APPENDIX E

HYDROLOGY & WATER QUALITY

APPENDIX E.1

WEBB-A

Preliminary Drainage Analysis (Proposed)

Ethanac Logistics Center
DPR22-00030
Perris, California

Preliminary Drainage Study

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Original Date Prepared: January 2023
Revision Date(s): April 2023, September 2023, December 2023, January 2024

DRAFT

Sarah Kowalski
Project Engineer

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Illinois Avenue Line A Storm Drain Plan P8-921
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SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the Ethanac Logistics Center project located in City of Perris, County of Riverside, California. The project site is located north of Ethanac Road, bounded by Sherman Road to east, Trumble Road to the west, vacant land and an industrial development to the north. The project applicant proposes to build a commercial/industrial building on approximately 21 gross acres. This report will summarize the hydrologic and hydraulic analyses that were conducted in order to determine the necessary drainage improvements required to provide flood protection for the proposed building and safely convey the runoff through the site.

The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the developed condition using the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Rational Method.
- Determine the required storm drain facilities, alignment, and sizes required to flood protect the project site.
- Determine the volume required for water quality treatment and to mitigate for increases in runoff.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

DESCRIPTION OF WATERSHED

As previously described, the project applicant is proposing 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.

PROPOSED CONDITIONS

ONSITE

In the proposed condition of Ethanac Logistics Center (Project) onsite runoff 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 Lines 1 and 2 convey captured flows towards underground storage chambers before being pumped to a proposed biotreatment device for water quality treatment. Treated stormwater will then gravity flow to proposed storm drain Line 4 in Trumble Road, that connects to the existing City Line A in Illinois Avenue. City Line A then connects to MDP Line A-11 via 6'x5' RCB under the I-215 per the "Perris Crossing Temporary Earth Channel, Romoland MDP Line A11 and Laterals" P-397 plans, referenced in Appendix D. This RCB yields a flow capacity of approximately 404 CFS to MDP Line A-11. The total confluence flows through City Line A in Illinois, including Ethanac Logistics Center flows, tributary flows, and surrounding area flows is approximately 358 CFS.

This Project 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 A). The 100-year storm will gravity to the proposed Line 4.

OFFSITE

The Project receives runoff from approximately 65 acres easterly of Sherman Road. This tributary area is an existing residential area that is characterized by sheetflow runoff as the streets have no curb and gutters to contain and convey runoff. While there are some minor roadside swales in this tributary area, there is no defined drainage system within the tributary area. Once runoff from the tributary area intersects Sherman Road, runoff ponds on the east side of Sherman Road until enough runoff has accumulated to spillover the centerline of the street and continues to sheetflow across the Project area towards Interstate 215. A number of low flow cross-gutters have been constructed across Sherman Road to relieve the low flow ponding that occurs at several areas along the easterly side of Sherman Road.

Per the Romoland MDP, this area east of Sherman Road is to be picked up by MDP Line A-1 that is to be located in Sherman Road traveling north from the existing MDP Line A channel located just north of McLaughlin Avenue. A preliminary profile for MDP Line A-1 was ran from the existing MDP Line A north in Sherman Road to the mid-point of the Ethanac Logistics Center project frontage, utilizing a minimum grade of 0.3% and preliminary MDP facilities sizes ranging from 39″ to 72″ RCP. This approach showed that once the pipe was to reach Ethanac Road, as a 48″ RCP, the cover over the storm drain pipe was approximately one foot. As the pipe extended north of Ethanac Road it was modeled as a 42″ RCP and the cover over the facility became non-existent with approximately 1-2′ of the 42″ RCP above the existing street surface. In addition to the vertical constraints, existing utilities within the Ethanac Road and Sherman Road intersection, and traveling north in Sherman Road, present several horizontal constraints. Some the existing utilities consist of, but are not limited to, gas lines ranging from 2″ to 6″, water lines ranging from 8″ to 20″, sewer lines ranging from 6″ to 18″, 18″ raw water lines, and communications conduit.

Runoff from the Project, the area tributary to the Project, and the surrounding area northerly and westerly of the Project all naturally drain to a culvert crossing of Interstate 215. A total of approximately 235 acres is tributary to the existing Caltrans dual 6′x5′ box culvert crossing underneath Interstate 215 at the west end of Illinois Avenue. Runoff from the area tributary to the box crossing is predominately sheetflow that is collected in a linear basin along the easterly side of Interstate 215 that was constructed with the Classic Pacific Business Park (PM 34082). The Classic Pacific Business Park (PM 34082) also constructed City Line A storm drain in Illinois Avenue (Classic Pacific Business Park Storm Drain Improvement Plans, P8-921 in Appendix D, attached to this memorandum) to collect local runoff, but is not designed to collect the runoff from the approximately 235 acres that is tributary to the Interstate 215 box crossing.

Due to the constructability constraints described above, it was decided to perpetuate the natural drainage pattern of the area. The offsite runoff from the approximately 65 acres of residential land to the east of Sherman Road that is naturally tributary to the Project will be perpetuated across the proposed Project to Trumble Road. The proposed catch basins in Trumble Road will collect as much runoff as possible while the higher flows will continue to sheetflow westerly to Interstate 215 consistent with the direction from the City of Perris. Offsite flows that are collected by the catch basin system will then be conveyed by the proposed Line 4 storm drain in Trumble Road to the Illinois Avenue storm drain. It has been discussed with the City of Perris that a parallel storm drain in Illinois Avenue may be provided for additional capacity if so, required by the City of Perris.

METHODOLOGY

HYDROLOGY

Hydrologic calculations were performed in accordance with the RCFC&WCD Hydrology Manual, dated April 1978. The Rational Method was utilized in determining peak flow rates.

The hydrological parameters, including rainfall values and soil types were derived from the RCFC&WCD Hydrology Manual. The isohyetal maps and soil map have been included in Section 2.

Rational Method calculations were performed using a computer program developed by CivilDesign Corporation and Joseph E. Bonadiman and Associates Inc. The computer program is commonly referred to as CivilD which incorporates the hydrological parameters outlined in the RCFC&WCD Hydrology Manual.

The Rational Method was used to determine the peak flow rates to size and design the drainage facilities need to convey onsite flows through the site to the proposed underground chamber. The flow rates were computed by generating a hydrologic "link-node" model in which the overall area is divided into separate drainage sub-areas, each tributary to a concentration point (node) determined by the proposed layout and grading.

The Unit Hydrograph Method was used to determine the peak flow rates and volumes associated with the 2-year, 24-hour storm events for the site. Calculations were performed for both the existing condition and developed condition to be used in the HCOC mitigation analysis.

HYDRAULICS

Hydraulic calculations to determine the required pipe sizes of proposed storm drain facilities will be provided in the Final Drainage Study.

Preliminary hydraulic calculations to determine capacity of City Line A with added project flows are provided in Appendix B.

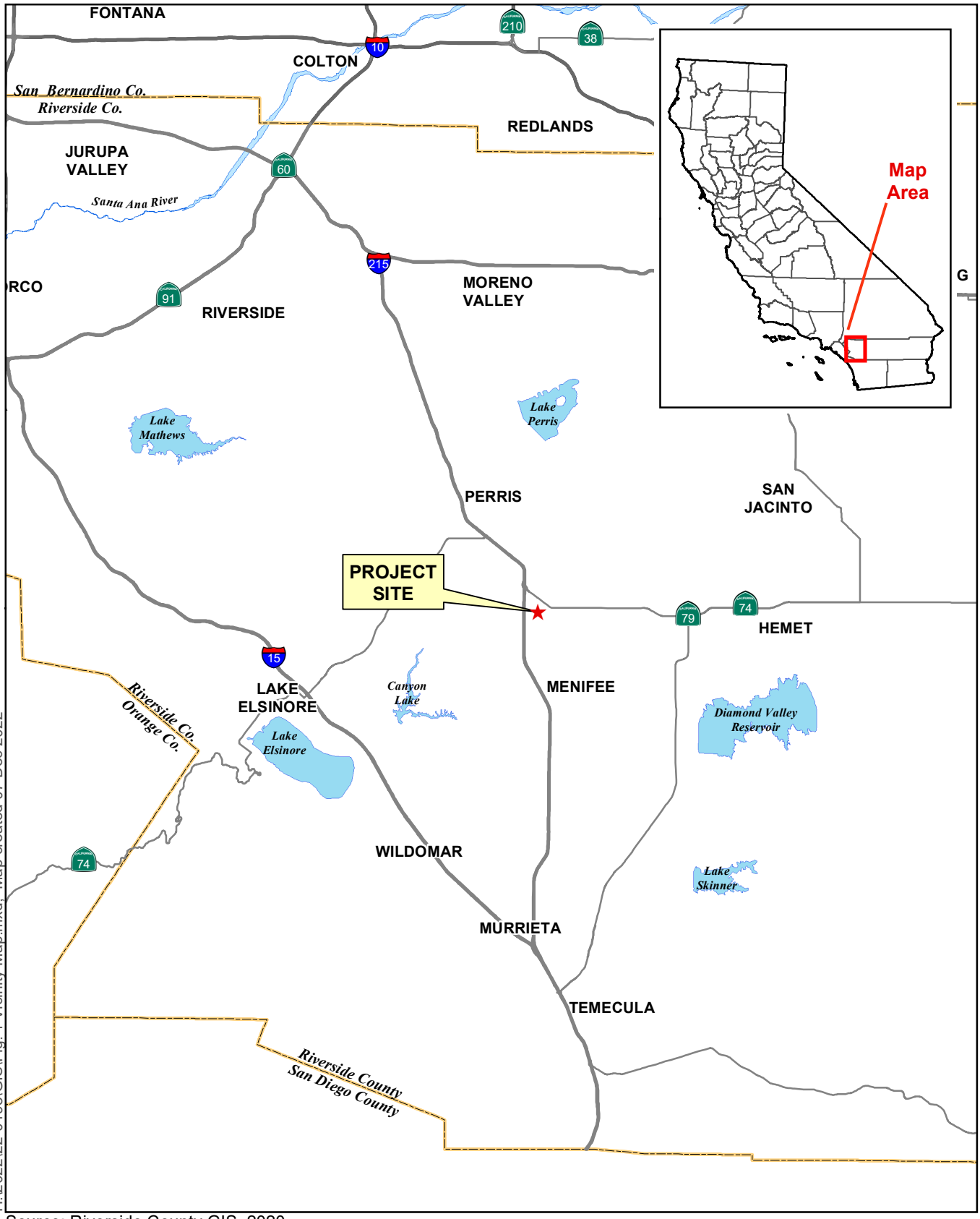
FIG. 1 VICINITY MAP

FIG. 2 USGS TOPOGRAPHY MAP

FIG. 3 AERIAL PHOTOGRAPH

FIG. 4 RECEIVING WATERBODIES

FIG. 5 SOILS MAP



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

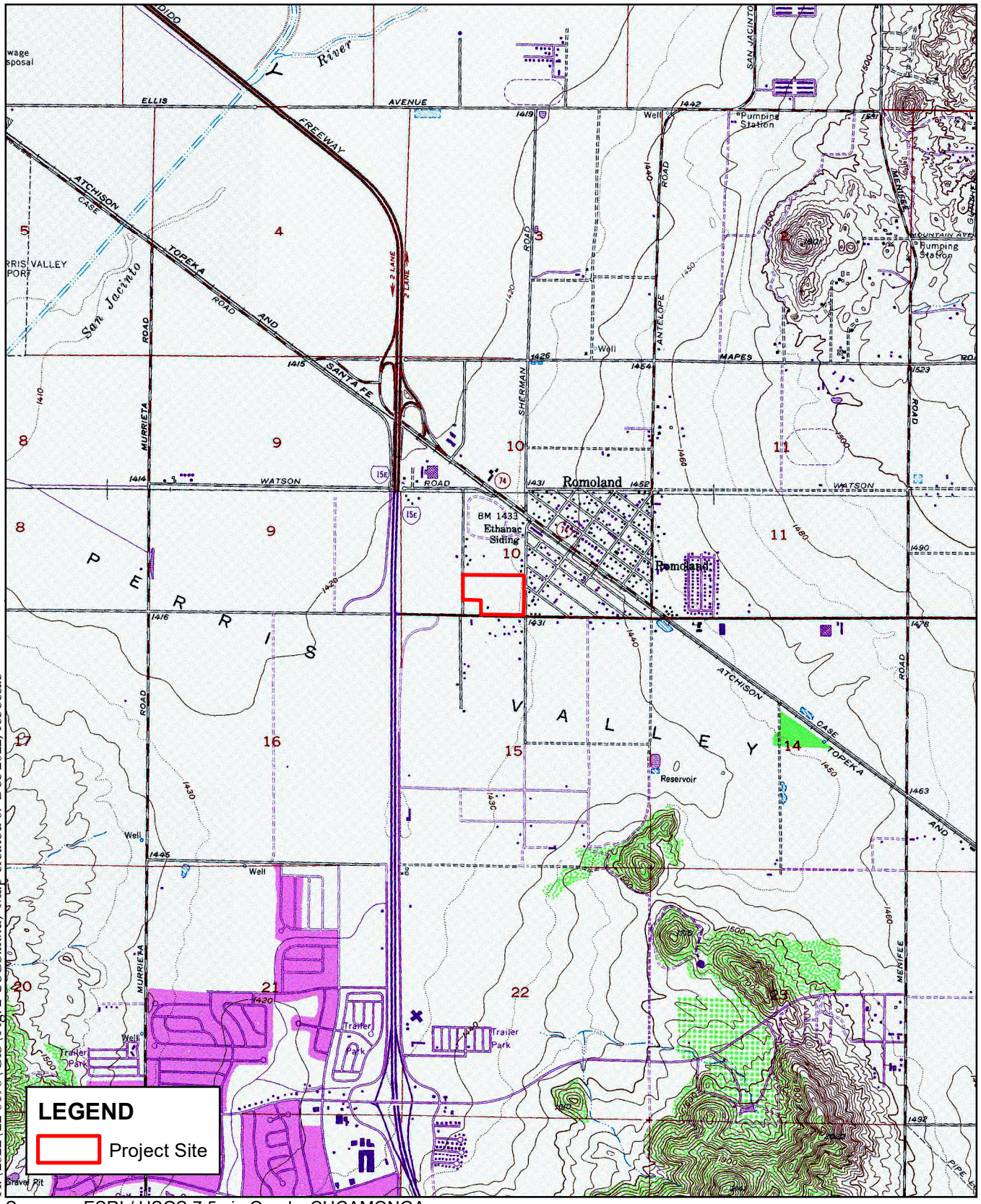
Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure 1 – Vicinity Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



H:\2022\22-0198\GIS\Fig. 2 USGS.mxd; Map created 07 Dec 2022; rebeccab

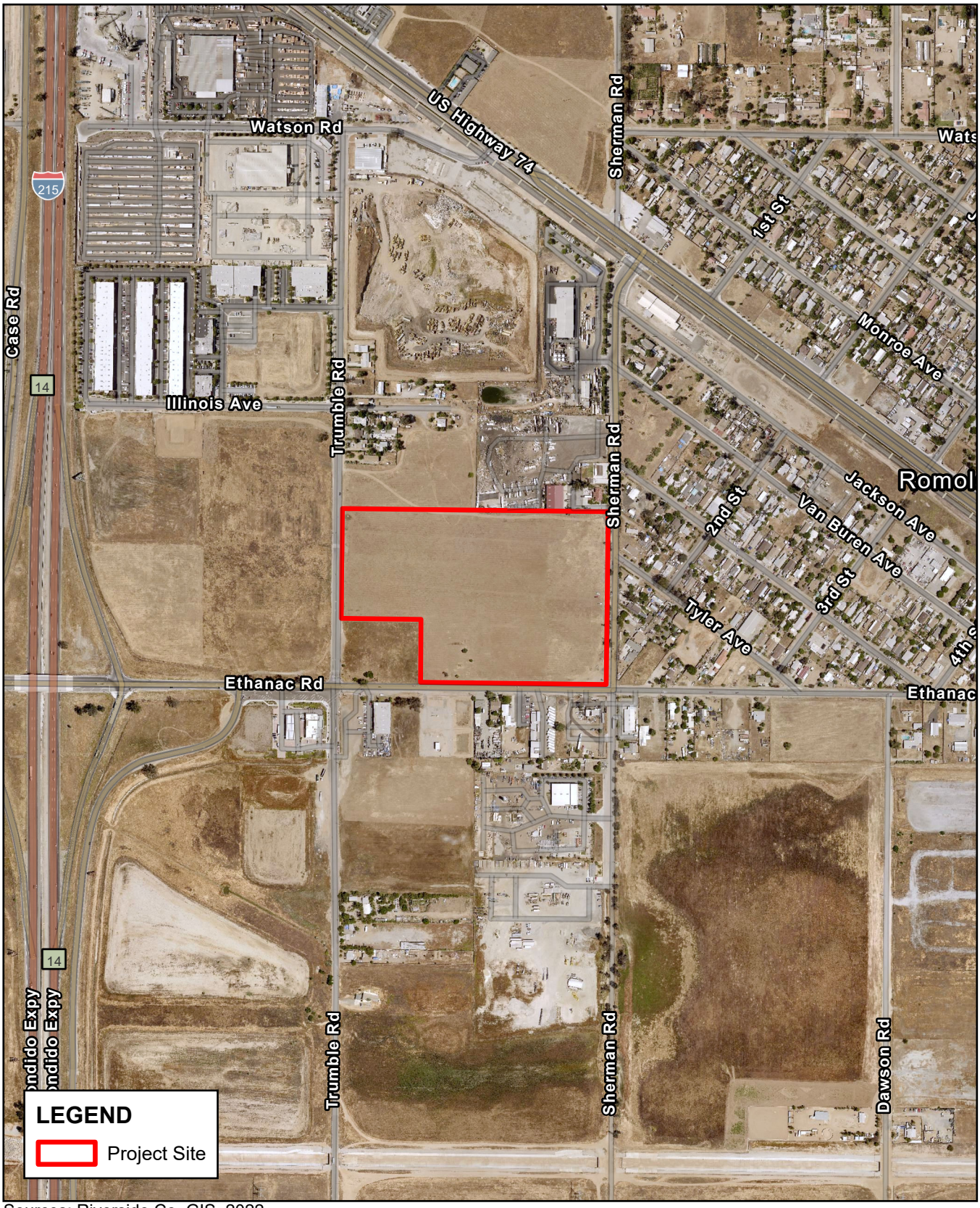
Sources: ESRI / USGS 7.5min Quads: CUCAMONGA PEAK, DEVORE, GUASTI, FONTANA

Figure 2 - USGS Map

Ethanac Logistics Center

0 4,000 8,000 12,000 Feet

ALBERT A. WEBB ASSOCIATES



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

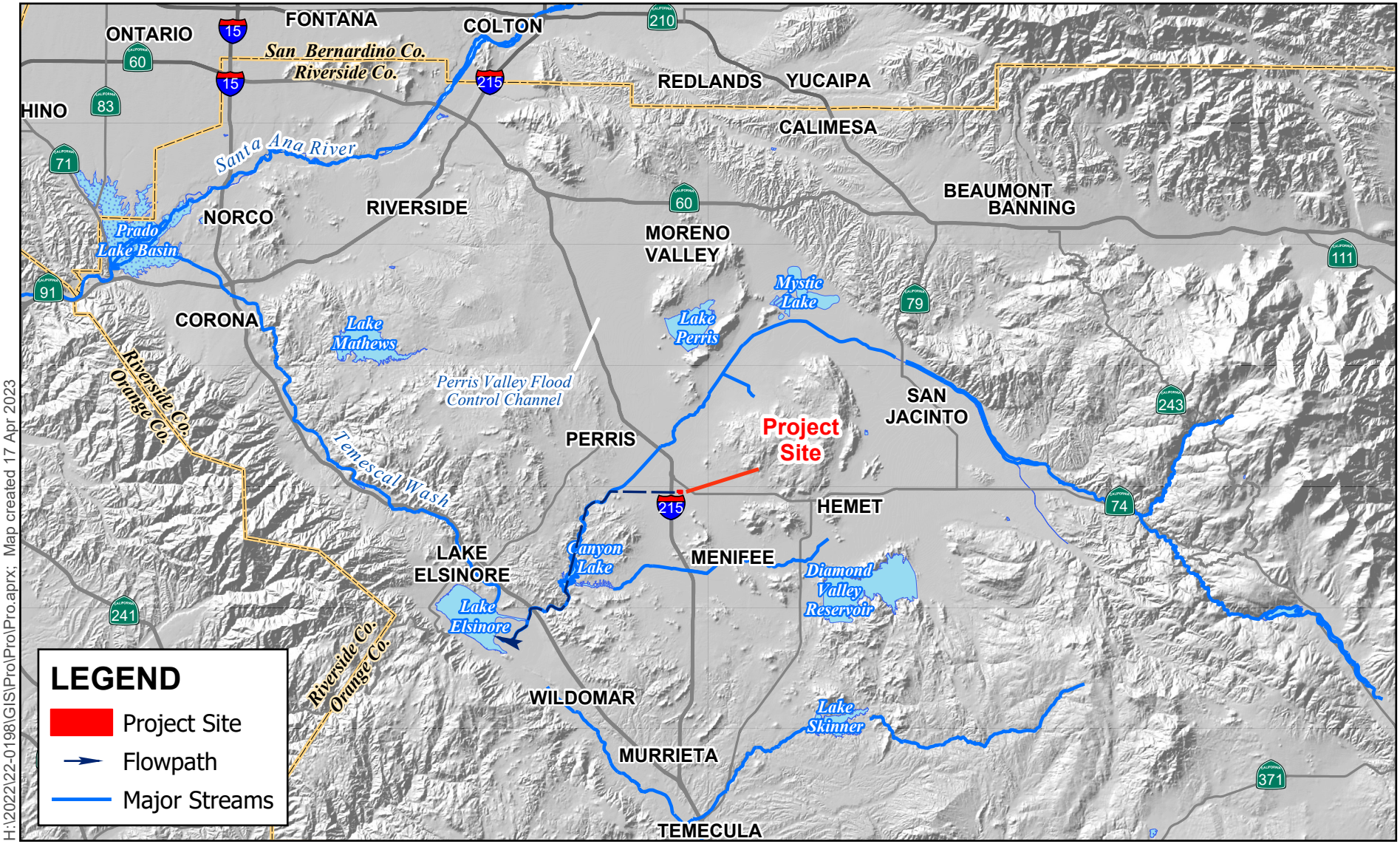
Sources: Riverside Co. GIS, 2022.

Figure 3 - Aerial Map

Ethanac Logistics Center

0 500 1,000 1,500 Feet

ALBERT A. WEBB ASSOCIATES



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

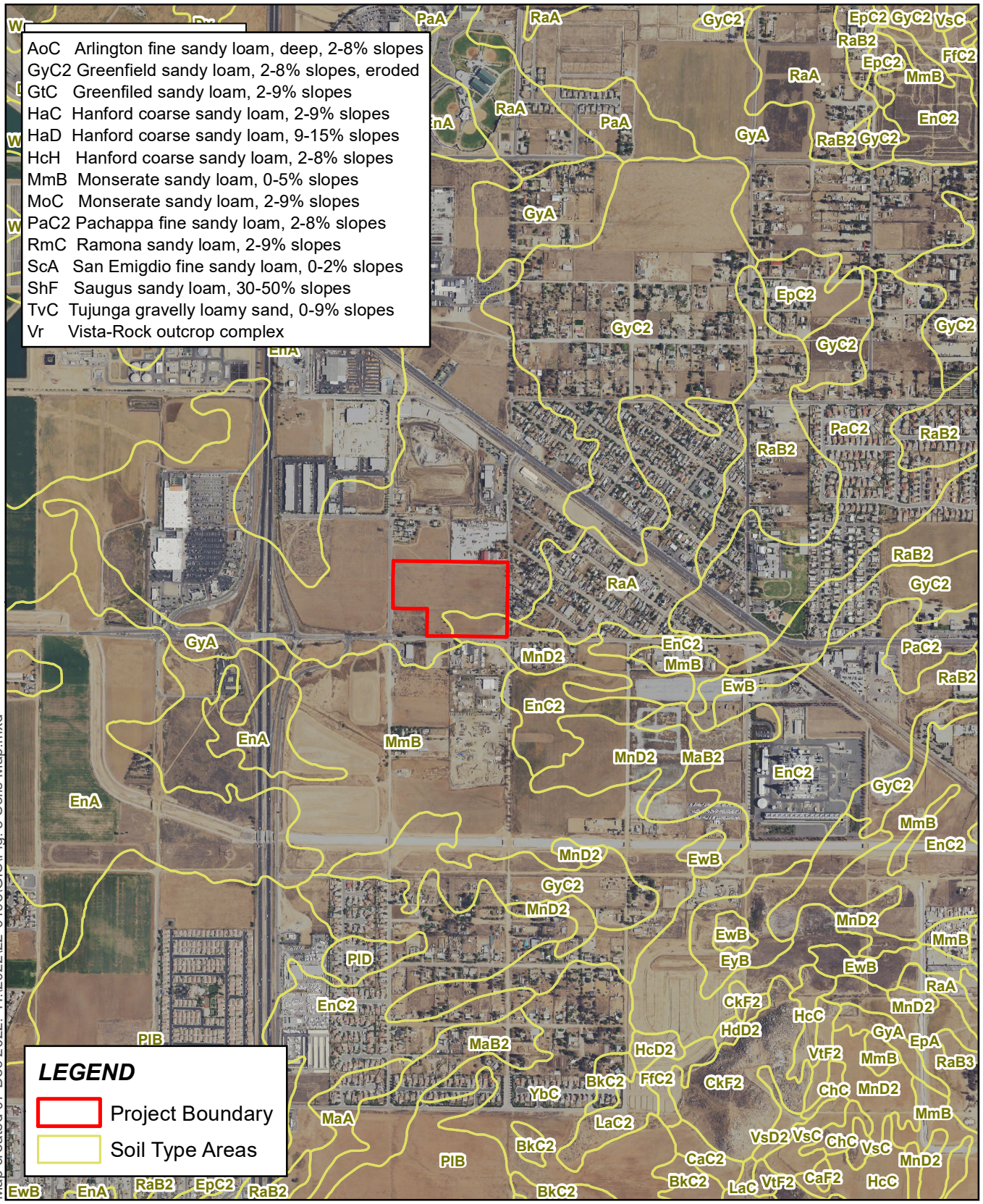
Sources: US NHD; USGS 30 Meter DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



Map created 07 Dec 2022. H:\2022\22-0198\GIS\Fig. 5 Soils Map.mxd

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

0 1,000 2,000 3,000 Feet

Figure 5 – Soils Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES

SECTION 2 - HYDROLOGY ANALYSIS

HYDROLOGY PARAMETERS

The RCFC&WCD Hydrology Manual was used to determine several of the hydrological parameters. The following rainfall depths were utilized in the hydrology analyses, which were obtained from the isohyetal maps provided in the RCFC&WCD Hydrology Manual:

Table 1 – Precipitation

	Duration	
Storm Event	**1-Hour (inches)**	**24-Hour (inches)**
2-Year	0.46	1.6
100-Year	1.24	4.0

The value for slope of intensity was determined to be 0.61. The isohyetal maps have been included in Appendix A.

Based on the Plate C-1.42 - Romoland in the RCFC&WCD Hydrology Manual, the project site is classified as soil type D. The soils map is included in Appendix A.

The cover type was determined based on the existing land cover and proposed land use of the site. Hydrological computations for the existing condition were done using 'Natural Grass'. The Commercial Landscaping cover type was used to represent the developed condition. The table below summarizes the runoff index values and the recommended values for percentage of impervious cover for each category:

Table 2 – Cover Type

Cover Type	Soil Group A	Soil Group B	Soil Group C	Soil Group D	Percentage of Impervious Cover
Existing Condition Natural Grass	67	78	86	89	0.0%
Developed Condition Commercial Landscaping	32	56	69	75	90%

ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey on-site flows to the underground storage chamber.

There are two onsite storm drain systems, Line 1 (200-series nodes) and Line 2 (300-series nodes) that drain into the underground chambers. Line 1 drains from the southwest portion of the building and Line 2 drains from the east side of the building. There are also a few inlets on the west side trailer parking area with short laterals punching directly into the underground chamber. These three areas make up one

DMA for the site. The underground storage chamber is pumped through a treatment box and then leaves the site via proposed storm drain Line 4 in Trumble Road, that connects to City Line A in Illinois Avenue per P8-921. City Line A ultimately connects to MDP Line A-11. The water quality pump is estimated to be 86 GPM; a maximum of 1 CFS of onsite flows will be pumped into Line 4 at a time. Flows in Line 4 will be discussed further below.

The following table summarizes the rational method results at key points:

Table 3 – Onsite Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 201 – Line 1 Total Flows	2.7	4.1
Node 304 – Line 2 Total Flows	14.9	22.5
Node 104 – Total Flows for the Site	28.4	44.0

The rational method output files and hydrology map have been included in Appendix A.

OFF-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey off-site flows to the proposed storm drain connection. As mentioned previously, offsite flows are collected by reverse under-sidewalk drains in Sherman Road, represented by Nodes 402-404 on the Rational Hydrology Map. The peak flow from the offsite area totals 111 CFS, per the 100-year 1-hour unit hydrograph for the offsite area, as shown in "A11TRIB1000SERIES" in Appendix A.

As previously stated in Section 1, these flows were originally planned to go to MDP Line A-1. However, as discussed in Section 1, the construction of Line A-1 has been deemed infeasible. These flows will be conveyed from the under-sidewalk drains via proposed channel to the north end of the site, and then westerly across the site along the northern driveway. The proposed catch basins in Trumble Road will collect as much runoff as possible while the higher flows will continue to sheetflow westerly to Interstate 215 consistent with the direction from the City of Perris. Offsite flows that are collected by the catch basin system will then be conveyed by the proposed Line 4 storm drain in Trumble Road to the Illinois Avenue storm drain. It has been discussed with the City of Perris that a parallel storm drain in Illinois Avenue may be provided for additional capacity if so, required by the City of Perris.

Offsite flows from the improved half of Trumble Road are collected by a catch basin at Node 501. These flows are conveyed in Line 4 with the pumped Project flow. Rational method calculations for this area can be found in Appendix A.

As described in the previous section, Line 4 connects to the existing City Line A in Illinois Avenue, denoted by Node 406 on the Rational Hydrology map. The invert elevation at this point of connection is shown on the Line A storm drain plan as approximately 1419.3 (NGVD29) and it is called out as 1421.8 (NAVD88) on the Rational Method Hydrology map. City Line A then connects to MDP Line A-11 via 6'x5' RCB under the I-215 per the "Perris Crossing Temporary Earth Channel, Romoland MDP Line A11 and Laterals" P-397 plans, referenced in Appendix D. This RCB yields a flow capacity of approximately 404 CFS to MDP Line A-11. The total confluence flows through City Line A in Illinois, including Ethanac Logistics Center flows, tributary flows, and surrounding area flows is approximately 358 CFS. The

existing condition unit hydrograph calculations for this tributary area can be found in Appendix A and summarized in Table 5 and 6 below.

The following table summarizes the rational method results at key points:

Table 4 – Offsite Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 405 – Offsite Tributary Area	-	110.0
Node 501 – Trumble Road Half Improvement Flows		2.7
Node 407 – City Line A Existing Flows	-	8.9

Table 5 – Offsite Unit Hydrograph Results

		Existing Condition		Proposed Condition	
Analysis Area	Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Volume (Ac-ft)	Peak Flow (cfs)
Ethanac Logistics Center Project	100-Year, 1-Hour	1.75	47.1	1.89	67.7
	100-Year, 3-Hour	2.44	28.6	2.86	34.9
	100-Year, 6-Hour	2.75	24.0	3.65	30.7
	100-Year, 24-Hour	3.06	8.3	5.59	9.9
Area East of Sherman Rd Tributary to Ethanac Logistics Center	100-Year, 1-Hour	5.2	110.8	-	-
	100-Year, 3-Hour	6.9	73.3	-	-
	100-Year, 6-Hour	8.3	64.8	-	-
	100-Year, 24-Hour	11.2	20.7	-	-
Total Area Tributary to A-11	100-Year, 1-Hour	20.62	404.4	-	-
	100-Year, 3-Hour	28.78	289.3	-	-
	100-Year, 6-Hour	33.97	249.8	-	-
	100-Year, 24-Hour	46.18	93.0	-	-

Table 6 summarizes the flows for the total area tributary to the existing Caltrans dual 6′x5′ box culvert crossing in post-development condition of the Project. The total proposed flow rate is calculated by subtracting out the existing Project flows and replacing with the proposed pumped Project flow of 1 cfs.

Table 6 –Total Area Proposed Condition Flows

		Proposed Condition
Analysis Area	**Storm Event**	**Peak Flow (cfs)**
Total Area Tributary to A-11	100-Year, 1-Hour	358.3
	100-Year, 3-Hour	261.7
	100-Year, 6-Hour	226.8
	100-Year, 24-Hour	85.7

See Appendix A for the output files of the off-site rational method analysis and unit hydrograph analysis. See Appendix B for hydraulic calculations regarding sizing of offsite storm drain facilities.

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

Onsite hydraulic analysis was not taken into consideration for the preliminary drainage.

OFF-SITE STORM DRAIN FACILITIES

Offsite hydraulic analysis was taken into consideration for the preliminary drainage. Due to the nature of adding onsite project flows and offsite tributary flows to the existing City Line A in Illinois Avenue, the capacity of City Line A needed to be evaluated for its ability to handle the additional flows prior to outletting into the MDP Line A-11.

The existing city-maintained Line A in Illinois Avenue consists of 36″ RCP at the proposed connection location and 48″ RCP downstream, before it outlets at Station 10+00 to a forebay structure which then connects MDP Line A-11 via 6′x5′ double RCB, per P8-921, referenced in Appendix D.

The WSPG Program was run for City Line A, simply adding in 17 CFS from Line 4 in Trumble Road. The addition of the proposed Ethanac Logistics Center pumped project flows, chamber emergency escape flows, and Trumble Road flows put the existing City Line A under pressure, but it would not cause ponding at the existing catch basins in Illinois Avenue. The WSPG calculations are referenced in Appendix B.

SECTION 4 - CONCLUSION

Based on the analyses and results of this report, the following conclusions were derived from the hydrology and hydraulic results:

- The proposed drainage improvements will adequately convey flows to the underground chamber and provide flood protection for the 100-year storm event.
- The proposed treatment box will provide adequate water quality treatment.
- Offsite flows will be perpetuated across the site and remain comparable to the existing drainage pattern.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

HYDROLOGIC SOILS GROUP MAP (PLATE C-1.42)

LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

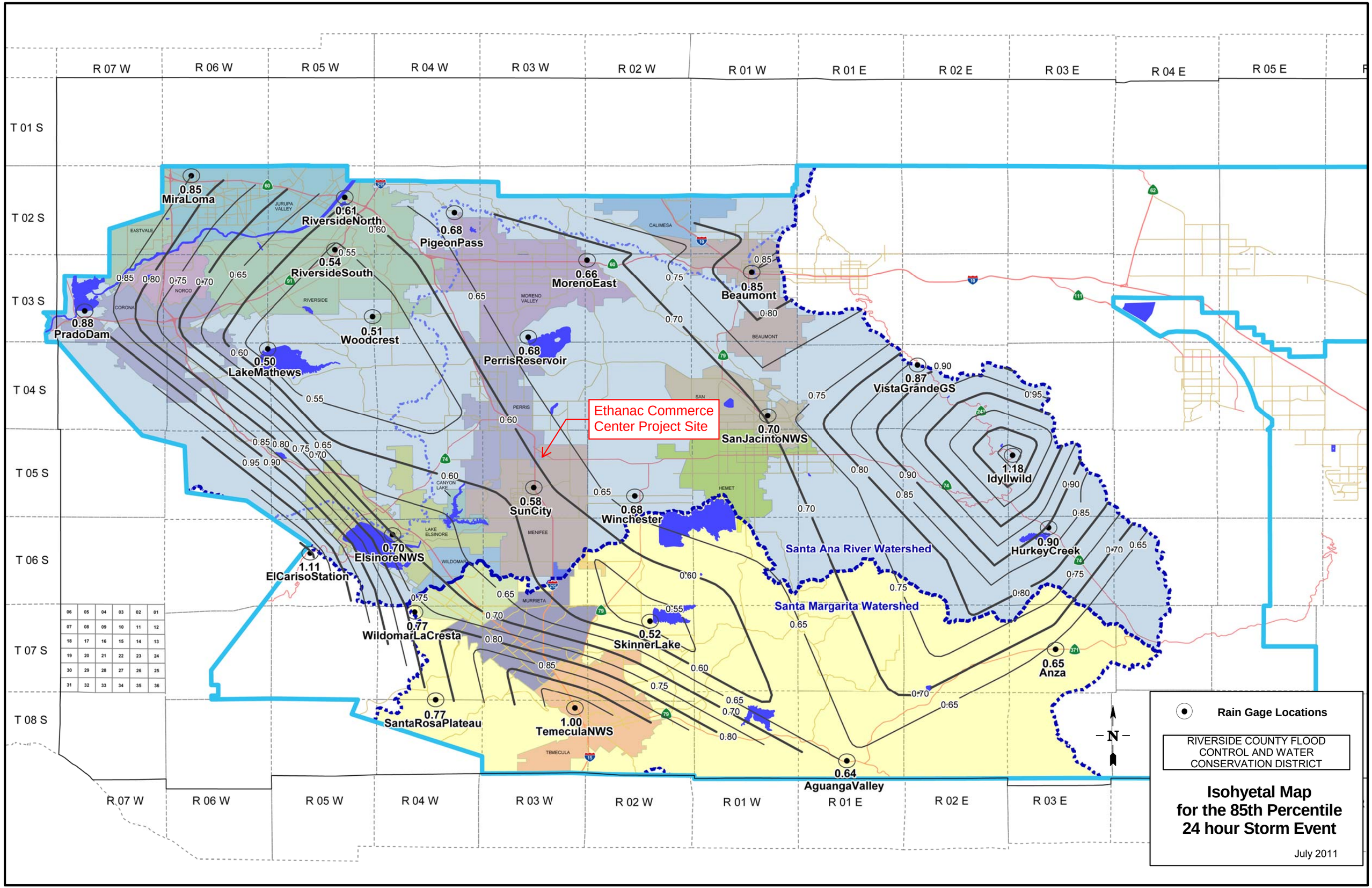
N

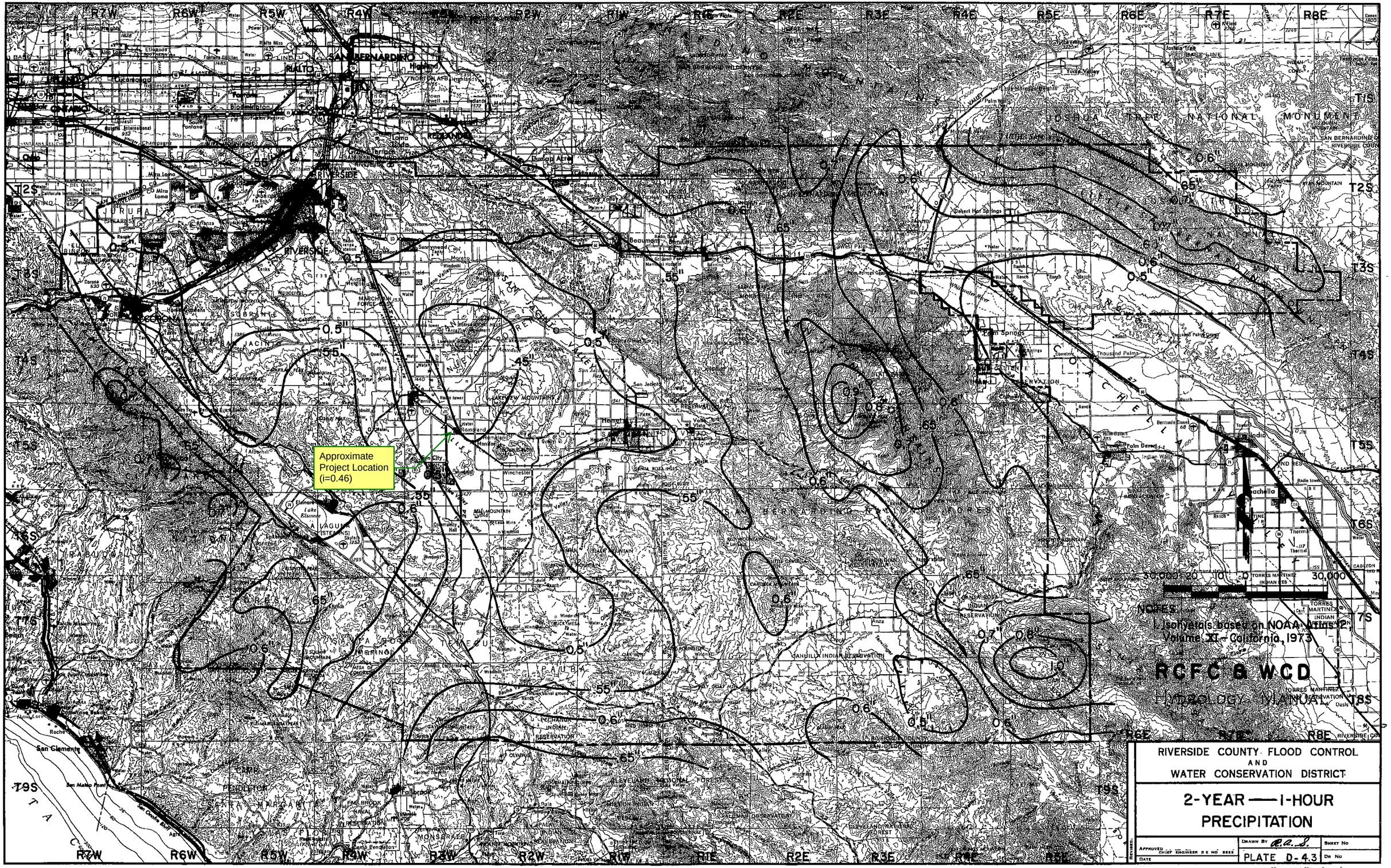
0 FEET 5000

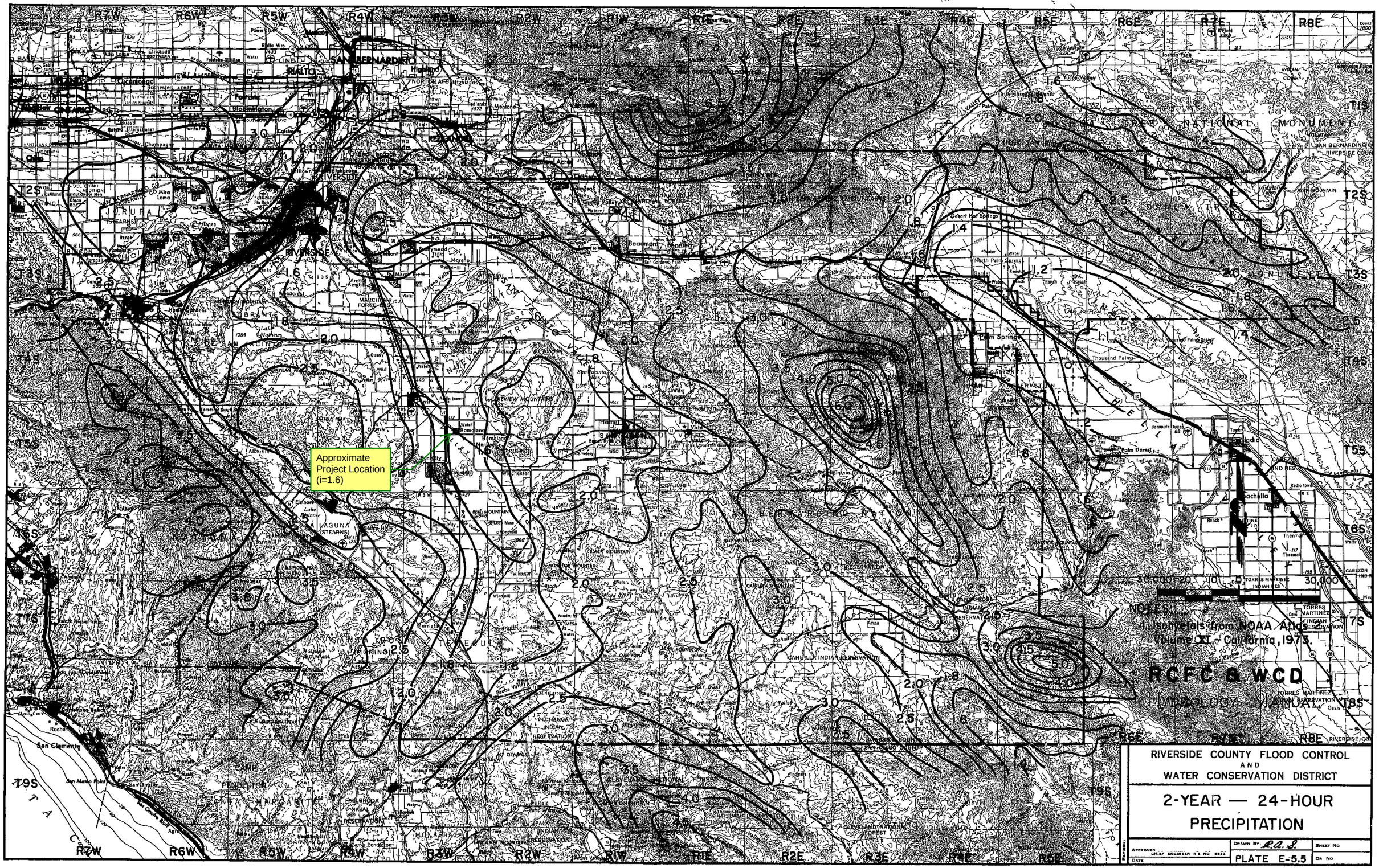
HYDROLOGIC SOILS GROUP MAP FOR ROMOLAND

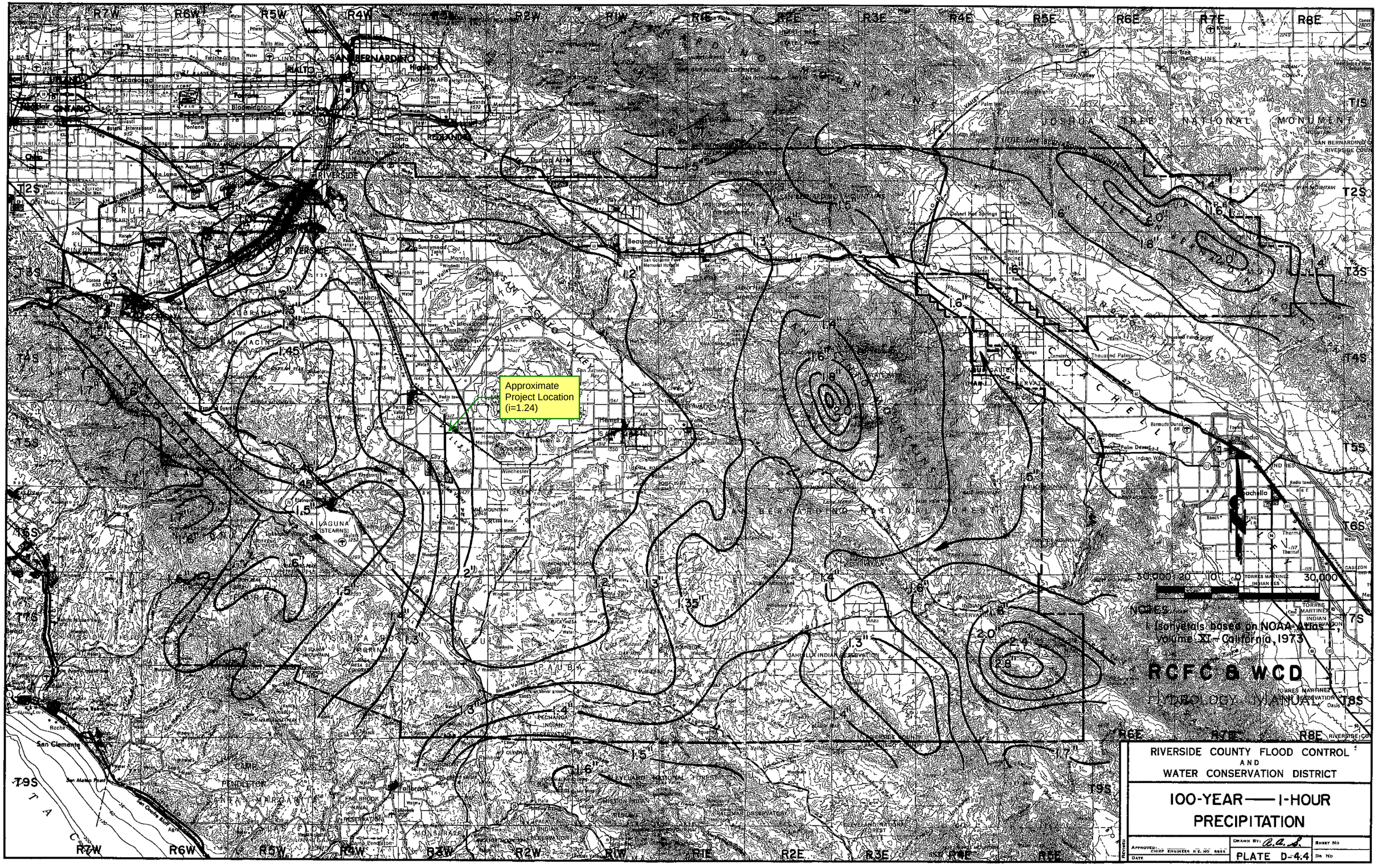
PLATE C-1.42

ISOHYETAL MAPS


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Ethanac Commerce Center Project Site
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011


Approximate Project Location (i=0.46)
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3

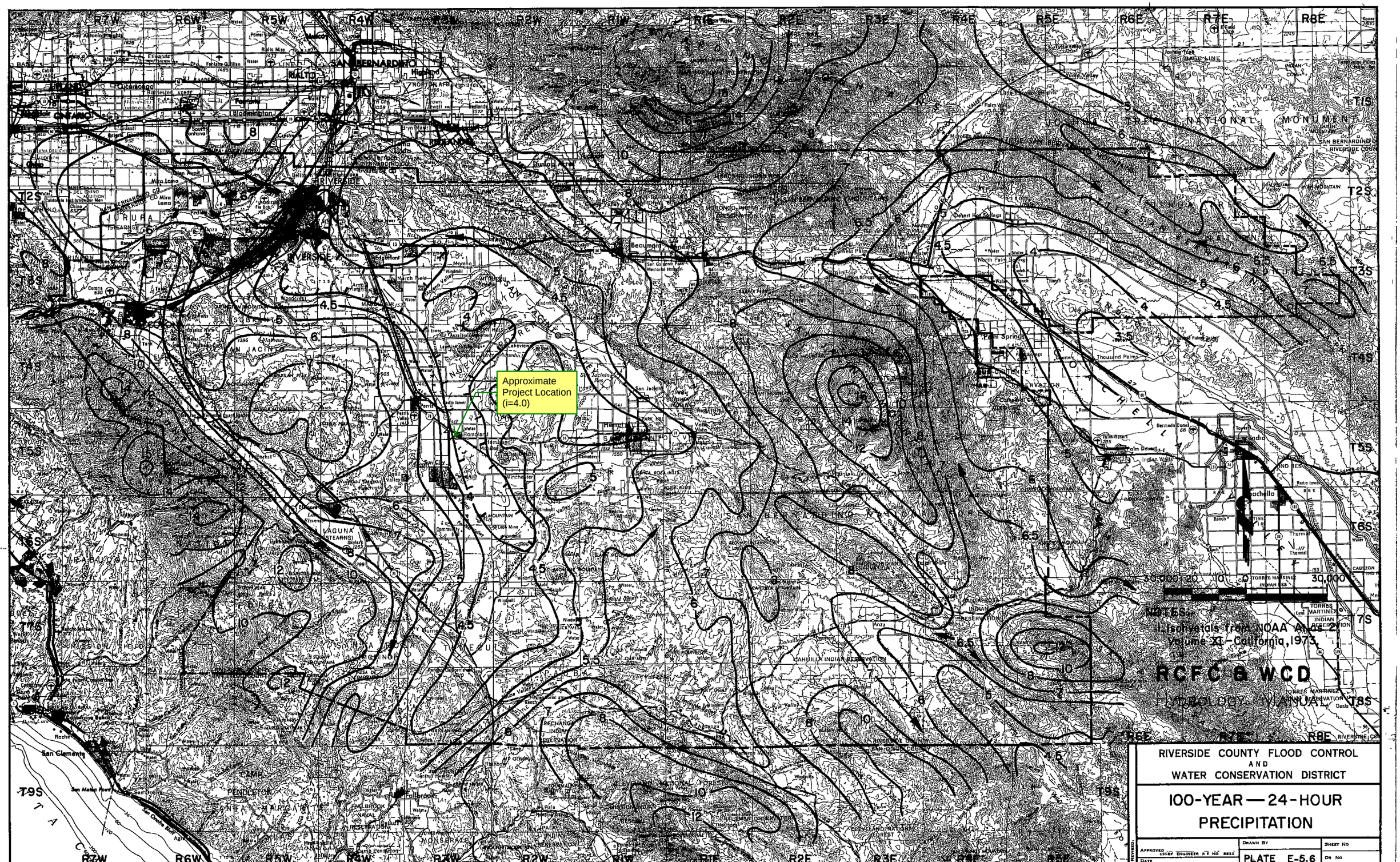

Approximate Project Location (i=1.6)
NOTES:
1. Isoverals from NOAA Atlas Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.5



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 6655	DRAWN BY: A.A.L.	SHEET NO
DATE	PLATE D-4.4	DR NO


Approximate Project Location (i=4.0)
SAN BERNARDINO
RIVERSIDE
RALTO
Beaumont
Banning
Palm Springs
Indio
Coachella
Hemet
San Jacinto
Perris
Menifee
Murrieta
Temecula
Lake Elsinore
San Clemente
Fallbrook
Winchester
Moreno
Mira Loma
Bloomington
Colton
Redlands
Yucaipa
Desert Hot Springs
Thousand Palms
Bermuda Dunes
Palm Desert
Indian Wells
Thermal
Oasis
Mecca
Anza
Aguanga
Pechanga Indian Reservation
Cahuilla Indian Reservation
Torres Martinez Indian Reservation
Joshua Tree National Monument
Cleveland National Forest
Santa Rosa Plateau
Lake Mathews
Lake Perris
Lake Elsinore
Vista Chino
Mt. Jacinto
San Jacinto Peak
Mt. San Gorgonio
Mt. San Antonio
Mt. Baldy
San Jacinto Fault
San Andreas Fault
Elsinore Fault
Chino Fault
Cucamonga Fault
San Jacinto Valley
Temecula Valley
Coachella Valley
Cahuilla Valley
Pala Valley
Pechanga Valley
Murrieta Creek
Santa Ana River
Temecula Creek
Santa Rosa Plateau
Pechanga Indian Reservation
Cahuilla Indian Reservation
Torres Martinez Indian Reservation
Cleveland National Forest
Santa Rosa Plateau
Lake Mathews
Lake Perris
Lake Elsinore
Vista Chino
Mt. Jacinto
San Jacinto Peak
Mt. San Gorgonio
Mt. San Antonio
Mt. Baldy
San Jacinto Fault
San Andreas Fault
Elsinore Fault
Chino Fault
Cucamonga Fault
San Jacinto Valley
Temecula Valley
Coachella Valley
Cahuilla Valley
Pala Valley
Pechanga Valley
Murrieta Creek
Santa Ana River
Temecula Creek
30,000 20 10 0 30,000
METERS
Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8833
DATE
DRAWN BY
PLATE E-5.6
SHEET NO
DR NO
REVISED

RAINFALL INTENSITY—INCHES PER HOUR

HEMET			HIGHGROVE			HOMELAND – WINCHESTER			IDYLLWILD			LAKEVIEW		
DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.40	5	3.02	4.37	5	2.91	4.37	5	4.91	7.28	5	2.77	4.16
6	2.58	4.00	6	2.75	3.97	6	2.65	3.97	6	4.47	6.62	6	2.53	3.79
7	2.37	3.68	7	2.54	3.67	7	2.44	3.67	7	4.13	6.11	7	2.34	3.51
8	2.21	3.43	8	2.37	3.42	8	2.28	3.42	8	3.85	5.70	8	2.19	3.29
9	2.08	3.23	9	2.23	3.22	9	2.15	3.22	9	3.62	5.36	9	2.07	3.10
10	1.96	3.05	10	2.11	3.05	10	2.03	3.05	10	3.43	5.08	10	1.96	2.94
11	1.87	2.90	11	2.01	2.90	11	1.93	2.90	11	3.26	4.83	11	1.87	2.80
12	1.78	2.77	12	1.92	2.77	12	1.85	2.77	12	3.12	4.62	12	1.79	2.68
13	1.71	2.65	13	1.84	2.66	13	1.77	2.66	13	2.99	4.43	13	1.72	2.58
14	1.64	2.55	14	1.77	2.56	14	1.71	2.56	14	2.88	4.26	14	1.66	2.48
15	1.58	2.46	15	1.71	2.47	15	1.64	2.47	15	2.78	4.11	15	1.60	2.40
16	1.53	2.38	16	1.65	2.39	16	1.59	2.39	16	2.68	3.98	16	1.55	2.32
17	1.48	2.30	17	1.60	2.31	17	1.54	2.31	17	2.60	3.85	17	1.50	2.25
18	1.44	2.23	18	1.55	2.24	18	1.50	2.24	18	2.52	3.74	18	1.46	2.19
19	1.40	2.17	19	1.51	2.18	19	1.45	2.18	19	2.45	3.64	19	1.42	2.13
20	1.36	2.11	20	1.47	2.12	20	1.42	2.12	20	2.39	3.54	20	1.39	2.08
22	1.29	2.01	22	1.40	2.02	22	1.35	2.02	22	2.27	3.37	22	1.32	1.98
24	1.24	1.92	24	1.34	1.93	24	1.29	1.93	24	2.17	3.22	24	1.26	1.90
26	1.18	1.84	26	1.28	1.85	26	1.24	1.85	26	2.09	3.09	26	1.22	1.82
28	1.14	1.77	28	1.23	1.78	28	1.19	1.78	28	2.01	2.97	28	1.17	1.76
30	1.10	1.70	30	1.19	1.72	30	1.15	1.72	30	1.94	2.87	30	1.13	1.70
32	1.06	1.65	32	1.15	1.66	32	1.11	1.66	32	1.87	2.77	32	1.10	1.64
34	1.03	1.59	34	1.12	1.61	34	1.07	1.61	34	1.81	2.69	34	1.06	1.59
36	1.00	1.55	36	1.08	1.57	36	1.04	1.57	36	1.76	2.61	36	1.03	1.55
38	.97	1.50	38	1.05	1.52	38	1.01	1.52	38	1.71	2.54	38	1.01	1.51
40	.94	1.46	40	1.02	1.48	40	.99	1.48	40	1.67	2.47	40	.98	1.47
45	.89	1.37	45	.96	1.39	45	.93	1.39	45	1.57	2.32	45	.92	1.39
50	.84	1.30	50	.91	1.32	50	.88	1.32	50	1.48	2.20	50	.88	1.31
55	.80	1.24	55	.87	1.26	55	.84	1.26	55	1.41	2.09	55	.84	1.25
60	.76	1.18	60	.83	1.20	60	.80	1.20	60	1.35	2.00	60	.80	1.20
65	.73	1.13	65	.80	1.15	65	.77	1.15	65	1.29	1.92	65	.77	1.15
70	.70	1.09	70	.77	1.11	70	.74	1.11	70	1.25	1.85	70	.74	1.11
75	.68	1.05	75	.74	1.07	75	.71	1.07	75	1.20	1.78	75	.72	1.07
80	.65	1.01	80	.71	1.03	80	.69	1.03	80	1.16	1.72	80	.69	1.04
85	.63	.98	85	.69	1.00	85	.67	1.00	85	1.13	1.67	85	.67	1.01
SLOPE = .530			SLOPE = .520			SLOPE = .520			SLOPE = .520			SLOPE = .500		

STANDARD
INTENSITY–DURATION
CURVES DATA

10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
       Rational Hydrology Study        Date: 01/18/24  File:PROP10ONSITE.out
----------------------------------------------------------------------
22-0198 - ETHANAC COMMERCE CENTER
ONSITE RATIONAL METHOD HYDROLOGY
10 YEAR STORM EVENT
FN: PROP10.OUT RSB
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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Program License Serial Number 6586

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

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.800(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   707.000(Ft.)
Top (of initial area) elevation =  1433.000(Ft.)
Bottom (of initial area) elevation =  1427.600(Ft.)
Difference in elevation =     5.400(Ft.)
Slope =    0.00764  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.972 min.
Rainfall intensity =      1.935(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.179(CFS)
Total initial stream area =        4.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1422.600(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.179(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.179(CFS)
Normal flow depth in pipe =    8.67(In.)
Flow top width inside pipe =   14.82(In.)
Critical Depth =   12.86(In.)
Pipe flow velocity =      9.77(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =    11.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.200(Ac.)
Runoff from this stream =      7.179(CFS)
Time of concentration =   11.47 min.
Rainfall intensity =     1.891(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   529.000(Ft.)
Top (of initial area) elevation =  1433.000(Ft.)
Bottom (of initial area) elevation =  1427.600(Ft.)
Difference in elevation =     5.400(Ft.)
Slope =    0.01021  s(percent)=       1.02
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.220 min.
Rainfall intensity =      2.119(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.247(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1422.600(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.247(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.247(CFS)
Normal flow depth in pipe =    6.57(In.)
Flow top width inside pipe =    7.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.16(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     9.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.800(Ac.)
Runoff from this stream =      5.247(CFS)
Time of concentration =    9.30 min.
Rainfall intensity =     2.110(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   356.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1429.500(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01292  s(percent)=       1.29
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.507 min.
Rainfall intensity =      2.358(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.715(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =   740.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.715(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.715(CFS)
Normal flow depth in pipe =    6.54(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    8.48(In.)
Pipe flow velocity =      6.20(Ft/s)
Travel time through pipe =    1.99 min.
Time of concentration (TC) =     9.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.300(Ac.)
Runoff from this stream =      2.715(CFS)
Time of concentration =    9.49 min.
Rainfall intensity =     2.087(In/Hr)
Program is now starting with Main Stream No. 4


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1427.300(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.01223  s(percent)=       1.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      2.137(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.804(CFS)
Total initial stream area =        3.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.300(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.804(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.804(CFS)
Normal flow depth in pipe =   14.37(In.)
Flow top width inside pipe =   19.52(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      3.88(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =     9.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.69 min.
Rainfall intensity =      2.065(In/Hr) for a    10.0 year storm
Subarea runoff =      3.104(CFS) for      1.700(Ac.)
Total runoff =      9.907(CFS)      Total area =       5.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.907(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =     9.907(CFS)
Normal flow depth in pipe =   15.38(In.)
Flow top width inside pipe =   23.03(In.)
Critical Depth =   13.52(In.)
```

```
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    10.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.20 min.
Rainfall intensity =      2.011(In/Hr) for a    10.0 year storm
Subarea runoff =      4.975(CFS) for      2.800(Ac.)
Total runoff =     14.882(CFS)      Total area =       8.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =  1125.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.882(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.882(CFS)
Normal flow depth in pipe =   17.34(In.)
Flow top width inside pipe =   15.93(In.)
Critical Depth =   17.14(In.)
Pipe flow velocity =      7.01(Ft/s)
Travel time through pipe =    2.68 min.
Time of concentration (TC) =    12.87 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      8.100(Ac.)
Runoff from this stream =     14.882(CFS)
Time of concentration =   12.87 min.
Rainfall intensity =     1.781(In/Hr)
Summary of stream data:

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

```
1        7.179     11.47              1.891
2        5.247      9.30              2.110
3        2.715      9.49              2.087
4       14.882     12.87              1.781
Largest stream flow has longer time of concentration
Qp =     14.882 + sum of
         Qb         Ia/Ib
          7.179 *    0.942 =      6.762
         Qb         Ia/Ib
          5.247 *    0.844 =      4.430
         Qb         Ia/Ib
          2.715 *    0.854 =      2.317
Qp =     28.392

Total of 4 main streams to confluence:
Flow rates before confluence point:
       7.179       5.247       2.715      14.882
Area of streams before confluence:
        4.200        2.800        1.300        8.100


Results of confluence:
Total flow rate =     28.392(CFS)
Time of concentration =    12.872 min.
Effective stream area after confluence  =     16.400(Ac.)
End of computations, total study area =           16.40 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
       Rational Hydrology Study        Date: 01/19/24  File:PROP100ONSITE.out
----------------------------------------------------------------------
22-0198 - ETHANAC LOGISTICS CENTER
ONSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100.OUT RSB
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 6584

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

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   707.000(Ft.)
Top (of initial area) elevation =  1433.000(Ft.)
Bottom (of initial area) elevation =  1427.600(Ft.)
Difference in elevation =     5.400(Ft.)
Slope =    0.00764  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.972 min.
Rainfall intensity =      2.903(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     11.859(CFS)
Total initial stream area =        4.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1422.600(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.859(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.859(CFS)
Normal flow depth in pipe =   10.51(In.)
Flow top width inside pipe =   17.74(In.)
Critical Depth =   15.71(In.)
Pipe flow velocity =     11.07(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =    11.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.600(Ac.)
Runoff from this stream =     11.859(CFS)
Time of concentration =   11.41 min.
Rainfall intensity =     2.844(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   529.000(Ft.)
Top (of initial area) elevation =  1433.000(Ft.)
Bottom (of initial area) elevation =  1427.600(Ft.)
Difference in elevation =     5.400(Ft.)
Slope =    0.01021  s(percent)=       1.02
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.220 min.
Rainfall intensity =      3.178(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.911(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1422.600(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.911(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.911(CFS)
Normal flow depth in pipe =    6.83(In.)
Flow top width inside pipe =   11.88(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.13(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     9.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.800(Ac.)
Runoff from this stream =      7.911(CFS)
Time of concentration =    9.29 min.
Rainfall intensity =     3.166(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   356.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1429.500(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01292  s(percent)=       1.29
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.507 min.
Rainfall intensity =      3.537(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.092(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =   740.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.092(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.092(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   10.77(In.)
Critical Depth =   10.27(In.)
Pipe flow velocity =      6.75(Ft/s)
Travel time through pipe =    1.83 min.
Time of concentration (TC) =     9.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.300(Ac.)
Runoff from this stream =      4.092(CFS)
Time of concentration =    9.33 min.
Rainfall intensity =     3.158(In/Hr)
Program is now starting with Main Stream No. 4


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1427.300(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.01223  s(percent)=       1.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      3.205(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.258(CFS)
Total initial stream area =        3.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.300(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.258(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.258(CFS)
Normal flow depth in pipe =   17.11(In.)
Flow top width inside pipe =   21.72(In.)
Critical Depth =   13.76(In.)
Pipe flow velocity =      4.28(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =     9.63 min.


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Process from Point/Station      303.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.63 min.
Rainfall intensity =      3.107(In/Hr) for a   100.0 year storm
Subarea runoff =      4.695(CFS) for      1.700(Ac.)
Total runoff =     14.953(CFS)      Total area =       5.300(Ac.)


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Process from Point/Station      302.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.953(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    14.953(CFS)
Normal flow depth in pipe =   18.54(In.)
Flow top width inside pipe =   25.05(In.)
Critical Depth =   16.16(In.)
```

```
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    10.09 min.


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Process from Point/Station      305.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.09 min.
Rainfall intensity =      3.032(In/Hr) for a   100.0 year storm
Subarea runoff =      7.543(CFS) for      2.800(Ac.)
Total runoff =     22.496(CFS)      Total area =       8.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1413.600(Ft.)
Pipe length  =  1125.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.496(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    22.496(CFS)
Normal flow depth in pipe =   21.60(In.)
Flow top width inside pipe =   14.40(In.)
Critical Depth =   20.29(In.)
Pipe flow velocity =      7.56(Ft/s)
Travel time through pipe =    2.48 min.
Time of concentration (TC) =    12.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      8.100(Ac.)
Runoff from this stream =     22.496(CFS)
Time of concentration =   12.57 min.
Rainfall intensity =     2.705(In/Hr)
Summary of stream data:

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

```
1       11.859     11.41              2.844
2        7.911      9.29              3.166
3        4.092      9.33              3.158
4       22.496     12.57              2.705
Largest stream flow has longer time of concentration
Qp =     22.496 + sum of
         Qb         Ia/Ib
         11.859 *    0.951 =     11.277
         Qb         Ia/Ib
          7.911 *    0.854 =      6.758
         Qb         Ia/Ib
          4.092 *    0.857 =      3.505
Qp =     44.036

Total of 4 main streams to confluence:
Flow rates before confluence point:
      11.859       7.911       4.092      22.496
Area of streams before confluence:
        4.600        2.800        1.300        8.100


Results of confluence:
Total flow rate =     44.036(CFS)
Time of concentration =    12.573 min.
Effective stream area after confluence  =     16.800(Ac.)
End of computations, total study area =           16.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

100-YEAR OFFSITE HYDROLOGY (RATIONAL METHOD)

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
       Rational Hydrology Study        Date: 01/19/24  File:PROP100TRUMBLE.out
----------------------------------------------------------------------
22-0198 - ETHANAC LOGISTICS CENTER
OFFSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100TRUMBLE.OUT RSB
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 6584

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

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   630.000(Ft.)
Top (of initial area) elevation =  1428.900(Ft.)
Bottom (of initial area) elevation =  1426.600(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00365  s(percent)=       0.37
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.145 min.
Rainfall intensity =      2.754(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.688(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.000(Ft.)
Downstream point/station elevation =  1423.700(Ft.)
Pipe length  =   118.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.688(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.688(CFS)
Normal flow depth in pipe =   10.38(In.)
Flow top width inside pipe =   13.85(In.)
Critical Depth =    7.89(In.)
Pipe flow velocity =      2.96(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =    12.81 min.
End of computations, total study area =            1.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
       Rational Hydrology Study        Date: 01/19/24  File:PROP100OFFSITE.out
----------------------------------------------------------------------
22-0198 - ETHANAC LOGISTICS CENTER
OFFSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100OFFSITE.OUT RSB
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 6584

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

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
```

```
TC =  21.94 min.  Rain intensity =       2.02(In/Hr)
Total area =        27.80(Ac.)  Total runoff =     47.80(CFS)


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Process from Point/Station      402.000 to Point/Station      403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1431.300(Ft.)
End of natural channel elevation =   1430.200(Ft.)
Length of natural channel  =   258.000(Ft.)
Estimated mean flow rate at midpoint of channel =     48.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0043
Corrected/adjusted channel slope =  0.0043
Travel time =    1.72 min.     TC =   23.66  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.947(In/Hr) for a   100.0 year storm
Subarea runoff =      0.516(CFS) for      0.300(Ac.)
Total runoff =     48.316(CFS)      Total area =      28.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.100(Ac.)
Runoff from this stream =     48.316(CFS)
Time of concentration =   23.66 min.
Rainfall intensity =     1.947(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.100 to Point/Station      403.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.819
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.94 min.  Rain intensity =       2.02(In/Hr)
Total area =        11.00(Ac.)  Total runoff =     18.90(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.100 to Point/Station      403.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     11.000(Ac.)
Runoff from this stream =     18.900(CFS)
Time of concentration =   21.94 min.
Rainfall intensity =     2.025(In/Hr)
Summary of stream data:

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


1       48.316     23.66                 1.947
2       18.900     21.94                 2.025
Largest stream flow has longer time of concentration
Qp =     48.316 + sum of
         Qb         Ia/Ib
         18.900 *    0.961 =     18.172
Qp =     66.488

Total of 2 streams to confluence:
Flow rates before confluence point:
      48.316      18.900
Area of streams before confluence:
       28.100       11.000
Results of confluence:
Total flow rate =     66.488(CFS)
Time of concentration =    23.661 min.
Effective stream area after confluence =     39.100(Ac.)


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Process from Point/Station      403.000 to Point/Station      404.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1430.200(Ft.)
End of natural channel elevation =   1429.700(Ft.)
Length of natural channel  =   250.000(Ft.)
Estimated mean flow rate at midpoint of channel =     66.743(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
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Velocity using mean channel flow =   1.88(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0020
Corrected/adjusted channel slope =  0.0020
Travel time =    2.21 min.     TC =   25.87  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.858(In/Hr) for a   100.0 year storm
Subarea runoff =      0.492(CFS) for      0.300(Ac.)
Total runoff =     66.980(CFS)      Total area =      39.400(Ac.)


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Process from Point/Station      403.000 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.400(Ac.)
Runoff from this stream =     66.980(CFS)
Time of concentration =   25.87 min.
Rainfall intensity =     1.858(In/Hr)


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Process from Point/Station      401.200 to Point/Station      404.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.94 min.  Rain intensity =       2.02(In/Hr)
Total area =        25.80(Ac.)  Total runoff =     44.40(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.200 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
```
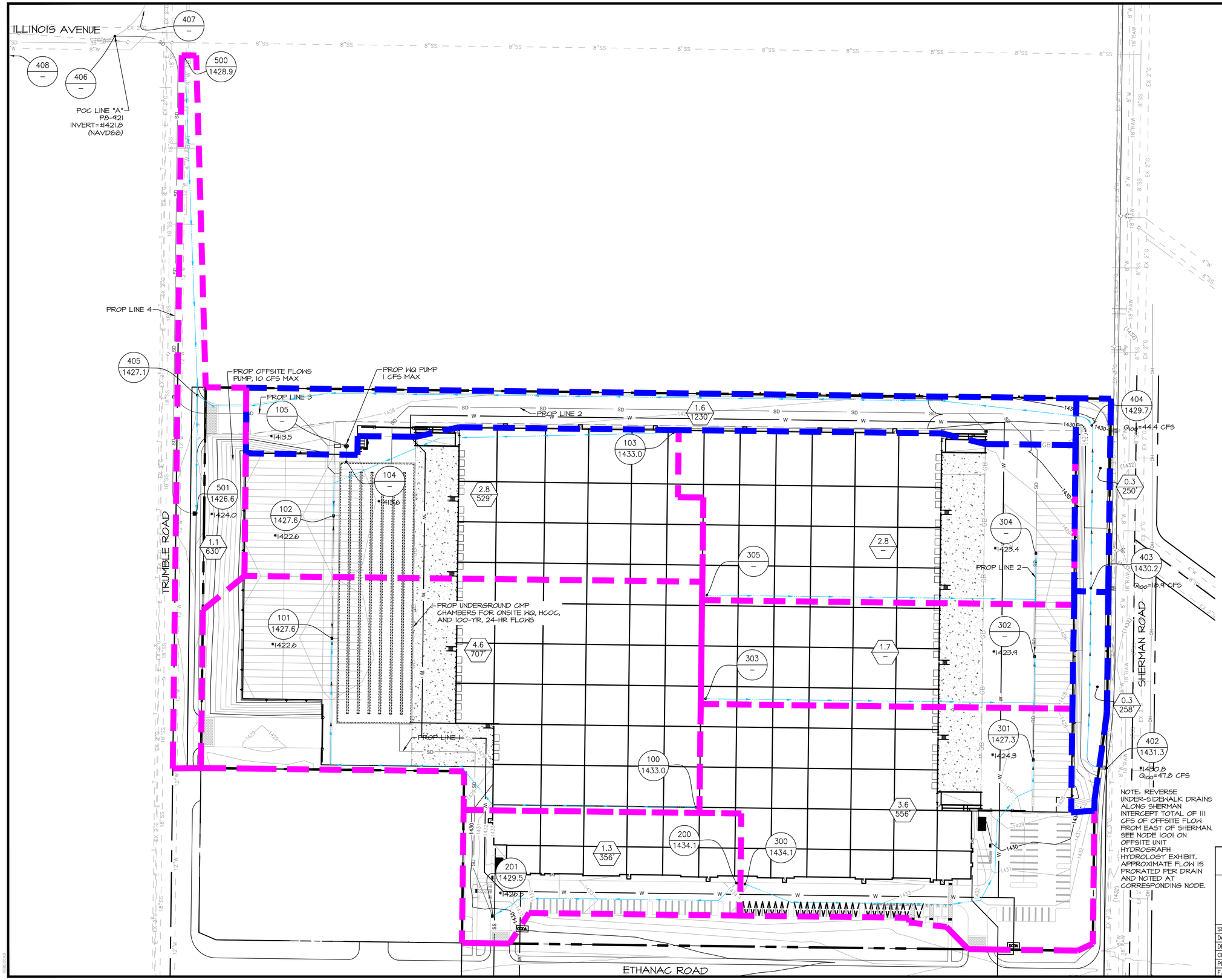

```
Stream flow area =     25.800(Ac.)
Runoff from this stream =     44.400(CFS)
Time of concentration =   21.94 min.
Rainfall intensity =     2.025(In/Hr)
Summary of stream data:

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


1       66.980     25.87                 1.858
2       44.400     21.94                 2.025
Largest stream flow has longer time of concentration
Qp =     66.980 + sum of
         Qb         Ia/Ib
         44.400 *    0.918 =     40.751
Qp =    107.731

Total of 2 streams to confluence:
Flow rates before confluence point:
      66.980      44.400
Area of streams before confluence:
       39.400       25.800
Results of confluence:
Total flow rate =    107.731(CFS)
Time of concentration =    25.874 min.
Effective stream area after confluence =     65.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1429.700(Ft.)
End of natural channel elevation =   1427.100(Ft.)
Length of natural channel  =  1227.000(Ft.)
Estimated mean flow rate at midpoint of channel =    109.053(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.24(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0021
Corrected/adjusted channel slope =  0.0021
Travel time =    9.12 min.     TC =   34.99  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.588(In/Hr) for a   100.0 year storm
Subarea runoff =      2.237(CFS) for      1.600(Ac.)
Total runoff =    109.968(CFS)      Total area =      66.800(Ac.)
End of computations, total study area =           66.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.487
Area averaged RI index number =  75.0
```

RATIONAL METHOD HYDROLOGY MAPS



LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- 101 / 14xx — NODE DESIGNATION / NODE ELEVATION
- *14xx — *INVERT ELEVATION
- 5.0 / 1000' — WATERSHED AREA (ACRES) / LONGEST WATER PATH (FT)

NOTE: REVERSE UNDER-SIDEWALK DRAINS ALONG SHERMAN INTERCEPT TOTAL OF 111 CFS OF OFFSITE FLOW FROM EAST OF SHERMAN. SEE NODE 1001 ON OFFSITE UNIT HYDROGRAPH HYDROLOGY EXHIBIT. APPROXIMATE FLOW IS PRORATED PER DRAIN AND NOTED AT CORRESPONDING NODE.

N W E S

1" = 60'

30 0 60 120 180

CITY OF PERRIS

RATIONAL METHOD ONSITE HYDROLOGY MAP
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: 1/19/24		SHEET 1	
DESIGNED: RSB		OF 1 SHEETS	
CHECKED: SKK		DWG. NO.	
PLN CK REF:			
F.B.			

H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-PHYD-RATIONAL.DWG 1/19/2024 10:35:17 AM

EXISTING CONDITION UNIT HYDROGRAPHS

EXISTING CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPRE242.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, 2-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) = 2.00
Area Averaged 2-Year Rainfall = 1.600(In)
Area Averaged 100-Year Rainfall = 4.000(In)

Point rain (area averaged) = 1.600(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.600(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.800	89.00	0.000

Total Area Entered = 19.80(Ac.)

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

Area averaged mean soil loss (F) (In/Hr) = 0.286
Minimum soil loss rate ((In/Hr)) = 0.143
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	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	0.013	(0.508)	0.012	0.001
2	0.17	0.07	0.013	(0.506)	0.012	0.001
3	0.25	0.07	0.013	(0.504)	0.012	0.001
4	0.33	0.10	0.019	(0.502)	0.017	0.002
5	0.42	0.10	0.019	(0.500)	0.017	0.002
6	0.50	0.10	0.019	(0.498)	0.017	0.002
7	0.58	0.10	0.019	(0.496)	0.017	0.002
8	0.67	0.10	0.019	(0.494)	0.017	0.002
9	0.75	0.10	0.019	(0.492)	0.017	0.002
10	0.83	0.13	0.026	(0.490)	0.023	0.003
11	0.92	0.13	0.026	(0.488)	0.023	0.003
12	1.00	0.13	0.026	(0.486)	0.023	0.003
13	1.08	0.10	0.019	(0.485)	0.017	0.002
14	1.17	0.10	0.019	(0.483)	0.017	0.002
15	1.25	0.10	0.019	(0.481)	0.017	0.002
16	1.33	0.10	0.019	(0.479)	0.017	0.002
17	1.42	0.10	0.019	(0.477)	0.017	0.002
18	1.50	0.10	0.019	(0.475)	0.017	0.002
19	1.58	0.10	0.019	(0.473)	0.017	0.002
20	1.67	0.10	0.019	(0.471)	0.017	0.002
21	1.75	0.10	0.019	(0.469)	0.017	0.002
22	1.83	0.13	0.026	(0.467)	0.023	0.003
23	1.92	0.13	0.026	(0.466)	0.023	0.003
24	2.00	0.13	0.026	(0.464)	0.023	0.003
25	2.08	0.13	0.026	(0.462)	0.023	0.003
26	2.17	0.13	0.026	(0.460)	0.023	0.003
27	2.25	0.13	0.026	(0.458)	0.023	0.003
28	2.33	0.13	0.026	(0.456)	0.023	0.003
29	2.42	0.13	0.026	(0.454)	0.023	0.003
30	2.50	0.13	0.026	(0.452)	0.023	0.003
31	2.58	0.17	0.032	(0.451)	0.029	0.003
32	2.67	0.17	0.032	(0.449)	0.029	0.003
33	2.75	0.17	0.032	(0.447)	0.029	0.003
34	2.83	0.17	0.032	(0.445)	0.029	0.003
35	2.92	0.17	0.032	(0.443)	0.029	0.003
36	3.00	0.17	0.032	(0.441)	0.029	0.003
37	3.08	0.17	0.032	(0.440)	0.029	0.003
38	3.17	0.17	0.032	(0.438)	0.029	0.003

39	3.25	0.17	0.032	(0.436)	0.029	0.003
40	3.33	0.17	0.032	(0.434)	0.029	0.003
41	3.42	0.17	0.032	(0.432)	0.029	0.003
42	3.50	0.17	0.032	(0.430)	0.029	0.003
43	3.58	0.17	0.032	(0.429)	0.029	0.003
44	3.67	0.17	0.032	(0.427)	0.029	0.003
45	3.75	0.17	0.032	(0.425)	0.029	0.003
46	3.83	0.20	0.038	(0.423)	0.035	0.004
47	3.92	0.20	0.038	(0.422)	0.035	0.004
48	4.00	0.20	0.038	(0.420)	0.035	0.004
49	4.08	0.20	0.038	(0.418)	0.035	0.004
50	4.17	0.20	0.038	(0.416)	0.035	0.004
51	4.25	0.20	0.038	(0.414)	0.035	0.004
52	4.33	0.23	0.045	(0.413)	0.040	0.004
53	4.42	0.23	0.045	(0.411)	0.040	0.004
54	4.50	0.23	0.045	(0.409)	0.040	0.004
55	4.58	0.23	0.045	(0.407)	0.040	0.004
56	4.67	0.23	0.045	(0.406)	0.040	0.004
57	4.75	0.23	0.045	(0.404)	0.040	0.004
58	4.83	0.27	0.051	(0.402)	0.046	0.005
59	4.92	0.27	0.051	(0.400)	0.046	0.005
60	5.00	0.27	0.051	(0.399)	0.046	0.005
61	5.08	0.20	0.038	(0.397)	0.035	0.004
62	5.17	0.20	0.038	(0.395)	0.035	0.004
63	5.25	0.20	0.038	(0.393)	0.035	0.004
64	5.33	0.23	0.045	(0.392)	0.040	0.004
65	5.42	0.23	0.045	(0.390)	0.040	0.004
66	5.50	0.23	0.045	(0.388)	0.040	0.004
67	5.58	0.27	0.051	(0.387)	0.046	0.005
68	5.67	0.27	0.051	(0.385)	0.046	0.005
69	5.75	0.27	0.051	(0.383)	0.046	0.005
70	5.83	0.27	0.051	(0.382)	0.046	0.005
71	5.92	0.27	0.051	(0.380)	0.046	0.005
72	6.00	0.27	0.051	(0.378)	0.046	0.005
73	6.08	0.30	0.058	(0.376)	0.052	0.006
74	6.17	0.30	0.058	(0.375)	0.052	0.006
75	6.25	0.30	0.058	(0.373)	0.052	0.006
76	6.33	0.30	0.058	(0.371)	0.052	0.006
77	6.42	0.30	0.058	(0.370)	0.052	0.006
78	6.50	0.30	0.058	(0.368)	0.052	0.006
79	6.58	0.33	0.064	(0.366)	0.058	0.006
80	6.67	0.33	0.064	(0.365)	0.058	0.006
81	6.75	0.33	0.064	(0.363)	0.058	0.006
82	6.83	0.33	0.064	(0.362)	0.058	0.006
83	6.92	0.33	0.064	(0.360)	0.058	0.006
84	7.00	0.33	0.064	(0.358)	0.058	0.006
85	7.08	0.33	0.064	(0.357)	0.058	0.006
86	7.17	0.33	0.064	(0.355)	0.058	0.006
87	7.25	0.33	0.064	(0.353)	0.058	0.006
88	7.33	0.37	0.070	(0.352)	0.063	0.007

89	7.42	0.37	0.070	(0.350)	0.063	0.007
90	7.50	0.37	0.070	(0.349)	0.063	0.007
91	7.58	0.40	0.077	(0.347)	0.069	0.008
92	7.67	0.40	0.077	(0.345)	0.069	0.008
93	7.75	0.40	0.077	(0.344)	0.069	0.008
94	7.83	0.43	0.083	(0.342)	0.075	0.008
95	7.92	0.43	0.083	(0.341)	0.075	0.008
96	8.00	0.43	0.083	(0.339)	0.075	0.008
97	8.08	0.50	0.096	(0.337)	0.086	0.010
98	8.17	0.50	0.096	(0.336)	0.086	0.010
99	8.25	0.50	0.096	(0.334)	0.086	0.010
100	8.33	0.50	0.096	(0.333)	0.086	0.010
101	8.42	0.50	0.096	(0.331)	0.086	0.010
102	8.50	0.50	0.096	(0.330)	0.086	0.010
103	8.58	0.53	0.102	(0.328)	0.092	0.010
104	8.67	0.53	0.102	(0.327)	0.092	0.010
105	8.75	0.53	0.102	(0.325)	0.092	0.010
106	8.83	0.57	0.109	(0.323)	0.098	0.011
107	8.92	0.57	0.109	(0.322)	0.098	0.011
108	9.00	0.57	0.109	(0.320)	0.098	0.011
109	9.08	0.63	0.122	(0.319)	0.109	0.012
110	9.17	0.63	0.122	(0.317)	0.109	0.012
111	9.25	0.63	0.122	(0.316)	0.109	0.012
112	9.33	0.67	0.128	(0.314)	0.115	0.013
113	9.42	0.67	0.128	(0.313)	0.115	0.013
114	9.50	0.67	0.128	(0.311)	0.115	0.013
115	9.58	0.70	0.134	(0.310)	0.121	0.013
116	9.67	0.70	0.134	(0.308)	0.121	0.013
117	9.75	0.70	0.134	(0.307)	0.121	0.013
118	9.83	0.73	0.141	(0.305)	0.127	0.014
119	9.92	0.73	0.141	(0.304)	0.127	0.014
120	10.00	0.73	0.141	(0.303)	0.127	0.014
121	10.08	0.50	0.096	(0.301)	0.086	0.010
122	10.17	0.50	0.096	(0.300)	0.086	0.010
123	10.25	0.50	0.096	(0.298)	0.086	0.010
124	10.33	0.50	0.096	(0.297)	0.086	0.010
125	10.42	0.50	0.096	(0.295)	0.086	0.010
126	10.50	0.50	0.096	(0.294)	0.086	0.010
127	10.58	0.67	0.128	(0.292)	0.115	0.013
128	10.67	0.67	0.128	(0.291)	0.115	0.013
129	10.75	0.67	0.128	(0.290)	0.115	0.013
130	10.83	0.67	0.128	(0.288)	0.115	0.013
131	10.92	0.67	0.128	(0.287)	0.115	0.013
132	11.00	0.67	0.128	(0.285)	0.115	0.013
133	11.08	0.63	0.122	(0.284)	0.109	0.012
134	11.17	0.63	0.122	(0.282)	0.109	0.012
135	11.25	0.63	0.122	(0.281)	0.109	0.012
136	11.33	0.63	0.122	(0.280)	0.109	0.012
137	11.42	0.63	0.122	(0.278)	0.109	0.012
138	11.50	0.63	0.122	(0.277)	0.109	0.012

139	11.58	0.57	0.109	(0.276)	0.098	0.011
140	11.67	0.57	0.109	(0.274)	0.098	0.011
141	11.75	0.57	0.109	(0.273)	0.098	0.011
142	11.83	0.60	0.115	(0.271)	0.104	0.012
143	11.92	0.60	0.115	(0.270)	0.104	0.012
144	12.00	0.60	0.115	(0.269)	0.104	0.012
145	12.08	0.83	0.160	(0.267)	0.144	0.016
146	12.17	0.83	0.160	(0.266)	0.144	0.016
147	12.25	0.83	0.160	(0.265)	0.144	0.016
148	12.33	0.87	0.166	(0.263)	0.150	0.017
149	12.42	0.87	0.166	(0.262)	0.150	0.017
150	12.50	0.87	0.166	(0.261)	0.150	0.017
151	12.58	0.93	0.179	(0.259)	0.161	0.018
152	12.67	0.93	0.179	(0.258)	0.161	0.018
153	12.75	0.93	0.179	(0.257)	0.161	0.018
154	12.83	0.97	0.186	(0.256)	0.167	0.019
155	12.92	0.97	0.186	(0.254)	0.167	0.019
156	13.00	0.97	0.186	(0.253)	0.167	0.019
157	13.08	1.13	0.218	(0.252)	0.196	0.022
158	13.17	1.13	0.218	(0.250)	0.196	0.022
159	13.25	1.13	0.218	(0.249)	0.196	0.022
160	13.33	1.13	0.218	(0.248)	0.196	0.022
161	13.42	1.13	0.218	(0.247)	0.196	0.022
162	13.50	1.13	0.218	(0.245)	0.196	0.022
163	13.58	0.77	0.147	(0.244)	0.132	0.015
164	13.67	0.77	0.147	(0.243)	0.132	0.015
165	13.75	0.77	0.147	(0.242)	0.132	0.015
166	13.83	0.77	0.147	(0.240)	0.132	0.015
167	13.92	0.77	0.147	(0.239)	0.132	0.015
168	14.00	0.77	0.147	(0.238)	0.132	0.015
169	14.08	0.90	0.173	(0.237)	0.156	0.017
170	14.17	0.90	0.173	(0.236)	0.156	0.017
171	14.25	0.90	0.173	(0.234)	0.156	0.017
172	14.33	0.87	0.166	(0.233)	0.150	0.017
173	14.42	0.87	0.166	(0.232)	0.150	0.017
174	14.50	0.87	0.166	(0.231)	0.150	0.017
175	14.58	0.87	0.166	(0.230)	0.150	0.017
176	14.67	0.87	0.166	(0.228)	0.150	0.017
177	14.75	0.87	0.166	(0.227)	0.150	0.017
178	14.83	0.83	0.160	(0.226)	0.144	0.016
179	14.92	0.83	0.160	(0.225)	0.144	0.016
180	15.00	0.83	0.160	(0.224)	0.144	0.016
181	15.08	0.80	0.154	(0.223)	0.138	0.015
182	15.17	0.80	0.154	(0.221)	0.138	0.015
183	15.25	0.80	0.154	(0.220)	0.138	0.015
184	15.33	0.77	0.147	(0.219)	0.132	0.015
185	15.42	0.77	0.147	(0.218)	0.132	0.015
186	15.50	0.77	0.147	(0.217)	0.132	0.015
187	15.58	0.63	0.122	(0.216)	0.109	0.012
188	15.67	0.63	0.122	(0.215)	0.109	0.012

189	15.75	0.63	0.122	(0.214)	0.109	0.012
190	15.83	0.63	0.122	(0.213)	0.109	0.012
191	15.92	0.63	0.122	(0.211)	0.109	0.012
192	16.00	0.63	0.122	(0.210)	0.109	0.012
193	16.08	0.13	0.026	(0.209)	0.023	0.003
194	16.17	0.13	0.026	(0.208)	0.023	0.003
195	16.25	0.13	0.026	(0.207)	0.023	0.003
196	16.33	0.13	0.026	(0.206)	0.023	0.003
197	16.42	0.13	0.026	(0.205)	0.023	0.003
198	16.50	0.13	0.026	(0.204)	0.023	0.003
199	16.58	0.10	0.019	(0.203)	0.017	0.002
200	16.67	0.10	0.019	(0.202)	0.017	0.002
201	16.75	0.10	0.019	(0.201)	0.017	0.002
202	16.83	0.10	0.019	(0.200)	0.017	0.002
203	16.92	0.10	0.019	(0.199)	0.017	0.002
204	17.00	0.10	0.019	(0.198)	0.017	0.002
205	17.08	0.17	0.032	(0.197)	0.029	0.003
206	17.17	0.17	0.032	(0.196)	0.029	0.003
207	17.25	0.17	0.032	(0.195)	0.029	0.003
208	17.33	0.17	0.032	(0.194)	0.029	0.003
209	17.42	0.17	0.032	(0.193)	0.029	0.003
210	17.50	0.17	0.032	(0.192)	0.029	0.003
211	17.58	0.17	0.032	(0.191)	0.029	0.003
212	17.67	0.17	0.032	(0.190)	0.029	0.003
213	17.75	0.17	0.032	(0.189)	0.029	0.003
214	17.83	0.13	0.026	(0.188)	0.023	0.003
215	17.92	0.13	0.026	(0.187)	0.023	0.003
216	18.00	0.13	0.026	(0.186)	0.023	0.003
217	18.08	0.13	0.026	(0.185)	0.023	0.003
218	18.17	0.13	0.026	(0.185)	0.023	0.003
219	18.25	0.13	0.026	(0.184)	0.023	0.003
220	18.33	0.13	0.026	(0.183)	0.023	0.003
221	18.42	0.13	0.026	(0.182)	0.023	0.003
222	18.50	0.13	0.026	(0.181)	0.023	0.003
223	18.58	0.10	0.019	(0.180)	0.017	0.002
224	18.67	0.10	0.019	(0.179)	0.017	0.002
225	18.75	0.10	0.019	(0.178)	0.017	0.002
226	18.83	0.07	0.013	(0.177)	0.012	0.001
227	18.92	0.07	0.013	(0.177)	0.012	0.001
228	19.00	0.07	0.013	(0.176)	0.012	0.001
229	19.08	0.10	0.019	(0.175)	0.017	0.002
230	19.17	0.10	0.019	(0.174)	0.017	0.002
231	19.25	0.10	0.019	(0.173)	0.017	0.002
232	19.33	0.13	0.026	(0.173)	0.023	0.003
233	19.42	0.13	0.026	(0.172)	0.023	0.003
234	19.50	0.13	0.026	(0.171)	0.023	0.003
235	19.58	0.10	0.019	(0.170)	0.017	0.002
236	19.67	0.10	0.019	(0.169)	0.017	0.002
237	19.75	0.10	0.019	(0.169)	0.017	0.002
238	19.83	0.07	0.013	(0.168)	0.012	0.001

239	19.92	0.07	0.013	(0.167)	0.012	0.001
240	20.00	0.07	0.013	(0.166)	0.012	0.001
241	20.08	0.10	0.019	(0.166)	0.017	0.002
242	20.17	0.10	0.019	(0.165)	0.017	0.002
243	20.25	0.10	0.019	(0.164)	0.017	0.002
244	20.33	0.10	0.019	(0.163)	0.017	0.002
245	20.42	0.10	0.019	(0.163)	0.017	0.002
246	20.50	0.10	0.019	(0.162)	0.017	0.002
247	20.58	0.10	0.019	(0.161)	0.017	0.002
248	20.67	0.10	0.019	(0.161)	0.017	0.002
249	20.75	0.10	0.019	(0.160)	0.017	0.002
250	20.83	0.07	0.013	(0.159)	0.012	0.001
251	20.92	0.07	0.013	(0.159)	0.012	0.001
252	21.00	0.07	0.013	(0.158)	0.012	0.001
253	21.08	0.10	0.019	(0.157)	0.017	0.002
254	21.17	0.10	0.019	(0.157)	0.017	0.002
255	21.25	0.10	0.019	(0.156)	0.017	0.002
256	21.33	0.07	0.013	(0.156)	0.012	0.001
257	21.42	0.07	0.013	(0.155)	0.012	0.001
258	21.50	0.07	0.013	(0.155)	0.012	0.001
259	21.58	0.10	0.019	(0.154)	0.017	0.002
260	21.67	0.10	0.019	(0.153)	0.017	0.002
261	21.75	0.10	0.019	(0.153)	0.017	0.002
262	21.83	0.07	0.013	(0.152)	0.012	0.001
263	21.92	0.07	0.013	(0.152)	0.012	0.001
264	22.00	0.07	0.013	(0.151)	0.012	0.001
265	22.08	0.10	0.019	(0.151)	0.017	0.002
266	22.17	0.10	0.019	(0.150)	0.017	0.002
267	22.25	0.10	0.019	(0.150)	0.017	0.002
268	22.33	0.07	0.013	(0.149)	0.012	0.001
269	22.42	0.07	0.013	(0.149)	0.012	0.001
270	22.50	0.07	0.013	(0.148)	0.012	0.001
271	22.58	0.07	0.013	(0.148)	0.012	0.001
272	22.67	0.07	0.013	(0.148)	0.012	0.001
273	22.75	0.07	0.013	(0.147)	0.012	0.001
274	22.83	0.07	0.013	(0.147)	0.012	0.001
275	22.92	0.07	0.013	(0.146)	0.012	0.001
276	23.00	0.07	0.013	(0.146)	0.012	0.001
277	23.08	0.07	0.013	(0.146)	0.012	0.001
278	23.17	0.07	0.013	(0.145)	0.012	0.001
279	23.25	0.07	0.013	(0.145)	0.012	0.001
280	23.33	0.07	0.013	(0.145)	0.012	0.001
281	23.42	0.07	0.013	(0.145)	0.012	0.001
282	23.50	0.07	0.013	(0.144)	0.012	0.001
283	23.58	0.07	0.013	(0.144)	0.012	0.001
284	23.67	0.07	0.013	(0.144)	0.012	0.001
285	23.75	0.07	0.013	(0.144)	0.012	0.001
286	23.83	0.07	0.013	(0.143)	0.012	0.001
287	23.92	0.07	0.013	(0.143)	0.012	0.001
288	24.00	0.07	0.013	(0.143)	0.012	0.001

```
              (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     1.9
      Flood volume = Effective rainfall      0.16(In)
       times area      19.8(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      1.44(In)
      Total soil loss =     2.376(Ac.Ft)
      Total rainfall =      1.60(In)
      Flood volume =       11499.4 Cubic Feet
      Total soil loss =      103494.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.430(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0001      0.01  Q         |         |         |         |
  0+15       0.0002      0.02  Q         |         |         |         |
  0+20       0.0004      0.02  Q         |         |         |         |
  0+25       0.0006      0.03  Q         |         |         |         |
  0+30       0.0008      0.03  Q         |         |         |         |
  0+35       0.0011      0.04  Q         |         |         |         |
  0+40       0.0013      0.04  Q         |         |         |         |
  0+45       0.0016      0.04  Q         |         |         |         |
  0+50       0.0019      0.04  Q         |         |         |         |
  0+55       0.0022      0.04  Q         |         |         |         |
  1+ 0       0.0025      0.05  Q         |         |         |         |
  1+ 5       0.0028      0.05  Q         |         |         |         |
  1+10       0.0031      0.04  Q         |         |         |         |
  1+15       0.0034      0.04  Q         |         |         |         |
  1+20       0.0037      0.04  Q         |         |         |         |
  1+25       0.0039      0.04  Q         |         |         |         |
  1+30       0.0042      0.04  Q         |         |         |         |
  1+35       0.0045      0.04  Q         |         |         |         |
  1+40       0.0047      0.04  Q         |         |         |         |
  1+45       0.0050      0.04  Q         |         |         |         |
  1+50       0.0053      0.04  Q         |         |         |         |
  1+55       0.0056      0.05  Q         |         |         |         |
  2+ 0       0.0059      0.05  Q         |         |         |         |
  2+ 5       0.0063      0.05  Q         |         |         |         |
  2+10       0.0066      0.05  Q         |         |         |         |
  2+15       0.0069      0.05  QV        |         |         |         |
  2+20       0.0073      0.05  QV        |         |         |         |
  2+25       0.0076      0.05  QV        |         |         |         |
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2+30	0.0080	0.05	QV				
2+35	0.0084	0.05	QV				
2+40	0.0088	0.06	QV				
2+45	0.0092	0.06	QV				
2+50	0.0096	0.06	QV				
2+55	0.0100	0.06	QV				
3+ 0	0.0105	0.06	QV				
3+ 5	0.0109	0.06	QV				
3+10	0.0113	0.06	QV				
3+15	0.0118	0.06	QV				
3+20	0.0122	0.06	QV				
3+25	0.0127	0.06	QV				
3+30	0.0131	0.06	QV				
3+35	0.0135	0.06	Q V				
3+40	0.0140	0.06	Q V				
3+45	0.0144	0.06	Q V				
3+50	0.0149	0.07	Q V				
3+55	0.0153	0.07	Q V				
4+ 0	0.0159	0.07	Q V				
4+ 5	0.0164	0.07	Q V				
4+10	0.0169	0.08	Q V				
4+15	0.0174	0.08	Q V				
4+20	0.0179	0.08	Q V				
4+25	0.0185	0.08	Q V				
4+30	0.0191	0.09	Q V				
4+35	0.0197	0.09	Q V				
4+40	0.0203	0.09	Q V				
4+45	0.0209	0.09	Q V				
4+50	0.0215	0.09	Q V				
4+55	0.0222	0.10	Q V				
5+ 0	0.0229	0.10	Q V				
5+ 5	0.0236	0.10	Q V				
5+10	0.0242	0.09	Q V				
5+15	0.0247	0.08	Q V				
5+20	0.0253	0.08	Q V				
5+25	0.0259	0.09	Q V				
5+30	0.0265	0.09	Q V				
5+35	0.0271	0.09	Q V				
5+40	0.0278	0.10	Q V				
5+45	0.0284	0.10	Q V				
5+50	0.0291	0.10	Q V				
5+55	0.0298	0.10	Q V				
6+ 0	0.0305	0.10	Q V				
6+ 5	0.0312	0.10	Q V				
6+10	0.0320	0.11	Q V				
6+15	0.0327	0.11	Q V				
6+20	0.0335	0.11	Q V				
6+25	0.0343	0.11	Q V				
6+30	0.0351	0.11	Q V				
6+35	0.0359	0.12	Q V				

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 6+40       0.0367      0.12  Q    V    |          |          |          |
 6+45       0.0376      0.12  Q    V    |          |          |          |
 6+50       0.0384      0.13  Q    V    |          |          |          |
 6+55       0.0393      0.13  Q    V    |          |          |          |
 7+ 0       0.0402      0.13  Q     V   |          |          |          |
 7+ 5       0.0411      0.13  Q     V   |          |          |          |
 7+10       0.0419      0.13  Q     V   |          |          |          |
 7+15       0.0428      0.13  Q     V   |          |          |          |
 7+20       0.0437      0.13  Q     V   |          |          |          |
 7+25       0.0446      0.13  Q     V   |          |          |          |
 7+30       0.0456      0.14  Q     V   |          |          |          |
 7+35       0.0465      0.14  Q      V  |          |          |          |
 7+40       0.0475      0.15  Q      V  |          |          |          |
 7+45       0.0486      0.15  Q      V  |          |          |          |
 7+50       0.0496      0.15  Q      V  |          |          |          |
 7+55       0.0507      0.16  Q      V  |          |          |          |
 8+ 0       0.0518      0.16  Q      V  |          |          |          |
 8+ 5       0.0530      0.17  Q       V |          |          |          |
 8+10       0.0542      0.18  Q       V |          |          |          |
 8+15       0.0555      0.18  Q       V |          |          |          |
 8+20       0.0568      0.19  Q       V |          |          |          |
 8+25       0.0580      0.19  Q       V |          |          |          |
 8+30       0.0594      0.19  Q       V |          |          |          |
 8+35       0.0607      0.19  Q        V|          |          |          |
 8+40       0.0620      0.20  Q        V|          |          |          |
 8+45       0.0634      0.20  Q        V|          |          |          |
 8+50       0.0648      0.20  Q        V|          |          |          |
 8+55       0.0663      0.21  Q         V          |          |          |
 9+ 0       0.0677      0.21  Q         V          |          |          |
 9+ 5       0.0692      0.22  Q         V          |          |          |
 9+10       0.0708      0.23  Q         V          |          |          |
 9+15       0.0724      0.24  Q         V          |          |          |
 9+20       0.0741      0.24  Q         |V         |          |          |
 9+25       0.0758      0.25  Q         |V         |          |          |
 9+30       0.0775      0.25  |Q        |V         |          |          |
 9+35       0.0792      0.25  |Q        | V        |          |          |
 9+40       0.0810      0.26  |Q        | V        |          |          |
 9+45       0.0829      0.26  |Q        | V        |          |          |
 9+50       0.0847      0.27  |Q        | V        |          |          |
 9+55       0.0866      0.27  |Q        |  V       |          |          |
10+ 0       0.0885      0.28  |Q        |  V       |          |          |
10+ 5       0.0903      0.27  |Q        |  V       |          |          |
10+10       0.0919      0.23  Q         |  V       |          |          |
10+15       0.0934      0.21  Q         |   V      |          |          |
10+20       0.0948      0.21  Q         |   V      |          |          |
10+25       0.0962      0.20  Q         |   V      |          |          |
10+30       0.0975      0.20  Q         |   V      |          |          |
10+35       0.0989      0.20  Q         |   V      |          |          |
10+40       0.1005      0.23  Q         |    V     |          |          |
10+45       0.1022      0.24  Q         |    V     |          |          |
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10+50       0.1039      0.25  Q         |    V    |         |         |
10+55       0.1056      0.25  Q         |    V    |         |         |
11+ 0       0.1073      0.25  |Q        |     V   |         |         |
11+ 5       0.1090      0.25  |Q        |     V   |         |         |
11+10       0.1107      0.25  Q         |     V   |         |         |
11+15       0.1124      0.24  Q         |      V  |         |         |
11+20       0.1141      0.24  Q         |      V  |         |         |
11+25       0.1158      0.24  Q         |      V  |         |         |
11+30       0.1175      0.24  Q         |      V  |         |         |
11+35       0.1191      0.24  Q         |       V |         |         |
11+40       0.1207      0.23  Q         |       V |         |         |
11+45       0.1223      0.22  Q         |       V |         |         |
11+50       0.1238      0.22  Q         |       V |         |         |
11+55       0.1253      0.23  Q         |       V |         |         |
12+ 0       0.1269      0.23  Q         |        V|         |         |
12+ 5       0.1286      0.24  Q         |        V|         |         |
12+10       0.1305      0.28  |Q        |        V|         |         |
12+15       0.1325      0.30  |Q        |         V         |         |
12+20       0.1346      0.31  |Q        |         V         |         |
12+25       0.1368      0.32  |Q        |         V         |         |
12+30       0.1390      0.32  |Q        |         |V        |         |
12+35       0.1413      0.33  |Q        |         |V        |         |
12+40       0.1437      0.34  |Q        |         |V        |         |
12+45       0.1461      0.35  |Q        |         | V       |         |
12+50       0.1485      0.35  |Q        |         | V       |         |
12+55       0.1510      0.36  |Q        |         | V       |         |
13+ 0       0.1535      0.37  |Q        |         |  V      |         |
13+ 5       0.1561      0.37  |Q        |         |  V      |         |
13+10       0.1588      0.40  |Q        |         |   V     |         |
13+15       0.1617      0.42  |Q        |         |   V     |         |
13+20       0.1646      0.42  |Q        |         |   V     |         |
13+25       0.1676      0.43  |Q        |         |    V    |         |
13+30       0.1705      0.43  |Q        |         |    V    |         |
13+35       0.1734      0.41  |Q        |         |     V   |         |
13+40       0.1759      0.36  |Q        |         |     V   |         |
13+45       0.1781      0.33  |Q        |         |     V   |         |
13+50       0.1803      0.32  |Q        |         |      V  |         |
13+55       0.1824      0.31  |Q        |         |      V  |         |
14+ 0       0.1845      0.30  |Q        |         |      V  |         |
14+ 5       0.1866      0.31  |Q        |         |       V |         |
14+10       0.1889      0.33  |Q        |         |       V |         |
14+15       0.1912      0.33  |Q        |         |       V |         |
14+20       0.1935      0.34  |Q        |         |        V|         |
14+25       0.1958      0.33  |Q        |         |        V|         |
14+30       0.1981      0.33  |Q        |         |         V         |
14+35       0.2003      0.33  |Q        |         |         V         |
14+40       0.2026      0.33  |Q        |         |         V         |
14+45       0.2049      0.33  |Q        |         |         |V        |
14+50       0.2072      0.33  |Q        |         |         |V        |
14+55       0.2094      0.33  |Q        |         |         |V        |
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15+ 0       0.2117      0.32  |Q        |         |         | V       |
15+ 5       0.2139      0.32  |Q        |         |         | V       |
15+10       0.2160      0.31  |Q        |         |         | V       |
15+15       0.2182      0.31  |Q        |         |         |  V      |
15+20       0.2203      0.31  |Q        |         |         |  V      |
15+25       0.2224      0.30  |Q        |         |         |  V      |
15+30       0.2244      0.30  |Q        |         |         |   V     |
15+35       0.2264      0.29  |Q        |         |         |   V     |
15+40       0.2283      0.27  |Q        |         |         |   V     |
15+45       0.2300      0.26  |Q        |         |         |   V     |
15+50       0.2318      0.25  |Q        |         |         |    V    |
15+55       0.2335      0.25  Q         |         |         |    V    |
16+ 0       0.2352      0.25  Q         |         |         |    V    |
16+ 5       0.2367      0.22  Q         |         |         |    V    |
16+10       0.2377      0.14  Q         |         |         |     V   |
16+15       0.2384      0.10  Q         |         |         |     V   |
16+20       0.2390      0.08  Q         |         |         |     V   |
16+25       0.2394      0.07  Q         |         |         |     V   |
16+30       0.2399      0.07  Q         |         |         |     V   |
16+35       0.2403      0.06  Q         |         |         |     V   |
16+40       0.2406      0.05  Q         |         |         |     V   |
16+45       0.2410      0.05  Q         |         |         |     V   |
16+50       0.2412      0.04  Q         |         |         |     V   |
16+55       0.2415      0.04  Q         |         |         |     V   |
17+ 0       0.2418      0.04  Q         |         |         |     V   |
17+ 5       0.2421      0.04  Q         |         |         |     V   |
17+10       0.2424      0.05  Q         |         |         |     V   |
17+15       0.2428      0.06  Q         |         |         |     V   |
17+20       0.2433      0.06  Q         |         |         |     V   |
17+25       0.2437      0.06  Q         |         |         |     V   |
17+30       0.2441      0.06  Q         |         |         |     V   |
17+35       0.2445      0.06  Q         |         |         |      V  |
17+40       0.2450      0.06  Q         |         |         |      V  |
17+45       0.2454      0.06  Q         |         |         |      V  |
17+50       0.2458      0.06  Q         |         |         |      V  |
17+55       0.2462      0.06  Q         |         |         |      V  |
18+ 0       0.2466      0.05  Q         |         |         |      V  |
18+ 5       0.2470      0.05  Q         |         |         |      V  |
18+10       0.2473      0.05  Q         |         |         |      V  |
18+15       0.2477      0.05  Q         |         |         |      V  |
18+20       0.2480      0.05  Q         |         |         |      V  |
18+25       0.2484      0.05  Q         |         |         |      V  |
18+30       0.2487      0.05  Q         |         |         |      V  |
18+35       0.2491      0.05  Q         |         |         |      V  |
18+40       0.2494      0.04  Q         |         |         |      V  |
18+45       0.2497      0.04  Q         |         |         |      V  |
18+50       0.2500      0.04  Q         |         |         |      V  |
18+55       0.2502      0.03  Q         |         |         |      V  |
19+ 0       0.2504      0.03  Q         |         |         |      V  |
19+ 5       0.2506      0.03  Q         |         |         |      V  |
```

```
19+10       0.2508      0.03  Q          |          |          |        V |
19+15       0.2511      0.04  Q          |          |          |        V |
19+20       0.2513      0.04  Q          |          |          |        V |
19+25       0.2516      0.04  Q          |          |          |        V |
19+30       0.2520      0.05  Q          |          |          |        V |
19+35       0.2523      0.05  Q          |          |          |        V |
19+40       0.2526      0.04  Q          |          |          |        V |
19+45       0.2529      0.04  Q          |          |          |        V |
19+50       0.2531      0.04  Q          |          |          |        V |
19+55       0.2533      0.03  Q          |          |          |        V |
20+ 0       0.2535      0.03  Q          |          |          |        V |
20+ 5       0.2538      0.03  Q          |          |          |        V |
20+10       0.2540      0.03  Q          |          |          |        V |
20+15       0.2542      0.04  Q          |          |          |        V |
20+20       0.2545      0.04  Q          |          |          |        V |
20+25       0.2548      0.04  Q          |          |          |        V |
20+30       0.2550      0.04  Q          |          |          |        V |
20+35       0.2553      0.04  Q          |          |          |        V |
20+40       0.2555      0.04  Q          |          |          |        V |
20+45       0.2558      0.04  Q          |          |          |        V |
20+50       0.2560      0.04  Q          |          |          |        V |
20+55       0.2563      0.03  Q          |          |          |        V |
21+ 0       0.2565      0.03  Q          |          |          |        V |
21+ 5       0.2567      0.03  Q          |          |          |        V |
21+10       0.2569      0.03  Q          |          |          |        V |
21+15       0.2571      0.04  Q          |          |          |        V |
21+20       0.2574      0.04  Q          |          |          |        V |
21+25       0.2576      0.03  Q          |          |          |         V|
21+30       0.2578      0.03  Q          |          |          |         V|
21+35       0.2580      0.03  Q          |          |          |         V|
21+40       0.2582      0.03  Q          |          |          |         V|
21+45       0.2585      0.04  Q          |          |          |         V|
21+50       0.2587      0.04  Q          |          |          |         V|
21+55       0.2589      0.03  Q          |          |          |         V|
22+ 0       0.2591      0.03  Q          |          |          |         V|
22+ 5       0.2593      0.03  Q          |          |          |         V|
22+10       0.2595      0.03  Q          |          |          |         V|
22+15       0.2598      0.04  Q          |          |          |         V|
22+20       0.2600      0.04  Q          |          |          |         V|
22+25       0.2602      0.03  Q          |          |          |         V|
22+30       0.2604      0.03  Q          |          |          |         V|
22+35       0.2606      0.03  Q          |          |          |         V|
22+40       0.2608      0.03  Q          |          |          |         V|
22+45       0.2610      0.03  Q          |          |          |         V|
22+50       0.2612      0.03  Q          |          |          |         V|
22+55       0.2613      0.03  Q          |          |          |         V|
23+ 0       0.2615      0.03  Q          |          |          |         V|
23+ 5       0.2617      0.03  Q          |          |          |         V|
23+10       0.2619      0.03  Q          |          |          |         V|
23+15       0.2620      0.03  Q          |          |          |         V|
```

```
   23+20       0.2622      0.03  Q         |         |         |        V|
   23+25       0.2624      0.03  Q         |         |         |        V|
   23+30       0.2626      0.03  Q         |         |         |        V|
   23+35       0.2627      0.03  Q         |         |         |        V|
   23+40       0.2629      0.03  Q         |         |         |        V|
   23+45       0.2631      0.03  Q         |         |         |        V|
   23+50       0.2633      0.03  Q         |         |         |        V|
   23+55       0.2635      0.03  Q         |         |         |        V|
   24+ 0       0.2636      0.03  Q         |         |         |        V|
   24+ 5       0.2638      0.02  Q         |         |         |        V|
   24+10       0.2639      0.01  Q         |         |         |        V|
   24+15       0.2639      0.01  Q         |         |         |        V|
   24+20       0.2639      0.00  Q         |         |         |        V|
   24+25       0.2640      0.00  Q         |         |         |        V|
   24+30       0.2640      0.00  Q         |         |         |        V|
   24+35       0.2640      0.00  Q         |         |         |        V|
   24+40       0.2640      0.00  Q         |         |         |        V|
   24+45       0.2640      0.00  Q         |         |         |        V|
   24+50       0.2640      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE TOTAL 100-YEAR, 1-HOUR UNIT HYDROGRAPH

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
Study date 12/21/23 File: A11TRIB1100.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: A11TRIB.OUT- RSB

Drainage Area = 235.50(Ac.) = 0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 235.50(Ac.) = 0.368 Sq. Mi.
Length along longest watercourse = 5432.00(Ft.)
Length along longest watercourse measured to centroid = 1784.00(Ft.)
Length along longest watercourse = 1.029 Mi.
Length along longest watercourse measured to centroid = 0.338 Mi.
Difference in elevation = 20.50(Ft.)
Slope along watercourse = 19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.227 Hr.
Lag time = 13.65 Min.
25% of lag time = 3.41 Min.
40% of lag time = 5.46 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]
235.50	0.50	117.75

100 YEAR Area rainfall data:

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

```
      235.50          1.20                282.60

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 =   99.79 %
Adjusted average point rain =    1.197(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    44.000           56.00         0.500
    21.600           75.00         0.500
    88.600           89.00         0.000
     5.400           75.00         0.500
    57.300           69.00         0.900
    18.600           75.00         0.900
 Total Area Entered =    235.50(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       0.187      0.052
75.0  75.0      0.303     0.500        0.167       0.092      0.015
89.0  89.0      0.141     0.000        0.141       0.376      0.053
75.0  75.0      0.303     0.500        0.167       0.023      0.004
69.0  69.0      0.373     0.900        0.071       0.243      0.017
75.0  75.0      0.303     0.900        0.058       0.079      0.005
                                                  Sum (F) =   0.147
Area averaged mean soil loss (F) (In/Hr) =  0.147
Minimum soil loss rate ((In/Hr)) =  0.073
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
---------------------------------------------------------------------
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         36.639          3.827              9.083
    2   0.167         73.278         15.298             36.309
    3   0.250        109.918         24.567             58.307
    4   0.333        146.557         18.994             45.081
    5   0.417        183.196          9.692             23.004
    6   0.500        219.835          5.696             13.518
    7   0.583        256.474          4.227             10.033
    8   0.667        293.114          3.309              7.853
    9   0.750        329.753          2.568              6.095
   10   0.833        366.392          2.147              5.097
   11   0.917        403.031          1.700              4.035
```

12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	0.604	0.147	(0.302)	0.457
2	0.17	4.30	0.618	0.147	(0.309)	0.471
3	0.25	5.00	0.718	0.147	(0.359)	0.572
4	0.33	5.00	0.718	0.147	(0.359)	0.572
5	0.42	5.80	0.833	0.147	(0.417)	0.687
6	0.50	6.50	0.934	0.147	(0.467)	0.787
7	0.58	7.40	1.063	0.147	(0.532)	0.917
8	0.67	8.60	1.236	0.147	(0.618)	1.089
9	0.75	12.30	1.767	0.147	(0.884)	1.621
10	0.83	29.10	4.181	0.147	(2.091)	4.035
11	0.92	6.80	0.977	0.147	(0.489)	0.831
12	1.00	5.00	0.718	0.147	(0.359)	0.572
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	12.6

Flood volume = Effective rainfall 1.05(In)
times area 235.5(Ac.)/[(In)/(Ft.)] = 20.6(Ac.Ft)
Total soil loss = 0.15(In)
Total soil loss = 2.877(Ac.Ft)
Total rainfall = 1.20(In)
Flood volume = 898346.8 Cubic Feet
Total soil loss = 125301.9 Cubic Feet

Peak flow rate of this hydrograph = 404.404(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      125.0     250.0     375.0     500.0
 ----------------------------------------------------------------------
   0+ 5       0.0286      4.15  Q         |         |         |         |
   0+10       0.1724     20.88  VQ        |         |         |         |
   0+15       0.5097     48.97  V  Q      |         |         |         |
   0+20       1.0199     74.08  |V   Q    |         |         |         |
```

```
   0+25       1.6545     92.15  |  V   Q  |         |         |         |
   0+30       2.4003    108.29  |   V   Q |         |         |         |
   0+35       3.2745    126.92  |     V   Q         |         |         |
   0+40       4.3029    149.34  |       V |Q        |         |         |
   0+45       5.5362    179.07  |         V   Q     |         |         |
   0+50       7.2117    243.29  |         |  V     Q|         |         |
   0+55       9.6131    348.68  |         |       V |      Q  |         |
   1+ 0      12.3982    404.40  |         |         |   V     | Q       |
   1+ 5      14.6767    330.83  |         |         |     Q V |         |
   1+10      16.1827    218.67  |         |      Q  |         |V        |
   1+15      17.1624    142.25  |         |Q        |         |  V      |
   1+20      17.8452     99.15  |      Q  |         |         |   V     |
   1+25      18.3651     75.49  |     Q   |         |         |    V    |
   1+30      18.7774     59.86  |   Q     |         |         |     V   |
   1+35      19.1149     49.02  |  Q      |         |         |      V  |
   1+40      19.3891     39.81  |  Q      |         |         |      V  |
   1+45      19.6155     32.87  | Q       |         |         |       V |
   1+50      19.8088     28.07  | Q       |         |         |       V |
   1+55      19.9761     24.29  |Q        |         |         |       V |
   2+ 0      20.1147     20.12  |Q        |         |         |        V|
   2+ 5      20.2305     16.82  |Q        |         |         |        V|
   2+10      20.3269     14.00  |Q        |         |         |        V|
   2+15      20.4057     11.43  Q         |         |         |        V|
   2+20      20.4690      9.20  Q         |         |         |        V|
   2+25      20.5220      7.69  Q         |         |         |        V|
   2+30      20.5679      6.67  Q         |         |         |        V|
   2+35      20.6086      5.91  Q         |         |         |        V|
   2+40      20.6186      1.46  Q         |         |         |        V|
   2+45      20.6232      0.66  Q         |         |         |         V
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE TOTAL 100-YEAR, 3-HOUR UNIT HYDROGRAPH

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

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
              Study date  12/21/23 File: A11TRIB3100.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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =      0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
      235.50           0.80                188.40

100 YEAR Area rainfall data:


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

235.50 1.90 447.45

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 = 99.90 %
Adjusted average point rain = 1.898(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738

14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	0.147	(0.148)	0.150
2	0.17	1.30	0.296	0.147	(0.148)	0.150
3	0.25	1.10	0.251	(0.147)	0.125	0.125
4	0.33	1.50	0.342	0.147	(0.171)	0.195
5	0.42	1.50	0.342	0.147	(0.171)	0.195
6	0.50	1.80	0.410	0.147	(0.205)	0.263
7	0.58	1.50	0.342	0.147	(0.171)	0.195
8	0.67	1.80	0.410	0.147	(0.205)	0.263
9	0.75	1.80	0.410	0.147	(0.205)	0.263
10	0.83	1.50	0.342	0.147	(0.171)	0.195
11	0.92	1.60	0.364	0.147	(0.182)	0.218
12	1.00	1.80	0.410	0.147	(0.205)	0.263
13	1.08	2.20	0.501	0.147	(0.251)	0.355
14	1.17	2.20	0.501	0.147	(0.251)	0.355
15	1.25	2.20	0.501	0.147	(0.251)	0.355
16	1.33	2.00	0.456	0.147	(0.228)	0.309
17	1.42	2.60	0.592	0.147	(0.296)	0.446
18	1.50	2.70	0.615	0.147	(0.307)	0.468
19	1.58	2.40	0.547	0.147	(0.273)	0.400
20	1.67	2.70	0.615	0.147	(0.307)	0.468
21	1.75	3.30	0.752	0.147	(0.376)	0.605
22	1.83	3.10	0.706	0.147	(0.353)	0.559
23	1.92	2.90	0.661	0.147	(0.330)	0.514
24	2.00	3.00	0.683	0.147	(0.342)	0.537
25	2.08	3.10	0.706	0.147	(0.353)	0.559
26	2.17	4.20	0.957	0.147	(0.478)	0.810
27	2.25	5.00	1.139	0.147	(0.569)	0.992
28	2.33	3.50	0.797	0.147	(0.399)	0.651
29	2.42	6.80	1.549	0.147	(0.774)	1.402
30	2.50	7.30	1.663	0.147	(0.831)	1.516
31	2.58	8.20	1.868	0.147	(0.934)	1.721
32	2.67	5.90	1.344	0.147	(0.672)	1.197
33	2.75	2.00	0.456	0.147	(0.228)	0.309
34	2.83	1.80	0.410	0.147	(0.205)	0.263
35	2.92	1.80	0.410	0.147	(0.205)	0.263
36	3.00	0.60	0.137	(0.147)	0.068	0.068
		(Loss Rate Not Used)				
	Sum =	100.0			Sum =	17.6

Flood volume = Effective rainfall 1.47(In)

```
 times area     235.5(Ac.)/[(In)/(Ft.)] =      28.8(Ac.Ft)
Total soil loss =      0.43(In)
Total soil loss =     8.467(Ac.Ft)
Total rainfall =      1.90(In)
Flood volume =     1253756.2 Cubic Feet
Total soil loss =      368813.9 Cubic Feet
---------------------------------------------------------------------
 Peak flow rate of this hydrograph =    289.328(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       75.0     150.0     225.0     300.0
-----------------------------------------------------------------------
  0+ 5       0.0094      1.36  Q         |         |         |         |
  0+10       0.0561      6.79  Q         |         |         |         |
  0+15       0.1614     15.29  V Q       |         |         |         |
  0+20       0.3115     21.79  V Q       |         |         |         |
  0+25       0.4930     26.35  V  Q      |         |         |         |
  0+30       0.7132     31.97  V   Q     |         |         |         |
  0+35       0.9744     37.93  |V   Q    |         |         |         |
  0+40       1.2671     42.50  |V   Q    |         |         |         |
  0+45       1.5818     45.70  | V   Q   |         |         |         |
  0+50       1.9181     48.82  | V   Q   |         |         |         |
  0+55       2.2623     49.99  |  V  Q   |         |         |         |
  1+ 0       2.6023     49.36  |  V  Q   |         |         |         |
  1+ 5       2.9572     51.53  |   V Q   |         |         |         |
  1+10       3.3574     58.11  |   V  Q  |         |         |         |
  1+15       3.8120     66.01  |    V  Q |         |         |         |
  1+20       4.3018     71.11  |    V   Q|         |         |         |
  1+25       4.8097     73.75  |     V  Q|         |         |         |
  1+30       5.3486     78.24  |      V  Q         |         |         |
  1+35       5.9400     85.87  |       V |Q        |         |         |
  1+40       6.5711     91.64  |        V| Q       |         |         |
  1+45       7.2319     95.94  |         V Q       |         |         |
  1+50       7.9495    104.19  |         |V Q      |         |         |
  1+55       8.7309    113.47  |         | V  Q    |         |         |
  2+ 0       9.5412    117.65  |         |  V Q    |         |         |
  2+ 5      10.3580    118.59  |         |   VQ    |         |         |
  2+10      11.2044    122.90  |         |    VQ   |         |         |
  2+15      12.1456    136.66  |         |     V Q |         |         |
  2+20      13.2268    156.99  |         |       V Q         |         |
  2+25      14.4309    174.83  |         |         V  Q      |         |
  2+30      15.7967    198.31  |         |         |V    Q   |         |
  2+35      17.4574    241.14  |         |         |   V     | Q       |
  2+40      19.4010    282.21  |         |         |     V   |      Q  |
  2+45      21.3936    289.33  |         |         |        V|       Q |
  2+50      23.1031    248.22  |         |         |         | VQ      |
  2+55      24.3770    184.97  |         |         |   Q     |  V      |
  3+ 0      25.3300    138.38  |         |       Q |         |    V    |
  3+ 5      26.0785    108.68  |         |   Q     |         |     V   |
  3+10      26.6490     82.84  |         |Q        |         |      V  |
  3+15      27.0721     61.43  |       Q |         |         |      V  |
```

```
   3+20      27.3977     47.28  |     Q   |         |         |       V |
   3+25      27.6593     37.99  |    Q    |         |         |       V |
   3+30      27.8743     31.21  |   Q     |         |         |       V |
   3+35      28.0521     25.82  |  Q      |         |         |       V |
   3+40      28.2010     21.62  | Q       |         |         |        V|
   3+45      28.3254     18.05  | Q       |         |         |        V|
   3+50      28.4283     14.95  |Q        |         |         |        V|
   3+55      28.5145     12.51  |Q        |         |         |        V|
   4+ 0      28.5852     10.26  |Q        |         |         |        V|
   4+ 5      28.6408      8.07  |Q        |         |         |        V|
   4+10      28.6888      6.98  Q         |         |         |        V|
   4+15      28.7262      5.44  Q         |         |         |        V|
   4+20      28.7537      3.99  Q         |         |         |        V|
   4+25      28.7690      2.23  Q         |         |         |        V|
   4+30      28.7751      0.88  Q         |         |         |        V|
   4+35      28.7792      0.59  Q         |         |         |        V|
   4+40      28.7817      0.37  Q         |         |         |        V|
   4+45      28.7823      0.08  Q         |         |         |        V|
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE TOTAL 100-YEAR, 6-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB6100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	1.00	235.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	2.50	588.75

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 = 99.92 %
Adjusted average point rain = 2.498(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	(0.147)	0.075	0.075
2	0.17	0.60	0.180	(0.147)	0.090	0.090
3	0.25	0.60	0.180	(0.147)	0.090	0.090
4	0.33	0.60	0.180	(0.147)	0.090	0.090
5	0.42	0.60	0.180	(0.147)	0.090	0.090
6	0.50	0.70	0.210	(0.147)	0.105	0.105
7	0.58	0.70	0.210	(0.147)	0.105	0.105
8	0.67	0.70	0.210	(0.147)	0.105	0.105
9	0.75	0.70	0.210	(0.147)	0.105	0.105
10	0.83	0.70	0.210	(0.147)	0.105	0.105
11	0.92	0.70	0.210	(0.147)	0.105	0.105
12	1.00	0.80	0.240	(0.147)	0.120	0.120
13	1.08	0.80	0.240	(0.147)	0.120	0.120
14	1.17	0.80	0.240	(0.147)	0.120	0.120
15	1.25	0.80	0.240	(0.147)	0.120	0.120
16	1.33	0.80	0.240	(0.147)	0.120	0.120
17	1.42	0.80	0.240	(0.147)	0.120	0.120

18	1.50	0.80	0.240	(0.147)	0.120	0.120
19	1.58	0.80	0.240	(0.147)	0.120	0.120
20	1.67	0.80	0.240	(0.147)	0.120	0.120
21	1.75	0.80	0.240	(0.147)	0.120	0.120
22	1.83	0.80	0.240	(0.147)	0.120	0.120
23	1.92	0.80	0.240	(0.147)	0.120	0.120
24	2.00	0.90	0.270	(0.147)	0.135	0.135
25	2.08	0.80	0.240	(0.147)	0.120	0.120
26	2.17	0.90	0.270	(0.147)	0.135	0.135
27	2.25	0.90	0.270	(0.147)	0.135	0.135
28	2.33	0.90	0.270	(0.147)	0.135	0.135
29	2.42	0.90	0.270	(0.147)	0.135	0.135
30	2.50	0.90	0.270	(0.147)	0.135	0.135
31	2.58	0.90	0.270	(0.147)	0.135	0.135
32	2.67	0.90	0.270	(0.147)	0.135	0.135
33	2.75	1.00	0.300	0.147	(0.150)	0.153
34	2.83	1.00	0.300	0.147	(0.150)	0.153
35	2.92	1.00	0.300	0.147	(0.150)	0.153
36	3.00	1.00	0.300	0.147	(0.150)	0.153
37	3.08	1.00	0.300	0.147	(0.150)	0.153
38	3.17	1.10	0.330	0.147	(0.165)	0.183
39	3.25	1.10	0.330	0.147	(0.165)	0.183
40	3.33	1.10	0.330	0.147	(0.165)	0.183
41	3.42	1.20	0.360	0.147	(0.180)	0.213
42	3.50	1.30	0.390	0.147	(0.195)	0.243
43	3.58	1.40	0.420	0.147	(0.210)	0.273
44	3.67	1.40	0.420	0.147	(0.210)	0.273
45	3.75	1.50	0.450	0.147	(0.225)	0.303
46	3.83	1.50	0.450	0.147	(0.225)	0.303
47	3.92	1.60	0.480	0.147	(0.240)	0.333
48	4.00	1.60	0.480	0.147	(0.240)	0.333
49	4.08	1.70	0.510	0.147	(0.255)	0.363
50	4.17	1.80	0.540	0.147	(0.270)	0.393
51	4.25	1.90	0.570	0.147	(0.285)	0.423
52	4.33	2.00	0.600	0.147	(0.300)	0.453
53	4.42	2.10	0.629	0.147	(0.315)	0.483
54	4.50	2.10	0.629	0.147	(0.315)	0.483
55	4.58	2.20	0.659	0.147	(0.330)	0.513
56	4.67	2.30	0.689	0.147	(0.345)	0.543
57	4.75	2.40	0.719	0.147	(0.360)	0.573
58	4.83	2.40	0.719	0.147	(0.360)	0.573
59	4.92	2.50	0.749	0.147	(0.375)	0.603
60	5.00	2.60	0.779	0.147	(0.390)	0.633
61	5.08	3.10	0.929	0.147	(0.465)	0.783
62	5.17	3.60	1.079	0.147	(0.540)	0.933
63	5.25	3.90	1.169	0.147	(0.585)	1.022
64	5.33	4.20	1.259	0.147	(0.629)	1.112
65	5.42	4.70	1.409	0.147	(0.704)	1.262
66	5.50	5.60	1.679	0.147	(0.839)	1.532
67	5.58	1.90	0.570	0.147	(0.285)	0.423

```
68   5.67     0.90      0.270       (  0.147)       0.135        0.135
69   5.75     0.60      0.180       (  0.147)       0.090        0.090
70   5.83     0.50      0.150       (  0.147)       0.075        0.075
71   5.92     0.30      0.090       (  0.147)       0.045        0.045
72   6.00     0.20      0.060       (  0.147)       0.030        0.030
               (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    20.8
      Flood volume = Effective rainfall      1.73(In)
       times area     235.5(Ac.)/[(In)/(Ft.)] =      34.0(Ac.Ft)
      Total soil loss =      0.77(In)
      Total soil loss =    15.057(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =     1479549.8 Cubic Feet
      Total soil loss =      655882.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =    249.777(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       75.0     150.0     225.0     300.0
-----------------------------------------------------------------------
  0+ 5       0.0047      0.68  Q         |         |         |         |
  0+10       0.0291      3.54  Q         |         |         |         |
  0+15       0.0873      8.46  VQ        |         |         |         |
  0+20       0.1748     12.71  VQ        |         |         |         |
  0+25       0.2789     15.11  V Q       |         |         |         |
  0+30       0.3933     16.61  V Q       |         |         |         |
  0+35       0.5180     18.11  V Q       |         |         |         |
  0+40       0.6538     19.72  V Q       |         |         |         |
  0+45       0.7982     20.97  V Q       |         |         |         |
  0+50       0.9482     21.79  |VQ       |         |         |         |
  0+55       1.1023     22.37  |VQ       |         |         |         |
  1+ 0       1.2604     22.96  |V Q      |         |         |         |
  1+ 5       1.4248     23.87  |V Q      |         |         |         |
  1+10       1.5975     25.07  |V Q      |         |         |         |
  1+15       1.7767     26.02  | VQ      |         |         |         |
  1+20       1.9598     26.59  | VQ      |         |         |         |
  1+25       2.1456     26.98  | VQ      |         |         |         |
  1+30       2.3335     27.28  | VQ      |         |         |         |
  1+35       2.5231     27.53  | VQ      |         |         |         |
  1+40       2.7141     27.73  |  Q      |         |         |         |
  1+45       2.9063     27.91  |  Q      |         |         |         |
  1+50       3.0998     28.09  |  Q      |         |         |         |
  1+55       3.2939     28.18  |  Q      |         |         |         |
  2+ 0       3.4893     28.37  |  QV     |         |         |         |
```

```
2+ 5       3.6878     28.83  |  QV     |         |         |         |
2+10       3.8899     29.34  |  QV     |         |         |         |
2+15       4.0946     29.73  |  QV     |         |         |         |
2+20       4.3033     30.30  |   QV    |         |         |         |
2+25       4.5157     30.85  |   QV    |         |         |         |
2+30       4.7303     31.16  |   QV    |         |         |         |
2+35       4.9461     31.34  |   QV    |         |         |         |
2+40       5.1629     31.48  |   Q V   |         |         |         |
2+45       5.3817     31.76  |   Q V   |         |         |         |
2+50       5.6055     32.50  |   Q V   |         |         |         |
2+55       5.8371     33.63  |   Q V   |         |         |         |
3+ 0       6.0748     34.51  |   Q  V  |         |         |         |
3+ 5       6.3157     34.98  |   Q  V  |         |         |         |
3+10       6.5604     35.53  |   Q  V  |         |         |         |
3+15       6.8141     36.84  |   Q   V |         |         |         |
3+20       7.0811     38.76  |    Q  V |         |         |         |
3+25       7.3601     40.52  |    Q  V |         |         |         |
3+30       7.6540     42.68  |    Q   V|         |         |         |
3+35       7.9728     46.28  |     Q  V|         |         |         |
3+40       8.3230     50.85  |     Q  V|         |         |         |
3+45       8.7033     55.21  |      Q  V         |         |         |
3+50       9.1094     58.98  |      Q  V         |         |         |
3+55       9.5406     62.60  |       Q |V        |         |         |
4+ 0       9.9961     66.14  |       Q |V        |         |         |
4+ 5      10.4760     69.69  |        Q| V       |         |         |
4+10      10.9821     73.49  |        Q| V       |         |         |
4+15      11.5203     78.14  |         Q  V      |         |         |
4+20      12.0967     83.69  |         |Q  V     |         |         |
4+25      12.7144     89.69  |         |Q  V     |         |         |
4+30      13.3734     95.69  |         | Q  V    |         |         |
4+35      14.0691    101.02  |         |  Q  V   |         |         |
4+40      14.7980    105.83  |         |   Q  V  |         |         |
4+45      15.5635    111.15  |         |   Q   V |         |         |
4+50      16.3689    116.95  |         |    Q   V|         |         |
4+55      17.2112    122.29  |         |     Q   V         |         |
5+ 0      18.0866    127.11  |         |     Q   |V        |         |
5+ 5      19.0063    133.53  |         |      Q  | V       |         |
5+10      20.0055    145.09  |         |        Q|  V      |         |
5+15      21.1310    163.43  |         |         |Q  V     |         |
5+20      22.4062    185.15  |         |         |   Q V   |         |
5+25      23.8302    206.77  |         |         |      QV |         |
5+30      25.4189    230.69  |         |         |        VQ         |
5+35      27.1392    249.78  |         |         |         |V Q      |
5+40      28.7655    236.15  |         |         |         |Q V      |
5+45      30.0125    181.06  |         |         |   Q     |    V    |
5+50      30.8703    124.55  |         |     Q   |         |     V   |
5+55      31.4958     90.82  |         | Q       |         |      V  |
6+ 0      31.9876     71.42  |        Q|         |         |      V  |
6+ 5      32.3814     57.17  |      Q  |         |         |       V |
6+10      32.6941     45.40  |     Q   |         |         |       V |
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    6+15      32.9420     35.99  |   Q     |         |         |       V |
    6+20      33.1401     28.76  |  Q      |         |         |        V|
    6+25      33.3022     23.54  |  Q      |         |         |        V|
    6+30      33.4376     19.66  | Q       |         |         |        V|
    6+35      33.5513     16.51  | Q       |         |         |        V|
    6+40      33.6448     13.58  |Q        |         |         |        V|
    6+45      33.7218     11.19  |Q        |         |         |        V|
    6+50      33.7855      9.25  |Q        |         |         |        V|
    6+55      33.8373      7.51  |Q        |         |         |        V|
    7+ 0      33.8783      5.96  Q        |         |         |        V|
    7+ 5      33.9109      4.73  Q        |         |         |        V|
    7+10      33.9361      3.66  Q        |         |         |        V|
    7+15      33.9538      2.56  Q        |         |         |        V|
    7+20      33.9597      0.86  Q        |         |         |        V|
    7+25      33.9623      0.38  Q        |         |         |        V|
    7+30      33.9640      0.24  Q        |         |         |        V|
    7+35      33.9650      0.15  Q        |         |         |        V|
    7+40      33.9655      0.08  Q        |         |         |        V|
    7+45      33.9658      0.03  Q        |         |         |         V
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE TOTAL 100-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB24100.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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	1.60	376.80

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	4.00	942.00

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 = 99.95 %
Adjusted average point rain = 3.998(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	(0.260)	0.016	0.016
2	0.17	0.07	0.032	(0.259)	0.016	0.016
3	0.25	0.07	0.032	(0.258)	0.016	0.016
4	0.33	0.10	0.048	(0.257)	0.024	0.024
5	0.42	0.10	0.048	(0.256)	0.024	0.024
6	0.50	0.10	0.048	(0.255)	0.024	0.024
7	0.58	0.10	0.048	(0.254)	0.024	0.024
8	0.67	0.10	0.048	(0.253)	0.024	0.024
9	0.75	0.10	0.048	(0.252)	0.024	0.024
10	0.83	0.13	0.064	(0.251)	0.032	0.032
11	0.92	0.13	0.064	(0.250)	0.032	0.032
12	1.00	0.13	0.064	(0.249)	0.032	0.032
13	1.08	0.10	0.048	(0.248)	0.024	0.024
14	1.17	0.10	0.048	(0.247)	0.024	0.024
15	1.25	0.10	0.048	(0.246)	0.024	0.024
16	1.33	0.10	0.048	(0.245)	0.024	0.024
17	1.42	0.10	0.048	(0.244)	0.024	0.024

18	1.50	0.10	0.048	(0.243)	0.024	0.024
19	1.58	0.10	0.048	(0.242)	0.024	0.024
20	1.67	0.10	0.048	(0.241)	0.024	0.024
21	1.75	0.10	0.048	(0.240)	0.024	0.024
22	1.83	0.13	0.064	(0.239)	0.032	0.032
23	1.92	0.13	0.064	(0.238)	0.032	0.032
24	2.00	0.13	0.064	(0.237)	0.032	0.032
25	2.08	0.13	0.064	(0.236)	0.032	0.032
26	2.17	0.13	0.064	(0.235)	0.032	0.032
27	2.25	0.13	0.064	(0.234)	0.032	0.032
28	2.33	0.13	0.064	(0.233)	0.032	0.032
29	2.42	0.13	0.064	(0.232)	0.032	0.032
30	2.50	0.13	0.064	(0.231)	0.032	0.032
31	2.58	0.17	0.080	(0.231)	0.040	0.040
32	2.67	0.17	0.080	(0.230)	0.040	0.040
33	2.75	0.17	0.080	(0.229)	0.040	0.040
34	2.83	0.17	0.080	(0.228)	0.040	0.040
35	2.92	0.17	0.080	(0.227)	0.040	0.040
36	3.00	0.17	0.080	(0.226)	0.040	0.040
37	3.08	0.17	0.080	(0.225)	0.040	0.040
38	3.17	0.17	0.080	(0.224)	0.040	0.040
39	3.25	0.17	0.080	(0.223)	0.040	0.040
40	3.33	0.17	0.080	(0.222)	0.040	0.040
41	3.42	0.17	0.080	(0.221)	0.040	0.040
42	3.50	0.17	0.080	(0.220)	0.040	0.040
43	3.58	0.17	0.080	(0.219)	0.040	0.040
44	3.67	0.17	0.080	(0.218)	0.040	0.040
45	3.75	0.17	0.080	(0.217)	0.040	0.040
46	3.83	0.20	0.096	(0.217)	0.048	0.048
47	3.92	0.20	0.096	(0.216)	0.048	0.048
48	4.00	0.20	0.096	(0.215)	0.048	0.048
49	4.08	0.20	0.096	(0.214)	0.048	0.048
50	4.17	0.20	0.096	(0.213)	0.048	0.048
51	4.25	0.20	0.096	(0.212)	0.048	0.048
52	4.33	0.23	0.112	(0.211)	0.056	0.056
53	4.42	0.23	0.112	(0.210)	0.056	0.056
54	4.50	0.23	0.112	(0.209)	0.056	0.056
55	4.58	0.23	0.112	(0.208)	0.056	0.056
56	4.67	0.23	0.112	(0.208)	0.056	0.056
57	4.75	0.23	0.112	(0.207)	0.056	0.056
58	4.83	0.27	0.128	(0.206)	0.064	0.064
59	4.92	0.27	0.128	(0.205)	0.064	0.064
60	5.00	0.27	0.128	(0.204)	0.064	0.064
61	5.08	0.20	0.096	(0.203)	0.048	0.048
62	5.17	0.20	0.096	(0.202)	0.048	0.048
63	5.25	0.20	0.096	(0.201)	0.048	0.048
64	5.33	0.23	0.112	(0.200)	0.056	0.056
65	5.42	0.23	0.112	(0.200)	0.056	0.056
66	5.50	0.23	0.112	(0.199)	0.056	0.056
67	5.58	0.27	0.128	(0.198)	0.064	0.064

68	5.67	0.27	0.128	(0.197)	0.064	0.064
69	5.75	0.27	0.128	(0.196)	0.064	0.064
70	5.83	0.27	0.128	(0.195)	0.064	0.064
71	5.92	0.27	0.128	(0.194)	0.064	0.064
72	6.00	0.27	0.128	(0.193)	0.064	0.064
73	6.08	0.30	0.144	(0.193)	0.072	0.072
74	6.17	0.30	0.144	(0.192)	0.072	0.072
75	6.25	0.30	0.144	(0.191)	0.072	0.072
76	6.33	0.30	0.144	(0.190)	0.072	0.072
77	6.42	0.30	0.144	(0.189)	0.072	0.072
78	6.50	0.30	0.144	(0.188)	0.072	0.072
79	6.58	0.33	0.160	(0.188)	0.080	0.080
80	6.67	0.33	0.160	(0.187)	0.080	0.080
81	6.75	0.33	0.160	(0.186)	0.080	0.080
82	6.83	0.33	0.160	(0.185)	0.080	0.080
83	6.92	0.33	0.160	(0.184)	0.080	0.080
84	7.00	0.33	0.160	(0.183)	0.080	0.080
85	7.08	0.33	0.160	(0.182)	0.080	0.080
86	7.17	0.33	0.160	(0.182)	0.080	0.080
87	7.25	0.33	0.160	(0.181)	0.080	0.080
88	7.33	0.37	0.176	(0.180)	0.088	0.088
89	7.42	0.37	0.176	(0.179)	0.088	0.088
90	7.50	0.37	0.176	(0.178)	0.088	0.088
91	7.58	0.40	0.192	(0.178)	0.096	0.096
92	7.67	0.40	0.192	(0.177)	0.096	0.096
93	7.75	0.40	0.192	(0.176)	0.096	0.096
94	7.83	0.43	0.208	(0.175)	0.104	0.104
95	7.92	0.43	0.208	(0.174)	0.104	0.104
96	8.00	0.43	0.208	(0.173)	0.104	0.104
97	8.08	0.50	0.240	(0.173)	0.120	0.120
98	8.17	0.50	0.240	(0.172)	0.120	0.120
99	8.25	0.50	0.240	(0.171)	0.120	0.120
100	8.33	0.50	0.240	(0.170)	0.120	0.120
101	8.42	0.50	0.240	(0.169)	0.120	0.120
102	8.50	0.50	0.240	(0.169)	0.120	0.120
103	8.58	0.53	0.256	(0.168)	0.128	0.128
104	8.67	0.53	0.256	(0.167)	0.128	0.128
105	8.75	0.53	0.256	(0.166)	0.128	0.128
106	8.83	0.57	0.272	(0.166)	0.136	0.136
107	8.92	0.57	0.272	(0.165)	0.136	0.136
108	9.00	0.57	0.272	(0.164)	0.136	0.136
109	9.08	0.63	0.304	(0.163)	0.152	0.152
110	9.17	0.63	0.304	(0.162)	0.152	0.152
111	9.25	0.63	0.304	(0.162)	0.152	0.152
112	9.33	0.67	0.320	(0.161)	0.160	0.160
113	9.42	0.67	0.320	(0.160)	0.160	0.160
114	9.50	0.67	0.320	0.159	(0.160)	0.161
115	9.58	0.70	0.336	0.159	(0.168)	0.177
116	9.67	0.70	0.336	0.158	(0.168)	0.178
117	9.75	0.70	0.336	0.157	(0.168)	0.179

118	9.83	0.73	0.352		0.156	(0.176)	0.196
119	9.92	0.73	0.352		0.156	(0.176)	0.196
120	10.00	0.73	0.352		0.155	(0.176)	0.197
121	10.08	0.50	0.240	(	0.154)	0.120	0.120
122	10.17	0.50	0.240	(	0.153)	0.120	0.120
123	10.25	0.50	0.240	(	0.153)	0.120	0.120
124	10.33	0.50	0.240	(	0.152)	0.120	0.120
125	10.42	0.50	0.240	(	0.151)	0.120	0.120
126	10.50	0.50	0.240	(	0.150)	0.120	0.120
127	10.58	0.67	0.320		0.150	(0.160)	0.170
128	10.67	0.67	0.320		0.149	(0.160)	0.171
129	10.75	0.67	0.320		0.148	(0.160)	0.172
130	10.83	0.67	0.320		0.147	(0.160)	0.172
131	10.92	0.67	0.320		0.147	(0.160)	0.173
132	11.00	0.67	0.320		0.146	(0.160)	0.174
133	11.08	0.63	0.304		0.145	(0.152)	0.159
134	11.17	0.63	0.304		0.145	(0.152)	0.159
135	11.25	0.63	0.304		0.144	(0.152)	0.160
136	11.33	0.63	0.304		0.143	(0.152)	0.161
137	11.42	0.63	0.304		0.142	(0.152)	0.161
138	11.50	0.63	0.304		0.142	(0.152)	0.162
139	11.58	0.57	0.272	(	0.141)	0.136	0.136
140	11.67	0.57	0.272	(	0.140)	0.136	0.136
141	11.75	0.57	0.272	(	0.140)	0.136	0.136
142	11.83	0.60	0.288		0.139	(0.144)	0.149
143	11.92	0.60	0.288		0.138	(0.144)	0.150
144	12.00	0.60	0.288		0.138	(0.144)	0.150
145	12.08	0.83	0.400		0.137	(0.200)	0.263
146	12.17	0.83	0.400		0.136	(0.200)	0.264
147	12.25	0.83	0.400		0.135	(0.200)	0.264
148	12.33	0.87	0.416		0.135	(0.208)	0.281
149	12.42	0.87	0.416		0.134	(0.208)	0.282
150	12.50	0.87	0.416		0.133	(0.208)	0.282
151	12.58	0.93	0.448		0.133	(0.224)	0.315
152	12.67	0.93	0.448		0.132	(0.224)	0.316
153	12.75	0.93	0.448		0.131	(0.224)	0.316
154	12.83	0.97	0.464		0.131	(0.232)	0.333
155	12.92	0.97	0.464		0.130	(0.232)	0.334
156	13.00	0.97	0.464		0.129	(0.232)	0.334
157	13.08	1.13	0.544		0.129	(0.272)	0.415
158	13.17	1.13	0.544		0.128	(0.272)	0.416
159	13.25	1.13	0.544		0.127	(0.272)	0.416
160	13.33	1.13	0.544		0.127	(0.272)	0.417
161	13.42	1.13	0.544		0.126	(0.272)	0.418
162	13.50	1.13	0.544		0.126	(0.272)	0.418
163	13.58	0.77	0.368		0.125	(0.184)	0.243
164	13.67	0.77	0.368		0.124	(0.184)	0.244
165	13.75	0.77	0.368		0.124	(0.184)	0.244
166	13.83	0.77	0.368		0.123	(0.184)	0.245
167	13.92	0.77	0.368		0.122	(0.184)	0.245

168	14.00	0.77	0.368	0.122	(0.184)	0.246
169	14.08	0.90	0.432	0.121	(0.216)	0.311
170	14.17	0.90	0.432	0.121	(0.216)	0.311
171	14.25	0.90	0.432	0.120	(0.216)	0.312
172	14.33	0.87	0.416	0.119	(0.208)	0.297
173	14.42	0.87	0.416	0.119	(0.208)	0.297
174	14.50	0.87	0.416	0.118	(0.208)	0.298
175	14.58	0.87	0.416	0.117	(0.208)	0.298
176	14.67	0.87	0.416	0.117	(0.208)	0.299
177	14.75	0.87	0.416	0.116	(0.208)	0.300
178	14.83	0.83	0.400	0.116	(0.200)	0.284
179	14.92	0.83	0.400	0.115	(0.200)	0.285
180	15.00	0.83	0.400	0.114	(0.200)	0.285
181	15.08	0.80	0.384	0.114	(0.192)	0.270
182	15.17	0.80	0.384	0.113	(0.192)	0.271
183	15.25	0.80	0.384	0.113	(0.192)	0.271
184	15.33	0.77	0.368	0.112	(0.184)	0.256
185	15.42	0.77	0.368	0.112	(0.184)	0.256
186	15.50	0.77	0.368	0.111	(0.184)	0.257
187	15.58	0.63	0.304	0.110	(0.152)	0.193
188	15.67	0.63	0.304	0.110	(0.152)	0.194
189	15.75	0.63	0.304	0.109	(0.152)	0.195
190	15.83	0.63	0.304	0.109	(0.152)	0.195
191	15.92	0.63	0.304	0.108	(0.152)	0.196
192	16.00	0.63	0.304	0.108	(0.152)	0.196
193	16.08	0.13	0.064	(0.107)	0.032	0.032
194	16.17	0.13	0.064	(0.107)	0.032	0.032
195	16.25	0.13	0.064	(0.106)	0.032	0.032
196	16.33	0.13	0.064	(0.105)	0.032	0.032
197	16.42	0.13	0.064	(0.105)	0.032	0.032
198	16.50	0.13	0.064	(0.104)	0.032	0.032
199	16.58	0.10	0.048	(0.104)	0.024	0.024
200	16.67	0.10	0.048	(0.103)	0.024	0.024
201	16.75	0.10	0.048	(0.103)	0.024	0.024
202	16.83	0.10	0.048	(0.102)	0.024	0.024
203	16.92	0.10	0.048	(0.102)	0.024	0.024
204	17.00	0.10	0.048	(0.101)	0.024	0.024
205	17.08	0.17	0.080	(0.101)	0.040	0.040
206	17.17	0.17	0.080	(0.100)	0.040	0.040
207	17.25	0.17	0.080	(0.100)	0.040	0.040
208	17.33	0.17	0.080	(0.099)	0.040	0.040
209	17.42	0.17	0.080	(0.099)	0.040	0.040
210	17.50	0.17	0.080	(0.098)	0.040	0.040
211	17.58	0.17	0.080	(0.098)	0.040	0.040
212	17.67	0.17	0.080	(0.097)	0.040	0.040
213	17.75	0.17	0.080	(0.097)	0.040	0.040
214	17.83	0.13	0.064	(0.096)	0.032	0.032
215	17.92	0.13	0.064	(0.096)	0.032	0.032
216	18.00	0.13	0.064	(0.095)	0.032	0.032
217	18.08	0.13	0.064	(0.095)	0.032	0.032

218	18.17	0.13	0.064	(0.094)	0.032	0.032
219	18.25	0.13	0.064	(0.094)	0.032	0.032
220	18.33	0.13	0.064	(0.093)	0.032	0.032
221	18.42	0.13	0.064	(0.093)	0.032	0.032
222	18.50	0.13	0.064	(0.093)	0.032	0.032
223	18.58	0.10	0.048	(0.092)	0.024	0.024
224	18.67	0.10	0.048	(0.092)	0.024	0.024
225	18.75	0.10	0.048	(0.091)	0.024	0.024
226	18.83	0.07	0.032	(0.091)	0.016	0.016
227	18.92	0.07	0.032	(0.090)	0.016	0.016
228	19.00	0.07	0.032	(0.090)	0.016	0.016
229	19.08	0.10	0.048	(0.090)	0.024	0.024
230	19.17	0.10	0.048	(0.089)	0.024	0.024
231	19.25	0.10	0.048	(0.089)	0.024	0.024
232	19.33	0.13	0.064	(0.088)	0.032	0.032
233	19.42	0.13	0.064	(0.088)	0.032	0.032
234	19.50	0.13	0.064	(0.087)	0.032	0.032
235	19.58	0.10	0.048	(0.087)	0.024	0.024
236	19.67	0.10	0.048	(0.087)	0.024	0.024
237	19.75	0.10	0.048	(0.086)	0.024	0.024
238	19.83	0.07	0.032	(0.086)	0.016	0.016
239	19.92	0.07	0.032	(0.085)	0.016	0.016
240	20.00	0.07	0.032	(0.085)	0.016	0.016
241	20.08	0.10	0.048	(0.085)	0.024	0.024
242	20.17	0.10	0.048	(0.084)	0.024	0.024
243	20.25	0.10	0.048	(0.084)	0.024	0.024
244	20.33	0.10	0.048	(0.084)	0.024	0.024
245	20.42	0.10	0.048	(0.083)	0.024	0.024
246	20.50	0.10	0.048	(0.083)	0.024	0.024
247	20.58	0.10	0.048	(0.083)	0.024	0.024
248	20.67	0.10	0.048	(0.082)	0.024	0.024
249	20.75	0.10	0.048	(0.082)	0.024	0.024
250	20.83	0.07	0.032	(0.082)	0.016	0.016
251	20.92	0.07	0.032	(0.081)	0.016	0.016
252	21.00	0.07	0.032	(0.081)	0.016	0.016
253	21.08	0.10	0.048	(0.081)	0.024	0.024
254	21.17	0.10	0.048	(0.080)	0.024	0.024
255	21.25	0.10	0.048	(0.080)	0.024	0.024
256	21.33	0.07	0.032	(0.080)	0.016	0.016
257	21.42	0.07	0.032	(0.079)	0.016	0.016
258	21.50	0.07	0.032	(0.079)	0.016	0.016
259	21.58	0.10	0.048	(0.079)	0.024	0.024
260	21.67	0.10	0.048	(0.078)	0.024	0.024
261	21.75	0.10	0.048	(0.078)	0.024	0.024
262	21.83	0.07	0.032	(0.078)	0.016	0.016
263	21.92	0.07	0.032	(0.078)	0.016	0.016
264	22.00	0.07	0.032	(0.077)	0.016	0.016
265	22.08	0.10	0.048	(0.077)	0.024	0.024
266	22.17	0.10	0.048	(0.077)	0.024	0.024
267	22.25	0.10	0.048	(0.077)	0.024	0.024

