```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       65.60            1.00                  65.60

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       65.60            2.50                 164.00

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.000(In)
Area Averaged 100-Year Rainfall =    2.500(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    2.499(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    44.000           56.00         0.500
    21.600           75.00         0.500
 Total Area Entered =     65.60(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
56.0  56.0      0.511     0.500        0.281       0.671      0.188
75.0  75.0      0.303     0.500        0.167       0.329      0.055
                                                 Sum (F) =   0.243
Area averaged mean soil loss (F) (In/Hr) =  0.243
Minimum soil loss rate ((In/Hr)) =  0.122
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------
    1   0.083         59.573          8.119              5.367
    2   0.167        119.146         33.665             22.257
    3   0.250        178.719         26.721             17.666
    4   0.333        238.292         10.380              6.863
    5   0.417        297.865          6.122              4.048
    6   0.500        357.438          4.144              2.740
```

7	0.583	417.011	2.958	1.955
8	0.667	476.584	2.077	1.373
9	0.750	536.157	1.718	1.136
10	0.833	595.730	1.277	0.844
11	0.917	655.303	0.975	0.645
12	1.000	714.876	0.695	0.460
13	1.083	774.448	0.596	0.394
14	1.167	834.021	0.553	0.366
			Sum = 100.000	Sum= 66.112

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	0.50	0.150	(0.243)	0.075	0.075
2	0.17	0.60	0.180	(0.243)	0.090	0.090
3	0.25	0.60	0.180	(0.243)	0.090	0.090
4	0.33	0.60	0.180	(0.243)	0.090	0.090
5	0.42	0.60	0.180	(0.243)	0.090	0.090
6	0.50	0.70	0.210	(0.243)	0.105	0.105
7	0.58	0.70	0.210	(0.243)	0.105	0.105
8	0.67	0.70	0.210	(0.243)	0.105	0.105
9	0.75	0.70	0.210	(0.243)	0.105	0.105
10	0.83	0.70	0.210	(0.243)	0.105	0.105
11	0.92	0.70	0.210	(0.243)	0.105	0.105
12	1.00	0.80	0.240	(0.243)	0.120	0.120
13	1.08	0.80	0.240	(0.243)	0.120	0.120
14	1.17	0.80	0.240	(0.243)	0.120	0.120
15	1.25	0.80	0.240	(0.243)	0.120	0.120
16	1.33	0.80	0.240	(0.243)	0.120	0.120
17	1.42	0.80	0.240	(0.243)	0.120	0.120
18	1.50	0.80	0.240	(0.243)	0.120	0.120
19	1.58	0.80	0.240	(0.243)	0.120	0.120
20	1.67	0.80	0.240	(0.243)	0.120	0.120
21	1.75	0.80	0.240	(0.243)	0.120	0.120
22	1.83	0.80	0.240	(0.243)	0.120	0.120
23	1.92	0.80	0.240	(0.243)	0.120	0.120
24	2.00	0.90	0.270	(0.243)	0.135	0.135
25	2.08	0.80	0.240	(0.243)	0.120	0.120
26	2.17	0.90	0.270	(0.243)	0.135	0.135
27	2.25	0.90	0.270	(0.243)	0.135	0.135
28	2.33	0.90	0.270	(0.243)	0.135	0.135
29	2.42	0.90	0.270	(0.243)	0.135	0.135
30	2.50	0.90	0.270	(0.243)	0.135	0.135
31	2.58	0.90	0.270	(0.243)	0.135	0.135
32	2.67	0.90	0.270	(0.243)	0.135	0.135
33	2.75	1.00	0.300	(0.243)	0.150	0.150

34	2.83	1.00	0.300	(0.243)	0.150	0.150
35	2.92	1.00	0.300	(0.243)	0.150	0.150
36	3.00	1.00	0.300	(0.243)	0.150	0.150
37	3.08	1.00	0.300	(0.243)	0.150	0.150
38	3.17	1.10	0.330	(0.243)	0.165	0.165
39	3.25	1.10	0.330	(0.243)	0.165	0.165
40	3.33	1.10	0.330	(0.243)	0.165	0.165
41	3.42	1.20	0.360	(0.243)	0.180	0.180
42	3.50	1.30	0.390	(0.243)	0.195	0.195
43	3.58	1.40	0.420	(0.243)	0.210	0.210
44	3.67	1.40	0.420	(0.243)	0.210	0.210
45	3.75	1.50	0.450	(0.243)	0.225	0.225
46	3.83	1.50	0.450	(0.243)	0.225	0.225
47	3.92	1.60	0.480	(0.243)	0.240	0.240
48	4.00	1.60	0.480	(0.243)	0.240	0.240
49	4.08	1.70	0.510	0.243	(0.255)	0.267
50	4.17	1.80	0.540	0.243	(0.270)	0.297
51	4.25	1.90	0.570	0.243	(0.285)	0.327
52	4.33	2.00	0.600	0.243	(0.300)	0.357
53	4.42	2.10	0.630	0.243	(0.315)	0.387
54	4.50	2.10	0.630	0.243	(0.315)	0.387
55	4.58	2.20	0.660	0.243	(0.330)	0.417
56	4.67	2.30	0.690	0.243	(0.345)	0.447
57	4.75	2.40	0.720	0.243	(0.360)	0.477
58	4.83	2.40	0.720	0.243	(0.360)	0.477
59	4.92	2.50	0.750	0.243	(0.375)	0.507
60	5.00	2.60	0.780	0.243	(0.390)	0.537
61	5.08	3.10	0.930	0.243	(0.465)	0.686
62	5.17	3.60	1.080	0.243	(0.540)	0.836
63	5.25	3.90	1.170	0.243	(0.585)	0.926
64	5.33	4.20	1.260	0.243	(0.630)	1.016
65	5.42	4.70	1.410	0.243	(0.705)	1.166
66	5.50	5.60	1.680	0.243	(0.840)	1.436
67	5.58	1.90	0.570	0.243	(0.285)	0.327
68	5.67	0.90	0.270	(0.243)	0.135	0.135
69	5.75	0.60	0.180	(0.243)	0.090	0.090
70	5.83	0.50	0.150	(0.243)	0.075	0.075
71	5.92	0.30	0.090	(0.243)	0.045	0.045
72	6.00	0.20	0.060	(0.243)	0.030	0.030

(Loss Rate Not Used)

Sum = 100.0 Sum = 18.3

Flood volume = Effective rainfall 1.53(In)
times area 65.6(Ac.)/[(In)/(Ft.)] = 8.3(Ac.Ft)
Total soil loss = 0.97(In)
Total soil loss = 5.317(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 363581.3 Cubic Feet
Total soil loss = 231604.5 Cubic Feet

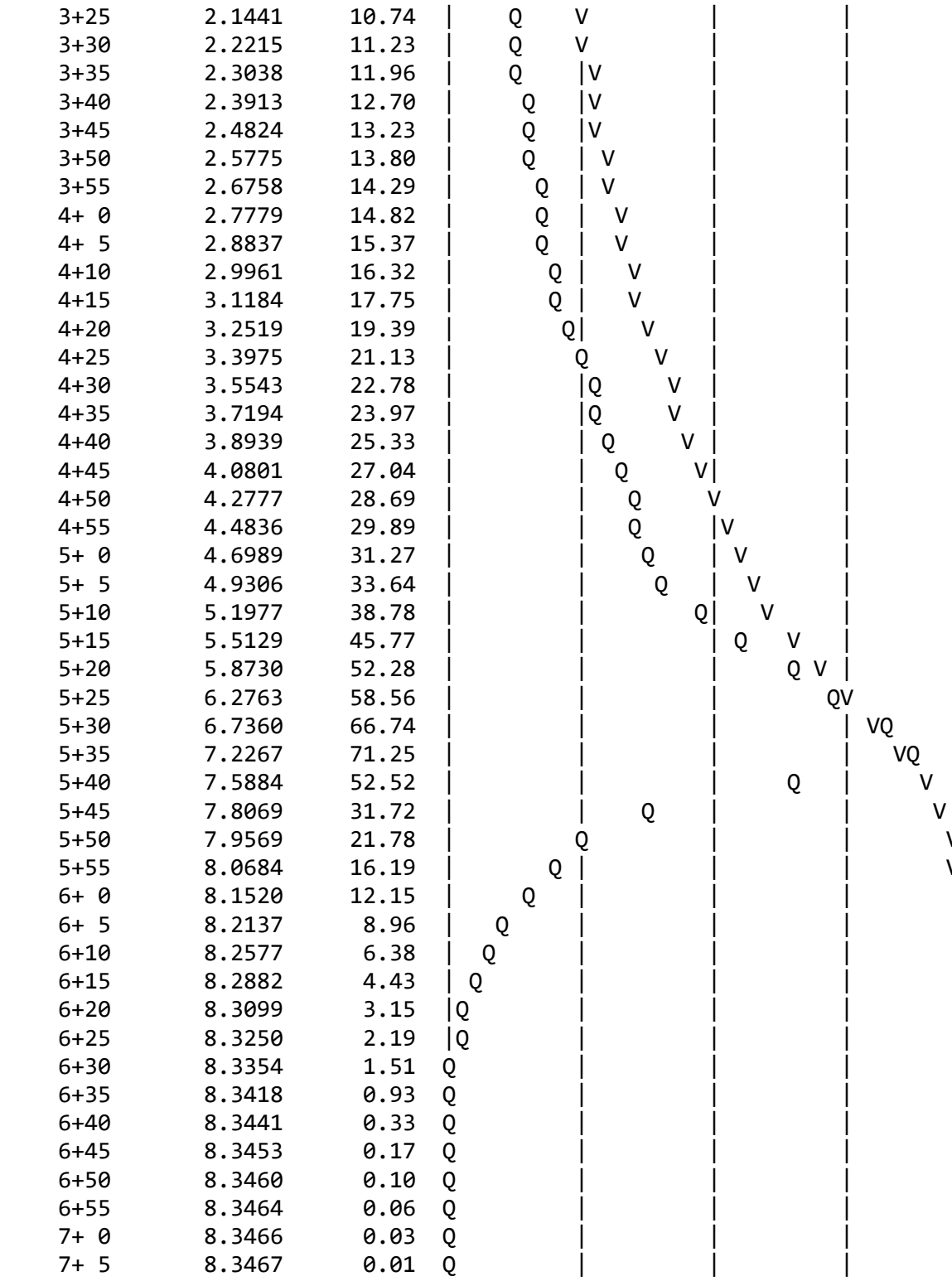
Peak flow rate of this hydrograph = 71.253(CFS)

6 - 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	20.0	40.0	60.0	80.0
0+ 5	0.0028	0.40	Q				
0+10	0.0176	2.15	VQ				
0+15	0.0439	3.81	VQ				
0+20	0.0755	4.59	V Q				
0+25	0.1099	5.00	V Q				
0+30	0.1467	5.35	V Q				
0+35	0.1871	5.87	V Q				
0+40	0.2303	6.26	V Q				
0+45	0.2749	6.47	V Q				
0+50	0.3204	6.61	V Q				
0+55	0.3667	6.72	V Q				
1+ 0	0.4140	6.87	V Q				
1+ 5	0.4640	7.26	VQ				
1+10	0.5162	7.58	VQ				
1+15	0.5692	7.70	VQ				
1+20	0.6227	7.77	VQ				
1+25	0.6766	7.82	Q				
1+30	0.7306	7.85	Q				
1+35	0.7849	7.88	Q				
1+40	0.8393	7.90	QV				
1+45	0.8937	7.91	QV				
1+50	0.9482	7.92	QV				
1+55	1.0028	7.92	QV				
2+ 0	1.0580	8.01	QV				
2+ 5	1.1150	8.27	QV				
2+10	1.1720	8.28	QV				
2+15	1.2302	8.45	QV				
2+20	1.2900	8.68	Q V				
2+25	1.3503	8.76	Q V				
2+30	1.4109	8.81	Q V				
2+35	1.4718	8.84	Q V				
2+40	1.5329	8.87	Q V				
2+45	1.5946	8.96	Q V				
2+50	1.6588	9.31	Q V				
2+55	1.7248	9.59	Q V				
3+ 0	1.7916	9.70	Q V				
3+ 5	1.8588	9.77	Q V				
3+10	1.9269	9.89	Q V				
3+15	1.9975	10.26	Q V				
3+20	2.0701	10.54	Q V				



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

Study date 12/21/23 File: A11TRIB1000SERIES24100.out

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

Program License Serial Number 6586

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
OFFSITE UNIT HYDROGRAPH ANALYSIS
A-11 TRIBUTARY, 100-YEAR 24-HOUR
FN: A11TRIB1000SERIES.OUT- RSB

Drainage Area = 65.60(Ac.) = 0.102 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 65.60(Ac.) = 0.102 Sq. Mi.
Length along longest watercourse = 3208.00(Ft.)
Length along longest watercourse measured to centroid = 1567.00(Ft.)
Length along longest watercourse = 0.608 Mi.
Length along longest watercourse measured to centroid = 0.297 Mi.
Difference in elevation = 13.00(Ft.)
Slope along watercourse = 21.3965 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.140 Hr.
Lag time = 8.39 Min.
25% of lag time = 2.10 Min.
40% of lag time = 3.36 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]
       65.60            1.60                 104.96

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       65.60            4.00                 262.40

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    4.000(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    3.999(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    44.000           56.00         0.500
    21.600           75.00         0.500
 Total Area Entered =     65.60(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
56.0  56.0      0.511     0.500        0.281       0.671      0.188
75.0  75.0      0.303     0.500        0.167       0.329      0.055
                                                 Sum (F) =   0.243
Area averaged mean soil loss (F) (In/Hr) =  0.243
Minimum soil loss rate ((In/Hr)) =  0.122
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------
    1   0.083         59.573          8.119              5.367
    2   0.167        119.146         33.665             22.257
    3   0.250        178.719         26.721             17.666
    4   0.333        238.292         10.380              6.863
    5   0.417        297.865          6.122              4.048
    6   0.500        357.438          4.144              2.740
```

7	0.583	417.011	2.958	1.955
8	0.667	476.584	2.077	1.373
9	0.750	536.157	1.718	1.136
10	0.833	595.730	1.277	0.844
11	0.917	655.303	0.975	0.645
12	1.000	714.876	0.695	0.460
13	1.083	774.448	0.596	0.394
14	1.167	834.021	0.553	0.366
			Sum = 100.000	Sum= 66.112

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	0.032	(0.431)	0.016	0.016
2	0.17	0.07	0.032	(0.430)	0.016	0.016
3	0.25	0.07	0.032	(0.428)	0.016	0.016
4	0.33	0.10	0.048	(0.426)	0.024	0.024
5	0.42	0.10	0.048	(0.425)	0.024	0.024
6	0.50	0.10	0.048	(0.423)	0.024	0.024
7	0.58	0.10	0.048	(0.421)	0.024	0.024
8	0.67	0.10	0.048	(0.420)	0.024	0.024
9	0.75	0.10	0.048	(0.418)	0.024	0.024
10	0.83	0.13	0.064	(0.416)	0.032	0.032
11	0.92	0.13	0.064	(0.415)	0.032	0.032
12	1.00	0.13	0.064	(0.413)	0.032	0.032
13	1.08	0.10	0.048	(0.412)	0.024	0.024
14	1.17	0.10	0.048	(0.410)	0.024	0.024
15	1.25	0.10	0.048	(0.408)	0.024	0.024
16	1.33	0.10	0.048	(0.407)	0.024	0.024
17	1.42	0.10	0.048	(0.405)	0.024	0.024
18	1.50	0.10	0.048	(0.403)	0.024	0.024
19	1.58	0.10	0.048	(0.402)	0.024	0.024
20	1.67	0.10	0.048	(0.400)	0.024	0.024
21	1.75	0.10	0.048	(0.399)	0.024	0.024
22	1.83	0.13	0.064	(0.397)	0.032	0.032
23	1.92	0.13	0.064	(0.395)	0.032	0.032
24	2.00	0.13	0.064	(0.394)	0.032	0.032
25	2.08	0.13	0.064	(0.392)	0.032	0.032
26	2.17	0.13	0.064	(0.391)	0.032	0.032
27	2.25	0.13	0.064	(0.389)	0.032	0.032
28	2.33	0.13	0.064	(0.387)	0.032	0.032
29	2.42	0.13	0.064	(0.386)	0.032	0.032
30	2.50	0.13	0.064	(0.384)	0.032	0.032
31	2.58	0.17	0.080	(0.383)	0.040	0.040
32	2.67	0.17	0.080	(0.381)	0.040	0.040
33	2.75	0.17	0.080	(0.380)	0.040	0.040

34	2.83	0.17	0.080	(0.378)	0.040	0.040
35	2.92	0.17	0.080	(0.376)	0.040	0.040
36	3.00	0.17	0.080	(0.375)	0.040	0.040
37	3.08	0.17	0.080	(0.373)	0.040	0.040
38	3.17	0.17	0.080	(0.372)	0.040	0.040
39	3.25	0.17	0.080	(0.370)	0.040	0.040
40	3.33	0.17	0.080	(0.369)	0.040	0.040
41	3.42	0.17	0.080	(0.367)	0.040	0.040
42	3.50	0.17	0.080	(0.366)	0.040	0.040
43	3.58	0.17	0.080	(0.364)	0.040	0.040
44	3.67	0.17	0.080	(0.363)	0.040	0.040
45	3.75	0.17	0.080	(0.361)	0.040	0.040
46	3.83	0.20	0.096	(0.360)	0.048	0.048
47	3.92	0.20	0.096	(0.358)	0.048	0.048
48	4.00	0.20	0.096	(0.356)	0.048	0.048
49	4.08	0.20	0.096	(0.355)	0.048	0.048
50	4.17	0.20	0.096	(0.353)	0.048	0.048
51	4.25	0.20	0.096	(0.352)	0.048	0.048
52	4.33	0.23	0.112	(0.350)	0.056	0.056
53	4.42	0.23	0.112	(0.349)	0.056	0.056
54	4.50	0.23	0.112	(0.347)	0.056	0.056
55	4.58	0.23	0.112	(0.346)	0.056	0.056
56	4.67	0.23	0.112	(0.344)	0.056	0.056
57	4.75	0.23	0.112	(0.343)	0.056	0.056
58	4.83	0.27	0.128	(0.342)	0.064	0.064
59	4.92	0.27	0.128	(0.340)	0.064	0.064
60	5.00	0.27	0.128	(0.339)	0.064	0.064
61	5.08	0.20	0.096	(0.337)	0.048	0.048
62	5.17	0.20	0.096	(0.336)	0.048	0.048
63	5.25	0.20	0.096	(0.334)	0.048	0.048
64	5.33	0.23	0.112	(0.333)	0.056	0.056
65	5.42	0.23	0.112	(0.331)	0.056	0.056
66	5.50	0.23	0.112	(0.330)	0.056	0.056
67	5.58	0.27	0.128	(0.328)	0.064	0.064
68	5.67	0.27	0.128	(0.327)	0.064	0.064
69	5.75	0.27	0.128	(0.325)	0.064	0.064
70	5.83	0.27	0.128	(0.324)	0.064	0.064
71	5.92	0.27	0.128	(0.323)	0.064	0.064
72	6.00	0.27	0.128	(0.321)	0.064	0.064
73	6.08	0.30	0.144	(0.320)	0.072	0.072
74	6.17	0.30	0.144	(0.318)	0.072	0.072
75	6.25	0.30	0.144	(0.317)	0.072	0.072
76	6.33	0.30	0.144	(0.315)	0.072	0.072
77	6.42	0.30	0.144	(0.314)	0.072	0.072
78	6.50	0.30	0.144	(0.313)	0.072	0.072
79	6.58	0.33	0.160	(0.311)	0.080	0.080
80	6.67	0.33	0.160	(0.310)	0.080	0.080
81	6.75	0.33	0.160	(0.308)	0.080	0.080
82	6.83	0.33	0.160	(0.307)	0.080	0.080
83	6.92	0.33	0.160	(0.306)	0.080	0.080

84	7.00	0.33	0.160	(0.304)	0.080	0.080
85	7.08	0.33	0.160	(0.303)	0.080	0.080
86	7.17	0.33	0.160	(0.302)	0.080	0.080
87	7.25	0.33	0.160	(0.300)	0.080	0.080
88	7.33	0.37	0.176	(0.299)	0.088	0.088
89	7.42	0.37	0.176	(0.297)	0.088	0.088
90	7.50	0.37	0.176	(0.296)	0.088	0.088
91	7.58	0.40	0.192	(0.295)	0.096	0.096
92	7.67	0.40	0.192	(0.293)	0.096	0.096
93	7.75	0.40	0.192	(0.292)	0.096	0.096
94	7.83	0.43	0.208	(0.291)	0.104	0.104
95	7.92	0.43	0.208	(0.289)	0.104	0.104
96	8.00	0.43	0.208	(0.288)	0.104	0.104
97	8.08	0.50	0.240	(0.287)	0.120	0.120
98	8.17	0.50	0.240	(0.285)	0.120	0.120
99	8.25	0.50	0.240	(0.284)	0.120	0.120
100	8.33	0.50	0.240	(0.283)	0.120	0.120
101	8.42	0.50	0.240	(0.281)	0.120	0.120
102	8.50	0.50	0.240	(0.280)	0.120	0.120
103	8.58	0.53	0.256	(0.279)	0.128	0.128
104	8.67	0.53	0.256	(0.277)	0.128	0.128
105	8.75	0.53	0.256	(0.276)	0.128	0.128
106	8.83	0.57	0.272	(0.275)	0.136	0.136
107	8.92	0.57	0.272	(0.273)	0.136	0.136
108	9.00	0.57	0.272	(0.272)	0.136	0.136
109	9.08	0.63	0.304	(0.271)	0.152	0.152
110	9.17	0.63	0.304	(0.270)	0.152	0.152
111	9.25	0.63	0.304	(0.268)	0.152	0.152
112	9.33	0.67	0.320	(0.267)	0.160	0.160
113	9.42	0.67	0.320	(0.266)	0.160	0.160
114	9.50	0.67	0.320	(0.264)	0.160	0.160
115	9.58	0.70	0.336	(0.263)	0.168	0.168
116	9.67	0.70	0.336	(0.262)	0.168	0.168
117	9.75	0.70	0.336	(0.261)	0.168	0.168
118	9.83	0.73	0.352	(0.259)	0.176	0.176
119	9.92	0.73	0.352	(0.258)	0.176	0.176
120	10.00	0.73	0.352	(0.257)	0.176	0.176
121	10.08	0.50	0.240	(0.256)	0.120	0.120
122	10.17	0.50	0.240	(0.254)	0.120	0.120
123	10.25	0.50	0.240	(0.253)	0.120	0.120
124	10.33	0.50	0.240	(0.252)	0.120	0.120
125	10.42	0.50	0.240	(0.251)	0.120	0.120
126	10.50	0.50	0.240	(0.250)	0.120	0.120
127	10.58	0.67	0.320	(0.248)	0.160	0.160
128	10.67	0.67	0.320	(0.247)	0.160	0.160
129	10.75	0.67	0.320	(0.246)	0.160	0.160
130	10.83	0.67	0.320	(0.245)	0.160	0.160
131	10.92	0.67	0.320	(0.243)	0.160	0.160
132	11.00	0.67	0.320	(0.242)	0.160	0.160
133	11.08	0.63	0.304	(0.241)	0.152	0.152

134	11.17	0.63	0.304	(	0.240)	0.152		0.152
135	11.25	0.63	0.304	(	0.239)	0.152		0.152
136	11.33	0.63	0.304	(	0.238)	0.152		0.152
137	11.42	0.63	0.304	(	0.236)	0.152		0.152
138	11.50	0.63	0.304	(	0.235)	0.152		0.152
139	11.58	0.57	0.272	(	0.234)	0.136		0.136
140	11.67	0.57	0.272	(	0.233)	0.136		0.136
141	11.75	0.57	0.272	(	0.232)	0.136		0.136
142	11.83	0.60	0.288	(	0.231)	0.144		0.144
143	11.92	0.60	0.288	(	0.229)	0.144		0.144
144	12.00	0.60	0.288	(	0.228)	0.144		0.144
145	12.08	0.83	0.400	(	0.227)	0.200		0.200
146	12.17	0.83	0.400	(	0.226)	0.200		0.200
147	12.25	0.83	0.400	(	0.225)	0.200		0.200
148	12.33	0.87	0.416	(	0.224)	0.208		0.208
149	12.42	0.87	0.416	(	0.223)	0.208		0.208
150	12.50	0.87	0.416	(	0.221)	0.208		0.208
151	12.58	0.93	0.448		0.220	(	0.224)	0.228
152	12.67	0.93	0.448		0.219	(	0.224)	0.229
153	12.75	0.93	0.448		0.218	(	0.224)	0.230
154	12.83	0.97	0.464		0.217	(	0.232)	0.247
155	12.92	0.97	0.464		0.216	(	0.232)	0.248
156	13.00	0.97	0.464		0.215	(	0.232)	0.249
157	13.08	1.13	0.544		0.214	(	0.272)	0.330
158	13.17	1.13	0.544		0.213	(	0.272)	0.331
159	13.25	1.13	0.544		0.212	(	0.272)	0.332
160	13.33	1.13	0.544		0.211	(	0.272)	0.333
161	13.42	1.13	0.544		0.209	(	0.272)	0.334
162	13.50	1.13	0.544		0.208	(	0.272)	0.336
163	13.58	0.77	0.368	(	0.207)	0.184		0.184
164	13.67	0.77	0.368	(	0.206)	0.184		0.184
165	13.75	0.77	0.368	(	0.205)	0.184		0.184
166	13.83	0.77	0.368	(	0.204)	0.184		0.184
167	13.92	0.77	0.368	(	0.203)	0.184		0.184
168	14.00	0.77	0.368	(	0.202)	0.184		0.184
169	14.08	0.90	0.432		0.201	(	0.216)	0.231
170	14.17	0.90	0.432		0.200	(	0.216)	0.232
171	14.25	0.90	0.432		0.199	(	0.216)	0.233
172	14.33	0.87	0.416		0.198	(	0.208)	0.218
173	14.42	0.87	0.416		0.197	(	0.208)	0.219
174	14.50	0.87	0.416		0.196	(	0.208)	0.220
175	14.58	0.87	0.416		0.195	(	0.208)	0.221
176	14.67	0.87	0.416		0.194	(	0.208)	0.222
177	14.75	0.87	0.416		0.193	(	0.208)	0.223
178	14.83	0.83	0.400		0.192	(	0.200)	0.208
179	14.92	0.83	0.400		0.191	(	0.200)	0.209
180	15.00	0.83	0.400		0.190	(	0.200)	0.210
181	15.08	0.80	0.384		0.189	(	0.192)	0.195
182	15.17	0.80	0.384		0.188	(	0.192)	0.196
183	15.25	0.80	0.384		0.187	(	0.192)	0.197

184	15.33	0.77	0.368	(0.186)	0.184	0.184
185	15.42	0.77	0.368	(0.185)	0.184	0.184
186	15.50	0.77	0.368	(0.184)	0.184	0.184
187	15.58	0.63	0.304	(0.183)	0.152	0.152
188	15.67	0.63	0.304	(0.182)	0.152	0.152
189	15.75	0.63	0.304	(0.181)	0.152	0.152
190	15.83	0.63	0.304	(0.181)	0.152	0.152
191	15.92	0.63	0.304	(0.180)	0.152	0.152
192	16.00	0.63	0.304	(0.179)	0.152	0.152
193	16.08	0.13	0.064	(0.178)	0.032	0.032
194	16.17	0.13	0.064	(0.177)	0.032	0.032
195	16.25	0.13	0.064	(0.176)	0.032	0.032
196	16.33	0.13	0.064	(0.175)	0.032	0.032
197	16.42	0.13	0.064	(0.174)	0.032	0.032
198	16.50	0.13	0.064	(0.173)	0.032	0.032
199	16.58	0.10	0.048	(0.172)	0.024	0.024
200	16.67	0.10	0.048	(0.172)	0.024	0.024
201	16.75	0.10	0.048	(0.171)	0.024	0.024
202	16.83	0.10	0.048	(0.170)	0.024	0.024
203	16.92	0.10	0.048	(0.169)	0.024	0.024
204	17.00	0.10	0.048	(0.168)	0.024	0.024
205	17.08	0.17	0.080	(0.167)	0.040	0.040
206	17.17	0.17	0.080	(0.166)	0.040	0.040
207	17.25	0.17	0.080	(0.166)	0.040	0.040
208	17.33	0.17	0.080	(0.165)	0.040	0.040
209	17.42	0.17	0.080	(0.164)	0.040	0.040
210	17.50	0.17	0.080	(0.163)	0.040	0.040
211	17.58	0.17	0.080	(0.162)	0.040	0.040
212	17.67	0.17	0.080	(0.161)	0.040	0.040
213	17.75	0.17	0.080	(0.161)	0.040	0.040
214	17.83	0.13	0.064	(0.160)	0.032	0.032
215	17.92	0.13	0.064	(0.159)	0.032	0.032
216	18.00	0.13	0.064	(0.158)	0.032	0.032
217	18.08	0.13	0.064	(0.157)	0.032	0.032
218	18.17	0.13	0.064	(0.157)	0.032	0.032
219	18.25	0.13	0.064	(0.156)	0.032	0.032
220	18.33	0.13	0.064	(0.155)	0.032	0.032
221	18.42	0.13	0.064	(0.154)	0.032	0.032
222	18.50	0.13	0.064	(0.154)	0.032	0.032
223	18.58	0.10	0.048	(0.153)	0.024	0.024
224	18.67	0.10	0.048	(0.152)	0.024	0.024
225	18.75	0.10	0.048	(0.151)	0.024	0.024
226	18.83	0.07	0.032	(0.151)	0.016	0.016
227	18.92	0.07	0.032	(0.150)	0.016	0.016
228	19.00	0.07	0.032	(0.149)	0.016	0.016
229	19.08	0.10	0.048	(0.149)	0.024	0.024
230	19.17	0.10	0.048	(0.148)	0.024	0.024
231	19.25	0.10	0.048	(0.147)	0.024	0.024
232	19.33	0.13	0.064	(0.147)	0.032	0.032
233	19.42	0.13	0.064	(0.146)	0.032	0.032

234	19.50	0.13	0.064	(0.145)	0.032	0.032
235	19.58	0.10	0.048	(0.145)	0.024	0.024
236	19.67	0.10	0.048	(0.144)	0.024	0.024
237	19.75	0.10	0.048	(0.143)	0.024	0.024
238	19.83	0.07	0.032	(0.143)	0.016	0.016
239	19.92	0.07	0.032	(0.142)	0.016	0.016
240	20.00	0.07	0.032	(0.141)	0.016	0.016
241	20.08	0.10	0.048	(0.141)	0.024	0.024
242	20.17	0.10	0.048	(0.140)	0.024	0.024
243	20.25	0.10	0.048	(0.139)	0.024	0.024
244	20.33	0.10	0.048	(0.139)	0.024	0.024
245	20.42	0.10	0.048	(0.138)	0.024	0.024
246	20.50	0.10	0.048	(0.138)	0.024	0.024
247	20.58	0.10	0.048	(0.137)	0.024	0.024
248	20.67	0.10	0.048	(0.136)	0.024	0.024
249	20.75	0.10	0.048	(0.136)	0.024	0.024
250	20.83	0.07	0.032	(0.135)	0.016	0.016
251	20.92	0.07	0.032	(0.135)	0.016	0.016
252	21.00	0.07	0.032	(0.134)	0.016	0.016
253	21.08	0.10	0.048	(0.134)	0.024	0.024
254	21.17	0.10	0.048	(0.133)	0.024	0.024
255	21.25	0.10	0.048	(0.133)	0.024	0.024
256	21.33	0.07	0.032	(0.132)	0.016	0.016
257	21.42	0.07	0.032	(0.132)	0.016	0.016
258	21.50	0.07	0.032	(0.131)	0.016	0.016
259	21.58	0.10	0.048	(0.131)	0.024	0.024
260	21.67	0.10	0.048	(0.130)	0.024	0.024
261	21.75	0.10	0.048	(0.130)	0.024	0.024
262	21.83	0.07	0.032	(0.129)	0.016	0.016
263	21.92	0.07	0.032	(0.129)	0.016	0.016
264	22.00	0.07	0.032	(0.128)	0.016	0.016
265	22.08	0.10	0.048	(0.128)	0.024	0.024
266	22.17	0.10	0.048	(0.128)	0.024	0.024
267	22.25	0.10	0.048	(0.127)	0.024	0.024
268	22.33	0.07	0.032	(0.127)	0.016	0.016
269	22.42	0.07	0.032	(0.126)	0.016	0.016
270	22.50	0.07	0.032	(0.126)	0.016	0.016
271	22.58	0.07	0.032	(0.126)	0.016	0.016
272	22.67	0.07	0.032	(0.125)	0.016	0.016
273	22.75	0.07	0.032	(0.125)	0.016	0.016
274	22.83	0.07	0.032	(0.125)	0.016	0.016
275	22.92	0.07	0.032	(0.124)	0.016	0.016
276	23.00	0.07	0.032	(0.124)	0.016	0.016
277	23.08	0.07	0.032	(0.124)	0.016	0.016
278	23.17	0.07	0.032	(0.123)	0.016	0.016
279	23.25	0.07	0.032	(0.123)	0.016	0.016
280	23.33	0.07	0.032	(0.123)	0.016	0.016
281	23.42	0.07	0.032	(0.123)	0.016	0.016
282	23.50	0.07	0.032	(0.123)	0.016	0.016
283	23.58	0.07	0.032	(0.122)	0.016	0.016

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284  23.67     0.07      0.032       (  0.122)       0.016        0.016
285  23.75     0.07      0.032       (  0.122)       0.016        0.016
286  23.83     0.07      0.032       (  0.122)       0.016        0.016
287  23.92     0.07      0.032       (  0.122)       0.016        0.016
288  24.00     0.07      0.032       (  0.122)       0.016        0.016
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    24.6
       Flood volume = Effective rainfall      2.05(In)
        times area      65.6(Ac.)/[(In)/(Ft.)] =      11.2(Ac.Ft)
       Total soil loss =      1.95(In)
       Total soil loss =    10.664(Ac.Ft)
       Total rainfall =      4.00(In)
       Flood volume =      487878.5 Cubic Feet
       Total soil loss =      464511.5 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =     21.384(CFS)
       ---------------------------------------------------------------------
       +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
       ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
 ------------------------------------------------------------------------
   0+ 5       0.0006      0.09  Q         |         |         |         |
   0+10       0.0036      0.44  Q         |         |         |         |
   0+15       0.0086      0.72  Q         |         |         |         |
   0+20       0.0147      0.88  VQ        |         |         |         |
   0+25       0.0224      1.12  VQ        |         |         |         |
   0+30       0.0314      1.31  VQ        |         |         |         |
   0+35       0.0410      1.39  VQ        |         |         |         |
   0+40       0.0509      1.45  VQ        |         |         |         |
   0+45       0.0612      1.49  VQ        |         |         |         |
   0+50       0.0719      1.56  V Q       |         |         |         |
   0+55       0.0840      1.76  V Q       |         |         |         |
   1+ 0       0.0972      1.92  V Q       |         |         |         |
   1+ 5       0.1106      1.94  V Q       |         |         |         |
   1+10       0.1230      1.81  V Q       |         |         |         |
   1+15       0.1347      1.69  V Q       |         |         |         |
   1+20       0.1461      1.65  V Q       |         |         |         |
   1+25       0.1573      1.64  V Q       |         |         |         |
   1+30       0.1685      1.62  V Q       |         |         |         |
   1+35       0.1796      1.61  V Q       |         |         |         |
   1+40       0.1907      1.61  V Q       |         |         |         |
   1+45       0.2017      1.60  V Q       |         |         |         |
   1+50       0.2130      1.64  V Q       |         |         |         |
   1+55       0.2256      1.82  V Q       |         |         |         |
   2+ 0       0.2390      1.96  V Q       |         |         |         |
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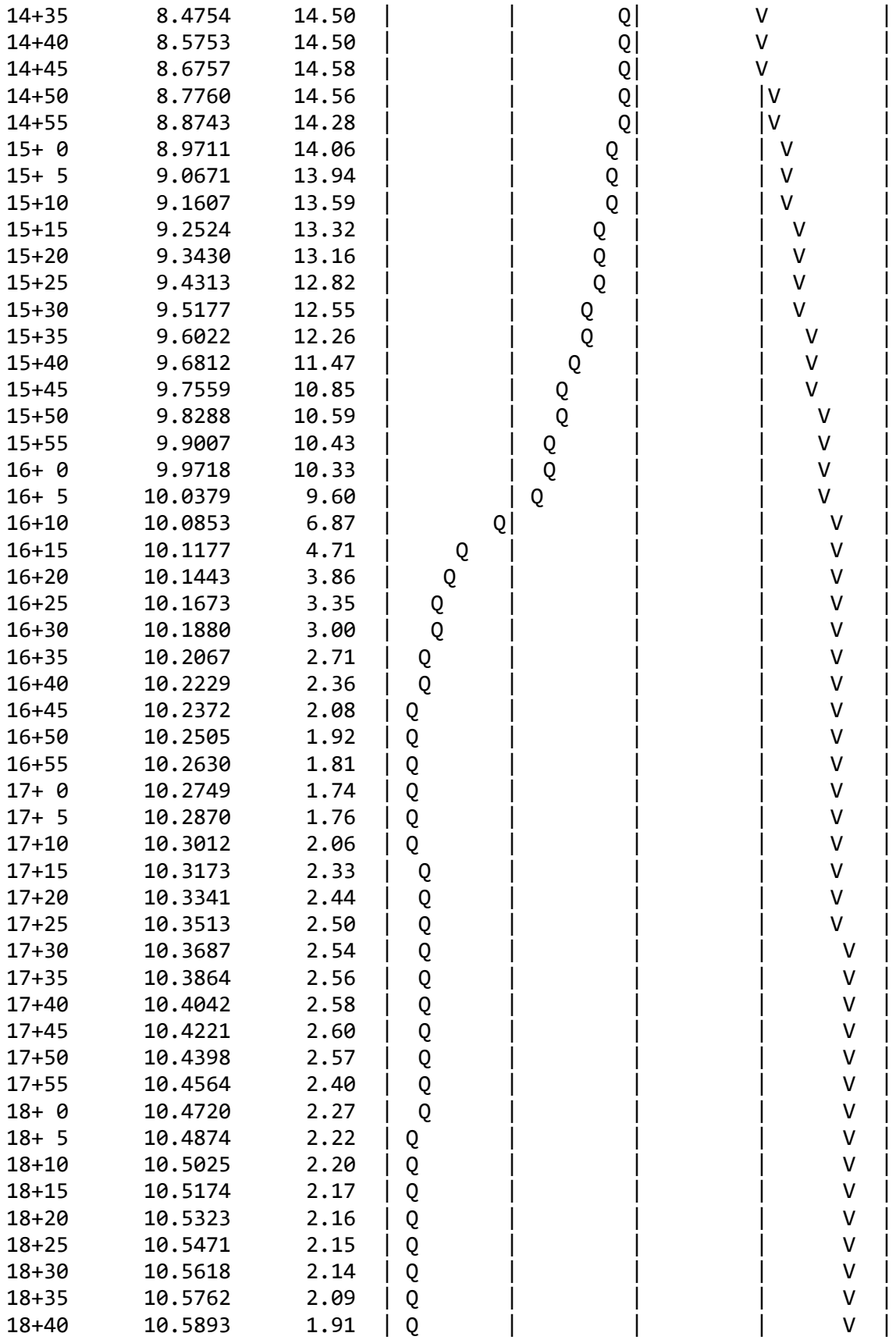
2+ 5	0.2529	2.01	V Q	|	|	|	|
2+10	0.2669	2.04	V Q	|	|	|	|
2+15	0.2811	2.06	|VQ	|	|	|	|
2+20	0.2954	2.07	|VQ	|	|	|	|
2+25	0.3097	2.09	|VQ	|	|	|	|
2+30	0.3241	2.09	|VQ	|	|	|	|
2+35	0.3389	2.14	|VQ	|	|	|	|
2+40	0.3549	2.33	|V Q	|	|	|	|
2+45	0.3720	2.47	|V Q	|	|	|	|
2+50	0.3894	2.53	|V Q	|	|	|	|
2+55	0.4071	2.57	|V Q	|	|	|	|
3+ 0	0.4249	2.59	|V Q	|	|	|	|
3+ 5	0.4428	2.60	|V Q	|	|	|	|
3+10	0.4608	2.61	|V Q	|	|	|	|
3+15	0.4789	2.62	|V Q	|	|	|	|
3+20	0.4970	2.63	|V Q	|	|	|	|
3+25	0.5152	2.64	|V Q	|	|	|	|
3+30	0.5334	2.64	|V Q	|	|	|	|
3+35	0.5516	2.64	|V Q	|	|	|	|
3+40	0.5698	2.65	| VQ	|	|	|	|
3+45	0.5880	2.65	| VQ	|	|	|	|
3+50	0.6065	2.69	| VQ	|	|	|	|
3+55	0.6263	2.87	| VQ	|	|	|	|
4+ 0	0.6470	3.01	| V Q	|	|	|	|
4+ 5	0.6681	3.06	| V Q	|	|	|	|
4+10	0.6894	3.10	| V Q	|	|	|	|
4+15	0.7109	3.12	| V Q	|	|	|	|
4+20	0.7327	3.18	| V Q	|	|	|	|
4+25	0.7559	3.36	| V Q	|	|	|	|
4+30	0.7801	3.52	| V Q	|	|	|	|
4+35	0.8048	3.58	| V Q	|	|	|	|
4+40	0.8296	3.61	| V Q	|	|	|	|
4+45	0.8547	3.64	| VQ	|	|	|	|
4+50	0.8802	3.70	| VQ	|	|	|	|
4+55	0.9070	3.89	| V Q	|	|	|	|
5+ 0	0.9349	4.04	| V Q	|	|	|	|
5+ 5	0.9626	4.02	| V Q	|	|	|	|
5+10	0.9881	3.70	| VQ	|	|	|	|
5+15	1.0118	3.44	| VQ	|	|	|	|
5+20	1.0352	3.40	| VQ	|	|	|	|
5+25	1.0595	3.52	| VQ	|	|	|	|
5+30	1.0845	3.63	| VQ	|	|	|	|
5+35	1.1100	3.70	| VQ	|	|	|	|
5+40	1.1368	3.90	| VQ	|	|	|	|
5+45	1.1647	4.05	| VQ	|	|	|	|
5+50	1.1929	4.11	| VQ	|	|	|	|
5+55	1.2215	4.14	| VQ	|	|	|	|
6+ 0	1.2502	4.17	| VQ	|	|	|	|
6+ 5	1.2793	4.22	| VQ	|	|	|	|
6+10	1.3097	4.41	| VQ	|	|	|	|

6+15	1.3411	4.57	V Q				
6+20	1.3730	4.63	V Q				
6+25	1.4052	4.67	VQ				
6+30	1.4376	4.70	VQ				
6+35	1.4703	4.76	VQ				
6+40	1.5044	4.95	VQ				
6+45	1.5396	5.10	VQ				
6+50	1.5752	5.16	VQ				
6+55	1.6110	5.20	VQ				
7+ 0	1.6470	5.23	VQ				
7+ 5	1.6831	5.25	Q				
7+10	1.7193	5.26	VQ				
7+15	1.7556	5.27	VQ				
7+20	1.7923	5.32	VQ				
7+25	1.8302	5.50	VQ				
7+30	1.8691	5.65	VQ				
7+35	1.9087	5.75	VQ				
7+40	1.9497	5.96	VQ				
7+45	1.9919	6.13	VQ				
7+50	2.0349	6.24	VQ				
7+55	2.0794	6.46	VQ				
8+ 0	2.1250	6.63	VQ				
8+ 5	2.1718	6.80	V Q				
8+10	2.2214	7.20	V Q				
8+15	2.2732	7.52	V Q				
8+20	2.3259	7.65	V Q				
8+25	2.3792	7.74	V Q				
8+30	2.4329	7.79	V Q				
8+35	2.4871	7.88	V Q				
8+40	2.5428	8.09	VQ				
8+45	2.5996	8.25	VQ				
8+50	2.6573	8.36	V|Q				
8+55	2.7164	8.59	V|Q				
9+ 0	2.7767	8.76	V|Q				
9+ 5	2.8382	8.92	VQ				
9+10	2.9024	9.33	V Q				
9+15	2.9688	9.64	V Q				
9+20	3.0364	9.82	V Q				
9+25	3.1058	10.07	|V Q				
9+30	3.1765	10.27	|V Q				
9+35	3.2482	10.41	|V Q				
9+40	3.3216	10.65	|V Q				
9+45	3.3962	10.84	| V Q				
9+50	3.4718	10.97	| V Q				
9+55	3.5489	11.20	| V Q				
10+ 0	3.6273	11.38	| V Q				
10+ 5	3.7042	11.17	| VQ				
10+10	3.7729	9.97	| Q				
10+15	3.8350	9.02	| QV				
10+20	3.8946	8.66	|Q V				

10+25	3.9529	8.45	|	|Q V |	|	|
10+30	4.0101	8.31	|	|Q V |	|	|
10+35	4.0681	8.43	|	|Q V |	|	|
10+40	4.1318	9.25	|	| Q V |	|	|
10+45	4.1999	9.89	|	| QV |	|	|
10+50	4.2697	10.12	|	| Q V |	|	|
10+55	4.3403	10.25	|	| Q V |	|	|
11+ 0	4.4115	10.34	|	| Q V |	|	|
11+ 5	4.4828	10.35	|	| Q V |	|	|
11+10	4.5531	10.21	|	| Q V |	|	|
11+15	4.6227	10.11	|	| Q V |	|	|
11+20	4.6922	10.09	|	| Q V |	|	|
11+25	4.7617	10.08	|	| Q V |	|	|
11+30	4.8311	10.08	|	| Q V |	|	|
11+35	4.8999	9.99	|	| Q V |	|	|
11+40	4.9663	9.64	|	| Q V |	|	|
11+45	5.0307	9.35	|	| Q V |	|	|
11+50	5.0946	9.28	|	| Q V |	|	|
11+55	5.1592	9.38	|	| Q V |	|	|
12+ 0	5.2245	9.48	|	| Q V |	|	|
12+ 5	5.2920	9.80	|	| Q V |	|	|
12+10	5.3681	11.05	|	| Q V|	|	|
12+15	5.4511	12.05	|	| Q V|	|	|
12+20	5.5370	12.48	|	| Q V|	|	|
12+25	5.6257	12.88	|	| Q V	|	|
12+30	5.7165	13.18	|	| Q V	|	|
12+35	5.8091	13.45	|	| Q V	|	|
12+40	5.9055	14.00	|	| Q |V	|	|
12+45	6.0052	14.47	|	| Q|V	|	|
12+50	6.1071	14.80	|	| Q|V	|	|
12+55	6.2128	15.35	|	| Q V	|	|
13+ 0	6.3215	15.78	|	| |QV	|	|
13+ 5	6.4348	16.45	|	| |QV	|	|
13+10	6.5616	18.42	|	| | VQ	|	|
13+15	6.6991	19.97	|	| | V Q	|	|
13+20	6.8413	20.64	|	| | V Q	|	|
13+25	6.9863	21.07	|	| | V Q	|	|
13+30	7.1336	21.38	|	| | V Q	|	|
13+35	7.2769	20.81	|	| | V Q	|	|
13+40	7.3982	17.61	|	| | Q V	|	|
13+45	7.5018	15.05	|	| Q V	|	|
13+50	7.5989	14.10	|	| Q | V	|	|
13+55	7.6922	13.55	|	| Q | V	|	|
14+ 0	7.7830	13.18	|	| Q | V	|	|
14+ 5	7.8737	13.17	|	| Q | V	|	|
14+10	7.9704	14.05	|	| Q | V	|	|
14+15	8.0719	14.73	|	| Q| V	|	|
14+20	8.1745	14.89	|	| Q| V|	|	|
14+25	8.2756	14.68	|	| Q| V|	|	|
14+30	8.3756	14.52	|	| Q| V|	|	|



18+45	10.6014	1.76	| Q	|	|	|	V |
18+50	10.6129	1.66	| Q	|	|	|	V |
18+55	10.6228	1.45	|Q	|	|	|	V |
19+ 0	10.6317	1.28	|Q	|	|	|	V |
19+ 5	10.6403	1.25	|Q	|	|	|	V |
19+10	10.6499	1.39	|Q	|	|	|	V |
19+15	10.6602	1.50	|Q	|	|	|	V |
19+20	10.6710	1.58	| Q	|	|	|	V |
19+25	10.6832	1.77	| Q	|	|	|	V |
19+30	10.6965	1.92	| Q	|	|	|	V |
19+35	10.7098	1.94	| Q	|	|	|	V |
19+40	10.7222	1.80	| Q	|	|	|	V |
19+45	10.7337	1.68	| Q	|	|	|	V |
19+50	10.7448	1.60	| Q	|	|	|	V |
19+55	10.7545	1.41	|Q	|	|	|	V |
20+ 0	10.7631	1.25	|Q	|	|	|	V |
20+ 5	10.7716	1.24	|Q	|	|	|	V |
20+10	10.7811	1.38	|Q	|	|	|	V |
20+15	10.7914	1.49	|Q	|	|	|	V |
20+20	10.8019	1.53	| Q	|	|	|	V |
20+25	10.8126	1.55	| Q	|	|	|	V |
20+30	10.8233	1.56	| Q	|	|	|	V |
20+35	10.8341	1.56	| Q	|	|	|	V |
20+40	10.8449	1.57	| Q	|	|	|	V |
20+45	10.8557	1.57	| Q	|	|	|	V |
20+50	10.8663	1.53	| Q	|	|	|	V |
20+55	10.8756	1.36	|Q	|	|	|	V |
21+ 0	10.8840	1.22	|Q	|	|	|	V |
21+ 5	10.8923	1.21	|Q	|	|	|	V |
21+10	10.9017	1.36	|Q	|	|	|	V |
21+15	10.9119	1.48	|Q	|	|	|	V |
21+20	10.9220	1.47	|Q	|	|	|	V|
21+25	10.9311	1.32	|Q	|	|	|	V|
21+30	10.9393	1.19	|Q	|	|	|	V|
21+35	10.9475	1.19	|Q	|	|	|	V|
21+40	10.9567	1.34	|Q	|	|	|	V|
21+45	10.9667	1.46	|Q	|	|	|	V|
21+50	10.9768	1.46	|Q	|	|	|	V|
21+55	10.9858	1.31	|Q	|	|	|	V|
22+ 0	10.9940	1.18	|Q	|	|	|	V|
22+ 5	11.0021	1.18	|Q	|	|	|	V|
22+10	11.0113	1.34	|Q	|	|	|	V|
22+15	11.0214	1.46	|Q	|	|	|	V|
22+20	11.0315	1.46	|Q	|	|	|	V|
22+25	11.0405	1.31	|Q	|	|	|	V|
22+30	11.0486	1.18	|Q	|	|	|	V|
22+35	11.0565	1.14	|Q	|	|	|	V|
22+40	11.0642	1.12	|Q	|	|	|	V|
22+45	11.0717	1.10	|Q	|	|	|	V|
22+50	11.0792	1.09	|Q	|	|	|	V|

