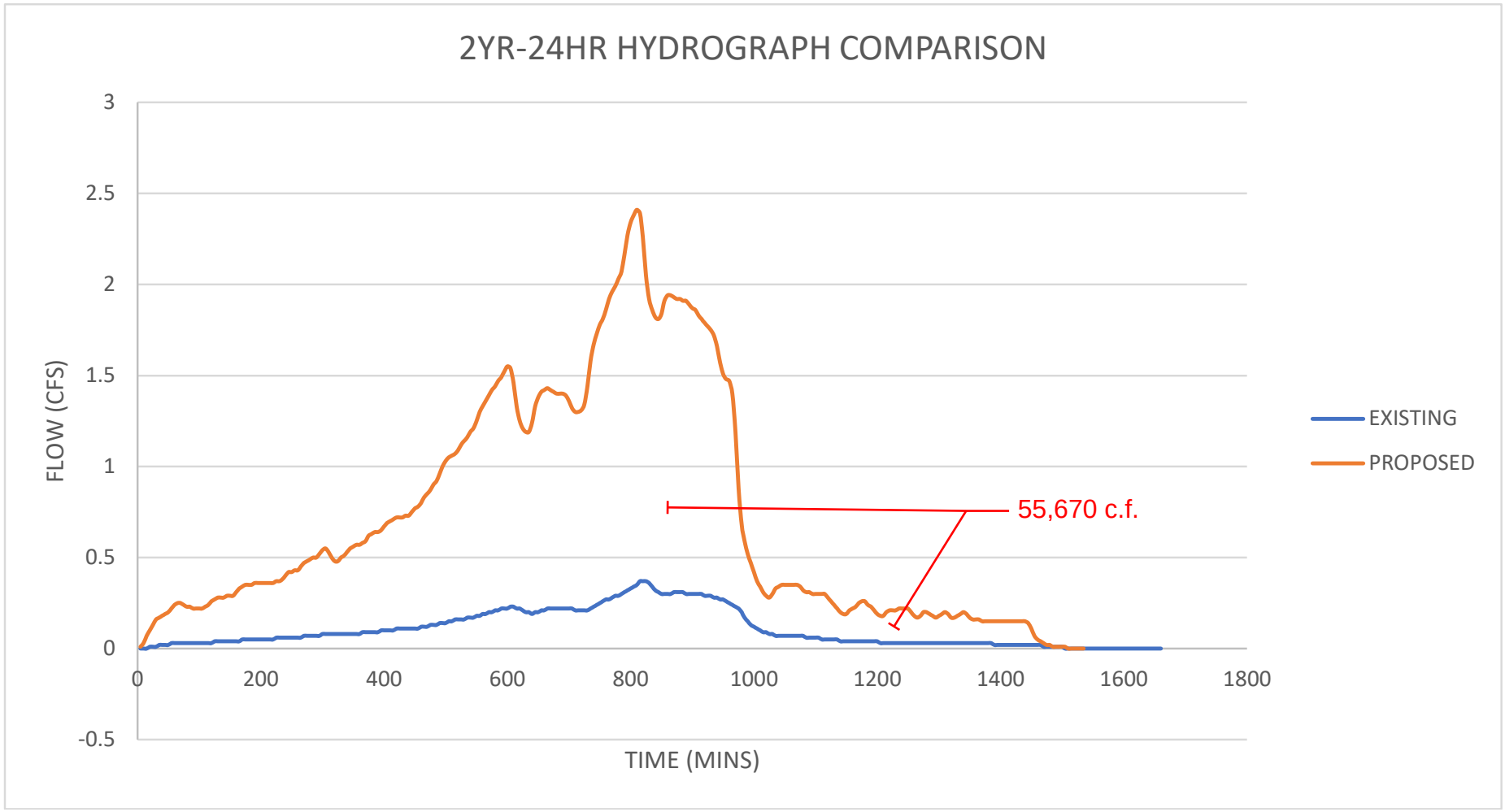
2YR-24HR HYDROGRAPH COMPARISON
FLOW (CFS)
3
2.5
2
1.5
1
0.5
0
-0.5
0
200
400
600
800
1000
1200
1400
1600
1800
TIME (MINS)
55,670 c.f.
EXISTING
PROPOSED

Prelim Basin Volume

Project: Pilot Perris

Basin Description: BMP-1

Contour Elevation	Contour Area (sq. ft)	Depth (ft)	Incremental Volume Avg. End (cu. ft)	Cumulative Volume Avg. End (cu. ft)	Incremental Volume Conic (cu. ft)	Cumulative Volume Conic (cu. ft)
1,416.300	36,306.67	N/A	N/A	0.00	N/A	0.00
1,416.500	37,040.35	0.200	7334.70	7334.70	7334.58	7334.58
1,417.000	40,050.26	0.500	19272.65	26607.35	19267.75	26602.33
1,417.500	44,986.52	0.500	21259.19	47866.55	21247.24	47849.58
1,418.000	50,208.87	0.500	23798.85	71665.39	23786.90	71636.48
1,418.500	55,728.50	0.500	26484.34	98149.73	26472.35	98108.83
1,419.000	61,542.39	0.500	29317.72	127467.45	29305.70	127414.53
1,419.500	67,647.94	0.500	32297.58	159765.04	32285.55	159700.08
1,420.000	74,043.99	0.500	35422.98	195188.02	35410.95	195111.03
1,420.400	79,369.27	0.400	30682.65	225870.67	30676.49	225787.52

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	**… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☑ **A.** On-site storm drain inlets	☑ Locations of inlets.	☑ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☑ Maintain and periodically repaint or replace inlet markings. ☑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☑ **B.** Interior floor drains and elevator shaft sump pumps		☑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☑ Inspect and maintain drains to prevent blockages and overflow.
☒ **C.** Interior parking garages		☒ State that parking garage floor drains will be plumbed to the sanitary sewer.	☒ Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☑ **D1.** 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.
☑ **D2.** Landscape/ Outdoor Pesticide Use	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☑ Show self-retaining landscape areas, if any. ☑ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	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.	☑ 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.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **E.** Pools, spas, ponds, decorative fountains, and other water features.	☒ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☒ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☑ **F.** Food service	☑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☑ Describe the location and features of the designated cleaning area. ☑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☑ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
☑ **G.** Refuse areas	☑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☑ 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.	☑ 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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☒ **H.** Industrial processes.	☒ Show process area.	☒ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	☒ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

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X **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	X Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. X Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. X Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	X Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	X See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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☒ **J.** Vehicle and Equipment Cleaning	☒ Show on drawings as appropriate: **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	☒ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ☒ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ☐ **Car dealerships and similar may rinse cars with water only.**

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☒ **K.** Vehicle/Equipment Repair and Maintenance	☒ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ☒ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ☒ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☒ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☒ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☒ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☒ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ☒ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ☒ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

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☑ **L.** Fuel Dispensing Areas	☑ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		☑ The property owner shall dry sweep the fueling area routinely. ☑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

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☒ **M.** Loading Docks	☒ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☒ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☒ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☒ 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

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☑ **N.** 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
O. Miscellaneous Drain or Wash Water or Other Sources ☑ Boiler drain lines ☑ Condensate drain lines ☒ Rooftop equipment ☒ Drainage sumps ☑ Roofing, gutters, and trim. ☒ 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. Include controls for other sources as specified by local reviewer.	

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☑ **P.** Plazas, sidewalks, and parking lots.			☑ 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.

Appendix 9: O&M

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

TO BE PROVIDED IN FINAL

Appendix 10: Educational Materials

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

TO BE PROVIDED IN FINAL