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268  22.33     0.07      0.032       (  0.076)       0.016        0.016
269  22.42     0.07      0.032       (  0.076)       0.016        0.016
270  22.50     0.07      0.032       (  0.076)       0.016        0.016
271  22.58     0.07      0.032       (  0.076)       0.016        0.016
272  22.67     0.07      0.032       (  0.076)       0.016        0.016
273  22.75     0.07      0.032       (  0.075)       0.016        0.016
274  22.83     0.07      0.032       (  0.075)       0.016        0.016
275  22.92     0.07      0.032       (  0.075)       0.016        0.016
276  23.00     0.07      0.032       (  0.075)       0.016        0.016
277  23.08     0.07      0.032       (  0.075)       0.016        0.016
278  23.17     0.07      0.032       (  0.074)       0.016        0.016
279  23.25     0.07      0.032       (  0.074)       0.016        0.016
280  23.33     0.07      0.032       (  0.074)       0.016        0.016
281  23.42     0.07      0.032       (  0.074)       0.016        0.016
282  23.50     0.07      0.032       (  0.074)       0.016        0.016
283  23.58     0.07      0.032       (  0.074)       0.016        0.016
284  23.67     0.07      0.032       (  0.074)       0.016        0.016
285  23.75     0.07      0.032       (  0.073)       0.016        0.016
286  23.83     0.07      0.032       (  0.073)       0.016        0.016
287  23.92     0.07      0.032       (  0.073)       0.016        0.016
288  24.00     0.07      0.032       (  0.073)       0.016        0.016
                (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    28.2
      Flood volume = Effective rainfall      2.35(In)
       times area     235.5(Ac.)/[(In)/(Ft.)] =      46.2(Ac.Ft)
      Total soil loss =      1.64(In)
      Total soil loss =    32.281(Ac.Ft)
      Total rainfall =      4.00(In)
      Flood volume =     2011715.0 Cubic Feet
      Total soil loss =     1406172.2 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     92.977(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       25.0      50.0      75.0     100.0
 ---------------------------------------------------------------------
   0+ 5       0.0010      0.15  Q         |         |         |         |
   0+10       0.0060      0.73  Q         |         |         |         |
   0+15       0.0174      1.66  Q         |         |         |         |
   0+20       0.0343      2.45  Q         |         |         |         |
   0+25       0.0558      3.11  VQ        |         |         |         |
   0+30       0.0819      3.79  VQ        |         |         |         |
   0+35       0.1116      4.32  VQ        |         |         |         |
   0+40       0.1435      4.63  VQ        |         |         |         |
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0+45       0.1767      4.83  VQ        |         |         |         |
0+50       0.2116      5.07  V Q       |         |         |         |
0+55       0.2494      5.48  V Q       |         |         |         |
1+ 0       0.2911      6.05  V Q       |         |         |         |
1+ 5       0.3353      6.42  V Q       |         |         |         |
1+10       0.3793      6.39  V Q       |         |         |         |
1+15       0.4213      6.09  V Q       |         |         |         |
1+20       0.4616      5.86  V Q       |         |         |         |
1+25       0.5014      5.78  V Q       |         |         |         |
1+30       0.5411      5.76  V Q       |         |         |         |
1+35       0.5807      5.75  V Q       |         |         |         |
1+40       0.6203      5.75  V Q       |         |         |         |
1+45       0.6598      5.75  V Q       |         |         |         |
1+50       0.7000      5.83  V Q       |         |         |         |
1+55       0.7421      6.11  V Q       |         |         |         |
2+ 0       0.7873      6.58  V Q       |         |         |         |
2+ 5       0.8351      6.94  V Q       |         |         |         |
2+10       0.8841      7.11  V Q       |         |         |         |
2+15       0.9338      7.21  V Q       |         |         |         |
2+20       0.9840      7.29  V Q       |         |         |         |
2+25       1.0346      7.35  V Q       |         |         |         |
2+30       1.0855      7.39  V Q       |         |         |         |
2+35       1.1372      7.51  V  Q      |         |         |         |
2+40       1.1911      7.82  |V Q      |         |         |         |
2+45       1.2483      8.31  |V Q      |         |         |         |
2+50       1.3081      8.68  |V Q      |         |         |         |
2+55       1.3693      8.89  |V Q      |         |         |         |
3+ 0       1.4314      9.01  |V Q      |         |         |         |
3+ 5       1.4941      9.11  |V Q      |         |         |         |
3+10       1.5573      9.18  |V Q      |         |         |         |
3+15       1.6209      9.24  |V Q      |         |         |         |
3+20       1.6849      9.29  |V Q      |         |         |         |
3+25       1.7491      9.33  |V Q      |         |         |         |
3+30       1.8136      9.36  |V Q      |         |         |         |
3+35       1.8783      9.39  |V Q      |         |         |         |
3+40       1.9431      9.41  |V Q      |         |         |         |
3+45       2.0080      9.43  |V Q      |         |         |         |
3+50       2.0735      9.51  |V Q      |         |         |         |
3+55       2.1411      9.82  |V Q      |         |         |         |
4+ 0       2.2120     10.29  |V  Q     |         |         |         |
4+ 5       2.2854     10.66  |V  Q     |         |         |         |
4+10       2.3602     10.85  | V Q     |         |         |         |
4+15       2.4357     10.97  | V Q     |         |         |         |
4+20       2.5124     11.13  | V Q     |         |         |         |
4+25       2.5914     11.48  | V Q     |         |         |         |
4+30       2.6741     12.00  | V Q     |         |         |         |
4+35       2.7595     12.40  | V Q     |         |         |         |
4+40       2.8464     12.62  | V  Q    |         |         |         |
4+45       2.9342     12.75  | V  Q    |         |         |         |
4+50       3.0232     12.92  | V  Q    |         |         |         |
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4+55       3.1148     13.30  | V  Q    |          |          |          |
5+ 0       3.2100     13.83  | V  Q    |          |          |          |
5+ 5       3.3071     14.10  | V  Q    |          |          |          |
5+10       3.4018     13.75  | V  Q    |          |          |          |
5+15       3.4911     12.96  |  V Q    |          |          |          |
5+20       3.5766     12.42  |  VQ     |          |          |          |
5+25       3.6622     12.43  |  VQ     |          |          |          |
5+30       3.7501     12.75  |  V Q    |          |          |          |
5+35       3.8402     13.09  |  V Q    |          |          |          |
5+40       3.9331     13.48  |  V Q    |          |          |          |
5+45       4.0295     14.00  |  V Q    |          |          |          |
5+50       4.1286     14.39  |  V Q    |          |          |          |
5+55       4.2291     14.60  |  V Q    |          |          |          |
6+ 0       4.3305     14.73  |  V Q    |          |          |          |
6+ 5       4.4331     14.90  |  V Q    |          |          |          |
6+10       4.5382     15.25  |  V  Q   |          |          |          |
6+15       4.6468     15.77  |   V Q   |          |          |          |
6+20       4.7582     16.18  |   V Q   |          |          |          |
6+25       4.8711     16.40  |   V Q   |          |          |          |
6+30       4.9850     16.53  |   V Q   |          |          |          |
6+35       5.1001     16.72  |   V Q   |          |          |          |
6+40       5.2178     17.09  |   V Q   |          |          |          |
6+45       5.3391     17.62  |   V  Q  |          |          |          |
6+50       5.4632     18.02  |   V  Q  |          |          |          |
6+55       5.5889     18.26  |   V  Q  |          |          |          |
7+ 0       5.7157     18.41  |   V  Q  |          |          |          |
7+ 5       5.8433     18.53  |    V Q  |          |          |          |
7+10       5.9715     18.62  |    V Q  |          |          |          |
7+15       6.1002     18.69  |    V Q  |          |          |          |
7+20       6.2298     18.82  |    V Q  |          |          |          |
7+25       6.3618     19.16  |    V Q  |          |          |          |
7+30       6.4972     19.66  |    V Q  |          |          |          |
7+35       6.6358     20.12  |    V  Q |          |          |          |
7+40       6.7779     20.63  |    V  Q |          |          |          |
7+45       6.9240     21.22  |    V  Q |          |          |          |
7+50       7.0739     21.76  |     V Q |          |          |          |
7+55       7.2276     22.31  |     V Q |          |          |          |
8+ 0       7.3856     22.94  |     V  Q|          |          |          |
8+ 5       7.5480     23.58  |     V  Q|          |          |          |
8+10       7.7163     24.45  |     V  Q|          |          |          |
8+15       7.8924     25.57  |     V   Q          |          |          |
8+20       8.0745     26.44  |     V   Q          |          |          |
8+25       8.2600     26.93  |      V  Q          |          |          |
8+30       8.4475     27.23  |      V  Q          |          |          |
8+35       8.6372     27.54  |      V  |Q         |          |          |
8+40       8.8302     28.02  |      V  |Q         |          |          |
8+45       9.0274     28.64  |      V  |Q         |          |          |
8+50       9.2285     29.20  |      V  |Q         |          |          |
8+55       9.4336     29.78  |       V |Q         |          |          |
9+ 0       9.6432     30.44  |       V | Q        |          |          |
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 9+ 5       9.8574     31.10  |        V | Q       |         |         |
 9+10      10.0777     31.99  |        V | Q       |         |         |
 9+15      10.3058     33.12  |        V |  Q      |         |         |
 9+20      10.5406     34.08  |         V|  Q      |         |         |
 9+25      10.7807     34.87  |         V|  Q      |         |         |
 9+30      11.0263     35.66  |         V|   Q     |         |         |
 9+35      11.2773     36.44  |         V|   Q     |         |         |
 9+40      11.5353     37.47  |         V|   Q     |         |         |
 9+45      11.8023     38.77  |          V    Q    |         |         |
 9+50      12.0777     39.98  |          V    Q    |         |         |
 9+55      12.3616     41.23  |          V     Q   |         |         |
10+ 0      12.6553     42.65  |          V      Q  |         |         |
10+ 5      12.9520     43.08  |          |V     Q  |         |         |
10+10      13.2343     40.99  |          |V    Q   |         |         |
10+15      13.4889     36.96  |          |V  Q     |         |         |
10+20      13.7220     33.85  |          |V Q      |         |         |
10+25      13.9448     32.35  |          | Q       |         |         |
10+30      14.1619     31.53  |          | Q       |         |         |
10+35      14.3782     31.40  |          | Q       |         |         |
10+40      14.6039     32.78  |          | VQ      |         |         |
10+45      14.8478     35.40  |          | V Q     |         |         |
10+50      15.1058     37.46  |          |  VQ     |         |         |
10+55      15.3709     38.50  |          |  V Q    |         |         |
11+ 0      15.6404     39.13  |          |  V Q    |         |         |
11+ 5      15.9123     39.47  |          |  V Q    |         |         |
11+10      16.1828     39.27  |          |   VQ    |         |         |
11+15      16.4491     38.68  |          |   VQ    |         |         |
11+20      16.7126     38.27  |          |   VQ    |         |         |
11+25      16.9754     38.16  |          |   VQ    |         |         |
11+30      17.2384     38.18  |          |   VQ    |         |         |
11+35      17.5002     38.02  |          |    Q    |         |         |
11+40      17.7559     37.13  |          |   QV    |         |         |
11+45      18.0013     35.63  |          |   QV    |         |         |
11+50      18.2391     34.54  |          |  Q V    |         |         |
11+55      18.4765     34.47  |          |  Q  V   |         |         |
12+ 0      18.7172     34.95  |          |  Q  V   |         |         |
12+ 5      18.9678     36.39  |          |   Q V   |         |         |
12+10      19.2480     40.68  |          |     Q   |         |         |
12+15      19.5742     47.37  |          |     V Q |         |         |
12+20      19.9375     52.74  |          |      V  |Q        |         |
12+25      20.3233     56.02  |          |      V  | Q       |         |
12+30      20.7268     58.59  |          |      V  |  Q      |         |
12+35      21.1459     60.86  |          |       V |   Q     |         |
12+40      21.5825     63.39  |          |       V |    Q    |         |
12+45      22.0389     66.28  |          |        V|     Q   |         |
12+50      22.5123     68.73  |          |        V|      Q  |         |
12+55      22.9997     70.77  |          |        V|       Q |         |
13+ 0      23.5006     72.74  |          |         V        Q|         |
13+ 5      24.0175     75.05  |          |         V         Q         |
13+10      24.5621     79.08  |          |         |V        |Q        |
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13+15      25.1447     84.59  |         |         |V        |  Q      |
13+20      25.7569     88.89  |         |         | V       |    Q    |
13+25      26.3861     91.36  |         |         | V       |     Q   |
13+30      27.0264     92.98  |         |         |  V      |      Q  |
13+35      27.6645     92.66  |         |         |  V      |      Q  |
13+40      28.2659     87.31  |         |         |   V     |   Q     |
13+45      28.8026     77.93  |         |         |   V     |Q        |
13+50      29.2902     70.80  |         |         |    V  Q |         |
13+55      29.7539     67.33  |         |         |    VQ   |         |
14+ 0      30.2046     65.44  |         |         |     Q   |         |
14+ 5      30.6502     64.70  |         |         |    QV   |         |
14+10      31.1051     66.05  |         |         |     Q   |         |
14+15      31.5808     69.07  |         |         |      Q  |         |
14+20      32.0716     71.26  |         |         |      VQ |         |
14+25      32.5655     71.72  |         |         |       Q |         |
14+30      33.0569     71.34  |         |         |       Q |         |
14+35      33.5460     71.03  |         |         |       QV|         |
14+40      34.0345     70.92  |         |         |       QV|         |
14+45      34.5231     70.95  |         |         |       QV|         |
14+50      35.0114     70.90  |         |         |       Q V         |
14+55      35.4958     70.33  |         |         |       Q V         |
15+ 0      35.9740     69.43  |         |         |      Q  |V        |
15+ 5      36.4467     68.63  |         |         |      Q  |V        |
15+10      36.9134     67.77  |         |         |      Q  |V        |
15+15      37.3727     66.69  |         |         |     Q   | V       |
15+20      37.8250     65.67  |         |         |     Q   | V       |
15+25      38.2712     64.79  |         |         |    Q    |  V      |
15+30      38.7100     63.72  |         |         |    Q    |  V      |
15+35      39.1395     62.35  |         |         |   Q     |  V      |
15+40      39.5502     59.64  |         |         |  Q      |   V     |
15+45      39.9339     55.71  |         |         | Q       |   V     |
15+50      40.2971     52.74  |         |         |Q        |   V     |
15+55      40.6494     51.16  |         |         Q         |    V    |
16+ 0      40.9954     50.23  |         |         Q         |    V    |
16+ 5      41.3263     48.05  |         |        Q|         |    V    |
16+10      41.6125     41.56  |         |     Q   |         |     V   |
16+15      41.8299     31.56  |         | Q       |         |     V   |
16+20      41.9937     23.79  |        Q|         |         |     V   |
16+25      42.1294     19.71  |      Q  |         |         |     V   |
16+30      42.2482     17.24  |     Q   |         |         |     V   |
16+35      42.3536     15.31  |     Q   |         |         |     V   |
16+40      42.4469     13.55  |    Q    |         |         |     V   |
16+45      42.5291     11.93  |   Q     |         |         |     V   |
16+50      42.6020     10.60  |   Q     |         |         |     V   |
16+55      42.6685      9.65  |  Q      |         |         |     V   |
17+ 0      42.7300      8.93  |  Q      |         |         |      V  |
17+ 5      42.7883      8.47  |  Q      |         |         |      V  |
17+10      42.8470      8.52  |  Q      |         |         |      V  |
17+15      42.9091      9.01  |  Q      |         |         |      V  |
17+20      42.9734      9.34  |  Q      |         |         |      V  |
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17+25      43.0383      9.43  |  Q      |         |         |      V  |
17+30      43.1032      9.42  |  Q      |         |         |      V  |
17+35      43.1679      9.40  |  Q      |         |         |      V  |
17+40      43.2324      9.36  |  Q      |         |         |      V  |
17+45      43.2965      9.30  |  Q      |         |         |      V  |
17+50      43.3592      9.11  |  Q      |         |         |      V  |
17+55      43.4203      8.87  |  Q      |         |         |      V  |
18+ 0      43.4784      8.44  |  Q      |         |         |      V  |
18+ 5      43.5343      8.12  |  Q      |         |         |      V  |
18+10      43.5892      7.97  |  Q      |         |         |      V  |
18+15      43.6435      7.89  |  Q      |         |         |      V  |
18+20      43.6974      7.83  |  Q      |         |         |      V  |
18+25      43.7511      7.79  |  Q      |         |         |      V  |
18+30      43.8045      7.76  |  Q      |         |         |      V  |
18+35      43.8573      7.66  |  Q      |         |         |      V  |
18+40      43.9079      7.35  | Q       |         |         |       V |
18+45      43.9552      6.87  | Q       |         |         |       V |
18+50      43.9995      6.44  | Q       |         |         |       V |
18+55      44.0405      5.94  | Q       |         |         |       V |
19+ 0      44.0773      5.35  | Q       |         |         |       V |
19+ 5      44.1115      4.97  |Q        |         |         |       V |
19+10      44.1459      5.00  |Q        |         |         |       V |
19+15      44.1824      5.30  | Q       |         |         |       V |
19+20      44.2210      5.60  | Q       |         |         |       V |
19+25      44.2622      5.98  | Q       |         |         |       V |
19+30      44.3067      6.47  | Q       |         |         |       V |
19+35      44.3533      6.77  | Q       |         |         |       V |
19+40      44.3993      6.67  | Q       |         |         |       V |
19+45      44.4428      6.32  | Q       |         |         |       V |
19+50      44.4839      5.97  | Q       |         |         |       V |
19+55      44.5222      5.56  | Q       |         |         |       V |
20+ 0      44.5568      5.03  | Q       |         |         |       V |
20+ 5      44.5892      4.70  |Q        |         |         |       V |
20+10      44.6221      4.78  |Q        |         |         |       V |
20+15      44.6574      5.12  | Q       |         |         |       V |
20+20      44.6944      5.37  | Q       |         |         |       V |
20+25      44.7322      5.49  | Q       |         |         |       V |
20+30      44.7703      5.54  | Q       |         |         |       V |
20+35      44.8087      5.57  | Q       |         |         |       V |
20+40      44.8473      5.60  | Q       |         |         |       V |
20+45      44.8860      5.62  | Q       |         |         |       V |
20+50      44.9244      5.57  | Q       |         |         |       V |
20+55      44.9608      5.29  | Q       |         |         |       V |
21+ 0      44.9941      4.83  |Q        |         |         |       V |
21+ 5      45.0254      4.55  |Q        |         |         |       V |
21+10      45.0575      4.66  |Q        |         |         |        V|
21+15      45.0921      5.02  | Q       |         |         |        V|
21+20      45.1280      5.22  | Q       |         |         |        V|
21+25      45.1629      5.06  | Q       |         |         |        V|
21+30      45.1949      4.65  |Q        |         |         |        V|
```

```
21+35      45.2252      4.40  |Q        |         |         |        V|
21+40      45.2566      4.55  |Q        |         |         |        V|
21+45      45.2906      4.94  |Q        |         |         |        V|
21+50      45.3262      5.17  | Q       |         |         |        V|
21+55      45.3607      5.01  | Q       |         |         |        V|
22+ 0      45.3925      4.62  |Q        |         |         |        V|
22+ 5      45.4226      4.38  |Q        |         |         |        V|
22+10      45.4538      4.52  |Q        |         |         |        V|
22+15      45.4876      4.91  |Q        |         |         |        V|
22+20      45.5230      5.14  | Q       |         |         |        V|
22+25      45.5573      4.99  |Q        |         |         |        V|
22+30      45.5890      4.59  |Q        |         |         |        V|
22+35      45.6185      4.28  |Q        |         |         |        V|
22+40      45.6470      4.14  |Q        |         |         |        V|
22+45      45.6750      4.07  |Q        |         |         |        V|
22+50      45.7027      4.02  |Q        |         |         |        V|
22+55      45.7301      3.98  |Q        |         |         |        V|
23+ 0      45.7573      3.94  |Q        |         |         |        V|
23+ 5      45.7842      3.91  |Q        |         |         |        V|
23+10      45.8110      3.89  |Q        |         |         |        V|
23+15      45.8377      3.88  |Q        |         |         |        V|
23+20      45.8644      3.87  |Q        |         |         |        V|
23+25      45.8909      3.86  |Q        |         |         |        V|
23+30      45.9174      3.84  |Q        |         |         |        V|
23+35      45.9437      3.83  |Q        |         |         |        V|
23+40      45.9701      3.82  |Q        |         |         |        V|
23+45      45.9964      3.82  |Q        |         |         |        V|
23+50      46.0227      3.82  |Q        |         |         |        V|
23+55      46.0489      3.81  |Q        |         |         |        V|
24+ 0      46.0752      3.81  |Q        |         |         |        V|
24+ 5      46.1003      3.65  |Q        |         |         |        V|
24+10      46.1215      3.07  |Q        |         |         |        V|
24+15      46.1362      2.14  Q         |         |         |        V|
24+20      46.1460      1.42  Q         |         |         |        V|
24+25      46.1532      1.05  Q         |         |         |        V|
24+30      46.1589      0.83  Q         |         |         |        V|
24+35      46.1635      0.67  Q         |         |         |        V|
24+40      46.1673      0.55  Q         |         |         |        V|
24+45      46.1704      0.45  Q         |         |         |        V|
24+50      46.1729      0.37  Q         |         |         |        V|
24+55      46.1750      0.30  Q         |         |         |        V|
25+ 0      46.1767      0.25  Q         |         |         |        V|
25+ 5      46.1782      0.21  Q         |         |         |        V|
25+10      46.1793      0.17  Q         |         |         |        V|
25+15      46.1802      0.13  Q         |         |         |        V|
25+20      46.1810      0.11  Q         |         |         |        V|
25+25      46.1815      0.08  Q         |         |         |        V|
25+30      46.1820      0.06  Q         |         |         |        V|
25+35      46.1823      0.05  Q         |         |         |        V|
25+40      46.1825      0.03  Q         |         |         |        V|
```

```
   25+45      46.1826      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE EAST OF SHERMAN 100-YEAR, 1-HOUR UNIT HYDROGRAPH

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

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
              Study date  01/19/24 File: A11TRIB1000SERIES1100.out


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

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


Program License Serial Number 6584

-------------------------------------------------------------------
 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' = 0.030
Lag time =    0.210 Hr.
Lag time =    12.59 Min.
25% of lag time =     3.15 Min.
40% of lag time =     5.04 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]
       65.60           0.50                 32.80

100 YEAR Area rainfall data:


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

```
       65.60          1.20                 78.72

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 =   99.94 %
Adjusted average point rain =    1.199(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
---------------------------------------------------------------------
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         39.715          4.310              2.849
    2   0.167         79.431         17.664             11.678
    3   0.250        119.146         26.597             17.584
    4   0.333        158.861         17.586             11.626
    5   0.417        198.577          8.605              5.689
    6   0.500        238.292          5.406              3.574
    7   0.583        278.007          4.028              2.663
    8   0.667        317.722          3.104              2.052
    9   0.750        357.438          2.445              1.616
   10   0.833        397.153          1.957              1.294
   11   0.917        436.868          1.542              1.020
   12   1.000        476.584          1.254              0.829
   13   1.083        516.299          1.169              0.773
   14   1.167        556.014          0.927              0.613
   15   1.250        595.730          0.772              0.510
   16   1.333        635.445          0.652              0.431
   17   1.417        675.160          0.525              0.347
   18   1.500        714.876          0.408              0.270
   19   1.583        754.591          0.397              0.263
```

```
          20   1.667        794.306          0.397              0.263
          21   1.750        834.021          0.256              0.169
                                     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	4.20	0.604	0.243	(0.302)	0.361
2	0.17	4.30	0.619	0.243	(0.309)	0.376
3	0.25	5.00	0.720	0.243	(0.360)	0.476
4	0.33	5.00	0.720	0.243	(0.360)	0.476
5	0.42	5.80	0.835	0.243	(0.417)	0.591
6	0.50	6.50	0.935	0.243	(0.468)	0.692
7	0.58	7.40	1.065	0.243	(0.532)	0.822
8	0.67	8.60	1.238	0.243	(0.619)	0.994
9	0.75	12.30	1.770	0.243	(0.885)	1.527
10	0.83	29.10	4.188	0.243	(2.094)	3.945
11	0.92	6.80	0.979	0.243	(0.489)	0.735
12	1.00	5.00	0.720	0.243	(0.360)	0.476
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.5

```
      Flood volume = Effective rainfall      0.96(In)
       times area      65.6(Ac.)/[(In)/(Ft.)] =       5.2(Ac.Ft)
      Total soil loss =      0.24(In)
      Total soil loss =     1.330(Ac.Ft)
      Total rainfall =      1.20(In)
      Flood volume =      227645.3 Cubic Feet
      Total soil loss =       57938.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =    110.832(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       50.0     100.0     150.0     200.0
 ---------------------------------------------------------------------
   0+ 5       0.0071      1.03  Q         |         |         |         |
   0+10       0.0435      5.29  VQ        |         |         |         |
   0+15       0.1268     12.10  V Q       |         |         |         |
   0+20       0.2490     17.73  |V Q      |         |         |         |
   0+25       0.4008     22.05  |  VQ     |         |         |         |
   0+30       0.5815     26.23  |   VQ    |         |         |         |
   0+35       0.7977     31.39  |     Q   |         |         |         |
   0+40       1.0569     37.65  |      QV |         |         |         |
   0+45       1.3749     46.17  |        QV         |         |         |
   0+50       1.8261     65.51  |         |  Q      |         |         |
   0+55       2.5006     97.94  |         |        Q|         |         |
   1+ 0       3.2639    110.83  |         |         | Q V     |         |
   1+ 5       3.8348     82.89  |         |     Q   |        V|         |
```

```
   1+10       4.1961     52.46  |         Q         |         | V       |
   1+15       4.4299     33.95  |     Q   |         |         |  V      |
   1+20       4.5942     23.86  |   Q     |         |         |    V    |
   1+25       4.7197     18.21  |  Q      |         |         |     V   |
   1+30       4.8189     14.40  | Q       |         |         |     V   |
   1+35       4.8987     11.59  | Q       |         |         |      V  |
   1+40       4.9633      9.38  |Q        |         |         |      V  |
   1+45       5.0168      7.77  |Q        |         |         |       V |
   1+50       5.0626      6.66  |Q        |         |         |       V |
   1+55       5.1000      5.42  |Q        |         |         |        V|
   2+ 0       5.1308      4.48  Q         |         |         |        V|
   2+ 5       5.1560      3.66  Q         |         |         |        V|
   2+10       5.1763      2.94  Q         |         |         |        V|
   2+15       5.1923      2.33  Q         |         |         |        V|
   2+20       5.2058      1.97  Q         |         |         |        V|
   2+25       5.2170      1.62  Q         |         |         |        V|
   2+30       5.2237      0.98  Q         |         |         |        V|
   2+35       5.2255      0.25  Q         |         |         |        V|
   2+40       5.2260      0.08  Q         |         |         |         V
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE EAST OF SHERMAN 100-YEAR, 3-HOUR UNIT HYDROGRAPH

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

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
              Study date  01/19/24 File: A11TRIB1000SERIES3100.out


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


Program License Serial Number 6584

-------------------------------------------------------------------
 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' = 0.030
Lag time =    0.210 Hr.
Lag time =    12.59 Min.
25% of lag time =     3.15 Min.
40% of lag time =     5.04 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]
       65.60           0.80                 52.48

100 YEAR Area rainfall data:


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

65.60 1.90 124.64

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 = 99.97 %
Adjusted average point rain = 1.899(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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.715	4.310	2.849
2	0.167	79.431	17.664	11.678
3	0.250	119.146	26.597	17.584
4	0.333	158.861	17.586	11.626
5	0.417	198.577	8.605	5.689
6	0.500	238.292	5.406	3.574
7	0.583	278.007	4.028	2.663
8	0.667	317.722	3.104	2.052
9	0.750	357.438	2.445	1.616
10	0.833	397.153	1.957	1.294
11	0.917	436.868	1.542	1.020
12	1.000	476.584	1.254	0.829
13	1.083	516.299	1.169	0.773
14	1.167	556.014	0.927	0.613
15	1.250	595.730	0.772	0.510
16	1.333	635.445	0.652	0.431
17	1.417	675.160	0.525	0.347
18	1.500	714.876	0.408	0.270
19	1.583	754.591	0.397	0.263
20	1.667	794.306	0.397	0.263
21	1.750	834.021	0.256	0.169

```
                                    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	1.30	0.296	(0.243)	0.148	0.148
2	0.17	1.30	0.296	(0.243)	0.148	0.148
3	0.25	1.10	0.251	(0.243)	0.125	0.125
4	0.33	1.50	0.342	(0.243)	0.171	0.171
5	0.42	1.50	0.342	(0.243)	0.171	0.171
6	0.50	1.80	0.410	(0.243)	0.205	0.205
7	0.58	1.50	0.342	(0.243)	0.171	0.171
8	0.67	1.80	0.410	(0.243)	0.205	0.205
9	0.75	1.80	0.410	(0.243)	0.205	0.205
10	0.83	1.50	0.342	(0.243)	0.171	0.171
11	0.92	1.60	0.365	(0.243)	0.182	0.182
12	1.00	1.80	0.410	(0.243)	0.205	0.205
13	1.08	2.20	0.501	0.243	(0.251)	0.258
14	1.17	2.20	0.501	0.243	(0.251)	0.258
15	1.25	2.20	0.501	0.243	(0.251)	0.258
16	1.33	2.00	0.456	(0.243)	0.228	0.228
17	1.42	2.60	0.593	0.243	(0.296)	0.349
18	1.50	2.70	0.615	0.243	(0.308)	0.372
19	1.58	2.40	0.547	0.243	(0.274)	0.304
20	1.67	2.70	0.615	0.243	(0.308)	0.372
21	1.75	3.30	0.752	0.243	(0.376)	0.509
22	1.83	3.10	0.707	0.243	(0.353)	0.463
23	1.92	2.90	0.661	0.243	(0.331)	0.418
24	2.00	3.00	0.684	0.243	(0.342)	0.440
25	2.08	3.10	0.707	0.243	(0.353)	0.463
26	2.17	4.20	0.957	0.243	(0.479)	0.714
27	2.25	5.00	1.140	0.243	(0.570)	0.896
28	2.33	3.50	0.798	0.243	(0.399)	0.554
29	2.42	6.80	1.550	0.243	(0.775)	1.307
30	2.50	7.30	1.664	0.243	(0.832)	1.421
31	2.58	8.20	1.869	0.243	(0.935)	1.626
32	2.67	5.90	1.345	0.243	(0.672)	1.102
33	2.75	2.00	0.456	(0.243)	0.228	0.228
34	2.83	1.80	0.410	(0.243)	0.205	0.205
35	2.92	1.80	0.410	(0.243)	0.205	0.205
36	3.00	0.60	0.137	(0.243)	0.068	0.068
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	15.1

```
   Flood volume = Effective rainfall      1.26(In)
    times area      65.6(Ac.)/[(In)/(Ft.)] =       6.9(Ac.Ft)
   Total soil loss =      0.64(In)
   Total soil loss =     3.492(Ac.Ft)
   Total rainfall =      1.90(In)
   Flood volume =      300193.7 Cubic Feet
   Total soil loss =      152119.7 Cubic Feet
   ----------------------------------------------------------------------
    Peak flow rate of this hydrograph =     75.350(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 20.0 40.0 60.0 80.0
0+ 5	0.0029	0.42	Q | | | |
0+10	0.0177	2.15	VQ | | | |
0+15	0.0501	4.69	V Q | | | |
0+20	0.0933	6.28	V Q | | | |
0+25	0.1433	7.26	V Q | | | |
0+30	0.2013	8.42	|V Q | | | |
0+35	0.2669	9.52	|V Q | | | |
0+40	0.3378	10.30	|V Q | | | |
0+45	0.4124	10.84	| V Q | | | |
0+50	0.4910	11.41	| V Q | | | |
0+55	0.5707	11.57	| V Q | | | |
1+ 0	0.6499	11.50	| V Q | | | |
1+ 5	0.7323	11.97	| VQ | | | |
1+10	0.8227	13.12	| V Q | | | |
1+15	0.9220	14.42	| V Q | | | |
1+20	1.0264	15.16	| V Q | | | |
1+25	1.1338	15.60	| VQ | | | |
1+30	1.2500	16.86	| VQ | | | |
1+35	1.3805	18.95	| VQ| | | |
1+40	1.5195	20.18	| V Q | | |
1+45	1.6652	21.17	| VQ | | |
1+50	1.8279	23.62	| VQ | | |
1+55	2.0083	26.19	| |V Q | | |
2+ 0	2.1942	26.99	| | VQ | | |
2+ 5	2.3807	27.09	| | Q | | |
2+10	2.5765	28.42	| | Q | | |
2+15	2.8015	32.67	| | Q | | |
2+20	3.0685	38.78	| | V Q| | |
2+25	3.3675	43.40	| | V|Q | |
2+30	3.7139	50.31	| | |V Q | |
2+35	4.1521	63.62	| | | V |Q |
2+40	4.6674	74.82	| | | V | Q |
2+45	5.1864	75.35	| | | V Q |
2+50	5.6103	61.55	| | | Q V |
2+55	5.9091	43.40	| | |Q | V |
3+ 0	6.1300	32.07	| | Q | | V |
3+ 5	6.3033	25.17	| | Q | | V |
3+10	6.4337	18.92	| Q| | | V |
3+15	6.5296	13.94	| Q | | | V |
3+20	6.6032	10.68	| Q | | | V |
3+25	6.6622	8.56	| Q | | | V |
3+30	6.7100	6.95	| Q | | | V |
3+35	6.7495	5.73	| Q | | | V|
3+40	6.7821	4.73	| Q | | | V|
3+45	6.8087	3.87	|Q | | | V|
3+50	6.8304	3.15	|Q | | | V|
3+55	6.8477	2.52	|Q | | | V|
4+ 0	6.8616	2.01	|Q | | | V|

```
   4+ 5       6.8729      1.63  Q         |         |         |        V|
   4+10       6.8812      1.21  Q         |         |         |        V|
   4+15       6.8866      0.78  Q         |         |         |        V|
   4+20       6.8892      0.38  Q         |         |         |        V|
   4+25       6.8903      0.16  Q         |         |         |        V|
   4+30       6.8911      0.11  Q         |         |         |        V|
   4+35       6.8914      0.05  Q         |         |         |        V|
   4+40       6.8915      0.01  Q         |         |         |        V|
----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE EAST OF SHERMAN 100-YEAR, 6-HOUR UNIT HYDROGRAPH

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

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
              Study date  01/19/24 File: A11TRIB1000SERIES6100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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


Program License Serial Number 6584

-------------------------------------------------------------------
 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' = 0.030
Lag time =    0.210 Hr.
Lag time =    12.59 Min.
25% of lag time =     3.15 Min.
40% of lag time =     5.04 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]
       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         39.715          4.310              2.849
    2   0.167         79.431         17.664             11.678
    3   0.250        119.146         26.597             17.584
    4   0.333        158.861         17.586             11.626
    5   0.417        198.577          8.605              5.689
    6   0.500        238.292          5.406              3.574
    7   0.583        278.007          4.028              2.663
    8   0.667        317.722          3.104              2.052
    9   0.750        357.438          2.445              1.616
   10   0.833        397.153          1.957              1.294
   11   0.917        436.868          1.542              1.020
   12   1.000        476.584          1.254              0.829
   13   1.083        516.299          1.169              0.773
   14   1.167        556.014          0.927              0.613
   15   1.250        595.730          0.772              0.510
   16   1.333        635.445          0.652              0.431
   17   1.417        675.160          0.525              0.347
   18   1.500        714.876          0.408              0.270
   19   1.583        754.591          0.397              0.263
   20   1.667        794.306          0.397              0.263
   21   1.750        834.021          0.256              0.169
```

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 =     64.821(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       17.5      35.0      52.5      70.0
-----------------------------------------------------------------------
  0+ 5       0.0015      0.21  Q         |         |         |         |
  0+10       0.0093      1.13  Q         |         |         |         |
  0+15       0.0274      2.63  VQ        |         |         |         |
  0+20       0.0533      3.76  V Q       |         |         |         |
  0+25       0.0833      4.36  V Q       |         |         |         |
  0+30       0.1161      4.76  V Q       |         |         |         |
  0+35       0.1519      5.19  V Q       |         |         |         |
  0+40       0.1908      5.65  V  Q      |         |         |         |
  0+45       0.2319      5.97  |V Q      |         |         |         |
  0+50       0.2745      6.18  |V Q      |         |         |         |
  0+55       0.3180      6.33  |V Q      |         |         |         |
  1+ 0       0.3627      6.49  |V Q      |         |         |         |
```

```
1+ 5       0.4093      6.77  |V Q      |         |         |         |
1+10       0.4583      7.11  | V Q     |         |         |         |
1+15       0.5090      7.35  | V Q     |         |         |         |
1+20       0.5606      7.49  | V Q     |         |         |         |
1+25       0.6129      7.59  | V Q     |         |         |         |
1+30       0.6657      7.67  |  VQ     |         |         |         |
1+35       0.7189      7.73  |  VQ     |         |         |         |
1+40       0.7726      7.79  |  VQ     |         |         |         |
1+45       0.8265      7.83  |  VQ     |         |         |         |
1+50       0.8806      7.85  |   Q     |         |         |         |
1+55       0.9348      7.87  |   Q     |         |         |         |
2+ 0       0.9894      7.93  |   Q     |         |         |         |
2+ 5       1.0450      8.07  |   QV    |         |         |         |
2+10       1.1016      8.22  |   QV    |         |         |         |
2+15       1.1588      8.31  |   QV    |         |         |         |
2+20       1.2173      8.49  |   QV    |         |         |         |
2+25       1.2768      8.64  |   Q V   |         |         |         |
2+30       1.3368      8.71  |   Q V   |         |         |         |
2+35       1.3971      8.76  |    QV   |         |         |         |
2+40       1.4577      8.80  |    QV   |         |         |         |
2+45       1.5187      8.86  |    Q V  |         |         |         |
2+50       1.5811      9.06  |    Q V  |         |         |         |
2+55       1.6454      9.34  |    Q V  |         |         |         |
3+ 0       1.7111      9.53  |    Q  V |         |         |         |
3+ 5       1.7773      9.62  |    Q  V |         |         |         |
3+10       1.8444      9.73  |    Q  V |         |         |         |
3+15       1.9129      9.95  |    Q   V|         |         |         |
3+20       1.9835     10.25  |    Q   V|         |         |         |
3+25       2.0559     10.50  |     Q  V|         |         |         |
3+30       2.1304     10.83  |     Q   V         |         |         |
3+35       2.2088     11.38  |     Q   V         |         |         |
3+40       2.2918     12.05  |     Q   V         |         |         |
3+45       2.3791     12.66  |      Q  |V        |         |         |
3+50       2.4699     13.19  |      Q  |V        |         |         |
3+55       2.5642     13.70  |      Q  | V       |         |         |
4+ 0       2.6620     14.20  |       Q | V       |         |         |
4+ 5       2.7635     14.73  |       Q |  V      |         |         |
4+10       2.8699     15.45  |       Q |  V      |         |         |
4+15       2.9838     16.55  |        Q|   V     |         |         |
4+20       3.1076     17.97  |         Q   V     |         |         |
4+25       3.2422     19.54  |         |Q   V    |         |         |
4+30       3.3877     21.12  |         | Q   V   |         |         |
4+35       3.5427     22.51  |         | Q   V   |         |         |
4+40       3.7063     23.76  |         |  Q   V  |         |         |
4+45       3.8802     25.24  |         |   Q   V |         |         |
4+50       4.0650     26.84  |         |    Q   V|         |         |
4+55       4.2597     28.26  |         |     Q   V         |         |
5+ 0       4.4632     29.55  |         |     Q   |V        |         |
5+ 5       4.6795     31.40  |         |      Q  | V       |         |
5+10       4.9195     34.86  |         |        Q|  V      |         |
5+15       5.1973     40.34  |         |         |  QV     |         |
5+20       5.5180     46.56  |         |         |     Q   |         |
5+25       5.8803     52.61  |         |         |       V Q         |
5+30       6.2897     59.45  |         |         |         V  Q      |
5+35       6.7362     64.82  |         |         |         | V    Q  |
5+40       7.1462     59.54  |         |         |         |   Q     |
5+45       7.4418     42.92  |         |         |   Q     |    V    |
```

```
   5+50       7.6425     29.14  |         |     Q   |         |     V   |
   5+55       7.7919     21.69  |         | Q       |         |      V  |
   6+ 0       7.9097     17.11  |        Q|         |         |      V  |
   6+ 5       8.0031     13.56  |      Q  |         |         |       V |
   6+10       8.0762     10.61  |     Q   |         |         |       V |
   6+15       8.1329      8.24  |   Q     |         |         |       V |
   6+20       8.1778      6.52  |  Q      |         |         |        V|
   6+25       8.2144      5.31  |  Q      |         |         |        V|
   6+30       8.2446      4.39  | Q       |         |         |        V|
   6+35       8.2691      3.56  | Q       |         |         |        V|
   6+40       8.2890      2.89  |Q        |         |         |        V|
   6+45       8.3052      2.34  |Q        |         |         |        V|
   6+50       8.3180      1.86  |Q        |         |         |        V|
   6+55       8.3279      1.44  Q         |         |         |        V|
   7+ 0       8.3356      1.12  Q         |         |         |        V|
   7+ 5       8.3411      0.80  Q         |         |         |        V|
   7+10       8.3442      0.45  Q         |         |         |        V|
   7+15       8.3453      0.16  Q         |         |         |        V|
   7+20       8.3459      0.09  Q         |         |         |        V|
   7+25       8.3463      0.05  Q         |         |         |        V|
   7+30       8.3465      0.03  Q         |         |         |        V|
   7+35       8.3466      0.02  Q         |         |         |        V|
   7+40       8.3467      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

EXISTING CONDITION OFFSITE EAST OF SHERMAN 100-YEAR, 24-HOUR UNIT HYDROGRAPH

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

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
              Study date  01/19/24 File: A11TRIB1000SERIES24100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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


Program License Serial Number 6584

-------------------------------------------------------------------
 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' = 0.030
Lag time =    0.210 Hr.
Lag time =    12.59 Min.
25% of lag time =     3.15 Min.
40% of lag time =     5.04 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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.715	4.310	2.849
2	0.167	79.431	17.664	11.678
3	0.250	119.146	26.597	17.584
4	0.333	158.861	17.586	11.626
5	0.417	198.577	8.605	5.689
6	0.500	238.292	5.406	3.574
7	0.583	278.007	4.028	2.663
8	0.667	317.722	3.104	2.052
9	0.750	357.438	2.445	1.616
10	0.833	397.153	1.957	1.294
11	0.917	436.868	1.542	1.020
12	1.000	476.584	1.254	0.829
13	1.083	516.299	1.169	0.773
14	1.167	556.014	0.927	0.613
15	1.250	595.730	0.772	0.510
16	1.333	635.445	0.652	0.431
17	1.417	675.160	0.525	0.347
18	1.500	714.876	0.408	0.270
19	1.583	754.591	0.397	0.263
20	1.667	794.306	0.397	0.263
21	1.750	834.021	0.256	0.169

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

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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
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 =     20.657(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
 ----------------------------------------------------------------------
   0+ 5       0.0003      0.05  Q         |         |         |         |
   0+10       0.0019      0.23  Q         |         |         |         |
   0+15       0.0055      0.51  Q         |         |         |         |
   0+20       0.0104      0.72  Q         |         |         |         |
   0+25       0.0167      0.91  VQ        |         |         |         |
   0+30       0.0243      1.11  VQ        |         |         |         |
   0+35       0.0328      1.24  VQ        |         |         |         |
   0+40       0.0419      1.32  VQ        |         |         |         |
   0+45       0.0514      1.37  VQ        |         |         |         |
   0+50       0.0613      1.44  VQ        |         |         |         |
   0+55       0.0721      1.56  V Q       |         |         |         |
   1+ 0       0.0840      1.73  V Q       |         |         |         |
   1+ 5       0.0966      1.82  V Q       |         |         |         |
   1+10       0.1089      1.79  V Q       |         |         |         |
   1+15       0.1206      1.70  V Q       |         |         |         |
   1+20       0.1319      1.64  V Q       |         |         |         |
   1+25       0.1431      1.62  V Q       |         |         |         |
   1+30       0.1542      1.61  V Q       |         |         |         |
   1+35       0.1653      1.61  V Q       |         |         |         |
   1+40       0.1763      1.61  V Q       |         |         |         |
   1+45       0.1874      1.61  V Q       |         |         |         |
   1+50       0.1986      1.63  V Q       |         |         |         |
   1+55       0.2105      1.72  V Q       |         |         |         |
   2+ 0       0.2233      1.86  V Q       |         |         |         |
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2+ 5       0.2367      1.95  V Q       |         |         |         |
2+10       0.2504      1.99  V Q       |         |         |         |
2+15       0.2643      2.02  V Q       |         |         |         |
2+20       0.2784      2.04  V Q       |         |         |         |
2+25       0.2925      2.06  |VQ       |         |         |         |
2+30       0.3068      2.07  |VQ       |         |         |         |
2+35       0.3212      2.10  |VQ       |         |         |         |
2+40       0.3364      2.20  |VQ       |         |         |         |
2+45       0.3525      2.34  |V Q      |         |         |         |
2+50       0.3693      2.44  |V Q      |         |         |         |
2+55       0.3865      2.49  |V Q      |         |         |         |
3+ 0       0.4039      2.53  |V Q      |         |         |         |
3+ 5       0.4215      2.55  |V Q      |         |         |         |
3+10       0.4392      2.57  |V Q      |         |         |         |
3+15       0.4570      2.59  |V Q      |         |         |         |
3+20       0.4749      2.60  |V Q      |         |         |         |
3+25       0.4929      2.61  |V Q      |         |         |         |
3+30       0.5109      2.62  |V Q      |         |         |         |
3+35       0.5289      2.62  |V Q      |         |         |         |
3+40       0.5470      2.63  |V Q      |         |         |         |
3+45       0.5652      2.63  | VQ      |         |         |         |
3+50       0.5835      2.66  | VQ      |         |         |         |
3+55       0.6024      2.75  | VQ      |         |         |         |
4+ 0       0.6224      2.90  | VQ      |         |         |         |
4+ 5       0.6430      2.99  | VQ      |         |         |         |
4+10       0.6639      3.04  | V Q     |         |         |         |
4+15       0.6851      3.07  | V Q     |         |         |         |
4+20       0.7065      3.11  | V Q     |         |         |         |
4+25       0.7287      3.22  | V Q     |         |         |         |
4+30       0.7520      3.38  | V Q     |         |         |         |
4+35       0.7760      3.48  | V Q     |         |         |         |
4+40       0.8003      3.53  | V Q     |         |         |         |
4+45       0.8249      3.57  | V Q     |         |         |         |
4+50       0.8498      3.62  |  VQ     |         |         |         |
4+55       0.8755      3.73  |  VQ     |         |         |         |
5+ 0       0.9023      3.89  |  V Q    |         |         |         |
5+ 5       0.9296      3.95  |  V Q    |         |         |         |
5+10       0.9559      3.82  |  V Q    |         |         |         |
5+15       0.9806      3.58  |  VQ     |         |         |         |
5+20       1.0043      3.45  |  VQ     |         |         |         |
5+25       1.0282      3.47  |  VQ     |         |         |         |
5+30       1.0528      3.57  |  VQ     |         |         |         |
5+35       1.0780      3.66  |  VQ     |         |         |         |
5+40       1.1040      3.78  |  V Q    |         |         |         |
5+45       1.1311      3.93  |   VQ    |         |         |         |
5+50       1.1589      4.03  |   VQ    |         |         |         |
5+55       1.1870      4.08  |   VQ    |         |         |         |
6+ 0       1.2153      4.12  |   VQ    |         |         |         |
6+ 5       1.2440      4.16  |   VQ    |         |         |         |
6+10       1.2735      4.27  |   VQ    |         |         |         |
6+15       1.3040      4.43  |   VQ    |         |         |         |
6+20       1.3352      4.53  |   V Q   |         |         |         |
6+25       1.3668      4.59  |   V Q   |         |         |         |
6+30       1.3986      4.63  |   V Q   |         |         |         |
6+35       1.4308      4.67  |    VQ   |         |         |         |
6+40       1.4638      4.79  |    VQ   |         |         |         |
6+45       1.4979      4.95  |    VQ   |         |         |         |
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 6+50       1.5327      5.05  |    VQ   |         |         |         |
 6+55       1.5679      5.11  |    VQ   |         |         |         |
 7+ 0       1.6034      5.15  |    VQ   |         |         |         |
 7+ 5       1.6390      5.18  |    VQ   |         |         |         |
 7+10       1.6749      5.20  |    VQ   |         |         |         |
 7+15       1.7109      5.22  |     Q   |         |         |         |
 7+20       1.7471      5.26  |     VQ  |         |         |         |
 7+25       1.7840      5.36  |     VQ  |         |         |         |
 7+30       1.8220      5.51  |     VQ  |         |         |         |
 7+35       1.8608      5.64  |     VQ  |         |         |         |
 7+40       1.9006      5.78  |     VQ  |         |         |         |
 7+45       1.9417      5.96  |     VQ  |         |         |         |
 7+50       1.9837      6.10  |      VQ |         |         |         |
 7+55       2.0268      6.26  |      VQ |         |         |         |
 8+ 0       2.0711      6.44  |      VQ |         |         |         |
 8+ 5       2.1167      6.61  |      VQ |         |         |         |
 8+10       2.1640      6.87  |      V Q|         |         |         |
 8+15       2.2136      7.20  |      V Q|         |         |         |
 8+20       2.2648      7.43  |       VQ|         |         |         |
 8+25       2.3168      7.55  |       V Q         |         |         |
 8+30       2.3693      7.63  |       V Q         |         |         |
 8+35       2.4225      7.71  |       V Q         |         |         |
 8+40       2.4766      7.86  |       V Q         |         |         |
 8+45       2.5319      8.04  |        VQ         |         |         |
 8+50       2.5883      8.18  |        VQ         |         |         |
 8+55       2.6458      8.35  |        V|Q        |         |         |
 9+ 0       2.7046      8.54  |        V|Q        |         |         |
 9+ 5       2.7646      8.72  |        V|Q        |         |         |
 9+10       2.8265      8.98  |         VQ        |         |         |
 9+15       2.8907      9.32  |         V Q       |         |         |
 9+20       2.9565      9.57  |         V Q       |         |         |
 9+25       3.0239      9.78  |         V  Q      |         |         |
 9+30       3.0928     10.01  |         |V Q      |         |         |
 9+35       3.1630     10.18  |         |V Q      |         |         |
 9+40       3.2344     10.37  |         |V Q      |         |         |
 9+45       3.3073     10.58  |         |V  Q     |         |         |
 9+50       3.3813     10.75  |         | V Q     |         |         |
 9+55       3.4566     10.93  |         | V Q     |         |         |
10+ 0       3.5333     11.13  |         | V Q     |         |         |
10+ 5       3.6098     11.11  |         | V Q     |         |         |
10+10       3.6824     10.54  |         |  VQ     |         |         |
10+15       3.7487      9.62  |         | QV      |         |         |
10+20       3.8108      9.02  |         | QV      |         |         |
10+25       3.8709      8.73  |         |Q V      |         |         |
10+30       3.9299      8.56  |         |Q  V     |         |         |
10+35       3.9888      8.55  |         |Q  V     |         |         |
10+40       4.0503      8.92  |         |Q  V     |         |         |
10+45       4.1160      9.55  |         | Q V     |         |         |
10+50       4.1846      9.96  |         |  QV     |         |         |
10+55       4.2544     10.14  |         |  Q V    |         |         |
11+ 0       4.3250     10.24  |         |  Q V    |         |         |
11+ 5       4.3958     10.29  |         |  Q V    |         |         |
11+10       4.4664     10.25  |         |  Q V    |         |         |
11+15       4.5363     10.15  |         |  Q  V   |         |         |
11+20       4.6057     10.08  |         |  Q  V   |         |         |
11+25       4.6750     10.06  |         |  Q  V   |         |         |
11+30       4.7442     10.05  |         |  Q  V   |         |         |
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11+35       4.8131     10.00  |          |  Q   V  |         |         |
11+40       4.8806      9.81  |          |  Q   V  |         |         |
11+45       4.9462      9.52  |          | Q    V  |         |         |
11+50       5.0107      9.37  |          | Q    V  |         |         |
11+55       5.0753      9.38  |          | Q     V |         |         |
12+ 0       5.1405      9.46  |          | Q     V |         |         |
12+ 5       5.2071      9.68  |          | Q     V |         |         |
12+10       5.2784     10.35  |          |  Q    V |         |         |
12+15       5.3565     11.34  |          |    Q   V|         |         |
12+20       5.4392     12.01  |          |     Q  V|         |         |
12+25       5.5248     12.42  |          |     Q  V|         |         |
12+30       5.6127     12.76  |          |      Q  V         |         |
12+35       5.7026     13.05  |          |      Q  V         |         |
12+40       5.7951     13.44  |          |      Q  V         |         |
12+45       5.8910     13.92  |          |       Q |V        |         |
12+50       5.9896     14.32  |          |        Q|V        |         |
12+55       6.0912     14.74  |          |        Q|V        |         |
13+ 0       6.1959     15.21  |          |         Q V       |         |
13+ 5       6.3046     15.78  |          |         |QV       |         |
13+10       6.4214     16.95  |          |         | Q       |         |
13+15       6.5491     18.55  |          |         |  VQ     |         |
13+20       6.6844     19.64  |          |         |  V  Q   |         |
13+25       6.8238     20.24  |          |         |   V Q   |         |
13+30       6.9660     20.66  |          |         |   V  Q  |         |
13+35       7.1076     20.56  |          |         |    V Q  |         |
13+40       7.2388     19.05  |          |         |    Q    |         |
13+45       7.3530     16.58  |          |         | Q   V   |         |
13+50       7.4561     14.97  |          |        Q|     V   |         |
13+55       7.5540     14.22  |          |       Q |     V   |         |
14+ 0       7.6489     13.77  |          |       Q |      V  |         |
14+ 5       7.7424     13.59  |          |       Q |      V  |         |
14+10       7.8381     13.90  |          |       Q |      V  |         |
14+15       7.9383     14.55  |          |        Q|       V |         |
14+20       8.0411     14.93  |          |        Q|       V |         |
14+25       8.1440     14.93  |          |        Q|        V|         |
14+30       8.2457     14.77  |          |        Q|        V|         |
14+35       8.3468     14.67  |          |        Q|        V|         |
14+40       8.4478     14.66  |          |        Q|         V         |
14+45       8.5488     14.68  |          |        Q|         V         |
14+50       8.6497     14.65  |          |        Q|         V         |
14+55       8.7495     14.48  |          |        Q|         |V        |
15+ 0       8.8475     14.24  |          |       Q |         |V        |
15+ 5       8.9443     14.04  |          |       Q |         |V        |
15+10       9.0393     13.80  |          |       Q |         | V       |
15+15       9.1323     13.51  |          |       Q |         | V       |
15+20       9.2240     13.31  |          |      Q  |         | V       |
15+25       9.3142     13.09  |          |      Q  |         |  V      |
15+30       9.4025     12.82  |          |      Q  |         |  V      |
15+35       9.4889     12.54  |          |     Q   |         |  V      |
15+40       9.5720     12.07  |          |     Q   |         |   V     |
15+45       9.6508     11.44  |          |    Q    |         |   V     |
15+50       9.7266     11.01  |          |   Q     |         |   V     |
15+55       9.8008     10.78  |          |   Q     |         |    V    |
16+ 0       9.8740     10.62  |          |   Q     |         |    V    |
16+ 5       9.9440     10.16  |          |  Q      |         |    V    |
16+10      10.0037      8.67  |          |Q        |         |    V    |
16+15      10.0484      6.49  |        Q |         |         |    V    |
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16+20      10.0831      5.04  |     Q   |         |         |     V   |
16+25      10.1127      4.30  |    Q    |         |         |     V   |
16+30      10.1392      3.84  |    Q    |         |         |     V   |
16+35      10.1630      3.46  |   Q     |         |         |     V   |
16+40      10.1843      3.09  |   Q     |         |         |     V   |
16+45      10.2032      2.74  |  Q      |         |         |     V   |
16+50      10.2202      2.47  |  Q      |         |         |     V   |
16+55      10.2360      2.29  |  Q      |         |         |     V   |
17+ 0      10.2508      2.15  | Q       |         |         |     V   |
17+ 5      10.2651      2.07  | Q       |         |         |     V   |
17+10      10.2800      2.16  | Q       |         |         |     V   |
17+15      10.2963      2.36  |  Q      |         |         |     V   |
17+20      10.3134      2.49  |  Q      |         |         |     V   |
17+25      10.3308      2.53  |  Q      |         |         |     V   |
17+30      10.3484      2.55  |  Q      |         |         |     V   |
17+35      10.3660      2.55  |  Q      |         |         |      V  |
17+40      10.3835      2.55  |  Q      |         |         |      V  |
17+45      10.4011      2.55  |  Q      |         |         |      V  |
17+50      10.4186      2.55  |  Q      |         |         |      V  |
17+55      10.4356      2.47  |  Q      |         |         |      V  |
18+ 0      10.4517      2.34  |  Q      |         |         |      V  |
18+ 5      10.4672      2.25  |  Q      |         |         |      V  |
18+10      10.4824      2.22  | Q       |         |         |      V  |
18+15      10.4976      2.19  | Q       |         |         |      V  |
18+20      10.5126      2.18  | Q       |         |         |      V  |
18+25      10.5275      2.17  | Q       |         |         |      V  |
18+30      10.5424      2.16  | Q       |         |         |      V  |
18+35      10.5570      2.13  | Q       |         |         |      V  |
18+40      10.5710      2.03  | Q       |         |         |      V  |
18+45      10.5841      1.89  | Q       |         |         |      V  |
18+50      10.5962      1.77  | Q       |         |         |      V  |
18+55      10.6074      1.62  | Q       |         |         |      V  |
19+ 0      10.6174      1.45  |Q        |         |         |      V  |
19+ 5      10.6267      1.35  |Q        |         |         |      V  |
19+10      10.6362      1.38  |Q        |         |         |      V  |
19+15      10.6464      1.48  |Q        |         |         |       V |
19+20      10.6572      1.56  | Q       |         |         |       V |
19+25      10.6687      1.67  | Q       |         |         |       V |
19+30      10.6813      1.82  | Q       |         |         |       V |
19+35      10.6943      1.90  | Q       |         |         |       V |
19+40      10.7071      1.85  | Q       |         |         |       V |
19+45      10.7191      1.74  | Q       |         |         |       V |
19+50      10.7305      1.65  | Q       |         |         |       V |
19+55      10.7410      1.53  | Q       |         |         |       V |
20+ 0      10.7504      1.37  |Q        |         |         |       V |
20+ 5      10.7593      1.29  |Q        |         |         |       V |
20+10      10.7685      1.33  |Q        |         |         |       V |
20+15      10.7784      1.44  |Q        |         |         |       V |
20+20      10.7887      1.51  | Q       |         |         |       V |
20+25      10.7993      1.53  | Q       |         |         |       V |
20+30      10.8099      1.55  | Q       |         |         |       V |
20+35      10.8207      1.56  | Q       |         |         |       V |
20+40      10.8314      1.56  | Q       |         |         |       V |
20+45      10.8423      1.57  | Q       |         |         |       V |
20+50      10.8529      1.55  | Q       |         |         |       V |
20+55      10.8630      1.46  |Q        |         |         |       V |
21+ 0      10.8721      1.32  |Q        |         |         |       V |
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 21+ 5      10.8807      1.25  |Q        |         |         |       V |
 21+10      10.8896      1.30  |Q        |         |         |       V |
 21+15      10.8994      1.41  |Q        |         |         |       V |
 21+20      10.9094      1.46  |Q        |         |         |       V |
 21+25      10.9191      1.40  |Q        |         |         |       V |
 21+30      10.9278      1.27  |Q        |         |         |        V|
 21+35      10.9362      1.22  |Q        |         |         |        V|
 21+40      10.9450      1.28  |Q        |         |         |        V|
 21+45      10.9546      1.39  |Q        |         |         |        V|
 21+50      10.9646      1.45  |Q        |         |         |        V|
 21+55      10.9741      1.39  |Q        |         |         |        V|
 22+ 0      10.9829      1.26  |Q        |         |         |        V|
 22+ 5      10.9912      1.21  |Q        |         |         |        V|
 22+10      10.9999      1.27  |Q        |         |         |        V|
 22+15      11.0094      1.39  |Q        |         |         |        V|
 22+20      11.0194      1.44  |Q        |         |         |        V|
 22+25      11.0289      1.38  |Q        |         |         |        V|
 22+30      11.0375      1.26  |Q        |         |         |        V|
 22+35      11.0457      1.18  |Q        |         |         |        V|
 22+40      11.0536      1.15  |Q        |         |         |        V|
 22+45      11.0614      1.13  |Q        |         |         |        V|
 22+50      11.0690      1.11  |Q        |         |         |        V|
 22+55      11.0766      1.10  |Q        |         |         |        V|
 23+ 0      11.0841      1.09  |Q        |         |         |        V|
 23+ 5      11.0916      1.09  |Q        |         |         |        V|
 23+10      11.0991      1.08  |Q        |         |         |        V|
 23+15      11.1065      1.08  |Q        |         |         |        V|
 23+20      11.1139      1.07  |Q        |         |         |        V|
 23+25      11.1213      1.07  |Q        |         |         |        V|
 23+30      11.1286      1.07  |Q        |         |         |        V|
 23+35      11.1360      1.07  |Q        |         |         |        V|
 23+40      11.1433      1.06  |Q        |         |         |        V|
 23+45      11.1506      1.06  |Q        |         |         |        V|
 23+50      11.1579      1.06  |Q        |         |         |        V|
 23+55      11.1652      1.06  |Q        |         |         |        V|
 24+ 0      11.1725      1.06  |Q        |         |         |        V|
 24+ 5      11.1795      1.01  |Q        |         |         |        V|
 24+10      11.1852      0.83  |Q        |         |         |        V|
 24+15      11.1889      0.54  Q         |         |         |        V|
 24+20      11.1914      0.36  Q         |         |         |        V|
 24+25      11.1932      0.27  Q         |         |         |        V|
 24+30      11.1947      0.21  Q         |         |         |        V|
 24+35      11.1958      0.17  Q         |         |         |        V|
 24+40      11.1968      0.13  Q         |         |         |        V|
 24+45      11.1975      0.11  Q         |         |         |        V|
 24+50      11.1981      0.09  Q         |         |         |        V|
 24+55      11.1986      0.07  Q         |         |         |        V|
 25+ 0      11.1990      0.06  Q         |         |         |        V|
 25+ 5      11.1993      0.05  Q         |         |         |        V|
 25+10      11.1996      0.04  Q         |         |         |        V|
 25+15      11.1998      0.03  Q         |         |         |        V|
 25+20      11.1999      0.02  Q         |         |         |        V|
 25+25      11.2000      0.02  Q         |         |         |        V|
 25+30      11.2001      0.01  Q         |         |         |        V|
 25+35      11.2001      0.01  Q         |         |         |        V|
 25+40      11.2001      0.00  Q         |         |         |        V|
----------------------------------------------------------------------
```

PROPOSED CONDITION UNIT HYDROGRAPHS

PROPOSED CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPROP242.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, 2-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) =    2.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    1.600(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.600(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-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.900        0.095       1.000      0.095
                                                  Sum (F) =   0.095
Area averaged mean soil loss (F) (In/Hr) =  0.095
Minimum soil loss rate ((In/Hr)) =  0.048
(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	0.013	(0.169)	0.002	0.010
2	0.17	0.07	0.013	(0.168)	0.002	0.010
3	0.25	0.07	0.013	(0.167)	0.002	0.010
4	0.33	0.10	0.019	(0.167)	0.003	0.016
5	0.42	0.10	0.019	(0.166)	0.003	0.016
6	0.50	0.10	0.019	(0.165)	0.003	0.016
7	0.58	0.10	0.019	(0.165)	0.003	0.016
8	0.67	0.10	0.019	(0.164)	0.003	0.016
9	0.75	0.10	0.019	(0.163)	0.003	0.016
10	0.83	0.13	0.026	(0.163)	0.005	0.021
11	0.92	0.13	0.026	(0.162)	0.005	0.021
12	1.00	0.13	0.026	(0.162)	0.005	0.021
13	1.08	0.10	0.019	(0.161)	0.003	0.016
14	1.17	0.10	0.019	(0.160)	0.003	0.016
15	1.25	0.10	0.019	(0.160)	0.003	0.016
16	1.33	0.10	0.019	(0.159)	0.003	0.016
17	1.42	0.10	0.019	(0.158)	0.003	0.016
18	1.50	0.10	0.019	(0.158)	0.003	0.016
19	1.58	0.10	0.019	(0.157)	0.003	0.016
20	1.67	0.10	0.019	(0.156)	0.003	0.016
21	1.75	0.10	0.019	(0.156)	0.003	0.016
22	1.83	0.13	0.026	(0.155)	0.005	0.021
23	1.92	0.13	0.026	(0.155)	0.005	0.021
24	2.00	0.13	0.026	(0.154)	0.005	0.021
25	2.08	0.13	0.026	(0.153)	0.005	0.021
26	2.17	0.13	0.026	(0.153)	0.005	0.021
27	2.25	0.13	0.026	(0.152)	0.005	0.021
28	2.33	0.13	0.026	(0.151)	0.005	0.021
29	2.42	0.13	0.026	(0.151)	0.005	0.021
30	2.50	0.13	0.026	(0.150)	0.005	0.021
31	2.58	0.17	0.032	(0.150)	0.006	0.026
32	2.67	0.17	0.032	(0.149)	0.006	0.026
33	2.75	0.17	0.032	(0.148)	0.006	0.026
34	2.83	0.17	0.032	(0.148)	0.006	0.026
35	2.92	0.17	0.032	(0.147)	0.006	0.026
36	3.00	0.17	0.032	(0.147)	0.006	0.026
37	3.08	0.17	0.032	(0.146)	0.006	0.026
38	3.17	0.17	0.032	(0.145)	0.006	0.026
39	3.25	0.17	0.032	(0.145)	0.006	0.026
40	3.33	0.17	0.032	(0.144)	0.006	0.026
41	3.42	0.17	0.032	(0.144)	0.006	0.026
42	3.50	0.17	0.032	(0.143)	0.006	0.026
43	3.58	0.17	0.032	(0.142)	0.006	0.026
44	3.67	0.17	0.032	(0.142)	0.006	0.026
45	3.75	0.17	0.032	(0.141)	0.006	0.026
46	3.83	0.20	0.038	(0.141)	0.007	0.031
47	3.92	0.20	0.038	(0.140)	0.007	0.031

48	4.00	0.20	0.038	(0.139)	0.007	0.031
49	4.08	0.20	0.038	(0.139)	0.007	0.031
50	4.17	0.20	0.038	(0.138)	0.007	0.031
51	4.25	0.20	0.038	(0.138)	0.007	0.031
52	4.33	0.23	0.045	(0.137)	0.008	0.037
53	4.42	0.23	0.045	(0.136)	0.008	0.037
54	4.50	0.23	0.045	(0.136)	0.008	0.037
55	4.58	0.23	0.045	(0.135)	0.008	0.037
56	4.67	0.23	0.045	(0.135)	0.008	0.037
57	4.75	0.23	0.045	(0.134)	0.008	0.037
58	4.83	0.27	0.051	(0.134)	0.009	0.042
59	4.92	0.27	0.051	(0.133)	0.009	0.042
60	5.00	0.27	0.051	(0.132)	0.009	0.042
61	5.08	0.20	0.038	(0.132)	0.007	0.031
62	5.17	0.20	0.038	(0.131)	0.007	0.031
63	5.25	0.20	0.038	(0.131)	0.007	0.031
64	5.33	0.23	0.045	(0.130)	0.008	0.037
65	5.42	0.23	0.045	(0.129)	0.008	0.037
66	5.50	0.23	0.045	(0.129)	0.008	0.037
67	5.58	0.27	0.051	(0.128)	0.009	0.042
68	5.67	0.27	0.051	(0.128)	0.009	0.042
69	5.75	0.27	0.051	(0.127)	0.009	0.042
70	5.83	0.27	0.051	(0.127)	0.009	0.042
71	5.92	0.27	0.051	(0.126)	0.009	0.042
72	6.00	0.27	0.051	(0.126)	0.009	0.042
73	6.08	0.30	0.058	(0.125)	0.010	0.047
74	6.17	0.30	0.058	(0.124)	0.010	0.047
75	6.25	0.30	0.058	(0.124)	0.010	0.047
76	6.33	0.30	0.058	(0.123)	0.010	0.047
77	6.42	0.30	0.058	(0.123)	0.010	0.047
78	6.50	0.30	0.058	(0.122)	0.010	0.047
79	6.58	0.33	0.064	(0.122)	0.012	0.052
80	6.67	0.33	0.064	(0.121)	0.012	0.052
81	6.75	0.33	0.064	(0.121)	0.012	0.052
82	6.83	0.33	0.064	(0.120)	0.012	0.052
83	6.92	0.33	0.064	(0.119)	0.012	0.052
84	7.00	0.33	0.064	(0.119)	0.012	0.052
85	7.08	0.33	0.064	(0.118)	0.012	0.052
86	7.17	0.33	0.064	(0.118)	0.012	0.052
87	7.25	0.33	0.064	(0.117)	0.012	0.052
88	7.33	0.37	0.070	(0.117)	0.013	0.058
89	7.42	0.37	0.070	(0.116)	0.013	0.058
90	7.50	0.37	0.070	(0.116)	0.013	0.058
91	7.58	0.40	0.077	(0.115)	0.014	0.063
92	7.67	0.40	0.077	(0.115)	0.014	0.063
93	7.75	0.40	0.077	(0.114)	0.014	0.063
94	7.83	0.43	0.083	(0.114)	0.015	0.068
95	7.92	0.43	0.083	(0.113)	0.015	0.068
96	8.00	0.43	0.083	(0.113)	0.015	0.068
97	8.08	0.50	0.096	(0.112)	0.017	0.079

98	8.17	0.50	0.096	(0.112)	0.017	0.079
99	8.25	0.50	0.096	(0.111)	0.017	0.079
100	8.33	0.50	0.096	(0.110)	0.017	0.079
101	8.42	0.50	0.096	(0.110)	0.017	0.079
102	8.50	0.50	0.096	(0.109)	0.017	0.079
103	8.58	0.53	0.102	(0.109)	0.018	0.084
104	8.67	0.53	0.102	(0.108)	0.018	0.084
105	8.75	0.53	0.102	(0.108)	0.018	0.084
106	8.83	0.57	0.109	(0.107)	0.020	0.089
107	8.92	0.57	0.109	(0.107)	0.020	0.089
108	9.00	0.57	0.109	(0.106)	0.020	0.089
109	9.08	0.63	0.122	(0.106)	0.022	0.100
110	9.17	0.63	0.122	(0.105)	0.022	0.100
111	9.25	0.63	0.122	(0.105)	0.022	0.100
112	9.33	0.67	0.128	(0.104)	0.023	0.105
113	9.42	0.67	0.128	(0.104)	0.023	0.105
114	9.50	0.67	0.128	(0.103)	0.023	0.105
115	9.58	0.70	0.134	(0.103)	0.024	0.110
116	9.67	0.70	0.134	(0.102)	0.024	0.110
117	9.75	0.70	0.134	(0.102)	0.024	0.110
118	9.83	0.73	0.141	(0.101)	0.025	0.115
119	9.92	0.73	0.141	(0.101)	0.025	0.115
120	10.00	0.73	0.141	(0.100)	0.025	0.115
121	10.08	0.50	0.096	(0.100)	0.017	0.079
122	10.17	0.50	0.096	(0.099)	0.017	0.079
123	10.25	0.50	0.096	(0.099)	0.017	0.079
124	10.33	0.50	0.096	(0.099)	0.017	0.079
125	10.42	0.50	0.096	(0.098)	0.017	0.079
126	10.50	0.50	0.096	(0.098)	0.017	0.079
127	10.58	0.67	0.128	(0.097)	0.023	0.105
128	10.67	0.67	0.128	(0.097)	0.023	0.105
129	10.75	0.67	0.128	(0.096)	0.023	0.105
130	10.83	0.67	0.128	(0.096)	0.023	0.105
131	10.92	0.67	0.128	(0.095)	0.023	0.105
132	11.00	0.67	0.128	(0.095)	0.023	0.105
133	11.08	0.63	0.122	(0.094)	0.022	0.100
134	11.17	0.63	0.122	(0.094)	0.022	0.100
135	11.25	0.63	0.122	(0.093)	0.022	0.100
136	11.33	0.63	0.122	(0.093)	0.022	0.100
137	11.42	0.63	0.122	(0.092)	0.022	0.100
138	11.50	0.63	0.122	(0.092)	0.022	0.100
139	11.58	0.57	0.109	(0.091)	0.020	0.089
140	11.67	0.57	0.109	(0.091)	0.020	0.089
141	11.75	0.57	0.109	(0.091)	0.020	0.089
142	11.83	0.60	0.115	(0.090)	0.021	0.094
143	11.92	0.60	0.115	(0.090)	0.021	0.094
144	12.00	0.60	0.115	(0.089)	0.021	0.094
145	12.08	0.83	0.160	(0.089)	0.029	0.131
146	12.17	0.83	0.160	(0.088)	0.029	0.131
147	12.25	0.83	0.160	(0.088)	0.029	0.131

148	12.33	0.87	0.166	(0.087)	0.030	0.136
149	12.42	0.87	0.166	(0.087)	0.030	0.136
150	12.50	0.87	0.166	(0.087)	0.030	0.136
151	12.58	0.93	0.179	(0.086)	0.032	0.147
152	12.67	0.93	0.179	(0.086)	0.032	0.147
153	12.75	0.93	0.179	(0.085)	0.032	0.147
154	12.83	0.97	0.186	(0.085)	0.033	0.152
155	12.92	0.97	0.186	(0.084)	0.033	0.152
156	13.00	0.97	0.186	(0.084)	0.033	0.152
157	13.08	1.13	0.218	(0.084)	0.039	0.178
158	13.17	1.13	0.218	(0.083)	0.039	0.178
159	13.25	1.13	0.218	(0.083)	0.039	0.178
160	13.33	1.13	0.218	(0.082)	0.039	0.178
161	13.42	1.13	0.218	(0.082)	0.039	0.178
162	13.50	1.13	0.218	(0.081)	0.039	0.178
163	13.58	0.77	0.147	(0.081)	0.026	0.121
164	13.67	0.77	0.147	(0.081)	0.026	0.121
165	13.75	0.77	0.147	(0.080)	0.026	0.121
166	13.83	0.77	0.147	(0.080)	0.026	0.121
167	13.92	0.77	0.147	(0.079)	0.026	0.121
168	14.00	0.77	0.147	(0.079)	0.026	0.121
169	14.08	0.90	0.173	(0.079)	0.031	0.142
170	14.17	0.90	0.173	(0.078)	0.031	0.142
171	14.25	0.90	0.173	(0.078)	0.031	0.142
172	14.33	0.87	0.166	(0.077)	0.030	0.136
173	14.42	0.87	0.166	(0.077)	0.030	0.136
174	14.50	0.87	0.166	(0.077)	0.030	0.136
175	14.58	0.87	0.166	(0.076)	0.030	0.136
176	14.67	0.87	0.166	(0.076)	0.030	0.136
177	14.75	0.87	0.166	(0.075)	0.030	0.136
178	14.83	0.83	0.160	(0.075)	0.029	0.131
179	14.92	0.83	0.160	(0.075)	0.029	0.131
180	15.00	0.83	0.160	(0.074)	0.029	0.131
181	15.08	0.80	0.154	(0.074)	0.028	0.126
182	15.17	0.80	0.154	(0.074)	0.028	0.126
183	15.25	0.80	0.154	(0.073)	0.028	0.126
184	15.33	0.77	0.147	(0.073)	0.026	0.121
185	15.42	0.77	0.147	(0.072)	0.026	0.121
186	15.50	0.77	0.147	(0.072)	0.026	0.121
187	15.58	0.63	0.122	(0.072)	0.022	0.100
188	15.67	0.63	0.122	(0.071)	0.022	0.100
189	15.75	0.63	0.122	(0.071)	0.022	0.100
190	15.83	0.63	0.122	(0.071)	0.022	0.100
191	15.92	0.63	0.122	(0.070)	0.022	0.100
192	16.00	0.63	0.122	(0.070)	0.022	0.100
193	16.08	0.13	0.026	(0.069)	0.005	0.021
194	16.17	0.13	0.026	(0.069)	0.005	0.021
195	16.25	0.13	0.026	(0.069)	0.005	0.021
196	16.33	0.13	0.026	(0.068)	0.005	0.021
197	16.42	0.13	0.026	(0.068)	0.005	0.021

198	16.50	0.13	0.026	(0.068)	0.005	0.021
199	16.58	0.10	0.019	(0.067)	0.003	0.016
200	16.67	0.10	0.019	(0.067)	0.003	0.016
201	16.75	0.10	0.019	(0.067)	0.003	0.016
202	16.83	0.10	0.019	(0.066)	0.003	0.016
203	16.92	0.10	0.019	(0.066)	0.003	0.016
204	17.00	0.10	0.019	(0.066)	0.003	0.016
205	17.08	0.17	0.032	(0.065)	0.006	0.026
206	17.17	0.17	0.032	(0.065)	0.006	0.026
207	17.25	0.17	0.032	(0.065)	0.006	0.026
208	17.33	0.17	0.032	(0.064)	0.006	0.026
209	17.42	0.17	0.032	(0.064)	0.006	0.026
210	17.50	0.17	0.032	(0.064)	0.006	0.026
211	17.58	0.17	0.032	(0.063)	0.006	0.026
212	17.67	0.17	0.032	(0.063)	0.006	0.026
213	17.75	0.17	0.032	(0.063)	0.006	0.026
214	17.83	0.13	0.026	(0.062)	0.005	0.021
215	17.92	0.13	0.026	(0.062)	0.005	0.021
216	18.00	0.13	0.026	(0.062)	0.005	0.021
217	18.08	0.13	0.026	(0.062)	0.005	0.021
218	18.17	0.13	0.026	(0.061)	0.005	0.021
219	18.25	0.13	0.026	(0.061)	0.005	0.021
220	18.33	0.13	0.026	(0.061)	0.005	0.021
221	18.42	0.13	0.026	(0.060)	0.005	0.021
222	18.50	0.13	0.026	(0.060)	0.005	0.021
223	18.58	0.10	0.019	(0.060)	0.003	0.016
224	18.67	0.10	0.019	(0.059)	0.003	0.016
225	18.75	0.10	0.019	(0.059)	0.003	0.016
226	18.83	0.07	0.013	(0.059)	0.002	0.010
227	18.92	0.07	0.013	(0.059)	0.002	0.010
228	19.00	0.07	0.013	(0.058)	0.002	0.010
229	19.08	0.10	0.019	(0.058)	0.003	0.016
230	19.17	0.10	0.019	(0.058)	0.003	0.016
231	19.25	0.10	0.019	(0.058)	0.003	0.016
232	19.33	0.13	0.026	(0.057)	0.005	0.021
233	19.42	0.13	0.026	(0.057)	0.005	0.021
234	19.50	0.13	0.026	(0.057)	0.005	0.021
235	19.58	0.10	0.019	(0.056)	0.003	0.016
236	19.67	0.10	0.019	(0.056)	0.003	0.016
237	19.75	0.10	0.019	(0.056)	0.003	0.016
238	19.83	0.07	0.013	(0.056)	0.002	0.010
239	19.92	0.07	0.013	(0.055)	0.002	0.010
240	20.00	0.07	0.013	(0.055)	0.002	0.010
241	20.08	0.10	0.019	(0.055)	0.003	0.016
242	20.17	0.10	0.019	(0.055)	0.003	0.016
243	20.25	0.10	0.019	(0.055)	0.003	0.016
244	20.33	0.10	0.019	(0.054)	0.003	0.016
245	20.42	0.10	0.019	(0.054)	0.003	0.016
246	20.50	0.10	0.019	(0.054)	0.003	0.016
247	20.58	0.10	0.019	(0.054)	0.003	0.016

248	20.67	0.10	0.019	(0.053)	0.003	0.016
249	20.75	0.10	0.019	(0.053)	0.003	0.016
250	20.83	0.07	0.013	(0.053)	0.002	0.010
251	20.92	0.07	0.013	(0.053)	0.002	0.010
252	21.00	0.07	0.013	(0.052)	0.002	0.010
253	21.08	0.10	0.019	(0.052)	0.003	0.016
254	21.17	0.10	0.019	(0.052)	0.003	0.016
255	21.25	0.10	0.019	(0.052)	0.003	0.016
256	21.33	0.07	0.013	(0.052)	0.002	0.010
257	21.42	0.07	0.013	(0.051)	0.002	0.010
258	21.50	0.07	0.013	(0.051)	0.002	0.010
259	21.58	0.10	0.019	(0.051)	0.003	0.016
260	21.67	0.10	0.019	(0.051)	0.003	0.016
261	21.75	0.10	0.019	(0.051)	0.003	0.016
262	21.83	0.07	0.013	(0.051)	0.002	0.010
263	21.92	0.07	0.013	(0.050)	0.002	0.010
264	22.00	0.07	0.013	(0.050)	0.002	0.010
265	22.08	0.10	0.019	(0.050)	0.003	0.016
266	22.17	0.10	0.019	(0.050)	0.003	0.016
267	22.25	0.10	0.019	(0.050)	0.003	0.016
268	22.33	0.07	0.013	(0.050)	0.002	0.010
269	22.42	0.07	0.013	(0.049)	0.002	0.010
270	22.50	0.07	0.013	(0.049)	0.002	0.010
271	22.58	0.07	0.013	(0.049)	0.002	0.010
272	22.67	0.07	0.013	(0.049)	0.002	0.010
273	22.75	0.07	0.013	(0.049)	0.002	0.010
274	22.83	0.07	0.013	(0.049)	0.002	0.010
275	22.92	0.07	0.013	(0.049)	0.002	0.010
276	23.00	0.07	0.013	(0.048)	0.002	0.010
277	23.08	0.07	0.013	(0.048)	0.002	0.010
278	23.17	0.07	0.013	(0.048)	0.002	0.010
279	23.25	0.07	0.013	(0.048)	0.002	0.010
280	23.33	0.07	0.013	(0.048)	0.002	0.010
281	23.42	0.07	0.013	(0.048)	0.002	0.010
282	23.50	0.07	0.013	(0.048)	0.002	0.010
283	23.58	0.07	0.013	(0.048)	0.002	0.010
284	23.67	0.07	0.013	(0.048)	0.002	0.010
285	23.75	0.07	0.013	(0.048)	0.002	0.010
286	23.83	0.07	0.013	(0.048)	0.002	0.010
287	23.92	0.07	0.013	(0.048)	0.002	0.010
288	24.00	0.07	0.013	(0.048)	0.002	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.475(Ac.Ft)
Total rainfall = 1.60(In)
Flood volume = 94295.0 Cubic Feet
Total soil loss = 20698.9 Cubic Feet

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      ----------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.562(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       0.0010      0.15  Q         |         |         |         |
  0+10       0.0024      0.21  Q         |         |         |         |
  0+15       0.0039      0.21  Q         |         |         |         |
  0+20       0.0058      0.28  VQ        |         |         |         |
  0+25       0.0080      0.31  VQ        |         |         |         |
  0+30       0.0102      0.31  VQ        |         |         |         |
  0+35       0.0123      0.31  VQ        |         |         |         |
  0+40       0.0145      0.31  VQ        |         |         |         |
  0+45       0.0167      0.31  VQ        |         |         |         |
  0+50       0.0193      0.39  VQ        |         |         |         |
  0+55       0.0222      0.42  VQ        |         |         |         |
  1+ 0       0.0251      0.42  VQ        |         |         |         |
  1+ 5       0.0275      0.35  VQ        |         |         |         |
  1+10       0.0296      0.31  VQ        |         |         |         |
  1+15       0.0318      0.31  VQ        |         |         |         |
  1+20       0.0340      0.31  VQ        |         |         |         |
  1+25       0.0361      0.31  VQ        |         |         |         |
  1+30       0.0383      0.31  VQ        |         |         |         |
  1+35       0.0405      0.31  VQ        |         |         |         |
  1+40       0.0426      0.31  VQ        |         |         |         |
  1+45       0.0448      0.31  VQ        |         |         |         |
  1+50       0.0475      0.39  VQ        |         |         |         |
  1+55       0.0503      0.42  VQ        |         |         |         |
  2+ 0       0.0532      0.42  VQ        |         |         |         |
  2+ 5       0.0561      0.42  |Q        |         |         |         |
  2+10       0.0590      0.42  |Q        |         |         |         |
  2+15       0.0619      0.42  |Q        |         |         |         |
  2+20       0.0648      0.42  |Q        |         |         |         |
  2+25       0.0677      0.42  |Q        |         |         |         |
  2+30       0.0706      0.42  |Q        |         |         |         |
  2+35       0.0739      0.49  |Q        |         |         |         |
  2+40       0.0775      0.52  |VQ       |         |         |         |
  2+45       0.0812      0.52  |VQ       |         |         |         |
  2+50       0.0848      0.52  |VQ       |         |         |         |
  2+55       0.0884      0.52  |VQ       |         |         |         |
  3+ 0       0.0920      0.52  |VQ       |         |         |         |
  3+ 5       0.0956      0.52  |VQ       |         |         |         |
  3+10       0.0992      0.52  |VQ       |         |         |         |
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3+15	0.1028	0.52	VQ			
3+20	0.1064	0.52	VQ			
3+25	0.1100	0.52	Q			
3+30	0.1136	0.52	Q			
3+35	0.1172	0.52	Q			
3+40	0.1208	0.52	Q			
3+45	0.1244	0.52	Q			
3+50	0.1286	0.60	Q			
3+55	0.1329	0.63	Q			
4+ 0	0.1372	0.63	Q			
4+ 5	0.1415	0.63	Q			
4+10	0.1459	0.63	Q			
4+15	0.1502	0.63	Q			
4+20	0.1550	0.70	Q			
4+25	0.1601	0.73	Q			
4+30	0.1651	0.73	QV			
4+35	0.1702	0.73	QV			
4+40	0.1752	0.73	QV			
4+45	0.1803	0.73	QV			
4+50	0.1858	0.81	Q			
4+55	0.1916	0.84	Q			
5+ 0	0.1974	0.84	Q			
5+ 5	0.2022	0.69	QV			
5+10	0.2065	0.63	QV			
5+15	0.2108	0.63	QV			
5+20	0.2156	0.70	QV			
5+25	0.2207	0.73	Q V			
5+30	0.2257	0.73	Q V			
5+35	0.2313	0.81	QV			
5+40	0.2371	0.84	QV			
5+45	0.2428	0.84	QV			
5+50	0.2486	0.84	QV			
5+55	0.2544	0.84	QV			
6+ 0	0.2602	0.84	QV			
6+ 5	0.2664	0.91	QV			
6+10	0.2729	0.94	Q V			
6+15	0.2794	0.94	Q V			
6+20	0.2859	0.94	Q V			
6+25	0.2924	0.94	Q V			
6+30	0.2989	0.94	Q V			
6+35	0.3059	1.02	QV			
6+40	0.3131	1.05	QV			
6+45	0.3203	1.05	QV			
6+50	0.3275	1.05	Q V			
6+55	0.3348	1.05	Q V			
7+ 0	0.3420	1.05	Q V			
7+ 5	0.3492	1.05	Q V			
7+10	0.3564	1.05	Q V			
7+15	0.3636	1.05	Q V			
7+20	0.3713	1.12	Q V			

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 7+25       0.3793      1.15  |   Q  V  |          |          |          |
 7+30       0.3872      1.15  |   Q  V  |          |          |          |
 7+35       0.3957      1.23  |   Q  V  |          |          |          |
 7+40       0.4043      1.26  |    Q V  |          |          |          |
 7+45       0.4130      1.26  |    Q V  |          |          |          |
 7+50       0.4221      1.33  |    Q V  |          |          |          |
 7+55       0.4315      1.36  |    Q V  |          |          |          |
 8+ 0       0.4409      1.36  |    Q  V |          |          |          |
 8+ 5       0.4513      1.51  |     Q V |          |          |          |
 8+10       0.4621      1.57  |     Q V |          |          |          |
 8+15       0.4729      1.57  |     Q V |          |          |          |
 8+20       0.4837      1.57  |     Q V |          |          |          |
 8+25       0.4946      1.57  |     Q  V|          |          |          |
 8+30       0.5054      1.57  |     Q  V|          |          |          |
 8+35       0.5167      1.64  |     Q  V|          |          |          |
 8+40       0.5283      1.68  |     Q  V|          |          |          |
 8+45       0.5398      1.68  |     Q  V|          |          |          |
 8+50       0.5518      1.75  |     Q   V          |          |          |
 8+55       0.5641      1.78  |      Q  V          |          |          |
 9+ 0       0.5764      1.78  |      Q  V          |          |          |
 9+ 5       0.5896      1.93  |      Q  V          |          |          |
 9+10       0.6034      1.99  |      Q  |V         |          |          |
 9+15       0.6171      1.99  |      Q  |V         |          |          |
 9+20       0.6313      2.06  |       Q |V         |          |          |
 9+25       0.6457      2.10  |       Q |V         |          |          |
 9+30       0.6601      2.10  |       Q | V        |          |          |
 9+35       0.6751      2.17  |       Q | V        |          |          |
 9+40       0.6902      2.20  |       Q | V        |          |          |
 9+45       0.7054      2.20  |       Q |  V       |          |          |
 9+50       0.7210      2.27  |        Q|  V       |          |          |
 9+55       0.7369      2.30  |        Q|  V       |          |          |
10+ 0       0.7528      2.30  |        Q|  V       |          |          |
10+ 5       0.7652      1.80  |      Q  |   V      |          |          |
10+10       0.7760      1.57  |     Q   |   V      |          |          |
10+15       0.7868      1.57  |     Q   |   V      |          |          |
10+20       0.7976      1.57  |     Q   |   V      |          |          |
10+25       0.8084      1.57  |     Q   |   V      |          |          |
10+30       0.8193      1.57  |     Q   |    V     |          |          |
10+35       0.8326      1.93  |      Q  |    V     |          |          |
10+40       0.8470      2.10  |       Q |    V     |          |          |
10+45       0.8615      2.10  |       Q |    V     |          |          |
10+50       0.8759      2.10  |       Q |     V    |          |          |
10+55       0.8903      2.10  |       Q |     V    |          |          |
11+ 0       0.9048      2.10  |       Q |     V    |          |          |
11+ 5       0.9187      2.02  |       Q |     V    |          |          |
11+10       0.9324      1.99  |      Q  |      V   |          |          |
11+15       0.9461      1.99  |      Q  |      V   |          |          |
11+20       0.9598      1.99  |      Q  |      V   |          |          |
11+25       0.9735      1.99  |      Q  |      V   |          |          |
11+30       0.9872      1.99  |      Q  |       V  |          |          |
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11+35       0.9999      1.85  |      Q  |       V |         |         |
11+40       1.0122      1.78  |      Q  |       V |         |         |
11+45       1.0245      1.78  |      Q  |       V |         |         |
11+50       1.0372      1.85  |      Q  |        V|         |         |
11+55       1.0502      1.89  |      Q  |        V|         |         |
12+ 0       1.0632      1.89  |      Q  |        V|         |         |
12+ 5       1.0797      2.39  |        Q|        V|         |         |
12+10       1.0977      2.62  |         Q        V         |         |
12+15       1.1158      2.62  |         Q        V         |         |
12+20       1.1343      2.69  |         Q        V         |         |
12+25       1.1531      2.72  |         Q        |V        |         |
12+30       1.1718      2.72  |         Q        |V        |         |
12+35       1.1916      2.87  |         |Q       | V       |         |
12+40       1.2118      2.93  |         |Q       | V       |         |
12+45       1.2320      2.93  |         |Q       | V       |         |
12+50       1.2527      3.01  |         | Q      |  V      |         |
12+55       1.2736      3.04  |         | Q      |  V      |         |
13+ 0       1.2946      3.04  |         | Q      |  V      |         |
13+ 5       1.3180      3.40  |         |  Q     |   V     |         |
13+10       1.3425      3.56  |         |   Q    |   V     |         |
13+15       1.3671      3.56  |         |   Q    |    V    |         |
13+20       1.3916      3.56  |         |   Q    |    V    |         |
13+25       1.4161      3.56  |         |   Q    |     V   |         |
13+30       1.4407      3.56  |         |   Q    |     V   |         |
13+35       1.4597      2.76  |         |Q       |     V   |         |
13+40       1.4763      2.41  |        Q|        |      V  |         |
13+45       1.4929      2.41  |        Q|        |      V  |         |
13+50       1.5095      2.41  |        Q|        |      V  |         |
13+55       1.5261      2.41  |        Q|        |       V |         |
14+ 0       1.5427      2.41  |        Q|        |       V |         |
14+ 5       1.5613      2.70  |         Q        |       V |         |
14+10       1.5808      2.83  |         |Q       |        V|         |
14+15       1.6002      2.83  |         |Q       |        V|         |
14+20       1.6192      2.76  |         |Q       |        V|         |
14+25       1.6380      2.72  |         Q        |         V         |
14+30       1.6567      2.72  |         Q        |         V         |
14+35       1.6755      2.72  |         Q        |         V         |
14+40       1.6943      2.72  |         Q        |         |V        |
14+45       1.7130      2.72  |         Q        |         |V        |
14+50       1.7313      2.65  |         Q        |         |V        |
14+55       1.7493      2.62  |         Q        |         | V       |
15+ 0       1.7674      2.62  |         Q        |         | V       |
15+ 5       1.7849      2.55  |         Q        |         | V       |
15+10       1.8022      2.51  |         Q        |         |  V      |
15+15       1.8195      2.51  |         Q        |         |  V      |
15+20       1.8364      2.44  |        Q|        |         |  V      |
15+25       1.8530      2.41  |        Q|        |         |   V     |
15+30       1.8696      2.41  |        Q|        |         |   V     |
15+35       1.8841      2.12  |       Q |        |         |   V     |
15+40       1.8979      1.99  |      Q  |        |         |    V    |
```

```
15+45        1.9116       1.99  |       Q  |          |          |     V    |
15+50        1.9253       1.99  |       Q  |          |          |     V    |
15+55        1.9390       1.99  |       Q  |          |          |     V    |
16+ 0        1.9527       1.99  |       Q  |          |          |      V   |
16+ 5        1.9589       0.90  |   Q      |          |          |      V   |
16+10        1.9618       0.42  |Q         |          |          |      V   |
16+15        1.9647       0.42  |Q         |          |          |      V   |
16+20        1.9676       0.42  |Q         |          |          |      V   |
16+25        1.9704       0.42  |Q         |          |          |      V   |
16+30        1.9733       0.42  |Q         |          |          |      V   |
16+35        1.9757       0.35  |Q         |          |          |      V   |
16+40        1.9779       0.31  |Q         |          |          |      V   |
16+45        1.9801       0.31  |Q         |          |          |      V   |
16+50        1.9822       0.31  |Q         |          |          |      V   |
16+55        1.9844       0.31  |Q         |          |          |      V   |
17+ 0        1.9865       0.31  |Q         |          |          |      V   |
17+ 5        1.9897       0.46  |Q         |          |          |      V   |
17+10        1.9933       0.52  | Q        |          |          |      V   |
17+15        1.9969       0.52  | Q        |          |          |      V   |
17+20        2.0005       0.52  | Q        |          |          |      V   |
17+25        2.0041       0.52  | Q        |          |          |       V  |
17+30        2.0077       0.52  | Q        |          |          |       V  |
17+35        2.0114       0.52  | Q        |          |
17+40        2.0150       0.52  | Q        |          |
17+45        2.0186       0.52  | Q        |          |
17+50        2.0217       0.45  |Q         |          |
17+55        2.0246       0.42  |Q         |          |
18+ 0        2.0275       0.42  |Q         |          |          |       V  |
18+ 5        2.0303       0.42  |Q         |          |          |       V  |
18+10        2.0332       0.42  |Q         |          |          |       V  |
18+15        2.0361       0.42  |Q         |          |          |       V  |
18+20        2.0390       0.42  |Q         |          |          |       V  |
18+25        2.0419       0.42  |Q         |          |          |       V  |
18+30        2.0448       0.42  |Q         |          |          |       V  |
18+35        2.0472       0.35  |Q         |          |          |       V  |
18+40        2.0493       0.31  |Q         |          |          |       V  |
18+45        2.0515       0.31  |Q         |          |          |       V  |
18+50        2.0532       0.24  Q          |          |          |       V  |
18+55        2.0546       0.21  Q          |          |          |       V  |
19+ 0        2.0560       0.21  Q          |          |          |       V  |
19+ 5        2.0580       0.28  |Q         |          |          |        V |
19+10        2.0601       0.31  |Q         |          |          |        V |
19+15        2.0623       0.31  |Q         |          |          |        V |
19+20        2.0650       0.39  |Q         |          |          |        V |
19+25        2.0679       0.42  |Q         |          |          |        V |
19+30        2.0707       0.42  |Q         |          |          |        V |
19+35        2.0731       0.35  |Q         |          |          |        V |
19+40        2.0753       0.31  |Q         |          |          |        V |
19+45        2.0775       0.31  |Q         |          |          |        V |
19+50        2.0791       0.24  Q          |          |          |        V |
```

Qpeak,pre = 0.43 cfs
2.0246-0.0706=1.954 ac-ft
85,116 cf
110% preliminary
93,628 cf

```
19+55       2.0806      0.21  Q          |          |          |        V |
20+ 0       2.0820      0.21  Q          |          |          |        V |
20+ 5       2.0840      0.28  |Q         |          |          |        V |
20+10       2.0861      0.31  |Q         |          |          |        V |
20+15       2.0883      0.31  |Q         |          |          |        V |
20+20       2.0905      0.31  |Q         |          |          |        V |
20+25       2.0926      0.31  |Q         |          |          |        V |
20+30       2.0948      0.31  |Q         |          |          |        V |
20+35       2.0969      0.31  |Q         |          |          |        V |
20+40       2.0991      0.31  |Q         |          |          |        V |
20+45       2.1013      0.31  |Q         |          |          |        V |
20+50       2.1029      0.24  Q          |          |          |        V |
20+55       2.1044      0.21  Q          |          |          |        V |
21+ 0       2.1058      0.21  Q          |          |          |        V |
21+ 5       2.1078      0.28  |Q         |          |          |        V |
21+10       2.1099      0.31  |Q         |          |          |        V |
21+15       2.1121      0.31  |Q         |          |          |         V|
21+20       2.1138      0.24  Q          |          |          |         V|
21+25       2.1152      0.21  Q          |          |          |         V|
21+30       2.1166      0.21  Q          |          |          |         V|
21+35       2.1186      0.28  |Q         |          |          |         V|
21+40       2.1208      0.31  |Q         |          |          |         V|
21+45       2.1229      0.31  |Q         |          |          |         V|
21+50       2.1246      0.24  Q          |          |          |         V|
21+55       2.1260      0.21  Q          |          |          |         V|
22+ 0       2.1275      0.21  Q          |          |          |         V|
22+ 5       2.1294      0.28  |Q         |          |          |         V|
22+10       2.1316      0.31  |Q         |          |          |         V|
22+15       2.1337      0.31  |Q         |          |          |         V|
22+20       2.1354      0.24  Q          |          |          |         V|
22+25       2.1369      0.21  Q          |          |          |         V|
22+30       2.1383      0.21  Q          |          |          |         V|
22+35       2.1397      0.21  Q          |          |          |         V|
22+40       2.1412      0.21  Q          |          |          |         V|
22+45       2.1426      0.21  Q          |          |          |         V|
22+50       2.1441      0.21  Q          |          |          |         V|
22+55       2.1455      0.21  Q          |          |          |         V|
23+ 0       2.1470      0.21  Q          |          |          |         V|
23+ 5       2.1484      0.21  Q          |          |          |         V|
23+10       2.1498      0.21  Q          |          |          |         V|
23+15       2.1513      0.21  Q          |          |          |         V|
23+20       2.1527      0.21  Q          |          |          |         V|
23+25       2.1542      0.21  Q          |          |          |         V|
23+30       2.1556      0.21  Q          |          |          |         V|
23+35       2.1571      0.21  Q          |          |          |         V|
23+40       2.1585      0.21  Q          |          |          |         V|
23+45       2.1599      0.21  Q          |          |          |         V|
23+50       2.1614      0.21  Q          |          |          |         V|
23+55       2.1628      0.21  Q          |          |          |         V|
24+ 0       2.1643      0.21  Q          |          |          |         V|
```

```
   24+ 5       2.1647      0.06  Q         |         |         |        V|
-------------------------------------------------------------------------
```

PROPOSED CONDITION ONSITE 100-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPROP24100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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      ----------------------------------------------------------------------
       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 |
```

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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|
```

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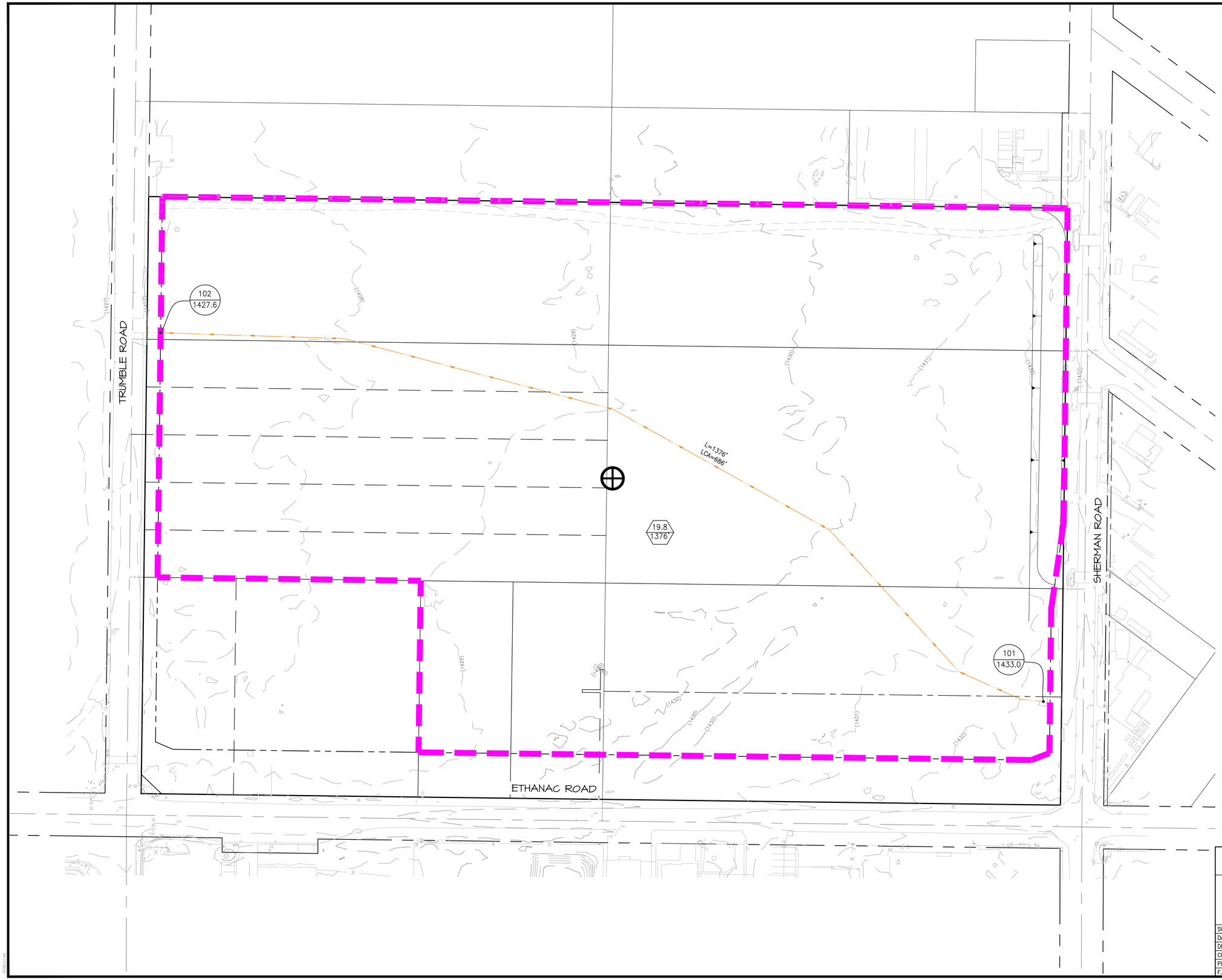

UNIT HYDROGRAPH HYDROLOGY MAPS



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

N W 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: 1/19/24			SHEET 1
DESIGNED: RSB			OF 4 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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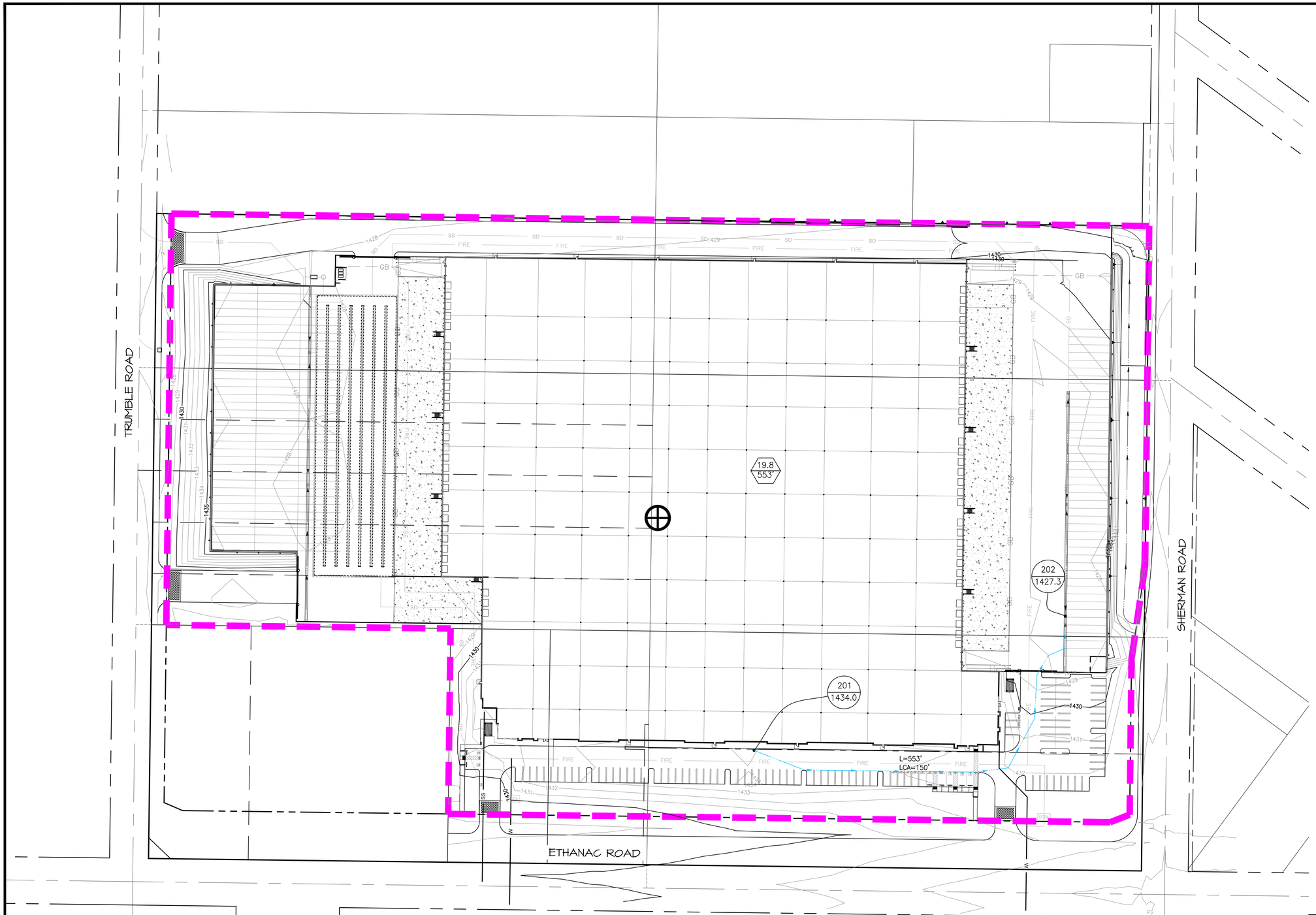

LEGEND

	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

N W 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: 1/19/24			SHEET 2
DESIGNED: RSB			OF 4 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

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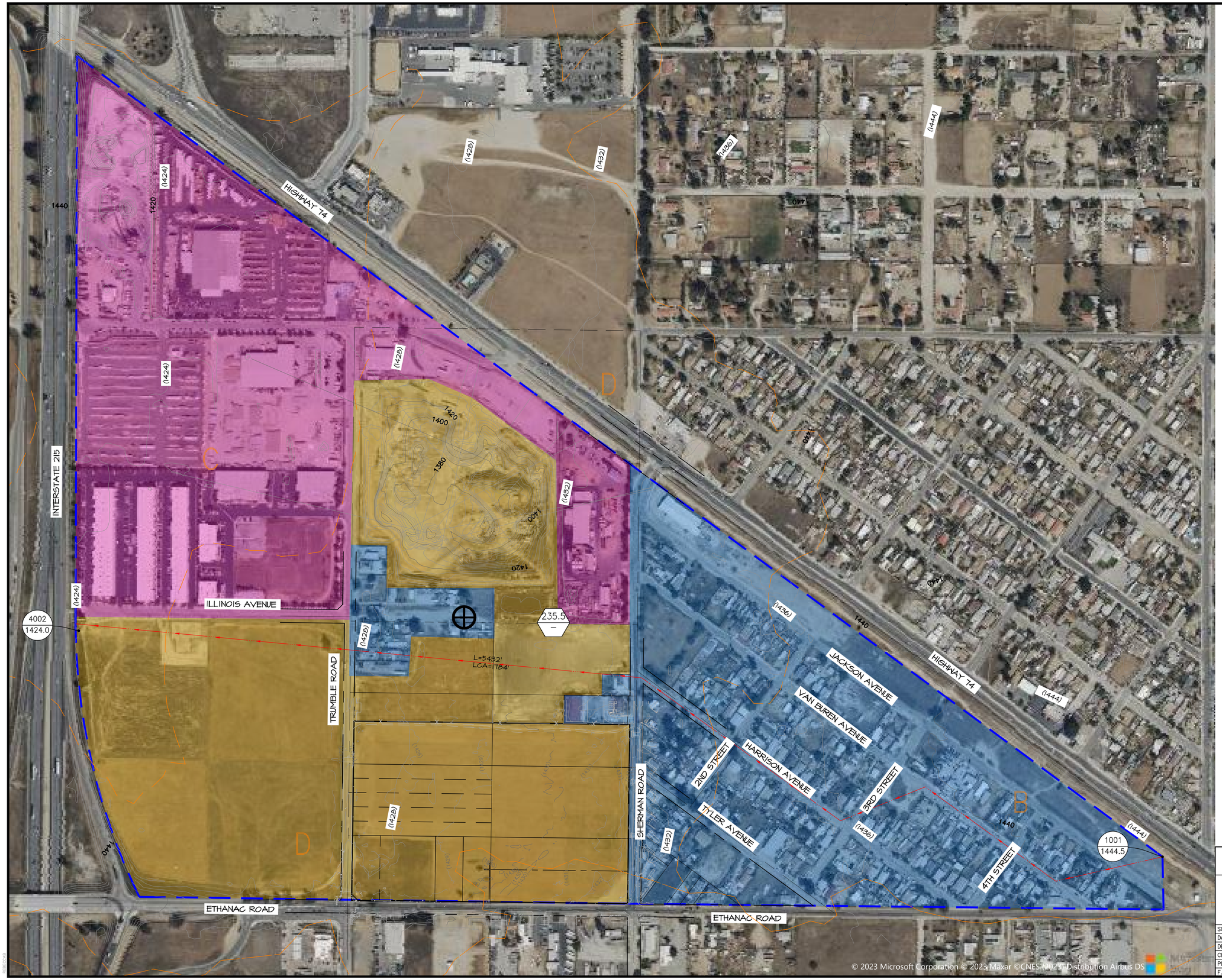

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- SOIL TYPE BOUNDARY
- 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
- COMMERCIAL / INDUSTRIAL
- UNDEVELOPED
- ¼ ACRE LOT RESIDENTIAL

N W E S

1" = 200'

100 0 200 400 600

CITY OF PERRIS

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

SCALE: 1"=200'	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: 1/19/24			SHEET 3
DESIGNED: RSB			OF 4 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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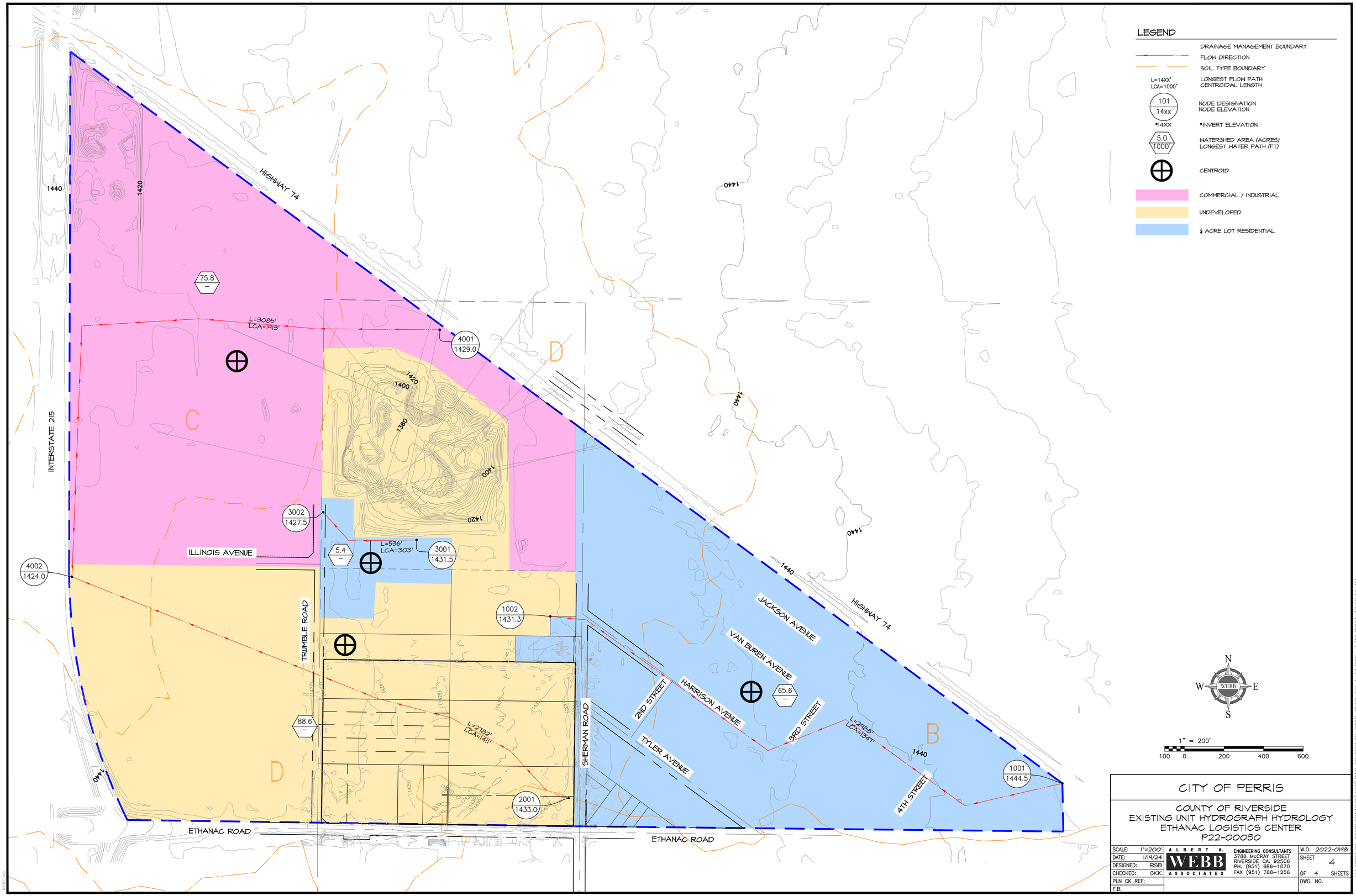
LEGEND
DRAINAGE MANAGEMENT BOUNDARY
FLOW DIRECTION
SOIL TYPE BOUNDARY
L=14XX'
LCA=1000'
LONGEST FLOW PATH
CENTROIDAL LENGTH
101
14xx
NODE DESIGNATION
NODE ELEVATION
*14XX
*INVERT ELEVATION
5.0
1000'
WATERSHED AREA (ACRES)
LONGEST WATER PATH (FT)
CENTROID
COMMERCIAL / INDUSTRIAL
UNDEVELOPED
¼ ACRE LOT RESIDENTIAL
HIGHWAY 74
INTERSTATE 215
ILLINOIS AVENUE
TRUMBLE ROAD
SHERMAN ROAD
ETHANAC ROAD
JACKSON AVENUE
VAN BUREN AVENUE
HARRISON AVENUE
2ND STREET
3RD STREET
4TH STREET
TYLER AVENUE
C
D
B
75.8
5.4
88.6
65.6
L=3085'
LCA=1913'
L=536'
LCA=303'
L=2182'
LCA=1411'
L=2498'
LCA=1841'
4001
1429.0
3002
1427.5
3001
1431.5
4002
1424.0
1002
1431.3
2001
1433.0
1001
1444.5
1440
1420
1400
1380
N
S
E
W
WEBB
1" = 200'
100 0 200 400 600
CITY OF PERRIS
COUNTY OF RIVERSIDE
EXISTING UNIT HYDROGRAPH HYDROLOGY
ETHANAC LOGISTICS CENTER
P22-00030
SCALE: 1"=200'
DATE: 1/19/24
DESIGNED: RSB
CHECKED: SKK
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. 2022-0198
SHEET 4 OF 4 SHEETS
DWG. NO.
H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-PHYD-UH A-11.DWG 1/19/2024 10:52:46 AM

APPENDIX B – HYDRAULIC ANALYSIS

CITY OF PERRIS LINE A WSPG CALCULATION

CITY OF PERRIS LINE A - MAIN LINE WSPG

```
↑ FILE: SDMAINCONFL30IN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                          PAGE    1
                                   Program Package Serial Number: 1585

                                                     WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time:11:25:25
                           04-425 I-215 Business Park (Main Line)

                             Flows from Onsite Hydrology & Offsite Basin routing

                               31 May 2006 TD


*******************************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1000.000  1416.000    4.000  1420.000     85.20    6.78     .71  1420.71     .00
 2.80      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    21.990    .0028                                        .0030      .07     4.00
   .00    3.40    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1021.990  1416.062    4.004  1420.066     85.20    6.78     .71  1420.78     .00
 2.80      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                        .0028      .01    4.00
  .00             .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1024.990  1416.070    4.163  1420.233     79.50    6.33     .62  1420.85     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    36.970    .0028                                        .0026      .10     4.16
   .00    3.17    .012       .00   .00  PIPE
```

```
         |         |        |         |         |               |         |       |
       |        |       |       |
  1061.960  1416.173    4.157  1420.330     79.50    6.33     .62  1420.95     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.830    .0028                                          .0026      .11      .00
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1104.790  1416.293    4.217  1420.510     79.50    6.33     .62  1421.13     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.830    .0028                                          .0026      .11      .00
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1147.620  1416.413    4.333  1420.746     79.50    6.33     .62  1421.37     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    61.970    .0028                                          .0026      .16     4.33
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1209.590  1416.587    4.321  1420.908     79.50    6.33     .62  1421.53     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                          .0025      .01    4.32
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1212.590  1416.595    4.413  1421.008     76.20    6.06     .57  1421.58     .00
 2.64      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    23.960    .0028                                          .0024      .06     4.41
   .00    3.04    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1236.550  1416.662    4.403  1421.065     76.20    6.06     .57  1421.64     .00
 2.64      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0030                                          .0022      .01    4.40
  .00             .012       .00   .00  PIPE
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

```
*******************************************************************************
************************************* ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |
  1239.550  1416.671    4.569  1421.240     68.80    5.47     .47  1421.71     .00
 2.51      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    39.720    .0028                                        .0020      .08     4.57
   .00    2.80    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1279.270  1416.782    4.535  1421.317     68.80    5.47     .47  1421.78     .00
 2.51      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0028                                        .0018      .01    4.54
  .00             .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1286.770  1416.803    4.666  1421.469     62.90    5.01     .39  1421.86     .00
 2.39      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    69.580    .0028                                        .0016      .11     4.67
   .00    2.62    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
```

```
  1356.350  1416.998    4.585  1421.583     62.90    5.01     .39  1421.97     .00
 2.39      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                          .0013      .00    4.58
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1359.350  1417.006    4.790  1421.796     48.90    3.89     .24  1422.03     .00
 2.10      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   209.024    .0029                                          .0010      .21     4.79
   .00    2.20    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1568.374  1417.610    4.392  1422.002     48.90    3.89     .24  1422.24     .00
 2.10      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0376                                          .0009      .01    4.39
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1575.874  1417.892    4.210  1422.102     42.80    3.41     .18  1422.28     .00
 1.96      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    99.806    .0000                                          .0008      .08     4.21
   .00     .00    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1675.680  1417.892    4.285  1422.177     42.80    3.41     .18  1422.36     .00
 1.96      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0027                                          .0010      .00    4.29
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1678.680  1417.900    4.252  1422.152     25.90    3.66     .21  1422.36     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   428.880    .0028                                          .0013      .55     4.25
   .00    1.81    .012       .00   .00  PIPE
```

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

```
*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2107.560  1419.101    3.602  1422.703     25.90    3.66     .21  1422.91     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.440    .0047                                        .0013      .05      .00
   .00    1.54    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2150.000  1419.300    3.480  1422.780     25.90    3.66     .21  1422.99     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0033                                        .0007      .00     .00
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2153.000  1419.310    3.609  1422.920      8.90    1.26     .02  1422.94     .00
  .94      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    95.910    .0019                                        .0002      .01      .00
   .00    1.08    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2248.910  1419.497    3.441  1422.938      8.90    1.26     .02  1422.96     .00
  .94      .00    3.000     .000   .00   1   .0
```

```
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    80.190    .0028                                        .0002      .01     3.44
   .00     .99    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2329.100  1419.721    3.229  1422.950      8.90    1.26     .02  1422.97     .00
  .94      .00    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0030                                        .0004      .00    3.23
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2332.100  1419.730    3.215  1422.945      6.20    1.97     .06  1423.01     .00
  .88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   287.510    .0028                                        .0006      .18     3.22
   .00     .97    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2619.610  1420.535    2.594  1423.129      6.20    1.97     .06  1423.19     .00
  .88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                        .0005      .00    2.59
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2622.610  1420.543    2.650  1423.193      4.30    1.37     .03  1423.22     .00
  .73      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   163.140    .0028                                        .0003      .05     2.65
   .00     .79    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2785.750  1421.000    2.244  1423.244      4.30    1.37     .03  1423.27     .00
  .73      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    19.800    .0028                                        .0003      .01      .00
   .00     .79    .012       .00   .00  PIPE
```


WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

```
*********************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  2805.550  1421.056    2.198  1423.254      4.30    1.37     .03  1423.28     .00
  .73      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

CITY OF PERRIS LINE A - LATERAL M-1 WSPG

```
↑ FILE: LATM-1-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                Program Package Serial Number: 1585

                                                    WATER SURFACE PROFILE LISTING
                Date: 9- 1-2023  Time: 1:49:15
                          04-425 I-215 Business Park (LATERAL M-1)

                            Catch Basin #1

                              2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.500  1417.290    2.940  1420.230      5.70    1.81     .05  1420.28     .00
  .84      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     6.810    .0088                                        .0005      .00     2.94
   .00     .68    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    10.310  1417.350    2.884  1420.234      5.70    1.81     .05  1420.28     .00
  .84      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    10.310  1417.350    2.959  1420.308      5.70     .28     .00  1420.31     .00
  .27     7.00    4.950    7.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0167                                        .0000      .00     2.96
   .03     .17    .012       .00   .00  RECTANG
```

```
          |          |         |          |          |                |          |        |
       |         |       |       |      |
   13.310  1417.400    2.909  1420.309      5.70     .28     .00  1420.31     .00
 .27     7.00    4.950    7.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```
↑

CITY OF PERRIS LINE A - LATERAL M-2 WSPG

```
↑ FILE: LATM-2-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:52: 5
                           04-425 I-215 Business Park (LATERAL M-2)

                             Catch Basin #2

                               2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.780  1418.080    3.390  1421.470      2.04    1.15     .02  1421.49     .00
  .54      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    18.850    .0101                                        .0003      .01     3.39
   .00     .43    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1418.270    3.206  1421.476      2.04    1.15     .02  1421.50     .00
  .54      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1418.270    3.237  1421.507      2.04     .06     .00  1421.51     .00
  .11    10.00    5.000   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0100                                        .0000      .00     3.24
   .01     .09    .012       .00   .00  RECTANG
```

```
          |         |        |         |         |                |         |       |
       |        |       |       |      |
    25.630  1418.300    3.207  1421.507      2.04     .06     .00  1421.51     .00
  .11    10.00    5.000   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

CITY OF PERRIS LINE A - LATERAL M-4 WSPG

```
↑ FILE: LATM-4-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:54:37
                           04-425 I-215 Business Park (LATERAL M-4)

                             Catch Basin #4

                               2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.780  1418.890    3.212  1422.102      1.45     .82     .01  1422.11     .00
  .45      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    18.850    .0095                                        .0002      .00     3.21
   .00     .37    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1419.070    3.035  1422.105      1.45     .82     .01  1422.12     .00
  .45      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1419.070    3.051  1422.121      1.45     .05     .00  1422.12     .00
  .09    10.00    4.200   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0100                                        .0000      .00     3.05
   .00     .07    .012       .00   .00  RECTANG
```

25.630	1419.100	3.021	1422.121	1.45	.05	.00	1422.12
.00	.09	10.00	4.200	10.000	.00	0	.0