```
   22+55      11.0867      1.08  |Q        |         |         |        V|
   23+ 0      11.0941      1.07  |Q        |         |         |        V|
   23+ 5      11.1014      1.07  |Q        |         |         |        V|
   23+10      11.1088      1.07  |Q        |         |         |        V|
   23+15      11.1161      1.06  |Q        |         |         |        V|
   23+20      11.1234      1.06  |Q        |         |         |        V|
   23+25      11.1307      1.06  |Q        |         |         |        V|
   23+30      11.1380      1.06  |Q        |         |         |        V|
   23+35      11.1453      1.06  |Q        |         |         |        V|
   23+40      11.1526      1.06  |Q        |         |         |        V|
   23+45      11.1599      1.06  |Q        |         |         |        V|
   23+50      11.1672      1.06  |Q        |         |         |        V|
   23+55      11.1744      1.06  |Q        |         |         |        V|
   24+ 0      11.1817      1.06  |Q        |         |         |        V|
   24+ 5      11.1884      0.97  |Q        |         |         |        V|
   24+10      11.1927      0.62  Q         |         |         |        V|
   24+15      11.1950      0.33  Q         |         |         |        V|
   24+20      11.1965      0.22  Q         |         |         |        V|
   24+25      11.1976      0.16  Q         |         |         |        V|
   24+30      11.1984      0.11  Q         |         |         |        V|
   24+35      11.1990      0.08  Q         |         |         |        V|
   24+40      11.1994      0.06  Q         |         |         |        V|
   24+45      11.1997      0.04  Q         |         |         |        V|
   24+50      11.1999      0.03  Q         |         |         |        V|
   24+55      11.2000      0.02  Q         |         |         |        V|
   25+ 0      11.2001      0.01  Q         |         |         |        V|
   25+ 5      11.2001      0.01  Q         |         |         |         V
-------------------------------------------------------------------------
```

APPENDIX C

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- L=14XX' LCA=1000' — LONGEST FLOW PATH CENTROIDAL LENGTH
- 101 / 14XX — NODE DESIGNATION NODE ELEVATION
- *14XX — *INVERT ELEVATION
- 5.0 / 1000' — WATERSHED AREA (ACRES) LONGEST WATER PATH (FT)
- CENTROID

TRUMBLE ROAD

SHERMAN ROAD

ETHANAC ROAD

102
1427.6

L=1376'
LCA=686'

19.8
1376'

101
1433.0

N
W WEBB E
S

1" = 60'
30 0 60 120 180

CITY OF PERRIS

COUNTY OF RIVERSIDE
EXISTING UNIT HYDROGRAPH HYDROLOGY
ETHANAC LOGISTICS CENTER
P22-00030

SCALE: 1"=60'	ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 2022-0198
DATE: 10/11/23		SHEET 1
DESIGNED: RSB		OF 3 SHEETS
CHECKED: SKK		
PLN CK REF:		DWG. NO.
F.B.		

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CAL UNW

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- L=14XX' / LCA=1000' — LONGEST FLOW PATH CENTROIDAL LENGTH
- 101 / 14XX — NODE DESIGNATION / NODE ELEVATION
- *14XX — *INVERT ELEVATION
- 5.0 / 1000' — WATERSHED AREA (ACRES) / LONGEST WATER PATH (FT)
- CENTROID

TRUMBLE ROAD

SHERMAN ROAD

ETHANAC ROAD

19.8
553'

202
1427.3

201
1434.0

L=553'
LCA=150'

N
W WEBB E
S

1" = 60'
30 0 60 120 180

CITY OF PERRIS

COUNTY OF RIVERSIDE
PROPOSED UNIT HYDROGRAPH HYDROLOGY
ETHANAC LOGISTICS CENTER
P22-00030

SCALE:	1"=60'	ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS, 3788 McCRAY STREET, RIVERSIDE, CA. 92506, PH. (951) 686-1070, FAX (951) 788-1256	W.O. 2022-0198
DATE:	10/17/23		SHEET 2
DESIGNED:	RSB		OF 3 SHEETS
CHECKED:	SKK		DWG. NO.
PLN CK REF:			
F.B.			

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CALWIN

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

Study date 04/04/23 File: ONSITEPRE1100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 1-HOUR
FN: ONSITEPRE.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1376.00(Ft.)
Length along longest watercourse measured to centroid = 686.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 5.00(Ft.)
Slope along watercourse = 19.1860 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.113 Hr.
Lag time = 6.81 Min.
25% of lag time = 1.70 Min.
40% of lag time = 2.72 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            0.50                   9.90

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.20                  23.76

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           89.00         0.000
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  89.0      0.141     0.000        0.141       1.000      0.141
                                                 Sum (F) =   0.141
Area averaged mean soil loss (F) (In/Hr) =  0.141
Minimum soil loss rate ((In/Hr)) =  0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
------------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
-----------------------------------------------------------------
               Unit Hydrograph Data
-----------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
-----------------------------------------------------------------
    1   0.083         73.448         11.521              2.299
    2   0.167        146.895         41.791              8.339
    3   0.250        220.343         21.981              4.386
    4   0.333        293.790          8.716              1.739
    5   0.417        367.238          5.287              1.055
    6   0.500        440.685          3.444              0.687
```

7	0.583	514.133	2.371	0.473
8	0.667	587.580	1.770	0.353
9	0.750	661.028	1.252	0.250
10	0.833	734.475	0.845	0.169
11	0.917	807.923	1.022	0.204
		Sum = 100.000	Sum=	19.955

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	4.20	0.605	0.141	(0.544)	0.463
2	0.17	4.30	0.619	0.141	(0.557)	0.478
3	0.25	5.00	0.720	0.141	(0.648)	0.578
4	0.33	5.00	0.720	0.141	(0.648)	0.578
5	0.42	5.80	0.835	0.141	(0.752)	0.694
6	0.50	6.50	0.936	0.141	(0.842)	0.794
7	0.58	7.40	1.065	0.141	(0.959)	0.924
8	0.67	8.60	1.238	0.141	(1.114)	1.097
9	0.75	12.30	1.771	0.141	(1.594)	1.629
10	0.83	29.10	4.190	0.141	(3.771)	4.048
11	0.92	6.80	0.979	0.141	(0.881)	0.838
12	1.00	5.00	0.720	0.141	(0.648)	0.578
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	12.7

Flood volume = Effective rainfall 1.06(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 1.7(Ac.Ft)
Total soil loss = 0.14(In)
Total soil loss = 0.233(Ac.Ft)
Total rainfall = 1.20(In)
Flood volume = 76070.3 Cubic Feet
Total soil loss = 10163.0 Cubic Feet

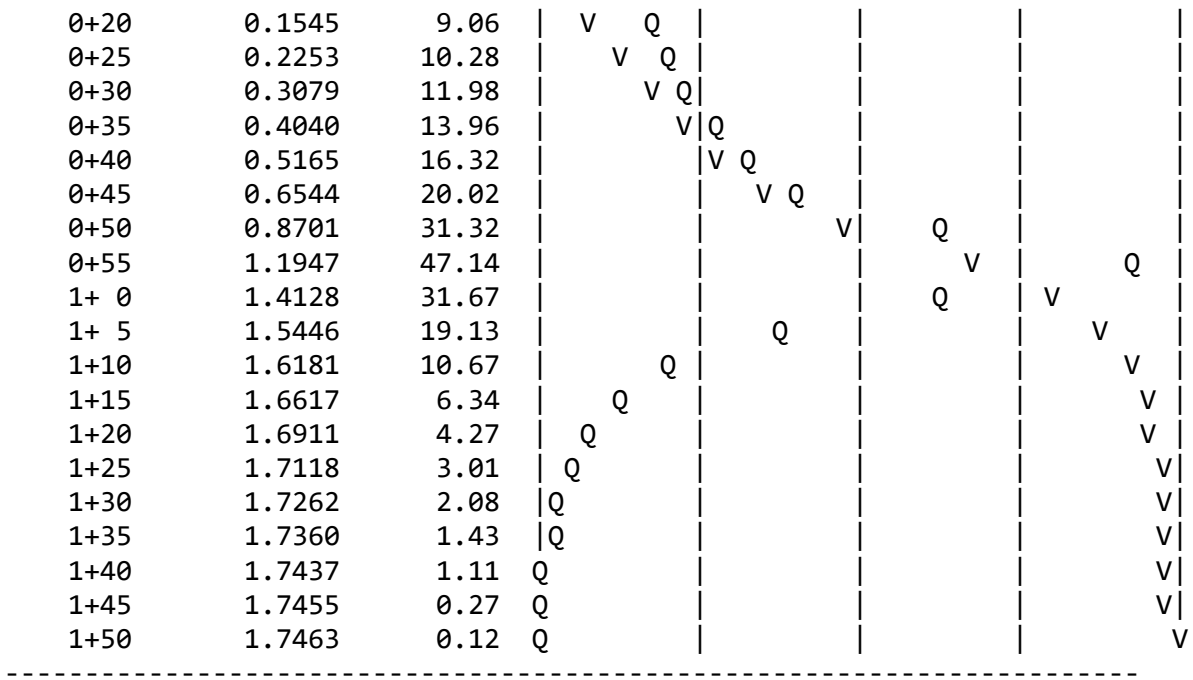
Peak flow rate of this hydrograph = 47.137(CFS)

++

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0
0+ 5	0.0073	1.07	Q	|	|	|	|
0+10	0.0415	4.96	V Q	|	|	|	|
0+15	0.0921	7.35	| V Q	|	|	|	|


0+20 0.1545 9.06
0+25 0.2253 10.28
0+30 0.3079 11.98
0+35 0.4040 13.96
0+40 0.5165 16.32
0+45 0.6544 20.02
0+50 0.8701 31.32
0+55 1.1947 47.14
1+ 0 1.4128 31.67
1+ 5 1.5446 19.13
1+10 1.6181 10.67
1+15 1.6617 6.34
1+20 1.6911 4.27
1+25 1.7118 3.01
1+30 1.7262 2.08
1+35 1.7360 1.43
1+40 1.7437 1.11
1+45 1.7455 0.27
1+50 1.7463 0.12

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

Study date 04/04/23 File: ONSITEPRE3100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 3-HOUR
FN: ONSITEPRE.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1376.00(Ft.)
Length along longest watercourse measured to centroid = 686.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 5.00(Ft.)
Slope along watercourse = 19.1860 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.113 Hr.
Lag time = 6.81 Min.
25% of lag time = 1.70 Min.
40% of lag time = 2.72 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            0.80                  15.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.90                  37.62

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.800(In)
Area Averaged 100-Year Rainfall =    1.900(In)

Point rain (area averaged) =    1.900(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    1.900(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           89.00         0.000
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  89.0      0.141     0.000        0.141       1.000      0.141
                                                 Sum (F) =   0.141
Area averaged mean soil loss (F) (In/Hr) =  0.141
Minimum soil loss rate ((In/Hr)) =  0.071
(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   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083         73.448         11.521              2.299
    2   0.167        146.895         41.791              8.339
    3   0.250        220.343         21.981              4.386
    4   0.333        293.790          8.716              1.739
    5   0.417        367.238          5.287              1.055
    6   0.500        440.685          3.444              0.687
    7   0.583        514.133          2.371              0.473
    8   0.667        587.580          1.770              0.353
```

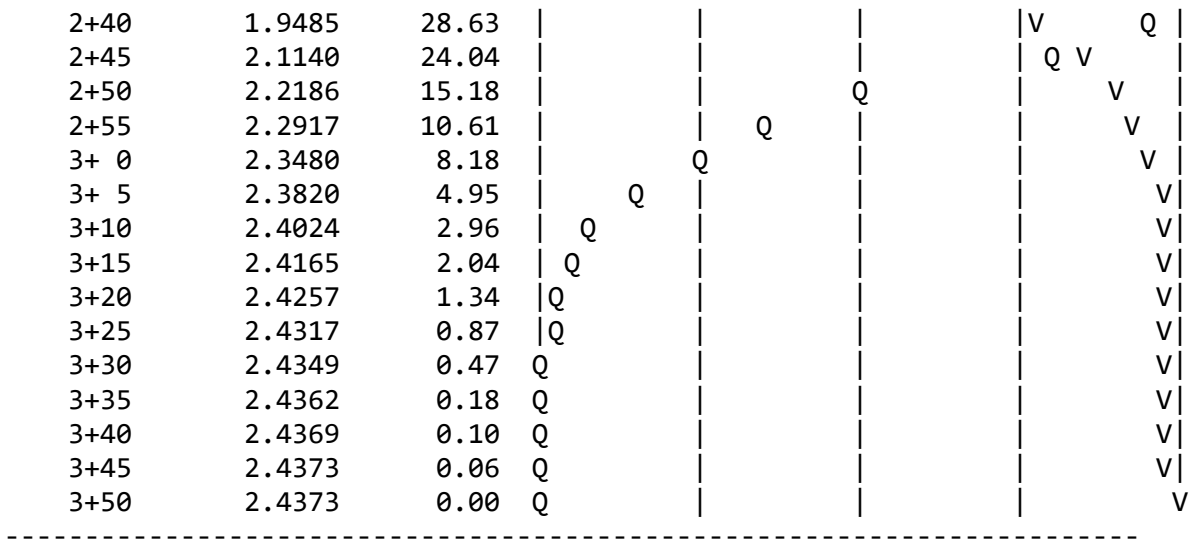
9	0.750	661.028	1.252	0.250
10	0.833	734.475	0.845	0.169
11	0.917	807.923	1.022	0.204
			Sum = 100.000	Sum= 19.955

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	1.30	0.296	0.141	(0.267)	0.155
2	0.17	1.30	0.296	0.141	(0.267)	0.155
3	0.25	1.10	0.251	0.141	(0.226)	0.109
4	0.33	1.50	0.342	0.141	(0.308)	0.201
5	0.42	1.50	0.342	0.141	(0.308)	0.201
6	0.50	1.80	0.410	0.141	(0.369)	0.269
7	0.58	1.50	0.342	0.141	(0.308)	0.201
8	0.67	1.80	0.410	0.141	(0.369)	0.269
9	0.75	1.80	0.410	0.141	(0.369)	0.269
10	0.83	1.50	0.342	0.141	(0.308)	0.201
11	0.92	1.60	0.365	0.141	(0.328)	0.223
12	1.00	1.80	0.410	0.141	(0.369)	0.269
13	1.08	2.20	0.502	0.141	(0.451)	0.360
14	1.17	2.20	0.502	0.141	(0.451)	0.360
15	1.25	2.20	0.502	0.141	(0.451)	0.360
16	1.33	2.00	0.456	0.141	(0.410)	0.315
17	1.42	2.60	0.593	0.141	(0.533)	0.451
18	1.50	2.70	0.616	0.141	(0.554)	0.474
19	1.58	2.40	0.547	0.141	(0.492)	0.406
20	1.67	2.70	0.616	0.141	(0.554)	0.474
21	1.75	3.30	0.752	0.141	(0.677)	0.611
22	1.83	3.10	0.707	0.141	(0.636)	0.565
23	1.92	2.90	0.661	0.141	(0.595)	0.520
24	2.00	3.00	0.684	0.141	(0.616)	0.543
25	2.08	3.10	0.707	0.141	(0.636)	0.565
26	2.17	4.20	0.958	0.141	(0.862)	0.816
27	2.25	5.00	1.140	0.141	(1.026)	0.999
28	2.33	3.50	0.798	0.141	(0.718)	0.657
29	2.42	6.80	1.550	0.141	(1.395)	1.409
30	2.50	7.30	1.664	0.141	(1.498)	1.523
31	2.58	8.20	1.869	0.141	(1.682)	1.728
32	2.67	5.90	1.345	0.141	(1.211)	1.204
33	2.75	2.00	0.456	0.141	(0.410)	0.315
34	2.83	1.80	0.410	0.141	(0.369)	0.269
35	2.92	1.80	0.410	0.141	(0.369)	0.269
36	3.00	0.60	0.137	(0.141)	0.123	0.014
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	17.7

```
 Flood volume = Effective rainfall      1.48(In)
  times area      19.8(Ac.)/[(In)/(Ft.)] =       2.4(Ac.Ft)
 Total soil loss =      0.42(In)
 Total soil loss =     0.697(Ac.Ft)
 Total rainfall =      1.90(In)
 Flood volume =      106169.4 Cubic Feet
 Total soil loss =       30379.4 Cubic Feet
 ---------------------------------------------------------------------
  Peak flow rate of this hydrograph =     28.626(CFS)
 ---------------------------------------------------------------------
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     3 - H O U R    S T O R M
                  R u n o f f      H y d r o g r a p h
 ---------------------------------------------------------------------
              Hydrograph in   5   Minute intervals ((CFS))

 ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
---------------------------------------------------------------------
  0+ 5       0.0025      0.36  Q         |         |         |         |
  0+10       0.0138      1.65  V Q       |         |         |         |
  0+15       0.0291      2.22  V Q       |         |         |         |
  0+20       0.0451      2.32  V  Q      |         |         |         |
  0+25       0.0661      3.05  |V  Q     |         |         |         |
  0+30       0.0912      3.63  |V  Q     |         |         |         |
  0+35       0.1203      4.23  |V   Q    |         |         |         |
  0+40       0.1495      4.24  | V  Q    |         |         |         |
  0+45       0.1819      4.71  | V   Q   |         |         |         |
  0+50       0.2153      4.86  |  V  Q   |         |         |         |
  0+55       0.2462      4.48  |   VQ    |         |         |         |
  1+ 0       0.2775      4.55  |   V Q   |         |         |         |
  1+ 5       0.3131      5.17  |    VQ   |         |         |         |
  1+10       0.3554      6.14  |    V  Q |         |         |         |
  1+15       0.4009      6.61  |     V Q |         |         |         |
  1+20       0.4472      6.72  |      VQ |         |         |         |
  1+25       0.4938      6.77  |       VQ|         |         |         |
  1+30       0.5479      7.85  |       V Q         |         |         |
  1+35       0.6061      8.46  |        V|Q        |         |         |
  1+40       0.6637      8.37  |         VQ        |         |         |
  1+45       0.7266      9.14  |         |VQ       |         |         |
  1+50       0.7988     10.48  |         |  Q      |         |         |
  1+55       0.8726     10.72  |         |   Q     |         |         |
  2+ 0       0.9450     10.50  |         |   QV    |         |         |
  2+ 5       1.0184     10.66  |         |   Q V   |         |         |
  2+10       1.0978     11.52  |         |    Q  V |         |         |
  2+15       1.1956     14.20  |         |       QV|         |         |
  2+20       1.3065     16.10  |         |         |Q        |         |
  2+25       1.4184     16.25  |         |         |Q V      |         |
  2+30       1.5693     21.91  |         |         |    V   Q|         |
  2+35       1.7513     26.43  |         |         |       V |    Q    |
```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2+45 2.1140 24.04
2+50 2.2186 15.18
2+55 2.2917 10.61
3+ 0 2.3480 8.18
3+ 5 2.3820 4.95
3+10 2.4024 2.96
3+15 2.4165 2.04
3+20 2.4257 1.34
3+25 2.4317 0.87
3+30 2.4349 0.47
3+35 2.4362 0.18
3+40 2.4369 0.10
3+45 2.4373 0.06
3+50 2.4373 0.00

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

Study date 04/04/23 File: ONSITEPRE6100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 6-HOUR
FN: ONSITEPRE.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1376.00(Ft.)
Length along longest watercourse measured to centroid = 686.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 5.00(Ft.)
Slope along watercourse = 19.1860 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.113 Hr.
Lag time = 6.81 Min.
25% of lag time = 1.70 Min.
40% of lag time = 2.72 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.00                  19.80

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            2.50                  49.50

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.000(In)
Area Averaged 100-Year Rainfall =    2.500(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           89.00         0.000
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  89.0      0.141     0.000        0.141       1.000      0.141
                                                 Sum (F) =   0.141
Area averaged mean soil loss (F) (In/Hr) =  0.141
Minimum soil loss rate ((In/Hr)) =  0.071
(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   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083         73.448         11.521              2.299
    2   0.167        146.895         41.791              8.339
    3   0.250        220.343         21.981              4.386
    4   0.333        293.790          8.716              1.739
    5   0.417        367.238          5.287              1.055
    6   0.500        440.685          3.444              0.687
    7   0.583        514.133          2.371              0.473
    8   0.667        587.580          1.770              0.353
```

9	0.750	661.028	1.252	0.250
10	0.833	734.475	0.845	0.169
11	0.917	807.923	1.022	0.204
			Sum = 100.000	Sum= 19.955

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	0.50	0.150	(0.141)	0.135	0.015
2	0.17	0.60	0.180	0.141	(0.162)	0.039
3	0.25	0.60	0.180	0.141	(0.162)	0.039
4	0.33	0.60	0.180	0.141	(0.162)	0.039
5	0.42	0.60	0.180	0.141	(0.162)	0.039
6	0.50	0.70	0.210	0.141	(0.189)	0.069
7	0.58	0.70	0.210	0.141	(0.189)	0.069
8	0.67	0.70	0.210	0.141	(0.189)	0.069
9	0.75	0.70	0.210	0.141	(0.189)	0.069
10	0.83	0.70	0.210	0.141	(0.189)	0.069
11	0.92	0.70	0.210	0.141	(0.189)	0.069
12	1.00	0.80	0.240	0.141	(0.216)	0.099
13	1.08	0.80	0.240	0.141	(0.216)	0.099
14	1.17	0.80	0.240	0.141	(0.216)	0.099
15	1.25	0.80	0.240	0.141	(0.216)	0.099
16	1.33	0.80	0.240	0.141	(0.216)	0.099
17	1.42	0.80	0.240	0.141	(0.216)	0.099
18	1.50	0.80	0.240	0.141	(0.216)	0.099
19	1.58	0.80	0.240	0.141	(0.216)	0.099
20	1.67	0.80	0.240	0.141	(0.216)	0.099
21	1.75	0.80	0.240	0.141	(0.216)	0.099
22	1.83	0.80	0.240	0.141	(0.216)	0.099
23	1.92	0.80	0.240	0.141	(0.216)	0.099
24	2.00	0.90	0.270	0.141	(0.243)	0.129
25	2.08	0.80	0.240	0.141	(0.216)	0.099
26	2.17	0.90	0.270	0.141	(0.243)	0.129
27	2.25	0.90	0.270	0.141	(0.243)	0.129
28	2.33	0.90	0.270	0.141	(0.243)	0.129
29	2.42	0.90	0.270	0.141	(0.243)	0.129
30	2.50	0.90	0.270	0.141	(0.243)	0.129
31	2.58	0.90	0.270	0.141	(0.243)	0.129
32	2.67	0.90	0.270	0.141	(0.243)	0.129
33	2.75	1.00	0.300	0.141	(0.270)	0.159
34	2.83	1.00	0.300	0.141	(0.270)	0.159
35	2.92	1.00	0.300	0.141	(0.270)	0.159
36	3.00	1.00	0.300	0.141	(0.270)	0.159
37	3.08	1.00	0.300	0.141	(0.270)	0.159
38	3.17	1.10	0.330	0.141	(0.297)	0.189

39	3.25	1.10	0.330	0.141	(0.297)		0.189
40	3.33	1.10	0.330	0.141	(0.297)		0.189
41	3.42	1.20	0.360	0.141	(0.324)		0.219
42	3.50	1.30	0.390	0.141	(0.351)		0.249
43	3.58	1.40	0.420	0.141	(0.378)		0.279
44	3.67	1.40	0.420	0.141	(0.378)		0.279
45	3.75	1.50	0.450	0.141	(0.405)		0.309
46	3.83	1.50	0.450	0.141	(0.405)		0.309
47	3.92	1.60	0.480	0.141	(0.432)		0.339
48	4.00	1.60	0.480	0.141	(0.432)		0.339
49	4.08	1.70	0.510	0.141	(0.459)		0.369
50	4.17	1.80	0.540	0.141	(0.486)		0.399
51	4.25	1.90	0.570	0.141	(0.513)		0.429
52	4.33	2.00	0.600	0.141	(0.540)		0.459
53	4.42	2.10	0.630	0.141	(0.567)		0.489
54	4.50	2.10	0.630	0.141	(0.567)		0.489
55	4.58	2.20	0.660	0.141	(0.594)		0.519
56	4.67	2.30	0.690	0.141	(0.621)		0.549
57	4.75	2.40	0.720	0.141	(0.648)		0.579
58	4.83	2.40	0.720	0.141	(0.648)		0.579
59	4.92	2.50	0.750	0.141	(0.675)		0.609
60	5.00	2.60	0.780	0.141	(0.702)		0.639
61	5.08	3.10	0.930	0.141	(0.837)		0.789
62	5.17	3.60	1.080	0.141	(0.972)		0.939
63	5.25	3.90	1.170	0.141	(1.053)		1.029
64	5.33	4.20	1.260	0.141	(1.134)		1.119
65	5.42	4.70	1.410	0.141	(1.269)		1.269
66	5.50	5.60	1.680	0.141	(1.512)		1.538
67	5.58	1.90	0.570	0.141	(0.513)		0.429
68	5.67	0.90	0.270	0.141	(0.243)		0.129
69	5.75	0.60	0.180	0.141	(0.162)		0.039
70	5.83	0.50	0.150	(0.141)	0.135		0.015
71	5.92	0.30	0.090	(0.141)	0.081		0.009
72	6.00	0.20	0.060	(0.141)	0.054		0.006

(Loss Rate Not Used)

Sum = 100.0 Sum = 20.0

Flood volume = Effective rainfall 1.66(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.7(Ac.Ft)
Total soil loss = 0.84(In)
Total soil loss = 1.378(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 119656.9 Cubic Feet
Total soil loss = 60015.8 Cubic Feet

Peak flow rate of this hydrograph = 24.033(CFS)

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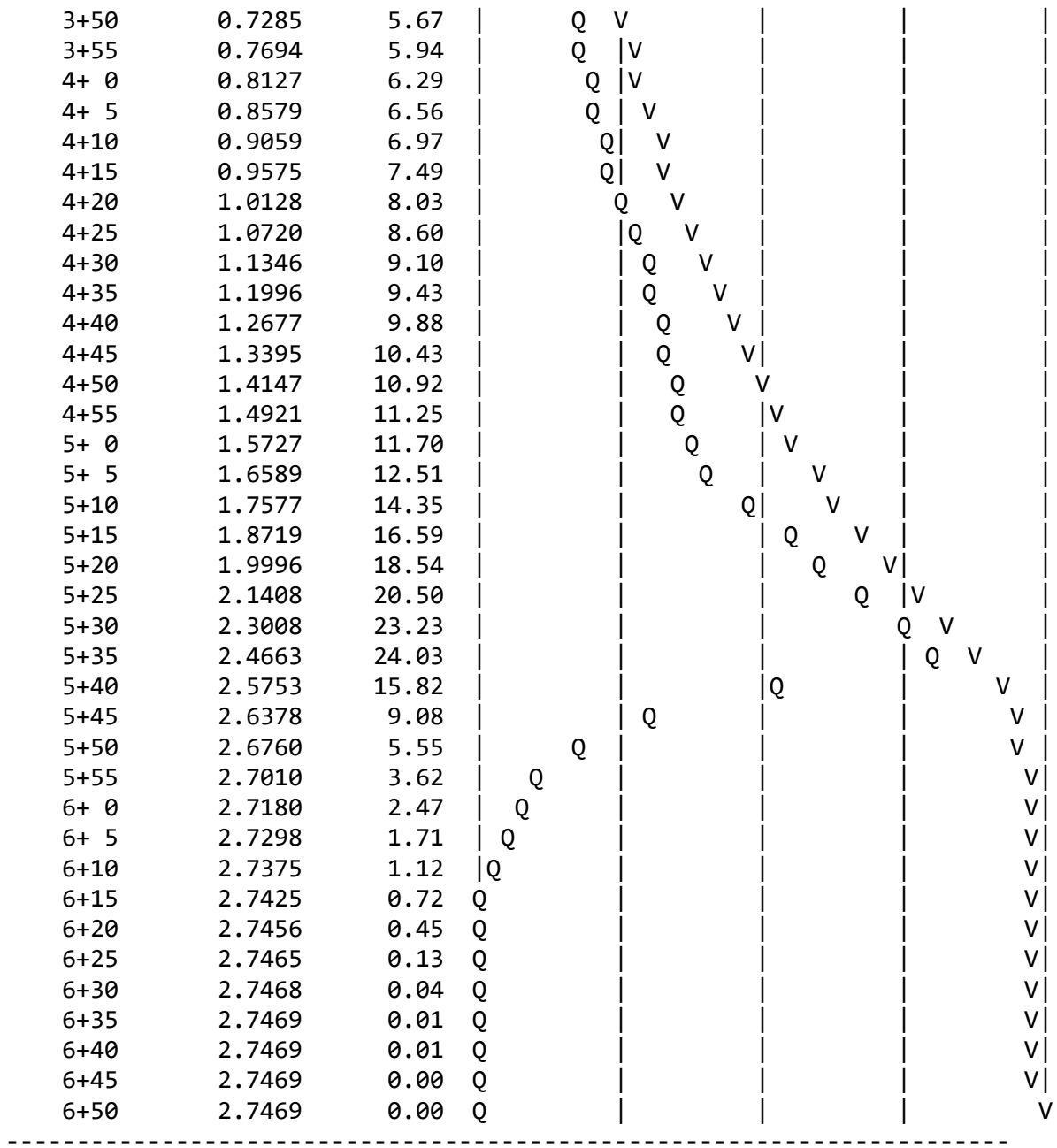
6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0002	0.03	Q				
0+10	0.0017	0.21	Q				
0+15	0.0050	0.48	Q				
0+20	0.0092	0.61	Q				
0+25	0.0137	0.66	Q				
0+30	0.0190	0.77	VQ				
0+35	0.0262	1.04	VQ				
0+40	0.0344	1.19	VQ				
0+45	0.0430	1.25	VQ				
0+50	0.0519	1.29	VQ				
0+55	0.0610	1.32	VQ				
1+ 0	0.0707	1.41	|Q				
1+ 5	0.0822	1.67	|VQ				
1+10	0.0947	1.81	|VQ				
1+15	0.1075	1.87	|VQ				
1+20	0.1206	1.90	|VQ				
1+25	0.1339	1.92	|VQ				
1+30	0.1473	1.94	| Q				
1+35	0.1607	1.95	| Q				
1+40	0.1742	1.96	| Q				
1+45	0.1877	1.96	| Q				
1+50	0.2012	1.97	| Q				
1+55	0.2148	1.97	| QV				
2+ 0	0.2288	2.04	| QV				
2+ 5	0.2441	2.22	| QV				
2+10	0.2590	2.17	| QV				
2+15	0.2751	2.34	| QV				
2+20	0.2920	2.45	| QV				
2+25	0.3092	2.49	| QV				
2+30	0.3265	2.52	| QV				
2+35	0.3440	2.53	| Q V				
2+40	0.3615	2.55	| Q V				
2+45	0.3796	2.62	| Q V				
2+50	0.3994	2.88	| Q V				
2+55	0.4202	3.01	| Q V				
3+ 0	0.4413	3.07	| Q V				
3+ 5	0.4627	3.10	| Q V				
3+10	0.4846	3.19	| Q V				
3+15	0.5084	3.46	| Q V				
3+20	0.5332	3.60	| Q V				
3+25	0.5589	3.73	| Q V				
3+30	0.5870	4.08	| Q V				
3+35	0.6184	4.56	| Q V|				
3+40	0.6529	5.01	| Q V|				
3+45	0.6894	5.30	| Q V				



3+50	0.7285	5.67	
3+55	0.7694	5.94	
4+ 0	0.8127	6.29	
4+ 5	0.8579	6.56	
4+10	0.9059	6.97	
4+15	0.9575	7.49	
4+20	1.0128	8.03	
4+25	1.0720	8.60	
4+30	1.1346	9.10	
4+35	1.1996	9.43	
4+40	1.2677	9.88	
4+45	1.3395	10.43	
4+50	1.4147	10.92	
4+55	1.4921	11.25	
5+ 0	1.5727	11.70	
5+ 5	1.6589	12.51	
5+10	1.7577	14.35	
5+15	1.8719	16.59	
5+20	1.9996	18.54	
5+25	2.1408	20.50	
5+30	2.3008	23.23	
5+35	2.4663	24.03	
5+40	2.5753	15.82	
5+45	2.6378	9.08	
5+50	2.6760	5.55	
5+55	2.7010	3.62	
6+ 0	2.7180	2.47	
6+ 5	2.7298	1.71	
6+10	2.7375	1.12	
6+15	2.7425	0.72	
6+20	2.7456	0.45	
6+25	2.7465	0.13	
6+30	2.7468	0.04	
6+35	2.7469	0.01	
6+40	2.7469	0.01	
6+45	2.7469	0.00	
6+50	2.7469	0.00	

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

Study date 04/04/23 File: ONSITEPRE24100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 24-HOUR
FN: ONSITEPRE.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1376.00(Ft.)
Length along longest watercourse measured to centroid = 686.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 5.00(Ft.)
Slope along watercourse = 19.1860 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.113 Hr.
Lag time = 6.81 Min.
25% of lag time = 1.70 Min.
40% of lag time = 2.72 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]
       19.80            1.60                  31.68

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            4.00                  79.20

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    4.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           89.00         0.000
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  89.0      0.141     0.000        0.141       1.000      0.141
                                                 Sum (F) =   0.141
Area averaged mean soil loss (F) (In/Hr) =  0.141
Minimum soil loss rate ((In/Hr)) =  0.071
(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   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083         73.448         11.521              2.299
    2   0.167        146.895         41.791              8.339
    3   0.250        220.343         21.981              4.386
    4   0.333        293.790          8.716              1.739
    5   0.417        367.238          5.287              1.055
    6   0.500        440.685          3.444              0.687
    7   0.583        514.133          2.371              0.473
    8   0.667        587.580          1.770              0.353
```

9	0.750	661.028	1.252	0.250
10	0.833	734.475	0.845	0.169
11	0.917	807.923	1.022	0.204
			Sum = 100.000	Sum= 19.955

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	0.032	(0.251)	0.029	0.003
2	0.17	0.07	0.032	(0.250)	0.029	0.003
3	0.25	0.07	0.032	(0.249)	0.029	0.003
4	0.33	0.10	0.048	(0.248)	0.043	0.005
5	0.42	0.10	0.048	(0.247)	0.043	0.005
6	0.50	0.10	0.048	(0.246)	0.043	0.005
7	0.58	0.10	0.048	(0.245)	0.043	0.005
8	0.67	0.10	0.048	(0.244)	0.043	0.005
9	0.75	0.10	0.048	(0.243)	0.043	0.005
10	0.83	0.13	0.064	(0.242)	0.058	0.006
11	0.92	0.13	0.064	(0.241)	0.058	0.006
12	1.00	0.13	0.064	(0.240)	0.058	0.006
13	1.08	0.10	0.048	(0.239)	0.043	0.005
14	1.17	0.10	0.048	(0.238)	0.043	0.005
15	1.25	0.10	0.048	(0.237)	0.043	0.005
16	1.33	0.10	0.048	(0.236)	0.043	0.005
17	1.42	0.10	0.048	(0.235)	0.043	0.005
18	1.50	0.10	0.048	(0.234)	0.043	0.005
19	1.58	0.10	0.048	(0.234)	0.043	0.005
20	1.67	0.10	0.048	(0.233)	0.043	0.005
21	1.75	0.10	0.048	(0.232)	0.043	0.005
22	1.83	0.13	0.064	(0.231)	0.058	0.006
23	1.92	0.13	0.064	(0.230)	0.058	0.006
24	2.00	0.13	0.064	(0.229)	0.058	0.006
25	2.08	0.13	0.064	(0.228)	0.058	0.006
26	2.17	0.13	0.064	(0.227)	0.058	0.006
27	2.25	0.13	0.064	(0.226)	0.058	0.006
28	2.33	0.13	0.064	(0.225)	0.058	0.006
29	2.42	0.13	0.064	(0.224)	0.058	0.006
30	2.50	0.13	0.064	(0.223)	0.058	0.006
31	2.58	0.17	0.080	(0.222)	0.072	0.008
32	2.67	0.17	0.080	(0.221)	0.072	0.008
33	2.75	0.17	0.080	(0.221)	0.072	0.008
34	2.83	0.17	0.080	(0.220)	0.072	0.008
35	2.92	0.17	0.080	(0.219)	0.072	0.008
36	3.00	0.17	0.080	(0.218)	0.072	0.008
37	3.08	0.17	0.080	(0.217)	0.072	0.008
38	3.17	0.17	0.080	(0.216)	0.072	0.008

39	3.25	0.17	0.080	(0.215)	0.072	0.008
40	3.33	0.17	0.080	(0.214)	0.072	0.008
41	3.42	0.17	0.080	(0.213)	0.072	0.008
42	3.50	0.17	0.080	(0.212)	0.072	0.008
43	3.58	0.17	0.080	(0.212)	0.072	0.008
44	3.67	0.17	0.080	(0.211)	0.072	0.008
45	3.75	0.17	0.080	(0.210)	0.072	0.008
46	3.83	0.20	0.096	(0.209)	0.086	0.010
47	3.92	0.20	0.096	(0.208)	0.086	0.010
48	4.00	0.20	0.096	(0.207)	0.086	0.010
49	4.08	0.20	0.096	(0.206)	0.086	0.010
50	4.17	0.20	0.096	(0.205)	0.086	0.010
51	4.25	0.20	0.096	(0.205)	0.086	0.010
52	4.33	0.23	0.112	(0.204)	0.101	0.011
53	4.42	0.23	0.112	(0.203)	0.101	0.011
54	4.50	0.23	0.112	(0.202)	0.101	0.011
55	4.58	0.23	0.112	(0.201)	0.101	0.011
56	4.67	0.23	0.112	(0.200)	0.101	0.011
57	4.75	0.23	0.112	(0.199)	0.101	0.011
58	4.83	0.27	0.128	(0.198)	0.115	0.013
59	4.92	0.27	0.128	(0.198)	0.115	0.013
60	5.00	0.27	0.128	(0.197)	0.115	0.013
61	5.08	0.20	0.096	(0.196)	0.086	0.010
62	5.17	0.20	0.096	(0.195)	0.086	0.010
63	5.25	0.20	0.096	(0.194)	0.086	0.010
64	5.33	0.23	0.112	(0.193)	0.101	0.011
65	5.42	0.23	0.112	(0.193)	0.101	0.011
66	5.50	0.23	0.112	(0.192)	0.101	0.011
67	5.58	0.27	0.128	(0.191)	0.115	0.013
68	5.67	0.27	0.128	(0.190)	0.115	0.013
69	5.75	0.27	0.128	(0.189)	0.115	0.013
70	5.83	0.27	0.128	(0.188)	0.115	0.013
71	5.92	0.27	0.128	(0.187)	0.115	0.013
72	6.00	0.27	0.128	(0.187)	0.115	0.013
73	6.08	0.30	0.144	(0.186)	0.130	0.014
74	6.17	0.30	0.144	(0.185)	0.130	0.014
75	6.25	0.30	0.144	(0.184)	0.130	0.014
76	6.33	0.30	0.144	(0.183)	0.130	0.014
77	6.42	0.30	0.144	(0.183)	0.130	0.014
78	6.50	0.30	0.144	(0.182)	0.130	0.014
79	6.58	0.33	0.160	(0.181)	0.144	0.016
80	6.67	0.33	0.160	(0.180)	0.144	0.016
81	6.75	0.33	0.160	(0.179)	0.144	0.016
82	6.83	0.33	0.160	(0.178)	0.144	0.016
83	6.92	0.33	0.160	(0.178)	0.144	0.016
84	7.00	0.33	0.160	(0.177)	0.144	0.016
85	7.08	0.33	0.160	(0.176)	0.144	0.016
86	7.17	0.33	0.160	(0.175)	0.144	0.016
87	7.25	0.33	0.160	(0.174)	0.144	0.016
88	7.33	0.37	0.176	(0.174)	0.158	0.018

89	7.42	0.37	0.176	(	0.173)	0.158		0.018
90	7.50	0.37	0.176	(	0.172)	0.158		0.018
91	7.58	0.40	0.192		0.171	(0.173)		0.021
92	7.67	0.40	0.192		0.170	(0.173)		0.022
93	7.75	0.40	0.192		0.170	(0.173)		0.022
94	7.83	0.43	0.208		0.169	(0.187)		0.039
95	7.92	0.43	0.208		0.168	(0.187)		0.040
96	8.00	0.43	0.208		0.167	(0.187)		0.041
97	8.08	0.50	0.240		0.167	(0.216)		0.073
98	8.17	0.50	0.240		0.166	(0.216)		0.074
99	8.25	0.50	0.240		0.165	(0.216)		0.075
100	8.33	0.50	0.240		0.164	(0.216)		0.076
101	8.42	0.50	0.240		0.163	(0.216)		0.077
102	8.50	0.50	0.240		0.163	(0.216)		0.077
103	8.58	0.53	0.256		0.162	(0.230)		0.094
104	8.67	0.53	0.256		0.161	(0.230)		0.095
105	8.75	0.53	0.256		0.160	(0.230)		0.096
106	8.83	0.57	0.272		0.160	(0.245)		0.112
107	8.92	0.57	0.272		0.159	(0.245)		0.113
108	9.00	0.57	0.272		0.158	(0.245)		0.114
109	9.08	0.63	0.304		0.157	(0.274)		0.147
110	9.17	0.63	0.304		0.157	(0.274)		0.147
111	9.25	0.63	0.304		0.156	(0.274)		0.148
112	9.33	0.67	0.320		0.155	(0.288)		0.165
113	9.42	0.67	0.320		0.154	(0.288)		0.166
114	9.50	0.67	0.320		0.154	(0.288)		0.166
115	9.58	0.70	0.336		0.153	(0.302)		0.183
116	9.67	0.70	0.336		0.152	(0.302)		0.184
117	9.75	0.70	0.336		0.151	(0.302)		0.184
118	9.83	0.73	0.352		0.151	(0.317)		0.201
119	9.92	0.73	0.352		0.150	(0.317)		0.202
120	10.00	0.73	0.352		0.149	(0.317)		0.203
121	10.08	0.50	0.240		0.149	(0.216)		0.091
122	10.17	0.50	0.240		0.148	(0.216)		0.092
123	10.25	0.50	0.240		0.147	(0.216)		0.093
124	10.33	0.50	0.240		0.146	(0.216)		0.094
125	10.42	0.50	0.240		0.146	(0.216)		0.094
126	10.50	0.50	0.240		0.145	(0.216)		0.095
127	10.58	0.67	0.320		0.144	(0.288)		0.176
128	10.67	0.67	0.320		0.144	(0.288)		0.176
129	10.75	0.67	0.320		0.143	(0.288)		0.177
130	10.83	0.67	0.320		0.142	(0.288)		0.178
131	10.92	0.67	0.320		0.142	(0.288)		0.178
132	11.00	0.67	0.320		0.141	(0.288)		0.179
133	11.08	0.63	0.304		0.140	(0.274)		0.164
134	11.17	0.63	0.304		0.139	(0.274)		0.165
135	11.25	0.63	0.304		0.139	(0.274)		0.165
136	11.33	0.63	0.304		0.138	(0.274)		0.166
137	11.42	0.63	0.304		0.137	(0.274)		0.167
138	11.50	0.63	0.304		0.137	(0.274)		0.167

139	11.58	0.57	0.272	0.136	(	0.245)	0.136
140	11.67	0.57	0.272	0.135	(	0.245)	0.137
141	11.75	0.57	0.272	0.135	(	0.245)	0.137
142	11.83	0.60	0.288	0.134	(	0.259)	0.154
143	11.92	0.60	0.288	0.133	(	0.259)	0.155
144	12.00	0.60	0.288	0.133	(	0.259)	0.155
145	12.08	0.83	0.400	0.132	(	0.360)	0.268
146	12.17	0.83	0.400	0.131	(	0.360)	0.269
147	12.25	0.83	0.400	0.131	(	0.360)	0.269
148	12.33	0.87	0.416	0.130	(	0.374)	0.286
149	12.42	0.87	0.416	0.129	(	0.374)	0.287
150	12.50	0.87	0.416	0.129	(	0.374)	0.287
151	12.58	0.93	0.448	0.128	(	0.403)	0.320
152	12.67	0.93	0.448	0.127	(	0.403)	0.321
153	12.75	0.93	0.448	0.127	(	0.403)	0.321
154	12.83	0.97	0.464	0.126	(	0.418)	0.338
155	12.92	0.97	0.464	0.126	(	0.418)	0.338
156	13.00	0.97	0.464	0.125	(	0.418)	0.339
157	13.08	1.13	0.544	0.124	(	0.490)	0.420
158	13.17	1.13	0.544	0.124	(	0.490)	0.420
159	13.25	1.13	0.544	0.123	(	0.490)	0.421
160	13.33	1.13	0.544	0.122	(	0.490)	0.422
161	13.42	1.13	0.544	0.122	(	0.490)	0.422
162	13.50	1.13	0.544	0.121	(	0.490)	0.423
163	13.58	0.77	0.368	0.120	(	0.331)	0.247
164	13.67	0.77	0.368	0.120	(	0.331)	0.248
165	13.75	0.77	0.368	0.119	(	0.331)	0.249
166	13.83	0.77	0.368	0.119	(	0.331)	0.249
167	13.92	0.77	0.368	0.118	(	0.331)	0.250
168	14.00	0.77	0.368	0.117	(	0.331)	0.251
169	14.08	0.90	0.432	0.117	(	0.389)	0.315
170	14.17	0.90	0.432	0.116	(	0.389)	0.316
171	14.25	0.90	0.432	0.116	(	0.389)	0.316
172	14.33	0.87	0.416	0.115	(	0.374)	0.301
173	14.42	0.87	0.416	0.114	(	0.374)	0.302
174	14.50	0.87	0.416	0.114	(	0.374)	0.302
175	14.58	0.87	0.416	0.113	(	0.374)	0.303
176	14.67	0.87	0.416	0.113	(	0.374)	0.303
177	14.75	0.87	0.416	0.112	(	0.374)	0.304
178	14.83	0.83	0.400	0.112	(	0.360)	0.288
179	14.92	0.83	0.400	0.111	(	0.360)	0.289
180	15.00	0.83	0.400	0.110	(	0.360)	0.290
181	15.08	0.80	0.384	0.110	(	0.346)	0.274
182	15.17	0.80	0.384	0.109	(	0.346)	0.275
183	15.25	0.80	0.384	0.109	(	0.346)	0.275
184	15.33	0.77	0.368	0.108	(	0.331)	0.260
185	15.42	0.77	0.368	0.108	(	0.331)	0.260
186	15.50	0.77	0.368	0.107	(	0.331)	0.261
187	15.58	0.63	0.304	0.107	(	0.274)	0.197
188	15.67	0.63	0.304	0.106	(	0.274)	0.198

189	15.75	0.63	0.304	0.105	(0.274)	0.199
190	15.83	0.63	0.304	0.105	(0.274)	0.199
191	15.92	0.63	0.304	0.104	(0.274)	0.200
192	16.00	0.63	0.304	0.104	(0.274)	0.200
193	16.08	0.13	0.064	(0.103)	0.058	0.006
194	16.17	0.13	0.064	(0.103)	0.058	0.006
195	16.25	0.13	0.064	(0.102)	0.058	0.006
196	16.33	0.13	0.064	(0.102)	0.058	0.006
197	16.42	0.13	0.064	(0.101)	0.058	0.006
198	16.50	0.13	0.064	(0.101)	0.058	0.006
199	16.58	0.10	0.048	(0.100)	0.043	0.005
200	16.67	0.10	0.048	(0.100)	0.043	0.005
201	16.75	0.10	0.048	(0.099)	0.043	0.005
202	16.83	0.10	0.048	(0.099)	0.043	0.005
203	16.92	0.10	0.048	(0.098)	0.043	0.005
204	17.00	0.10	0.048	(0.098)	0.043	0.005
205	17.08	0.17	0.080	(0.097)	0.072	0.008
206	17.17	0.17	0.080	(0.097)	0.072	0.008
207	17.25	0.17	0.080	(0.096)	0.072	0.008
208	17.33	0.17	0.080	(0.096)	0.072	0.008
209	17.42	0.17	0.080	(0.095)	0.072	0.008
210	17.50	0.17	0.080	(0.095)	0.072	0.008
211	17.58	0.17	0.080	(0.094)	0.072	0.008
212	17.67	0.17	0.080	(0.094)	0.072	0.008
213	17.75	0.17	0.080	(0.093)	0.072	0.008
214	17.83	0.13	0.064	(0.093)	0.058	0.006
215	17.92	0.13	0.064	(0.092)	0.058	0.006
216	18.00	0.13	0.064	(0.092)	0.058	0.006
217	18.08	0.13	0.064	(0.092)	0.058	0.006
218	18.17	0.13	0.064	(0.091)	0.058	0.006
219	18.25	0.13	0.064	(0.091)	0.058	0.006
220	18.33	0.13	0.064	(0.090)	0.058	0.006
221	18.42	0.13	0.064	(0.090)	0.058	0.006
222	18.50	0.13	0.064	(0.089)	0.058	0.006
223	18.58	0.10	0.048	(0.089)	0.043	0.005
224	18.67	0.10	0.048	(0.088)	0.043	0.005
225	18.75	0.10	0.048	(0.088)	0.043	0.005
226	18.83	0.07	0.032	(0.088)	0.029	0.003
227	18.92	0.07	0.032	(0.087)	0.029	0.003
228	19.00	0.07	0.032	(0.087)	0.029	0.003
229	19.08	0.10	0.048	(0.086)	0.043	0.005
230	19.17	0.10	0.048	(0.086)	0.043	0.005
231	19.25	0.10	0.048	(0.086)	0.043	0.005
232	19.33	0.13	0.064	(0.085)	0.058	0.006
233	19.42	0.13	0.064	(0.085)	0.058	0.006
234	19.50	0.13	0.064	(0.084)	0.058	0.006
235	19.58	0.10	0.048	(0.084)	0.043	0.005
236	19.67	0.10	0.048	(0.084)	0.043	0.005
237	19.75	0.10	0.048	(0.083)	0.043	0.005
238	19.83	0.07	0.032	(0.083)	0.029	0.003

239	19.92	0.07	0.032	(0.082)	0.029	0.003
240	20.00	0.07	0.032	(0.082)	0.029	0.003
241	20.08	0.10	0.048	(0.082)	0.043	0.005
242	20.17	0.10	0.048	(0.081)	0.043	0.005
243	20.25	0.10	0.048	(0.081)	0.043	0.005
244	20.33	0.10	0.048	(0.081)	0.043	0.005
245	20.42	0.10	0.048	(0.080)	0.043	0.005
246	20.50	0.10	0.048	(0.080)	0.043	0.005
247	20.58	0.10	0.048	(0.080)	0.043	0.005
248	20.67	0.10	0.048	(0.079)	0.043	0.005
249	20.75	0.10	0.048	(0.079)	0.043	0.005
250	20.83	0.07	0.032	(0.079)	0.029	0.003
251	20.92	0.07	0.032	(0.078)	0.029	0.003
252	21.00	0.07	0.032	(0.078)	0.029	0.003
253	21.08	0.10	0.048	(0.078)	0.043	0.005
254	21.17	0.10	0.048	(0.077)	0.043	0.005
255	21.25	0.10	0.048	(0.077)	0.043	0.005
256	21.33	0.07	0.032	(0.077)	0.029	0.003
257	21.42	0.07	0.032	(0.077)	0.029	0.003
258	21.50	0.07	0.032	(0.076)	0.029	0.003
259	21.58	0.10	0.048	(0.076)	0.043	0.005
260	21.67	0.10	0.048	(0.076)	0.043	0.005
261	21.75	0.10	0.048	(0.075)	0.043	0.005
262	21.83	0.07	0.032	(0.075)	0.029	0.003
263	21.92	0.07	0.032	(0.075)	0.029	0.003
264	22.00	0.07	0.032	(0.075)	0.029	0.003
265	22.08	0.10	0.048	(0.074)	0.043	0.005
266	22.17	0.10	0.048	(0.074)	0.043	0.005
267	22.25	0.10	0.048	(0.074)	0.043	0.005
268	22.33	0.07	0.032	(0.074)	0.029	0.003
269	22.42	0.07	0.032	(0.073)	0.029	0.003
270	22.50	0.07	0.032	(0.073)	0.029	0.003
271	22.58	0.07	0.032	(0.073)	0.029	0.003
272	22.67	0.07	0.032	(0.073)	0.029	0.003
273	22.75	0.07	0.032	(0.073)	0.029	0.003
274	22.83	0.07	0.032	(0.072)	0.029	0.003
275	22.92	0.07	0.032	(0.072)	0.029	0.003
276	23.00	0.07	0.032	(0.072)	0.029	0.003
277	23.08	0.07	0.032	(0.072)	0.029	0.003
278	23.17	0.07	0.032	(0.072)	0.029	0.003
279	23.25	0.07	0.032	(0.072)	0.029	0.003
280	23.33	0.07	0.032	(0.071)	0.029	0.003
281	23.42	0.07	0.032	(0.071)	0.029	0.003
282	23.50	0.07	0.032	(0.071)	0.029	0.003
283	23.58	0.07	0.032	(0.071)	0.029	0.003
284	23.67	0.07	0.032	(0.071)	0.029	0.003
285	23.75	0.07	0.032	(0.071)	0.029	0.003
286	23.83	0.07	0.032	(0.071)	0.029	0.003
287	23.92	0.07	0.032	(0.071)	0.029	0.003
288	24.00	0.07	0.032	(0.071)	0.029	0.003

(Loss Rate Not Used)
Sum = 100.0 Sum = 22.3
Flood volume = Effective rainfall 1.86(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 3.1(Ac.Ft)
Total soil loss = 2.14(In)
Total soil loss = 3.539(Ac.Ft)
Total rainfall = 4.00(In)
Flood volume = 133342.4 Cubic Feet
Total soil loss = 154142.5 Cubic Feet

Peak flow rate of this hydrograph = 8.295(CFS)

++

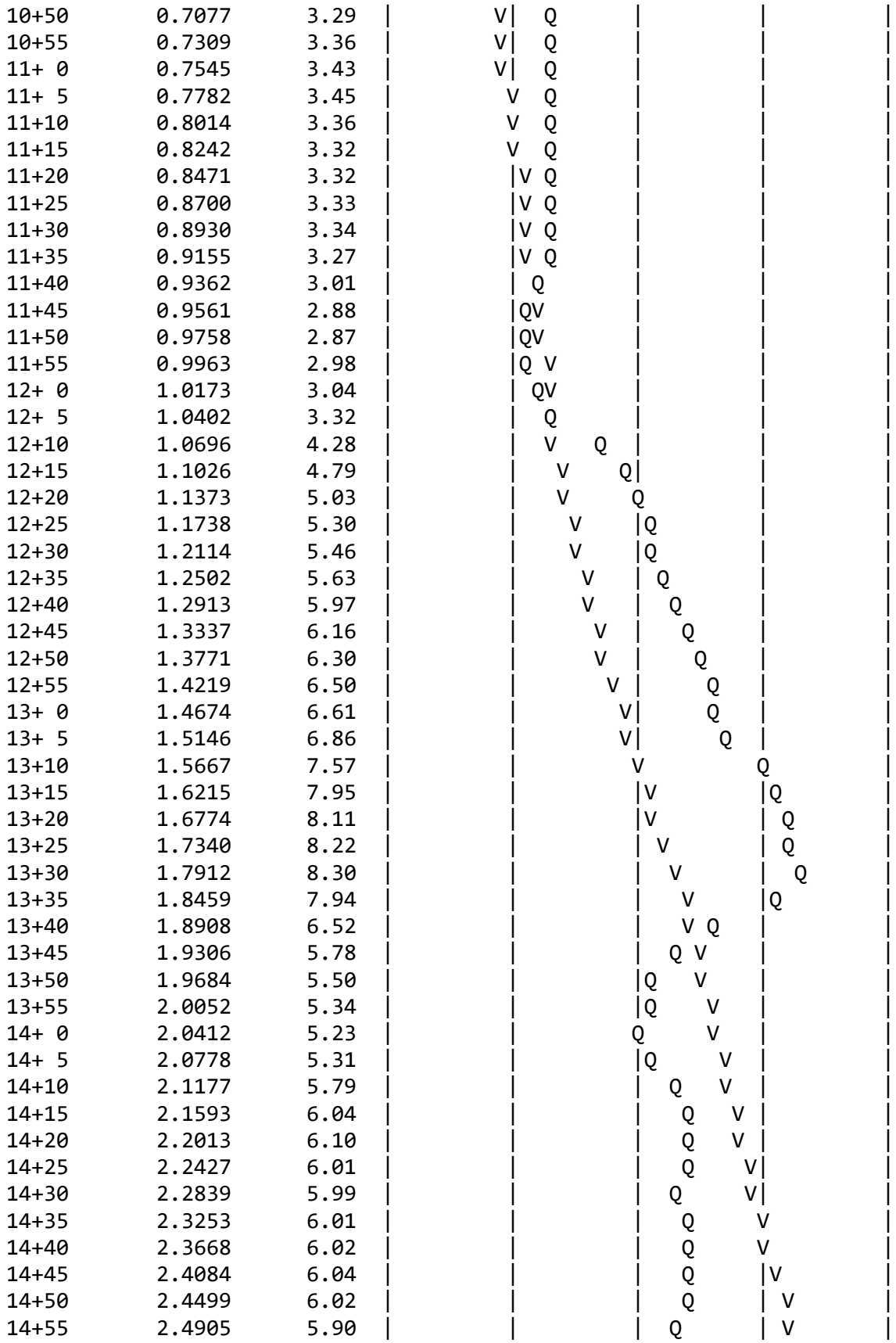
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

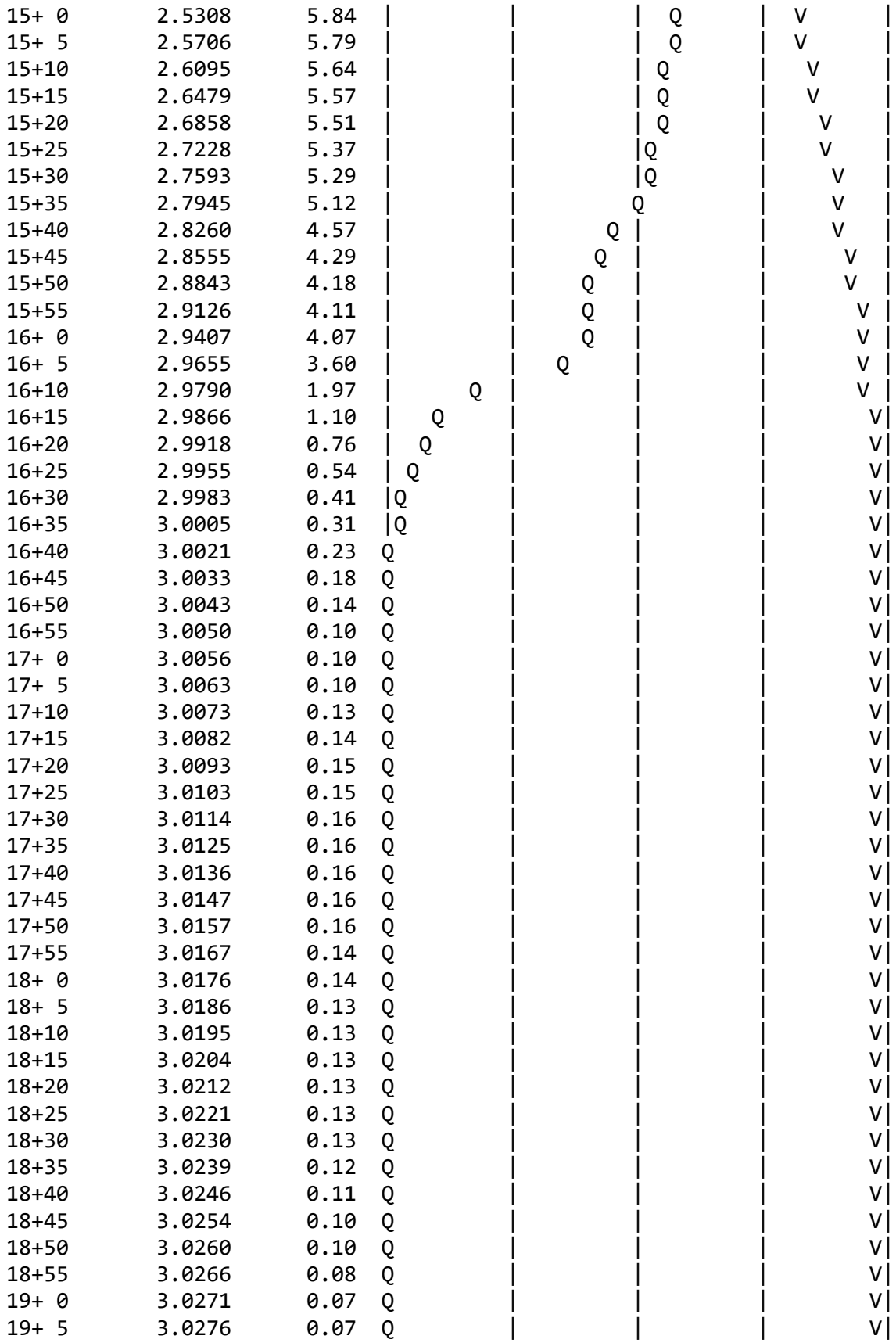
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0003	0.03	Q				
0+15	0.0006	0.05	Q				
0+20	0.0010	0.06	Q				
0+25	0.0015	0.07	Q				
0+30	0.0021	0.08	Q				
0+35	0.0027	0.09	Q				
0+40	0.0033	0.09	Q				
0+45	0.0040	0.09	Q				
0+50	0.0046	0.10	Q				
0+55	0.0054	0.11	Q				
1+ 0	0.0062	0.12	Q				
1+ 5	0.0070	0.12	Q				
1+10	0.0078	0.11	Q				
1+15	0.0085	0.10	Q				
1+20	0.0092	0.10	Q				
1+25	0.0098	0.10	Q				
1+30	0.0105	0.10	Q				
1+35	0.0112	0.10	Q				
1+40	0.0118	0.10	Q				
1+45	0.0125	0.10	Q				
1+50	0.0132	0.10	Q				
1+55	0.0140	0.11	Q				
2+ 0	0.0148	0.12	Q				
2+ 5	0.0156	0.12	Q				
2+10	0.0165	0.12	Q				
2+15	0.0174	0.13	Q				
2+20	0.0182	0.13	Q				
2+25	0.0191	0.13	Q				

2+30	0.0200	0.13	Q	|	|	|	|
2+35	0.0209	0.13	Q	|	|	|	|
2+40	0.0219	0.14	Q	|	|	|	|
2+45	0.0229	0.15	Q	|	|	|	|
2+50	0.0240	0.15	Q	|	|	|	|
2+55	0.0251	0.16	Q	|	|	|	|
3+ 0	0.0262	0.16	Q	|	|	|	|
3+ 5	0.0272	0.16	Q	|	|	|	|
3+10	0.0283	0.16	Q	|	|	|	|
3+15	0.0294	0.16	Q	|	|	|	|
3+20	0.0305	0.16	Q	|	|	|	|
3+25	0.0316	0.16	Q	|	|	|	|
3+30	0.0327	0.16	Q	|	|	|	|
3+35	0.0338	0.16	Q	|	|	|	|
3+40	0.0349	0.16	Q	|	|	|	|
3+45	0.0360	0.16	Q	|	|	|	|
3+50	0.0372	0.16	Q	|	|	|	|
3+55	0.0384	0.18	Q	|	|	|	|
4+ 0	0.0396	0.18	Q	|	|	|	|
4+ 5	0.0409	0.19	Q	|	|	|	|
4+10	0.0422	0.19	Q	|	|	|	|
4+15	0.0435	0.19	Q	|	|	|	|
4+20	0.0449	0.19	Q	|	|	|	|
4+25	0.0463	0.21	Q	|	|	|	|
4+30	0.0478	0.22	Q	|	|	|	|
4+35	0.0493	0.22	Q	|	|	|	|
4+40	0.0508	0.22	Q	|	|	|	|
4+45	0.0523	0.22	Q	|	|	|	|
4+50	0.0539	0.23	Q	|	|	|	|
4+55	0.0555	0.24	Q	|	|	|	|
5+ 0	0.0572	0.25	Q	|	|	|	|
5+ 5	0.0589	0.24	Q	|	|	|	|
5+10	0.0604	0.22	Q	|	|	|	|
5+15	0.0618	0.21	Q	|	|	|	|
5+20	0.0632	0.20	Q	|	|	|	|
5+25	0.0647	0.21	Q	|	|	|	|
5+30	0.0662	0.22	Q	|	|	|	|
5+35	0.0677	0.22	Q	|	|	|	|
5+40	0.0694	0.24	Q	|	|	|	|
5+45	0.0711	0.25	Q	|	|	|	|
5+50	0.0728	0.25	Q	|	|	|	|
5+55	0.0745	0.25	VQ	|	|	|	|
6+ 0	0.0763	0.25	VQ	|	|	|	|
6+ 5	0.0781	0.26	|Q	|	|	|	|
6+10	0.0799	0.27	|Q	|	|	|	|
6+15	0.0818	0.28	|Q	|	|	|	|
6+20	0.0838	0.28	|Q	|	|	|	|
6+25	0.0857	0.28	|Q	|	|	|	|
6+30	0.0877	0.29	|Q	|	|	|	|
6+35	0.0897	0.29	|Q	|	|	|	|

```
 6+40       0.0918      0.30  |Q        |         |         |         |
 6+45       0.0939      0.31  |Q        |         |         |         |
 6+50       0.0961      0.31  |Q        |         |         |         |
 6+55       0.0983      0.32  |Q        |         |         |         |
 7+ 0       0.1005      0.32  |Q        |         |         |         |
 7+ 5       0.1026      0.32  |Q        |         |         |         |
 7+10       0.1048      0.32  |Q        |         |         |         |
 7+15       0.1070      0.32  |Q        |         |         |         |
 7+20       0.1093      0.32  |Q        |         |         |         |
 7+25       0.1116      0.34  |Q        |         |         |         |
 7+30       0.1139      0.34  |Q        |         |         |         |
 7+35       0.1164      0.35  |Q        |         |         |         |
 7+40       0.1190      0.38  |Q        |         |         |         |
 7+45       0.1218      0.41  |Q        |         |         |         |
 7+50       0.1250      0.46  |Q        |         |         |         |
 7+55       0.1292      0.61  |VQ       |         |         |         |
 8+ 0       0.1340      0.70  |VQ       |         |         |         |
 8+ 5       0.1396      0.82  |V Q      |         |         |         |
 8+10       0.1473      1.12  |V  Q     |         |         |         |
 8+15       0.1562      1.28  | V  Q    |         |         |         |
 8+20       0.1655      1.36  | V  Q    |         |         |         |
 8+25       0.1753      1.42  | V  Q    |         |         |         |
 8+30       0.1854      1.46  | V  Q    |         |         |         |
 8+35       0.1959      1.53  | V   Q   |         |         |         |
 8+40       0.2075      1.69  | V   Q   |         |         |         |
 8+45       0.2198      1.79  | V    Q  |         |         |         |
 8+50       0.2327      1.87  |  V   Q  |         |         |         |
 8+55       0.2468      2.04  |  V    Q |         |         |         |
 9+ 0       0.2615      2.14  |  V    Q |         |         |         |
 9+ 5       0.2771      2.26  |  V     Q|         |         |         |
 9+10       0.2948      2.57  |  V      Q         |         |         |
 9+15       0.3137      2.74  |   V     Q         |         |         |
 9+20       0.3333      2.86  |   V     |Q        |         |         |
 9+25       0.3543      3.05  |   V     | Q       |         |         |
 9+30       0.3761      3.16  |   V     | Q       |         |         |
 9+35       0.3985      3.26  |    V    |  Q      |         |         |
 9+40       0.4222      3.44  |    V    |  Q      |         |         |
 9+45       0.4465      3.54  |    V    |   Q     |         |         |
 9+50       0.4715      3.63  |     V   |   Q     |         |         |
 9+55       0.4978      3.81  |     V   |    Q    |         |         |
10+ 0       0.5247      3.91  |     V   |    Q    |         |         |
10+ 5       0.5502      3.70  |      V  |   Q     |         |         |
10+10       0.5695      2.81  |      V  |Q        |         |         |
10+15       0.5857      2.35  |      V Q|         |         |         |
10+20       0.6007      2.18  |      VQ |         |         |         |
10+25       0.6150      2.08  |       Q |         |         |         |
10+30       0.6290      2.02  |       Q |         |         |         |
10+35       0.6439      2.17  |       Q |         |         |         |
10+40       0.6633      2.82  |       V |Q        |         |         |
10+45       0.6850      3.15  |       V | Q       |         |         |
```





19+10	3.0282	0.09	Q	|	|	|	V|
19+15	3.0288	0.09	Q	|	|	|	V|
19+20	3.0295	0.10	Q	|	|	|	V|
19+25	3.0302	0.11	Q	|	|	|	V|
19+30	3.0311	0.12	Q	|	|	|	V|
19+35	3.0319	0.12	Q	|	|	|	V|
19+40	3.0326	0.11	Q	|	|	|	V|
19+45	3.0333	0.10	Q	|	|	|	V|
19+50	3.0340	0.10	Q	|	|	|	V|
19+55	3.0345	0.08	Q	|	|	|	V|
20+ 0	3.0350	0.07	Q	|	|	|	V|
20+ 5	3.0355	0.07	Q	|	|	|	V|
20+10	3.0361	0.09	Q	|	|	|	V|
20+15	3.0367	0.09	Q	|	|	|	V|
20+20	3.0374	0.09	Q	|	|	|	V|
20+25	3.0380	0.09	Q	|	|	|	V|
20+30	3.0387	0.09	Q	|	|	|	V|
20+35	3.0393	0.09	Q	|	|	|	V|
20+40	3.0400	0.09	Q	|	|	|	V|
20+45	3.0406	0.10	Q	|	|	|	V|
20+50	3.0413	0.09	Q	|	|	|	V|
20+55	3.0418	0.08	Q	|	|	|	V|
21+ 0	3.0423	0.07	Q	|	|	|	V|
21+ 5	3.0428	0.07	Q	|	|	|	V|
21+10	3.0434	0.08	Q	|	|	|	V|
21+15	3.0440	0.09	Q	|	|	|	V|
21+20	3.0446	0.09	Q	|	|	|	V|
21+25	3.0451	0.08	Q	|	|	|	V|
21+30	3.0456	0.07	Q	|	|	|	V|
21+35	3.0461	0.07	Q	|	|	|	V|
21+40	3.0467	0.08	Q	|	|	|	V|
21+45	3.0473	0.09	Q	|	|	|	V|
21+50	3.0479	0.09	Q	|	|	|	V|
21+55	3.0484	0.08	Q	|	|	|	V|
22+ 0	3.0489	0.07	Q	|	|	|	V|
22+ 5	3.0494	0.07	Q	|	|	|	V|
22+10	3.0500	0.08	Q	|	|	|	V|
22+15	3.0506	0.09	Q	|	|	|	V|
22+20	3.0512	0.09	Q	|	|	|	V|
22+25	3.0517	0.08	Q	|	|	|	V|
22+30	3.0522	0.07	Q	|	|	|	V|
22+35	3.0527	0.07	Q	|	|	|	V|
22+40	3.0531	0.07	Q	|	|	|	V|
22+45	3.0536	0.07	Q	|	|	|	V|
22+50	3.0540	0.07	Q	|	|	|	V|
22+55	3.0545	0.06	Q	|	|	|	V|
23+ 0	3.0549	0.06	Q	|	|	|	V|
23+ 5	3.0554	0.06	Q	|	|	|	V|
23+10	3.0558	0.06	Q	|	|	|	V|
23+15	3.0563	0.06	Q	|	|	|	V|

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   23+20       3.0567      0.06  Q         |          |          |         V|
   23+25       3.0571      0.06  Q         |          |          |         V|
   23+30       3.0576      0.06  Q         |          |          |         V|
   23+35       3.0580      0.06  Q         |          |          |         V|
   23+40       3.0585      0.06  Q         |          |          |         V|
   23+45       3.0589      0.06  Q         |          |          |         V|
   23+50       3.0593      0.06  Q         |          |          |         V|
   23+55       3.0598      0.06  Q         |          |          |         V|
   24+ 0       3.0602      0.06  Q         |          |          |         V|
   24+ 5       3.0606      0.06  Q         |          |          |         V|
   24+10       3.0608      0.03  Q         |          |          |         V|
   24+15       3.0609      0.02  Q         |          |          |         V|
   24+20       3.0610      0.01  Q         |          |          |         V|
   24+25       3.0610      0.01  Q         |          |          |         V|
   24+30       3.0611      0.00  Q         |          |          |         V|
   24+35       3.0611      0.00  Q         |          |          |         V|
   24+40       3.0611      0.00  Q         |          |          |         V|
   24+45       3.0611      0.00  Q         |          |          |         V|
   24+50       3.0611      0.00  Q         |          |          |          V
-------------------------------------------------------------------------
```

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

Study date 04/04/23 File: ONSITEPROP1100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 1-HOUR
FN: ONSITEPROP.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 553.00(Ft.)
Length along longest watercourse measured to centroid = 150.00(Ft.)
Length along longest watercourse = 0.105 Mi.
Length along longest watercourse measured to centroid = 0.028 Mi.
Difference in elevation = 7.00(Ft.)
Slope along watercourse = 66.8354 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.018 Hr.
Lag time = 1.07 Min.
25% of lag time = 0.27 Min.
40% of lag time = 0.43 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            0.50                  9.90

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.20                 23.76

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           75.00         0.900
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  75.0      0.303     0.900        0.058       1.000      0.058
                                                 Sum (F) =   0.058
Area averaged mean soil loss (F) (In/Hr) =  0.058
Minimum soil loss rate ((In/Hr)) =  0.029
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.180
------------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
------------------------------------------------------------------------

                U n i t  H y d r o g r a p h
                        VALLEY S-Curve
-----------------------------------------------------------------
                Unit Hydrograph Data
-----------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
-----------------------------------------------------------------
    1   0.083        469.158         69.318             13.832
    2   0.167        938.316         30.682              6.122
                               Sum = 100.000   Sum=      19.955
-----------------------------------------------------------------
```

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	4.20	0.605	0.058	(0.109)	0.547
2	0.17	4.30	0.619	0.058	(0.111)	0.562
3	0.25	5.00	0.720	0.058	(0.130)	0.662
4	0.33	5.00	0.720	0.058	(0.130)	0.662
5	0.42	5.80	0.835	0.058	(0.150)	0.777
6	0.50	6.50	0.936	0.058	(0.168)	0.878
7	0.58	7.40	1.065	0.058	(0.192)	1.008
8	0.67	8.60	1.238	0.058	(0.223)	1.181
9	0.75	12.30	1.771	0.058	(0.319)	1.713
10	0.83	29.10	4.190	0.058	(0.754)	4.132
11	0.92	6.80	0.979	0.058	(0.176)	0.921
12	1.00	5.00	0.720	0.058	(0.130)	0.662
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	13.7

Flood volume = Effective rainfall 1.14(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 1.9(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.095(Ac.Ft)
Total rainfall = 1.20(In)
Flood volume = 82095.5 Cubic Feet
Total soil loss = 4137.8 Cubic Feet

Peak flow rate of this hydrograph = 67.680(CFS)

++

1 - 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	17.5	35.0	52.5	70.0
0+ 5	0.0521	7.57	V Q				
0+10	0.1287	11.12	V Q				
0+15	0.2156	12.61	V Q				
0+20	0.3066	13.22	VQ				
0+25	0.4087	14.82	Q				
0+30	0.5252	16.92	Q V				
0+35	0.6583	19.33	Q V				
0+40	0.8133	22.51	Q V				
0+45	1.0264	30.94	Q V				
0+50	1.4926	67.68	V Q				
0+55	1.7547	38.06	Q V				
1+ 0	1.8567	14.81	Q V				