-|- -|- -|- -|- -|- -|- -|- -|-
-|- -|- -|- -|- -|- |-

LINE 4 - WSPG

```
↑ FILE: LINE4V2.WSW                          W S P G W - CIVILDESIGN Version 14.06
                                       PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:29: 5
                           ETHANAC LOGISTICS CENTER

                             22-0198 LINE 4 WSPG

                               2023-09-01 RSB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1000.000  1421.800    3.620  1425.420     19.20    2.72     .11  1425.53     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    38.100    .0029                                        .0008      .03     3.62
   .00    1.56    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1038.100  1421.910    3.542  1425.452     19.20    2.72     .11  1425.57     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    78.440    .0031                                        .0008      .06      .00
   .00    1.54    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1116.540  1422.150    3.390  1425.540     19.20    2.72     .11  1425.65     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   180.066    .0030                                        .0008      .15     3.39
   .00    1.55    .013       .00   .00  PIPE
```

```
         |         |        |         |         |               |         |       |
       |        |       |       |
  1296.606  1422.689    3.000  1425.689     19.20    2.72     .11  1425.80     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   119.930    .0030                                        .0008      .09     3.00
   .00    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1416.536  1423.047    2.721  1425.769     19.20    2.85     .13  1425.89     .00
 1.40     1.74    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    66.196    .0030                                        .0008      .05     2.72
   .26    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1482.733  1423.245    2.560  1425.806     19.20    2.99     .14  1425.94     .00
 1.40     2.12    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    54.656    .0030                                        .0008      .04     2.56
   .30    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1537.388  1423.409    2.427  1425.836     19.20    3.13     .15  1425.99     .00
 1.40     2.36    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    27.012    .0030                                        .0009      .02     2.43
   .34    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1564.400  1423.490    2.362  1425.852     19.20    3.22     .16  1426.01     .00
 1.40     2.46    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0067                                        .0008      .00    2.36
  .36             .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1567.400  1423.510    2.377  1425.887     18.20    3.03     .14  1426.03     .00
 1.37     2.43    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    20.020    .0025                                        .0008      .02     2.38
   .34    1.58    .013       .00   .00  PIPE
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time: 1:29: 5

ETHANAC LOGISTICS CENTER

22-0198 LINE 4 WSPG

2023-09-01 RSB

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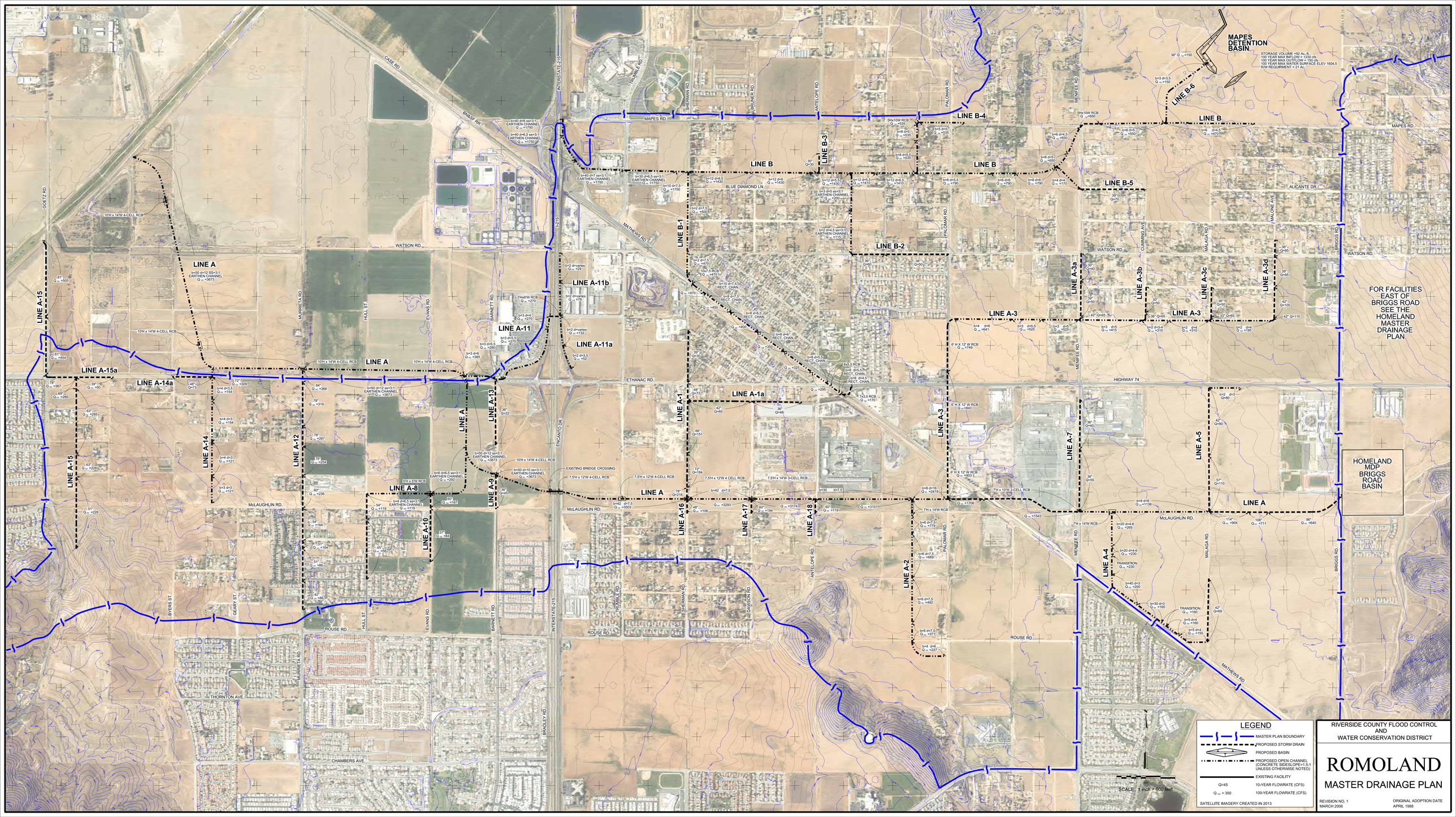
*******************************************************************************
************************************* ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |
  1587.420  1423.560    2.338  1425.898     18.20    3.08     .15  1426.05     .00
 1.37     2.49    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0033                                          .0020      .01    2.34
  .35             .013       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1590.420  1423.570    2.287  1425.857     12.70    4.04     .25  1426.11     .00
 1.28      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    37.180    .0030                                          .0032      .12     2.29
   .00    1.70    .013       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1627.600  1423.680    2.294  1425.974     12.70    4.04     .25  1426.23     .00
 1.28      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0037                                          .0004      .01    2.29
  .00             .013       .00   .00  PIPE
                       -------------------- WARNING - Junction Analysis - Change in
Channel Type ---------------
```

```
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1643.610  1423.740    2.534  1426.274      2.70    1.20     .02  1426.30     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    53.890    .0028                                        .0004      .02     2.53
   .17     .62    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1697.500  1423.890    2.406  1426.296      2.70    1.20     .02  1426.32     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    45.230    .0031                                        .0004      .02      .00
   .17     .59    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1742.730  1424.030    2.289  1426.319      2.70    1.20     .02  1426.34     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     4.500    .0031                                        .0004      .00     2.29
   .17     .59    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1747.230  1424.044    2.277  1426.321      2.70    1.20     .02  1426.34     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

APPENDIX C – REFERENCES

ROMOLAND MASTER DRAINAGE PLAN


MAPES DETENTION BASIN
STORAGE VOLUME =92 Ac.-ft.
100 YEAR MAX INFLOW = 1230 cfs
100 YEAR MAX OUTFLOW = 150 cfs
100 YEAR MAX WATER SURFACE ELEV 1604.5
R/W REQUIRMENT = 21 Ac.
FOR FACILITIES EAST OF BRIGGS ROAD SEE THE HOMELAND MASTER DRAINAGE PLAN
HOMELAND MDP BRIGGS ROAD BASIN
LINE A
LINE A-1
LINE A-1a
LINE A-2
LINE A-3
LINE A-3a
LINE A-3b
LINE A-3c
LINE A-3d
LINE A-4
LINE A-5
LINE A-7
LINE A-8
LINE A-9
LINE A-10
LINE A-11
LINE A-11a
LINE A-11b
LINE A-12
LINE A-13
LINE A-14
LINE A-14a
LINE A-15
LINE A-15a
LINE A-16
LINE A-17
LINE A-18
LINE B
LINE B-1
LINE B-2
LINE B-3
LINE B-4
LINE B-5
LINE B-6
MAPES RD.
WATSON RD.
ETHANAC RD.
McLAUGHLIN RD.
ROUSE RD.
HIGHWAY 74
ALICANTE DR.
THORNTON AVE.
CHAMBERS AVE.
MATHEWS RD.
INTERSTATE-215
I-215
BNSF RR
CASE RD.
GOETZ RD.
MURRIETA RD.
HULL ST.
EVANS RD.
BARNETT RD.
ENCANTO DR.
BYERS ST.
GEARY ST.
BRADLEY RD.
TRUMBLE RD.
SHERMAN RD.
PALMER RD.
ANTELOPE RD.
DAWSON RD.
PALOMAR RD.
MENIFEE RD.
MALAGA RD.
CLIMMING AVE.
MALONE AVE.
BRIGGS RD.
BLUE DIAMOND LN.
EXISTING BRIDGE CROSSING
SCALE: 1 inch = 600 feet
LEGEND
MASTER PLAN BOUNDARY
PROPOSED STORM DRAIN
PROPOSED BASIN
PROPOSED OPEN CHANNEL (CONCRETE SIDESLOPE=1:1 UNLESS OTHERWISE NOTED)
EXISTING FACILITY
Q=45 10-YEAR FLOWRATE (CFS)
Q 100 = 350 100-YEAR FLOWRATE (CFS)
SATELLITE IMAGERY CREATED IN 2013
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
ROMOLAND
MASTER DRAINAGE PLAN
REVISION NO. 1
MARCH 2006
ORIGINAL ADOPTION DATE
APRIL 1988

ILLINOIS AVENUE LINE A STORM DRAIN PLAN P8-921

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.

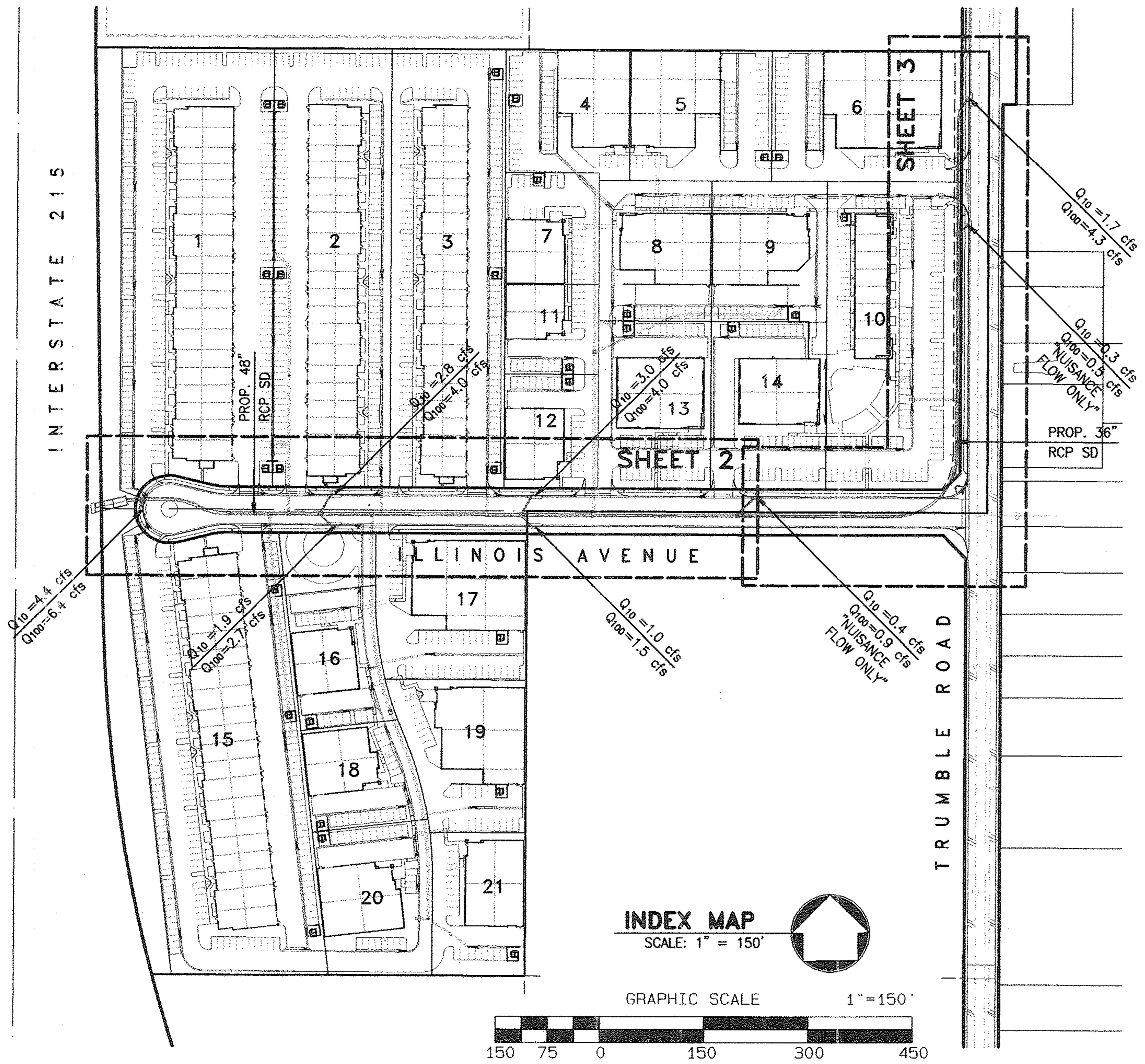
THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. LOCATIONS OF UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

BASIS OF BEARINGS

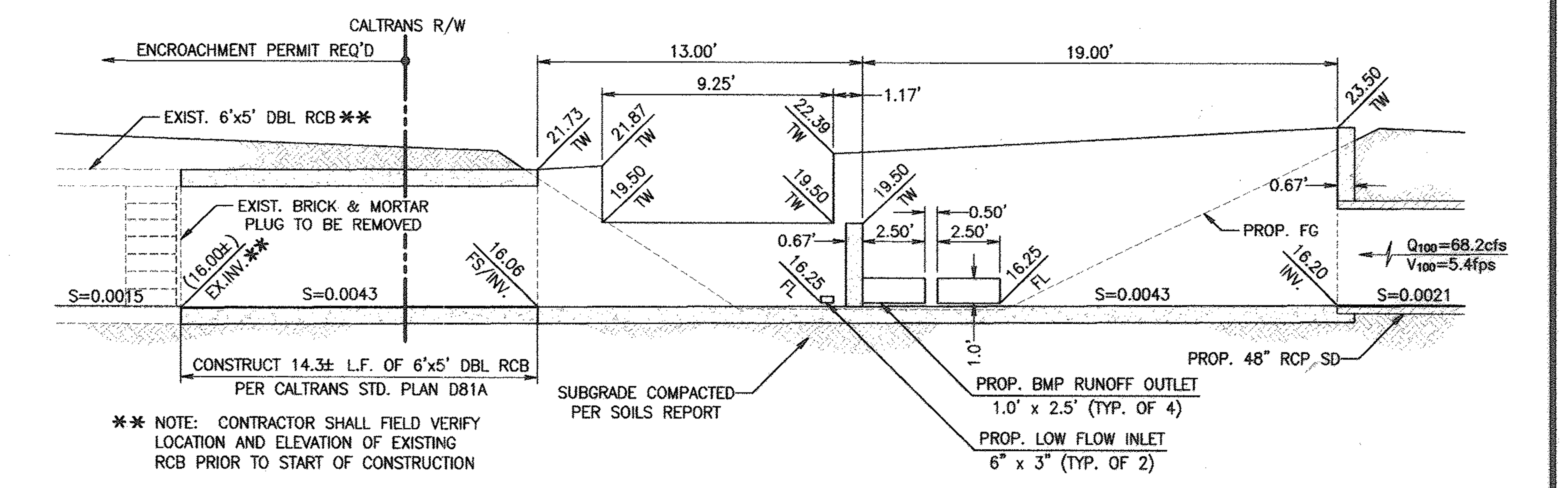
BASIS OF BEARING IS THE CENTERLINE OF PERRIS BOULEVARD TAKEN AS N00°16'30"E, AS SHOWN BY AMENDED PARCEL MAP 16950 PER P.M. 113/62–70, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

NOTE

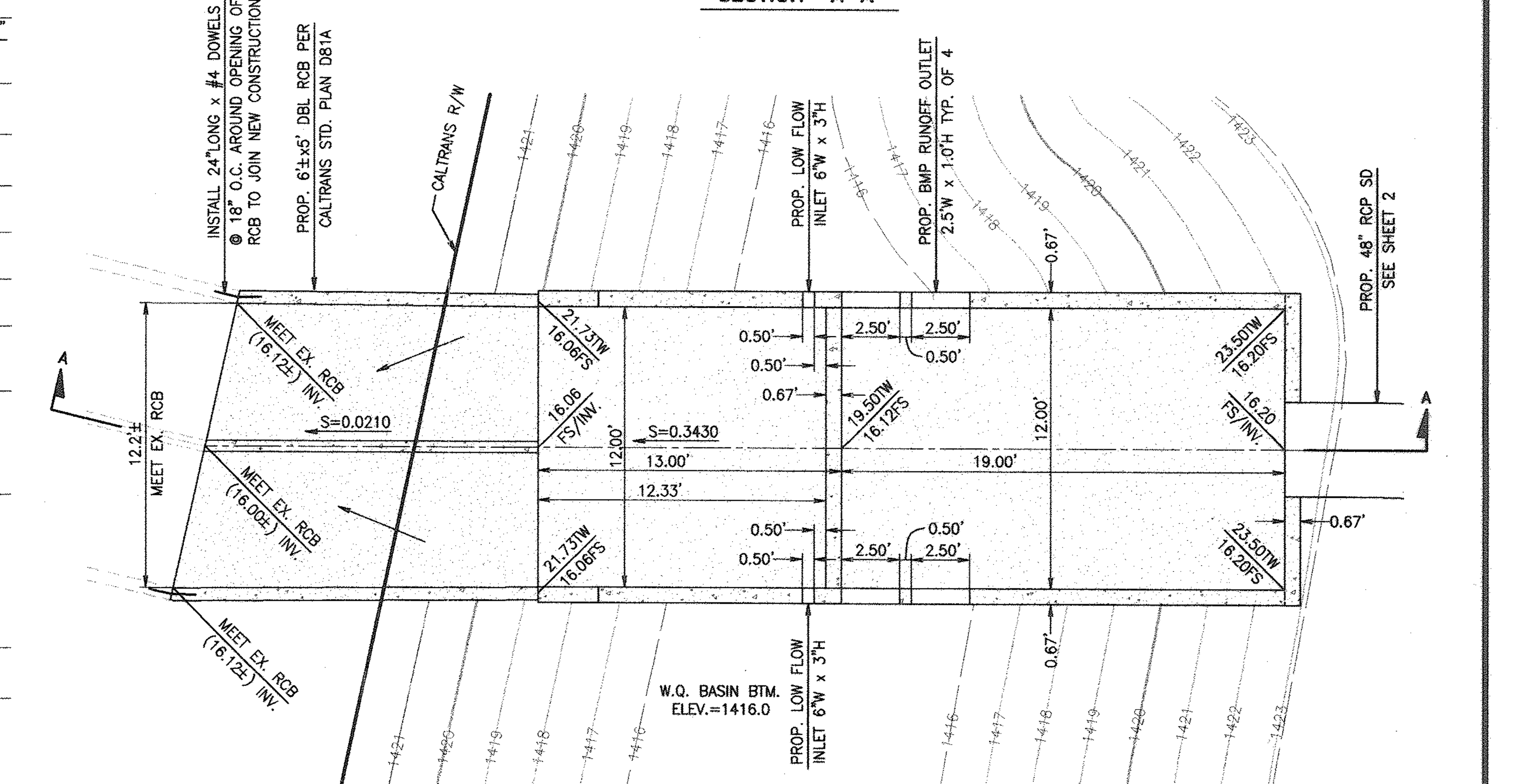
ALL ON–SITE STORM DRAIN AND PRIVATE LATERALS REFERRED TO ON THESE PLANS ARE TO BE CONSTRUCTED PER SEPARATE ON–SITE DRAINAGE PLANS AND CONCURRENTLY WITH PUBLIC STORM DRAIN SHOWN HEREON.



INDEX MAP
SCALE: 1" = 150'



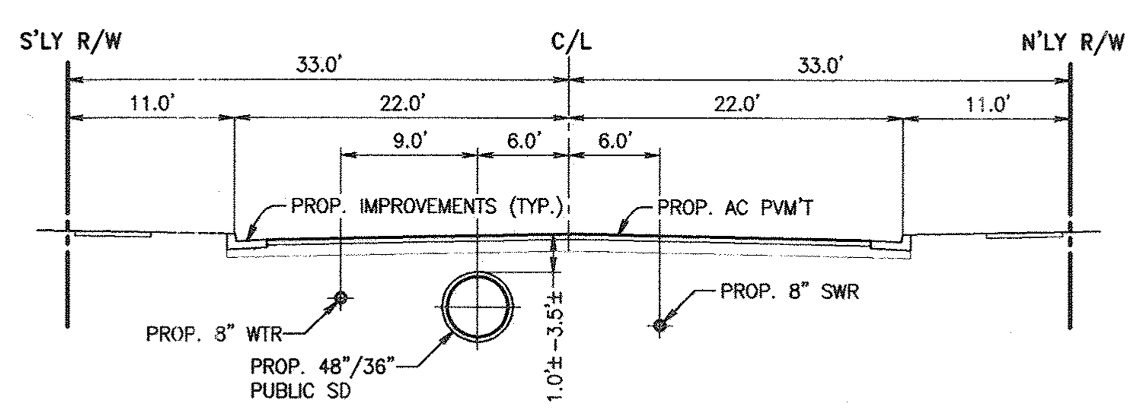
SECTION "A–A"



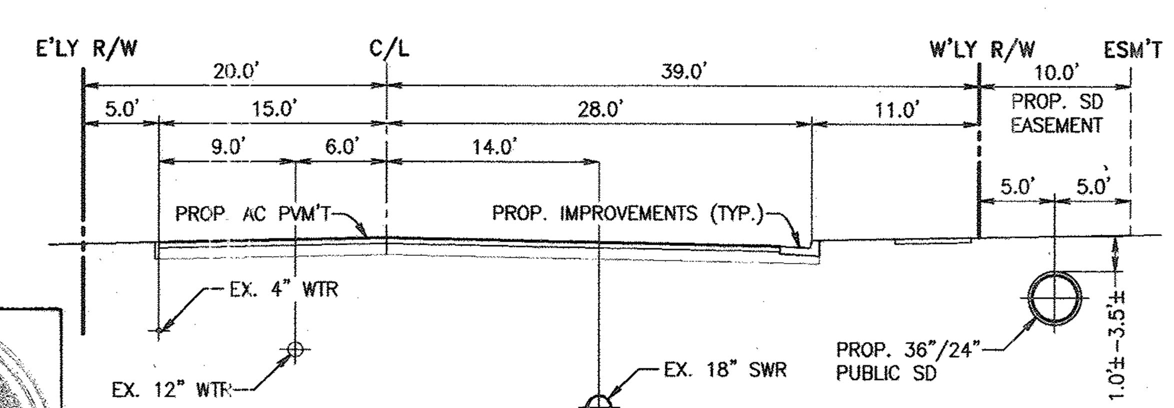
WEIR/FOREBAY STRUCTURE DETAIL
SCALE: 1" = 5'

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



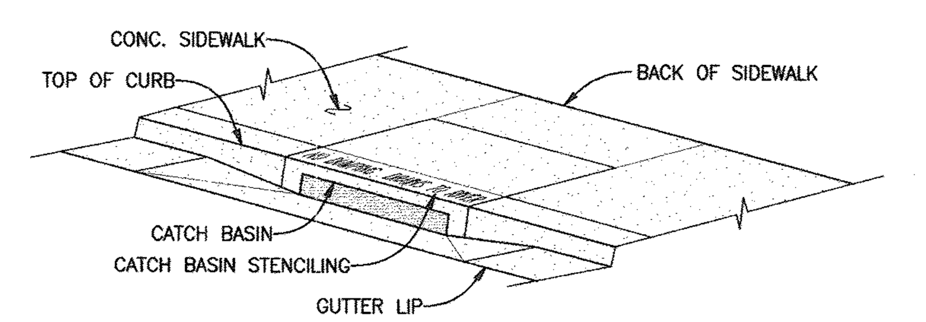
UNDERGROUND UTILITIES TYPICAL SECTION
ILLINOIS AVENUE
NOT TO SCALE



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

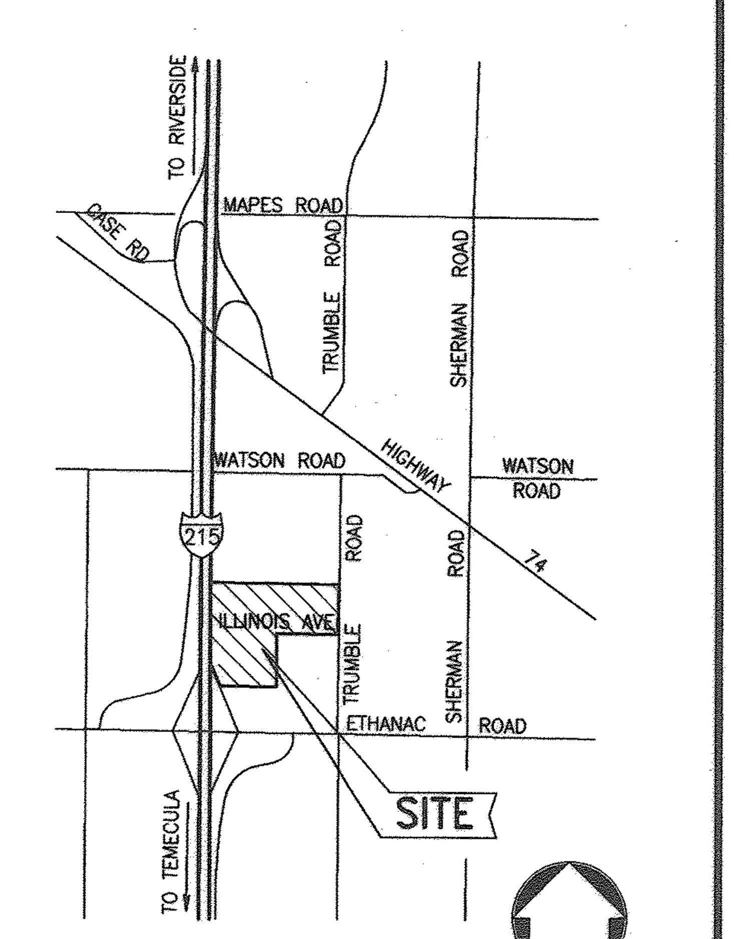


CATCH BASIN STENCILING DETAIL
NOT TO SCALE

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

SHEET 1 TITLE SHEET
SHEET 2 STA 10+00 TO 19+00 – PLAN & PROFILE
SHEET 3 STA 19+00 TO 28+06 – PLAN & PROFILE



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

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

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 SEVICE 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: P8–921

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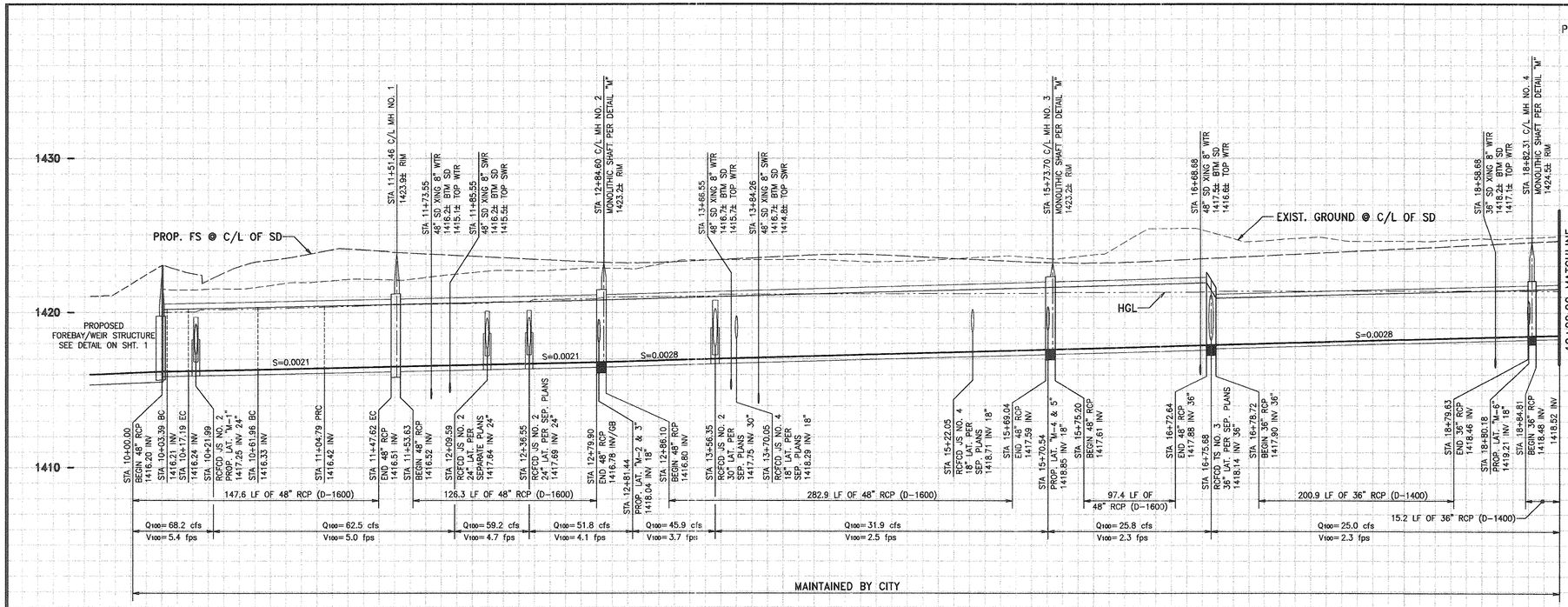
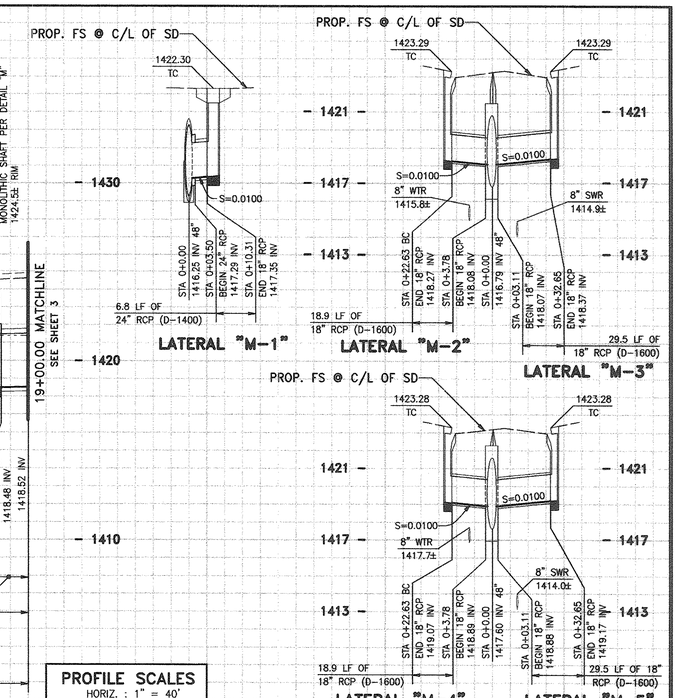
16575 P-412





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

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

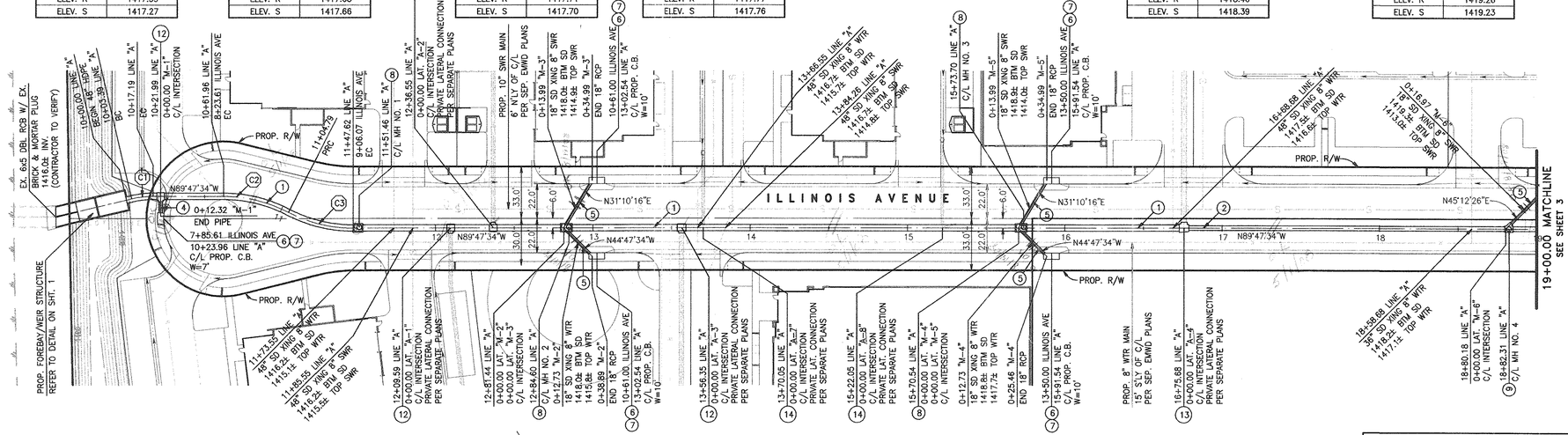
TS STA 16+75.68	
ANGLE A	90°00'00"
B	36"
C	3.67'
D_1 & D_2	48" & 36"
L	6.08'
ELEV. R	1418.40
ELEV. S	1418.39

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

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

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



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'

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

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
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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

16575 P-412

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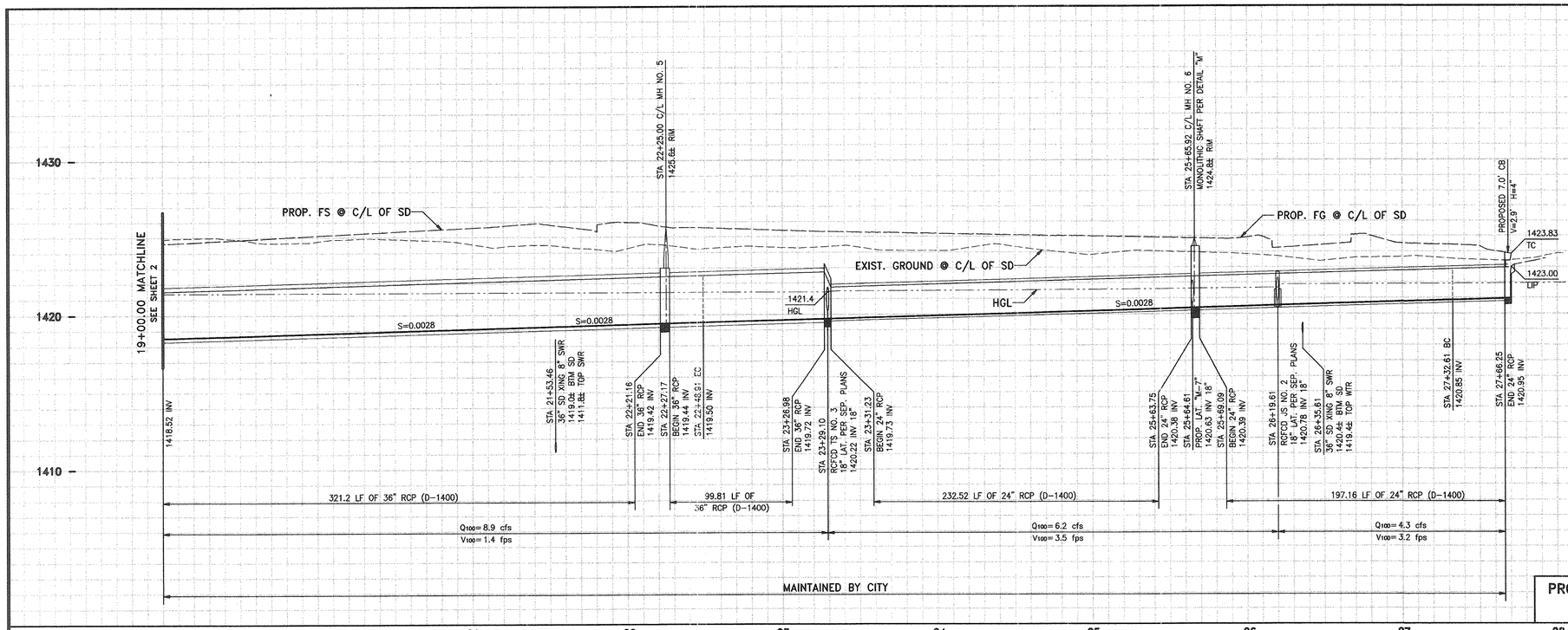
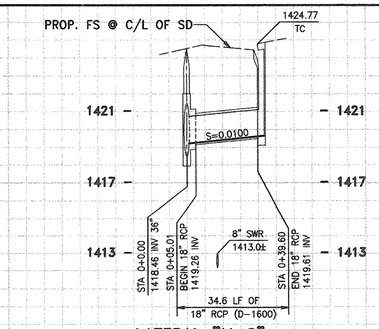
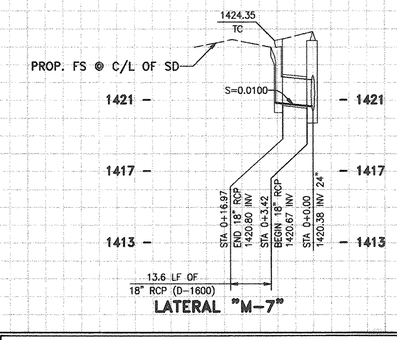


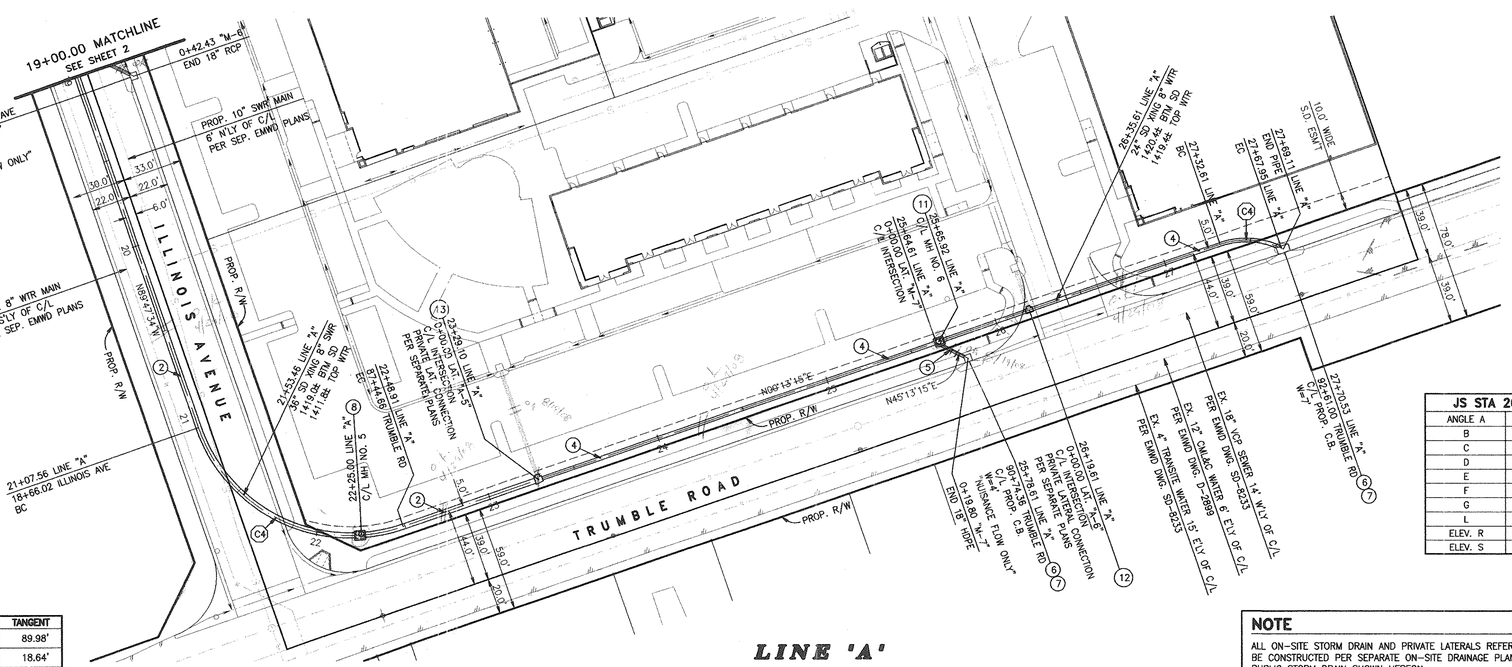


LATERAL "M-6"



LATERAL "M-7"

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 03-08 DATE
R.C.E. C44762

REGISTERED PROFESSIONAL ENGINEER SCOTT R. WILDEBRANDT No. C44762 EXP. 3/31/10 CIVIL STATE OF CALIFORNIA

CONSTRUCTION NOTES

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NOTE
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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
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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		

ENGINEER | CITY
DESIGNED BY: RB DRAWN BY: BTE CHECKED BY: RB

SEAL

SEAL

APPROVED BY: DATE: 2-2-07
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 34062)
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

16575 P-412

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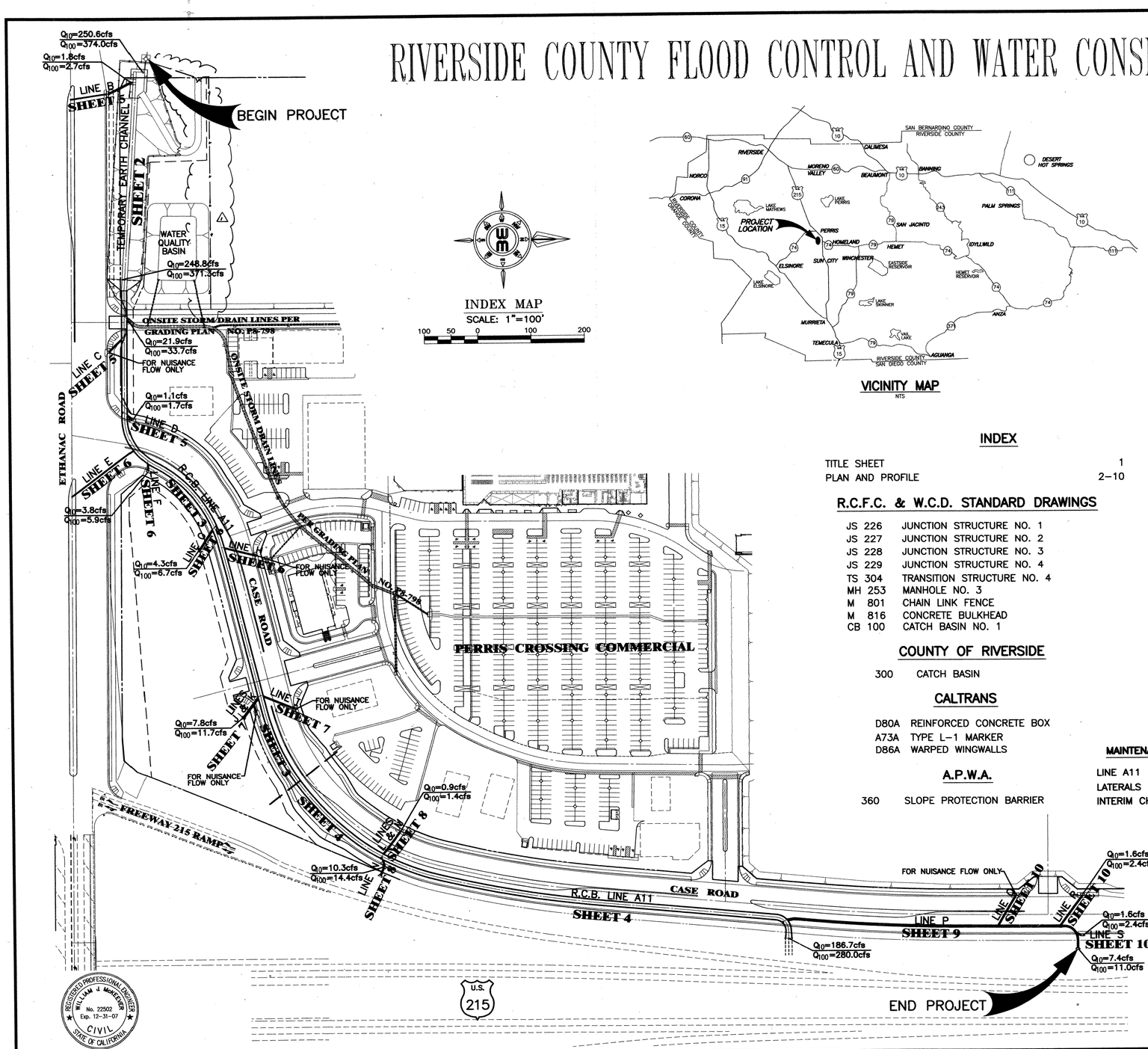
MDP LINE A-11 STORM DRAIN PLAN P8-798

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



INDEX MAP
SCALE: 1"=100'
100 50 0 100 200

VICINITY MAP
NTS

INDEX

TITLE SHEET 1
PLAN AND PROFILE 2–10

R.C.F.C. & W.C.D. STANDARD DRAWINGS

JS 226	JUNCTION STRUCTURE NO. 1
JS 227	JUNCTION STRUCTURE NO. 2
JS 228	JUNCTION STRUCTURE NO. 3
JS 229	JUNCTION STRUCTURE NO. 4
TS 304	TRANSITION STRUCTURE NO. 4
MH 253	MANHOLE NO. 3
M 801	CHAIN LINK FENCE
M 816	CONCRETE BULKHEAD
CB 100	CATCH BASIN NO. 1

COUNTY OF RIVERSIDE

300 CATCH BASIN

CALTRANS

D80A REINFORCED CONCRETE BOX
A73A TYPE L–1 MARKER
D86A WARPED WINGWALLS

A.P.W.A.

360 SLOPE PROTECTION BARRIER

MAINTENANCE RESPONSIBILITY

LINE A11	CITY OF PERRIS
LATERALS	CITY OF PERRIS
INTERIM CHANNEL	CITY OF PERRIS

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 M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 2004.
2. CONSTRUCTION INSPECTION WILL BE PERFORMED BY CITY OF PERRIS. THE CITY MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
3. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
5. FORTY–EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1–800–422–4133 AND/OR 1800–227–2600.
6. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
7. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
10. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI–2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
11. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
12. 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.
13. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
14. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
15. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
16. APPROVAL OF THESE PLANS BY THE CITY DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
17. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
18. VIDEO'S OF ALL STORM DRAINS SHALL BE SUBMITTED TO THE CITY ENGINEER.

CONSTRUCTION NOTES AND QUANTITIES

REFERENCE/S	CONSTRUCTION NOTE	QUANTITY
1	CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION SHEET 2.	388 L.F.
2	CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS SHEET 2.	1 EA.
3	CONSTRUCT WARPED WINGWALL PER CALTRANS STD. PLAN D86A. W=32.7' AND 29' L=30.8' AND 34.3'	1 EA.
4	CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.	2,022 L.F.
5	INSTALL SLOPE PROTECTION BARRIER PER A.P.W.A. STD. PLAN 360.	1 EA.
6	PLACE 4" THICK CONCRETE SLAB.	1,567 S.F.
7	CONSTRUCT 3" A.C. OVER NATIVE.	3,542 S.F.
8 20	CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226.	2 EA.
30 34 36	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227	3 EA.
9 10 11 12 13 14 15 18 19 32	CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228.	10 EA.
16	CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.	4 EA.
17	REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.	385 L.F.
21	CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. TS304.	1 EA.
22	CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.	5 EA.
23	INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.	382 L.F.
24	INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.	635 L.F.
25	INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.	232 L.F.
26	INSTALL 8" NDS–10 ROUND GRATES PER NAT'L DIVERSIFIED SALES, INC. OR APPROVED EQUAL.	3 EA.
27	CONSTRUCT CONCRETE DROP INLET PER RCFCD STD. DWG. NO. CB110.	2 EA.
28	CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.	3 EA.
29	INSTALL 30" RCP 1500D. SLOPE PER PLAN.	45 L.F.
33	CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.	2 EA.
35	CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251	3 EA.
38	INSTALL MARKERS PER CALTRANS STD. PLAN A73A TYPE L–1 ALONG CHANNEL AT 100' O.C.	5 EA.
39	INSTALL 36" RCP 1500D. SLOPE PER PLAN.	510 L.F.
40	CONSTRUCT CHAIN LINK FENCE PER RCFCD STD. DWG. NO. M801.	145 L.F.
41	CONSTRUCT RCB CURVED SECTIONS PER RCFCD STD. DWG. NO. M819.	38 L.F.
42	INSTALL 4 L.F. 48" STUB AT S=0.0354.	4 L.F.
43	CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.	1 EA.
44	CONSTRUCT GROUTED 12" MIN. DIA. ROCK AROUND PUMP 2' THICK AND 2' DEPTH.	128 C.F.
45	CONSTRUCT CATCH BASIN NO. 1 PER COUNTY OF RCFCD STD. DWG. NO. CB100.	7 EA.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341–3700
FAX: (951) 341–3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE

CITY OF PERRIS
CITY FILE NO. P8–798
APPROVED BY:
CITY ENGINEER DATE

DIG ALERT
CALL: TOLL FREE
1–800
227–2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600–31–68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT REV. INDEX MAP ADD FENCE & BASIN		

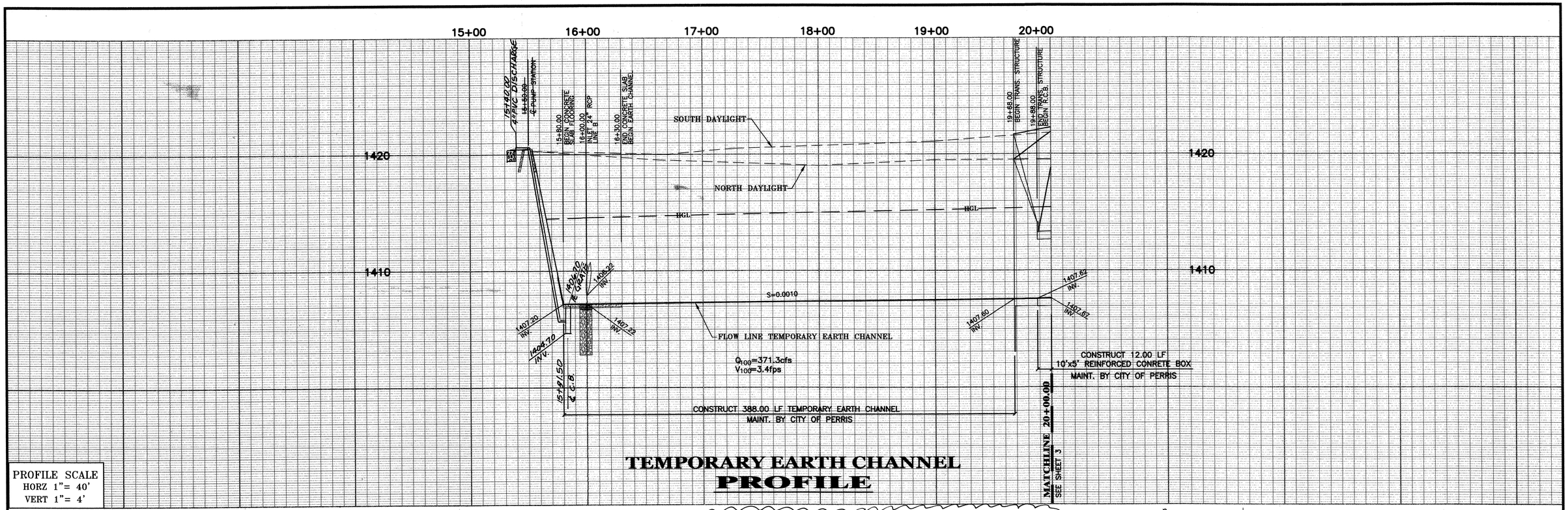
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
TEMPORARY EARTH CHANNEL, ROMOLAND MDP LINE A11 AND LATERALS
TITLE SHEET

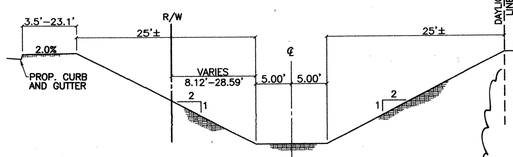
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 1 OF 10

P-397



PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'

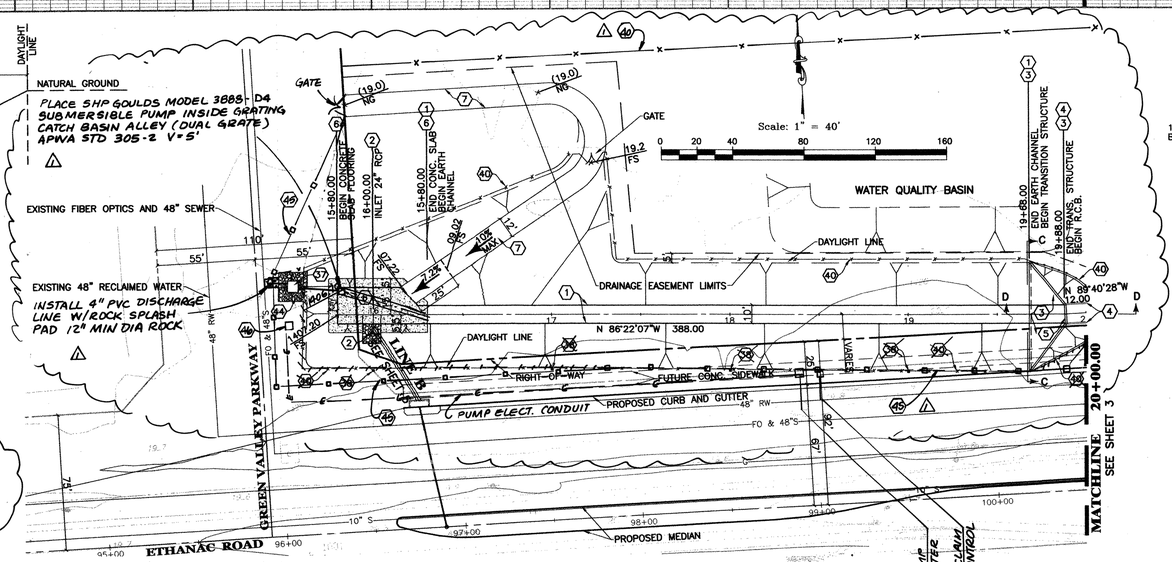
TEMPORARY EARTH CHANNEL PROFILE



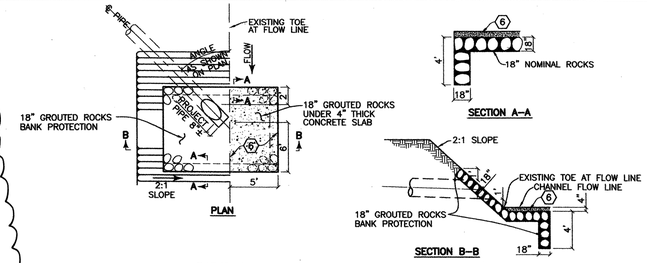
1 TRAPEZOIDAL EARTH CHANNEL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

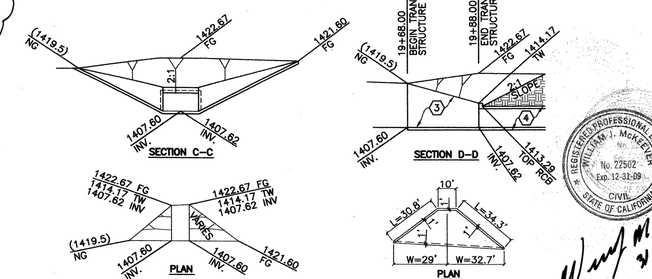
1. CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION ABOVE.
2. CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS RIGHT.
3. CONSTRUCT WARPED WINGWALL PER CALTRANS STD. PLAN D86A. W=32.7' AND 29' L=30.8' AND 34.3'
4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
5. INSTALL SLOPE PROTECTION BARRIER PER A.P.W.A. STD. PLAN 360.
6. PLACE 4" THICK CONCRETE SLAB.
7. CONSTRUCT 3" A.C. OVER NATIVE.
37. ~~FUTURE PUMP PAD~~ 5'WIDE 3'THICK CONC. SPLASH PAD
38. ~~INSTALL MARKERS PER CALTRANS STD. PLAN A73A TYPE L-1 ALONG CHANNEL AT 100' O.C.~~
40. CONSTRUCT CHAIN LINK FENCE PER RCFCD STD. DWG. NO. M801.
44. CONSTRUCT GROUTED 12" MIN. DIA. ROCK AROUND ~~PUMP~~ SPLASH PAD 2' THICK AND 2' DEPTH.
45. 6' WROUGHT IRON FENCE
46. PUMP CONTROL PAD



TEMPORARY EARTH CHANNEL PLAN



2 PIPE THRU EARTHEN CHANNEL DETAILS
N.T.S.



3 WARPED WINGWALL DETAILS
N.T.S.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER DATE

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT REV FENCE LOCATION & TYPE ADD DISCHARGE LINE, ELECT LINE AND METERS ADD PUMP, BASIN AND SPLASH PAD NOTES		

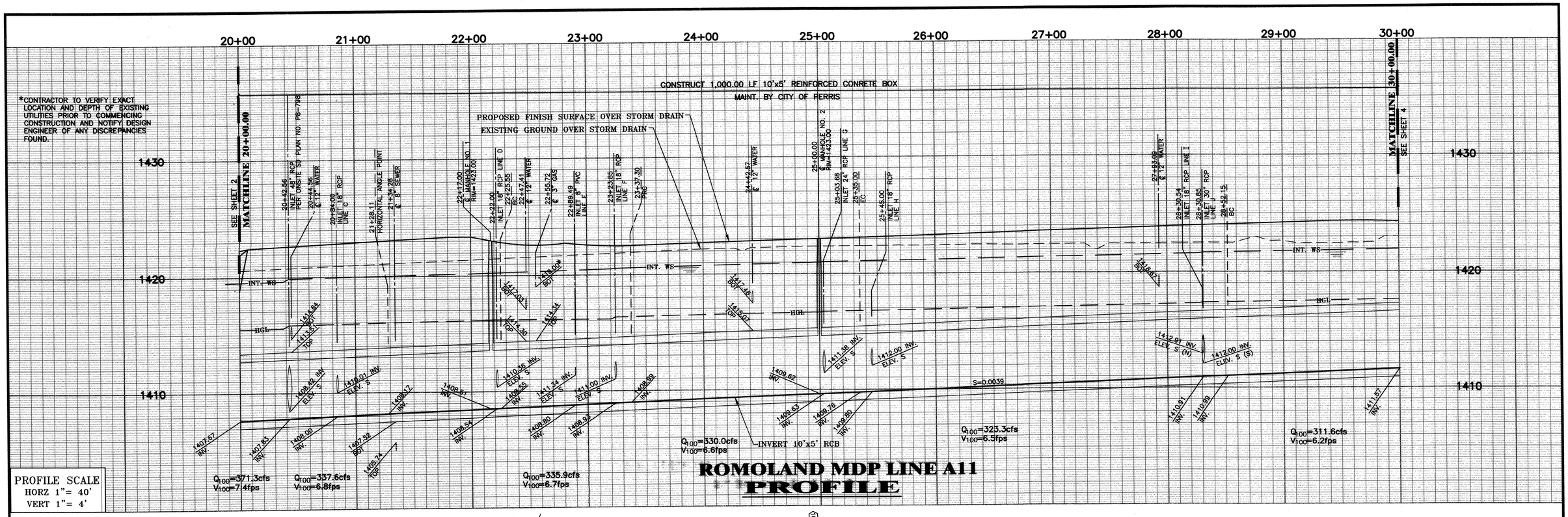
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
TEMPORARY
EARTH CHANNEL
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 2 OF 10

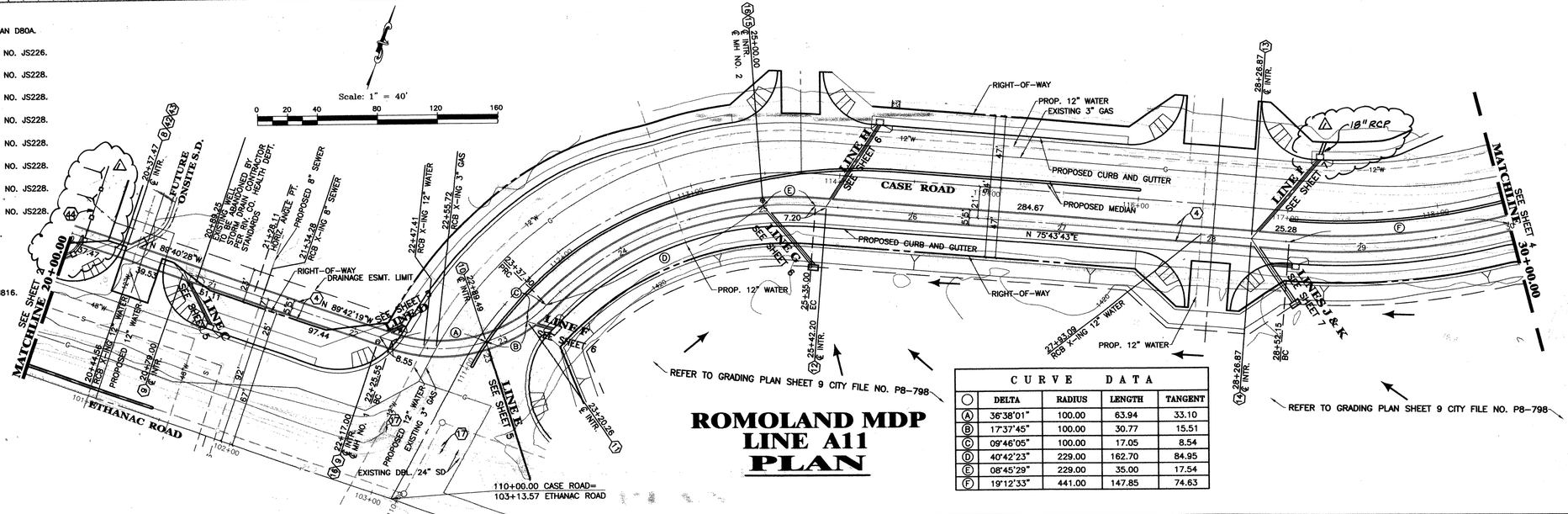
P-397



ROMOLAND MDP LINE A11 PROFILE

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
8. CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=44°29'32" B=48" C=11.55" ELEV. "R"=1408.56
9. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=45°00'00" D=18"
10. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=90°00'00" D=8"
11. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=52°33'30" D=18"
12. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=60°43'43" D=18"
13. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=53°45'04" D=18"
14. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=51°28'18" D=30"
15. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=54°23'26" B=24"
16. CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.
17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
42. INSTALL 4 L.F. 48" STUB AT S=0.0354.
43. CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.
44. CONSTRUCT 6' WROUGHT IRON FENCE



ROMOLAND MDP LINE A11 PLAN

CURVE DATA				
	DELTA	RADIUS	LENGTH	TANGENT
A	36°38'01"	100.00	63.94	33.10
B	17°37'45"	100.00	30.77	15.51
C	09°46'05"	100.00	17.05	8.54
D	40°42'23"	229.00	162.70	84.95
E	08°45'29"	229.00	35.00	17.54
F	19°12'33"	441.00	147.85	74.63

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS-BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740

WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/14/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY: — CITY ENGINEER — DATE 12-26-06

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST.
ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT ADD W.I FENCE 18"R.C.P.		

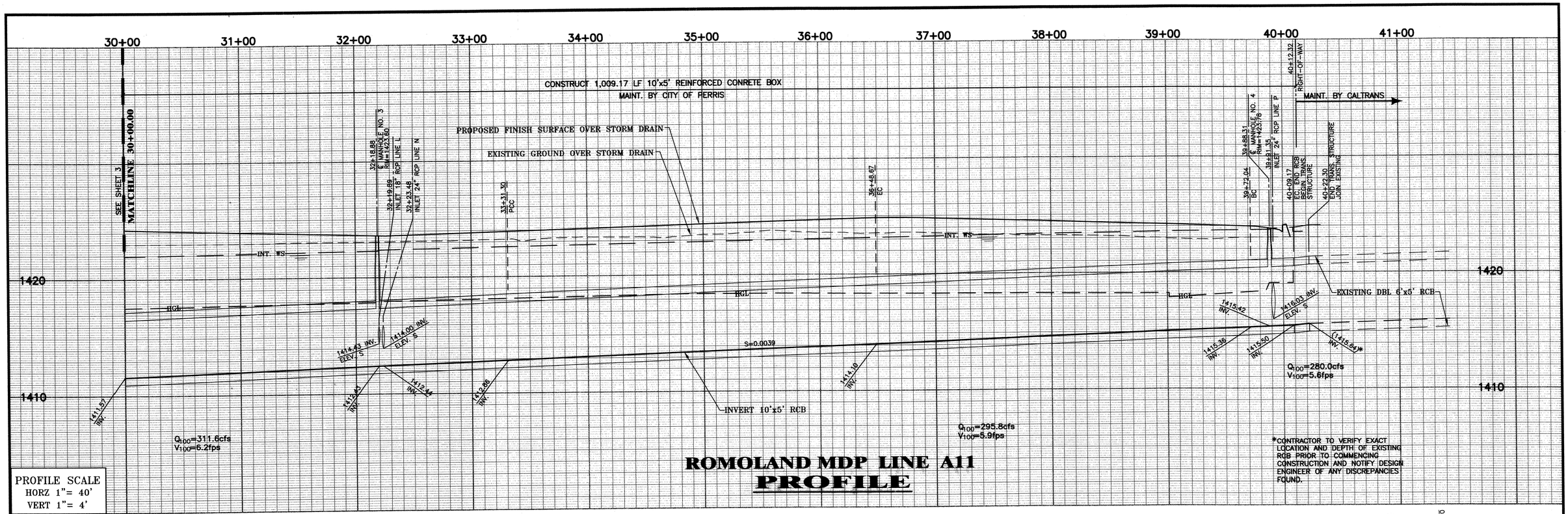
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
ROMOLAND MDP
LINE A11
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 3 OF 10

P-397



PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'

ROMOLAND MDP LINE A11
PROFILE

CONSTRUCTION NOTES:

(4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.

(16) CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.

(17) REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.

(18) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=78°43'51" D=18"

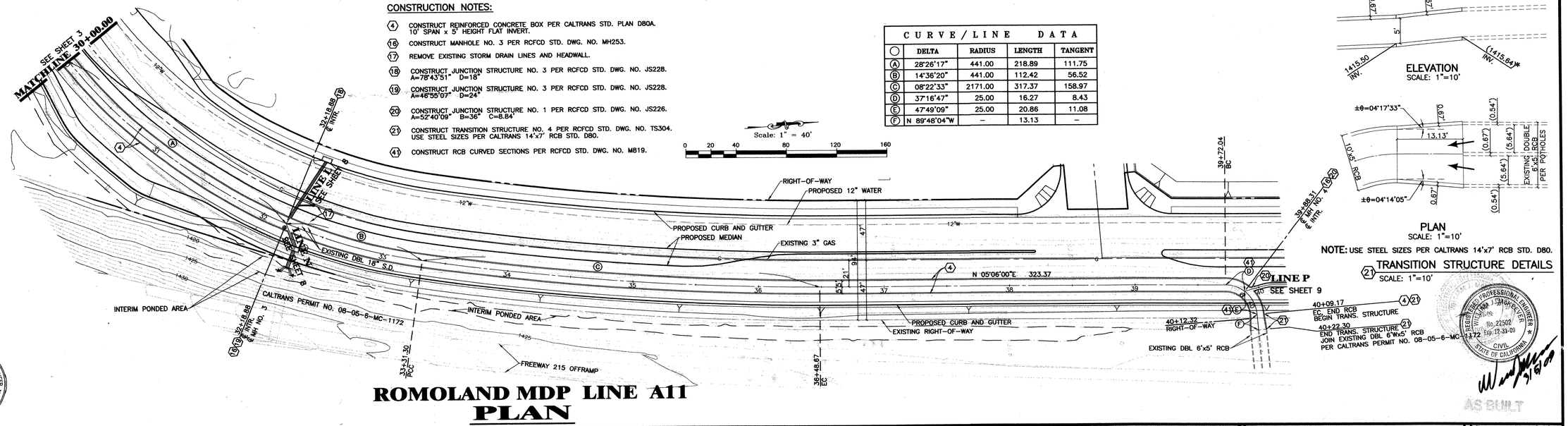
(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=46°55'07" D=24"

(20) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=52°40'09" B=36" C=8.84'

(21) CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. TS304. USE STEEL SIZES PER CALTRANS 14'x7' RCB STD. D80.

(41) CONSTRUCT RCB CURVED SECTIONS PER RCFCD STD. DWG. NO. M819.

CURVE / LINE DATA				
○	DELTA	RADIUS	LENGTH	TANGENT
(A)	28°26'17"	441.00	218.89	111.75
(B)	14°36'20"	441.00	112.42	56.52
(C)	08°22'33"	2171.00	317.37	158.97
(D)	37°16'47"	25.00	16.27	8.43
(E)	47°49'09"	25.00	20.86	11.08
(F)	N 89°48'04"W	–	13.13	–



NOTE: USE STEEL SIZES PER CALTRANS 14'x7' RCB STD. D80.

(21) TRANSITION STRUCTURE DETAILS
SCALE: 1"=10'

ROMOLAND MDP LINE A11
PLAN

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 11/8/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE 12-26-06

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

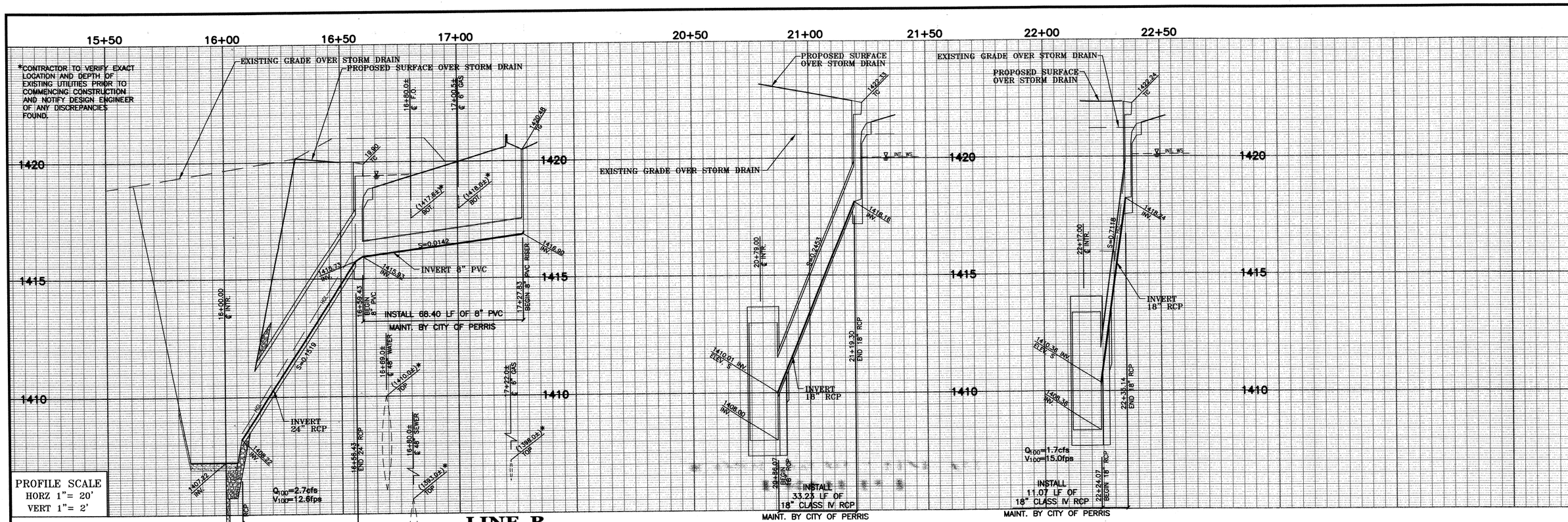
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
ROMOLAND MDP
LINE A11
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 4 OF 10

P-397

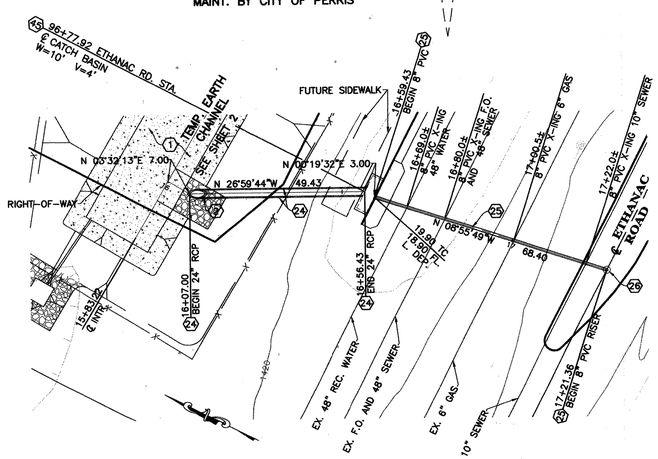


LINE B PROFILE

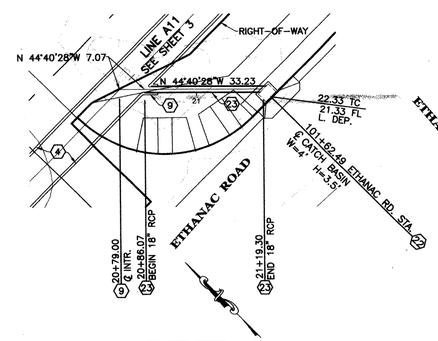
LINE C PROFILE

*CB FOR NUISANCE FLOWS ONLY

LINE D PROFILE



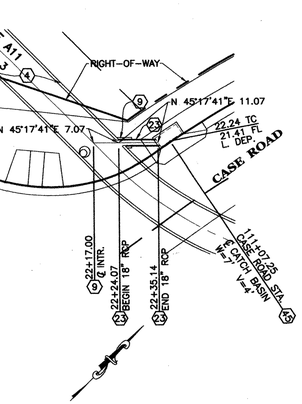
LINE B PLAN



LINE C PLAN

Scale: 1" = 20'

0 10 20 40 60 80



LINE D PLAN

CONSTRUCTION NOTES:

1. CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION SHEET 2.
2. CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS SHEET 2.
4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
9. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=45°00'00" D=18"
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
23. INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
24. INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
25. INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.
26. INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.
45. CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/19/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST.
ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
△	AS BUILT NO REVISIONS		

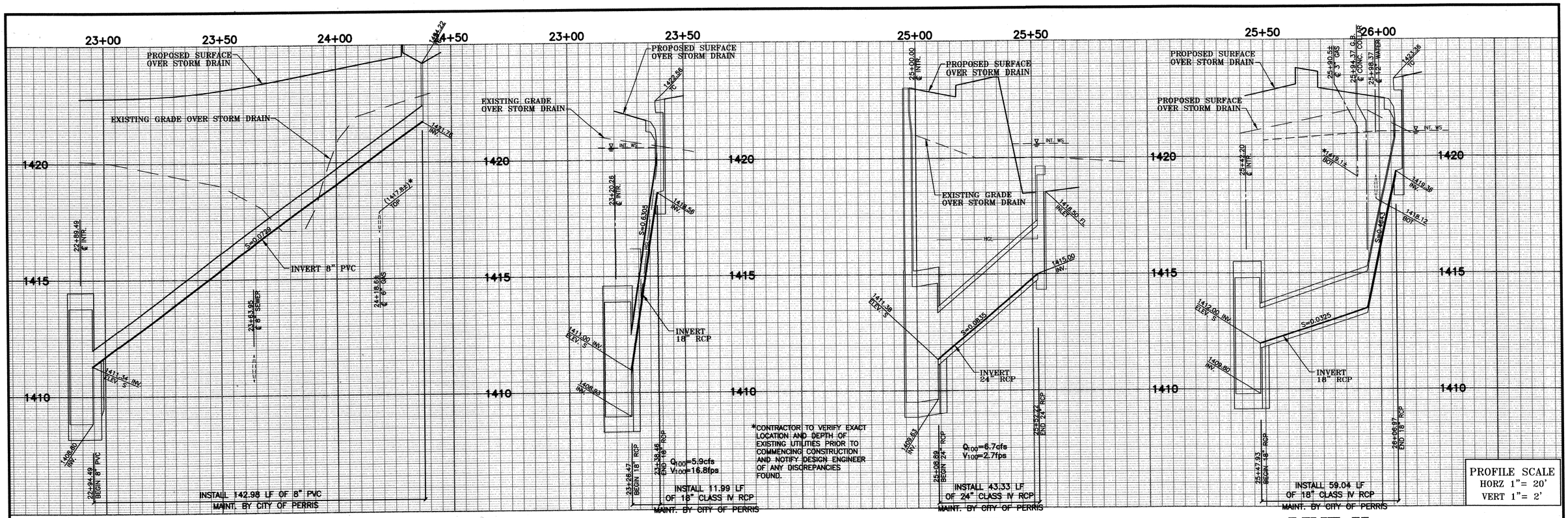
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
R.C.P.
LINES B, C, AND D
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 5 OF 10

P-397



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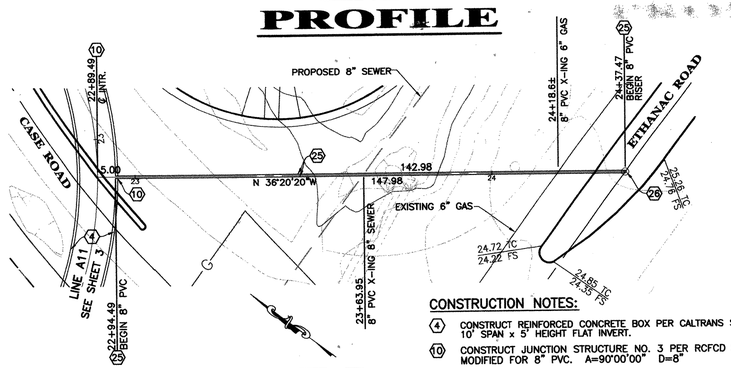
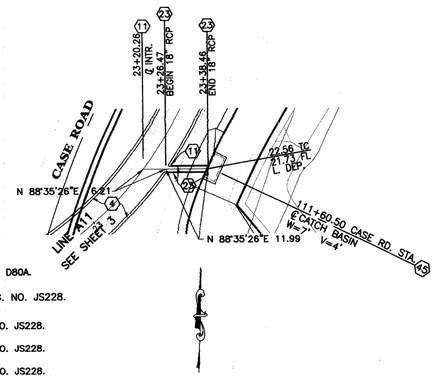
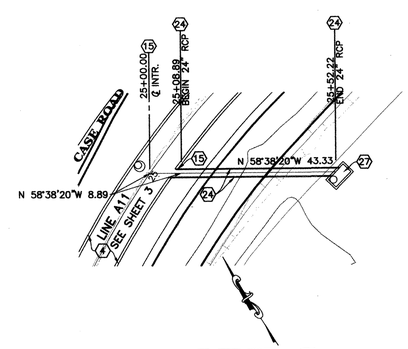


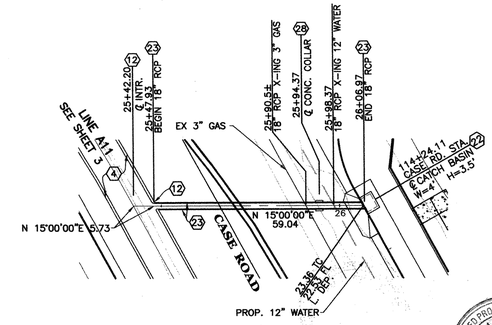
LINE E
PLAN



LINE F
PLAN



LINE G
PLAN



LINE H
PLAN

CONSTRUCTION NOTES:

- (4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
- (10) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=90°00'00" D=8"
- (11) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=52°33'30" D=18"
- (12) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=60°43'43" D=18"
- (15) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=54°23'26" D=24"
- (22) CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
- (23) INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
- (24) INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
- (25) INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.
- (26) INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.
- (27) CONSTRUCT CONCRETE DROP INLET (W=6' V=4.62') PER RCFCD STD. DWG. NO. CB110.
- (28) CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.
- (45) CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

Scale: 1" = 20'
0 10 20 40 60 80

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

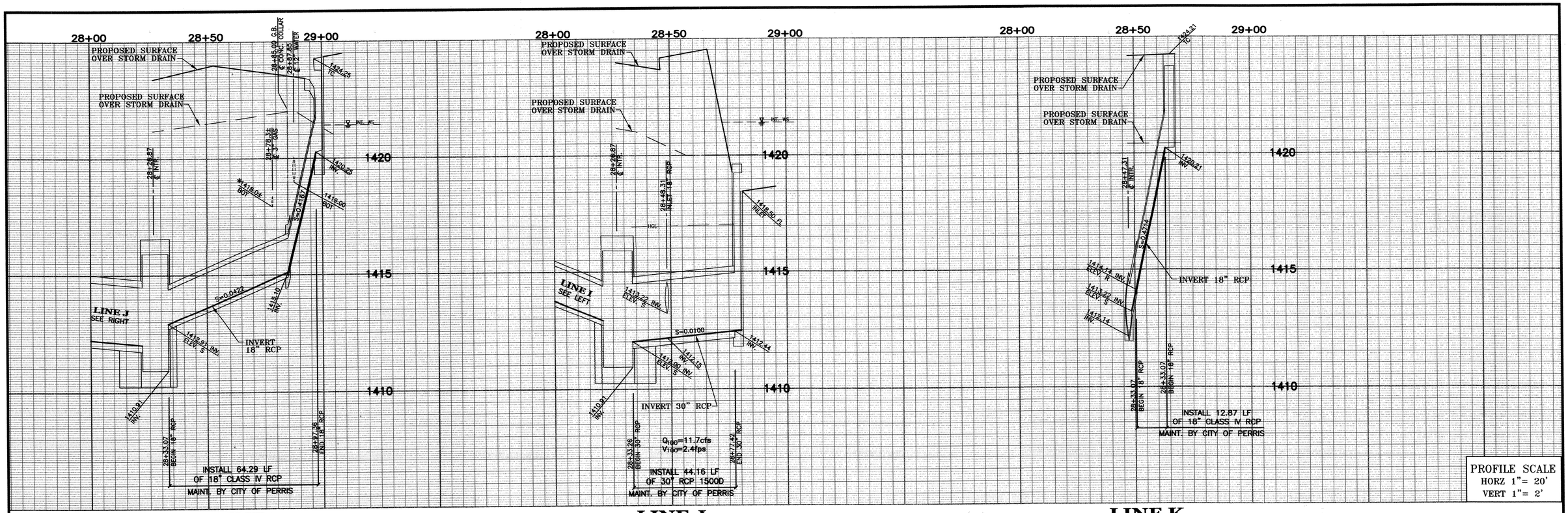
AS BUILT

W.J. McKEEVER, INC. CIVIL ENGINEERING 647 NORTH MAIN STREET, SUITE 2A RIVERSIDE, CALIFORNIA 92501 PH.: (951) 341-3700 FAX: (951) 341-3740 WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/31/06	CITY OF PERRIS CITY FILE NO. P8-798 APPROVED BY: CITY ENGINEER DATE 12-26-06	DIG ALERT CALL: TOLL FREE 1-800 227-2600 TWO WORKING DAYS BEFORE YOU DIG!	BENCHMARK: RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)	REVISIONS: REF. / DESCRIPTION / APPR. / DATE — 1 AS-BUILT NO REVISIONS	DESIGN BY: G. MELUSKI; DRAWN BY: J. NAPOLES; DATE DRAWN: JANUARY 2006; CHECKED BY: W.J. McKEEVER	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT — RECOMMENDED FOR APPROVAL BY: DATE: APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES E, F, G AND H
PLAN AND PROFILE

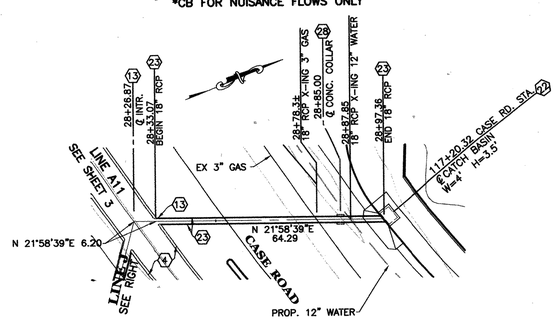
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 6 OF 10

P-397



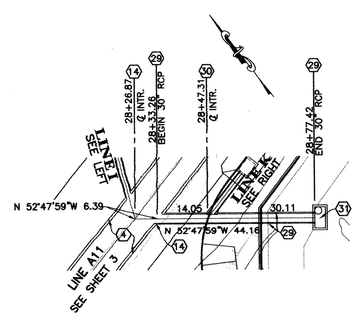
LINE I PROFILE

*CB FOR NUISANCE FLOWS ONLY



LINE I PLAN

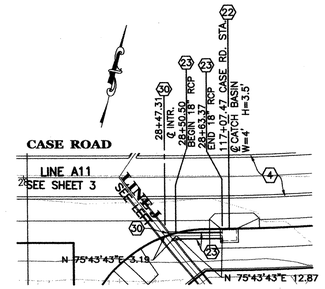
LINE J PROFILE



LINE J PLAN

LINE K PROFILE

*CB FOR NUISANCE FLOWS ONLY



LINE K PLAN

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
13. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=53°45'04" D=18"
14. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=51°28'18" D=30"
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
23. INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
28. CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.
29. INSTALL 30" RCP 1500D. SLOPE PER PLAN.
30. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227 A=51°28'18" B=18" C=3.61' D=30" E=2.66' F=0.68' G=1.22' L=2.86'
31. CONSTRUCT CONCRETE DROP INLET (W=6' V=7.18') PER RCFCD STD. DWG NO. CB110.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

Scale: 1" = 20'

0 10 20 40 60 80

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

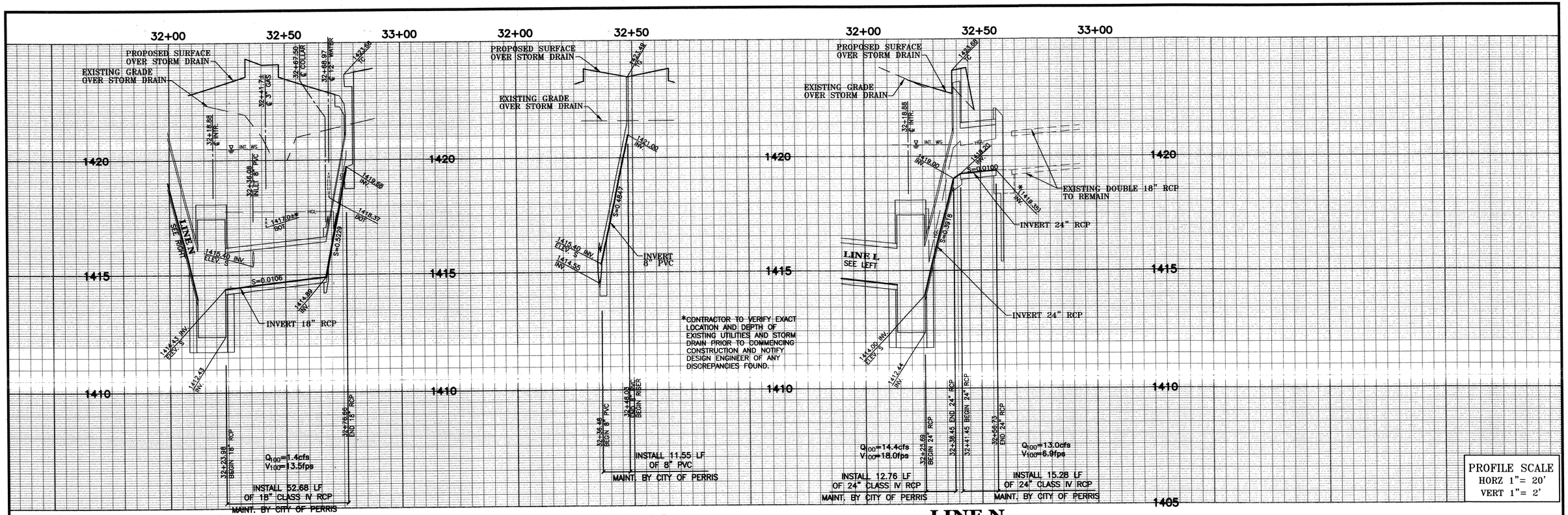
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

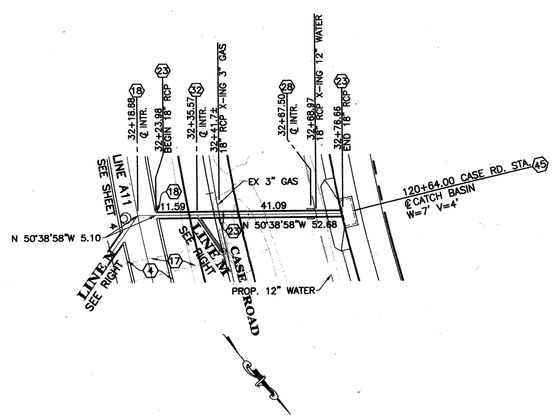
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
R.C.P.
LINES I, J AND K
PLAN AND PROFILE

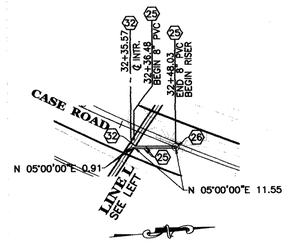
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 7 OF 10

P-397



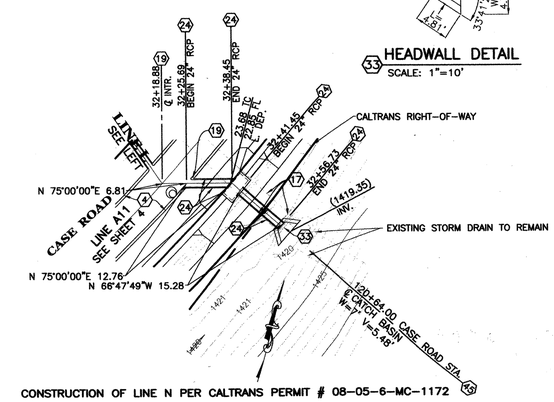


LINE L
PLAN



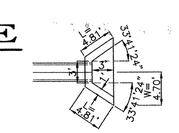
LINE M
PLAN

Scale: 1" = 20'
0 10 20 40 60 80



CONSTRUCTION OF LINE N PER CALTRANS PERMIT # 08-05-6-MC-1172

LINE N
PLAN



HEADWALL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

(4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.

(17) REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.

(18) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=78°43'51" D=18"

(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=46°55'07" D=24"

(23) INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.

(24) INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.

(25) INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.

(26) INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.

(28) CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.

(32) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=55°38'58" D=8"

(33) CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.

(45) CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS-BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER DATE 10-26-06

DIG ALERT
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TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT NO REVISIONS		

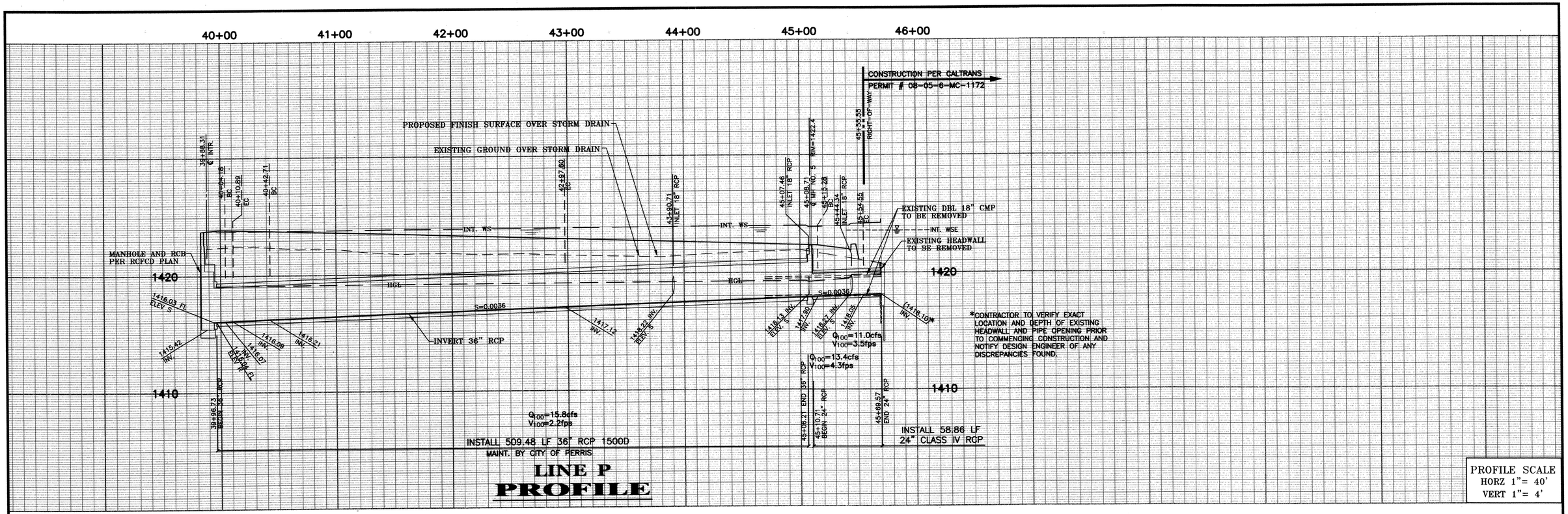
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES L, M AND N
PLAN AND PROFILE

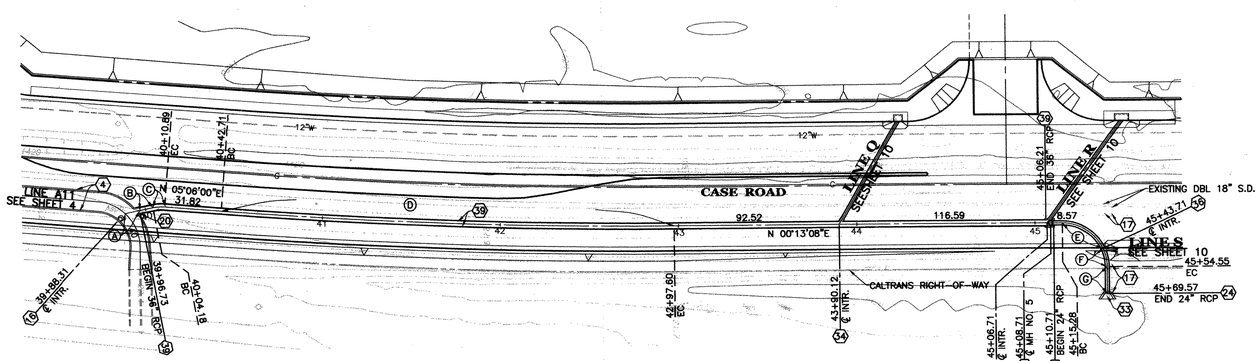
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 8 OF 10

P-397



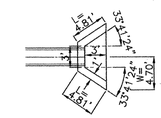
LINE P
PROFILE

PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'



CONSTRUCTION OF LINE S PER CALTRANS PERMIT # 08-05-6-MC-1172

LINE P
PLAN



33 HEADWALL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
16. CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.
17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
20. CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=52°40'09" B=36" C=8.84'
24. INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
33. CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.
34. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=59°13'08" B=18" C=3.80' D=36" E=2.39' F=1.41' G=1.16' L=2.61'
35. CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251
36. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=56°31'55" B=18" C=3.13' D=24" E=2.01' F=0.99' G=0.81' L=2.50'
39. INSTALL 36" RCP 1500D. SLOPE PER PLAN.

CURVE / LINE DATA				
	DELTA/BEARING	RADIUS	LENGTH	TANGENT
A	N 10°17'22"W	–	8.42	–
B	N 10°17'22"W	–	7.45	–
C	15°23'22"	25.00	6.71	3.38
D	04°52'52"	2992.00	254.89	127.52
E	65°09'55"	25.00	28.43	15.98
F	24°50'05"	25.00	10.84	5.50
G	N 89°46'52"W	–	15.02	–

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY: CITY ENGINEER DATE 12-26-06

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BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

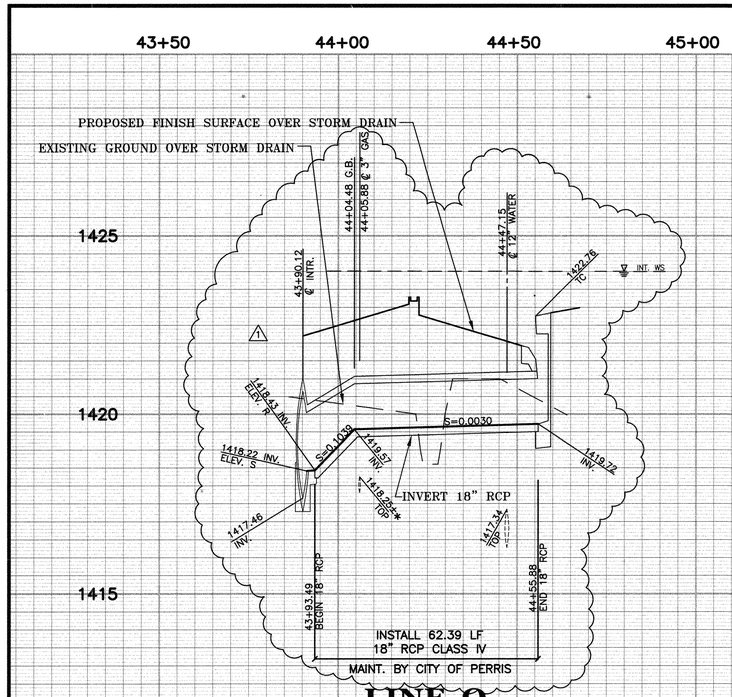
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINE P
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 9 OF 10

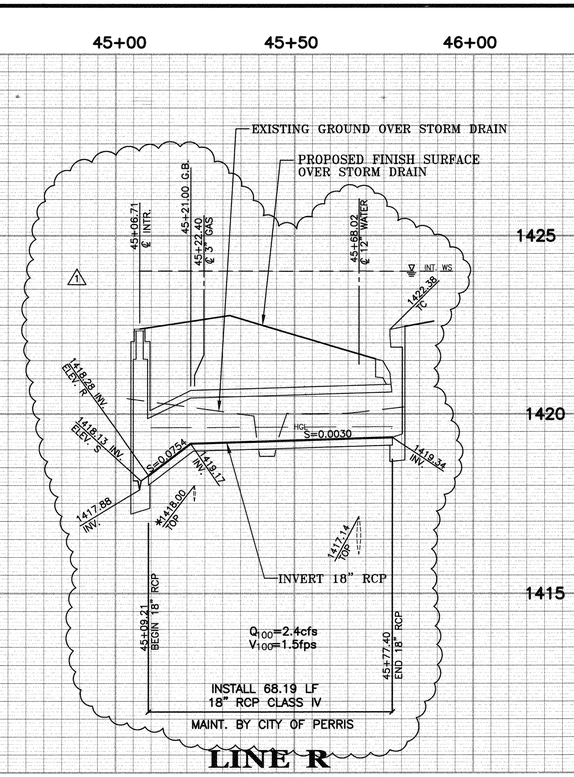
P-397



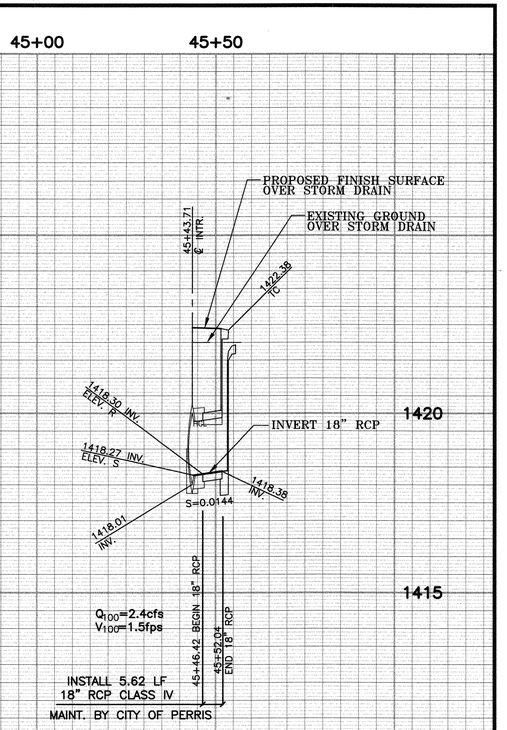
PROFILE SCALE
HORZ 1"= 20'
VERT 1"= 2'

LINE Q PROFILE

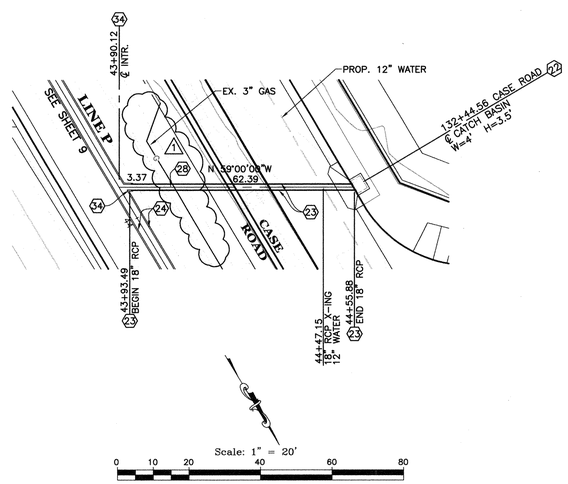
*CB FOR NUISANCE FLOWS ONLY



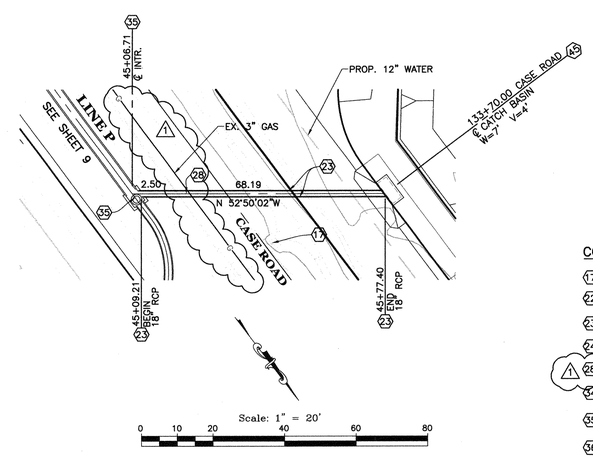
LINE R PROFILE



LINE S PROFILE



LINE Q PLAN

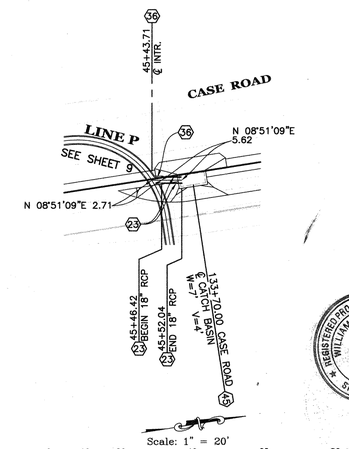


LINE R PLAN

CURVE / LINE DATA				
	DELTA/BEARING	RADIUS	LENGTH	TANGENT
A	N 10°17'22"W	–	8.09	–
B	N 10°17'22"W	–	8.24	–
C	15°23'22"	25.00	6.71	3.38
D	04°52'52"	2992.00	254.89	127.52
E	65°09'55"	25.00	28.43	15.98
F	24°50'05"	25.00	10.84	5.50
G	N 89°46'52"W	–	15.02	–

CONSTRUCTION NOTES:

17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
23. INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
24. INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
28. CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.
34. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=59°13'08" B=18" C=3.37' D=24" E=2.05' F=0.91' G=0.66' L=2.61'
35. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=53°03'10" B=18" C=3.64' D=24" E=2.34' F=1.00' G=0.80' L=2.80'
36. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=56°31'55" B=18" C=3.13' D=24" E=2.01' F=0.99' G=0.81' L=2.50'
45. CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.



LINE S PLAN

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 4/6/07

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE 2-13-07

DIG ALERT
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227-2600
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BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST.
ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
2	AS BUILT NO REVISIONS		
1	REVISED STORM DRAIN TO CLEAR GAS LINE		2-13-07

DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES Q,R AND S
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 10 OF 10

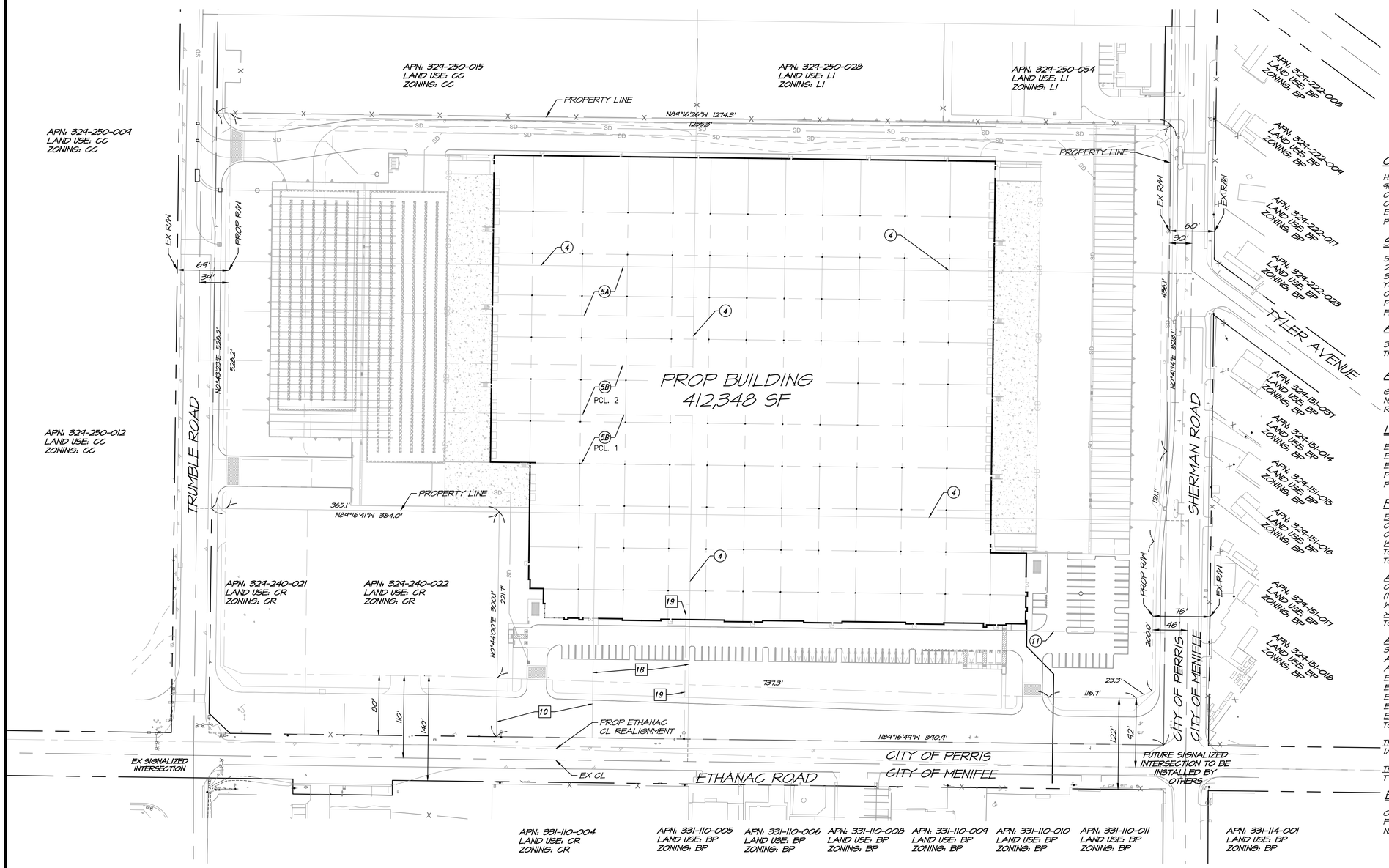
P-397

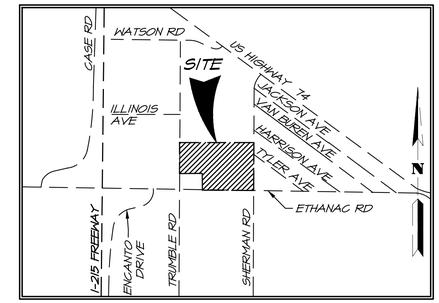
DEVELOPMENT PLAN REVIEW 22-00030

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) 256-5924

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

A.P.N.

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

ACREAGE

GROSS	21.6 AC
NET	19.9 AC
R/W	1.7 AC

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 REPRESENTATIVE

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

ENGINEER

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

ARCHITECT

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

TOPOGRAPHY SOURCE

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

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

SHEET 1 - TITLE SHEET
SHEET 2 - STREET AND GRADING SECTIONS
SHEET 3 - CONCEPTUAL GRADING
SHEETS 4,5 - CONCEPTUAL UTILITIES

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) 926-9244 PERRIS UNION HIGH SCHOOL DISTRICT (9-12) PHONE: (951) 943-6369

EASEMENT NOTES

SEE SHEET 2

LEGAL DESCRIPTION

SEE SHEET 2

1" = 70'

70 0 70 140 210

N W E S WEBB

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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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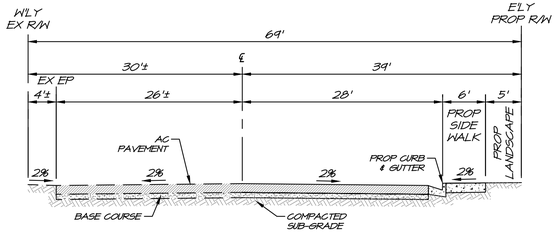
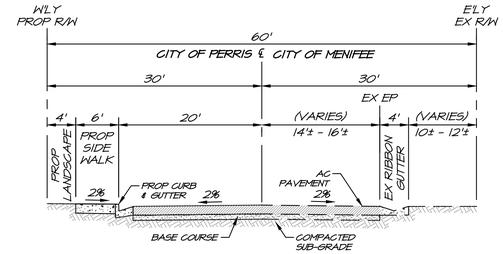
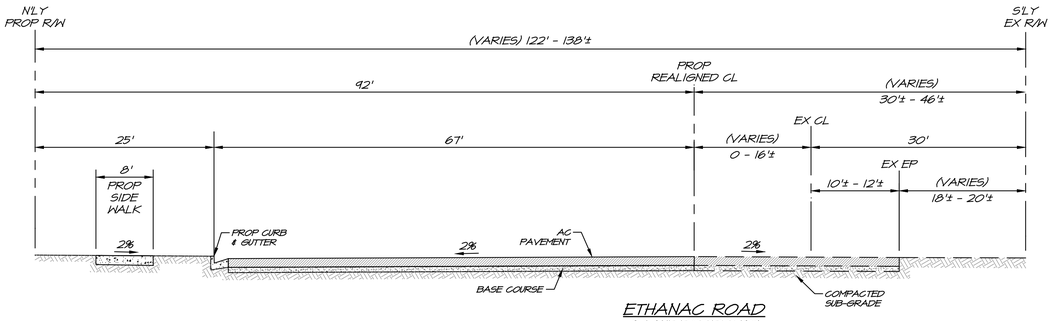


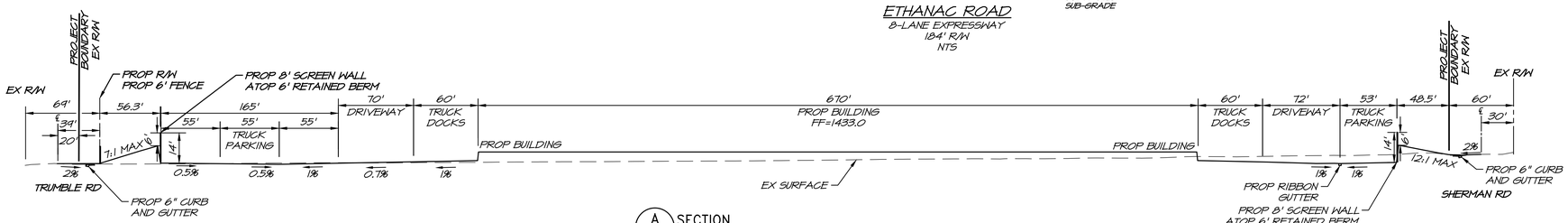
TRUMBLE ROAD
MAJOR COLLECTOR
78' R/W
NTS



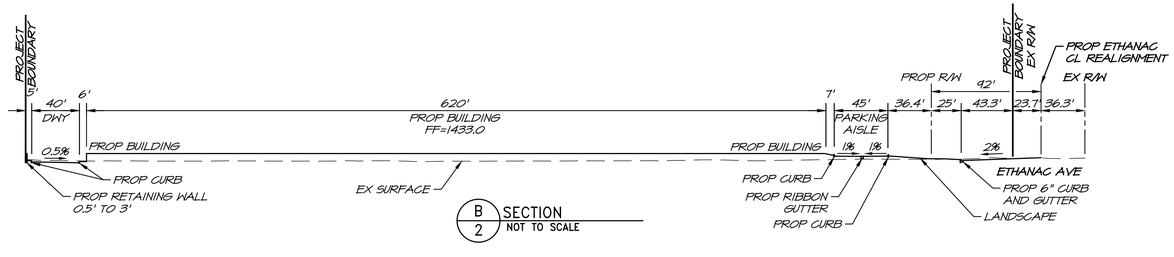
SHERMAN ROAD
LOCAL
60' R/W
NTS



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



A/2 SECTION
NOT TO SCALE



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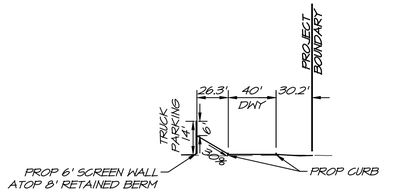

C/2 SECTION
NOT TO SCALE

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 T33), **324-240-017** (AFFECTS THE PORTION OF LOT T34), **324-240-018** (AFFECTS THE PORTION OF LOT T34), **324-240-019** (AFFECTS THE PORTION OF LOT T34), **324-240-020** (AFFECTS THE PORTION OF LOT T34), **324-240-026** (AFFECTS THE LOT T37), **324-240-027** (AFFECTS THE PORTION OF LOT T38), **324-240-025** (AFFECT LOT T36).

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

PARCEL A:
LOTS T34, T37 AND THE SOUTH 198 FEET OF LOTS T33 AND T38 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 T36 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 T35 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 T35 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 T35; 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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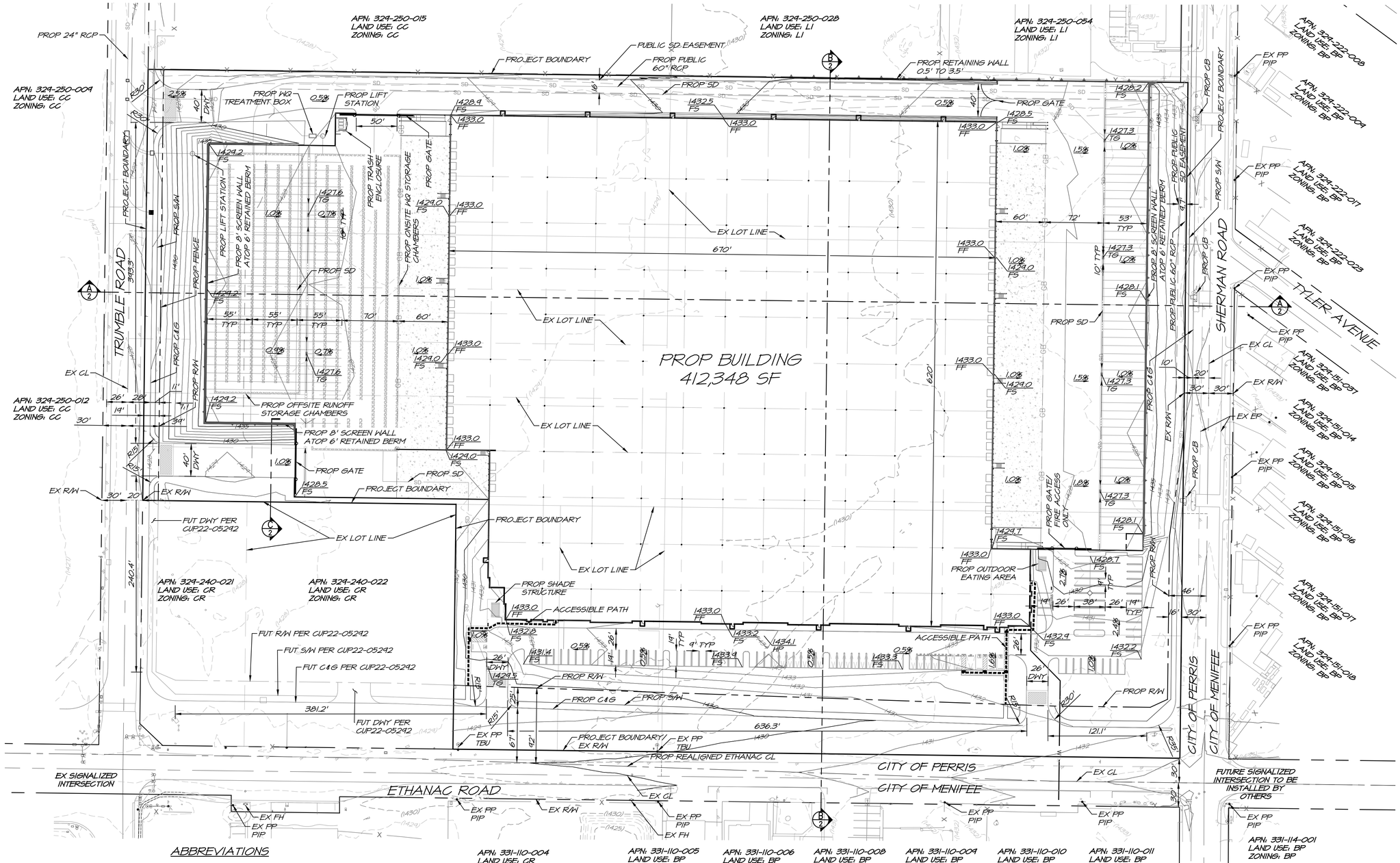

LEGEND

- 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

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
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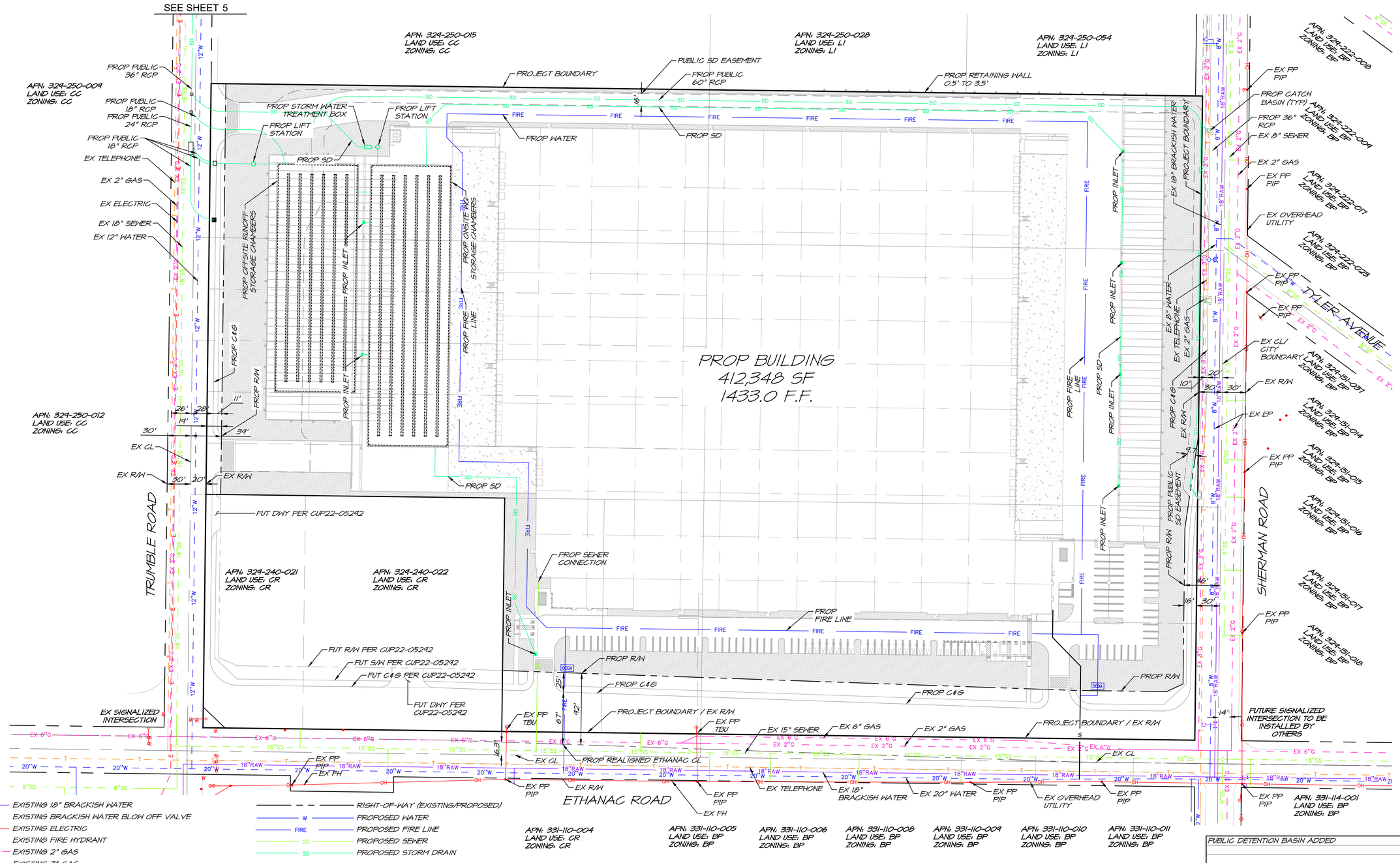

LEGEND

- 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

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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
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FAX (951) 788-1256

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

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SEE SHEET 4

LEGEND

- 18"RAW — EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- E — EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EX 2"G — EXISTING 2" GAS
- EX 3"G — EXISTING 3" GAS
- EX 6"G — EXISTING 6" GAS
- OH — EXISTING OVERHEAD UTILITY
- 6"SS — EXISTING 6" SEWER
- 8"SS — EXISTING 8" SEWER
- 15"SS — EXISTING 15" SEWER
- 18"SS — EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- 36"SD — EXISTING 36" STORM DRAIN
- 48"SD — EXISTING 48" STORM DRAIN
- T — EXISTING TELEPHONE
- 8"W — EXISTING 8" WATER
- 12"W — EXISTING 12" WATER
- 20"W — EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- W — PROPOSED WATER
- FIRE — PROPOSED FIRE LINE
- SS — PROPOSED SEWER
- SD — 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
DESIGNED: AG
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F.B.

ALBERT A. WEBB ASSOCIATES
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FAX (951) 788-1256

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

H:\2022\22-0198\DRAWINGS\ENTITLEMENT\22-0198-C-PP-CONCEPTUAL UTILITIES.DWG 9/1/2023 4:06:01 PM Rebecca

Preliminary Drainage Analysis (Optional)

Ethanac Logistics Center
DPR22-00030
Perris, California

Preliminary Drainage Study

Prepared for:
Hillwood
901 Via Piemonte Suite 175
Ontario, CA 91764
(909) 256-5924

Prepared By:

ALBERT A. WEBB ASSOCIATES
3788 McCray Street
Riverside, CA 92506

Original Date Prepared: January 2023
Revision Date(s): April 2023, September 2023, December 2023

DRAFT

Sarah Kowalski
Project Engineer

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FIG. 3 AERIAL PHOTOGRAPH
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FIG. 5 SOILS MAP

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APPENDIX A – HYDROLOGY ANALYSIS ..... A

HYDROLOGIC SOILS GROUP MAP (plate C-1.42)
ISOHYETAL MAPS
10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)
100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)
100-YEAR OFFSITE HYDROLOGY (RATIONAL METHOD)
RATIONAL METHOD HYDROLOGY MAPS

APPENDIX B – HYDRAULIC ANALYSIS ..... B

CITY OF PERRIS LINE A WSPG CALCULATIONS

APPENDIX C – BASIN ANALYSIS C

EXISTING CONDITION UNIT HYDROGRAPHS
EXISTING CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH
PROPOSED CONDITION UNIT HYDROGRAPHS
PROPOSED CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH
PROPOSED CONDITION ONSITE 100-YEAR, 24-HOUR UNIT HYDROGRAPH
PROPOSED CONDITION OFFSITE 100-YEAR, 1-HOUR UNIT HYDROGRAPH
PROPOSED CONDITION OFFSITE 100-YEAR, 24-HOUR UNIT HYDROGRAPH
PROPOSED CONDITION OFFSITE 100-YEAR, 1-HOUR PLUS BASE FLOW UNIT HYDROGRAPH
STAGE-STORAGE/OUTFLOW TABLE
BASIN ROUTING 100-YEAR, 1-HOUR PLUS BASE FLOW STORM EVENT

UNIT HYDROGRAPH HYDROLOGY MAPS

APPENDIX D – REFERENCES ..... D

Romoland Master Drainage Plan
Illinois Avenue Line A Storm Drain Plan P8-921
MDP Line A-11 Storm Drain Plan P8-798
Development Plan Review 22-00030

SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the Ethanac Logistics Center project located in City of Perris, County of Riverside, California. The project site is located north of Ethanac Road, bounded by Sherman Road to east, Trumble Road to the west, vacant land and an industrial development to the north. The project applicant proposes to build a commercial/industrial building on approximately 21 gross acres. This report will summarize the hydrologic and hydraulic analyses that were conducted in order to determine the necessary drainage improvements required to provide flood protection for the proposed building and safely convey the runoff through the site.

The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the developed condition using the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Rational Method.
- Determine the required storm drain facilities, alignment, and sizes required to flood protect the project site.
- Determine the volume required for water quality treatment and to mitigate for increases in runoff.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

DESCRIPTION OF WATERSHED

As previously described, the project applicant is proposing 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.

PROPOSED CONDITIONS

ONSITE

In the proposed condition of Ethanac Logistics Center onsite runoff 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 Lines 1 and 2 convey captured flows towards underground storage chambers before being pumped to a proposed biotreatment device for water quality treatment. Treated stormwater will then gravity flow to proposed storm drain Line 4 in Trumble Road, that connects 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). The Ethanac Logistics Center project site is naturally tributary to MDP Line A-11.

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 A). The 100-year storm will gravity to the proposed public underground chambers which are further described below and in Section 2.

OFFSITE

Offsite flows from the area east of the project site, as shown on "Offsite Unit Hydrograph Hydrology" Map in Appendix A, currently flow westerly to Sherman Road and across existing ribbon gutters, draining to the Ethanac Logistics Center project site. The proposed project is to be improving Sherman Road, thus storm drain facilities will be required to pick up the storm water. Per the Romoland MDP, this area east of Sherman Road is to be picked up by MDP Line A-1 that is to be located in Sherman Road traveling north from the existing MDP Line A channel located just north of McLaughlin Avenue.

A preliminary profile for MDP Line A-1 was ran from the existing MDP Line A north in Sherman Road to the mid-point of the Ethanac Logistics Center project frontage, utilizing a minimum grade of 0.3% and preliminary MDP facilities sizes ranging from 39″ to 72″ RCP. This approach showed that once the pipe was to reach Ethanac Road, as a 48″ RCP, the cover over the storm drain pipe was approximately one foot. As the pipe extended north of Ethanac Road it was modeled as a 42″ RCP and the cover over the facility became non-existent with approximately 1-2′ of the 42″ RCP above the existing street surface.

In addition to the vertical constraints, existing utilities within the Ethanac Road and Sherman Road intersection, and traveling north in Sherman Road, present several horizontal constraints. Some the existing utilities consist of, but are not limited to, gas lines ranging from 2″ to 6″, water lines ranging from 8″ to 20″, sewer lines ranging from 6″ to 18″, 18″ raw water lines, and communications conduit.

Due to the constructability constraints described above, it was decided to collect these offsite flows via proposed catch basins in Sherman Road and convey them in a proposed public storm drain (Line 3, 60″ RCP) across the north end of the site. These flows will eventually confluence with the onsite flows in proposed public storm drain Line 4 in Trumble Road. As mentioned earlier in this report, this project proposed to connect to existing City Line A within Illinois Avenue with proposed public Line 4. To maintain the gravity flow, the proposed upstream end of Line 4 at the project site is to be shallow with approximately 2 feet of cover from the future street finished surface. Due to the shallower elevation of the Line 4 pipe, these offsite flows need to be pumped up to Line 4 elevation. Line 3 discharges the offsite Sherman Avenue flows into a public maintained underground storage chamber that is on the west side of the Ethanac Logistics Center project site, in the truck court area. This chamber is sized to hold the 100-year, 3-hour storm peak volume. The flows will then be pumped out of the basin utilizing a 10 CFS pump and will confluence with the treated onsite flows in Line 4. There is also an 18″ gravity line that exits near the top of the storage chamber and connects to Line 4. This gravity line outlets 5.5 cfs, acting as an emergency escape for the chamber.

As described in the previous section, Line 4 connects to the existing City Line A in Illinois Avenue. The Illinois Avenue facilities have been confirmed that they can handle the additional flow. City Line A then connects to MDP Line A-11 via 6′x5′ RCB under the I-215. Per the "Perris Crossing Temporary Earth Channel, Romoland MDP Line A11 and Laterals" P-397 plans, referenced in Appendix D, this RCB is sized to handle and contribute 280 CFS to MDP Line A-11. The total confluence flows through City Line A in Illinois, including Ethanac Logistics Center flows and offsite flows, is approximately 85 CFS.

METHODOLOGY

HYDROLOGY

Hydrologic calculations were performed in accordance with the RCFC&WCD Hydrology Manual, dated April 1978. The Rational Method was utilized in determining peak flow rates.

The hydrological parameters, including rainfall values and soil types were derived from the RCFC&WCD Hydrology Manual. The isohyetal maps and soil map have been included in Section 2.

Rational Method calculations were performed using a computer program developed by CivilDesign Corporation and Joseph E. Bonadiman and Associates Inc. The computer program is commonly referred

to as CivilD which incorporates the hydrological parameters outlined in the RCFC&WCD Hydrology Manual.

The Rational Method was used to determine the peak flow rates to size and design the drainage facilities need to convey onsite flows through the site to the proposed underground chamber. The flow rates were computed by generating a hydrologic "link-node" model in which the overall area is divided into separate drainage sub-areas, each tributary to a concentration point (node) determined by the proposed layout and grading.

The Unit Hydrograph Method was used to determine the peak flow rates and volumes associated with the 2-year, 24-hour storm events for the site. Calculations were performed for both the existing condition and developed condition to be used in the HCOC mitigation analysis.

HYDRAULICS

Hydraulic calculations to determine the required pipe sizes of proposed storm drain facilities will be provided in the Final Drainage Study.

Preliminary hydraulic calculations to determine capacity of City Line A with added project flows are provided in Appendix B.

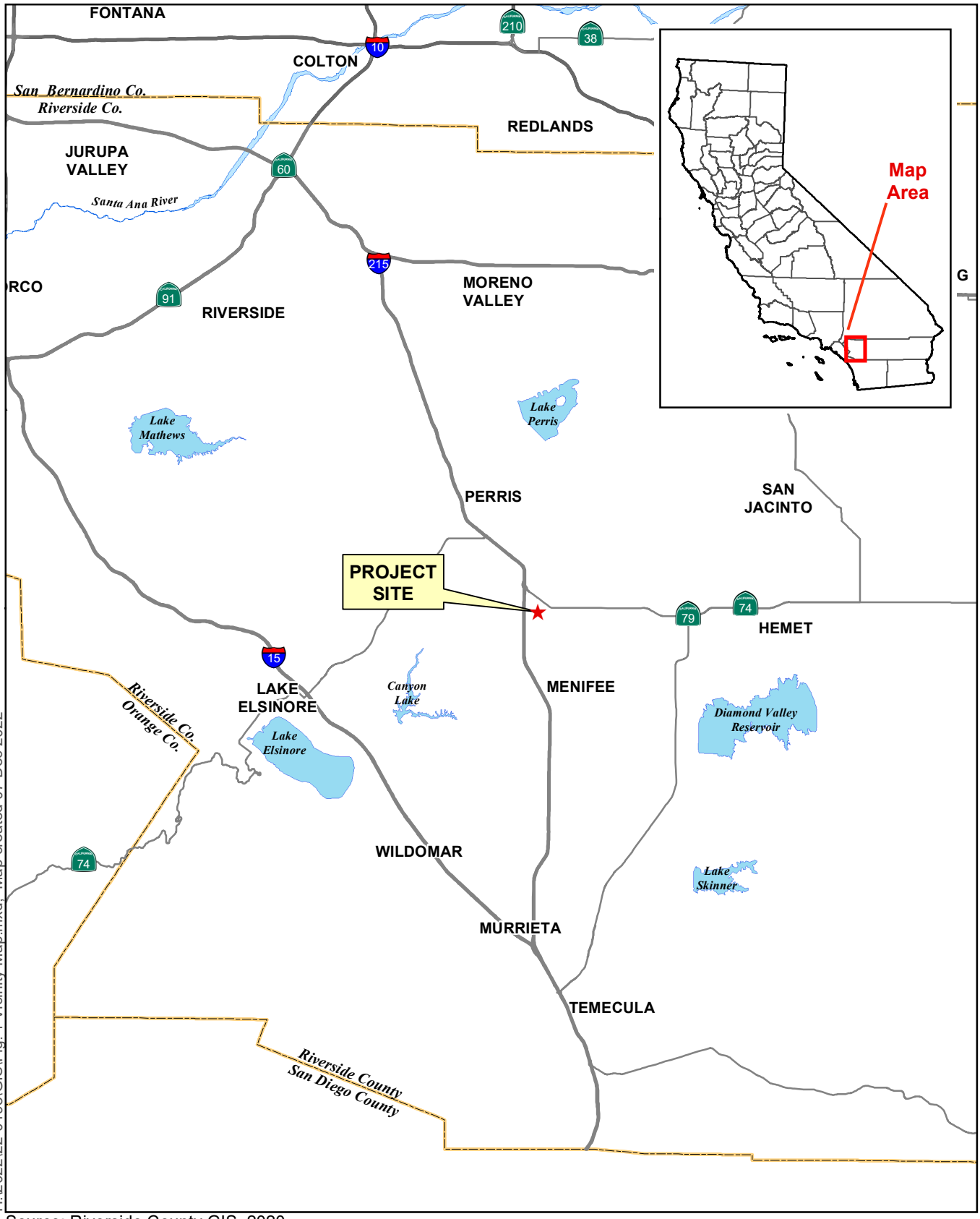
FIG. 1 VICINITY MAP

FIG. 2 USGS TOPOGRAPHY MAP

FIG. 3 AERIAL PHOTOGRAPH

FIG. 4 RECEIVING WATERBODIES

FIG. 5 SOILS MAP



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

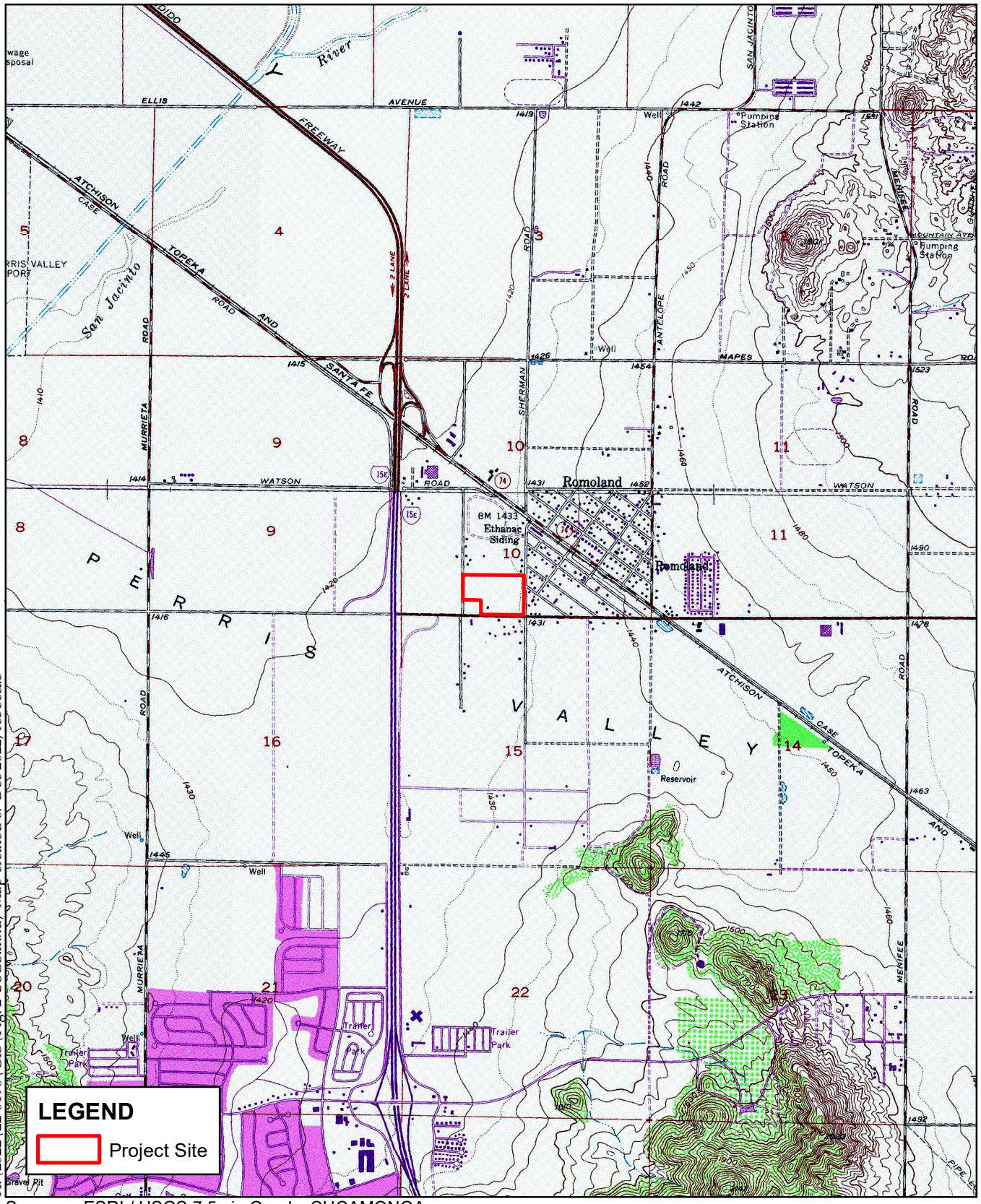
Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure 1 – Vicinity Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



H:\2022\22-0198\GIS\Fig. 2 USGS.mxd; Map created 07 Dec 2022; rebeccab

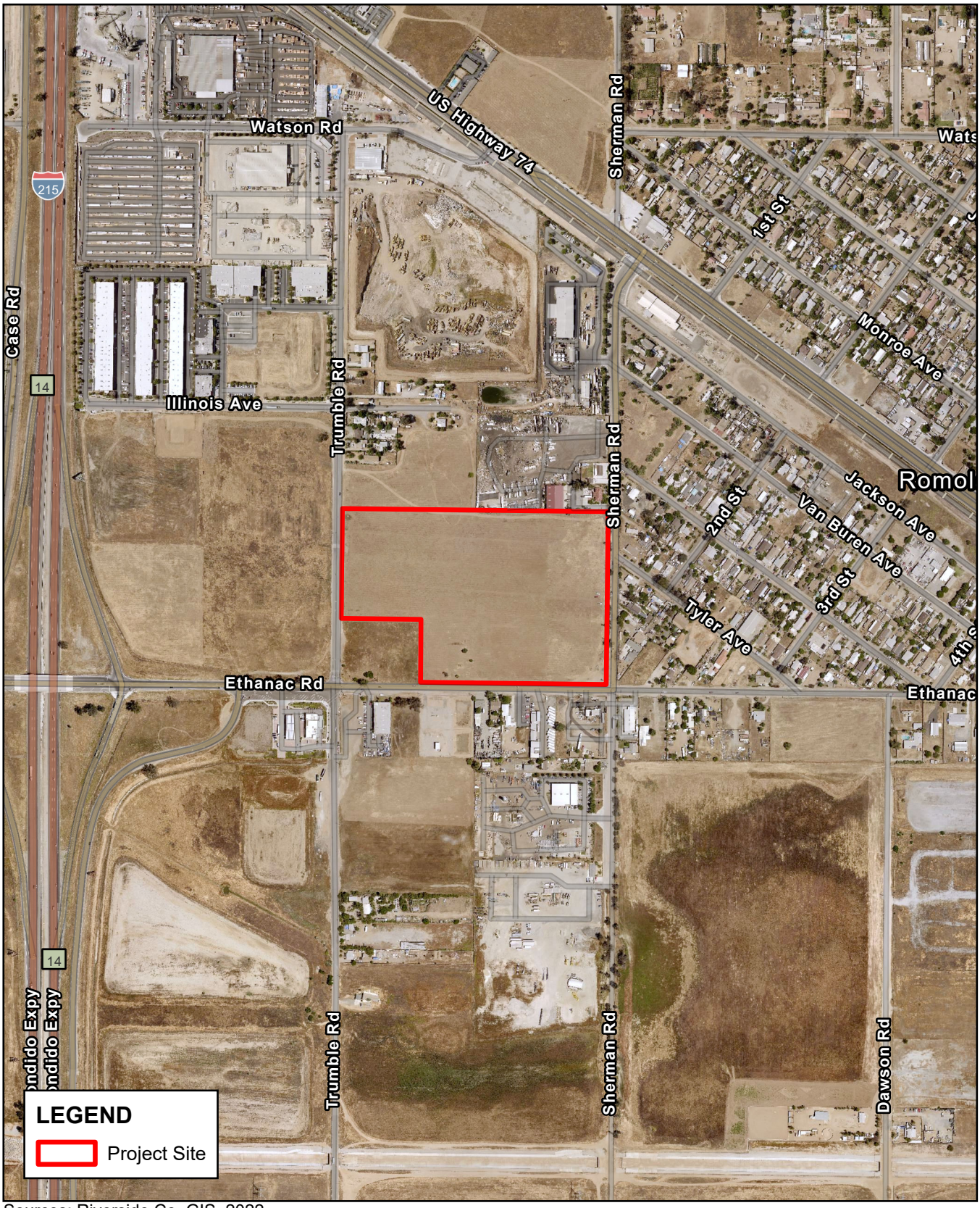
Sources: ESRI / USGS 7.5min Quads: CUCAMONGA PEAK, DEVORE, GUASTI, FONTANA

Figure 2 - USGS Map

Ethanac Logistics Center

0 4,000 8,000 12,000 Feet

ALBERT A. WEBB ASSOCIATES



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

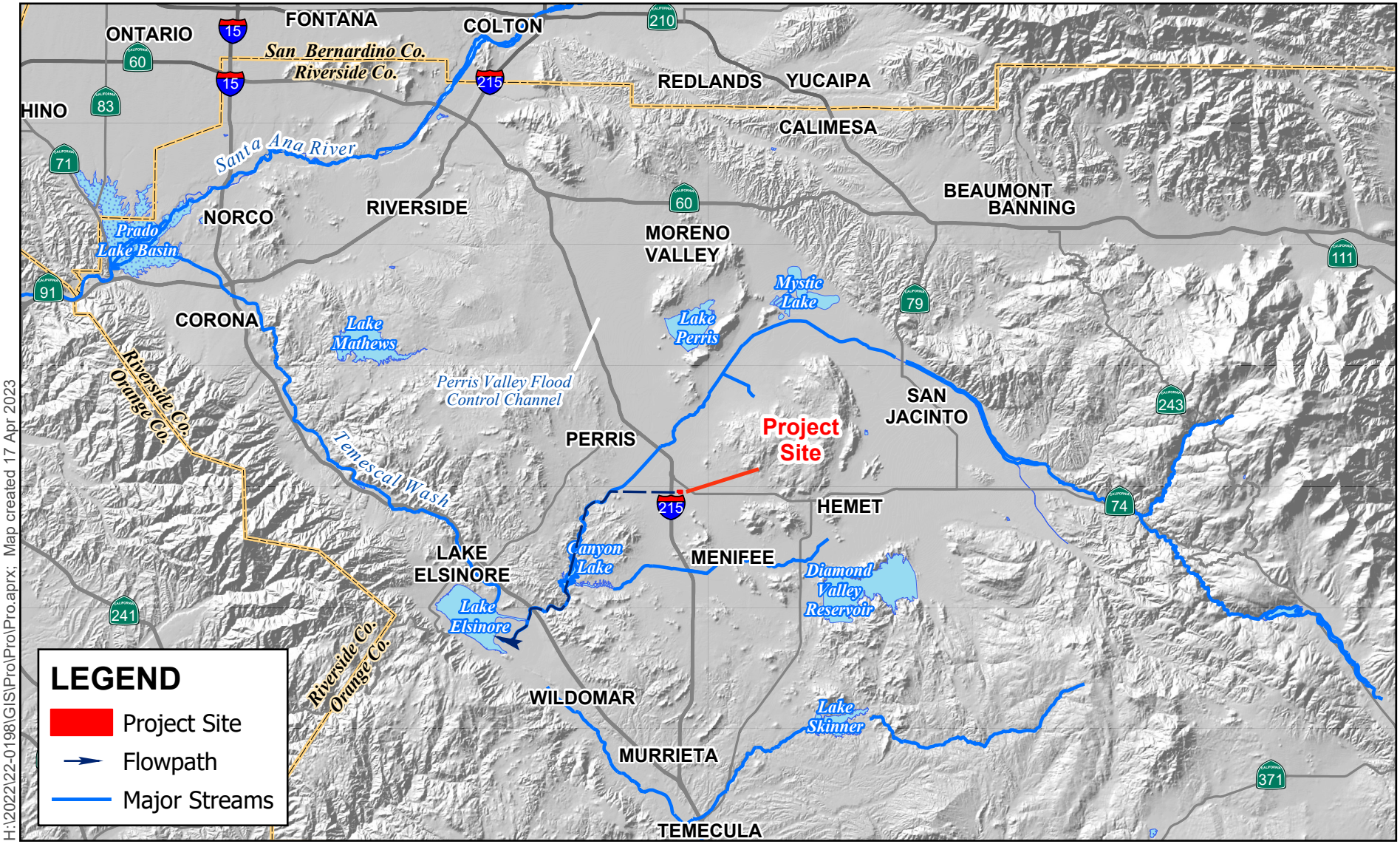
Sources: Riverside Co. GIS, 2022.

Figure 3 - Aerial Map

Ethanac Logistics Center

0 500 1,000 1,500 Feet

ALBERT A. WEBB ASSOCIATES



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

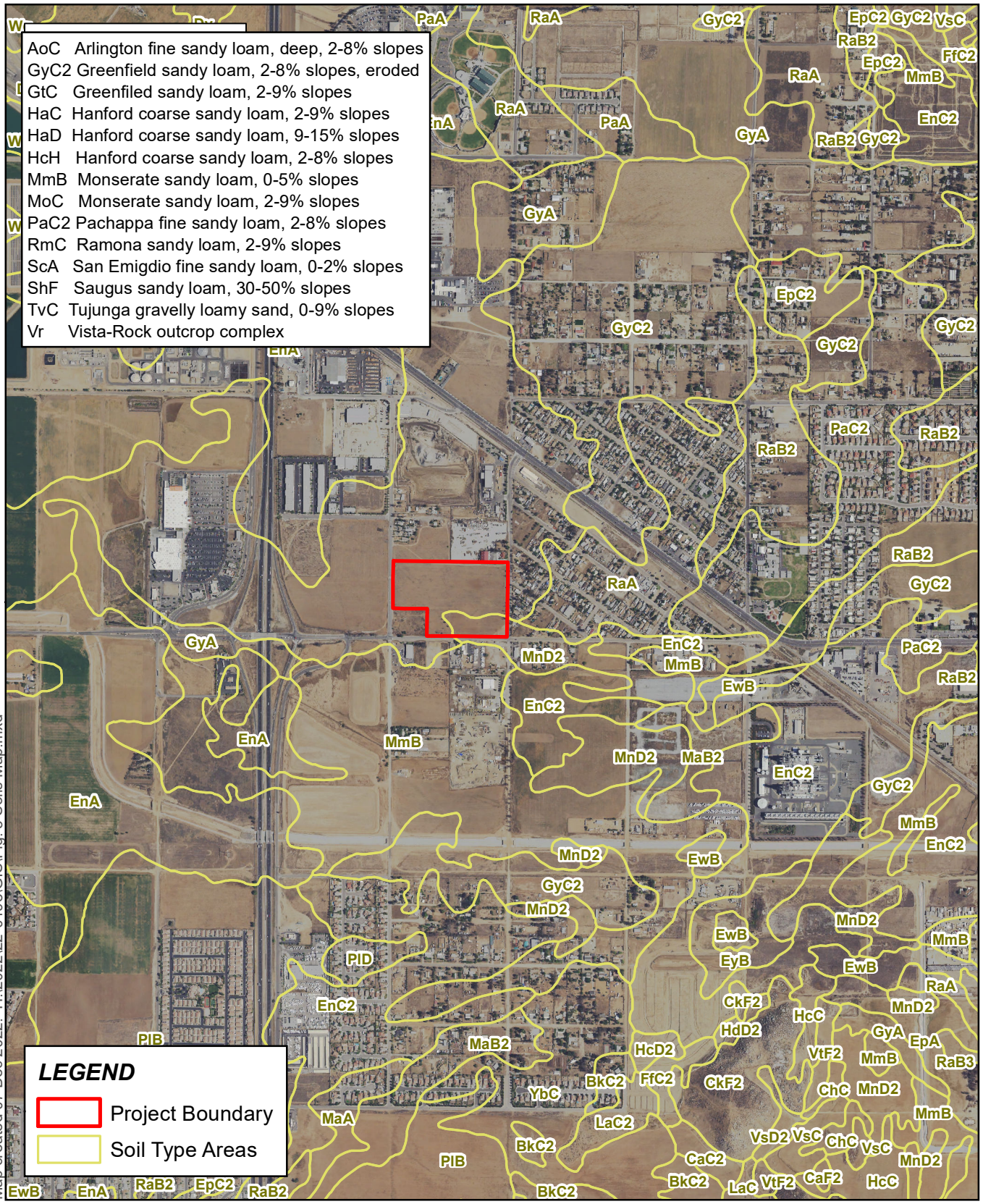
Sources: US NHD; USGS 30 Meter DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



Map created 07 Dec 2022. H:\2022\22-0198\GIS\Fig. 5 Soils Map.mxd

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

0 1,000 2,000 3,000 Feet

Figure 5 – Soils Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES

SECTION 2 - HYDROLOGY ANALYSIS

HYDROLOGY PARAMETERS

The RCFC&WCD Hydrology Manual was used to determine several of the hydrological parameters. The following rainfall depths were utilized in the hydrology analyses, which were obtained from the isohyetal maps provided in the RCFC&WCD Hydrology Manual:

Table 1 – Precipitation

	Duration	
Storm Event	**1-Hour (inches)**	**24-Hour (inches)**
2-Year	0.46	1.6
100-Year	1.24	4.0

The value for slope of intensity was determined to be 0.61. The isohyetal maps have been included in Appendix A.

Based on the Plate C-1.42 - Romoland in the RCFC&WCD Hydrology Manual, the project site is classified as soil type D. The soils map is included in Appendix A.

The cover type was determined based on the existing land cover and proposed land use of the site. Hydrological computations for the existing condition were done using 'Natural Grass'. The Commercial Landscaping cover type was used to represent the developed condition. The table below summarizes the runoff index values and the recommended values for percentage of impervious cover for each category:

Table 2 – Cover Type

Cover Type	Soil Group A	Soil Group B	Soil Group C	Soil Group D	Percentage of Impervious Cover
Existing Condition Natural Grass	67	78	86	89	0.0%
Developed Condition Commercial Landscaping	32	56	69	75	90%

ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey on-site flows to the underground storage chamber.

There are two onsite storm drain systems, Line 1 (200-series nodes) and Line 2 (300-series nodes) that drain into the underground chambers. Line 1 drains from the southwest portion of the building and Line 2 drains from the east side of the building. There are also a few inlets on the west side trailer parking area with short laterals punching directly into the underground chamber. These three areas make up one

DMA for the site. The underground storage chamber is pumped through a treatment box and then leaves the site via proposed storm drain Line 4 in Trumble Road, that connects to City Line A in Illinois Avenue per P8-921. City Line A ultimately connects to MDP Line A-11. The water quality pump is estimated to be 86 GPM; a maximum of 1 CFS of onsite flows will be pumped into Line 4 at a time. Flows in Line 4 will be discussed further below.

The following table summarizes the rational method results at key points:

Table 3 – Onsite Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 201 – Line 1 Total Flows	2.7	4.1
Node 306 – Line 2 Total Flows	17.1	25.9
Node 104 – Total Flows for the Site	31.2	47.4

The rational method output files and hydrology map have been included in Appendix A.

OFF-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey off-site flows to the proposed storm drain connection. As described previously, offsite flows are collected by catch basins in Sherman Road, represented by Node 402 on the Rational Hydrology Map. The peak flow from the offsite area totals 163 CFS, per the 100-year 1-hour unit hydrograph for the offsite area, which is described further in Section 4.

As previously stated in Section 1, these flows were originally planned to go to MDP Line A-1. However, as discussed in Section 1, the construction of Line A-1 has been deemed infeasible. These flows will be conveyed via a 60" RCP, confirmed to handle the peak flow, across the north end of the project site and outlet into the public underground storage chambers on the west side of the project site under the truck court area, at node 403 on the Rational Hydrology Map in Appendix A. This portion of the rational hydrology calculations is shown in "PROP100OFFSITEIN" in Appendix A.

Offsite flows are then pumped out of the storage chamber, via a 10 CFS pump at node 404, into storm drain Line 4 in Trumble Road where they confluence with the onsite flows as they leave the site at node 405. Because these flows (onsite and offsite) that are leaving the site are both pumped flows, they are represented in the CivilD program as user inputs. It is modeled as 10 cfs of offsite flows confluencing with 1 CFS of onsite flows.

Offsite flows from the improved half of Trumble Road are collected by a catch basin at Node 501. These flows confluence with the onsite project flows, and the offsite flows from east of the project, at Nodes 502 and 503. In total, these produce a total confluence flow of 17 cfs, requiring a minimum 24" RCP for Line 4 in Trumble Road.

These combined flows travel through Line 4 north to a point of connection, represented by node 406, in City Line A in Illinois Avenue. The invert elevation at this point of connection is shown on the Line A storm drain plan as approximately 1419.3 (NGVD29) and it is called out as 1421.8 (NAVD88) on the Rational Method Hydrology map. Here the flows confluence with existing flows in City Line A. Sizing

calculations for City Line A can be found in Appendix B and are discussed further in Section 3. This portion of the rational hydrology calculations is shown in "PROP100OFFSITEOUT" in Appendix A.

As discussed in Section 1, City Line A then connects to MDP Line A-11 via 6'x5' RCB under the I-215. Per the "Perris Crossing Temporary Earth Channel, Romoland MDP Line A11 and Laterals" P-397 plans, referenced in Appendix D, this RCB is sized to handle and contribute 280 CFS to MDP Line A-11. The total confluence flows through City Line A in Illinois, including Ethanac Logistics Center flows and offsite flows, is approximately 85 CFS.

The following table summarizes the rational method results at key points:

Table 4 – Offsite Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 402 – Line 3 Total Flows (Offsite Tributary Flows)	-	163.0
Node 501 – Trumble Road Half Improvement Flows		2.7
Node 502 – Trumble Road & Public Chamber Pumped Flow Confluenced		12.1
Node 503 – Confluence of Public Chamber Emergency Escape		16.2
Node 405 – Line 4 Total Flows (Onsite and Offsite Tributary Routed, Confluenced Flows)	-	17.0
Node 407 – City Line A Existing Flows	-	8.9
Node 408 – City Line A Total Flows (Line A & Line 4 Confluenced Flows)	-	17*

*The Rational Method confluences the incoming Line 4 flows with the existing upstream flows in City Line A resulting with 17 CFS. The WSPG run in Section 3/Appendix B more accurately includes incoming flows to City Line A from various laterals downstream, resulting in a higher total Q of 85 CFS.

See Appendix A for the output files of the off-site rational method analysis.

See Appendix B for hydraulic calculations regarding sizing of offsite storm drain facilities.

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

Onsite hydraulic analysis was not taken into consideration for the preliminary drainage.

OFF-SITE STORM DRAIN FACILITIES

Offsite hydraulic analysis was taken into consideration for the preliminary drainage. Due to the nature of adding onsite project flows and offsite tributary flows to the existing City Line A in Illinois Avenue, the capacity of City Line A needed to be evaluated for its ability to handle the additional flows prior to outletting into the MDP Line A-11.

The existing city-maintained Line A in Illinois Avenue consists of 36″ RCP at the proposed connection location and 48″ RCP downstream, before it outlets at Station 10+00 to a forebay structure which then connects MDP Line A-11 via 6′x5′ double RCB, per P8-921, referenced in Appendix D.

The WSPG Program was run for City Line A, simply adding in 17 CFS from Line 4 in Trumble Road. The addition of the proposed Ethanac Logistics Center project flows and the offsite tributary flows would put the existing City Line A under pressure, but it would not cause ponding at the existing catch basins in Illinois Avenue. The WSPG calculations are referenced in Appendix B.

SECTION 4 - BASIN (CHAMBER) ANALYSIS

ON-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

The unit hydrograph method was used to determine the peak flow rates and volumes in order to adequately size the proposed underground chambers to address HCOC mitigation and 100-year storm volume storage. Unit hydrographs were performed for both the existing condition and developed condition. The existing condition is used to establish a baseline for comparative purposes. The developed condition is used for design purposes. The following table summarizes the results of the unit hydrograph analysis:

Table 5 – 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
100-Year, 24-Hour	-	-	5.6	9.88

The 2-year 24-hour storm unit hydrograph was run to determine the HCOC volume that needed to be accounted for in the onsite underground chambers. HCOC will be discussed further in the PWQMP. The 2-year 24-hour unit hydrograph calculations and exhibit are referenced in Appendix C.

As described in Section 2, the onsite flows drain to the onsite underground chambers where they are held for water quality treatment. There is a separate emergency escape storm drain line that bypasses the treatment box for the larger 100-year 24-hour storm event. This proposed Line 5 connects the onsite underground chambers to the proposed public underground storage chambers that detain offsite flows which is described subsequently.

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 onsite underground chambers prior to being pumped offsite. The larger storm flows leave the onsite underground chambers via Line 5, which will be 12" RCP. Line 5 was sized to allow 8 CFS of inflow into the basin, which detains offsite flows, and will be discussed further below. The invert of Line 5 as it exits the chamber will be set at the top of the HCOC ponding elevation, making sure only larger storm flows exit through Line 5. This elevation will be determined in final engineering. The 100-year 24-hour unit hydrograph calculations and exhibit are referenced in Appendix C.

OFF-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

The unit hydrograph method was used to determine the peak flow rates and volumes in order to adequately size the proposed public underground storage chambers for the offsite flows as well as a calculated inflow from the underground chambers in case of a larger storm event. Unit hydrographs were performed for the developed condition. The developed condition is used for design purposes. The following table summarizes the results of the unit hydrograph analysis:

Table 6 – Off-Site Unit Hydrograph Results

	Existing Condition		Proposed Condition	
Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Volume (Ac-ft)	Peak Flow (cfs)
100-Year, 3-Hour	-	-	5.6	163
100-Year, 24-Hour	-	-	12.2	25.9
100-Year, 1-Hour + Base Flow	-	-	5.6	171

The 100-year 3-hour storm unit hydrograph was calculated to determine the peak flow and volume generated by the offsite area east of Sherman Road that would need to be stored in the public underground storage chambers onsite. This storm event's results were used in an initial basin routing exercise in comparison with the 100-year 24-hour results to determine which had a larger impact on the chamber depth and which should be used to conservatively size the public underground storage chambers. The 100-year 3-hour peak flow for the offsite area is 163 CFS and the volume required for the chambers from this storm event is 242,154 CF. Unit hydrograph calculations can be found in Appendix A.

The 100-year 3-hour storm unit hydrograph was then run using a base flow of 8 CFS. This scenario models the offsite flows flowing into the public underground storage chambers plus an 8 CFS inflow into the public chambers from the onsite private chambers. As described in the previous section, this inflow is in case of larger storm events. This unit hydrograph was used to more accurately size the public chambers that detain the offsite flows and is discussed further below. Unit hydrograph calculations can be found in Appendix C.

BASIN ROUTING ANALYSIS

An initial basin routing analysis was completed to compare the difference in water depth that the 100-year 3-hour and 100-year 24-hour storm hydrographs had on the public underground storage chambers. The 100-year 3-hour storm impacted the chamber depth more and was used as the controlling storm for sizing the chambers sufficiently. A subsequent routing analysis was completed using the 100-year 3-hour storm unit hydrograph with base flow of 8 CFS to demonstrate that the public underground storage chambers contain sufficient volume needed to accept the incoming offsite flowrate, respecting a pumped outflow of 10 CFS and an emergency gravity outflow of 5.5 cfs.

Basin routing calculations were conducted for the offsite flows. A stage-storage-discharge table was determined for the proposed public underground storage chambers. The stage-storage-discharge table provides input data at select elevations in the basin which will determine the storage and discharge at each point based on the pump rate.

As mentioned previously, the public underground storage chambers volume was targeted using the 100-year 3-hour peak flow volume. Routing calculations were performed using this storm event with a base flow of 8 CFS to model the inflow of 100-year onsite storm overflow. It was an iterative process to determine that 8 CFS inflow could be sufficiently handled by the proposed basin volume.

The public underground storage chambers bottom elevation is 1413.6 and is are 12 foot high CMP chambers. The pump will kick out a constant 10 CFS and is kicked on at 0.1 foot deep ponding of water. This is reflected in the routing calculations. The gravity emergency escape line is sized to be 18″ and will outlet 5.5 cfs from the chambers. This emergency escape is situated at the very top of the chamber so that

it can adequately gravity to Line 4 in Trumble Road. It was determined that with these inflow and outflow parameters, the public underground storage chambers have sufficient capacity for the offsite flows.

The following table presents the results of routing analysis for the 100-year, 3-hour storm event with an 8 CFS base flow to demonstrate that the public underground storage chambers provides the necessary storage volume needed to accept the peak offsite flows and outlet them at a pumped rate of 10 CFS and gravity outflow of 5.5 cfs.

Table 7 – Basin Routing Results

	Existing Condition		Proposed Condition		
Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Volume (Ac-ft)	Peak Flow (cfs)	Routing Peak Flow (cfs)
100-Year, 3-Hour	-	-	6.2	171	15.5

SECTION 5 - CONCLUSION

Based on the analyses and results of this report, the following conclusions were derived from the hydrology and hydraulic results:

- The proposed drainage improvements will adequately convey flows to the underground chamber and provide flood protection for the 100-year storm event.
- The proposed treatment box will provide adequate water quality treatment.
- The proposed public underground storage chambers will adequately accept offsite flows and release at the determined pump rate.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

HYDROLOGIC SOILS GROUP MAP (PLATE C-1.42)

LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

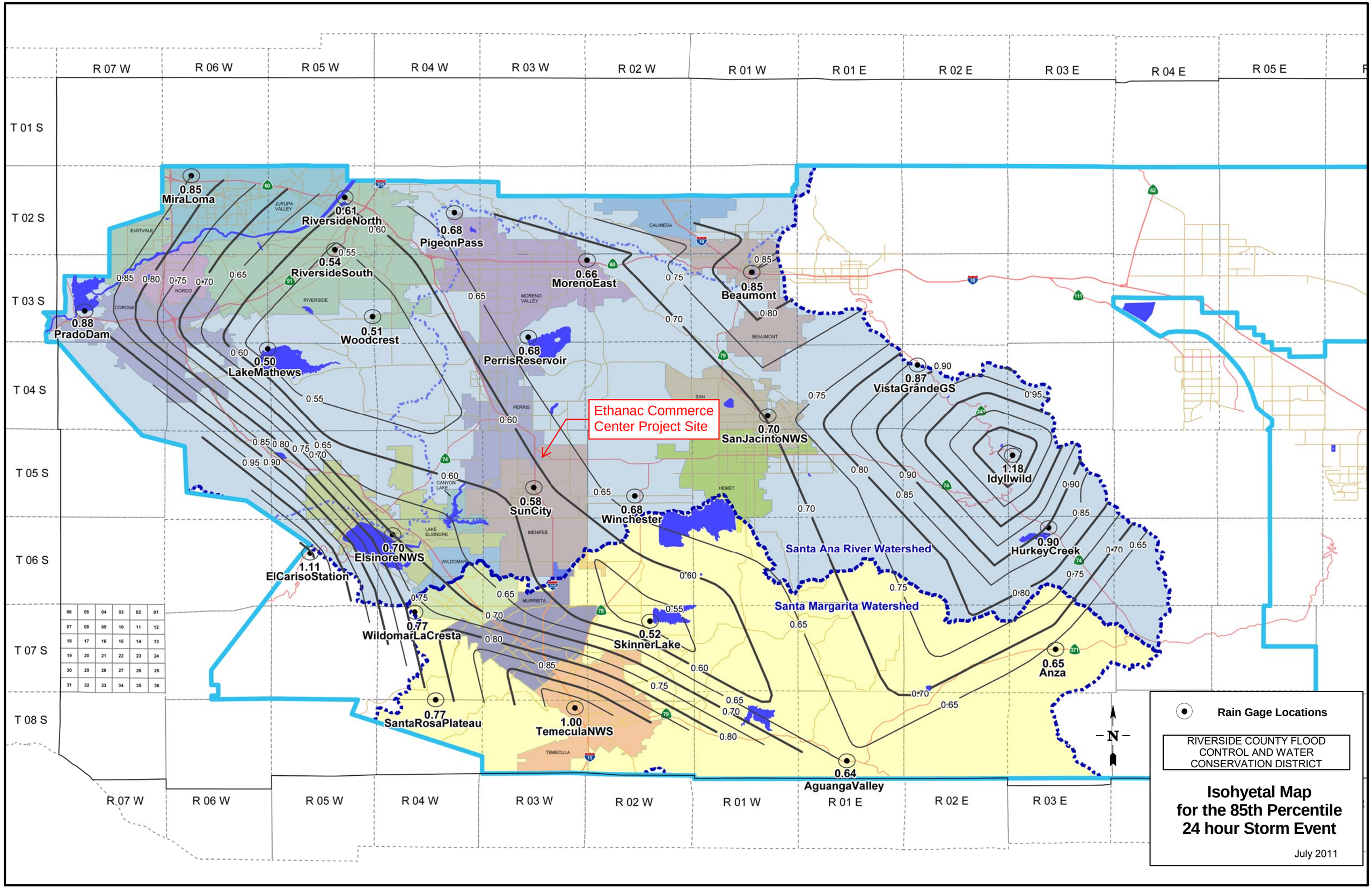
N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR ROMOLAND

PLATE C-1.42

ISOHYETAL MAPS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R 06 W
R 05 W
R 04 W
R 03 W
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R 02 E
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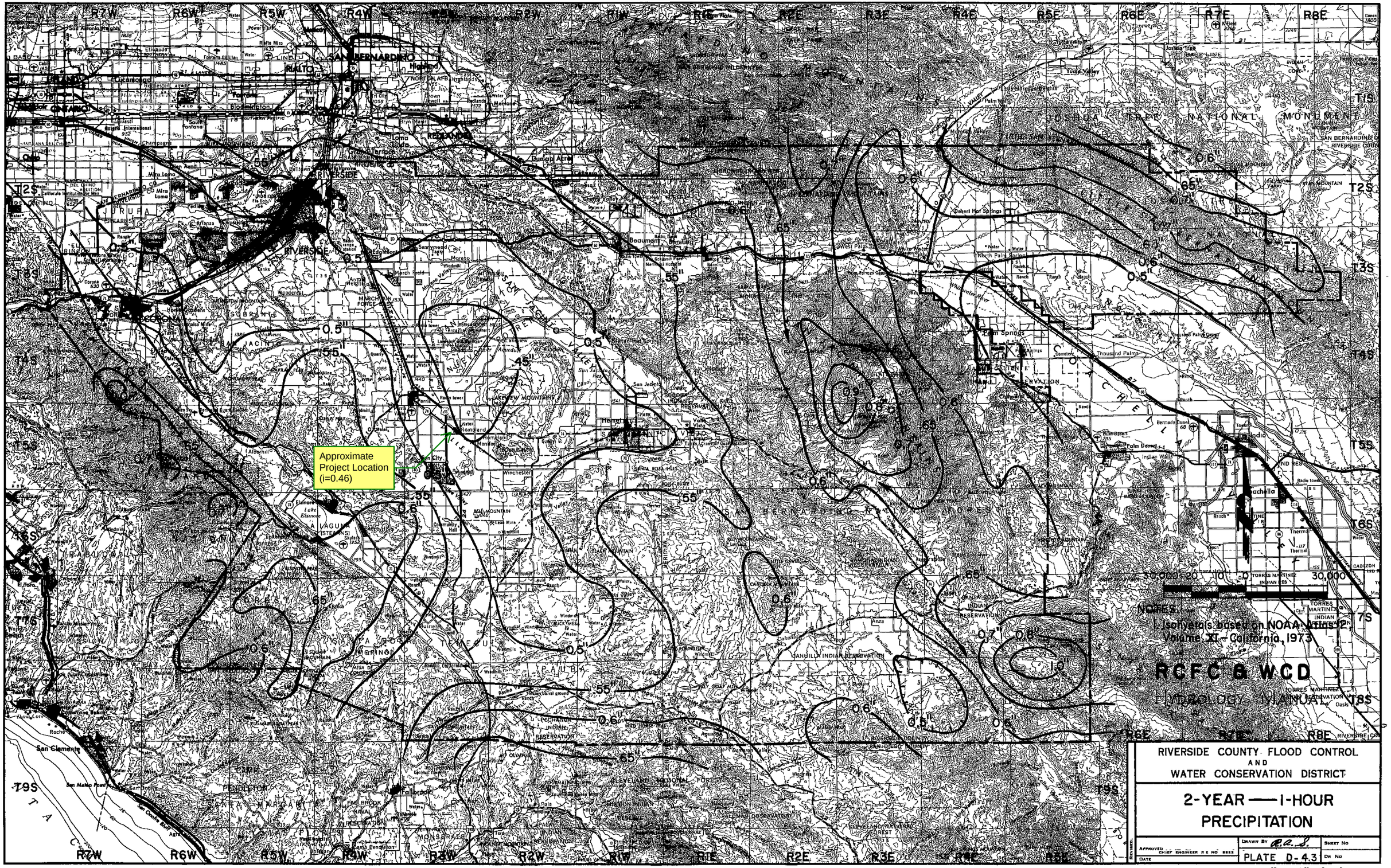
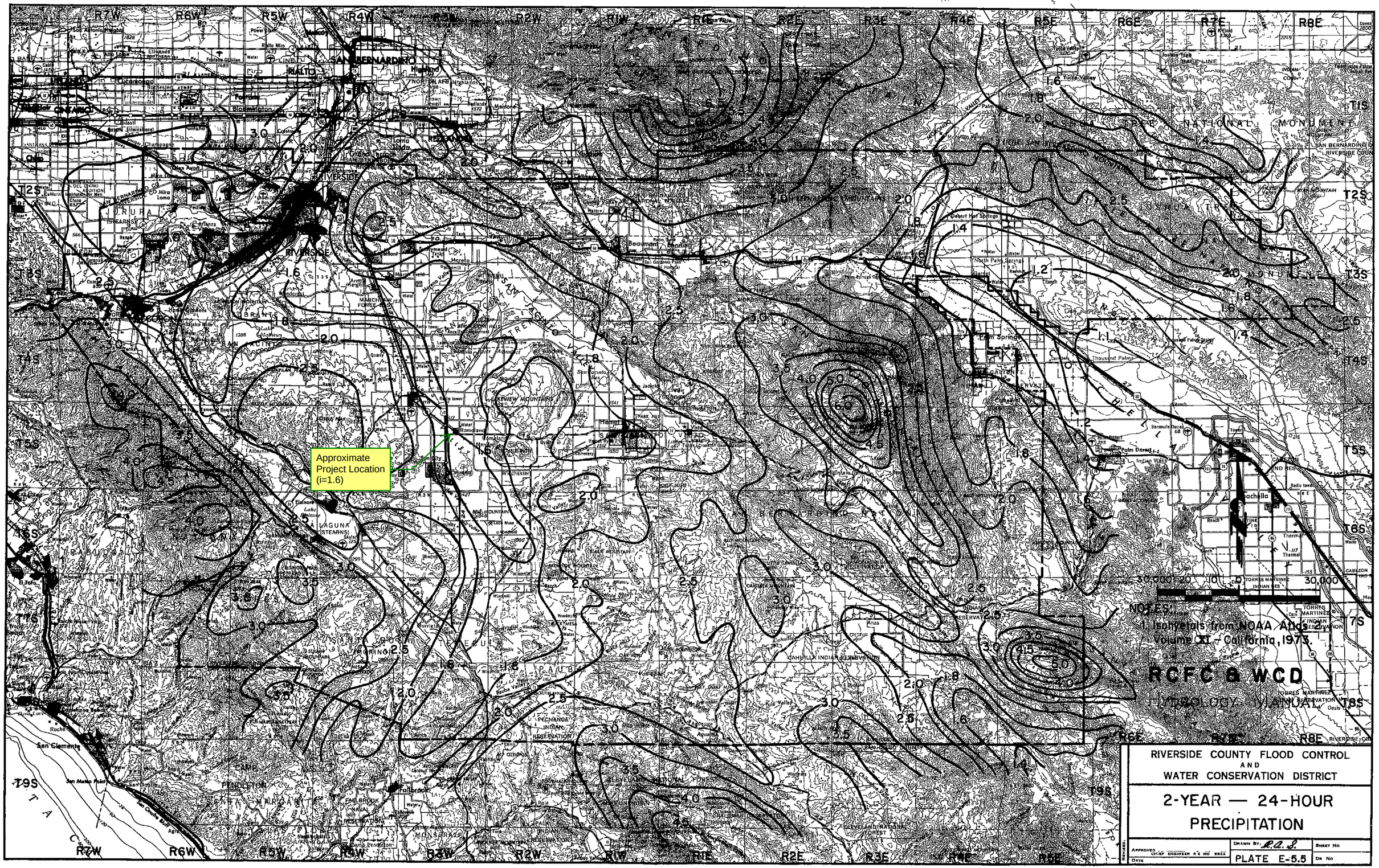
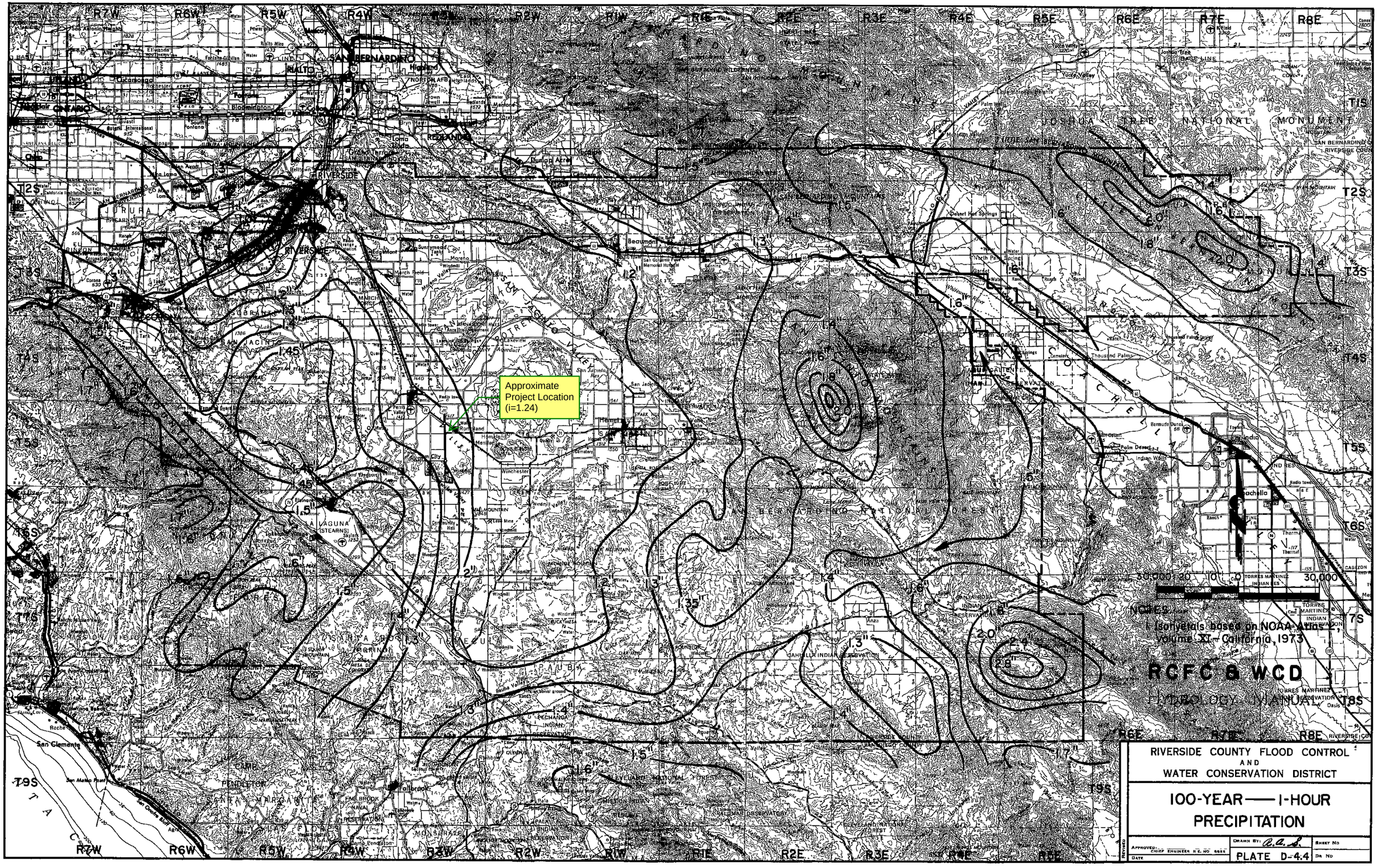
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Ethanac Commerce Center Project Site
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011


Approximate Project Location (i=0.46)
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3

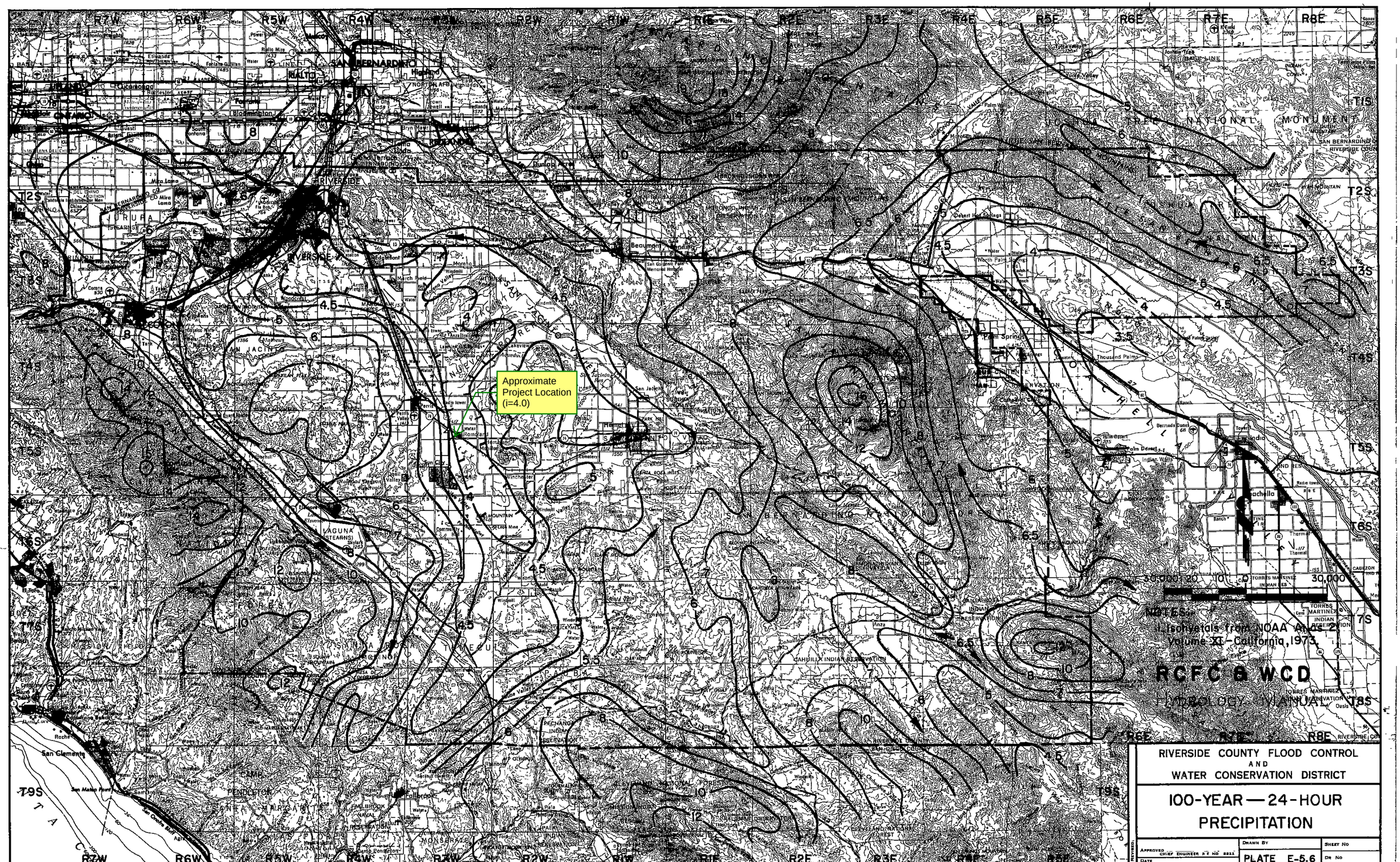

Approximate Project Location (i=1.6)
NOTES:
1. Isoverals from NOAA Atlas Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.5



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 6655	DRAWN BY: A.A.L.	SHEET NO
DATE	PLATE D-4.4	DR NO


Approximate Project Location (i=4.0)
SAN BERNARDINO
RIVERSIDE
RALTO
Beaumont
Banning
Palm Springs
Indio
Coachella
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San Jacinto
Perris
Menifee
Murrieta
Temecula
Lake Elsinore
San Clemente
Fallbrook
Winchester
Moreno
Mira Loma
Bloomington
Colton
Redlands
Yucaipa
Desert Hot Springs
Thousand Palms
Bermuda Dunes
Palm Desert
Indian Wells
Thermal
Oasis
Mecca
Anza
Aguanga
Pechanga Indian Reservation
Cahuilla Indian Reservation
Torres Martinez Indian Reservation
Joshua Tree National Monument
Cleveland National Forest
Santa Rosa Plateau
Lake Mathews
Lake Perris
Lake Elsinore
Vista Chino
Mt. Jacinto
San Jacinto Peak
Mt. San Gorgonio
Mt. San Antonio
Mt. Baldy
San Jacinto Fault
San Andreas Fault
Elsinore Fault
Chino Fault
Cucamonga Fault
San Jacinto Valley
Temecula Valley
Coachella Valley
Cahuilla Valley
Pala Valley
Pechanga Valley
Murrieta Creek
Santa Ana River
Temecula Creek
Santa Rosa Plateau
Pechanga Indian Reservation
Cahuilla Indian Reservation
Torres Martinez Indian Reservation
Cleveland National Forest
Santa Rosa Plateau
Lake Mathews
Lake Perris
Lake Elsinore
Vista Chino
Mt. Jacinto
San Jacinto Peak
Mt. San Gorgonio
Mt. San Antonio
Mt. Baldy
San Jacinto Fault
San Andreas Fault
Elsinore Fault
Chino Fault
Cucamonga Fault
San Jacinto Valley
Temecula Valley
Coachella Valley
Cahuilla Valley
Pala Valley
Pechanga Valley
Murrieta Creek
Santa Ana River
Temecula Creek
30,000 20 10 0 30,000
METERS
Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8833
DATE
DRAWN BY
PLATE E-5.6
SHEET NO
DR NO
REVISED

RAINFALL INTENSITY—INCHES PER HOUR

HEMET			HIGHGROVE			HOMELAND – WINCHESTER			IDYLLWILD			LAKEVIEW		
DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.40	5	3.02	4.37	5	2.91	4.37	5	4.91	7.28	5	2.77	4.16
6	2.58	4.00	6	2.75	3.97	6	2.65	3.97	6	4.47	6.62	6	2.53	3.79
7	2.37	3.68	7	2.54	3.67	7	2.44	3.67	7	4.13	6.11	7	2.34	3.51
8	2.21	3.43	8	2.37	3.42	8	2.28	3.42	8	3.85	5.70	8	2.19	3.29
9	2.08	3.23	9	2.23	3.22	9	2.15	3.22	9	3.62	5.36	9	2.07	3.10
10	1.96	3.05	10	2.11	3.05	10	2.03	3.05	10	3.43	5.08	10	1.96	2.94
11	1.87	2.90	11	2.01	2.90	11	1.93	2.90	11	3.26	4.83	11	1.87	2.80
12	1.78	2.77	12	1.92	2.77	12	1.85	2.77	12	3.12	4.62	12	1.79	2.68
13	1.71	2.65	13	1.84	2.66	13	1.77	2.66	13	2.99	4.43	13	1.72	2.58
14	1.64	2.55	14	1.77	2.56	14	1.71	2.56	14	2.88	4.26	14	1.66	2.48
15	1.58	2.46	15	1.71	2.47	15	1.64	2.47	15	2.78	4.11	15	1.60	2.40
16	1.53	2.38	16	1.65	2.39	16	1.59	2.39	16	2.68	3.98	16	1.55	2.32
17	1.48	2.30	17	1.60	2.31	17	1.54	2.31	17	2.60	3.85	17	1.50	2.25
18	1.44	2.23	18	1.55	2.24	18	1.50	2.24	18	2.52	3.74	18	1.46	2.19
19	1.40	2.17	19	1.51	2.18	19	1.45	2.18	19	2.45	3.64	19	1.42	2.13
20	1.36	2.11	20	1.47	2.12	20	1.42	2.12	20	2.39	3.54	20	1.39	2.08
22	1.29	2.01	22	1.40	2.02	22	1.35	2.02	22	2.27	3.37	22	1.32	1.98
24	1.24	1.92	24	1.34	1.93	24	1.29	1.93	24	2.17	3.22	24	1.26	1.90
26	1.18	1.84	26	1.28	1.85	26	1.24	1.85	26	2.09	3.09	26	1.22	1.82
28	1.14	1.77	28	1.23	1.78	28	1.19	1.78	28	2.01	2.97	28	1.17	1.76
30	1.10	1.70	30	1.19	1.72	30	1.15	1.72	30	1.94	2.87	30	1.13	1.70
32	1.06	1.65	32	1.15	1.66	32	1.11	1.66	32	1.87	2.77	32	1.10	1.64
34	1.03	1.59	34	1.12	1.61	34	1.07	1.61	34	1.81	2.69	34	1.06	1.59
36	1.00	1.55	36	1.08	1.57	36	1.04	1.57	36	1.76	2.61	36	1.03	1.55
38	.97	1.50	38	1.05	1.52	38	1.01	1.52	38	1.71	2.54	38	1.01	1.51
40	.94	1.46	40	1.02	1.48	40	.99	1.48	40	1.67	2.47	40	.98	1.47
45	.89	1.37	45	.96	1.39	45	.93	1.39	45	1.57	2.32	45	.92	1.39
50	.84	1.30	50	.91	1.32	50	.88	1.32	50	1.48	2.20	50	.88	1.31
55	.80	1.24	55	.87	1.26	55	.84	1.26	55	1.41	2.09	55	.84	1.25
60	.76	1.18	60	.83	1.20	60	.80	1.20	60	1.35	2.00	60	.80	1.20
65	.73	1.13	65	.80	1.15	65	.77	1.15	65	1.29	1.92	65	.77	1.15
70	.70	1.09	70	.77	1.11	70	.74	1.11	70	1.25	1.85	70	.74	1.11
75	.68	1.05	75	.74	1.07	75	.71	1.07	75	1.20	1.78	75	.72	1.07
80	.65	1.01	80	.71	1.03	80	.69	1.03	80	1.16	1.72	80	.69	1.04
85	.63	.98	85	.69	1.00	85	.67	1.00	85	1.13	1.67	85	.67	1.01
SLOPE = .530			SLOPE = .520			SLOPE = .520			SLOPE = .520			SLOPE = .500		

STANDARD
INTENSITY–DURATION
CURVES DATA

10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

```
                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
                Rational Hydrology Study        Date: 12/15/22
File:PROP10ONSITE.out
        ----------------------------------------------------------------------
        22-0198 - ETHANAC COMMERCE CENTER
        ONSITE RATIONAL METHOD HYDROLOGY
        10 YEAR STORM EVENT
        FN: PROP10.OUT RSB
        ----------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

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

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


        Program License Serial Number 4010

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

        Storm event (year) =   10.00 Antecedent Moisture Condition = 2

        Standard intensity-duration curves data (Plate D-4.1)
        For the [ Homeland-Winchester ] area used.
        10 year storm 10 minute intensity =  2.030(In/Hr)
        10 year storm 60 minute intensity =  0.800(In/Hr)
        100 year storm 10 minute intensity =  3.050(In/Hr)
        100 year storm 60 minute intensity =  1.200(In/Hr)

        Storm event year =  10.0
        Calculated rainfall intensity data:
        1 hour intensity =  0.800(In/Hr)
        Slope of intensity duration curve = 0.5200




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      100.000 to Point/Station      101.000
        **** INITIAL AREA EVALUATION ****
        ______________________________________________________________________
        Initial area flow distance =   720.000(Ft.)
        Top (of initial area) elevation =  1433.000(Ft.)
```

```
Bottom (of initial area) elevation =  1426.900(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.00847  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.826 min.
Rainfall intensity =      1.949(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.919(CFS)
Total initial stream area =        4.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.919(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.919(CFS)
Normal flow depth in pipe =   15.89(In.)
Flow top width inside pipe =   18.02(In.)
Critical Depth =   12.52(In.)
Pipe flow velocity =      4.05(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =    11.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      102.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.52 min.
```

```
Rainfall intensity =      1.887(In/Hr) for a    10.0 year storm
Subarea runoff =      6.163(CFS) for      3.700(Ac.)
Total runoff =     14.082(CFS)  Total area =       8.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   149.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.082(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    14.082(CFS)
Normal flow depth in pipe =   10.82(In.)
Flow top width inside pipe =   17.63(In.)
Critical Depth =   16.61(In.)
Pipe flow velocity =     12.69(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    11.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.300(Ac.)
Runoff from this stream =     14.082(CFS)
Time of concentration =   11.72 min.
Rainfall intensity =     1.870(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   356.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1429.500(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01292  s(percent)=       1.29
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.507 min.
Rainfall intensity =      2.358(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.715(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   798.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.715(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.715(CFS)
Normal flow depth in pipe =    7.52(In.)
Flow top width inside pipe =   11.61(In.)
Critical Depth =    8.48(In.)
Pipe flow velocity =      5.24(Ft/s)
Travel time through pipe =    2.54 min.
Time of concentration (TC) =    10.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      2.715(CFS)
Time of concentration =   10.04 min.
Rainfall intensity =     2.026(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1427.300(Ft.)
Difference in elevation =     6.800(Ft.)
```

```
Slope =    0.01223  s(percent)=       1.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      2.137(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.993(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.300(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.993(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.993(CFS)
Normal flow depth in pipe =   14.67(In.)
Flow top width inside pipe =   19.27(In.)
Critical Depth =   11.73(In.)
Pipe flow velocity =      3.90(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =     9.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.68 min.
Rainfall intensity =      2.065(In/Hr) for a    10.0 year storm
Subarea runoff =      3.469(CFS) for      1.900(Ac.)
```

```
Total runoff =     10.462(CFS)  Total area =       5.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.462(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.462(CFS)
Normal flow depth in pipe =   15.98(In.)
Flow top width inside pipe =   22.64(In.)
Critical Depth =   13.89(In.)
Pipe flow velocity =      4.71(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    10.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.19 min.
Rainfall intensity =      2.011(In/Hr) for a    10.0 year storm
Subarea runoff =      3.200(CFS) for      1.800(Ac.)
Total runoff =     13.662(CFS)  Total area =       7.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      306.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1423.000(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.662(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    13.662(CFS)
Normal flow depth in pipe =   18.84(In.)
```

```
Flow top width inside pipe =   24.79(In.)
Critical Depth =   15.42(In.)
Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.52 min.
Time of concentration (TC) =    10.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.71 min.
Rainfall intensity =      1.960(In/Hr) for a    10.0 year storm
Subarea runoff =      3.463(CFS) for      2.000(Ac.)
Total runoff =     17.125(CFS)  Total area =       9.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.000(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   998.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.125(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.125(CFS)
Normal flow depth in pipe =   20.11(In.)
Flow top width inside pipe =   17.69(In.)
Critical Depth =   17.91(In.)
Pipe flow velocity =      6.09(Ft/s)
Travel time through pipe =    2.73 min.
Time of concentration (TC) =    13.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      9.400(Ac.)
```

```
Runoff from this stream =     17.125(CFS)
Time of concentration =   13.44 min.
Rainfall intensity =     1.742(In/Hr)
Summary of stream data:

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


1       14.082     11.72                 1.870
2        2.715     10.04                 2.026
3       17.125     13.44                 1.742
Largest stream flow has longer time of concentration
Qp =     17.125 + sum of
          Qb         Ia/Ib
          14.082 *    0.931 =     13.115
          Qb         Ia/Ib
           2.715 *    0.860 =      2.334
Qp =     32.574

Total of 3 main streams to confluence:
Flow rates before confluence point:
      14.082       2.715      17.125
Area of streams before confluence:
        8.300        1.300        9.400


Results of confluence:
Total flow rate =     32.574(CFS)
Time of concentration =    13.437 min.
Effective stream area after confluence  =     19.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1417.500(Ft.)
Downstream point/station elevation =  1417.400(Ft.)
Pipe length  =    28.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.574(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    32.574(CFS)
Normal flow depth in pipe =   28.03(In.)
Flow top width inside pipe =   23.60(In.)
Critical Depth =   22.79(In.)
Pipe flow velocity =      6.05(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.51 min.
End of computations, total study area =          19.00 (Ac.)
```

The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 75.0

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

```
                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
                Rational Hydrology Study        Date: 12/15/22
File:PROP100ONSITE.out
        ----------------------------------------------------------------------
        22-0198 - ETHANAC COMMERCE CENTER
        ONSITE RATIONAL METHOD HYDROLOGY
        100 YEAR STORM EVENT
        FN: PROP100.OUT RSB
        ----------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

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

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


        Program License Serial Number 4010

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

        Storm event (year) =  100.00 Antecedent Moisture Condition = 2

        Standard intensity-duration curves data (Plate D-4.1)
        For the [ Homeland-Winchester ] area used.
        10 year storm 10 minute intensity =  2.030(In/Hr)
        10 year storm 60 minute intensity =  0.800(In/Hr)
        100 year storm 10 minute intensity =  3.050(In/Hr)
        100 year storm 60 minute intensity =  1.200(In/Hr)

        Storm event year = 100.0
        Calculated rainfall intensity data:
        1 hour intensity =  1.200(In/Hr)
        Slope of intensity duration curve = 0.5200




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      100.000 to Point/Station      101.000
        **** INITIAL AREA EVALUATION ****
        ______________________________________________________________________
        Initial area flow distance =   720.000(Ft.)
        Top (of initial area) elevation =  1433.000(Ft.)
```

```
Bottom (of initial area) elevation =  1426.900(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.00847  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.826 min.
Rainfall intensity =      2.924(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     11.944(CFS)
Total initial stream area =        4.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.944(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.944(CFS)
Normal flow depth in pipe =   19.13(In.)
Flow top width inside pipe =   19.31(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =      4.45(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =    11.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      102.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.46 min.
```

```
Rainfall intensity =      2.838(In/Hr) for a   100.0 year storm
Subarea runoff =      9.322(CFS) for      3.700(Ac.)
Total runoff =     21.266(CFS)  Total area =       8.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   149.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.266(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    21.266(CFS)
Normal flow depth in pipe =   12.63(In.)
Flow top width inside pipe =   20.56(In.)
Critical Depth =   19.51(In.)
Pipe flow velocity =     14.07(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    11.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.300(Ac.)
Runoff from this stream =     21.266(CFS)
Time of concentration =   11.64 min.
Rainfall intensity =     2.815(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   356.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1429.500(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01292  s(percent)=       1.29
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.507 min.
Rainfall intensity =      3.537(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.092(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   798.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.092(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.092(CFS)
Normal flow depth in pipe =    8.34(In.)
Flow top width inside pipe =   14.90(In.)
Critical Depth =    9.83(In.)
Pipe flow velocity =      5.84(Ft/s)
Travel time through pipe =    2.28 min.
Time of concentration (TC) =     9.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      4.092(CFS)
Time of concentration =    9.79 min.
Rainfall intensity =     3.081(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1434.100(Ft.)
Bottom (of initial area) elevation =  1427.300(Ft.)
Difference in elevation =     6.800(Ft.)
```

```
Slope =    0.01223  s(percent)=       1.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      3.205(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.543(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.300(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.543(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.543(CFS)
Normal flow depth in pipe =   17.48(In.)
Flow top width inside pipe =   21.35(In.)
Critical Depth =   13.97(In.)
Pipe flow velocity =      4.30(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =     9.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.63 min.
Rainfall intensity =      3.108(In/Hr) for a   100.0 year storm
Subarea runoff =      5.248(CFS) for      1.900(Ac.)
```

```
Total runoff =     15.790(CFS)  Total area =       5.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.790(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    15.790(CFS)
Normal flow depth in pipe =   19.34(In.)
Flow top width inside pipe =   24.35(In.)
Critical Depth =   16.62(In.)
Pipe flow velocity =      5.18(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    10.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.09 min.
Rainfall intensity =      3.033(In/Hr) for a   100.0 year storm
Subarea runoff =      4.851(CFS) for      1.800(Ac.)
Total runoff =     20.641(CFS)  Total area =       7.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      306.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.400(Ft.)
Downstream point/station elevation =  1423.000(Ft.)
Pipe length  =   143.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.641(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    20.641(CFS)
Normal flow depth in pipe =   23.39(In.)
```

```
Flow top width inside pipe =   24.87(In.)
Critical Depth =   18.52(In.)
Pipe flow velocity =      5.03(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    10.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.56 min.
Rainfall intensity =      2.962(In/Hr) for a   100.0 year storm
Subarea runoff =      5.261(CFS) for      2.000(Ac.)
Total runoff =     25.903(CFS)  Total area =       9.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.000(Ft.)
Downstream point/station elevation =  1417.500(Ft.)
Pipe length  =   998.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.903(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.903(CFS)
Normal flow depth in pipe =   21.26(In.)
Flow top width inside pipe =   27.26(In.)
Critical Depth =   20.81(In.)
Pipe flow velocity =      6.96(Ft/s)
Travel time through pipe =    2.39 min.
Time of concentration (TC) =    12.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      9.400(Ac.)
```

```
Runoff from this stream =     25.903(CFS)
Time of concentration =   12.95 min.
Rainfall intensity =     2.664(In/Hr)
Summary of stream data:

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


1       21.266     11.64                 2.815
2        4.092      9.79                 3.081
3       25.903     12.95                 2.664
Largest stream flow has longer time of concentration
Qp =     25.903 + sum of
          Qb         Ia/Ib
          21.266 *    0.946 =     20.119
          Qb         Ia/Ib
           4.092 *    0.864 =      3.537
Qp =     49.559

Total of 3 main streams to confluence:
Flow rates before confluence point:
      21.266       4.092      25.903
Area of streams before confluence:
        8.300        1.300        9.400


Results of confluence:
Total flow rate =     49.559(CFS)
Time of concentration =    12.948 min.
Effective stream area after confluence  =     19.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1417.500(Ft.)
Downstream point/station elevation =  1417.400(Ft.)
Pipe length  =    28.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    49.559(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    49.559(CFS)
Normal flow depth in pipe =   32.16(In.)
Flow top width inside pipe =   29.67(In.)
Critical Depth =   26.96(In.)
Pipe flow velocity =      6.78(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    13.02 min.
End of computations, total study area =          19.00 (Ac.)
```

The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 75.0

100-YEAR OFFSITE HYDROLOGY (RATIONAL METHOD)

100-Year Offsite Flows To Basin

```
                    Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
        Rational Hydrology Study        Date: 04/12/23
File:PROP100OFFSITEIN.out
---------------------------------------------------------------------------
22-0198 - ETHANAC COMMERCE CENTER
OFFSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT - RUNON INTO BASIN
FN: PROP100.OUT RSB
---------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 4010

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

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
```

```
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.94 min.  Rain intensity =       2.02(In/Hr)
Total area =        64.60(Ac.)  Total runoff =    163.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.500(Ft.)
Downstream point/station elevation =  1413.900(Ft.)
Pipe length  =  1753.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   163.000(CFS)
Nearest computed pipe diameter  =     54.00(In.)
Calculated individual pipe flow  =   163.000(CFS)
Normal flow depth in pipe =   48.60(In.)
Flow top width inside pipe =   32.40(In.)
Critical Depth =   44.76(In.)
Pipe flow velocity =     10.81(Ft/s)
Travel time through pipe =    2.70 min.
Time of concentration (TC) =    24.64 min.
End of computations, total study area =           64.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number =  75.0
```

```
                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
                Rational Hydrology Study        Date: 09/01/23
File:PROP100TRUMBLE.out
        ----------------------------------------------------------------------
        22-0198 - ETHANAC COMMERCE CENTER
        OFFSITE TRUMBLE RATIONAL METHOD HYDROLOGY
        100 YEAR STORM EVENT
        FN: PROP100TRUMBLE.OUT RSB
        ----------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

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

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


        Program License Serial Number 4010

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

        Storm event (year) =  100.00 Antecedent Moisture Condition = 2

        Standard intensity-duration curves data (Plate D-4.1)
        For the [ Homeland-Winchester ] area used.
        10 year storm 10 minute intensity =  2.030(In/Hr)
        10 year storm 60 minute intensity =  0.800(In/Hr)
        100 year storm 10 minute intensity =  3.050(In/Hr)
        100 year storm 60 minute intensity =  1.200(In/Hr)

        Storm event year = 100.0
        Calculated rainfall intensity data:
        1 hour intensity =  1.200(In/Hr)
        Slope of intensity duration curve = 0.5200




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      500.000 to Point/Station      501.000
        **** INITIAL AREA EVALUATION ****
        ______________________________________________________________________
        Initial area flow distance =   630.000(Ft.)
        Top (of initial area) elevation =  1428.900(Ft.)
```

```
Bottom (of initial area) elevation =  1426.600(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00365  s(percent)=       0.37
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.145 min.
Rainfall intensity =      2.754(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.688(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.000(Ft.)
Downstream point/station elevation =  1423.700(Ft.)
Pipe length  =   118.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.688(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.688(CFS)
Normal flow depth in pipe =   10.38(In.)
Flow top width inside pipe =   13.85(In.)
Critical Depth =    7.89(In.)
Pipe flow velocity =      2.96(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =    12.81 min.
End of computations, total study area =            1.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

100-Year Offsite Flows From Basin To MDP Line A-11

```
                    Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
        Rational Hydrology Study        Date: 09/01/23
File:PROP100OFFSITEOUT.out
---------------------------------------------------------------------------
22-0198 - ETHANAC COMMERCE CENTER
OFFSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT - RUNOFF OUT OF BASIN
FN: PROP100.OUT RSB
---------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 4010

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

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Homeland-Winchester ] area used.
10 year storm 10 minute intensity =  2.030(In/Hr)
10 year storm 60 minute intensity =  0.800(In/Hr)
100 year storm 10 minute intensity =  3.050(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5200




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      404.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
```

```
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.94 min.  Rain intensity =       2.02(In/Hr)
Total area =        64.60(Ac.)  Total runoff =     10.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1424.000(Ft.)
Downstream point/station elevation =  1423.700(Ft.)
Pipe length  =    94.80(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.000(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.000(CFS)
Normal flow depth in pipe =   16.03(In.)
Flow top width inside pipe =   22.61(In.)
Critical Depth =   13.58(In.)
Pipe flow velocity =      4.49(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    22.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      502.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     64.600(Ac.)
Runoff from this stream =     10.000(CFS)
Time of concentration =   22.29 min.
Rainfall intensity =     2.008(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.559(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  13.99 min.  Rain intensity =       2.56(In/Hr)
Total area =         1.10(Ac.)  Total runoff =      2.70(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.700(CFS)
Time of concentration =   13.99 min.
Rainfall intensity =     2.559(In/Hr)
Summary of stream data:

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


1       10.000     22.29                 2.008
2        2.700     13.99                 2.559
Largest stream flow has longer time of concentration
Qp =     10.000 + sum of
          Qb         Ia/Ib
           2.700 *    0.785 =      2.119
Qp =     12.119

Total of 2 main streams to confluence:
Flow rates before confluence point:
      10.000       2.700
Area of streams before confluence:
       64.600        1.100


Results of confluence:
Total flow rate =     12.119(CFS)
Time of concentration =    22.292 min.
Effective stream area after confluence  =     65.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =  1423.700(Ft.)
Downstream point/station elevation =  1423.600(Ft.)
Pipe length  =    45.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.119(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    12.119(CFS)
Normal flow depth in pipe =   18.87(In.)
Flow top width inside pipe =   24.77(In.)
Critical Depth =   14.49(In.)
Pipe flow velocity =      4.08(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    22.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     65.700(Ac.)
Runoff from this stream =     12.119(CFS)
Time of concentration =   22.48 min.
Rainfall intensity =     1.999(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      503.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____________________________________________________________
Rainfall intensity =      2.680(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  12.80 min.  Rain intensity =       2.68(In/Hr)
Total area =         1.00(Ac.)  Total runoff =      5.50(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      503.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.000(Ac.)
Runoff from this stream =      5.500(CFS)
Time of concentration =   12.80 min.
Rainfall intensity =     2.680(In/Hr)
Summary of stream data:

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


1       12.119     22.48                 1.999
2        5.500     12.80                 2.680
Largest stream flow has longer time of concentration
Qp =     12.119 + sum of
          Qb         Ia/Ib
           5.500 *    0.746 =      4.104
Qp =     16.223

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.119       5.500
Area of streams before confluence:
       65.700        1.000


Results of confluence:
Total flow rate =     16.223(CFS)
Time of concentration =    22.478 min.
Effective stream area after confluence  =     66.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      405.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1423.600(Ft.)
Downstream point/station elevation =  1423.500(Ft.)
Pipe length  =    22.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.223(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.223(CFS)
Normal flow depth in pipe =   18.14(In.)
Flow top width inside pipe =   25.35(In.)
Critical Depth =   16.85(In.)
Pipe flow velocity =      5.71(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    22.55 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     66.700(Ac.)
Runoff from this stream =     16.223(CFS)
Time of concentration =   22.55 min.
Rainfall intensity =     1.996(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      405.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.680(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  12.80 min.  Rain intensity =       2.68(In/Hr)
Total area =        18.20(Ac.)  Total runoff =      1.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      405.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.200(Ac.)
Runoff from this stream =      1.000(CFS)
Time of concentration =   12.80 min.
Rainfall intensity =     2.680(In/Hr)
Summary of stream data:

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


1       16.223     22.55                  1.996
```

```
2        1.000     12.80                 2.680
Largest stream flow has longer time of concentration
Qp =     16.223 + sum of
          Qb         Ia/Ib
           1.000 *    0.745 =      0.745
Qp =     16.968

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.223       1.000
Area of streams before confluence:
       66.700       18.200


Results of confluence:
Total flow rate =     16.968(CFS)
Time of concentration =    22.545 min.
Effective stream area after confluence  =     84.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1423.500(Ft.)
Downstream point/station elevation =  1421.800(Ft.)
Pipe length  =   566.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.968(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.968(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   20.77(In.)
Critical Depth =   17.25(In.)
Pipe flow velocity =      4.87(Ft/s)
Travel time through pipe =    1.94 min.
Time of concentration (TC) =    24.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     84.900(Ac.)
Runoff from this stream =     16.968(CFS)
Time of concentration =   24.48 min.
Rainfall intensity =     1.913(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      406.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.941(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  10.70 min.  Rain intensity =       2.94(In/Hr)
Total area =         3.60(Ac.)  Total runoff =      8.90(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      406.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.600(Ac.)
Runoff from this stream =      8.900(CFS)
Time of concentration =   10.70 min.
Rainfall intensity =     2.941(In/Hr)
Summary of stream data:

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


1       16.968     24.48                 1.913
2        8.900     10.70                 2.941
Largest stream flow has longer time of concentration
Qp =     16.968 + sum of
          Qb         Ia/Ib
           8.900 *    0.650 =      5.787
Qp =     22.755

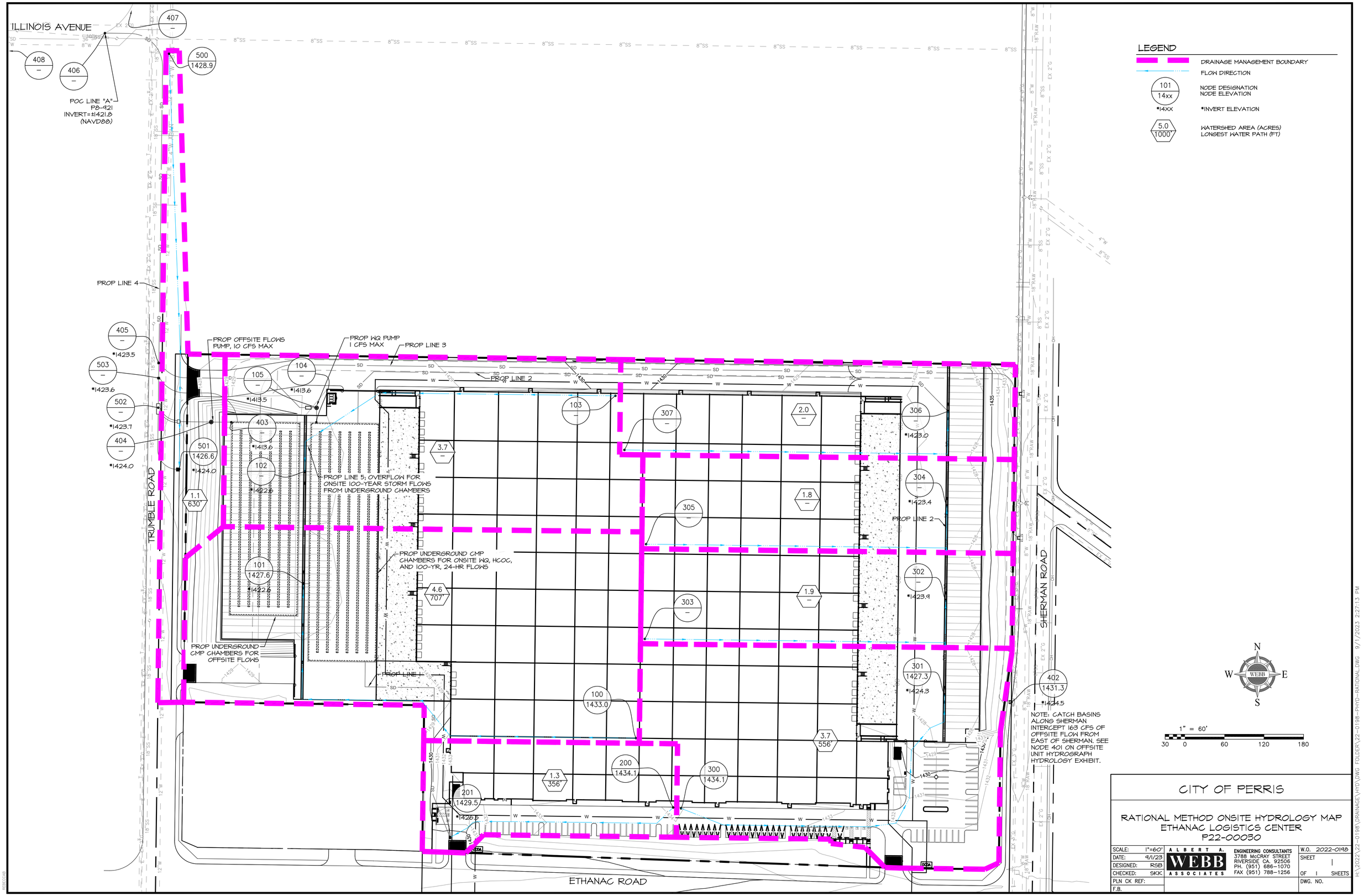
Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.968       8.900
Area of streams before confluence:
       84.900        3.600
```

```
Results of confluence:
Total flow rate =     22.755(CFS)
Time of concentration =    24.484 min.
Effective stream area after confluence  =     88.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1421.800(Ft.)
Downstream point/station elevation =  1418.700(Ft.)
Pipe length  =  1150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.755(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    22.755(CFS)
Normal flow depth in pipe =   22.92(In.)
Flow top width inside pipe =   30.40(In.)
Critical Depth =   18.92(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    3.71 min.
Time of concentration (TC) =    28.19 min.
End of computations, total study area =           88.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.392
Area averaged RI index number =  75.0
```

RATIONAL METHOD HYDROLOGY MAPS



CITY OF PERRIS

RATIONAL METHOD ONSITE HYDROLOGY MAP
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: 9/1/23			SHEET 1
DESIGNED: RSB			OF 1 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-HYD-RATIONAL.DWG 9/1/2023 2:27:13 PM

APPENDIX B – HYDRAULIC ANALYSIS

CITY OF PERRIS LINE A WSPG CALCULATIONS

CITY OF PERRIS LINE A - MAIN LINE WSPG

```
↑ FILE: SDMAINCONFL30IN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                          PAGE    1
                                   Program Package Serial Number: 1585

                                                     WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time:11:25:25
                           04-425 I-215 Business Park (Main Line)

                             Flows from Onsite Hydrology & Offsite Basin routing

                               31 May 2006 TD


*******************************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1000.000  1416.000    4.000  1420.000     85.20    6.78     .71  1420.71     .00
 2.80      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    21.990    .0028                                        .0030      .07     4.00
   .00    3.40    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1021.990  1416.062    4.004  1420.066     85.20    6.78     .71  1420.78     .00
 2.80      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                        .0028      .01    4.00
  .00             .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1024.990  1416.070    4.163  1420.233     79.50    6.33     .62  1420.85     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    36.970    .0028                                        .0026      .10     4.16
   .00    3.17    .012       .00   .00  PIPE
```

```
         |         |        |         |         |               |         |       |
       |        |       |       |
  1061.960  1416.173    4.157  1420.330     79.50    6.33     .62  1420.95     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.830    .0028                                          .0026      .11      .00
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1104.790  1416.293    4.217  1420.510     79.50    6.33     .62  1421.13     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.830    .0028                                          .0026      .11      .00
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1147.620  1416.413    4.333  1420.746     79.50    6.33     .62  1421.37     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    61.970    .0028                                          .0026      .16     4.33
   .00    3.16    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1209.590  1416.587    4.321  1420.908     79.50    6.33     .62  1421.53     .00
 2.70      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                          .0025      .01    4.32
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1212.590  1416.595    4.413  1421.008     76.20    6.06     .57  1421.58     .00
 2.64      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    23.960    .0028                                          .0024      .06     4.41
   .00    3.04    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1236.550  1416.662    4.403  1421.065     76.20    6.06     .57  1421.64     .00
 2.64      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0030                                          .0022      .01    4.40
  .00             .012       .00   .00  PIPE
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

```
*******************************************************************************
************************************* ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |
  1239.550  1416.671    4.569  1421.240     68.80    5.47     .47  1421.71     .00
 2.51      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    39.720    .0028                                        .0020      .08     4.57
   .00    2.80    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1279.270  1416.782    4.535  1421.317     68.80    5.47     .47  1421.78     .00
 2.51      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0028                                        .0018      .01    4.54
  .00             .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1286.770  1416.803    4.666  1421.469     62.90    5.01     .39  1421.86     .00
 2.39      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    69.580    .0028                                        .0016      .11     4.67
   .00    2.62    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
```

```
  1356.350  1416.998    4.585  1421.583     62.90    5.01     .39  1421.97     .00
 2.39      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                          .0013      .00    4.58
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1359.350  1417.006    4.790  1421.796     48.90    3.89     .24  1422.03     .00
 2.10      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   209.024    .0029                                          .0010      .21     4.79
   .00    2.20    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1568.374  1417.610    4.392  1422.002     48.90    3.89     .24  1422.24     .00
 2.10      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0376                                          .0009      .01    4.39
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1575.874  1417.892    4.210  1422.102     42.80    3.41     .18  1422.28     .00
 1.96      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    99.806    .0000                                          .0008      .08     4.21
   .00     .00    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1675.680  1417.892    4.285  1422.177     42.80    3.41     .18  1422.36     .00
 1.96      .00    4.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0027                                          .0010      .00    4.29
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1678.680  1417.900    4.252  1422.152     25.90    3.66     .21  1422.36     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   428.880    .0028                                          .0013      .55     4.25
   .00    1.81    .012       .00   .00  PIPE
```

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

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*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2107.560  1419.101    3.602  1422.703     25.90    3.66     .21  1422.91     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    42.440    .0047                                        .0013      .05      .00
   .00    1.54    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2150.000  1419.300    3.480  1422.780     25.90    3.66     .21  1422.99     .00
 1.64      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0033                                        .0007      .00     .00
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2153.000  1419.310    3.609  1422.920      8.90    1.26     .02  1422.94     .00
  .94      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    95.910    .0019                                        .0002      .01      .00
   .00    1.08    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2248.910  1419.497    3.441  1422.938      8.90    1.26     .02  1422.96     .00
  .94      .00    3.000     .000   .00   1   .0
```

```
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    80.190    .0028                                        .0002      .01     3.44
   .00     .99    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2329.100  1419.721    3.229  1422.950      8.90    1.26     .02  1422.97     .00
  .94      .00    3.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0030                                        .0004      .00    3.23
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2332.100  1419.730    3.215  1422.945      6.20    1.97     .06  1423.01     .00
  .88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   287.510    .0028                                        .0006      .18     3.22
   .00     .97    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2619.610  1420.535    2.594  1423.129      6.20    1.97     .06  1423.19     .00
  .88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0026                                        .0005      .00    2.59
  .00             .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2622.610  1420.543    2.650  1423.193      4.30    1.37     .03  1423.22     .00
  .73      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   163.140    .0028                                        .0003      .05     2.65
   .00     .79    .012       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  2785.750  1421.000    2.244  1423.244      4.30    1.37     .03  1423.27     .00
  .73      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    19.800    .0028                                        .0003      .01      .00
   .00     .79    .012       .00   .00  PIPE
```


WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time:11:25:25

04-425 I-215 Business Park (Main Line)

Flows from Onsite Hydrology & Offsite Basin routing

31 May 2006 TD

```
*********************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  2805.550  1421.056    2.198  1423.254      4.30    1.37     .03  1423.28     .00
  .73      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

CITY OF PERRIS LINE A - LATERAL M-1 WSPG

```
↑ FILE: LATM-1-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                Program Package Serial Number: 1585

                                                    WATER SURFACE PROFILE LISTING
                Date: 9- 1-2023  Time: 1:49:15
                          04-425 I-215 Business Park (LATERAL M-1)

                            Catch Basin #1

                              2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.500  1417.290    2.940  1420.230      5.70    1.81     .05  1420.28     .00
  .84      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     6.810    .0088                                        .0005      .00     2.94
   .00     .68    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    10.310  1417.350    2.884  1420.234      5.70    1.81     .05  1420.28     .00
  .84      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    10.310  1417.350    2.959  1420.308      5.70     .28     .00  1420.31     .00
  .27     7.00    4.950    7.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0167                                        .0000      .00     2.96
   .03     .17    .012       .00   .00  RECTANG
```

```
          |          |         |          |          |                |          |        |
       |         |       |       |      |
    13.310  1417.400    2.909  1420.309      5.70     .28     .00  1420.31     .00
  .27     7.00    4.950    7.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

CITY OF PERRIS LINE A - LATERAL M-2 WSPG

```
↑ FILE: LATM-2-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:52: 5
                           04-425 I-215 Business Park (LATERAL M-2)

                             Catch Basin #2

                               2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.780  1418.080    3.390  1421.470      2.04    1.15     .02  1421.49     .00
  .54      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    18.850    .0101                                        .0003      .01     3.39
   .00     .43    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1418.270    3.206  1421.476      2.04    1.15     .02  1421.50     .00
  .54      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1418.270    3.237  1421.507      2.04     .06     .00  1421.51     .00
  .11    10.00    5.000   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0100                                        .0000      .00     3.24
   .01     .09    .012       .00   .00  RECTANG
```

```
          |         |        |         |         |                |         |       |
       |        |       |       |      |
    25.630  1418.300    3.207  1421.507      2.04     .06     .00  1421.51     .00
  .11    10.00    5.000   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

CITY OF PERRIS LINE A - LATERAL M-4 WSPG

```
↑ FILE: LATM-4-SDMAIN.WSW                    W S P G W - CIVILDESIGN Version 14.06
                                        PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:54:37
                           04-425 I-215 Business Park (LATERAL M-4)

                             Catch Basin #4

                               2022-12-20 RB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |      |
     3.780  1418.890    3.212  1422.102      1.45     .82     .01  1422.11     .00
  .45      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    18.850    .0095                                        .0002      .00     3.21
   .00     .37    .012       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1419.070    3.035  1422.105      1.45     .82     .01  1422.12     .00
  .45      .00    1.500     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
  WALL  ENTRANCE

          |         |        |         |         |               |         |       |
       |        |       |       |      |
    22.630  1419.070    3.051  1422.121      1.45     .05     .00  1422.12     .00
  .09    10.00    4.200   10.000   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     3.000    .0100                                        .0000      .00     3.05
   .00     .07    .012       .00   .00  RECTANG
```

25.630	1419.100	3.021	1422.121	1.45	.05	.00	1422.12
.00	.09	10.00	4.200	10.000	.00	0	.0

-|- -|- -|- -|- -|- -|- -|- -|-
-|- -|- -|- -|- -|- |-

LINE 4 - WSPG

```
↑ FILE: LINE4V2.WSW                          W S P G W - CIVILDESIGN Version 14.06
                                       PAGE    1
                                 Program Package Serial Number: 1585

                                                   WATER SURFACE PROFILE LISTING
                 Date: 9- 1-2023  Time: 1:29: 5
                           ETHANAC LOGISTICS CENTER

                             22-0198 LINE 4 WSPG

                               2023-09-01 RSB


*******************************************************************************
************************************** ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1000.000  1421.800    3.620  1425.420     19.20    2.72     .11  1425.53     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    38.100    .0029                                        .0008      .03     3.62
   .00    1.56    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1038.100  1421.910    3.542  1425.452     19.20    2.72     .11  1425.57     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    78.440    .0031                                        .0008      .06      .00
   .00    1.54    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |      |
  1116.540  1422.150    3.390  1425.540     19.20    2.72     .11  1425.65     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   180.066    .0030                                        .0008      .15     3.39
   .00    1.55    .013       .00   .00  PIPE
```

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         |         |        |         |         |               |         |       |
       |        |       |       |
  1296.606  1422.689    3.000  1425.689     19.20    2.72     .11  1425.80     .00
 1.40      .00    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
   119.930    .0030                                        .0008      .09     3.00
   .00    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1416.536  1423.047    2.721  1425.769     19.20    2.85     .13  1425.89     .00
 1.40     1.74    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    66.196    .0030                                        .0008      .05     2.72
   .26    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1482.733  1423.245    2.560  1425.806     19.20    2.99     .14  1425.94     .00
 1.40     2.12    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    54.656    .0030                                        .0008      .04     2.56
   .30    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1537.388  1423.409    2.427  1425.836     19.20    3.13     .15  1425.99     .00
 1.40     2.36    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    27.012    .0030                                        .0009      .02     2.43
   .34    1.55    .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1564.400  1423.490    2.362  1425.852     19.20    3.22     .16  1426.01     .00
 1.40     2.46    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0067                                        .0008      .00    2.36
  .36             .013       .00   .00  PIPE
         |         |        |         |         |               |         |       |
       |        |       |       |
  1567.400  1423.510    2.377  1425.887     18.20    3.03     .14  1426.03     .00
 1.37     2.43    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    20.020    .0025                                        .0008      .02     2.38
   .34    1.58    .013       .00   .00  PIPE
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING

Date: 9- 1-2023 Time: 1:29: 5

ETHANAC LOGISTICS CENTER

22-0198 LINE 4 WSPG

2023-09-01 RSB

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*******************************************************************************
************************************* ********
          | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super
|Critical|Flow Top|Height/|Base Wt|      |No Wth
  Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev |
Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-    -|
  L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE
Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch

*********|*********|********|*********|*********|*******|*******|*********|*******|*
*******|********|*******|*******|***** |*******
          |         |        |         |         |               |         |       |
       |        |       |       |
  1587.420  1423.560    2.338  1425.898     18.20    3.08     .15  1426.05     .00
 1.37     2.49    3.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0033                                          .0020      .01    2.34
  .35             .013       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1590.420  1423.570    2.287  1425.857     12.70    4.04     .25  1426.11     .00
 1.28      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    37.180    .0030                                          .0032      .12     2.29
   .00    1.70    .013       .00   .00  PIPE
          |         |        |         |         |               |         |       |
       |        |       |       |
  1627.600  1423.680    2.294  1425.974     12.70    4.04     .25  1426.23     .00
 1.28      .00    2.000     .000   .00   1   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
 JUNCT STR   .0037                                          .0004      .01    2.29
  .00             .013       .00   .00  PIPE
                       -------------------- WARNING - Junction Analysis - Change in
Channel Type ---------------
```

```
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1643.610  1423.740    2.534  1426.274      2.70    1.20     .02  1426.30     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    53.890    .0028                                        .0004      .02     2.53
   .17     .62    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1697.500  1423.890    2.406  1426.296      2.70    1.20     .02  1426.32     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
    45.230    .0031                                        .0004      .02      .00
   .17     .59    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1742.730  1424.030    2.289  1426.319      2.70    1.20     .02  1426.34     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
     4.500    .0031                                        .0004      .00     2.29
   .17     .59    .013       .00   .00  BOX
          |         |        |         |         |               |         |       |
       |        |       |       |      |
  1747.230  1424.044    2.277  1426.321      2.70    1.20     .02  1426.34     .00
  .47     1.50    1.500    1.500   .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-
-|-      -|-      -|-     -|-     -|-     |-
```

APPENDIX C – BASIN ANALYSIS

EXISTING CONDITION UNIT HYDROGRAPHS

EXISTING CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPRE242.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, 2-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) = 2.00
Area Averaged 2-Year Rainfall = 1.600(In)
Area Averaged 100-Year Rainfall = 4.000(In)

Point rain (area averaged) = 1.600(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.600(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.800	89.00	0.000

Total Area Entered = 19.80(Ac.)

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

Area averaged mean soil loss (F) (In/Hr) = 0.286
Minimum soil loss rate ((In/Hr)) = 0.143
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	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	0.013	(0.508)	0.012	0.001
2	0.17	0.07	0.013	(0.506)	0.012	0.001
3	0.25	0.07	0.013	(0.504)	0.012	0.001
4	0.33	0.10	0.019	(0.502)	0.017	0.002
5	0.42	0.10	0.019	(0.500)	0.017	0.002
6	0.50	0.10	0.019	(0.498)	0.017	0.002
7	0.58	0.10	0.019	(0.496)	0.017	0.002
8	0.67	0.10	0.019	(0.494)	0.017	0.002
9	0.75	0.10	0.019	(0.492)	0.017	0.002
10	0.83	0.13	0.026	(0.490)	0.023	0.003
11	0.92	0.13	0.026	(0.488)	0.023	0.003
12	1.00	0.13	0.026	(0.486)	0.023	0.003
13	1.08	0.10	0.019	(0.485)	0.017	0.002
14	1.17	0.10	0.019	(0.483)	0.017	0.002
15	1.25	0.10	0.019	(0.481)	0.017	0.002
16	1.33	0.10	0.019	(0.479)	0.017	0.002
17	1.42	0.10	0.019	(0.477)	0.017	0.002
18	1.50	0.10	0.019	(0.475)	0.017	0.002
19	1.58	0.10	0.019	(0.473)	0.017	0.002
20	1.67	0.10	0.019	(0.471)	0.017	0.002
21	1.75	0.10	0.019	(0.469)	0.017	0.002
22	1.83	0.13	0.026	(0.467)	0.023	0.003
23	1.92	0.13	0.026	(0.466)	0.023	0.003
24	2.00	0.13	0.026	(0.464)	0.023	0.003
25	2.08	0.13	0.026	(0.462)	0.023	0.003
26	2.17	0.13	0.026	(0.460)	0.023	0.003
27	2.25	0.13	0.026	(0.458)	0.023	0.003
28	2.33	0.13	0.026	(0.456)	0.023	0.003
29	2.42	0.13	0.026	(0.454)	0.023	0.003
30	2.50	0.13	0.026	(0.452)	0.023	0.003
31	2.58	0.17	0.032	(0.451)	0.029	0.003
32	2.67	0.17	0.032	(0.449)	0.029	0.003
33	2.75	0.17	0.032	(0.447)	0.029	0.003
34	2.83	0.17	0.032	(0.445)	0.029	0.003
35	2.92	0.17	0.032	(0.443)	0.029	0.003
36	3.00	0.17	0.032	(0.441)	0.029	0.003
37	3.08	0.17	0.032	(0.440)	0.029	0.003
38	3.17	0.17	0.032	(0.438)	0.029	0.003

39	3.25	0.17	0.032	(0.436)	0.029	0.003
40	3.33	0.17	0.032	(0.434)	0.029	0.003
41	3.42	0.17	0.032	(0.432)	0.029	0.003
42	3.50	0.17	0.032	(0.430)	0.029	0.003
43	3.58	0.17	0.032	(0.429)	0.029	0.003
44	3.67	0.17	0.032	(0.427)	0.029	0.003
45	3.75	0.17	0.032	(0.425)	0.029	0.003
46	3.83	0.20	0.038	(0.423)	0.035	0.004
47	3.92	0.20	0.038	(0.422)	0.035	0.004
48	4.00	0.20	0.038	(0.420)	0.035	0.004
49	4.08	0.20	0.038	(0.418)	0.035	0.004
50	4.17	0.20	0.038	(0.416)	0.035	0.004
51	4.25	0.20	0.038	(0.414)	0.035	0.004
52	4.33	0.23	0.045	(0.413)	0.040	0.004
53	4.42	0.23	0.045	(0.411)	0.040	0.004
54	4.50	0.23	0.045	(0.409)	0.040	0.004
55	4.58	0.23	0.045	(0.407)	0.040	0.004
56	4.67	0.23	0.045	(0.406)	0.040	0.004
57	4.75	0.23	0.045	(0.404)	0.040	0.004
58	4.83	0.27	0.051	(0.402)	0.046	0.005
59	4.92	0.27	0.051	(0.400)	0.046	0.005
60	5.00	0.27	0.051	(0.399)	0.046	0.005
61	5.08	0.20	0.038	(0.397)	0.035	0.004
62	5.17	0.20	0.038	(0.395)	0.035	0.004
63	5.25	0.20	0.038	(0.393)	0.035	0.004
64	5.33	0.23	0.045	(0.392)	0.040	0.004
65	5.42	0.23	0.045	(0.390)	0.040	0.004
66	5.50	0.23	0.045	(0.388)	0.040	0.004
67	5.58	0.27	0.051	(0.387)	0.046	0.005
68	5.67	0.27	0.051	(0.385)	0.046	0.005
69	5.75	0.27	0.051	(0.383)	0.046	0.005
70	5.83	0.27	0.051	(0.382)	0.046	0.005
71	5.92	0.27	0.051	(0.380)	0.046	0.005
72	6.00	0.27	0.051	(0.378)	0.046	0.005
73	6.08	0.30	0.058	(0.376)	0.052	0.006
74	6.17	0.30	0.058	(0.375)	0.052	0.006
75	6.25	0.30	0.058	(0.373)	0.052	0.006
76	6.33	0.30	0.058	(0.371)	0.052	0.006
77	6.42	0.30	0.058	(0.370)	0.052	0.006
78	6.50	0.30	0.058	(0.368)	0.052	0.006
79	6.58	0.33	0.064	(0.366)	0.058	0.006
80	6.67	0.33	0.064	(0.365)	0.058	0.006
81	6.75	0.33	0.064	(0.363)	0.058	0.006
82	6.83	0.33	0.064	(0.362)	0.058	0.006
83	6.92	0.33	0.064	(0.360)	0.058	0.006
84	7.00	0.33	0.064	(0.358)	0.058	0.006
85	7.08	0.33	0.064	(0.357)	0.058	0.006
86	7.17	0.33	0.064	(0.355)	0.058	0.006
87	7.25	0.33	0.064	(0.353)	0.058	0.006
88	7.33	0.37	0.070	(0.352)	0.063	0.007

89	7.42	0.37	0.070	(0.350)	0.063	0.007
90	7.50	0.37	0.070	(0.349)	0.063	0.007
91	7.58	0.40	0.077	(0.347)	0.069	0.008
92	7.67	0.40	0.077	(0.345)	0.069	0.008
93	7.75	0.40	0.077	(0.344)	0.069	0.008
94	7.83	0.43	0.083	(0.342)	0.075	0.008
95	7.92	0.43	0.083	(0.341)	0.075	0.008
96	8.00	0.43	0.083	(0.339)	0.075	0.008
97	8.08	0.50	0.096	(0.337)	0.086	0.010
98	8.17	0.50	0.096	(0.336)	0.086	0.010
99	8.25	0.50	0.096	(0.334)	0.086	0.010
100	8.33	0.50	0.096	(0.333)	0.086	0.010
101	8.42	0.50	0.096	(0.331)	0.086	0.010
102	8.50	0.50	0.096	(0.330)	0.086	0.010
103	8.58	0.53	0.102	(0.328)	0.092	0.010
104	8.67	0.53	0.102	(0.327)	0.092	0.010
105	8.75	0.53	0.102	(0.325)	0.092	0.010
106	8.83	0.57	0.109	(0.323)	0.098	0.011
107	8.92	0.57	0.109	(0.322)	0.098	0.011
108	9.00	0.57	0.109	(0.320)	0.098	0.011
109	9.08	0.63	0.122	(0.319)	0.109	0.012
110	9.17	0.63	0.122	(0.317)	0.109	0.012
111	9.25	0.63	0.122	(0.316)	0.109	0.012
112	9.33	0.67	0.128	(0.314)	0.115	0.013
113	9.42	0.67	0.128	(0.313)	0.115	0.013
114	9.50	0.67	0.128	(0.311)	0.115	0.013
115	9.58	0.70	0.134	(0.310)	0.121	0.013
116	9.67	0.70	0.134	(0.308)	0.121	0.013
117	9.75	0.70	0.134	(0.307)	0.121	0.013
118	9.83	0.73	0.141	(0.305)	0.127	0.014
119	9.92	0.73	0.141	(0.304)	0.127	0.014
120	10.00	0.73	0.141	(0.303)	0.127	0.014
121	10.08	0.50	0.096	(0.301)	0.086	0.010
122	10.17	0.50	0.096	(0.300)	0.086	0.010
123	10.25	0.50	0.096	(0.298)	0.086	0.010
124	10.33	0.50	0.096	(0.297)	0.086	0.010
125	10.42	0.50	0.096	(0.295)	0.086	0.010
126	10.50	0.50	0.096	(0.294)	0.086	0.010
127	10.58	0.67	0.128	(0.292)	0.115	0.013
128	10.67	0.67	0.128	(0.291)	0.115	0.013
129	10.75	0.67	0.128	(0.290)	0.115	0.013
130	10.83	0.67	0.128	(0.288)	0.115	0.013
131	10.92	0.67	0.128	(0.287)	0.115	0.013
132	11.00	0.67	0.128	(0.285)	0.115	0.013
133	11.08	0.63	0.122	(0.284)	0.109	0.012
134	11.17	0.63	0.122	(0.282)	0.109	0.012
135	11.25	0.63	0.122	(0.281)	0.109	0.012
136	11.33	0.63	0.122	(0.280)	0.109	0.012
137	11.42	0.63	0.122	(0.278)	0.109	0.012
138	11.50	0.63	0.122	(0.277)	0.109	0.012

139	11.58	0.57	0.109	(0.276)	0.098	0.011
140	11.67	0.57	0.109	(0.274)	0.098	0.011
141	11.75	0.57	0.109	(0.273)	0.098	0.011
142	11.83	0.60	0.115	(0.271)	0.104	0.012
143	11.92	0.60	0.115	(0.270)	0.104	0.012
144	12.00	0.60	0.115	(0.269)	0.104	0.012
145	12.08	0.83	0.160	(0.267)	0.144	0.016
146	12.17	0.83	0.160	(0.266)	0.144	0.016
147	12.25	0.83	0.160	(0.265)	0.144	0.016
148	12.33	0.87	0.166	(0.263)	0.150	0.017
149	12.42	0.87	0.166	(0.262)	0.150	0.017
150	12.50	0.87	0.166	(0.261)	0.150	0.017
151	12.58	0.93	0.179	(0.259)	0.161	0.018
152	12.67	0.93	0.179	(0.258)	0.161	0.018
153	12.75	0.93	0.179	(0.257)	0.161	0.018
154	12.83	0.97	0.186	(0.256)	0.167	0.019
155	12.92	0.97	0.186	(0.254)	0.167	0.019
156	13.00	0.97	0.186	(0.253)	0.167	0.019
157	13.08	1.13	0.218	(0.252)	0.196	0.022
158	13.17	1.13	0.218	(0.250)	0.196	0.022
159	13.25	1.13	0.218	(0.249)	0.196	0.022
160	13.33	1.13	0.218	(0.248)	0.196	0.022
161	13.42	1.13	0.218	(0.247)	0.196	0.022
162	13.50	1.13	0.218	(0.245)	0.196	0.022
163	13.58	0.77	0.147	(0.244)	0.132	0.015
164	13.67	0.77	0.147	(0.243)	0.132	0.015
165	13.75	0.77	0.147	(0.242)	0.132	0.015
166	13.83	0.77	0.147	(0.240)	0.132	0.015
167	13.92	0.77	0.147	(0.239)	0.132	0.015
168	14.00	0.77	0.147	(0.238)	0.132	0.015
169	14.08	0.90	0.173	(0.237)	0.156	0.017
170	14.17	0.90	0.173	(0.236)	0.156	0.017
171	14.25	0.90	0.173	(0.234)	0.156	0.017
172	14.33	0.87	0.166	(0.233)	0.150	0.017
173	14.42	0.87	0.166	(0.232)	0.150	0.017
174	14.50	0.87	0.166	(0.231)	0.150	0.017
175	14.58	0.87	0.166	(0.230)	0.150	0.017
176	14.67	0.87	0.166	(0.228)	0.150	0.017
177	14.75	0.87	0.166	(0.227)	0.150	0.017
178	14.83	0.83	0.160	(0.226)	0.144	0.016
179	14.92	0.83	0.160	(0.225)	0.144	0.016
180	15.00	0.83	0.160	(0.224)	0.144	0.016
181	15.08	0.80	0.154	(0.223)	0.138	0.015
182	15.17	0.80	0.154	(0.221)	0.138	0.015
183	15.25	0.80	0.154	(0.220)	0.138	0.015
184	15.33	0.77	0.147	(0.219)	0.132	0.015
185	15.42	0.77	0.147	(0.218)	0.132	0.015
186	15.50	0.77	0.147	(0.217)	0.132	0.015
187	15.58	0.63	0.122	(0.216)	0.109	0.012
188	15.67	0.63	0.122	(0.215)	0.109	0.012

189	15.75	0.63	0.122	(0.214)	0.109	0.012
190	15.83	0.63	0.122	(0.213)	0.109	0.012
191	15.92	0.63	0.122	(0.211)	0.109	0.012
192	16.00	0.63	0.122	(0.210)	0.109	0.012
193	16.08	0.13	0.026	(0.209)	0.023	0.003
194	16.17	0.13	0.026	(0.208)	0.023	0.003
195	16.25	0.13	0.026	(0.207)	0.023	0.003
196	16.33	0.13	0.026	(0.206)	0.023	0.003
197	16.42	0.13	0.026	(0.205)	0.023	0.003
198	16.50	0.13	0.026	(0.204)	0.023	0.003
199	16.58	0.10	0.019	(0.203)	0.017	0.002
200	16.67	0.10	0.019	(0.202)	0.017	0.002
201	16.75	0.10	0.019	(0.201)	0.017	0.002
202	16.83	0.10	0.019	(0.200)	0.017	0.002
203	16.92	0.10	0.019	(0.199)	0.017	0.002
204	17.00	0.10	0.019	(0.198)	0.017	0.002
205	17.08	0.17	0.032	(0.197)	0.029	0.003
206	17.17	0.17	0.032	(0.196)	0.029	0.003
207	17.25	0.17	0.032	(0.195)	0.029	0.003
208	17.33	0.17	0.032	(0.194)	0.029	0.003
209	17.42	0.17	0.032	(0.193)	0.029	0.003
210	17.50	0.17	0.032	(0.192)	0.029	0.003
211	17.58	0.17	0.032	(0.191)	0.029	0.003
212	17.67	0.17	0.032	(0.190)	0.029	0.003
213	17.75	0.17	0.032	(0.189)	0.029	0.003
214	17.83	0.13	0.026	(0.188)	0.023	0.003
215	17.92	0.13	0.026	(0.187)	0.023	0.003
216	18.00	0.13	0.026	(0.186)	0.023	0.003
217	18.08	0.13	0.026	(0.185)	0.023	0.003
218	18.17	0.13	0.026	(0.185)	0.023	0.003
219	18.25	0.13	0.026	(0.184)	0.023	0.003
220	18.33	0.13	0.026	(0.183)	0.023	0.003
221	18.42	0.13	0.026	(0.182)	0.023	0.003
222	18.50	0.13	0.026	(0.181)	0.023	0.003
223	18.58	0.10	0.019	(0.180)	0.017	0.002
224	18.67	0.10	0.019	(0.179)	0.017	0.002
225	18.75	0.10	0.019	(0.178)	0.017	0.002
226	18.83	0.07	0.013	(0.177)	0.012	0.001
227	18.92	0.07	0.013	(0.177)	0.012	0.001
228	19.00	0.07	0.013	(0.176)	0.012	0.001
229	19.08	0.10	0.019	(0.175)	0.017	0.002
230	19.17	0.10	0.019	(0.174)	0.017	0.002
231	19.25	0.10	0.019	(0.173)	0.017	0.002
232	19.33	0.13	0.026	(0.173)	0.023	0.003
233	19.42	0.13	0.026	(0.172)	0.023	0.003
234	19.50	0.13	0.026	(0.171)	0.023	0.003
235	19.58	0.10	0.019	(0.170)	0.017	0.002
236	19.67	0.10	0.019	(0.169)	0.017	0.002
237	19.75	0.10	0.019	(0.169)	0.017	0.002
238	19.83	0.07	0.013	(0.168)	0.012	0.001

239	19.92	0.07	0.013	(0.167)	0.012	0.001
240	20.00	0.07	0.013	(0.166)	0.012	0.001
241	20.08	0.10	0.019	(0.166)	0.017	0.002
242	20.17	0.10	0.019	(0.165)	0.017	0.002
243	20.25	0.10	0.019	(0.164)	0.017	0.002
244	20.33	0.10	0.019	(0.163)	0.017	0.002
245	20.42	0.10	0.019	(0.163)	0.017	0.002
246	20.50	0.10	0.019	(0.162)	0.017	0.002
247	20.58	0.10	0.019	(0.161)	0.017	0.002
248	20.67	0.10	0.019	(0.161)	0.017	0.002
249	20.75	0.10	0.019	(0.160)	0.017	0.002
250	20.83	0.07	0.013	(0.159)	0.012	0.001
251	20.92	0.07	0.013	(0.159)	0.012	0.001
252	21.00	0.07	0.013	(0.158)	0.012	0.001
253	21.08	0.10	0.019	(0.157)	0.017	0.002
254	21.17	0.10	0.019	(0.157)	0.017	0.002
255	21.25	0.10	0.019	(0.156)	0.017	0.002
256	21.33	0.07	0.013	(0.156)	0.012	0.001
257	21.42	0.07	0.013	(0.155)	0.012	0.001
258	21.50	0.07	0.013	(0.155)	0.012	0.001
259	21.58	0.10	0.019	(0.154)	0.017	0.002
260	21.67	0.10	0.019	(0.153)	0.017	0.002
261	21.75	0.10	0.019	(0.153)	0.017	0.002
262	21.83	0.07	0.013	(0.152)	0.012	0.001
263	21.92	0.07	0.013	(0.152)	0.012	0.001
264	22.00	0.07	0.013	(0.151)	0.012	0.001
265	22.08	0.10	0.019	(0.151)	0.017	0.002
266	22.17	0.10	0.019	(0.150)	0.017	0.002
267	22.25	0.10	0.019	(0.150)	0.017	0.002
268	22.33	0.07	0.013	(0.149)	0.012	0.001
269	22.42	0.07	0.013	(0.149)	0.012	0.001
270	22.50	0.07	0.013	(0.148)	0.012	0.001
271	22.58	0.07	0.013	(0.148)	0.012	0.001
272	22.67	0.07	0.013	(0.148)	0.012	0.001
273	22.75	0.07	0.013	(0.147)	0.012	0.001
274	22.83	0.07	0.013	(0.147)	0.012	0.001
275	22.92	0.07	0.013	(0.146)	0.012	0.001
276	23.00	0.07	0.013	(0.146)	0.012	0.001
277	23.08	0.07	0.013	(0.146)	0.012	0.001
278	23.17	0.07	0.013	(0.145)	0.012	0.001
279	23.25	0.07	0.013	(0.145)	0.012	0.001
280	23.33	0.07	0.013	(0.145)	0.012	0.001
281	23.42	0.07	0.013	(0.145)	0.012	0.001
282	23.50	0.07	0.013	(0.144)	0.012	0.001
283	23.58	0.07	0.013	(0.144)	0.012	0.001
284	23.67	0.07	0.013	(0.144)	0.012	0.001
285	23.75	0.07	0.013	(0.144)	0.012	0.001
286	23.83	0.07	0.013	(0.143)	0.012	0.001
287	23.92	0.07	0.013	(0.143)	0.012	0.001
288	24.00	0.07	0.013	(0.143)	0.012	0.001

```
              (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     1.9
      Flood volume = Effective rainfall      0.16(In)
       times area      19.8(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      1.44(In)
      Total soil loss =     2.376(Ac.Ft)
      Total rainfall =      1.60(In)
      Flood volume =       11499.4 Cubic Feet
      Total soil loss =      103494.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.430(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0001      0.01  Q         |         |         |         |
  0+15       0.0002      0.02  Q         |         |         |         |
  0+20       0.0004      0.02  Q         |         |         |         |
  0+25       0.0006      0.03  Q         |         |         |         |
  0+30       0.0008      0.03  Q         |         |         |         |
  0+35       0.0011      0.04  Q         |         |         |         |
  0+40       0.0013      0.04  Q         |         |         |         |
  0+45       0.0016      0.04  Q         |         |         |         |
  0+50       0.0019      0.04  Q         |         |         |         |
  0+55       0.0022      0.04  Q         |         |         |         |
  1+ 0       0.0025      0.05  Q         |         |         |         |
  1+ 5       0.0028      0.05  Q         |         |         |         |
  1+10       0.0031      0.04  Q         |         |         |         |
  1+15       0.0034      0.04  Q         |         |         |         |
  1+20       0.0037      0.04  Q         |         |         |         |
  1+25       0.0039      0.04  Q         |         |         |         |
  1+30       0.0042      0.04  Q         |         |         |         |
  1+35       0.0045      0.04  Q         |         |         |         |
  1+40       0.0047      0.04  Q         |         |         |         |
  1+45       0.0050      0.04  Q         |         |         |         |
  1+50       0.0053      0.04  Q         |         |         |         |
  1+55       0.0056      0.05  Q         |         |         |         |
  2+ 0       0.0059      0.05  Q         |         |         |         |
  2+ 5       0.0063      0.05  Q         |         |         |         |
  2+10       0.0066      0.05  Q         |         |         |         |
  2+15       0.0069      0.05  QV        |         |         |         |
  2+20       0.0073      0.05  QV        |         |         |         |
  2+25       0.0076      0.05  QV        |         |         |         |
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2+30	0.0080	0.05	QV				
2+35	0.0084	0.05	QV				
2+40	0.0088	0.06	QV				
2+45	0.0092	0.06	QV				
2+50	0.0096	0.06	QV				
2+55	0.0100	0.06	QV				
3+ 0	0.0105	0.06	QV				
3+ 5	0.0109	0.06	QV				
3+10	0.0113	0.06	QV				
3+15	0.0118	0.06	QV				
3+20	0.0122	0.06	QV				
3+25	0.0127	0.06	QV				
3+30	0.0131	0.06	QV				
3+35	0.0135	0.06	Q V				
3+40	0.0140	0.06	Q V				
3+45	0.0144	0.06	Q V				
3+50	0.0149	0.07	Q V				
3+55	0.0153	0.07	Q V				
4+ 0	0.0159	0.07	Q V				
4+ 5	0.0164	0.07	Q V				
4+10	0.0169	0.08	Q V				
4+15	0.0174	0.08	Q V				
4+20	0.0179	0.08	Q V				
4+25	0.0185	0.08	Q V				
4+30	0.0191	0.09	Q V				
4+35	0.0197	0.09	Q V				
4+40	0.0203	0.09	Q V				
4+45	0.0209	0.09	Q V				
4+50	0.0215	0.09	Q V				
4+55	0.0222	0.10	Q V				
5+ 0	0.0229	0.10	Q V				
5+ 5	0.0236	0.10	Q V				
5+10	0.0242	0.09	Q V				
5+15	0.0247	0.08	Q V				
5+20	0.0253	0.08	Q V				
5+25	0.0259	0.09	Q V				
5+30	0.0265	0.09	Q V				
5+35	0.0271	0.09	Q V				
5+40	0.0278	0.10	Q V				
5+45	0.0284	0.10	Q V				
5+50	0.0291	0.10	Q V				
5+55	0.0298	0.10	Q V				
6+ 0	0.0305	0.10	Q V				
6+ 5	0.0312	0.10	Q V				
6+10	0.0320	0.11	Q V				
6+15	0.0327	0.11	Q V				
6+20	0.0335	0.11	Q V				
6+25	0.0343	0.11	Q V				
6+30	0.0351	0.11	Q V				
6+35	0.0359	0.12	Q V				

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 6+40       0.0367      0.12  Q    V    |          |          |          |
 6+45       0.0376      0.12  Q    V    |          |          |          |
 6+50       0.0384      0.13  Q    V    |          |          |          |
 6+55       0.0393      0.13  Q    V    |          |          |          |
 7+ 0       0.0402      0.13  Q     V   |          |          |          |
 7+ 5       0.0411      0.13  Q     V   |          |          |          |
 7+10       0.0419      0.13  Q     V   |          |          |          |
 7+15       0.0428      0.13  Q     V   |          |          |          |
 7+20       0.0437      0.13  Q     V   |          |          |          |
 7+25       0.0446      0.13  Q     V   |          |          |          |
 7+30       0.0456      0.14  Q     V   |          |          |          |
 7+35       0.0465      0.14  Q      V  |          |          |          |
 7+40       0.0475      0.15  Q      V  |          |          |          |
 7+45       0.0486      0.15  Q      V  |          |          |          |
 7+50       0.0496      0.15  Q      V  |          |          |          |
 7+55       0.0507      0.16  Q      V  |          |          |          |
 8+ 0       0.0518      0.16  Q      V  |          |          |          |
 8+ 5       0.0530      0.17  Q       V |          |          |          |
 8+10       0.0542      0.18  Q       V |          |          |          |
 8+15       0.0555      0.18  Q       V |          |          |          |
 8+20       0.0568      0.19  Q       V |          |          |          |
 8+25       0.0580      0.19  Q       V |          |          |          |
 8+30       0.0594      0.19  Q       V |          |          |          |
 8+35       0.0607      0.19  Q        V|          |          |          |
 8+40       0.0620      0.20  Q        V|          |          |          |
 8+45       0.0634      0.20  Q        V|          |          |          |
 8+50       0.0648      0.20  Q        V|          |          |          |
 8+55       0.0663      0.21  Q         V          |          |          |
 9+ 0       0.0677      0.21  Q         V          |          |          |
 9+ 5       0.0692      0.22  Q         V          |          |          |
 9+10       0.0708      0.23  Q         V          |          |          |
 9+15       0.0724      0.24  Q         V          |          |          |
 9+20       0.0741      0.24  Q         |V         |          |          |
 9+25       0.0758      0.25  Q         |V         |          |          |
 9+30       0.0775      0.25  |Q        |V         |          |          |
 9+35       0.0792      0.25  |Q        | V        |          |          |
 9+40       0.0810      0.26  |Q        | V        |          |          |
 9+45       0.0829      0.26  |Q        | V        |          |          |
 9+50       0.0847      0.27  |Q        | V        |          |          |
 9+55       0.0866      0.27  |Q        |  V       |          |          |
10+ 0       0.0885      0.28  |Q        |  V       |          |          |
10+ 5       0.0903      0.27  |Q        |  V       |          |          |
10+10       0.0919      0.23  Q         |  V       |          |          |
10+15       0.0934      0.21  Q         |   V      |          |          |
10+20       0.0948      0.21  Q         |   V      |          |          |
10+25       0.0962      0.20  Q         |   V      |          |          |
10+30       0.0975      0.20  Q         |   V      |          |          |
10+35       0.0989      0.20  Q         |   V      |          |          |
10+40       0.1005      0.23  Q         |    V     |          |          |
10+45       0.1022      0.24  Q         |    V     |          |          |
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10+50       0.1039      0.25  Q         |    V    |         |         |
10+55       0.1056      0.25  Q         |    V    |         |         |
11+ 0       0.1073      0.25  |Q        |     V   |         |         |
11+ 5       0.1090      0.25  |Q        |     V   |         |         |
11+10       0.1107      0.25  Q         |     V   |         |         |
11+15       0.1124      0.24  Q         |      V  |         |         |
11+20       0.1141      0.24  Q         |      V  |         |         |
11+25       0.1158      0.24  Q         |      V  |         |         |
11+30       0.1175      0.24  Q         |      V  |         |         |
11+35       0.1191      0.24  Q         |       V |         |         |
11+40       0.1207      0.23  Q         |       V |         |         |
11+45       0.1223      0.22  Q         |       V |         |         |
11+50       0.1238      0.22  Q         |       V |         |         |
11+55       0.1253      0.23  Q         |       V |         |         |
12+ 0       0.1269      0.23  Q         |        V|         |         |
12+ 5       0.1286      0.24  Q         |        V|         |         |
12+10       0.1305      0.28  |Q        |        V|         |         |
12+15       0.1325      0.30  |Q        |         V         |         |
12+20       0.1346      0.31  |Q        |         V         |         |
12+25       0.1368      0.32  |Q        |         V         |         |
12+30       0.1390      0.32  |Q        |         |V        |         |
12+35       0.1413      0.33  |Q        |         |V        |         |
12+40       0.1437      0.34  |Q        |         |V        |         |
12+45       0.1461      0.35  |Q        |         | V       |         |
12+50       0.1485      0.35  |Q        |         | V       |         |
12+55       0.1510      0.36  |Q        |         | V       |         |
13+ 0       0.1535      0.37  |Q        |         |  V      |         |
13+ 5       0.1561      0.37  |Q        |         |  V      |         |
13+10       0.1588      0.40  |Q        |         |   V     |         |
13+15       0.1617      0.42  |Q        |         |   V     |         |
13+20       0.1646      0.42  |Q        |         |   V     |         |
13+25       0.1676      0.43  |Q        |         |    V    |         |
13+30       0.1705      0.43  |Q        |         |    V    |         |
13+35       0.1734      0.41  |Q        |         |     V   |         |
13+40       0.1759      0.36  |Q        |         |     V   |         |
13+45       0.1781      0.33  |Q        |         |     V   |         |
13+50       0.1803      0.32  |Q        |         |      V  |         |
13+55       0.1824      0.31  |Q        |         |      V  |         |
14+ 0       0.1845      0.30  |Q        |         |      V  |         |
14+ 5       0.1866      0.31  |Q        |         |       V |         |
14+10       0.1889      0.33  |Q        |         |       V |         |
14+15       0.1912      0.33  |Q        |         |       V |         |
14+20       0.1935      0.34  |Q        |         |        V|         |
14+25       0.1958      0.33  |Q        |         |        V|         |
14+30       0.1981      0.33  |Q        |         |         V         |
14+35       0.2003      0.33  |Q        |         |         V         |
14+40       0.2026      0.33  |Q        |         |         V         |
14+45       0.2049      0.33  |Q        |         |         |V        |
14+50       0.2072      0.33  |Q        |         |         |V        |
14+55       0.2094      0.33  |Q        |         |         |V        |
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15+ 0       0.2117      0.32  |Q        |         |         | V       |
15+ 5       0.2139      0.32  |Q        |         |         | V       |
15+10       0.2160      0.31  |Q        |         |         | V       |
15+15       0.2182      0.31  |Q        |         |         |  V      |
15+20       0.2203      0.31  |Q        |         |         |  V      |
15+25       0.2224      0.30  |Q        |         |         |  V      |
15+30       0.2244      0.30  |Q        |         |         |   V     |
15+35       0.2264      0.29  |Q        |         |         |   V     |
15+40       0.2283      0.27  |Q        |         |         |   V     |
15+45       0.2300      0.26  |Q        |         |         |   V     |
15+50       0.2318      0.25  |Q        |         |         |    V    |
15+55       0.2335      0.25  Q         |         |         |    V    |
16+ 0       0.2352      0.25  Q         |         |         |    V    |
16+ 5       0.2367      0.22  Q         |         |         |    V    |
16+10       0.2377      0.14  Q         |         |         |     V   |
16+15       0.2384      0.10  Q         |         |         |     V   |
16+20       0.2390      0.08  Q         |         |         |     V   |
16+25       0.2394      0.07  Q         |         |         |     V   |
16+30       0.2399      0.07  Q         |         |         |     V   |
16+35       0.2403      0.06  Q         |         |         |     V   |
16+40       0.2406      0.05  Q         |         |         |     V   |
16+45       0.2410      0.05  Q         |         |         |     V   |
16+50       0.2412      0.04  Q         |         |         |     V   |
16+55       0.2415      0.04  Q         |         |         |     V   |
17+ 0       0.2418      0.04  Q         |         |         |     V   |
17+ 5       0.2421      0.04  Q         |         |         |     V   |
17+10       0.2424      0.05  Q         |         |         |     V   |
17+15       0.2428      0.06  Q         |         |         |     V   |
17+20       0.2433      0.06  Q         |         |         |     V   |
17+25       0.2437      0.06  Q         |         |         |     V   |
17+30       0.2441      0.06  Q         |         |         |     V   |
17+35       0.2445      0.06  Q         |         |         |      V  |
17+40       0.2450      0.06  Q         |         |         |      V  |
17+45       0.2454      0.06  Q         |         |         |      V  |
17+50       0.2458      0.06  Q         |         |         |      V  |
17+55       0.2462      0.06  Q         |         |         |      V  |
18+ 0       0.2466      0.05  Q         |         |         |      V  |
18+ 5       0.2470      0.05  Q         |         |         |      V  |
18+10       0.2473      0.05  Q         |         |         |      V  |
18+15       0.2477      0.05  Q         |         |         |      V  |
18+20       0.2480      0.05  Q         |         |         |      V  |
18+25       0.2484      0.05  Q         |         |         |      V  |
18+30       0.2487      0.05  Q         |         |         |      V  |
18+35       0.2491      0.05  Q         |         |         |      V  |
18+40       0.2494      0.04  Q         |         |         |      V  |
18+45       0.2497      0.04  Q         |         |         |      V  |
18+50       0.2500      0.04  Q         |         |         |      V  |
18+55       0.2502      0.03  Q         |         |         |      V  |
19+ 0       0.2504      0.03  Q         |         |         |      V  |
19+ 5       0.2506      0.03  Q         |         |         |      V  |
```

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19+10       0.2508      0.03  Q          |          |          |        V |
19+15       0.2511      0.04  Q          |          |          |        V |
19+20       0.2513      0.04  Q          |          |          |        V |
19+25       0.2516      0.04  Q          |          |          |        V |
19+30       0.2520      0.05  Q          |          |          |        V |
19+35       0.2523      0.05  Q          |          |          |        V |
19+40       0.2526      0.04  Q          |          |          |        V |
19+45       0.2529      0.04  Q          |          |          |        V |
19+50       0.2531      0.04  Q          |          |          |        V |
19+55       0.2533      0.03  Q          |          |          |        V |
20+ 0       0.2535      0.03  Q          |          |          |        V |
20+ 5       0.2538      0.03  Q          |          |          |        V |
20+10       0.2540      0.03  Q          |          |          |        V |
20+15       0.2542      0.04  Q          |          |          |        V |
20+20       0.2545      0.04  Q          |          |          |        V |
20+25       0.2548      0.04  Q          |          |          |        V |
20+30       0.2550      0.04  Q          |          |          |        V |
20+35       0.2553      0.04  Q          |          |          |        V |
20+40       0.2555      0.04  Q          |          |          |        V |
20+45       0.2558      0.04  Q          |          |          |        V |
20+50       0.2560      0.04  Q          |          |          |        V |
20+55       0.2563      0.03  Q          |          |          |        V |
21+ 0       0.2565      0.03  Q          |          |          |        V |
21+ 5       0.2567      0.03  Q          |          |          |        V |
21+10       0.2569      0.03  Q          |          |          |        V |
21+15       0.2571      0.04  Q          |          |          |        V |
21+20       0.2574      0.04  Q          |          |          |        V |
21+25       0.2576      0.03  Q          |          |          |         V|
21+30       0.2578      0.03  Q          |          |          |         V|
21+35       0.2580      0.03  Q          |          |          |         V|
21+40       0.2582      0.03  Q          |          |          |         V|
21+45       0.2585      0.04  Q          |          |          |         V|
21+50       0.2587      0.04  Q          |          |          |         V|
21+55       0.2589      0.03  Q          |          |          |         V|
22+ 0       0.2591      0.03  Q          |          |          |         V|
22+ 5       0.2593      0.03  Q          |          |          |         V|
22+10       0.2595      0.03  Q          |          |          |         V|
22+15       0.2598      0.04  Q          |          |          |         V|
22+20       0.2600      0.04  Q          |          |          |         V|
22+25       0.2602      0.03  Q          |          |          |         V|
22+30       0.2604      0.03  Q          |          |          |         V|
22+35       0.2606      0.03  Q          |          |          |         V|
22+40       0.2608      0.03  Q          |          |          |         V|
22+45       0.2610      0.03  Q          |          |          |         V|
22+50       0.2612      0.03  Q          |          |          |         V|
22+55       0.2613      0.03  Q          |          |          |         V|
23+ 0       0.2615      0.03  Q          |          |          |         V|
23+ 5       0.2617      0.03  Q          |          |          |         V|
23+10       0.2619      0.03  Q          |          |          |         V|
23+15       0.2620      0.03  Q          |          |          |         V|
```

```
   23+20       0.2622      0.03  Q         |         |         |        V|
   23+25       0.2624      0.03  Q         |         |         |        V|
   23+30       0.2626      0.03  Q         |         |         |        V|
   23+35       0.2627      0.03  Q         |         |         |        V|
   23+40       0.2629      0.03  Q         |         |         |        V|
   23+45       0.2631      0.03  Q         |         |         |        V|
   23+50       0.2633      0.03  Q         |         |         |        V|
   23+55       0.2635      0.03  Q         |         |         |        V|
   24+ 0       0.2636      0.03  Q         |         |         |        V|
   24+ 5       0.2638      0.02  Q         |         |         |        V|
   24+10       0.2639      0.01  Q         |         |         |        V|
   24+15       0.2639      0.01  Q         |         |         |        V|
   24+20       0.2639      0.00  Q         |         |         |        V|
   24+25       0.2640      0.00  Q         |         |         |        V|
   24+30       0.2640      0.00  Q         |         |         |        V|
   24+35       0.2640      0.00  Q         |         |         |        V|
   24+40       0.2640      0.00  Q         |         |         |        V|
   24+45       0.2640      0.00  Q         |         |         |        V|
   24+50       0.2640      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

PROPOSED CONDITION UNIT HYDROGRAPHS

PROPOSED CONDITION ONSITE 2-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPROP242.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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, 2-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) =    2.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    1.600(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.600(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-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.900        0.095       1.000      0.095
                                                  Sum (F) =   0.095
Area averaged mean soil loss (F) (In/Hr) =  0.095
Minimum soil loss rate ((In/Hr)) =  0.048
(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	0.013	(0.169)	0.002	0.010
2	0.17	0.07	0.013	(0.168)	0.002	0.010
3	0.25	0.07	0.013	(0.167)	0.002	0.010
4	0.33	0.10	0.019	(0.167)	0.003	0.016
5	0.42	0.10	0.019	(0.166)	0.003	0.016
6	0.50	0.10	0.019	(0.165)	0.003	0.016
7	0.58	0.10	0.019	(0.165)	0.003	0.016
8	0.67	0.10	0.019	(0.164)	0.003	0.016
9	0.75	0.10	0.019	(0.163)	0.003	0.016
10	0.83	0.13	0.026	(0.163)	0.005	0.021
11	0.92	0.13	0.026	(0.162)	0.005	0.021
12	1.00	0.13	0.026	(0.162)	0.005	0.021
13	1.08	0.10	0.019	(0.161)	0.003	0.016
14	1.17	0.10	0.019	(0.160)	0.003	0.016
15	1.25	0.10	0.019	(0.160)	0.003	0.016
16	1.33	0.10	0.019	(0.159)	0.003	0.016
17	1.42	0.10	0.019	(0.158)	0.003	0.016
18	1.50	0.10	0.019	(0.158)	0.003	0.016
19	1.58	0.10	0.019	(0.157)	0.003	0.016
20	1.67	0.10	0.019	(0.156)	0.003	0.016
21	1.75	0.10	0.019	(0.156)	0.003	0.016
22	1.83	0.13	0.026	(0.155)	0.005	0.021
23	1.92	0.13	0.026	(0.155)	0.005	0.021
24	2.00	0.13	0.026	(0.154)	0.005	0.021
25	2.08	0.13	0.026	(0.153)	0.005	0.021
26	2.17	0.13	0.026	(0.153)	0.005	0.021
27	2.25	0.13	0.026	(0.152)	0.005	0.021
28	2.33	0.13	0.026	(0.151)	0.005	0.021
29	2.42	0.13	0.026	(0.151)	0.005	0.021
30	2.50	0.13	0.026	(0.150)	0.005	0.021
31	2.58	0.17	0.032	(0.150)	0.006	0.026
32	2.67	0.17	0.032	(0.149)	0.006	0.026
33	2.75	0.17	0.032	(0.148)	0.006	0.026
34	2.83	0.17	0.032	(0.148)	0.006	0.026
35	2.92	0.17	0.032	(0.147)	0.006	0.026
36	3.00	0.17	0.032	(0.147)	0.006	0.026
37	3.08	0.17	0.032	(0.146)	0.006	0.026
38	3.17	0.17	0.032	(0.145)	0.006	0.026
39	3.25	0.17	0.032	(0.145)	0.006	0.026
40	3.33	0.17	0.032	(0.144)	0.006	0.026
41	3.42	0.17	0.032	(0.144)	0.006	0.026
42	3.50	0.17	0.032	(0.143)	0.006	0.026
43	3.58	0.17	0.032	(0.142)	0.006	0.026
44	3.67	0.17	0.032	(0.142)	0.006	0.026
45	3.75	0.17	0.032	(0.141)	0.006	0.026
46	3.83	0.20	0.038	(0.141)	0.007	0.031
47	3.92	0.20	0.038	(0.140)	0.007	0.031

48	4.00	0.20	0.038	(0.139)	0.007	0.031
49	4.08	0.20	0.038	(0.139)	0.007	0.031
50	4.17	0.20	0.038	(0.138)	0.007	0.031
51	4.25	0.20	0.038	(0.138)	0.007	0.031
52	4.33	0.23	0.045	(0.137)	0.008	0.037
53	4.42	0.23	0.045	(0.136)	0.008	0.037
54	4.50	0.23	0.045	(0.136)	0.008	0.037
55	4.58	0.23	0.045	(0.135)	0.008	0.037
56	4.67	0.23	0.045	(0.135)	0.008	0.037
57	4.75	0.23	0.045	(0.134)	0.008	0.037
58	4.83	0.27	0.051	(0.134)	0.009	0.042
59	4.92	0.27	0.051	(0.133)	0.009	0.042
60	5.00	0.27	0.051	(0.132)	0.009	0.042
61	5.08	0.20	0.038	(0.132)	0.007	0.031
62	5.17	0.20	0.038	(0.131)	0.007	0.031
63	5.25	0.20	0.038	(0.131)	0.007	0.031
64	5.33	0.23	0.045	(0.130)	0.008	0.037
65	5.42	0.23	0.045	(0.129)	0.008	0.037
66	5.50	0.23	0.045	(0.129)	0.008	0.037
67	5.58	0.27	0.051	(0.128)	0.009	0.042
68	5.67	0.27	0.051	(0.128)	0.009	0.042
69	5.75	0.27	0.051	(0.127)	0.009	0.042
70	5.83	0.27	0.051	(0.127)	0.009	0.042
71	5.92	0.27	0.051	(0.126)	0.009	0.042
72	6.00	0.27	0.051	(0.126)	0.009	0.042
73	6.08	0.30	0.058	(0.125)	0.010	0.047
74	6.17	0.30	0.058	(0.124)	0.010	0.047
75	6.25	0.30	0.058	(0.124)	0.010	0.047
76	6.33	0.30	0.058	(0.123)	0.010	0.047
77	6.42	0.30	0.058	(0.123)	0.010	0.047
78	6.50	0.30	0.058	(0.122)	0.010	0.047
79	6.58	0.33	0.064	(0.122)	0.012	0.052
80	6.67	0.33	0.064	(0.121)	0.012	0.052
81	6.75	0.33	0.064	(0.121)	0.012	0.052
82	6.83	0.33	0.064	(0.120)	0.012	0.052
83	6.92	0.33	0.064	(0.119)	0.012	0.052
84	7.00	0.33	0.064	(0.119)	0.012	0.052
85	7.08	0.33	0.064	(0.118)	0.012	0.052
86	7.17	0.33	0.064	(0.118)	0.012	0.052
87	7.25	0.33	0.064	(0.117)	0.012	0.052
88	7.33	0.37	0.070	(0.117)	0.013	0.058
89	7.42	0.37	0.070	(0.116)	0.013	0.058
90	7.50	0.37	0.070	(0.116)	0.013	0.058
91	7.58	0.40	0.077	(0.115)	0.014	0.063
92	7.67	0.40	0.077	(0.115)	0.014	0.063
93	7.75	0.40	0.077	(0.114)	0.014	0.063
94	7.83	0.43	0.083	(0.114)	0.015	0.068
95	7.92	0.43	0.083	(0.113)	0.015	0.068
96	8.00	0.43	0.083	(0.113)	0.015	0.068
97	8.08	0.50	0.096	(0.112)	0.017	0.079

98	8.17	0.50	0.096	(0.112)	0.017	0.079
99	8.25	0.50	0.096	(0.111)	0.017	0.079
100	8.33	0.50	0.096	(0.110)	0.017	0.079
101	8.42	0.50	0.096	(0.110)	0.017	0.079
102	8.50	0.50	0.096	(0.109)	0.017	0.079
103	8.58	0.53	0.102	(0.109)	0.018	0.084
104	8.67	0.53	0.102	(0.108)	0.018	0.084
105	8.75	0.53	0.102	(0.108)	0.018	0.084
106	8.83	0.57	0.109	(0.107)	0.020	0.089
107	8.92	0.57	0.109	(0.107)	0.020	0.089
108	9.00	0.57	0.109	(0.106)	0.020	0.089
109	9.08	0.63	0.122	(0.106)	0.022	0.100
110	9.17	0.63	0.122	(0.105)	0.022	0.100
111	9.25	0.63	0.122	(0.105)	0.022	0.100
112	9.33	0.67	0.128	(0.104)	0.023	0.105
113	9.42	0.67	0.128	(0.104)	0.023	0.105
114	9.50	0.67	0.128	(0.103)	0.023	0.105
115	9.58	0.70	0.134	(0.103)	0.024	0.110
116	9.67	0.70	0.134	(0.102)	0.024	0.110
117	9.75	0.70	0.134	(0.102)	0.024	0.110
118	9.83	0.73	0.141	(0.101)	0.025	0.115
119	9.92	0.73	0.141	(0.101)	0.025	0.115
120	10.00	0.73	0.141	(0.100)	0.025	0.115
121	10.08	0.50	0.096	(0.100)	0.017	0.079
122	10.17	0.50	0.096	(0.099)	0.017	0.079
123	10.25	0.50	0.096	(0.099)	0.017	0.079
124	10.33	0.50	0.096	(0.099)	0.017	0.079
125	10.42	0.50	0.096	(0.098)	0.017	0.079
126	10.50	0.50	0.096	(0.098)	0.017	0.079
127	10.58	0.67	0.128	(0.097)	0.023	0.105
128	10.67	0.67	0.128	(0.097)	0.023	0.105
129	10.75	0.67	0.128	(0.096)	0.023	0.105
130	10.83	0.67	0.128	(0.096)	0.023	0.105
131	10.92	0.67	0.128	(0.095)	0.023	0.105
132	11.00	0.67	0.128	(0.095)	0.023	0.105
133	11.08	0.63	0.122	(0.094)	0.022	0.100
134	11.17	0.63	0.122	(0.094)	0.022	0.100
135	11.25	0.63	0.122	(0.093)	0.022	0.100
136	11.33	0.63	0.122	(0.093)	0.022	0.100
137	11.42	0.63	0.122	(0.092)	0.022	0.100
138	11.50	0.63	0.122	(0.092)	0.022	0.100
139	11.58	0.57	0.109	(0.091)	0.020	0.089
140	11.67	0.57	0.109	(0.091)	0.020	0.089
141	11.75	0.57	0.109	(0.091)	0.020	0.089
142	11.83	0.60	0.115	(0.090)	0.021	0.094
143	11.92	0.60	0.115	(0.090)	0.021	0.094
144	12.00	0.60	0.115	(0.089)	0.021	0.094
145	12.08	0.83	0.160	(0.089)	0.029	0.131
146	12.17	0.83	0.160	(0.088)	0.029	0.131
147	12.25	0.83	0.160	(0.088)	0.029	0.131

148	12.33	0.87	0.166	(0.087)	0.030	0.136
149	12.42	0.87	0.166	(0.087)	0.030	0.136
150	12.50	0.87	0.166	(0.087)	0.030	0.136
151	12.58	0.93	0.179	(0.086)	0.032	0.147
152	12.67	0.93	0.179	(0.086)	0.032	0.147
153	12.75	0.93	0.179	(0.085)	0.032	0.147
154	12.83	0.97	0.186	(0.085)	0.033	0.152
155	12.92	0.97	0.186	(0.084)	0.033	0.152
156	13.00	0.97	0.186	(0.084)	0.033	0.152
157	13.08	1.13	0.218	(0.084)	0.039	0.178
158	13.17	1.13	0.218	(0.083)	0.039	0.178
159	13.25	1.13	0.218	(0.083)	0.039	0.178
160	13.33	1.13	0.218	(0.082)	0.039	0.178
161	13.42	1.13	0.218	(0.082)	0.039	0.178
162	13.50	1.13	0.218	(0.081)	0.039	0.178
163	13.58	0.77	0.147	(0.081)	0.026	0.121
164	13.67	0.77	0.147	(0.081)	0.026	0.121
165	13.75	0.77	0.147	(0.080)	0.026	0.121
166	13.83	0.77	0.147	(0.080)	0.026	0.121
167	13.92	0.77	0.147	(0.079)	0.026	0.121
168	14.00	0.77	0.147	(0.079)	0.026	0.121
169	14.08	0.90	0.173	(0.079)	0.031	0.142
170	14.17	0.90	0.173	(0.078)	0.031	0.142
171	14.25	0.90	0.173	(0.078)	0.031	0.142
172	14.33	0.87	0.166	(0.077)	0.030	0.136
173	14.42	0.87	0.166	(0.077)	0.030	0.136
174	14.50	0.87	0.166	(0.077)	0.030	0.136
175	14.58	0.87	0.166	(0.076)	0.030	0.136
176	14.67	0.87	0.166	(0.076)	0.030	0.136
177	14.75	0.87	0.166	(0.075)	0.030	0.136
178	14.83	0.83	0.160	(0.075)	0.029	0.131
179	14.92	0.83	0.160	(0.075)	0.029	0.131
180	15.00	0.83	0.160	(0.074)	0.029	0.131
181	15.08	0.80	0.154	(0.074)	0.028	0.126
182	15.17	0.80	0.154	(0.074)	0.028	0.126
183	15.25	0.80	0.154	(0.073)	0.028	0.126
184	15.33	0.77	0.147	(0.073)	0.026	0.121
185	15.42	0.77	0.147	(0.072)	0.026	0.121
186	15.50	0.77	0.147	(0.072)	0.026	0.121
187	15.58	0.63	0.122	(0.072)	0.022	0.100
188	15.67	0.63	0.122	(0.071)	0.022	0.100
189	15.75	0.63	0.122	(0.071)	0.022	0.100
190	15.83	0.63	0.122	(0.071)	0.022	0.100
191	15.92	0.63	0.122	(0.070)	0.022	0.100
192	16.00	0.63	0.122	(0.070)	0.022	0.100
193	16.08	0.13	0.026	(0.069)	0.005	0.021
194	16.17	0.13	0.026	(0.069)	0.005	0.021
195	16.25	0.13	0.026	(0.069)	0.005	0.021
196	16.33	0.13	0.026	(0.068)	0.005	0.021
197	16.42	0.13	0.026	(0.068)	0.005	0.021

198	16.50	0.13	0.026	(0.068)	0.005	0.021
199	16.58	0.10	0.019	(0.067)	0.003	0.016
200	16.67	0.10	0.019	(0.067)	0.003	0.016
201	16.75	0.10	0.019	(0.067)	0.003	0.016
202	16.83	0.10	0.019	(0.066)	0.003	0.016
203	16.92	0.10	0.019	(0.066)	0.003	0.016
204	17.00	0.10	0.019	(0.066)	0.003	0.016
205	17.08	0.17	0.032	(0.065)	0.006	0.026
206	17.17	0.17	0.032	(0.065)	0.006	0.026
207	17.25	0.17	0.032	(0.065)	0.006	0.026
208	17.33	0.17	0.032	(0.064)	0.006	0.026
209	17.42	0.17	0.032	(0.064)	0.006	0.026
210	17.50	0.17	0.032	(0.064)	0.006	0.026
211	17.58	0.17	0.032	(0.063)	0.006	0.026
212	17.67	0.17	0.032	(0.063)	0.006	0.026
213	17.75	0.17	0.032	(0.063)	0.006	0.026
214	17.83	0.13	0.026	(0.062)	0.005	0.021
215	17.92	0.13	0.026	(0.062)	0.005	0.021
216	18.00	0.13	0.026	(0.062)	0.005	0.021
217	18.08	0.13	0.026	(0.062)	0.005	0.021
218	18.17	0.13	0.026	(0.061)	0.005	0.021
219	18.25	0.13	0.026	(0.061)	0.005	0.021
220	18.33	0.13	0.026	(0.061)	0.005	0.021
221	18.42	0.13	0.026	(0.060)	0.005	0.021
222	18.50	0.13	0.026	(0.060)	0.005	0.021
223	18.58	0.10	0.019	(0.060)	0.003	0.016
224	18.67	0.10	0.019	(0.059)	0.003	0.016
225	18.75	0.10	0.019	(0.059)	0.003	0.016
226	18.83	0.07	0.013	(0.059)	0.002	0.010
227	18.92	0.07	0.013	(0.059)	0.002	0.010
228	19.00	0.07	0.013	(0.058)	0.002	0.010
229	19.08	0.10	0.019	(0.058)	0.003	0.016
230	19.17	0.10	0.019	(0.058)	0.003	0.016
231	19.25	0.10	0.019	(0.058)	0.003	0.016
232	19.33	0.13	0.026	(0.057)	0.005	0.021
233	19.42	0.13	0.026	(0.057)	0.005	0.021
234	19.50	0.13	0.026	(0.057)	0.005	0.021
235	19.58	0.10	0.019	(0.056)	0.003	0.016
236	19.67	0.10	0.019	(0.056)	0.003	0.016
237	19.75	0.10	0.019	(0.056)	0.003	0.016
238	19.83	0.07	0.013	(0.056)	0.002	0.010
239	19.92	0.07	0.013	(0.055)	0.002	0.010
240	20.00	0.07	0.013	(0.055)	0.002	0.010
241	20.08	0.10	0.019	(0.055)	0.003	0.016
242	20.17	0.10	0.019	(0.055)	0.003	0.016
243	20.25	0.10	0.019	(0.055)	0.003	0.016
244	20.33	0.10	0.019	(0.054)	0.003	0.016
245	20.42	0.10	0.019	(0.054)	0.003	0.016
246	20.50	0.10	0.019	(0.054)	0.003	0.016
247	20.58	0.10	0.019	(0.054)	0.003	0.016

248	20.67	0.10	0.019	(0.053)	0.003	0.016
249	20.75	0.10	0.019	(0.053)	0.003	0.016
250	20.83	0.07	0.013	(0.053)	0.002	0.010
251	20.92	0.07	0.013	(0.053)	0.002	0.010
252	21.00	0.07	0.013	(0.052)	0.002	0.010
253	21.08	0.10	0.019	(0.052)	0.003	0.016
254	21.17	0.10	0.019	(0.052)	0.003	0.016
255	21.25	0.10	0.019	(0.052)	0.003	0.016
256	21.33	0.07	0.013	(0.052)	0.002	0.010
257	21.42	0.07	0.013	(0.051)	0.002	0.010
258	21.50	0.07	0.013	(0.051)	0.002	0.010
259	21.58	0.10	0.019	(0.051)	0.003	0.016
260	21.67	0.10	0.019	(0.051)	0.003	0.016
261	21.75	0.10	0.019	(0.051)	0.003	0.016
262	21.83	0.07	0.013	(0.051)	0.002	0.010
263	21.92	0.07	0.013	(0.050)	0.002	0.010
264	22.00	0.07	0.013	(0.050)	0.002	0.010
265	22.08	0.10	0.019	(0.050)	0.003	0.016
266	22.17	0.10	0.019	(0.050)	0.003	0.016
267	22.25	0.10	0.019	(0.050)	0.003	0.016
268	22.33	0.07	0.013	(0.050)	0.002	0.010
269	22.42	0.07	0.013	(0.049)	0.002	0.010
270	22.50	0.07	0.013	(0.049)	0.002	0.010
271	22.58	0.07	0.013	(0.049)	0.002	0.010
272	22.67	0.07	0.013	(0.049)	0.002	0.010
273	22.75	0.07	0.013	(0.049)	0.002	0.010
274	22.83	0.07	0.013	(0.049)	0.002	0.010
275	22.92	0.07	0.013	(0.049)	0.002	0.010
276	23.00	0.07	0.013	(0.048)	0.002	0.010
277	23.08	0.07	0.013	(0.048)	0.002	0.010
278	23.17	0.07	0.013	(0.048)	0.002	0.010
279	23.25	0.07	0.013	(0.048)	0.002	0.010
280	23.33	0.07	0.013	(0.048)	0.002	0.010
281	23.42	0.07	0.013	(0.048)	0.002	0.010
282	23.50	0.07	0.013	(0.048)	0.002	0.010
283	23.58	0.07	0.013	(0.048)	0.002	0.010
284	23.67	0.07	0.013	(0.048)	0.002	0.010
285	23.75	0.07	0.013	(0.048)	0.002	0.010
286	23.83	0.07	0.013	(0.048)	0.002	0.010
287	23.92	0.07	0.013	(0.048)	0.002	0.010
288	24.00	0.07	0.013	(0.048)	0.002	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.475(Ac.Ft)
Total rainfall = 1.60(In)
Flood volume = 94295.0 Cubic Feet
Total soil loss = 20698.9 Cubic Feet

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      ----------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.562(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       0.0010      0.15  Q         |         |         |         |
  0+10       0.0024      0.21  Q         |         |         |         |
  0+15       0.0039      0.21  Q         |         |         |         |
  0+20       0.0058      0.28  VQ        |         |         |         |
  0+25       0.0080      0.31  VQ        |         |         |         |
  0+30       0.0102      0.31  VQ        |         |         |         |
  0+35       0.0123      0.31  VQ        |         |         |         |
  0+40       0.0145      0.31  VQ        |         |         |         |
  0+45       0.0167      0.31  VQ        |         |         |         |
  0+50       0.0193      0.39  VQ        |         |         |         |
  0+55       0.0222      0.42  VQ        |         |         |         |
  1+ 0       0.0251      0.42  VQ        |         |         |         |
  1+ 5       0.0275      0.35  VQ        |         |         |         |
  1+10       0.0296      0.31  VQ        |         |         |         |
  1+15       0.0318      0.31  VQ        |         |         |         |
  1+20       0.0340      0.31  VQ        |         |         |         |
  1+25       0.0361      0.31  VQ        |         |         |         |
  1+30       0.0383      0.31  VQ        |         |         |         |
  1+35       0.0405      0.31  VQ        |         |         |         |
  1+40       0.0426      0.31  VQ        |         |         |         |
  1+45       0.0448      0.31  VQ        |         |         |         |
  1+50       0.0475      0.39  VQ        |         |         |         |
  1+55       0.0503      0.42  VQ        |         |         |         |
  2+ 0       0.0532      0.42  VQ        |         |         |         |
  2+ 5       0.0561      0.42  |Q        |         |         |         |
  2+10       0.0590      0.42  |Q        |         |         |         |
  2+15       0.0619      0.42  |Q        |         |         |         |
  2+20       0.0648      0.42  |Q        |         |         |         |
  2+25       0.0677      0.42  |Q        |         |         |         |
  2+30       0.0706      0.42  |Q        |         |         |         |
  2+35       0.0739      0.49  |Q        |         |         |         |
  2+40       0.0775      0.52  |VQ       |         |         |         |
  2+45       0.0812      0.52  |VQ       |         |         |         |
  2+50       0.0848      0.52  |VQ       |         |         |         |
  2+55       0.0884      0.52  |VQ       |         |         |         |
  3+ 0       0.0920      0.52  |VQ       |         |         |         |
  3+ 5       0.0956      0.52  |VQ       |         |         |         |
  3+10       0.0992      0.52  |VQ       |         |         |         |
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3+15	0.1028	0.52	VQ			
3+20	0.1064	0.52	VQ			
3+25	0.1100	0.52	Q			
3+30	0.1136	0.52	Q			
3+35	0.1172	0.52	Q			
3+40	0.1208	0.52	Q			
3+45	0.1244	0.52	Q			
3+50	0.1286	0.60	Q			
3+55	0.1329	0.63	Q			
4+ 0	0.1372	0.63	Q			
4+ 5	0.1415	0.63	Q			
4+10	0.1459	0.63	Q			
4+15	0.1502	0.63	Q			
4+20	0.1550	0.70	Q			
4+25	0.1601	0.73	Q			
4+30	0.1651	0.73	QV			
4+35	0.1702	0.73	QV			
4+40	0.1752	0.73	QV			
4+45	0.1803	0.73	QV			
4+50	0.1858	0.81	Q			
4+55	0.1916	0.84	Q			
5+ 0	0.1974	0.84	Q			
5+ 5	0.2022	0.69	QV			
5+10	0.2065	0.63	QV			
5+15	0.2108	0.63	QV			
5+20	0.2156	0.70	QV			
5+25	0.2207	0.73	Q V			
5+30	0.2257	0.73	Q V			
5+35	0.2313	0.81	QV			
5+40	0.2371	0.84	QV			
5+45	0.2428	0.84	QV			
5+50	0.2486	0.84	QV			
5+55	0.2544	0.84	QV			
6+ 0	0.2602	0.84	QV			
6+ 5	0.2664	0.91	QV			
6+10	0.2729	0.94	Q V			
6+15	0.2794	0.94	Q V			
6+20	0.2859	0.94	Q V			
6+25	0.2924	0.94	Q V			
6+30	0.2989	0.94	Q V			
6+35	0.3059	1.02	QV			
6+40	0.3131	1.05	QV			
6+45	0.3203	1.05	QV			
6+50	0.3275	1.05	Q V			
6+55	0.3348	1.05	Q V			
7+ 0	0.3420	1.05	Q V			
7+ 5	0.3492	1.05	Q V			
7+10	0.3564	1.05	Q V			
7+15	0.3636	1.05	Q V			
7+20	0.3713	1.12	Q V			

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 7+25       0.3793      1.15  |   Q  V  |          |          |          |
 7+30       0.3872      1.15  |   Q  V  |          |          |          |
 7+35       0.3957      1.23  |   Q  V  |          |          |          |
 7+40       0.4043      1.26  |    Q V  |          |          |          |
 7+45       0.4130      1.26  |    Q V  |          |          |          |
 7+50       0.4221      1.33  |    Q V  |          |          |          |
 7+55       0.4315      1.36  |    Q V  |          |          |          |
 8+ 0       0.4409      1.36  |    Q  V |          |          |          |
 8+ 5       0.4513      1.51  |     Q V |          |          |          |
 8+10       0.4621      1.57  |     Q V |          |          |          |
 8+15       0.4729      1.57  |     Q V |          |          |          |
 8+20       0.4837      1.57  |     Q V |          |          |          |
 8+25       0.4946      1.57  |     Q  V|          |          |          |
 8+30       0.5054      1.57  |     Q  V|          |          |          |
 8+35       0.5167      1.64  |     Q  V|          |          |          |
 8+40       0.5283      1.68  |     Q  V|          |          |          |
 8+45       0.5398      1.68  |     Q  V|          |          |          |
 8+50       0.5518      1.75  |     Q   V          |          |          |
 8+55       0.5641      1.78  |      Q  V          |          |          |
 9+ 0       0.5764      1.78  |      Q  V          |          |          |
 9+ 5       0.5896      1.93  |      Q  V          |          |          |
 9+10       0.6034      1.99  |      Q  |V         |          |          |
 9+15       0.6171      1.99  |      Q  |V         |          |          |
 9+20       0.6313      2.06  |       Q |V         |          |          |
 9+25       0.6457      2.10  |       Q |V         |          |          |
 9+30       0.6601      2.10  |       Q | V        |          |          |
 9+35       0.6751      2.17  |       Q | V        |          |          |
 9+40       0.6902      2.20  |       Q | V        |          |          |
 9+45       0.7054      2.20  |       Q |  V       |          |          |
 9+50       0.7210      2.27  |        Q|  V       |          |          |
 9+55       0.7369      2.30  |        Q|  V       |          |          |
10+ 0       0.7528      2.30  |        Q|  V       |          |          |
10+ 5       0.7652      1.80  |      Q  |   V      |          |          |
10+10       0.7760      1.57  |     Q   |   V      |          |          |
10+15       0.7868      1.57  |     Q   |   V      |          |          |
10+20       0.7976      1.57  |     Q   |   V      |          |          |
10+25       0.8084      1.57  |     Q   |   V      |          |          |
10+30       0.8193      1.57  |     Q   |    V     |          |          |
10+35       0.8326      1.93  |      Q  |    V     |          |          |
10+40       0.8470      2.10  |       Q |    V     |          |          |
10+45       0.8615      2.10  |       Q |    V     |          |          |
10+50       0.8759      2.10  |       Q |     V    |          |          |
10+55       0.8903      2.10  |       Q |     V    |          |          |
11+ 0       0.9048      2.10  |       Q |     V    |          |          |
11+ 5       0.9187      2.02  |       Q |     V    |          |          |
11+10       0.9324      1.99  |      Q  |      V   |          |          |
11+15       0.9461      1.99  |      Q  |      V   |          |          |
11+20       0.9598      1.99  |      Q  |      V   |          |          |
11+25       0.9735      1.99  |      Q  |      V   |          |          |
11+30       0.9872      1.99  |      Q  |       V  |          |          |
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11+35       0.9999      1.85  |      Q  |       V |         |         |
11+40       1.0122      1.78  |      Q  |       V |         |         |
11+45       1.0245      1.78  |      Q  |       V |         |         |
11+50       1.0372      1.85  |      Q  |        V|         |         |
11+55       1.0502      1.89  |      Q  |        V|         |         |
12+ 0       1.0632      1.89  |      Q  |        V|         |         |
12+ 5       1.0797      2.39  |        Q|        V|         |         |
12+10       1.0977      2.62  |         Q        V         |         |
12+15       1.1158      2.62  |         Q        V         |         |
12+20       1.1343      2.69  |         Q        V         |         |
12+25       1.1531      2.72  |         Q        |V        |         |
12+30       1.1718      2.72  |         Q        |V        |         |
12+35       1.1916      2.87  |         |Q       | V       |         |
12+40       1.2118      2.93  |         |Q       | V       |         |
12+45       1.2320      2.93  |         |Q       | V       |         |
12+50       1.2527      3.01  |         | Q      |  V      |         |
12+55       1.2736      3.04  |         | Q      |  V      |         |
13+ 0       1.2946      3.04  |         | Q      |  V      |         |
13+ 5       1.3180      3.40  |         |  Q     |   V     |         |
13+10       1.3425      3.56  |         |   Q    |   V     |         |
13+15       1.3671      3.56  |         |   Q    |    V    |         |
13+20       1.3916      3.56  |         |   Q    |    V    |         |
13+25       1.4161      3.56  |         |   Q    |     V   |         |
13+30       1.4407      3.56  |         |   Q    |     V   |         |
13+35       1.4597      2.76  |         |Q       |     V   |         |
13+40       1.4763      2.41  |        Q|        |      V  |         |
13+45       1.4929      2.41  |        Q|        |      V  |         |
13+50       1.5095      2.41  |        Q|        |      V  |         |
13+55       1.5261      2.41  |        Q|        |       V |         |
14+ 0       1.5427      2.41  |        Q|        |       V |         |
14+ 5       1.5613      2.70  |         Q        |       V |         |
14+10       1.5808      2.83  |         |Q       |        V|         |
14+15       1.6002      2.83  |         |Q       |        V|         |
14+20       1.6192      2.76  |         |Q       |        V|         |
14+25       1.6380      2.72  |         Q        |         V         |
14+30       1.6567      2.72  |         Q        |         V         |
14+35       1.6755      2.72  |         Q        |         V         |
14+40       1.6943      2.72  |         Q        |         |V        |
14+45       1.7130      2.72  |         Q        |         |V        |
14+50       1.7313      2.65  |         Q        |         |V        |
14+55       1.7493      2.62  |         Q        |         | V       |
15+ 0       1.7674      2.62  |         Q        |         | V       |
15+ 5       1.7849      2.55  |         Q        |         | V       |
15+10       1.8022      2.51  |         Q        |         |  V      |
15+15       1.8195      2.51  |         Q        |         |  V      |
15+20       1.8364      2.44  |        Q|        |         |  V      |
15+25       1.8530      2.41  |        Q|        |         |   V     |
15+30       1.8696      2.41  |        Q|        |         |   V     |
15+35       1.8841      2.12  |       Q |        |         |   V     |
15+40       1.8979      1.99  |      Q  |        |         |    V    |
```

```
15+45        1.9116       1.99  |       Q  |          |          |     V    |
15+50        1.9253       1.99  |       Q  |          |          |     V    |
15+55        1.9390       1.99  |       Q  |          |          |     V    |
16+ 0        1.9527       1.99  |       Q  |          |          |      V   |
16+ 5        1.9589       0.90  |   Q      |          |          |      V   |
16+10        1.9618       0.42  |Q         |          |          |      V   |
16+15        1.9647       0.42  |Q         |          |          |      V   |
16+20        1.9676       0.42  |Q         |          |          |      V   |
16+25        1.9704       0.42  |Q         |          |          |      V   |
16+30        1.9733       0.42  |Q         |          |          |      V   |
16+35        1.9757       0.35  |Q         |          |          |      V   |
16+40        1.9779       0.31  |Q         |          |          |      V   |
16+45        1.9801       0.31  |Q         |          |          |      V   |
16+50        1.9822       0.31  |Q         |          |          |      V   |
16+55        1.9844       0.31  |Q         |          |          |      V   |
17+ 0        1.9865       0.31  |Q         |          |          |      V   |
17+ 5        1.9897       0.46  |Q         |          |          |      V   |
17+10        1.9933       0.52  | Q        |          |          |      V   |
17+15        1.9969       0.52  | Q        |          |          |      V   |
17+20        2.0005       0.52  | Q        |          |          |      V   |
17+25        2.0041       0.52  | Q        |          |          |       V  |
17+30        2.0077       0.52  | Q        |          |          |       V  |
17+35        2.0114       0.52  | Q        |          |
17+40        2.0150       0.52  | Q        |          |
17+45        2.0186       0.52  | Q        |          |
17+50        2.0217       0.45  |Q         |          |
17+55        2.0246       0.42  |Q         |          |
18+ 0        2.0275       0.42  |Q         |          |          |       V  |
18+ 5        2.0303       0.42  |Q         |          |          |       V  |
18+10        2.0332       0.42  |Q         |          |          |       V  |
18+15        2.0361       0.42  |Q         |          |          |       V  |
18+20        2.0390       0.42  |Q         |          |          |       V  |
18+25        2.0419       0.42  |Q         |          |          |       V  |
18+30        2.0448       0.42  |Q         |          |          |       V  |
18+35        2.0472       0.35  |Q         |          |          |       V  |
18+40        2.0493       0.31  |Q         |          |          |       V  |
18+45        2.0515       0.31  |Q         |          |          |       V  |
18+50        2.0532       0.24  Q          |          |          |       V  |
18+55        2.0546       0.21  Q          |          |          |       V  |
19+ 0        2.0560       0.21  Q          |          |          |       V  |
19+ 5        2.0580       0.28  |Q         |          |          |        V |
19+10        2.0601       0.31  |Q         |          |          |        V |
19+15        2.0623       0.31  |Q         |          |          |        V |
19+20        2.0650       0.39  |Q         |          |          |        V |
19+25        2.0679       0.42  |Q         |          |          |        V |
19+30        2.0707       0.42  |Q         |          |          |        V |
19+35        2.0731       0.35  |Q         |          |          |        V |
19+40        2.0753       0.31  |Q         |          |          |        V |
19+45        2.0775       0.31  |Q         |          |          |        V |
19+50        2.0791       0.24  Q          |          |          |        V |
```

Qpeak,pre = 0.43 cfs
2.0246-0.0706=1.954 ac-ft
85,116 cf
110% preliminary
93,628 cf

```
19+55       2.0806      0.21  Q          |          |          |        V |
20+ 0       2.0820      0.21  Q          |          |          |        V |
20+ 5       2.0840      0.28  |Q         |          |          |        V |
20+10       2.0861      0.31  |Q         |          |          |        V |
20+15       2.0883      0.31  |Q         |          |          |        V |
20+20       2.0905      0.31  |Q         |          |          |        V |
20+25       2.0926      0.31  |Q         |          |          |        V |
20+30       2.0948      0.31  |Q         |          |          |        V |
20+35       2.0969      0.31  |Q         |          |          |        V |
20+40       2.0991      0.31  |Q         |          |          |        V |
20+45       2.1013      0.31  |Q         |          |          |        V |
20+50       2.1029      0.24  Q          |          |          |        V |
20+55       2.1044      0.21  Q          |          |          |        V |
21+ 0       2.1058      0.21  Q          |          |          |        V |
21+ 5       2.1078      0.28  |Q         |          |          |        V |
21+10       2.1099      0.31  |Q         |          |          |        V |
21+15       2.1121      0.31  |Q         |          |          |         V|
21+20       2.1138      0.24  Q          |          |          |         V|
21+25       2.1152      0.21  Q          |          |          |         V|
21+30       2.1166      0.21  Q          |          |          |         V|
21+35       2.1186      0.28  |Q         |          |          |         V|
21+40       2.1208      0.31  |Q         |          |          |         V|
21+45       2.1229      0.31  |Q         |          |          |         V|
21+50       2.1246      0.24  Q          |          |          |         V|
21+55       2.1260      0.21  Q          |          |          |         V|
22+ 0       2.1275      0.21  Q          |          |          |         V|
22+ 5       2.1294      0.28  |Q         |          |          |         V|
22+10       2.1316      0.31  |Q         |          |          |         V|
22+15       2.1337      0.31  |Q         |          |          |         V|
22+20       2.1354      0.24  Q          |          |          |         V|
22+25       2.1369      0.21  Q          |          |          |         V|
22+30       2.1383      0.21  Q          |          |          |         V|
22+35       2.1397      0.21  Q          |          |          |         V|
22+40       2.1412      0.21  Q          |          |          |         V|
22+45       2.1426      0.21  Q          |          |          |         V|
22+50       2.1441      0.21  Q          |          |          |         V|
22+55       2.1455      0.21  Q          |          |          |         V|
23+ 0       2.1470      0.21  Q          |          |          |         V|
23+ 5       2.1484      0.21  Q          |          |          |         V|
23+10       2.1498      0.21  Q          |          |          |         V|
23+15       2.1513      0.21  Q          |          |          |         V|
23+20       2.1527      0.21  Q          |          |          |         V|
23+25       2.1542      0.21  Q          |          |          |         V|
23+30       2.1556      0.21  Q          |          |          |         V|
23+35       2.1571      0.21  Q          |          |          |         V|
23+40       2.1585      0.21  Q          |          |          |         V|
23+45       2.1599      0.21  Q          |          |          |         V|
23+50       2.1614      0.21  Q          |          |          |         V|
23+55       2.1628      0.21  Q          |          |          |         V|
24+ 0       2.1643      0.21  Q          |          |          |         V|
```

```
   24+ 5       2.1647      0.06  Q         |         |         |        V|
-------------------------------------------------------------------------
```

PROPOSED CONDITION ONSITE 100-YEAR, 24-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPROP24100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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      ----------------------------------------------------------------------
       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    |
```

```
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|
-------------------------------------------------------------------------
```

PROPOSED CONDITION OFFSITE 100-YEAR, 3-HOUR UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/11/23 File: OFFSITEPROP3100.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
OFFSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 24-HOUR
FN: OFFSITEPROP.OUT- RSB
-------------------------------------------------------------------
Drainage Area =      64.60(Ac.)  =      0.101 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      64.60(Ac.)  =
0.101 Sq. Mi.
Length along longest watercourse =    2500.00(Ft.)
Length along longest watercourse measured to centroid =    1250.00(Ft.)
Length along longest watercourse =      0.473 Mi.
Length along longest watercourse measured to centroid =      0.237 Mi.
Difference in elevation =      13.00(Ft.)
Slope along watercourse =     27.4560 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 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]
64.60	0.80	51.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
64.60	1.90	122.74

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 = 99.97 %
Adjusted average point rain = 1.899(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
64.600	75.00	0.500

Total Area Entered = 64.60(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	75.0	0.303	0.500	0.167	1.000	0.167
					Sum (F) =	0.167

Area averaged mean soil loss (F) (In/Hr) = 0.167
Minimum soil loss rate ((In/Hr)) = 0.083
(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 (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	99.774	19.130	12.455
2	0.167	199.547	48.385	31.501
3	0.250	299.321	15.669	10.201
4	0.333	399.095	7.074	4.606
5	0.417	498.869	3.984	2.594
6	0.500	598.642	2.582	1.681
7	0.583	698.416	1.607	1.046
8	0.667	798.190	1.051	0.684

9	0.750	897.963	0.517	0.337
			Sum = 100.000	Sum= 65.105

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	(0.167)	0.148	0.148
2	0.17	1.30	0.296	(0.167)	0.148	0.148
3	0.25	1.10	0.251	(0.167)	0.125	0.125
4	0.33	1.50	0.342	0.167	(0.171)	0.175
5	0.42	1.50	0.342	0.167	(0.171)	0.175
6	0.50	1.80	0.410	0.167	(0.205)	0.244
7	0.58	1.50	0.342	0.167	(0.171)	0.175
8	0.67	1.80	0.410	0.167	(0.205)	0.244
9	0.75	1.80	0.410	0.167	(0.205)	0.244
10	0.83	1.50	0.342	0.167	(0.171)	0.175
11	0.92	1.60	0.365	0.167	(0.182)	0.198
12	1.00	1.80	0.410	0.167	(0.205)	0.244
13	1.08	2.20	0.501	0.167	(0.251)	0.335
14	1.17	2.20	0.501	0.167	(0.251)	0.335
15	1.25	2.20	0.501	0.167	(0.251)	0.335
16	1.33	2.00	0.456	0.167	(0.228)	0.289
17	1.42	2.60	0.593	0.167	(0.296)	0.426
18	1.50	2.70	0.615	0.167	(0.308)	0.449
19	1.58	2.40	0.547	0.167	(0.274)	0.380
20	1.67	2.70	0.615	0.167	(0.308)	0.449
21	1.75	3.30	0.752	0.167	(0.376)	0.586
22	1.83	3.10	0.707	0.167	(0.353)	0.540
23	1.92	2.90	0.661	0.167	(0.331)	0.494
24	2.00	3.00	0.684	0.167	(0.342)	0.517
25	2.08	3.10	0.707	0.167	(0.353)	0.540
26	2.17	4.20	0.957	0.167	(0.479)	0.791
27	2.25	5.00	1.140	0.167	(0.570)	0.973
28	2.33	3.50	0.798	0.167	(0.399)	0.631
29	2.42	6.80	1.550	0.167	(0.775)	1.383
30	2.50	7.30	1.664	0.167	(0.832)	1.497
31	2.58	8.20	1.869	0.167	(0.935)	1.702
32	2.67	5.90	1.345	0.167	(0.672)	1.178
33	2.75	2.00	0.456	0.167	(0.228)	0.289
34	2.83	1.80	0.410	0.167	(0.205)	0.244
35	2.92	1.80	0.410	0.167	(0.205)	0.244
36	3.00	0.60	0.137	(0.167)	0.068	0.068
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	17.0

Flood volume = Effective rainfall 1.41(In)
times area 64.6(Ac.)/[(In)/(Ft.)] = 7.6(Ac.Ft)

```
Total soil loss =      0.49(In)
Total soil loss =     2.612(Ac.Ft)
Total rainfall =      1.90(In)
Flood volume =      331632.8 Cubic Feet
Total soil loss =      113787.4 Cubic Feet
-------------------------------------------------------------------
 Peak flow rate of this hydrograph =     94.640(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       25.0      50.0      75.0     100.0
-------------------------------------------------------------------
  0+ 5       0.0127      1.85  Q         |         |         |         |
  0+10       0.0576      6.52  V Q       |         |         |         |
  0+15       0.1109      7.74  V  Q      |         |         |         |
  0+20       0.1683      8.33  V  Q      |         |         |         |
  0+25       0.2375     10.05  |V  Q     |         |         |         |
  0+30       0.3171     11.56  |V  Q     |         |         |         |
  0+35       0.4080     13.19  | V  Q    |         |         |         |
  0+40       0.4960     12.78  | V  Q    |         |         |         |
  0+45       0.5969     14.66  |  V Q    |         |         |         |
  0+50       0.6961     14.40  |  V Q    |         |         |         |
  0+55       0.7843     12.81  |   VQ    |         |         |         |
  1+ 0       0.8777     13.55  |   VQ    |         |         |         |
  1+ 5       0.9888     16.13  |    VQ   |         |         |         |
  1+10       1.1227     19.45  |    V Q  |         |         |         |
  1+15       1.2642     20.55  |     V Q |         |         |         |
  1+20       1.4055     20.51  |      VQ |         |         |         |
  1+25       1.5506     21.07  |       Q |         |         |         |
  1+30       1.7255     25.39  |        VQ         |         |         |
  1+35       1.9086     26.58  |         Q         |         |         |
  1+40       2.0883     26.10  |         Q         |         |         |
  1+45       2.2927     29.68  |         |QV       |         |         |
  1+50       2.5272     34.04  |         |  Q      |         |         |
  1+55       2.7594     33.72  |         |  QV     |         |         |
  2+ 0       2.9860     32.90  |         |  Q V    |         |         |
  2+ 5       3.2180     33.68  |         |  Q  V   |         |         |
  2+10       3.4776     37.69  |         |    Q  V |         |         |
  2+15       3.8094     48.18  |         |        QV         |         |
  2+20       4.1701     52.38  |         |         QV        |         |
  2+25       4.5424     54.06  |         |         |Q V      |         |
  2+30       5.0741     77.20  |         |         |     V   Q         |
  2+35       5.6965     90.37  |         |         |        V|     Q   |
  2+40       6.3483     94.64  |         |         |         |  V   Q  |
  2+45       6.8401     71.41  |         |         |       Q |    V    |
```

```
    2+50       7.1144     39.83  |         |    Q    |         |      V  |
    2+55       7.3089     28.24  |         |Q        |         |       V |
    3+ 0       7.4535     21.00  |       Q |         |         |        V|
    3+ 5       7.5346     11.77  |   Q     |         |         |        V|
    3+10       7.5748      5.84  | Q       |         |         |        V|
    3+15       7.5957      3.04  |Q        |         |         |        V|
    3+20       7.6056      1.44  Q         |         |         |        V|
    3+25       7.6100      0.63  Q         |         |         |        V|
    3+30       7.6122      0.32  Q         |         |         |        V|
    3+35       7.6131      0.13  Q         |         |         |        V|
    3+40       7.6132      0.02  Q         |         |         |         V
-------------------------------------------------------------------
```

PROPOSED CONDITION OFFSITE 100-YEAR, 24-HOUR UNIT HYDROGRAPH

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

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                Study date  04/11/23 File: OFFSITEPROP24100.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
OFFSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 24-HOUR
FN: OFFSITEPROP.OUT- RSB
------------------------------------------------------------------
Drainage Area =      64.60(Ac.)  =      0.101 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      64.60(Ac.)  =
0.101 Sq. Mi.
Length along longest watercourse =    2500.00(Ft.)
Length along longest watercourse measured to centroid =    1250.00(Ft.)
Length along longest watercourse =      0.473 Mi.
Length along longest watercourse measured to centroid =      0.237 Mi.
Difference in elevation =      13.00(Ft.)
Slope along watercourse =     27.4560 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 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]
64.60	1.60	103.36

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
64.60	4.00	258.40

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 %
64.600	75.00	0.500

Total Area Entered = 64.60(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	75.0	0.303	0.500	0.167	1.000	0.167
					Sum (F) =	0.167

Area averaged mean soil loss (F) (In/Hr) = 0.167
Minimum soil loss rate ((In/Hr)) = 0.083
(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 (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	99.774	19.130	12.455
2	0.167	199.547	48.385	31.501
3	0.250	299.321	15.669	10.201
4	0.333	399.095	7.074	4.606
5	0.417	498.869	3.984	2.594
6	0.500	598.642	2.582	1.681
7	0.583	698.416	1.607	1.046
8	0.667	798.190	1.051	0.684

9	0.750	897.963	0.517		0.337
			Sum = 100.000	Sum=	65.105

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	(0.295)	0.016	0.016
2	0.17	0.07	0.032	(0.294)	0.016	0.016
3	0.25	0.07	0.032	(0.293)	0.016	0.016
4	0.33	0.10	0.048	(0.292)	0.024	0.024
5	0.42	0.10	0.048	(0.291)	0.024	0.024
6	0.50	0.10	0.048	(0.290)	0.024	0.024
7	0.58	0.10	0.048	(0.289)	0.024	0.024
8	0.67	0.10	0.048	(0.287)	0.024	0.024
9	0.75	0.10	0.048	(0.286)	0.024	0.024
10	0.83	0.13	0.064	(0.285)	0.032	0.032
11	0.92	0.13	0.064	(0.284)	0.032	0.032
12	1.00	0.13	0.064	(0.283)	0.032	0.032
13	1.08	0.10	0.048	(0.282)	0.024	0.024
14	1.17	0.10	0.048	(0.281)	0.024	0.024
15	1.25	0.10	0.048	(0.280)	0.024	0.024
16	1.33	0.10	0.048	(0.279)	0.024	0.024
17	1.42	0.10	0.048	(0.277)	0.024	0.024
18	1.50	0.10	0.048	(0.276)	0.024	0.024
19	1.58	0.10	0.048	(0.275)	0.024	0.024
20	1.67	0.10	0.048	(0.274)	0.024	0.024
21	1.75	0.10	0.048	(0.273)	0.024	0.024
22	1.83	0.13	0.064	(0.272)	0.032	0.032
23	1.92	0.13	0.064	(0.271)	0.032	0.032
24	2.00	0.13	0.064	(0.270)	0.032	0.032
25	2.08	0.13	0.064	(0.269)	0.032	0.032
26	2.17	0.13	0.064	(0.268)	0.032	0.032
27	2.25	0.13	0.064	(0.266)	0.032	0.032
28	2.33	0.13	0.064	(0.265)	0.032	0.032
29	2.42	0.13	0.064	(0.264)	0.032	0.032
30	2.50	0.13	0.064	(0.263)	0.032	0.032
31	2.58	0.17	0.080	(0.262)	0.040	0.040
32	2.67	0.17	0.080	(0.261)	0.040	0.040
33	2.75	0.17	0.080	(0.260)	0.040	0.040
34	2.83	0.17	0.080	(0.259)	0.040	0.040
35	2.92	0.17	0.080	(0.258)	0.040	0.040
36	3.00	0.17	0.080	(0.257)	0.040	0.040
37	3.08	0.17	0.080	(0.256)	0.040	0.040
38	3.17	0.17	0.080	(0.255)	0.040	0.040
39	3.25	0.17	0.080	(0.254)	0.040	0.040
40	3.33	0.17	0.080	(0.253)	0.040	0.040

41	3.42	0.17	0.080	(0.251)	0.040	0.040
42	3.50	0.17	0.080	(0.250)	0.040	0.040
43	3.58	0.17	0.080	(0.249)	0.040	0.040
44	3.67	0.17	0.080	(0.248)	0.040	0.040
45	3.75	0.17	0.080	(0.247)	0.040	0.040
46	3.83	0.20	0.096	(0.246)	0.048	0.048
47	3.92	0.20	0.096	(0.245)	0.048	0.048
48	4.00	0.20	0.096	(0.244)	0.048	0.048
49	4.08	0.20	0.096	(0.243)	0.048	0.048
50	4.17	0.20	0.096	(0.242)	0.048	0.048
51	4.25	0.20	0.096	(0.241)	0.048	0.048
52	4.33	0.23	0.112	(0.240)	0.056	0.056
53	4.42	0.23	0.112	(0.239)	0.056	0.056
54	4.50	0.23	0.112	(0.238)	0.056	0.056
55	4.58	0.23	0.112	(0.237)	0.056	0.056
56	4.67	0.23	0.112	(0.236)	0.056	0.056
57	4.75	0.23	0.112	(0.235)	0.056	0.056
58	4.83	0.27	0.128	(0.234)	0.064	0.064
59	4.92	0.27	0.128	(0.233)	0.064	0.064
60	5.00	0.27	0.128	(0.232)	0.064	0.064
61	5.08	0.20	0.096	(0.231)	0.048	0.048
62	5.17	0.20	0.096	(0.230)	0.048	0.048
63	5.25	0.20	0.096	(0.229)	0.048	0.048
64	5.33	0.23	0.112	(0.228)	0.056	0.056
65	5.42	0.23	0.112	(0.227)	0.056	0.056
66	5.50	0.23	0.112	(0.226)	0.056	0.056
67	5.58	0.27	0.128	(0.225)	0.064	0.064
68	5.67	0.27	0.128	(0.224)	0.064	0.064
69	5.75	0.27	0.128	(0.223)	0.064	0.064
70	5.83	0.27	0.128	(0.222)	0.064	0.064
71	5.92	0.27	0.128	(0.221)	0.064	0.064
72	6.00	0.27	0.128	(0.220)	0.064	0.064
73	6.08	0.30	0.144	(0.219)	0.072	0.072
74	6.17	0.30	0.144	(0.218)	0.072	0.072
75	6.25	0.30	0.144	(0.217)	0.072	0.072
76	6.33	0.30	0.144	(0.216)	0.072	0.072
77	6.42	0.30	0.144	(0.215)	0.072	0.072
78	6.50	0.30	0.144	(0.214)	0.072	0.072
79	6.58	0.33	0.160	(0.213)	0.080	0.080
80	6.67	0.33	0.160	(0.212)	0.080	0.080
81	6.75	0.33	0.160	(0.211)	0.080	0.080
82	6.83	0.33	0.160	(0.210)	0.080	0.080
83	6.92	0.33	0.160	(0.209)	0.080	0.080
84	7.00	0.33	0.160	(0.208)	0.080	0.080
85	7.08	0.33	0.160	(0.207)	0.080	0.080
86	7.17	0.33	0.160	(0.207)	0.080	0.080
87	7.25	0.33	0.160	(0.206)	0.080	0.080
88	7.33	0.37	0.176	(0.205)	0.088	0.088
89	7.42	0.37	0.176	(0.204)	0.088	0.088
90	7.50	0.37	0.176	(0.203)	0.088	0.088

91	7.58	0.40	0.192	(0.202)	0.096	0.096
92	7.67	0.40	0.192	(0.201)	0.096	0.096
93	7.75	0.40	0.192	(0.200)	0.096	0.096
94	7.83	0.43	0.208	(0.199)	0.104	0.104
95	7.92	0.43	0.208	(0.198)	0.104	0.104
96	8.00	0.43	0.208	(0.197)	0.104	0.104
97	8.08	0.50	0.240	(0.196)	0.120	0.120
98	8.17	0.50	0.240	(0.195)	0.120	0.120
99	8.25	0.50	0.240	(0.194)	0.120	0.120
100	8.33	0.50	0.240	(0.194)	0.120	0.120
101	8.42	0.50	0.240	(0.193)	0.120	0.120
102	8.50	0.50	0.240	(0.192)	0.120	0.120
103	8.58	0.53	0.256	(0.191)	0.128	0.128
104	8.67	0.53	0.256	(0.190)	0.128	0.128
105	8.75	0.53	0.256	(0.189)	0.128	0.128
106	8.83	0.57	0.272	(0.188)	0.136	0.136
107	8.92	0.57	0.272	(0.187)	0.136	0.136
108	9.00	0.57	0.272	(0.186)	0.136	0.136
109	9.08	0.63	0.304	(0.186)	0.152	0.152
110	9.17	0.63	0.304	(0.185)	0.152	0.152
111	9.25	0.63	0.304	(0.184)	0.152	0.152
112	9.33	0.67	0.320	(0.183)	0.160	0.160
113	9.42	0.67	0.320	(0.182)	0.160	0.160
114	9.50	0.67	0.320	(0.181)	0.160	0.160
115	9.58	0.70	0.336	(0.180)	0.168	0.168
116	9.67	0.70	0.336	(0.179)	0.168	0.168
117	9.75	0.70	0.336	(0.179)	0.168	0.168
118	9.83	0.73	0.352	(0.178)	0.176	0.176
119	9.92	0.73	0.352	(0.177)	0.176	0.176
120	10.00	0.73	0.352	(0.176)	0.176	0.176
121	10.08	0.50	0.240	(0.175)	0.120	0.120
122	10.17	0.50	0.240	(0.174)	0.120	0.120
123	10.25	0.50	0.240	(0.173)	0.120	0.120
124	10.33	0.50	0.240	(0.173)	0.120	0.120
125	10.42	0.50	0.240	(0.172)	0.120	0.120
126	10.50	0.50	0.240	(0.171)	0.120	0.120
127	10.58	0.67	0.320	(0.170)	0.160	0.160
128	10.67	0.67	0.320	(0.169)	0.160	0.160
129	10.75	0.67	0.320	(0.168)	0.160	0.160
130	10.83	0.67	0.320	(0.168)	0.160	0.160
131	10.92	0.67	0.320	(0.167)	0.160	0.160
132	11.00	0.67	0.320	(0.166)	0.160	0.160
133	11.08	0.63	0.304	(0.165)	0.152	0.152
134	11.17	0.63	0.304	(0.164)	0.152	0.152
135	11.25	0.63	0.304	(0.164)	0.152	0.152
136	11.33	0.63	0.304	(0.163)	0.152	0.152
137	11.42	0.63	0.304	(0.162)	0.152	0.152
138	11.50	0.63	0.304	(0.161)	0.152	0.152
139	11.58	0.57	0.272	(0.160)	0.136	0.136
140	11.67	0.57	0.272	(0.160)	0.136	0.136

141	11.75	0.57	0.272	(0.159)	0.136	0.136
142	11.83	0.60	0.288	(0.158)	0.144	0.144
143	11.92	0.60	0.288	(0.157)	0.144	0.144
144	12.00	0.60	0.288	(0.156)	0.144	0.144
145	12.08	0.83	0.400	0.156	(0.200)	0.244
146	12.17	0.83	0.400	0.155	(0.200)	0.245
147	12.25	0.83	0.400	0.154	(0.200)	0.246
148	12.33	0.87	0.416	0.153	(0.208)	0.263
149	12.42	0.87	0.416	0.152	(0.208)	0.263
150	12.50	0.87	0.416	0.152	(0.208)	0.264
151	12.58	0.93	0.448	0.151	(0.224)	0.297
152	12.67	0.93	0.448	0.150	(0.224)	0.298
153	12.75	0.93	0.448	0.149	(0.224)	0.299
154	12.83	0.97	0.464	0.149	(0.232)	0.315
155	12.92	0.97	0.464	0.148	(0.232)	0.316
156	13.00	0.97	0.464	0.147	(0.232)	0.317
157	13.08	1.13	0.544	0.146	(0.272)	0.398
158	13.17	1.13	0.544	0.146	(0.272)	0.398
159	13.25	1.13	0.544	0.145	(0.272)	0.399
160	13.33	1.13	0.544	0.144	(0.272)	0.400
161	13.42	1.13	0.544	0.143	(0.272)	0.400
162	13.50	1.13	0.544	0.143	(0.272)	0.401
163	13.58	0.77	0.368	0.142	(0.184)	0.226
164	13.67	0.77	0.368	0.141	(0.184)	0.227
165	13.75	0.77	0.368	0.141	(0.184)	0.227
166	13.83	0.77	0.368	0.140	(0.184)	0.228
167	13.92	0.77	0.368	0.139	(0.184)	0.229
168	14.00	0.77	0.368	0.138	(0.184)	0.230
169	14.08	0.90	0.432	0.138	(0.216)	0.294
170	14.17	0.90	0.432	0.137	(0.216)	0.295
171	14.25	0.90	0.432	0.136	(0.216)	0.296
172	14.33	0.87	0.416	0.136	(0.208)	0.280
173	14.42	0.87	0.416	0.135	(0.208)	0.281
174	14.50	0.87	0.416	0.134	(0.208)	0.282
175	14.58	0.87	0.416	0.134	(0.208)	0.282
176	14.67	0.87	0.416	0.133	(0.208)	0.283
177	14.75	0.87	0.416	0.132	(0.208)	0.284
178	14.83	0.83	0.400	0.132	(0.200)	0.268
179	14.92	0.83	0.400	0.131	(0.200)	0.269
180	15.00	0.83	0.400	0.130	(0.200)	0.270
181	15.08	0.80	0.384	0.129	(0.192)	0.254
182	15.17	0.80	0.384	0.129	(0.192)	0.255
183	15.25	0.80	0.384	0.128	(0.192)	0.256
184	15.33	0.77	0.368	0.128	(0.184)	0.240
185	15.42	0.77	0.368	0.127	(0.184)	0.241
186	15.50	0.77	0.368	0.126	(0.184)	0.242
187	15.58	0.63	0.304	0.126	(0.152)	0.178
188	15.67	0.63	0.304	0.125	(0.152)	0.179
189	15.75	0.63	0.304	0.124	(0.152)	0.180
190	15.83	0.63	0.304	0.124	(0.152)	0.180

191	15.92	0.63	0.304	0.123	(0.152)	0.181
192	16.00	0.63	0.304	0.122	(0.152)	0.182
193	16.08	0.13	0.064	(0.122)	0.032	0.032
194	16.17	0.13	0.064	(0.121)	0.032	0.032
195	16.25	0.13	0.064	(0.121)	0.032	0.032
196	16.33	0.13	0.064	(0.120)	0.032	0.032
197	16.42	0.13	0.064	(0.119)	0.032	0.032
198	16.50	0.13	0.064	(0.119)	0.032	0.032
199	16.58	0.10	0.048	(0.118)	0.024	0.024
200	16.67	0.10	0.048	(0.117)	0.024	0.024
201	16.75	0.10	0.048	(0.117)	0.024	0.024
202	16.83	0.10	0.048	(0.116)	0.024	0.024
203	16.92	0.10	0.048	(0.116)	0.024	0.024
204	17.00	0.10	0.048	(0.115)	0.024	0.024
205	17.08	0.17	0.080	(0.115)	0.040	0.040
206	17.17	0.17	0.080	(0.114)	0.040	0.040
207	17.25	0.17	0.080	(0.113)	0.040	0.040
208	17.33	0.17	0.080	(0.113)	0.040	0.040
209	17.42	0.17	0.080	(0.112)	0.040	0.040
210	17.50	0.17	0.080	(0.112)	0.040	0.040
211	17.58	0.17	0.080	(0.111)	0.040	0.040
212	17.67	0.17	0.080	(0.111)	0.040	0.040
213	17.75	0.17	0.080	(0.110)	0.040	0.040
214	17.83	0.13	0.064	(0.109)	0.032	0.032
215	17.92	0.13	0.064	(0.109)	0.032	0.032
216	18.00	0.13	0.064	(0.108)	0.032	0.032
217	18.08	0.13	0.064	(0.108)	0.032	0.032
218	18.17	0.13	0.064	(0.107)	0.032	0.032
219	18.25	0.13	0.064	(0.107)	0.032	0.032
220	18.33	0.13	0.064	(0.106)	0.032	0.032
221	18.42	0.13	0.064	(0.106)	0.032	0.032
222	18.50	0.13	0.064	(0.105)	0.032	0.032
223	18.58	0.10	0.048	(0.105)	0.024	0.024
224	18.67	0.10	0.048	(0.104)	0.024	0.024
225	18.75	0.10	0.048	(0.104)	0.024	0.024
226	18.83	0.07	0.032	(0.103)	0.016	0.016
227	18.92	0.07	0.032	(0.103)	0.016	0.016
228	19.00	0.07	0.032	(0.102)	0.016	0.016
229	19.08	0.10	0.048	(0.102)	0.024	0.024
230	19.17	0.10	0.048	(0.101)	0.024	0.024
231	19.25	0.10	0.048	(0.101)	0.024	0.024
232	19.33	0.13	0.064	(0.100)	0.032	0.032
233	19.42	0.13	0.064	(0.100)	0.032	0.032
234	19.50	0.13	0.064	(0.099)	0.032	0.032
235	19.58	0.10	0.048	(0.099)	0.024	0.024
236	19.67	0.10	0.048	(0.099)	0.024	0.024
237	19.75	0.10	0.048	(0.098)	0.024	0.024
238	19.83	0.07	0.032	(0.098)	0.016	0.016
239	19.92	0.07	0.032	(0.097)	0.016	0.016
240	20.00	0.07	0.032	(0.097)	0.016	0.016

241	20.08	0.10	0.048	(0.096)	0.024	0.024
242	20.17	0.10	0.048	(0.096)	0.024	0.024
243	20.25	0.10	0.048	(0.096)	0.024	0.024
244	20.33	0.10	0.048	(0.095)	0.024	0.024
245	20.42	0.10	0.048	(0.095)	0.024	0.024
246	20.50	0.10	0.048	(0.094)	0.024	0.024
247	20.58	0.10	0.048	(0.094)	0.024	0.024
248	20.67	0.10	0.048	(0.093)	0.024	0.024
249	20.75	0.10	0.048	(0.093)	0.024	0.024
250	20.83	0.07	0.032	(0.093)	0.016	0.016
251	20.92	0.07	0.032	(0.092)	0.016	0.016
252	21.00	0.07	0.032	(0.092)	0.016	0.016
253	21.08	0.10	0.048	(0.092)	0.024	0.024
254	21.17	0.10	0.048	(0.091)	0.024	0.024
255	21.25	0.10	0.048	(0.091)	0.024	0.024
256	21.33	0.07	0.032	(0.091)	0.016	0.016
257	21.42	0.07	0.032	(0.090)	0.016	0.016
258	21.50	0.07	0.032	(0.090)	0.016	0.016
259	21.58	0.10	0.048	(0.090)	0.024	0.024
260	21.67	0.10	0.048	(0.089)	0.024	0.024
261	21.75	0.10	0.048	(0.089)	0.024	0.024
262	21.83	0.07	0.032	(0.089)	0.016	0.016
263	21.92	0.07	0.032	(0.088)	0.016	0.016
264	22.00	0.07	0.032	(0.088)	0.016	0.016
265	22.08	0.10	0.048	(0.088)	0.024	0.024
266	22.17	0.10	0.048	(0.087)	0.024	0.024
267	22.25	0.10	0.048	(0.087)	0.024	0.024
268	22.33	0.07	0.032	(0.087)	0.016	0.016
269	22.42	0.07	0.032	(0.087)	0.016	0.016
270	22.50	0.07	0.032	(0.086)	0.016	0.016
271	22.58	0.07	0.032	(0.086)	0.016	0.016
272	22.67	0.07	0.032	(0.086)	0.016	0.016
273	22.75	0.07	0.032	(0.086)	0.016	0.016
274	22.83	0.07	0.032	(0.085)	0.016	0.016
275	22.92	0.07	0.032	(0.085)	0.016	0.016
276	23.00	0.07	0.032	(0.085)	0.016	0.016
277	23.08	0.07	0.032	(0.085)	0.016	0.016
278	23.17	0.07	0.032	(0.085)	0.016	0.016
279	23.25	0.07	0.032	(0.084)	0.016	0.016
280	23.33	0.07	0.032	(0.084)	0.016	0.016
281	23.42	0.07	0.032	(0.084)	0.016	0.016
282	23.50	0.07	0.032	(0.084)	0.016	0.016
283	23.58	0.07	0.032	(0.084)	0.016	0.016
284	23.67	0.07	0.032	(0.084)	0.016	0.016
285	23.75	0.07	0.032	(0.084)	0.016	0.016
286	23.83	0.07	0.032	(0.083)	0.016	0.016
287	23.92	0.07	0.032	(0.083)	0.016	0.016
288	24.00	0.07	0.032	(0.083)	0.016	0.016
		(Loss Rate Not Used)				
	Sum =	100.0			Sum =	27.2

```
Flood volume = Effective rainfall      2.27(In)
 times area      64.6(Ac.)/[(In)/(Ft.)] =      12.2(Ac.Ft)
Total soil loss =      1.73(In)
Total soil loss =     9.321(Ac.Ft)
Total rainfall =      4.00(In)
Flood volume =      531864.8 Cubic Feet
Total soil loss =      406008.9 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =     25.896(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       0.0014      0.20  Q         |         |         |         |
  0+10       0.0062      0.70  Q         |         |         |         |
  0+15       0.0122      0.87  VQ        |         |         |         |
  0+20       0.0194      1.04  VQ        |         |         |         |
  0+25       0.0285      1.33  VQ        |         |         |         |
  0+30       0.0385      1.44  VQ        |         |         |         |
  0+35       0.0488      1.50  VQ        |         |         |         |
  0+40       0.0593      1.53  V Q       |         |         |         |
  0+45       0.0699      1.55  V Q       |         |         |         |
  0+50       0.0813      1.65  V Q       |         |         |         |
  0+55       0.0945      1.91  V Q       |         |         |         |
  1+ 0       0.1083      2.00  V Q       |         |         |         |
  1+ 5       0.1216      1.93  V Q       |         |         |         |
  1+10       0.1333      1.70  V Q       |         |         |         |
  1+15       0.1446      1.63  V Q       |         |         |         |
  1+20       0.1556      1.61  V Q       |         |         |         |
  1+25       0.1666      1.59  V Q       |         |         |         |
  1+30       0.1775      1.58  V Q       |         |         |         |
  1+35       0.1883      1.57  V Q       |         |         |         |
  1+40       0.1991      1.57  V Q       |         |         |         |
  1+45       0.2098      1.56  V Q       |         |         |         |
  1+50       0.2213      1.66  V Q       |         |         |         |
  1+55       0.2345      1.91  V Q       |         |         |         |
  2+ 0       0.2482      2.00  V Q       |         |         |         |
  2+ 5       0.2622      2.03  V Q       |         |         |         |
  2+10       0.2764      2.05  V Q       |         |         |         |
  2+15       0.2906      2.07  V Q       |         |         |         |
  2+20       0.3049      2.08  V Q       |         |         |         |
  2+25       0.3192      2.08  |VQ       |         |         |         |
  2+30       0.3336      2.08  |VQ       |         |         |         |
  2+35       0.3486      2.18  |VQ       |         |         |         |
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2+40       0.3654      2.44  |V Q      |          |          |          |
2+45       0.3827      2.52  |V Q      |          |          |          |
2+50       0.4003      2.55  |V Q      |          |          |          |
2+55       0.4181      2.58  |V Q      |          |          |          |
3+ 0       0.4359      2.59  |V Q      |          |          |          |
3+ 5       0.4538      2.60  |V Q      |          |          |          |
3+10       0.4717      2.60  |V Q      |          |          |          |
3+15       0.4897      2.61  |V Q      |          |          |          |
3+20       0.5076      2.61  |V Q      |          |          |          |
3+25       0.5255      2.61  |V Q      |          |          |          |
3+30       0.5435      2.61  |V Q      |          |          |          |
3+35       0.5614      2.61  |V Q      |          |          |          |
3+40       0.5794      2.61  |V Q      |          |          |          |
3+45       0.5973      2.61  |V Q      |          |          |          |
3+50       0.6159      2.70  | VQ      |          |          |          |
3+55       0.6363      2.96  | VQ      |          |          |          |
4+ 0       0.6572      3.04  | V Q     |          |          |          |
4+ 5       0.6784      3.08  | V Q     |          |          |          |
4+10       0.6997      3.10  | V Q     |          |          |          |
4+15       0.7212      3.11  | V Q     |          |          |          |
4+20       0.7433      3.22  | V Q     |          |          |          |
4+25       0.7672      3.48  | V Q     |          |          |          |
4+30       0.7918      3.56  | V Q     |          |          |          |
4+35       0.8165      3.60  | V Q     |          |          |          |
4+40       0.8414      3.62  | V Q     |          |          |          |
4+45       0.8664      3.63  | V Q     |          |          |          |
4+50       0.8922      3.74  | V Q     |          |          |          |
4+55       0.9197      4.00  |  V Q    |          |          |          |
5+ 0       0.9478      4.08  |  V Q    |          |          |          |
5+ 5       0.9748      3.92  |  V Q    |          |          |          |
5+10       0.9985      3.43  |  VQ     |          |          |          |
5+15       1.0211      3.28  |  VQ     |          |          |          |
5+20       1.0439      3.32  |  VQ     |          |          |          |
5+25       1.0683      3.54  |  VQ     |          |          |          |
5+30       1.0930      3.59  |  VQ     |          |          |          |
5+35       1.1186      3.71  |  VQ     |          |          |          |
5+40       1.1460      3.97  |  V Q    |          |          |          |
5+45       1.1740      4.06  |  V Q    |          |          |          |
5+50       1.2023      4.11  |  V Q    |          |          |          |
5+55       1.2308      4.14  |   VQ    |          |          |          |
6+ 0       1.2593      4.15  |   VQ    |          |          |          |
6+ 5       1.2887      4.26  |   VQ    |          |          |          |
6+10       1.3198      4.52  |   V Q   |          |          |          |
6+15       1.3515      4.60  |   V Q   |          |          |          |
6+20       1.3834      4.64  |   V Q   |          |          |          |
6+25       1.4155      4.66  |   V Q   |          |          |          |
6+30       1.4477      4.67  |   V Q   |          |          |          |
6+35       1.4806      4.78  |   V Q   |          |          |          |
6+40       1.5153      5.04  |   V Q   |          |          |          |
6+45       1.5506      5.12  |    VQ   |          |          |          |
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 6+50       1.5862      5.16  |    VQ   |         |         |         |
 6+55       1.6218      5.18  |    VQ   |         |         |         |
 7+ 0       1.6576      5.19  |    VQ   |         |         |         |
 7+ 5       1.6934      5.20  |    VQ   |         |         |         |
 7+10       1.7293      5.21  |    VQ   |         |         |         |
 7+15       1.7652      5.21  |    VQ   |         |         |         |
 7+20       1.8017      5.31  |    V Q  |         |         |         |
 7+25       1.8401      5.56  |     VQ  |         |         |         |
 7+30       1.8789      5.64  |     VQ  |         |         |         |
 7+35       1.9187      5.78  |     VQ  |         |         |         |
 7+40       1.9604      6.05  |     V Q |         |         |         |
 7+45       2.0028      6.15  |     V Q |         |         |         |
 7+50       2.0461      6.29  |     V Q |         |         |         |
 7+55       2.0914      6.57  |     V Q |         |         |         |
 8+ 0       2.1373      6.67  |      VQ |         |         |         |
 8+ 5       2.1849      6.91  |      V Q|         |         |         |
 8+10       2.2362      7.44  |      V Q|         |         |         |
 8+15       2.2887      7.62  |      V  Q         |         |         |
 8+20       2.3418      7.71  |      V  Q         |         |         |
 8+25       2.3952      7.75  |      V  Q         |         |         |
 8+30       2.4488      7.78  |       V Q         |         |         |
 8+35       2.5032      7.90  |       V Q         |         |         |
 8+40       2.5594      8.16  |       V Q         |         |         |
 8+45       2.6162      8.25  |       V Q         |         |         |
 8+50       2.6739      8.39  |       V |Q        |         |         |
 8+55       2.7336      8.66  |       V |Q        |         |         |
 9+ 0       2.7939      8.75  |        V|Q        |         |         |
 9+ 5       2.8558      9.00  |        V|Q        |         |         |
 9+10       2.9214      9.53  |        V| Q       |         |         |
 9+15       2.9883      9.71  |        V| Q       |         |         |
 9+20       3.0564      9.89  |         V  Q      |         |         |
 9+25       3.1266     10.19  |         V  Q      |         |         |
 9+30       3.1975     10.30  |         V  Q      |         |         |
 9+35       3.2695     10.45  |         V  Q      |         |         |
 9+40       3.3435     10.74  |         V   Q     |         |         |
 9+45       3.4181     10.84  |         |V  Q     |         |         |
 9+50       3.4937     10.98  |         |V  Q     |         |         |
 9+55       3.5713     11.26  |         |V   Q    |         |         |
10+ 0       3.6495     11.36  |         |V   Q    |         |         |
10+ 5       3.7233     10.71  |         | V Q     |         |         |
10+10       3.7850      8.97  |         |QV       |         |         |
10+15       3.8430      8.41  |         |QV       |         |         |
10+20       3.8992      8.16  |         Q V       |         |         |
10+25       3.9544      8.02  |         Q V       |         |         |
10+30       4.0091      7.93  |         Q  V      |         |         |
10+35       4.0667      8.37  |         |Q V      |         |         |
10+40       4.1328      9.59  |         | QV      |         |         |
10+45       4.2015      9.98  |         |  Q      |         |         |
10+50       4.2716     10.17  |         |  Q      |         |         |
10+55       4.3423     10.27  |         |  QV     |         |         |
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11+ 0       4.4135     10.34  |          |  QV     |         |         |
11+ 5       4.4843     10.28  |          |  QV     |         |         |
11+10       4.5535     10.06  |          |  QV     |         |         |
11+15       4.6223      9.99  |          |  Q V    |         |         |
11+20       4.6909      9.95  |          |  Q V    |         |         |
11+25       4.7592      9.93  |          |  Q V    |         |         |
11+30       4.8275      9.92  |          |  Q V    |         |         |
11+35       4.8944      9.71  |          | Q   V   |         |         |
11+40       4.9578      9.20  |          | Q   V   |         |         |
11+45       5.0200      9.03  |          | Q   V   |         |         |
11+50       5.0824      9.06  |          | Q   V   |         |         |
11+55       5.1462      9.27  |          | Q   V   |         |         |
12+ 0       5.2104      9.32  |          | Q    V  |         |         |
12+ 5       5.2834     10.60  |          |   Q  V  |         |         |
12+10       5.3783     13.78  |          |      VQ |         |         |
12+15       5.4805     14.85  |          |      V Q|         |         |
12+20       5.5877     15.56  |          |       V Q         |         |
12+25       5.7005     16.37  |          |       V |Q        |         |
12+30       5.8159     16.76  |          |        V| Q       |         |
12+35       5.9356     17.38  |          |        V|  Q      |         |
12+40       6.0633     18.55  |          |        V|   Q     |         |
12+45       6.1941     18.99  |          |         V    Q    |         |
12+50       6.3277     19.40  |          |         V    Q    |         |
12+55       6.4658     20.05  |          |         |V    Q   |         |
13+ 0       6.6057     20.32  |          |         |V     Q  |         |
13+ 5       6.7536     21.47  |          |         | V     Q |         |
13+10       6.9196     24.11  |          |         | V        | Q      |
13+15       7.0918     25.01  |          |         |  V       |  Q     |
13+20       7.2671     25.44  |          |         |  V       |  Q     |
13+25       7.4441     25.71  |          |         |   V      |   Q    |
13+30       7.6224     25.90  |          |         |   V      |   Q    |
13+35       7.7866     23.83  |          |         |    V     |Q       |
13+40       7.9132     18.39  |          |         |   QV     |        |
13+45       8.0280     16.67  |          |         | Q   V    |        |
13+50       8.1376     15.90  |          |         |Q    V    |        |
13+55       8.2443     15.49  |          |         Q      V   |        |
14+ 0       8.3493     15.24  |          |         Q      V   |        |
14+ 5       8.4588     15.90  |          |         |Q     V   |        |
14+10       8.5817     17.85  |          |         |  Q    V  |        |
14+15       8.7090     18.49  |          |         |   Q   V  |        |
14+20       8.8373     18.63  |          |         |   Q   V  |        |
14+25       8.9636     18.34  |          |         |   Q    V|        |
14+30       9.0898     18.32  |          |         |   Q    V|        |
14+35       9.2163     18.36  |          |         |   Q     V        |
14+40       9.3431     18.41  |          |         |   Q     V        |
14+45       9.4701     18.45  |          |         |   Q     |V       |
14+50       9.5960     18.28  |          |         |   Q     |V       |
14+55       9.7187     17.81  |          |         |  Q      |V       |
15+ 0       9.8404     17.68  |          |         |  Q      | V      |
15+ 5       9.9606     17.45  |          |         |  Q      | V      |
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15+10      10.0774     16.95  |         |         | Q       |  V      |
15+15      10.1931     16.80  |         |         | Q       |  V      |
15+20      10.3071     16.56  |         |         | Q       |  V      |
15+25      10.4176     16.04  |         |         |Q        |   V     |
15+30      10.5271     15.89  |         |         |Q        |   V     |
15+35      10.6307     15.05  |         |         Q         |   V     |
15+40      10.7204     13.02  |         |      Q  |         |    V    |
15+45      10.8056     12.38  |         |     Q   |         |    V    |
15+50      10.8890     12.11  |         |     Q   |         |    V    |
15+55      10.9714     11.97  |         |    Q    |         |    V    |
16+ 0      11.0533     11.90  |         |    Q    |         |     V   |
16+ 5      11.1222     10.00  |         |  Q      |         |     V   |
16+10      11.1584      5.26  |      Q  |         |         |     V   |
16+15      11.1840      3.71  |   Q     |         |         |     V   |
16+20      11.2048      3.03  |   Q     |         |         |     V   |
16+25      11.2230      2.64  |  Q      |         |         |     V   |
16+30      11.2395      2.39  |  Q      |         |         |     V   |
16+35      11.2542      2.14  | Q       |         |         |     V   |
16+40      11.2665      1.78  | Q       |         |         |     V   |
16+45      11.2779      1.65  | Q       |         |         |     V   |
16+50      11.2890      1.61  | Q       |         |         |     V   |
16+55      11.3000      1.59  | Q       |         |         |      V  |
17+ 0      11.3109      1.58  | Q       |         |         |      V  |
17+ 5      11.3231      1.77  | Q       |         |         |      V  |
17+10      11.3387      2.27  |  Q      |         |         |      V  |
17+15      11.3554      2.43  |  Q      |         |         |      V  |
17+20      11.3727      2.50  |  Q      |         |         |      V  |
17+25      11.3902      2.55  |  Q      |         |         |      V  |
17+30      11.4079      2.57  |  Q      |         |         |      V  |
17+35      11.4257      2.59  |  Q      |         |         |      V  |
17+40      11.4436      2.60  |  Q      |         |         |      V  |
17+45      11.4616      2.61  |  Q      |         |         |      V  |
17+50      11.4788      2.51  |  Q      |         |         |      V  |
17+55      11.4944      2.25  |  Q      |         |         |      V  |
18+ 0      11.5093      2.17  | Q       |         |         |      V  |
18+ 5      11.5240      2.13  | Q       |         |         |      V  |
18+10      11.5386      2.11  | Q       |         |         |      V  |
18+15      11.5530      2.10  | Q       |         |         |      V  |
18+20      11.5675      2.09  | Q       |         |         |      V  |
18+25      11.5818      2.09  | Q       |         |         |      V  |
18+30      11.5962      2.08  | Q       |         |         |      V  |
18+35      11.6098      1.98  | Q       |         |         |       V |
18+40      11.6218      1.73  | Q       |         |         |       V |
18+45      11.6331      1.65  | Q       |         |         |       V |
18+50      11.6436      1.51  | Q       |         |         |       V |
18+55      11.6521      1.24  |Q        |         |         |       V |
19+ 0      11.6600      1.15  |Q        |         |         |       V |
19+ 5      11.6683      1.20  |Q        |         |         |       V |
19+10      11.6781      1.43  |Q        |         |         |       V |
19+15      11.6884      1.49  |Q        |         |         |       V |
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19+20      11.6995      1.62  | Q       |         |         |       V |
19+25      11.7125      1.89  | Q       |         |         |       V |
19+30      11.7262      1.98  | Q       |         |         |       V |
19+35      11.7394      1.93  | Q       |         |         |       V |
19+40      11.7512      1.70  | Q       |         |         |       V |
19+45      11.7624      1.63  | Q       |         |         |       V |
19+50      11.7728      1.51  | Q       |         |         |       V |
19+55      11.7813      1.24  |Q        |         |         |       V |
20+ 0      11.7892      1.15  |Q        |         |         |       V |
20+ 5      11.7975      1.20  |Q        |         |         |       V |
20+10      11.8073      1.43  |Q        |         |         |       V |
20+15      11.8176      1.49  |Q        |         |         |       V |
20+20      11.8280      1.52  | Q       |         |         |       V |
20+25      11.8386      1.54  | Q       |         |         |       V |
20+30      11.8493      1.55  | Q       |         |         |       V |
20+35      11.8600      1.55  | Q       |         |         |       V |
20+40      11.8707      1.56  | Q       |         |         |       V |
20+45      11.8815      1.56  | Q       |         |         |       V |
20+50      11.8916      1.46  |Q        |         |         |       V |
20+55      11.8999      1.21  |Q        |         |         |       V |
21+ 0      11.9077      1.13  |Q        |         |         |        V|
21+ 5      11.9159      1.19  |Q        |         |         |        V|
21+10      11.9257      1.42  |Q        |         |         |        V|
21+15      11.9360      1.49  |Q        |         |         |        V|
21+20      11.9458      1.42  |Q        |         |         |        V|
21+25      11.9539      1.18  |Q        |         |         |        V|
21+30      11.9616      1.11  |Q        |         |         |        V|
21+35      11.9698      1.18  |Q        |         |         |        V|
21+40      11.9795      1.42  |Q        |         |         |        V|
21+45      11.9898      1.49  |Q        |         |         |        V|
21+50      11.9996      1.42  |Q        |         |         |        V|
21+55      12.0078      1.18  |Q        |         |         |        V|
22+ 0      12.0154      1.11  |Q        |         |         |        V|
22+ 5      12.0236      1.18  |Q        |         |         |        V|
22+10      12.0334      1.42  |Q        |         |         |        V|
22+15      12.0436      1.49  |Q        |         |         |        V|
22+20      12.0534      1.42  |Q        |         |         |        V|
22+25      12.0616      1.18  |Q        |         |         |        V|
22+30      12.0693      1.11  |Q        |         |         |        V|
22+35      12.0767      1.08  |Q        |         |         |        V|
22+40      12.0841      1.07  |Q        |         |         |        V|
22+45      12.0914      1.06  |Q        |         |         |        V|
22+50      12.0986      1.05  |Q        |         |         |        V|
22+55      12.1058      1.04  |Q        |         |         |        V|
23+ 0      12.1130      1.04  |Q        |         |         |        V|
23+ 5      12.1202      1.04  |Q        |         |         |        V|
23+10      12.1273      1.04  |Q        |         |         |        V|
23+15      12.1345      1.04  |Q        |         |         |        V|
23+20      12.1417      1.04  |Q        |         |         |        V|
23+25      12.1489      1.04  |Q        |         |         |        V|
```

```
   23+30      12.1560      1.04  |Q        |         |         |        V|
   23+35      12.1632      1.04  |Q        |         |         |        V|
   23+40      12.1704      1.04  |Q        |         |         |        V|
   23+45      12.1776      1.04  |Q        |         |         |        V|
   23+50      12.1848      1.04  |Q        |         |         |        V|
   23+55      12.1919      1.04  |Q        |         |         |        V|
   24+ 0      12.1991      1.04  |Q        |         |         |        V|
   24+ 5      12.2049      0.84  |Q        |         |         |        V|
   24+10      12.2072      0.34  Q         |         |         |        V|
   24+15      12.2084      0.18  Q         |         |         |        V|
   24+20      12.2091      0.10  Q         |         |         |        V|
   24+25      12.2096      0.06  Q         |         |         |        V|
   24+30      12.2098      0.03  Q         |         |         |        V|
   24+35      12.2099      0.02  Q         |         |         |        V|
   24+40      12.2099      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

PROPOSED CONDITION OFFSITE 100-YEAR, 3-HOUR PLUS BASE FLOW UNIT HYDROGRAPH

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  07/05/23 File: OFFSITEPROPONSITE1003100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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
OFFSITE UNIT HYDROGRAPH ANALYSIS
100 YEAR, 1 HOUR + ONSITE 100 YEAR
FN: OFFSITEPROPONSITE100.OUT-RSB
------------------------------------------------------------------
Drainage Area =      64.60(Ac.)  =      0.101 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      64.60(Ac.)  =
0.101 Sq. Mi.
Length along longest watercourse =    2500.00(Ft.)
Length along longest watercourse measured to centroid =    1250.00(Ft.)
Length along longest watercourse =      0.473 Mi.
Length along longest watercourse measured to centroid =      0.237 Mi.
Difference in elevation =      13.00(Ft.)
Slope along watercourse =     27.4560 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     5.00(CFS)

2 YEAR Area rainfall data:
```

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
64.60	0.80	51.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
64.60	1.90	122.74

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 = 99.97 %
Adjusted average point rain = 1.899(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
64.600	75.00	0.500

Total Area Entered = 64.60(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	75.0	0.303	0.500	0.167	1.000	0.167
					Sum (F) =	0.167

Area averaged mean soil loss (F) (In/Hr) = 0.167
Minimum soil loss rate ((In/Hr)) = 0.083
(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 (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	99.774	19.130	12.455
2	0.167	199.547	48.385	31.501
3	0.250	299.321	15.669	10.201
4	0.333	399.095	7.074	4.606
5	0.417	498.869	3.984	2.594
6	0.500	598.642	2.582	1.681
7	0.583	698.416	1.607	1.046
8	0.667	798.190	1.051	0.684

9	0.750	897.963	0.517	0.337
			Sum = 100.000	Sum= 65.105

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	(0.167)	0.148	0.148
2	0.17	1.30	0.296	(0.167)	0.148	0.148
3	0.25	1.10	0.251	(0.167)	0.125	0.125
4	0.33	1.50	0.342	0.167	(0.171)	0.175
5	0.42	1.50	0.342	0.167	(0.171)	0.175
6	0.50	1.80	0.410	0.167	(0.205)	0.244
7	0.58	1.50	0.342	0.167	(0.171)	0.175
8	0.67	1.80	0.410	0.167	(0.205)	0.244
9	0.75	1.80	0.410	0.167	(0.205)	0.244
10	0.83	1.50	0.342	0.167	(0.171)	0.175
11	0.92	1.60	0.365	0.167	(0.182)	0.198
12	1.00	1.80	0.410	0.167	(0.205)	0.244
13	1.08	2.20	0.501	0.167	(0.251)	0.335
14	1.17	2.20	0.501	0.167	(0.251)	0.335
15	1.25	2.20	0.501	0.167	(0.251)	0.335
16	1.33	2.00	0.456	0.167	(0.228)	0.289
17	1.42	2.60	0.593	0.167	(0.296)	0.426
18	1.50	2.70	0.615	0.167	(0.308)	0.449
19	1.58	2.40	0.547	0.167	(0.274)	0.380
20	1.67	2.70	0.615	0.167	(0.308)	0.449
21	1.75	3.30	0.752	0.167	(0.376)	0.586
22	1.83	3.10	0.707	0.167	(0.353)	0.540
23	1.92	2.90	0.661	0.167	(0.331)	0.494
24	2.00	3.00	0.684	0.167	(0.342)	0.517
25	2.08	3.10	0.707	0.167	(0.353)	0.540
26	2.17	4.20	0.957	0.167	(0.479)	0.791
27	2.25	5.00	1.140	0.167	(0.570)	0.973
28	2.33	3.50	0.798	0.167	(0.399)	0.631
29	2.42	6.80	1.550	0.167	(0.775)	1.383
30	2.50	7.30	1.664	0.167	(0.832)	1.497
31	2.58	8.20	1.869	0.167	(0.935)	1.702
32	2.67	5.90	1.345	0.167	(0.672)	1.178
33	2.75	2.00	0.456	0.167	(0.228)	0.289
34	2.83	1.80	0.410	0.167	(0.205)	0.244
35	2.92	1.80	0.410	0.167	(0.205)	0.244
36	3.00	0.60	0.137	(0.167)	0.068	0.068
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	17.0

Flood volume = Effective rainfall 1.41(In)
times area 64.6(Ac.)/[(In)/(Ft.)] = 7.6(Ac.Ft)

```
Total soil loss =      0.49(In)
Total soil loss =     2.612(Ac.Ft)
Total rainfall =      1.90(In)
Flood volume =      331632.8 Cubic Feet
Total soil loss =      113787.4 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =     99.640(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       25.0      50.0      75.0     100.0
-----------------------------------------------------------------------
  0+ 5       0.0472      6.85  V Q       |         |         |         |
  0+10       0.1265     11.52  V   Q     |         |         |         |
  0+15       0.2142     12.74  V    Q    |         |         |         |
  0+20       0.3060     13.33  |V   Q    |         |         |         |
  0+25       0.4097     15.05  |V    Q   |         |         |         |
  0+30       0.5238     16.56  | V   Q   |         |         |         |
  0+35       0.6490     18.19  | V    Q  |         |         |         |
  0+40       0.7714     17.78  |  V   Q  |         |         |         |
  0+45       0.9068     19.66  |  V   Q  |         |         |         |
  0+50       1.0405     19.40  |   V  Q  |         |         |         |
  0+55       1.1631     17.81  |    V Q  |         |         |         |
  1+ 0       1.2909     18.55  |    V Q  |         |         |         |
  1+ 5       1.4364     21.13  |     V Q |         |         |         |
  1+10       1.6048     24.45  |      V Q|         |         |         |
  1+15       1.7808     25.55  |      V  Q         |         |         |
  1+20       1.9565     25.51  |       V Q         |         |         |
  1+25       2.1360     26.07  |        VQ         |         |         |
  1+30       2.3454     30.39  |         V Q       |         |         |
  1+35       2.5629     31.58  |         |VQ       |         |         |
  1+40       2.7771     31.10  |         | Q       |         |         |
  1+45       3.0159     34.68  |         |  Q      |         |         |
  1+50       3.2848     39.04  |         |   VQ    |         |         |
  1+55       3.5514     38.72  |         |    Q    |         |         |
  2+ 0       3.8124     37.90  |         |    QV   |         |         |
  2+ 5       4.0789     38.68  |         |    Q V  |         |         |
  2+10       4.3729     42.69  |         |      Q V|         |         |
  2+15       4.7391     53.18  |         |         VQ        |         |
  2+20       5.1343     57.38  |         |         | Q       |         |
  2+25       5.5411     59.06  |         |         |  QV     |         |
  2+30       6.1072     82.20  |         |         |     V   | Q       |
  2+35       6.7640     95.37  |         |         |        V|       Q |
  2+40       7.4503     99.64  |         |         |         | V      Q|
  2+45       7.9765     76.41  |         |         |         Q   V     |
```

```
    2+50       8.2852     44.83  |         |      Q  |         |     V   |
    2+55       8.5141     33.24  |         |  Q      |         |      V  |
    3+ 0       8.6932     26.00  |         Q         |         |       V |
    3+ 5       8.8087     16.77  |     Q   |         |         |       V |
    3+10       8.8833     10.84  |   Q     |         |         |       V |
    3+15       8.9387      8.04  |  Q      |         |         |        V|
    3+20       8.9830      6.44  | Q       |         |         |        V|
    3+25       9.0218      5.63  | Q       |         |         |        V|
    3+30       9.0585      5.32  | Q       |         |         |        V|
    3+35       9.0938      5.13  | Q       |         |         |        V|
    3+40       9.1284      5.02  | Q       |         |         |         V
-------------------------------------------------------------------
```