```
    1+ 5       1.8847      4.06  | Q       |         |         V
-------------------------------------------------------------------------
```

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

Study date 04/04/23 File: ONSITEPROP3100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 3-HOUR
FN: ONSITEPROP.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 553.00(Ft.)
Length along longest watercourse measured to centroid = 150.00(Ft.)
Length along longest watercourse = 0.105 Mi.
Length along longest watercourse measured to centroid = 0.028 Mi.
Difference in elevation = 7.00(Ft.)
Slope along watercourse = 66.8354 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.018 Hr.
Lag time = 1.07 Min.
25% of lag time = 0.27 Min.
40% of lag time = 0.43 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            0.80                  15.84

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.90                  37.62

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.800(In)
Area Averaged 100-Year Rainfall =    1.900(In)

Point rain (area averaged) =    1.900(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    1.900(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           75.00         0.900
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  75.0      0.303     0.900        0.058       1.000      0.058
                                                 Sum (F) =   0.058
Area averaged mean soil loss (F) (In/Hr) =  0.058
Minimum soil loss rate ((In/Hr)) =  0.029
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.180
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083        469.158         69.318             13.832
    2   0.167        938.316         30.682              6.122
                              Sum = 100.000   Sum=      19.955
------------------------------------------------------------------------

 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	1.30	0.296	(0.058)	0.053	0.243
2	0.17	1.30	0.296	(0.058)	0.053	0.243
3	0.25	1.10	0.251	(0.058)	0.045	0.206
4	0.33	1.50	0.342	0.058	(0.062)	0.284
5	0.42	1.50	0.342	0.058	(0.062)	0.284
6	0.50	1.80	0.410	0.058	(0.074)	0.353
7	0.58	1.50	0.342	0.058	(0.062)	0.284
8	0.67	1.80	0.410	0.058	(0.074)	0.353
9	0.75	1.80	0.410	0.058	(0.074)	0.353
10	0.83	1.50	0.342	0.058	(0.062)	0.284
11	0.92	1.60	0.365	0.058	(0.066)	0.307
12	1.00	1.80	0.410	0.058	(0.074)	0.353
13	1.08	2.20	0.502	0.058	(0.090)	0.444
14	1.17	2.20	0.502	0.058	(0.090)	0.444
15	1.25	2.20	0.502	0.058	(0.090)	0.444
16	1.33	2.00	0.456	0.058	(0.082)	0.398
17	1.42	2.60	0.593	0.058	(0.107)	0.535
18	1.50	2.70	0.616	0.058	(0.111)	0.558
19	1.58	2.40	0.547	0.058	(0.098)	0.490
20	1.67	2.70	0.616	0.058	(0.111)	0.558
21	1.75	3.30	0.752	0.058	(0.135)	0.695
22	1.83	3.10	0.707	0.058	(0.127)	0.649
23	1.92	2.90	0.661	0.058	(0.119)	0.604
24	2.00	3.00	0.684	0.058	(0.123)	0.626
25	2.08	3.10	0.707	0.058	(0.127)	0.649
26	2.17	4.20	0.958	0.058	(0.172)	0.900
27	2.25	5.00	1.140	0.058	(0.205)	1.082
28	2.33	3.50	0.798	0.058	(0.144)	0.740
29	2.42	6.80	1.550	0.058	(0.279)	1.493
30	2.50	7.30	1.664	0.058	(0.300)	1.607
31	2.58	8.20	1.869	0.058	(0.336)	1.812
32	2.67	5.90	1.345	0.058	(0.242)	1.288
33	2.75	2.00	0.456	0.058	(0.082)	0.398
34	2.83	1.80	0.410	0.058	(0.074)	0.353
35	2.92	1.80	0.410	0.058	(0.074)	0.353
36	3.00	0.60	0.137	(0.058)	0.025	0.112
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	20.8

Flood volume = Effective rainfall 1.73(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.9(Ac.Ft)
Total soil loss = 0.17(In)
Total soil loss = 0.278(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 124457.8 Cubic Feet
Total soil loss = 12091.0 Cubic Feet

Peak flow rate of this hydrograph = 34.917(CFS)

3 - 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 10.0 20.0 30.0 40.0
0+ 5	0.0232	3.36	V Q
0+10	0.0566	4.85	V Q
0+15	0.0864	4.33	V Q
0+20	0.1222	5.20	V Q
0+25	0.1613	5.68	V Q
0+30	0.2069	6.62	V Q
0+35	0.2489	6.10	V Q
0+40	0.2946	6.62	V Q
0+45	0.3431	7.04	V Q
0+50	0.3851	6.10	VQ
0+55	0.4263	5.99	Q
1+ 0	0.4729	6.76	Q
1+ 5	0.5301	8.31	VQ
1+10	0.5912	8.86	Q
1+15	0.6522	8.86	QV
1+20	0.7089	8.23	QV
1+25	0.7767	9.85	QV
1+30	0.8525	11.00	Q
1+35	0.9227	10.19	Q V
1+40	0.9965	10.72	Q V
1+45	1.0863	13.03	Q V
1+50	1.1775	13.24	Q V
1+55	1.2624	12.33	Q V
2+ 0	1.3476	12.37	Q V
2+ 5	1.4359	12.82	Q V
2+10	1.5490	16.43	Q V
2+15	1.6901	20.49	Q V
2+20	1.8064	16.88	Q V
2+25	1.9799	25.19	Q V
2+30	2.1960	31.38	VQ
2+35	2.4365	34.92	Q
2+40	2.6356	28.92	Q V
2+45	2.7279	13.40	Q V
2+50	2.7783	7.32	Q V
2+55	2.8269	7.04	Q V
3+ 0	2.8524	3.71	Q V
3+ 5	2.8572	0.69	Q V

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

Study date 04/04/23 File: ONSITEPROP6100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 6-HOUR
FN: ONSITEPROP.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 553.00(Ft.)
Length along longest watercourse measured to centroid = 150.00(Ft.)
Length along longest watercourse = 0.105 Mi.
Length along longest watercourse measured to centroid = 0.028 Mi.
Difference in elevation = 7.00(Ft.)
Slope along watercourse = 66.8354 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.018 Hr.
Lag time = 1.07 Min.
25% of lag time = 0.27 Min.
40% of lag time = 0.43 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            1.00                  19.80

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            2.50                  49.50

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.000(In)
Area Averaged 100-Year Rainfall =    2.500(In)

Point rain (area averaged) =    2.500(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.500(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           75.00         0.900
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  75.0      0.303     0.900        0.058       1.000      0.058
                                                 Sum (F) =   0.058
Area averaged mean soil loss (F) (In/Hr) =  0.058
Minimum soil loss rate ((In/Hr)) =  0.029
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.180
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083        469.158         69.318             13.832
    2   0.167        938.316         30.682              6.122
                              Sum = 100.000   Sum=      19.955
------------------------------------------------------------------------

 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	0.50	0.150	(0.058)	0.027	0.123
2	0.17	0.60	0.180	(0.058)	0.032	0.148
3	0.25	0.60	0.180	(0.058)	0.032	0.148
4	0.33	0.60	0.180	(0.058)	0.032	0.148
5	0.42	0.60	0.180	(0.058)	0.032	0.148
6	0.50	0.70	0.210	(0.058)	0.038	0.172
7	0.58	0.70	0.210	(0.058)	0.038	0.172
8	0.67	0.70	0.210	(0.058)	0.038	0.172
9	0.75	0.70	0.210	(0.058)	0.038	0.172
10	0.83	0.70	0.210	(0.058)	0.038	0.172
11	0.92	0.70	0.210	(0.058)	0.038	0.172
12	1.00	0.80	0.240	(0.058)	0.043	0.197
13	1.08	0.80	0.240	(0.058)	0.043	0.197
14	1.17	0.80	0.240	(0.058)	0.043	0.197
15	1.25	0.80	0.240	(0.058)	0.043	0.197
16	1.33	0.80	0.240	(0.058)	0.043	0.197
17	1.42	0.80	0.240	(0.058)	0.043	0.197
18	1.50	0.80	0.240	(0.058)	0.043	0.197
19	1.58	0.80	0.240	(0.058)	0.043	0.197
20	1.67	0.80	0.240	(0.058)	0.043	0.197
21	1.75	0.80	0.240	(0.058)	0.043	0.197
22	1.83	0.80	0.240	(0.058)	0.043	0.197
23	1.92	0.80	0.240	(0.058)	0.043	0.197
24	2.00	0.90	0.270	(0.058)	0.049	0.221
25	2.08	0.80	0.240	(0.058)	0.043	0.197
26	2.17	0.90	0.270	(0.058)	0.049	0.221
27	2.25	0.90	0.270	(0.058)	0.049	0.221
28	2.33	0.90	0.270	(0.058)	0.049	0.221
29	2.42	0.90	0.270	(0.058)	0.049	0.221
30	2.50	0.90	0.270	(0.058)	0.049	0.221
31	2.58	0.90	0.270	(0.058)	0.049	0.221
32	2.67	0.90	0.270	(0.058)	0.049	0.221
33	2.75	1.00	0.300	(0.058)	0.054	0.246
34	2.83	1.00	0.300	(0.058)	0.054	0.246
35	2.92	1.00	0.300	(0.058)	0.054	0.246
36	3.00	1.00	0.300	(0.058)	0.054	0.246
37	3.08	1.00	0.300	(0.058)	0.054	0.246
38	3.17	1.10	0.330	0.058	(0.059)	0.272
39	3.25	1.10	0.330	0.058	(0.059)	0.272
40	3.33	1.10	0.330	0.058	(0.059)	0.272
41	3.42	1.20	0.360	0.058	(0.065)	0.302
42	3.50	1.30	0.390	0.058	(0.070)	0.332
43	3.58	1.40	0.420	0.058	(0.076)	0.362
44	3.67	1.40	0.420	0.058	(0.076)	0.362
45	3.75	1.50	0.450	0.058	(0.081)	0.392
46	3.83	1.50	0.450	0.058	(0.081)	0.392
47	3.92	1.60	0.480	0.058	(0.086)	0.422

```
48   4.00     1.60      0.480          0.058    (  0.086)        0.422
49   4.08     1.70      0.510          0.058    (  0.092)        0.452
50   4.17     1.80      0.540          0.058    (  0.097)        0.482
51   4.25     1.90      0.570          0.058    (  0.103)        0.512
52   4.33     2.00      0.600          0.058    (  0.108)        0.542
53   4.42     2.10      0.630          0.058    (  0.113)        0.572
54   4.50     2.10      0.630          0.058    (  0.113)        0.572
55   4.58     2.20      0.660          0.058    (  0.119)        0.602
56   4.67     2.30      0.690          0.058    (  0.124)        0.632
57   4.75     2.40      0.720          0.058    (  0.130)        0.662
58   4.83     2.40      0.720          0.058    (  0.130)        0.662
59   4.92     2.50      0.750          0.058    (  0.135)        0.692
60   5.00     2.60      0.780          0.058    (  0.140)        0.722
61   5.08     3.10      0.930          0.058    (  0.167)        0.872
62   5.17     3.60      1.080          0.058    (  0.194)        1.022
63   5.25     3.90      1.170          0.058    (  0.211)        1.112
64   5.33     4.20      1.260          0.058    (  0.227)        1.202
65   5.42     4.70      1.410          0.058    (  0.254)        1.352
66   5.50     5.60      1.680          0.058    (  0.302)        1.622
67   5.58     1.90      0.570          0.058    (  0.103)        0.512
68   5.67     0.90      0.270       (  0.058)       0.049        0.221
69   5.75     0.60      0.180       (  0.058)       0.032        0.148
70   5.83     0.50      0.150       (  0.058)       0.027        0.123
71   5.92     0.30      0.090       (  0.058)       0.016        0.074
72   6.00     0.20      0.060       (  0.058)       0.011        0.049
               (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    26.5
      Flood volume = Effective rainfall      2.21(In)
       times area      19.8(Ac.)/[(In)/(Ft.)] =       3.6(Ac.Ft)
      Total soil loss =      0.29(In)
      Total soil loss =     0.477(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =      158914.5 Cubic Feet
      Total soil loss =       20758.3 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     30.736(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - 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       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0117      1.70  VQ        |         |         |         |
  0+10       0.0310      2.80  V Q       |         |         |         |
  0+15       0.0513      2.95  V Q       |         |         |         |
  0+20       0.0716      2.95  V Q       |         |         |         |
```

```
0+25       0.0919      2.95  |VQ       |         |         |         |
0+30       0.1145      3.29  |V Q      |         |         |         |
0+35       0.1382      3.44  |V Q      |         |         |         |
0+40       0.1618      3.44  |V Q      |         |         |         |
0+45       0.1855      3.44  | VQ      |         |         |         |
0+50       0.2092      3.44  | VQ      |         |         |         |
0+55       0.2329      3.44  | VQ      |         |         |         |
1+ 0       0.2589      3.78  | VQ      |         |         |         |
1+ 5       0.2860      3.93  |  Q      |         |         |         |
1+10       0.3130      3.93  |  Q      |         |         |         |
1+15       0.3401      3.93  |  Q      |         |         |         |
1+20       0.3671      3.93  |  QV     |         |         |         |
1+25       0.3942      3.93  |  QV     |         |         |         |
1+30       0.4212      3.93  |  QV     |         |         |         |
1+35       0.4483      3.93  |  QV     |         |         |         |
1+40       0.4754      3.93  |  Q V    |         |         |         |
1+45       0.5024      3.93  |  Q V    |         |         |         |
1+50       0.5295      3.93  |  Q V    |         |         |         |
1+55       0.5565      3.93  |  Q  V   |         |         |         |
2+ 0       0.5859      4.27  |   Q V   |         |         |         |
2+ 5       0.6140      4.08  |   Q V   |         |         |         |
2+10       0.6434      4.27  |   Q  V  |         |         |         |
2+15       0.6739      4.42  |   Q  V  |         |         |         |
2+20       0.7043      4.42  |   Q  V  |         |         |         |
2+25       0.7348      4.42  |   Q   V |         |         |         |
2+30       0.7652      4.42  |   Q   V |         |         |         |
2+35       0.7956      4.42  |   Q   V |         |         |         |
2+40       0.8261      4.42  |   Q    V|         |         |         |
2+45       0.8589      4.76  |   Q    V|         |         |         |
2+50       0.8927      4.91  |   Q    V|         |         |         |
2+55       0.9265      4.91  |   Q     V         |         |         |
3+ 0       0.9603      4.91  |   Q     V         |         |         |
3+ 5       0.9942      4.91  |   Q     V         |         |         |
3+10       1.0305      5.28  |    Q    |V        |         |         |
3+15       1.0680      5.44  |    Q    |V        |         |         |
3+20       1.1054      5.44  |    Q    | V       |         |         |
3+25       1.1457      5.85  |    Q    | V       |         |         |
3+30       1.1902      6.45  |     Q   |  V      |         |         |
3+35       1.2387      7.05  |      Q  |  V      |         |         |
3+40       1.2886      7.24  |      Q  |   V     |         |         |
3+45       1.3412      7.65  |      Q  |   V     |         |         |
3+50       1.3952      7.83  |      Q  |    V    |         |         |
3+55       1.4520      8.25  |       Q |    V    |         |         |
4+ 0       1.5101      8.43  |       Q |     V   |         |         |
4+ 5       1.5710      8.85  |       Q |      V  |         |         |
4+10       1.6361      9.45  |        Q|      V  |         |         |
4+15       1.7053     10.05  |         Q       V |         |         |
4+20       1.7786     10.65  |         Q        V|         |         |
4+25       1.8560     11.24  |         |Q        V         |         |
4+30       1.9347     11.43  |         |Q        |V        |         |
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   4+35       2.0163     11.84  |         |Q        | V       |         |
   4+40       2.1020     12.44  |         | Q       |  V      |         |
   4+45       2.1918     13.04  |         |  Q      |   V     |         |
   4+50       2.2829     13.22  |         |  Q      |    V    |         |
   4+55       2.3768     13.64  |         |  Q      |     V   |         |
   5+ 0       2.4749     14.24  |         |   Q     |      V  |         |
   5+ 5       2.5885     16.50  |         |     Q   |       V |         |
   5+10       2.7227     19.49  |         |        Q|        V|         |
   5+15       2.8719     21.66  |         |         |Q        |V        |
   5+20       3.0334     23.45  |         |         |  Q      |  V      |
   5+25       3.2130     26.08  |         |         |     Q   |    V    |
   5+30       3.4247     30.74  |         |         |         Q      V  |
   5+35       3.5420     17.03  |         |      Q  |         |       V |
   5+40       3.5847      6.20  |     Q   |         |         |        V|
   5+45       3.6081      3.40  |  Q      |         |         |        V|
   5+50       3.6261      2.61  | Q       |         |         |        V|
   5+55       3.6383      1.77  |Q        |         |         |        V|
   6+ 0       3.6461      1.13  |Q        |         |         |        V|
   6+ 5       3.6482      0.30  Q         |         |         |         V
-------------------------------------------------------------------------
```

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

Study date 04/04/23 File: ONSITEPROP24100.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0198 - ETHANAC COMMERCE CENTER
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 24-HOUR
FN: ONSITEPROP.OUT- RSB

Drainage Area = 19.80(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.80(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 553.00(Ft.)
Length along longest watercourse measured to centroid = 150.00(Ft.)
Length along longest watercourse = 0.105 Mi.
Length along longest watercourse measured to centroid = 0.028 Mi.
Difference in elevation = 7.00(Ft.)
Slope along watercourse = 66.8354 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.018 Hr.
Lag time = 1.07 Min.
25% of lag time = 0.27 Min.
40% of lag time = 0.43 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]
       19.80            1.60                  31.68

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       19.80            4.00                  79.20

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    4.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    4.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    19.800           75.00         0.900
 Total Area Entered =     19.80(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  75.0      0.303     0.900        0.058       1.000      0.058
                                                 Sum (F) =   0.058
Area averaged mean soil loss (F) (In/Hr) =  0.058
Minimum soil loss rate ((In/Hr)) =  0.029
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.180
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083        469.158         69.318             13.832
    2   0.167        938.316         30.682              6.122
                               Sum = 100.000   Sum=      19.955
------------------------------------------------------------------------

 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	0.032	(0.102)	0.006	0.026
2	0.17	0.07	0.032	(0.102)	0.006	0.026
3	0.25	0.07	0.032	(0.101)	0.006	0.026
4	0.33	0.10	0.048	(0.101)	0.009	0.039
5	0.42	0.10	0.048	(0.100)	0.009	0.039
6	0.50	0.10	0.048	(0.100)	0.009	0.039
7	0.58	0.10	0.048	(0.100)	0.009	0.039
8	0.67	0.10	0.048	(0.099)	0.009	0.039
9	0.75	0.10	0.048	(0.099)	0.009	0.039
10	0.83	0.13	0.064	(0.099)	0.012	0.052
11	0.92	0.13	0.064	(0.098)	0.012	0.052
12	1.00	0.13	0.064	(0.098)	0.012	0.052
13	1.08	0.10	0.048	(0.097)	0.009	0.039
14	1.17	0.10	0.048	(0.097)	0.009	0.039
15	1.25	0.10	0.048	(0.097)	0.009	0.039
16	1.33	0.10	0.048	(0.096)	0.009	0.039
17	1.42	0.10	0.048	(0.096)	0.009	0.039
18	1.50	0.10	0.048	(0.095)	0.009	0.039
19	1.58	0.10	0.048	(0.095)	0.009	0.039
20	1.67	0.10	0.048	(0.095)	0.009	0.039
21	1.75	0.10	0.048	(0.094)	0.009	0.039
22	1.83	0.13	0.064	(0.094)	0.012	0.052
23	1.92	0.13	0.064	(0.094)	0.012	0.052
24	2.00	0.13	0.064	(0.093)	0.012	0.052
25	2.08	0.13	0.064	(0.093)	0.012	0.052
26	2.17	0.13	0.064	(0.092)	0.012	0.052
27	2.25	0.13	0.064	(0.092)	0.012	0.052
28	2.33	0.13	0.064	(0.092)	0.012	0.052
29	2.42	0.13	0.064	(0.091)	0.012	0.052
30	2.50	0.13	0.064	(0.091)	0.012	0.052
31	2.58	0.17	0.080	(0.091)	0.014	0.066
32	2.67	0.17	0.080	(0.090)	0.014	0.066
33	2.75	0.17	0.080	(0.090)	0.014	0.066
34	2.83	0.17	0.080	(0.089)	0.014	0.066
35	2.92	0.17	0.080	(0.089)	0.014	0.066
36	3.00	0.17	0.080	(0.089)	0.014	0.066
37	3.08	0.17	0.080	(0.088)	0.014	0.066
38	3.17	0.17	0.080	(0.088)	0.014	0.066
39	3.25	0.17	0.080	(0.088)	0.014	0.066
40	3.33	0.17	0.080	(0.087)	0.014	0.066
41	3.42	0.17	0.080	(0.087)	0.014	0.066
42	3.50	0.17	0.080	(0.087)	0.014	0.066
43	3.58	0.17	0.080	(0.086)	0.014	0.066
44	3.67	0.17	0.080	(0.086)	0.014	0.066
45	3.75	0.17	0.080	(0.085)	0.014	0.066
46	3.83	0.20	0.096	(0.085)	0.017	0.079
47	3.92	0.20	0.096	(0.085)	0.017	0.079

48	4.00	0.20	0.096	(0.084)	0.017	0.079
49	4.08	0.20	0.096	(0.084)	0.017	0.079
50	4.17	0.20	0.096	(0.084)	0.017	0.079
51	4.25	0.20	0.096	(0.083)	0.017	0.079
52	4.33	0.23	0.112	(0.083)	0.020	0.092
53	4.42	0.23	0.112	(0.083)	0.020	0.092
54	4.50	0.23	0.112	(0.082)	0.020	0.092
55	4.58	0.23	0.112	(0.082)	0.020	0.092
56	4.67	0.23	0.112	(0.082)	0.020	0.092
57	4.75	0.23	0.112	(0.081)	0.020	0.092
58	4.83	0.27	0.128	(0.081)	0.023	0.105
59	4.92	0.27	0.128	(0.080)	0.023	0.105
60	5.00	0.27	0.128	(0.080)	0.023	0.105
61	5.08	0.20	0.096	(0.080)	0.017	0.079
62	5.17	0.20	0.096	(0.079)	0.017	0.079
63	5.25	0.20	0.096	(0.079)	0.017	0.079
64	5.33	0.23	0.112	(0.079)	0.020	0.092
65	5.42	0.23	0.112	(0.078)	0.020	0.092
66	5.50	0.23	0.112	(0.078)	0.020	0.092
67	5.58	0.27	0.128	(0.078)	0.023	0.105
68	5.67	0.27	0.128	(0.077)	0.023	0.105
69	5.75	0.27	0.128	(0.077)	0.023	0.105
70	5.83	0.27	0.128	(0.077)	0.023	0.105
71	5.92	0.27	0.128	(0.076)	0.023	0.105
72	6.00	0.27	0.128	(0.076)	0.023	0.105
73	6.08	0.30	0.144	(0.076)	0.026	0.118
74	6.17	0.30	0.144	(0.075)	0.026	0.118
75	6.25	0.30	0.144	(0.075)	0.026	0.118
76	6.33	0.30	0.144	(0.075)	0.026	0.118
77	6.42	0.30	0.144	(0.074)	0.026	0.118
78	6.50	0.30	0.144	(0.074)	0.026	0.118
79	6.58	0.33	0.160	(0.074)	0.029	0.131
80	6.67	0.33	0.160	(0.073)	0.029	0.131
81	6.75	0.33	0.160	(0.073)	0.029	0.131
82	6.83	0.33	0.160	(0.073)	0.029	0.131
83	6.92	0.33	0.160	(0.072)	0.029	0.131
84	7.00	0.33	0.160	(0.072)	0.029	0.131
85	7.08	0.33	0.160	(0.072)	0.029	0.131
86	7.17	0.33	0.160	(0.071)	0.029	0.131
87	7.25	0.33	0.160	(0.071)	0.029	0.131
88	7.33	0.37	0.176	(0.071)	0.032	0.144
89	7.42	0.37	0.176	(0.070)	0.032	0.144
90	7.50	0.37	0.176	(0.070)	0.032	0.144
91	7.58	0.40	0.192	(0.070)	0.035	0.157
92	7.67	0.40	0.192	(0.069)	0.035	0.157
93	7.75	0.40	0.192	(0.069)	0.035	0.157
94	7.83	0.43	0.208	(0.069)	0.037	0.171
95	7.92	0.43	0.208	(0.068)	0.037	0.171
96	8.00	0.43	0.208	(0.068)	0.037	0.171
97	8.08	0.50	0.240	(0.068)	0.043	0.197

98	8.17	0.50	0.240	(0.067)	0.043	0.197
99	8.25	0.50	0.240	(0.067)	0.043	0.197
100	8.33	0.50	0.240	(0.067)	0.043	0.197
101	8.42	0.50	0.240	(0.067)	0.043	0.197
102	8.50	0.50	0.240	(0.066)	0.043	0.197
103	8.58	0.53	0.256	(0.066)	0.046	0.210
104	8.67	0.53	0.256	(0.066)	0.046	0.210
105	8.75	0.53	0.256	(0.065)	0.046	0.210
106	8.83	0.57	0.272	(0.065)	0.049	0.223
107	8.92	0.57	0.272	(0.065)	0.049	0.223
108	9.00	0.57	0.272	(0.064)	0.049	0.223
109	9.08	0.63	0.304	(0.064)	0.055	0.249
110	9.17	0.63	0.304	(0.064)	0.055	0.249
111	9.25	0.63	0.304	(0.063)	0.055	0.249
112	9.33	0.67	0.320	(0.063)	0.058	0.262
113	9.42	0.67	0.320	(0.063)	0.058	0.262
114	9.50	0.67	0.320	(0.063)	0.058	0.262
115	9.58	0.70	0.336	(0.062)	0.060	0.276
116	9.67	0.70	0.336	(0.062)	0.060	0.276
117	9.75	0.70	0.336	(0.062)	0.060	0.276
118	9.83	0.73	0.352	0.061	(0.063)	0.291
119	9.92	0.73	0.352	0.061	(0.063)	0.291
120	10.00	0.73	0.352	0.061	(0.063)	0.291
121	10.08	0.50	0.240	(0.060)	0.043	0.197
122	10.17	0.50	0.240	(0.060)	0.043	0.197
123	10.25	0.50	0.240	(0.060)	0.043	0.197
124	10.33	0.50	0.240	(0.060)	0.043	0.197
125	10.42	0.50	0.240	(0.059)	0.043	0.197
126	10.50	0.50	0.240	(0.059)	0.043	0.197
127	10.58	0.67	0.320	(0.059)	0.058	0.262
128	10.67	0.67	0.320	(0.058)	0.058	0.262
129	10.75	0.67	0.320	(0.058)	0.058	0.262
130	10.83	0.67	0.320	(0.058)	0.058	0.262
131	10.92	0.67	0.320	(0.058)	0.058	0.262
132	11.00	0.67	0.320	0.057	(0.058)	0.263
133	11.08	0.63	0.304	(0.057)	0.055	0.249
134	11.17	0.63	0.304	(0.057)	0.055	0.249
135	11.25	0.63	0.304	(0.056)	0.055	0.249
136	11.33	0.63	0.304	(0.056)	0.055	0.249
137	11.42	0.63	0.304	(0.056)	0.055	0.249
138	11.50	0.63	0.304	(0.056)	0.055	0.249
139	11.58	0.57	0.272	(0.055)	0.049	0.223
140	11.67	0.57	0.272	(0.055)	0.049	0.223
141	11.75	0.57	0.272	(0.055)	0.049	0.223
142	11.83	0.60	0.288	(0.055)	0.052	0.236
143	11.92	0.60	0.288	(0.054)	0.052	0.236
144	12.00	0.60	0.288	(0.054)	0.052	0.236
145	12.08	0.83	0.400	0.054	(0.072)	0.346
146	12.17	0.83	0.400	0.053	(0.072)	0.347
147	12.25	0.83	0.400	0.053	(0.072)	0.347

148	12.33	0.87	0.416	0.053	(0.075)	0.363
149	12.42	0.87	0.416	0.053	(0.075)	0.363
150	12.50	0.87	0.416	0.052	(0.075)	0.364
151	12.58	0.93	0.448	0.052	(0.081)	0.396
152	12.67	0.93	0.448	0.052	(0.081)	0.396
153	12.75	0.93	0.448	0.052	(0.081)	0.396
154	12.83	0.97	0.464	0.051	(0.084)	0.413
155	12.92	0.97	0.464	0.051	(0.084)	0.413
156	13.00	0.97	0.464	0.051	(0.084)	0.413
157	13.08	1.13	0.544	0.051	(0.098)	0.493
158	13.17	1.13	0.544	0.050	(0.098)	0.494
159	13.25	1.13	0.544	0.050	(0.098)	0.494
160	13.33	1.13	0.544	0.050	(0.098)	0.494
161	13.42	1.13	0.544	0.050	(0.098)	0.494
162	13.50	1.13	0.544	0.049	(0.098)	0.495
163	13.58	0.77	0.368	0.049	(0.066)	0.319
164	13.67	0.77	0.368	0.049	(0.066)	0.319
165	13.75	0.77	0.368	0.049	(0.066)	0.319
166	13.83	0.77	0.368	0.048	(0.066)	0.320
167	13.92	0.77	0.368	0.048	(0.066)	0.320
168	14.00	0.77	0.368	0.048	(0.066)	0.320
169	14.08	0.90	0.432	0.048	(0.078)	0.384
170	14.17	0.90	0.432	0.047	(0.078)	0.385
171	14.25	0.90	0.432	0.047	(0.078)	0.385
172	14.33	0.87	0.416	0.047	(0.075)	0.369
173	14.42	0.87	0.416	0.047	(0.075)	0.369
174	14.50	0.87	0.416	0.046	(0.075)	0.370
175	14.58	0.87	0.416	0.046	(0.075)	0.370
176	14.67	0.87	0.416	0.046	(0.075)	0.370
177	14.75	0.87	0.416	0.046	(0.075)	0.370
178	14.83	0.83	0.400	0.045	(0.072)	0.355
179	14.92	0.83	0.400	0.045	(0.072)	0.355
180	15.00	0.83	0.400	0.045	(0.072)	0.355
181	15.08	0.80	0.384	0.045	(0.069)	0.339
182	15.17	0.80	0.384	0.045	(0.069)	0.339
183	15.25	0.80	0.384	0.044	(0.069)	0.340
184	15.33	0.77	0.368	0.044	(0.066)	0.324
185	15.42	0.77	0.368	0.044	(0.066)	0.324
186	15.50	0.77	0.368	0.044	(0.066)	0.324
187	15.58	0.63	0.304	0.043	(0.055)	0.261
188	15.67	0.63	0.304	0.043	(0.055)	0.261
189	15.75	0.63	0.304	0.043	(0.055)	0.261
190	15.83	0.63	0.304	0.043	(0.055)	0.261
191	15.92	0.63	0.304	0.042	(0.055)	0.261
192	16.00	0.63	0.304	0.042	(0.055)	0.262
193	16.08	0.13	0.064	(0.042)	0.012	0.052
194	16.17	0.13	0.064	(0.042)	0.012	0.052
195	16.25	0.13	0.064	(0.042)	0.012	0.052
196	16.33	0.13	0.064	(0.041)	0.012	0.052
197	16.42	0.13	0.064	(0.041)	0.012	0.052

198	16.50	0.13	0.064	(0.041)	0.012	0.052
199	16.58	0.10	0.048	(0.041)	0.009	0.039
200	16.67	0.10	0.048	(0.041)	0.009	0.039
201	16.75	0.10	0.048	(0.040)	0.009	0.039
202	16.83	0.10	0.048	(0.040)	0.009	0.039
203	16.92	0.10	0.048	(0.040)	0.009	0.039
204	17.00	0.10	0.048	(0.040)	0.009	0.039
205	17.08	0.17	0.080	(0.040)	0.014	0.066
206	17.17	0.17	0.080	(0.039)	0.014	0.066
207	17.25	0.17	0.080	(0.039)	0.014	0.066
208	17.33	0.17	0.080	(0.039)	0.014	0.066
209	17.42	0.17	0.080	(0.039)	0.014	0.066
210	17.50	0.17	0.080	(0.039)	0.014	0.066
211	17.58	0.17	0.080	(0.038)	0.014	0.066
212	17.67	0.17	0.080	(0.038)	0.014	0.066
213	17.75	0.17	0.080	(0.038)	0.014	0.066
214	17.83	0.13	0.064	(0.038)	0.012	0.052
215	17.92	0.13	0.064	(0.038)	0.012	0.052
216	18.00	0.13	0.064	(0.037)	0.012	0.052
217	18.08	0.13	0.064	(0.037)	0.012	0.052
218	18.17	0.13	0.064	(0.037)	0.012	0.052
219	18.25	0.13	0.064	(0.037)	0.012	0.052
220	18.33	0.13	0.064	(0.037)	0.012	0.052
221	18.42	0.13	0.064	(0.037)	0.012	0.052
222	18.50	0.13	0.064	(0.036)	0.012	0.052
223	18.58	0.10	0.048	(0.036)	0.009	0.039
224	18.67	0.10	0.048	(0.036)	0.009	0.039
225	18.75	0.10	0.048	(0.036)	0.009	0.039
226	18.83	0.07	0.032	(0.036)	0.006	0.026
227	18.92	0.07	0.032	(0.035)	0.006	0.026
228	19.00	0.07	0.032	(0.035)	0.006	0.026
229	19.08	0.10	0.048	(0.035)	0.009	0.039
230	19.17	0.10	0.048	(0.035)	0.009	0.039
231	19.25	0.10	0.048	(0.035)	0.009	0.039
232	19.33	0.13	0.064	(0.035)	0.012	0.052
233	19.42	0.13	0.064	(0.035)	0.012	0.052
234	19.50	0.13	0.064	(0.034)	0.012	0.052
235	19.58	0.10	0.048	(0.034)	0.009	0.039
236	19.67	0.10	0.048	(0.034)	0.009	0.039
237	19.75	0.10	0.048	(0.034)	0.009	0.039
238	19.83	0.07	0.032	(0.034)	0.006	0.026
239	19.92	0.07	0.032	(0.034)	0.006	0.026
240	20.00	0.07	0.032	(0.033)	0.006	0.026
241	20.08	0.10	0.048	(0.033)	0.009	0.039
242	20.17	0.10	0.048	(0.033)	0.009	0.039
243	20.25	0.10	0.048	(0.033)	0.009	0.039
244	20.33	0.10	0.048	(0.033)	0.009	0.039
245	20.42	0.10	0.048	(0.033)	0.009	0.039
246	20.50	0.10	0.048	(0.033)	0.009	0.039
247	20.58	0.10	0.048	(0.032)	0.009	0.039

248	20.67	0.10	0.048	(0.032)	0.009	0.039
249	20.75	0.10	0.048	(0.032)	0.009	0.039
250	20.83	0.07	0.032	(0.032)	0.006	0.026
251	20.92	0.07	0.032	(0.032)	0.006	0.026
252	21.00	0.07	0.032	(0.032)	0.006	0.026
253	21.08	0.10	0.048	(0.032)	0.009	0.039
254	21.17	0.10	0.048	(0.032)	0.009	0.039
255	21.25	0.10	0.048	(0.031)	0.009	0.039
256	21.33	0.07	0.032	(0.031)	0.006	0.026
257	21.42	0.07	0.032	(0.031)	0.006	0.026
258	21.50	0.07	0.032	(0.031)	0.006	0.026
259	21.58	0.10	0.048	(0.031)	0.009	0.039
260	21.67	0.10	0.048	(0.031)	0.009	0.039
261	21.75	0.10	0.048	(0.031)	0.009	0.039
262	21.83	0.07	0.032	(0.031)	0.006	0.026
263	21.92	0.07	0.032	(0.030)	0.006	0.026
264	22.00	0.07	0.032	(0.030)	0.006	0.026
265	22.08	0.10	0.048	(0.030)	0.009	0.039
266	22.17	0.10	0.048	(0.030)	0.009	0.039
267	22.25	0.10	0.048	(0.030)	0.009	0.039
268	22.33	0.07	0.032	(0.030)	0.006	0.026
269	22.42	0.07	0.032	(0.030)	0.006	0.026
270	22.50	0.07	0.032	(0.030)	0.006	0.026
271	22.58	0.07	0.032	(0.030)	0.006	0.026
272	22.67	0.07	0.032	(0.030)	0.006	0.026
273	22.75	0.07	0.032	(0.030)	0.006	0.026
274	22.83	0.07	0.032	(0.029)	0.006	0.026
275	22.92	0.07	0.032	(0.029)	0.006	0.026
276	23.00	0.07	0.032	(0.029)	0.006	0.026
277	23.08	0.07	0.032	(0.029)	0.006	0.026
278	23.17	0.07	0.032	(0.029)	0.006	0.026
279	23.25	0.07	0.032	(0.029)	0.006	0.026
280	23.33	0.07	0.032	(0.029)	0.006	0.026
281	23.42	0.07	0.032	(0.029)	0.006	0.026
282	23.50	0.07	0.032	(0.029)	0.006	0.026
283	23.58	0.07	0.032	(0.029)	0.006	0.026
284	23.67	0.07	0.032	(0.029)	0.006	0.026
285	23.75	0.07	0.032	(0.029)	0.006	0.026
286	23.83	0.07	0.032	(0.029)	0.006	0.026
287	23.92	0.07	0.032	(0.029)	0.006	0.026
288	24.00	0.07	0.032	(0.029)	0.006	0.026

(Loss Rate Not Used)

Sum = 100.0 Sum = 40.6

Flood volume = Effective rainfall 3.39(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 5.6(Ac.Ft)
Total soil loss = 0.61(In)
Total soil loss = 1.014(Ac.Ft)
Total rainfall = 4.00(In)
Flood volume = 243304.0 Cubic Feet
Total soil loss = 44180.9 Cubic Feet

Peak flow rate of this hydrograph = 9.875(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	0.0025	0.36	VQ
0+10	0.0061	0.52	V Q
0+15	0.0097	0.52	V Q
0+20	0.0146	0.71	V Q
0+25	0.0200	0.79	V Q
0+30	0.0254	0.79	V Q
0+35	0.0308	0.79	V Q
0+40	0.0362	0.79	V Q
0+45	0.0416	0.79	V Q
0+50	0.0483	0.97	V Q
0+55	0.0555	1.05	V Q
1+ 0	0.0627	1.05	V Q
1+ 5	0.0687	0.87	V Q
1+10	0.0741	0.79	V Q
1+15	0.0795	0.79	V Q
1+20	0.0849	0.79	V Q
1+25	0.0903	0.79	V Q
1+30	0.0958	0.79	V Q
1+35	0.1012	0.79	V Q
1+40	0.1066	0.79	V Q
1+45	0.1120	0.79	V Q
1+50	0.1186	0.97	V Q
1+55	0.1259	1.05	V Q
2+ 0	0.1331	1.05	V Q
2+ 5	0.1403	1.05	|V Q
2+10	0.1475	1.05	|V Q
2+15	0.1547	1.05	|V Q
2+20	0.1619	1.05	|V Q
2+25	0.1692	1.05	|V Q
2+30	0.1764	1.05	|V Q
2+35	0.1848	1.23	|V Q
2+40	0.1939	1.31	|V Q
2+45	0.2029	1.31	|V Q
2+50	0.2119	1.31	|V Q
2+55	0.2209	1.31	|V Q
3+ 0	0.2299	1.31	|V Q
3+ 5	0.2390	1.31	|V Q
3+10	0.2480	1.31	|V Q

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3+15       0.2570      1.31  |V   Q    |          |          |          |
3+20       0.2660      1.31  |V   Q    |          |          |          |
3+25       0.2750      1.31  |V   Q    |          |          |          |
3+30       0.2841      1.31  | V  Q    |          |          |          |
3+35       0.2931      1.31  | V  Q    |          |          |          |
3+40       0.3021      1.31  | V  Q    |          |          |          |
3+45       0.3111      1.31  | V  Q    |          |          |          |
3+50       0.3214      1.49  | V  Q    |          |          |          |
3+55       0.3322      1.57  | V   Q   |          |          |          |
4+ 0       0.3430      1.57  | V   Q   |          |          |          |
4+ 5       0.3539      1.57  | V   Q   |          |          |          |
4+10       0.3647      1.57  | V   Q   |          |          |          |
4+15       0.3755      1.57  | V   Q   |          |          |          |
4+20       0.3876      1.75  | V    Q  |          |          |          |
4+25       0.4002      1.83  | V    Q  |          |          |          |
4+30       0.4128      1.83  | V    Q  |          |          |          |
4+35       0.4255      1.83  |  V   Q  |          |          |          |
4+40       0.4381      1.83  |  V   Q  |          |          |          |
4+45       0.4507      1.83  |  V   Q  |          |          |          |
4+50       0.4646      2.02  |  V    Q |          |          |          |
4+55       0.4790      2.10  |  V    Q |          |          |          |
5+ 0       0.4935      2.10  |  V    Q |          |          |          |
5+ 5       0.5054      1.73  |  V  Q   |          |          |          |
5+10       0.5162      1.57  |  V  Q   |          |          |          |
5+15       0.5270      1.57  |  V  Q   |          |          |          |
5+20       0.5391      1.75  |  V   Q  |          |          |          |
5+25       0.5517      1.83  |  V   Q  |          |          |          |
5+30       0.5644      1.83  |   V  Q  |          |          |          |
5+35       0.5782      2.02  |   V   Q |          |          |          |
5+40       0.5927      2.10  |   V   Q |          |          |          |
5+45       0.6071      2.10  |   V   Q |          |          |          |
5+50       0.6215      2.10  |   V   Q |          |          |          |
5+55       0.6360      2.10  |   V   Q |          |          |          |
6+ 0       0.6504      2.10  |   V   Q |          |          |          |
6+ 5       0.6661      2.28  |   V    Q|          |          |          |
6+10       0.6823      2.36  |   V    Q|          |          |          |
6+15       0.6986      2.36  |    V   Q|          |          |          |
6+20       0.7148      2.36  |    V   Q|          |          |          |
6+25       0.7310      2.36  |    V   Q|          |          |          |
6+30       0.7473      2.36  |    V   Q|          |          |          |
6+35       0.7647      2.54  |    V    Q          |          |          |
6+40       0.7828      2.62  |    V    Q          |          |          |
6+45       0.8008      2.62  |    V    Q          |          |          |
6+50       0.8189      2.62  |    V    Q          |          |          |
6+55       0.8369      2.62  |    V    Q          |          |          |
7+ 0       0.8549      2.62  |     V   Q          |          |          |
7+ 5       0.8730      2.62  |     V   Q          |          |          |
7+10       0.8910      2.62  |     V   Q          |          |          |
7+15       0.9091      2.62  |     V   Q          |          |          |
7+20       0.9283      2.80  |     V   |Q         |          |          |
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7+25	0.9482	2.88	V	Q			
7+30	0.9680	2.88	V	Q			
7+35	0.9891	3.06	V	Q			
7+40	1.0108	3.14	V	Q			
7+45	1.0324	3.14	V	Q			
7+50	1.0553	3.32	V	Q			
7+55	1.0788	3.41	V	Q			
8+ 0	1.1022	3.41	V	Q			
8+ 5	1.1282	3.77	V	Q			
8+10	1.1552	3.93	V	Q			
8+15	1.1823	3.93	V	Q			
8+20	1.2094	3.93	V	Q			
8+25	1.2364	3.93	V	Q			
8+30	1.2635	3.93	V	Q			
8+35	1.2918	4.11	V	Q			
8+40	1.3206	4.19	V	Q			
8+45	1.3495	4.19	V	Q			
8+50	1.3796	4.37	V	Q			
8+55	1.4103	4.45	V	Q			
9+ 0	1.4410	4.45	V	Q			
9+ 5	1.4741	4.82	V	Q			
9+10	1.5084	4.98	V	Q			
9+15	1.5427	4.98	V	Q			
9+20	1.5782	5.16	V	Q			
9+25	1.6143	5.24	V	Q			
9+30	1.6504	5.24	V	Q			
9+35	1.6877	5.42	V	Q			
9+40	1.7256	5.50	V	Q			
9+45	1.7634	5.50	V	Q			
9+50	1.8028	5.71	V	Q			
9+55	1.8428	5.81	V	Q			
10+ 0	1.8828	5.81	V	Q			
10+ 5	1.9138	4.51	V	Q			
10+10	1.9409	3.93	V Q				
10+15	1.9679	3.93	VQ				
10+20	1.9950	3.93	VQ				
10+25	2.0221	3.93	VQ				
10+30	2.0491	3.93	VQ				
10+35	2.0824	4.84	V	Q			
10+40	2.1185	5.24	V	Q			
10+45	2.1546	5.24	V	Q			
10+50	2.1907	5.24	V	Q			
10+55	2.2267	5.24	V	Q			
11+ 0	2.2628	5.24	V	Q			
11+ 5	2.2977	5.06	V	Q			
11+10	2.3320	4.98	V	Q			
11+15	2.3662	4.98	V	Q			
11+20	2.4005	4.98	V	Q			
11+25	2.4348	4.98	V	Q			
11+30	2.4691	4.98	V	Q			

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11+35       2.5008      4.61  |          |       VQ |          |          |
11+40       2.5315      4.45  |          |       QV |          |          |
11+45       2.5622      4.45  |          |       QV |          |          |
11+50       2.5941      4.63  |          |        Q |          |          |
11+55       2.6266      4.71  |          |        Q |          |          |
12+ 0       2.6590      4.71  |          |       QV |          |          |
12+ 5       2.7020      6.24  |          |        V |   Q      |          |
12+10       2.7496      6.92  |          |        V |      Q   |          |
12+15       2.7973      6.92  |          |         V|      Q   |          |
12+20       2.8465      7.15  |          |         V|       Q  |          |
12+25       2.8965      7.25  |          |         V|        Q |          |
12+30       2.9465      7.26  |          |          |V       Q |          |
12+35       2.9995      7.71  |          |          |V        Q|          |
12+40       3.0540      7.91  |          |          |V         |Q         |
12+45       3.1085      7.91  |          |          | V        |Q         |
12+50       3.1645      8.14  |          |          | V        | Q        |
12+55       3.2213      8.24  |          |          |  V       | Q        |
13+ 0       3.2781      8.25  |          |          |  V       | Q        |
13+ 5       3.3425      9.36  |          |          |  V       |       Q  |
13+10       3.4104      9.85  |          |          |   V      |         Q|
13+15       3.4783      9.86  |          |          |   V      |         Q|
13+20       3.5462      9.86  |          |          |    V     |         Q|
13+25       3.6142      9.87  |          |          |    V     |         Q|
13+30       3.6822      9.87  |          |          |     V    |         Q|
13+35       3.7335      7.44  |          |          |     V  Q |          |
13+40       3.7773      6.37  |          |          |    Q V   |          |
13+45       3.8213      6.38  |          |          |    Q V   |          |
13+50       3.8652      6.38  |          |          |    Q V   |          |
13+55       3.9092      6.39  |          |          |    Q V   |          |
14+ 0       3.9532      6.39  |          |          |    Q  V  |          |
14+ 5       4.0033      7.28  |          |          |       VQ |          |
14+10       4.0562      7.68  |          |          |         VQ          |
14+15       4.1091      7.68  |          |          |         VQ          |
14+20       4.1606      7.47  |          |          |         Q|          |
14+25       4.2113      7.37  |          |          |         QV          |
14+30       4.2621      7.38  |          |          |         QV          |
14+35       4.3130      7.38  |          |          |         QV          |
14+40       4.3639      7.39  |          |          |         Q|V         |
14+45       4.4148      7.39  |          |          |         Q|V         |
14+50       4.4642      7.18  |          |          |        Q |V         |
14+55       4.5130      7.08  |          |          |        Q | V        |
15+ 0       4.5618      7.09  |          |          |        Q | V        |
15+ 5       4.6091      6.87  |          |          |       Q  |  V       |
15+10       4.6558      6.78  |          |          |       Q  |  V       |
15+15       4.7025      6.78  |          |          |       Q  |  V       |
15+20       4.7477      6.56  |          |          |      Q   |  V       |
15+25       4.7922      6.47  |          |          |     Q    |   V      |
15+30       4.8368      6.48  |          |          |     Q    |   V      |
15+35       4.8753      5.59  |          |          |  Q       |   V      |
15+40       4.9112      5.21  |          |          |         Q|    V     |
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15+45	4.9471	5.21	|	Q	|	V |
15+50	4.9830	5.22	|	Q	|	V |
15+55	5.0189	5.22	|	Q	|	V |
16+ 0	5.0549	5.22	|	Q	|	V |
16+ 5	5.0710	2.33	| Q	|	|	V |
16+10	5.0782	1.05	| Q	|	|	V |
16+15	5.0854	1.05	| Q	|	|	V |
16+20	5.0926	1.05	| Q	|	|	V |
16+25	5.0998	1.05	| Q	|	|	V |
16+30	5.1070	1.05	| Q	|	|	V |
16+35	5.1130	0.87	| Q	|	|	V |
16+40	5.1184	0.79	| Q	|	|	V |
16+45	5.1238	0.79	| Q	|	|	V |
16+50	5.1292	0.79	| Q	|	|	V |
16+55	5.1347	0.79	| Q	|	|	V |
17+ 0	5.1401	0.79	| Q	|	|	V |
17+ 5	5.1480	1.15	| Q	|	|	V |
17+10	5.1570	1.31	| Q	|	|	V |
17+15	5.1660	1.31	| Q	|	|	V |
17+20	5.1750	1.31	| Q	|	|	V |
17+25	5.1841	1.31	| Q	|	|	V |
17+30	5.1931	1.31	| Q	|	|	V |
17+35	5.2021	1.31	| Q	|	|	V |
17+40	5.2111	1.31	| Q	|	|	V |
17+45	5.2201	1.31	| Q	|	|	V |
17+50	5.2279	1.13	| Q	|	|	V |
17+55	5.2351	1.05	| Q	|	|	V |
18+ 0	5.2423	1.05	| Q	|	|	V |
18+ 5	5.2496	1.05	| Q	|	|	V |
18+10	5.2568	1.05	| Q	|	|	V |
18+15	5.2640	1.05	| Q	|	|	V |
18+20	5.2712	1.05	| Q	|	|	V |
18+25	5.2784	1.05	| Q	|	|	V |
18+30	5.2856	1.05	| Q	|	|	V |
18+35	5.2916	0.87	| Q	|	|	V |
18+40	5.2970	0.79	| Q	|	|	V |
18+45	5.3024	0.79	| Q	|	|	V |
18+50	5.3066	0.60	| Q	|	|	V |
18+55	5.3102	0.52	| Q	|	|	V |
19+ 0	5.3138	0.52	| Q	|	|	V |
19+ 5	5.3187	0.71	| Q	|	|	V |
19+10	5.3241	0.79	| Q	|	|	V |
19+15	5.3295	0.79	| Q	|	|	V |
19+20	5.3361	0.97	| Q	|	|	V |
19+25	5.3434	1.05	| Q	|	|	V |
19+30	5.3506	1.05	| Q	|	|	V |
19+35	5.3565	0.87	| Q	|	|	V |
19+40	5.3619	0.79	| Q	|	|	V |
19+45	5.3674	0.79	| Q	|	|	V |
19+50	5.3715	0.60	| Q	|	|	V |

19+55	5.3751	0.52	Q				V
20+ 0	5.3787	0.52	Q				V
20+ 5	5.3836	0.71	Q				V
20+10	5.3890	0.79	Q				V
20+15	5.3944	0.79	Q				V
20+20	5.3998	0.79	Q				V
20+25	5.4052	0.79	Q				V
20+30	5.4107	0.79	Q				V
20+35	5.4161	0.79	Q				V
20+40	5.4215	0.79	Q				V
20+45	5.4269	0.79	Q				V
20+50	5.4311	0.60	Q				V
20+55	5.4347	0.52	Q				V
21+ 0	5.4383	0.52	Q				V
21+ 5	5.4431	0.71	Q				V
21+10	5.4485	0.79	Q				V
21+15	5.4539	0.79	Q				V
21+20	5.4581	0.60	Q				V
21+25	5.4617	0.52	Q				V
21+30	5.4653	0.52	Q				V
21+35	5.4702	0.71	Q				V
21+40	5.4756	0.79	Q				V
21+45	5.4810	0.79	Q				V
21+50	5.4852	0.60	Q				V
21+55	5.4888	0.52	Q				V
22+ 0	5.4924	0.52	Q				V
22+ 5	5.4972	0.71	Q				V
22+10	5.5027	0.79	Q				V
22+15	5.5081	0.79	Q				V
22+20	5.5122	0.60	Q				V
22+25	5.5158	0.52	Q				V
22+30	5.5194	0.52	Q				V
22+35	5.5231	0.52	Q				V
22+40	5.5267	0.52	Q				V
22+45	5.5303	0.52	Q				V
22+50	5.5339	0.52	Q				V
22+55	5.5375	0.52	Q				V
23+ 0	5.5411	0.52	Q				V
23+ 5	5.5447	0.52	Q				V
23+10	5.5483	0.52	Q				V
23+15	5.5519	0.52	Q				V
23+20	5.5555	0.52	Q				V
23+25	5.5591	0.52	Q				V
23+30	5.5627	0.52	Q				V
23+35	5.5663	0.52	Q				V
23+40	5.5700	0.52	Q				V
23+45	5.5736	0.52	Q				V
23+50	5.5772	0.52	Q				V
23+55	5.5808	0.52	Q				V
24+ 0	5.5844	0.52	Q				V

```
   24+ 5       5.5855      0.16  Q         |         |         |        V|
-------------------------------------------------------------------------
```

APPENDIX D

STORM DRAIN IMPROVEMENT PLANS FOR:
CLASSIC PACIFIC BUSINESS PARK (PM 34082)
IN THE CITY OF PERRIS, CALIFORNIA

STORM DRAIN GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984 AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. ALL STATIONING REFERS TO THE CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
3. STATIONING FOR LATERALS AND CONNECTOR PIPES REFER TO THE CENTERLINE- CENTERLINE INTERSECTION STATION, UNLESS OTHERWISE NOTED.
4. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
5. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
6. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
7. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
8. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES, OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 8" OF CLASS "B" CONCRETE.
9. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO THE INVERT OF THE CONNECTOR PIPE.
10. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
11. ROAD CLOSURES SHALL BE PERMITTED FOR A SHORT PERIOD ONLY. THE CONTRACTOR IS TO SUBMIT A DETOUR PLAN TO THE CITY ENGINEER FOR APPROVAL AND PLACE SIGNS PER APPROVED PLANS PRIOR TO BEGINNING CONSTRUCTION.
12. VIDEO OF STORM DRAIN FACILITIES SHOWN ON THESE PLANS MUST BE SUBMITTED TO CITY ENGINEER FOR REVIEW.
13. TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL.
14. ALL MANHOLE COVERS FOR STORM DRAIN LOCATED OUTSIDE OF DEDICATED RIGHT-OF-WAY SHALL BE LOCKED PRESSURE TYPE, AND SHALL READ "CITY OF PERRIS S.D."
15. VIDEO OF ALL ON-SITE AND OFF-SITE STORM DRAIN SHALL BE SUBMITTED TO CITY ENGINEER FOR REVIEW AND APPROVAL.

NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES (UTILITY PIPES, STRUCTURES, ETC.) SHOWN ON THESE PLANS (MAIN LINES ONLY – NO SERVICE LATERALS) WERE ASCERTAINED BY A REVIEW OF RECORDS PROVIDED BY THESE MEMBER AGENCIES AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. LOCATIONS OF UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

BASIS OF BEARINGS

BASIS OF BEARING IS THE CENTERLINE OF PERRIS BOULEVARD TAKEN AS N00°16'30"E, AS SHOWN BY AMENDED PARCEL MAP 16950 PER P.M. 113/62-70, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

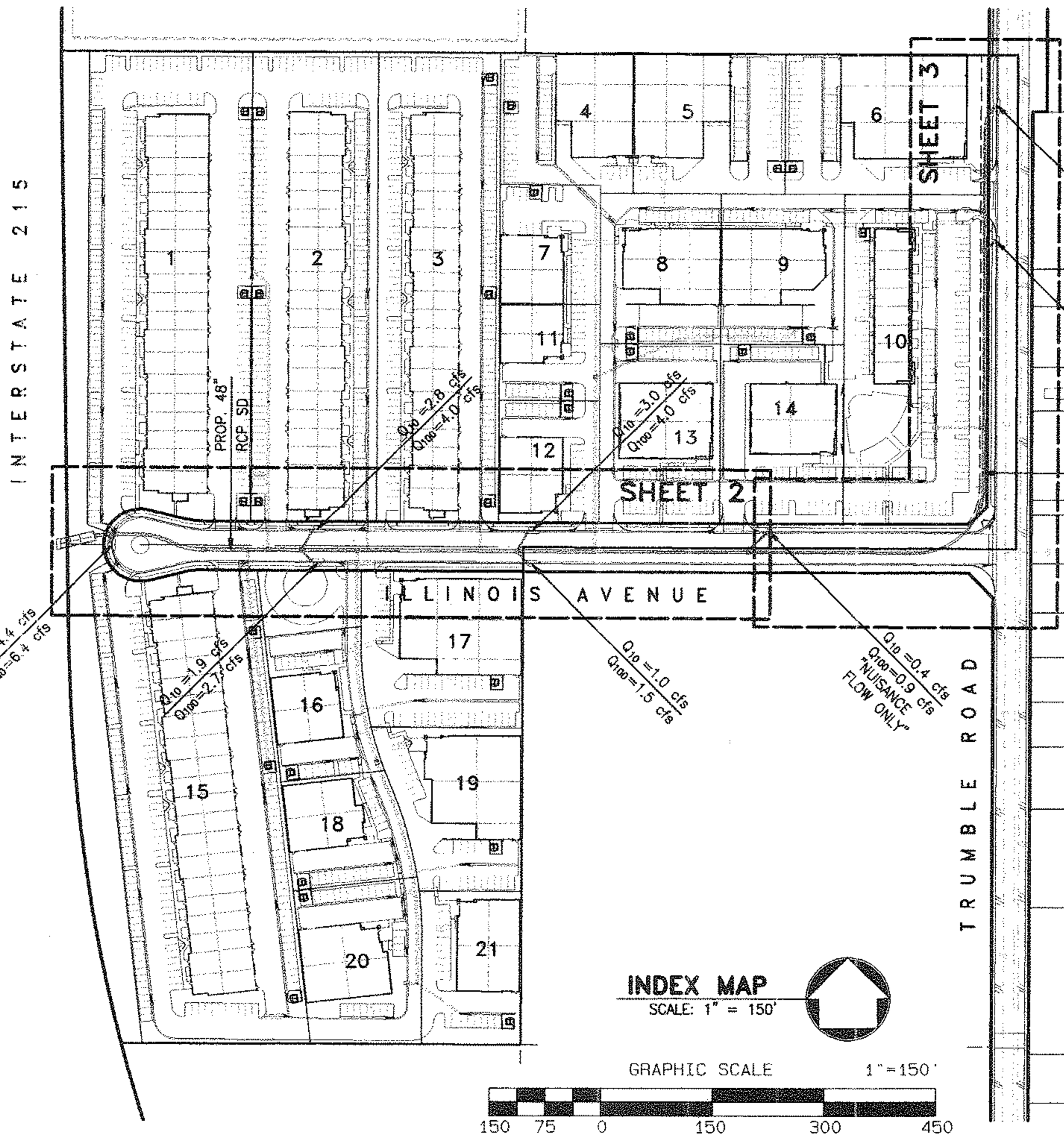
NOTE

ALL ON-SITE STORM DRAIN AND PRIVATE LATERALS REFERRED TO ON THESE PLANS ARE TO BE CONSTRUCTED PER SEPARATE ON-SITE DRAINAGE PLANS AND CONCURRENTLY WITH PUBLIC STORM DRAIN SHOWN HEREON.

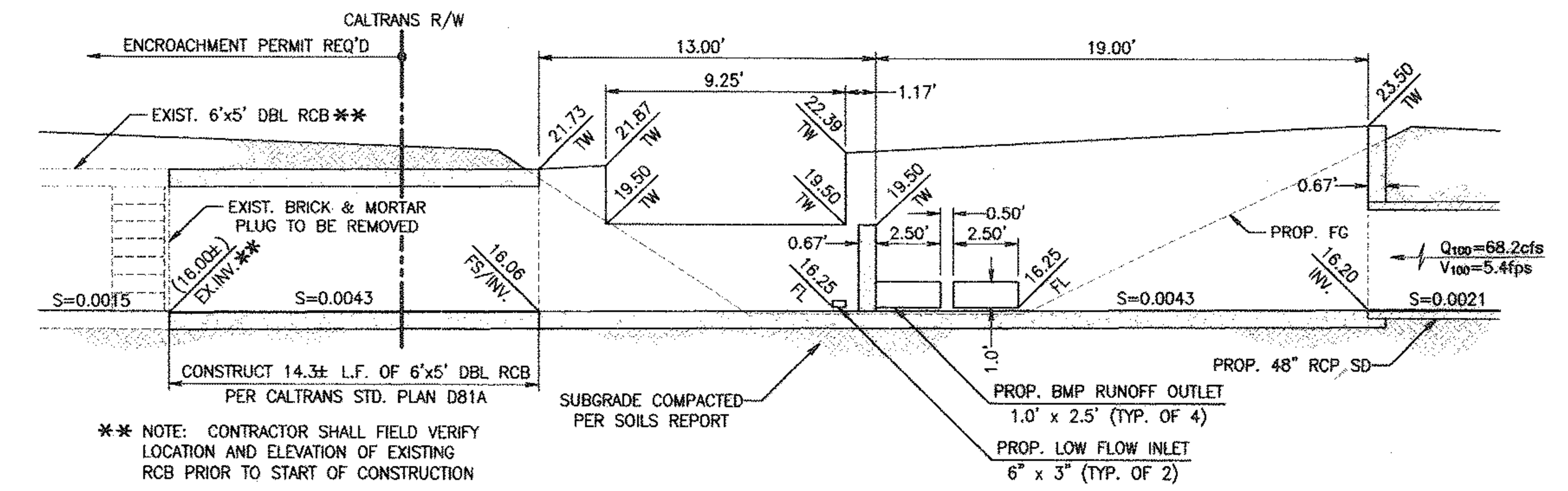
CONSTRUCTION NOTES

No.	CONSTRUCTION NOTES	QUANTITIES	
1	INSTALL 48" RCP, D-LOAD PER PLAN	661	LF
2	INSTALL 36" RCP, D-LOAD PER PLAN	638	LF
3	INTENTIONALLY LEFT BLANK	–	–
4	INSTALL 24" RCP, D-LOAD PER PLAN	437	LF
5	INSTALL 18" RCP, D-LOAD PER PLAN	180	LF
6	CONSTRUCT CURB OPENING CATCH BASIN PER APWA STD. PLAN 300-2 (H=4" – W NOTED ON PLANS)	5	EA
7	CONSTRUCT LOCAL DEPRESSION PER AWA STD. PLAN 313-1 CASE B	5	EA
8	CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. NO. MH252	4	EA
9	CONSTRUCT MANHOLE NO. 4 PER RCFCD STD. DWG. NO. MH254	1	EA
10	INTENTIONALLY LEFT BLANK	–	–
11	CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251	1	EA
12	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227	4	EA
13	CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. TS303	2	EA
14	CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. JS229	2	EA

AS BUILT
THESE PLANS REFLECT ANY SUBSTANTIAL DESIGN MODIFICATIONS AS PROVIDED TO WEBB ASSOCIATES BY THE CONTRACTOR.
SCOTT R. HILDEBRANDT   DATE
R.C.E. C44762

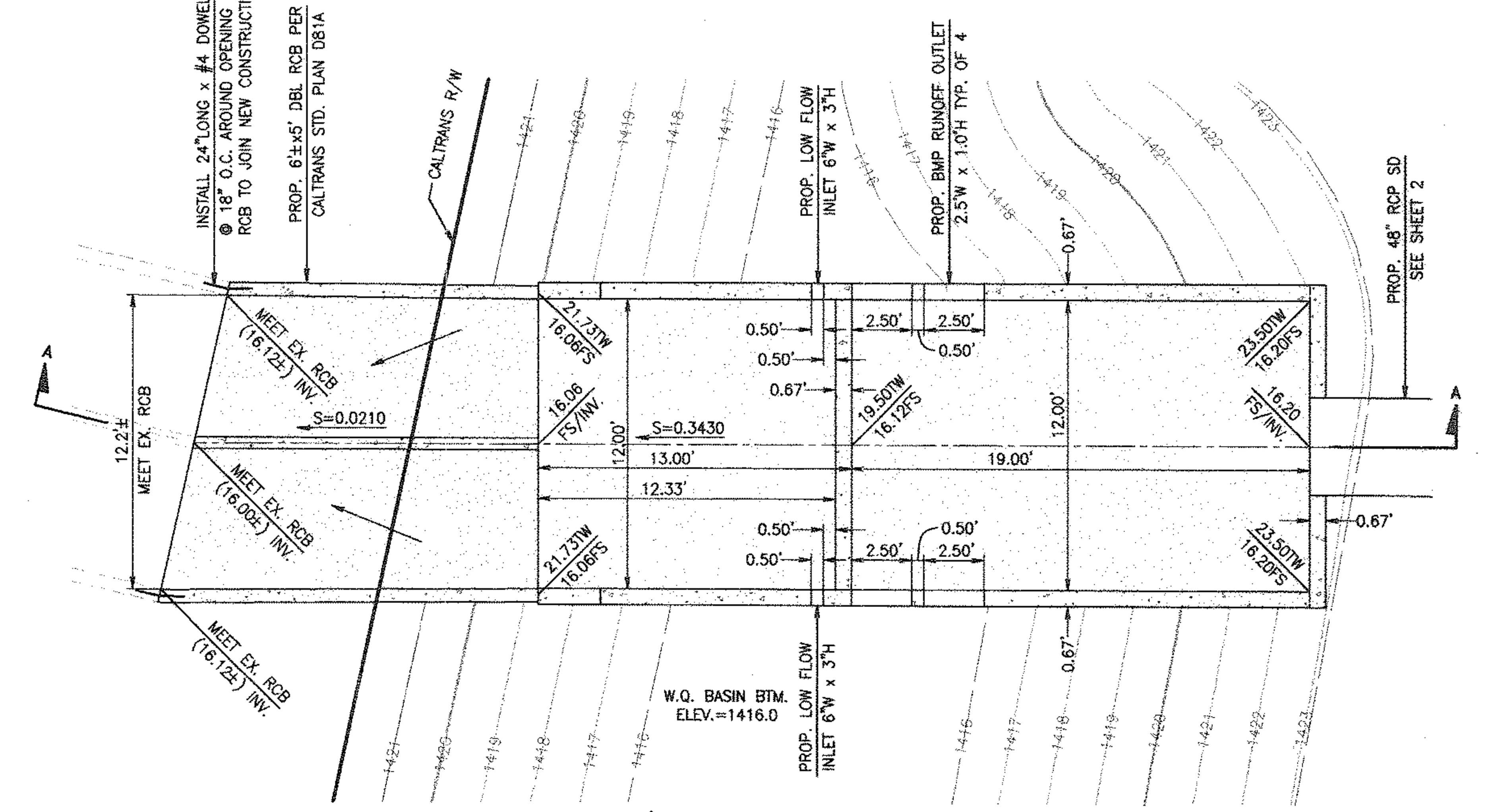


INDEX MAP
SCALE: 1" = 150'
GRAPHIC SCALE 1" = 150'

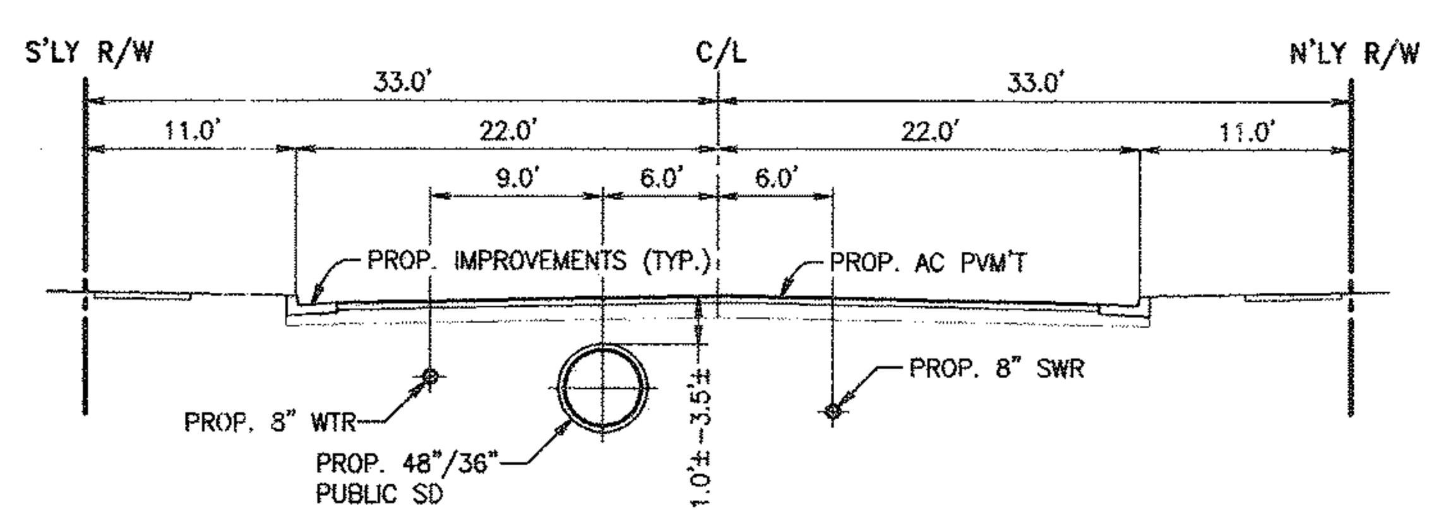


** NOTE: CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF EXISTING RCB PRIOR TO START OF CONSTRUCTION

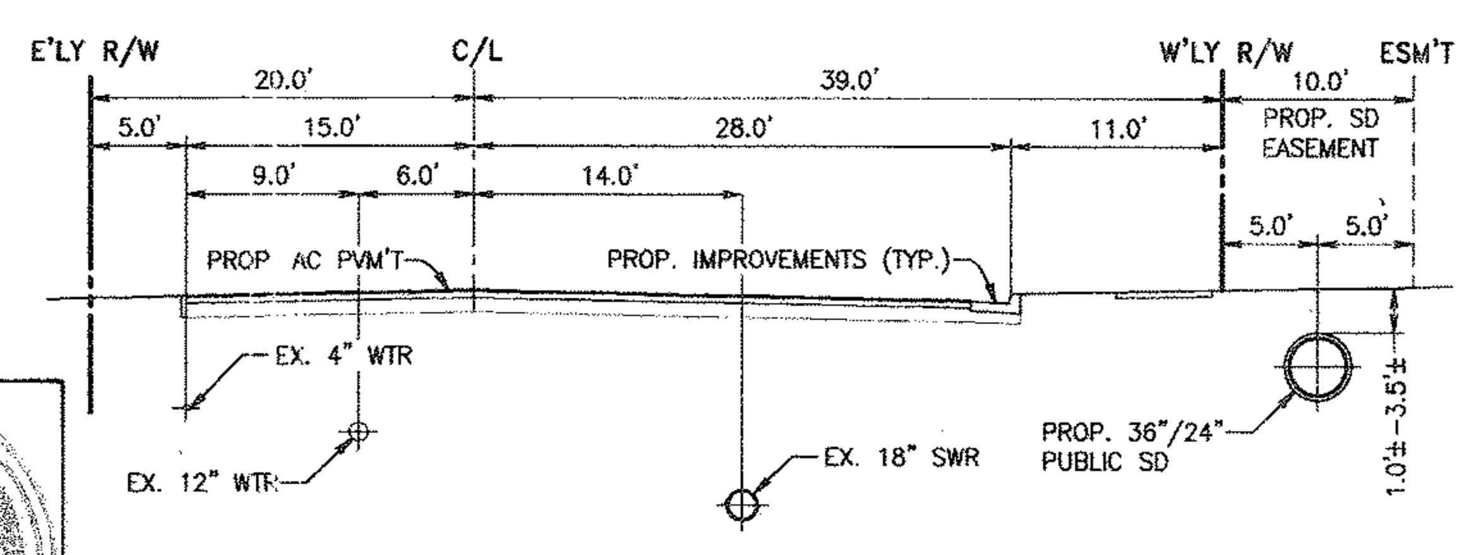
SECTION "A-A"



WEIR/FOREBAY STRUCTURE DETAIL
SCALE: 1" = 5'



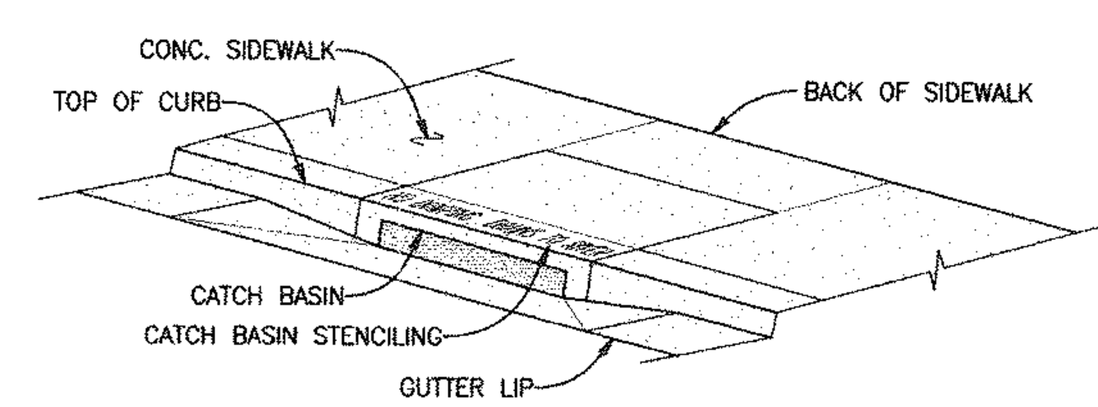
UNDERGROUND UTILITIES TYPICAL SECTION ILLINOIS AVENUE
NOT TO SCALE



UNDERGROUND UTILITIES TYPICAL SECTION TRUMBLE ROAD
NOT TO SCALE

LIST OF ABBREVIATIONS

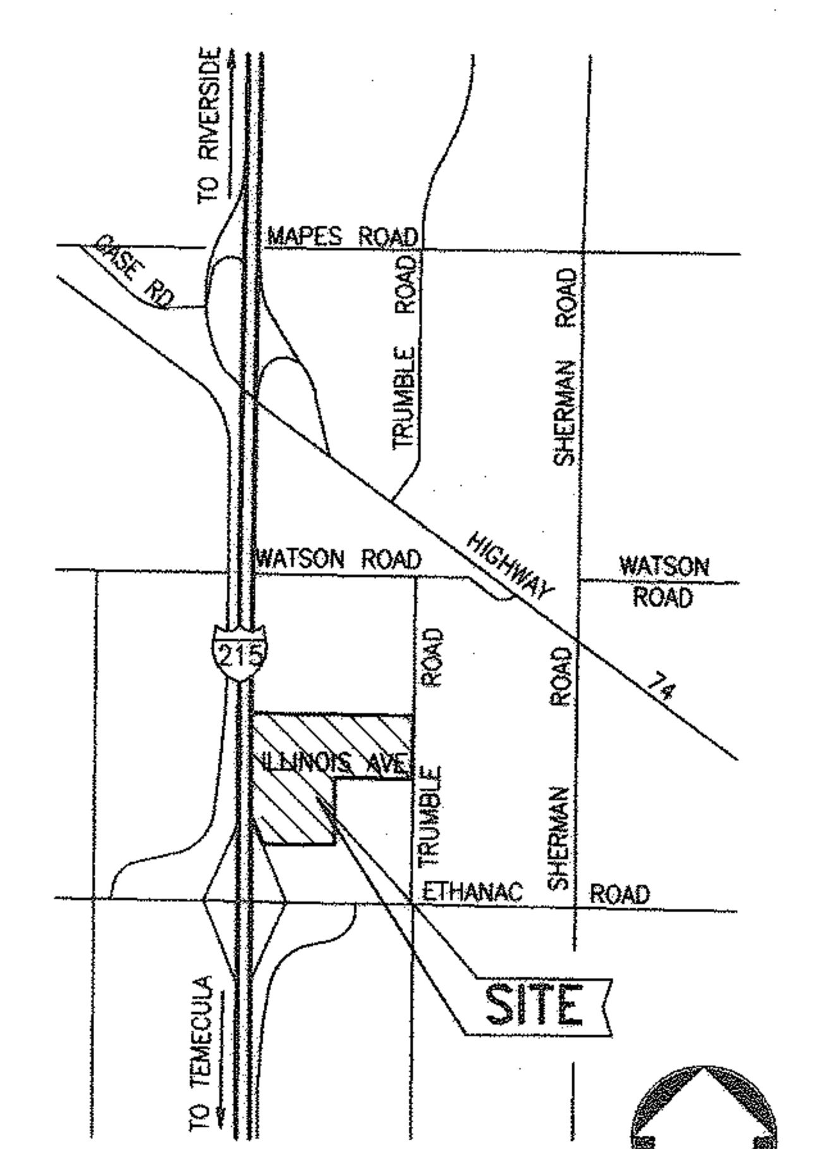
AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
BC	BEGINNING OF CURVE
BCR	BEGINNING OF CURVE RETURN
BTM	BOTTOM
BVC	BEGINNING OF VERTICAL CURVE
CB	CATCH BASIN
C/L	CENTERLINE
C&G	CURB & GUTTER
EC	END OF CURVE
ECC.	ECCENTRIC
ECR	END OF CURVE RETURN
ESMT	EASEMENT
EVC	END OF VERTICAL CURVE
FH	FIRE HYDRANT
FL	FLOWLINE
FS	FINISH SURFACE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HP	HIGH POINT
INV	INVERT ELEVATION
JS	JUNCTION STRUCTURE
LAT.	LATERAL
LF	LINEAR FEET
LP	LOW POINT
MC	MEDIAN CURB
MH	MANHOLE
MVC	MIDDLE OF VERTICAL CURVE
NTS	NOT TO SCALE
PCC	PORTLAND CEMENT CONCRETE
PRC	POINT OF REVERSE CURVE
RCP	REINFORCED CONCRETE PIPE
RED.	REDUCER
R/W	RIGHT OF WAY
SCE	SOUTHERN CALIFORNIA EDISON
SEP.	SEPARATE
S/W	SIDEWALK
TC	TOP OF CURB
TS	TRANSITION STRUCTURE
XING	CROSSING



CATCH BASIN STENCILING DETAIL
NOT TO SCALE

A. STENCILS TO HAVE 2" LETTERS AS FOLLOW:
   NO DUMPING
   DRAINS TO RIVER
B. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENING AND WITHIN THE TOP OF CURB.
C. SPRAY BOTH STENCILS WITH WHITE PAINT.
D. REMOVE STENCILS WHEN PAINT IS DRY.

INDEX OF SHEETS



VICINITY MAP
T.5S., R3W., SECTION 18
N.T.S.

BENCHMARK
RIVERSIDE COUNTY B.M. M-26-2, BRASS DISC ON BRIDGE
ELEV = 1423.462, DATUM NGVD29.
AT THE SOUTHWEST CORNER OF THE BRIDGE SO 14-P OVER THE SAN JACINTO RIVER AT NUEVO ROAD; 14.0 FEET SOUTH OF NUEVO ROAD; A BRASS DISK SET IN THE TOP OF A CONCRETE BRIDGE ABUTMENT AND MARKED M-26-2 1963.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

DATE	BY	MARK	REVISIONS	APPR.	DATE
9/30/08	RR	1	AS BUILT		
ENGINEER				CITY	

DESIGNED BY: RB DRAWN BY: BTE CHECKED BY: RB

SEAL

SEAL — REGISTERED PROFESSIONAL ENGINEER, SCOTT R. HILDEBRANDT, NO. C44762, EXP. 3-31-08, CIVIL, STATE OF CALIFORNIA

APPROVED BY: DATE: 2-15-07
CITY ENGINEER
PREPARED UNDER THE SUPERVISION OF: DATE: 2-9-07
SCOTT R. HILDEBRANDT
R.C.E. NO. C44762 EXP. DATE 3-31-08

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH: (951) 686-1070
FAX: (951) 788-1256
SCALE: AS SHOWN
DATE: Feb 2007

CITY OF PERRIS
STORM DRAIN PLANS
CLASSIC PACIFIC BUSINESS PARK (PM 34082)
TITLE SHEET
INDEX MAP
FOR: CLASSIC PACIFIC W.O. 04-0425

SHEET 1 OF 3 SHEETS
CITY FILE NO: PB-921

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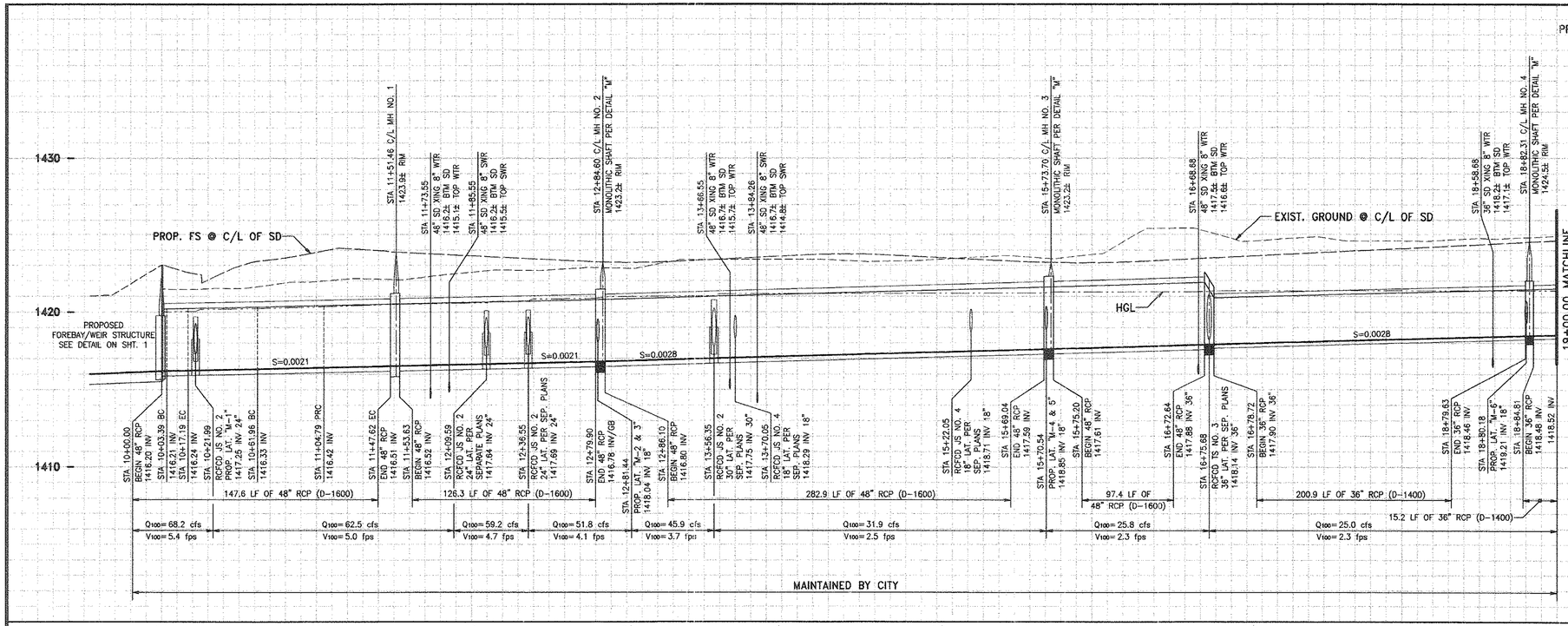
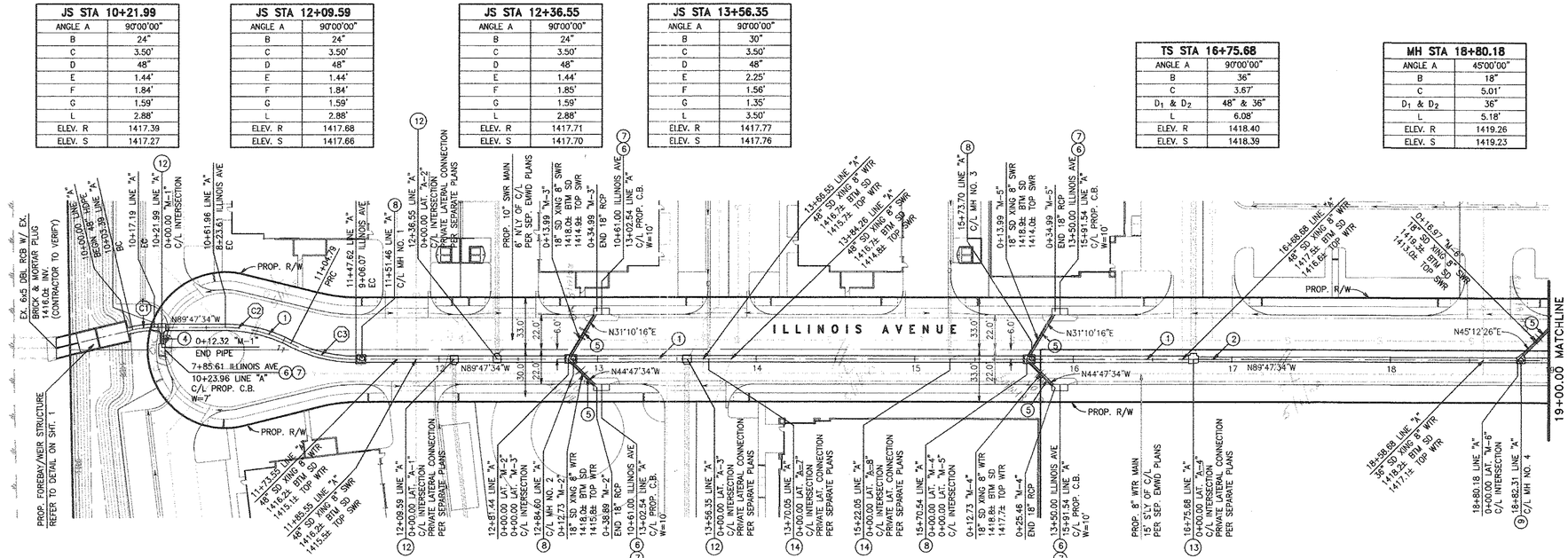
16575 P-412





JS STA 10+21.99	
ANGLE A	90°00'00"
B	24"
C	3.50'
D	48"
E	1.44'
F	1.84'
G	1.59'
L	2.88'
ELEV. R	1417.39
ELEV. S	1417.27

JS STA 12+09.59	
ANGLE A	90°00'00"
B	24"
C	3.50'
D	48"
E	1.44'
F	1.84'
G	1.59'
L	2.88'
ELEV. R	1417.68
ELEV. S	1417.66

JS STA 12+36.55	
ANGLE A	90°00'00"
B	24"
C	3.50'
D	48"
E	1.44'
F	1.85'
G	1.59'
L	2.88'
ELEV. R	1417.71
ELEV. S	1417.70

JS STA 13+56.35	
ANGLE A	90°00'00"
B	30"
C	3.50'
D	48"
E	2.25'
F	1.56'
G	1.35'
L	3.50'
ELEV. R	1417.77
ELEV. S	1417.76

TS STA 16+75.68	
ANGLE A	90°00'00"
B	36"
C	3.67"
D_1 & D_2	48" & 36"
L	6.08'
ELEV. R	1418.40
ELEV. S	1418.39

MH STA 18+80.18	
ANGLE A	45°00'00"
B	18"
C	5.01'
D_1 & D_2	36"
L	5.18'
ELEV. R	1419.26
ELEV. S	1419.23

CURVE DATA TABLE	RADIUS	DELTA	LENGTH	TANGENT
C1	60.00'	13°10'44"	13.80'	6.93'
C2	90.00'	27°15'58"	42.83'	21.83'
C3	90.00'	27°15'58"	42.83'	21.83'

AS BUILT
THESE PLANS REFLECT ANY SUBSTANTIAL DESIGN MODIFICATIONS AS PROVIDED TO WEBB ASSOCIATES BY THE CONTRACTOR.
SCOTT R. HILDEBRANDT R.C.E. C44762
16-308 DATE
REGISTERED PROFESSIONAL ENGINEER SCOTT R. HILDEBRANDT NO. C44762 EXP. 3-31-08 CIVIL STATE OF CALIFORNIA
3/3/10

CONSTRUCTION NOTES

1. INSTALL 48" RCP, D-LOAD PER PLAN
2. INSTALL 36" RCP, D-LOAD PER PLAN
3. INTENTIONALLY LEFT BLANK
4. INSTALL 24" RCP, D-LOAD PER PLAN
5. INSTALL 18" RCP, D-LOAD PER PLAN
6. CONSTRUCT CURB OPENING CATCH BASIN PER APWA STD. PLAN 300-2 (H=4" – W NOTED ON PLANS)
7. CONSTRUCT LOCAL DEPRESSION PER AWA STD. PLAN 313-1 CASE B
8. CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. NO. MH252
9. CONSTRUCT MANHOLE NO. 4 PER RCFCD STD. DWG. NO. MH254
10. INTENTIONALLY LEFT BLANK
11. CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251
12. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227
13. CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. TS303
14. CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. JS229

NOTE

ALL ON-SITE STORM DRAIN AND PRIVATE LATERALS REFERRED TO ON THESE PLANS ARE TO BE CONSTRUCTED PER SEPARATE ON-SITE DRAINAGE PLANS AND CONCURRENTLY WITH PUBLIC STORM DRAIN SHOWN HEREON.

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

BENCHMARK

RIVERSIDE COUNTY B.M. M-26-2, BRASS DISC ON BRIDGE
ELEV = 1423.462, DATUM NGVD29.
AT THE SOUTHWEST CORNER OF THE BRIDGE SO 14-P OVER THE SAN JACINTO RIVER AT NUEVO ROAD; 14.0 FEET SOUTH OF NUEVO ROAD; A BRASS DISK SET IN THE TOP OF A CONCRETE BRIDGE ABUTMENT AND MARKED M-26-2 1963.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DIGALERT
DIAL BEFORE YOU DIG TOLL FREE
A PUBLIC SEVICE BY 1-800-227-2600 UNDERGROUND SERVICE ALERT
TWO WORKING DAYS BEFORE YOU DIG

DATE	BY	MARK	REVISIONS	APPR.	DATE
9-30-08	RR	1	AS BUILT		
ENGINEER				CITY	

DESIGNED BY: RB DRAWN BY: BTE CHECKED BY: RB

SEAL

SEAL
REGISTERED PROFESSIONAL ENGINEER SCOTT R. HILDEBRANDT NO. C44762 EXP. 3-31-08 CIVIL STATE OF CALIFORNIA

APPROVED BY: DATE: 2-7-07
CITY ENGINEER
PREPARED UNDER THE SUPERVISION OF: DATE: 2-9-07
SCOTT R. HILDEBRANDT
R.C.E. NO. C44762 EXP. DATE 3-31-08

ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH: (951) 686-1070
FAX: (951) 788-1256

SCALE: AS SHOWN
DATE: Feb 2007

CITY OF PERRIS
STORM DRAIN PLANS
CLASSIC PACIFIC BUSINESS PARK (PM 34082)
PLAN AND PROFILE
STA. 10+00 TO STA. 19+00

FOR: CLASSIC PACIFIC
W.O. 04-0425

SHEET 2 OF 3 SHEETS
CITY FILE NO: P8-921

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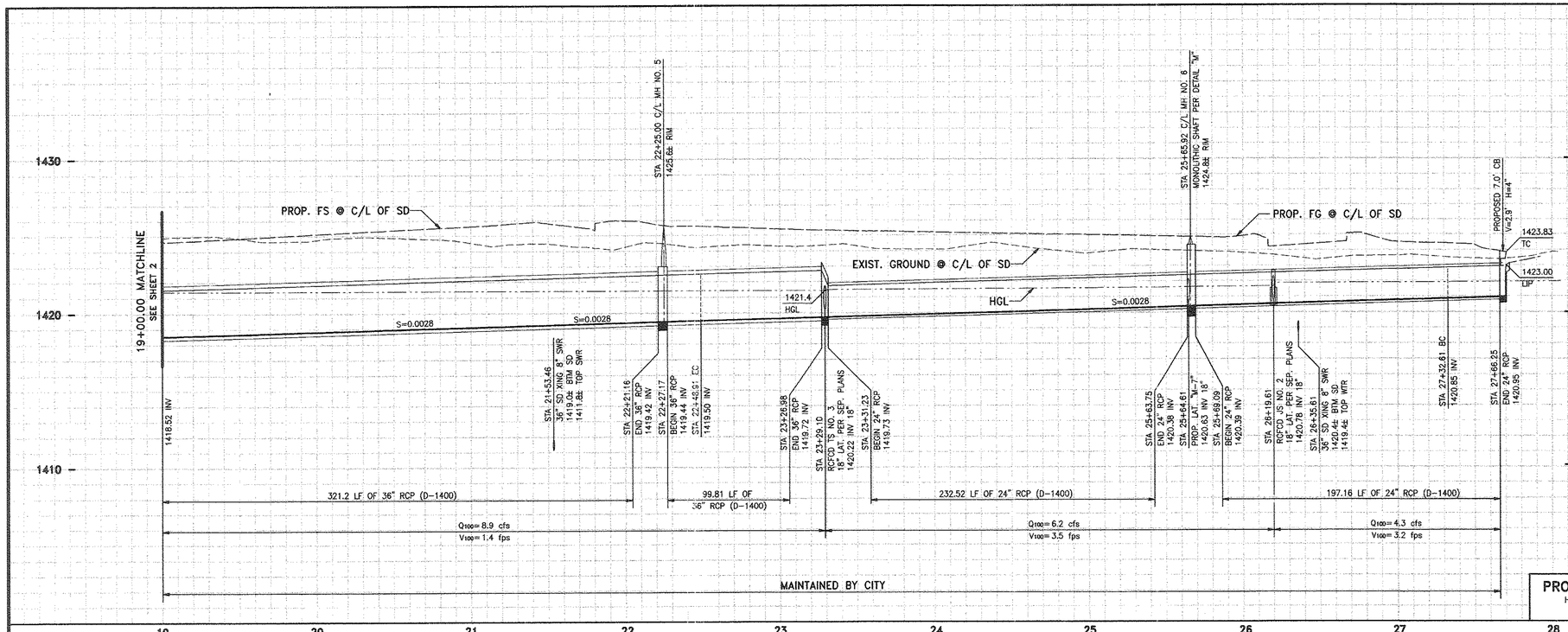
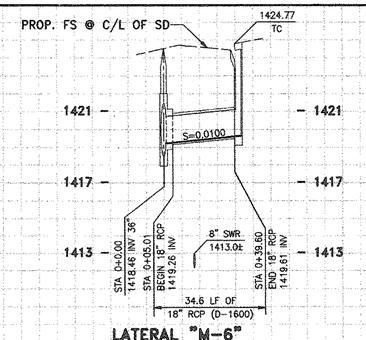
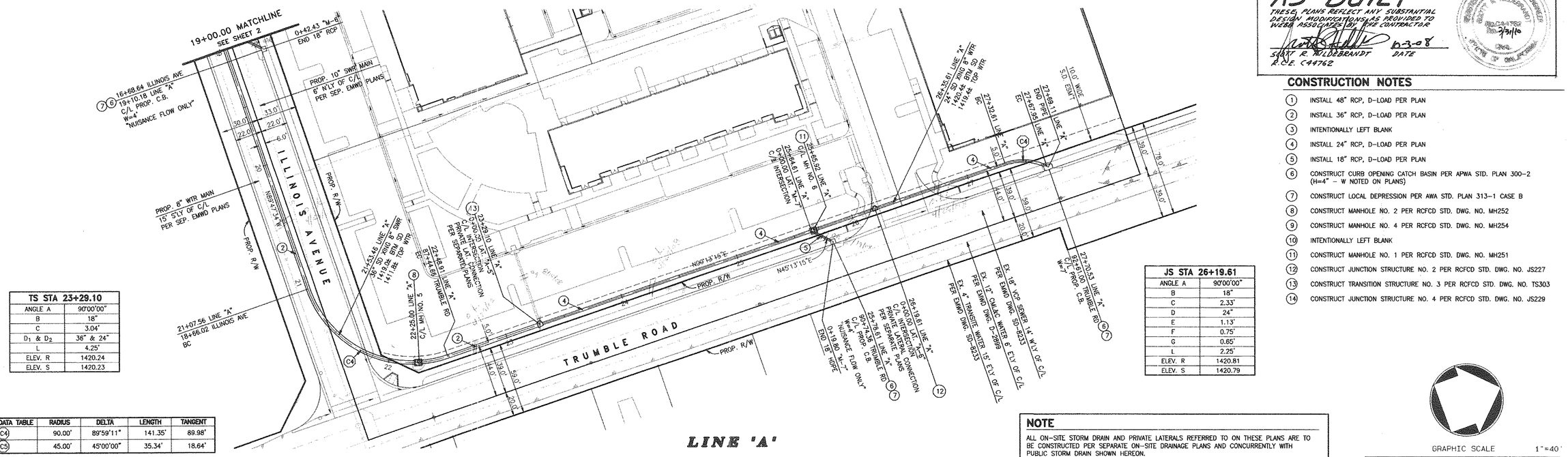




PROFILE SCALES
HORIZ. : 1" = 40'
VERT. : 1" = 4'



TS STA 23+29.10	
ANGLE A	90°00'00"
B	18"
C	3.04'
D_1 & D_2	36" & 24"
L	4.25'
ELEV. R	1420.24
ELEV. S	1420.23

JS STA 26+19.61	
ANGLE A	90°00'00"
B	18"
C	2.33'
D	24"
E	1.13'
F	0.75'
G	0.65'
L	2.25'
ELEV. R	1420.81
ELEV. S	1420.79

CURVE DATA TABLE	RADIUS	DELTA	LENGTH	TANGENT
C4	90.00'	89°59'11"	141.35'	89.98'
C5	45.00'	45°00'00"	35.34'	18.64'

AS BUILT
THESE PLANS REFLECT ANY SUBSTANTIAL DESIGN MODIFICATIONS AS PROVIDED TO WEBB ASSOCIATES BY THE CONTRACTOR

SCOTT R. WILDEBRANDT R.C.E. C44762 — DATE 3-3-08

REGISTERED PROFESSIONAL ENGINEER SCOTT R. WILDEBRANDT NO. C44762 EXP. 3-31-08 CIVIL STATE OF CALIFORNIA — 3/5/15

CONSTRUCTION NOTES
1. INSTALL 48" RCP, D-LOAD PER PLAN
2. INSTALL 36" RCP, D-LOAD PER PLAN
3. INTENTIONALLY LEFT BLANK
4. INSTALL 24" RCP, D-LOAD PER PLAN
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6. CONSTRUCT CURB OPENING CATCH BASIN PER APWA STD. PLAN 300-2 (H=4" – W NOTED ON PLANS)
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12. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227
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GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

BENCHMARK
RIVERSIDE COUNTY B.M. M-26-2, BRASS DISC ON BRIDGE
ELEV = 1423.462, DATUM NGVD29.
AT THE SOUTHWEST CORNER OF THE BRIDGE SO 14-P OVER THE SAN JACINTO RIVER AT NUEVO ROAD; 14.0 FEET SOUTH OF NUEVO ROAD; A BRASS DISK SET IN THE TOP OF A CONCRETE BRIDGE ABUTMENT AND MARKED M-26-2 1963.

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DIGALERT — DIAL BEFORE YOU DIG TOLL FREE — TWO WORKING DAYS BEFORE YOU DIG — A PUBLIC SEVICE BY 1-800-227-2600 UNDERGROUND SERVICE ALERT

DATE	BY	MARK	REVISIONS	APPR.	DATE
9-30-08	RR	1	AS BUILT	CITY	

DESIGNED BY: RB DRAWN BY: BTE CHECKED BY: RB

SEAL

SEAL — REGISTERED PROFESSIONAL ENGINEER SCOTT R. WILDEBRANDT NO. C44762 EXP. 3-31-08 CIVIL STATE OF CALIFORNIA

APPROVED BY: DATE: 2-7-07
CITY ENGINEER

PREPARED UNDER THE SUPERVISION OF: DATE: 2-5-07
SCOTT R. HILDEBRANDT
R.C.E. NO. C44762 EXP. DATE 3-31-08

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH: (951) 686-1070
FAX: (951) 788-1256

SCALE: AS SHOWN
DATE: Feb 2007

CITY OF PERRIS
STORM DRAIN PLANS
CLASSIC PACIFIC BUSINESS PARK (PM 34082)
PLAN AND PROFILE
STA. 19+00 TO STA. 28+06

FOR: CLASSIC PACIFIC — W.O. 04-0425

SHEET 3 OF 3 SHEETS
CITY FILE NO: P8-921

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APPENDIX E.3

WEBB-B

Preliminary Water Quality Management Plan(PWQMP) (Proposed)

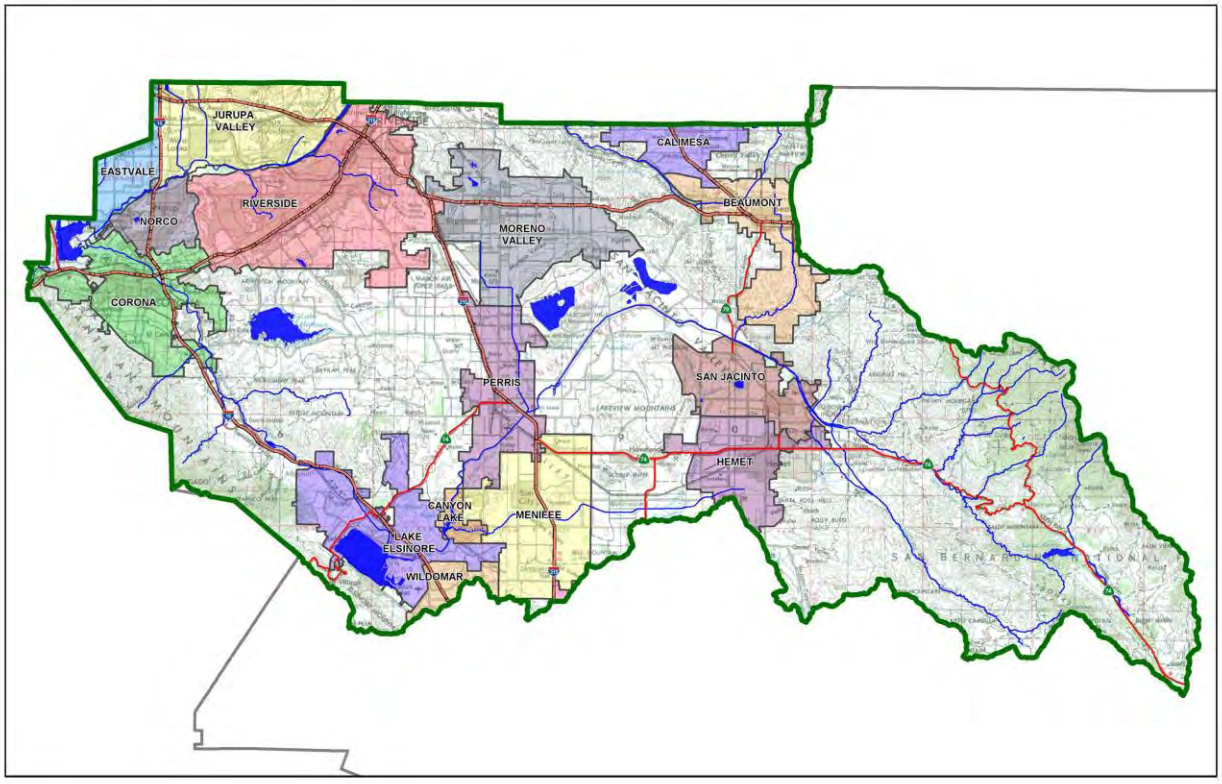
Project Specific Water Quality Management Plan

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

Project Title: Ethanac Logistics Center

Development No: TPM 38600

Design Review/Case No: DPR22-00030



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☒ **Preliminary**
☐ **Final**

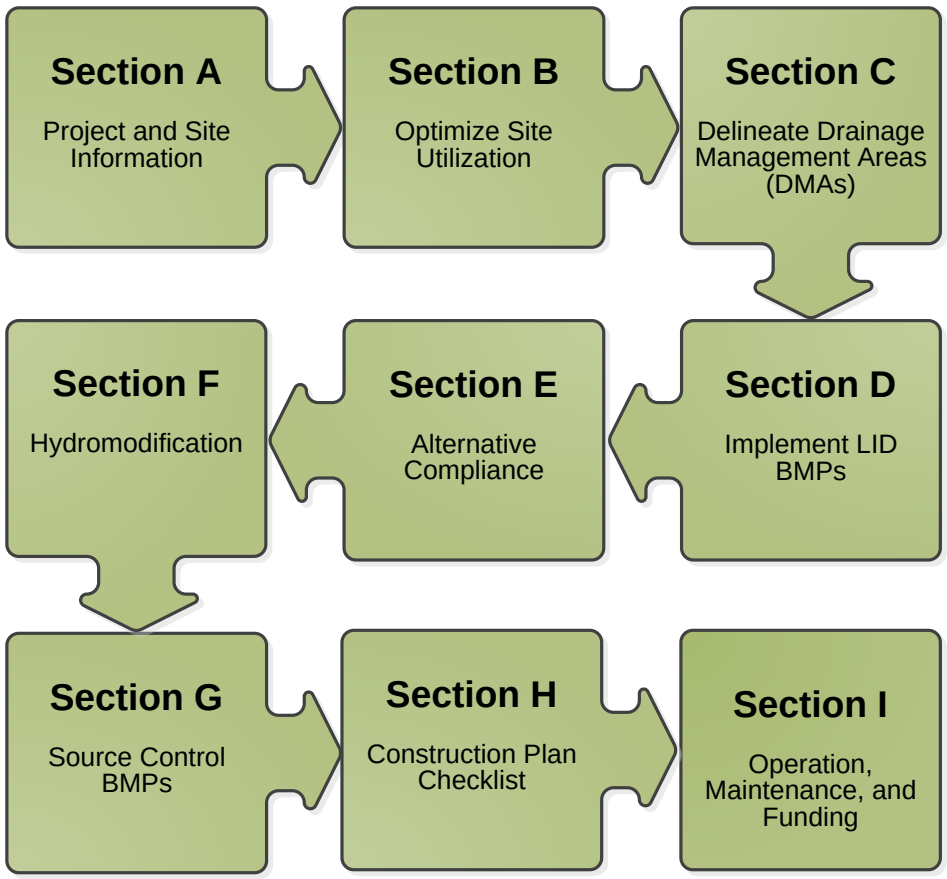
Original Date Prepared: December 2022

Revision Date(s): December 2023

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

A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Hillwood by Albert A. Webb Associates for the Ethanac Commerce Center project (P22-00030).

This WQMP is intended to comply with the requirements of City of Perris for Water Quality Ordinance No. 1194 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

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

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

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2013-0024** and any subsequent amendments thereto."

DRAFT Preparer's Signature	Date
Preparer's Printed Name	Senior Engineer Preparer's Title/Position

Preparer's Licensure: DRAFT

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Commercial/Industrial
Planning Area:	City of Perris Redevelopment Project Area
Community Name:	N/A
Development Name:	Ethanac Commerce Center

PROJECT LOCATION
Latitude & Longitude (DMS): 33°44'39.31" N, 117°10'57.29" W
Project Watershed and Sub-Watershed: Santa Ana, San Jacinto
Total Acres: 21 Ac
APN(s): 329-240-016 thru -020, -023 thru -027
Map Book and Page No.: Thomas Bros. Map Book Page: 838, Grid: C1 and D1

PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial/Industrial
Proposed or Potential SIC Code(s)	**1541** (General Contractor-Industrial Building) **4225** (General Warehousing & Storage)
Area of Impervious Project Footprint (SF)	413,350 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	413,350 SF
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N

EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	N/A
What is the Water Quality Design Storm Depth for the project?	0.61

A.1 Project Description

The Ethanac Commerce Center project site is located in the City of Perris, north of Ethanac Road, bounded by Sherman Road to east, Trumble Road to the west, and Illinois Avenue to the north. The project applicant proposes to build a commercial/industrial building (approximately 400,000 square feet) on approximately 21 gross acres of vacant land. Existing elevations across the site vary from 1433 in the southeast corner of the site to 1427.7 in the west end (NAVD88 datum). The site currently slopes down at approximately 1% grade to the west. The existing drainage pattern for the site and the general area is characterized by sheet flows that follow the slope to the west towards Trumble Road.

The project site is not located within a specific plan, but it is within the Romoland Master Drainage Plan watershed area.

In the proposed condition of Ethanac Commerce Center onsite runoff, represented by DMA-A, will be conveyed throughout the site via proposed ribbon gutters and curbs and gutters. Onsite runoff will then

be captured by a network of drainage inlets provided at low points. Proposed private underground storm drain conveys captured flows towards a Contech underground storage chamber (approximately 372,000 cubic feet storage provided) before being pumped to a proposed Contech Filterra Bioscape system for water quality treatment.

Treated stormwater will then gravity flow to proposed storm drain Line 4 in Trumble Road, which will be sized to convey the pumped, treated flows to City of Perris Line A (City Line A) in Illinois Avenue per P8-921. City Line A ultimately connects to Romoland MDP Line A-11 (MDP Line A-11), and thence Romoland MDP Line A (MDP Line A).

This project site is subject to HCOC mitigation. The 2-Year, 24-Hour unit hydrograph storm event was calculated and it was determined that the site would need to mitigate for volume of approximately 93,600 cubic feet. The underground chambers onsite have been sized to accommodate the HCOC volume. In addition to this and the water quality volume, the underground chambers have been sized to accommodate the onsite 100-year storm volume (unit hydrograph calculations provided in Appendix 6).

The 100-year 24-hour storm unit hydrograph was run for the onsite in order to determine the volume needed to be stored in the underground chambers prior to being pumped offsite. The larger storm flows gravity flow out of the underground chambers via a separate storm drain line. Sizing of this line will be determined in final engineering. The 100-year 24-hour unit hydrograph calculations and exhibit are referenced in Appendix 6.

Offsite flows from the east side of the project are intercepted by reverse under-sidewalk drains in Sherman Road. The flows are then conveyed northerly and westerly across the site via channel and outletted into Trumble Road. The portion of the project site that acts as the channel for offsite flows is considered DMA-B. DMA-B does not drain to the water quality treatment BMP-A, however BMP-A is oversized to include the DMA-B area.

The project contains some amount of self-retaining, and all trash enclosures will be covered. The impervious cover on site is 86.0% leaving 14.0% of pervious site coverage.

A.2 Maps and Site Plans

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

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

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

A.3 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River (Reach 3) (HU#802.11)	NONE	AGR, GWR, WILD, RARE, REC1, REC2, WARM	2.5 MILES
Canyon Lake (HU#802.11, 802.12)	NUTRIENTS, PATHOGENS	AGR, COMM, GWR, WILD, MUN, REC1, REC2, WARM	NOT A WATER BODY CLASSIFIED AS RARE
San Jacinto River (Reach 1) (HU#802.11, 802.32, 802.31)	NONE	AGR, GWR, WILD, MUN, RARE, REC1, REC 2, WARM	10 MILES
Lake Elsinore (HU#302.31)	DDT< NUTRIENTS, LOW DO, PCBs, TOXICITY	COMM, RARE, REC1, REC2, WARM, WILD	13 MILES

A.4 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

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

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

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

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

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

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

The project proposes to preserve the existing drainage pattern to the west.

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

The site is vacant with minimal vegetal scrub. There are no dense areas of vegetation nor well-established trees.

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

Per the attached geotechnical and infiltration report, infiltration has an in-situ rate of 0.1-0.2 in/hr. However, self-retaining areas exist that will retain small amounts of rainfall in the topsoil.

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

The site contains the standard impervious area per code for the given land use.

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

All water quality runoff will be directed to the proposed underground chambers.

Section C: Delineate Drainage Management Areas (DMAs)

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

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
L-A	LANDSCAPE	60,535	D
R-A	ROOFS	407,336	D
H-A	HARDSCAPE	282,477	D
SR-A	LANDSCAPE	22,143	B
L-B	LANDSCAPE	44,110	D
H-B	HARDSCAPE	54,149	D

[1]Reference Table 2-1 in the WQMP Guidance Document to populate this column

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

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

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

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
SR-A	LANDSCAPE	30,344	0.61			0.61

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

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

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

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

DMA Name or ID	BMP Name or ID
L-A	BMP-A Contech Filterra BioScape System
R-A	
H-A	

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

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

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

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

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

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

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

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

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

Total Area of Impervious Surfaces: N/A

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

Enter your EIATIA factor: N/A

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

Minimum required irrigated area: N/A

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

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

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

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