BASIN ROUTING 100-YEAR, 3-HOUR PLUS BASE FLOW STORM EVENT

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
             Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2022
                        Study date: 08/29/23

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


HILLWOOD-ETHANAC
100-YR 3-HR ROUTING, 5 CFS INFLOW
22-0198
2023-08-29 RSB
------------------------------------------------------------------


Program License Serial Number 6584

------------------------------------------------------------------
******************** HYDROGRAPH INFORMATION *********************

                From study/file name: OFFSITEPROPONSITE1003100.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =    44
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       99.640 (CFS)
                Total volume =       9.128 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*******************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
------------------------------------------------------------------
Total number of inflow hydrograph intervals = 44
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------
------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
```

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.100	0.060	10.000	0.026	0.094
1.000	0.580	10.000	0.546	0.614
2.000	1.160	10.000	1.126	1.194
3.000	1.730	10.000	1.696	1.764
4.000	2.310	10.000	2.276	2.344
5.000	2.890	10.000	2.856	2.924
6.000	3.470	10.000	3.436	3.504
7.000	4.050	10.000	4.016	4.084
8.000	4.630	10.000	4.596	4.664
9.000	5.200	10.000	5.166	5.234
10.000	5.780	10.000	5.746	5.814
10.500	6.070	15.500	6.017	6.123
11.000	6.360	15.500	6.307	6.413
12.000	6.940	15.500	6.887	6.993

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 24.9 49.82 74.73 99.64	Depth (Ft.)
0.083	6.85	2.50	0.015	O I | | | | |	0.02
0.167	11.52	7.37	0.044	| OI | | | | |	0.07
0.250	12.74	10.00	0.068	| OI | | | | |	0.11
0.333	13.33	10.00	0.089	| OI | | | | |	0.15
0.417	15.05	10.00	0.118	| OI | | | | |	0.20
0.500	16.56	10.00	0.158	| O I | | | | |	0.27
0.583	18.19	10.00	0.209	| O I | | | | |	0.36
0.667	17.78	10.00	0.263	| O I | | | | |	0.45
0.750	19.66	10.00	0.324	| O I | | | | |	0.56
0.833	19.40	10.00	0.389	| O I | | | | |	0.67
0.917	17.81	10.00	0.448	| O I | | | | |	0.77
1.000	18.55	10.00	0.505	| O I | | | | |	0.87
1.083	21.13	10.00	0.573	| O I | | | | |	0.99
1.167	24.45	10.00	0.661	| O I| | | | |	1.14
1.250	25.55	10.00	0.764	| O I | | | | |	1.32
1.333	25.51	10.00	0.871	| O I | | | | |	1.50
1.417	26.07	10.00	0.980	| O I | | | | |	1.69
1.500	30.39	10.00	1.105	| O |I | | | |	1.91
1.583	31.58	10.00	1.250	| O | I | | | |	2.16
1.667	31.10	10.00	1.397	| O |I | | | |	2.42
1.750	34.68	10.00	1.554	| O | I | | | |	2.69

1.833	39.04	10.00	1.739	O	I				3.02
1.917	38.72	10.00	1.938	O	I				3.36
2.000	37.90	10.00	2.133	O	I				3.70
2.083	38.68	10.00	2.328	O	I				4.03
2.167	42.69	10.00	2.539	O	I				4.40
2.250	53.18	10.00	2.801	O	I				4.85
2.333	57.38	10.00	3.113	O	I				5.38
2.417	59.06	10.00	3.445	O	I				5.96
2.500	82.20	10.00	3.862	O			I		6.68
2.583	95.37	10.00	4.405	O				I	7.61
2.667	99.64	10.00	5.008	O				I	8.66
2.750	76.41	10.00	5.545	O		I			9.59
2.833	44.83	12.02	5.887	O	I				10.18
2.917	33.24	15.33	6.061	O	I				10.48
3.000	26.00	15.50	6.159	O	I				10.65
3.083	16.77	15.50	6.199	OI					10.72
3.167	10.84	15.50	6.188	IO					10.70
3.250	8.04	15.50	6.146	I O					10.63
3.333	6.44	15.50	6.089	I O					10.53
3.417	5.63	14.68	6.027	I O					10.43
3.500	5.32	13.55	5.967	I O					10.32
3.583	5.13	12.53	5.913	I O					10.23
3.667	5.02	11.62	5.865	I O					10.15
3.750	0.00	10.50	5.806	I O					10.05
3.833	0.00	10.00	5.736	I O					9.92
3.917	0.00	10.00	5.667	I O					9.81
4.000	0.00	10.00	5.598	I O					9.69
4.083	0.00	10.00	5.529	I O					9.57
4.167	0.00	10.00	5.460	I O					9.45
4.250	0.00	10.00	5.391	I O					9.33
4.333	0.00	10.00	5.323	I O					9.21
4.417	0.00	10.00	5.254	I O					9.09
4.500	0.00	10.00	5.185	I O					8.97
4.583	0.00	10.00	5.116	I O					8.85
4.667	0.00	10.00	5.047	I O					8.73
4.750	0.00	10.00	4.978	I O					8.61
4.833	0.00	10.00	4.909	I O					8.49
4.917	0.00	10.00	4.840	I O					8.37
5.000	0.00	10.00	4.772	I O					8.25
5.083	0.00	10.00	4.703	I O					8.13
5.167	0.00	10.00	4.634	I O					8.01
5.250	0.00	10.00	4.565	I O					7.89
5.333	0.00	10.00	4.496	I O					7.77
5.417	0.00	10.00	4.427	I O					7.65
5.500	0.00	10.00	4.358	I O					7.53
5.583	0.00	10.00	4.290	I O					7.41
5.667	0.00	10.00	4.221	I O					7.29
5.750	0.00	10.00	4.152	I O					7.18
5.833	0.00	10.00	4.083	I O					7.06
5.917	0.00	10.00	4.014	I O					6.94

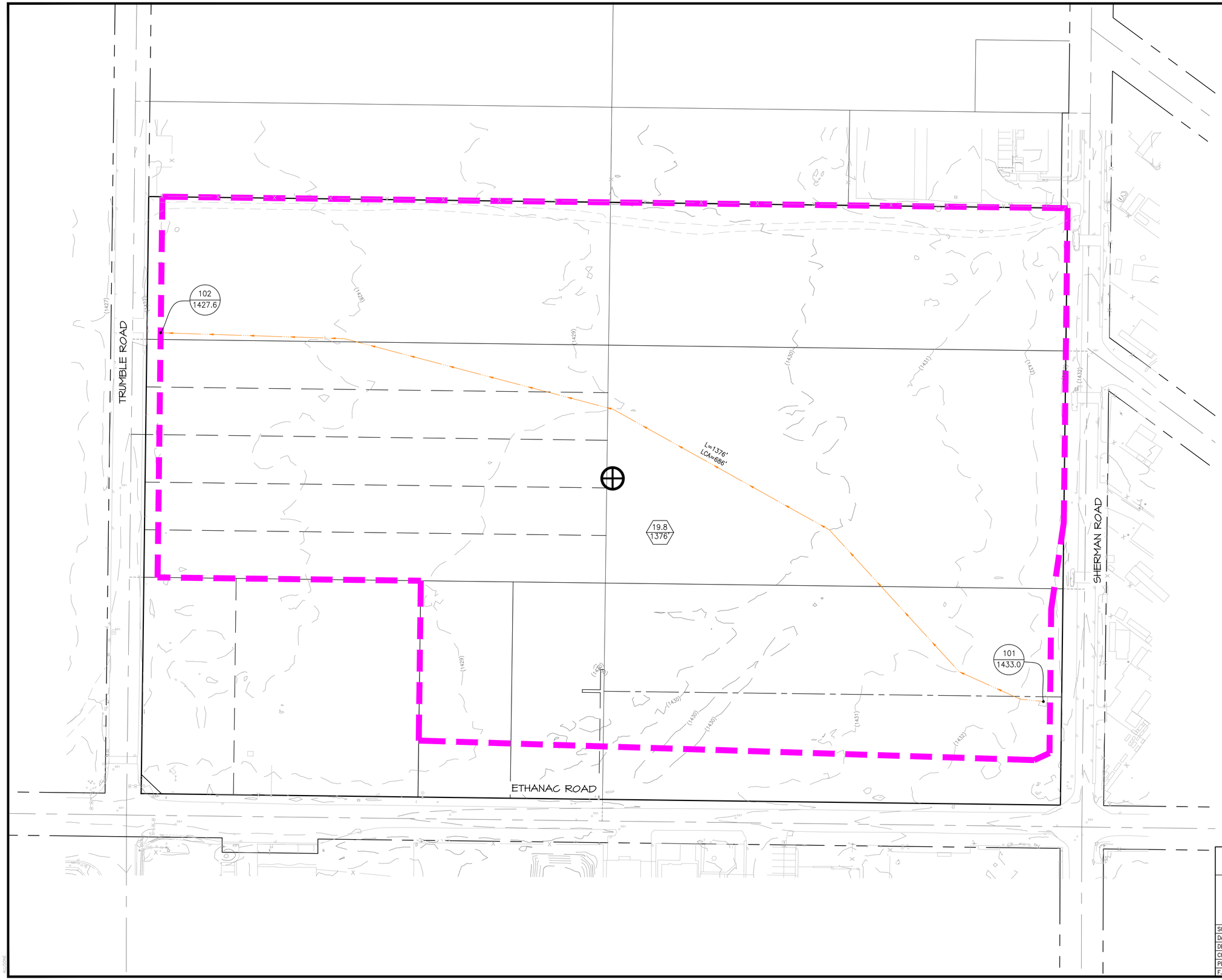
6.000	0.00	10.00	3.945	I	O				6.82
6.083	0.00	10.00	3.876	I	O				6.70
6.167	0.00	10.00	3.807	I	O				6.58
6.250	0.00	10.00	3.739	I	O				6.46
6.333	0.00	10.00	3.670	I	O				6.34
6.417	0.00	10.00	3.601	I	O				6.23
6.500	0.00	10.00	3.532	I	O				6.11
6.583	0.00	10.00	3.463	I	O				5.99
6.667	0.00	10.00	3.394	I	O				5.87
6.750	0.00	10.00	3.325	I	O				5.75
6.833	0.00	10.00	3.256	I	O				5.63
6.917	0.00	10.00	3.188	I	O				5.51
7.000	0.00	10.00	3.119	I	O				5.39
7.083	0.00	10.00	3.050	I	O				5.28
7.167	0.00	10.00	2.981	I	O				5.16
7.250	0.00	10.00	2.912	I	O				5.04
7.333	0.00	10.00	2.843	I	O				4.92
7.417	0.00	10.00	2.774	I	O				4.80
7.500	0.00	10.00	2.706	I	O				4.68
7.583	0.00	10.00	2.637	I	O				4.56
7.667	0.00	10.00	2.568	I	O				4.44
7.750	0.00	10.00	2.499	I	O				4.33
7.833	0.00	10.00	2.430	I	O				4.21
7.917	0.00	10.00	2.361	I	O				4.09
8.000	0.00	10.00	2.292	I	O				3.97
8.083	0.00	10.00	2.223	I	O				3.85
8.167	0.00	10.00	2.155	I	O				3.73
8.250	0.00	10.00	2.086	I	O				3.61
8.333	0.00	10.00	2.017	I	O				3.49
8.417	0.00	10.00	1.948	I	O				3.38
8.500	0.00	10.00	1.879	I	O				3.26
8.583	0.00	10.00	1.810	I	O				3.14
8.667	0.00	10.00	1.741	I	O				3.02
8.750	0.00	10.00	1.672	I	O				2.90
8.833	0.00	10.00	1.604	I	O				2.78
8.917	0.00	10.00	1.535	I	O				2.66
9.000	0.00	10.00	1.466	I	O				2.54
9.083	0.00	10.00	1.397	I	O				2.42
9.167	0.00	10.00	1.328	I	O				2.29
9.250	0.00	10.00	1.259	I	O				2.17
9.333	0.00	10.00	1.190	I	O				2.05
9.417	0.00	10.00	1.121	I	O				1.93
9.500	0.00	10.00	1.053	I	O				1.81
9.583	0.00	10.00	0.984	I	O				1.70
9.667	0.00	10.00	0.915	I	O				1.58
9.750	0.00	10.00	0.846	I	O				1.46
9.833	0.00	10.00	0.777	I	O				1.34
9.917	0.00	10.00	0.708	I	O				1.22
10.000	0.00	10.00	0.639	I	O				1.10
10.083	0.00	10.00	0.571	I	O				0.98

```
10.167    0.00   10.00      0.502  I  O    |       |       |       |     0.86
10.250    0.00   10.00      0.433  I  O    |       |       |       |     0.75
10.333    0.00   10.00      0.364  I  O    |       |       |       |     0.63
10.417    0.00   10.00      0.295  I  O    |       |       |       |     0.51
10.500    0.00   10.00      0.226  I  O    |       |       |       |     0.39
10.583    0.00   10.00      0.157  I  O    |       |       |       |     0.27
10.667    0.00   10.00      0.088  I  O    |       |       |       |     0.15
10.750    0.00    5.72      0.034  IO      |       |       |       |     0.06
10.833    0.00    1.55      0.009  O       |       |       |       |     0.02
10.917    0.00    0.42      0.003  O       |       |       |       |     0.00
11.000    0.00    0.11      0.001  O       |       |       |       |     0.00
11.083    0.00    0.03      0.000  O       |       |       |       |     0.00

        ****************************HYDROGRAPH DATA****************************
                        Number of intervals =   133
                        Time interval =    5.0 (Min.)
                        Maximum/Peak flow rate =       15.500 (CFS)
                        Total volume =       9.128 (Ac.Ft)
                Status of hydrographs being held in storage
                           Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
                Peak (CFS)      0.000     0.000     0.000     0.000     0.000
                Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
        ***********************************************************************

        ----------------------------------------------------------------------
```

UNIT HYDROGRAPH HYDROLOGY MAPS



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

N W 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: 9/6/23			SHEET 1
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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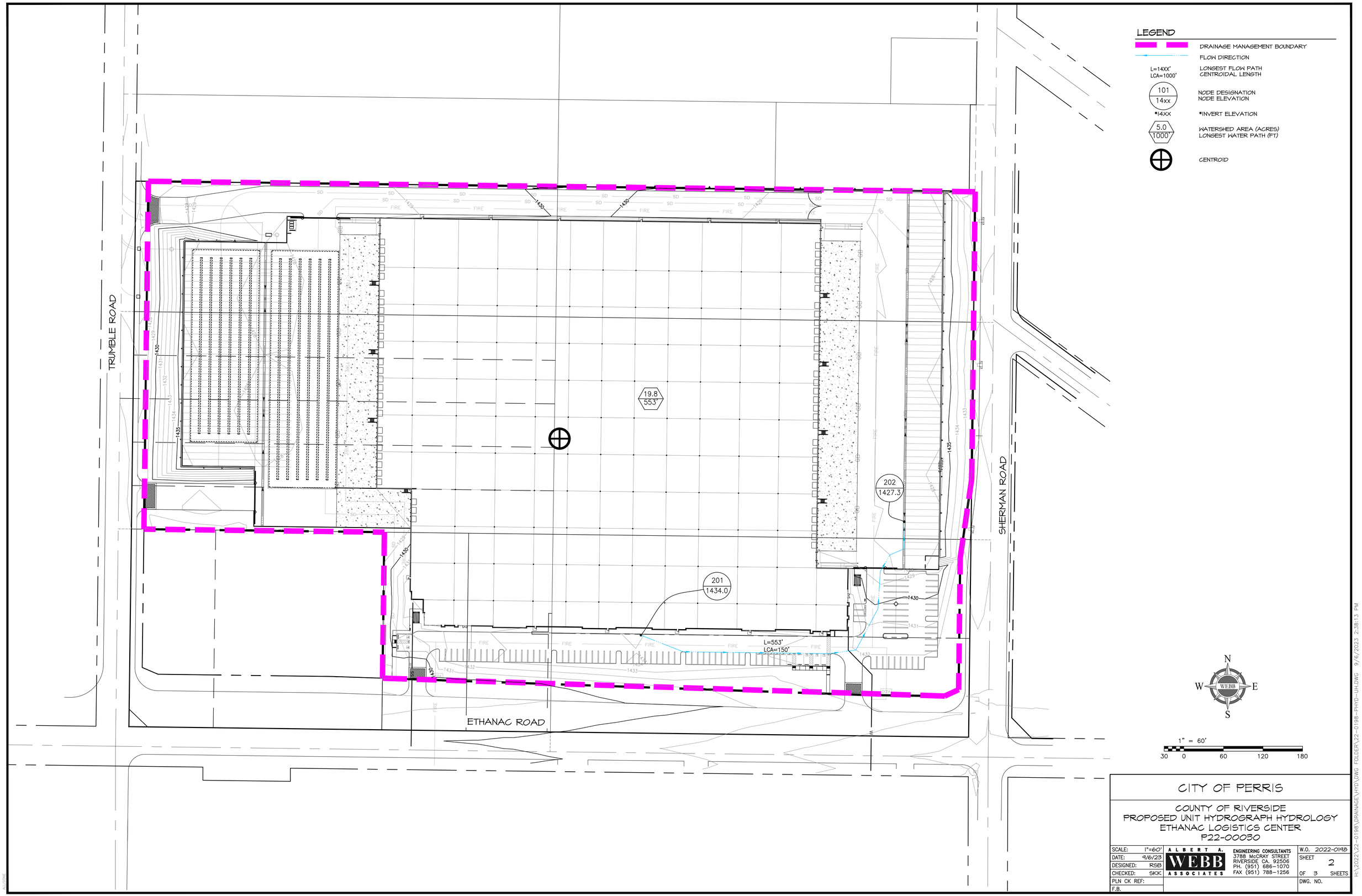
ALLSHAF

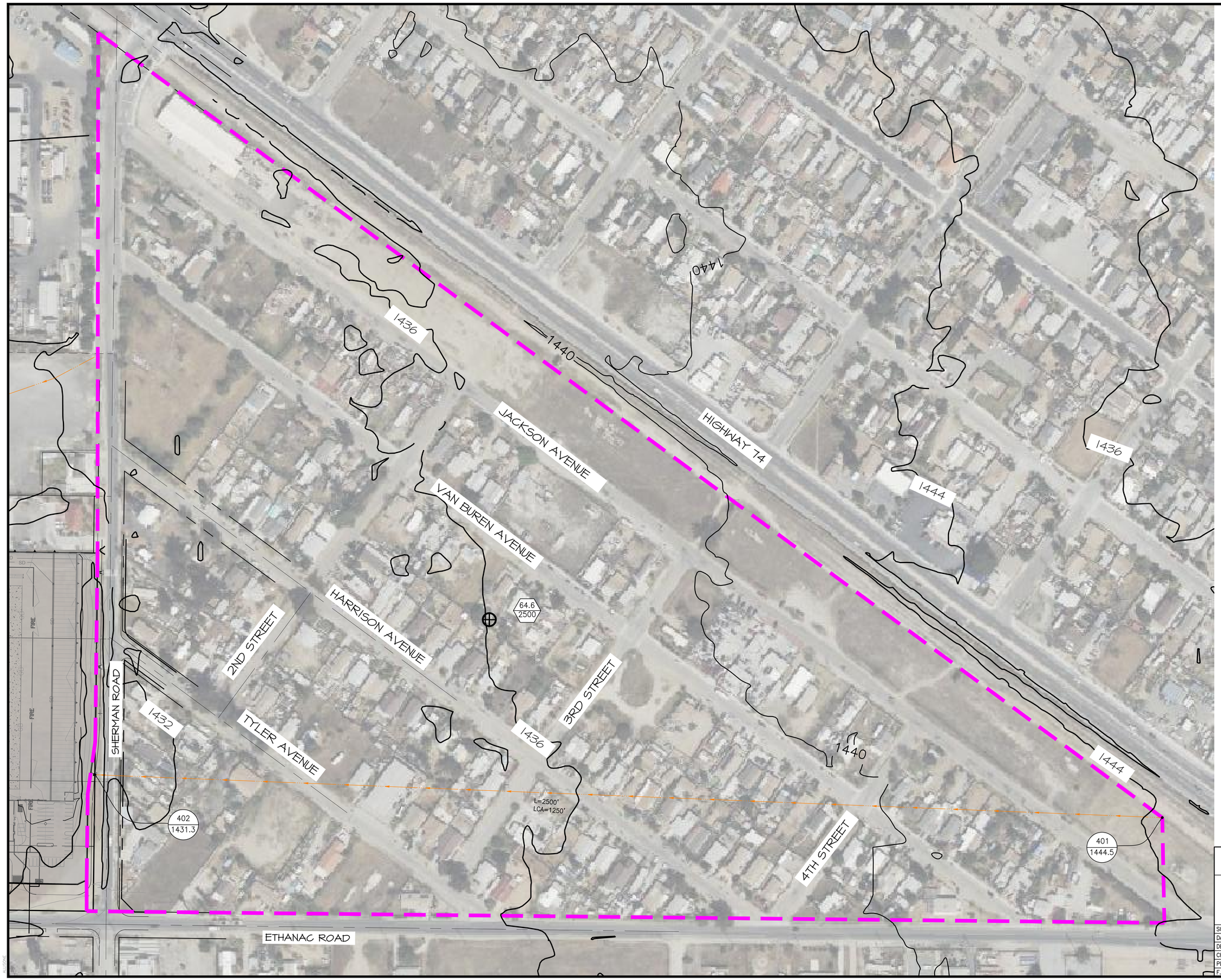


CITY OF PERRIS

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: 9/6/23			SHEET 2
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-PHYD-UH.DWG 9/6/2023 2:38:13 PM



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

N W E S

1" = 100'

50 0 100 200 300

CITY OF PERRIS

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

SCALE: 1"=100'	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: 9/6/23			SHEET 3
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

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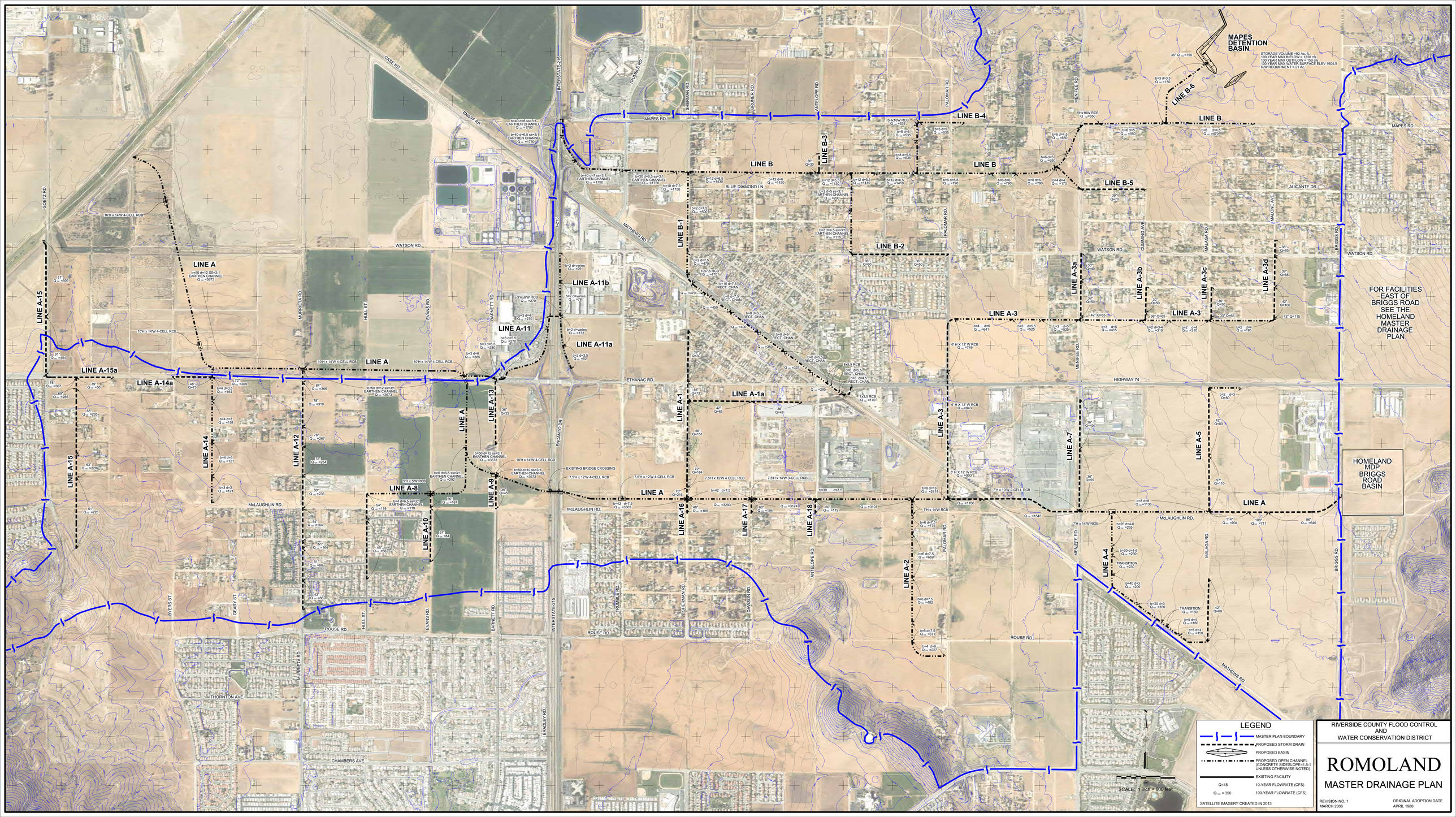
APPENDIX D – REFERENCES

ROMOLAND MASTER DRAINAGE PLAN


MAPES DETENTION BASIN
STORAGE VOLUME =92 Ac.-ft.
100 YEAR MAX INFLOW = 1230 cfs
100 YEAR MAX OUTFLOW = 150 cfs
100 YEAR MAX WATER SURFACE ELEV 1604.5
R/W REQUIRMENT = 21 Ac.
FOR FACILITIES EAST OF BRIGGS ROAD SEE THE HOMELAND MASTER DRAINAGE PLAN
HOMELAND MDP BRIGGS ROAD BASIN
LINE A
LINE A-1
LINE A-1a
LINE A-2
LINE A-3
LINE A-3a
LINE A-3b
LINE A-3c
LINE A-3d
LINE A-4
LINE A-5
LINE A-7
LINE A-8
LINE A-9
LINE A-10
LINE A-11
LINE A-11a
LINE A-11b
LINE A-12
LINE A-13
LINE A-14
LINE A-14a
LINE A-15
LINE A-15a
LINE A-16
LINE A-17
LINE A-18
LINE B
LINE B-1
LINE B-2
LINE B-3
LINE B-4
LINE B-5
LINE B-6
MAPES RD.
WATSON RD.
ETHANAC RD.
McLAUGHLIN RD.
ROUSE RD.
HIGHWAY 74
ALICANTE DR.
THORNTON AVE.
CHAMBERS AVE.
MATHEWS RD.
INTERSTATE-215
I-215
BNSF RR
CASE RD.
GOETZ RD.
MURRIETA RD.
HULL ST.
EVANS RD.
BARNETT RD.
ENCANTO DR.
BYERS ST.
GEARY ST.
BRADLEY RD.
TRUMBLE RD.
SHERMAN RD.
PALMER RD.
ANTELOPE RD.
DAWSON RD.
PALOMAR RD.
MENIFEE RD.
MALAGA RD.
CLIMMING AVE.
MALONE AVE.
BRIGGS RD.
BLUE DIAMOND LN.
EXISTING BRIDGE CROSSING
SCALE: 1 inch = 600 feet
LEGEND
MASTER PLAN BOUNDARY
PROPOSED STORM DRAIN
PROPOSED BASIN
PROPOSED OPEN CHANNEL (CONCRETE SIDESLOPE=1:1 UNLESS OTHERWISE NOTED)
EXISTING FACILITY
Q=45 10-YEAR FLOWRATE (CFS)
Q 100 = 350 100-YEAR FLOWRATE (CFS)
SATELLITE IMAGERY CREATED IN 2013
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
ROMOLAND
MASTER DRAINAGE PLAN
REVISION NO. 1
MARCH 2006
ORIGINAL ADOPTION DATE
APRIL 1988

ILLINOIS AVENUE LINE A STORM DRAIN PLAN P8-921

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.

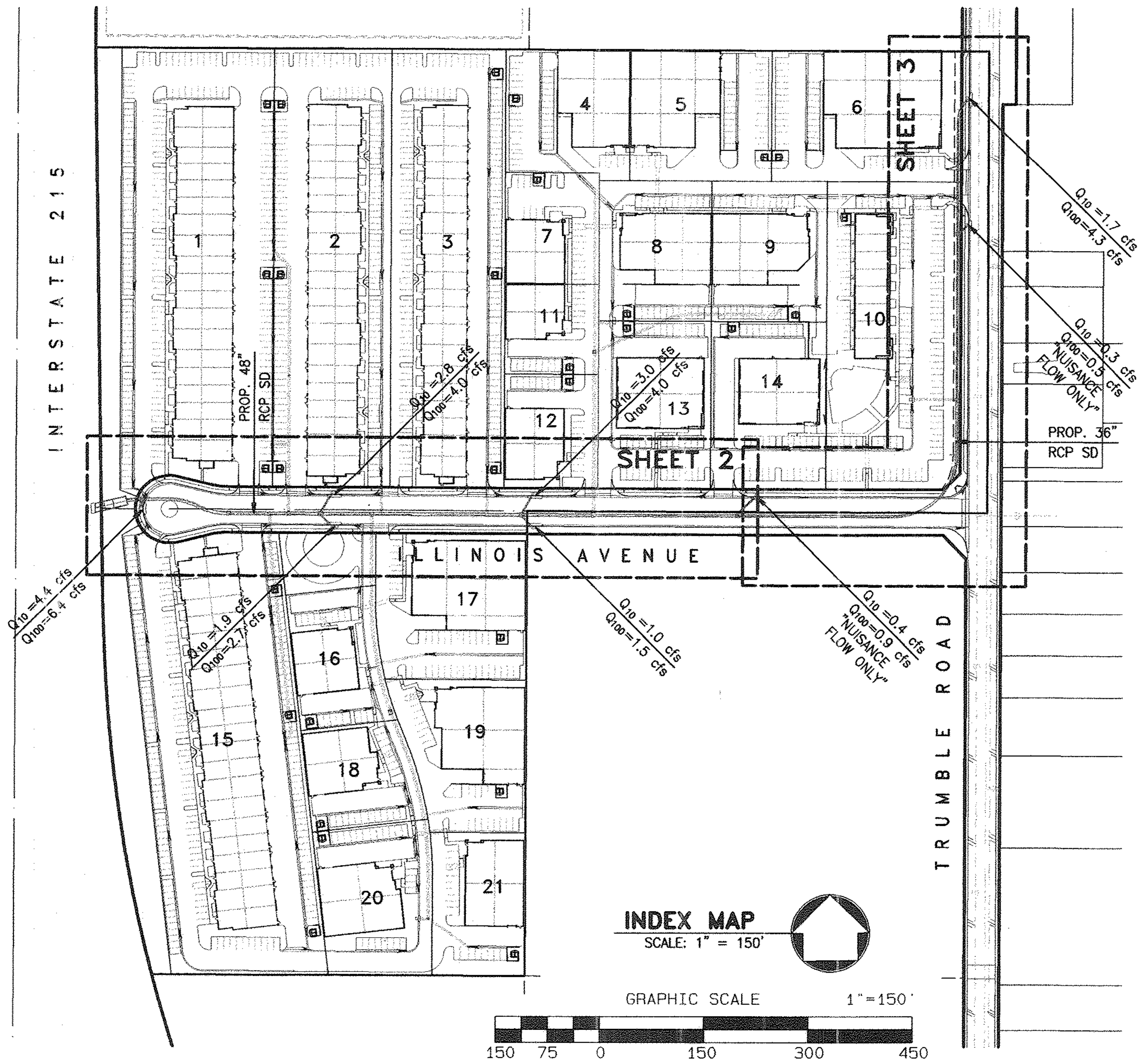
THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. LOCATIONS OF UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

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

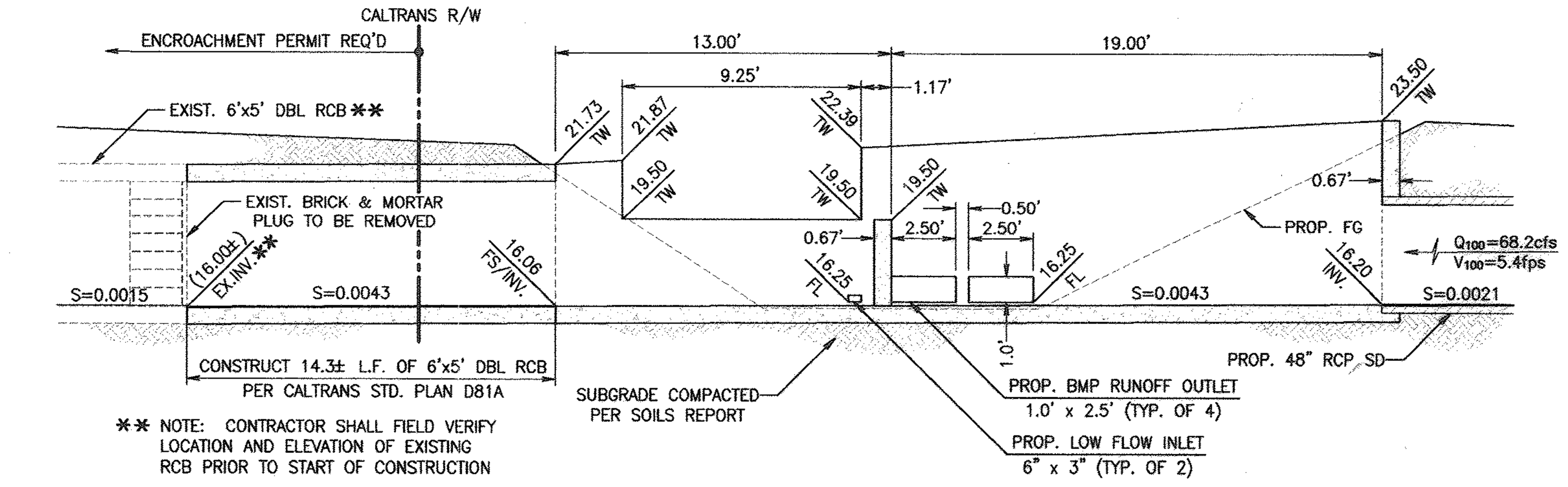
ALL ON–SITE STORM DRAIN AND PRIVATE LATERALS REFERRED TO ON THESE PLANS ARE TO BE CONSTRUCTED PER SEPARATE ON–SITE DRAINAGE PLANS AND CONCURRENTLY WITH PUBLIC STORM DRAIN SHOWN HEREON.



INDEX MAP

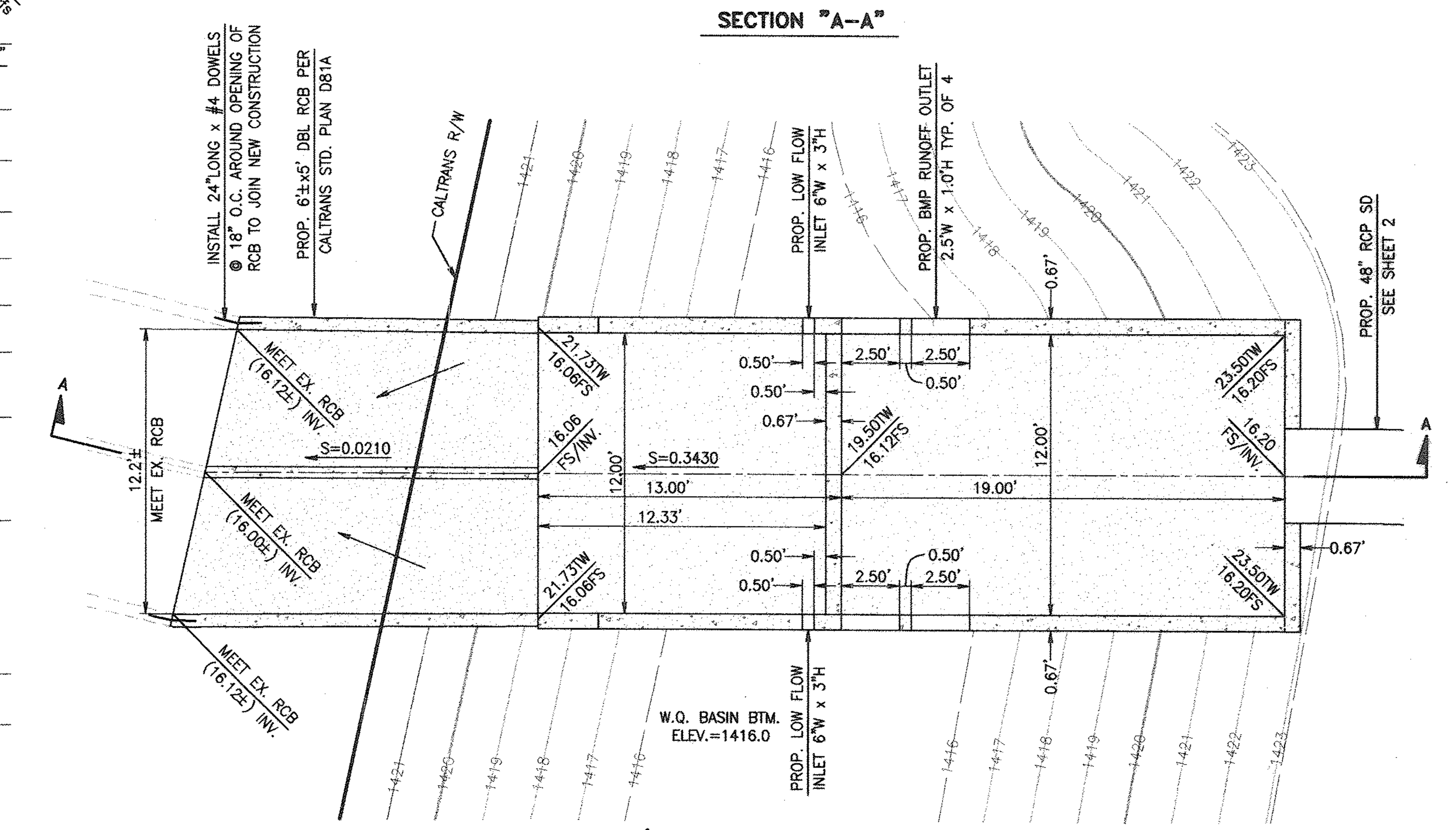
SCALE: 1" = 150'

GRAPHIC SCALE 1"=150'



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

SECTION "A–A"

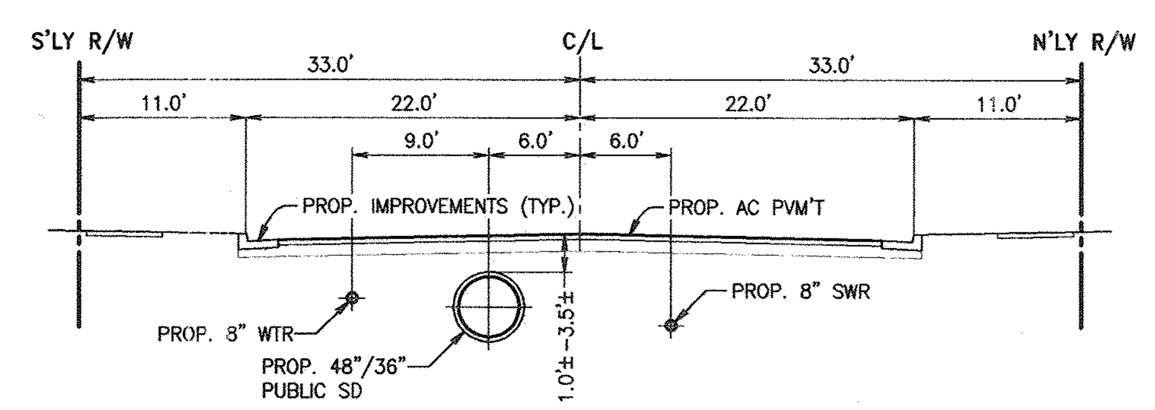


WEIR/FOREBAY STRUCTURE DETAIL

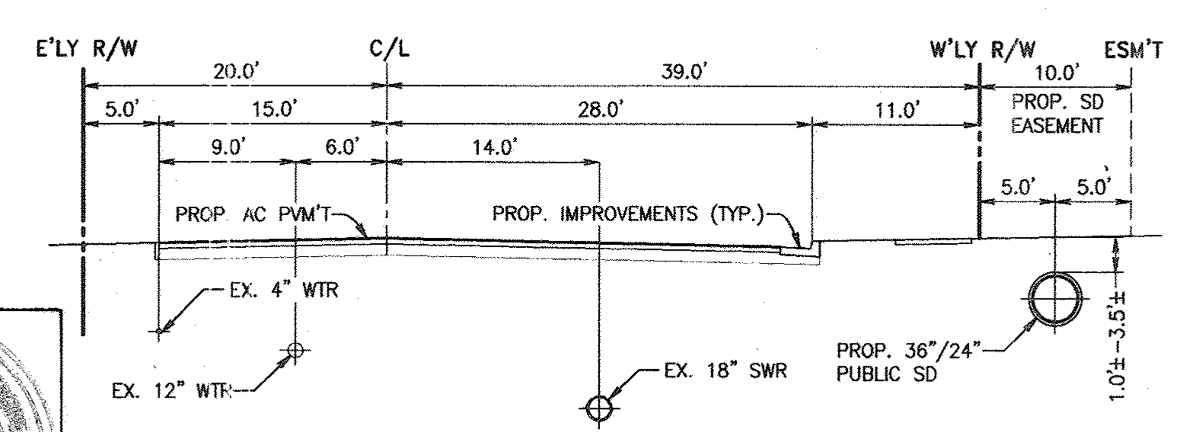
SCALE: 1" = 5'

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



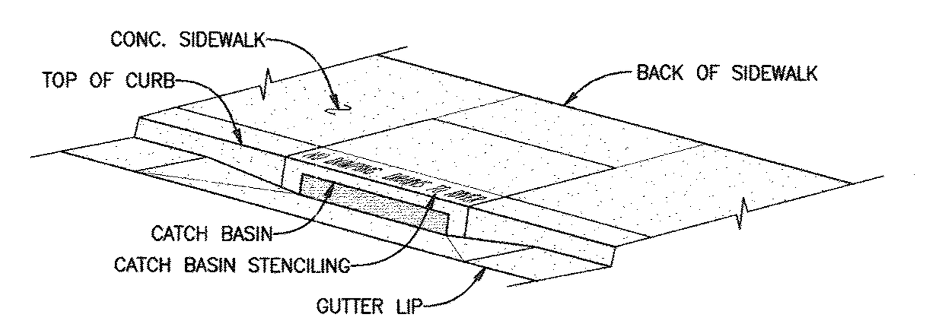
UNDERGROUND UTILITIES TYPICAL SECTION
ILLINOIS AVENUE
NOT TO SCALE



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



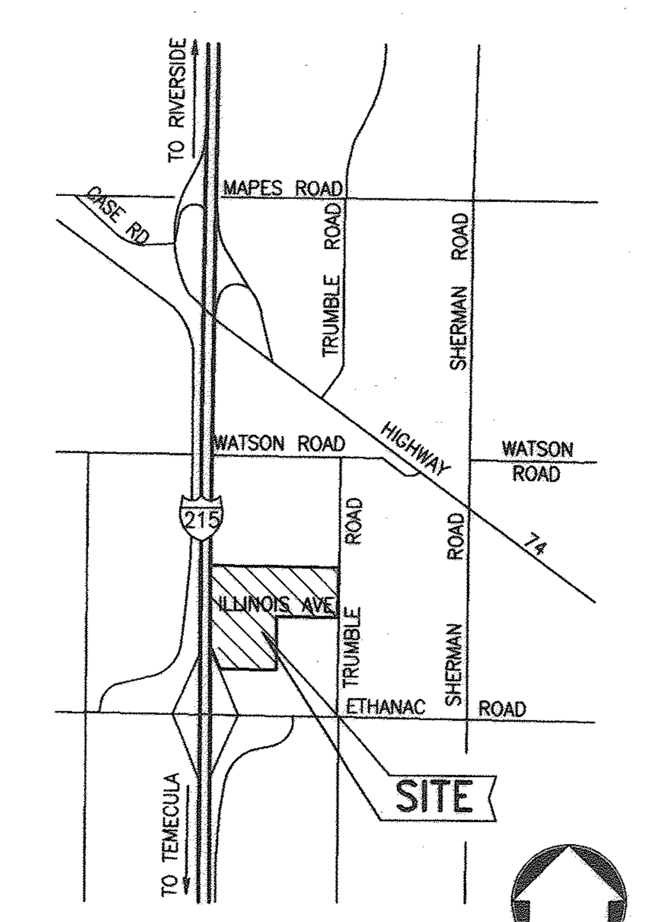
CATCH BASIN STENCILING DETAIL

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

SHEET 1 TITLE SHEET
SHEET 2 STA 10+00 TO 19+00 – PLAN & PROFILE
SHEET 3 STA 19+00 TO 28+06 – PLAN & PROFILE



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

AS BUILT
THESE PLANS REFLECT ANY SUBSTANTIAL DESIGN MODIFICATIONS AS PROVIDED TO WEBB ASSOCIATES BY THE CONTRACTOR
SCOTT R. HILDEBRANDT 10-3-08
DATE
R.C.E. C44762

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 SEVICE 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: P8–921

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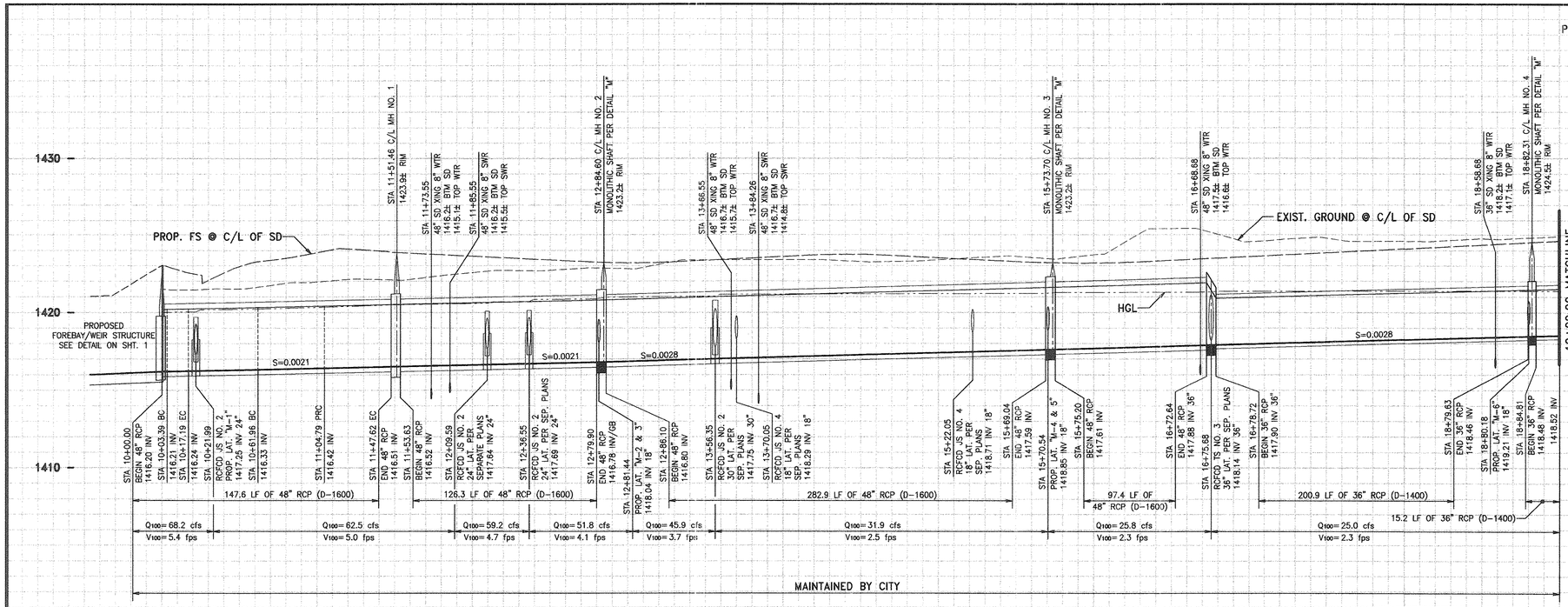
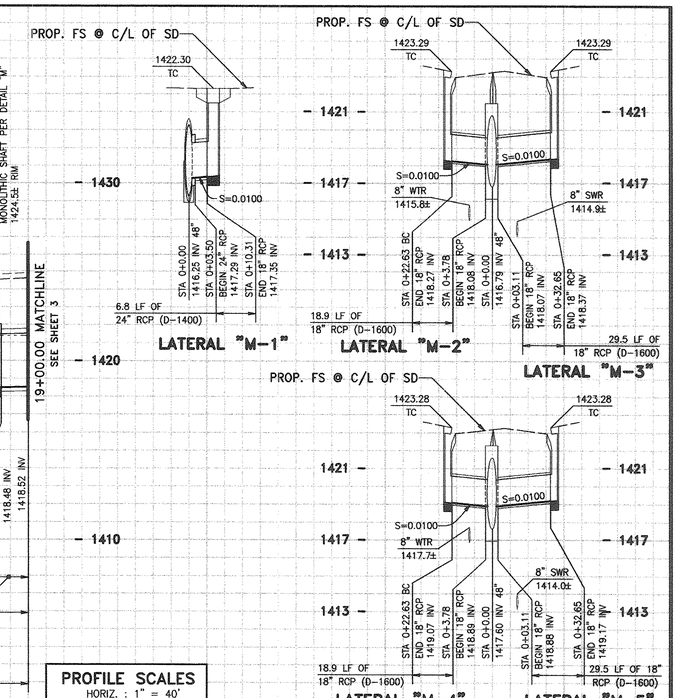
16575 P-412





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

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

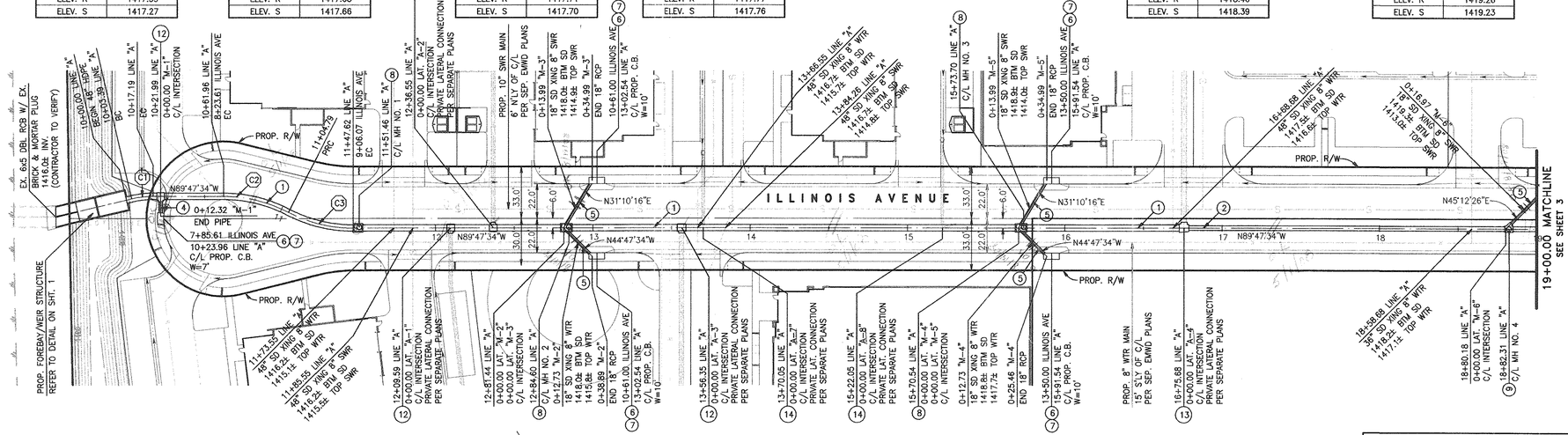
TS STA 16+75.68	
ANGLE A	90°00'00"
B	36"
C	3.67'
D_1 & D_2	48" & 36"
L	6.08'
ELEV. R	1418.40
ELEV. S	1418.39

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

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

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



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'

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

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

16575 P-412

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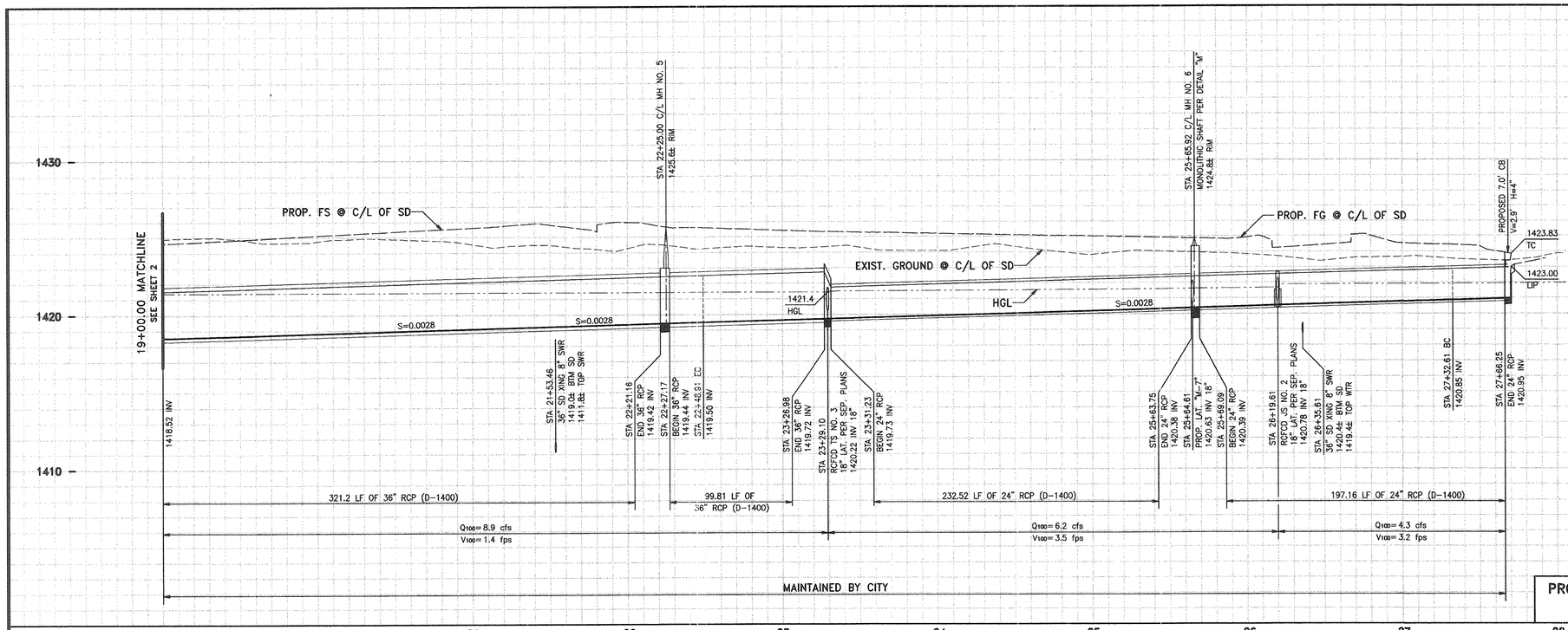
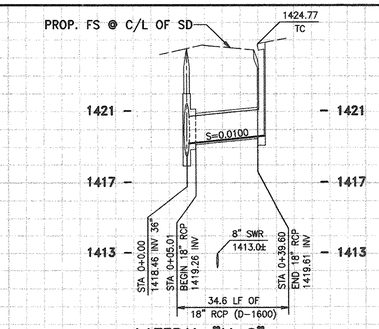
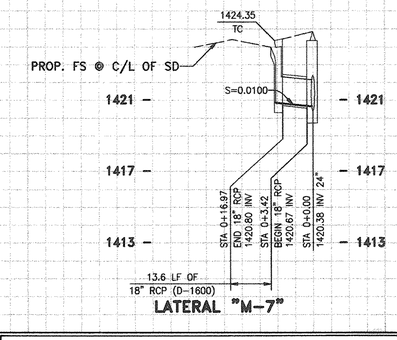


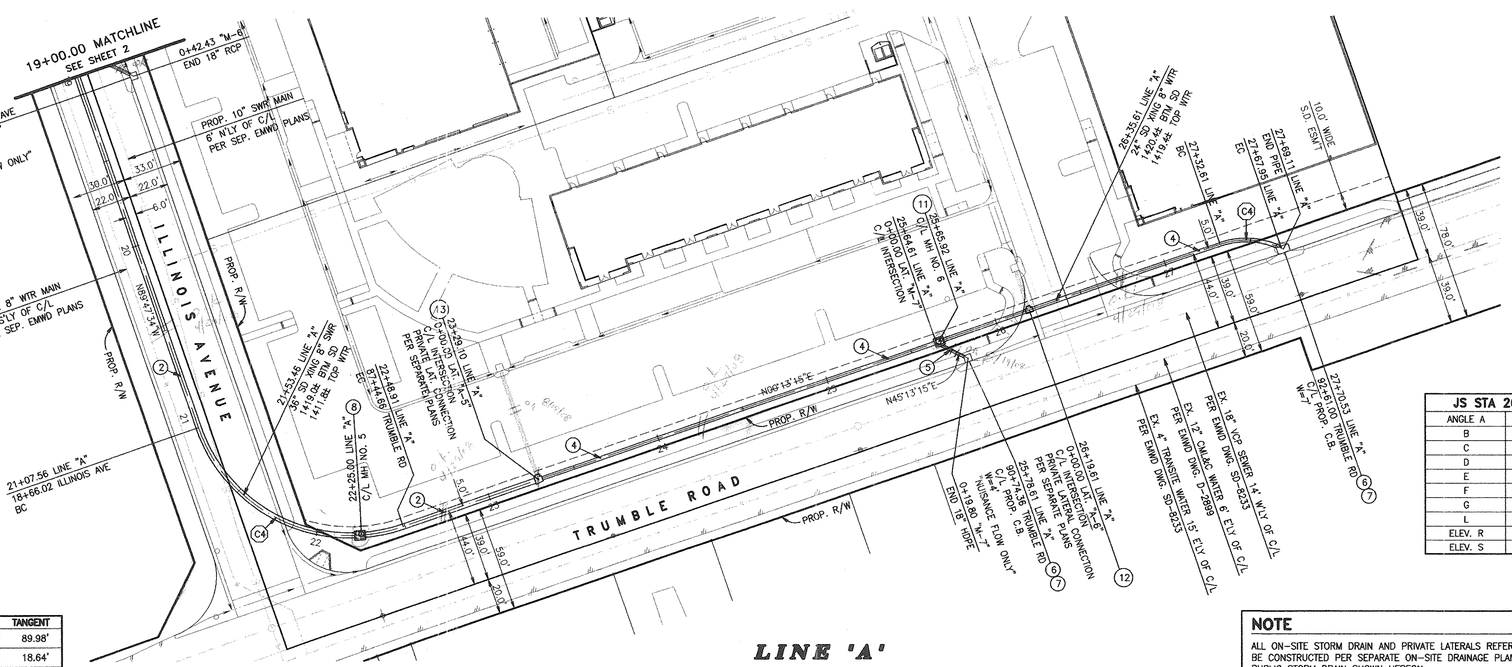


LATERAL "M-6"



LATERAL "M-7"

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 03-08 DATE
R.C.E. C44762

REGISTERED PROFESSIONAL ENGINEER SCOTT R. WILDEBRANDT No. C44762 EXP. 3/31/10 CIVIL STATE OF CALIFORNIA

CONSTRUCTION NOTES

1. INSTALL 48" RCP, D-LOAD PER PLAN
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3. INTENTIONALLY LEFT BLANK
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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)
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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
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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.

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
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		

ENGINEER | CITY
DESIGNED BY: RB DRAWN BY: BTE CHECKED BY: RB

SEAL

SEAL

APPROVED BY: DATE: 2-2-07
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 34062)
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

16575 P-412

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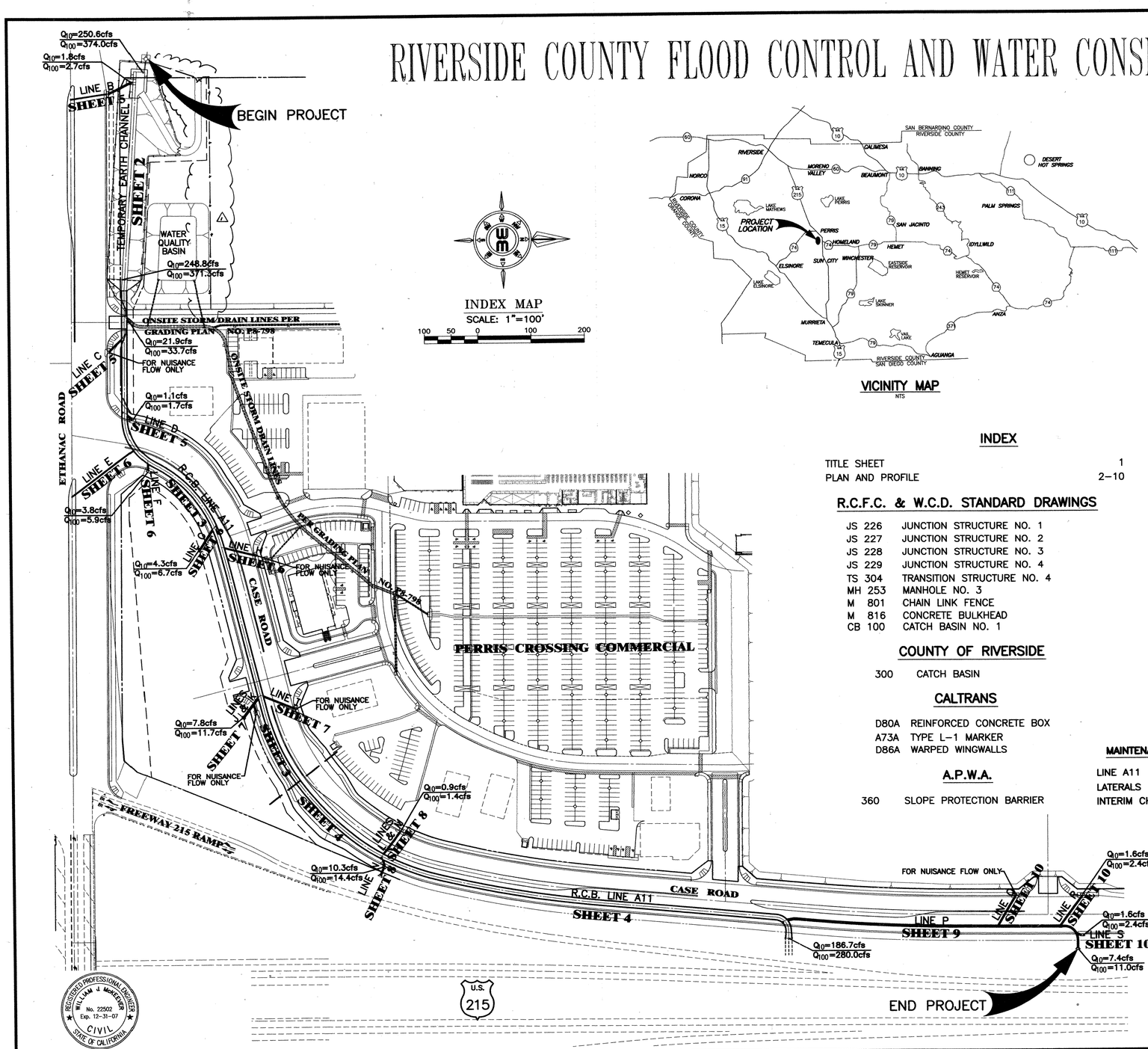
MDP LINE A-11 STORM DRAIN PLAN P8-798

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



INDEX MAP
SCALE: 1"=100'
100 50 0 100 200

VICINITY MAP
NTS

INDEX

TITLE SHEET 1
PLAN AND PROFILE 2–10

R.C.F.C. & W.C.D. STANDARD DRAWINGS

JS 226	JUNCTION STRUCTURE NO. 1
JS 227	JUNCTION STRUCTURE NO. 2
JS 228	JUNCTION STRUCTURE NO. 3
JS 229	JUNCTION STRUCTURE NO. 4
TS 304	TRANSITION STRUCTURE NO. 4
MH 253	MANHOLE NO. 3
M 801	CHAIN LINK FENCE
M 816	CONCRETE BULKHEAD
CB 100	CATCH BASIN NO. 1

COUNTY OF RIVERSIDE

300 CATCH BASIN

CALTRANS

D80A REINFORCED CONCRETE BOX
A73A TYPE L–1 MARKER
D86A WARPED WINGWALLS

A.P.W.A.

360 SLOPE PROTECTION BARRIER

MAINTENANCE RESPONSIBILITY

LINE A11	CITY OF PERRIS
LATERALS	CITY OF PERRIS
INTERIM CHANNEL	CITY OF PERRIS

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 M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 2004.
2. CONSTRUCTION INSPECTION WILL BE PERFORMED BY CITY OF PERRIS. THE CITY MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
3. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
5. FORTY–EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1–800–422–4133 AND/OR 1800–227–2600.
6. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
7. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
10. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI–2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
11. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
12. 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.
13. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
14. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
15. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
16. APPROVAL OF THESE PLANS BY THE CITY DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
17. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
18. VIDEO'S OF ALL STORM DRAINS SHALL BE SUBMITTED TO THE CITY ENGINEER.

CONSTRUCTION NOTES AND QUANTITIES

REFERENCE/S	CONSTRUCTION NOTE	QUANTITY
1	CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION SHEET 2.	388 L.F.
2	CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS SHEET 2.	1 EA.
3	CONSTRUCT WARPED WINGWALL PER CALTRANS STD. PLAN D86A. W=32.7' AND 29' L=30.8' AND 34.3'	1 EA.
4	CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.	2,022 L.F.
5	INSTALL SLOPE PROTECTION BARRIER PER A.P.W.A. STD. PLAN 360.	1 EA.
6	PLACE 4" THICK CONCRETE SLAB.	1,567 S.F.
7	CONSTRUCT 3" A.C. OVER NATIVE.	3,542 S.F.
8 20	CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226.	2 EA.
30 34 36	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227	3 EA.
9 10 11 12 13 14 15 18 19 32	CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228.	10 EA.
16	CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.	4 EA.
17	REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.	385 L.F.
21	CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. TS304.	1 EA.
22	CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.	5 EA.
23	INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.	382 L.F.
24	INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.	635 L.F.
25	INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.	232 L.F.
26	INSTALL 8" NDS–10 ROUND GRATES PER NAT'L DIVERSIFIED SALES, INC. OR APPROVED EQUAL.	3 EA.
27	CONSTRUCT CONCRETE DROP INLET PER RCFCD STD. DWG. NO. CB110.	2 EA.
28	CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.	3 EA.
29	INSTALL 30" RCP 1500D. SLOPE PER PLAN.	45 L.F.
33	CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.	2 EA.
35	CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251	3 EA.
38	INSTALL MARKERS PER CALTRANS STD. PLAN A73A TYPE L–1 ALONG CHANNEL AT 100' O.C.	5 EA.
39	INSTALL 36" RCP 1500D. SLOPE PER PLAN.	510 L.F.
40	CONSTRUCT CHAIN LINK FENCE PER RCFCD STD. DWG. NO. M801.	145 L.F.
41	CONSTRUCT RCB CURVED SECTIONS PER RCFCD STD. DWG. NO. M819.	38 L.F.
42	INSTALL 4 L.F. 48" STUB AT S=0.0354.	4 L.F.
43	CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.	1 EA.
44	CONSTRUCT GROUTED 12" MIN. DIA. ROCK AROUND PUMP 2' THICK AND 2' DEPTH.	128 C.F.
45	CONSTRUCT CATCH BASIN NO. 1 PER COUNTY OF RCFCD STD. DWG. NO. CB100.	7 EA.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341–3700
FAX: (951) 341–3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE

CITY OF PERRIS
CITY FILE NO. P8–798
APPROVED BY:
CITY ENGINEER DATE

DIG ALERT
CALL: TOLL FREE
1–800
227–2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600–31–68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT REV. INDEX MAP ADD FENCE & BASIN		

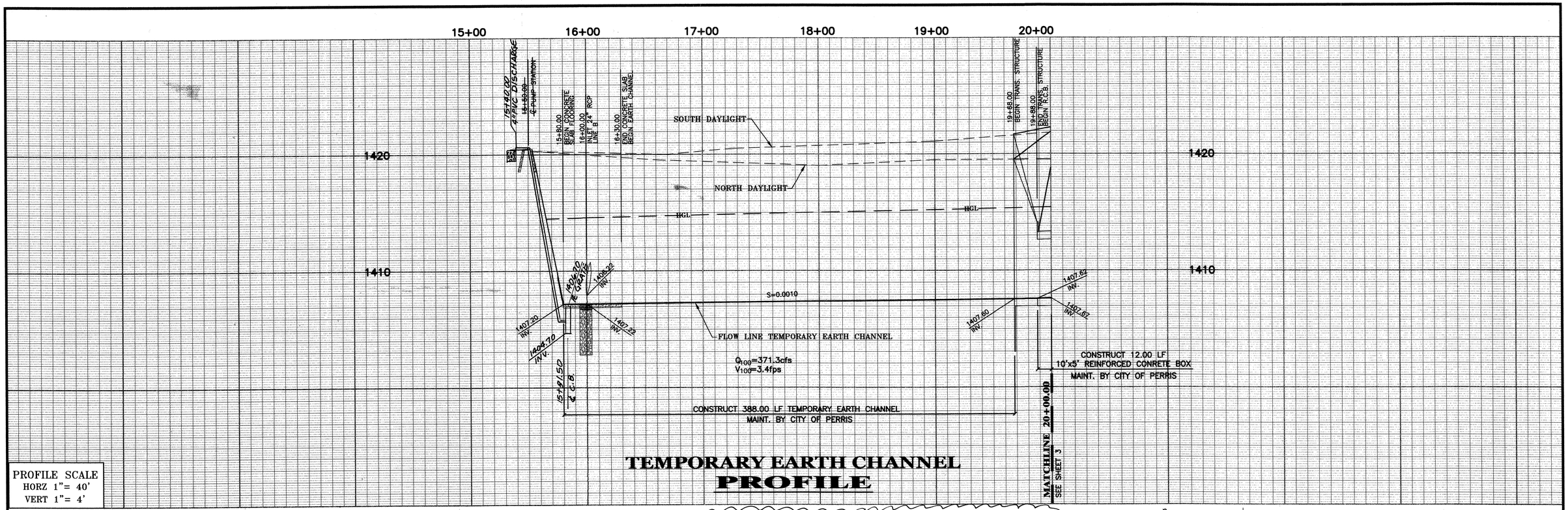
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
TEMPORARY EARTH CHANNEL, ROMOLAND MDP LINE A11 AND LATERALS
TITLE SHEET

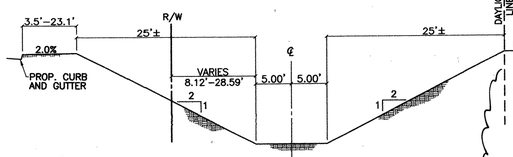
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 1 OF 10

P-397



PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'

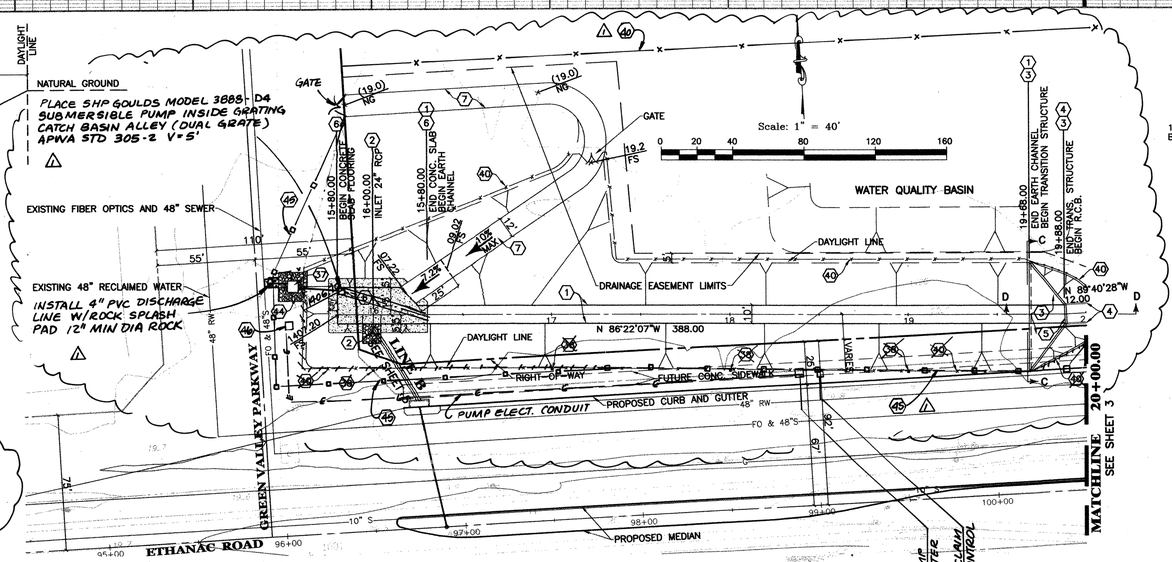
TEMPORARY EARTH CHANNEL PROFILE



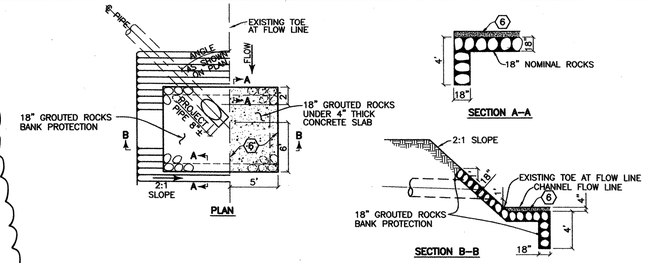
1 TRAPEZOIDAL EARTH CHANNEL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

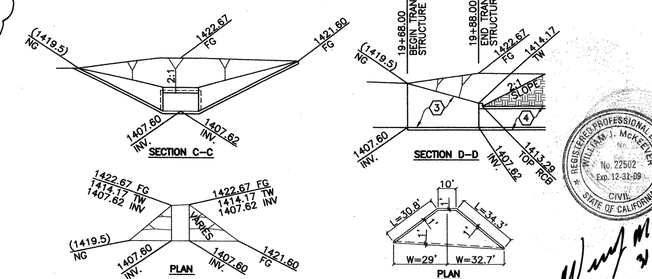
1. CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION ABOVE.
2. CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS RIGHT.
3. CONSTRUCT WARPED WINGWALL PER CALTRANS STD. PLAN D86A. W=32.7' AND 29' L=30.8' AND 34.3'
4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
5. INSTALL SLOPE PROTECTION BARRIER PER A.P.W.A. STD. PLAN 360.
6. PLACE 4" THICK CONCRETE SLAB.
7. CONSTRUCT 3" A.C. OVER NATIVE.
37. ~~FUTURE PUMP PAD~~ 5'WIDE 3'THICK CONC. SPLASH PAD
38. ~~INSTALL MARKERS PER CALTRANS STD. PLAN A73A TYPE L-1 ALONG CHANNEL AT 100' O.C.~~
40. CONSTRUCT CHAIN LINK FENCE PER RCFCD STD. DWG. NO. M801.
44. CONSTRUCT GROUTED 12" MIN. DIA. ROCK AROUND ~~PUMP~~ SPLASH PAD 2' THICK AND 2' DEPTH.
45. 6' WROUGHT IRON FENCE
46. PUMP CONTROL PAD



TEMPORARY EARTH CHANNEL PLAN



2 PIPE THRU EARTHEN CHANNEL DETAILS
N.T.S.



3 WARPED WINGWALL DETAILS
N.T.S.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER DATE

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT REV FENCE LOCATION & TYPE ADD DISCHARGE LINE, ELECT LINE AND METERS ADD PUMP, BASIN AND SPLASH PAD NOTES		

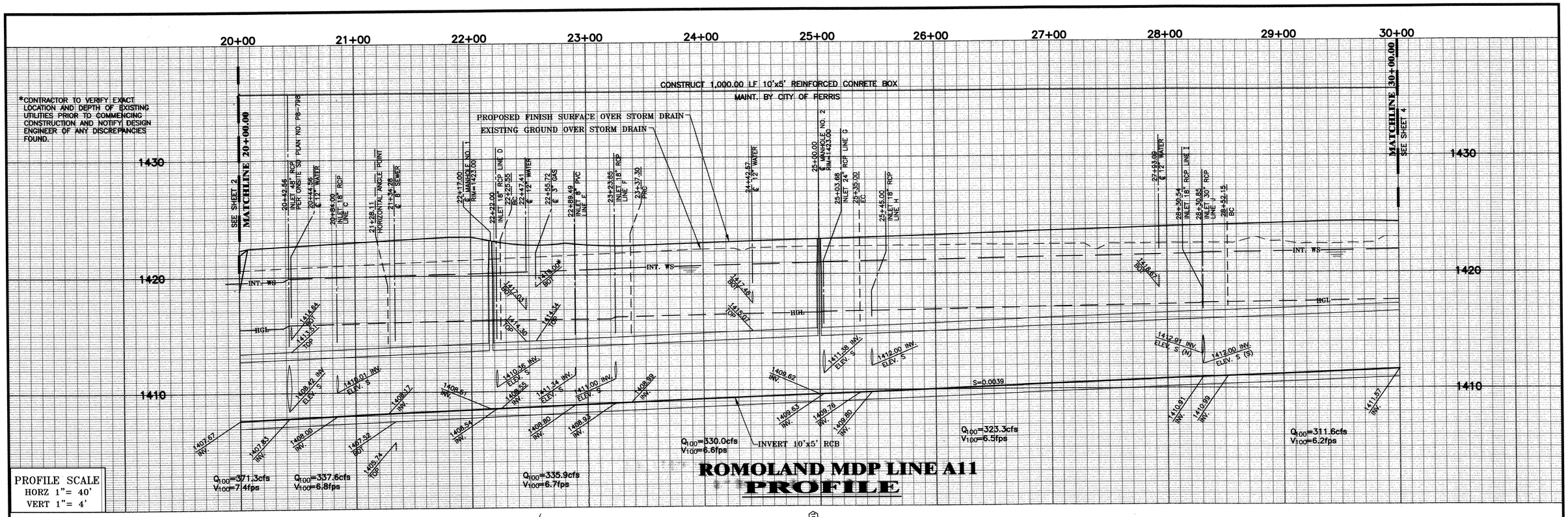
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
TEMPORARY
EARTH CHANNEL
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 2 OF 10

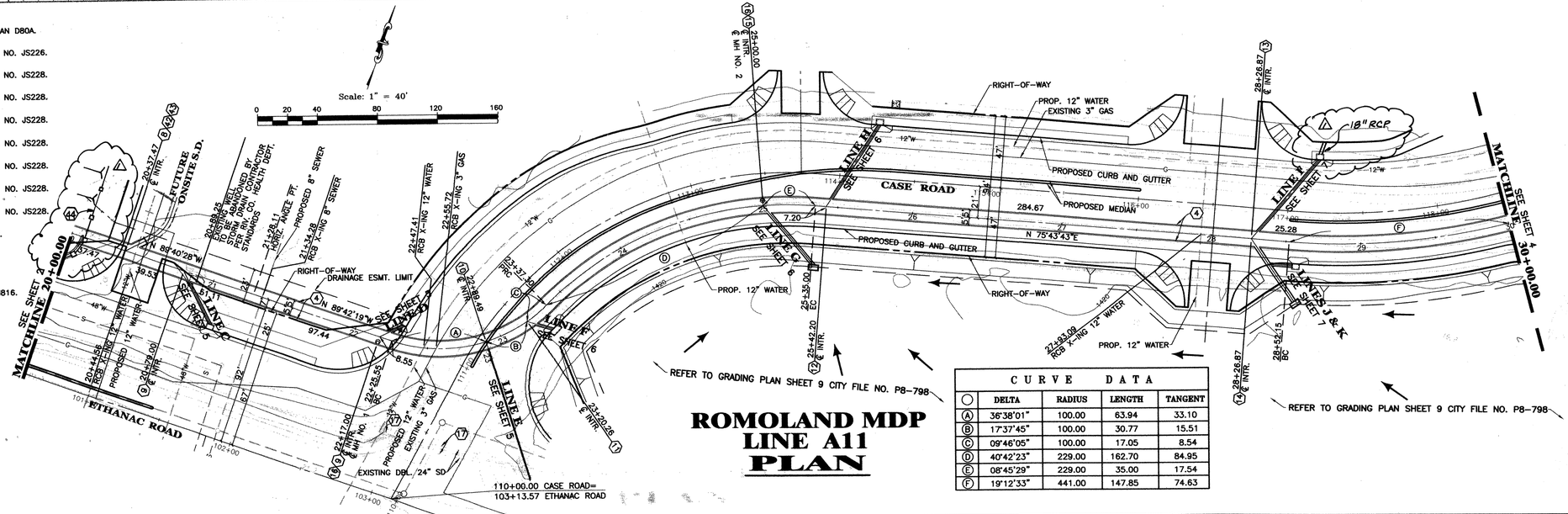
P-397



ROMOLAND MDP LINE A11 PROFILE

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
8. CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=44°29'32" B=48" C=11.55" ELEV. "R"=1408.56
9. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=45°00'00" D=18"
10. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=90°00'00" D=8"
11. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=52°33'30" D=18"
12. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=60°43'43" D=18"
13. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=53°45'04" D=18"
14. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=51°28'18" D=30"
15. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=54°23'26" B=24"
16. CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.
17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
42. INSTALL 4 L.F. 48" STUB AT S=0.0354.
43. CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.
44. CONSTRUCT 6' WROUGHT IRON FENCE



ROMOLAND MDP LINE A11 PLAN

CURVE DATA				
	DELTA	RADIUS	LENGTH	TANGENT
A	36°38'01"	100.00	63.94	33.10
B	17°37'45"	100.00	30.77	15.51
C	09°46'05"	100.00	17.05	8.54
D	40°42'23"	229.00	162.70	84.95
E	08°45'29"	229.00	35.00	17.54
F	19°12'33"	441.00	147.85	74.63

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS-BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740

WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/14/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY: — CITY ENGINEER — DATE 12-26-06

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST.
ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT ADD W.I FENCE 18"R.C.P.		

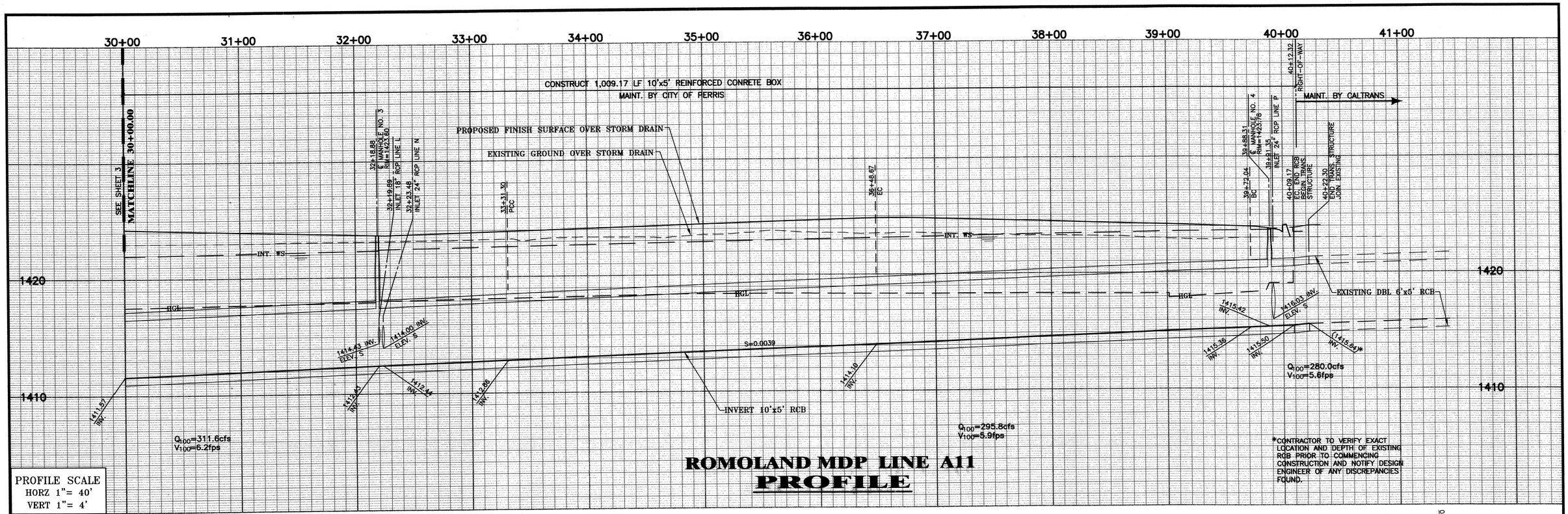
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
ROMOLAND MDP
LINE A11
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 3 OF 10

P-397



PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'

ROMOLAND MDP LINE A11
PROFILE

CONSTRUCTION NOTES:

(4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.

(16) CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.

(17) REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.

(18) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=78°43'51" D=18"

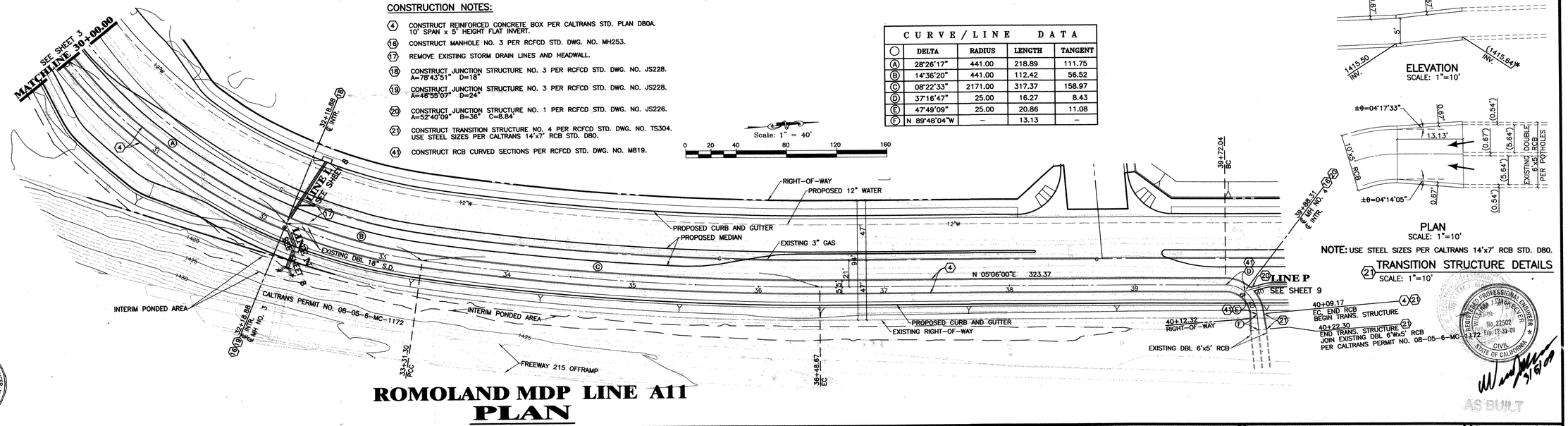
(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=46°55'07" D=24"

(20) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=52°40'09" B=36" C=8.84'

(21) CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFCD STD. DWG. NO. TS304. USE STEEL SIZES PER CALTRANS 14'x7' RCB STD. D80.

(41) CONSTRUCT RCB CURVED SECTIONS PER RCFCD STD. DWG. NO. M819.

CURVE / LINE DATA				
○	DELTA	RADIUS	LENGTH	TANGENT
(A)	28°26'17"	441.00	218.89	111.75
(B)	14°36'20"	441.00	112.42	56.52
(C)	08°22'33"	2171.00	317.37	158.97
(D)	37°16'47"	25.00	16.27	8.43
(E)	47°49'09"	25.00	20.86	11.08
(F)	N 89°48'04"W	–	13.13	–



NOTE: USE STEEL SIZES PER CALTRANS 14'x7' RCB STD. D80.

(21) TRANSITION STRUCTURE DETAILS
SCALE: 1"=10'

ROMOLAND MDP LINE A11
PLAN

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 11/8/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE 12-26-06

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

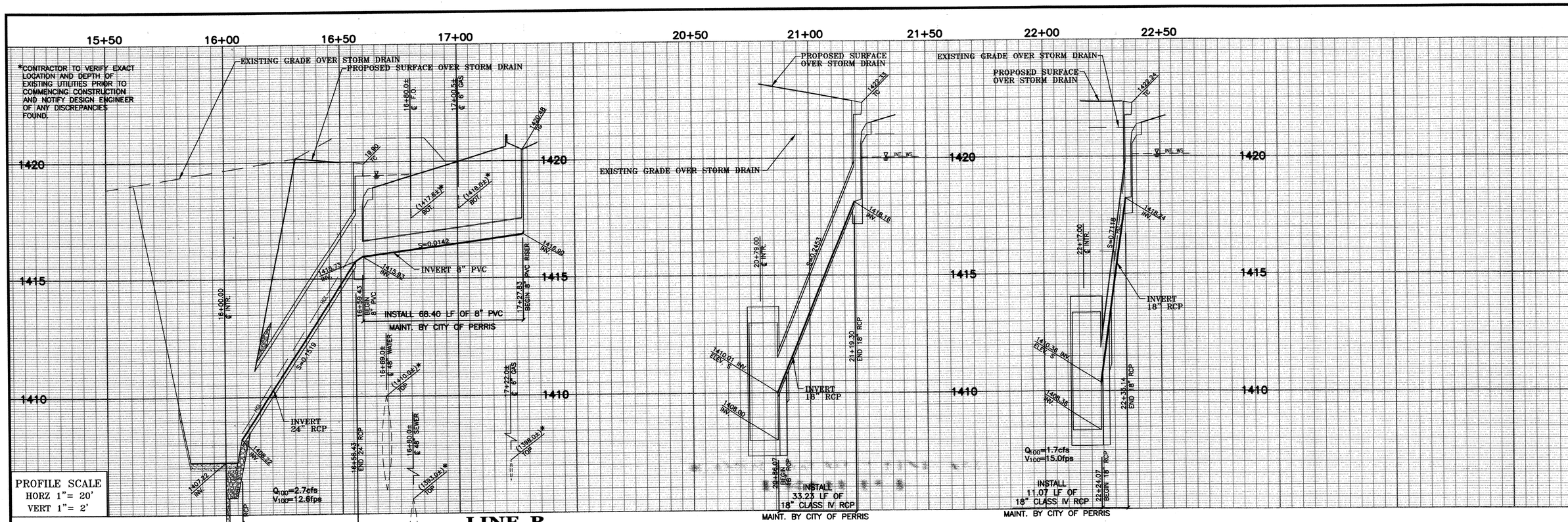
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
ROMOLAND MDP
LINE A11
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 4 OF 10

P-397

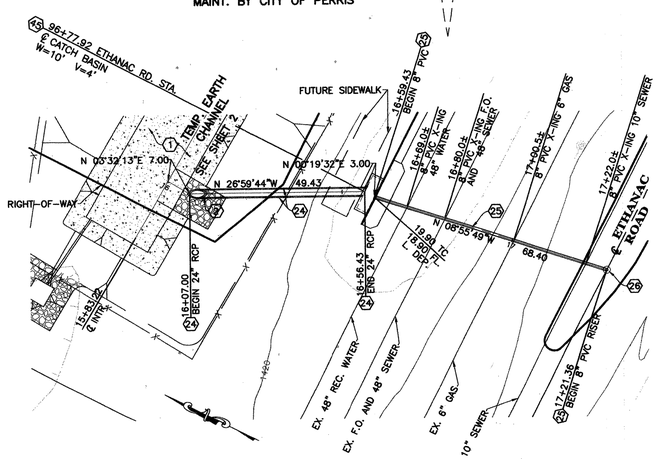


LINE B PROFILE

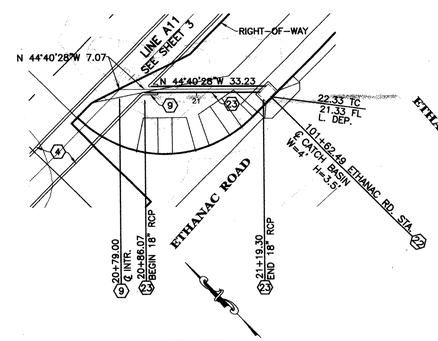
LINE C PROFILE

*CB FOR NUISANCE FLOWS ONLY

LINE D PROFILE



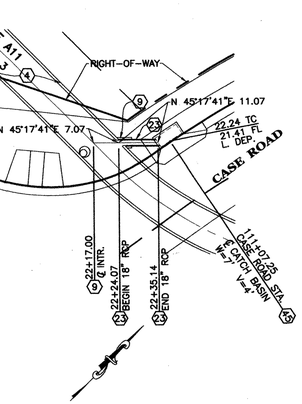
LINE B PLAN



LINE C PLAN

Scale: 1" = 20'

0 10 20 40 60 80



LINE D PLAN

CONSTRUCTION NOTES:

1. CONSTRUCT TEMPORARY TRAPEZOIDAL EARTHEN CHANNEL PER SECTION SHEET 2.
2. CONSTRUCT PIPE THRU EARTHEN CHANNEL PER DETAILS SHEET 2.
4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
9. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=45°00'00" D=18"
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
23. INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
24. INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
25. INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.
26. INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.
45. CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/19/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE

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1-800
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BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST.
ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
△	AS BUILT NO REVISIONS		

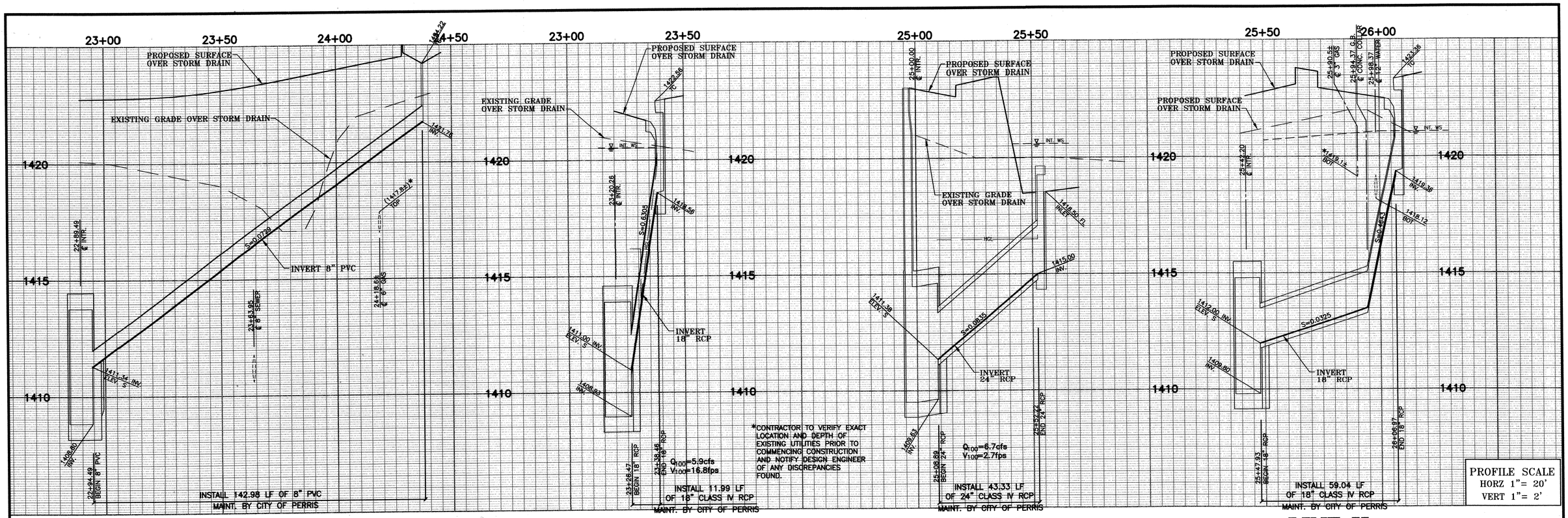
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

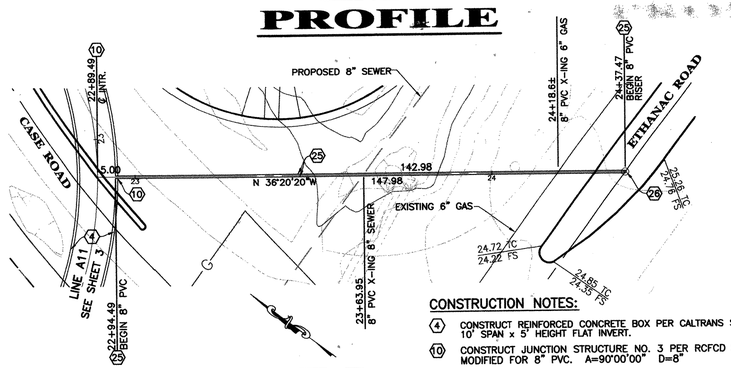
PERRIS CROSSING
R.C.P.
LINES B, C, AND D
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 5 OF 10

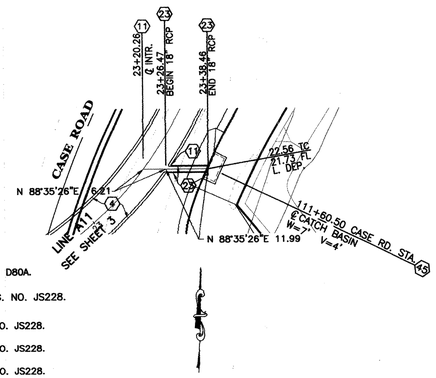
P-397



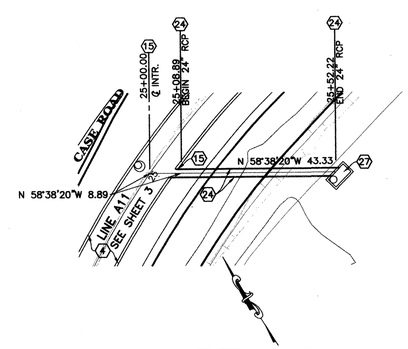
*CB FOR NUISANCE FLOWS ONLY



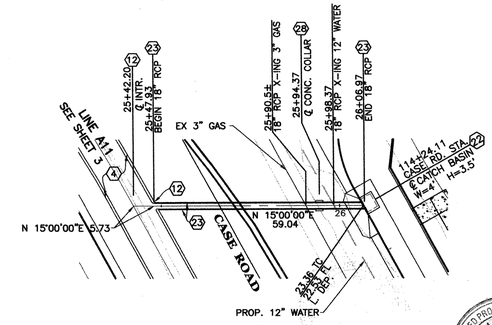
LINE E
PLAN



LINE F
PLAN



LINE G
PLAN



LINE H
PLAN

CONSTRUCTION NOTES:

- (4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
- (10) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=90°00'00" D=8"
- (11) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=52°33'30" D=18"
- (12) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=60°43'43" D=18"
- (15) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=54°23'26" D=24"
- (22) CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
- (23) INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
- (24) INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
- (25) INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.
- (26) INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.
- (27) CONSTRUCT CONCRETE DROP INLET (W=6' V=4.62') PER RCFCD STD. DWG. NO. CB110.
- (28) CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.
- (45) CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

Scale: 1" = 20'
0 10 20 40 60 80

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

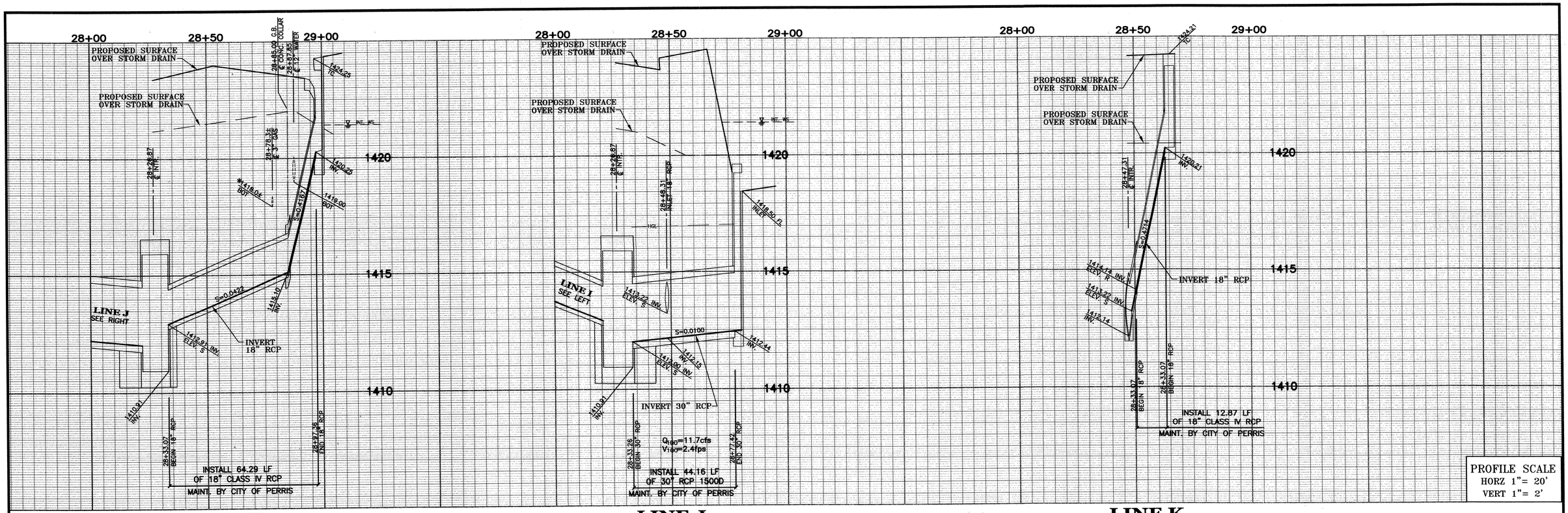
AS BUILT

W.J. McKEEVER, INC. CIVIL ENGINEERING 647 NORTH MAIN STREET, SUITE 2A RIVERSIDE, CALIFORNIA 92501 PH.: (951) 341-3700 FAX: (951) 341-3740 WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/31/06	CITY OF PERRIS CITY FILE NO. P8-798 APPROVED BY: CITY ENGINEER DATE 12-26-06	DIG ALERT CALL: TOLL FREE 1-800 227-2600 TWO WORKING DAYS BEFORE YOU DIG!	BENCHMARK: RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)	REVISIONS: REF. / DESCRIPTION / APPR. / DATE — 1 AS-BUILT NO REVISIONS	DESIGN BY: G. MELUSKI; DRAWN BY: J. NAPOLES; DATE DRAWN: JANUARY 2006; CHECKED BY: W.J. McKEEVER	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT — RECOMMENDED FOR APPROVAL BY: DATE: APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES E, F, G AND H
PLAN AND PROFILE

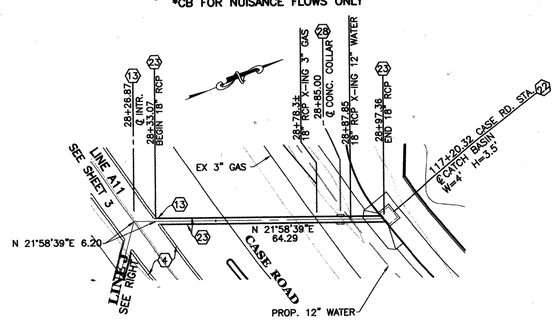
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 6 OF 10

P-397



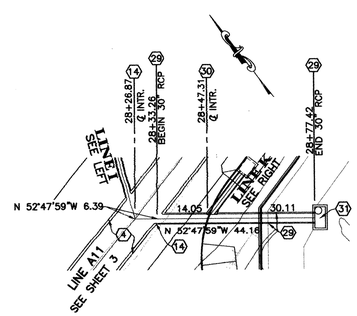
LINE I PROFILE

*CB FOR NUISANCE FLOWS ONLY



LINE I PLAN

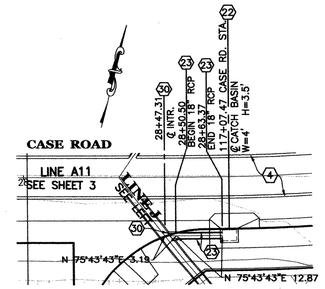
LINE J PROFILE



LINE J PLAN

LINE K PROFILE

*CB FOR NUISANCE FLOWS ONLY



LINE K PLAN

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
13. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=53°45'04" D=18"
14. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=51°28'18" D=30"
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
23. INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.
28. CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.
29. INSTALL 30" RCP 1500D. SLOPE PER PLAN.
30. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227 A=51°28'18" B=18" C=3.61' D=30" E=2.66' F=0.68' G=1.22' L=2.86'
31. CONSTRUCT CONCRETE DROP INLET (W=6' V=7.18') PER RCFCD STD. DWG NO. CB110.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

Scale: 1" = 20'

0 10 20 40 60 80

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE

DIG ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG!

BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

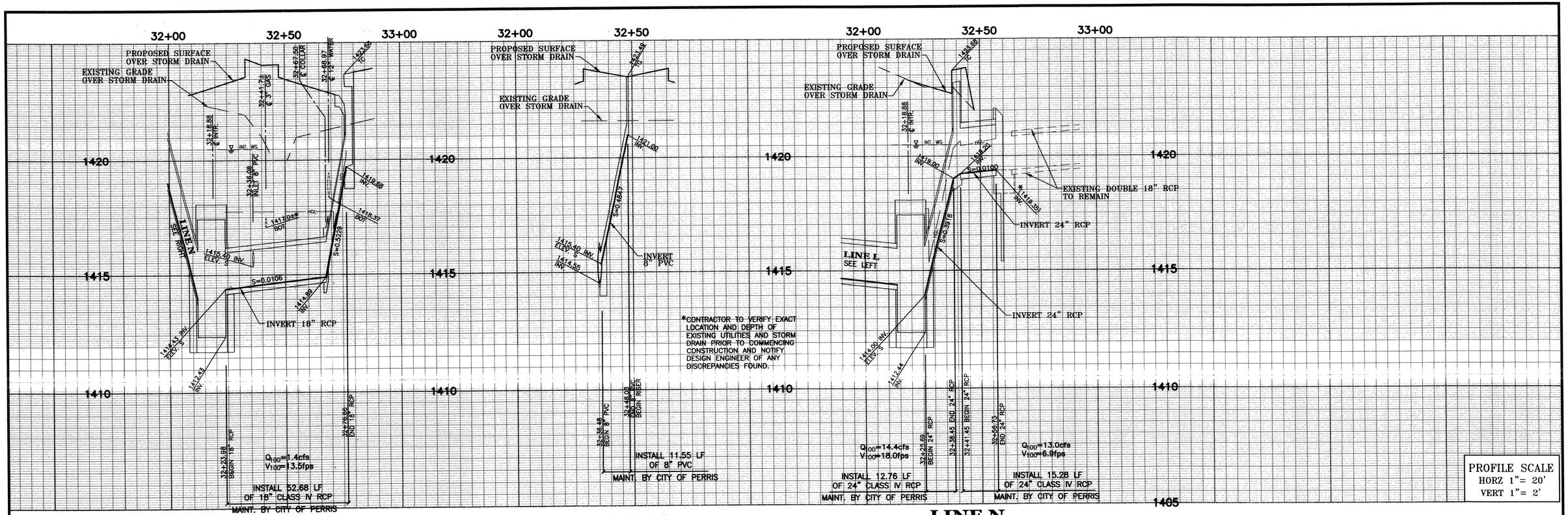
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

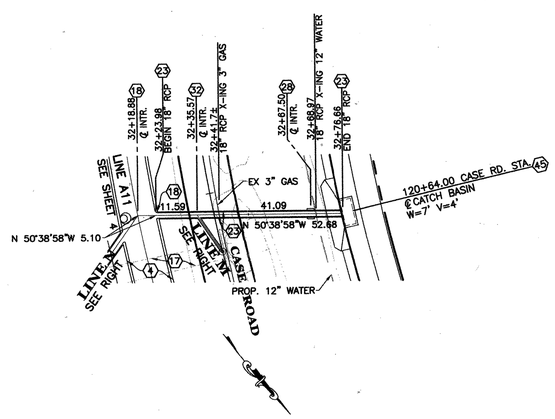
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: — DATE:
APPROVED BY: — DATE:

PERRIS CROSSING
R.C.P.
LINES I, J AND K
PLAN AND PROFILE

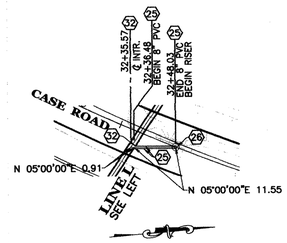
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 7 OF 10

P-397



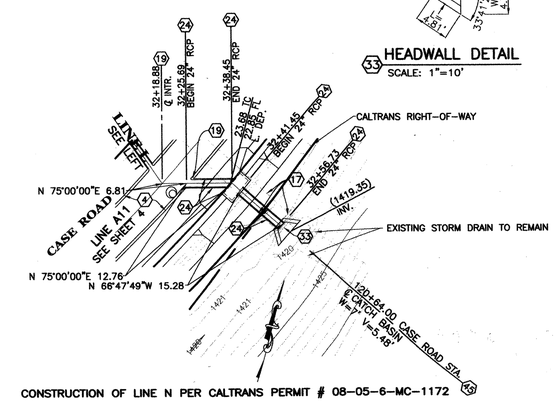


LINE L
PLAN



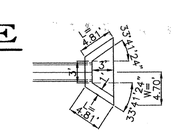
LINE M
PLAN

Scale: 1" = 20'
0 10 20 40 60 80



CONSTRUCTION OF LINE N PER CALTRANS PERMIT # 08-05-6-MC-1172

LINE N
PLAN



HEADWALL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

(4) CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.

(17) REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.

(18) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=78°43'51" D=18"

(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. A=46°55'07" D=24"

(23) INSTALL 18" CLASS IV RCP. SLOPE PER PLAN.

(24) INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.

(25) INSTALL 8" PVC DRAIN LINE AND RISER IN MEDIAN.

(26) INSTALL 8" NDS-10 ROUND GRATES PER NATIONAL DIVERSIFIED SALES, INC. OR APPROVED EQUAL.

(28) CONSTRUCT CONCRETE COLLAR PER RCFCD STD. DWG. NO. M803.

(32) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. JS228. MODIFIED FOR 8" PVC. A=55°38'58" D=8"

(33) CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.

(45) CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS-BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER DATE 10-26-06

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BENCHMARK:
RIVERSIDE COUNTY BENCHMARK BRASS DISK STAMPED "600-31-68" 700' N OF INT. MURRIETA RD & ETHANAC RD, 40' W OF MURRIETA ROAD 3' NE OF THE SE CORN. OF 8' CLF OF EMWD MURRIETA PUMP STA. 2' N OF A MARKER POST. ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS-BUILT NO REVISIONS		

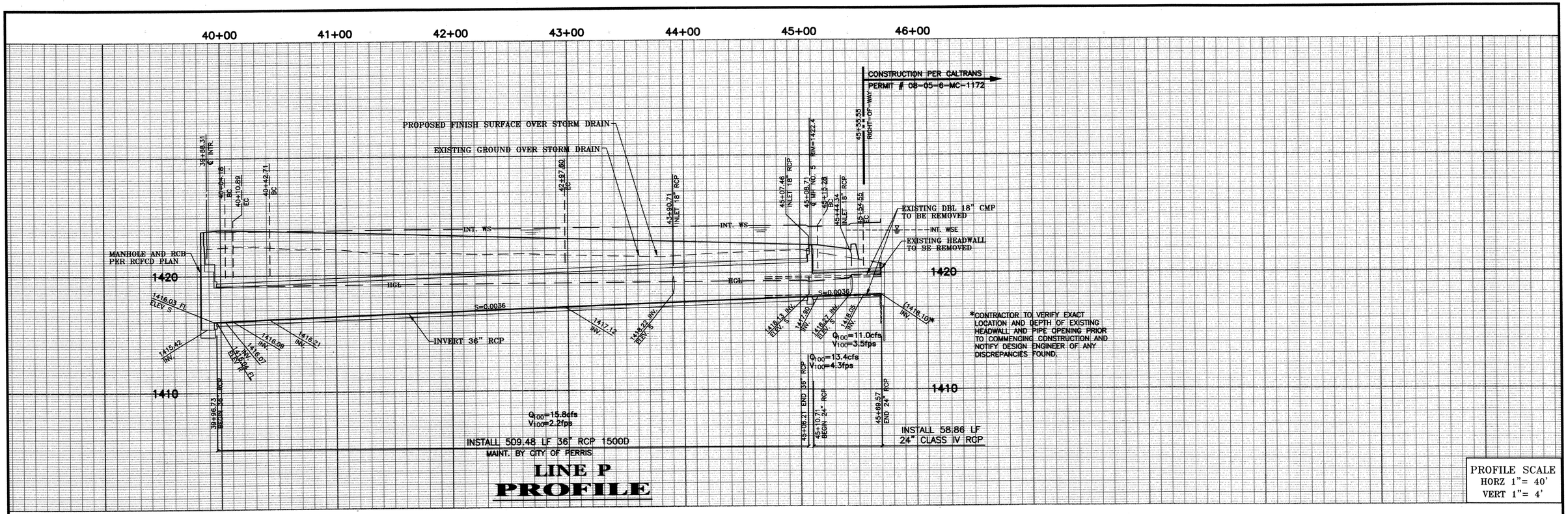
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES L, M AND N
PLAN AND PROFILE

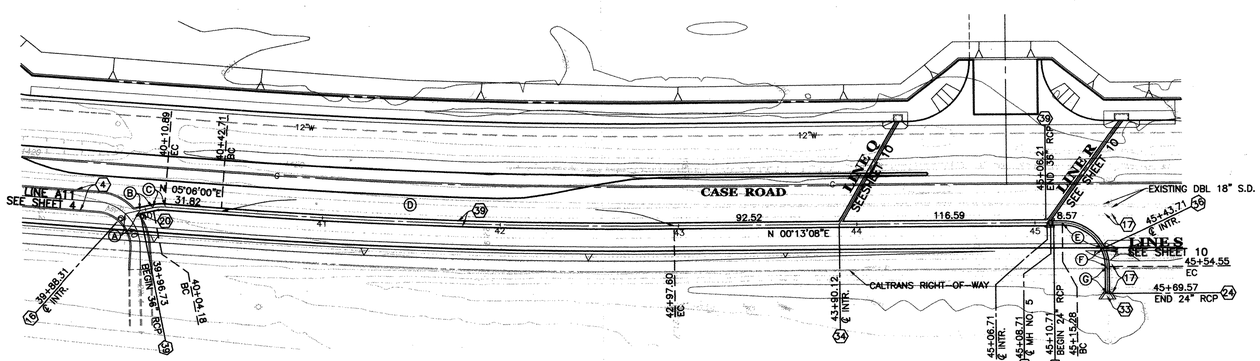
PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 8 OF 10

P-397



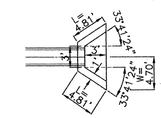
LINE P
PROFILE

PROFILE SCALE
HORZ 1"= 40'
VERT 1"= 4'



CONSTRUCTION OF LINE S PER CALTRANS PERMIT # 08-05-6-MC-1172

LINE P
PLAN



33 HEADWALL DETAIL
SCALE: 1"=10'

CONSTRUCTION NOTES:

4. CONSTRUCT REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80A. 10' SPAN x 5' HEIGHT FLAT INVERT.
16. CONSTRUCT MANHOLE NO. 3 PER RCFCD STD. DWG. NO. MH253.
17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
20. CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFCD STD. DWG. NO. JS226. A=52°40'09" B=36" C=8.84'
24. INSTALL 24" CLASS IV RCP. SLOPE PER PLAN.
33. CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D90A TYPE A.
34. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=59°13'08" B=18" C=3.80' D=36" E=2.39' F=1.41' G=1.16' L=2.61'
35. CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. NO. MH251
36. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=56°31'55" B=18" C=3.13' D=24" E=2.01' F=0.99' G=0.81' L=2.50'
39. INSTALL 36" RCP 1500D. SLOPE PER PLAN.

CURVE / LINE DATA				
	DELTA/BEARING	RADIUS	LENGTH	TANGENT
A	N 10°17'22"W	–	8.42	–
B	N 10°17'22"W	–	7.45	–
C	15°23'22"	25.00	6.71	3.38
D	04°52'52"	2992.00	254.89	127.52
E	65°09'55"	25.00	28.43	15.98
F	24°50'05"	25.00	10.84	5.50
G	N 89°46'52"W	–	15.02	–

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

W.J. McKEEVER, INC.
CIVIL ENGINEERING
647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 DATE 12/18/06

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY: CITY ENGINEER DATE 12-26-06

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REVISIONS

REF.	DESCRIPTION	APPR.	DATE
1	AS BUILT NO REVISIONS		

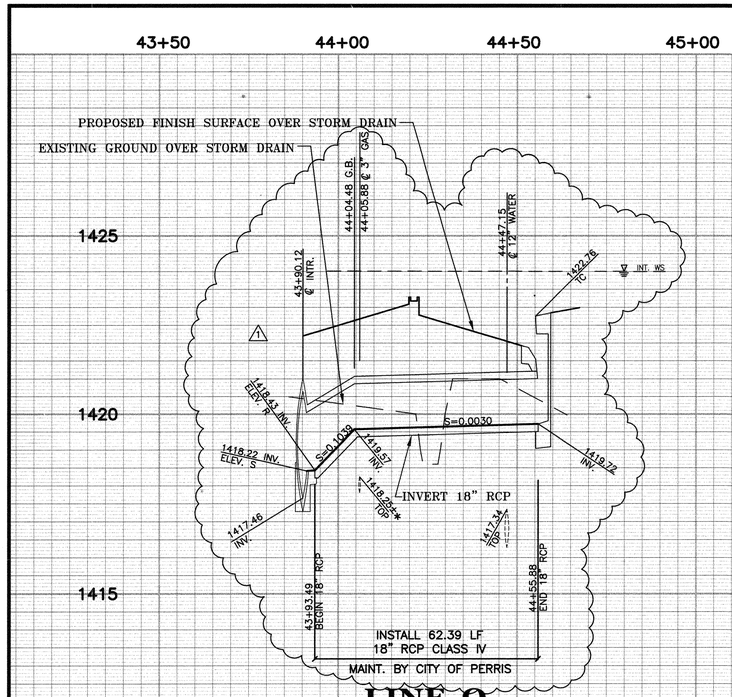
DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINE P
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 9 OF 10

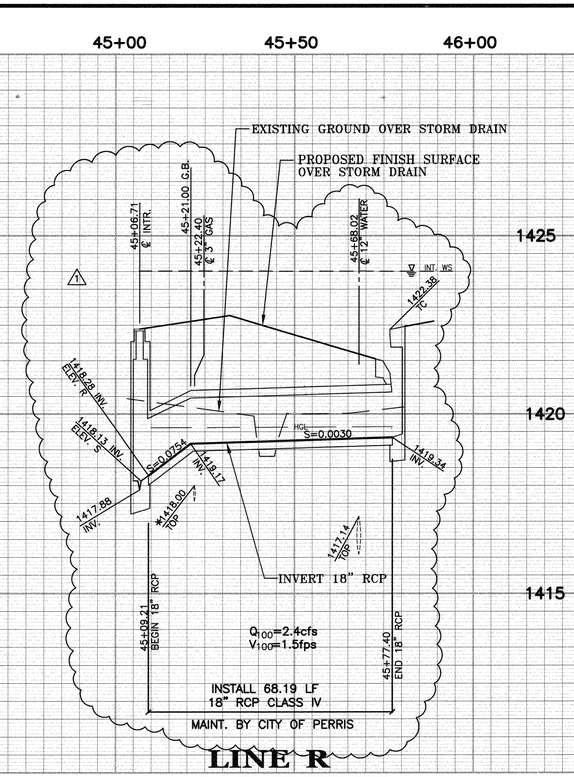
P-397



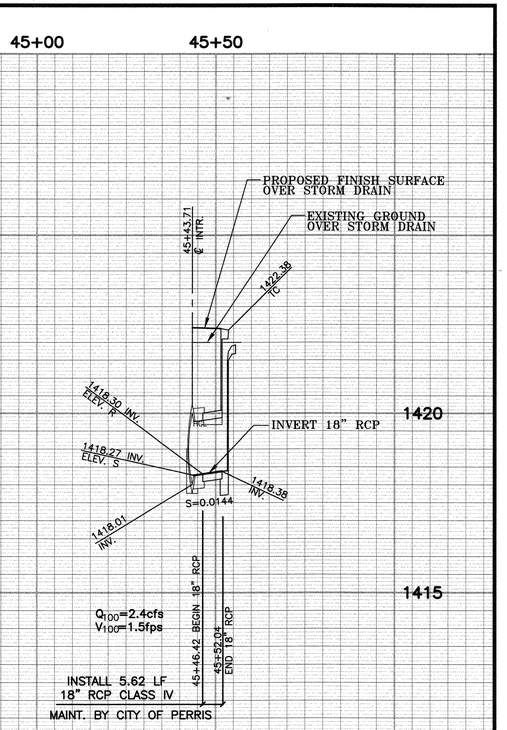
PROFILE SCALE
HORZ 1"= 20'
VERT 1"= 2'

LINE Q PROFILE

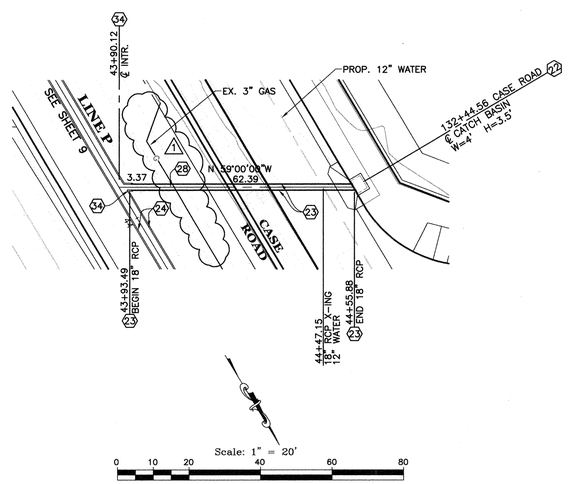
*CB FOR NUISANCE FLOWS ONLY



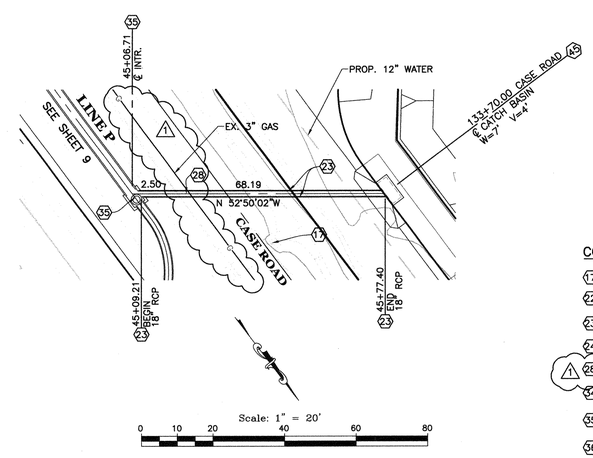
LINE R PROFILE



LINE S PROFILE



LINE Q PLAN



LINE R PLAN

CURVE / LINE DATA				
	DELTA/BEARING	RADIUS	LENGTH	TANGENT
A	N 10°17'22"W	–	8.09	–
B	N 10°17'22"W	–	8.24	–
C	15°23'22"	25.00	6.71	3.38
D	04°52'52"	2992.00	254.89	127.52
E	65°09'55"	25.00	28.43	15.98
F	24°50'05"	25.00	10.84	5.50
G	N 89°46'52"W	–	15.02	–

CONSTRUCTION NOTES:

17. REMOVE EXISTING STORM DRAIN LINES AND HEADWALL.
22. CONSTRUCT CATCH BASIN PER COUNTY OF RIVERSIDE STD. NO. 300.
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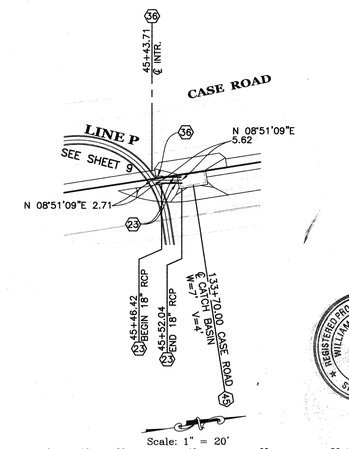
34. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=59°13'08" B=18" C=3.37' D=24" E=2.05' F=0.91' G=0.66' L=2.61'
35. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=53°03'10" B=18" C=3.64' D=24" E=2.34' F=1.00' G=0.80' L=2.80'
36. CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. DWG. NO. JS227. A=56°31'55" B=18" C=3.13' D=24" E=2.01' F=0.99' G=0.81' L=2.50'
45. CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. DWG. NO. CB100.



LINE S PLAN

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER WILLIAM J. McKEEVER No. 22502 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

AS BUILT

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647 NORTH MAIN STREET, SUITE 2A
RIVERSIDE, CALIFORNIA 92501
PH.: (951) 341-3700
FAX: (951) 341-3740
WILLIAM J. McKEEVER, R.C.E. 22502 — DATE 4/6/07

CITY OF PERRIS
CITY FILE NO. P8-798
APPROVED BY:
CITY ENGINEER — DATE 2-13-07

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ELEVATION = 1414.416 FT (5/85)

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
2	AS BUILT NO REVISIONS		
1	REVISED STORM DRAIN TO CLEAR GAS LINE		2-13-07

DESIGN BY: G. MELUSKI
DRAWN BY: J. NAPOLES
DATE DRAWN: JANUARY 2006
CHECKED BY: W.J. McKEEVER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

PERRIS CROSSING
R.C.P.
LINES Q,R AND S
PLAN AND PROFILE

PROJECT NUMBER P8-798
DRAWING NO.
SHEET NO. 10 OF 10

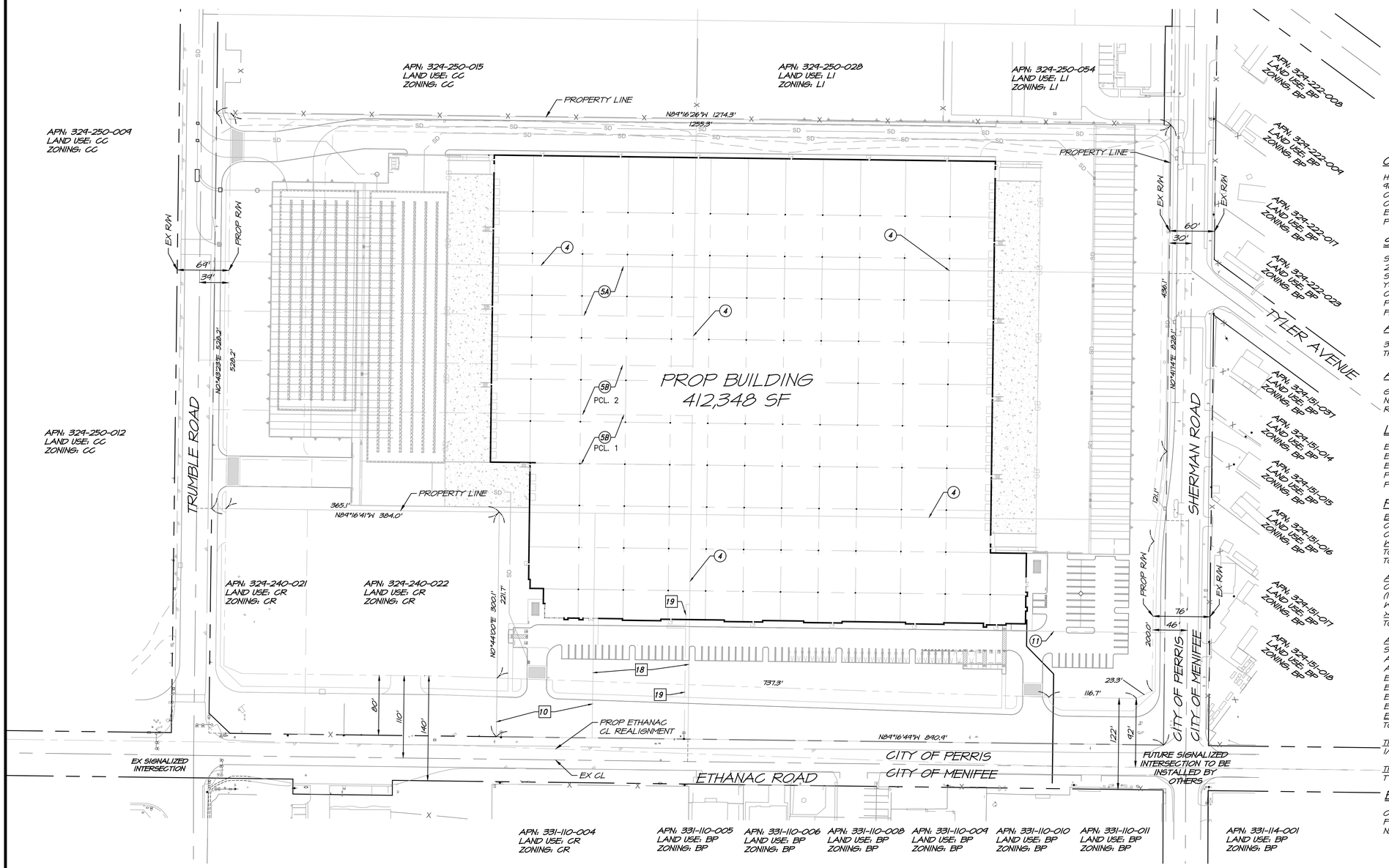
P-397

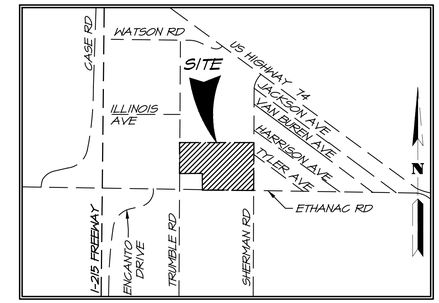
DEVELOPMENT PLAN REVIEW 22-00030

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) 256-5924

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

A.P.N.

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

ACREAGE

GROSS	21.6 AC
NET	19.9 AC
R/W	1.7 AC

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 REPRESENTATIVE

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

ENGINEER

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

ARCHITECT

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

TOPOGRAPHY SOURCE

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

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

SHEET 1 - TITLE SHEET
SHEET 2 - STREET AND GRADING SECTIONS
SHEET 3 - CONCEPTUAL GRADING
SHEETS 4,5 - CONCEPTUAL UTILITIES

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) 926-9244 PERRIS UNION HIGH SCHOOL DISTRICT (9-12) PHONE: (951) 943-6369

EASEMENT NOTES

SEE SHEET 2

LEGAL DESCRIPTION

SEE SHEET 2

1" = 70'

70 0 70 140 210

N W E S WEBB

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

CITY OF PERRIS

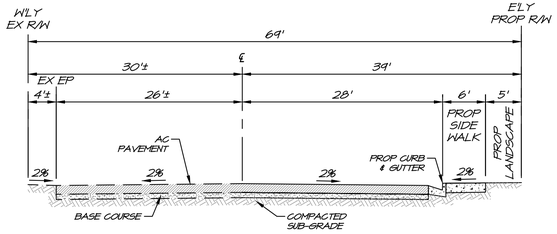
ETHANAC LOGISTICS CENTER
TITLE SHEET
DEVELOPMENT PLAN REVIEW NO. 22-00030

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

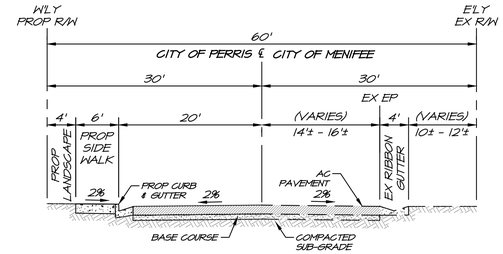
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

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

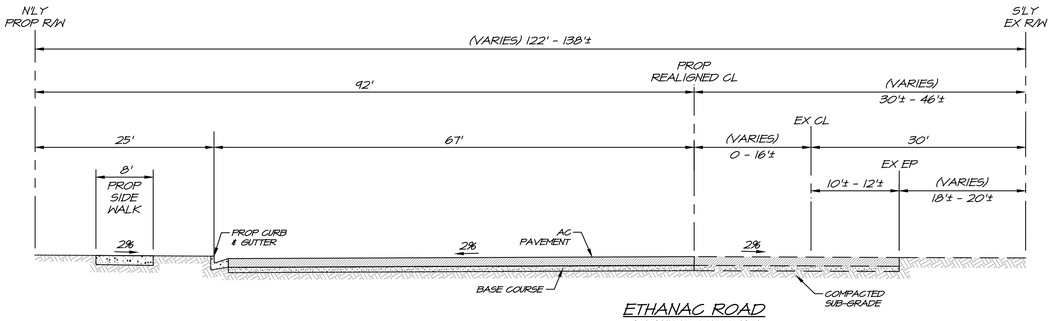
H:\2022\22-0198\DRAWINGS\ENTITLEMENT\22-0198-C-PP.DWG 9/1/2023 4:00:02 PM Rebecca



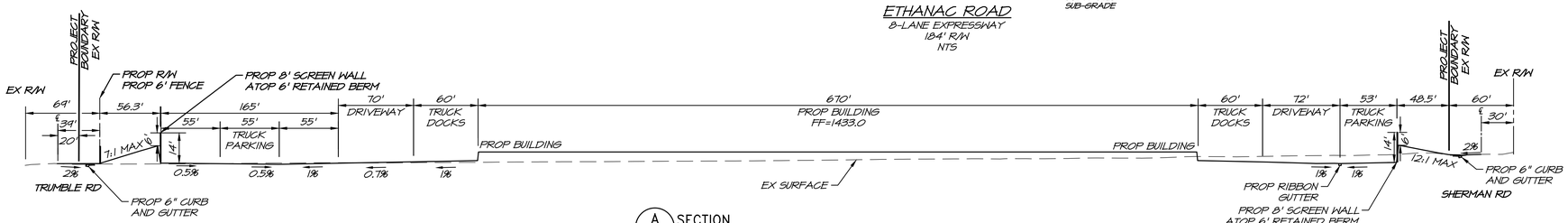
TRUMBLE ROAD
MAJOR COLLECTOR
78' R/W
NTS



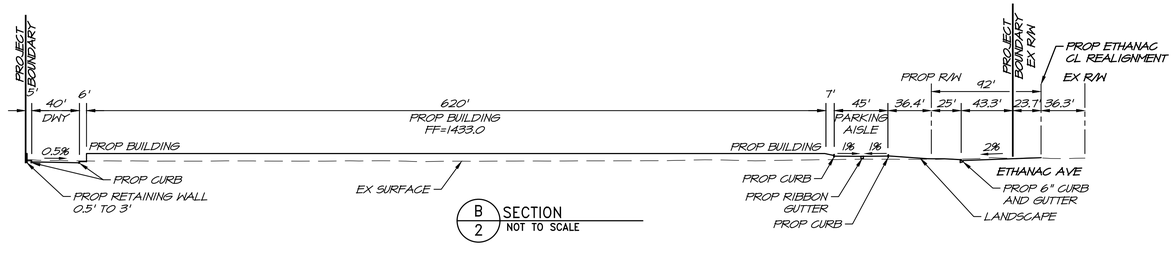
SHERMAN ROAD
LOCAL
60' R/W
NTS



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



A/2 SECTION
NOT TO SCALE



B/2 SECTION
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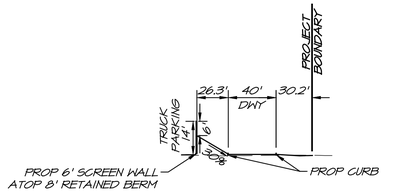


C/2 SECTION
NOT TO SCALE

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 T33), **324-240-017** (AFFECTS THE PORTION OF LOT T34), **324-240-018** (AFFECTS THE PORTION OF LOT T34), **324-240-019** (AFFECTS THE PORTION OF LOT T34), **324-240-020** (AFFECTS THE PORTION OF LOT T34), **324-240-026** (AFFECTS THE LOT T37), **324-240-027** (AFFECTS THE PORTION OF LOT T38), **324-240-025** (AFFECT LOT T36).

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

PARCEL A:
LOTS T34, T37 AND THE SOUTH 198 FEET OF LOTS T33 AND T38 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 T36 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 T35 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 T35 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 T35; 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

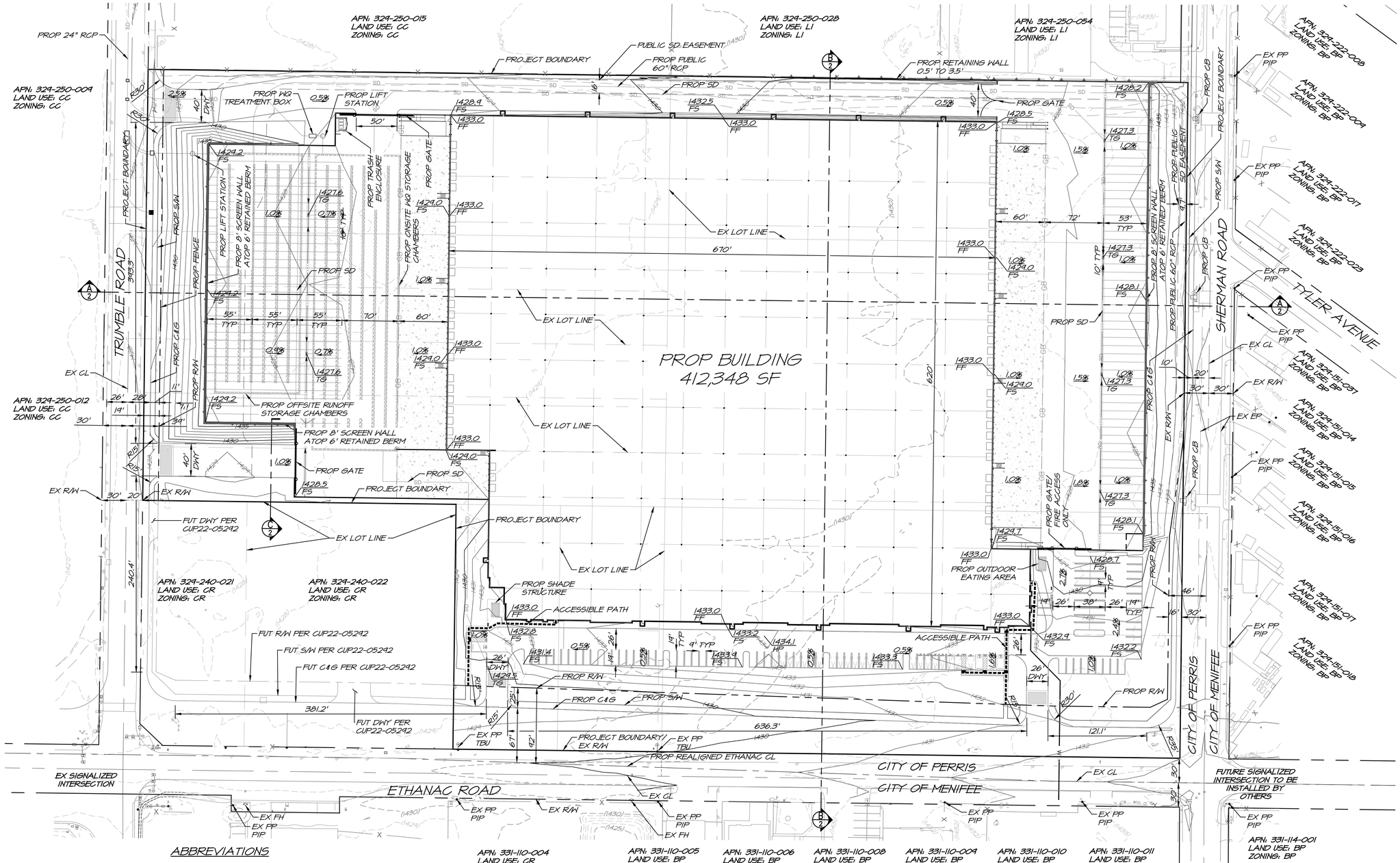
REVISIONS	DATE	BY
REVISED SECTIONS FOR PUBLIC DETENTION BASIN	4/23	AG

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.			

H:\2022\22-0198\DRAWINGS\ENTITLEMENT\22-0198-C-PP.DWG 9/1/2023 4:00:02 PM Rebecca.b



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

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.

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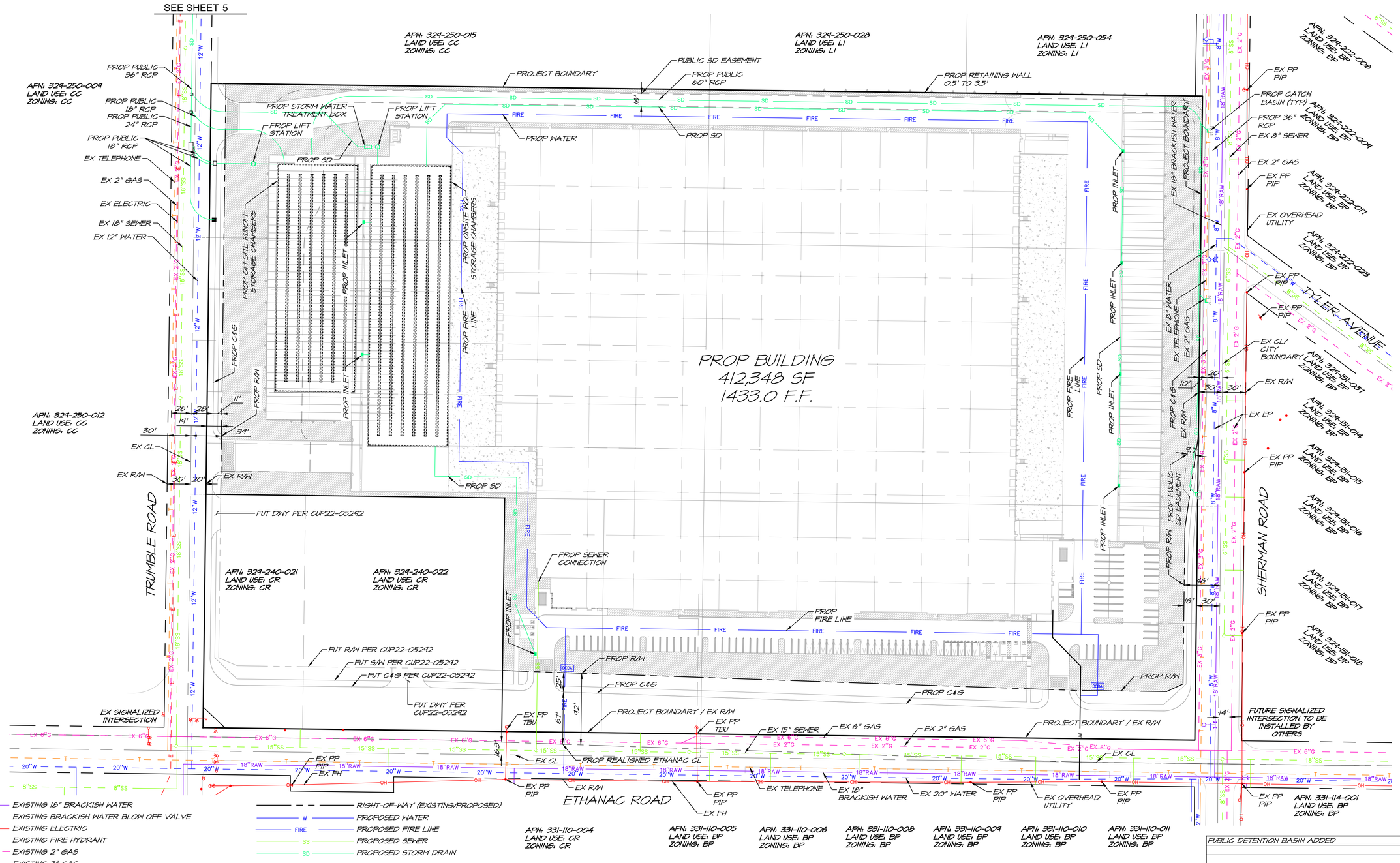

LEGEND

- 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

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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

- 18"RAW — EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- E — EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EX 2"G — EXISTING 2" GAS
- EX 3"G — EXISTING 3" GAS
- EX 6"G — EXISTING 6" GAS
- OH — EXISTING OVERHEAD UTILITY
- 6"SS — EXISTING 6" SEWER
- 8"SS — EXISTING 8" SEWER
- 15"SS — EXISTING 15" SEWER
- 18"SS — EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- 36"SD — EXISTING 36" STORM DRAIN
- 48"SD — EXISTING 48" STORM DRAIN
- T — EXISTING TELEPHONE
- 8"W — EXISTING 8" WATER
- 12"W — EXISTING 12" WATER
- 20"W — EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- W — PROPOSED WATER
- FIRE — PROPOSED FIRE LINE
- SS — PROPOSED SEWER
- SD — 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
DESIGNED: AG
CHECKED: SK
PLN CK REF:
F.B.

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
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W.O. 22-0192
SHEET 5 OF 5 SHEETS
DWG. NO.

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APPENDIX E.2

WEBB-A1

Preliminary Water Quality Management Plan (PWQMP)

Technical Memorandum

To: Deborah de Chambeau MS PE, Riverside County Flood Control & Water Conservation District (RCFC&WCD)

From: Sarah Kowalski, P.E., Senior Engineer

Date: January 8th, 2024

Re: Ethanac Logistics Center – DPR 22-00030 – Offsite Drainage Considerations

Introduction

As a follow up to our December 20, 2023 meeting, the purpose of this memorandum is to document the hydrologic analyses performed for the Ethanac Logistics Center (Project) located in City of Perris, County of Riverside, California and to demonstrate that implementation of this project will not create additional impacts to downstream drainage facilities.

The Project is located north of Ethanac Road, bounded by Sherman Road to east, Trumble Road to the west, vacant land and an industrial development to the north. The Project applicant proposes to build a commercial/industrial building on approximately 21 gross acres.

The centerline of Sherman Road is the boundary between the City of Perris and the City of Menifee. Under the current conditions, runoff from the easterly side of Sherman Road (City of Menifee) sheetflows across the centerline and the west side of the street (City of Perris) and continues westerly to Interstate 215. Ultimately, the runoff from the easterly side of Sherman Road will need to be collected and conveyed southerly to the RCFC&WCD Romoland MDP Line A. Based on discussions with the City of Perris, while the historic sheetflow condition drains from east to west, the City of Perris does not want to responsible for operating and maintaining storm drain facilities for another municipalities runoff. Therefore, the Project must be designed to allow the offsite tributary runoff to be conveyed through the site in a sheetflow manner, but the amount of runoff to the Interstate 215 storm drainage facilities cannot be increased due the development of the Project.

Existing Condition Runoff

The site receives runoff from approximately 65 acres easterly of Sherman Road. This tributary area is an existing residential area that is characterized by sheetflow runoff as the streets have no curb and gutters to contain and convey runoff. While there are some minor roadside swales in this tributary area, there is no defined drainage system within the tributary area. Once runoff from the tributary area intersects Sherman Road, runoff ponds on the east side of Sherman Road until enough runoff has accumulated to spillover the centerline of the street and continues to sheetflow across the Project area towards Interstate 215. A number of low flow cross-gutters have been constructed across Sherman Road to relieve the low flow ponding that occurs at several areas along the easterly side of Sherman Road.

Runoff from the Project, the area tributary to the Project, and the surrounding area northerly and westerly of the Project all drain to a culvert crossing of Interstate 215. A total of approximately 235 acres is tributary to the existing Caltrans dual 6'x5' box culvert crossing underneath Interstate 215 at the west end of Illinois Avenue. Runoff from the area tributary to the box crossing is predominately sheetflow that is collected in a linear basin along the easterly side of Interstate 215 that was constructed with the Classic Pacific Business Park (PM 34082). The Classic Pacific Business Park (PM 34082) also constructed a storm drain in Illinois Avenue (Classic Pacific Business Park Storm Drain Improvement Plans, P8-921 in Appendix D, attached to this memorandum) to collect local runoff, but is not designed to collect the runoff from the approximately 235 acres that is tributary to the Interstate 215 box crossing.

Downstream of the Interstate 215 box culvert there is a City of Perris maintained storm drain system that collects runoff from the existing shopping center that connects to RCFC&WCD Romoland MDP Line A-11, per the existing condition unit hydrograph calculations for this total tributary area can be found in Appendix B, attached to this memorandum, and summarized in Table 1 below.

Proposed Condition Runoff

For the proposed Project, unit hydrographs were performed for the pre- and post-developed condition. For the developed condition, the unit hydrograph method was used to determine the peak flow rates and volumes in order to adequately size the proposed underground storage chambers for the onsite Project flows. The pre- and post-development unit hydrograph exhibits and calculations for the Project can be found in Appendix C, attached to this memorandum, and are summarized in Table 1 below. Because the proposed Project flows are directed to an underground chamber and are pumped out of the Project at a rate of 1 cfs, the post-development flow rates are reduced significantly below the pre-development flow rates. The Project is proposing to collect and convey onsite runoff to the existing Illinois Avenue storm drain. The Project is proposing to extend the Illinois Avenue storm drain to the Project site where the pumped Project flows are conveyed via proposed storm drain in Trumble Road that connects to the existing Illinois Avenue storm drain.

The offsite runoff from the approximately 65 acres of residential land to the east of Sherman Road that is naturally tributary to the Project will be perpetuated across the proposed Project to Trumble Road. Catch basins will be added to the proposed storm drain in Trumble Road to collect as much runoff as possible while the higher flows will continue to sheetflow westerly to Interstate 215 consistent with the direction from the City of Perris. Offsite flows that are collected by the catch basin system will then be conveyed by the proposed storm drain in Trumble Road to the Illinois Avenue storm drain. It has been discussed with the City of Perris that a parallel storm drain in Illinois Avenue may be provided for additional capacity if so, required by the City of Perris. The existing condition unit hydrograph calculations for this tributary area can be found in Appendix B, attached to this memorandum, and summarized in Table 1 below.

The following table summarizes the results of the unit hydrograph analysis:

Table 1 – Unit Hydrograph Results

		Existing Condition		Proposed Condition	
Analysis Area	Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Volume (Ac-ft)	Peak Flow (cfs)
Ethanac Logistics Center Project	100-Year, 1-Hour	1.75	47.1	1.89	67.7
	100-Year, 3-Hour	2.44	28.6	2.86	34.9
	100-Year, 6-Hour	2.75	24.0	3.65	30.7
	100-Year, 24-Hour	3.06	8.3	5.59	9.9
Area East of Sherman Rd Tributary to Ethanac Logistics Center	100-Year, 1-Hour	5.23	133.7	-	-
	100-Year, 3-Hour	6.89	84.6	-	-
	100-Year, 6-Hour	8.35	71.3	-	-
	100-Year, 24-Hour	11.2	21.4	-	-
Total Area Tributary to A-11	100-Year, 1-Hour	20.62	404.4	-	-
	100-Year, 3-Hour	28.78	289.3	-	-
	100-Year, 6-Hour	33.97	249.8	-	-
	100-Year, 24-Hour	46.18	93.0	-	-

Table 2 summarizes the flows for the total area tributary to the existing Caltrans dual 6'x5' box culvert crossing in post-development condition of the Project. The total proposed flow rate is calculated by subtracting out the existing Project flows and replacing with the proposed pumped Project flow of 1 cfs.

Table 2 –Total Area Proposed Condition Flows

		Proposed Condition
Analysis Area	Storm Event	Peak Flow (cfs)
Total Area Tributary to A-11	100-Year, 1-Hour	358.3
	100-Year, 3-Hour	261.7
	100-Year, 6-Hour	226.8
	100-Year, 24-Hour	85.7

Interstate 215 Culvert Crossing Capacity

The previously mentioned existing Interstate 215 dual 6'x5' box culvert crossing that connects to a City of Perris maintained storm drain system that collects runoff from the existing shopping center that connects to RCFC&WCD Romoland MDP Line A-11 and eventually to Romoland MDP Line A. The Interstate 215 culvert crossing has a slope of 0.0015 per the storm drain plans, P8-921 in Appendix D attached to this memorandum. A capacity calculation for the culvert crossing at a slope of 0.0015 yields a flow capacity of the dual RCB as approximately 404 cfs. With a post-development peak flow of 358.3 cfs, the box culvert has sufficient capacity to handle the pumped Project flows while perpetuating all existing tributary flows, including the 65 acres east of Sherman Road that are tributary to the Project.

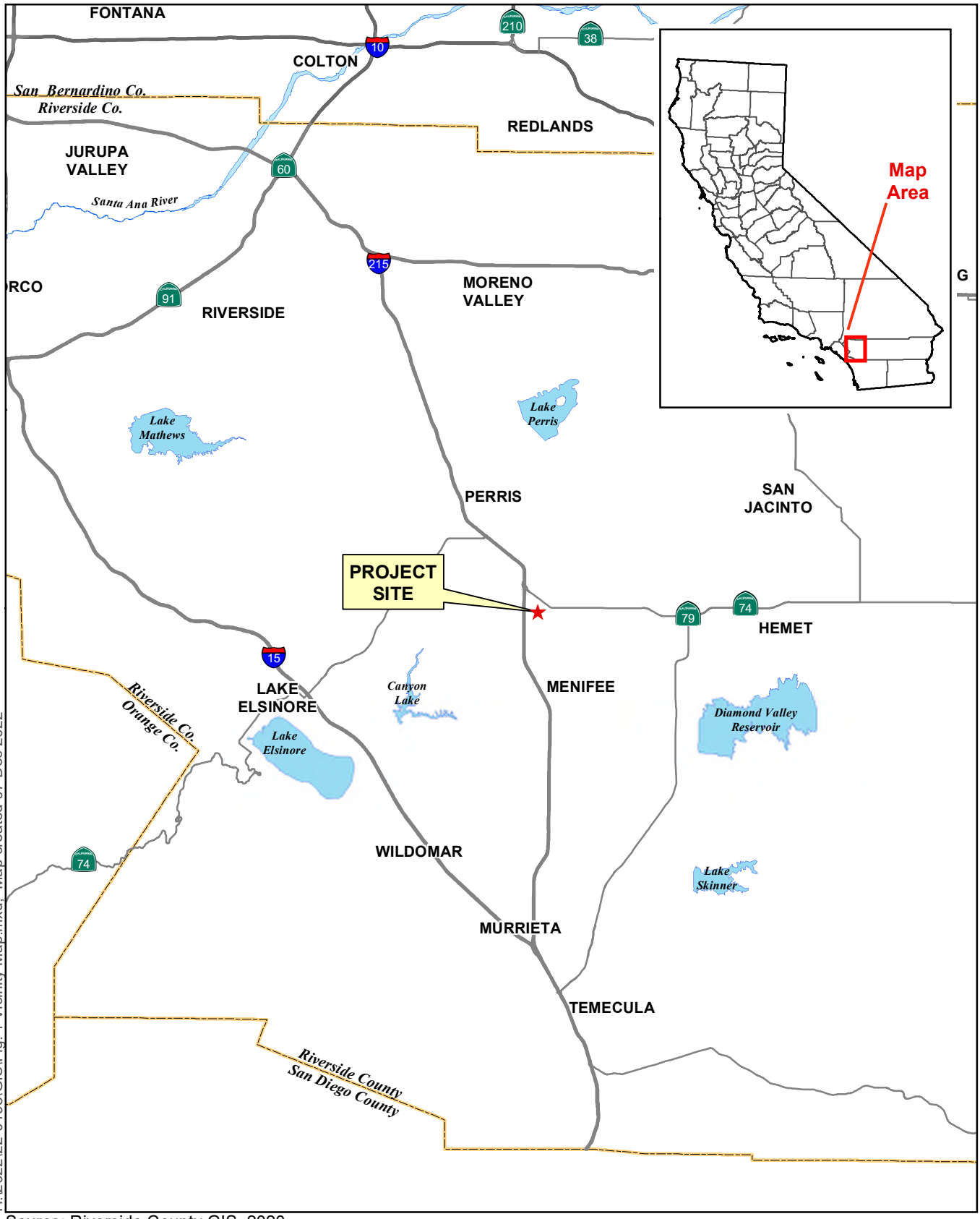
Conclusion

Based on the analysis of the existing and proposed conditions for the runoff tributary to the Interstate 215 culvert crossing, it has been determined that the existing culvert crossing has the capacity to convey the existing condition runoff under the Interstate to the storm drain system downstream. The proposed Project further reduces the peak runoff to the Interstate 215 culvert crossing by implementing a onsite storage and pumping system to control the runoff to levels significantly below the existing conditions. The Project will be designed in such a manner to allow the offsite runoff tributary to the Project to continue to sheetflow across the Project. With the reduction in the total runoff to the Interstate 215 culvert crossing being reduced with the implementation of the Project and with the verification that the Interstate 215 culvert crossing has sufficient capacity for the 100 -year runoff, no new impacts are created for the Interstate 215 culvert crossing or the existing storm drain systems on the west side of Interstate 215.

Appendices

APPENDIX A – Vicinity Map
APPENDIX B – Unit Hydrograph Exhibit – Existing Condition Tributary to Line A-11
APPENDIX C – Ethanac Logistics Center Unit Hydrograph Exhibits – Pre and Post Development
APPENDIX D – Classic Pacific Business Park Storm Drain Plans – P8-921

APPENDIX A



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

Source: Riverside County GIS, 2020

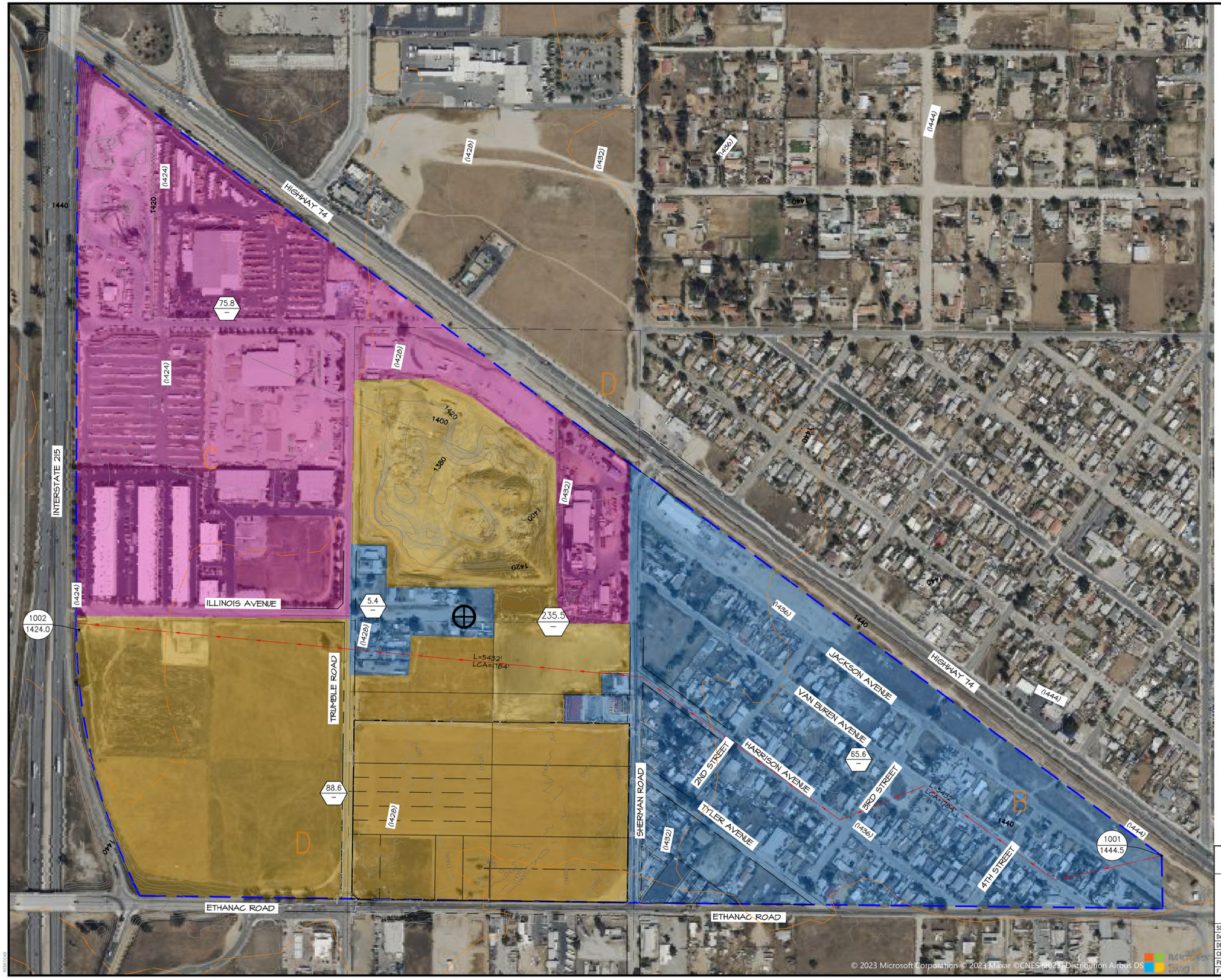
0 2 4 6 Miles

Figure 1 – Vicinity Map

Ethanac Commerce Center

ALBERT A. WEBB ASSOCIATES

APPENDIX B



LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- SOIL TYPE BOUNDARY
- 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
- COMMERCIAL / INDUSTRIAL
- UNDEVELOPED
- ¼ ACRE LOT RESIDENTIAL

N W E S

1" = 200'

100 0 200 400 600

CITY OF PERRIS

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

SCALE: 1"=200'	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: 12/18/23			SHEET 1
DESIGNED: RSB			OF 1 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-HYD-UH A-11.DWG 12/18/2023 10:29:20 AM

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB1100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	0.50	117.75

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	1.20	282.60

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 = 99.79 %
Adjusted average point rain = 1.197(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	0.604	0.147	(0.302)	0.457
2	0.17	4.30	0.618	0.147	(0.309)	0.471
3	0.25	5.00	0.718	0.147	(0.359)	0.572
4	0.33	5.00	0.718	0.147	(0.359)	0.572
5	0.42	5.80	0.833	0.147	(0.417)	0.687
6	0.50	6.50	0.934	0.147	(0.467)	0.787
7	0.58	7.40	1.063	0.147	(0.532)	0.917
8	0.67	8.60	1.236	0.147	(0.618)	1.089
9	0.75	12.30	1.767	0.147	(0.884)	1.621
10	0.83	29.10	4.181	0.147	(2.091)	4.035
11	0.92	6.80	0.977	0.147	(0.489)	0.831
12	1.00	5.00	0.718	0.147	(0.359)	0.572
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	12.6

Flood volume = Effective rainfall 1.05(In)

```
 times area     235.5(Ac.)/[(In)/(Ft.)] =      20.6(Ac.Ft)
Total soil loss =      0.15(In)
Total soil loss =     2.877(Ac.Ft)
Total rainfall =      1.20(In)
Flood volume =      898346.8 Cubic Feet
Total soil loss =      125301.9 Cubic Feet
-------------------------------------------------------------------
 Peak flow rate of this hydrograph =    404.404(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      125.0     250.0     375.0     500.0
-------------------------------------------------------------------
  0+ 5       0.0286      4.15  Q         |         |         |         |
  0+10       0.1724     20.88  VQ        |         |         |         |
  0+15       0.5097     48.97  V  Q      |         |         |         |
  0+20       1.0199     74.08  |V   Q    |         |         |         |
  0+25       1.6545     92.15  |  V   Q  |         |         |         |
  0+30       2.4003    108.29  |   V   Q |         |         |         |
  0+35       3.2745    126.92  |     V   Q         |         |         |
  0+40       4.3029    149.34  |       V |Q        |         |         |
  0+45       5.5362    179.07  |         V   Q     |         |         |
  0+50       7.2117    243.29  |         |  V     Q|         |         |
  0+55       9.6131    348.68  |         |       V |      Q  |         |
  1+ 0      12.3982    404.40  |         |         |   V     | Q       |
  1+ 5      14.6767    330.83  |         |         |     Q V |         |
  1+10      16.1827    218.67  |         |      Q  |         |V        |
  1+15      17.1624    142.25  |         |Q        |         |  V      |
  1+20      17.8452     99.15  |      Q  |         |         |   V     |
  1+25      18.3651     75.49  |     Q   |         |         |    V    |
  1+30      18.7774     59.86  |   Q     |         |         |     V   |
  1+35      19.1149     49.02  |  Q      |         |         |      V  |
  1+40      19.3891     39.81  |  Q      |         |         |      V  |
  1+45      19.6155     32.87  | Q       |         |         |       V |
  1+50      19.8088     28.07  | Q       |         |         |       V |
  1+55      19.9761     24.29  |Q        |         |         |       V |
  2+ 0      20.1147     20.12  |Q        |         |         |        V|
  2+ 5      20.2305     16.82  |Q        |         |         |        V|
  2+10      20.3269     14.00  |Q        |         |         |        V|
  2+15      20.4057     11.43  Q         |         |         |        V|
  2+20      20.4690      9.20  Q         |         |         |        V|
  2+25      20.5220      7.69  Q         |         |         |        V|
  2+30      20.5679      6.67  Q         |         |         |        V|
  2+35      20.6086      5.91  Q         |         |         |        V|
  2+40      20.6186      1.46  Q         |         |         |        V|
```

```
    2+45      20.6232      0.66  Q         |         |         |         V
-----------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB3100.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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	0.80	188.40

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	1.90	447.45

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 = 99.90 %
Adjusted average point rain = 1.898(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	0.147	(0.148)	0.150
2	0.17	1.30	0.296	0.147	(0.148)	0.150
3	0.25	1.10	0.251	(0.147)	0.125	0.125
4	0.33	1.50	0.342	0.147	(0.171)	0.195
5	0.42	1.50	0.342	0.147	(0.171)	0.195
6	0.50	1.80	0.410	0.147	(0.205)	0.263
7	0.58	1.50	0.342	0.147	(0.171)	0.195
8	0.67	1.80	0.410	0.147	(0.205)	0.263
9	0.75	1.80	0.410	0.147	(0.205)	0.263
10	0.83	1.50	0.342	0.147	(0.171)	0.195
11	0.92	1.60	0.364	0.147	(0.182)	0.218
12	1.00	1.80	0.410	0.147	(0.205)	0.263
13	1.08	2.20	0.501	0.147	(0.251)	0.355
14	1.17	2.20	0.501	0.147	(0.251)	0.355
15	1.25	2.20	0.501	0.147	(0.251)	0.355
16	1.33	2.00	0.456	0.147	(0.228)	0.309
17	1.42	2.60	0.592	0.147	(0.296)	0.446

```
18   1.50     2.70      0.615          0.147    (  0.307)        0.468
19   1.58     2.40      0.547          0.147    (  0.273)        0.400
20   1.67     2.70      0.615          0.147    (  0.307)        0.468
21   1.75     3.30      0.752          0.147    (  0.376)        0.605
22   1.83     3.10      0.706          0.147    (  0.353)        0.559
23   1.92     2.90      0.661          0.147    (  0.330)        0.514
24   2.00     3.00      0.683          0.147    (  0.342)        0.537
25   2.08     3.10      0.706          0.147    (  0.353)        0.559
26   2.17     4.20      0.957          0.147    (  0.478)        0.810
27   2.25     5.00      1.139          0.147    (  0.569)        0.992
28   2.33     3.50      0.797          0.147    (  0.399)        0.651
29   2.42     6.80      1.549          0.147    (  0.774)        1.402
30   2.50     7.30      1.663          0.147    (  0.831)        1.516
31   2.58     8.20      1.868          0.147    (  0.934)        1.721
32   2.67     5.90      1.344          0.147    (  0.672)        1.197
33   2.75     2.00      0.456          0.147    (  0.228)        0.309
34   2.83     1.80      0.410          0.147    (  0.205)        0.263
35   2.92     1.80      0.410          0.147    (  0.205)        0.263
36   3.00     0.60      0.137       (  0.147)       0.068        0.068
               (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    17.6
      Flood volume = Effective rainfall      1.47(In)
       times area     235.5(Ac.)/[(In)/(Ft.)] =      28.8(Ac.Ft)
      Total soil loss =      0.43(In)
      Total soil loss =     8.467(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =     1253756.2 Cubic Feet
      Total soil loss =      368813.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =    289.328(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       75.0     150.0     225.0     300.0
-----------------------------------------------------------------------
  0+ 5       0.0094      1.36  Q         |         |         |         |
  0+10       0.0561      6.79  Q         |         |         |         |
  0+15       0.1614     15.29  V Q       |         |         |         |
  0+20       0.3115     21.79  V Q       |         |         |         |
  0+25       0.4930     26.35  V  Q      |         |         |         |
  0+30       0.7132     31.97  V   Q     |         |         |         |
  0+35       0.9744     37.93  |V   Q    |         |         |         |
  0+40       1.2671     42.50  |V   Q    |         |         |         |
  0+45       1.5818     45.70  | V   Q   |         |         |         |
  0+50       1.9181     48.82  | V   Q   |         |         |         |
```

```
0+55       2.2623     49.99  |  V  Q   |         |         |         |
1+ 0       2.6023     49.36  |  V  Q   |         |         |         |
1+ 5       2.9572     51.53  |   V Q   |         |         |         |
1+10       3.3574     58.11  |   V  Q  |         |         |         |
1+15       3.8120     66.01  |    V  Q |         |         |         |
1+20       4.3018     71.11  |    V   Q|         |         |         |
1+25       4.8097     73.75  |     V  Q|         |         |         |
1+30       5.3486     78.24  |      V  Q         |         |         |
1+35       5.9400     85.87  |       V |Q        |         |         |
1+40       6.5711     91.64  |        V| Q       |         |         |
1+45       7.2319     95.94  |         V Q       |         |         |
1+50       7.9495    104.19  |         |V Q      |         |         |
1+55       8.7309    113.47  |         | V  Q    |         |         |
2+ 0       9.5412    117.65  |         |  V Q    |         |         |
2+ 5      10.3580    118.59  |         |   VQ    |         |         |
2+10      11.2044    122.90  |         |    VQ   |         |         |
2+15      12.1456    136.66  |         |     V Q |         |         |
2+20      13.2268    156.99  |         |       V Q         |         |
2+25      14.4309    174.83  |         |         V  Q      |         |
2+30      15.7967    198.31  |         |         |V    Q   |         |
2+35      17.4574    241.14  |         |         |   V     | Q       |
2+40      19.4010    282.21  |         |         |     V   |      Q  |
2+45      21.3936    289.33  |         |         |        V|       Q |
2+50      23.1031    248.22  |         |         |         | VQ      |
2+55      24.3770    184.97  |         |         |   Q     |  V      |
3+ 0      25.3300    138.38  |         |       Q |         |    V    |
3+ 5      26.0785    108.68  |         |   Q     |         |     V   |
3+10      26.6490     82.84  |         |Q        |         |      V  |
3+15      27.0721     61.43  |       Q |         |         |      V  |
3+20      27.3977     47.28  |     Q   |         |         |       V |
3+25      27.6593     37.99  |    Q    |         |         |       V |
3+30      27.8743     31.21  |   Q     |         |         |       V |
3+35      28.0521     25.82  |  Q      |         |         |       V |
3+40      28.2010     21.62  | Q       |         |         |        V|
3+45      28.3254     18.05  | Q       |         |         |        V|
3+50      28.4283     14.95  |Q        |         |         |        V|
3+55      28.5145     12.51  |Q        |         |         |        V|
4+ 0      28.5852     10.26  |Q        |         |         |        V|
4+ 5      28.6408      8.07  |Q        |         |         |        V|
4+10      28.6888      6.98  Q         |         |         |        V|
4+15      28.7262      5.44  Q         |         |         |        V|
4+20      28.7537      3.99  Q         |         |         |        V|
4+25      28.7690      2.23  Q         |         |         |        V|
4+30      28.7751      0.88  Q         |         |         |        V|
4+35      28.7792      0.59  Q         |         |         |        V|
4+40      28.7817      0.37  Q         |         |         |        V|
4+45      28.7823      0.08  Q         |         |         |        V|
-------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB6100.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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	1.00	235.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	2.50	588.75

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 = 99.92 %
Adjusted average point rain = 2.498(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	(0.147)	0.075	0.075
2	0.17	0.60	0.180	(0.147)	0.090	0.090
3	0.25	0.60	0.180	(0.147)	0.090	0.090
4	0.33	0.60	0.180	(0.147)	0.090	0.090
5	0.42	0.60	0.180	(0.147)	0.090	0.090
6	0.50	0.70	0.210	(0.147)	0.105	0.105
7	0.58	0.70	0.210	(0.147)	0.105	0.105
8	0.67	0.70	0.210	(0.147)	0.105	0.105
9	0.75	0.70	0.210	(0.147)	0.105	0.105
10	0.83	0.70	0.210	(0.147)	0.105	0.105
11	0.92	0.70	0.210	(0.147)	0.105	0.105
12	1.00	0.80	0.240	(0.147)	0.120	0.120
13	1.08	0.80	0.240	(0.147)	0.120	0.120
14	1.17	0.80	0.240	(0.147)	0.120	0.120
15	1.25	0.80	0.240	(0.147)	0.120	0.120
16	1.33	0.80	0.240	(0.147)	0.120	0.120
17	1.42	0.80	0.240	(0.147)	0.120	0.120

18	1.50	0.80	0.240	(0.147)	0.120	0.120
19	1.58	0.80	0.240	(0.147)	0.120	0.120
20	1.67	0.80	0.240	(0.147)	0.120	0.120
21	1.75	0.80	0.240	(0.147)	0.120	0.120
22	1.83	0.80	0.240	(0.147)	0.120	0.120
23	1.92	0.80	0.240	(0.147)	0.120	0.120
24	2.00	0.90	0.270	(0.147)	0.135	0.135
25	2.08	0.80	0.240	(0.147)	0.120	0.120
26	2.17	0.90	0.270	(0.147)	0.135	0.135
27	2.25	0.90	0.270	(0.147)	0.135	0.135
28	2.33	0.90	0.270	(0.147)	0.135	0.135
29	2.42	0.90	0.270	(0.147)	0.135	0.135
30	2.50	0.90	0.270	(0.147)	0.135	0.135
31	2.58	0.90	0.270	(0.147)	0.135	0.135
32	2.67	0.90	0.270	(0.147)	0.135	0.135
33	2.75	1.00	0.300	0.147	(0.150)	0.153
34	2.83	1.00	0.300	0.147	(0.150)	0.153
35	2.92	1.00	0.300	0.147	(0.150)	0.153
36	3.00	1.00	0.300	0.147	(0.150)	0.153
37	3.08	1.00	0.300	0.147	(0.150)	0.153
38	3.17	1.10	0.330	0.147	(0.165)	0.183
39	3.25	1.10	0.330	0.147	(0.165)	0.183
40	3.33	1.10	0.330	0.147	(0.165)	0.183
41	3.42	1.20	0.360	0.147	(0.180)	0.213
42	3.50	1.30	0.390	0.147	(0.195)	0.243
43	3.58	1.40	0.420	0.147	(0.210)	0.273
44	3.67	1.40	0.420	0.147	(0.210)	0.273
45	3.75	1.50	0.450	0.147	(0.225)	0.303
46	3.83	1.50	0.450	0.147	(0.225)	0.303
47	3.92	1.60	0.480	0.147	(0.240)	0.333
48	4.00	1.60	0.480	0.147	(0.240)	0.333
49	4.08	1.70	0.510	0.147	(0.255)	0.363
50	4.17	1.80	0.540	0.147	(0.270)	0.393
51	4.25	1.90	0.570	0.147	(0.285)	0.423
52	4.33	2.00	0.600	0.147	(0.300)	0.453
53	4.42	2.10	0.629	0.147	(0.315)	0.483
54	4.50	2.10	0.629	0.147	(0.315)	0.483
55	4.58	2.20	0.659	0.147	(0.330)	0.513
56	4.67	2.30	0.689	0.147	(0.345)	0.543
57	4.75	2.40	0.719	0.147	(0.360)	0.573
58	4.83	2.40	0.719	0.147	(0.360)	0.573
59	4.92	2.50	0.749	0.147	(0.375)	0.603
60	5.00	2.60	0.779	0.147	(0.390)	0.633
61	5.08	3.10	0.929	0.147	(0.465)	0.783
62	5.17	3.60	1.079	0.147	(0.540)	0.933
63	5.25	3.90	1.169	0.147	(0.585)	1.022
64	5.33	4.20	1.259	0.147	(0.629)	1.112
65	5.42	4.70	1.409	0.147	(0.704)	1.262
66	5.50	5.60	1.679	0.147	(0.839)	1.532
67	5.58	1.90	0.570	0.147	(0.285)	0.423

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68   5.67     0.90      0.270       (  0.147)       0.135        0.135
69   5.75     0.60      0.180       (  0.147)       0.090        0.090
70   5.83     0.50      0.150       (  0.147)       0.075        0.075
71   5.92     0.30      0.090       (  0.147)       0.045        0.045
72   6.00     0.20      0.060       (  0.147)       0.030        0.030
               (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    20.8
      Flood volume = Effective rainfall      1.73(In)
       times area     235.5(Ac.)/[(In)/(Ft.)] =      34.0(Ac.Ft)
      Total soil loss =      0.77(In)
      Total soil loss =    15.057(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =     1479549.8 Cubic Feet
      Total soil loss =      655882.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =    249.777(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       75.0     150.0     225.0     300.0
-----------------------------------------------------------------------
  0+ 5       0.0047      0.68  Q         |         |         |         |
  0+10       0.0291      3.54  Q         |         |         |         |
  0+15       0.0873      8.46  VQ        |         |         |         |
  0+20       0.1748     12.71  VQ        |         |         |         |
  0+25       0.2789     15.11  V Q       |         |         |         |
  0+30       0.3933     16.61  V Q       |         |         |         |
  0+35       0.5180     18.11  V Q       |         |         |         |
  0+40       0.6538     19.72  V Q       |         |         |         |
  0+45       0.7982     20.97  V Q       |         |         |         |
  0+50       0.9482     21.79  |VQ       |         |         |         |
  0+55       1.1023     22.37  |VQ       |         |         |         |
  1+ 0       1.2604     22.96  |V Q      |         |         |         |
  1+ 5       1.4248     23.87  |V Q      |         |         |         |
  1+10       1.5975     25.07  |V Q      |         |         |         |
  1+15       1.7767     26.02  | VQ      |         |         |         |
  1+20       1.9598     26.59  | VQ      |         |         |         |
  1+25       2.1456     26.98  | VQ      |         |         |         |
  1+30       2.3335     27.28  | VQ      |         |         |         |
  1+35       2.5231     27.53  | VQ      |         |         |         |
  1+40       2.7141     27.73  |  Q      |         |         |         |
  1+45       2.9063     27.91  |  Q      |         |         |         |
  1+50       3.0998     28.09  |  Q      |         |         |         |
  1+55       3.2939     28.18  |  Q      |         |         |         |
  2+ 0       3.4893     28.37  |  QV     |         |         |         |
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2+ 5       3.6878     28.83  |  QV     |         |         |         |
2+10       3.8899     29.34  |  QV     |         |         |         |
2+15       4.0946     29.73  |  QV     |         |         |         |
2+20       4.3033     30.30  |   QV    |         |         |         |
2+25       4.5157     30.85  |   QV    |         |         |         |
2+30       4.7303     31.16  |   QV    |         |         |         |
2+35       4.9461     31.34  |   QV    |         |         |         |
2+40       5.1629     31.48  |   Q V   |         |         |         |
2+45       5.3817     31.76  |   Q V   |         |         |         |
2+50       5.6055     32.50  |   Q V   |         |         |         |
2+55       5.8371     33.63  |   Q V   |         |         |         |
3+ 0       6.0748     34.51  |   Q  V  |         |         |         |
3+ 5       6.3157     34.98  |   Q  V  |         |         |         |
3+10       6.5604     35.53  |   Q  V  |         |         |         |
3+15       6.8141     36.84  |   Q   V |         |         |         |
3+20       7.0811     38.76  |    Q  V |         |         |         |
3+25       7.3601     40.52  |    Q  V |         |         |         |
3+30       7.6540     42.68  |    Q   V|         |         |         |
3+35       7.9728     46.28  |     Q  V|         |         |         |
3+40       8.3230     50.85  |     Q  V|         |         |         |
3+45       8.7033     55.21  |      Q  V         |         |         |
3+50       9.1094     58.98  |      Q  V         |         |         |
3+55       9.5406     62.60  |       Q |V        |         |         |
4+ 0       9.9961     66.14  |       Q |V        |         |         |
4+ 5      10.4760     69.69  |        Q| V       |         |         |
4+10      10.9821     73.49  |        Q| V       |         |         |
4+15      11.5203     78.14  |         Q  V      |         |         |
4+20      12.0967     83.69  |         |Q  V     |         |         |
4+25      12.7144     89.69  |         |Q  V     |         |         |
4+30      13.3734     95.69  |         | Q  V    |         |         |
4+35      14.0691    101.02  |         |  Q  V   |         |         |
4+40      14.7980    105.83  |         |   Q  V  |         |         |
4+45      15.5635    111.15  |         |   Q   V |         |         |
4+50      16.3689    116.95  |         |    Q   V|         |         |
4+55      17.2112    122.29  |         |     Q   V         |         |
5+ 0      18.0866    127.11  |         |     Q   |V        |         |
5+ 5      19.0063    133.53  |         |      Q  | V       |         |
5+10      20.0055    145.09  |         |        Q|  V      |         |
5+15      21.1310    163.43  |         |         |Q  V     |         |
5+20      22.4062    185.15  |         |         |   Q V   |         |
5+25      23.8302    206.77  |         |         |      QV |         |
5+30      25.4189    230.69  |         |         |        VQ         |
5+35      27.1392    249.78  |         |         |         |V Q      |
5+40      28.7655    236.15  |         |         |         |Q V      |
5+45      30.0125    181.06  |         |         |   Q     |    V    |
5+50      30.8703    124.55  |         |     Q   |         |     V   |
5+55      31.4958     90.82  |         | Q       |         |      V  |
6+ 0      31.9876     71.42  |        Q|         |         |      V  |
6+ 5      32.3814     57.17  |      Q  |         |         |       V |
6+10      32.6941     45.40  |     Q   |         |         |       V |
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    6+15      32.9420     35.99  |   Q     |         |         |       V |
    6+20      33.1401     28.76  |  Q      |         |         |        V|
    6+25      33.3022     23.54  |  Q      |         |         |        V|
    6+30      33.4376     19.66  | Q       |         |         |        V|
    6+35      33.5513     16.51  | Q       |         |         |        V|
    6+40      33.6448     13.58  |Q        |         |         |        V|
    6+45      33.7218     11.19  |Q        |         |         |        V|
    6+50      33.7855      9.25  |Q        |         |         |        V|
    6+55      33.8373      7.51  |Q        |         |         |        V|
    7+ 0      33.8783      5.96  Q        |         |         |        V|
    7+ 5      33.9109      4.73  Q        |         |         |        V|
    7+10      33.9361      3.66  Q        |         |         |        V|
    7+15      33.9538      2.56  Q        |         |         |        V|
    7+20      33.9597      0.86  Q        |         |         |        V|
    7+25      33.9623      0.38  Q        |         |         |        V|
    7+30      33.9640      0.24  Q        |         |         |        V|
    7+35      33.9650      0.15  Q        |         |         |        V|
    7+40      33.9655      0.08  Q        |         |         |        V|
    7+45      33.9658      0.03  Q        |         |         |         V
-----------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB24100.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: A11TRIB.OUT- RSB
-------------------------------------------------------------------
Drainage Area =     235.50(Ac.)  =      0.368 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     235.50(Ac.)  =
0.368 Sq. Mi.
Length along longest watercourse =    5432.00(Ft.)
Length along longest watercourse measured to centroid =    1784.00(Ft.)
Length along longest watercourse =      1.029 Mi.
Length along longest watercourse measured to centroid =      0.338 Mi.
Difference in elevation =      20.50(Ft.)
Slope along watercourse =     19.9264 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.227 Hr.
Lag time =    13.65 Min.
25% of lag time =     3.41 Min.
40% of lag time =     5.46 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]
235.50	1.60	376.80

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
235.50	4.00	942.00

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 = 99.95 %
Adjusted average point rain = 3.998(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
44.000	56.00	0.500
21.600	75.00	0.500
88.600	89.00	0.000
5.400	75.00	0.500
57.300	69.00	0.900
18.600	75.00	0.900

Total Area Entered = 235.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.500	0.281	0.187	0.052
75.0	75.0	0.303	0.500	0.167	0.092	0.015
89.0	89.0	0.141	0.000	0.141	0.376	0.053
75.0	75.0	0.303	0.500	0.167	0.023	0.004
69.0	69.0	0.373	0.900	0.071	0.243	0.017
75.0	75.0	0.303	0.900	0.058	0.079	0.005
					Sum (F) =	0.147

Area averaged mean soil loss (F) (In/Hr) = 0.147
Minimum soil loss rate ((In/Hr)) = 0.073
(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	36.639	3.827	9.083
2	0.167	73.278	15.298	36.309
3	0.250	109.918	24.567	58.307
4	0.333	146.557	18.994	45.081
5	0.417	183.196	9.692	23.004
6	0.500	219.835	5.696	13.518
7	0.583	256.474	4.227	10.033
8	0.667	293.114	3.309	7.853
9	0.750	329.753	2.568	6.095
10	0.833	366.392	2.147	5.097
11	0.917	403.031	1.700	4.035
12	1.000	439.670	1.357	3.222
13	1.083	476.309	1.154	2.738
14	1.167	512.949	1.084	2.572
15	1.250	549.588	0.867	2.059
16	1.333	586.227	0.734	1.743
17	1.417	622.866	0.631	1.498
18	1.500	659.505	0.518	1.230
19	1.583	696.145	0.407	0.965
20	1.667	732.784	0.366	0.870
21	1.750	769.423	0.366	0.870
22	1.833	806.062	0.489	1.161
			Sum = 100.000	Sum= 237.340

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	(0.260)	0.016	0.016
2	0.17	0.07	0.032	(0.259)	0.016	0.016
3	0.25	0.07	0.032	(0.258)	0.016	0.016
4	0.33	0.10	0.048	(0.257)	0.024	0.024
5	0.42	0.10	0.048	(0.256)	0.024	0.024
6	0.50	0.10	0.048	(0.255)	0.024	0.024
7	0.58	0.10	0.048	(0.254)	0.024	0.024
8	0.67	0.10	0.048	(0.253)	0.024	0.024
9	0.75	0.10	0.048	(0.252)	0.024	0.024
10	0.83	0.13	0.064	(0.251)	0.032	0.032
11	0.92	0.13	0.064	(0.250)	0.032	0.032
12	1.00	0.13	0.064	(0.249)	0.032	0.032
13	1.08	0.10	0.048	(0.248)	0.024	0.024
14	1.17	0.10	0.048	(0.247)	0.024	0.024
15	1.25	0.10	0.048	(0.246)	0.024	0.024
16	1.33	0.10	0.048	(0.245)	0.024	0.024
17	1.42	0.10	0.048	(0.244)	0.024	0.024

18	1.50	0.10	0.048	(0.243)	0.024	0.024
19	1.58	0.10	0.048	(0.242)	0.024	0.024
20	1.67	0.10	0.048	(0.241)	0.024	0.024
21	1.75	0.10	0.048	(0.240)	0.024	0.024
22	1.83	0.13	0.064	(0.239)	0.032	0.032
23	1.92	0.13	0.064	(0.238)	0.032	0.032
24	2.00	0.13	0.064	(0.237)	0.032	0.032
25	2.08	0.13	0.064	(0.236)	0.032	0.032
26	2.17	0.13	0.064	(0.235)	0.032	0.032
27	2.25	0.13	0.064	(0.234)	0.032	0.032
28	2.33	0.13	0.064	(0.233)	0.032	0.032
29	2.42	0.13	0.064	(0.232)	0.032	0.032
30	2.50	0.13	0.064	(0.231)	0.032	0.032
31	2.58	0.17	0.080	(0.231)	0.040	0.040
32	2.67	0.17	0.080	(0.230)	0.040	0.040
33	2.75	0.17	0.080	(0.229)	0.040	0.040
34	2.83	0.17	0.080	(0.228)	0.040	0.040
35	2.92	0.17	0.080	(0.227)	0.040	0.040
36	3.00	0.17	0.080	(0.226)	0.040	0.040
37	3.08	0.17	0.080	(0.225)	0.040	0.040
38	3.17	0.17	0.080	(0.224)	0.040	0.040
39	3.25	0.17	0.080	(0.223)	0.040	0.040
40	3.33	0.17	0.080	(0.222)	0.040	0.040
41	3.42	0.17	0.080	(0.221)	0.040	0.040
42	3.50	0.17	0.080	(0.220)	0.040	0.040
43	3.58	0.17	0.080	(0.219)	0.040	0.040
44	3.67	0.17	0.080	(0.218)	0.040	0.040
45	3.75	0.17	0.080	(0.217)	0.040	0.040
46	3.83	0.20	0.096	(0.217)	0.048	0.048
47	3.92	0.20	0.096	(0.216)	0.048	0.048
48	4.00	0.20	0.096	(0.215)	0.048	0.048
49	4.08	0.20	0.096	(0.214)	0.048	0.048
50	4.17	0.20	0.096	(0.213)	0.048	0.048
51	4.25	0.20	0.096	(0.212)	0.048	0.048
52	4.33	0.23	0.112	(0.211)	0.056	0.056
53	4.42	0.23	0.112	(0.210)	0.056	0.056
54	4.50	0.23	0.112	(0.209)	0.056	0.056
55	4.58	0.23	0.112	(0.208)	0.056	0.056
56	4.67	0.23	0.112	(0.208)	0.056	0.056
57	4.75	0.23	0.112	(0.207)	0.056	0.056
58	4.83	0.27	0.128	(0.206)	0.064	0.064
59	4.92	0.27	0.128	(0.205)	0.064	0.064
60	5.00	0.27	0.128	(0.204)	0.064	0.064
61	5.08	0.20	0.096	(0.203)	0.048	0.048
62	5.17	0.20	0.096	(0.202)	0.048	0.048
63	5.25	0.20	0.096	(0.201)	0.048	0.048
64	5.33	0.23	0.112	(0.200)	0.056	0.056
65	5.42	0.23	0.112	(0.200)	0.056	0.056
66	5.50	0.23	0.112	(0.199)	0.056	0.056
67	5.58	0.27	0.128	(0.198)	0.064	0.064

68	5.67	0.27	0.128	(0.197)	0.064	0.064
69	5.75	0.27	0.128	(0.196)	0.064	0.064
70	5.83	0.27	0.128	(0.195)	0.064	0.064
71	5.92	0.27	0.128	(0.194)	0.064	0.064
72	6.00	0.27	0.128	(0.193)	0.064	0.064
73	6.08	0.30	0.144	(0.193)	0.072	0.072
74	6.17	0.30	0.144	(0.192)	0.072	0.072
75	6.25	0.30	0.144	(0.191)	0.072	0.072
76	6.33	0.30	0.144	(0.190)	0.072	0.072
77	6.42	0.30	0.144	(0.189)	0.072	0.072
78	6.50	0.30	0.144	(0.188)	0.072	0.072
79	6.58	0.33	0.160	(0.188)	0.080	0.080
80	6.67	0.33	0.160	(0.187)	0.080	0.080
81	6.75	0.33	0.160	(0.186)	0.080	0.080
82	6.83	0.33	0.160	(0.185)	0.080	0.080
83	6.92	0.33	0.160	(0.184)	0.080	0.080
84	7.00	0.33	0.160	(0.183)	0.080	0.080
85	7.08	0.33	0.160	(0.182)	0.080	0.080
86	7.17	0.33	0.160	(0.182)	0.080	0.080
87	7.25	0.33	0.160	(0.181)	0.080	0.080
88	7.33	0.37	0.176	(0.180)	0.088	0.088
89	7.42	0.37	0.176	(0.179)	0.088	0.088
90	7.50	0.37	0.176	(0.178)	0.088	0.088
91	7.58	0.40	0.192	(0.178)	0.096	0.096
92	7.67	0.40	0.192	(0.177)	0.096	0.096
93	7.75	0.40	0.192	(0.176)	0.096	0.096
94	7.83	0.43	0.208	(0.175)	0.104	0.104
95	7.92	0.43	0.208	(0.174)	0.104	0.104
96	8.00	0.43	0.208	(0.173)	0.104	0.104
97	8.08	0.50	0.240	(0.173)	0.120	0.120
98	8.17	0.50	0.240	(0.172)	0.120	0.120
99	8.25	0.50	0.240	(0.171)	0.120	0.120
100	8.33	0.50	0.240	(0.170)	0.120	0.120
101	8.42	0.50	0.240	(0.169)	0.120	0.120
102	8.50	0.50	0.240	(0.169)	0.120	0.120
103	8.58	0.53	0.256	(0.168)	0.128	0.128
104	8.67	0.53	0.256	(0.167)	0.128	0.128
105	8.75	0.53	0.256	(0.166)	0.128	0.128
106	8.83	0.57	0.272	(0.166)	0.136	0.136
107	8.92	0.57	0.272	(0.165)	0.136	0.136
108	9.00	0.57	0.272	(0.164)	0.136	0.136
109	9.08	0.63	0.304	(0.163)	0.152	0.152
110	9.17	0.63	0.304	(0.162)	0.152	0.152
111	9.25	0.63	0.304	(0.162)	0.152	0.152
112	9.33	0.67	0.320	(0.161)	0.160	0.160
113	9.42	0.67	0.320	(0.160)	0.160	0.160
114	9.50	0.67	0.320	0.159	(0.160)	0.161
115	9.58	0.70	0.336	0.159	(0.168)	0.177
116	9.67	0.70	0.336	0.158	(0.168)	0.178
117	9.75	0.70	0.336	0.157	(0.168)	0.179

118	9.83	0.73	0.352		0.156	(0.176)	0.196
119	9.92	0.73	0.352		0.156	(0.176)	0.196
120	10.00	0.73	0.352		0.155	(0.176)	0.197
121	10.08	0.50	0.240	(	0.154)	0.120	0.120
122	10.17	0.50	0.240	(	0.153)	0.120	0.120
123	10.25	0.50	0.240	(	0.153)	0.120	0.120
124	10.33	0.50	0.240	(	0.152)	0.120	0.120
125	10.42	0.50	0.240	(	0.151)	0.120	0.120
126	10.50	0.50	0.240	(	0.150)	0.120	0.120
127	10.58	0.67	0.320		0.150	(0.160)	0.170
128	10.67	0.67	0.320		0.149	(0.160)	0.171
129	10.75	0.67	0.320		0.148	(0.160)	0.172
130	10.83	0.67	0.320		0.147	(0.160)	0.172
131	10.92	0.67	0.320		0.147	(0.160)	0.173
132	11.00	0.67	0.320		0.146	(0.160)	0.174
133	11.08	0.63	0.304		0.145	(0.152)	0.159
134	11.17	0.63	0.304		0.145	(0.152)	0.159
135	11.25	0.63	0.304		0.144	(0.152)	0.160
136	11.33	0.63	0.304		0.143	(0.152)	0.161
137	11.42	0.63	0.304		0.142	(0.152)	0.161
138	11.50	0.63	0.304		0.142	(0.152)	0.162
139	11.58	0.57	0.272	(	0.141)	0.136	0.136
140	11.67	0.57	0.272	(	0.140)	0.136	0.136
141	11.75	0.57	0.272	(	0.140)	0.136	0.136
142	11.83	0.60	0.288		0.139	(0.144)	0.149
143	11.92	0.60	0.288		0.138	(0.144)	0.150
144	12.00	0.60	0.288		0.138	(0.144)	0.150
145	12.08	0.83	0.400		0.137	(0.200)	0.263
146	12.17	0.83	0.400		0.136	(0.200)	0.264
147	12.25	0.83	0.400		0.135	(0.200)	0.264
148	12.33	0.87	0.416		0.135	(0.208)	0.281
149	12.42	0.87	0.416		0.134	(0.208)	0.282
150	12.50	0.87	0.416		0.133	(0.208)	0.282
151	12.58	0.93	0.448		0.133	(0.224)	0.315
152	12.67	0.93	0.448		0.132	(0.224)	0.316
153	12.75	0.93	0.448		0.131	(0.224)	0.316
154	12.83	0.97	0.464		0.131	(0.232)	0.333
155	12.92	0.97	0.464		0.130	(0.232)	0.334
156	13.00	0.97	0.464		0.129	(0.232)	0.334
157	13.08	1.13	0.544		0.129	(0.272)	0.415
158	13.17	1.13	0.544		0.128	(0.272)	0.416
159	13.25	1.13	0.544		0.127	(0.272)	0.416
160	13.33	1.13	0.544		0.127	(0.272)	0.417
161	13.42	1.13	0.544		0.126	(0.272)	0.418
162	13.50	1.13	0.544		0.126	(0.272)	0.418
163	13.58	0.77	0.368		0.125	(0.184)	0.243
164	13.67	0.77	0.368		0.124	(0.184)	0.244
165	13.75	0.77	0.368		0.124	(0.184)	0.244
166	13.83	0.77	0.368		0.123	(0.184)	0.245
167	13.92	0.77	0.368		0.122	(0.184)	0.245

168	14.00	0.77	0.368	0.122	(0.184)	0.246
169	14.08	0.90	0.432	0.121	(0.216)	0.311
170	14.17	0.90	0.432	0.121	(0.216)	0.311
171	14.25	0.90	0.432	0.120	(0.216)	0.312
172	14.33	0.87	0.416	0.119	(0.208)	0.297
173	14.42	0.87	0.416	0.119	(0.208)	0.297
174	14.50	0.87	0.416	0.118	(0.208)	0.298
175	14.58	0.87	0.416	0.117	(0.208)	0.298
176	14.67	0.87	0.416	0.117	(0.208)	0.299
177	14.75	0.87	0.416	0.116	(0.208)	0.300
178	14.83	0.83	0.400	0.116	(0.200)	0.284
179	14.92	0.83	0.400	0.115	(0.200)	0.285
180	15.00	0.83	0.400	0.114	(0.200)	0.285
181	15.08	0.80	0.384	0.114	(0.192)	0.270
182	15.17	0.80	0.384	0.113	(0.192)	0.271
183	15.25	0.80	0.384	0.113	(0.192)	0.271
184	15.33	0.77	0.368	0.112	(0.184)	0.256
185	15.42	0.77	0.368	0.112	(0.184)	0.256
186	15.50	0.77	0.368	0.111	(0.184)	0.257
187	15.58	0.63	0.304	0.110	(0.152)	0.193
188	15.67	0.63	0.304	0.110	(0.152)	0.194
189	15.75	0.63	0.304	0.109	(0.152)	0.195
190	15.83	0.63	0.304	0.109	(0.152)	0.195
191	15.92	0.63	0.304	0.108	(0.152)	0.196
192	16.00	0.63	0.304	0.108	(0.152)	0.196
193	16.08	0.13	0.064	(0.107)	0.032	0.032
194	16.17	0.13	0.064	(0.107)	0.032	0.032
195	16.25	0.13	0.064	(0.106)	0.032	0.032
196	16.33	0.13	0.064	(0.105)	0.032	0.032
197	16.42	0.13	0.064	(0.105)	0.032	0.032
198	16.50	0.13	0.064	(0.104)	0.032	0.032
199	16.58	0.10	0.048	(0.104)	0.024	0.024
200	16.67	0.10	0.048	(0.103)	0.024	0.024
201	16.75	0.10	0.048	(0.103)	0.024	0.024
202	16.83	0.10	0.048	(0.102)	0.024	0.024
203	16.92	0.10	0.048	(0.102)	0.024	0.024
204	17.00	0.10	0.048	(0.101)	0.024	0.024
205	17.08	0.17	0.080	(0.101)	0.040	0.040
206	17.17	0.17	0.080	(0.100)	0.040	0.040
207	17.25	0.17	0.080	(0.100)	0.040	0.040
208	17.33	0.17	0.080	(0.099)	0.040	0.040
209	17.42	0.17	0.080	(0.099)	0.040	0.040
210	17.50	0.17	0.080	(0.098)	0.040	0.040
211	17.58	0.17	0.080	(0.098)	0.040	0.040
212	17.67	0.17	0.080	(0.097)	0.040	0.040
213	17.75	0.17	0.080	(0.097)	0.040	0.040
214	17.83	0.13	0.064	(0.096)	0.032	0.032
215	17.92	0.13	0.064	(0.096)	0.032	0.032
216	18.00	0.13	0.064	(0.095)	0.032	0.032
217	18.08	0.13	0.064	(0.095)	0.032	0.032

218	18.17	0.13	0.064	(0.094)	0.032	0.032
219	18.25	0.13	0.064	(0.094)	0.032	0.032
220	18.33	0.13	0.064	(0.093)	0.032	0.032
221	18.42	0.13	0.064	(0.093)	0.032	0.032
222	18.50	0.13	0.064	(0.093)	0.032	0.032
223	18.58	0.10	0.048	(0.092)	0.024	0.024
224	18.67	0.10	0.048	(0.092)	0.024	0.024
225	18.75	0.10	0.048	(0.091)	0.024	0.024
226	18.83	0.07	0.032	(0.091)	0.016	0.016
227	18.92	0.07	0.032	(0.090)	0.016	0.016
228	19.00	0.07	0.032	(0.090)	0.016	0.016
229	19.08	0.10	0.048	(0.090)	0.024	0.024
230	19.17	0.10	0.048	(0.089)	0.024	0.024
231	19.25	0.10	0.048	(0.089)	0.024	0.024
232	19.33	0.13	0.064	(0.088)	0.032	0.032
233	19.42	0.13	0.064	(0.088)	0.032	0.032
234	19.50	0.13	0.064	(0.087)	0.032	0.032
235	19.58	0.10	0.048	(0.087)	0.024	0.024
236	19.67	0.10	0.048	(0.087)	0.024	0.024
237	19.75	0.10	0.048	(0.086)	0.024	0.024
238	19.83	0.07	0.032	(0.086)	0.016	0.016
239	19.92	0.07	0.032	(0.085)	0.016	0.016
240	20.00	0.07	0.032	(0.085)	0.016	0.016
241	20.08	0.10	0.048	(0.085)	0.024	0.024
242	20.17	0.10	0.048	(0.084)	0.024	0.024
243	20.25	0.10	0.048	(0.084)	0.024	0.024
244	20.33	0.10	0.048	(0.084)	0.024	0.024
245	20.42	0.10	0.048	(0.083)	0.024	0.024
246	20.50	0.10	0.048	(0.083)	0.024	0.024
247	20.58	0.10	0.048	(0.083)	0.024	0.024
248	20.67	0.10	0.048	(0.082)	0.024	0.024
249	20.75	0.10	0.048	(0.082)	0.024	0.024
250	20.83	0.07	0.032	(0.082)	0.016	0.016
251	20.92	0.07	0.032	(0.081)	0.016	0.016
252	21.00	0.07	0.032	(0.081)	0.016	0.016
253	21.08	0.10	0.048	(0.081)	0.024	0.024
254	21.17	0.10	0.048	(0.080)	0.024	0.024
255	21.25	0.10	0.048	(0.080)	0.024	0.024
256	21.33	0.07	0.032	(0.080)	0.016	0.016
257	21.42	0.07	0.032	(0.079)	0.016	0.016
258	21.50	0.07	0.032	(0.079)	0.016	0.016
259	21.58	0.10	0.048	(0.079)	0.024	0.024
260	21.67	0.10	0.048	(0.078)	0.024	0.024
261	21.75	0.10	0.048	(0.078)	0.024	0.024
262	21.83	0.07	0.032	(0.078)	0.016	0.016
263	21.92	0.07	0.032	(0.078)	0.016	0.016
264	22.00	0.07	0.032	(0.077)	0.016	0.016
265	22.08	0.10	0.048	(0.077)	0.024	0.024
266	22.17	0.10	0.048	(0.077)	0.024	0.024
267	22.25	0.10	0.048	(0.077)	0.024	0.024

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268  22.33     0.07      0.032       (  0.076)       0.016        0.016
269  22.42     0.07      0.032       (  0.076)       0.016        0.016
270  22.50     0.07      0.032       (  0.076)       0.016        0.016
271  22.58     0.07      0.032       (  0.076)       0.016        0.016
272  22.67     0.07      0.032       (  0.076)       0.016        0.016
273  22.75     0.07      0.032       (  0.075)       0.016        0.016
274  22.83     0.07      0.032       (  0.075)       0.016        0.016
275  22.92     0.07      0.032       (  0.075)       0.016        0.016
276  23.00     0.07      0.032       (  0.075)       0.016        0.016
277  23.08     0.07      0.032       (  0.075)       0.016        0.016
278  23.17     0.07      0.032       (  0.074)       0.016        0.016
279  23.25     0.07      0.032       (  0.074)       0.016        0.016
280  23.33     0.07      0.032       (  0.074)       0.016        0.016
281  23.42     0.07      0.032       (  0.074)       0.016        0.016
282  23.50     0.07      0.032       (  0.074)       0.016        0.016
283  23.58     0.07      0.032       (  0.074)       0.016        0.016
284  23.67     0.07      0.032       (  0.074)       0.016        0.016
285  23.75     0.07      0.032       (  0.073)       0.016        0.016
286  23.83     0.07      0.032       (  0.073)       0.016        0.016
287  23.92     0.07      0.032       (  0.073)       0.016        0.016
288  24.00     0.07      0.032       (  0.073)       0.016        0.016
                (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    28.2
      Flood volume = Effective rainfall      2.35(In)
       times area     235.5(Ac.)/[(In)/(Ft.)] =      46.2(Ac.Ft)
      Total soil loss =      1.64(In)
      Total soil loss =    32.281(Ac.Ft)
      Total rainfall =      4.00(In)
      Flood volume =     2011715.0 Cubic Feet
      Total soil loss =     1406172.2 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     92.977(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       25.0      50.0      75.0     100.0
 ---------------------------------------------------------------------
   0+ 5       0.0010      0.15  Q         |         |         |         |
   0+10       0.0060      0.73  Q         |         |         |         |
   0+15       0.0174      1.66  Q         |         |         |         |
   0+20       0.0343      2.45  Q         |         |         |         |
   0+25       0.0558      3.11  VQ        |         |         |         |
   0+30       0.0819      3.79  VQ        |         |         |         |
   0+35       0.1116      4.32  VQ        |         |         |         |
   0+40       0.1435      4.63  VQ        |         |         |         |
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0+45       0.1767      4.83  VQ        |         |         |         |
0+50       0.2116      5.07  V Q       |         |         |         |
0+55       0.2494      5.48  V Q       |         |         |         |
1+ 0       0.2911      6.05  V Q       |         |         |         |
1+ 5       0.3353      6.42  V Q       |         |         |         |
1+10       0.3793      6.39  V Q       |         |         |         |
1+15       0.4213      6.09  V Q       |         |         |         |
1+20       0.4616      5.86  V Q       |         |         |         |
1+25       0.5014      5.78  V Q       |         |         |         |
1+30       0.5411      5.76  V Q       |         |         |         |
1+35       0.5807      5.75  V Q       |         |         |         |
1+40       0.6203      5.75  V Q       |         |         |         |
1+45       0.6598      5.75  V Q       |         |         |         |
1+50       0.7000      5.83  V Q       |         |         |         |
1+55       0.7421      6.11  V Q       |         |         |         |
2+ 0       0.7873      6.58  V Q       |         |         |         |
2+ 5       0.8351      6.94  V Q       |         |         |         |
2+10       0.8841      7.11  V Q       |         |         |         |
2+15       0.9338      7.21  V Q       |         |         |         |
2+20       0.9840      7.29  V Q       |         |         |         |
2+25       1.0346      7.35  V Q       |         |         |         |
2+30       1.0855      7.39  V Q       |         |         |         |
2+35       1.1372      7.51  V  Q      |         |         |         |
2+40       1.1911      7.82  |V Q      |         |         |         |
2+45       1.2483      8.31  |V Q      |         |         |         |
2+50       1.3081      8.68  |V Q      |         |         |         |
2+55       1.3693      8.89  |V Q      |         |         |         |
3+ 0       1.4314      9.01  |V Q      |         |         |         |
3+ 5       1.4941      9.11  |V Q      |         |         |         |
3+10       1.5573      9.18  |V Q      |         |         |         |
3+15       1.6209      9.24  |V Q      |         |         |         |
3+20       1.6849      9.29  |V Q      |         |         |         |
3+25       1.7491      9.33  |V Q      |         |         |         |
3+30       1.8136      9.36  |V Q      |         |         |         |
3+35       1.8783      9.39  |V Q      |         |         |         |
3+40       1.9431      9.41  |V Q      |         |         |         |
3+45       2.0080      9.43  |V Q      |         |         |         |
3+50       2.0735      9.51  |V Q      |         |         |         |
3+55       2.1411      9.82  |V Q      |         |         |         |
4+ 0       2.2120     10.29  |V  Q     |         |         |         |
4+ 5       2.2854     10.66  |V  Q     |         |         |         |
4+10       2.3602     10.85  | V Q     |         |         |         |
4+15       2.4357     10.97  | V Q     |         |         |         |
4+20       2.5124     11.13  | V Q     |         |         |         |
4+25       2.5914     11.48  | V Q     |         |         |         |
4+30       2.6741     12.00  | V Q     |         |         |         |
4+35       2.7595     12.40  | V Q     |         |         |         |
4+40       2.8464     12.62  | V  Q    |         |         |         |
4+45       2.9342     12.75  | V  Q    |         |         |         |
4+50       3.0232     12.92  | V  Q    |         |         |         |
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4+55       3.1148     13.30  | V  Q    |          |          |          |
5+ 0       3.2100     13.83  | V  Q    |          |          |          |
5+ 5       3.3071     14.10  | V  Q    |          |          |          |
5+10       3.4018     13.75  | V  Q    |          |          |          |
5+15       3.4911     12.96  |  V Q    |          |          |          |
5+20       3.5766     12.42  |  VQ     |          |          |          |
5+25       3.6622     12.43  |  VQ     |          |          |          |
5+30       3.7501     12.75  |  V Q    |          |          |          |
5+35       3.8402     13.09  |  V Q    |          |          |          |
5+40       3.9331     13.48  |  V Q    |          |          |          |
5+45       4.0295     14.00  |  V Q    |          |          |          |
5+50       4.1286     14.39  |  V Q    |          |          |          |
5+55       4.2291     14.60  |  V Q    |          |          |          |
6+ 0       4.3305     14.73  |  V Q    |          |          |          |
6+ 5       4.4331     14.90  |  V Q    |          |          |          |
6+10       4.5382     15.25  |  V  Q   |          |          |          |
6+15       4.6468     15.77  |   V Q   |          |          |          |
6+20       4.7582     16.18  |   V Q   |          |          |          |
6+25       4.8711     16.40  |   V Q   |          |          |          |
6+30       4.9850     16.53  |   V Q   |          |          |          |
6+35       5.1001     16.72  |   V Q   |          |          |          |
6+40       5.2178     17.09  |   V Q   |          |          |          |
6+45       5.3391     17.62  |   V  Q  |          |          |          |
6+50       5.4632     18.02  |   V  Q  |          |          |          |
6+55       5.5889     18.26  |   V  Q  |          |          |          |
7+ 0       5.7157     18.41  |   V  Q  |          |          |          |
7+ 5       5.8433     18.53  |    V Q  |          |          |          |
7+10       5.9715     18.62  |    V Q  |          |          |          |
7+15       6.1002     18.69  |    V Q  |          |          |          |
7+20       6.2298     18.82  |    V Q  |          |          |          |
7+25       6.3618     19.16  |    V Q  |          |          |          |
7+30       6.4972     19.66  |    V Q  |          |          |          |
7+35       6.6358     20.12  |    V  Q |          |          |          |
7+40       6.7779     20.63  |    V  Q |          |          |          |
7+45       6.9240     21.22  |    V  Q |          |          |          |
7+50       7.0739     21.76  |     V Q |          |          |          |
7+55       7.2276     22.31  |     V Q |          |          |          |
8+ 0       7.3856     22.94  |     V  Q|          |          |          |
8+ 5       7.5480     23.58  |     V  Q|          |          |          |
8+10       7.7163     24.45  |     V  Q|          |          |          |
8+15       7.8924     25.57  |     V   Q          |          |          |
8+20       8.0745     26.44  |     V   Q          |          |          |
8+25       8.2600     26.93  |      V  Q          |          |          |
8+30       8.4475     27.23  |      V  Q          |          |          |
8+35       8.6372     27.54  |      V  |Q         |          |          |
8+40       8.8302     28.02  |      V  |Q         |          |          |
8+45       9.0274     28.64  |      V  |Q         |          |          |
8+50       9.2285     29.20  |      V  |Q         |          |          |
8+55       9.4336     29.78  |       V |Q         |          |          |
9+ 0       9.6432     30.44  |       V | Q        |          |          |
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 9+ 5       9.8574     31.10  |        V | Q       |         |         |
 9+10      10.0777     31.99  |        V | Q       |         |         |
 9+15      10.3058     33.12  |        V |  Q      |         |         |
 9+20      10.5406     34.08  |         V|  Q      |         |         |
 9+25      10.7807     34.87  |         V|  Q      |         |         |
 9+30      11.0263     35.66  |         V|   Q     |         |         |
 9+35      11.2773     36.44  |         V|   Q     |         |         |
 9+40      11.5353     37.47  |         V|   Q     |         |         |
 9+45      11.8023     38.77  |          V    Q    |         |         |
 9+50      12.0777     39.98  |          V    Q    |         |         |
 9+55      12.3616     41.23  |          V     Q   |         |         |
10+ 0      12.6553     42.65  |          V      Q  |         |         |
10+ 5      12.9520     43.08  |          |V     Q  |         |         |
10+10      13.2343     40.99  |          |V    Q   |         |         |
10+15      13.4889     36.96  |          |V  Q     |         |         |
10+20      13.7220     33.85  |          |V Q      |         |         |
10+25      13.9448     32.35  |          | Q       |         |         |
10+30      14.1619     31.53  |          | Q       |         |         |
10+35      14.3782     31.40  |          | Q       |         |         |
10+40      14.6039     32.78  |          | VQ      |         |         |
10+45      14.8478     35.40  |          | V Q     |         |         |
10+50      15.1058     37.46  |          |  VQ     |         |         |
10+55      15.3709     38.50  |          |  V Q    |         |         |
11+ 0      15.6404     39.13  |          |  V Q    |         |         |
11+ 5      15.9123     39.47  |          |  V Q    |         |         |
11+10      16.1828     39.27  |          |   VQ    |         |         |
11+15      16.4491     38.68  |          |   VQ    |         |         |
11+20      16.7126     38.27  |          |   VQ    |         |         |
11+25      16.9754     38.16  |          |   VQ    |         |         |
11+30      17.2384     38.18  |          |   VQ    |         |         |
11+35      17.5002     38.02  |          |    Q    |         |         |
11+40      17.7559     37.13  |          |   QV    |         |         |
11+45      18.0013     35.63  |          |   QV    |         |         |
11+50      18.2391     34.54  |          |  Q V    |         |         |
11+55      18.4765     34.47  |          |  Q  V   |         |         |
12+ 0      18.7172     34.95  |          |  Q  V   |         |         |
12+ 5      18.9678     36.39  |          |   Q V   |         |         |
12+10      19.2480     40.68  |          |     Q   |         |         |
12+15      19.5742     47.37  |          |     V Q |         |         |
12+20      19.9375     52.74  |          |      V  |Q        |         |
12+25      20.3233     56.02  |          |      V  | Q       |         |
12+30      20.7268     58.59  |          |      V  |  Q      |         |
12+35      21.1459     60.86  |          |       V |   Q     |         |
12+40      21.5825     63.39  |          |       V |    Q    |         |
12+45      22.0389     66.28  |          |        V|     Q   |         |
12+50      22.5123     68.73  |          |        V|      Q  |         |
12+55      22.9997     70.77  |          |        V|       Q |         |
13+ 0      23.5006     72.74  |          |         V        Q|         |
13+ 5      24.0175     75.05  |          |         V         Q         |
13+10      24.5621     79.08  |          |         |V        |Q        |
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13+15      25.1447     84.59  |         |         |V        |  Q      |
13+20      25.7569     88.89  |         |         | V       |    Q    |
13+25      26.3861     91.36  |         |         | V       |     Q   |
13+30      27.0264     92.98  |         |         |  V      |      Q  |
13+35      27.6645     92.66  |         |         |  V      |      Q  |
13+40      28.2659     87.31  |         |         |   V     |   Q     |
13+45      28.8026     77.93  |         |         |   V     |Q        |
13+50      29.2902     70.80  |         |         |    V  Q |         |
13+55      29.7539     67.33  |         |         |    VQ   |         |
14+ 0      30.2046     65.44  |         |         |     Q   |         |
14+ 5      30.6502     64.70  |         |         |    QV   |         |
14+10      31.1051     66.05  |         |         |     Q   |         |
14+15      31.5808     69.07  |         |         |      Q  |         |
14+20      32.0716     71.26  |         |         |      VQ |         |
14+25      32.5655     71.72  |         |         |       Q |         |
14+30      33.0569     71.34  |         |         |       Q |         |
14+35      33.5460     71.03  |         |         |       QV|         |
14+40      34.0345     70.92  |         |         |       QV|         |
14+45      34.5231     70.95  |         |         |       QV|         |
14+50      35.0114     70.90  |         |         |       Q V         |
14+55      35.4958     70.33  |         |         |       Q V         |
15+ 0      35.9740     69.43  |         |         |      Q  |V        |
15+ 5      36.4467     68.63  |         |         |      Q  |V        |
15+10      36.9134     67.77  |         |         |      Q  |V        |
15+15      37.3727     66.69  |         |         |     Q   | V       |
15+20      37.8250     65.67  |         |         |     Q   | V       |
15+25      38.2712     64.79  |         |         |    Q    |  V      |
15+30      38.7100     63.72  |         |         |    Q    |  V      |
15+35      39.1395     62.35  |         |         |   Q     |  V      |
15+40      39.5502     59.64  |         |         |  Q      |   V     |
15+45      39.9339     55.71  |         |         | Q       |   V     |
15+50      40.2971     52.74  |         |         |Q        |   V     |
15+55      40.6494     51.16  |         |         Q         |    V    |
16+ 0      40.9954     50.23  |         |         Q         |    V    |
16+ 5      41.3263     48.05  |         |        Q|         |    V    |
16+10      41.6125     41.56  |         |     Q   |         |     V   |
16+15      41.8299     31.56  |         | Q       |         |     V   |
16+20      41.9937     23.79  |        Q|         |         |     V   |
16+25      42.1294     19.71  |      Q  |         |         |     V   |
16+30      42.2482     17.24  |     Q   |         |         |     V   |
16+35      42.3536     15.31  |     Q   |         |         |     V   |
16+40      42.4469     13.55  |    Q    |         |         |     V   |
16+45      42.5291     11.93  |   Q     |         |         |     V   |
16+50      42.6020     10.60  |   Q     |         |         |     V   |
16+55      42.6685      9.65  |  Q      |         |         |     V   |
17+ 0      42.7300      8.93  |  Q      |         |         |      V  |
17+ 5      42.7883      8.47  |  Q      |         |         |      V  |
17+10      42.8470      8.52  |  Q      |         |         |      V  |
17+15      42.9091      9.01  |  Q      |         |         |      V  |
17+20      42.9734      9.34  |  Q      |         |         |      V  |
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17+25      43.0383      9.43  |  Q      |         |         |      V  |
17+30      43.1032      9.42  |  Q      |         |         |      V  |
17+35      43.1679      9.40  |  Q      |         |         |      V  |
17+40      43.2324      9.36  |  Q      |         |         |      V  |
17+45      43.2965      9.30  |  Q      |         |         |      V  |
17+50      43.3592      9.11  |  Q      |         |         |      V  |
17+55      43.4203      8.87  |  Q      |         |         |      V  |
18+ 0      43.4784      8.44  |  Q      |         |         |      V  |
18+ 5      43.5343      8.12  |  Q      |         |         |      V  |
18+10      43.5892      7.97  |  Q      |         |         |      V  |
18+15      43.6435      7.89  |  Q      |         |         |      V  |
18+20      43.6974      7.83  |  Q      |         |         |      V  |
18+25      43.7511      7.79  |  Q      |         |         |      V  |
18+30      43.8045      7.76  |  Q      |         |         |      V  |
18+35      43.8573      7.66  |  Q      |         |         |      V  |
18+40      43.9079      7.35  | Q       |         |         |       V |
18+45      43.9552      6.87  | Q       |         |         |       V |
18+50      43.9995      6.44  | Q       |         |         |       V |
18+55      44.0405      5.94  | Q       |         |         |       V |
19+ 0      44.0773      5.35  | Q       |         |         |       V |
19+ 5      44.1115      4.97  |Q        |         |         |       V |
19+10      44.1459      5.00  |Q        |         |         |       V |
19+15      44.1824      5.30  | Q       |         |         |       V |
19+20      44.2210      5.60  | Q       |         |         |       V |
19+25      44.2622      5.98  | Q       |         |         |       V |
19+30      44.3067      6.47  | Q       |         |         |       V |
19+35      44.3533      6.77  | Q       |         |         |       V |
19+40      44.3993      6.67  | Q       |         |         |       V |
19+45      44.4428      6.32  | Q       |         |         |       V |
19+50      44.4839      5.97  | Q       |         |         |       V |
19+55      44.5222      5.56  | Q       |         |         |       V |
20+ 0      44.5568      5.03  | Q       |         |         |       V |
20+ 5      44.5892      4.70  |Q        |         |         |       V |
20+10      44.6221      4.78  |Q        |         |         |       V |
20+15      44.6574      5.12  | Q       |         |         |       V |
20+20      44.6944      5.37  | Q       |         |         |       V |
20+25      44.7322      5.49  | Q       |         |         |       V |
20+30      44.7703      5.54  | Q       |         |         |       V |
20+35      44.8087      5.57  | Q       |         |         |       V |
20+40      44.8473      5.60  | Q       |         |         |       V |
20+45      44.8860      5.62  | Q       |         |         |       V |
20+50      44.9244      5.57  | Q       |         |         |       V |
20+55      44.9608      5.29  | Q       |         |         |       V |
21+ 0      44.9941      4.83  |Q        |         |         |       V |
21+ 5      45.0254      4.55  |Q        |         |         |       V |
21+10      45.0575      4.66  |Q        |         |         |        V|
21+15      45.0921      5.02  | Q       |         |         |        V|
21+20      45.1280      5.22  | Q       |         |         |        V|
21+25      45.1629      5.06  | Q       |         |         |        V|
21+30      45.1949      4.65  |Q        |         |         |        V|
```

```
21+35      45.2252      4.40  |Q        |         |         |        V|
21+40      45.2566      4.55  |Q        |         |         |        V|
21+45      45.2906      4.94  |Q        |         |         |        V|
21+50      45.3262      5.17  | Q       |         |         |        V|
21+55      45.3607      5.01  | Q       |         |         |        V|
22+ 0      45.3925      4.62  |Q        |         |         |        V|
22+ 5      45.4226      4.38  |Q        |         |         |        V|
22+10      45.4538      4.52  |Q        |         |         |        V|
22+15      45.4876      4.91  |Q        |         |         |        V|
22+20      45.5230      5.14  | Q       |         |         |        V|
22+25      45.5573      4.99  |Q        |         |         |        V|
22+30      45.5890      4.59  |Q        |         |         |        V|
22+35      45.6185      4.28  |Q        |         |         |        V|
22+40      45.6470      4.14  |Q        |         |         |        V|
22+45      45.6750      4.07  |Q        |         |         |        V|
22+50      45.7027      4.02  |Q        |         |         |        V|
22+55      45.7301      3.98  |Q        |         |         |        V|
23+ 0      45.7573      3.94  |Q        |         |         |        V|
23+ 5      45.7842      3.91  |Q        |         |         |        V|
23+10      45.8110      3.89  |Q        |         |         |        V|
23+15      45.8377      3.88  |Q        |         |         |        V|
23+20      45.8644      3.87  |Q        |         |         |        V|
23+25      45.8909      3.86  |Q        |         |         |        V|
23+30      45.9174      3.84  |Q        |         |         |        V|
23+35      45.9437      3.83  |Q        |         |         |        V|
23+40      45.9701      3.82  |Q        |         |         |        V|
23+45      45.9964      3.82  |Q        |         |         |        V|
23+50      46.0227      3.82  |Q        |         |         |        V|
23+55      46.0489      3.81  |Q        |         |         |        V|
24+ 0      46.0752      3.81  |Q        |         |         |        V|
24+ 5      46.1003      3.65  |Q        |         |         |        V|
24+10      46.1215      3.07  |Q        |         |         |        V|
24+15      46.1362      2.14  Q         |         |         |        V|
24+20      46.1460      1.42  Q         |         |         |        V|
24+25      46.1532      1.05  Q         |         |         |        V|
24+30      46.1589      0.83  Q         |         |         |        V|
24+35      46.1635      0.67  Q         |         |         |        V|
24+40      46.1673      0.55  Q         |         |         |        V|
24+45      46.1704      0.45  Q         |         |         |        V|
24+50      46.1729      0.37  Q         |         |         |        V|
24+55      46.1750      0.30  Q         |         |         |        V|
25+ 0      46.1767      0.25  Q         |         |         |        V|
25+ 5      46.1782      0.21  Q         |         |         |        V|
25+10      46.1793      0.17  Q         |         |         |        V|
25+15      46.1802      0.13  Q         |         |         |        V|
25+20      46.1810      0.11  Q         |         |         |        V|
25+25      46.1815      0.08  Q         |         |         |        V|
25+30      46.1820      0.06  Q         |         |         |        V|
25+35      46.1823      0.05  Q         |         |         |        V|
25+40      46.1825      0.03  Q         |         |         |        V|
```

```
   25+45      46.1826      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB1000SERIES1100.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 = 1 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	0.50	32.80

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
65.60	1.20	78.72

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 = 99.94 %
Adjusted average point rain = 1.199(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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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

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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (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	4.20	0.604	0.243	(0.302)	0.361
2	0.17	4.30	0.619	0.243	(0.309)	0.376
3	0.25	5.00	0.720	0.243	(0.360)	0.476
4	0.33	5.00	0.720	0.243	(0.360)	0.476
5	0.42	5.80	0.835	0.243	(0.417)	0.591
6	0.50	6.50	0.935	0.243	(0.468)	0.692
7	0.58	7.40	1.065	0.243	(0.532)	0.822
8	0.67	8.60	1.238	0.243	(0.619)	0.994
9	0.75	12.30	1.770	0.243	(0.885)	1.527
10	0.83	29.10	4.188	0.243	(2.094)	3.945
11	0.92	6.80	0.979	0.243	(0.489)	0.735
12	1.00	5.00	0.720	0.243	(0.360)	0.476
			(Loss Rate Not Used)			
Sum =		100.0			Sum =	11.5

Flood volume = Effective rainfall 0.96(In)
times area 65.6(Ac.)/[(In)/(Ft.)] = 5.2(Ac.Ft)
Total soil loss = 0.24(In)
Total soil loss = 1.330(Ac.Ft)
Total rainfall = 1.20(In)
Flood volume = 227645.3 Cubic Feet
Total soil loss = 57938.4 Cubic Feet

Peak flow rate of this hydrograph = 133.730(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       50.0     100.0     150.0     200.0
  ----------------------------------------------------------------------
    0+ 5       0.0134      1.94  Q         |         |         |         |
    0+10       0.0826     10.06  V Q       |         |         |         |
    0+15       0.2018     17.30  |V Q      |         |         |         |
    0+20       0.3552     22.28  | V Q     |         |         |         |
    0+25       0.5360     26.24  |   VQ    |         |         |         |
    0+30       0.7500     31.09  |    VQ   |         |         |         |
    0+35       1.0063     37.21  |      Q  |         |         |         |
    0+40       1.3121     44.40  |       Q V         |         |         |
    0+45       1.6921     55.18  |         |QV       |         |         |
    0+50       2.2785     85.14  |         |      Q  |         |         |
    0+55       3.1995    133.73  |         |         |   V Q   |         |
    1+ 0       3.9497    108.93  |         |         |Q        V         |
    1+ 5       4.3894     63.85  |         | Q       |         |  V      |
    1+10       4.6566     38.79  |      Q  |         |         |    V    |
    1+15       4.8209     23.86  |   Q     |         |         |     V   |
    1+20       4.9357     16.66  |  Q      |         |         |      V  |
    1+25       5.0183     11.99  | Q       |         |         |       V |
    1+30       5.0818      9.22  |Q        |         |         |       V |
    1+35       5.1289      6.84  |Q        |         |         |        V|
    1+40       5.1640      5.10  |Q        |         |         |        V|
    1+45       5.1892      3.66  Q         |         |         |        V|
    1+50       5.2082      2.76  Q         |         |         |        V|
    1+55       5.2217      1.95  Q         |         |         |        V|
    2+ 0       5.2248      0.46  Q         |         |         |        V|
    2+ 5       5.2260      0.17  Q         |         |         |        V|
  ----------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB1000SERIES3100.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 = 3 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	0.80	52.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
65.60	1.90	124.64

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 = 99.97 %
Adjusted average point rain = 1.899(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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (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	1.30	0.296	(0.243)	0.148	0.148
2	0.17	1.30	0.296	(0.243)	0.148	0.148
3	0.25	1.10	0.251	(0.243)	0.125	0.125
4	0.33	1.50	0.342	(0.243)	0.171	0.171
5	0.42	1.50	0.342	(0.243)	0.171	0.171
6	0.50	1.80	0.410	(0.243)	0.205	0.205
7	0.58	1.50	0.342	(0.243)	0.171	0.171
8	0.67	1.80	0.410	(0.243)	0.205	0.205
9	0.75	1.80	0.410	(0.243)	0.205	0.205
10	0.83	1.50	0.342	(0.243)	0.171	0.171
11	0.92	1.60	0.365	(0.243)	0.182	0.182
12	1.00	1.80	0.410	(0.243)	0.205	0.205
13	1.08	2.20	0.501	0.243	(0.251)	0.258
14	1.17	2.20	0.501	0.243	(0.251)	0.258
15	1.25	2.20	0.501	0.243	(0.251)	0.258
16	1.33	2.00	0.456	(0.243)	0.228	0.228
17	1.42	2.60	0.593	0.243	(0.296)	0.349
18	1.50	2.70	0.615	0.243	(0.308)	0.372
19	1.58	2.40	0.547	0.243	(0.274)	0.304
20	1.67	2.70	0.615	0.243	(0.308)	0.372
21	1.75	3.30	0.752	0.243	(0.376)	0.509
22	1.83	3.10	0.707	0.243	(0.353)	0.463
23	1.92	2.90	0.661	0.243	(0.331)	0.418
24	2.00	3.00	0.684	0.243	(0.342)	0.440
25	2.08	3.10	0.707	0.243	(0.353)	0.463
26	2.17	4.20	0.957	0.243	(0.479)	0.714
27	2.25	5.00	1.140	0.243	(0.570)	0.896
28	2.33	3.50	0.798	0.243	(0.399)	0.554
29	2.42	6.80	1.550	0.243	(0.775)	1.307
30	2.50	7.30	1.664	0.243	(0.832)	1.421
31	2.58	8.20	1.869	0.243	(0.935)	1.626
32	2.67	5.90	1.345	0.243	(0.672)	1.102
33	2.75	2.00	0.456	(0.243)	0.228	0.228

```
34   2.83     1.80      0.410       (  0.243)       0.205        0.205
35   2.92     1.80      0.410       (  0.243)       0.205        0.205
36   3.00     0.60      0.137       (  0.243)       0.068        0.068
               (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    15.1
      Flood volume = Effective rainfall      1.26(In)
       times area      65.6(Ac.)/[(In)/(Ft.)] =       6.9(Ac.Ft)
      Total soil loss =      0.64(In)
      Total soil loss =     3.492(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =      300193.7 Cubic Feet
      Total soil loss =      152119.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     84.579(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       22.5      45.0      67.5      90.0
----------------------------------------------------------------------
  0+ 5       0.0055      0.80  Q         |         |         |         |
  0+10       0.0337      4.09  VQ        |         |         |         |
  0+15       0.0791      6.59  V Q       |         |         |         |
  0+20       0.1297      7.35  V  Q      |         |         |         |
  0+25       0.1886      8.56  |V Q      |         |         |         |
  0+30       0.2561      9.80  |V  Q     |         |         |         |
  0+35       0.3310     10.89  |V  Q     |         |         |         |
  0+40       0.4084     11.24  | V Q     |         |         |         |
  0+45       0.4902     11.88  | V  Q    |         |         |         |
  0+50       0.5755     12.39  |  V Q    |         |         |         |
  0+55       0.6582     12.01  |  V Q    |         |         |         |
  1+ 0       0.7408     11.99  |   VQ    |         |         |         |
  1+ 5       0.8297     12.91  |   VQ    |         |         |         |
  1+10       0.9300     14.56  |    VQ   |         |         |         |
  1+15       1.0378     15.66  |     Q   |         |         |         |
  1+20       1.1477     15.96  |     VQ  |         |         |         |
  1+25       1.2595     16.23  |      Q  |         |         |         |
  1+30       1.3883     18.71  |       Q |         |         |         |
  1+35       1.5324     20.92  |       VQ|         |         |         |
  1+40       1.6767     20.96  |        Q|         |         |         |
  1+45       1.8328     22.66  |         Q         |         |         |
  1+50       2.0161     26.62  |         |Q        |         |         |
  1+55       2.2108     28.26  |         | Q       |         |         |
  2+ 0       2.4023     27.81  |         | QV      |         |         |
  2+ 5       2.5958     28.10  |         | Q  V    |         |         |
  2+10       2.8052     30.40  |         |  Q  V   |         |         |
```

```
    2+15       3.0640     37.58  |         |     QV  |         |         |
    2+20       3.3707     44.54  |         |        Q|         |         |
    2+25       3.6884     46.13  |         |         QV        |         |
    2+30       4.1008     59.89  |         |         |  V  Q   |         |
    2+35       4.6242     75.99  |         |         |     V   |  Q      |
    2+40       5.2067     84.58  |         |         |         V      Q  |
    2+45       5.7267     75.51  |         |         |         |  Q      |
    2+50       6.0745     50.51  |         |         | Q       |    V    |
    2+55       6.3054     33.51  |         |   Q     |         |     V   |
    3+ 0       6.4845     26.01  |         |Q        |         |      V  |
    3+ 5       6.6142     18.84  |       Q |         |         |       V |
    3+10       6.6996     12.40  |    Q    |         |         |       V |
    3+15       6.7587      8.58  |  Q      |         |         |        V|
    3+20       6.8017      6.24  | Q       |         |         |        V|
    3+25       6.8325      4.48  |Q        |         |         |        V|
    3+30       6.8555      3.34  |Q        |         |         |        V|
    3+35       6.8714      2.31  |Q        |         |         |        V|
    3+40       6.8819      1.52  Q         |         |         |        V|
    3+45       6.8872      0.78  Q         |         |         |        V|
    3+50       6.8893      0.30  Q         |         |         |        V|
    3+55       6.8906      0.19  Q         |         |         |        V|
    4+ 0       6.8913      0.10  Q         |         |         |        V|
    4+ 5       6.8915      0.03  Q         |         |         |         V
-----------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/21/23 File: A11TRIB1000SERIES6100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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 = 6 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	1.00	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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (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)

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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       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|         |         |         |
```

```
   3+25       2.1441     10.74  |    Q    V         |         |         |
   3+30       2.2215     11.23  |    Q    V         |         |         |
   3+35       2.3038     11.96  |    Q    |V        |         |         |
   3+40       2.3913     12.70  |     Q   |V        |         |         |
   3+45       2.4824     13.23  |     Q   |V        |         |         |
   3+50       2.5775     13.80  |     Q   | V       |         |         |
   3+55       2.6758     14.29  |      Q  | V       |         |         |
   4+ 0       2.7779     14.82  |      Q  |  V      |         |         |
   4+ 5       2.8837     15.37  |      Q  |  V      |         |         |
   4+10       2.9961     16.32  |       Q |   V     |         |         |
   4+15       3.1184     17.75  |       Q |   V     |         |         |
   4+20       3.2519     19.39  |        Q|    V    |         |         |
   4+25       3.3975     21.13  |         Q     V   |         |         |
   4+30       3.5543     22.78  |         |Q     V  |         |         |
   4+35       3.7194     23.97  |         |Q     V  |         |         |
   4+40       3.8939     25.33  |         | Q     V |         |         |
   4+45       4.0801     27.04  |         |  Q     V|         |         |
   4+50       4.2777     28.69  |         |   Q     V        |         |
   4+55       4.4836     29.89  |         |   Q     |V       |         |
   5+ 0       4.6989     31.27  |         |    Q    | V      |         |
   5+ 5       4.9306     33.64  |         |     Q   |  V     |         |
   5+10       5.1977     38.78  |         |        Q|   V    |         |
   5+15       5.5129     45.77  |         |         | Q   V  |         |
   5+20       5.8730     52.28  |         |         |     Q V |         |
   5+25       6.2763     58.56  |         |         |        QV        |
   5+30       6.7360     66.74  |         |         |         | VQ     |
   5+35       7.2267     71.25  |         |         |         |   VQ   |
   5+40       7.5884     52.52  |         |         |     Q   |     V  |
   5+45       7.8069     31.72  |         |    Q    |         |      V |
   5+50       7.9569     21.78  |         Q         |         |       V|
   5+55       8.0684     16.19  |       Q |         |         |       V|
   6+ 0       8.1520     12.15  |     Q   |         |         |        V|
   6+ 5       8.2137      8.96  |   Q     |         |         |        V|
   6+10       8.2577      6.38  |  Q      |         |         |        V|
   6+15       8.2882      4.43  | Q       |         |         |        V|
   6+20       8.3099      3.15  |Q        |         |         |        V|
   6+25       8.3250      2.19  |Q        |         |         |        V|
   6+30       8.3354      1.51  Q         |         |         |        V|
   6+35       8.3418      0.93  Q         |         |         |        V|
   6+40       8.3441      0.33  Q         |         |         |        V|
   6+45       8.3453      0.17  Q         |         |         |        V|
   6+50       8.3460      0.10  Q         |         |         |        V|
   6+55       8.3464      0.06  Q         |         |         |        V|
   7+ 0       8.3466      0.03  Q         |         |         |        V|
   7+ 5       8.3467      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
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        U n i t   H y d r o g r a p h   A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (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    |          |          |          |
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 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      |         |         |
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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|         |
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14+35       8.4754     14.50  |         |        Q|         V         |
14+40       8.5753     14.50  |         |        Q|         V         |
14+45       8.6757     14.58  |         |        Q|         V         |
14+50       8.7760     14.56  |         |        Q|         |V        |
14+55       8.8743     14.28  |         |        Q|         |V        |
15+ 0       8.9711     14.06  |         |       Q |         | V       |
15+ 5       9.0671     13.94  |         |       Q |         | V       |
15+10       9.1607     13.59  |         |       Q |         | V       |
15+15       9.2524     13.32  |         |      Q  |         |  V      |
15+20       9.3430     13.16  |         |      Q  |         |  V      |
15+25       9.4313     12.82  |         |      Q  |         |  V      |
15+30       9.5177     12.55  |         |     Q   |         |  V      |
15+35       9.6022     12.26  |         |     Q   |         |   V     |
15+40       9.6812     11.47  |         |    Q    |         |   V     |
15+45       9.7559     10.85  |         |   Q     |         |   V     |
15+50       9.8288     10.59  |         |   Q     |         |    V    |
15+55       9.9007     10.43  |         |  Q      |         |    V    |
16+ 0       9.9718     10.33  |         |  Q      |         |    V    |
16+ 5      10.0379      9.60  |         | Q       |         |    V    |
16+10      10.0853      6.87  |        Q|         |         |     V   |
16+15      10.1177      4.71  |     Q   |         |         |     V   |
16+20      10.1443      3.86  |    Q    |         |         |     V   |
16+25      10.1673      3.35  |   Q     |         |         |     V   |
16+30      10.1880      3.00  |   Q     |         |         |     V   |
16+35      10.2067      2.71  |  Q      |         |         |     V   |
16+40      10.2229      2.36  |  Q      |         |         |     V   |
16+45      10.2372      2.08  | Q       |         |         |     V   |
16+50      10.2505      1.92  | Q       |         |         |     V   |
16+55      10.2630      1.81  | Q       |         |         |     V   |
17+ 0      10.2749      1.74  | Q       |         |         |     V   |
17+ 5      10.2870      1.76  | Q       |         |         |     V   |
17+10      10.3012      2.06  | Q       |         |         |     V   |
17+15      10.3173      2.33  |  Q      |         |         |     V   |
17+20      10.3341      2.44  |  Q      |         |         |     V   |
17+25      10.3513      2.50  |  Q      |         |         |     V   |
17+30      10.3687      2.54  |  Q      |         |         |      V  |
17+35      10.3864      2.56  |  Q      |         |         |      V  |
17+40      10.4042      2.58  |  Q      |         |         |      V  |
17+45      10.4221      2.60  |  Q      |         |         |      V  |
17+50      10.4398      2.57  |  Q      |         |         |      V  |
17+55      10.4564      2.40  |  Q      |         |         |      V  |
18+ 0      10.4720      2.27  |  Q      |         |         |      V  |
18+ 5      10.4874      2.22  | Q       |         |         |      V  |
18+10      10.5025      2.20  | Q       |         |         |      V  |
18+15      10.5174      2.17  | Q       |         |         |      V  |
18+20      10.5323      2.16  | Q       |         |         |      V  |
18+25      10.5471      2.15  | Q       |         |         |      V  |
18+30      10.5618      2.14  | Q       |         |         |      V  |
18+35      10.5762      2.09  | Q       |         |         |      V  |
18+40      10.5893      1.91  | Q       |         |         |      V  |
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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|
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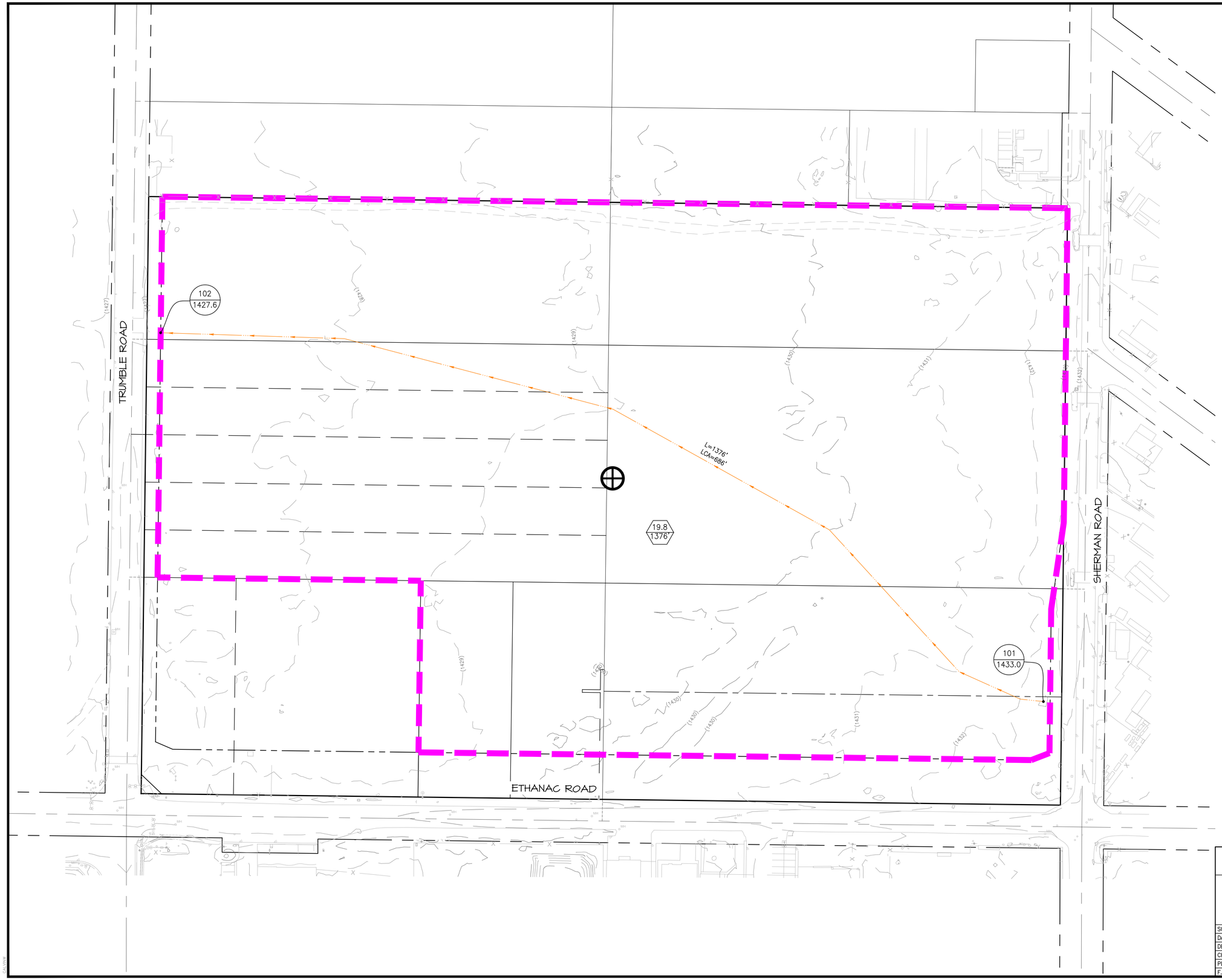
   22+55      11.0867      1.08  |Q        |         |         |        V|
   23+ 0      11.0941      1.07  |Q        |         |         |        V|
   23+ 5      11.1014      1.07  |Q        |         |         |        V|
   23+10      11.1088      1.07  |Q        |         |         |        V|
   23+15      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

N W E S

1" = 60'

30 0 60 120 180

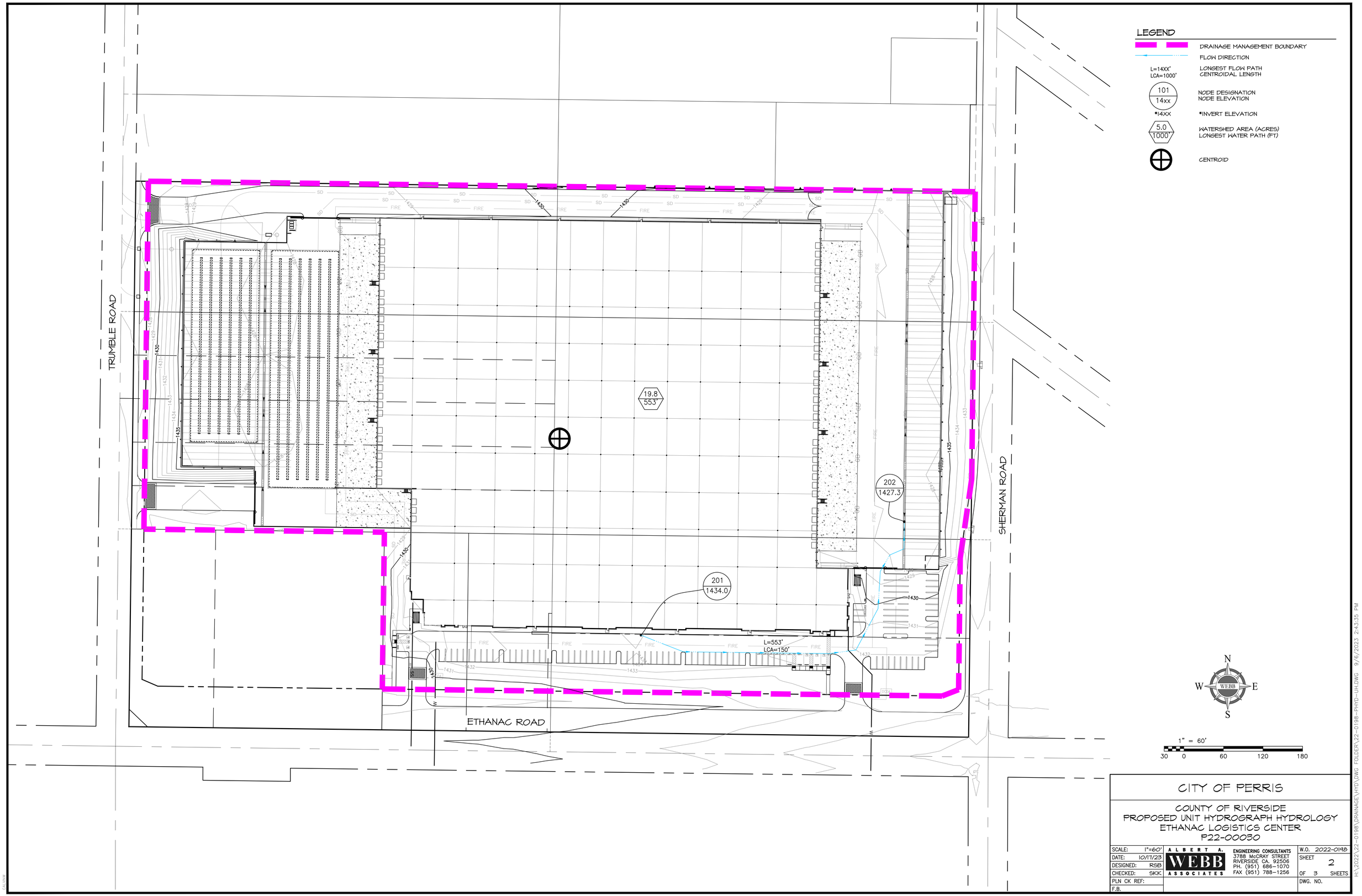
CITY OF PERRIS

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: 10/17/23			SHEET 1
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-PHYD-UH.DWG 9/6/2023 2:43:35 PM

CALVINW


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
E
S
WEBB
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'
DATE: 10/17/23
DESIGNED: RSB
CHECKED: SKK
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. 2022-0198
SHEET 2
OF 3 SHEETS
DWG. NO.
H:\2022\22-0198\DRAINAGE\HYD\DWG FOLDER\22-0198-PHYD-UH.DWG 9/6/2023 2:43:35 PM

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPRE3100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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    |
```

```
   2+40       1.9485     28.63  |         |         |         |V      Q |
   2+45       2.1140     24.04  |         |         |         | Q V     |
   2+50       2.2186     15.18  |         |         Q         |     V   |
   2+55       2.2917     10.61  |         |   Q     |         |      V  |
   3+ 0       2.3480      8.18  |         Q         |         |       V |
   3+ 5       2.3820      4.95  |     Q   |         |         |        V|
   3+10       2.4024      2.96  |  Q      |         |         |        V|
   3+15       2.4165      2.04  | Q       |         |         |        V|
   3+20       2.4257      1.34  |Q        |         |         |        V|
   3+25       2.4317      0.87  |Q        |         |         |        V|
   3+30       2.4349      0.47  Q         |         |         |        V|
   3+35       2.4362      0.18  Q         |         |         |        V|
   3+40       2.4369      0.10  Q         |         |         |        V|
   3+45       2.4373      0.06  Q         |         |         |        V|
   3+50       2.4373      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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPRE6100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (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)

++

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  |      Q  V         |         |         |
   3+55       0.7694      5.94  |      Q  |V        |         |         |
   4+ 0       0.8127      6.29  |       Q |V        |         |         |
   4+ 5       0.8579      6.56  |       Q | V       |         |         |
   4+10       0.9059      6.97  |        Q|  V      |         |         |
   4+15       0.9575      7.49  |        Q|  V      |         |         |
   4+20       1.0128      8.03  |         Q   V     |         |         |
   4+25       1.0720      8.60  |         |Q   V    |         |         |
   4+30       1.1346      9.10  |         | Q   V   |         |         |
   4+35       1.1996      9.43  |         | Q    V  |         |         |
   4+40       1.2677      9.88  |         |  Q    V |         |         |
   4+45       1.3395     10.43  |         |  Q     V|         |         |
   4+50       1.4147     10.92  |         |   Q     V         |         |
   4+55       1.4921     11.25  |         |   Q     |V        |         |
   5+ 0       1.5727     11.70  |         |    Q    | V       |         |
   5+ 5       1.6589     12.51  |         |     Q   |   V     |         |
   5+10       1.7577     14.35  |         |        Q|    V    |         |
   5+15       1.8719     16.59  |         |         | Q    V  |         |
   5+20       1.9996     18.54  |         |         |   Q    V|         |
   5+25       2.1408     20.50  |         |         |      Q  |V        |
   5+30       2.3008     23.23  |         |         |         Q  V      |
   5+35       2.4663     24.03  |         |         |         | Q  V    |
   5+40       2.5753     15.82  |         |         |Q        |      V  |
   5+45       2.6378      9.08  |         | Q       |         |       V |
   5+50       2.6760      5.55  |      Q  |         |         |       V |
   5+55       2.7010      3.62  |   Q     |         |         |        V|
   6+ 0       2.7180      2.47  |  Q      |         |         |        V|
   6+ 5       2.7298      1.71  | Q       |         |         |        V|
   6+10       2.7375      1.12  |Q        |         |         |        V|
   6+15       2.7425      0.72  Q         |         |         |        V|
   6+20       2.7456      0.45  Q         |         |         |        V|
   6+25       2.7465      0.13  Q         |         |         |        V|
   6+30       2.7468      0.04  Q         |         |         |        V|
   6+35       2.7469      0.01  Q         |         |         |        V|
   6+40       2.7469      0.01  Q         |         |         |        V|
   6+45       2.7469      0.00  Q         |         |         |        V|
   6+50       2.7469      0.00  Q         |         |         |         V
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        U n i t   H y d r o g r a p h   A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                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 AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (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 (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (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         |         |         |         |
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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       |         |         |
```

```
10+50       0.7077      3.29  |         V|  Q      |         |         |
10+55       0.7309      3.36  |         V|  Q      |         |         |
11+ 0       0.7545      3.43  |         V|  Q      |         |         |
11+ 5       0.7782      3.45  |          V  Q      |         |         |
11+10       0.8014      3.36  |          V  Q      |         |         |
11+15       0.8242      3.32  |          V  Q      |         |         |
11+20       0.8471      3.32  |          |V Q      |         |         |
11+25       0.8700      3.33  |          |V Q      |         |         |
11+30       0.8930      3.34  |          |V Q      |         |         |
11+35       0.9155      3.27  |          |V Q      |         |         |
11+40       0.9362      3.01  |          | Q       |         |         |
11+45       0.9561      2.88  |          |QV       |         |         |
11+50       0.9758      2.87  |          |QV       |         |         |
11+55       0.9963      2.98  |          |Q V      |         |         |
12+ 0       1.0173      3.04  |          | QV      |         |         |
12+ 5       1.0402      3.32  |          |  Q      |         |         |
12+10       1.0696      4.28  |          |  V   Q  |         |         |
12+15       1.1026      4.79  |          |   V    Q|         |         |
12+20       1.1373      5.03  |          |   V     Q         |         |
12+25       1.1738      5.30  |          |    V    |Q        |         |
12+30       1.2114      5.46  |          |    V    |Q        |         |
12+35       1.2502      5.63  |          |     V   | Q       |         |
12+40       1.2913      5.97  |          |     V   |  Q      |         |
12+45       1.3337      6.16  |          |      V  |   Q     |         |
12+50       1.3771      6.30  |          |      V  |    Q    |         |
12+55       1.4219      6.50  |          |       V |     Q   |         |
13+ 0       1.4674      6.61  |          |        V|     Q   |         |
13+ 5       1.5146      6.86  |          |        V|      Q  |         |
13+10       1.5667      7.57  |          |         V         Q         |
13+15       1.6215      7.95  |          |         |V        |Q        |
13+20       1.6774      8.11  |          |         |V        | Q       |
13+25       1.7340      8.22  |          |         | V       | Q       |
13+30       1.7912      8.30  |          |         |  V      |  Q      |
13+35       1.8459      7.94  |          |         |   V     |Q        |
13+40       1.8908      6.52  |          |         |   V Q   |         |
13+45       1.9306      5.78  |          |         |  Q V    |         |
13+50       1.9684      5.50  |          |         |Q   V    |         |
13+55       2.0052      5.34  |          |         |Q    V   |         |
14+ 0       2.0412      5.23  |          |         Q     V   |         |
14+ 5       2.0778      5.31  |          |         |Q     V  |         |
14+10       2.1177      5.79  |          |         |  Q   V  |         |
14+15       2.1593      6.04  |          |         |   Q   V |         |
14+20       2.2013      6.10  |          |         |   Q   V |         |
14+25       2.2427      6.01  |          |         |   Q    V|         |
14+30       2.2839      5.99  |          |         |  Q     V|         |
14+35       2.3253      6.01  |          |         |   Q     V         |
14+40       2.3668      6.02  |          |         |   Q     V         |
14+45       2.4084      6.04  |          |         |   Q     |V        |
14+50       2.4499      6.02  |          |         |   Q     | V       |
14+55       2.4905      5.90  |          |         |  Q      | V       |
```

```
15+ 0       2.5308      5.84  |         |         |  Q      |  V      |
15+ 5       2.5706      5.79  |         |         |  Q      |  V      |
15+10       2.6095      5.64  |         |         | Q       |   V     |
15+15       2.6479      5.57  |         |         | Q       |   V     |
15+20       2.6858      5.51  |         |         | Q       |    V    |
15+25       2.7228      5.37  |         |         |Q        |    V    |
15+30       2.7593      5.29  |         |         |Q        |     V   |
15+35       2.7945      5.12  |         |        Q        |     V   |
15+40       2.8260      4.57  |         |       Q |       |     V   |
15+45       2.8555      4.29  |         |      Q  |       |      V  |
15+50       2.8843      4.18  |         |     Q   |       |      V  |
15+55       2.9126      4.11  |         |     Q   |       |       V |
16+ 0       2.9407      4.07  |         |     Q   |       |       V |
16+ 5       2.9655      3.60  |         |   Q     |       |       V |
16+10       2.9790      1.97  |      Q  |         |       |       V |
16+15       2.9866      1.10  |   Q     |         |       |        V|
16+20       2.9918      0.76  |  Q      |         |       |        V|
16+25       2.9955      0.54  | Q       |         |       |        V|
16+30       2.9983      0.41  |Q        |         |       |        V|
16+35       3.0005      0.31  |Q        |         |       |        V|
16+40       3.0021      0.23  Q         |         |       |        V|
16+45       3.0033      0.18  Q         |         |       |        V|
16+50       3.0043      0.14  Q         |         |       |        V|
16+55       3.0050      0.10  Q         |         |       |        V|
17+ 0       3.0056      0.10  Q         |         |       |        V|
17+ 5       3.0063      0.10  Q         |         |       |        V|
17+10       3.0073      0.13  Q         |         |       |        V|
17+15       3.0082      0.14  Q         |         |       |        V|
17+20       3.0093      0.15  Q         |         |       |        V|
17+25       3.0103      0.15  Q         |         |       |        V|
17+30       3.0114      0.16  Q         |         |       |        V|
17+35       3.0125      0.16  Q         |         |       |        V|
17+40       3.0136      0.16  Q         |         |       |        V|
17+45       3.0147      0.16  Q         |         |       |        V|
17+50       3.0157      0.16  Q         |         |       |        V|
17+55       3.0167      0.14  Q         |         |       |        V|
18+ 0       3.0176      0.14  Q         |         |       |        V|
18+ 5       3.0186      0.13  Q         |         |       |        V|
18+10       3.0195      0.13  Q         |         |       |        V|
18+15       3.0204      0.13  Q         |         |       |        V|
18+20       3.0212      0.13  Q         |         |       |        V|
18+25       3.0221      0.13  Q         |         |       |        V|
18+30       3.0230      0.13  Q         |         |       |        V|
18+35       3.0239      0.12  Q         |         |       |        V|
18+40       3.0246      0.11  Q         |         |       |        V|
18+45       3.0254      0.10  Q         |         |       |        V|
18+50       3.0260      0.10  Q         |         |       |        V|
18+55       3.0266      0.08  Q         |         |       |        V|
19+ 0       3.0271      0.07  Q         |         |       |        V|
19+ 5       3.0276      0.07  Q         |         |       |        V|
```

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|

```
   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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPROP1100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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                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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                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

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

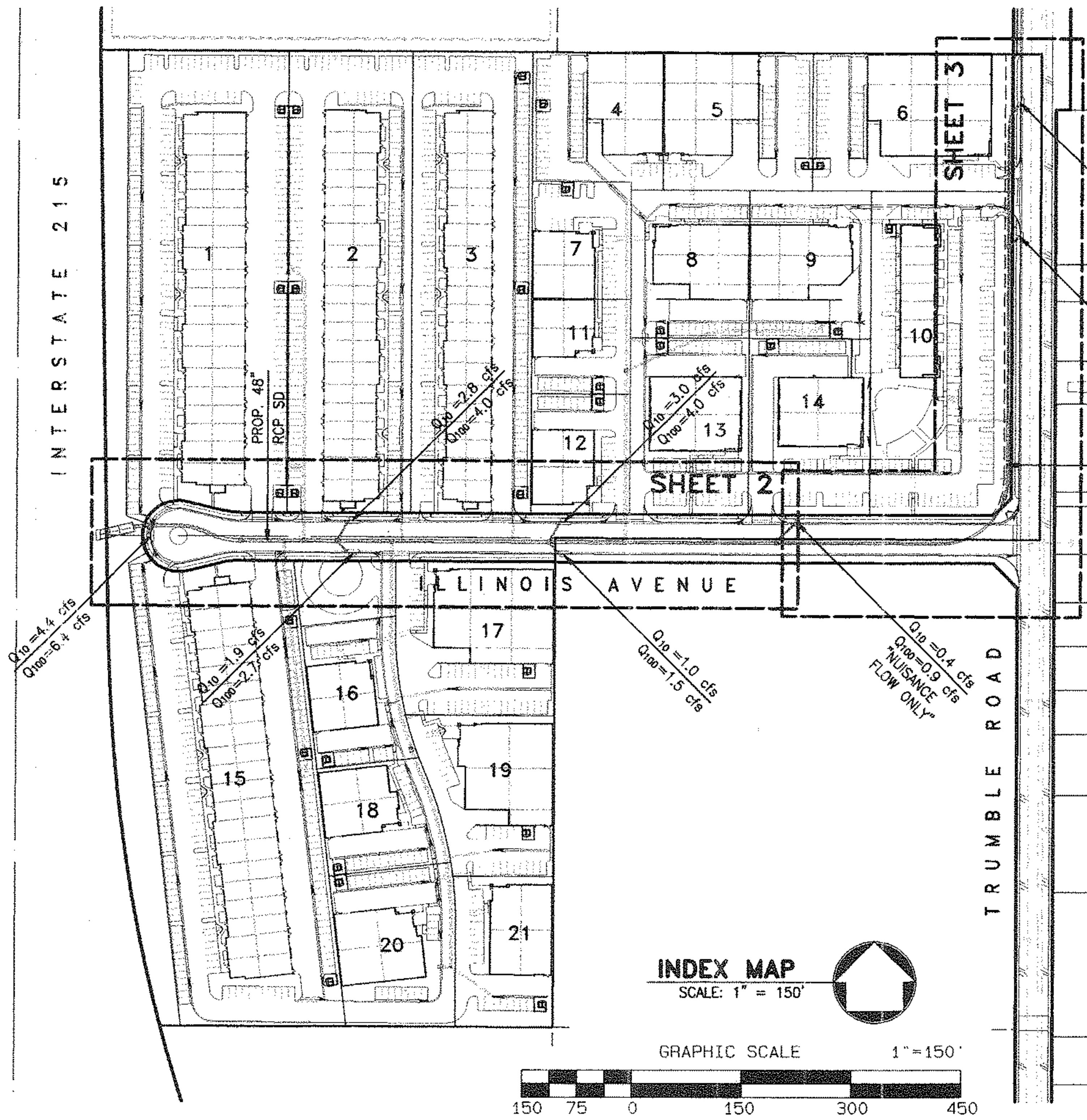
THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. LOCATIONS OF UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

BASIS OF BEARINGS

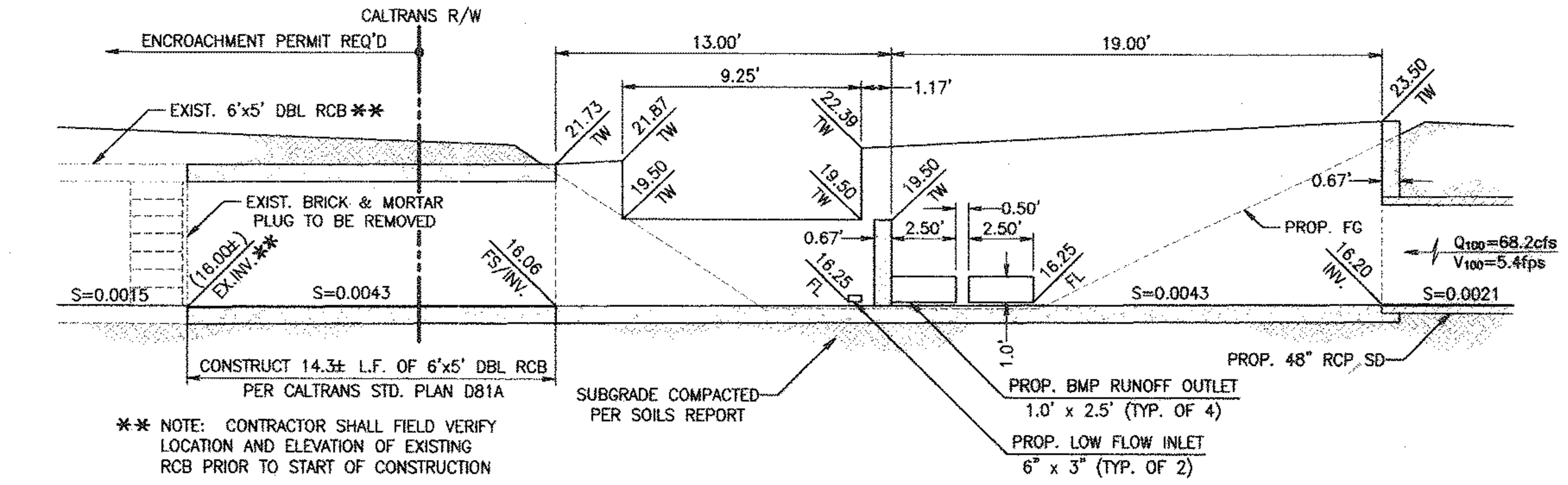
BASIS OF BEARING IS THE CENTERLINE OF PERRIS BOULEVARD TAKEN AS N00°16'30"E, AS SHOWN BY AMENDED PARCEL MAP 16950 PER P.M. 113/62-70, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

NOTE

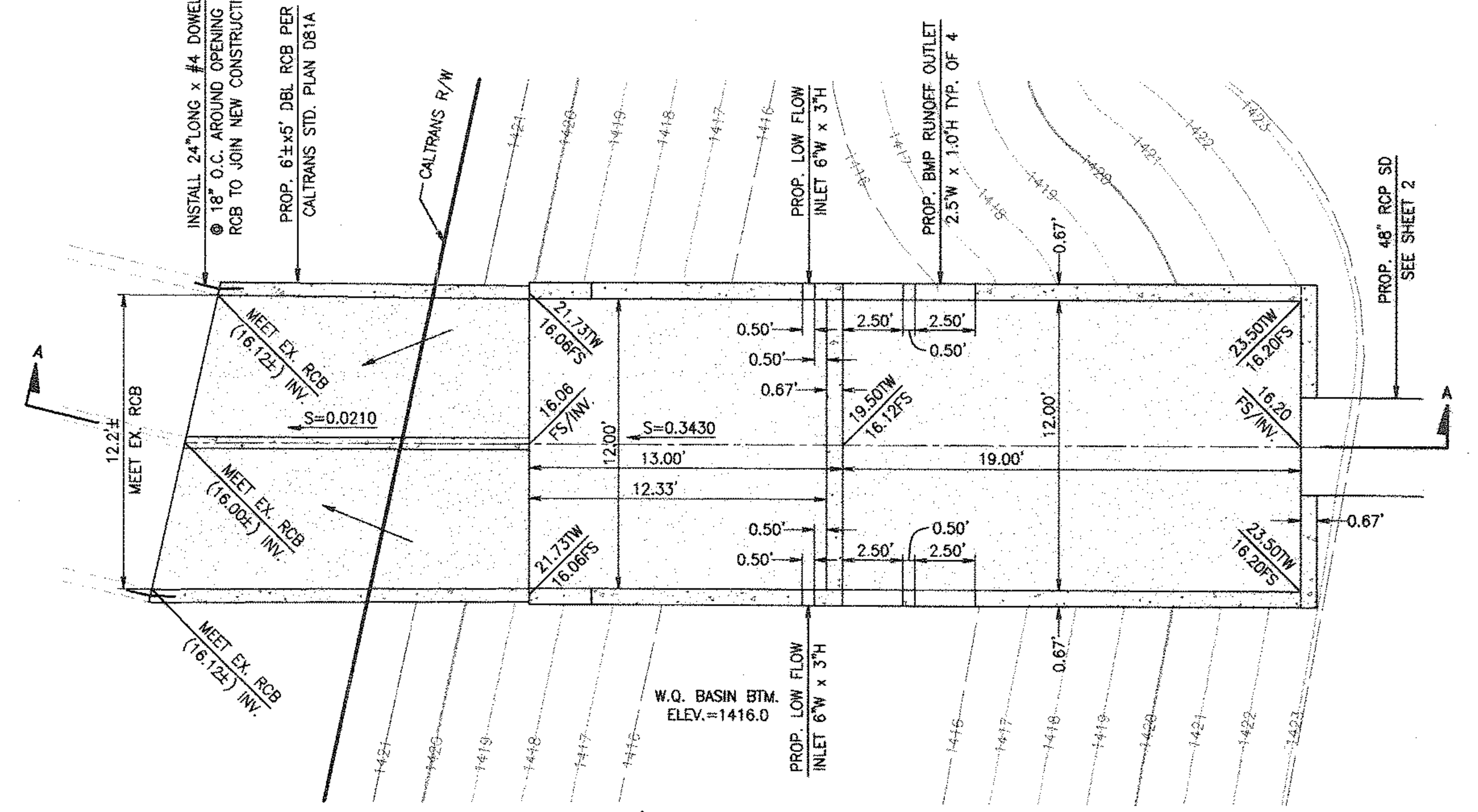
ALL ON-SITE STORM DRAIN AND PRIVATE LATERALS REFERRED TO ON THESE PLANS ARE TO BE CONSTRUCTED PER SEPARATE ON-SITE DRAINAGE PLANS AND CONCURRENTLY WITH PUBLIC STORM DRAIN SHOWN HEREON.



INDEX MAP
SCALE: 1" = 150'



SECTION "A-A"

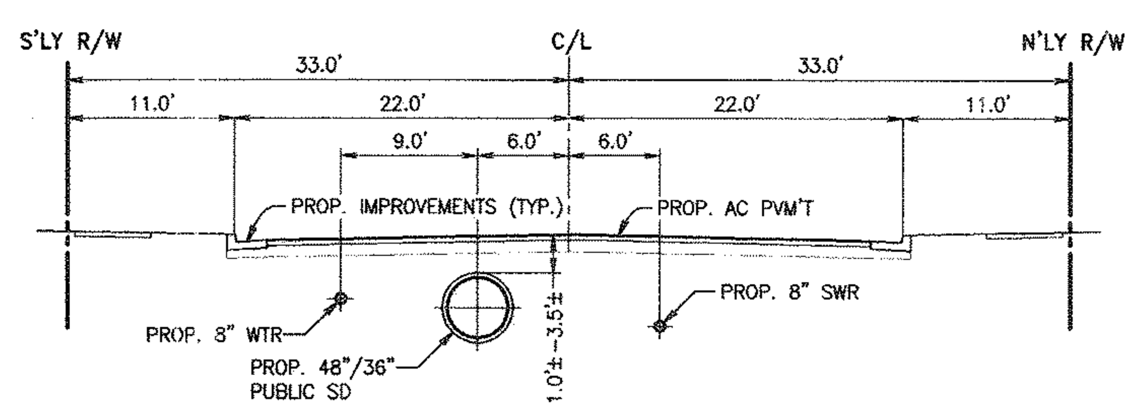


WEIR/FOREBAY STRUCTURE DETAIL
SCALE: 1" = 5'

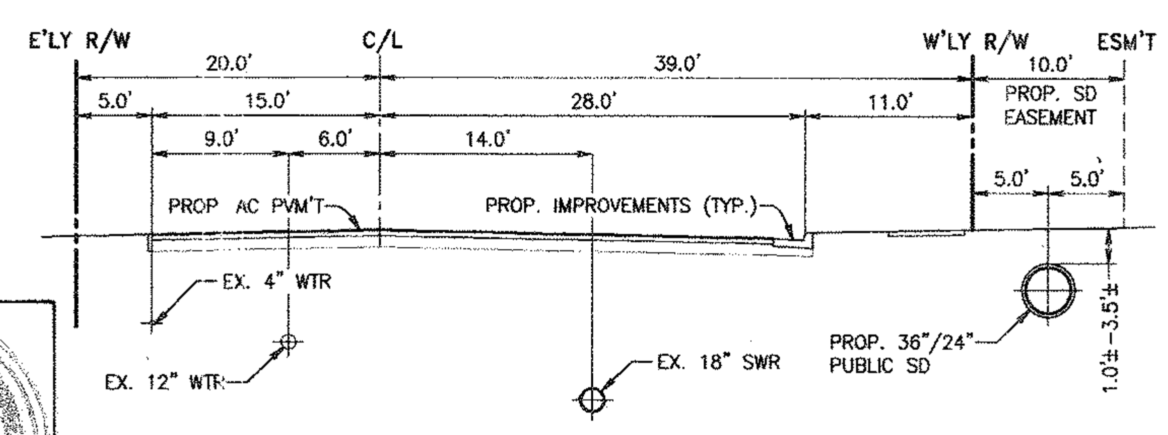
CONSTRUCTION NOTES

		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 10-7-08
R.C.E. C44762 DATE



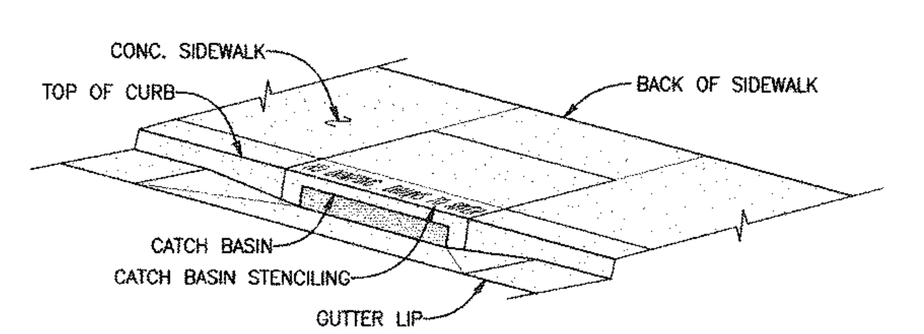
UNDERGROUND UTILITIES TYPICAL SECTION
ILLINOIS AVENUE
NOT TO SCALE



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



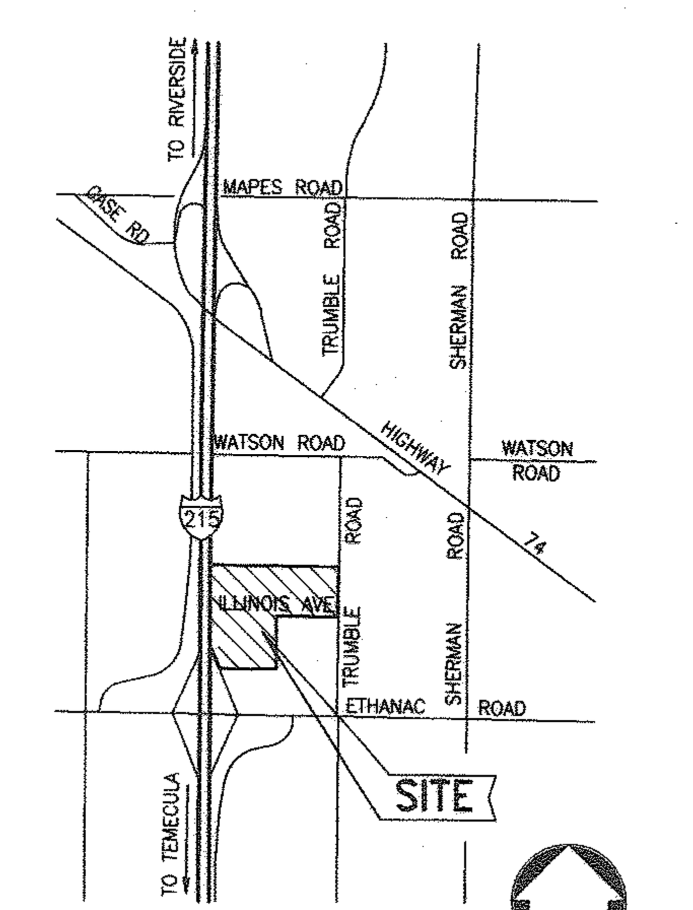
CATCH BASIN STENCILING DETAIL

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

SHEET 1 TITLE SHEET
SHEET 2 STA 10+00 TO 19+00 – PLAN & PROFILE
SHEET 3 STA 19+00 TO 28+06 – PLAN & PROFILE



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 TOLL FREE — TWO WORKING DAYS BEFORE YOU DIG 1-800-227-2600
A PUBLIC SEVICE 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: P8-921

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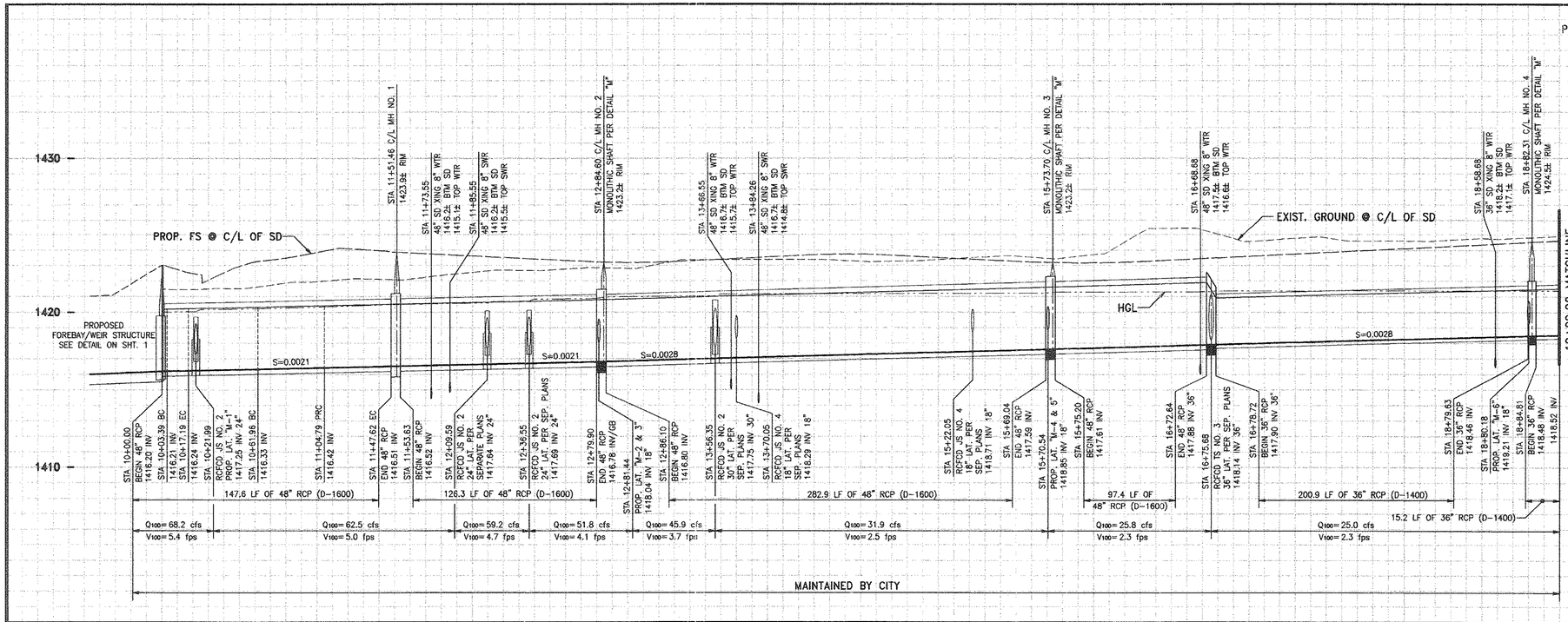
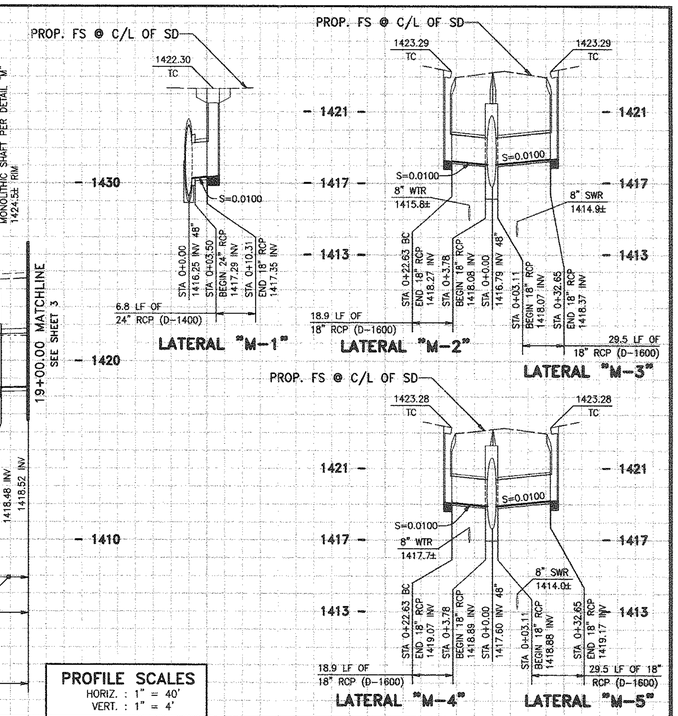
16515 P-412





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

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

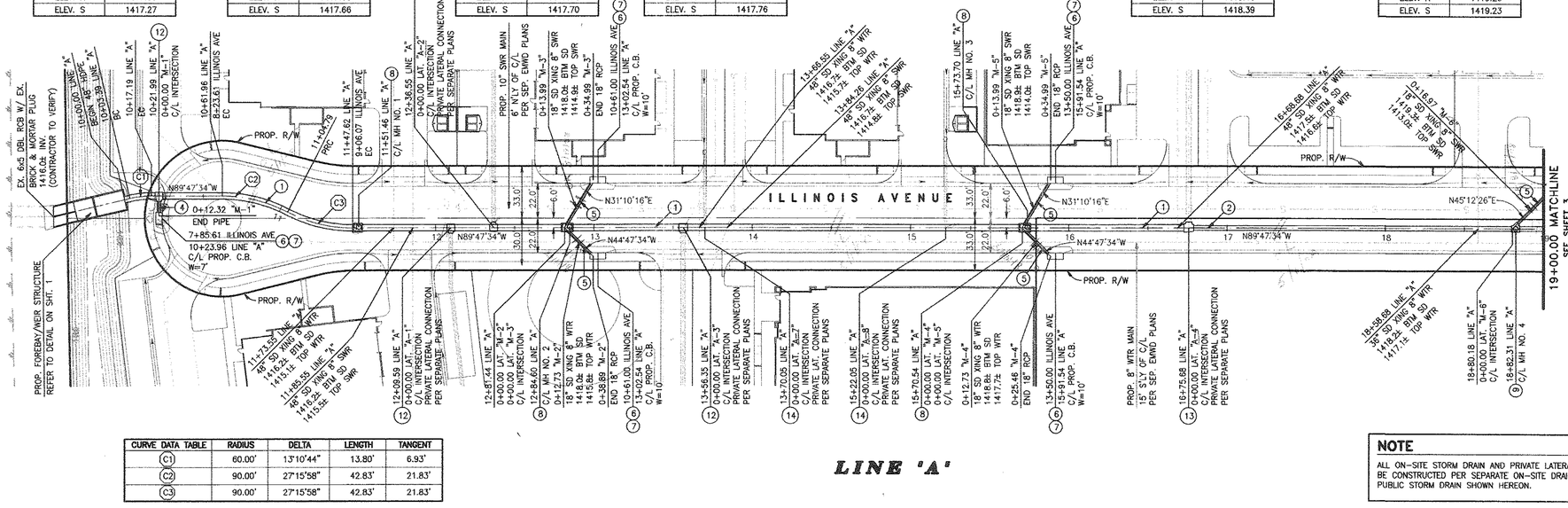
TS STA 16+75.68	
ANGLE A	90°00'00"
B	36"
C	3.67'
D_1 & D_2	48" & 36"
L	6.08'
ELEV. R	1418.40
ELEV. S	1418.39

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

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. 3/31/10 CIVIL STATE OF CALIFORNIA

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



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'

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

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

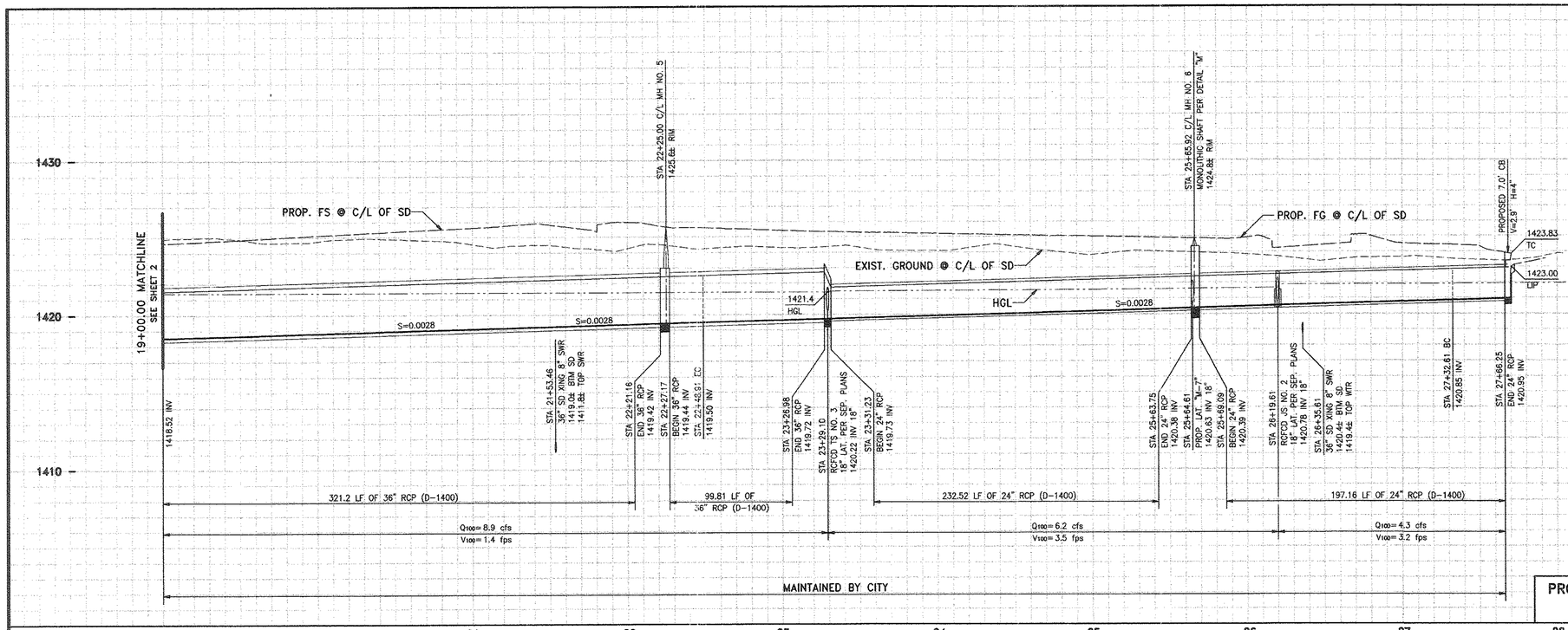
APPROVED BY: DATE: 2-7-07
CITY ENGINEER
PREPARED UNDER THE SUPERVISION OF: DATE: 2-5-07
SCOTT R. HILDEBRANDT
R.C.E. NO. C44762 EXP. DATE 3-31-08

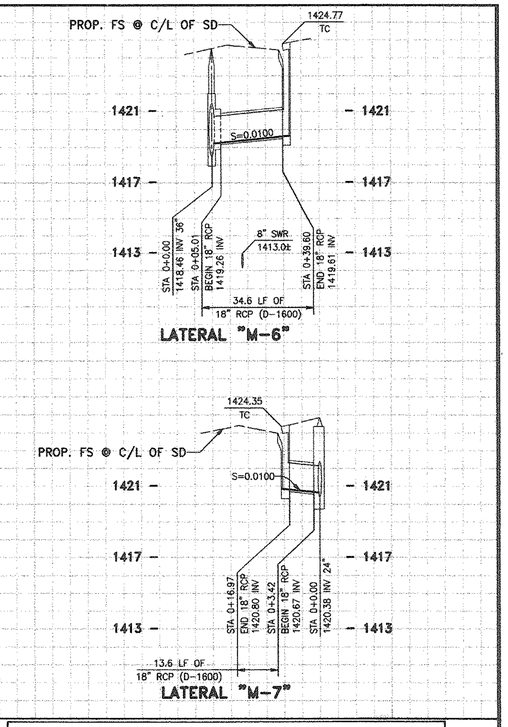
ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH: (951) 686-1070
FAX: (951) 788-1256
SCALE: AS SHOWN
DATE: Feb 2007

CITY OF PERRIS
STORM DRAIN PLANS
CLASSIC PACIFIC BUSINESS PARK (PM 34082)
PLAN AND PROFILE
STA. 10+00 TO STA. 19+00
FOR: CLASSIC PACIFIC W.O. 04-0425

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

16575 P-412





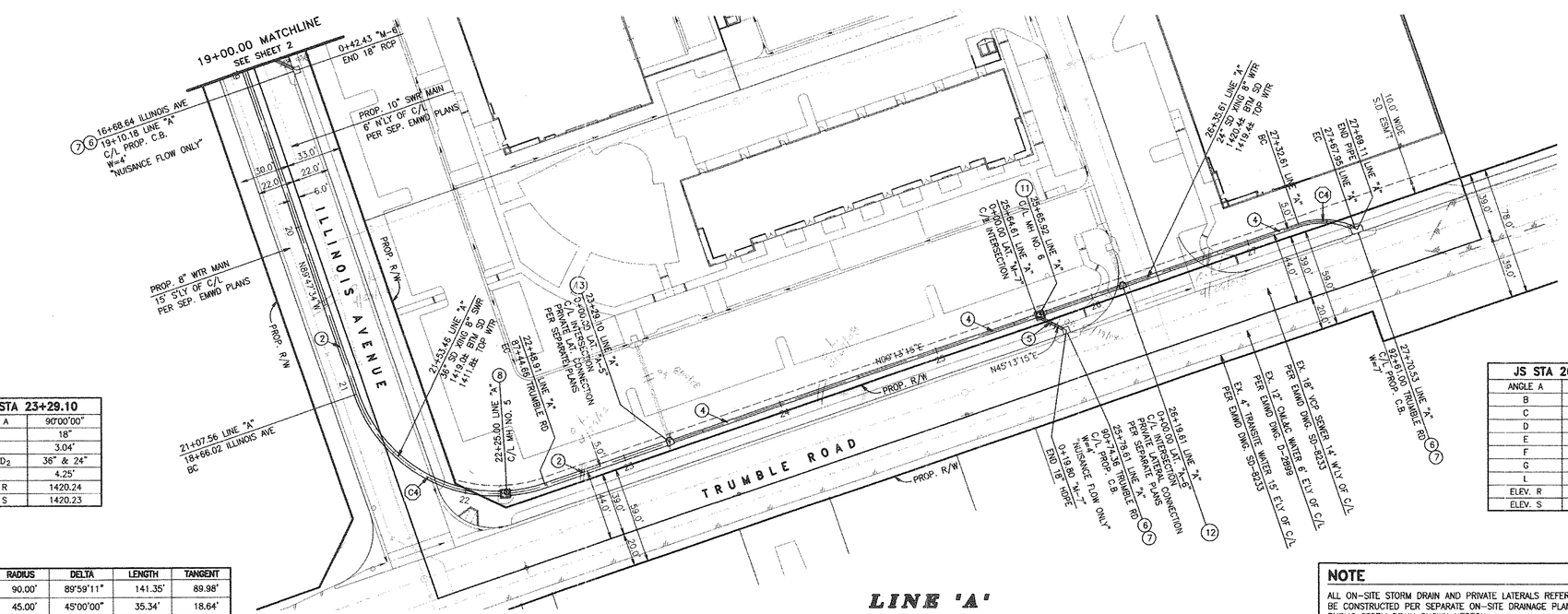
PROFILE SCALES
HORIZ. : 1" = 40'
VERT. : 1" = 4'

AS BUILT

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

SCOTT R. HILDEBRANDT R.C.E. C44762 — DATE 03-08

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



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'

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.

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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: 2-2-07
CITY ENGINEER

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

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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

16575 P-412

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APPENDIX E.3

WEBB-B

Preliminary Water Quality Management Plan(PWQMP) (Proposed)

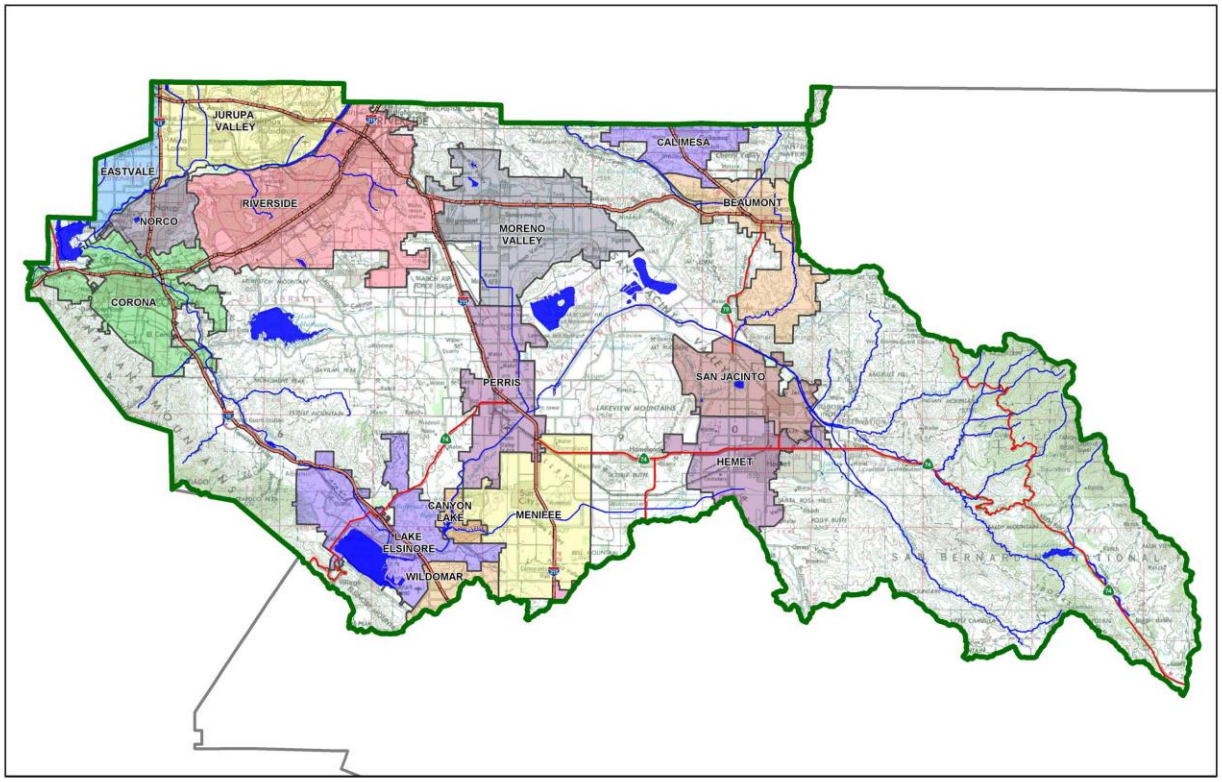
Project Specific Water Quality Management Plan

*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



Contact Information:

Prepared for: Hillwood
901 Via Piemonte Suite 175
Ontario, CA 91764

Prepared by:
Albert A. Webb Associates
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

☒ **Preliminary**
☐ **Final**

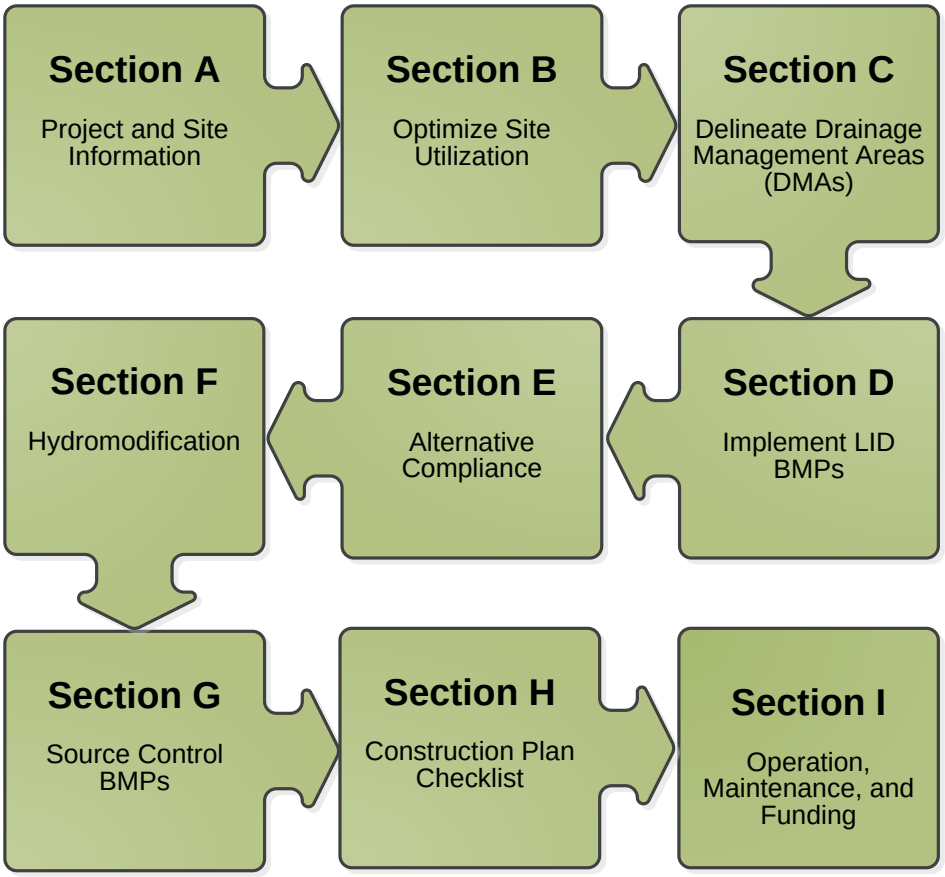
Original Date Prepared: December 2022

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
	Senior Engineer
Preparer's Printed Name	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	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[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 Impervious 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*	*Design Storm Depth (in)*	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
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]	[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)?

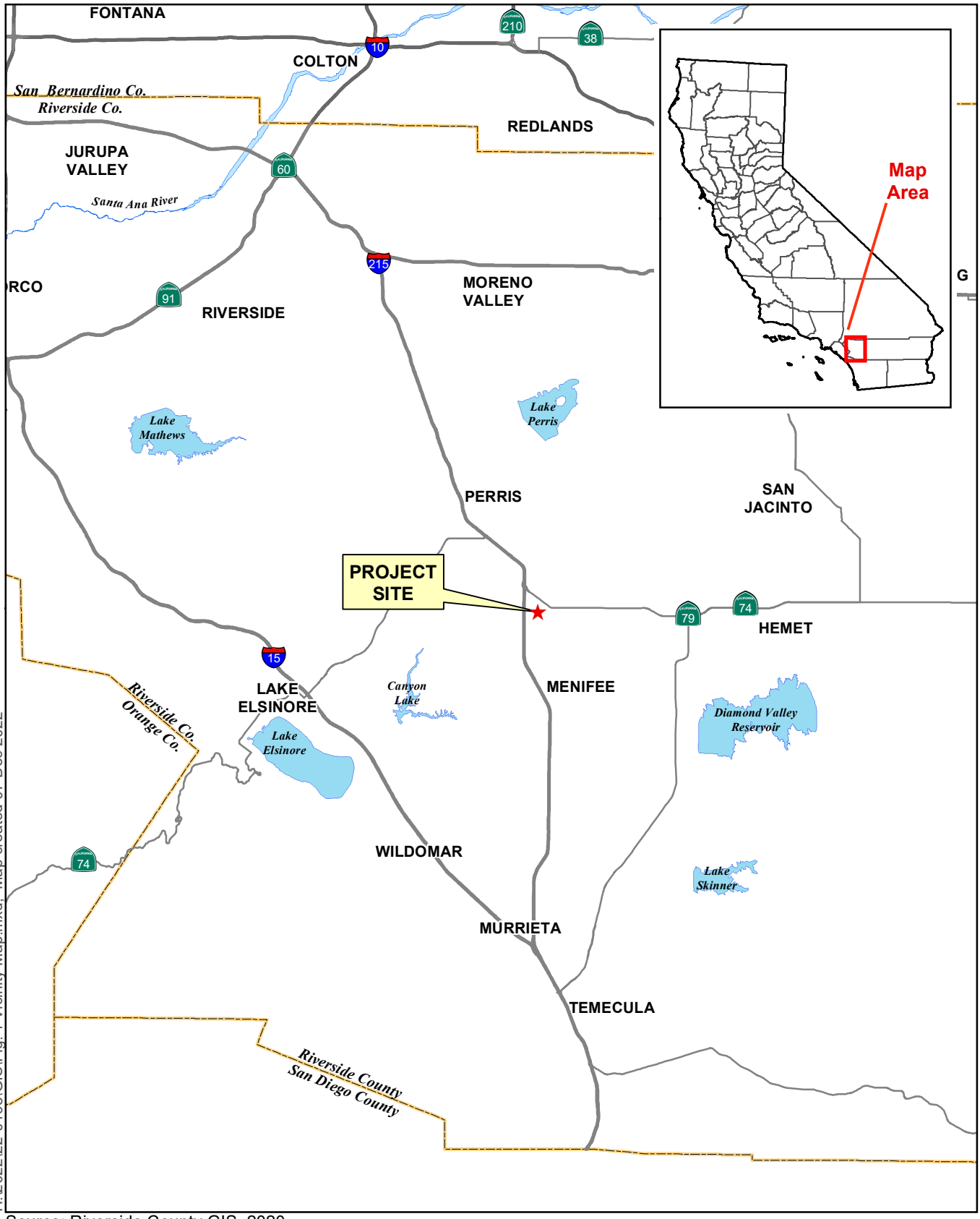
☐ Y ☒ N

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

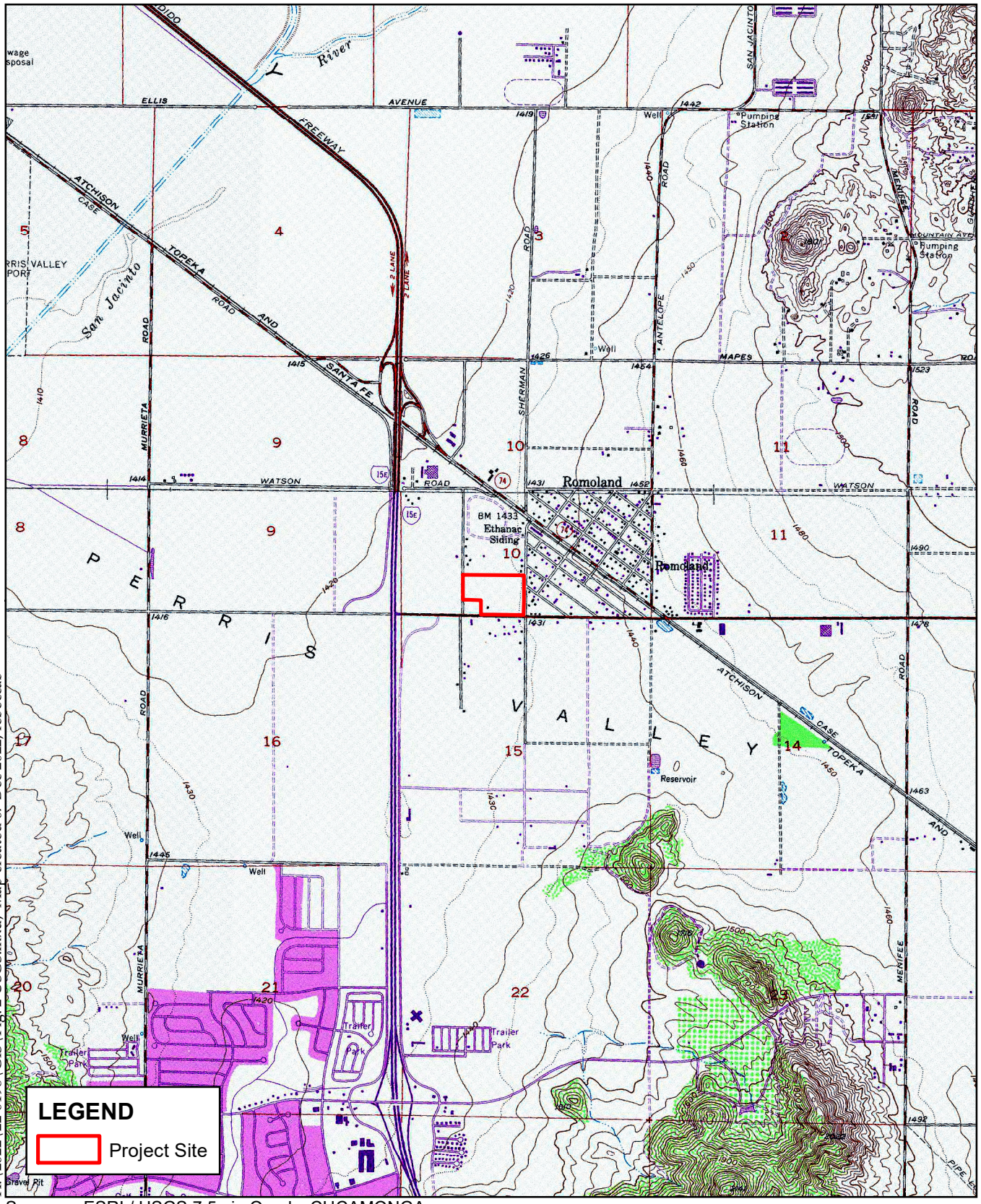
Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure 1 – Vicinity Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



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

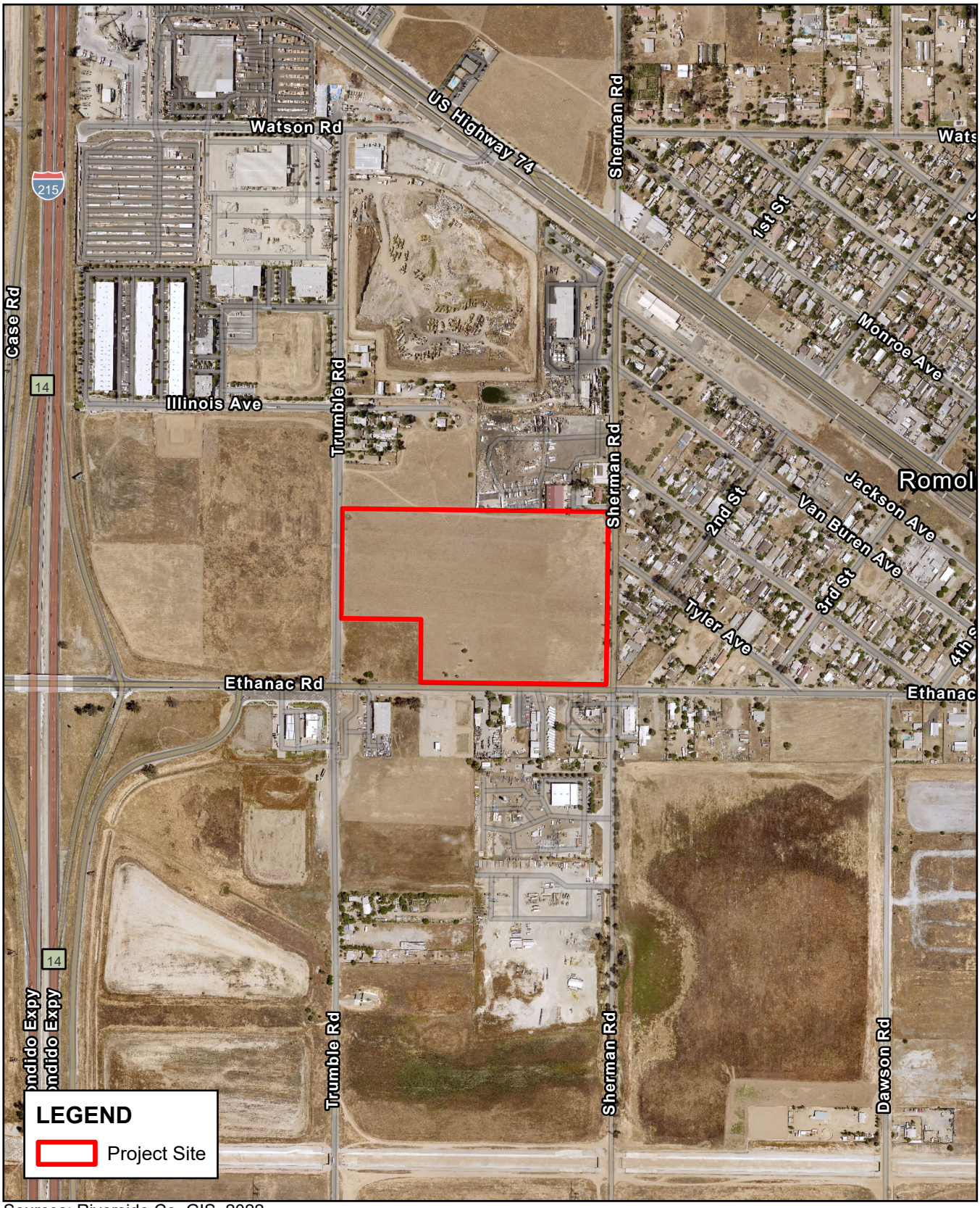
H:\2022\22-0198\GIS\Fig. 2 USGS.mxd; Map created 07 Dec 2022; rebeccab

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

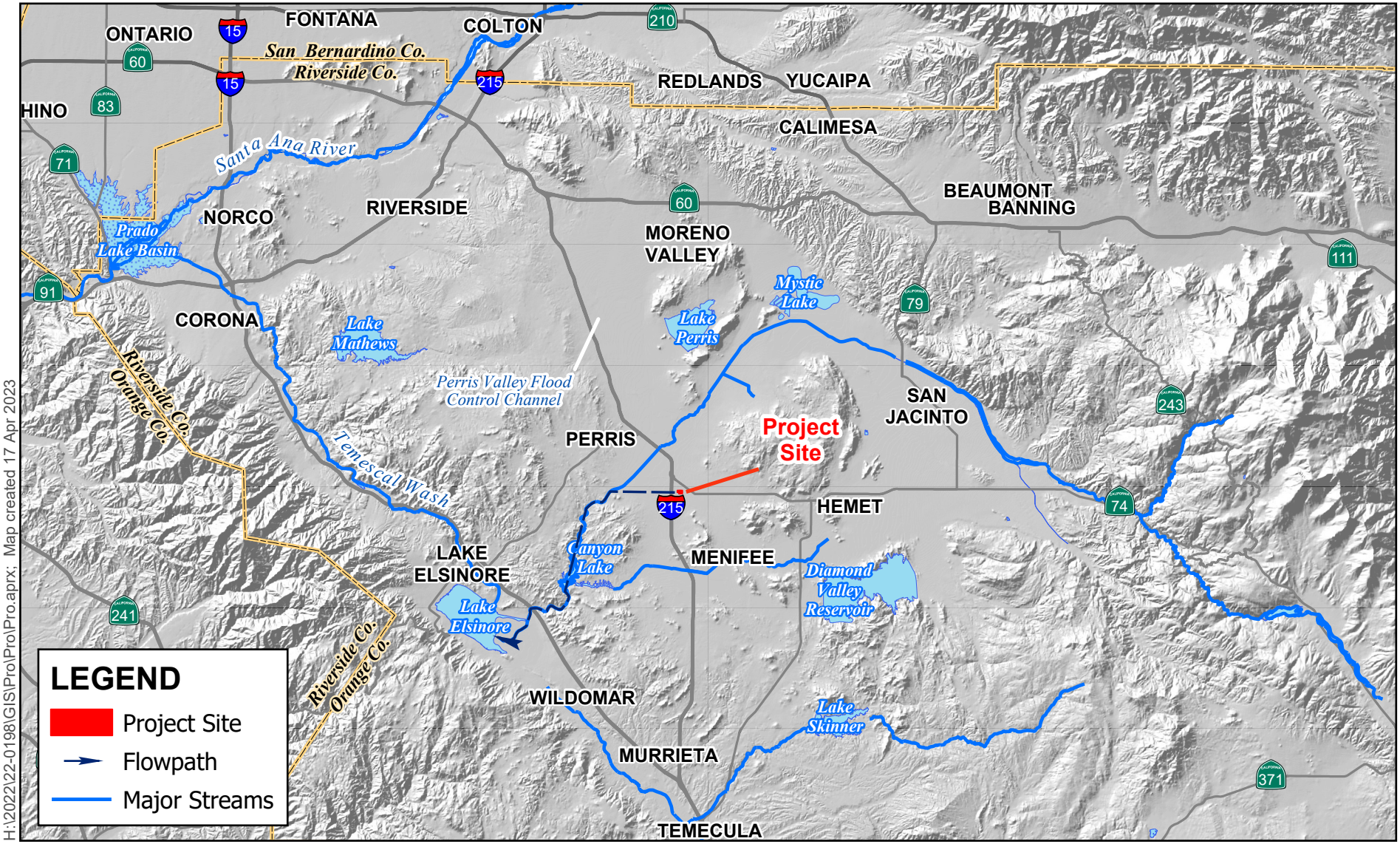
Sources: Riverside Co. GIS, 2022.

Figure 3 - Aerial Map

Ethanac Logistics Center

0 500 1,000 1,500 Feet

ALBERT A. WEBB ASSOCIATES



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

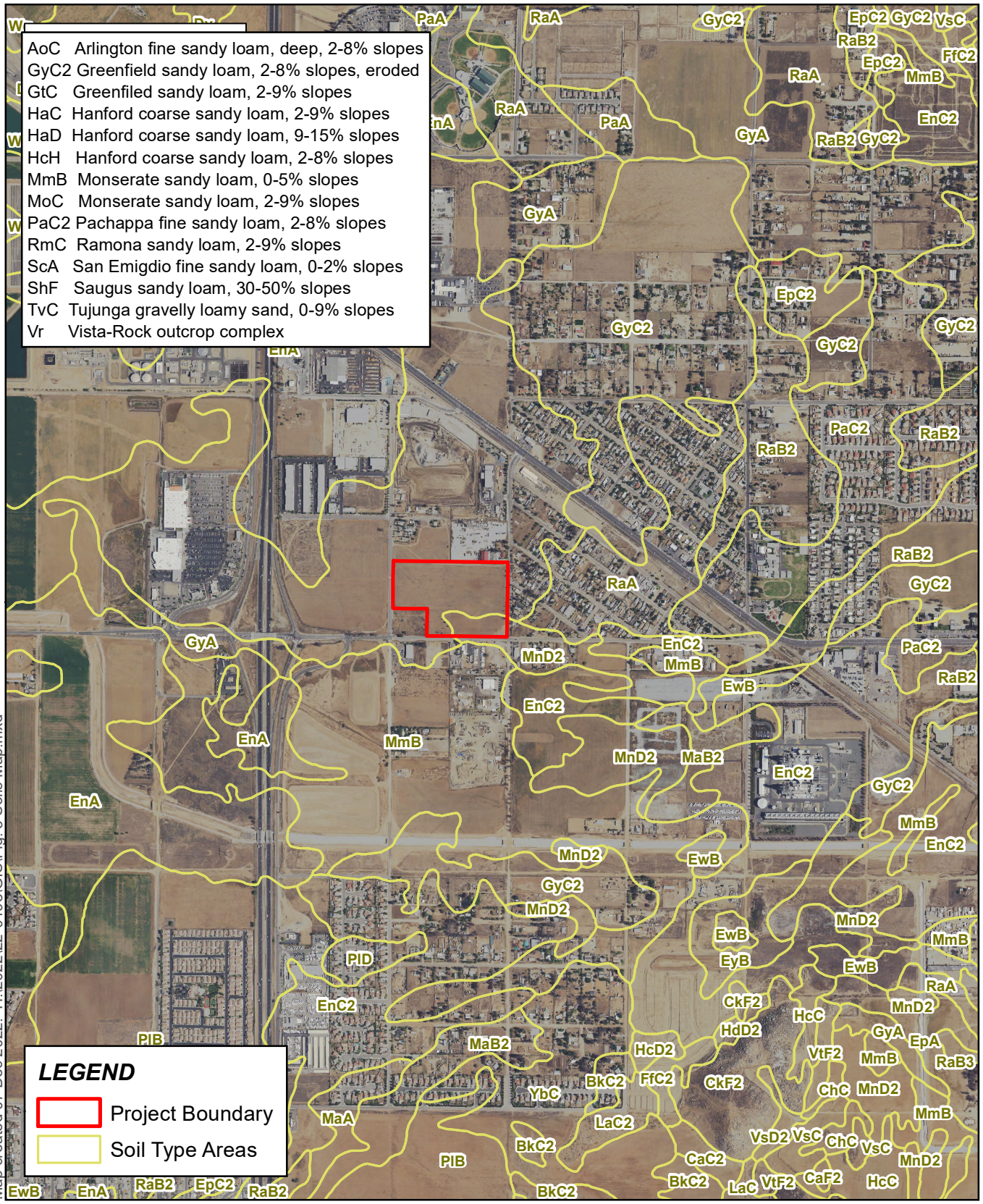
Sources: US NHD; USGS 30 Meter DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



Map created 07 Dec 2022. H:\2022\22-0198\GIS\Fig. 5 Soils Map.mxd

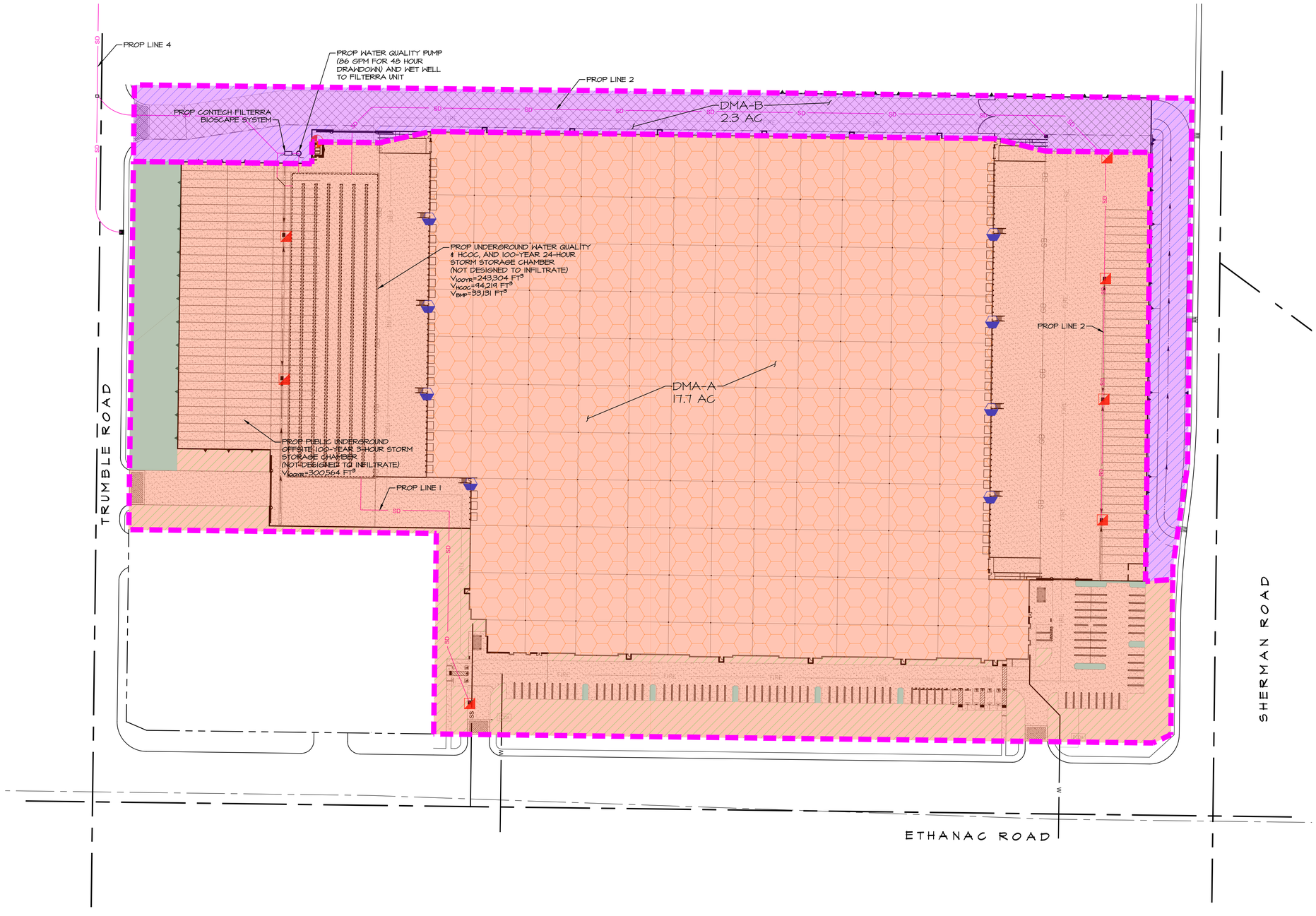
Sources: USDA NRCS SSURGO, 2015;
Riverside Co. GIS, 2020; USDA NAIP, 2016.