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

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

Total Area of Impervious Surfaces: N/A

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

Enter your TUTIA factor: N/A

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

Minimum number of toilet users: N/A

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

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

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

N/A

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

Average Daily Demand: N/A

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

Total Area of Impervious Surfaces: N/A

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

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

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

Minimum required use: N/A

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA-A	☐	☐	☐	☐	☒
DMA-B	☐	☐	☐	☐	☒
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the project will utilize bioretention and biotreatment for water quality requirements. Infiltration based BMPs are not feasible due to the inadequate infiltration rates on the site as determined by the geotechnical investigation. Harvest and use BMPs are not feasible as reclaimed water will be used for the non-potable water demands.

Based on the functionality and composition of the Contech Bioscape Filterra system, it operates as a biotreatment facility and is proposed as the water quality treatment method for DMA-A. Due to the system being proprietary, it is being classified as "Alternative Compliance" in Table D.2. Sizing information can be found in Table D.3.

DMA-B is being handled to the maximum extent practicable by oversizing BMP-A to account for DMA-B area. DMA-B is not draining to BMP-A.

D.5 LID BMP Sizing

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

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP-A*		
	[A]		[B]	[C]	[A] x [C]			
L-A	*60,535*	*Ornamental Landscaping*	*0.1*	*0.11*	*6,686.6*			
R-A	*407,336*	*Roofs*	*1*	*0.89*	*363,343.7*			
H-A	*282,477*	*Concrete or Asphalt*	*1*	*0.89*	*251,969.5*			
SR-A	*22,143*	*Ornamental Landscaping*	*0.1*	*0.11*	*2,445.9*			
L-B	*44,110*	*Ornamental Landscaping*	*0.1*	*0.11*	*4,872.3*			
H-B	*54,149*	*Concrete or Asphalt*	*1*	*0.89*	*48,300.9*			
	$A_T = \Sigma[A]$				Σ= [D]	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
						[E]	$[F] = \frac{[D]x[E]}{12}$	[G]
	870,750				677,618.9	0.61	34,445.6	372,205

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

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

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

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

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

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

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

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

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

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Contech Filterra BioScape (BMP-A)	TSS/TOC	66%-85%
	Nutrients	73%

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

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

If Yes, HCOC criteria do not apply.

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

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

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

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

Table F.1 Hydrologic Conditions of Concern Summary

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

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

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

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

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

F.2 HCOC Mitigation

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

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

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

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

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The 2-year, 24-hour storm unit hydrograph has been calculated and the underground chambers have been sized to adequately store the HCOC volume.

On-Site Unit Hydrograph Results

	Existing Condition		Proposed Condition	
Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Volume (Ac-ft)	Peak Flow (cfs)
2-Year, 24-Hour	0.3	0.43	2.2	3.56

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
A. On-site storm drain inlets	*Mark all inlets with the works "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.* *On-site drainage structures, including all storm drain clean outs, area drains, inlets, catch basins, inlet & outlet structures, forebays, & water treatment control basins shall be inspected and maintained on a regular basis to insure their*	*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 Appendix 10 (CASQA Stormwater Quality Handbook at www.cabmphandbooks.com* *Include the following in lessee*

	operational adequacy.	*agreements: "Tenants 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"* *Maintenance should include removal of trash, debris, & sediment and the repair of any deficiencies or damage that may impact water quality.*
B. Interior floor drains and elevator shaft sump	*The interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer*	*Inspect and maintain drains to prevent blockages and overflow.*
C. 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.*
D. Landscape/Outdoor Pesticide Use	*The final landscape shall be designed to accomplish all of the following:* *Preserve existing native trees, shrubs and ground cover to the maximum extent possible.* *Design landscape 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 establishments, select plants appropriate to site, soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency and plant interactions.* *Pesticide usage should be at a necessary minimum and be consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation. Pesticides should be*	

	used at an absolute minimum or not at all in the retention/infiltration basin. If used, it should not be applied in close proximity to the rainy season.	
E. Refuse Trash Storage areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards and the details on the PWQMP Exhibit in Appendix 1.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. 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, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook* *at www.cabmphandbooks.com*
F. Loading Docks	*Loading docks will not be covered and are 4 feet above finished pavement surface.* *Spill kits are to be kept on-site at all times per SC-11*	*Move loaded and unloaded items indoors as soon as possible.* *Inspect for accumulated trash and debris. Implement good housekeeping procedures on a regular basis. Sweep areas clean instead of using wash water.* *Loading docks will be kept in a clean and orderly condition, through a regular program of sweeping and litter control, and immediate clean up of any spills or broken containers. Property owner will ensure that loading docks will be swept as*

		needed. Cleanup procedures will not include the use of wash-down water. Property owner will be responsible for implementation of loading dock housekeeping procedures *See the Fact Sheet SC-30, in Appendix 10, "Outdoor Loading and Unloading" in the CASQA Stormwater Quality Handbooks a www.cabmphandbooks.com*
G. Fire Sprinkler Test Water	*Provide a means to drain fire sprinkler test water to the sanitary sewer.*	*See the note in the Fact Sheet SC-41, in Appendix 10, "Building and Grounds Maintenance", in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
H. Miscellaneous Drain or Wash Water or Other Sources *Boiler drain lines* *Condensate drain lines* *Rooftop equipment* *Drainage sumps* *Roofing, gutters and trim* *I. 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 of other unprotected metals that may leach into runoff.* *Include controls for other sources as specified by local reviewer.*	
J. Plazas, sidewalks, and parking lots	*Spill kits are to be kept on-site at all times per SC-11*	*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.*

Section H: Construction Plan Checklist

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

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
*	*	*

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

*This section will be completed in FWQMP

Section I: Operation, Maintenance and Funding

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

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

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

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

Maintenance Mechanism: WQMP Covenant and Agreement

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

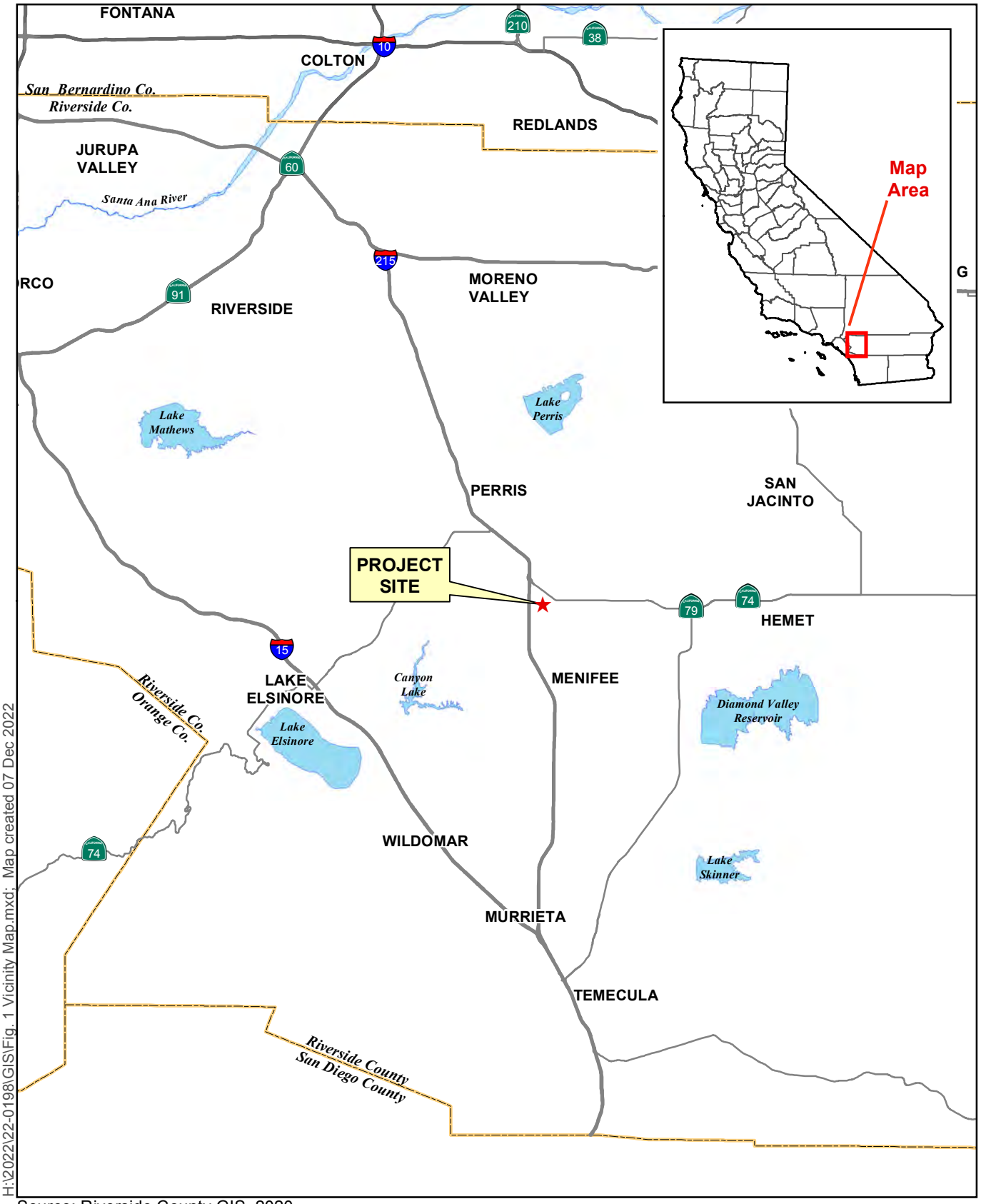
☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

*To be completed in FWQMP

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



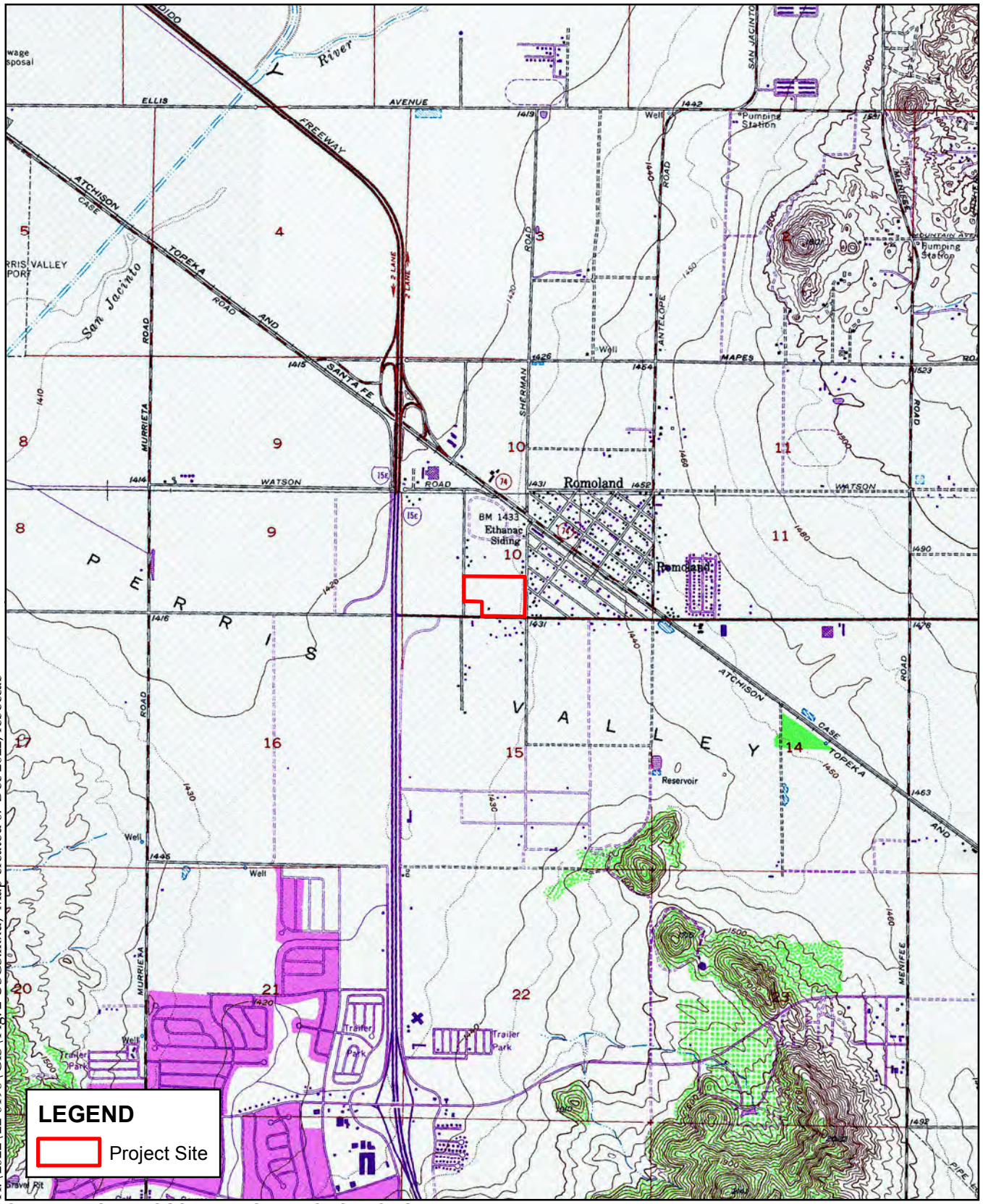
H:\2022\22-0198\GIS\Fig. 1 Vicinity Map.mxd; Map created 07 Dec 2022

Source: Riverside County GIS, 2020

Figure 1 – Vicinity Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



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Sources: ESRI / USGS 7.5min Quads: CUCAMONGA PEAK, DEVORE, GUASTI, FONTANA

0 4,000 8,000 12,000 Feet

Figure 2 - USGS Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES

H:\2022\22-0198\GIS\Pro\Pro\Pro.aprx; Map created 17 Apr 2023

Sources: Riverside Co. GIS, 2022.

0 500 1,000 1,500 Feet

Figure 3 - Aerial Map

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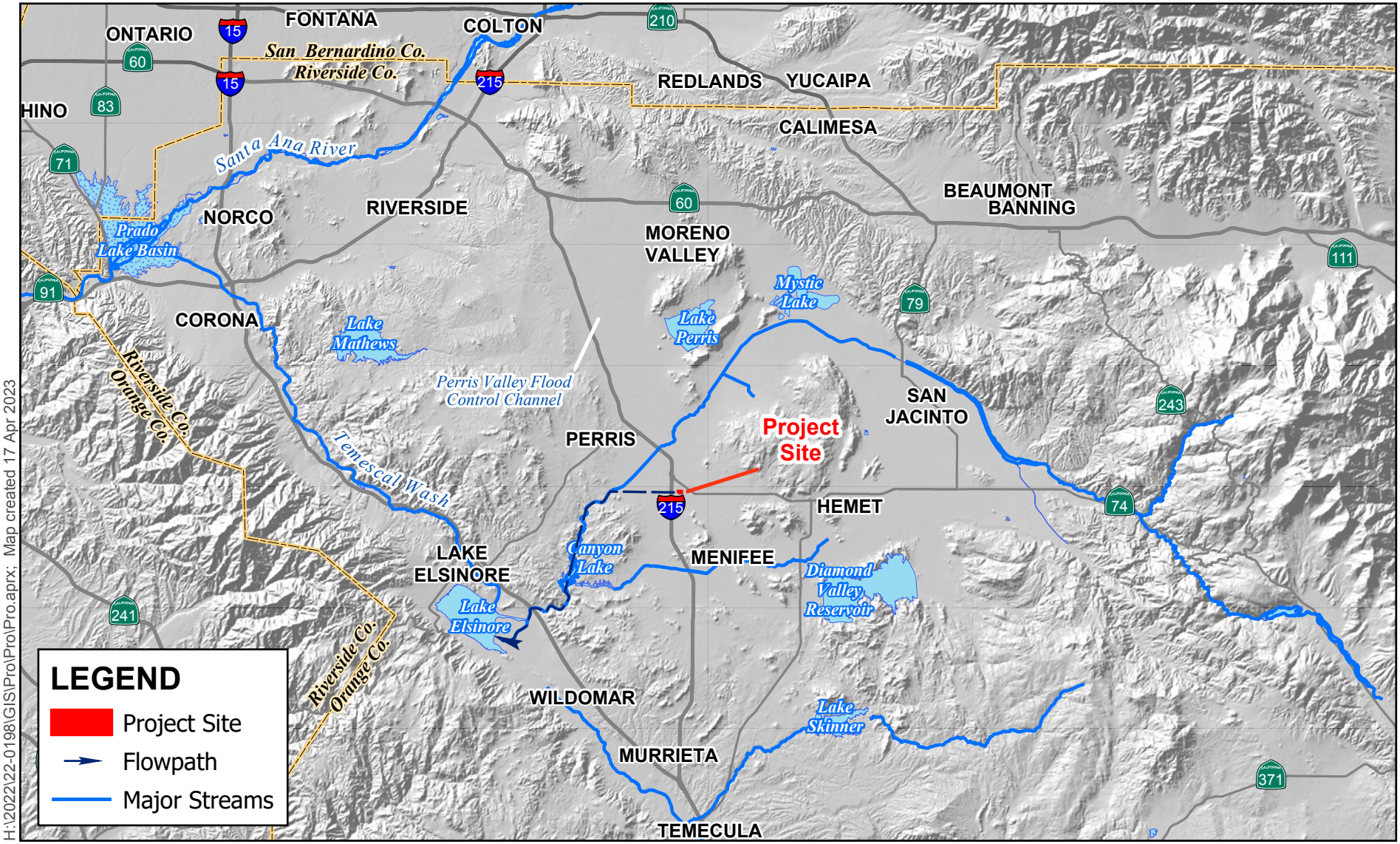

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Sources: US NHD; USGS 30 Meter DEM

Figure 4 – Receiving Waterbodies

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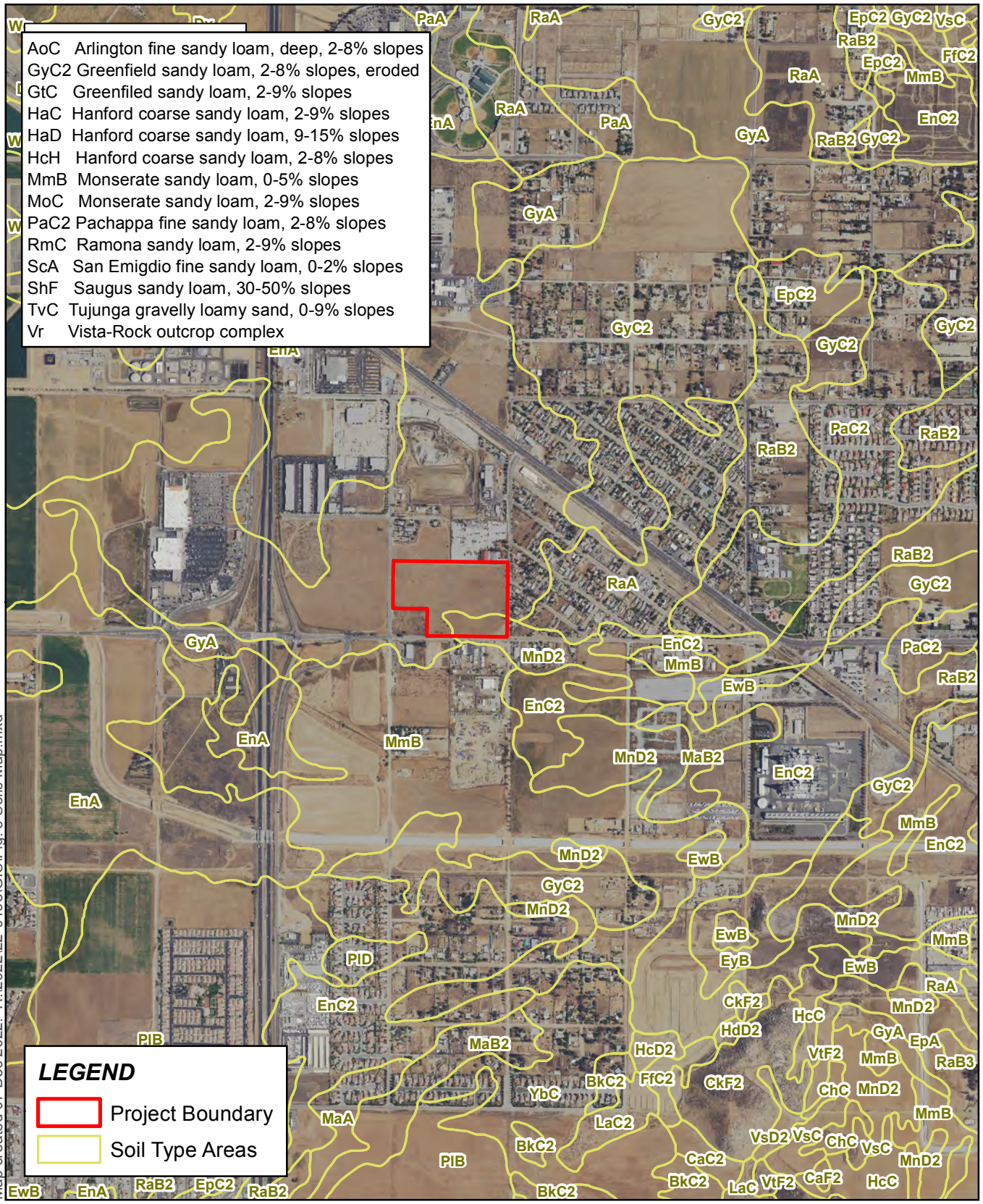

Sources: USDA NRCS SSURGO, 2015;
Riverside Co. GIS, 2020; USDA NAIP, 2016.

0 1,000 2,000 3,000 Feet

Figure 5 – Soils Map

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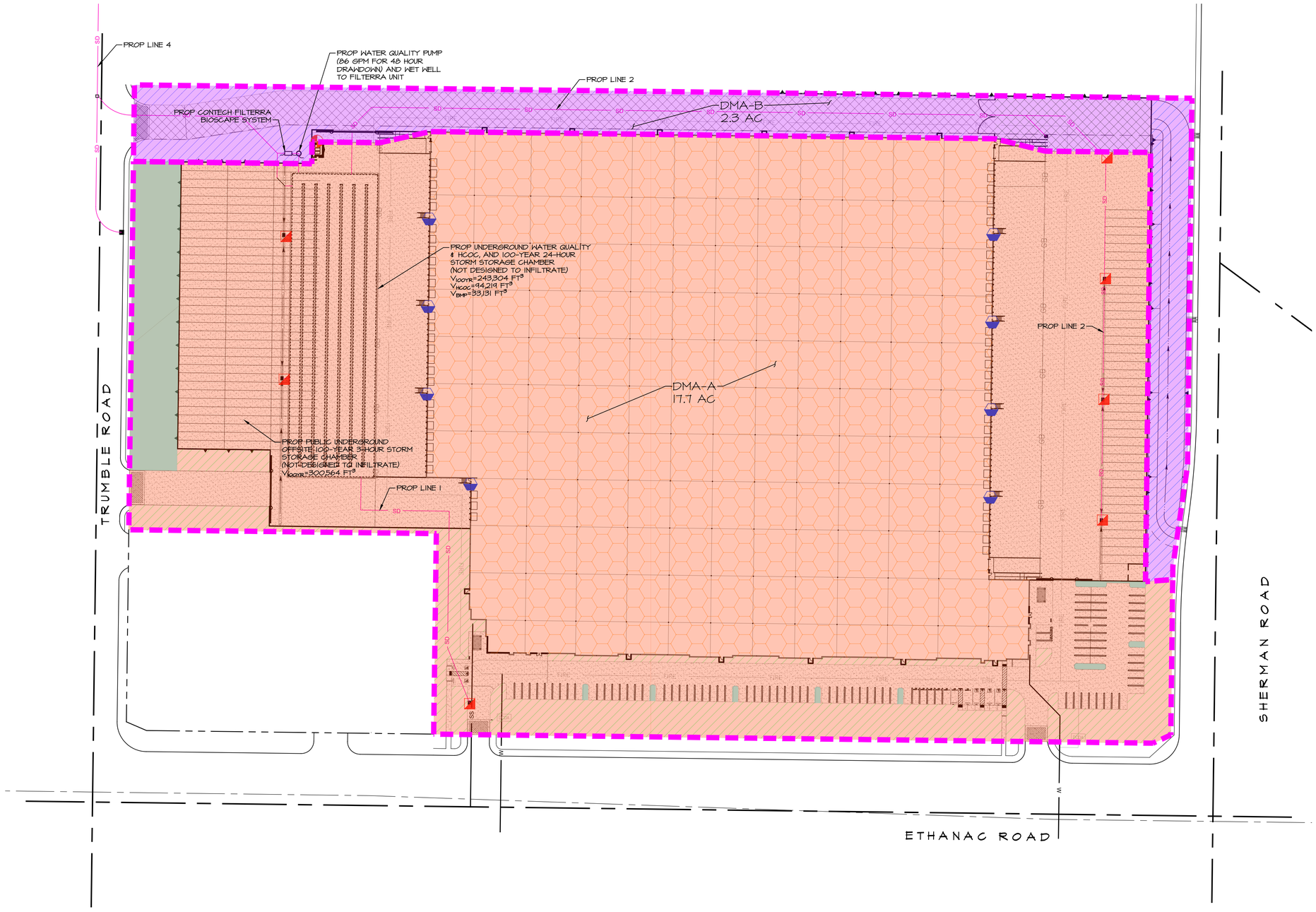

- DRAINAGE MANAGEMENT BOUNDARY
- LANDSCAPING - DMA-A
- LANDSCAPING - DMA-B
- ROOF
- CONCRETE OR ASPHALT - DMA-A
- CONCRETE OR ASPHALT - DMA-B
- SELF RETAINING - DMA-A (ONSITE FLOWS)
- FLOW DIRECTION
- SD — STORM DRAIN PIPE
- ROOF DRAIN DOWNSPOUT
- STORM INLET
- TRASH ENCLOSURE

DRAINAGE MANAGEMENT AREAS

LEGEND	DMA-ID	TYPE	AREA (SF)
	L-A	LANDSCAPE	60535
	R-A	ROOF	407336
	H-A	HARDSCAPE	282471
	SR-A	SELF-RETAINING	22143
	L-B	LANDSCAPE	44110
	H-B	HARDSCAPE	54149

% IMPERVIOUS = (407336+282471+54149)/870750= 85.4%

DMA SITE MAP

- DMA-A
- DMA-B

NOTE: WHILE DMA-B DOES NOT DRAIN TO BMP-A, THE UNDERGROUND CHAMBERS ARE OVERSIZED TO TREAT THIS AREA AND ARE INCLUDED IN V_{BMP} CALCUATIONS.

N W WEBB E S

1" = 60'

30 0 60 120 180

CITY OF PERRIS

DMA SITE PLAN
ETHANAC LOGISTICS CENTER
P22-00030

SCALE: 1" = 60'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 22-0198
DATE: 1/19/2024			SHEET 1
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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BENCH MARK

PROP LINE 4

PROP WATER QUALITY PUMP (86 GPM FOR 48 HOUR DRAWDOWN) AND WET WELL TO FILTERRA UNIT

PROP LINE 2

PROP CONTECH FILTERRA BIOSCAPE SYSTEM

DMA-B
2.3 AC

PROP UNDERGROUND WATER QUALITY & HCOC, AND 100-YEAR 24-HOUR STORM STORAGE CHAMBER (NOT DESIGNED TO INFILTRATE)
V_{100YR}=243,304 FT^3
V_{HCOC}=94,219 FT^3
V_{BMP}=93,131 FT^3

PROP LINE 2

DMA-A
17.7 AC

PROP PUBLIC UNDERGROUND OFFSITE 100-YEAR 3-HOUR STORM STORAGE CHAMBER (NOT DESIGNED TO INFILTRATE)
V_{100YR}=300,564 FT^3

PROP LINE 1

TRUMBLE ROAD

SHERMAN ROAD

ETHANAC ROAD

- DRAINAGE MANAGEMENT BOUNDARY
- LANDSCAPING - DMA-A
- LANDSCAPING - DMA-B
- ROOF
- CONCRETE OR ASPHALT - DMA-A
- CONCRETE OR ASPHALT - DMA-B
- SELF RETAINING - DMA-A (ONSITE FLOWS)
- FLOW DIRECTION
- STORM DRAIN PIPE
- ROOF DRAIN DOWNSPOUT
- STORM INLET
- TRASH ENCLOSURE

DRAINAGE MANAGEMENT AREAS

LEGEND	DMA-ID	TYPE	AREA (SF)
	L-A	LANDSCAPE	60535
	R-A	ROOF	407336
	H-A	HARDSCAPE	282471
	SR-A	SELF-RETAINING	22143
	L-B	LANDSCAPE	44110
	H-B	HARDSCAPE	54149

% IMPERVIOUS = (407336+282471+54149)/870750= 85.4%

N W E S WEBB

1" = 60'
30 0 60 120 180

CITY OF PERRIS

POST-CONSTRUCTION BMP SITE PLAN
ETHANAC LOGISTICS CENTER
P22-00030

SCALE: 1" = 60'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 22-0198
DATE: 1/19/2024			SHEET 2
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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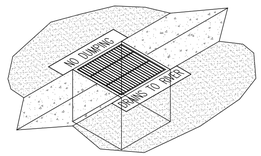
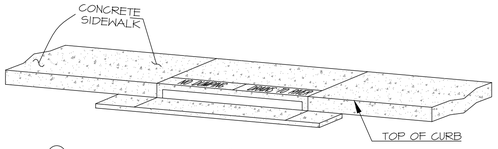
BORDER-AB

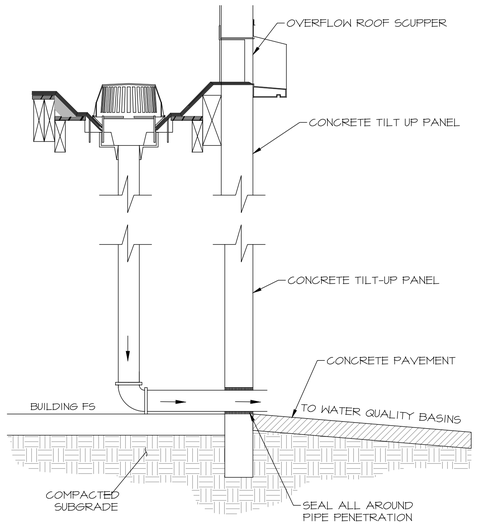




1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING - DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

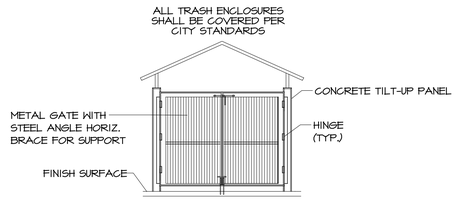
CATCH BASIN STENCILING DETAIL

NTS



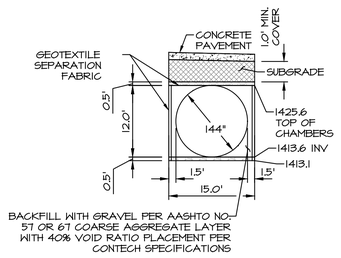
ROOF DRAIN DETAIL

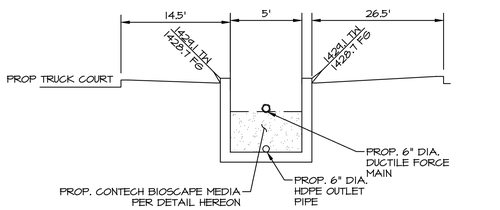
N.T.S.

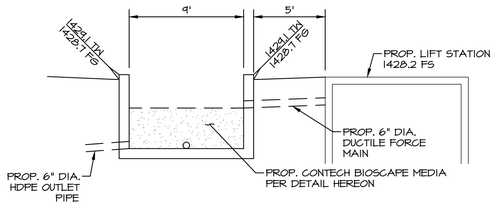


TRASH ENCLOSURE GATE ELEVATION

N.T.S.





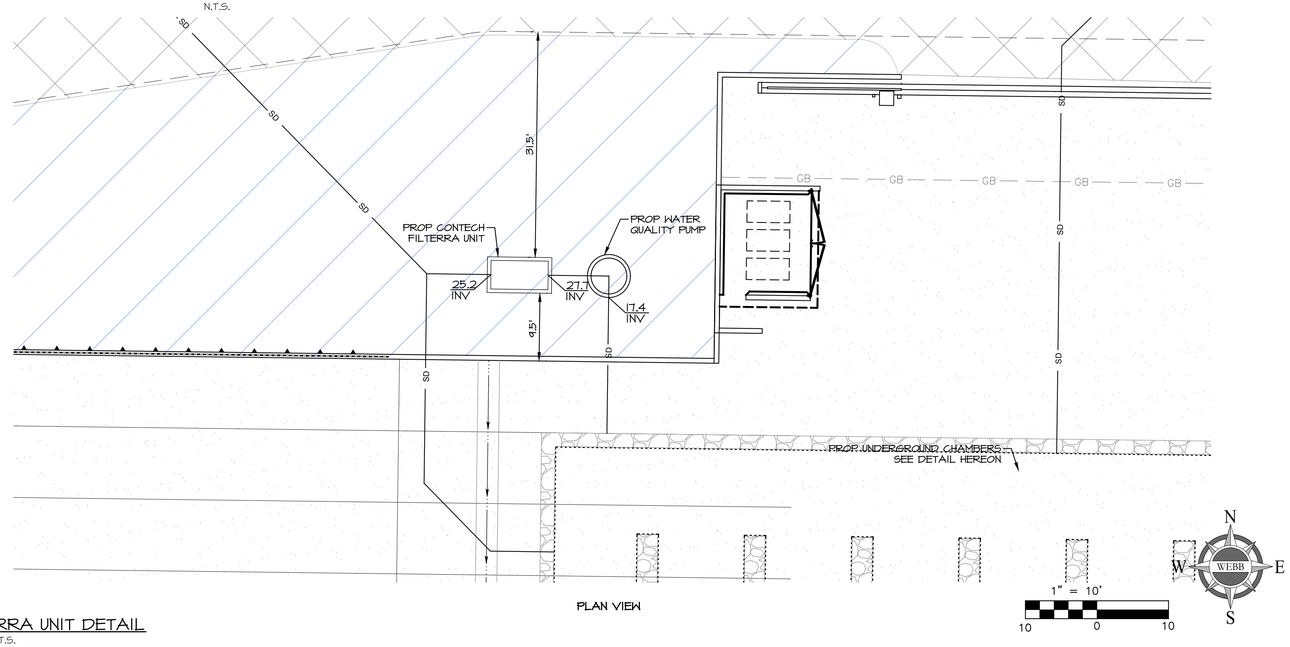


CONTECH FILTERRA UNIT DETAIL

N.T.S.
SEE DETAIL HEREON

CONTECH CMP UNDERGROUND DETENTION SYSTEM TYPICAL ROW CROSS SECTION

N.T.S.



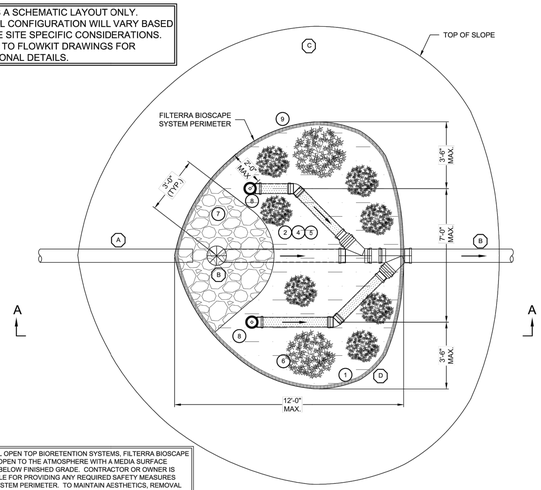
PLAN VIEW

1" = 10'

10 0 10

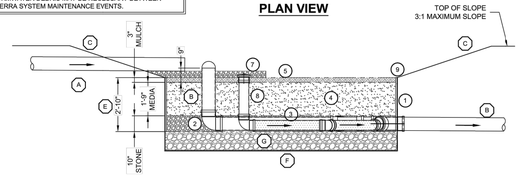
N W E S

THIS IS A SCHEMATIC LAYOUT ONLY. ACTUAL CONFIGURATION WILL VARY BASED ON THE SITE SPECIFIC CONSIDERATIONS. REFER TO FLOWKIT DRAWINGS FOR ADDITIONAL DETAILS.



AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE SYSTEM IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.

PLAN VIEW



SECTION A-A VIEW

BILL OF MATERIALS		
COUNT	DESCRIPTION	INSTALLED BY
X	FILTERRA SURFACE AREA (SF)	CONTRACTOR
X	MULCH VOLUME (CY)	CONTRACTOR
XX	FILTERRA MEDIA VOLUME (CY)	CONTRACTOR
X	1/2" #4 ROUND AGGREGATE UNDERDRAIN STONE (CY)	CONTRACTOR
X	ENERGY DISSIPATION ROCK (CY)	CONTRACTOR
X	EROSION CONTROL (LF)	CONTRACTOR
X	FILTERRA FLOWKIT	CONTRACTOR

PLANTING SCHEDULE *NOTE: PLANTS PROVIDED BY OTHERS	
QUANTITY	FILTERRA BIOSCAPE SYSTEM PLANT PALETTE

GENERAL NOTES

1. CONTRACTOR SHALL CONTACT CONTECH TO COORDINATE DELIVERY AND SUPERVISION OF PLACEMENT OF FILTERRA BIOSCAPE SYSTEM COMPONENTS (ACTIVATION). CONTRACTOR SHALL COMPLETE ITEMS IN THE LIST OF CONTRACTOR INSTALLATION RESPONSIBILITIES LISTED ON THIS DETAIL BEFORE CONTECH'S REPRESENTATIVE ATTENDS AND SUPERVISES THE ACTIVATION OF THE BIOSCAPE SYSTEM.
2. PERFORM FILTERRA BIOSCAPE SYSTEM EXCAVATION ONLY AFTER ALL THE CONTRIBUTING DRAINAGE AREAS ARE PERMANENTLY STABILIZED. DO NOT CONSTRUCT FILTERRA BIOSCAPE SYSTEM IN AN AREA USED AS EROSION AND SEDIMENT CONTROL FACILITIES. DO NOT STOCKPILE MATERIALS NOR STORE EQUIPMENT IN THIS AREA.
3. USE METHODS OF EXCAVATION THAT MINIMIZE COMPACTION OF THE UNDERLYING SOIL UNLESS THE SYSTEM IS TO BE LINED.
4. CONTRACTOR SHALL COORDINATE WITH CONTECH BEFORE THE FILTERRA BIOSCAPE SYSTEM AREA IS EXCAVATED TO MINIMIZE TIME BETWEEN EXCAVATION AND DELIVERY AND ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY STANDING WATER THAT ACCUMULATES IN THE EXCAVATED AREA MUST BE REMOVED BY THE CONTRACTOR BEFORE CONTECH CAN PROVIDE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY ADDITIONAL EXCAVATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. EXCAVATION DIMENSIONS SHOULD BE PROVIDED TO CONTECH IN THE ACTIVATION REQUEST CHECKLIST.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE EXCAVATED AREA(S) FOR USE DURING THE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM(S). ACCESS SHALL NOT PROHIBIT LIGHT DUTY EQUIPMENT THAT MAY BE USED TO INSTALL THE COMPONENTS (STONE, MEDIA, ETC). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RE-STABILIZATION THAT MAY BE REQUIRED AFTER THE FILTERRA BIOSCAPE SYSTEM ACTIVATION.
6. CONTECH AND/OR ITS REPRESENTATIVES MUST BE SCHEDULED TO BE ON SITE FOR THE LIST ENTITLED CONTRACTOR ACTIVATION RESPONSIBILITIES.

CONTRACTOR SITE PREPARATION RESPONSIBILITIES AS DENOTED BY (X) ON THIS DETAIL:

- (A) CONTRACTOR SHALL INSTALL PIPE OR SWALE THAT CONVEYS INFLUENT FLOWS AS WELL AS ANY REQUIRED INLET AND OUTLET STRUCTURES.
- (B) CONTRACTOR SHALL PROVIDE BYPASS PIPE AND RISER OR OTHER STRUCTURE AS SHOWN ON PLANS. THE BYPASS PIPE SHALL BE INSTALLED WITH WYE(S), OR OTHER PIPE FITTINGS, AND WITH REDUCER COUPLING(S) FOR CONNECTION OF UNDERDRAIN PIPE, PER PLANS. PIPES SHALL BE INSTALLED TO PROMOTE POSITIVE FLOW FROM THE FILTERRA BIOSCAPE SYSTEM.
- (C) IF REQUIRED, CONTRACTOR TO PROVIDE SHOULDER ACCORDING TO DIMENSION AND SLOPE SHOWN ON PLANS OR AS DESIGNED BY ENGINEER OF RECORD. SLOPE FROM SHOULDER TO FILTERRA BIOSCAPE SYSTEM SURFACE AREA SHALL NOT EXCEED 3:1. SOD IS REQUIRED TO STABILIZE SIDE SLOPES OR ADJACENT GRADE.
- (D) CONTRACTOR TO EXCAVATE MEDIA AREA CORRESPONDING TO THE SIZE OF THE FILTERRA BIOSCAPE SYSTEM SURFACE AREA AS SHOWN ON DETAIL AND ON PLAN SHEETS.
- (E) CONTRACTOR SHALL EXCAVATE VERTICALLY FROM BOTTOM OF UNDERDRAIN STONE, OR DRAINAGE STONE, IF REQUIRED, TO ELEVATION OF MULCH AS SHOWN ON THIS DETAIL.
- (F) CONTRACTOR TO PROVIDE AND INSTALL ANY GEOTEXTILE OR IMPERMEABLE LINER FOR BOTTOM OF THE FILTERRA BIOSCAPE SYSTEM IF REQUIRED PER THE PLANS.
- (G) CONTRACTOR TO PROVIDE AND INSTALL ANY ADDITIONAL DRAINAGE STONE BELOW THE FILTERRA BIOSCAPE SYSTEM AS CALLED OUT ON THE PLANS.

CONTRACTOR ACTIVATION RESPONSIBILITIES AS DENOTED BY (#) ON THIS DETAIL:

- (1) PLACE GEOTEXTILE FABRIC ALONG THE PERIMETER OF THE FILTERRA BIOSCAPE SYSTEM EXCAVATION.
- (2) PLACE 10" OF UNDERDRAIN STONE - 2" UNDER THE PIPING, 6" AROUND THE PIPING AND 2" ABOVE THE PIPING USING LIGHT DUTY EQUIPMENT ONLY.
- (3) PLACE 6" UNDERDRAIN PIPING UNLESS OTHERWISE APPROVED BY CONTECH, ASSOCIATED PIPING AND FITTINGS/ELBOWS TO CONNECT TO THE PIPING/FITTING(S) THAT IS PROVIDED BY CONTRACTOR (SEE CONTRACTOR INSTALLATION RESPONSIBILITIES THIS DETAIL).
- (4) PLACE 21" FILTERRA MEDIA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MEDIA.
- (5) PLACE 3" DOUBLE SHREDDED HARDWOOD MULCH OVER ENTIRE FILTERRA BIOSCAPE SYSTEM SURFACE AREA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MULCH.
- (6) PROVIDE AND PLANT VEGETATION AS INDICATED IN TABLE ON THIS DETAIL OR ON SITE PLANS.
- (7) PLACE ENERGY DISSIPATION ROCK APRON AS DESIGNED AND INDICATED ON THIS DETAIL OR PER ENGINEER OF RECORD PLANS.
- (8) PLACE CLEANOUT ADAPTER, PLUG AND PIPING.
- (9) PLACE ADDITIONAL EROSION CONTROL AROUND FILTERRA BIOSCAPE SYSTEM (IF REQUIRED).

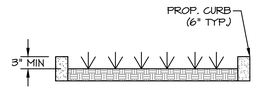
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA BIOSCAPE™ SYSTEM STANDARD DETAIL

H:\DRAWINGS\CAD\TRENTON4 FILTERRA\STANDARD DRAWINGS\FTBS - BIOSCAPE SYSTEM (BIOSLESS)\SHOP\FILTERRA BIOSCAPE SUPERVISED SYSTEM - STD DETAIL.DWG 5/31/2023 8:57 AM

BMP-A

N.T.S.



N.T.S.
ALL SELF-RETAINING AREAS WILL BE DEPRESSED A MINIMUM OF 3-INCHES

CITY OF PERRIS

POST-CONSTRUCTION BMP DETAILS ETHANAC LOGISTICS CENTER P22-00030

SCALE:	N/A	ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS, 3788 McCRAY STREET, RIVERSIDE CA. 92506, PH. (951) 686-1070, FAX (951) 788-1256	W.O. 22-0198
DATE:	1/19/2024		SHEET 3
DESIGNED:	RSB		OF 3 SHEETS
CHECKED:	SKK		
PLN CK REF:	REF		DWG. NO.
F.B.	F.B.		

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REVISED 4.8

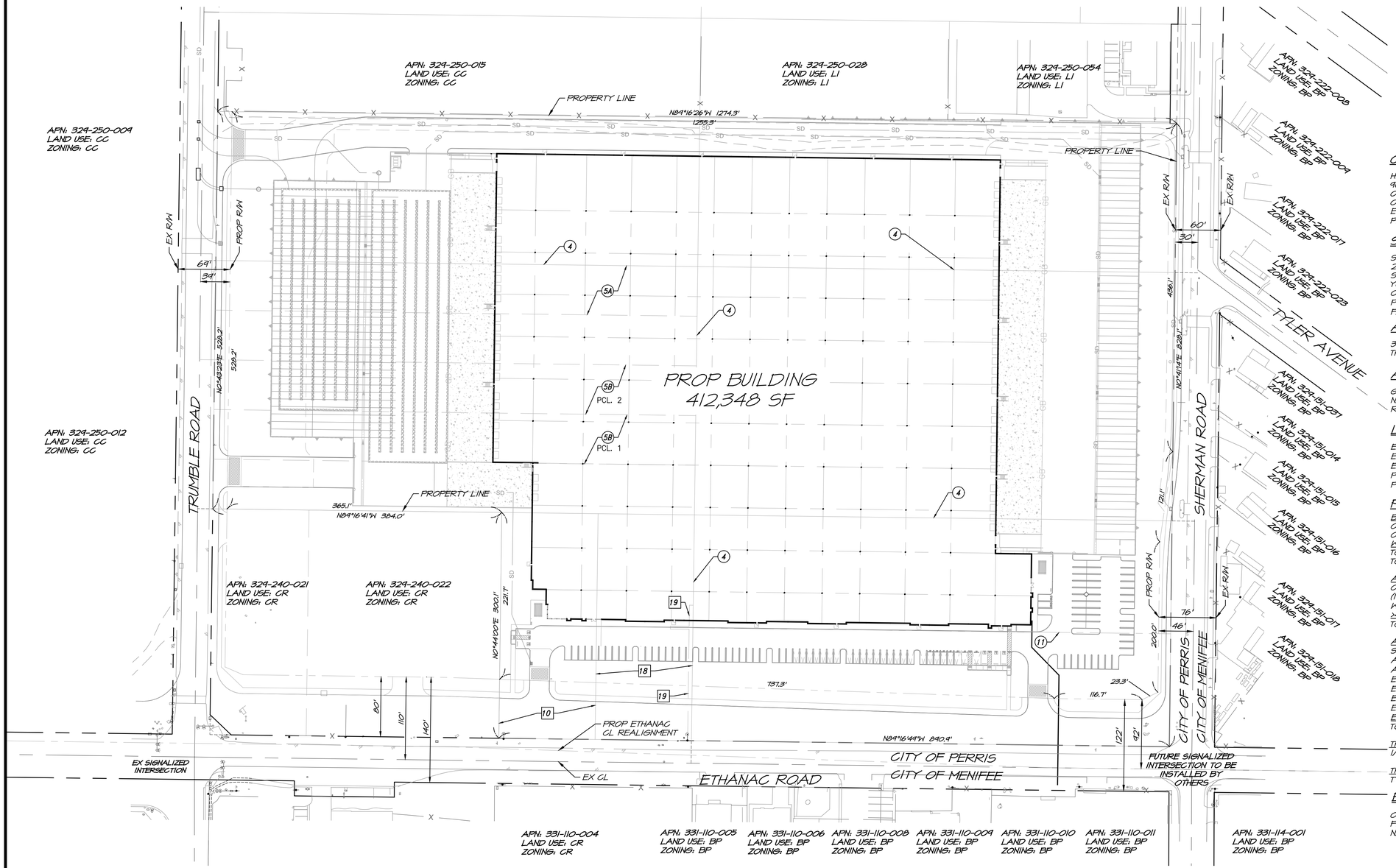
Appendix 2: Construction Plans

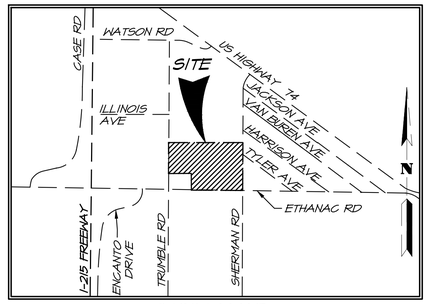
Grading and Drainage Plans

IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DEVELOPMENT PLAN REVIEW NO. 22-00030

LOCATED IN SECTION 10 SW, T. 5S., R. 3W., S.B.M.





VICINITY MAP
NTS

OWNER/APPLICANT

HILLWOOD INVESTMENT PROPERTIES
901 VIA PIEMONTE STE. 175
ONTARIO CA, 91764
CONTACT: JOHN GRACE
EMAIL: JOHN.GRACE@HILLWOOD.COM
PHONE: (909) 256-5424

PROJECT REPRESENTATIVE

ALBERT A. WEBB ASSOCIATES
3788 MCCRAY STREET
RIVERSIDE, CA 92506
CONTACT: RICHARD BELMUDEZ
PHONE: (951) 686-1070
FAX: (951) 788-1256

SOILS ENGINEER

SOUTHERN CALIFORNIA GEOTECHNICAL
22885 E. SAVI RANCH PARKWAY,
SUITE E
YORBA LINDA, CA 92887
CONTACT: ROBERT TRAZO
PHONE: (714) 685-1115
FAX: (714) 685-1118

ENGINEER

ALBERT A. WEBB ASSOCIATES
3788 MCCRAY STREET
RIVERSIDE, CA 92506
CONTACT: SARAH KOWALSKI
PHONE: (951) 686-1070
FAX: (951) 788-1256

A.P.N.

324-240-016 THRU -020, -023,
THRU -027

ARCHITECT

HPA ARCHITECTS
18831 BARDEEN AVE., STE 100
IRVINE, CA 92612
CONTACT: INKON KIM
PHONE: (949) 863-1770
EMAIL: INKON@HPARCHS.COM

ACREAGE

GROSS	21.6 AC
NET	19.9 AC
R/W	1.7 AC

TOPOGRAPHY SOURCE

TOPOGRAPHY FLOWN BY INLAND AERIAL SURVEYS INC. ON 02/15/2022

LAND USE

EXISTING LAND USE: VACANT
EXISTING GENERAL PLAN LAND USE: COMMERCIAL COMMUNITY (CC)
EXISTING ZONING: COMMERCIAL COMMUNITY (CC)
PROPOSED GENERAL PLAN LAND USE: LIGHT INDUSTRIAL (LI)
PROPOSED ZONING: LIGHT INDUSTRIAL (LI)

PROJECT DATA

BUILDING AREA	
OFFICE - FIRST FLOOR	10,000 SF
OFFICE - SECOND FLOOR	5,000 SF
WAREHOUSE	397,348 SF
TOTAL BUILDING FOOTPRINT	407,348 SF
TOTAL FLOOR AREA	412,348 SF
AUTO PARKING REQUIRED	
OFFICE:	
(1 STALL/300 SF IF LESS THAN 10% GFA)	N/A
WAREHOUSE:	
>40K SF @ (30 STALLS + 1 STALL/5,000 SF)	105 STALLS
TOTAL	105 STALLS
AUTO PARKING PROVIDED	
STANDARD (9' x 19')	76 STALLS
ADA STANDARD (9' x 19')	3 STALLS
ADA VAN (12' x 19')	2 STALLS
EV ADA STANDARD (9' x 19')	1 STALLS
EV ADA VAN (12' x 19')	1 STALLS
EV AMBULATORY (10' x 19')	1 STALLS
EVCS STANDARD (9' x 19')	3 STALLS
EV CALPABLE (9' x 19')	19 STALLS
TOTAL	106 STALLS
TRAILER PARKING REQUIRED	
1/ 5,000 SF	82 STALLS
TRAILER PARKING PROVIDED	
TYPICAL TRAILER (10' x 55')	157 STALLS

EARTHWORK ESTIMATE

CUT:	15,600 CY
FILL:	66,100 CY