0 1,000 2,000 3,000 Feet

Figure 5 – Soils Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



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	282477
	SR-A	SELF-RETAINING	22143
	L-B	LANDSCAPE	44110
	H-B	HARDSCAPE	54149

% IMPERVIOUS = (407336+282477+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 E S WEBB

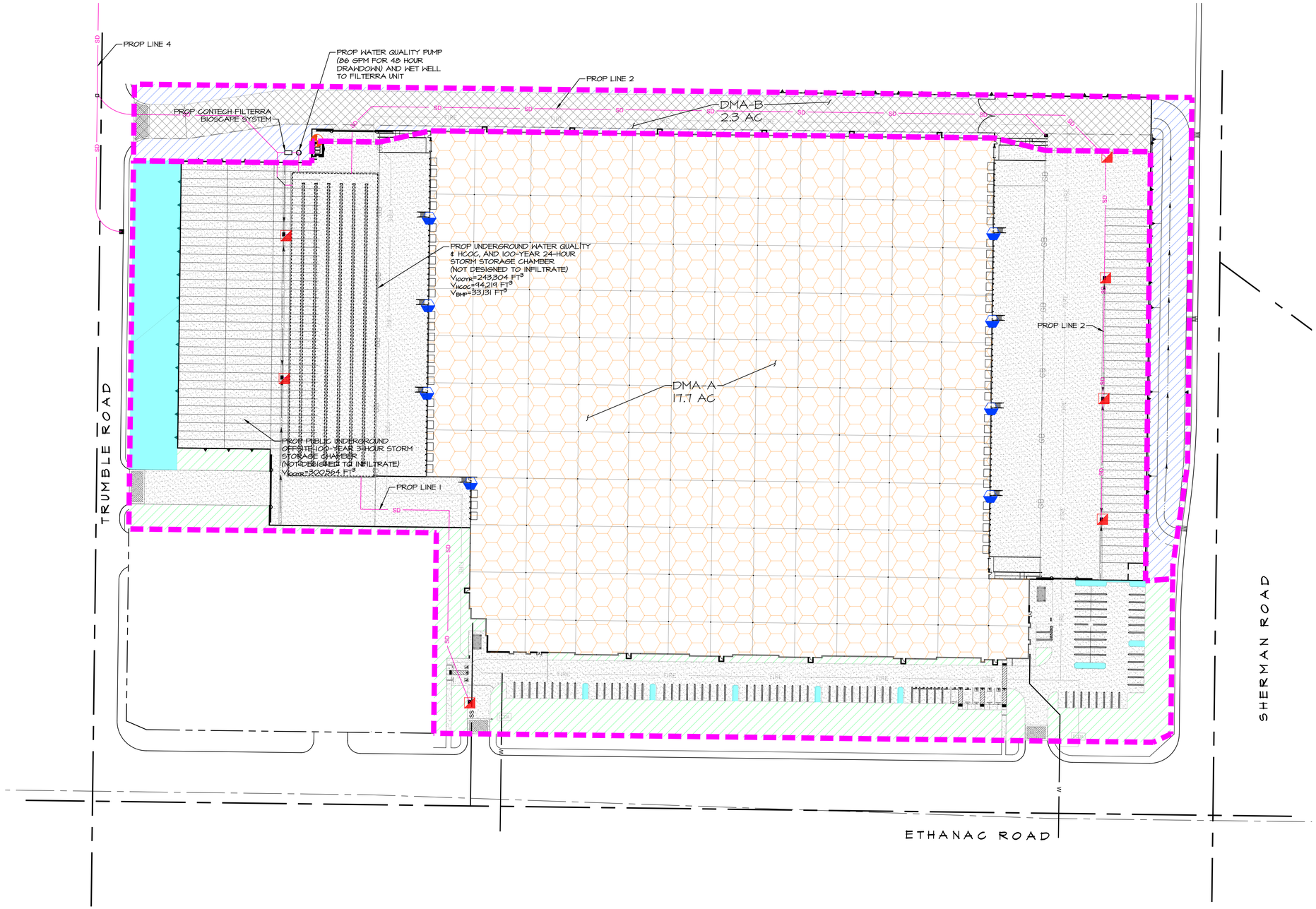
1" = 60'
30 0 60 120 180

CITY OF PERRIS

DMA SITE PLAN
ETHANAC LOGISTICS CENTER
P22-00030

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

H:\2022\22-0198\DRAINAGE\WQMP\DWG DRAWINGS\22-0198-PWQMP.DWG 1/19/2024 4:01:25 PM



DRAINAGE MANAGEMENT BOUNDARY
LANDSCAPING - DMA-A
LANDSCAPING - DMA-B
ROOF
CONCRETE OR ASPHALT - DMA-A
CONCRETE OR ASPHALT - DMA-B
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FLOW DIRECTION
SD STORM DRAIN PIPE
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DRAINAGE MANAGEMENT AREAS

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

% IMPERVIOUS = (407336+282477+54149)/870750= 85.4%

N W E S

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

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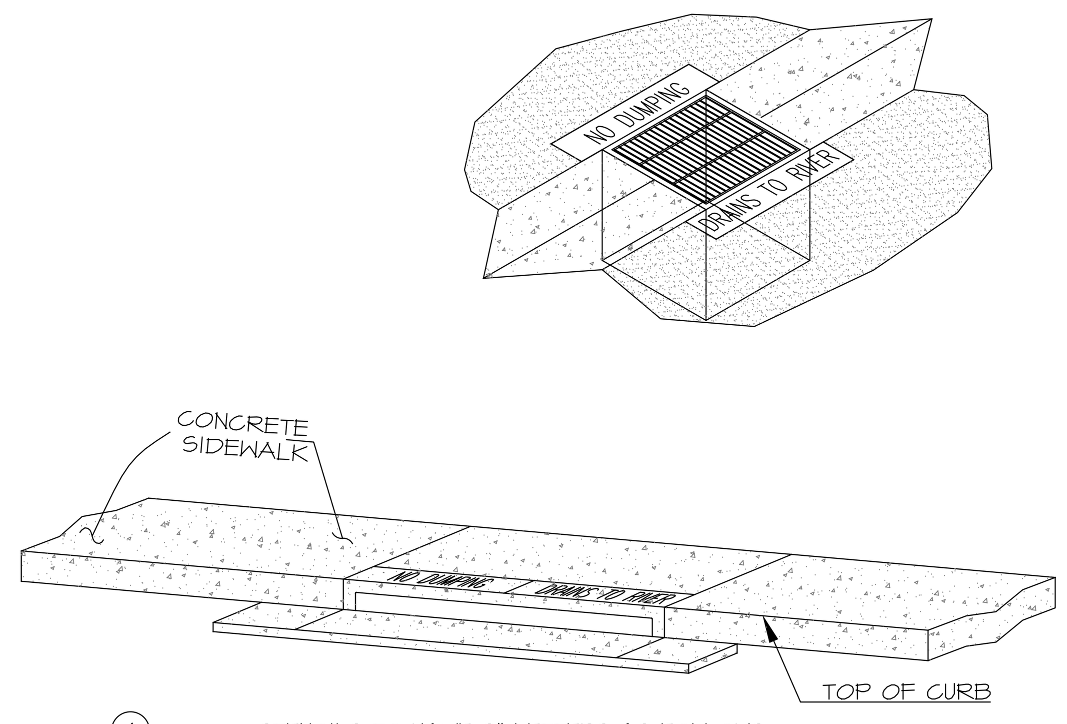
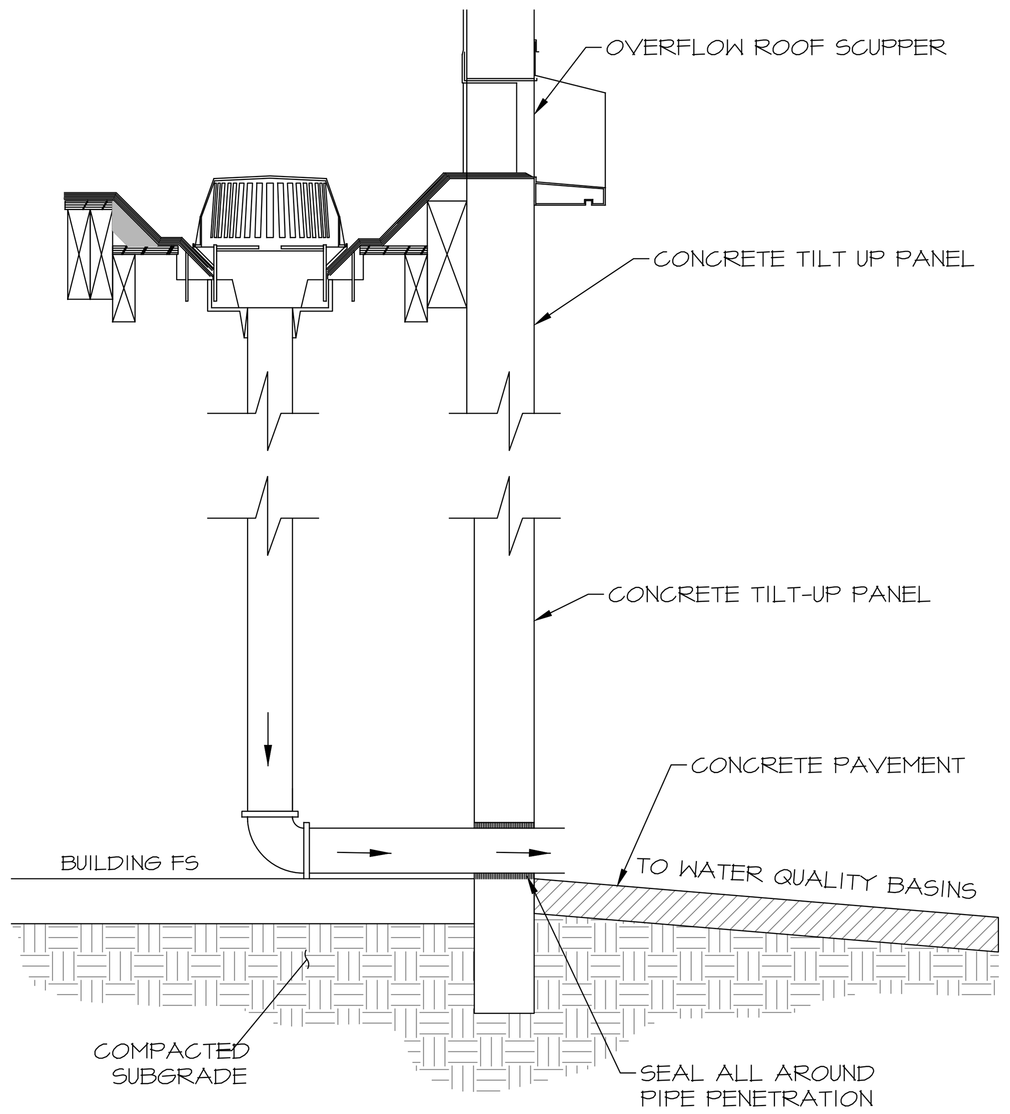


1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING - DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

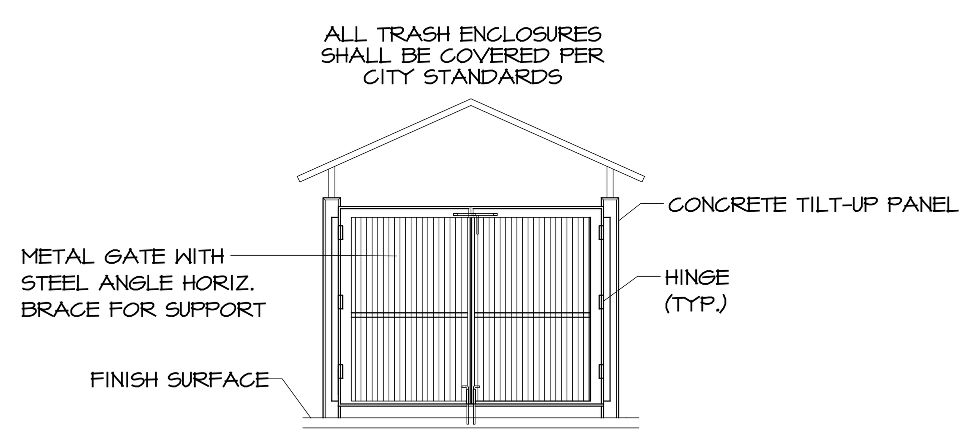
CATCH BASIN STENCILING DETAIL

NTS



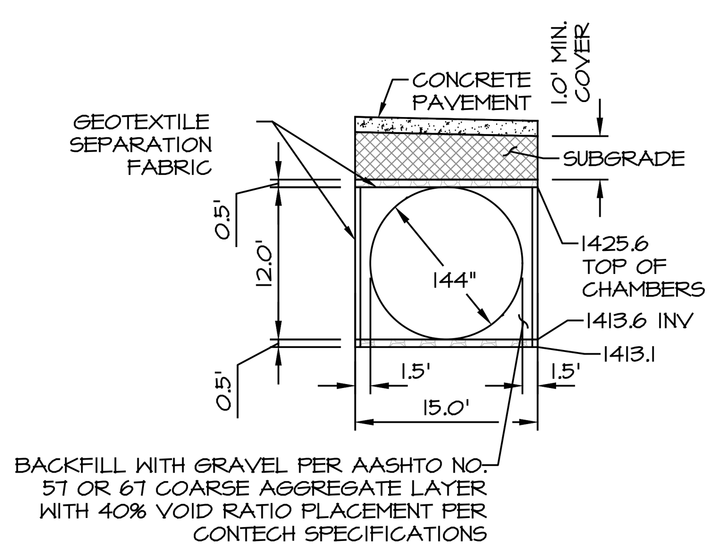
ROOF DRAIN DETAIL

N.T.S.



TRASH ENCLOSURE GATE ELEVATION

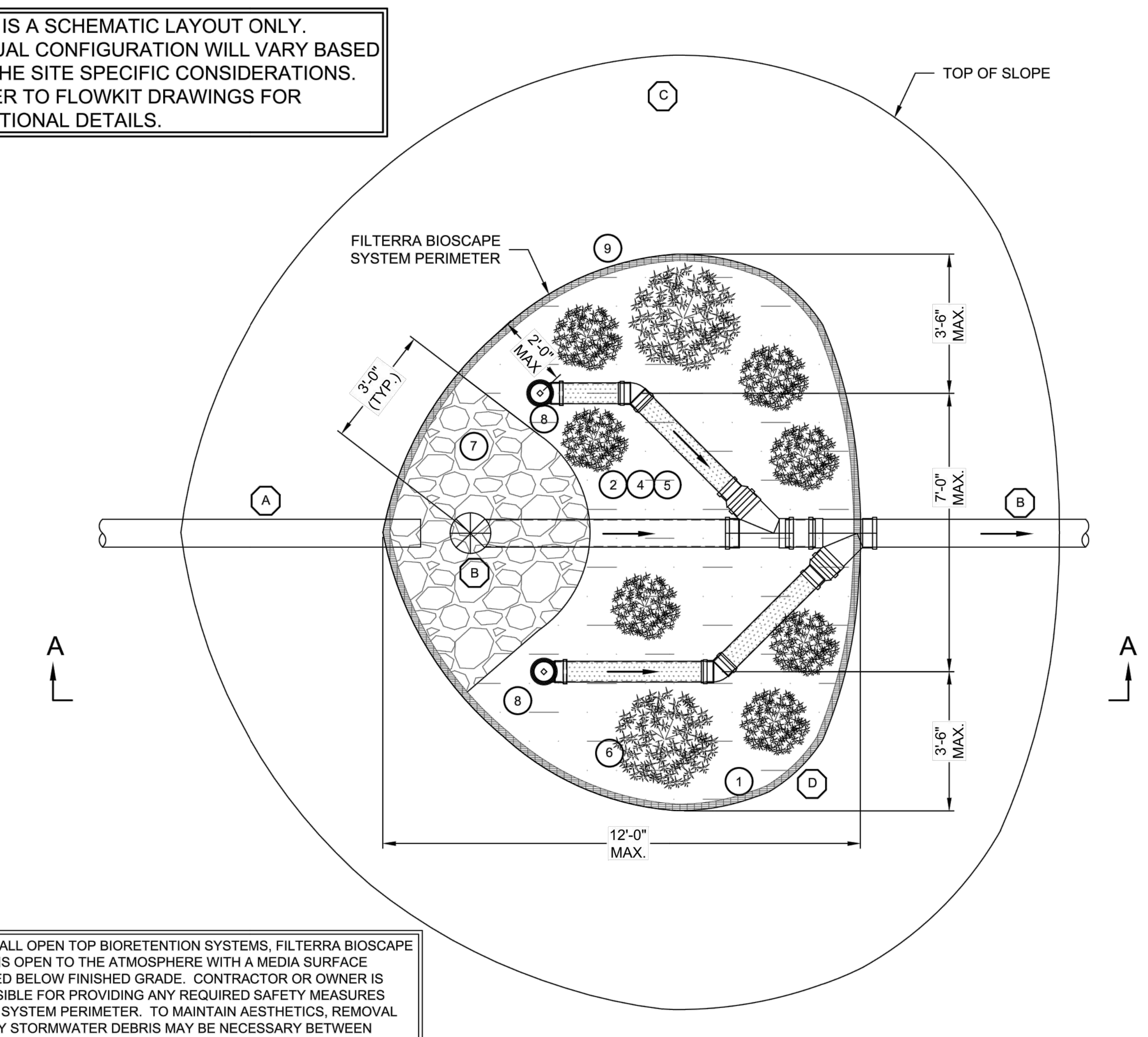
N.T.S.



CONTECH CMP UNDERGROUND DETENTION SYSTEM TYPICAL ROW CROSS SECTION

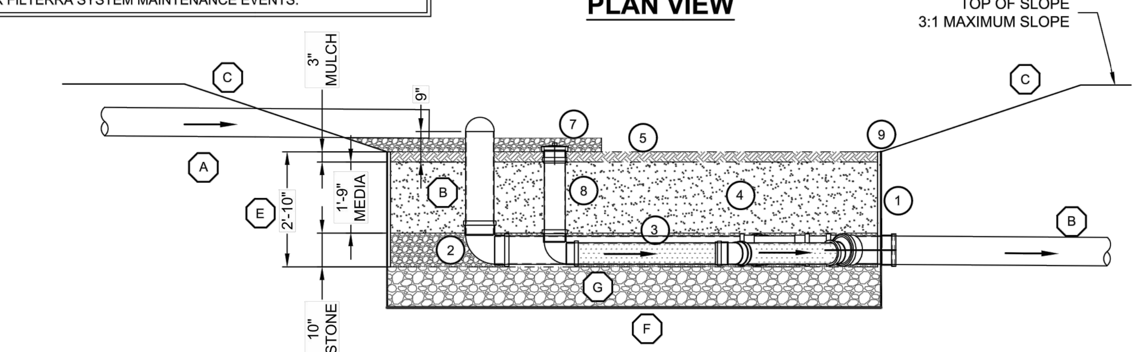
N.T.S.

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

I:\COMMON\CAD\TREATMENT\54 FILTERRA\40 STANDARD DRAWINGS\FTBS - BIOSCAPE SYSTEM (BOXLESS)\DWG\FILTERRA BIOSCAPE SUPERVISED SYSTEM - STD DETAIL.DWG 5/21/2020 8:57 AM

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:

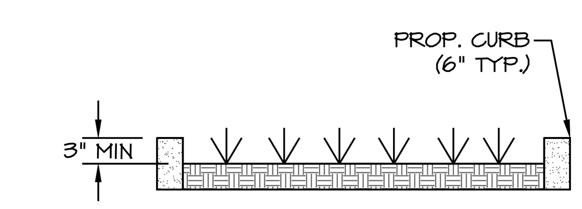
1. PLACE GEOTEXTILE FABRIC ALONG THE PERIMETER OF THE FILTERRA BIOSCAPE SYSTEM EXCAVATION.
2. PLACE 10" OF UNDERDRAIN STONE - 2" UNDER THE PIPING, 6" AROUND THE PIPING AND 2" ABOVE THE PIPING USING LIGHT DUTY EQUIPMENT ONLY.
3. PLACE 6" UNDERDRAIN PIPING UNLESS OTHERWISE APPROVED BY CONTECH, ASSOCIATED 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

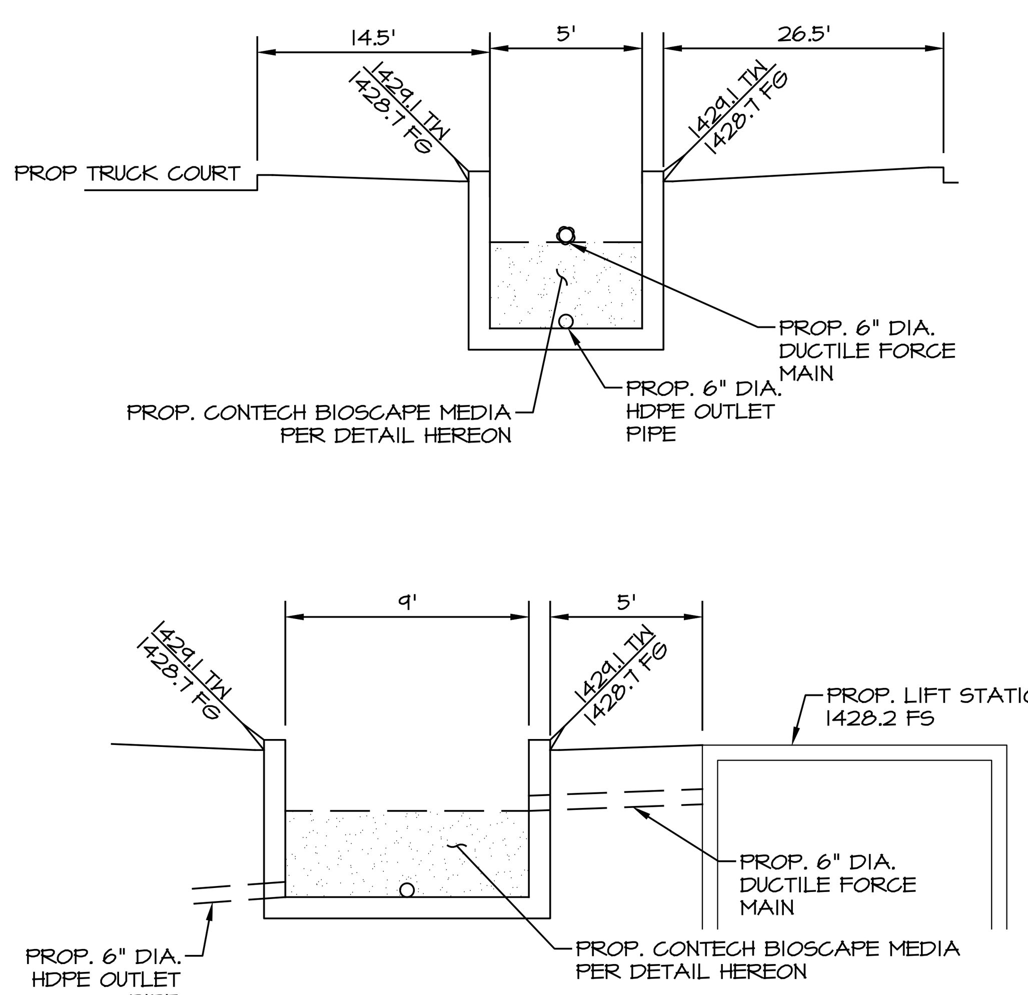
FILTERRA BIOSCAPE™ SYSTEM STANDARD DETAIL

BMP-A

N.T.S.

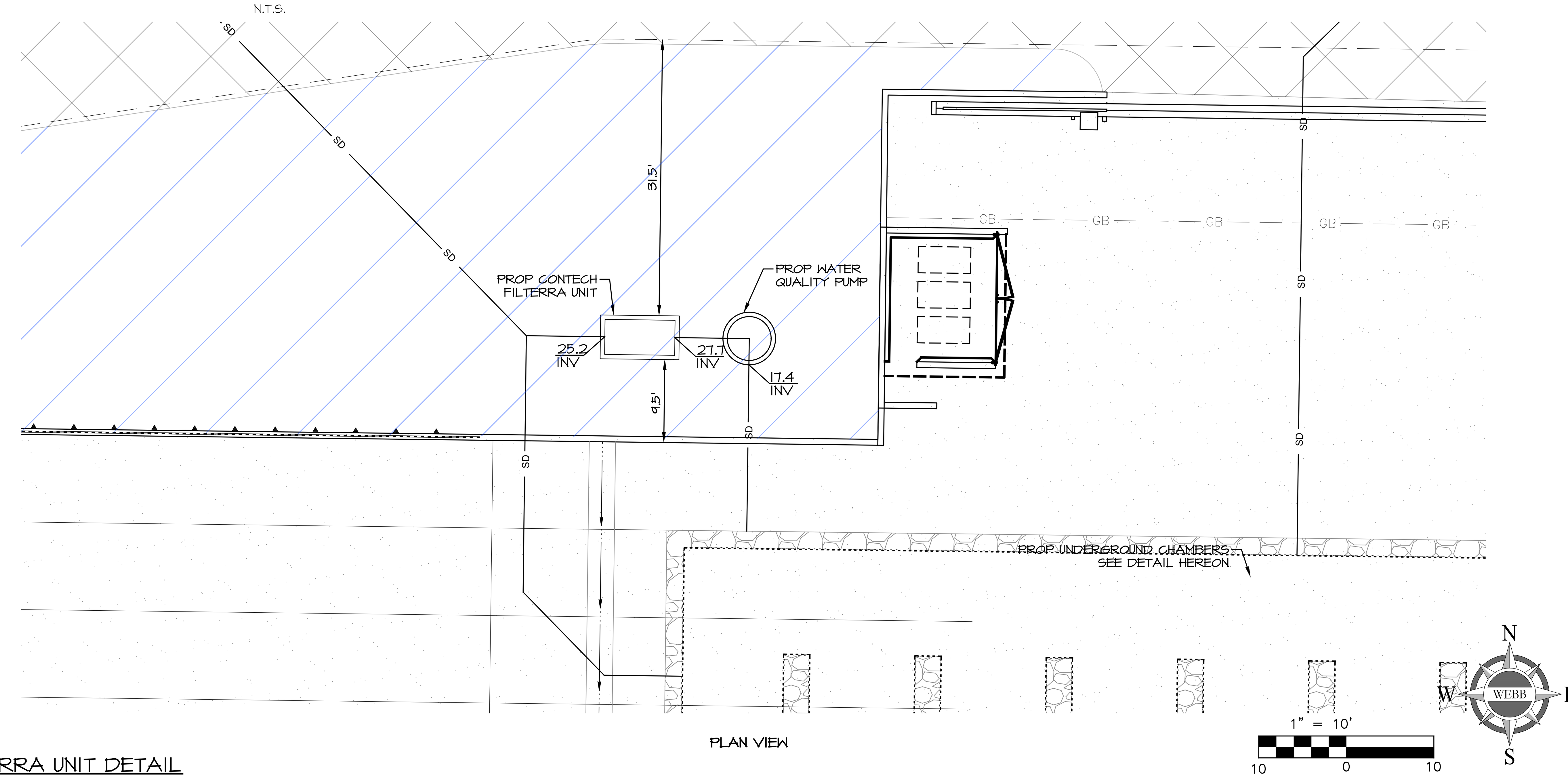


N.T.S.
ALL SELF-RETAINING AREAS WILL BE DEPRESSED A MINIMUM OF 3-INCHES



CONTECH FILTERRA UNIT DETAIL

N.T.S.
SEE DETAIL HEREON



PLAN VIEW

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 OF 3 SHEETS
DESIGNED: RSB			
CHECKED: SKK			
PLN CK REF: REF			DWG. NO.
F.B. F.B.			

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REBECCAB

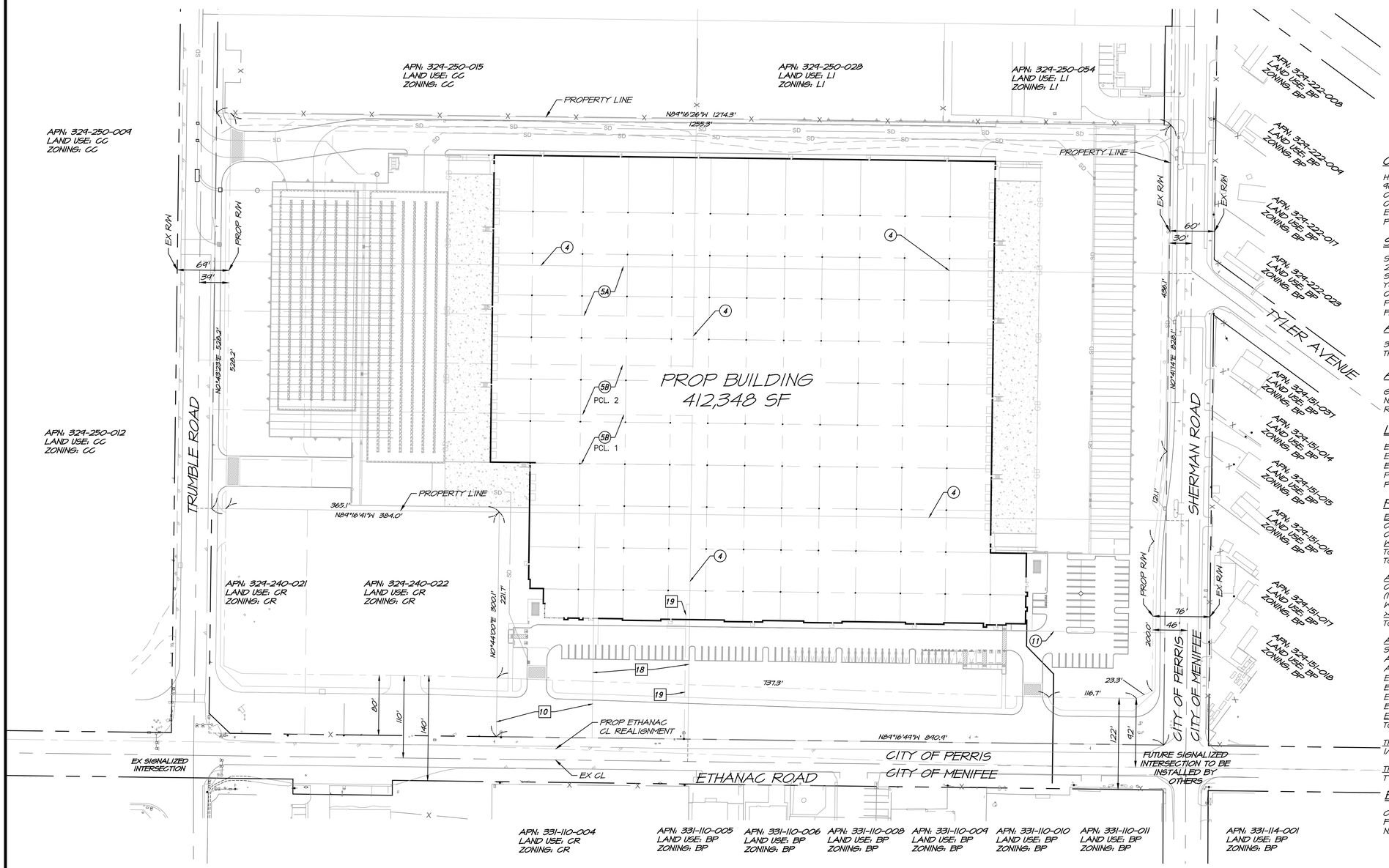
Appendix 2: Construction Plans

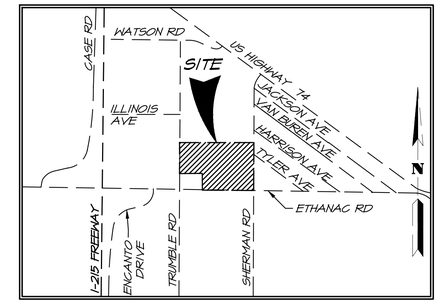
Grading and Drainage Plans

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) 256-5924

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

A.P.N.

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

ACREAGE

GROSS	21.6 AC
NET	19.9 AC
R/W	1.7 AC

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 REPRESENTATIVE

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

ENGINEER

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

ARCHITECT

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

TOPOGRAPHY SOURCE

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

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

SHEET 1 - TITLE SHEET
SHEET 2 - STREET AND GRADING SECTIONS
SHEET 3 - CONCEPTUAL GRADING
SHEETS 4,5 - CONCEPTUAL UTILITIES

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) 926-9244 PERRIS UNION HIGH SCHOOL DISTRICT (9-12) PHONE: (951) 943-6369

EASEMENT NOTES

SEE SHEET 2

LEGAL DESCRIPTION

SEE SHEET 2

1" = 70'

70 0 70 140 210

N W E S WEBB

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

CITY OF PERRIS

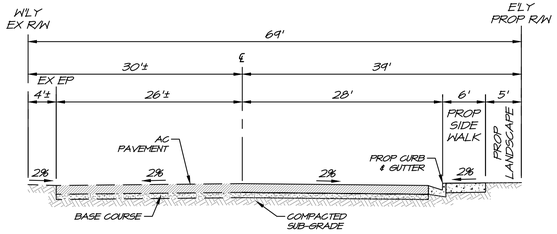
ETHANAC LOGISTICS CENTER
TITLE SHEET
DEVELOPMENT PLAN REVIEW NO. 22-00030

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

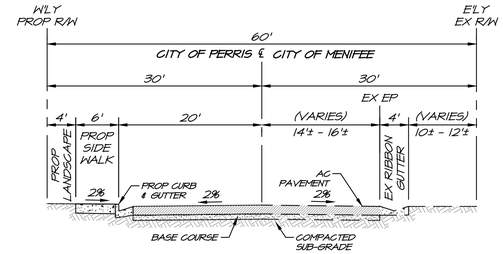
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

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

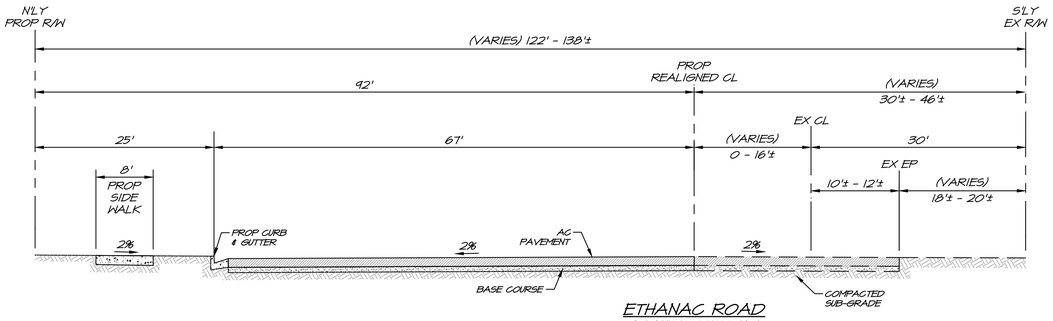
H:\2022\22-0198\DRAWINGS\ENTITLEMENT\22-0198-C-PP.DWG 9/1/2023 4:00:02 PM Rebecca



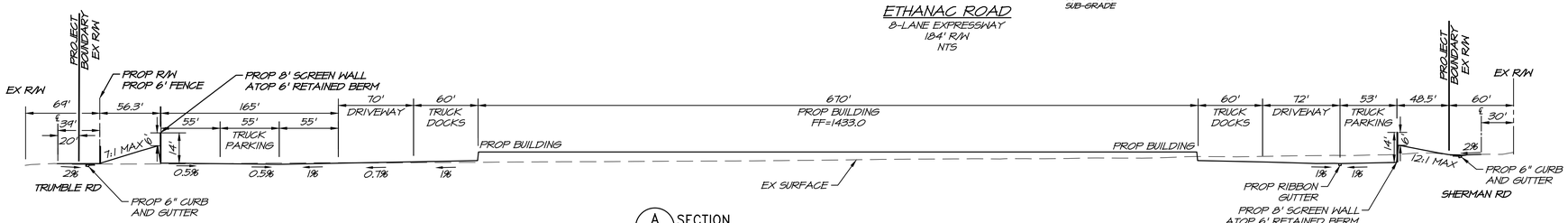
TRUMBLE ROAD
MAJOR COLLECTOR
78' R/W
NTS



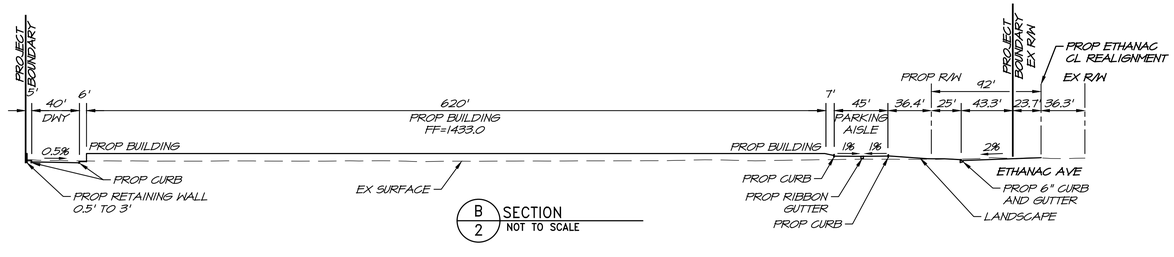
SHERMAN ROAD
LOCAL
60' R/W
NTS



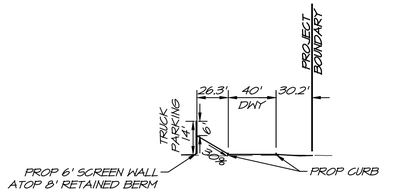
ETHANAC ROAD
8-LANE EXPRESSWAY
184' R/W
NTS



A/2 SECTION
NOT TO SCALE



B/2 SECTION
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 T33), **324-240-017** (AFFECTS THE PORTION OF LOT T34), **324-240-018** (AFFECTS THE PORTION OF LOT T34), **324-240-019** (AFFECTS THE PORTION OF LOT T34), **324-240-020** (AFFECTS THE PORTION OF LOT T34), **324-240-026** (AFFECTS THE LOT T37), **324-240-027** (AFFECTS THE PORTION OF LOT T38), **324-240-025** (AFFECT LOT T36).

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

PARCEL A:
LOTS T34, T37 AND THE SOUTH 198 FEET OF LOTS T33 AND T38 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 T36 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 T35 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 T35 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 T35; 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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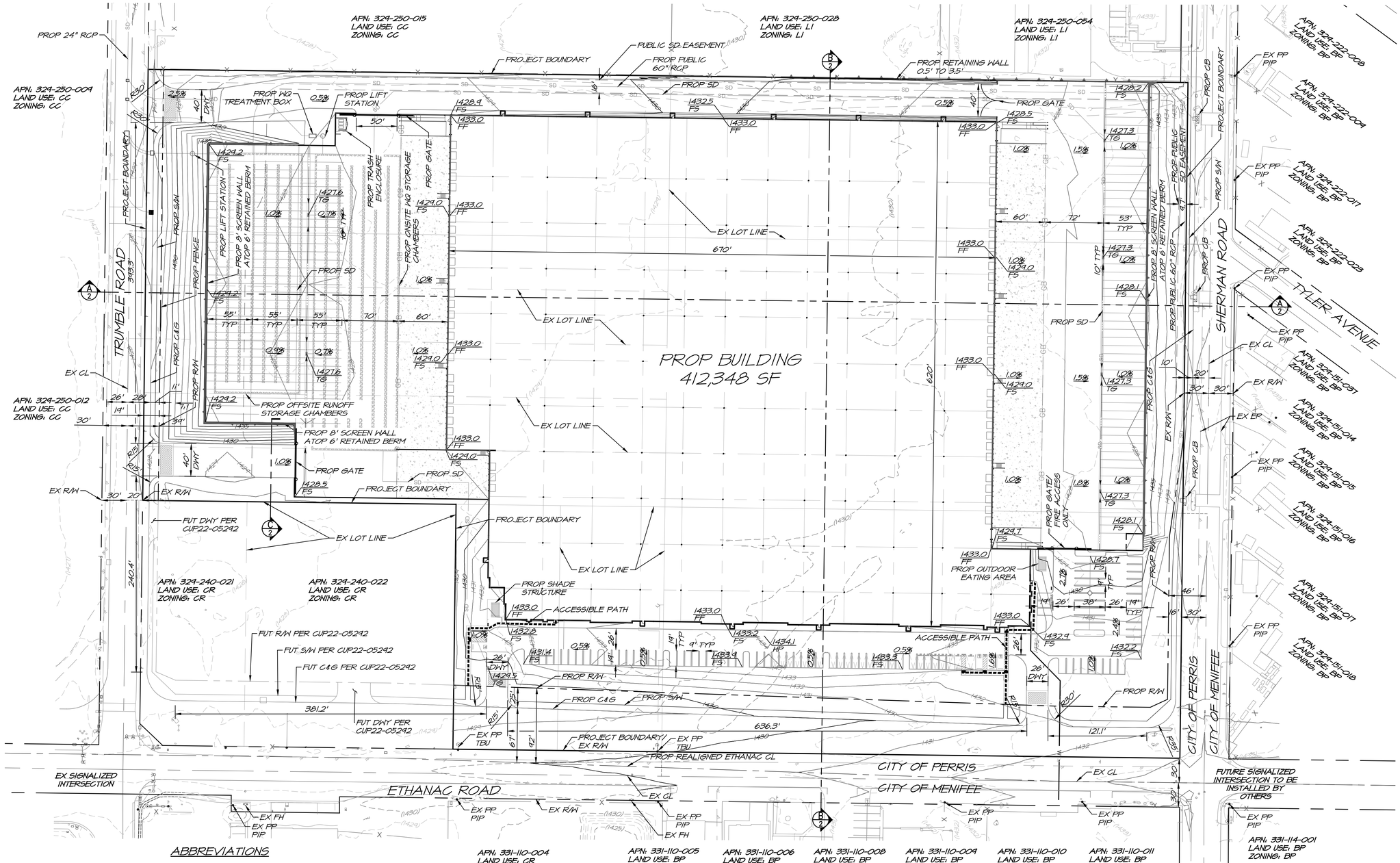

LEGEND

- 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

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
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FAX (951) 788-1256

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

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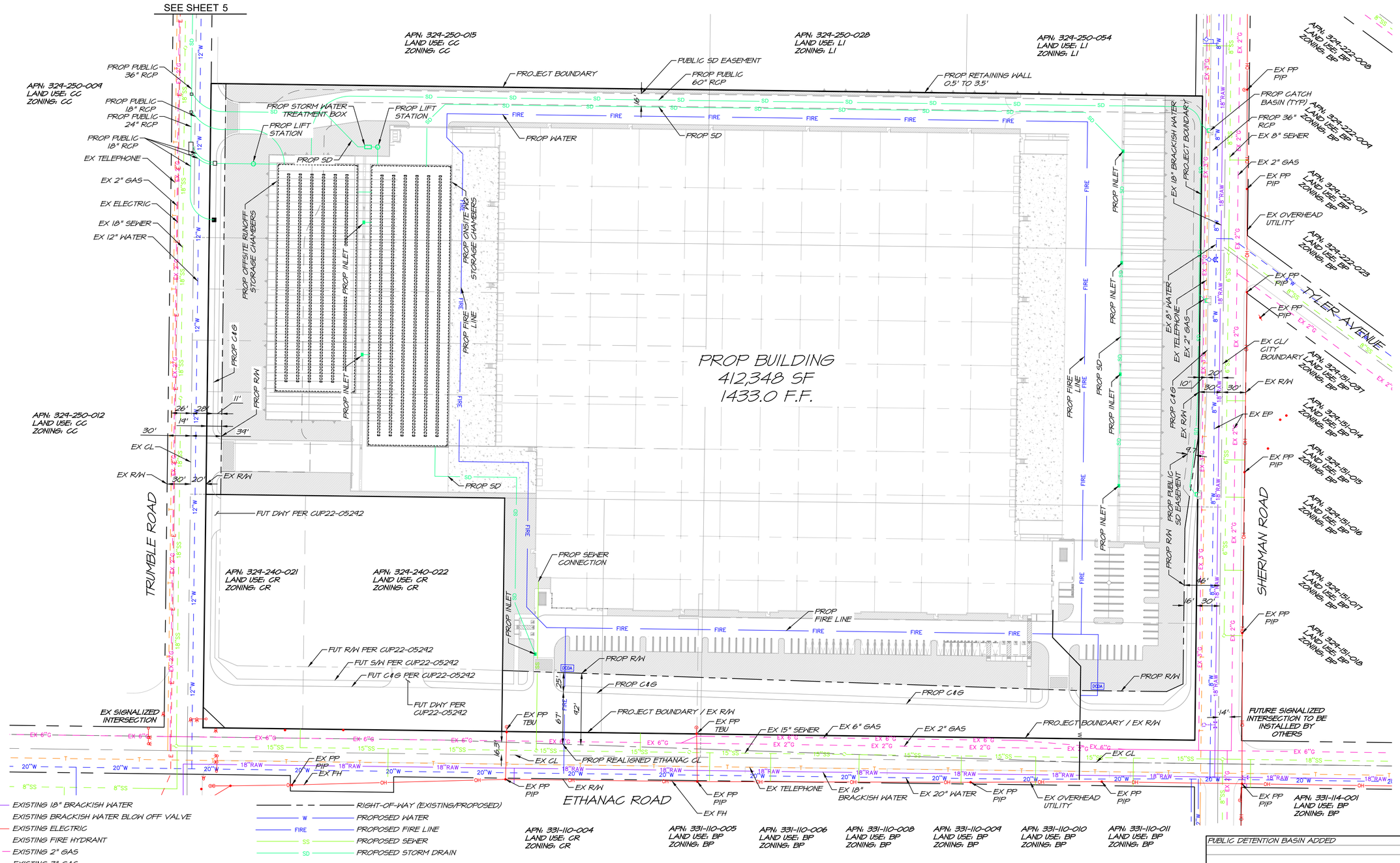

LEGEND

- 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

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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
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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

- 18"RAW — EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- E — EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EX 2"G — EXISTING 2" GAS
- EX 3"G — EXISTING 3" GAS
- EX 6"G — EXISTING 6" GAS
- OH — EXISTING OVERHEAD UTILITY
- 6"SS — EXISTING 6" SEWER
- 8"SS — EXISTING 8" SEWER
- 15"SS — EXISTING 15" SEWER
- 18"SS — EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- 36"SD — EXISTING 36" STORM DRAIN
- 48"SD — EXISTING 48" STORM DRAIN
- T — EXISTING TELEPHONE
- 8"W — EXISTING 8" WATER
- 12"W — EXISTING 12" WATER
- 20"W — EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- W — PROPOSED WATER
- FIRE — PROPOSED FIRE LINE
- SS — PROPOSED SEWER
- SD — 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
DESIGNED: AG
CHECKED: SK
PLN CK REF:
F.B.

ALBERT A. WEBB ASSOCIATES
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3788 McCRAY STREET
RIVERSIDE CA. 92506
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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

SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

February 23, 2022

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

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

22885 Savi Ranch Parkway ▾ Suite E ▾ Yorba Linda ▾ California ▾ 92887
voice: (714) 685-1115 ▾ fax: (714) 685-1118 ▾ www.socalgeo.com

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APPENDICES

A Plate 1: Site Location Map
Plate 2: Boring Location Plan
Plate 3: Geologic Map
B Boring Logs
C Laboratory Test Results
D Grading Guide Specifications
E Seismic Design Parameters

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

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements.

7.0 GENERAL COMMENTS

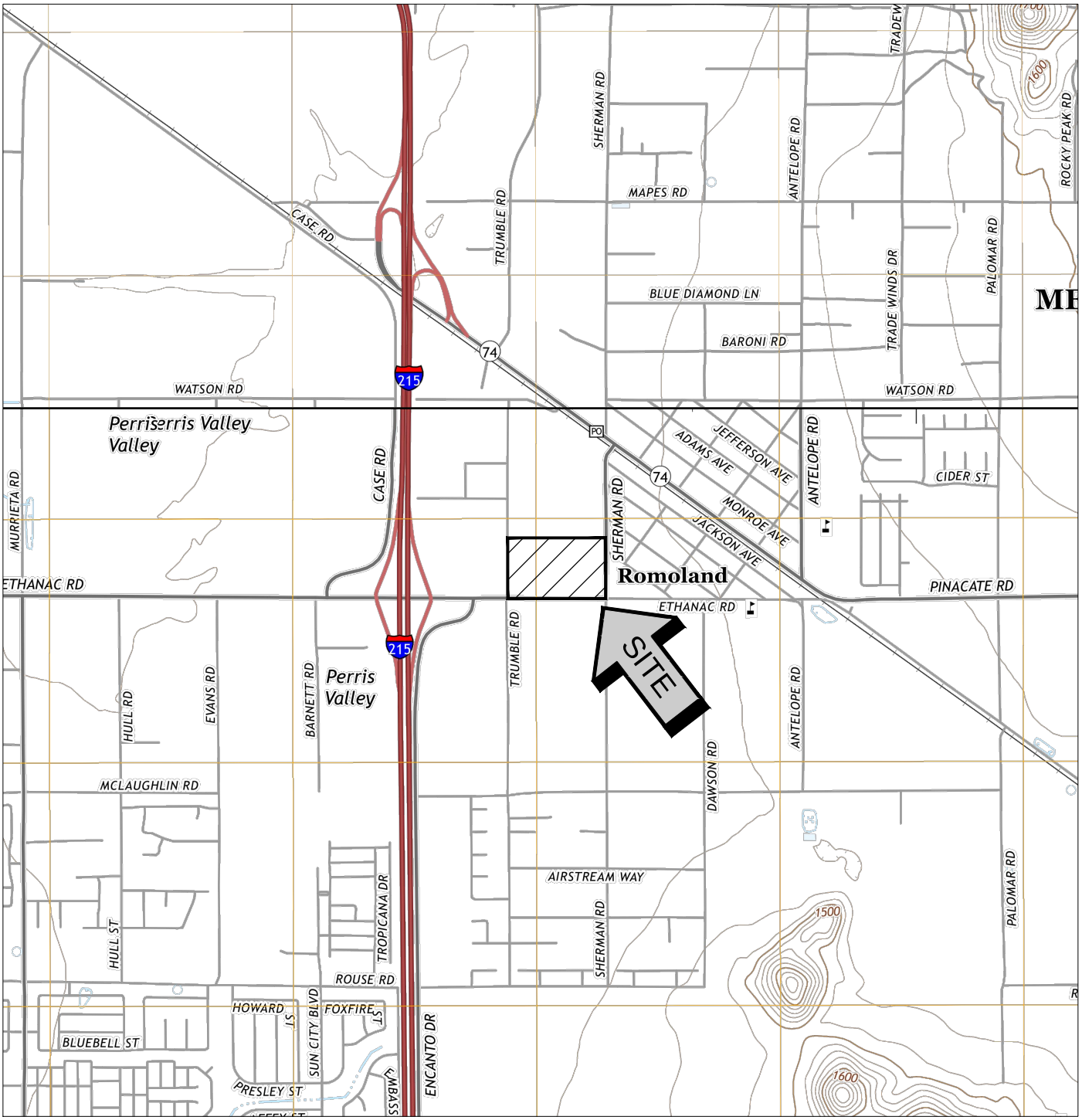
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

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

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

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

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE ROMOLAND & PERRIS QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: MD
CHKD: DN

SCG PROJECT
22G107-1

PLATE 1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

NORTH
SoCalGeo

NOTE: CONCEPTUAL SITE PLAN (SCHEME 7) PREPARED BY HERDMAN ARCHITECTURE + DESIGN.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH (2018)

BORING LOCATION PLAN

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 100'

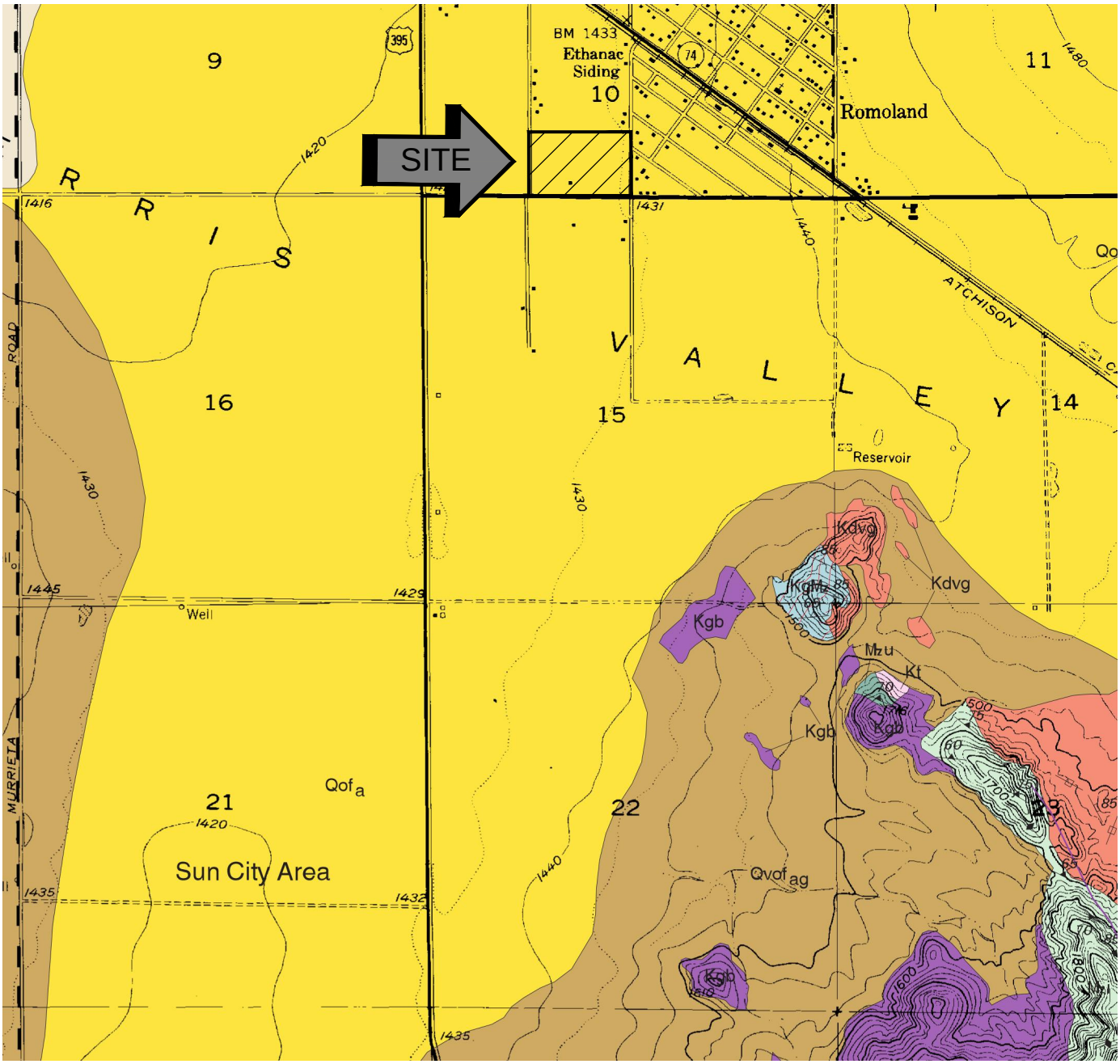
DRAWN: OS
CHKD: RGT

SCG PROJECT
22G107-1

PLATE 2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



DESCRIPTION OF MAP UNITS

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Reddish brown, gravel and sand alluvial fan deposits; indurated, commonly slightly dissected. In places includes thin alluvial fan deposits of Holocene age

Kdvg — **Granodiorite to tonalite**—Relatively uniform, massive hornblende biotite granodiorite grading into tonalite. Principal rock type of Domenigoni Valley pluton. Contains some mafic rich rocks in southern part of pluton. Common accessory minerals are zircon, sphene, apatite, and magnetite-ilmenite.

SOURCE: "GEOLOGIC MAP OF THE ROMOLAND 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA" BY D. M. MORTON.

GEOLOGIC MAP
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA

SCALE: 1" = 2000'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: DN	
SCG PROJECT 22G107-1	
PLATE 3	

APPENDIX B

BORING LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

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

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		47	4.5		OLDER ALLUVIUM: Red Brown fine to coarse Sandy Clay, trace Silt, hard-moist	123	10					
		50/5"				116	11					
5		77/11"	4.5		Red Brown fine Sandy Clay, trace Silt, hard-damp to moist	124	8					
		82	4.5			125	9					
10		80/10"			@ 8½ feet, trace medium to coarse Sand	116	8					
		59			GRANODIORITE TO TONALITE (Kdvg): Light Gray Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, dense to very dense-moist		10					
15												
		53					7					
20												
		46					8					
25					Boring Terminated at 25'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	68	4.0		OLDER ALLUVIUM: Light Brown fine to coarse Sandy Clay, trace Silt, hard-damp		8					
	X	82/11"					8					
5												
	X	80/11"	3.5		Light Brown to Brown fine Sandy Clay, very stiff to hard-moist to very moist		11					
	X	24	2.5				23					
10					Light Brown Clayey fine to coarse Sand to fine to coarse Sandy Clay, trace Silt, medium dense to very stiff-damp to moist to very moist		6					
	X	14					15					
15												
					Light Brown to Brown fine to coarse Sand, trace Silt, medium dense-damp							
	X	16					6					
20												
					Boring Terminated at 20'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	70/9"	4.5		OLDER ALLUVIUM: Dark Brown fine to coarse Sandy Clay, trace Silt, hard-damp to moist		8					
	X	50/4"					6					
5												
	X	42	4.5				11					
	X	43			Brown Clayey fine to coarse Sand, dense-damp		5					
10												
	X	40					6					
15												
					Boring Terminated at 20'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	36	4.5		OLDER ALLUVIUM: Dark Red Brown fine to medium Sandy Clay, trace Silt, very stiff to hard-moist to very moist	126	9					
	X	57	4.5			120	15					
5	X	72/10"	4.5			131	10					
	X	43			GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, medium dense to dense-moist	122	9					
10	X	49				121	8					
	X	26					7					
15					Boring Terminated at 15'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	42	4.5		OLDER ALLUVIUM: Red Brown fine to medium Sandy Clay, trace Silt, hard-moist		10					
	X	73	3.0				10					
5												
	X	31			GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, medium dense to dense-moist		9					
	X	39					9					
10												
	X	18					12					
15												
	X	41					8					
20												
					Boring Terminated at 15'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Dark Red Brown fine to medium Sandy Clay, trace Silt, hard-moist							
		70/11"	4.5			114	14					EI = 62 @ 0 to 5'
		77/11"	4.5			113	13					
5		58	4.5			123	10					
		64	4.5			130	10					
		45	4.5			128	11					
10												
					GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, very dense-moist							
		82/11"					10					
15												
		55					10					
20												
		55					9					
25												
					Boring Terminated at 25'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 4 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	80	4.5		OLDER ALLUVIUM: Light Brown fine Sandy Clay, trace medium Sand, trace Silt, hard-damp to moist		10					
	X	60					7					
5												
	X	80	4.5				9					
	X	50/5"	2.0		@ 8½ feet, stiff to very stiff		9					
10												
					Boring Terminated at 10'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

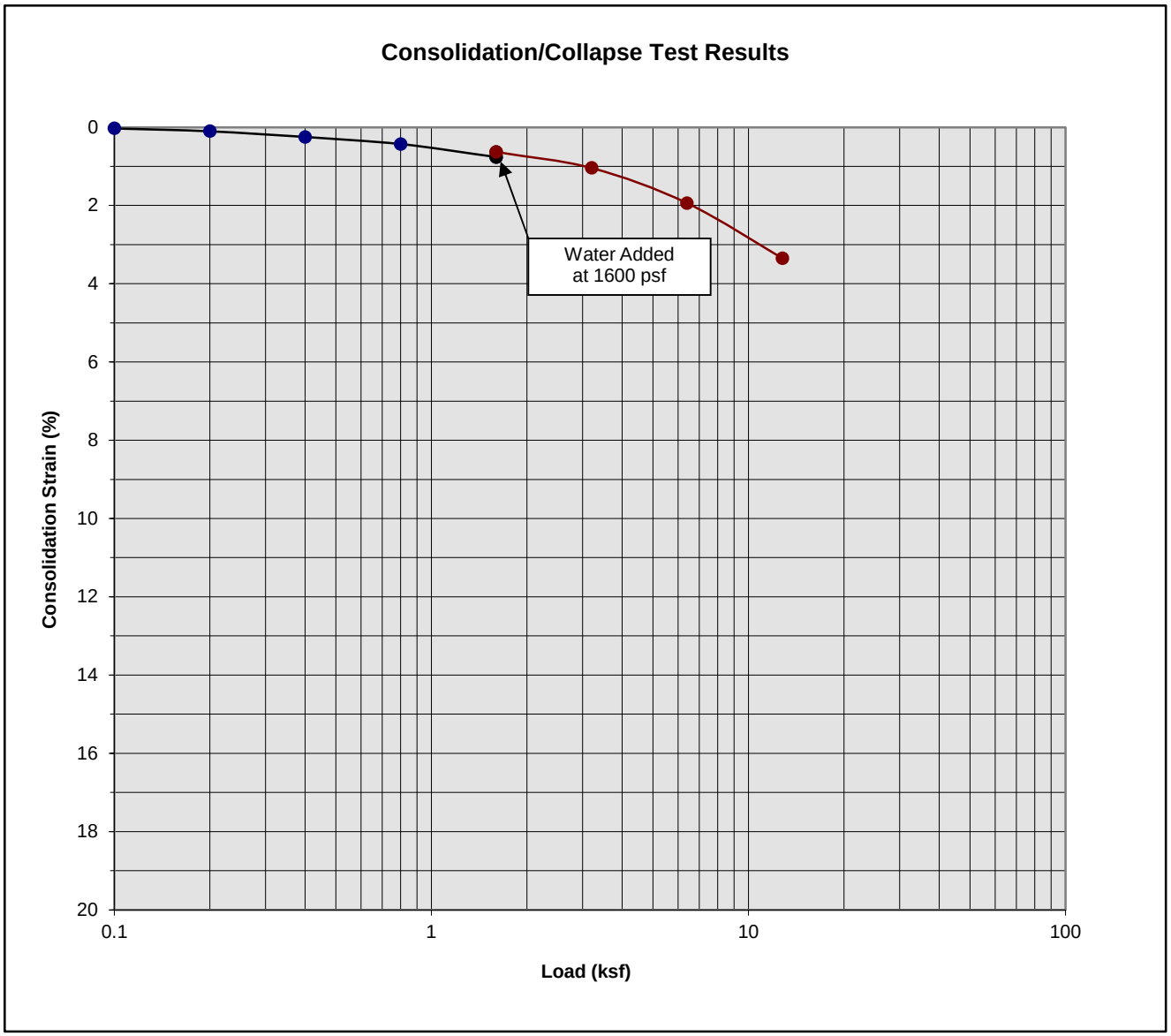
DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	85	4.5		OLDER ALLUVIUM: Dark Brown fine to medium Sandy Clay, trace Silt, trace coarse Sand, hard-moist		10					
	X	65/11"					9					
5												
	X	50/5"	4.5				9					
	X	87/10"					12					
10												
					Boring Terminated at 10'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

APPENDIX C

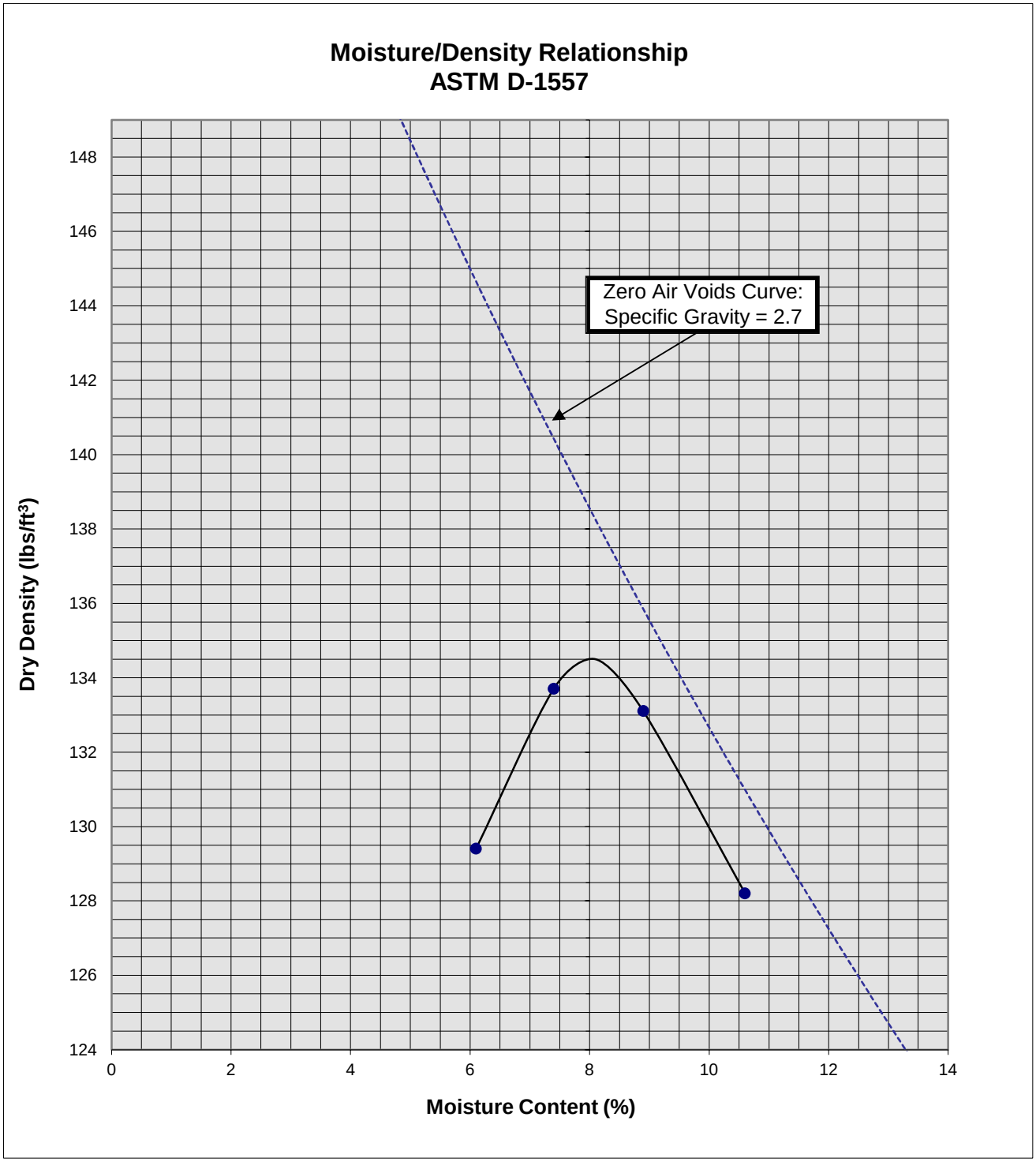


Classification: Dark Red Brown fine to medium Sandy Clay, trace Silt

Boring Number:	B-4	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	3 to 4	Initial Dry Density (pcf)	119.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.13

Proposed Warehouse
Perris, California
Project No. 22G107-1
PLATE C- 1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-1 @ 0 to 5'
Optimum Moisture (%)	8
Maximum Dry Density (pcf)	134.5
Soil Classification	Red Brown fine to coarse Sandy Clay, trace Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-1
PLATE C-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

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

General

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

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

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

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

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

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

Site Preparation

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

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

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

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

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

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

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

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

Compacted Fills

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Foundations

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

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

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

Fill Slopes

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

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

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

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

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

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

Cut Slopes

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

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

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

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

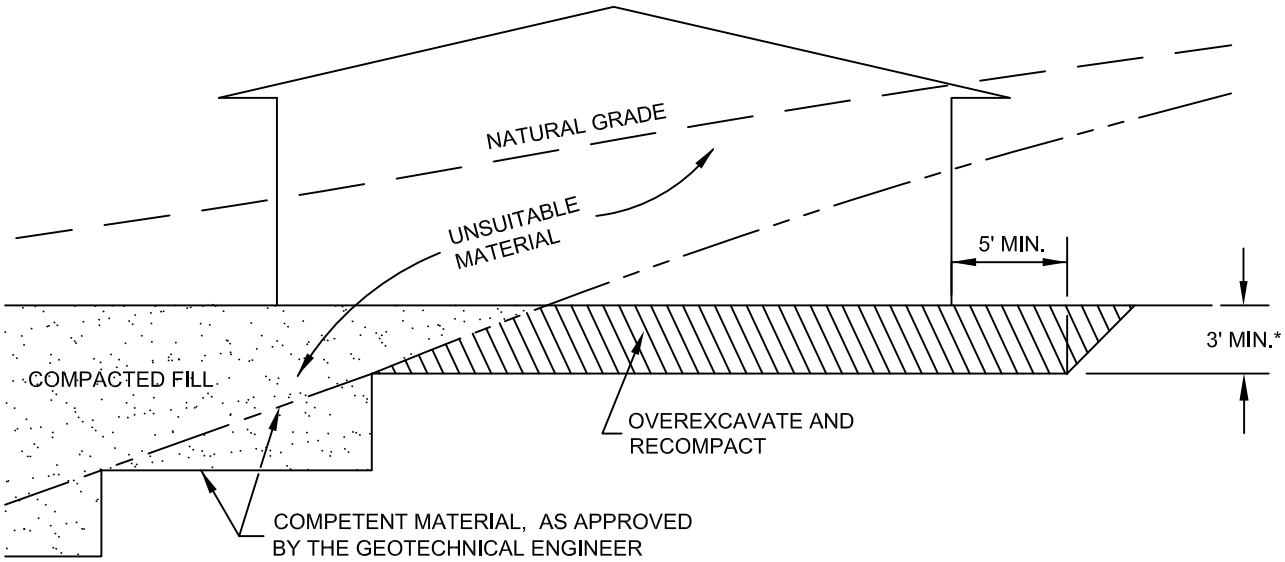
Subdrains

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

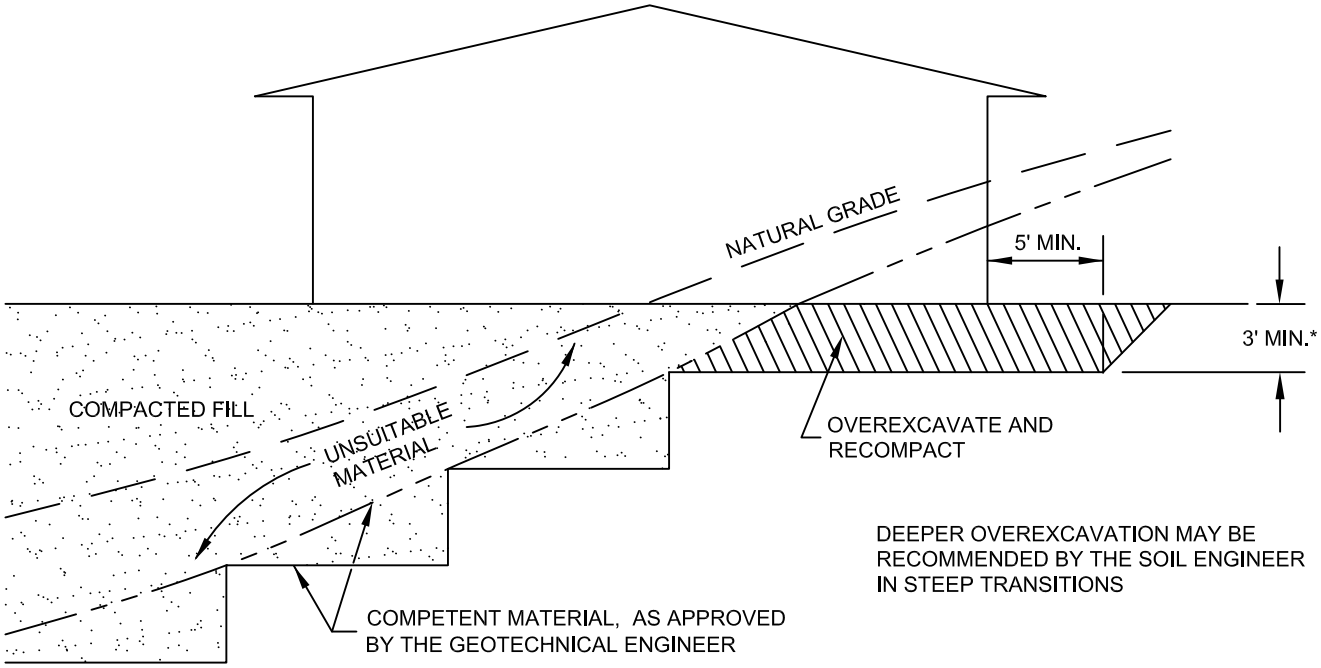
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

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

CUT LOT



CUT/FILL LOT (TRANSITION)



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

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

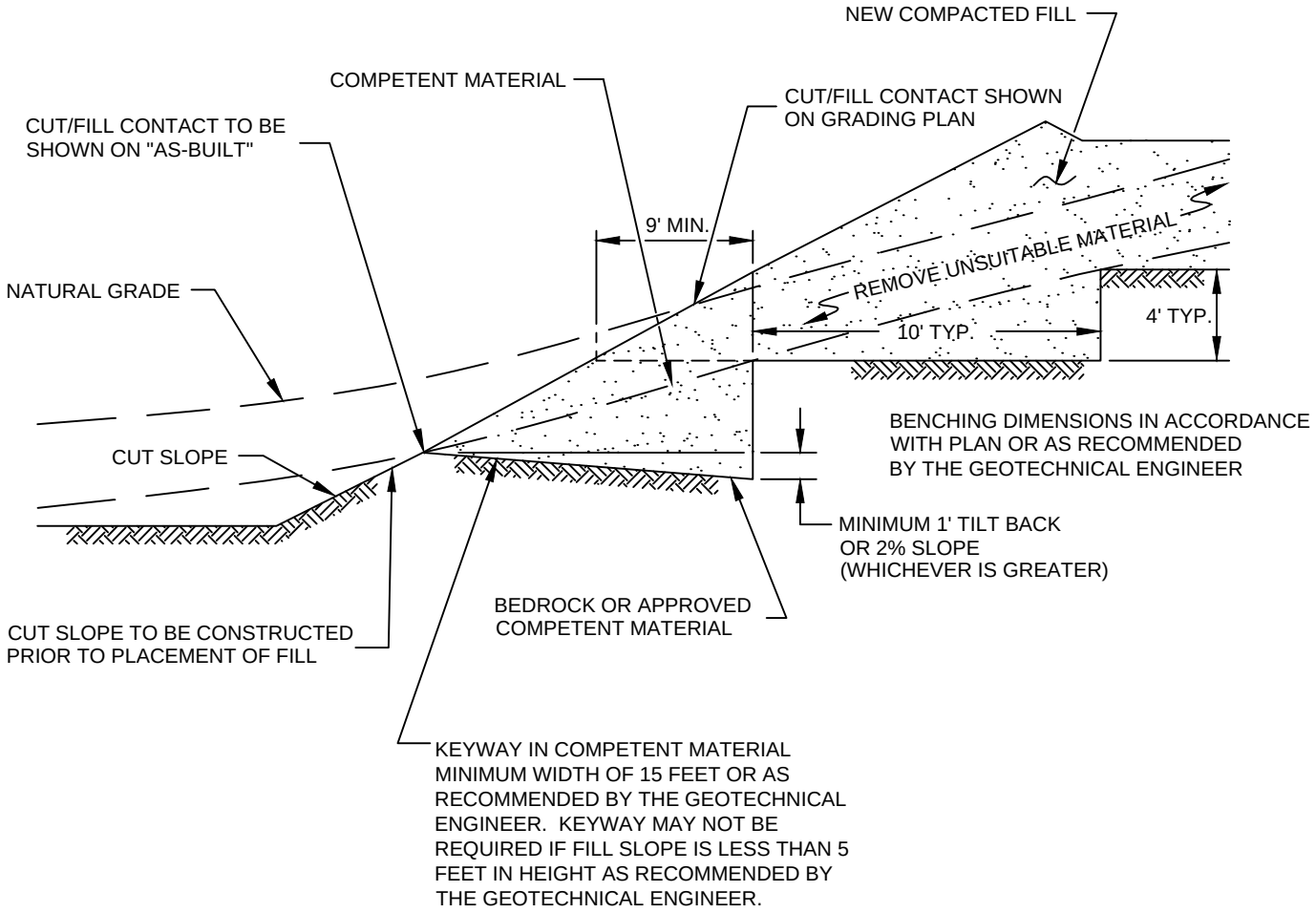
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

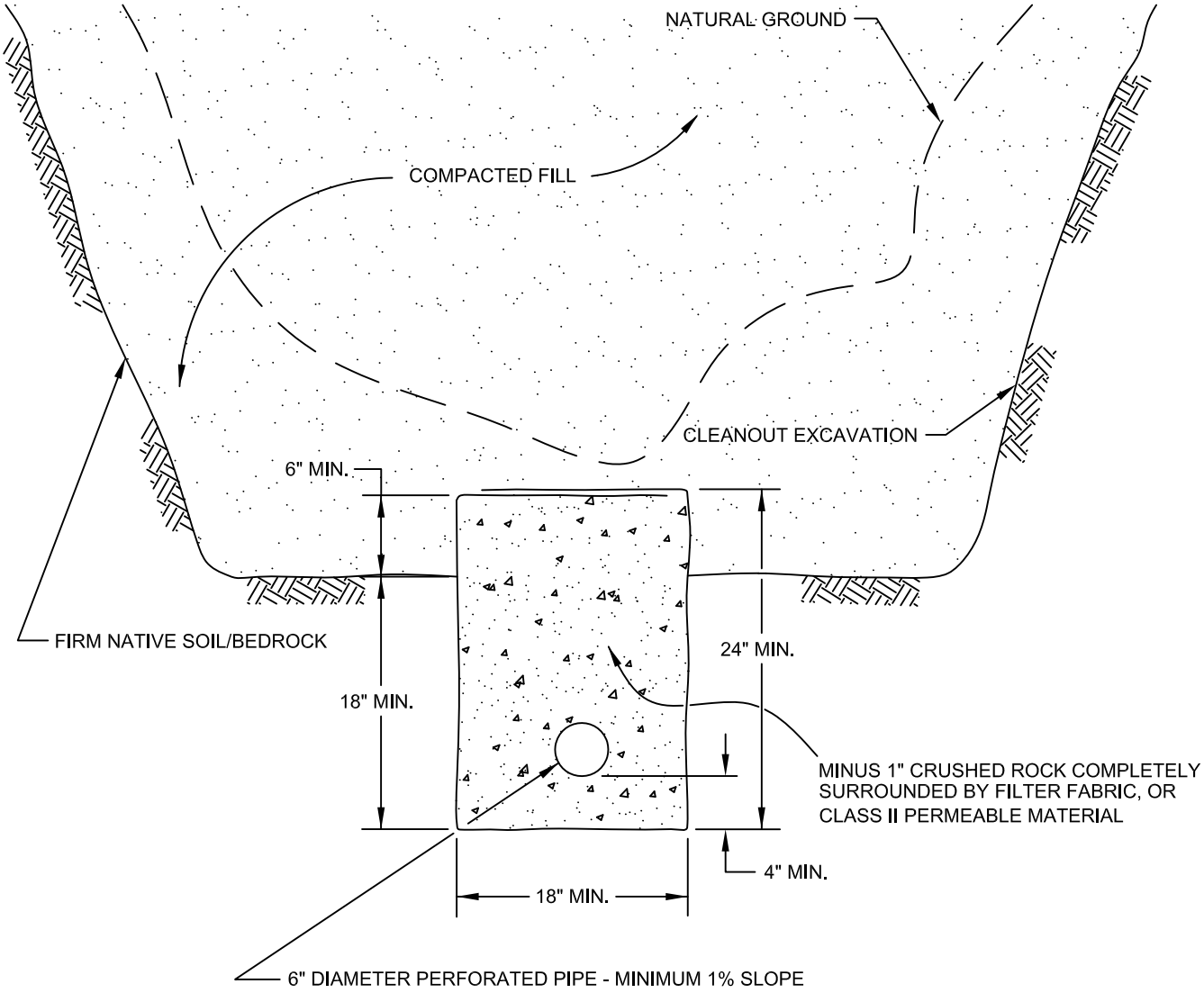
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



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

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

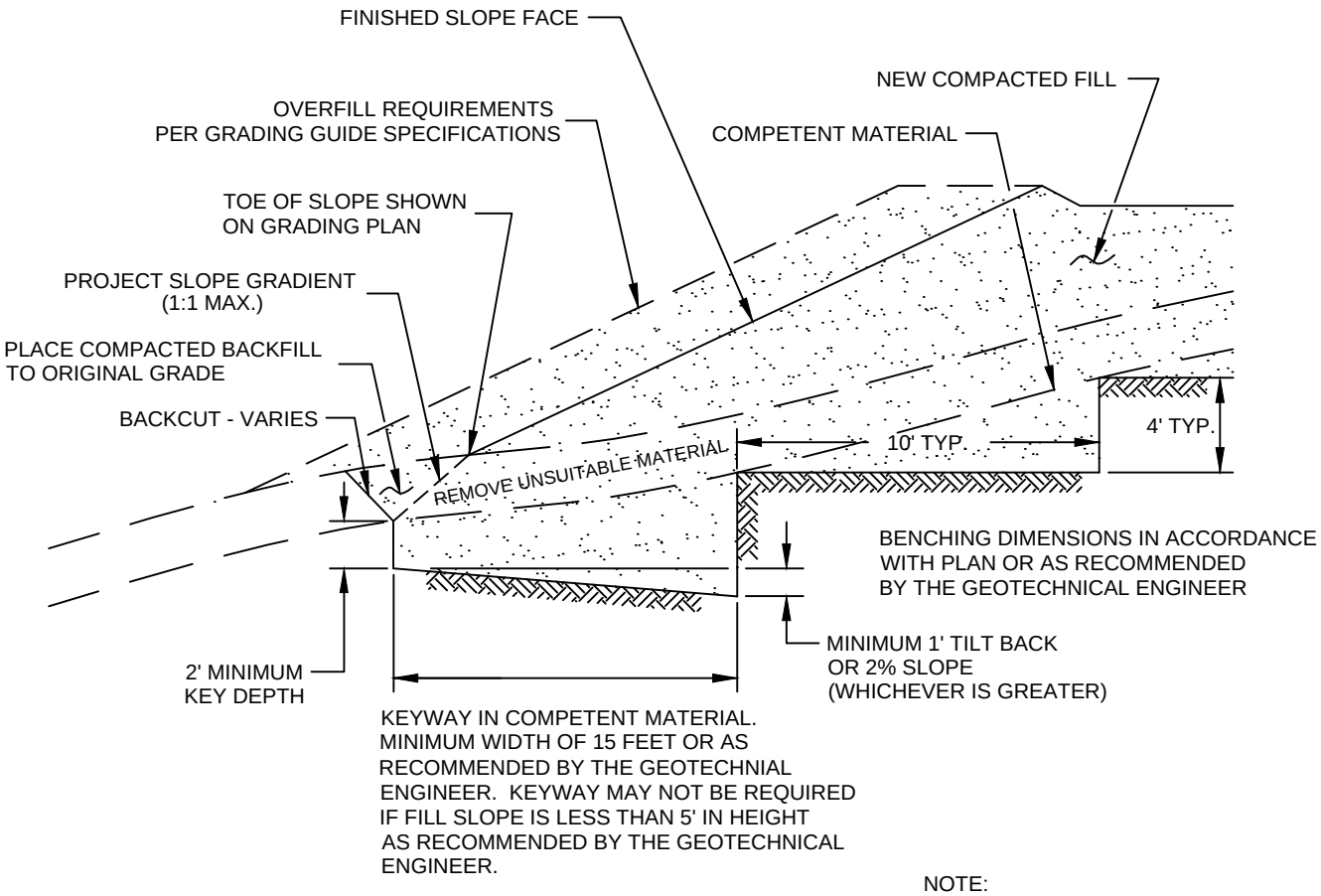
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SOUTHERN CALIFORNIA GEOTECHNICAL



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

FILL ABOVE NATURAL SLOPE DETAIL

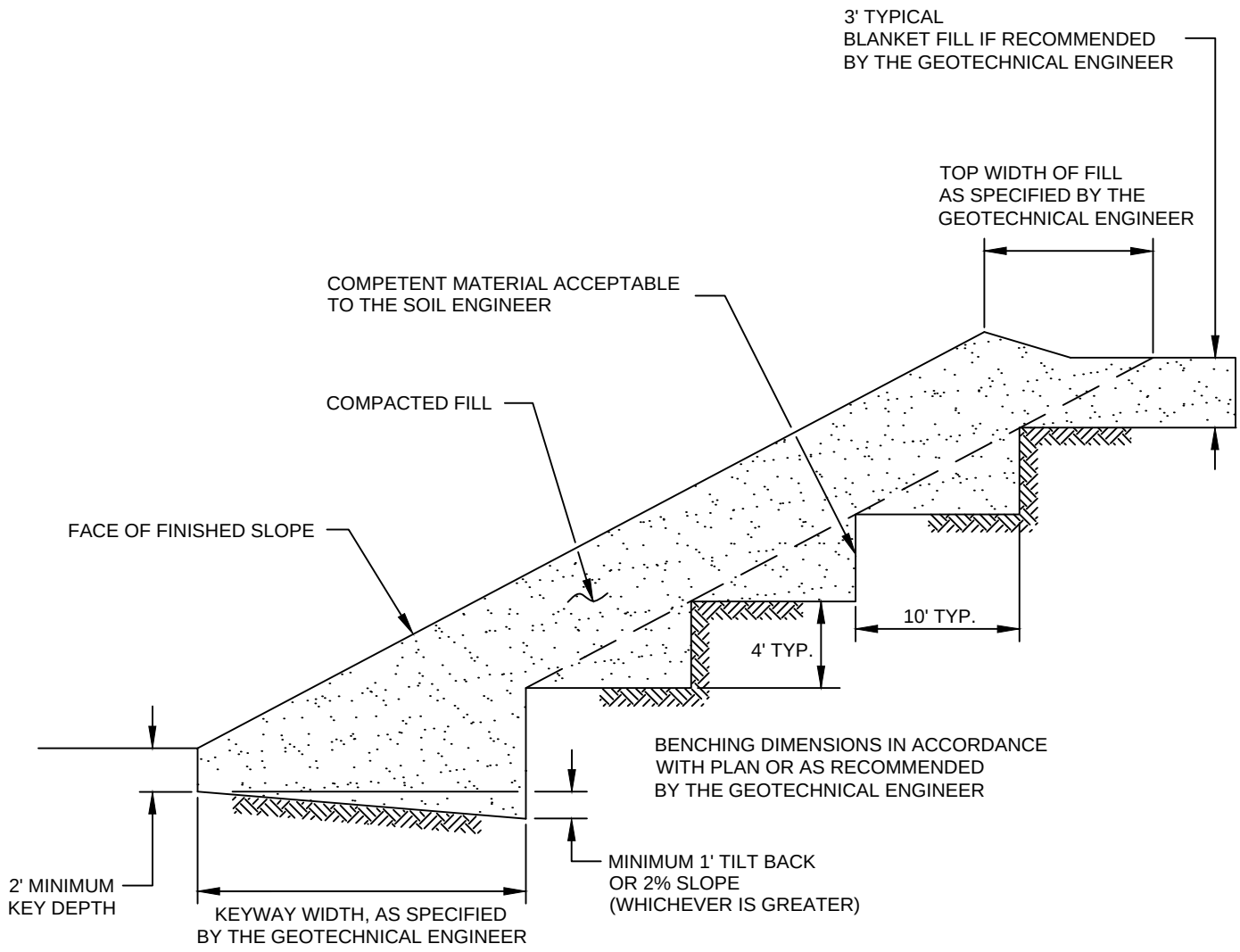
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

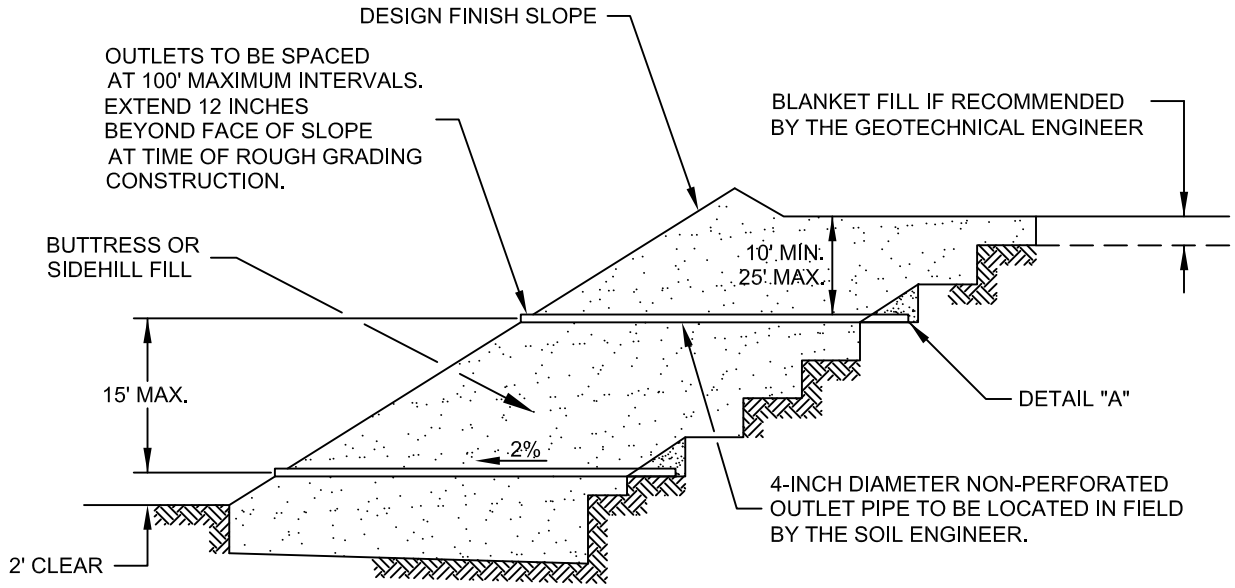
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SOUTHERN CALIFORNIA GEOTECHNICAL



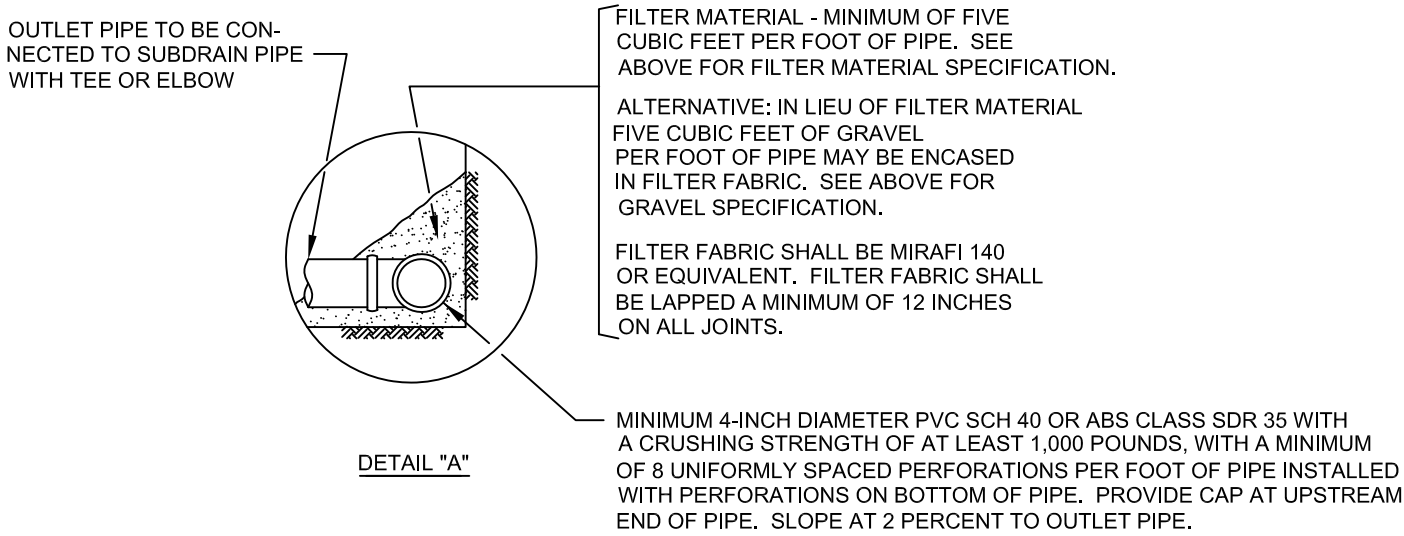
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

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

SLOPE FILL SUBDRAINS

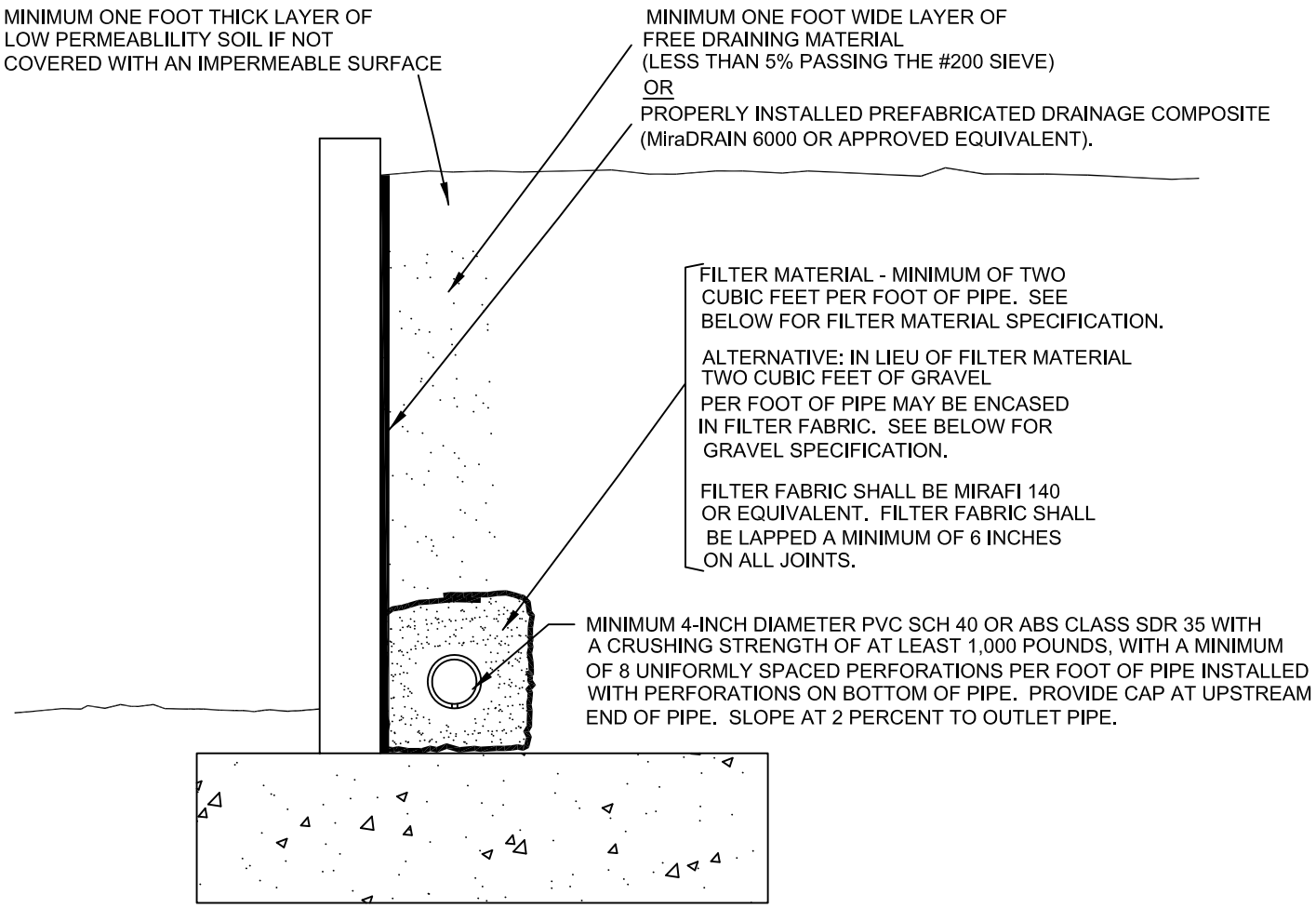
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SOUTHERN CALIFORNIA GEOTECHNICAL



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

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

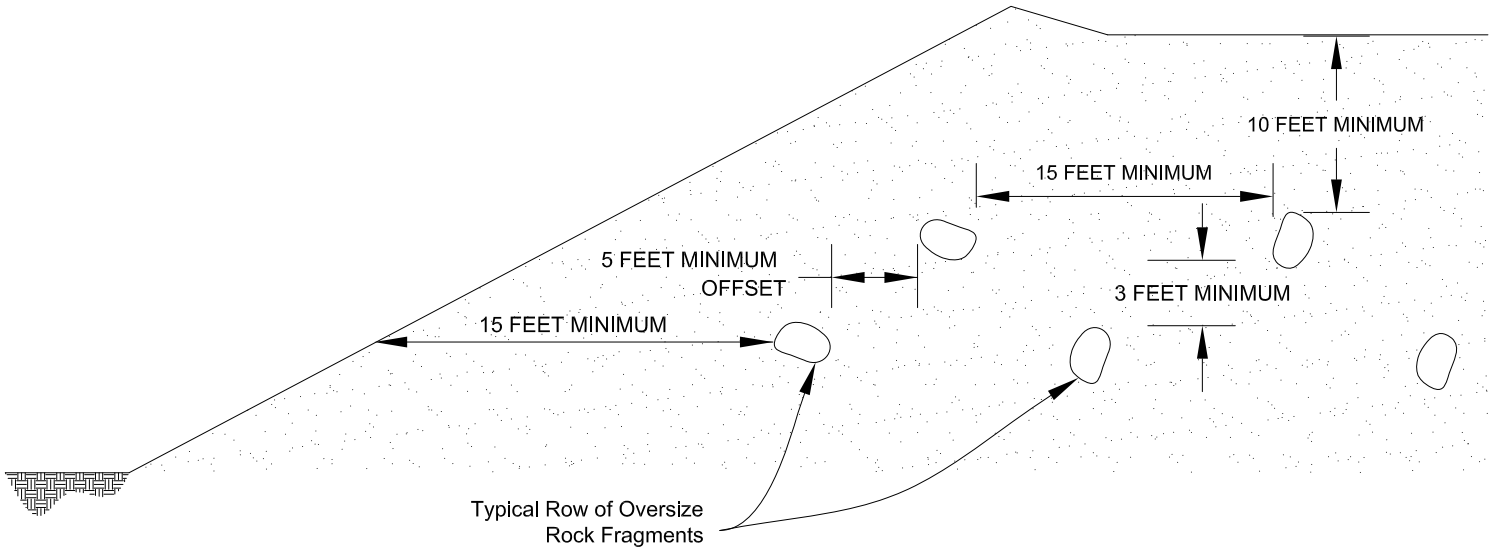
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

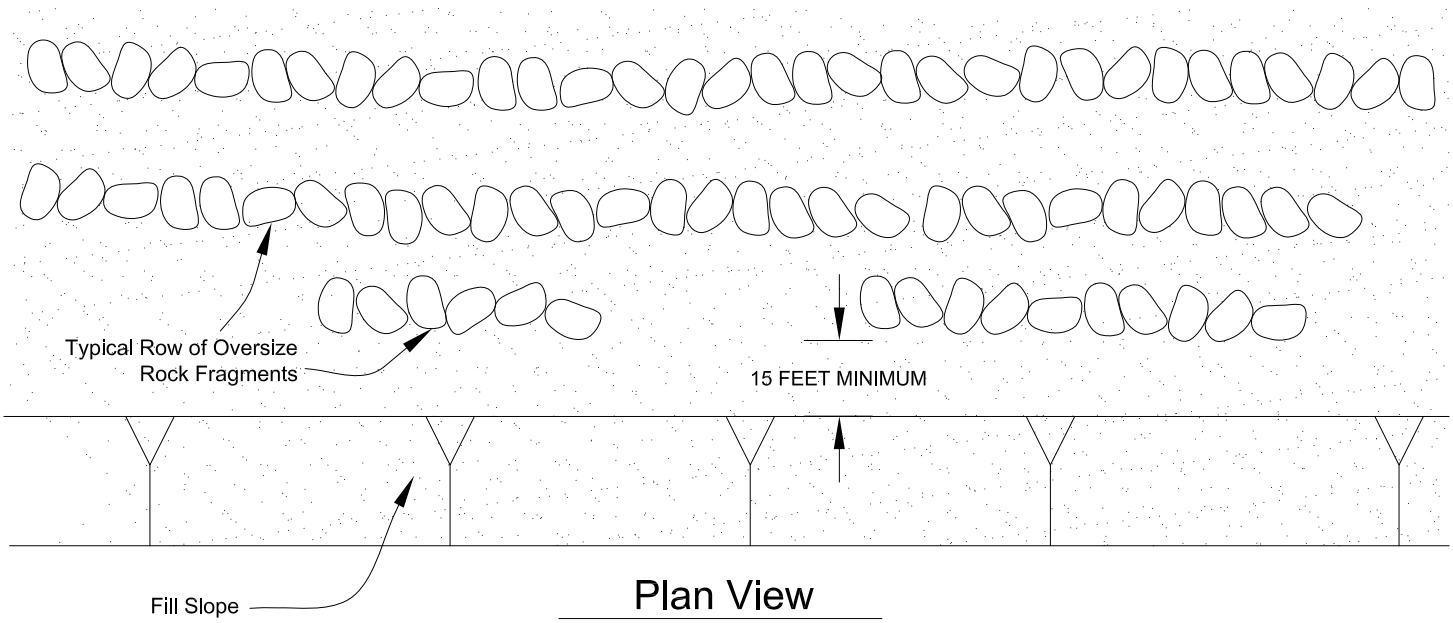
DRAWN: JAS
CHKD: GKM

PLATE D-7

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

OSHPD

Latitude, Longitude: 33.744164, -117.180544

Date	2/23/2022, 10:19:50 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.421	MCE_R ground motion. (for 0.2 second period)
S_1	0.528	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.705	Site-modified spectral acceleration value
S_{M1}	0.777	Site-modified spectral acceleration value
S_{DS}	1.137	Numeric seismic design value at 0.2 second SA
S_{D1}	0.518	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.472	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.421	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.52	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.528	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.575	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.935	Mapped value of the risk coefficient at short periods
C_{R1}	0.918	Mapped value of the risk coefficient at a period of 1 s

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

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

DRAWN: MD
CHKD: DN

SCG PROJECT
22G107-1

PLATE E-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

February 24, 2022

Hillwood
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. John Grace

Project No.: **22G107-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
NWC Ethanac Road and Sherman Road
Perris, California

Reference: Geotechnical Investigation, Proposed Warehouse, NWC Ethanac Road and Sherman Road, Perris, California, prepared for Hillwood, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G107-1, dated February 23, 2022.

Mr. Grace:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P511, dated December 17, 2021. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

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.

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.

The proposed development will include on-site storm water infiltration. Based on conversations with the project civil engineer, we understand that the infiltration system will consist a below-grade chamber system located in the southern area of the site. The bottom of the infiltration system will range from 10 to 12± feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, eight (8) borings were advanced to depths of 10 to 25± feet below existing site grades.

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 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 any of our subsurface explorations. Based on the lack of any water within the borings and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

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.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of two (2) backhoe-excavated trenches, extending to depths of 8 to 9± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 and I-2) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Older native alluvial soils were encountered at the ground surface at both of the infiltration test locations, extending to at least the maximum depths explored of 8 to 9± feet below ground surface. The older alluvium generally consists of very dense clayey fine to medium sands. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at both of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 15-minute increments. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	9	Clayey fine to medium Sand, little coarse Sand, little Silt	0.1
I-2	8	Clayey fine to medium Sand, trace coarse Sand, little Silt	0.2

Design Recommendations

Two (2) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 0.1 to 0.2 inches per hour. The major factors affecting the lack of infiltration at these locations is the presence of dense to very dense older alluvium. **Based on the lack of infiltration at the depths tested, infiltration is not considered feasible for this site. These areas are very likely to be underlain by much less permeable, denser older alluvium, which was encountered at the other boring and trench locations.**

Although infiltration is not considered feasible at the site, the client may desire to use storm water disposal systems that do not rely on infiltration at this site. The design of storm water disposal systems should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. It is recommended any such systems be designed and constructed to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the flow rates through the system. It should be noted that the recommended infiltration rates are based on infiltration testing at two (2) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the

structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

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

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

generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

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,

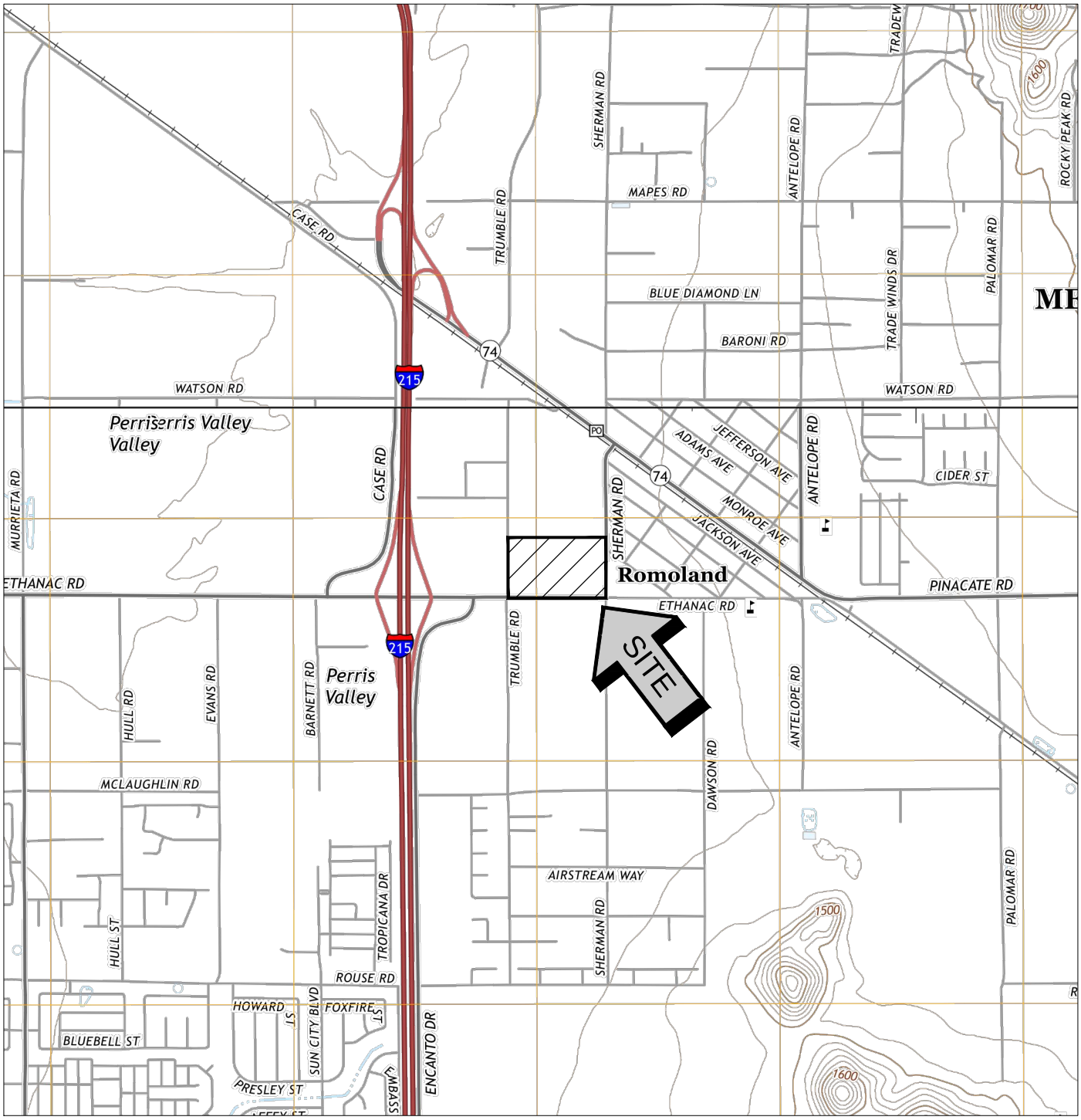
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Oscar Sandoval
Staff Engineer

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

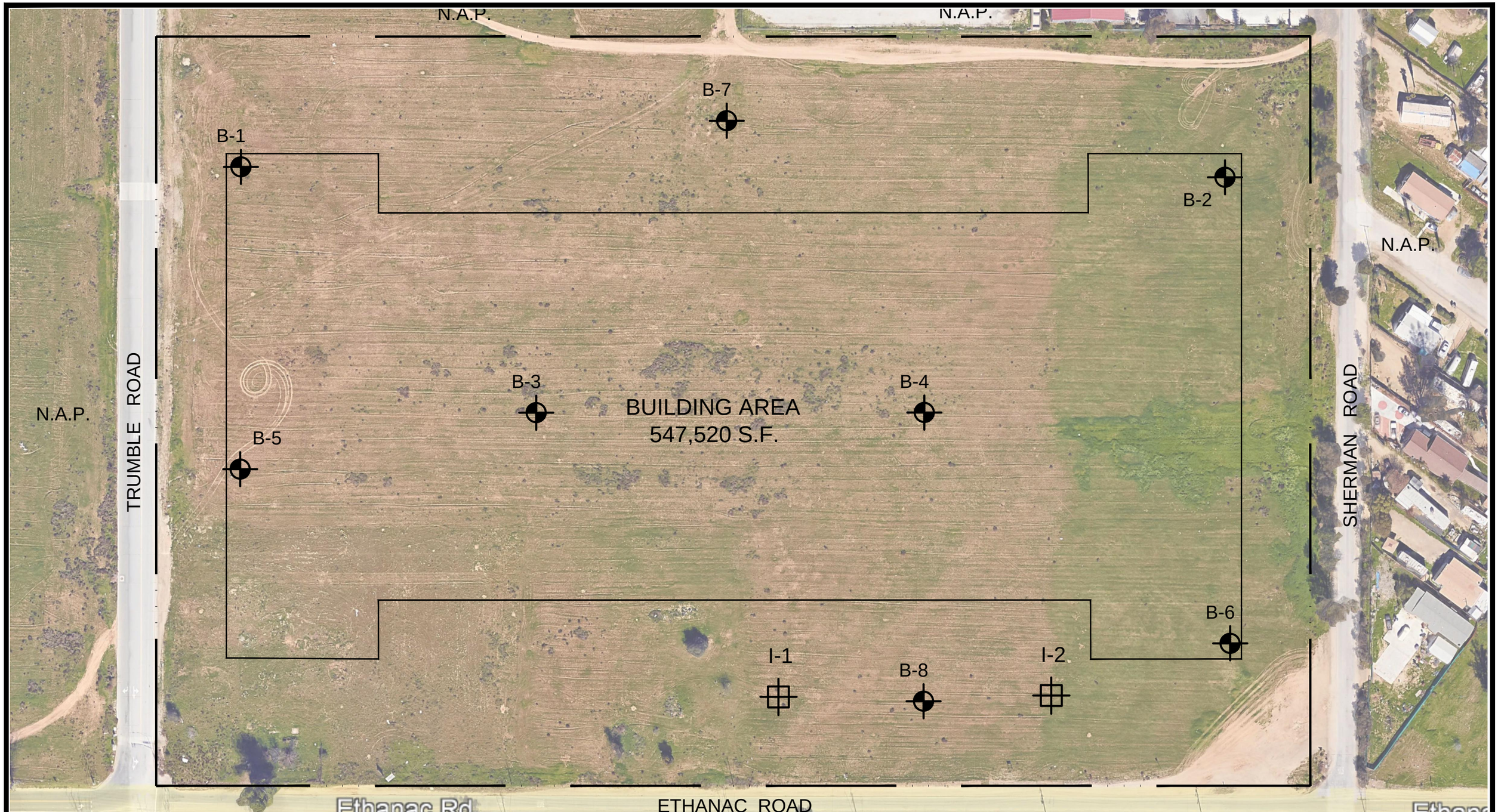
Enclosures: Plate 1: Site Location Map
Plate 2: Infiltration Test Location Plan
Trench Log Legend and Logs (4 pages)
Infiltration Test Results Spreadsheets (2 pages)
Grainsize Distribution Graphs (2 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE ROMOLAND & PERRIS QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA
SCALE: 1" = 2000'
DRAWN: MD CHKD: DN
SCG PROJECT 22G107-2
PLATE 1

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

APPROXIMATE INFILTRATION TEST LOCATION

APPROXIMATE BORING LOCATION

NORTH
SoCalGeo

NOTE: CONCEPTUAL SITE PLAN (SCHEME 7) PREPARED BY HERDMAN ARCHITECTURE + DESIGN.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH (2018)

INFILTRATION TEST LOCATION PLAN

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 100'

DRAWN: OS
CHKD: RGT

SCG PROJECT
22G107-2

PLATE 2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

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

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 22G107-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/24/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					OLDER ALLUVIUM: Light Brown Clayey fine to medium Sand, little Silt, little coarse Sand, trace Calcareous veining, cemented, slightly porous, very dense-damp to moist		11			29		
					Trench Terminated at 9' Due to Refusal on Very Dense Soils							

TBL 22G107-2.GPJ SOCALGEO.GDT 2/24/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-2

JOB NO.: 22G107-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/24/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					OLDER ALLUVIUM: Light Brown Clayey fine to medium Sand, little Silt, trace coarse Sand, cemented, slightly porous, very dense-damp to moist							
							10			26		
					Trench Terminated at 8' Due to Refusal on Very Dense Soils							

TBL 22G107-2.GPJ SOCALGEO.GDT 2/24/22

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, CA
Project Number	22G107-2
Engineer	CB

Infiltration Test No: I-1

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:20 AM	15	0	100	0	8000	0.55	14.62	0.22	5.76
	Final	9:35 AM	**15**	100		8000					
2	Initial	9:35 AM	15	0	0	8	5792	0.00	10.58	0.00	4.17
	Final	9:50 AM	**30**	0		5800					
3	Initial	9:50 AM	15	0	0	0	3900	0.00	7.13	0.00	2.81
	Final	10:05 AM	**45**	0		3900					
4	Initial	10:05 AM	15	0	0	0	3500	0.00	6.40	0.00	2.52
	Final	10:20 AM	**60**	0		3500					
5	Initial	10:20 AM	15	0	100	0	3600	0.55	6.58	0.22	2.59
	Final	10:35 AM	**75**	100		3600					
6	Initial	10:35 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	10:50 AM	**90**	50		3600					
7	Initial	10:50 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	11:05 AM	**105**	50		3600					
8	Initial	11:05 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	11:20 AM	**120**	50		3600					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, CA
Project Number	22G107-2
Engineer	CB

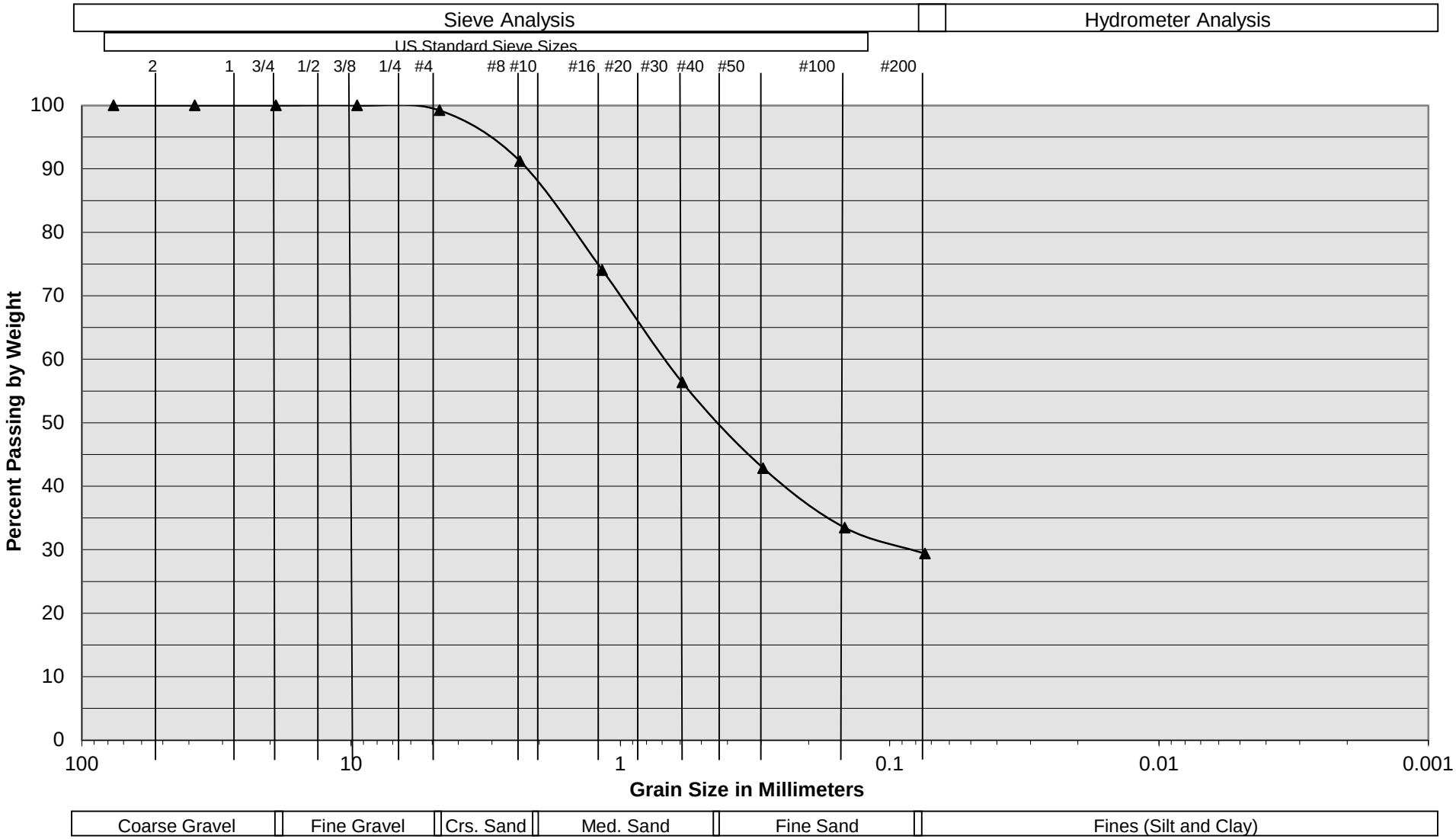
Infiltration Test No: I-2

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	7:00 AM	15	0	200	0	3500	1.10	6.40	0.43	2.52
	Final	7:15 AM	**15**	200		3500					
2	Initial	7:15 AM	15	0	150	0	4200	0.82	7.68	0.32	3.02
	Final	7:30 AM	**30**	150		4200					
3	Initial	7:30 AM	15	0	150	0	3000	0.82	5.48	0.32	2.16
	Final	7:45 AM	**45**	150		3000					
4	Initial	7:45 AM	15	0	100	0	2900	0.55	5.30	0.22	2.09
	Final	8:00 AM	**60**	100		2900					
5	Initial	8:00 AM	15	0	150	0	2900	0.82	5.30	0.32	2.09
	Final	8:15 AM	**75**	150		2900					
6	Initial	8:15 AM	15	0	100	0	2800	0.55	5.12	0.22	2.01
	Final	8:30 AM	**90**	100		2800					
7	Initial	8:30 AM	15	0	100	0	2900	0.55	5.30	0.22	2.09
	Final	8:45 AM	**105**	100		2900					
8	Initial	8:45 AM	15	0	100	0	2800	0.55	5.12	0.22	2.01
	Final	9:00 AM	**120**	100		2800					

Grain Size Distribution

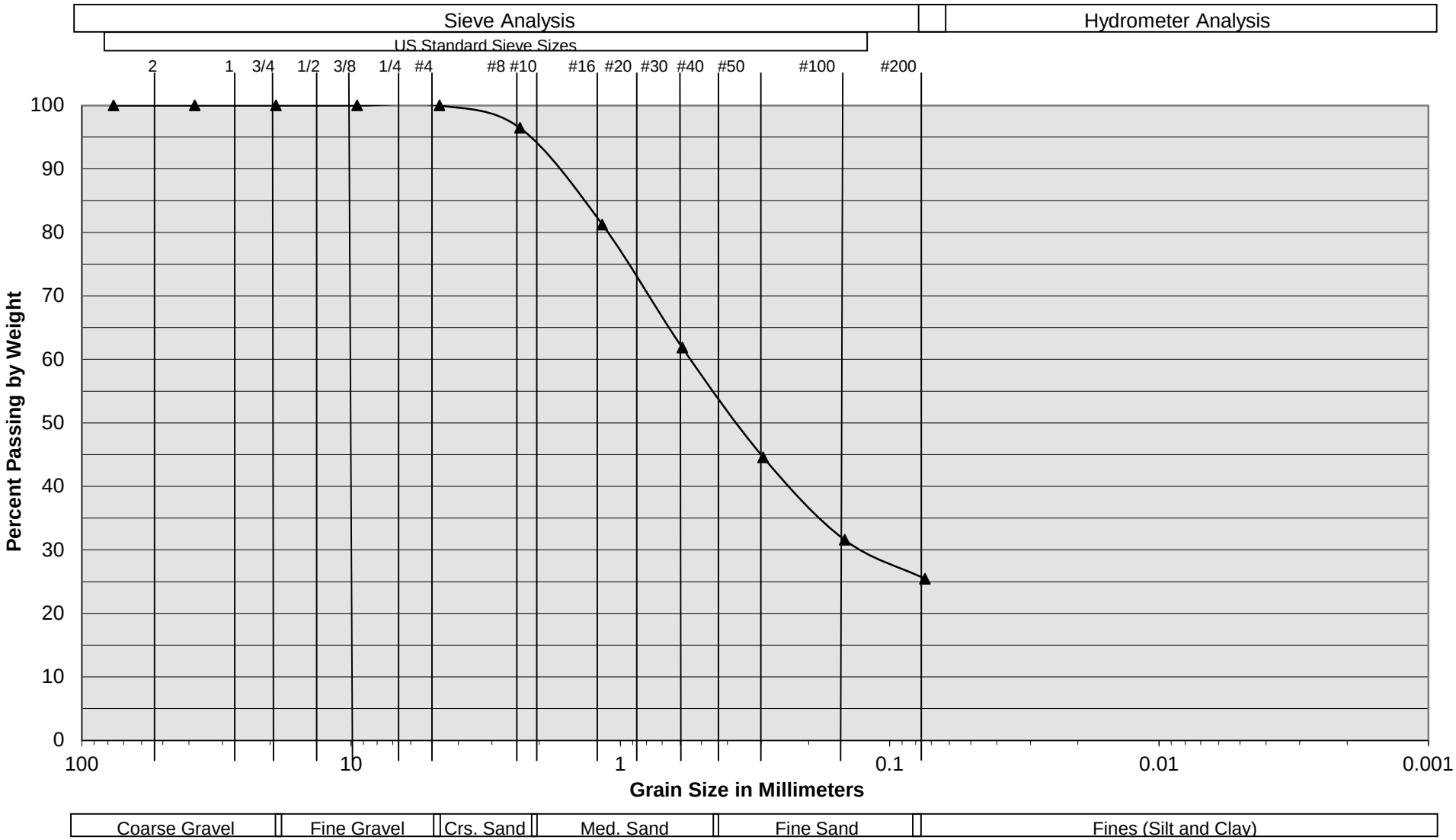


Sample Description	I-1 @ 8'
Soil Classification	Light Brown Clayey fine to medium Sand, little coarse Sand, little Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-2
PLATE C- 1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-2 @ 7'
Soil Classification	Light Brown Clayey fine to medium Sand, trace coarse Sand, little Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-2
PLATE C- 2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix 4: Historical Site Conditions

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

To be provided during final engineering

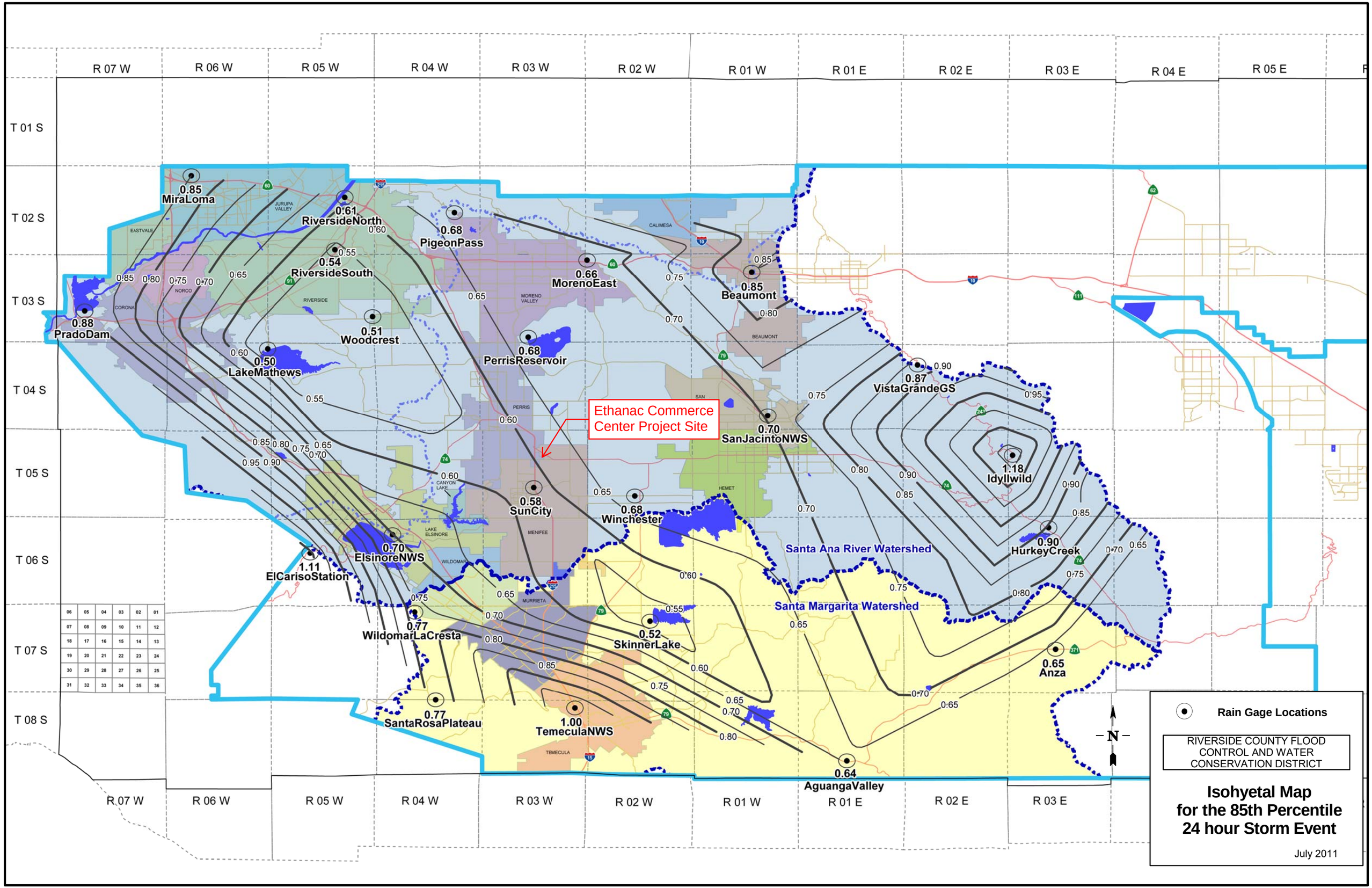
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Ethanac Commerce Center Project Site
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

Santa Ana Watershed - BMP Design Volume, V_{BMP}
(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name	Albert A. Webb Associates	Date	12/5/2022
Designed by	RSB	Case No	
Company Project Number/Name	2022-0198 Hillwood Ethanac		

BMP Identification

BMP NAME / ID: BMP-A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

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

D_{85}= 0.61 inches

Drainage Management Area Tabulation

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
L-A	60535	Ornamental Landscaping	0.1	0.11	6686.6			
R-A	407336	Roofs	1	0.89	363343.7			
H-A	282477	Concrete or Asphalt	1	0.89	251969.5			
SR-A	22143	Ornamental Landscaping	0.1	0.11	2445.9			
L-B	44110	Ornamental Landscaping	0.1	0.11	4872.3			
H-B	54149	Concrete or Asphalt	1	0.89	48300.9			
	870750	Total			677618.9	0.61	34445.6	372,205

Notes:

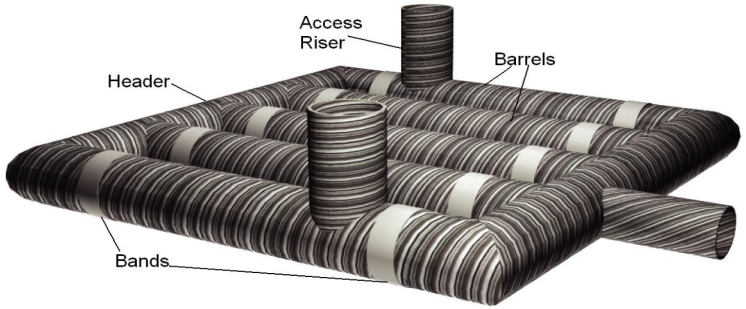
DMA-B does not drain to BMP-A. However, areas L-B and H-B are included for purposes of oversizing BMP-A to account for the entire project area.

DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings, and pricing send completed worksheet to:
dyods@contech-cpi.com

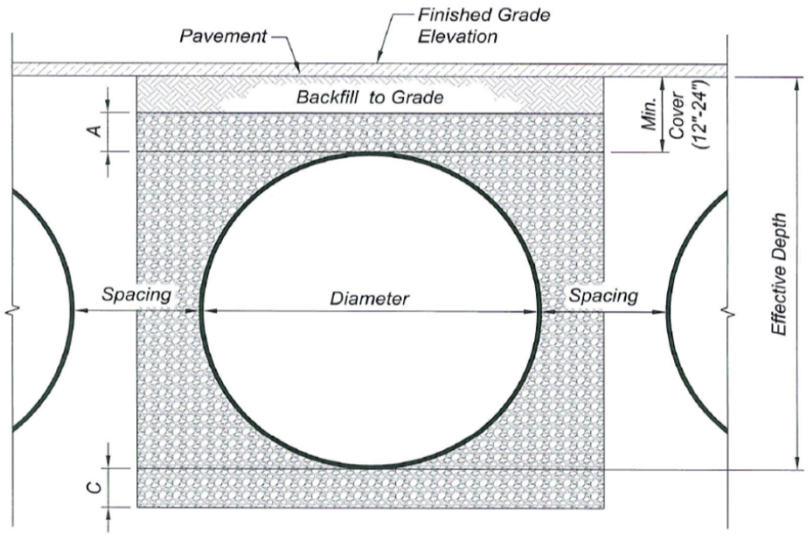


Project Summary

Date:	1/16/2024	
Project Name:	Hillwood Ethanac	
City / County:	City of Perris	
State:	CA	
Designed By:	RSB	
Company:	Albert A. Webb Associates	**Enter Information in Blue Cells**
Telephone:		

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	370,063	
Limiting Width (ft):	105.00	
Invert Depth Below Asphalt (ft):	14.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	144	113.10 ft^2 Pipe Area
Number Of Headers:	2	
Spacing between Barrels (ft):	3.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	12	
Depth C: Porous Stone Below Pipe (in):	0	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	289,077	cf	
Porous Stone Storage:	82,567	cf	
Total Storage Provided:	371,644	cf	100.4% Of Required Storage
Number of Barrels:	7	barrels	
Length per Barrel:	336.0	ft	
Length Per Header:	102.0	ft	
Rectangular Footprint (W x L):	105. ft x 363. ft		

CONTECH Materials

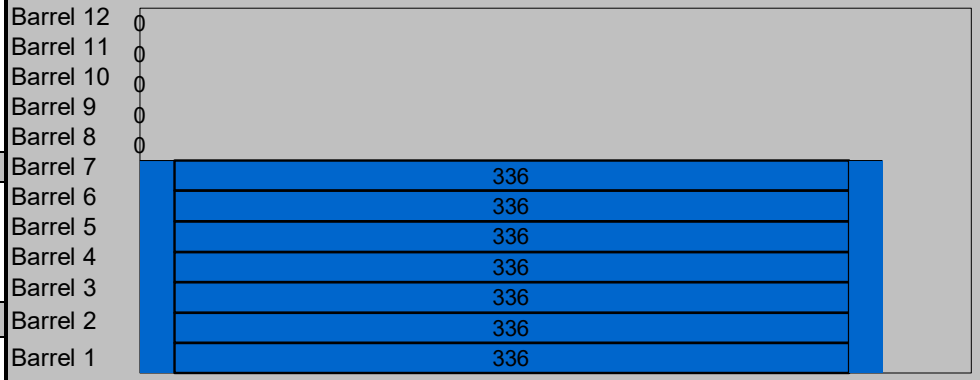
Total CMP Footage:	2,556	ft
Approximate Total Pieces:	99	pcs
Approximate Coupling Bands:	104	bands
Approximate Truckloads:	99	trucks

Construction Quantities**

Total Excavation:	19764	cy
Porous Stone Backfill For Storage:	7645	cy stone
Backfill to Grade Excluding Stone:	1412	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



© 2007 CONTECH Stormwater Solutions

Water Quality Pump Rate Calculation

$$\frac{V_{BMP}}{t_{drain}} = Area * i = Q_{pump}$$

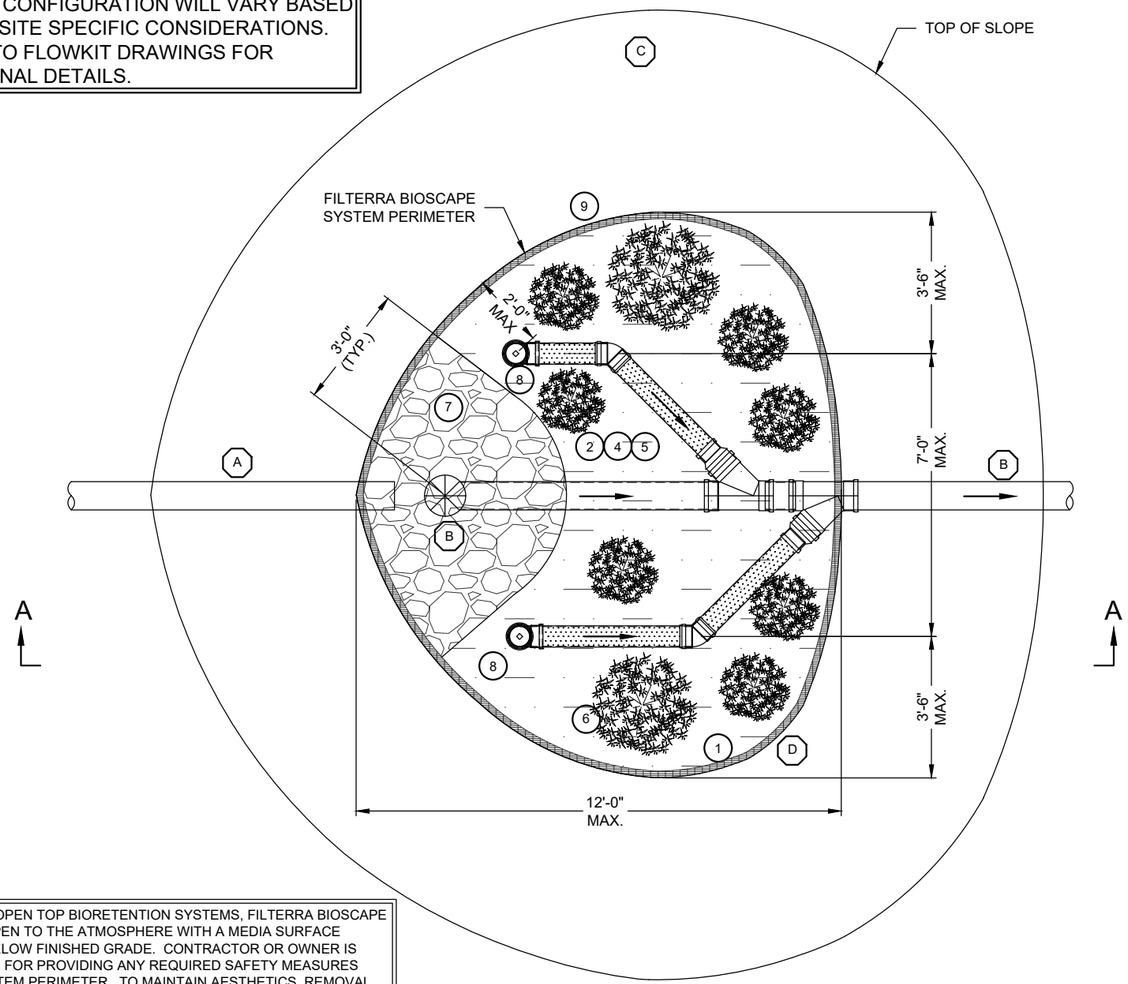
$$\frac{V_{BMP}}{t_{drain}} = Q_{pump}$$

$$Q_{pump} = \frac{ft^3}{hr} * \frac{1\ hr}{3600\ sec} * \frac{449\ gpm}{1\ \frac{ft^3}{sec}}$$

$$Q_{pump} = \frac{33{,}131\ ft^3}{48\ hr} * \frac{449}{3600}\ \frac{gpm}{\frac{ft^3}{hr}} = 86\ gpm$$

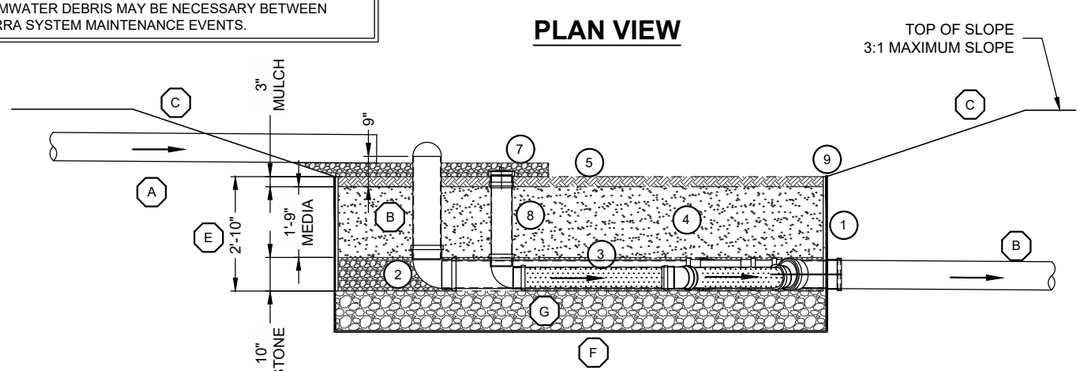
$$\boldsymbol{Q_{pump} = 86\ gpm}$$

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

I:\COMMON\CAD\TREATMENT\54 FILTERRA\40 STANDARD DRAWINGS\FTBS - BIOSCAPE SYSTEM (BOXLESS)\DWG\FILTERRA BIOSCAPE SUPERVISED SYSTEM - STD DETAIL.DWG 5/21/2020 8:57 AM

June 2020

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, and sized based on the water quality design flow rate for an off-line system. Calculate the water quality design flow rates using the following procedures:

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.7.6 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.
   - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
   - Conduct maintenance following manufacturer's guidelines.
7. Filterra systems come in standard sizes.
8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, Phosphorus, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:

1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

<u>Field Testing 2015-2019</u>

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

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Date	**Revision**
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate
February 2020	Revised sizing language to note sizing based on off-line calculations
June 2020	Added Phosphorus to Filterra Shallow sizing table

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPRE242.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, 2-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) = 2.00
Area Averaged 2-Year Rainfall = 1.600(In)
Area Averaged 100-Year Rainfall = 4.000(In)

Point rain (area averaged) = 1.600(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.600(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.800	89.00	0.000

Total Area Entered = 19.80(Ac.)