NET:	50,500 CY (FILL)

SHEET INDEX

PRELIMINARY

GENERAL INFORMATION

1. ALL PARCELS WITHIN PROJECT BOUNDARY TO BE COMBINED VIA PARCEL MAP
2. THOMAS BROS. MAP BOOK PAGE: 838, GRID: C1 AND D1
3. PROJECT IS NOT WITHIN A SPECIFIC PLAN.
4. PROJECT LIES WITHIN THE CITY OF PERRIS REDEVELOPMENT PROJECT AREA.
5. PROJECT LIES WITHIN CFD NO. 1.
6. EASEMENTS OF RECORD ARE PLOTTED HEREIN.
7. PROJECT IS WITHIN EASTERN MUNICIPAL WATER DISTRICT
8. THERE ARE NO EXISTING WELLS ON THE PROPERTY.
9. ALL SLOPES ARE 2:1 RATIO, UNLESS OTHERWISE NOTED.
10. LAND IS NOT WITHIN A SPECIAL STUDIES ZONE.
11. LAND HAS LOW POTENTIAL FOR LIQUEFACTION PER SOCAL GEO REPORT DATED 02/23/2022.
12. SUB-SURFACE SEPTIC DISPOSAL IS NOT INTENDED ON SITE.
13. STRUCTURES AND/OR DWELLINGS DO NOT EXIST ON SITE.
14. THE PROJECT WILL COMPLY WITH NPDES REQUIREMENTS AS REQUIRED BY NPDES SUPPLEMENT "A".
15. FLOOD ZONE X, AREA OF LOW FLOODING PER FEMA PANEL 06065C2060H.
16. PROJECT LIES WITHIN AIRPORT LAND USE COMPATIBILITY ZONE D.
17. ARCHITECTURAL SITE PLAN PROVIDED BY HPA ARCHITECTURE ON 04/12/23

UTILITY PROVIDERS

WATER:	EASTERN MUNICIPAL WATER DISTRICT PHONE: (951) 685-7434
SEWER:	EASTERN MUNICIPAL WATER DISTRICT PHONE: (951) 685-7434
GAS:	SOUTHERN CALIFORNIA GAS COMPANY PHONE: (909) 307-7070
ELECTRIC:	SOUTHERN CALIFORNIA EDISON PHONE: 1 (800) 655-4555
TELEPHONE:	CHARTER COMMUNICATIONS (SPECTRUM) PHONE: (951) 406-1666
CABLE T.V.:	FRONTIER COMMUNICATIONS PHONE: (310) 264-5100
SCHOOL DISTRICT(S):	ROMOLAND SCHOOL DISTRICT (TK-8) PHONE: (951) 926-4244 PERRIS UNION HIGH SCHOOL DISTRICT (9-12) PHONE: (951) 943-6369

EASEMENT NOTES

SEE SHEET 2

LEGAL DESCRIPTION

SEE SHEET 2

N
W WEBB E
S

1" = 70'
70 0 70 140 210

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

CITY OF PERRIS

ETHANAC LOGISTICS CENTER
TITLE SHEET
DEVELOPMENT PLAN REVIEW NO. 22-00030

SCALE:	1" = 70'
DATE:	9/1/2023
DESIGNED:	AG
CHECKED:	SK
PLN CK REF:	
F.B.	

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O. 22-0198
SHEET 1
OF 5 SHEETS
DWG. NO.

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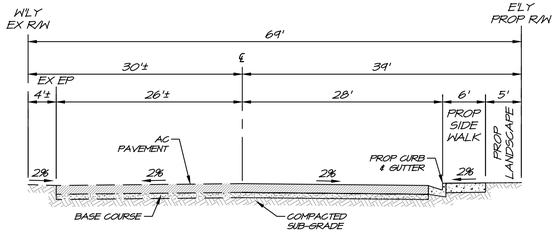
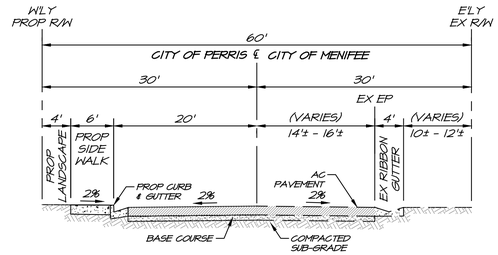
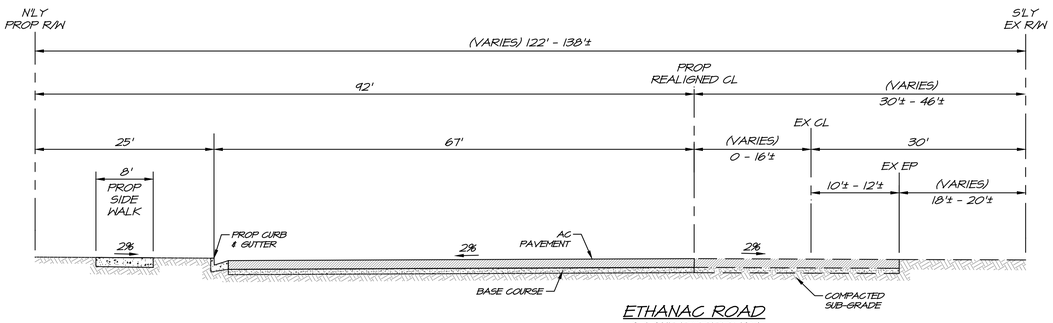


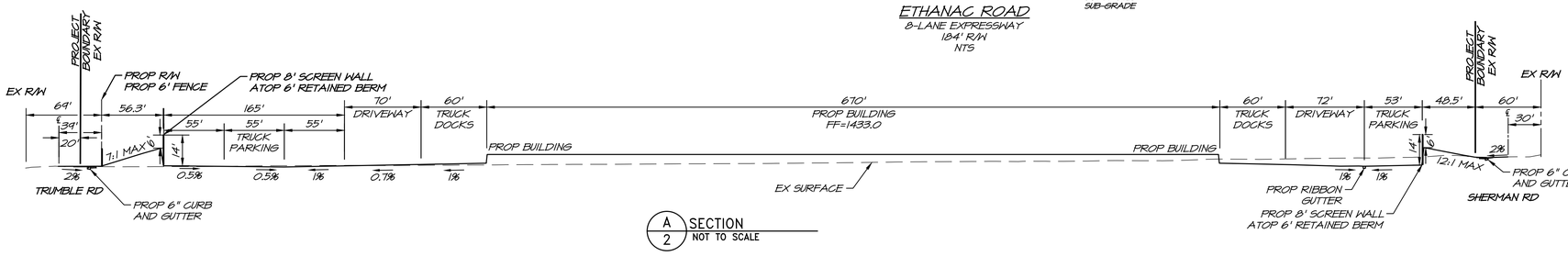
TRUMBLE ROAD
MAJOR COLLECTOR
78' R/W
NTS



SHERMAN ROAD
LOCAL
60' R/W
NTS



ETHANAC ROAD
8-LANE EXPRESSWAY
184' R/W
NTS



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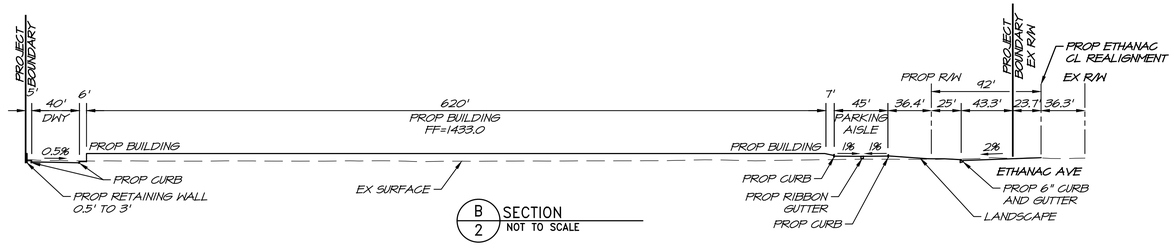

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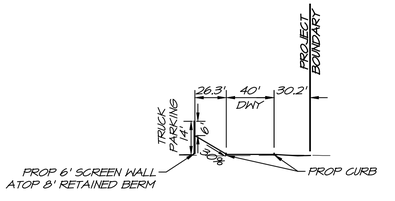
NOT TO SCALE



C
2
SECTION
NOT TO SCALE

EASEMENT NOTES

APN: 324-240-016 THRU -020 AND 324-240-025 THRU -027.

4. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED JUNE 25, 1927 IN BOOK 120 OF DEEDS, PAGE 209, IN FAVOR OF SOUTHERN SIERRAS POWER COMPANY. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.

5. COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS IN THE DOCUMENT RECORDED APRIL 17, 1934 AS BOOK 170, PAGE 305 AND JANUARY 13, 1936 IN BOOK 254, PAGE 560 (BOTH) OF OFFICIAL RECORDS, BUT DELETING ANY COVENANT, CONDITION OR RESTRICTION INDICATING A PREFERENCE, LIMITATION OR DISCRIMINATION BASED ON RACE, COLOR, RELIGION, SEX, HANDICAP, FAMILIAL STATUS, NATIONAL ORIGIN, SEXUAL ORIENTATION, MARITAL STATUS, ANCESTRY, SOURCE OF INCOME OR DISABILITY, TO THE EXTENT SUCH COVENANTS, CONDITIONS OR RESTRICTIONS VIOLATE TITLE 42, SECTION 3604(C), OF THE UNITED STATES CODES, LAWFUL RESTRICTIONS UNDER STATE AND FEDERAL LAW ON THE AGE OF OCCUPANTS IN SENIOR HOUSING OR HOUSING FOR OLDER PERSONS SHALL NOT BE CONSTRUED AS RESTRICTIONS BASED ON FAMILIAL STATUS.
[(5A) BOOK 170, PAGE 305 & (5B) BOOK 254, PAGE 560]

11. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED AUGUST 8, 1947 AS BOOK 846, PAGE 355 OF OFFICIAL RECORDS. IN FAVOR OF CALIFORNIA ELECTRIC POWER COMPANY.
[℄ OF UNDISCLOSED WIDTH]

APN: 324-240-023 AND -024

10. COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS IN THE DOCUMENT RECORDED APRIL 24, 1933 AS BOOK 120, PAGE 347 OF OFFICIAL RECORDS, WHICH PROVIDE THAT A VIOLATION THEREOF SHALL NOT DEFEAT OR RENDER INVALID THE LIEN OF ANY FIRST MORTGAGE OR DEED OF TRUST MADE IN GOOD FAITH AND FOR VALUE, BUT DELETING ANY COVENANT, CONDITION OR RESTRICTION INDICATING A PREFERENCE, LIMITATION OR DISCRIMINATION BASED ON RACE, COLOR, RELIGION, SEX, HANDICAP, FAMILIAL STATUS, NATIONAL ORIGIN, SEXUAL ORIENTATION, MARITAL STATUS, ANCESTRY, SOURCE OF INCOME OR DISABILITY, TO THE EXTENT SUCH COVENANTS, CONDITIONS OR RESTRICTIONS VIOLATE TITLE 42, SECTION 3604(C), OF THE UNITED STATES CODES OR SECTION 12955 OF THE CALIFORNIA GOVERNMENT CODE. LAWFUL RESTRICTIONS UNDER STATE AND FEDERAL LAW ON THE AGE OF OCCUPANTS IN SENIOR HOUSING OR HOUSING FOR OLDER PERSONS SHALL NOT BE CONSTRUED AS RESTRICTIONS BASED ON FAMILIAL STATUS.

18. EASEMENTS, COVENANTS AND CONDITIONS CONTAINED IN THE DEED FROM ETHANAC RANCHO, LTD, AS GRANTOR, TO PHILA M. LAUDIG, AS GRANTEE, RECORDED APRIL 24, 1933 AS BOOK 123, PAGE 42 OF OFFICIAL RECORDS. REFERENCE BEING MADE TO THE DOCUMENT FOR FULL PARTICULARS.
[BLANKET IN NATURE]

19. AN EASEMENT FOR TELEPHONE LINE, CONSISTING OF POLES, NECESSARY GUYS AND ANCHORS, BRACES, CROSS-ARMS, WIRE, CONDUITS, CABLES, AND OTHER FIXTURES AND APPLIANCES, FOR CONVEYING ELECTRIC ENERGY TO BE USED FOR COMMUNICATION, TELEPHONE, TELEGRAPH AND/OR OTHER PURPOSES AND ACCESS FOR EXERCISING THE RIGHTS AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 18, 1961 AS INSTRUMENT NO. 79475, BOOK 2483, PAGE 446 OF OFFICIAL RECORDS, IN FAVOR OF CALIFORNIA WATER & TELEPHONE COMPANY, A CORPORATION, AND ITS SUCCESSORS.

LEGAL DESCRIPTION

APN: 324-240-016 (AFFECTS THE PORTION OF LOT 133), **324-240-017** (AFFECTS THE PORTION OF LOT 134), **324-240-018** (AFFECTS THE PORTION OF LOT 134), **324-240-019** (AFFECTS THE PORTION OF LOT 134), **324-240-020** (AFFECTS THE PORTION OF LOT 134), **324-240-026** (AFFECTS THE LOT 131), **324-240-027** (AFFECTS THE PORTION OF LOT 138), **324-240-025** (AFFECT LOT 136).

REAL PROPERTY IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

PARCEL A:
LOTS 134, 131 AND THE SOUTH 198 FEET OF LOTS 133 AND 138 OF RAMOLA FARMS NO. 6A, IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 14, PAGES 63, 64, AND 65 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL B:
LOT 136 OF RAMOLA FARMS NO. 6A, IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 14, PAGES 63, 64, AND 65 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

APN: 324-240-023 (AFFECTS PARCEL A) AND **324-240-024** (AFFECTS PARCEL B)

PARCEL A:

THE WESTERLY 128.00 FEET OF THE EASTERLY 256.00 FEET OF LOT 135 OF ROMOLA FARMS NO. 6-A, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 14, PAGES 63, 64 AND 65 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL B:

THAT PORTION OF LOT 135 OF ROMOLA FARMS NO. 6A, AS SHOWN BY MAP OF SAID TRACT ON FILE IN BOOK 14, PAGES 63, 64, AND 65 OF MAPS, RIVERSIDE COUNTY RECORDS, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID LOT 135; THENCE WEST, ON THE SOUTH LINE OF SAID LOT, 128 FEET; THENCE NORTH, PARALLEL WITH THE EAST LINE OF SAID LOT, 300 FEET, TO A POINT ON THE NORTH LINE OF SAID LOT, 128 FEET WEST OF THE NORTHEAST CORNER THEREOF; THENCE EAST, ON THE NORTH LINE OF SAID LOT, 128 FEET, TO THE NORTHEAST CORNER THEREOF; THENCE SOUTH, ON THE EAST LINE OF SAID LOT, 300 FEET, TO THE POINT OF BEGINNING.

PRELIMINARY

REVISIONS	DATE	BY
REVISED SECTIONS FOR PUBLIC DETENTION BASIN	4/23	AG

CITY OF PERRIS

ETHANAC LOGISTICS CENTER
GRADING AND STREET SECTIONS
DEVELOPMENT PLAN REVIEW NO. 22-00030

SCALE: NTS	ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O.	22-0198
DATE: 9/1/2023		SHEET	2
DESIGNED: AG		OF	5 SHEETS
CHECKED: SK		DWG. NO.	
PLN CK REF:			
F.B.			

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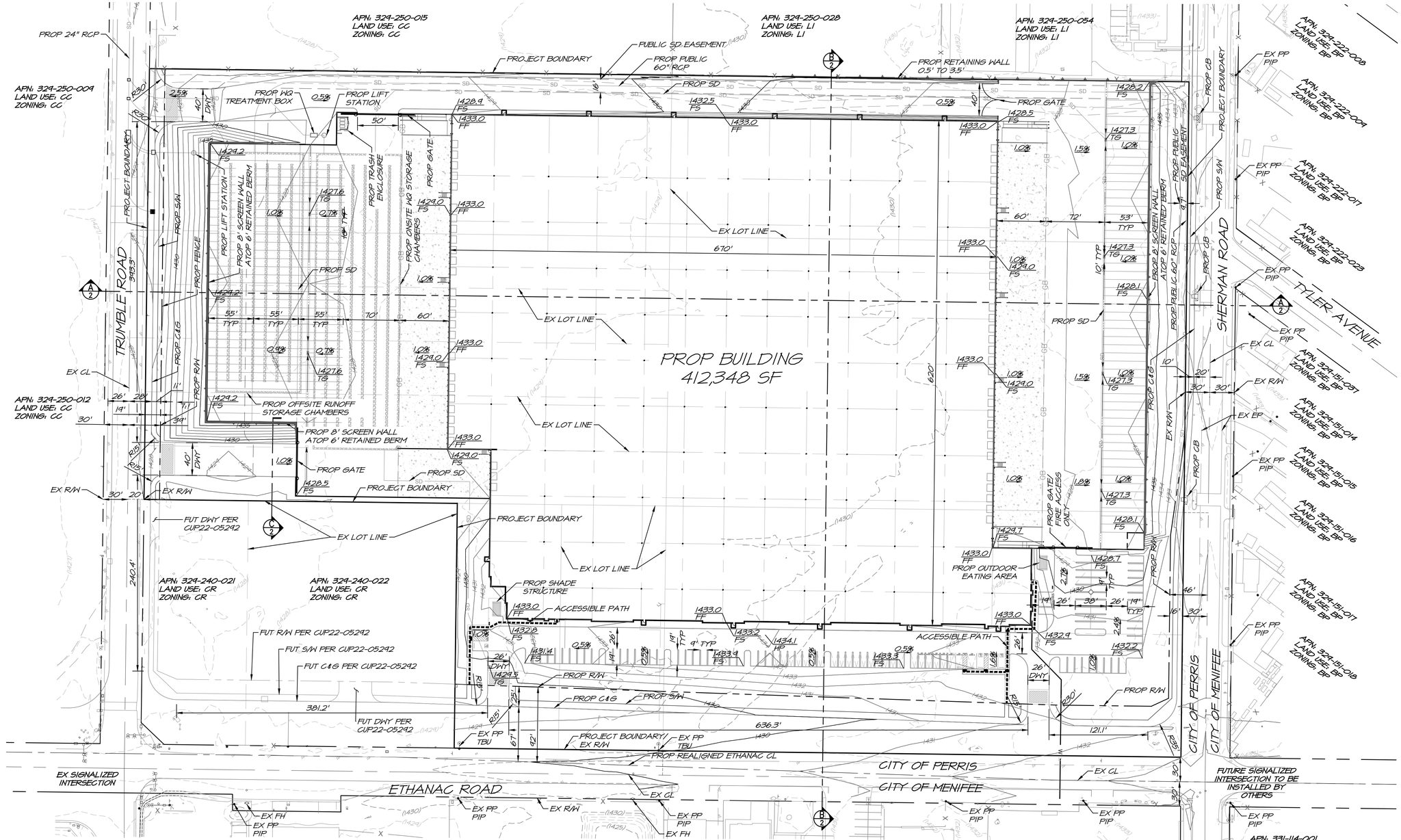

LEGEND

- ACCESSIBLE PATH
- (1430) EXISTING CONTOUR
- EXISTING CENTER LINE
- EXISTING EASEMENT
- EXISTING EDGE OF PAVEMENT
- X EXISTING FENCE
- EXISTING LOT LINE
- GB GRADE BREAK
- PROJECT BOUNDARY
- PROPOSED CENTER LINE
- 1430 PROPOSED CONTOUR
- PROPOSED CURB
- PROP/EX RIGHT OF WAY

ABBREVIATIONS

CB	CATCH BASIN
EP	EDGE OF PAVEMENT
EX	EXISTING
FF	FINISHED FLOOR
FH	FIRE HYDRANT
FS	FINISHED SURFACE
PIP	PROTECT IN PLACE
PROP	PROPOSED
R/W	RIGHT-OF-WAY
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
S/W	SIDEWALK
TBU	TO BE UNDERGROUNDED
TG	TOP OF GRATE
TYP	TYPICAL

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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CITY OF PERRIS

ETHANAC LOGISTICS CENTER
CONCEPTUAL GRADING
DEVELOPMENT PLAN REVIEW NO. 22-00030

SCALE:	1" = 60'
DATE:	9/1/2023
DESIGNED:	AG
CHECKED:	SK
PLN CK REF:	
F.B.	

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O.	22-0198
SHEET	3
OF	5 SHEETS
DWG. NO.	

SEE SHEET 5

APN: 324-250-015
LAND USE: CC
ZONING: CC

APN: 324-250-028
LAND USE: LI
ZONING: LI

APN: 324-250-054
LAND USE: LI
ZONING: LI

APN: 324-250-009
LAND USE: CC
ZONING: CC

APN: 324-250-012
LAND USE: CC
ZONING: CC

APN: 324-240-021
LAND USE: CR
ZONING: CR

APN: 324-240-022
LAND USE: CR
ZONING: CR

APN: 331-110-004
LAND USE: CR
ZONING: CR

APN: 331-110-005
LAND USE: BP
ZONING: BP

APN: 331-110-006
LAND USE: BP
ZONING: BP

APN: 331-110-008
LAND USE: BP
ZONING: BP

APN: 331-110-009
LAND USE: BP
ZONING: BP

APN: 331-110-010
LAND USE: BP
ZONING: BP

APN: 331-110-011
LAND USE: BP
ZONING: BP

APN: 331-114-001
LAND USE: BP
ZONING: BP

APN: 324-222-002
LAND USE: BP
ZONING: BP

APN: 324-222-001
LAND USE: BP
ZONING: BP

APN: 324-222-017
LAND USE: BP
ZONING: BP

APN: 324-222-023
LAND USE: BP
ZONING: BP

APN: 324-151-031
LAND USE: BP
ZONING: BP

APN: 324-151-014
LAND USE: BP
ZONING: BP

APN: 324-151-015
LAND USE: BP
ZONING: BP

APN: 324-151-016
LAND USE: BP
ZONING: BP

APN: 324-151-017
LAND USE: BP
ZONING: BP

APN: 324-151-018
LAND USE: BP
ZONING: BP

PROJECT BOUNDARY
PUBLIC SD EASEMENT
PROP PUBLIC 60" RCP
PROP RETAINING WALL 0.5' TO 3.5'
PROP PUBLIC 36" RCP
PROP PUBLIC 18" RCP
PROP PUBLIC 24" RCP
PROP PUBLIC 18" RCP
PROP STORM WATER TREATMENT BOX
PROP LIFT STATION
PROP LIFT STATION
PROP WATER
PROP SD
PROP SD
EX TELEPHONE
EX 2" GAS
EX ELECTRIC
EX 18" SEWER
EX 12" WATER
PROP OFFSITE RUNOFF STORAGE CHAMBERS
PROP INLET
PROP ONSITE RUNOFF STORAGE CHAMBERS
PROP FIRE LINE
PROP C&G
PROP R/W
PROP BUILDING
412,348 SF
1433.0 F.F.
PROP INLET
PROP FIRE LINE
PROP SD
PROP INLET
PROP INLET
EX 18" BRACKISH WATER
PROJECT BOUNDARY
EX 8" WATER
EX TELEPHONE
EX 2" GAS
PROP C&G
EX R/W
PROP PUBLIC SD EASEMENT
PROP R/W
EX PP PIP
PROP CATCH BASIN (TYP)
PROP 36" RCP
EX 8" SEWER
EX 2" GAS
EX PP PIP
EX OVERHEAD UTILITY
EX PP PIP
EX PP PIP
EX PP PIP
EX CL/ CITY BOUNDARY
EX R/W
EX EP
EX PP PIP
EX PP PIP
TYLER AVENUE
SHERMAN ROAD
TRUMBLE ROAD
ETHANAC ROAD
EX SIGNALIZED INTERSECTION
FUT DWY PER CUP22-05242
FUT R/W PER CUP22-05242
FUT S/W PER CUP22-05242
FUT C&G PER CUP22-05242
FUT DWY PER CUP22-05242
PROP SEWER CONNECTION
PROP FIRE LINE
PROP R/W
PROP C&G
PROJECT BOUNDARY / EX R/W
PROJECT BOUNDARY / EX R/W
EX PP TBU
EX PP TBU
EX 15" SEWER
EX 6" GAS
EX 2" GAS
EX CL
PROP REALIGNED ETHANAC CL
EX CL
EX PP PIP
EX FH
EX R/N
EX PP PIP
EX FH
EX TELEPHONE
EX 18" BRACKISH WATER
EX 20" WATER
EX PP PIP
EX OVERHEAD UTILITY
EX PP PIP
EX PP PIP
APN: 331-114-001
LAND USE: BP
ZONING: BP
FUTURE SIGNALIZED INTERSECTION TO BE INSTALLED BY OTHERS

LEGEND

- EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EXISTING 2" GAS
- EXISTING 3" GAS
- EXISTING 6" GAS
- EXISTING OVERHEAD UTILITY
- EXISTING 6" SEWER
- EXISTING 8" SEWER
- EXISTING 15" SEWER
- EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- EXISTING 36" STORM DRAIN
- EXISTING 48" STORM DRAIN
- EXISTING TELEPHONE
- EXISTING 8" WATER
- EXISTING 12" WATER
- EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- PROPOSED WATER
- PROPOSED FIRE LINE
- PROPOSED SEWER
- PROPOSED STORM DRAIN

ABBREVIATIONS

CL	CENTER LINE
C&G	CURB AND GUTTER
EX	EXISTING
PP	POWER POLE
PROP	PROPOSED
PIP	PROTECT IN PLACE
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
R/W	RIGHT-OF-WAY
SD	STORM DRAIN
TBU	TO BE UNDERGROUNDED
TYP	TYPICAL

1" = 60'
60 0 60 120 180

N W WEBB E S

PRELIMINARY

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

CITY OF PERRIS

ETHANAC LOGISTICS CENTER
CONCEPTUAL UTILITY
DEVELOPMENT PLAN REVIEW NO. 22-00030

SCALE:	1" = 60'
DATE:	9/1/2023
DESIGNED:	AG
CHECKED:	SK
PLN CK REF:	
F.B.	

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O.	22-0192
SHEET	4
OF	5 SHEETS
DWG. NO.	

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SEE SHEET 4

LEGEND

- EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EXISTING 2" GAS
- EXISTING 3" GAS
- EXISTING 6" GAS
- EXISTING OVERHEAD UTILITY
- EXISTING 6" SEWER
- EXISTING 8" SEWER
- EXISTING 15" SEWER
- EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- EXISTING 36" STORM DRAIN
- EXISTING 48" STORM DRAIN
- EXISTING TELEPHONE
- EXISTING 8" WATER
- EXISTING 12" WATER
- EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- PROPOSED WATER
- PROPOSED FIRE LINE
- PROPOSED SEWER
- PROPOSED STORM DRAIN

ABBREVIATIONS

CL	CENTER LINE
C&G	CURB AND GUTTER
EX	EXISTING
PP	POWER POLE
PROP	PROPOSED
PIP	PROTECT IN PLACE
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
R/W	RIGHT-OF-WAY
SD	STORM DRAIN
TBU	TO BE UNDERGROUNDED
TYP	TYPICAL

N W E S

1" = 60'

60 0 60 120 180

PRELIMINARY

REVISIONS	DATE	BY
REFERENCE TO MDP LINE A-11 ADDED	4/23	AG

CITY OF PERRIS

ETHANAC LOGISTICS CENTER
CONCEPTUAL UTILITY
DEVELOPMENT PLAN REVIEW NO. 22-00030

SCALE:	1" = 60'
DATE:	9/1/2023
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W.O.	22-0192
SHEET	5
OF	5 SHEETS
DWG. NO.	

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Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE

NWC Ethanac Road and Sherman Road
Perris, California
for
Hillwood

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

February 23, 2022

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Hillwood
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. John Grace
Vice President, Development

Project No.: **22G107-1**

Subject: **Geotechnical Investigation**
Proposed Warehouse
NWC Ethanac Road and Sherman Road
Perris, California

Ms. Buckle/Mr. Morse:

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

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Daniel W. Nielsen, GE 3166
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL W. NIELSEN
No. 3166
GEOTECHNICAL
STATE OF CALIFORNIA

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

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

Geotechnical Design Considerations

- The near-surface soils encountered at the boring locations consist of older alluvium which possesses high strengths and favorable consolidation/collapse characteristics.
- Granodiorite to tonalite bedrock was encountered at four (4) of the boring locations at depths of 5½ to 12± feet below the ground surface, extending to at least to the maximum depth explored of 25± feet.
- The near-surface alluvial soils possess varying strengths. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structure.
- Remedial grading is recommended in the proposed building pad area in order to provide more uniform support characteristics in the proposed foundation and floor slab areas and to help reduce the potential for differential settlements.

Site Preparation

- Remedial grading is recommended to be performed within the proposed building area in order to provide consistent support characteristics throughout the proposed building pad area and to help limit potential differential settlements to within tolerable limits. The proposed building area should be overexcavated to a depth of at least 2 feet below existing grade and to a depth of 2 feet below proposed building pad subgrade elevation, whichever is greater. Within the foundation influence zones, the overexcavation should extend to a depth of at least 2 feet below proposed foundation bearing grade. The overexcavation should extend horizontally at least 5 feet beyond the building and foundation perimeters.
- After the overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be removed. The resulting subgrade should then be scarified to a depth of 12 inches and moisture conditioned (or air dried) to 2 to 4 percent above optimum. The previously excavated soils may then be replaced as compacted structural fill. All structural fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings, due to the presence of medium expansive soils. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab

- Conventional Slab-on-Grade: minimum 6 inches thick.

- Modulus of Subgrade Reaction: k = 125 psi/in.
- Minimum slab reinforcement: No. 3 bars at 18 inches on center in both directions due to the presence of medium expansive soils. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed loading.

Pavement Design Recommendations

ASPHALT PAVEMENTS (R= 20)					
Materials	**Thickness (inches)**				
	Auto Parking (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Truck Traffic		
			(TI = 6.0)	(TI = 7.0)	(TI = 8.0)
Asphalt Concrete	3	3	3½	4	5
Aggregate Base	6	8	10	12	14
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=20)				
Materials	**Thickness (inches)**			
	Auto Parking & Drives (TI = 5.0)	Truck Traffic		
		(TI =6.0)	(TI =7.0)	(TI =8.0)
PCC	5	5	5½	7
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 21P511, dated December 17, 2021. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the northwest corner of Ethanac Road and Sherman Road in Perris, California. The site is bounded to the north by a commercial/industrial building and a vacant lot, to the west by Trumble Road, to the south by Ethanac Road, and to the east by Sherman Road. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site consists of several contiguous rectangular-shaped parcels which total 24± acres in size. The site is currently vacant and undeveloped. The ground surface cover generally consists of exposed soil with moderate native grass and weed growth. Concrete debris, including concrete fragments and a concrete pipe, is scattered on the ground surface in the southern portion of the site. Several small to medium sized trees are also present in the southern region of the site.

Based on our review of readily available historical aerial photographs, two (2) small structures were present in the southwestern portion of the overall site, between 1966 and 1997.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography is relatively flat that gently slopes downward to the northwest at a gradient of less than 1 percent.

3.2 Proposed Development

A conceptual site plan for the proposed development, identified as Scheme 7, prepared by Herdman Architecture and Design, was provided to our office by the client. Based on this plan, the subject site will be developed with a 547,520± ft² warehouse, located in the central region of the site. Dock-high doors will be constructed along a portion of the northern and southern building walls. The proposed building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the truck loading areas, and concrete flatwork with some landscaped areas.

Detailed structural information has not been provided. We assume that the new building will be a single-story structure of tilt-up concrete construction, typically supported on a conventional shallow foundation system with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 6 kips per linear foot, respectively.

No significant amounts of below-grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 4 to 7± feet are expected to be necessary to achieve the proposed site grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of eight (8) borings (identified as Boring Nos. B-1 through B-8) advanced to depths of 10 to 25± feet below the existing site grades. All of the borings were logged during drilling by a member of our staff.

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

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

4.2 Geotechnical Conditions

Older Alluvium

Older native alluvial soils were encountered at the ground surface at all of the boring locations, extending to depths of at least 5½ to 25± feet below ground surface. The older alluvium generally consists of stiff to hard fine sandy clays, fine to coarse sandy clays and medium dense to very dense clayey fine to medium sands.

Granodiorite to Tonalite (Kdgv)

Granodiorite to Tonalite bedrock, map symbol Kdgv, was encountered beneath the older alluvium at Boring Nos. B-1, B-4, B-5, and B-6, at depths of 5½ to 12± feet below ground surface, extending to the maximum depths explored at each of these borings of 15 to 25± feet. The bedrock generally consists of medium dense to very dense gray brown, highly weathered, friable, fine- to coarse-grained granodiorite to tonalite.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a greater depth than 25± feet below existing site grades.

As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. The primary reference used to determine the groundwater depths in the subject site area is the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located approximately 1,320 feet northwest from the site. Water level readings within this monitoring well indicates a high groundwater level of 95.6 feet below the ground surface in September 1995.

4.3 Geologic Conditions

Regional geologic conditions were obtained from the Preliminary Geologic Map of the Romoland 7.5' Quadrangle, Riverside County, California, by Douglas M. Morton, published by the U.S. Geologic Survey Department of Sciences University of California Riverside. A portion of this map indicating the location of the subject site, is included as Plate 3 in Appendix A of this report. This map indicates that the site is underlain by old alluvial-fan deposits (Map Symbol Qof). Qof is described as indurated, sandy alluvial-fan deposits.

Bedrock materials were encountered beneath the older alluvial soils at Boring Nos. B-1, B-4, B-5, and B-6 at depths of 6½ to 12± feet below the existing site grades. The bedrock is weathered, friable, and fine- to coarse- grained. Based on the characteristics of these bedrock materials and the geologic mapping in the vicinity of the subject site, it is our opinion that these bedrock materials consist of Granodiorite to Tonalite, (Map Symbol Kgdv). The Granodiorite to Tonalite unit is described on this map as relatively uniform, massive hornblende biotite granodiorite grading into tonalite.

5.0 LABORATORY TESTING

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

Classification

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

Density and Moisture Content

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

Consolidation

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

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample has been tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-2 in Appendix C of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Expansion Index

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

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

Sample Identification	Expansion Index	Expansive Potential
B-6 @ 0 to 5 feet	62	Medium

Soluble Sulfates

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

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-1 @ 0 to 5 feet	0.003	Not Applicable (S0)

Corrosivity Testing

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

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-1 @ 0 to 5 feet	3,400	7.9	3.0	5.7

6.0 CONCLUSIONS AND RECOMMENDATIONS

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

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

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

6.1 Seismic Design Considerations

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

Faulting and Seismicity

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

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

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of

the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

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

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

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.421
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.528
Site Class	---	C
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.705
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.777
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.137
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.518

Liquefaction

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

The Riverside County GIS website indicates that the subject site is located within a zone of low liquefaction susceptibility. In addition, the subsurface conditions encountered at the boring locations are not considered to be conducive to liquefaction. These conditions consist of moderate

to high strength alluvial soils underlain by bedrock, with no evidence of a long-term groundwater table within the depths explored by the borings. Based on these considerations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

The proposed building area is underlain by relatively high strength older alluvial soils. The results of consolidation testing indicate that the near surface soils may be subject to minor consolidation settlement when loaded. In order to provide more uniform support characteristics below the floor slab and foundation areas, and to help limit potential differential settlements, some remedial grading is considered warranted within the proposed building pad area in order to remove the upper portion of the existing soils and replace them as compacted structural fill.

Settlement

The recommended remedial grading will remove the upper portion of the near-surface native alluvium, and replace these soils as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation generally possess favorable consolidation characteristics and will not be subject to significant load increases from the foundations of the new structure. Provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structure is expected to be within tolerable limits.

Expansion

Laboratory testing performed on a representative sample of the near surface soils indicates that these materials possess a medium expansion potential (EI = 62). Based on the presence of expansive soils at this site, care should be given to proper moisture conditioning of all building pad subgrade soils to a moisture content of 2 to 4 percent above the ASTM D-1557 optimum during site grading. In addition to adequately moisture conditioning the subgrade soils and fill soils during grading, special care must be taken to maintaining moisture content of these soils at 2 to 4 percent above the optimum moisture content. This will require the contractor to frequently moisture condition these soils throughout the grading process, unless grading occurs during a period of relatively wet weather.

Soluble Sulfates

The results of the soluble sulfate testing indicated a sulfate concentration of approximately 0.003 percent for the selected sample of the near-surface soils. This concentration is considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possess a saturated resistivity of 3,400 ohm-cm, and a pH value of 7.9. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. Based on these factors, and utilizing the DIPRA procedure, the on-site soils are not considered to be corrosive to ductile iron pipe.

A relatively low concentration (3.0 mg/kg) of chlorides were detected in the sample submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of any significant chlorides in the tested sample, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested sample possess a nitrate concentration of 5.7 mg/kg. Based on this test result, the on-site soils are not considered to be corrosive to copper pipe.

Since SCG does not practice in the area of corrosion engineering, we recommend that the client contact a corrosion engineer to provide a more thorough evaluation.

Shrinkage/Subsidence

Based on the results of the laboratory testing, removal and recompaction of the near-surface older native alluvium will result in an average shrinkage of 0 to 6 percent. It should be noted that the potential shrinkage estimate is based on dry density testing performed on small-diameter samples taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.10 feet.

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

Grading and Foundation Plan Review

It is recommended that we be provided with copies of the finalized grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

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

Site Stripping

Initial site preparation should include stripping of any surficial vegetation. This includes the removal of the moderate native grass, weeds, and shrubs present at the site. These materials should be disposed of off-site. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

At the time of site stripping, trash and concrete debris should also should be removed from the site. Any remnants of the previous structures, if present, should be demolished. Demolition should include all subsurface remnants of the previous structures, including foundations, floor slabs, septic systems and any utilities that will not be reutilized with the proposed development. Any debris resultant from demolition should be disposed of offsite in accordance with local regulations. Any excavations associated with demolition should be backfilled with compacted fill soils.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building pad area in order to remove the upper portion of the near-surface alluvial soils in order to provide more uniform support characteristics below the floor slab and foundation areas. The overexcavation is recommended to extend to a depth of at least 2 feet below existing grade, and to a depth of at least 2 feet below proposed grade, whichever is greater. Within the influence zones of the new foundations, the overexcavation should extend to a depth of at least 2 feet below proposed foundation bearing grade.

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

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This

evaluation should include proofrolling and probing to identify any soft, loose, or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if additional fill or loose, porous, or low-density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture conditioned or air dried to achieve a moisture content of 2 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

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

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of proposed retaining and non-retaining site walls should be overexcavated to a depth of at least 2 feet below foundation bearing grade and replaced as compacted structural fill. Subgrades for erection pads for concrete tilt-up walls are considered to be a part of the foundation system and should also be overexcavated. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

If the full lateral extent of overexcavation is not achievable for the proposed walls, the foundations should be redesigned using a lower bearing pressure. The geotechnical engineer of record should be contacted for recommendations pertaining to this type of condition.

Treatment of Existing Soils: Parking and Drive Areas

Based on economic considerations, overexcavation of the existing soils in the new parking and drive areas is not considered warranted, with the exception of areas where lower strength, or unstable soils are identified by the geotechnical engineer during grading.

Subgrade preparation in the new parking and drive areas should initially consist of removal of all soils disturbed during stripping. The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed parking areas. The grading recommendations presented above do not provide remedial grading throughout the entire parking areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the parking and drive areas should be overexcavated to a depth of 2 feet below

proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Perris.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of very low to low expansive (EI < 50), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

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

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

6.4 Construction Considerations

Excavation Considerations

The near-surface soils generally consist of moderate to high strength sandy clays and clayey sands. These materials may be subject to minor to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation

stability. On a preliminary basis, the inclination of temporary slopes should not exceed 1½h:1v. Temporary excavations into bedrock may be laid back at a 1h:1v, at the discretion of the geotechnical engineer. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Medium dense to very dense granodiorite to tonalite bedrock was encountered at Boring Nos. B-1, B-4, B-5, and B-6, at depths of 5½ to 12± feet below the existing site grades. The recovered samples of the bedrock materials generally friable, and refusal conditions were not encountered during drilling. Based on the conditions at the boring locations, we expect that the near surface bedrock materials will be rippable using conventional grading equipment.

Expansive Soils

Based on results of laboratory testing, the near-surface soils at this site possess medium expansion potentials. Due to the presence of expansive soils at this site, provisions should be made to limit the potential for surface water to penetrate the soils immediately adjacent to the structures. These provisions should include directing surface runoff into rain gutters and area drains, reducing the extent of landscaped areas around the structures, and sloping the ground surface away from the buildings. Where possible, it is recommended that landscaped planters not be located immediately adjacent to the buildings. If landscaped planters around the buildings are necessary, it is recommended that drought tolerant plants or a drip irrigation system be utilized, to minimize the potential for deep moisture penetration around the structures. Presented below is a list of additional soil moisture control recommendations that should be considered by the owner, developer, and civil engineer:

- Ponding and areas of low flow gradients in unpaved walkways, grass and planter areas should be avoided. In general, minimum drainage gradients of 2 percent should be maintained in unpaved areas.
- Bare soil within five feet of proposed structures should be sloped at a minimum five percent gradient away from the structure (about three inches of fall in five feet), or the same area could be paved with a minimum surface gradient of one percent. Pavement is preferable.
- Decorative gravel ground cover tends to provide a reservoir for surface water and may hide areas of ponding or poor drainage. Decorative gravel is, therefore, not recommended and should not be utilized for landscaping unless equipped with a subsurface drainage system designed by a licensed landscape architect.
- Positive drainage devices, such as graded swales, paved ditches, and catch basins should be installed at appropriate locations within the area of proposed development.
- Concrete walks and flatwork should not obstruct the free flow of surface water to the appropriate drainage devices.
- Area drains should be recessed below grade to allow free flow of water into the drain. Concrete or brick flatwork joints should be sealed with mortar or flexible mastic.
- Gutter and downspout systems should be installed to capture all discharge from roof areas. Downspouts should discharge directly into a pipe or paved surface system to be conveyed offsite.
- Enclosed planters adjoining, or in close proximity to proposed structures, should be sealed at the bottom and provided with subsurface collection systems and outlet pipes.
- Depressed planters should be raised with soil to promote runoff (minimum drainage gradient two percent or five percent, see above), and/or equipped with area drains to eliminate ponding.

- Drainage outfall locations should be selected to avoid erosion of slopes and/or properly armored to prevent erosion of graded surfaces. No drainage should be directed over or towards adjoining slopes.
- All drainage devices should be maintained on a regular basis, including frequent observations during the rainy season to keep the drains free of leaves, soil and other debris.
- Landscape irrigation should conform to the recommendations of the landscape architect and should be performed judiciously to preclude either soaking or excessive drying of the foundation soils. This should entail regular watering during the drier portions of the year and little or no irrigation during the rainy season. Automatic sprinkler systems should, therefore, be switched to manual operation during the rainy season. Good irrigation practice typically requires frequent application of limited quantities of water that are sufficient to sustain plant growth, but do not excessively wet the soils. Ponding and/or run-off of irrigation water are indications of excessive watering.

Other provisions, as determined by the landscape architect or civil engineer, may also be appropriate.

Moisture Sensitive Subgrade Soils

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

Groundwater

The static groundwater table is considered to exist at a depth greater than 25± feet below the existing site grades. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by newly placed structural fill soils extending to a depth of at least 2 feet below foundation bearing grade. Based on this subsurface profile, the proposed structure may be supported on shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars (2 top and 2 bottom). Due to the presence of expansive soils. Additional reinforcement may be necessary for structural considerations.

- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.

- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

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

Foundation Construction

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

The foundation subgrade soils should also be properly moisture conditioned to 2 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential static settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively, under static conditions. Differential movements are expected to occur over a 50-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

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

- Passive Earth Pressure: 250 lbs/ft^3
- Friction Coefficient: 0.28

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

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slab should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the proposed structure may be constructed as a conventional slab-on-grade, supported on newly placed structural fill (or densified existing soils), extending to a depth of at least 2 feet below finished pad grade. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: 100 psi/in.

- Minimum slab reinforcement: No. 3 bars at 18 inches on center in both directions due to the presence of low expansive soils. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire slab area where such moisture sensitive floor coverings are expected. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as a 15-mil Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

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

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

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, some small (less than 6 feet in height) retaining walls may be required in truck court area and to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. The near surface soils generally consist of sandy clays and have been determined to possess a medium expansion potential. We do not recommend that the on-site soils be used to backfill retaining walls, based on their expansion potential. The following parameters assume that imported fill soils, consisting of very low expansive sands or silty sands will be utilized for retaining wall backfill. These materials are expected to possess a friction angle of at least 30 degrees when compacted to at least 90 percent of the ASTM D-1557 maximum dry density.

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

RETAINING WALL DESIGN PARAMETERS

Design Parameter		**Soil Type**
		Imported Silty Sands and Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		130 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	43 lbs/ft^3
	Active Condition (2h:1v backfill)	70 lbs/ft^3
	At-Rest Condition (level backfill)	65 lbs/ft^3

Regardless of the backfill type, the walls should be designed using a soil-footing coefficient of friction of 0.28 and an equivalent passive pressure of 250 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

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

such as those which will support foundation bearing soils, or which will support foundation loads directly.

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

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 2 feet below proposed foundation bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

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

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

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

Subsurface Drainage

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

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

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

6.8 Pavement Design Parameters

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

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of fine sandy clays, fine to coarse sandy clays, and clayey sands. These soils are generally considered to possess poor to fair pavement support characteristics with estimated R-values ranging from 20 to 30. The subsequent pavement design is therefore based upon an assumed R-value of 20. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering-controlled conditions. It is recommended that R-value testing be performed at the completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

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

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

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

ASPHALT PAVEMENTS (R= 20)					
Materials	**Thickness (inches)**				
	Auto Parking (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Truck Traffic		
			(TI = 6.0)	(TI = 7.0)	(TI = 8.0)
Asphalt Concrete	3	3	3½	4	5
Aggregate Base	6	8	10	12	14
Compacted Subgrade	12	12	12	12	12

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

Portland Cement Concrete

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

PORTLAND CEMENT CONCRETE PAVEMENTS (R=20)				
Materials	**Thickness (inches)**			
	Auto Parking & Drives (TI = 5.0)	Truck Traffic		
		(TI =6.0)	(TI =7.0)	(TI =8.0)
PCC	5	5	5½	7
Compacted Subgrade (95% minimum compaction)	12	12	12	12