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

Area averaged mean soil loss (F) (In/Hr) = 0.286
Minimum soil loss rate ((In/Hr)) = 0.143
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	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	0.013	(0.508)	0.012	0.001
2	0.17	0.07	0.013	(0.506)	0.012	0.001
3	0.25	0.07	0.013	(0.504)	0.012	0.001
4	0.33	0.10	0.019	(0.502)	0.017	0.002
5	0.42	0.10	0.019	(0.500)	0.017	0.002
6	0.50	0.10	0.019	(0.498)	0.017	0.002
7	0.58	0.10	0.019	(0.496)	0.017	0.002
8	0.67	0.10	0.019	(0.494)	0.017	0.002
9	0.75	0.10	0.019	(0.492)	0.017	0.002
10	0.83	0.13	0.026	(0.490)	0.023	0.003
11	0.92	0.13	0.026	(0.488)	0.023	0.003
12	1.00	0.13	0.026	(0.486)	0.023	0.003
13	1.08	0.10	0.019	(0.485)	0.017	0.002
14	1.17	0.10	0.019	(0.483)	0.017	0.002
15	1.25	0.10	0.019	(0.481)	0.017	0.002
16	1.33	0.10	0.019	(0.479)	0.017	0.002
17	1.42	0.10	0.019	(0.477)	0.017	0.002
18	1.50	0.10	0.019	(0.475)	0.017	0.002
19	1.58	0.10	0.019	(0.473)	0.017	0.002
20	1.67	0.10	0.019	(0.471)	0.017	0.002
21	1.75	0.10	0.019	(0.469)	0.017	0.002
22	1.83	0.13	0.026	(0.467)	0.023	0.003
23	1.92	0.13	0.026	(0.466)	0.023	0.003
24	2.00	0.13	0.026	(0.464)	0.023	0.003
25	2.08	0.13	0.026	(0.462)	0.023	0.003
26	2.17	0.13	0.026	(0.460)	0.023	0.003
27	2.25	0.13	0.026	(0.458)	0.023	0.003
28	2.33	0.13	0.026	(0.456)	0.023	0.003
29	2.42	0.13	0.026	(0.454)	0.023	0.003
30	2.50	0.13	0.026	(0.452)	0.023	0.003
31	2.58	0.17	0.032	(0.451)	0.029	0.003
32	2.67	0.17	0.032	(0.449)	0.029	0.003
33	2.75	0.17	0.032	(0.447)	0.029	0.003
34	2.83	0.17	0.032	(0.445)	0.029	0.003
35	2.92	0.17	0.032	(0.443)	0.029	0.003
36	3.00	0.17	0.032	(0.441)	0.029	0.003
37	3.08	0.17	0.032	(0.440)	0.029	0.003
38	3.17	0.17	0.032	(0.438)	0.029	0.003

39	3.25	0.17	0.032	(0.436)	0.029	0.003
40	3.33	0.17	0.032	(0.434)	0.029	0.003
41	3.42	0.17	0.032	(0.432)	0.029	0.003
42	3.50	0.17	0.032	(0.430)	0.029	0.003
43	3.58	0.17	0.032	(0.429)	0.029	0.003
44	3.67	0.17	0.032	(0.427)	0.029	0.003
45	3.75	0.17	0.032	(0.425)	0.029	0.003
46	3.83	0.20	0.038	(0.423)	0.035	0.004
47	3.92	0.20	0.038	(0.422)	0.035	0.004
48	4.00	0.20	0.038	(0.420)	0.035	0.004
49	4.08	0.20	0.038	(0.418)	0.035	0.004
50	4.17	0.20	0.038	(0.416)	0.035	0.004
51	4.25	0.20	0.038	(0.414)	0.035	0.004
52	4.33	0.23	0.045	(0.413)	0.040	0.004
53	4.42	0.23	0.045	(0.411)	0.040	0.004
54	4.50	0.23	0.045	(0.409)	0.040	0.004
55	4.58	0.23	0.045	(0.407)	0.040	0.004
56	4.67	0.23	0.045	(0.406)	0.040	0.004
57	4.75	0.23	0.045	(0.404)	0.040	0.004
58	4.83	0.27	0.051	(0.402)	0.046	0.005
59	4.92	0.27	0.051	(0.400)	0.046	0.005
60	5.00	0.27	0.051	(0.399)	0.046	0.005
61	5.08	0.20	0.038	(0.397)	0.035	0.004
62	5.17	0.20	0.038	(0.395)	0.035	0.004
63	5.25	0.20	0.038	(0.393)	0.035	0.004
64	5.33	0.23	0.045	(0.392)	0.040	0.004
65	5.42	0.23	0.045	(0.390)	0.040	0.004
66	5.50	0.23	0.045	(0.388)	0.040	0.004
67	5.58	0.27	0.051	(0.387)	0.046	0.005
68	5.67	0.27	0.051	(0.385)	0.046	0.005
69	5.75	0.27	0.051	(0.383)	0.046	0.005
70	5.83	0.27	0.051	(0.382)	0.046	0.005
71	5.92	0.27	0.051	(0.380)	0.046	0.005
72	6.00	0.27	0.051	(0.378)	0.046	0.005
73	6.08	0.30	0.058	(0.376)	0.052	0.006
74	6.17	0.30	0.058	(0.375)	0.052	0.006
75	6.25	0.30	0.058	(0.373)	0.052	0.006
76	6.33	0.30	0.058	(0.371)	0.052	0.006
77	6.42	0.30	0.058	(0.370)	0.052	0.006
78	6.50	0.30	0.058	(0.368)	0.052	0.006
79	6.58	0.33	0.064	(0.366)	0.058	0.006
80	6.67	0.33	0.064	(0.365)	0.058	0.006
81	6.75	0.33	0.064	(0.363)	0.058	0.006
82	6.83	0.33	0.064	(0.362)	0.058	0.006
83	6.92	0.33	0.064	(0.360)	0.058	0.006
84	7.00	0.33	0.064	(0.358)	0.058	0.006
85	7.08	0.33	0.064	(0.357)	0.058	0.006
86	7.17	0.33	0.064	(0.355)	0.058	0.006
87	7.25	0.33	0.064	(0.353)	0.058	0.006
88	7.33	0.37	0.070	(0.352)	0.063	0.007

89	7.42	0.37	0.070	(0.350)	0.063	0.007
90	7.50	0.37	0.070	(0.349)	0.063	0.007
91	7.58	0.40	0.077	(0.347)	0.069	0.008
92	7.67	0.40	0.077	(0.345)	0.069	0.008
93	7.75	0.40	0.077	(0.344)	0.069	0.008
94	7.83	0.43	0.083	(0.342)	0.075	0.008
95	7.92	0.43	0.083	(0.341)	0.075	0.008
96	8.00	0.43	0.083	(0.339)	0.075	0.008
97	8.08	0.50	0.096	(0.337)	0.086	0.010
98	8.17	0.50	0.096	(0.336)	0.086	0.010
99	8.25	0.50	0.096	(0.334)	0.086	0.010
100	8.33	0.50	0.096	(0.333)	0.086	0.010
101	8.42	0.50	0.096	(0.331)	0.086	0.010
102	8.50	0.50	0.096	(0.330)	0.086	0.010
103	8.58	0.53	0.102	(0.328)	0.092	0.010
104	8.67	0.53	0.102	(0.327)	0.092	0.010
105	8.75	0.53	0.102	(0.325)	0.092	0.010
106	8.83	0.57	0.109	(0.323)	0.098	0.011
107	8.92	0.57	0.109	(0.322)	0.098	0.011
108	9.00	0.57	0.109	(0.320)	0.098	0.011
109	9.08	0.63	0.122	(0.319)	0.109	0.012
110	9.17	0.63	0.122	(0.317)	0.109	0.012
111	9.25	0.63	0.122	(0.316)	0.109	0.012
112	9.33	0.67	0.128	(0.314)	0.115	0.013
113	9.42	0.67	0.128	(0.313)	0.115	0.013
114	9.50	0.67	0.128	(0.311)	0.115	0.013
115	9.58	0.70	0.134	(0.310)	0.121	0.013
116	9.67	0.70	0.134	(0.308)	0.121	0.013
117	9.75	0.70	0.134	(0.307)	0.121	0.013
118	9.83	0.73	0.141	(0.305)	0.127	0.014
119	9.92	0.73	0.141	(0.304)	0.127	0.014
120	10.00	0.73	0.141	(0.303)	0.127	0.014
121	10.08	0.50	0.096	(0.301)	0.086	0.010
122	10.17	0.50	0.096	(0.300)	0.086	0.010
123	10.25	0.50	0.096	(0.298)	0.086	0.010
124	10.33	0.50	0.096	(0.297)	0.086	0.010
125	10.42	0.50	0.096	(0.295)	0.086	0.010
126	10.50	0.50	0.096	(0.294)	0.086	0.010
127	10.58	0.67	0.128	(0.292)	0.115	0.013
128	10.67	0.67	0.128	(0.291)	0.115	0.013
129	10.75	0.67	0.128	(0.290)	0.115	0.013
130	10.83	0.67	0.128	(0.288)	0.115	0.013
131	10.92	0.67	0.128	(0.287)	0.115	0.013
132	11.00	0.67	0.128	(0.285)	0.115	0.013
133	11.08	0.63	0.122	(0.284)	0.109	0.012
134	11.17	0.63	0.122	(0.282)	0.109	0.012
135	11.25	0.63	0.122	(0.281)	0.109	0.012
136	11.33	0.63	0.122	(0.280)	0.109	0.012
137	11.42	0.63	0.122	(0.278)	0.109	0.012
138	11.50	0.63	0.122	(0.277)	0.109	0.012

139	11.58	0.57	0.109	(0.276)	0.098	0.011
140	11.67	0.57	0.109	(0.274)	0.098	0.011
141	11.75	0.57	0.109	(0.273)	0.098	0.011
142	11.83	0.60	0.115	(0.271)	0.104	0.012
143	11.92	0.60	0.115	(0.270)	0.104	0.012
144	12.00	0.60	0.115	(0.269)	0.104	0.012
145	12.08	0.83	0.160	(0.267)	0.144	0.016
146	12.17	0.83	0.160	(0.266)	0.144	0.016
147	12.25	0.83	0.160	(0.265)	0.144	0.016
148	12.33	0.87	0.166	(0.263)	0.150	0.017
149	12.42	0.87	0.166	(0.262)	0.150	0.017
150	12.50	0.87	0.166	(0.261)	0.150	0.017
151	12.58	0.93	0.179	(0.259)	0.161	0.018
152	12.67	0.93	0.179	(0.258)	0.161	0.018
153	12.75	0.93	0.179	(0.257)	0.161	0.018
154	12.83	0.97	0.186	(0.256)	0.167	0.019
155	12.92	0.97	0.186	(0.254)	0.167	0.019
156	13.00	0.97	0.186	(0.253)	0.167	0.019
157	13.08	1.13	0.218	(0.252)	0.196	0.022
158	13.17	1.13	0.218	(0.250)	0.196	0.022
159	13.25	1.13	0.218	(0.249)	0.196	0.022
160	13.33	1.13	0.218	(0.248)	0.196	0.022
161	13.42	1.13	0.218	(0.247)	0.196	0.022
162	13.50	1.13	0.218	(0.245)	0.196	0.022
163	13.58	0.77	0.147	(0.244)	0.132	0.015
164	13.67	0.77	0.147	(0.243)	0.132	0.015
165	13.75	0.77	0.147	(0.242)	0.132	0.015
166	13.83	0.77	0.147	(0.240)	0.132	0.015
167	13.92	0.77	0.147	(0.239)	0.132	0.015
168	14.00	0.77	0.147	(0.238)	0.132	0.015
169	14.08	0.90	0.173	(0.237)	0.156	0.017
170	14.17	0.90	0.173	(0.236)	0.156	0.017
171	14.25	0.90	0.173	(0.234)	0.156	0.017
172	14.33	0.87	0.166	(0.233)	0.150	0.017
173	14.42	0.87	0.166	(0.232)	0.150	0.017
174	14.50	0.87	0.166	(0.231)	0.150	0.017
175	14.58	0.87	0.166	(0.230)	0.150	0.017
176	14.67	0.87	0.166	(0.228)	0.150	0.017
177	14.75	0.87	0.166	(0.227)	0.150	0.017
178	14.83	0.83	0.160	(0.226)	0.144	0.016
179	14.92	0.83	0.160	(0.225)	0.144	0.016
180	15.00	0.83	0.160	(0.224)	0.144	0.016
181	15.08	0.80	0.154	(0.223)	0.138	0.015
182	15.17	0.80	0.154	(0.221)	0.138	0.015
183	15.25	0.80	0.154	(0.220)	0.138	0.015
184	15.33	0.77	0.147	(0.219)	0.132	0.015
185	15.42	0.77	0.147	(0.218)	0.132	0.015
186	15.50	0.77	0.147	(0.217)	0.132	0.015
187	15.58	0.63	0.122	(0.216)	0.109	0.012
188	15.67	0.63	0.122	(0.215)	0.109	0.012

189	15.75	0.63	0.122	(0.214)	0.109	0.012
190	15.83	0.63	0.122	(0.213)	0.109	0.012
191	15.92	0.63	0.122	(0.211)	0.109	0.012
192	16.00	0.63	0.122	(0.210)	0.109	0.012
193	16.08	0.13	0.026	(0.209)	0.023	0.003
194	16.17	0.13	0.026	(0.208)	0.023	0.003
195	16.25	0.13	0.026	(0.207)	0.023	0.003
196	16.33	0.13	0.026	(0.206)	0.023	0.003
197	16.42	0.13	0.026	(0.205)	0.023	0.003
198	16.50	0.13	0.026	(0.204)	0.023	0.003
199	16.58	0.10	0.019	(0.203)	0.017	0.002
200	16.67	0.10	0.019	(0.202)	0.017	0.002
201	16.75	0.10	0.019	(0.201)	0.017	0.002
202	16.83	0.10	0.019	(0.200)	0.017	0.002
203	16.92	0.10	0.019	(0.199)	0.017	0.002
204	17.00	0.10	0.019	(0.198)	0.017	0.002
205	17.08	0.17	0.032	(0.197)	0.029	0.003
206	17.17	0.17	0.032	(0.196)	0.029	0.003
207	17.25	0.17	0.032	(0.195)	0.029	0.003
208	17.33	0.17	0.032	(0.194)	0.029	0.003
209	17.42	0.17	0.032	(0.193)	0.029	0.003
210	17.50	0.17	0.032	(0.192)	0.029	0.003
211	17.58	0.17	0.032	(0.191)	0.029	0.003
212	17.67	0.17	0.032	(0.190)	0.029	0.003
213	17.75	0.17	0.032	(0.189)	0.029	0.003
214	17.83	0.13	0.026	(0.188)	0.023	0.003
215	17.92	0.13	0.026	(0.187)	0.023	0.003
216	18.00	0.13	0.026	(0.186)	0.023	0.003
217	18.08	0.13	0.026	(0.185)	0.023	0.003
218	18.17	0.13	0.026	(0.185)	0.023	0.003
219	18.25	0.13	0.026	(0.184)	0.023	0.003
220	18.33	0.13	0.026	(0.183)	0.023	0.003
221	18.42	0.13	0.026	(0.182)	0.023	0.003
222	18.50	0.13	0.026	(0.181)	0.023	0.003
223	18.58	0.10	0.019	(0.180)	0.017	0.002
224	18.67	0.10	0.019	(0.179)	0.017	0.002
225	18.75	0.10	0.019	(0.178)	0.017	0.002
226	18.83	0.07	0.013	(0.177)	0.012	0.001
227	18.92	0.07	0.013	(0.177)	0.012	0.001
228	19.00	0.07	0.013	(0.176)	0.012	0.001
229	19.08	0.10	0.019	(0.175)	0.017	0.002
230	19.17	0.10	0.019	(0.174)	0.017	0.002
231	19.25	0.10	0.019	(0.173)	0.017	0.002
232	19.33	0.13	0.026	(0.173)	0.023	0.003
233	19.42	0.13	0.026	(0.172)	0.023	0.003
234	19.50	0.13	0.026	(0.171)	0.023	0.003
235	19.58	0.10	0.019	(0.170)	0.017	0.002
236	19.67	0.10	0.019	(0.169)	0.017	0.002
237	19.75	0.10	0.019	(0.169)	0.017	0.002
238	19.83	0.07	0.013	(0.168)	0.012	0.001

239	19.92	0.07	0.013	(0.167)	0.012	0.001
240	20.00	0.07	0.013	(0.166)	0.012	0.001
241	20.08	0.10	0.019	(0.166)	0.017	0.002
242	20.17	0.10	0.019	(0.165)	0.017	0.002
243	20.25	0.10	0.019	(0.164)	0.017	0.002
244	20.33	0.10	0.019	(0.163)	0.017	0.002
245	20.42	0.10	0.019	(0.163)	0.017	0.002
246	20.50	0.10	0.019	(0.162)	0.017	0.002
247	20.58	0.10	0.019	(0.161)	0.017	0.002
248	20.67	0.10	0.019	(0.161)	0.017	0.002
249	20.75	0.10	0.019	(0.160)	0.017	0.002
250	20.83	0.07	0.013	(0.159)	0.012	0.001
251	20.92	0.07	0.013	(0.159)	0.012	0.001
252	21.00	0.07	0.013	(0.158)	0.012	0.001
253	21.08	0.10	0.019	(0.157)	0.017	0.002
254	21.17	0.10	0.019	(0.157)	0.017	0.002
255	21.25	0.10	0.019	(0.156)	0.017	0.002
256	21.33	0.07	0.013	(0.156)	0.012	0.001
257	21.42	0.07	0.013	(0.155)	0.012	0.001
258	21.50	0.07	0.013	(0.155)	0.012	0.001
259	21.58	0.10	0.019	(0.154)	0.017	0.002
260	21.67	0.10	0.019	(0.153)	0.017	0.002
261	21.75	0.10	0.019	(0.153)	0.017	0.002
262	21.83	0.07	0.013	(0.152)	0.012	0.001
263	21.92	0.07	0.013	(0.152)	0.012	0.001
264	22.00	0.07	0.013	(0.151)	0.012	0.001
265	22.08	0.10	0.019	(0.151)	0.017	0.002
266	22.17	0.10	0.019	(0.150)	0.017	0.002
267	22.25	0.10	0.019	(0.150)	0.017	0.002
268	22.33	0.07	0.013	(0.149)	0.012	0.001
269	22.42	0.07	0.013	(0.149)	0.012	0.001
270	22.50	0.07	0.013	(0.148)	0.012	0.001
271	22.58	0.07	0.013	(0.148)	0.012	0.001
272	22.67	0.07	0.013	(0.148)	0.012	0.001
273	22.75	0.07	0.013	(0.147)	0.012	0.001
274	22.83	0.07	0.013	(0.147)	0.012	0.001
275	22.92	0.07	0.013	(0.146)	0.012	0.001
276	23.00	0.07	0.013	(0.146)	0.012	0.001
277	23.08	0.07	0.013	(0.146)	0.012	0.001
278	23.17	0.07	0.013	(0.145)	0.012	0.001
279	23.25	0.07	0.013	(0.145)	0.012	0.001
280	23.33	0.07	0.013	(0.145)	0.012	0.001
281	23.42	0.07	0.013	(0.145)	0.012	0.001
282	23.50	0.07	0.013	(0.144)	0.012	0.001
283	23.58	0.07	0.013	(0.144)	0.012	0.001
284	23.67	0.07	0.013	(0.144)	0.012	0.001
285	23.75	0.07	0.013	(0.144)	0.012	0.001
286	23.83	0.07	0.013	(0.143)	0.012	0.001
287	23.92	0.07	0.013	(0.143)	0.012	0.001
288	24.00	0.07	0.013	(0.143)	0.012	0.001

```
              (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     1.9
      Flood volume = Effective rainfall      0.16(In)
       times area      19.8(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      1.44(In)
      Total soil loss =     2.376(Ac.Ft)
      Total rainfall =      1.60(In)
      Flood volume =       11499.4 Cubic Feet
      Total soil loss =      103494.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.430(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0001      0.01  Q         |         |         |         |
  0+15       0.0002      0.02  Q         |         |         |         |
  0+20       0.0004      0.02  Q         |         |         |         |
  0+25       0.0006      0.03  Q         |         |         |         |
  0+30       0.0008      0.03  Q         |         |         |         |
  0+35       0.0011      0.04  Q         |         |         |         |
  0+40       0.0013      0.04  Q         |         |         |         |
  0+45       0.0016      0.04  Q         |         |         |         |
  0+50       0.0019      0.04  Q         |         |         |         |
  0+55       0.0022      0.04  Q         |         |         |         |
  1+ 0       0.0025      0.05  Q         |         |         |         |
  1+ 5       0.0028      0.05  Q         |         |         |         |
  1+10       0.0031      0.04  Q         |         |         |         |
  1+15       0.0034      0.04  Q         |         |         |         |
  1+20       0.0037      0.04  Q         |         |         |         |
  1+25       0.0039      0.04  Q         |         |         |         |
  1+30       0.0042      0.04  Q         |         |         |         |
  1+35       0.0045      0.04  Q         |         |         |         |
  1+40       0.0047      0.04  Q         |         |         |         |
  1+45       0.0050      0.04  Q         |         |         |         |
  1+50       0.0053      0.04  Q         |         |         |         |
  1+55       0.0056      0.05  Q         |         |         |         |
  2+ 0       0.0059      0.05  Q         |         |         |         |
  2+ 5       0.0063      0.05  Q         |         |         |         |
  2+10       0.0066      0.05  Q         |         |         |         |
  2+15       0.0069      0.05  QV        |         |         |         |
  2+20       0.0073      0.05  QV        |         |         |         |
  2+25       0.0076      0.05  QV        |         |         |         |
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2+30	0.0080	0.05	QV				
2+35	0.0084	0.05	QV				
2+40	0.0088	0.06	QV				
2+45	0.0092	0.06	QV				
2+50	0.0096	0.06	QV				
2+55	0.0100	0.06	QV				
3+ 0	0.0105	0.06	QV				
3+ 5	0.0109	0.06	QV				
3+10	0.0113	0.06	QV				
3+15	0.0118	0.06	QV				
3+20	0.0122	0.06	QV				
3+25	0.0127	0.06	QV				
3+30	0.0131	0.06	QV				
3+35	0.0135	0.06	Q V				
3+40	0.0140	0.06	Q V				
3+45	0.0144	0.06	Q V				
3+50	0.0149	0.07	Q V				
3+55	0.0153	0.07	Q V				
4+ 0	0.0159	0.07	Q V				
4+ 5	0.0164	0.07	Q V				
4+10	0.0169	0.08	Q V				
4+15	0.0174	0.08	Q V				
4+20	0.0179	0.08	Q V				
4+25	0.0185	0.08	Q V				
4+30	0.0191	0.09	Q V				
4+35	0.0197	0.09	Q V				
4+40	0.0203	0.09	Q V				
4+45	0.0209	0.09	Q V				
4+50	0.0215	0.09	Q V				
4+55	0.0222	0.10	Q V				
5+ 0	0.0229	0.10	Q V				
5+ 5	0.0236	0.10	Q V				
5+10	0.0242	0.09	Q V				
5+15	0.0247	0.08	Q V				
5+20	0.0253	0.08	Q V				
5+25	0.0259	0.09	Q V				
5+30	0.0265	0.09	Q V				
5+35	0.0271	0.09	Q V				
5+40	0.0278	0.10	Q V				
5+45	0.0284	0.10	Q V				
5+50	0.0291	0.10	Q V				
5+55	0.0298	0.10	Q V				
6+ 0	0.0305	0.10	Q V				
6+ 5	0.0312	0.10	Q V				
6+10	0.0320	0.11	Q V				
6+15	0.0327	0.11	Q V				
6+20	0.0335	0.11	Q V				
6+25	0.0343	0.11	Q V				
6+30	0.0351	0.11	Q V				
6+35	0.0359	0.12	Q V				

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 6+40       0.0367      0.12  Q    V    |          |          |          |
 6+45       0.0376      0.12  Q    V    |          |          |          |
 6+50       0.0384      0.13  Q    V    |          |          |          |
 6+55       0.0393      0.13  Q    V    |          |          |          |
 7+ 0       0.0402      0.13  Q     V   |          |          |          |
 7+ 5       0.0411      0.13  Q     V   |          |          |          |
 7+10       0.0419      0.13  Q     V   |          |          |          |
 7+15       0.0428      0.13  Q     V   |          |          |          |
 7+20       0.0437      0.13  Q     V   |          |          |          |
 7+25       0.0446      0.13  Q     V   |          |          |          |
 7+30       0.0456      0.14  Q     V   |          |          |          |
 7+35       0.0465      0.14  Q      V  |          |          |          |
 7+40       0.0475      0.15  Q      V  |          |          |          |
 7+45       0.0486      0.15  Q      V  |          |          |          |
 7+50       0.0496      0.15  Q      V  |          |          |          |
 7+55       0.0507      0.16  Q      V  |          |          |          |
 8+ 0       0.0518      0.16  Q      V  |          |          |          |
 8+ 5       0.0530      0.17  Q       V |          |          |          |
 8+10       0.0542      0.18  Q       V |          |          |          |
 8+15       0.0555      0.18  Q       V |          |          |          |
 8+20       0.0568      0.19  Q       V |          |          |          |
 8+25       0.0580      0.19  Q       V |          |          |          |
 8+30       0.0594      0.19  Q       V |          |          |          |
 8+35       0.0607      0.19  Q        V|          |          |          |
 8+40       0.0620      0.20  Q        V|          |          |          |
 8+45       0.0634      0.20  Q        V|          |          |          |
 8+50       0.0648      0.20  Q        V|          |          |          |
 8+55       0.0663      0.21  Q         V          |          |          |
 9+ 0       0.0677      0.21  Q         V          |          |          |
 9+ 5       0.0692      0.22  Q         V          |          |          |
 9+10       0.0708      0.23  Q         V          |          |          |
 9+15       0.0724      0.24  Q         V          |          |          |
 9+20       0.0741      0.24  Q         |V         |          |          |
 9+25       0.0758      0.25  Q         |V         |          |          |
 9+30       0.0775      0.25  |Q        |V         |          |          |
 9+35       0.0792      0.25  |Q        | V        |          |          |
 9+40       0.0810      0.26  |Q        | V        |          |          |
 9+45       0.0829      0.26  |Q        | V        |          |          |
 9+50       0.0847      0.27  |Q        | V        |          |          |
 9+55       0.0866      0.27  |Q        |  V       |          |          |
10+ 0       0.0885      0.28  |Q        |  V       |          |          |
10+ 5       0.0903      0.27  |Q        |  V       |          |          |
10+10       0.0919      0.23  Q         |  V       |          |          |
10+15       0.0934      0.21  Q         |   V      |          |          |
10+20       0.0948      0.21  Q         |   V      |          |          |
10+25       0.0962      0.20  Q         |   V      |          |          |
10+30       0.0975      0.20  Q         |   V      |          |          |
10+35       0.0989      0.20  Q         |   V      |          |          |
10+40       0.1005      0.23  Q         |    V     |          |          |
10+45       0.1022      0.24  Q         |    V     |          |          |
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10+50       0.1039      0.25  Q         |    V    |         |         |
10+55       0.1056      0.25  Q         |    V    |         |         |
11+ 0       0.1073      0.25  |Q        |     V   |         |         |
11+ 5       0.1090      0.25  |Q        |     V   |         |         |
11+10       0.1107      0.25  Q         |     V   |         |         |
11+15       0.1124      0.24  Q         |      V  |         |         |
11+20       0.1141      0.24  Q         |      V  |         |         |
11+25       0.1158      0.24  Q         |      V  |         |         |
11+30       0.1175      0.24  Q         |      V  |         |         |
11+35       0.1191      0.24  Q         |       V |         |         |
11+40       0.1207      0.23  Q         |       V |         |         |
11+45       0.1223      0.22  Q         |       V |         |         |
11+50       0.1238      0.22  Q         |       V |         |         |
11+55       0.1253      0.23  Q         |       V |         |         |
12+ 0       0.1269      0.23  Q         |        V|         |         |
12+ 5       0.1286      0.24  Q         |        V|         |         |
12+10       0.1305      0.28  |Q        |        V|         |         |
12+15       0.1325      0.30  |Q        |         V         |         |
12+20       0.1346      0.31  |Q        |         V         |         |
12+25       0.1368      0.32  |Q        |         V         |         |
12+30       0.1390      0.32  |Q        |         |V        |         |
12+35       0.1413      0.33  |Q        |         |V        |         |
12+40       0.1437      0.34  |Q        |         |V        |         |
12+45       0.1461      0.35  |Q        |         | V       |         |
12+50       0.1485      0.35  |Q        |         | V       |         |
12+55       0.1510      0.36  |Q        |         | V       |         |
13+ 0       0.1535      0.37  |Q        |         |  V      |         |
13+ 5       0.1561      0.37  |Q        |         |  V      |         |
13+10       0.1588      0.40  |Q        |         |   V     |         |
13+15       0.1617      0.42  |Q        |         |   V     |         |
13+20       0.1646      0.42  |Q        |         |   V     |         |
13+25       0.1676      0.43  |Q        |         |    V    |         |
13+30       0.1705      0.43  |Q        |         |    V    |         |
13+35       0.1734      0.41  |Q        |         |     V   |         |
13+40       0.1759      0.36  |Q        |         |     V   |         |
13+45       0.1781      0.33  |Q        |         |     V   |         |
13+50       0.1803      0.32  |Q        |         |      V  |         |
13+55       0.1824      0.31  |Q        |         |      V  |         |
14+ 0       0.1845      0.30  |Q        |         |      V  |         |
14+ 5       0.1866      0.31  |Q        |         |       V |         |
14+10       0.1889      0.33  |Q        |         |       V |         |
14+15       0.1912      0.33  |Q        |         |       V |         |
14+20       0.1935      0.34  |Q        |         |        V|         |
14+25       0.1958      0.33  |Q        |         |        V|         |
14+30       0.1981      0.33  |Q        |         |         V         |
14+35       0.2003      0.33  |Q        |         |         V         |
14+40       0.2026      0.33  |Q        |         |         V         |
14+45       0.2049      0.33  |Q        |         |         |V        |
14+50       0.2072      0.33  |Q        |         |         |V        |
14+55       0.2094      0.33  |Q        |         |         |V        |
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15+ 0       0.2117      0.32  |Q        |         |         | V       |
15+ 5       0.2139      0.32  |Q        |         |         | V       |
15+10       0.2160      0.31  |Q        |         |         | V       |
15+15       0.2182      0.31  |Q        |         |         |  V      |
15+20       0.2203      0.31  |Q        |         |         |  V      |
15+25       0.2224      0.30  |Q        |         |         |  V      |
15+30       0.2244      0.30  |Q        |         |         |   V     |
15+35       0.2264      0.29  |Q        |         |         |   V     |
15+40       0.2283      0.27  |Q        |         |         |   V     |
15+45       0.2300      0.26  |Q        |         |         |   V     |
15+50       0.2318      0.25  |Q        |         |         |    V    |
15+55       0.2335      0.25  Q         |         |         |    V    |
16+ 0       0.2352      0.25  Q         |         |         |    V    |
16+ 5       0.2367      0.22  Q         |         |         |    V    |
16+10       0.2377      0.14  Q         |         |         |     V   |
16+15       0.2384      0.10  Q         |         |         |     V   |
16+20       0.2390      0.08  Q         |         |         |     V   |
16+25       0.2394      0.07  Q         |         |         |     V   |
16+30       0.2399      0.07  Q         |         |         |     V   |
16+35       0.2403      0.06  Q         |         |         |     V   |
16+40       0.2406      0.05  Q         |         |         |     V   |
16+45       0.2410      0.05  Q         |         |         |     V   |
16+50       0.2412      0.04  Q         |         |         |     V   |
16+55       0.2415      0.04  Q         |         |         |     V   |
17+ 0       0.2418      0.04  Q         |         |         |     V   |
17+ 5       0.2421      0.04  Q         |         |         |     V   |
17+10       0.2424      0.05  Q         |         |         |     V   |
17+15       0.2428      0.06  Q         |         |         |     V   |
17+20       0.2433      0.06  Q         |         |         |     V   |
17+25       0.2437      0.06  Q         |         |         |     V   |
17+30       0.2441      0.06  Q         |         |         |     V   |
17+35       0.2445      0.06  Q         |         |         |      V  |
17+40       0.2450      0.06  Q         |         |         |      V  |
17+45       0.2454      0.06  Q         |         |         |      V  |
17+50       0.2458      0.06  Q         |         |         |      V  |
17+55       0.2462      0.06  Q         |         |         |      V  |
18+ 0       0.2466      0.05  Q         |         |         |      V  |
18+ 5       0.2470      0.05  Q         |         |         |      V  |
18+10       0.2473      0.05  Q         |         |         |      V  |
18+15       0.2477      0.05  Q         |         |         |      V  |
18+20       0.2480      0.05  Q         |         |         |      V  |
18+25       0.2484      0.05  Q         |         |         |      V  |
18+30       0.2487      0.05  Q         |         |         |      V  |
18+35       0.2491      0.05  Q         |         |         |      V  |
18+40       0.2494      0.04  Q         |         |         |      V  |
18+45       0.2497      0.04  Q         |         |         |      V  |
18+50       0.2500      0.04  Q         |         |         |      V  |
18+55       0.2502      0.03  Q         |         |         |      V  |
19+ 0       0.2504      0.03  Q         |         |         |      V  |
19+ 5       0.2506      0.03  Q         |         |         |      V  |
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19+10       0.2508      0.03  Q          |          |          |        V |
19+15       0.2511      0.04  Q          |          |          |        V |
19+20       0.2513      0.04  Q          |          |          |        V |
19+25       0.2516      0.04  Q          |          |          |        V |
19+30       0.2520      0.05  Q          |          |          |        V |
19+35       0.2523      0.05  Q          |          |          |        V |
19+40       0.2526      0.04  Q          |          |          |        V |
19+45       0.2529      0.04  Q          |          |          |        V |
19+50       0.2531      0.04  Q          |          |          |        V |
19+55       0.2533      0.03  Q          |          |          |        V |
20+ 0       0.2535      0.03  Q          |          |          |        V |
20+ 5       0.2538      0.03  Q          |          |          |        V |
20+10       0.2540      0.03  Q          |          |          |        V |
20+15       0.2542      0.04  Q          |          |          |        V |
20+20       0.2545      0.04  Q          |          |          |        V |
20+25       0.2548      0.04  Q          |          |          |        V |
20+30       0.2550      0.04  Q          |          |          |        V |
20+35       0.2553      0.04  Q          |          |          |        V |
20+40       0.2555      0.04  Q          |          |          |        V |
20+45       0.2558      0.04  Q          |          |          |        V |
20+50       0.2560      0.04  Q          |          |          |        V |
20+55       0.2563      0.03  Q          |          |          |        V |
21+ 0       0.2565      0.03  Q          |          |          |        V |
21+ 5       0.2567      0.03  Q          |          |          |        V |
21+10       0.2569      0.03  Q          |          |          |        V |
21+15       0.2571      0.04  Q          |          |          |        V |
21+20       0.2574      0.04  Q          |          |          |        V |
21+25       0.2576      0.03  Q          |          |          |         V|
21+30       0.2578      0.03  Q          |          |          |         V|
21+35       0.2580      0.03  Q          |          |          |         V|
21+40       0.2582      0.03  Q          |          |          |         V|
21+45       0.2585      0.04  Q          |          |          |         V|
21+50       0.2587      0.04  Q          |          |          |         V|
21+55       0.2589      0.03  Q          |          |          |         V|
22+ 0       0.2591      0.03  Q          |          |          |         V|
22+ 5       0.2593      0.03  Q          |          |          |         V|
22+10       0.2595      0.03  Q          |          |          |         V|
22+15       0.2598      0.04  Q          |          |          |         V|
22+20       0.2600      0.04  Q          |          |          |         V|
22+25       0.2602      0.03  Q          |          |          |         V|
22+30       0.2604      0.03  Q          |          |          |         V|
22+35       0.2606      0.03  Q          |          |          |         V|
22+40       0.2608      0.03  Q          |          |          |         V|
22+45       0.2610      0.03  Q          |          |          |         V|
22+50       0.2612      0.03  Q          |          |          |         V|
22+55       0.2613      0.03  Q          |          |          |         V|
23+ 0       0.2615      0.03  Q          |          |          |         V|
23+ 5       0.2617      0.03  Q          |          |          |         V|
23+10       0.2619      0.03  Q          |          |          |         V|
23+15       0.2620      0.03  Q          |          |          |         V|
```

```
   23+20       0.2622      0.03  Q         |         |         |        V|
   23+25       0.2624      0.03  Q         |         |         |        V|
   23+30       0.2626      0.03  Q         |         |         |        V|
   23+35       0.2627      0.03  Q         |         |         |        V|
   23+40       0.2629      0.03  Q         |         |         |        V|
   23+45       0.2631      0.03  Q         |         |         |        V|
   23+50       0.2633      0.03  Q         |         |         |        V|
   23+55       0.2635      0.03  Q         |         |         |        V|
   24+ 0       0.2636      0.03  Q         |         |         |        V|
   24+ 5       0.2638      0.02  Q         |         |         |        V|
   24+10       0.2639      0.01  Q         |         |         |        V|
   24+15       0.2639      0.01  Q         |         |         |        V|
   24+20       0.2639      0.00  Q         |         |         |        V|
   24+25       0.2640      0.00  Q         |         |         |        V|
   24+30       0.2640      0.00  Q         |         |         |        V|
   24+35       0.2640      0.00  Q         |         |         |        V|
   24+40       0.2640      0.00  Q         |         |         |        V|
   24+45       0.2640      0.00  Q         |         |         |        V|
   24+50       0.2640      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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPROP242.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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, 2-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) =    2.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    1.600(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.600(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-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.900        0.095       1.000      0.095
                                                  Sum (F) =   0.095
Area averaged mean soil loss (F) (In/Hr) =  0.095
Minimum soil loss rate ((In/Hr)) =  0.048
(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	0.013	(0.169)	0.002	0.010
2	0.17	0.07	0.013	(0.168)	0.002	0.010
3	0.25	0.07	0.013	(0.167)	0.002	0.010
4	0.33	0.10	0.019	(0.167)	0.003	0.016
5	0.42	0.10	0.019	(0.166)	0.003	0.016
6	0.50	0.10	0.019	(0.165)	0.003	0.016
7	0.58	0.10	0.019	(0.165)	0.003	0.016
8	0.67	0.10	0.019	(0.164)	0.003	0.016
9	0.75	0.10	0.019	(0.163)	0.003	0.016
10	0.83	0.13	0.026	(0.163)	0.005	0.021
11	0.92	0.13	0.026	(0.162)	0.005	0.021
12	1.00	0.13	0.026	(0.162)	0.005	0.021
13	1.08	0.10	0.019	(0.161)	0.003	0.016
14	1.17	0.10	0.019	(0.160)	0.003	0.016
15	1.25	0.10	0.019	(0.160)	0.003	0.016
16	1.33	0.10	0.019	(0.159)	0.003	0.016
17	1.42	0.10	0.019	(0.158)	0.003	0.016
18	1.50	0.10	0.019	(0.158)	0.003	0.016
19	1.58	0.10	0.019	(0.157)	0.003	0.016
20	1.67	0.10	0.019	(0.156)	0.003	0.016
21	1.75	0.10	0.019	(0.156)	0.003	0.016
22	1.83	0.13	0.026	(0.155)	0.005	0.021
23	1.92	0.13	0.026	(0.155)	0.005	0.021
24	2.00	0.13	0.026	(0.154)	0.005	0.021
25	2.08	0.13	0.026	(0.153)	0.005	0.021
26	2.17	0.13	0.026	(0.153)	0.005	0.021
27	2.25	0.13	0.026	(0.152)	0.005	0.021
28	2.33	0.13	0.026	(0.151)	0.005	0.021
29	2.42	0.13	0.026	(0.151)	0.005	0.021
30	2.50	0.13	0.026	(0.150)	0.005	0.021
31	2.58	0.17	0.032	(0.150)	0.006	0.026
32	2.67	0.17	0.032	(0.149)	0.006	0.026
33	2.75	0.17	0.032	(0.148)	0.006	0.026
34	2.83	0.17	0.032	(0.148)	0.006	0.026
35	2.92	0.17	0.032	(0.147)	0.006	0.026
36	3.00	0.17	0.032	(0.147)	0.006	0.026
37	3.08	0.17	0.032	(0.146)	0.006	0.026
38	3.17	0.17	0.032	(0.145)	0.006	0.026
39	3.25	0.17	0.032	(0.145)	0.006	0.026
40	3.33	0.17	0.032	(0.144)	0.006	0.026
41	3.42	0.17	0.032	(0.144)	0.006	0.026
42	3.50	0.17	0.032	(0.143)	0.006	0.026
43	3.58	0.17	0.032	(0.142)	0.006	0.026
44	3.67	0.17	0.032	(0.142)	0.006	0.026
45	3.75	0.17	0.032	(0.141)	0.006	0.026
46	3.83	0.20	0.038	(0.141)	0.007	0.031
47	3.92	0.20	0.038	(0.140)	0.007	0.031

48	4.00	0.20	0.038	(0.139)	0.007	0.031
49	4.08	0.20	0.038	(0.139)	0.007	0.031
50	4.17	0.20	0.038	(0.138)	0.007	0.031
51	4.25	0.20	0.038	(0.138)	0.007	0.031
52	4.33	0.23	0.045	(0.137)	0.008	0.037
53	4.42	0.23	0.045	(0.136)	0.008	0.037
54	4.50	0.23	0.045	(0.136)	0.008	0.037
55	4.58	0.23	0.045	(0.135)	0.008	0.037
56	4.67	0.23	0.045	(0.135)	0.008	0.037
57	4.75	0.23	0.045	(0.134)	0.008	0.037
58	4.83	0.27	0.051	(0.134)	0.009	0.042
59	4.92	0.27	0.051	(0.133)	0.009	0.042
60	5.00	0.27	0.051	(0.132)	0.009	0.042
61	5.08	0.20	0.038	(0.132)	0.007	0.031
62	5.17	0.20	0.038	(0.131)	0.007	0.031
63	5.25	0.20	0.038	(0.131)	0.007	0.031
64	5.33	0.23	0.045	(0.130)	0.008	0.037
65	5.42	0.23	0.045	(0.129)	0.008	0.037
66	5.50	0.23	0.045	(0.129)	0.008	0.037
67	5.58	0.27	0.051	(0.128)	0.009	0.042
68	5.67	0.27	0.051	(0.128)	0.009	0.042
69	5.75	0.27	0.051	(0.127)	0.009	0.042
70	5.83	0.27	0.051	(0.127)	0.009	0.042
71	5.92	0.27	0.051	(0.126)	0.009	0.042
72	6.00	0.27	0.051	(0.126)	0.009	0.042
73	6.08	0.30	0.058	(0.125)	0.010	0.047
74	6.17	0.30	0.058	(0.124)	0.010	0.047
75	6.25	0.30	0.058	(0.124)	0.010	0.047
76	6.33	0.30	0.058	(0.123)	0.010	0.047
77	6.42	0.30	0.058	(0.123)	0.010	0.047
78	6.50	0.30	0.058	(0.122)	0.010	0.047
79	6.58	0.33	0.064	(0.122)	0.012	0.052
80	6.67	0.33	0.064	(0.121)	0.012	0.052
81	6.75	0.33	0.064	(0.121)	0.012	0.052
82	6.83	0.33	0.064	(0.120)	0.012	0.052
83	6.92	0.33	0.064	(0.119)	0.012	0.052
84	7.00	0.33	0.064	(0.119)	0.012	0.052
85	7.08	0.33	0.064	(0.118)	0.012	0.052
86	7.17	0.33	0.064	(0.118)	0.012	0.052
87	7.25	0.33	0.064	(0.117)	0.012	0.052
88	7.33	0.37	0.070	(0.117)	0.013	0.058
89	7.42	0.37	0.070	(0.116)	0.013	0.058
90	7.50	0.37	0.070	(0.116)	0.013	0.058
91	7.58	0.40	0.077	(0.115)	0.014	0.063
92	7.67	0.40	0.077	(0.115)	0.014	0.063
93	7.75	0.40	0.077	(0.114)	0.014	0.063
94	7.83	0.43	0.083	(0.114)	0.015	0.068
95	7.92	0.43	0.083	(0.113)	0.015	0.068
96	8.00	0.43	0.083	(0.113)	0.015	0.068
97	8.08	0.50	0.096	(0.112)	0.017	0.079

98	8.17	0.50	0.096	(0.112)	0.017	0.079
99	8.25	0.50	0.096	(0.111)	0.017	0.079
100	8.33	0.50	0.096	(0.110)	0.017	0.079
101	8.42	0.50	0.096	(0.110)	0.017	0.079
102	8.50	0.50	0.096	(0.109)	0.017	0.079
103	8.58	0.53	0.102	(0.109)	0.018	0.084
104	8.67	0.53	0.102	(0.108)	0.018	0.084
105	8.75	0.53	0.102	(0.108)	0.018	0.084
106	8.83	0.57	0.109	(0.107)	0.020	0.089
107	8.92	0.57	0.109	(0.107)	0.020	0.089
108	9.00	0.57	0.109	(0.106)	0.020	0.089
109	9.08	0.63	0.122	(0.106)	0.022	0.100
110	9.17	0.63	0.122	(0.105)	0.022	0.100
111	9.25	0.63	0.122	(0.105)	0.022	0.100
112	9.33	0.67	0.128	(0.104)	0.023	0.105
113	9.42	0.67	0.128	(0.104)	0.023	0.105
114	9.50	0.67	0.128	(0.103)	0.023	0.105
115	9.58	0.70	0.134	(0.103)	0.024	0.110
116	9.67	0.70	0.134	(0.102)	0.024	0.110
117	9.75	0.70	0.134	(0.102)	0.024	0.110
118	9.83	0.73	0.141	(0.101)	0.025	0.115
119	9.92	0.73	0.141	(0.101)	0.025	0.115
120	10.00	0.73	0.141	(0.100)	0.025	0.115
121	10.08	0.50	0.096	(0.100)	0.017	0.079
122	10.17	0.50	0.096	(0.099)	0.017	0.079
123	10.25	0.50	0.096	(0.099)	0.017	0.079
124	10.33	0.50	0.096	(0.099)	0.017	0.079
125	10.42	0.50	0.096	(0.098)	0.017	0.079
126	10.50	0.50	0.096	(0.098)	0.017	0.079
127	10.58	0.67	0.128	(0.097)	0.023	0.105
128	10.67	0.67	0.128	(0.097)	0.023	0.105
129	10.75	0.67	0.128	(0.096)	0.023	0.105
130	10.83	0.67	0.128	(0.096)	0.023	0.105
131	10.92	0.67	0.128	(0.095)	0.023	0.105
132	11.00	0.67	0.128	(0.095)	0.023	0.105
133	11.08	0.63	0.122	(0.094)	0.022	0.100
134	11.17	0.63	0.122	(0.094)	0.022	0.100
135	11.25	0.63	0.122	(0.093)	0.022	0.100
136	11.33	0.63	0.122	(0.093)	0.022	0.100
137	11.42	0.63	0.122	(0.092)	0.022	0.100
138	11.50	0.63	0.122	(0.092)	0.022	0.100
139	11.58	0.57	0.109	(0.091)	0.020	0.089
140	11.67	0.57	0.109	(0.091)	0.020	0.089
141	11.75	0.57	0.109	(0.091)	0.020	0.089
142	11.83	0.60	0.115	(0.090)	0.021	0.094
143	11.92	0.60	0.115	(0.090)	0.021	0.094
144	12.00	0.60	0.115	(0.089)	0.021	0.094
145	12.08	0.83	0.160	(0.089)	0.029	0.131
146	12.17	0.83	0.160	(0.088)	0.029	0.131
147	12.25	0.83	0.160	(0.088)	0.029	0.131

148	12.33	0.87	0.166	(0.087)	0.030	0.136
149	12.42	0.87	0.166	(0.087)	0.030	0.136
150	12.50	0.87	0.166	(0.087)	0.030	0.136
151	12.58	0.93	0.179	(0.086)	0.032	0.147
152	12.67	0.93	0.179	(0.086)	0.032	0.147
153	12.75	0.93	0.179	(0.085)	0.032	0.147
154	12.83	0.97	0.186	(0.085)	0.033	0.152
155	12.92	0.97	0.186	(0.084)	0.033	0.152
156	13.00	0.97	0.186	(0.084)	0.033	0.152
157	13.08	1.13	0.218	(0.084)	0.039	0.178
158	13.17	1.13	0.218	(0.083)	0.039	0.178
159	13.25	1.13	0.218	(0.083)	0.039	0.178
160	13.33	1.13	0.218	(0.082)	0.039	0.178
161	13.42	1.13	0.218	(0.082)	0.039	0.178
162	13.50	1.13	0.218	(0.081)	0.039	0.178
163	13.58	0.77	0.147	(0.081)	0.026	0.121
164	13.67	0.77	0.147	(0.081)	0.026	0.121
165	13.75	0.77	0.147	(0.080)	0.026	0.121
166	13.83	0.77	0.147	(0.080)	0.026	0.121
167	13.92	0.77	0.147	(0.079)	0.026	0.121
168	14.00	0.77	0.147	(0.079)	0.026	0.121
169	14.08	0.90	0.173	(0.079)	0.031	0.142
170	14.17	0.90	0.173	(0.078)	0.031	0.142
171	14.25	0.90	0.173	(0.078)	0.031	0.142
172	14.33	0.87	0.166	(0.077)	0.030	0.136
173	14.42	0.87	0.166	(0.077)	0.030	0.136
174	14.50	0.87	0.166	(0.077)	0.030	0.136
175	14.58	0.87	0.166	(0.076)	0.030	0.136
176	14.67	0.87	0.166	(0.076)	0.030	0.136
177	14.75	0.87	0.166	(0.075)	0.030	0.136
178	14.83	0.83	0.160	(0.075)	0.029	0.131
179	14.92	0.83	0.160	(0.075)	0.029	0.131
180	15.00	0.83	0.160	(0.074)	0.029	0.131
181	15.08	0.80	0.154	(0.074)	0.028	0.126
182	15.17	0.80	0.154	(0.074)	0.028	0.126
183	15.25	0.80	0.154	(0.073)	0.028	0.126
184	15.33	0.77	0.147	(0.073)	0.026	0.121
185	15.42	0.77	0.147	(0.072)	0.026	0.121
186	15.50	0.77	0.147	(0.072)	0.026	0.121
187	15.58	0.63	0.122	(0.072)	0.022	0.100
188	15.67	0.63	0.122	(0.071)	0.022	0.100
189	15.75	0.63	0.122	(0.071)	0.022	0.100
190	15.83	0.63	0.122	(0.071)	0.022	0.100
191	15.92	0.63	0.122	(0.070)	0.022	0.100
192	16.00	0.63	0.122	(0.070)	0.022	0.100
193	16.08	0.13	0.026	(0.069)	0.005	0.021
194	16.17	0.13	0.026	(0.069)	0.005	0.021
195	16.25	0.13	0.026	(0.069)	0.005	0.021
196	16.33	0.13	0.026	(0.068)	0.005	0.021
197	16.42	0.13	0.026	(0.068)	0.005	0.021

198	16.50	0.13	0.026	(0.068)	0.005	0.021
199	16.58	0.10	0.019	(0.067)	0.003	0.016
200	16.67	0.10	0.019	(0.067)	0.003	0.016
201	16.75	0.10	0.019	(0.067)	0.003	0.016
202	16.83	0.10	0.019	(0.066)	0.003	0.016
203	16.92	0.10	0.019	(0.066)	0.003	0.016
204	17.00	0.10	0.019	(0.066)	0.003	0.016
205	17.08	0.17	0.032	(0.065)	0.006	0.026
206	17.17	0.17	0.032	(0.065)	0.006	0.026
207	17.25	0.17	0.032	(0.065)	0.006	0.026
208	17.33	0.17	0.032	(0.064)	0.006	0.026
209	17.42	0.17	0.032	(0.064)	0.006	0.026
210	17.50	0.17	0.032	(0.064)	0.006	0.026
211	17.58	0.17	0.032	(0.063)	0.006	0.026
212	17.67	0.17	0.032	(0.063)	0.006	0.026
213	17.75	0.17	0.032	(0.063)	0.006	0.026
214	17.83	0.13	0.026	(0.062)	0.005	0.021
215	17.92	0.13	0.026	(0.062)	0.005	0.021
216	18.00	0.13	0.026	(0.062)	0.005	0.021
217	18.08	0.13	0.026	(0.062)	0.005	0.021
218	18.17	0.13	0.026	(0.061)	0.005	0.021
219	18.25	0.13	0.026	(0.061)	0.005	0.021
220	18.33	0.13	0.026	(0.061)	0.005	0.021
221	18.42	0.13	0.026	(0.060)	0.005	0.021
222	18.50	0.13	0.026	(0.060)	0.005	0.021
223	18.58	0.10	0.019	(0.060)	0.003	0.016
224	18.67	0.10	0.019	(0.059)	0.003	0.016
225	18.75	0.10	0.019	(0.059)	0.003	0.016
226	18.83	0.07	0.013	(0.059)	0.002	0.010
227	18.92	0.07	0.013	(0.059)	0.002	0.010
228	19.00	0.07	0.013	(0.058)	0.002	0.010
229	19.08	0.10	0.019	(0.058)	0.003	0.016
230	19.17	0.10	0.019	(0.058)	0.003	0.016
231	19.25	0.10	0.019	(0.058)	0.003	0.016
232	19.33	0.13	0.026	(0.057)	0.005	0.021
233	19.42	0.13	0.026	(0.057)	0.005	0.021
234	19.50	0.13	0.026	(0.057)	0.005	0.021
235	19.58	0.10	0.019	(0.056)	0.003	0.016
236	19.67	0.10	0.019	(0.056)	0.003	0.016
237	19.75	0.10	0.019	(0.056)	0.003	0.016
238	19.83	0.07	0.013	(0.056)	0.002	0.010
239	19.92	0.07	0.013	(0.055)	0.002	0.010
240	20.00	0.07	0.013	(0.055)	0.002	0.010
241	20.08	0.10	0.019	(0.055)	0.003	0.016
242	20.17	0.10	0.019	(0.055)	0.003	0.016
243	20.25	0.10	0.019	(0.055)	0.003	0.016
244	20.33	0.10	0.019	(0.054)	0.003	0.016
245	20.42	0.10	0.019	(0.054)	0.003	0.016
246	20.50	0.10	0.019	(0.054)	0.003	0.016
247	20.58	0.10	0.019	(0.054)	0.003	0.016

248	20.67	0.10	0.019	(0.053)	0.003	0.016
249	20.75	0.10	0.019	(0.053)	0.003	0.016
250	20.83	0.07	0.013	(0.053)	0.002	0.010
251	20.92	0.07	0.013	(0.053)	0.002	0.010
252	21.00	0.07	0.013	(0.052)	0.002	0.010
253	21.08	0.10	0.019	(0.052)	0.003	0.016
254	21.17	0.10	0.019	(0.052)	0.003	0.016
255	21.25	0.10	0.019	(0.052)	0.003	0.016
256	21.33	0.07	0.013	(0.052)	0.002	0.010
257	21.42	0.07	0.013	(0.051)	0.002	0.010
258	21.50	0.07	0.013	(0.051)	0.002	0.010
259	21.58	0.10	0.019	(0.051)	0.003	0.016
260	21.67	0.10	0.019	(0.051)	0.003	0.016
261	21.75	0.10	0.019	(0.051)	0.003	0.016
262	21.83	0.07	0.013	(0.051)	0.002	0.010
263	21.92	0.07	0.013	(0.050)	0.002	0.010
264	22.00	0.07	0.013	(0.050)	0.002	0.010
265	22.08	0.10	0.019	(0.050)	0.003	0.016
266	22.17	0.10	0.019	(0.050)	0.003	0.016
267	22.25	0.10	0.019	(0.050)	0.003	0.016
268	22.33	0.07	0.013	(0.050)	0.002	0.010
269	22.42	0.07	0.013	(0.049)	0.002	0.010
270	22.50	0.07	0.013	(0.049)	0.002	0.010
271	22.58	0.07	0.013	(0.049)	0.002	0.010
272	22.67	0.07	0.013	(0.049)	0.002	0.010
273	22.75	0.07	0.013	(0.049)	0.002	0.010
274	22.83	0.07	0.013	(0.049)	0.002	0.010
275	22.92	0.07	0.013	(0.049)	0.002	0.010
276	23.00	0.07	0.013	(0.048)	0.002	0.010
277	23.08	0.07	0.013	(0.048)	0.002	0.010
278	23.17	0.07	0.013	(0.048)	0.002	0.010
279	23.25	0.07	0.013	(0.048)	0.002	0.010
280	23.33	0.07	0.013	(0.048)	0.002	0.010
281	23.42	0.07	0.013	(0.048)	0.002	0.010
282	23.50	0.07	0.013	(0.048)	0.002	0.010
283	23.58	0.07	0.013	(0.048)	0.002	0.010
284	23.67	0.07	0.013	(0.048)	0.002	0.010
285	23.75	0.07	0.013	(0.048)	0.002	0.010
286	23.83	0.07	0.013	(0.048)	0.002	0.010
287	23.92	0.07	0.013	(0.048)	0.002	0.010
288	24.00	0.07	0.013	(0.048)	0.002	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.475(Ac.Ft)
Total rainfall = 1.60(In)
Flood volume = 94295.0 Cubic Feet
Total soil loss = 20698.9 Cubic Feet

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      ----------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.562(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       0.0010      0.15  Q         |         |         |         |
  0+10       0.0024      0.21  Q         |         |         |         |
  0+15       0.0039      0.21  Q         |         |         |         |
  0+20       0.0058      0.28  VQ        |         |         |         |
  0+25       0.0080      0.31  VQ        |         |         |         |
  0+30       0.0102      0.31  VQ        |         |         |         |
  0+35       0.0123      0.31  VQ        |         |         |         |
  0+40       0.0145      0.31  VQ        |         |         |         |
  0+45       0.0167      0.31  VQ        |         |         |         |
  0+50       0.0193      0.39  VQ        |         |         |         |
  0+55       0.0222      0.42  VQ        |         |         |         |
  1+ 0       0.0251      0.42  VQ        |         |         |         |
  1+ 5       0.0275      0.35  VQ        |         |         |         |
  1+10       0.0296      0.31  VQ        |         |         |         |
  1+15       0.0318      0.31  VQ        |         |         |         |
  1+20       0.0340      0.31  VQ        |         |         |         |
  1+25       0.0361      0.31  VQ        |         |         |         |
  1+30       0.0383      0.31  VQ        |         |         |         |
  1+35       0.0405      0.31  VQ        |         |         |         |
  1+40       0.0426      0.31  VQ        |         |         |         |
  1+45       0.0448      0.31  VQ        |         |         |         |
  1+50       0.0475      0.39  VQ        |         |         |         |
  1+55       0.0503      0.42  VQ        |         |         |         |
  2+ 0       0.0532      0.42  VQ        |         |         |         |
  2+ 5       0.0561      0.42  |Q        |         |         |         |
  2+10       0.0590      0.42  |Q        |         |         |         |
  2+15       0.0619      0.42  |Q        |         |         |         |
  2+20       0.0648      0.42  |Q        |         |         |         |
  2+25       0.0677      0.42  |Q        |         |         |         |
  2+30       0.0706      0.42  |Q        |         |         |         |
  2+35       0.0739      0.49  |Q        |         |         |         |
  2+40       0.0775      0.52  |VQ       |         |         |         |
  2+45       0.0812      0.52  |VQ       |         |         |         |
  2+50       0.0848      0.52  |VQ       |         |         |         |
  2+55       0.0884      0.52  |VQ       |         |         |         |
  3+ 0       0.0920      0.52  |VQ       |         |         |         |
  3+ 5       0.0956      0.52  |VQ       |         |         |         |
  3+10       0.0992      0.52  |VQ       |         |         |         |
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3+15	0.1028	0.52	VQ			
3+20	0.1064	0.52	VQ			
3+25	0.1100	0.52	Q			
3+30	0.1136	0.52	Q			
3+35	0.1172	0.52	Q			
3+40	0.1208	0.52	Q			
3+45	0.1244	0.52	Q			
3+50	0.1286	0.60	Q			
3+55	0.1329	0.63	Q			
4+ 0	0.1372	0.63	Q			
4+ 5	0.1415	0.63	Q			
4+10	0.1459	0.63	Q			
4+15	0.1502	0.63	Q			
4+20	0.1550	0.70	Q			
4+25	0.1601	0.73	Q			
4+30	0.1651	0.73	QV			
4+35	0.1702	0.73	QV			
4+40	0.1752	0.73	QV			
4+45	0.1803	0.73	QV			
4+50	0.1858	0.81	Q			
4+55	0.1916	0.84	Q			
5+ 0	0.1974	0.84	Q			
5+ 5	0.2022	0.69	QV			
5+10	0.2065	0.63	QV			
5+15	0.2108	0.63	QV			
5+20	0.2156	0.70	QV			
5+25	0.2207	0.73	Q V			
5+30	0.2257	0.73	Q V			
5+35	0.2313	0.81	QV			
5+40	0.2371	0.84	QV			
5+45	0.2428	0.84	QV			
5+50	0.2486	0.84	QV			
5+55	0.2544	0.84	QV			
6+ 0	0.2602	0.84	QV			
6+ 5	0.2664	0.91	QV			
6+10	0.2729	0.94	Q V			
6+15	0.2794	0.94	Q V			
6+20	0.2859	0.94	Q V			
6+25	0.2924	0.94	Q V			
6+30	0.2989	0.94	Q V			
6+35	0.3059	1.02	QV			
6+40	0.3131	1.05	QV			
6+45	0.3203	1.05	QV			
6+50	0.3275	1.05	Q V			
6+55	0.3348	1.05	Q V			
7+ 0	0.3420	1.05	Q V			
7+ 5	0.3492	1.05	Q V			
7+10	0.3564	1.05	Q V			
7+15	0.3636	1.05	Q V			
7+20	0.3713	1.12	Q V			

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 7+25       0.3793      1.15  |   Q  V  |          |          |          |
 7+30       0.3872      1.15  |   Q  V  |          |          |          |
 7+35       0.3957      1.23  |   Q  V  |          |          |          |
 7+40       0.4043      1.26  |    Q V  |          |          |          |
 7+45       0.4130      1.26  |    Q V  |          |          |          |
 7+50       0.4221      1.33  |    Q V  |          |          |          |
 7+55       0.4315      1.36  |    Q V  |          |          |          |
 8+ 0       0.4409      1.36  |    Q  V |          |          |          |
 8+ 5       0.4513      1.51  |     Q V |          |          |          |
 8+10       0.4621      1.57  |     Q V |          |          |          |
 8+15       0.4729      1.57  |     Q V |          |          |          |
 8+20       0.4837      1.57  |     Q V |          |          |          |
 8+25       0.4946      1.57  |     Q  V|          |          |          |
 8+30       0.5054      1.57  |     Q  V|          |          |          |
 8+35       0.5167      1.64  |     Q  V|          |          |          |
 8+40       0.5283      1.68  |     Q  V|          |          |          |
 8+45       0.5398      1.68  |     Q  V|          |          |          |
 8+50       0.5518      1.75  |     Q   V          |          |          |
 8+55       0.5641      1.78  |      Q  V          |          |          |
 9+ 0       0.5764      1.78  |      Q  V          |          |          |
 9+ 5       0.5896      1.93  |      Q  V          |          |          |
 9+10       0.6034      1.99  |      Q  |V         |          |          |
 9+15       0.6171      1.99  |      Q  |V         |          |          |
 9+20       0.6313      2.06  |       Q |V         |          |          |
 9+25       0.6457      2.10  |       Q |V         |          |          |
 9+30       0.6601      2.10  |       Q | V        |          |          |
 9+35       0.6751      2.17  |       Q | V        |          |          |
 9+40       0.6902      2.20  |       Q | V        |          |          |
 9+45       0.7054      2.20  |       Q |  V       |          |          |
 9+50       0.7210      2.27  |        Q|  V       |          |          |
 9+55       0.7369      2.30  |        Q|  V       |          |          |
10+ 0       0.7528      2.30  |        Q|  V       |          |          |
10+ 5       0.7652      1.80  |      Q  |   V      |          |          |
10+10       0.7760      1.57  |     Q   |   V      |          |          |
10+15       0.7868      1.57  |     Q   |   V      |          |          |
10+20       0.7976      1.57  |     Q   |   V      |          |          |
10+25       0.8084      1.57  |     Q   |   V      |          |          |
10+30       0.8193      1.57  |     Q   |    V     |          |          |
10+35       0.8326      1.93  |      Q  |    V     |          |          |
10+40       0.8470      2.10  |       Q |    V     |          |          |
10+45       0.8615      2.10  |       Q |    V     |          |          |
10+50       0.8759      2.10  |       Q |     V    |          |          |
10+55       0.8903      2.10  |       Q |     V    |          |          |
11+ 0       0.9048      2.10  |       Q |     V    |          |          |
11+ 5       0.9187      2.02  |       Q |     V    |          |          |
11+10       0.9324      1.99  |      Q  |      V   |          |          |
11+15       0.9461      1.99  |      Q  |      V   |          |          |
11+20       0.9598      1.99  |      Q  |      V   |          |          |
11+25       0.9735      1.99  |      Q  |      V   |          |          |
11+30       0.9872      1.99  |      Q  |       V  |          |          |
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11+35       0.9999      1.85  |      Q  |       V |         |         |
11+40       1.0122      1.78  |      Q  |       V |         |         |
11+45       1.0245      1.78  |      Q  |       V |         |         |
11+50       1.0372      1.85  |      Q  |        V|         |         |
11+55       1.0502      1.89  |      Q  |        V|         |         |
12+ 0       1.0632      1.89  |      Q  |        V|         |         |
12+ 5       1.0797      2.39  |        Q|        V|         |         |
12+10       1.0977      2.62  |         Q        V         |         |
12+15       1.1158      2.62  |         Q        V         |         |
12+20       1.1343      2.69  |         Q        V         |         |
12+25       1.1531      2.72  |         Q        |V        |         |
12+30       1.1718      2.72  |         Q        |V        |         |
12+35       1.1916      2.87  |         |Q       | V       |         |
12+40       1.2118      2.93  |         |Q       | V       |         |
12+45       1.2320      2.93  |         |Q       | V       |         |
12+50       1.2527      3.01  |         | Q      |  V      |         |
12+55       1.2736      3.04  |         | Q      |  V      |         |
13+ 0       1.2946      3.04  |         | Q      |  V      |         |
13+ 5       1.3180      3.40  |         |  Q     |   V     |         |
13+10       1.3425      3.56  |         |   Q    |   V     |         |
13+15       1.3671      3.56  |         |   Q    |    V    |         |
13+20       1.3916      3.56  |         |   Q    |    V    |         |
13+25       1.4161      3.56  |         |   Q    |     V   |         |
13+30       1.4407      3.56  |         |   Q    |     V   |         |
13+35       1.4597      2.76  |         |Q       |     V   |         |
13+40       1.4763      2.41  |        Q|        |      V  |         |
13+45       1.4929      2.41  |        Q|        |      V  |         |
13+50       1.5095      2.41  |        Q|        |      V  |         |
13+55       1.5261      2.41  |        Q|        |       V |         |
14+ 0       1.5427      2.41  |        Q|        |       V |         |
14+ 5       1.5613      2.70  |         Q        |       V |         |
14+10       1.5808      2.83  |         |Q       |        V|         |
14+15       1.6002      2.83  |         |Q       |        V|         |
14+20       1.6192      2.76  |         |Q       |        V|         |
14+25       1.6380      2.72  |         Q        |         V         |
14+30       1.6567      2.72  |         Q        |         V         |
14+35       1.6755      2.72  |         Q        |         V         |
14+40       1.6943      2.72  |         Q        |         |V        |
14+45       1.7130      2.72  |         Q        |         |V        |
14+50       1.7313      2.65  |         Q        |         |V        |
14+55       1.7493      2.62  |         Q        |         | V       |
15+ 0       1.7674      2.62  |         Q        |         | V       |
15+ 5       1.7849      2.55  |         Q        |         | V       |
15+10       1.8022      2.51  |         Q        |         |  V      |
15+15       1.8195      2.51  |         Q        |         |  V      |
15+20       1.8364      2.44  |        Q|        |         |  V      |
15+25       1.8530      2.41  |        Q|        |         |   V     |
15+30       1.8696      2.41  |        Q|        |         |   V     |
15+35       1.8841      2.12  |       Q |        |         |   V     |
15+40       1.8979      1.99  |      Q  |        |         |    V    |
```

```
15+45        1.9116       1.99  |       Q  |          |          |     V    |
15+50        1.9253       1.99  |       Q  |          |          |     V    |
15+55        1.9390       1.99  |       Q  |          |          |     V    |
16+ 0        1.9527       1.99  |       Q  |          |          |      V   |
16+ 5        1.9589       0.90  |   Q      |          |          |      V   |
16+10        1.9618       0.42  |Q         |          |          |      V   |
16+15        1.9647       0.42  |Q         |          |          |      V   |
16+20        1.9676       0.42  |Q         |          |          |      V   |
16+25        1.9704       0.42  |Q         |          |          |      V   |
16+30        1.9733       0.42  |Q         |          |          |      V   |
16+35        1.9757       0.35  |Q         |          |          |      V   |
16+40        1.9779       0.31  |Q         |          |          |      V   |
16+45        1.9801       0.31  |Q         |          |          |      V   |
16+50        1.9822       0.31  |Q         |          |          |      V   |
16+55        1.9844       0.31  |Q         |          |          |      V   |
17+ 0        1.9865       0.31  |Q         |          |          |      V   |
17+ 5        1.9897       0.46  |Q         |          |          |      V   |
17+10        1.9933       0.52  | Q        |          |          |      V   |
17+15        1.9969       0.52  | Q        |          |          |      V   |
17+20        2.0005       0.52  | Q        |          |          |      V   |
17+25        2.0041       0.52  | Q        |          |          |       V  |
17+30        2.0077       0.52  | Q        |          |          |       V  |
17+35        2.0114       0.52  | Q        |          |
17+40        2.0150       0.52  | Q        |          |
17+45        2.0186       0.52  | Q        |          |
17+50        2.0217       0.45  |Q         |          |
17+55        2.0246       0.42  |Q         |          |
18+ 0        2.0275       0.42  |Q         |          |          |       V  |
18+ 5        2.0303       0.42  |Q         |          |          |       V  |
18+10        2.0332       0.42  |Q         |          |          |       V  |
18+15        2.0361       0.42  |Q         |          |          |       V  |
18+20        2.0390       0.42  |Q         |          |          |       V  |
18+25        2.0419       0.42  |Q         |          |          |       V  |
18+30        2.0448       0.42  |Q         |          |          |       V  |
18+35        2.0472       0.35  |Q         |          |          |       V  |
18+40        2.0493       0.31  |Q         |          |          |       V  |
18+45        2.0515       0.31  |Q         |          |          |       V  |
18+50        2.0532       0.24  Q          |          |          |       V  |
18+55        2.0546       0.21  Q          |          |          |       V  |
19+ 0        2.0560       0.21  Q          |          |          |       V  |
19+ 5        2.0580       0.28  |Q         |          |          |        V |
19+10        2.0601       0.31  |Q         |          |          |        V |
19+15        2.0623       0.31  |Q         |          |          |        V |
19+20        2.0650       0.39  |Q         |          |          |        V |
19+25        2.0679       0.42  |Q         |          |          |        V |
19+30        2.0707       0.42  |Q         |          |          |        V |
19+35        2.0731       0.35  |Q         |          |          |        V |
19+40        2.0753       0.31  |Q         |          |          |        V |
19+45        2.0775       0.31  |Q         |          |          |        V |
19+50        2.0791       0.24  Q          |          |          |        V |
```

Qpeak,pre = 0.43 cfs
2.0246-0.0706=1.954 ac-ft
85,116 cf
110% preliminary
93,628 cf

```
19+55       2.0806      0.21  Q          |          |          |        V |
20+ 0       2.0820      0.21  Q          |          |          |        V |
20+ 5       2.0840      0.28  |Q         |          |          |        V |
20+10       2.0861      0.31  |Q         |          |          |        V |
20+15       2.0883      0.31  |Q         |          |          |        V |
20+20       2.0905      0.31  |Q         |          |          |        V |
20+25       2.0926      0.31  |Q         |          |          |        V |
20+30       2.0948      0.31  |Q         |          |          |        V |
20+35       2.0969      0.31  |Q         |          |          |        V |
20+40       2.0991      0.31  |Q         |          |          |        V |
20+45       2.1013      0.31  |Q         |          |          |        V |
20+50       2.1029      0.24  Q          |          |          |        V |
20+55       2.1044      0.21  Q          |          |          |        V |
21+ 0       2.1058      0.21  Q          |          |          |        V |
21+ 5       2.1078      0.28  |Q         |          |          |        V |
21+10       2.1099      0.31  |Q         |          |          |        V |
21+15       2.1121      0.31  |Q         |          |          |         V|
21+20       2.1138      0.24  Q          |          |          |         V|
21+25       2.1152      0.21  Q          |          |          |         V|
21+30       2.1166      0.21  Q          |          |          |         V|
21+35       2.1186      0.28  |Q         |          |          |         V|
21+40       2.1208      0.31  |Q         |          |          |         V|
21+45       2.1229      0.31  |Q         |          |          |         V|
21+50       2.1246      0.24  Q          |          |          |         V|
21+55       2.1260      0.21  Q          |          |          |         V|
22+ 0       2.1275      0.21  Q          |          |          |         V|
22+ 5       2.1294      0.28  |Q         |          |          |         V|
22+10       2.1316      0.31  |Q         |          |          |         V|
22+15       2.1337      0.31  |Q         |          |          |         V|
22+20       2.1354      0.24  Q          |          |          |         V|
22+25       2.1369      0.21  Q          |          |          |         V|
22+30       2.1383      0.21  Q          |          |          |         V|
22+35       2.1397      0.21  Q          |          |          |         V|
22+40       2.1412      0.21  Q          |          |          |         V|
22+45       2.1426      0.21  Q          |          |          |         V|
22+50       2.1441      0.21  Q          |          |          |         V|
22+55       2.1455      0.21  Q          |          |          |         V|
23+ 0       2.1470      0.21  Q          |          |          |         V|
23+ 5       2.1484      0.21  Q          |          |          |         V|
23+10       2.1498      0.21  Q          |          |          |         V|
23+15       2.1513      0.21  Q          |          |          |         V|
23+20       2.1527      0.21  Q          |          |          |         V|
23+25       2.1542      0.21  Q          |          |          |         V|
23+30       2.1556      0.21  Q          |          |          |         V|
23+35       2.1571      0.21  Q          |          |          |         V|
23+40       2.1585      0.21  Q          |          |          |         V|
23+45       2.1599      0.21  Q          |          |          |         V|
23+50       2.1614      0.21  Q          |          |          |         V|
23+55       2.1628      0.21  Q          |          |          |         V|
24+ 0       2.1643      0.21  Q          |          |          |         V|
```

```
   24+ 5       2.1647      0.06  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  04/04/23 File: ONSITEPROP24100.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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

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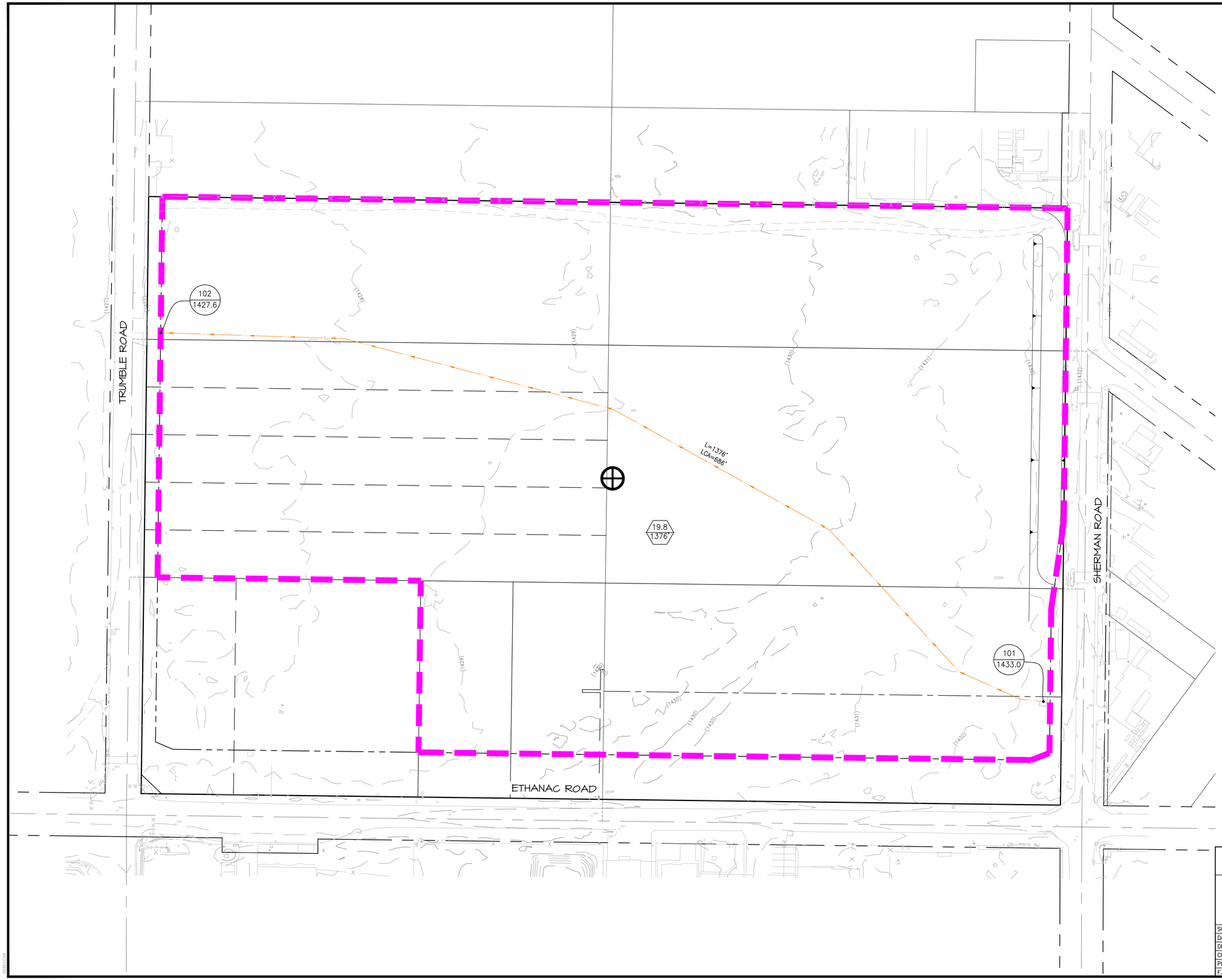

LEGEND

- 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

N W 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: 1/19/24			SHEET 1
DESIGNED: RSB			OF 4 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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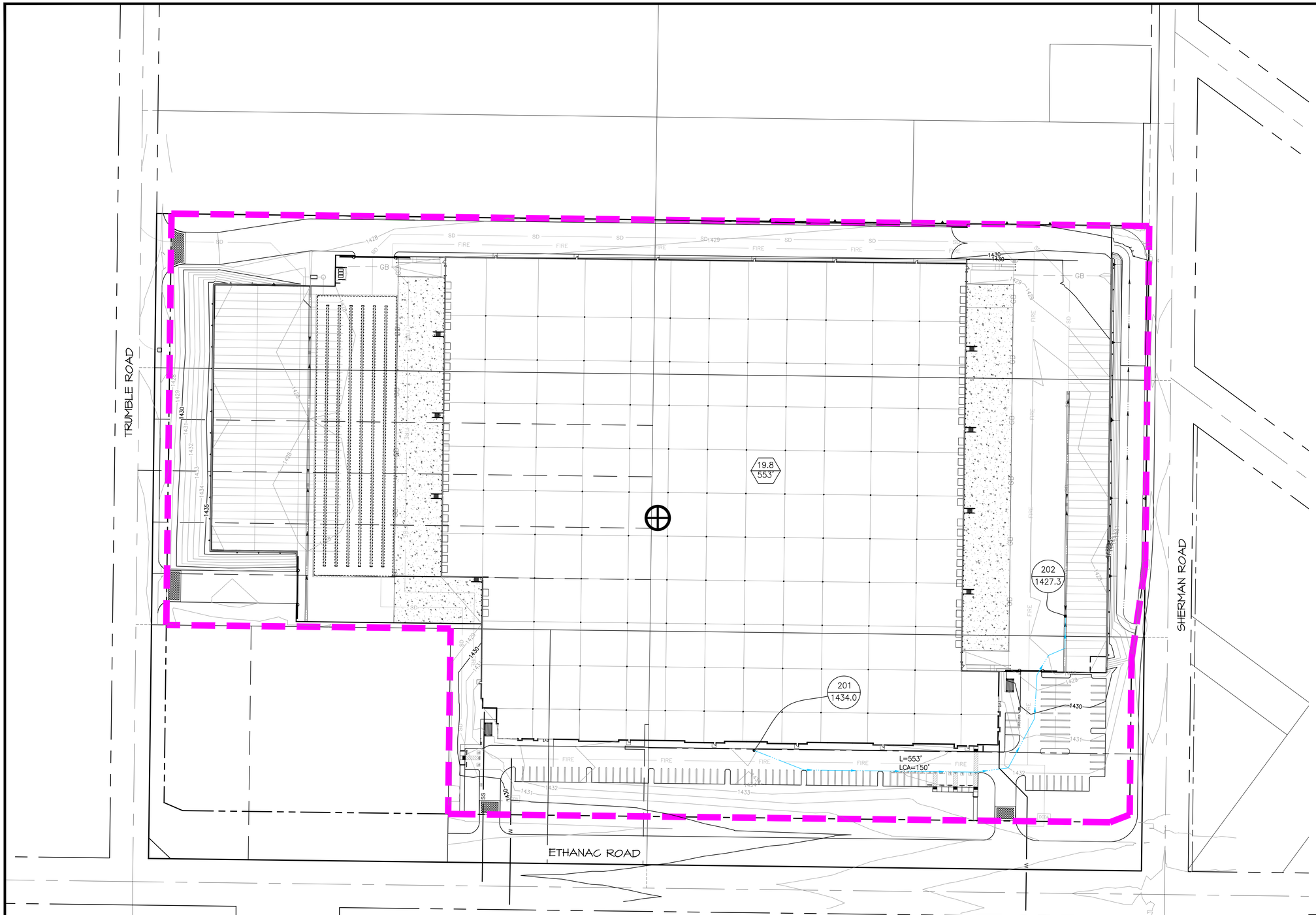

LEGEND

	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

N W 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: 1/19/24			SHEET 2
DESIGNED: RSB			OF 4 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

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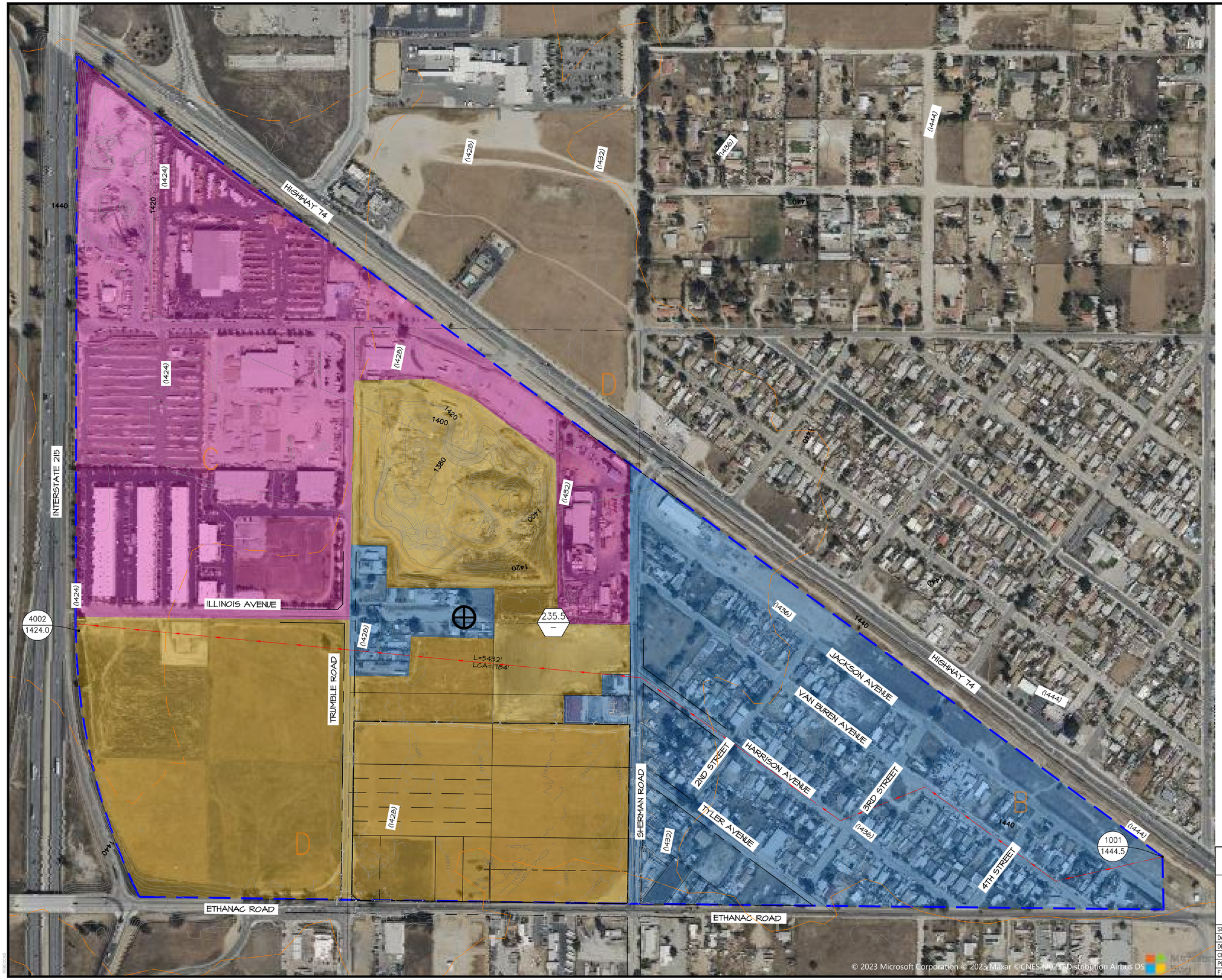

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- SOIL TYPE BOUNDARY
- 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
- COMMERCIAL / INDUSTRIAL
- UNDEVELOPED
- ¼ ACRE LOT RESIDENTIAL

N W E S

1" = 200'

100 0 200 400 600

CITY OF PERRIS

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

SCALE: 1"=200'	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: 1/19/24			SHEET 3
DESIGNED: RSB			OF 4 SHEETS
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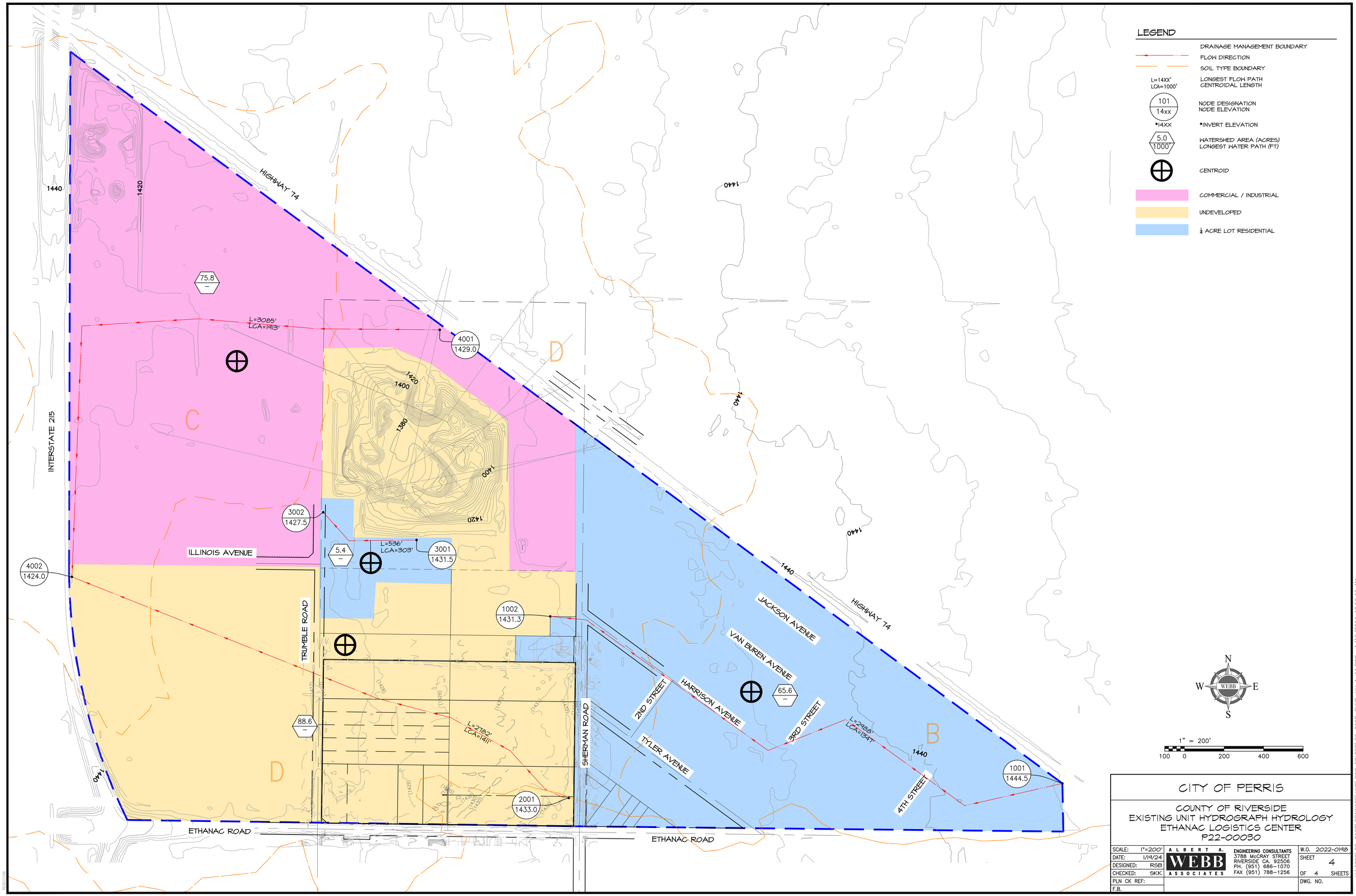
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DRAINAGE MANAGEMENT BOUNDARY
FLOW DIRECTION
SOIL TYPE BOUNDARY
L=14XX'
LCA=1000'
LONGEST FLOW PATH
CENTROIDAL LENGTH
101
14xx
NODE DESIGNATION
NODE ELEVATION
*14XX
*INVERT ELEVATION
5.0
1000'
WATERSHED AREA (ACRES)
LONGEST WATER PATH (FT)
CENTROID
COMMERCIAL / INDUSTRIAL
UNDEVELOPED
¼ ACRE LOT RESIDENTIAL
HIGHWAY 74
INTERSTATE 215
ILLINOIS AVENUE
TRUMBLE ROAD
SHERMAN ROAD
ETHANAC ROAD
JACKSON AVENUE
VAN BUREN AVENUE
HARRISON AVENUE
2ND STREET
3RD STREET
4TH STREET
TYLER AVENUE
C
D
B
75.8
5.4
88.6
65.6
L=3085'
LCA=1913'
L=536'
LCA=303'
L=2182'
LCA=1411'
L=2498'
LCA=1841'
4001
1429.0
3002
1427.5
3001
1431.5
4002
1424.0
1002
1431.3
2001
1433.0
1001
1444.5
1440
1420
1400
1380
N
S
E
W
WEBB
1" = 200'
100 0 200 400 600
CITY OF PERRIS
COUNTY OF RIVERSIDE
EXISTING UNIT HYDROGRAPH HYDROLOGY
ETHANAC LOGISTICS CENTER
P22-00030
SCALE: 1"=200'
DATE: 1/19/24
DESIGNED: RSB
CHECKED: SKK
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. 2022-0198
SHEET 4 OF 4 SHEETS
DWG. NO.
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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

***To be provided during final engineering**

Appendix 9: O&M

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

***To be provided during final engineering**

Appendix 10: Educational Materials

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

***To be provided during final engineering**

Preliminary Water Quality Management Plan (PWQMP) (Optional)

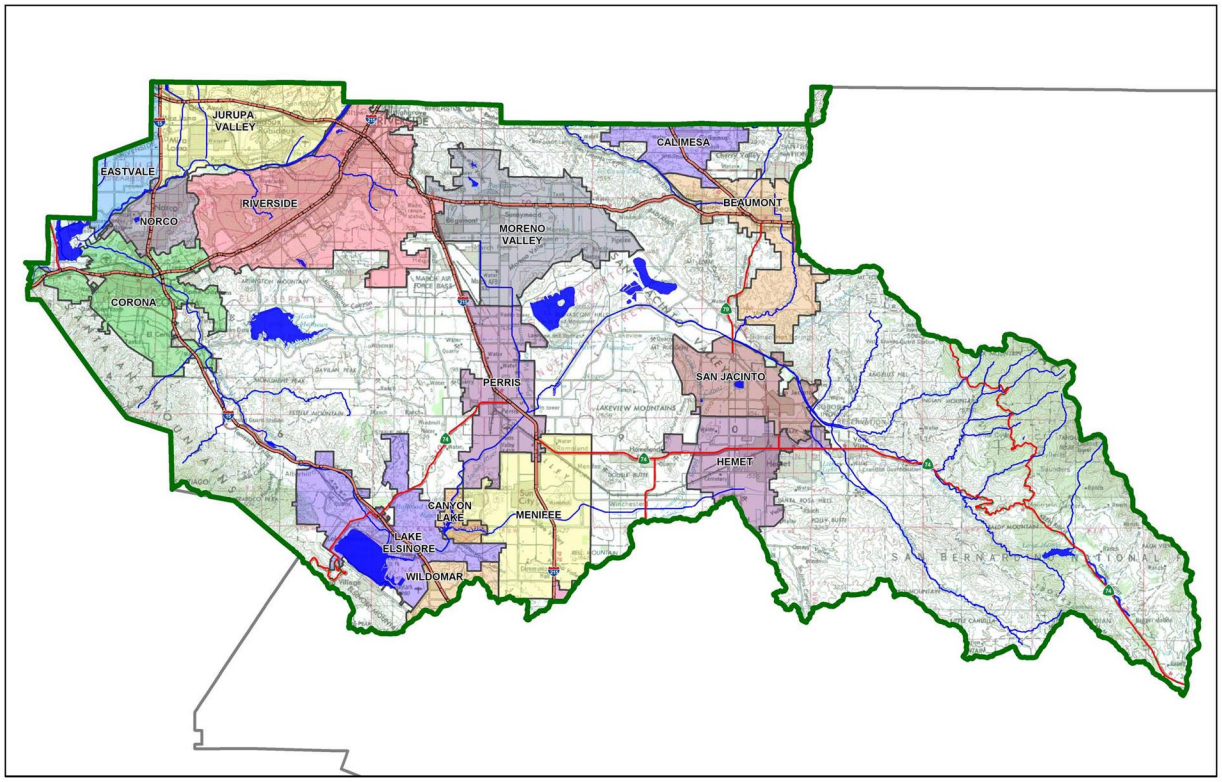
Project Specific Water Quality Management Plan

*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



Contact Information:

Prepared for: Hillwood
901 Via Piemonte Suite 175
Ontario, CA 91764

Prepared by:
Albert A. Webb Associates
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

☒ **Preliminary**
☐ **Final**

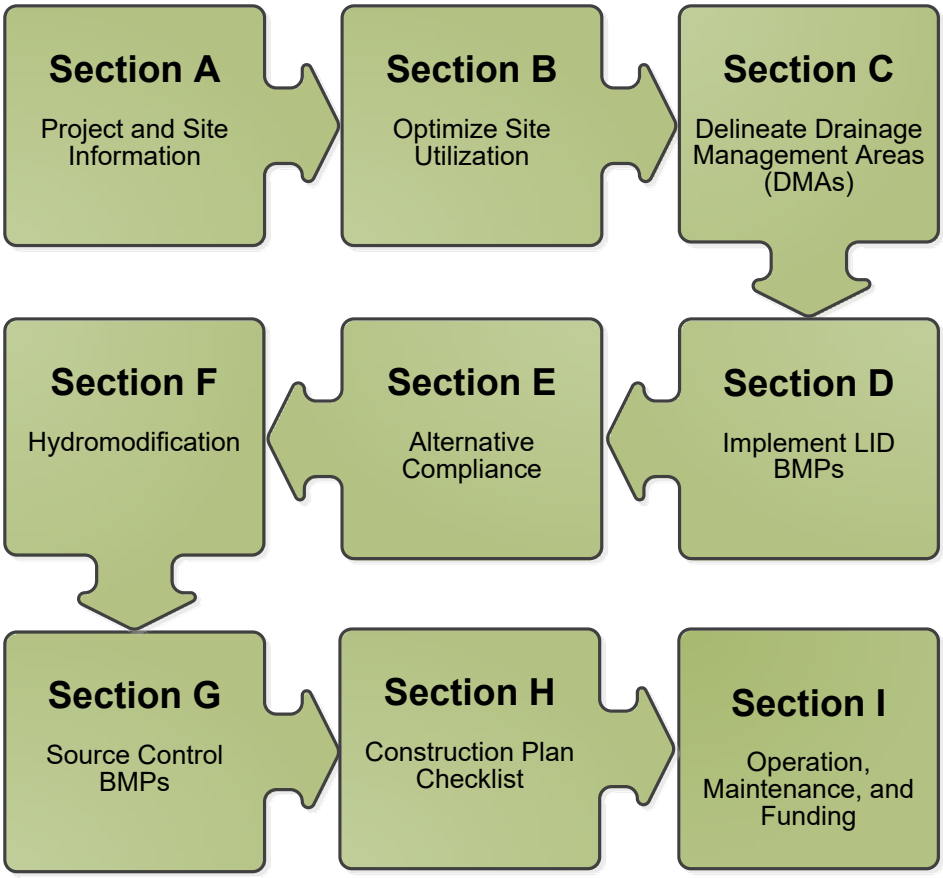
Original Date Prepared: December 2022

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
	Senior Engineer
Preparer's Printed Name	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 storm will gravity to the proposed public basin which is further described below.

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 leave the underground chambers via Line 5, which will be 12” RCP. Line 5 was sized to allow 8 CFS of inflow into the public underground storage chambers, which detains offsite flows. The invert of Line 5 as it exits the chamber will be set at the top of the HCOC ponding elevation, making sure only larger storm flows exit through Line 5. This elevation 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 catch basins in Sherman Road. The flows are then conveyed through proposed storm drain Line 3 across the north end of the project site, ultimately confluencing with the onsite flows in proposed public storm drain Line 4 in Trumble Road. As mentioned earlier, this project proposed to connect to existing City Line A within Illinois Avenue with proposed public Line 4. To maintain the gravity flow, the proposed upstream end of Line 4 at the project site is to be shallow with approximately 2 feet of cover from the future street finished surface. Due to the shallower elevation of the Line 4 pipe, these offsite flows need to be pumped up to Line 4 elevation. Line 3 discharges into a public maintained underground storage chamber, that is on the west side of the Ethanac Commerce Center project site. This storage chamber is sized to hold the 100-year, 3-hour storm peak volume. The flows will then be pumped out of the chamber utilizing a 10 CFS pump and will confluence with the treated onsite flows in Line 4.

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
- Source Control BMPs

- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- 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	90,873	D
R-A	ROOFS	407,336	D
H-A	HARDSCAPE	336,113	D
SR-A	LANDSCAPE	30,345	B

[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	30,345	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	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[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	☐	☐	☐	☐	☒
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

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.

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 Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
L-A	*90,768*	*Ornamental Landscaping*	*0.1*	*0.11*	*9,959.9*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
R-A	*407,336*	*Roofs*	*1*	*0.89*	*363,343.7*			
H-A	*336,463*	*Concrete or Asphalt*	*1*	*0.89*	*300,659.3*			
SR-A	*30,358*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,353.3*			
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{12}$	[G]
	864,925				676,848.1	0.61	34,406.4	128,629

[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)?

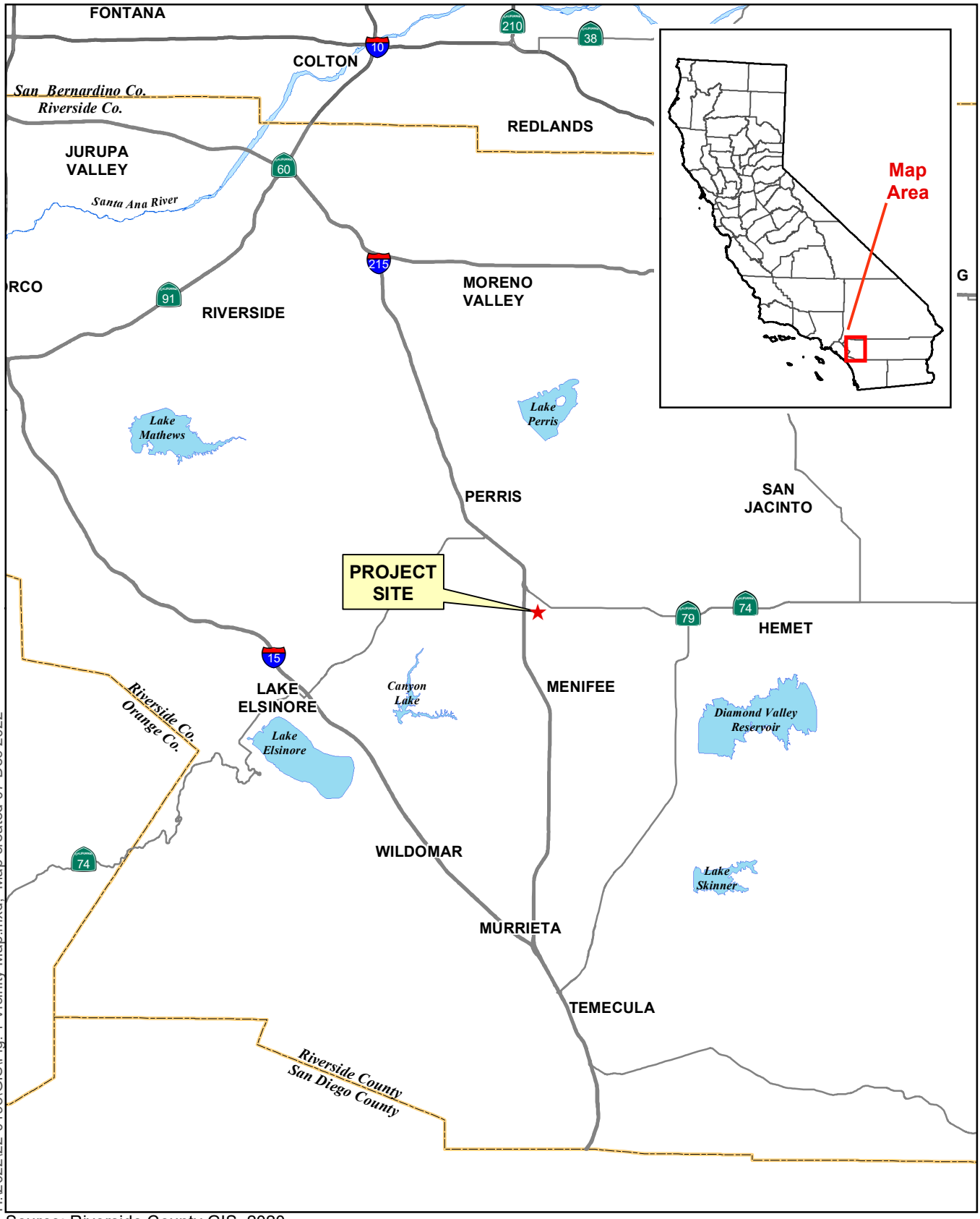
☐ Y ☒ N

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

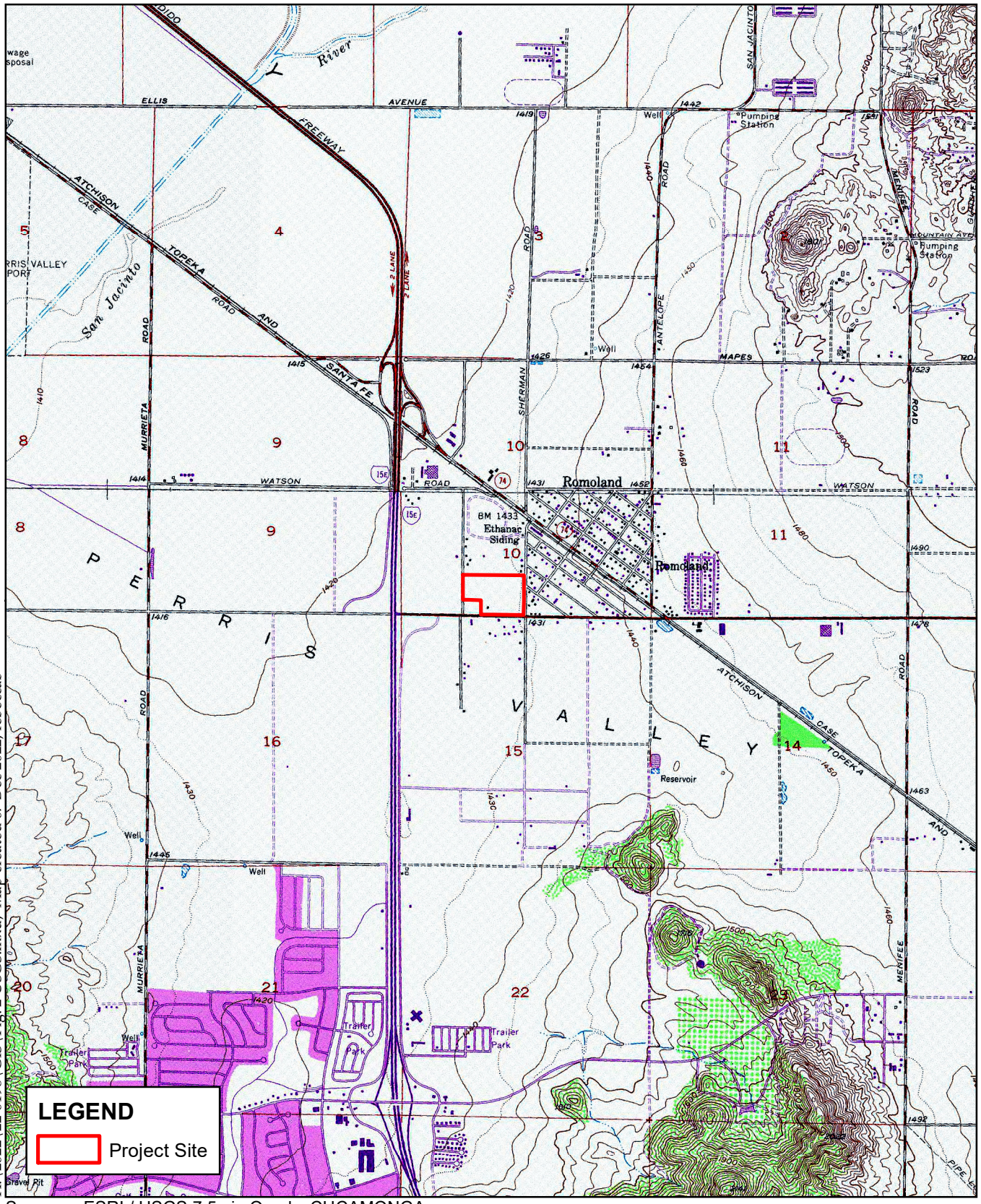
Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure 1 – Vicinity Map

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



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

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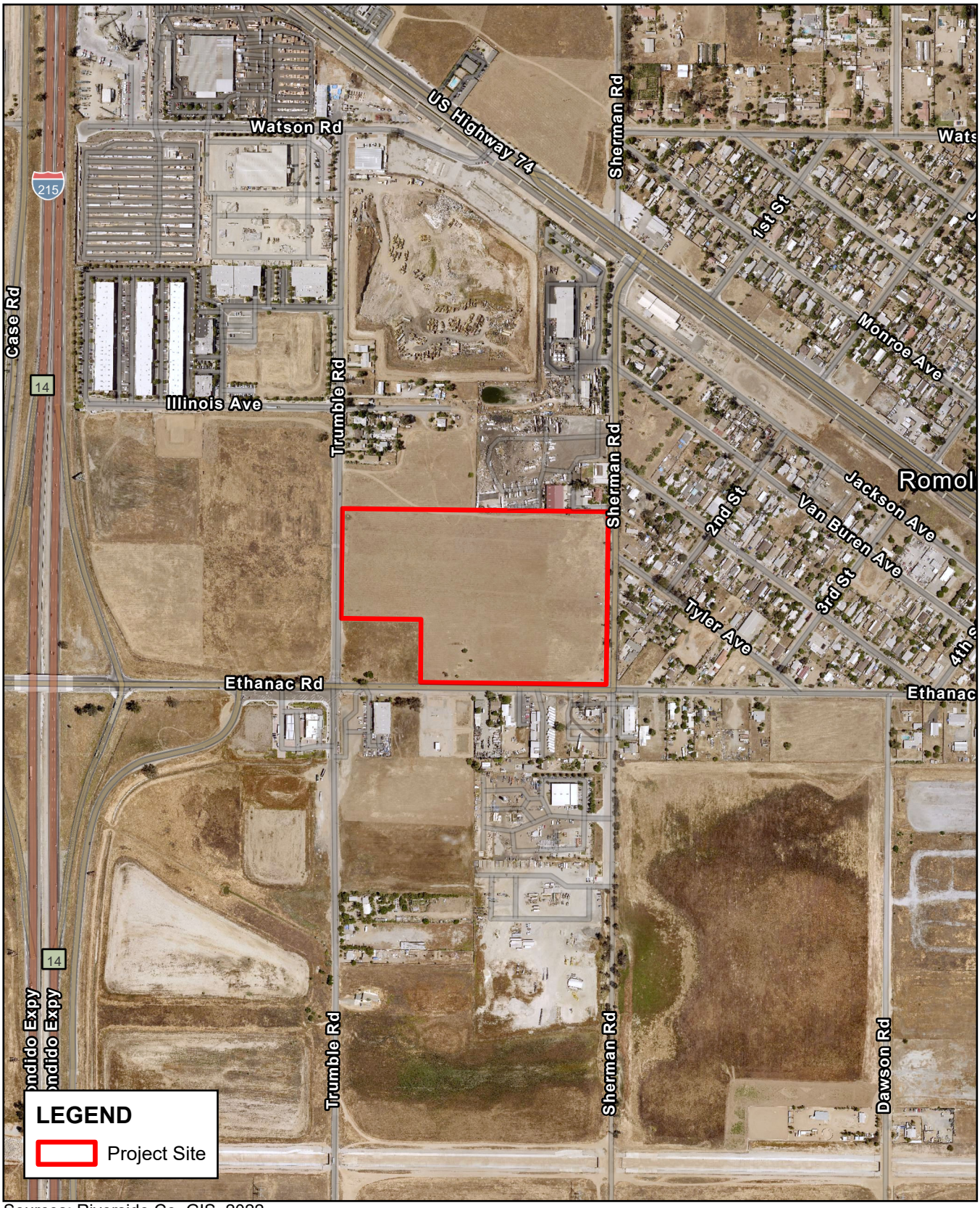
0 4,000 8,000 12,000 Feet

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

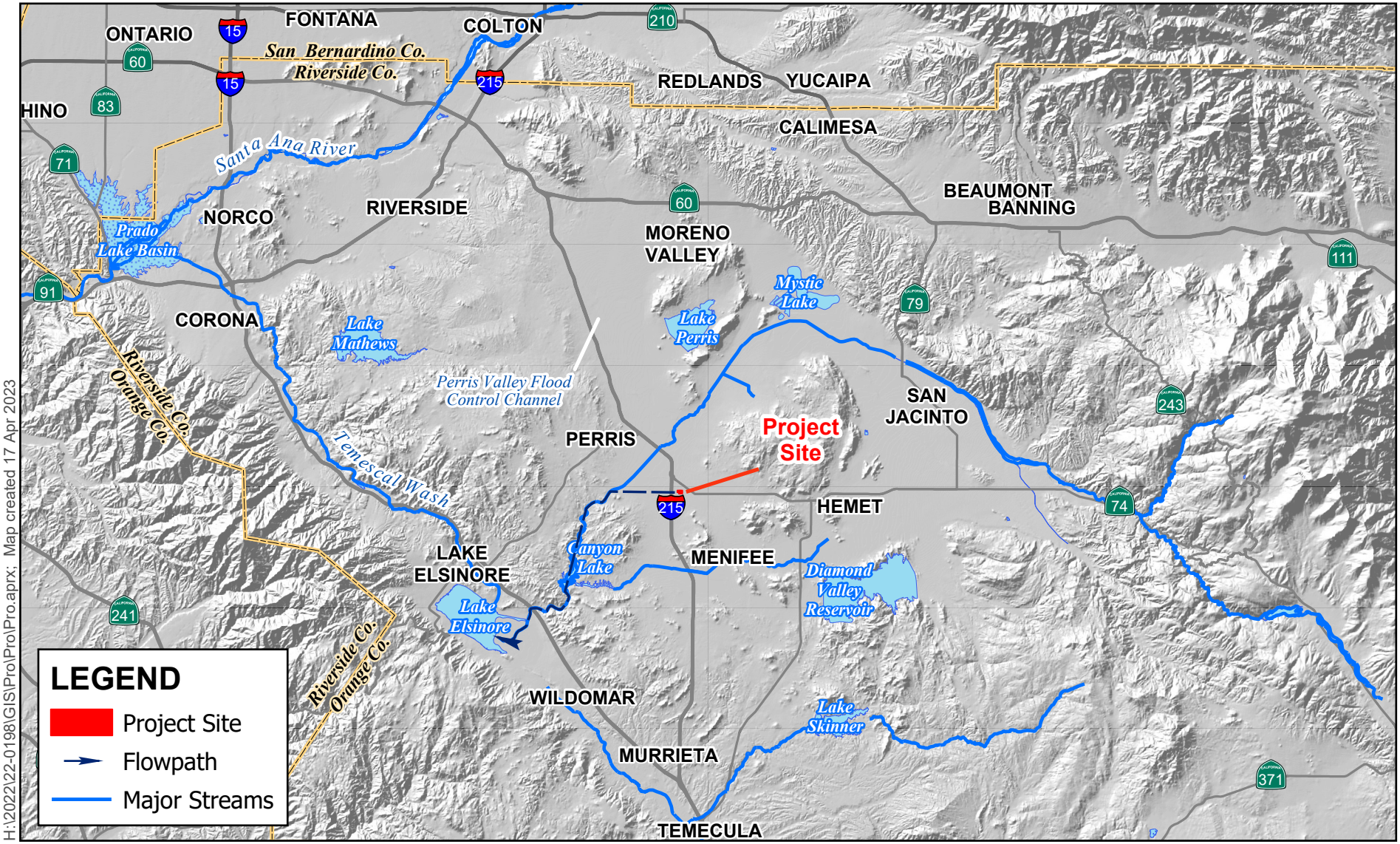
Sources: Riverside Co. GIS, 2022.

Figure 3 - Aerial Map

Ethanac Logistics Center

0 500 1,000 1,500 Feet

ALBERT A. WEBB ASSOCIATES



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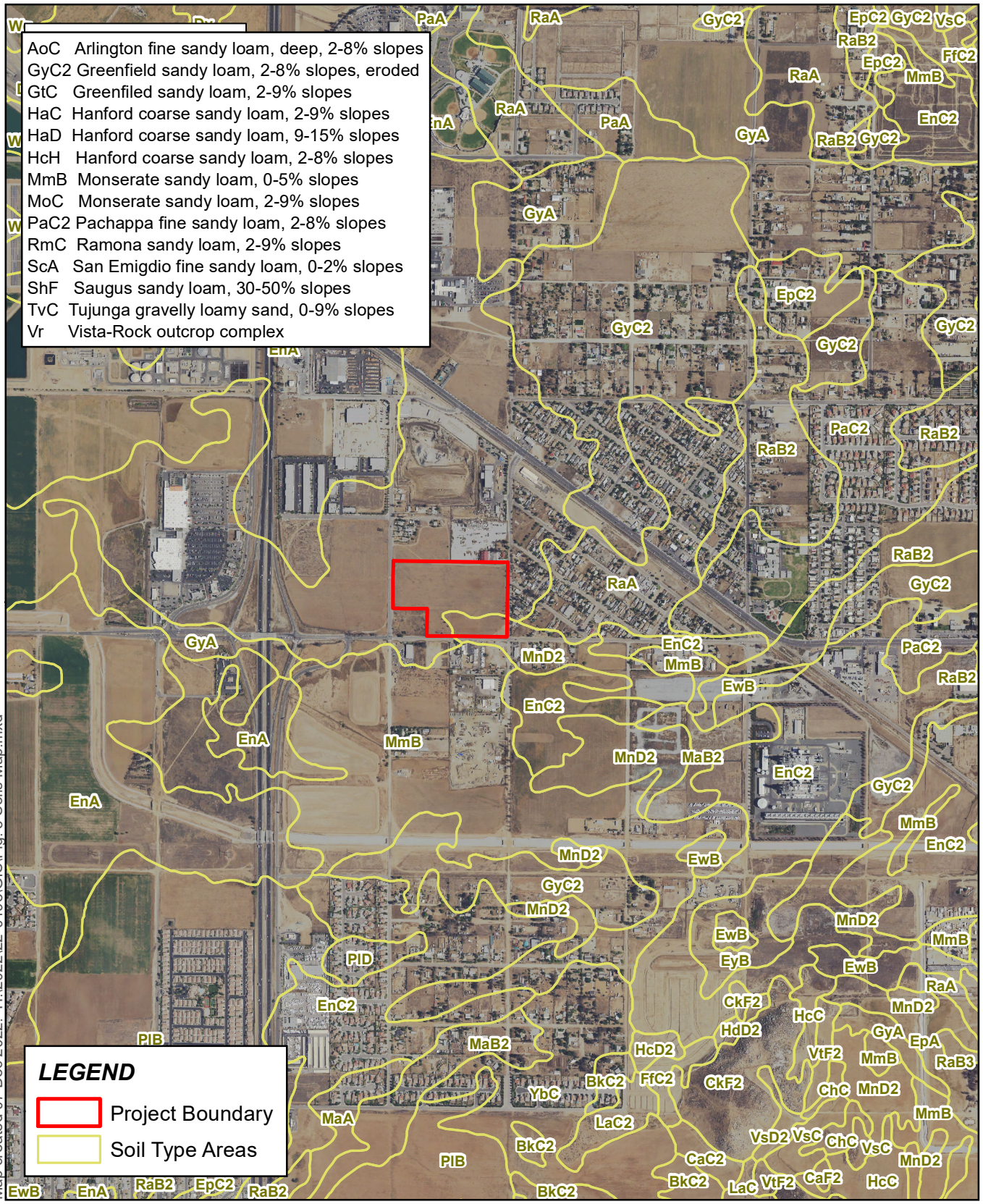
Sources: US NHD; USGS 30 Meter DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

Ethanac Logistics Center

ALBERT A. WEBB ASSOCIATES



Map created 07 Dec 2022. H:\2022\22-0198\GIS\Fig. 5 Soils Map.mxd

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

0 1,000 2,000 3,000 Feet

Figure 5 – Soils Map

Ethanac Logistics Center

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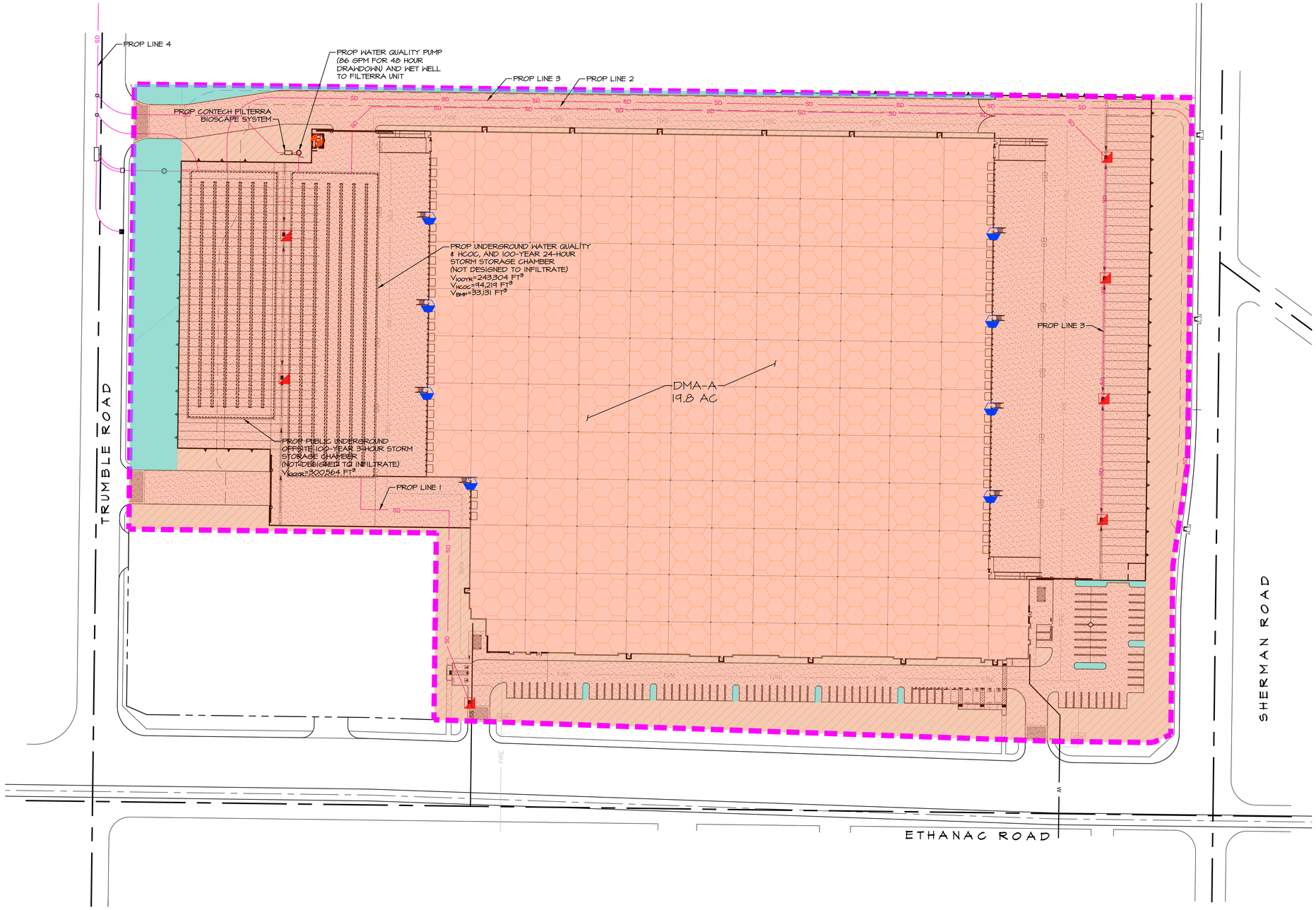

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- LANDSCAPING
- ROOF
- CONCRETE OR ASPHALT
- SELF RETAINING - DMA-A (ONSITE FLOWS)
- SELF RETAINING - DMA-B (OFFSITE 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	90873
	R-A	ROOF	407336
	H-A	HARDSCAPE	336113
	SR-A	SELF-RETAINING	30345

% IMPERVIOUS = (407336+336113)/864667 = 86.0%

DMA SITE MAP

DMA-A

N
W 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: 9/1/2023			SHEET 1
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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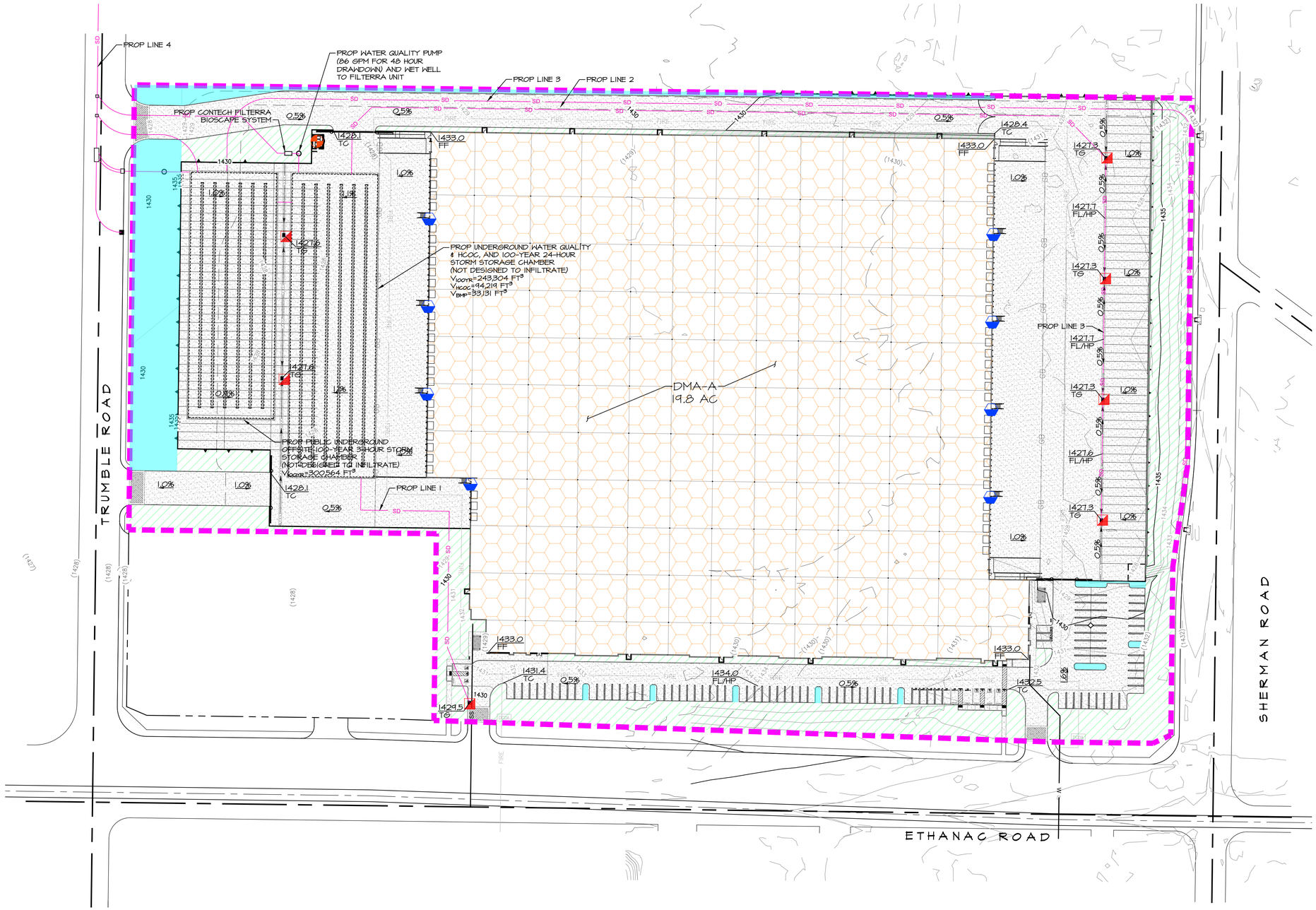

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- LANDSCAPING
- ROOF
- CONCRETE OR ASPHALT
- SELF RETAINING - DMA-A (ONSITE FLOWS)
- SELF RETAINING - DMA-B (OFFSITE 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	90873
	R-A	ROOF	407336
	H-A	HARDSCAPE	336113
	SR-A	SELF-RETAINING	30345

% IMPERVIOUS = (407336+336113)/864667 = 86.0%

N W E S

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: 9/1/2023		SHEET 2
DESIGNED: RSB		OF 3 SHEETS
CHECKED: SKK		
PLN CK REF:		DWG. NO.
F.B.		

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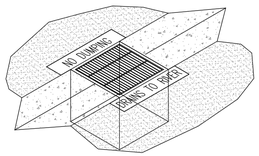
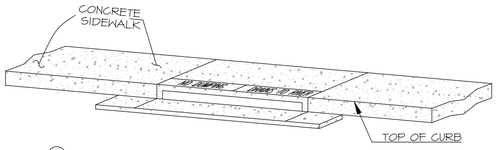
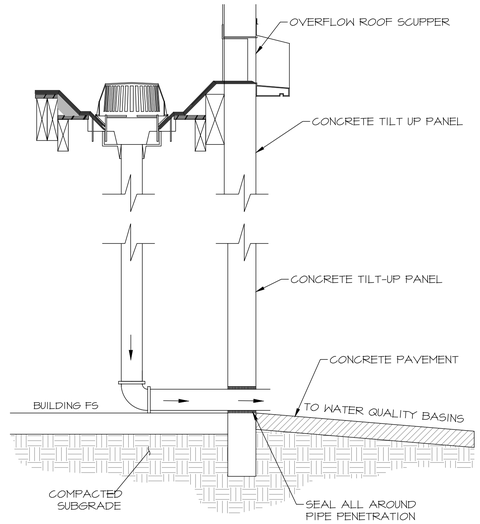




1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING - DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

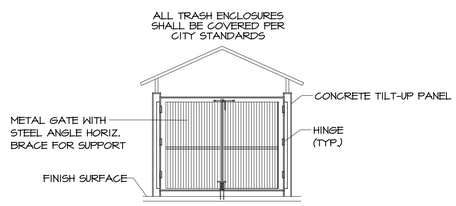
CATCH BASIN STENCILING DETAIL

NTS



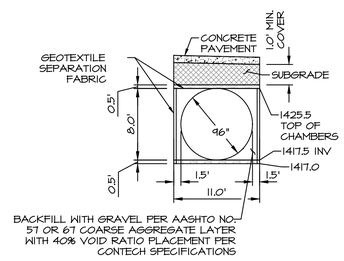
ROOF DRAIN DETAIL

N.T.S.



TRASH ENCLOSURE GATE ELEVATION

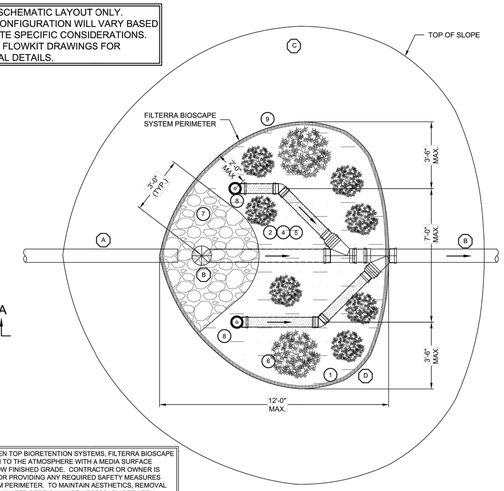
N.T.S.



CONTECH CMP UNDERGROUND DETENTION SYSTEM TYPICAL ROW CROSS SECTION

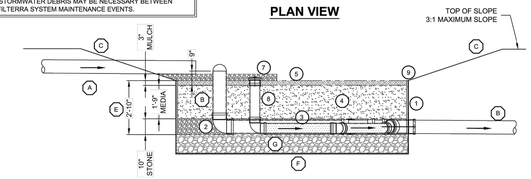
N.T.S.

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).

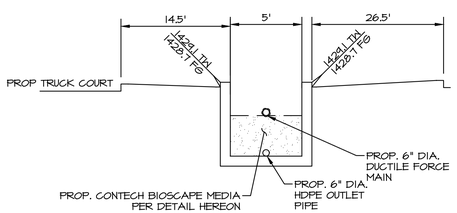
CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

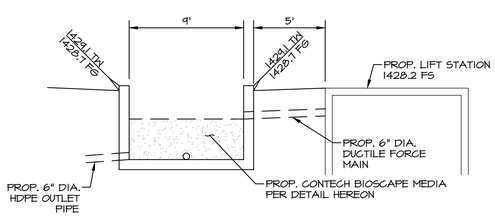
FILTERRA BIOSCAPE™ SYSTEM STANDARD DETAIL

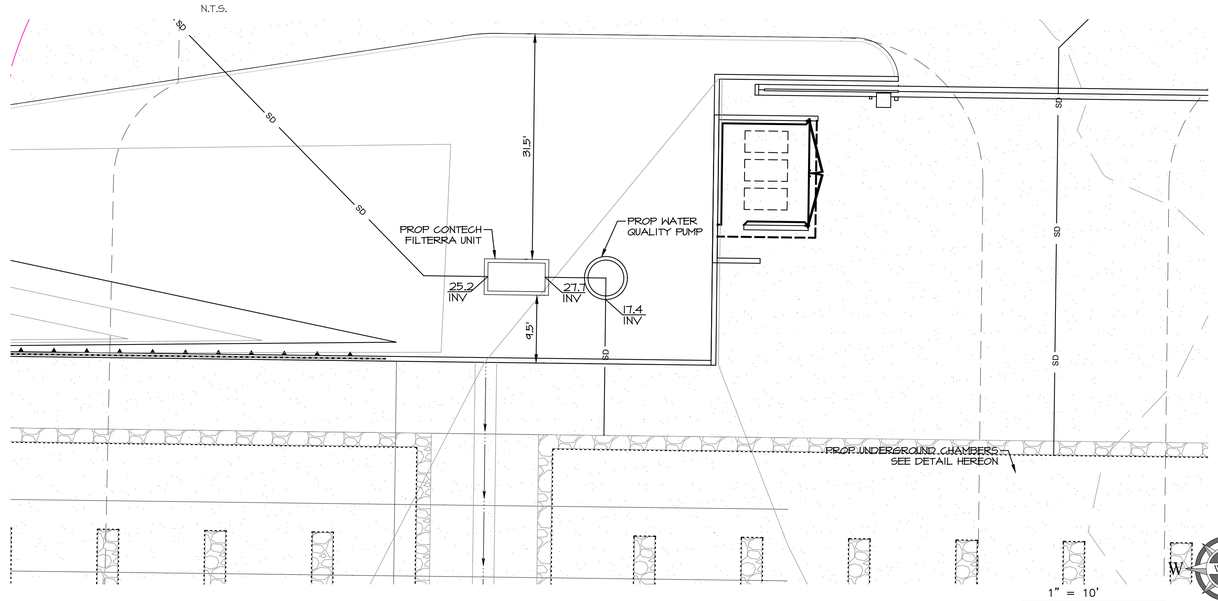
H:\COMMON\CAD\TRS\TMENT\54 FILTERRA\0 STANDARD DRAWINGS\FTRS - BIOSCAPE SYSTEM (BIOILESS)\SHOP\FILTERRA BIOSCAPE SUPERVISED SYSTEM - STD DETAIL.DWG 5/31/2023 8:57 AM

BMP-A

N.T.S.



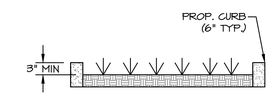




PLAN VIEW

CONTECH FILTERRA UNIT DETAIL

N.T.S.
SEE DETAIL HEREON



SELF-RETAINING FINGER ISLAND

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: 9/1/2023			SHEET 3
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			
PLN CK REF: REF			DWG. NO.
F.B. F.B.			

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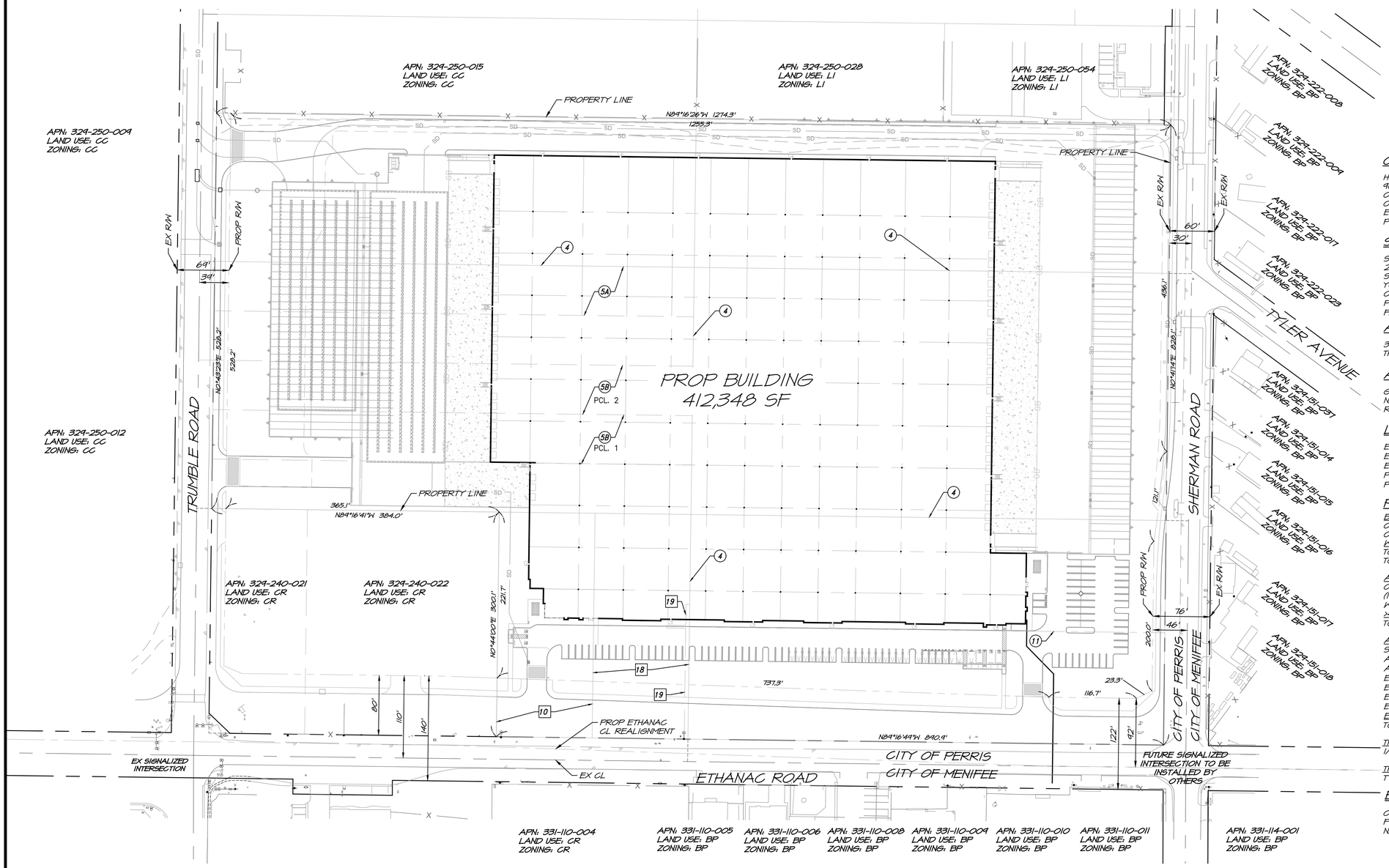
Appendix 2: Construction Plans

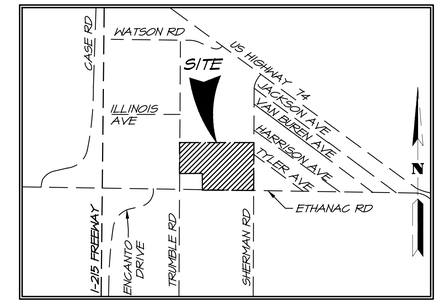
Grading and Drainage Plans

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) 256-5924

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

A.P.N.

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

ACREAGE

GROSS	21.6 AC
NET	19.9 AC
R/W	1.7 AC

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 REPRESENTATIVE

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

ENGINEER

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

ARCHITECT

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

TOPOGRAPHY SOURCE

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

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

SHEET 1 - TITLE SHEET
SHEET 2 - STREET AND GRADING SECTIONS
SHEET 3 - CONCEPTUAL GRADING
SHEETS 4,5 - CONCEPTUAL UTILITIES

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) 926-9244 PERRIS UNION HIGH SCHOOL DISTRICT (9-12) PHONE: (951) 943-6369

EASEMENT NOTES

SEE SHEET 2

LEGAL DESCRIPTION

SEE SHEET 2

1" = 70'

70 0 70 140 210

N W E S WEBB

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

CITY OF PERRIS

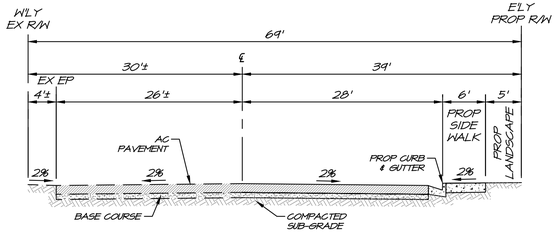
ETHANAC LOGISTICS CENTER
TITLE SHEET
DEVELOPMENT PLAN REVIEW NO. 22-00030

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

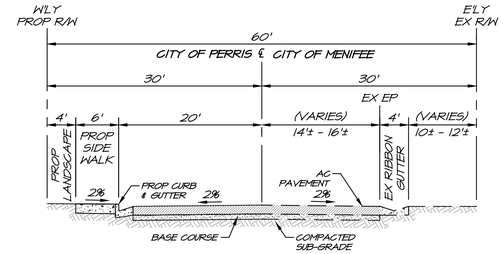
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

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

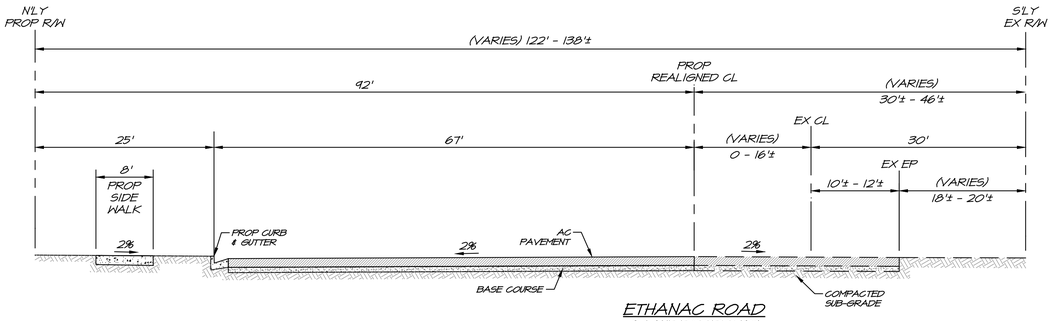
H:\2022\22-0198\DRAWINGS\ENTITLEMENT\22-0198-C-PP.DWG 9/1/2023 4:00:02 PM Rebecca



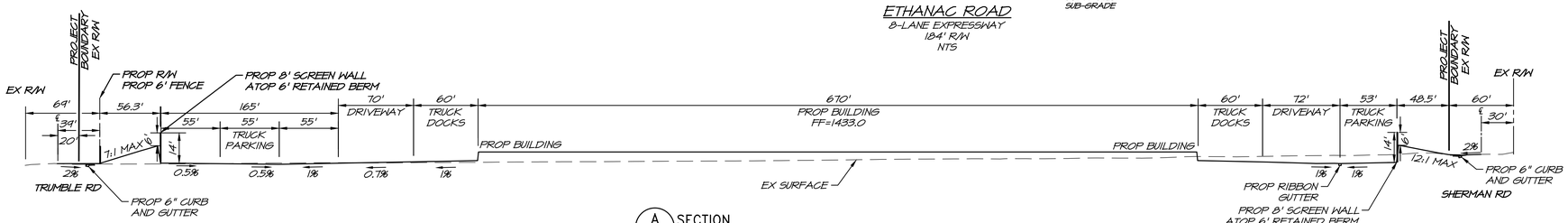
TRUMBLE ROAD
MAJOR COLLECTOR
78' R/W
NTS



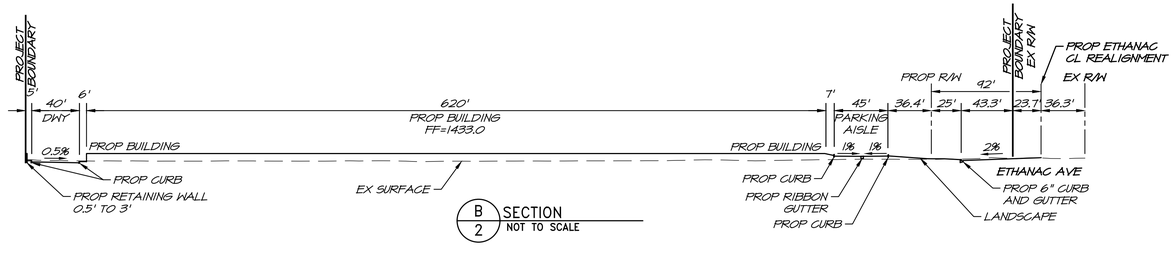
SHERMAN ROAD
LOCAL
60' R/W
NTS



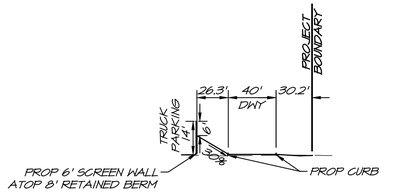
ETHANAC ROAD
8-LANE EXPRESSWAY
184' R/W
NTS



A/2 SECTION
NOT TO SCALE



B/2 SECTION
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 T33), **324-240-017** (AFFECTS THE PORTION OF LOT T34), **324-240-018** (AFFECTS THE PORTION OF LOT T34), **324-240-019** (AFFECTS THE PORTION OF LOT T34), **324-240-020** (AFFECTS THE PORTION OF LOT T34), **324-240-026** (AFFECTS THE LOT T37), **324-240-027** (AFFECTS THE PORTION OF LOT T38), **324-240-025** (AFFECT LOT T36).

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

PARCEL A:
LOTS T34, T37 AND THE SOUTH 198 FEET OF LOTS T33 AND T38 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 T36 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 T35 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 T35 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 T35; 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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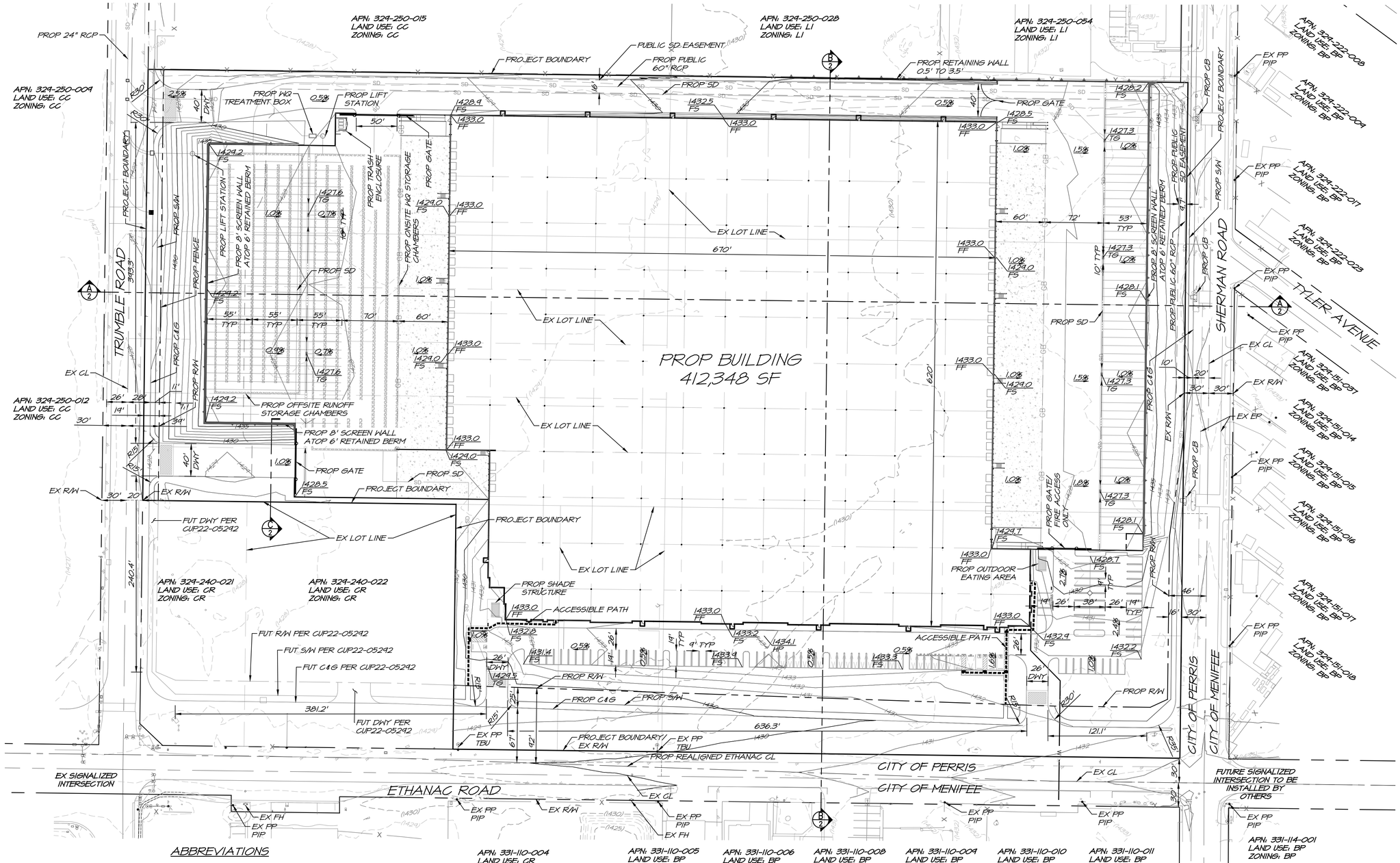

LEGEND

- 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

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.	

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3788 McCRAY STREET
RIVERSIDE CA. 92506
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W.O. 22-0198
SHEET 3 OF 5 SHEETS
DWG. NO.

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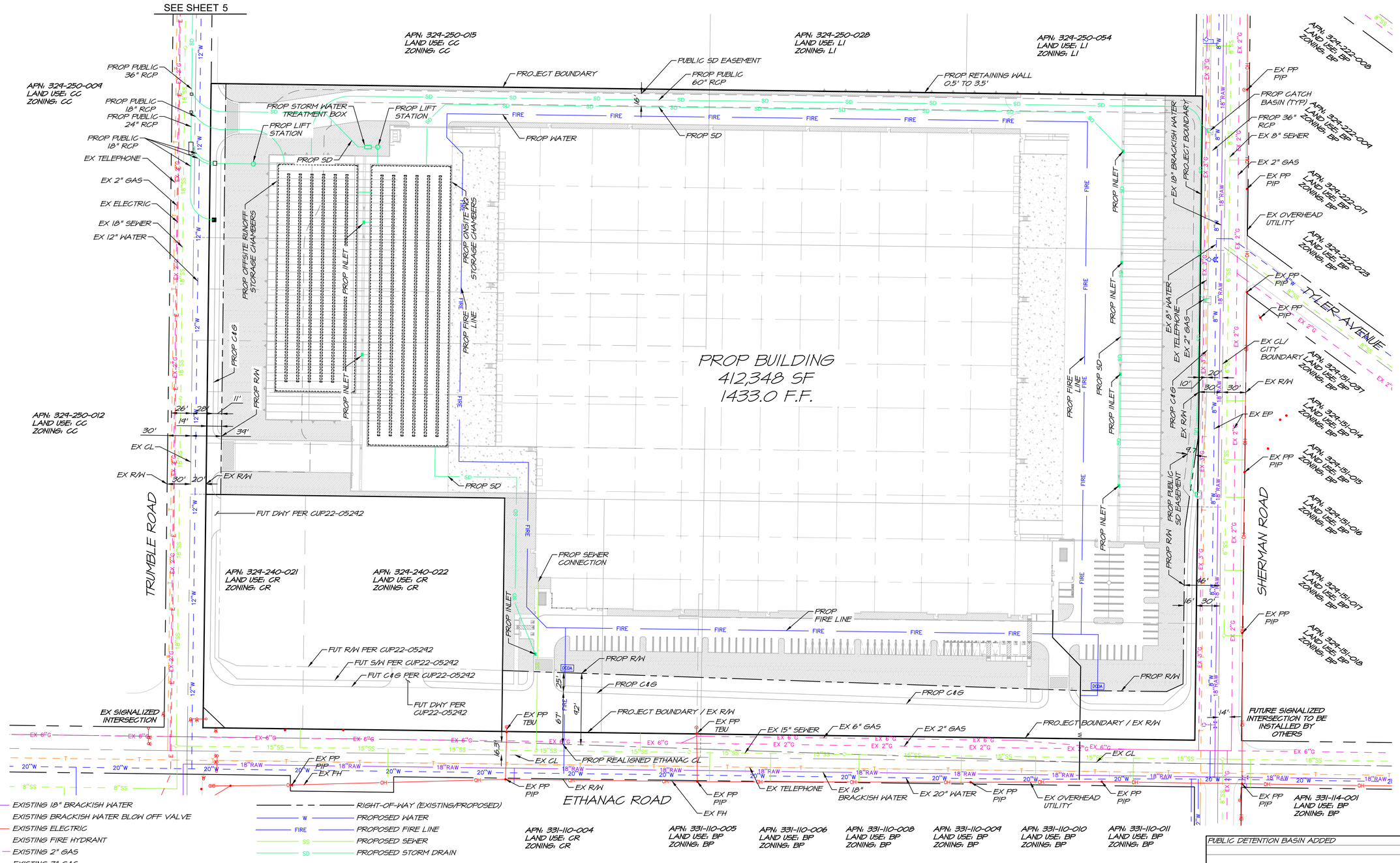

LEGEND

- 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

REVISIONS	DATE	BY
PUBLIC DETENTION BASIN ADDED	4/23	AG

PRELIMINARY

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.	

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

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SEE SHEET 4

LEGEND

- 18"RAW — EXISTING 18" BRACKISH WATER
- EXISTING BRACKISH WATER BLOW OFF VALVE
- E — EXISTING ELECTRIC
- EXISTING FIRE HYDRANT
- EX 2"G — EXISTING 2" GAS
- EX 3"G — EXISTING 3" GAS
- EX 6"G — EXISTING 6" GAS
- OH — EXISTING OVERHEAD UTILITY
- 6"SS — EXISTING 6" SEWER
- 8"SS — EXISTING 8" SEWER
- 15"SS — EXISTING 15" SEWER
- 18"SS — EXISTING 18" SEWER
- EXISTING SEWER MANHOLE
- 36"SD — EXISTING 36" STORM DRAIN
- 48"SD — EXISTING 48" STORM DRAIN
- T — EXISTING TELEPHONE
- 8"W — EXISTING 8" WATER
- 12"W — EXISTING 12" WATER
- 20"W — EXISTING 20" WATER
- PROJECT BOUNDARY
- RIGHT-OF-WAY (EXISTING/PROPOSED)
- W — PROPOSED WATER
- FIRE — PROPOSED FIRE LINE
- SS — PROPOSED SEWER
- SD — 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
DESIGNED: AG
CHECKED: SK
PLN CK REF:
F.B.

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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

SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

February 23, 2022

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

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

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APPENDICES

A Plate 1: Site Location Map
Plate 2: Boring Location Plan
Plate 3: Geologic Map
B Boring Logs
C Laboratory Test Results
D Grading Guide Specifications
E Seismic Design Parameters

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

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements.

7.0 GENERAL COMMENTS

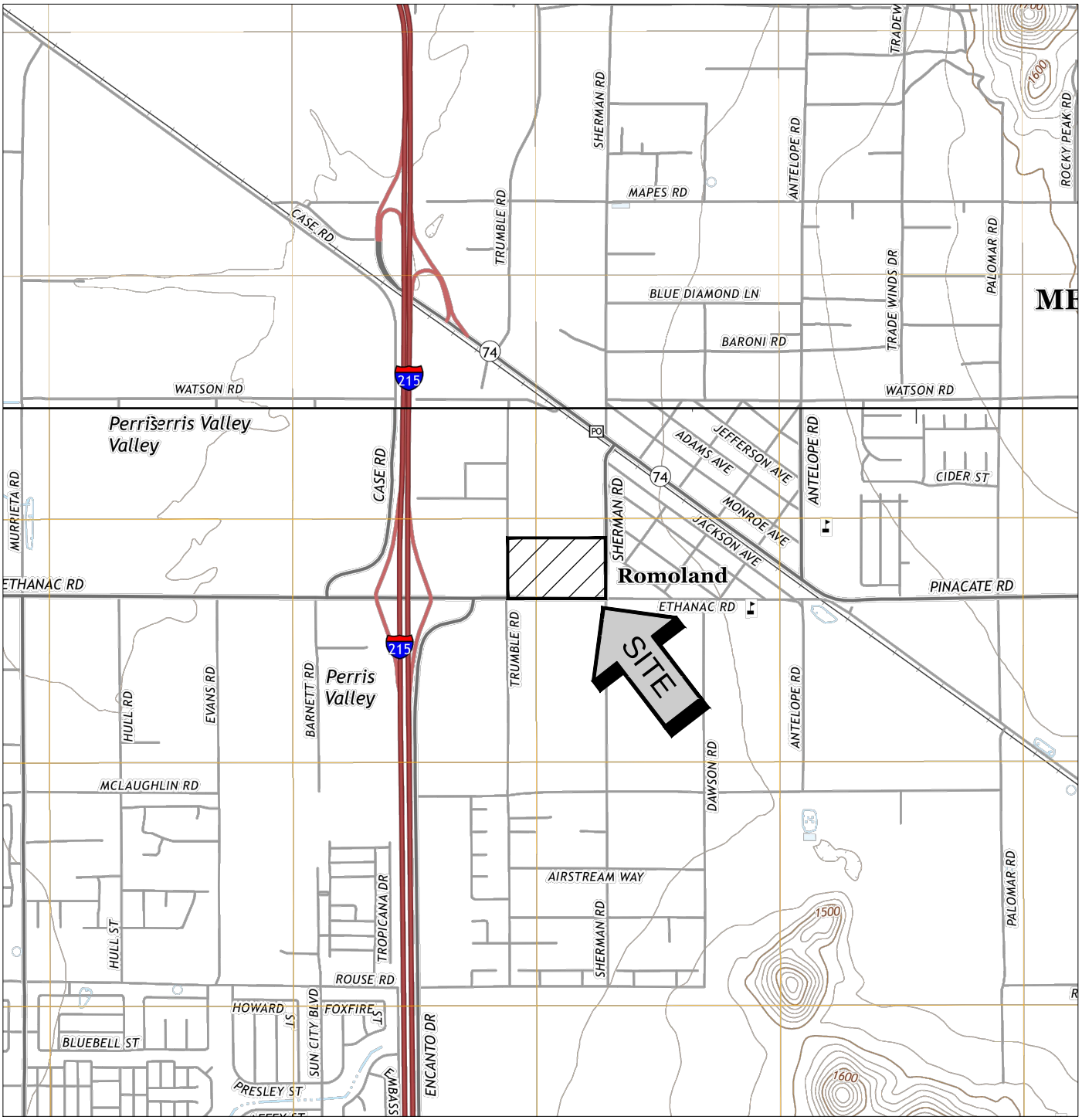
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

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

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

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

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE ROMOLAND & PERRIS QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: MD
CHKD: DN

SCG PROJECT
22G107-1

PLATE 1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

NORTH
SoCalGeo

NOTE: CONCEPTUAL SITE PLAN (SCHEME 7) PREPARED BY HERDMAN ARCHITECTURE + DESIGN.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH (2018)

BORING LOCATION PLAN

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 100'

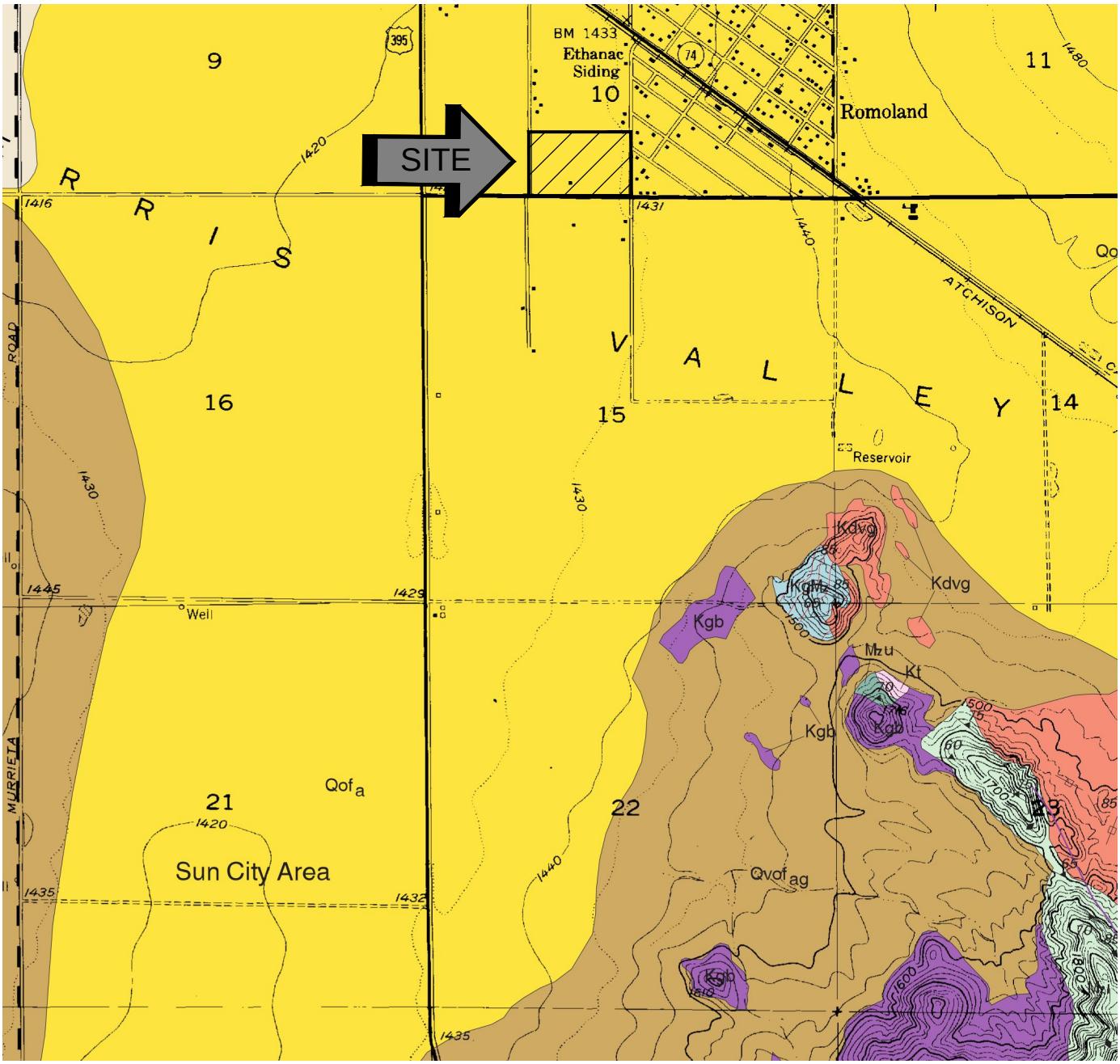
DRAWN: OS
CHKD: RGT

SCG PROJECT
22G107-1

PLATE 2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



DESCRIPTION OF MAP UNITS

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Reddish brown, gravel and sand alluvial fan deposits; indurated, commonly slightly dissected. In places includes thin alluvial fan deposits of Holocene age

Kdvg — **Granodiorite to tonalite**—Relatively uniform, massive hornblende biotite granodiorite grading into tonalite. Principal rock type of Domenigoni Valley pluton. Contains some mafic rich rocks in southern part of pluton. Common accessory minerals are zircon, sphene, apatite, and magnetite-ilmenite.

SOURCE: "GEOLOGIC MAP OF THE ROMOLAND 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA" BY D. M. MORTON.

GEOLOGIC MAP
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA

SCALE: 1" = 2000'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: DN	
SCG PROJECT 22G107-1	
PLATE 3	

APPENDIX B

BORING LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

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

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		47	4.5		OLDER ALLUVIUM: Red Brown fine to coarse Sandy Clay, trace Silt, hard-moist	123	10					
		50/5"				116	11					
5		77/11"	4.5		Red Brown fine Sandy Clay, trace Silt, hard-damp to moist	124	8					
		82	4.5			125	9					
10		80/10"			@ 8½ feet, trace medium to coarse Sand	116	8					
		59			GRANODIORITE TO TONALITE (Kdvg): Light Gray Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, dense to very dense-moist		10					
15												
		53					7					
20												
		46					8					
25					Boring Terminated at 25'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	68	4.0		OLDER ALLUVIUM: Light Brown fine to coarse Sandy Clay, trace Silt, hard-damp		8					
	X	82/11"					8					
5												
	X	80/11"	3.5		Light Brown to Brown fine Sandy Clay, very stiff to hard-moist to very moist		11					
	X	24	2.5				23					
10					Light Brown Clayey fine to coarse Sand to fine to coarse Sandy Clay, trace Silt, medium dense to very stiff-damp to moist to very moist		6					
	X	14					15					
15												
					Light Brown to Brown fine to coarse Sand, trace Silt, medium dense-damp							
	X	16					6					
20												
					Boring Terminated at 20'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	70/9"	4.5		OLDER ALLUVIUM: Dark Brown fine to coarse Sandy Clay, trace Silt, hard-damp to moist		8					
	X	50/4"					6					
5												
	X	42	4.5				11					
	X	43			Brown Clayey fine to coarse Sand, dense-damp		5					
10												
	X	40					6					
15												
					Boring Terminated at 20'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	36	4.5		OLDER ALLUVIUM: Dark Red Brown fine to medium Sandy Clay, trace Silt, very stiff to hard-moist to very moist	126	9					
	X	57	4.5			120	15					
5	X	72/10"	4.5			131	10					
	X	43			GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, medium dense to dense-moist	122	9					
10	X	49				121	8					
	X	26					7					
15					Boring Terminated at 15'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	42	4.5		OLDER ALLUVIUM: Red Brown fine to medium Sandy Clay, trace Silt, hard-moist		10					
	X	73	3.0				10					
5												
	X	31			GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, medium dense to dense-moist		9					
	X	39					9					
10												
	X	18					12					
15												
	X	41					8					
20												
					Boring Terminated at 15'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Dark Red Brown fine to medium Sandy Clay, trace Silt, hard-moist							
		70/11"	4.5			114	14					EI = 62 @ 0 to 5'
		77/11"	4.5			113	13					
5		58	4.5			123	10					
		64	4.5			130	10					
		45	4.5			128	11					
10												
					GRANODIORITE TO TONALITE (Kdvg): Light Gray Brown Clayey fine- to coarse-grained granodiorite to tonalite, friable, highly weathered, very dense-moist							
		82/11"					10					
15												
		55					10					
20												
		55					9					
25												
					Boring Terminated at 25'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 4 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	80	4.5		OLDER ALLUVIUM: Light Brown fine Sandy Clay, trace medium Sand, trace Silt, hard-damp to moist		10					
	X	60					7					
5												
	X	80	4.5				9					
	X	50/5"	2.0		@ 8½ feet, stiff to very stiff		9					
10												
					Boring Terminated at 10'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 22G107-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

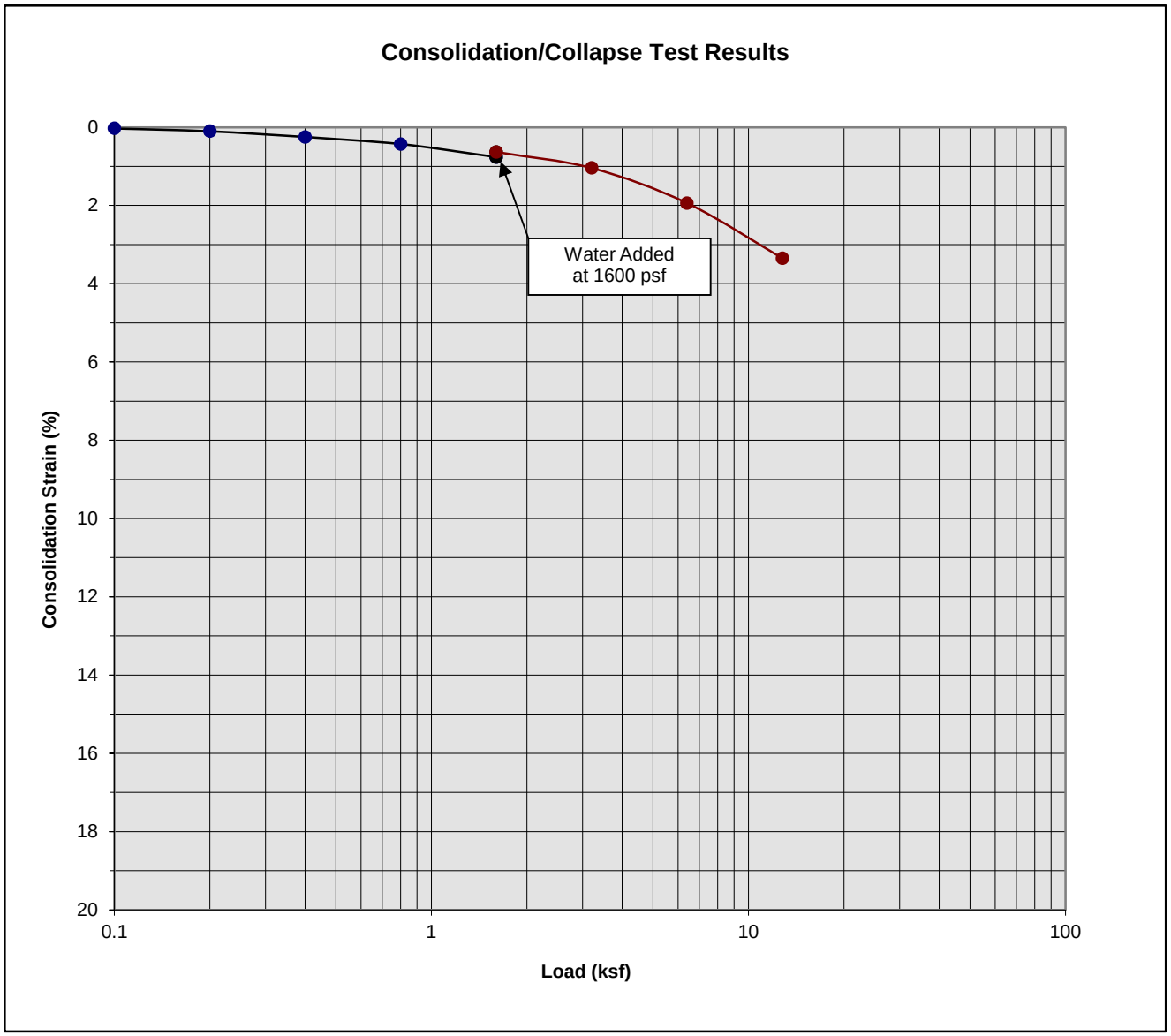
DRILLING DATE: 1/21/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Oscar Sandoval

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	85	4.5		OLDER ALLUVIUM: Dark Brown fine to medium Sandy Clay, trace Silt, trace coarse Sand, hard-moist		10					
	X	65/11"					9					
5												
	X	50/5"	4.5				9					
	X	87/10"					12					
10												
					Boring Terminated at 10'							

TBL 22G107-1.GPJ SOCALGEO.GDT 2/23/22

APPENDIX C

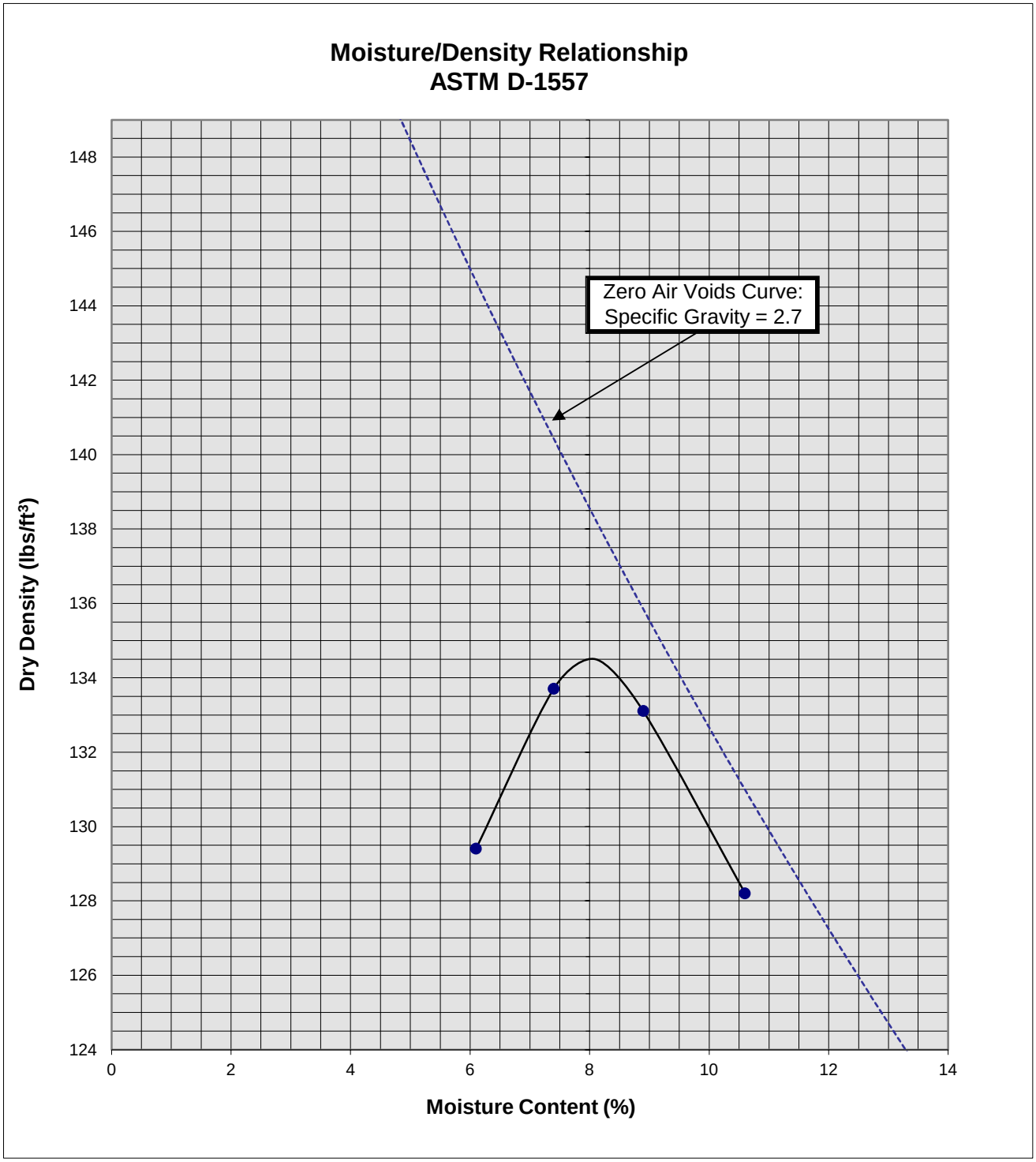


Classification: Dark Red Brown fine to medium Sandy Clay, trace Silt

Boring Number:	B-4	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	3 to 4	Initial Dry Density (pcf)	119.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.13

Proposed Warehouse
Perris, California
Project No. 22G107-1
PLATE C- 1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-1 @ 0 to 5'
Optimum Moisture (%)	8
Maximum Dry Density (pcf)	134.5
Soil Classification	Red Brown fine to coarse Sandy Clay, trace Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-1
PLATE C-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

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

General

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

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

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

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

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

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

Site Preparation

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

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

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

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

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

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

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

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

Compacted Fills

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Foundations

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

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

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

Fill Slopes

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

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

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

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

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

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

Cut Slopes

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

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

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

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

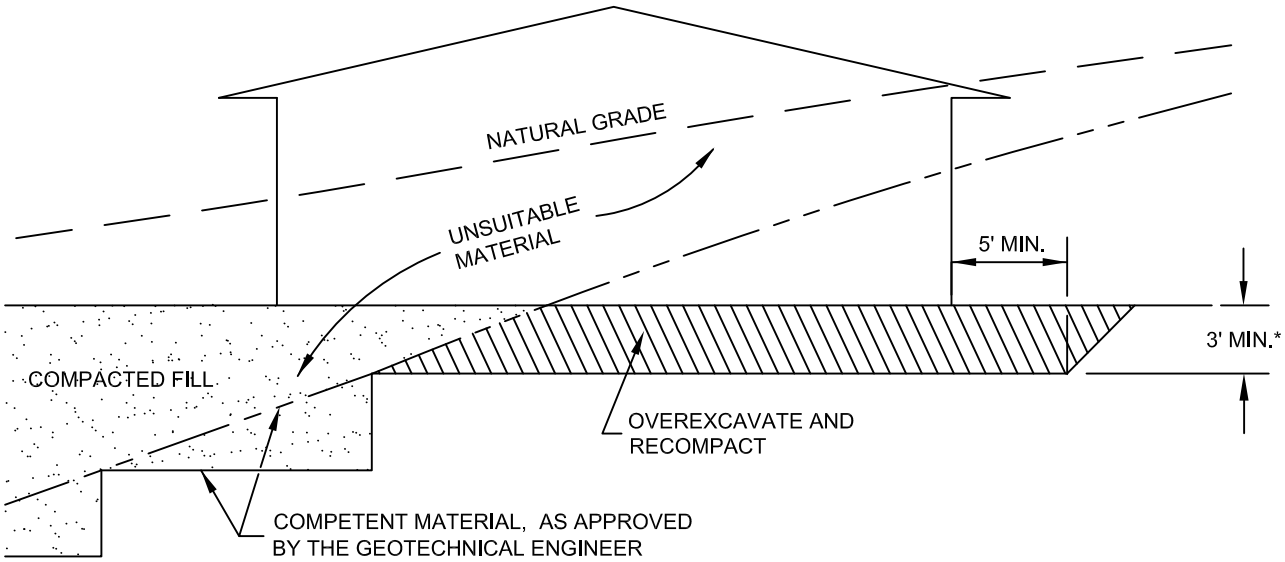
Subdrains

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

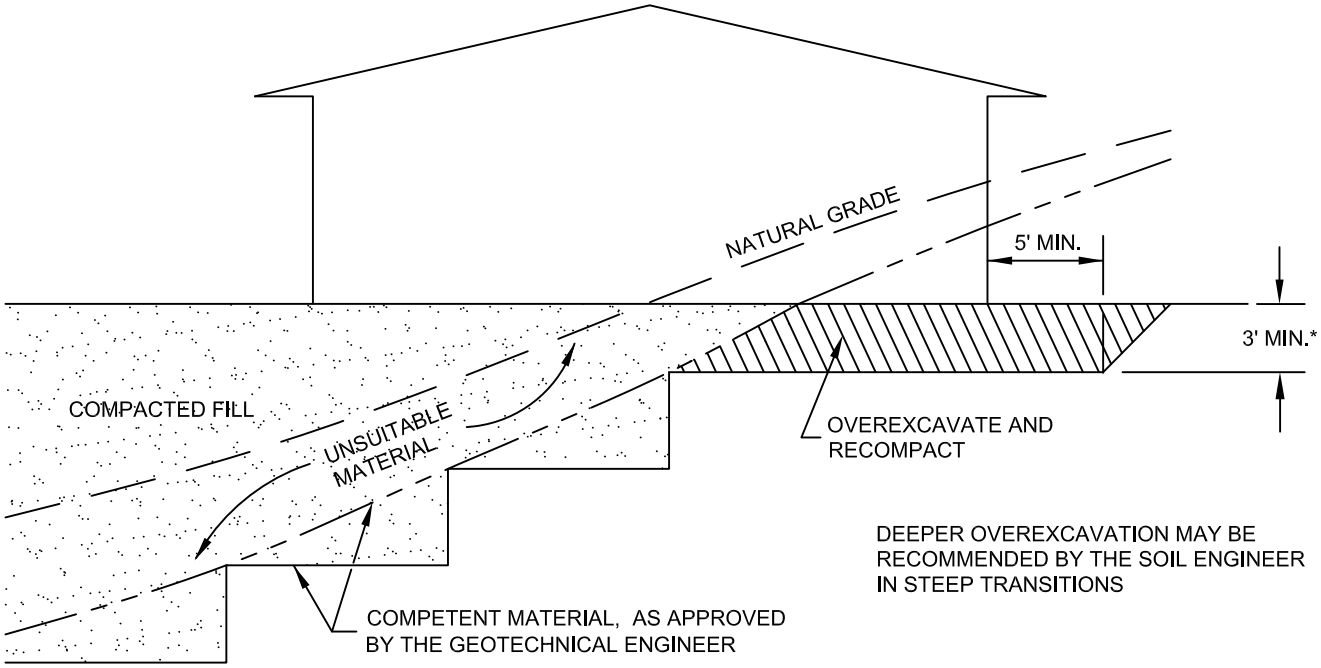
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

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

CUT LOT



CUT/FILL LOT (TRANSITION)



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

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

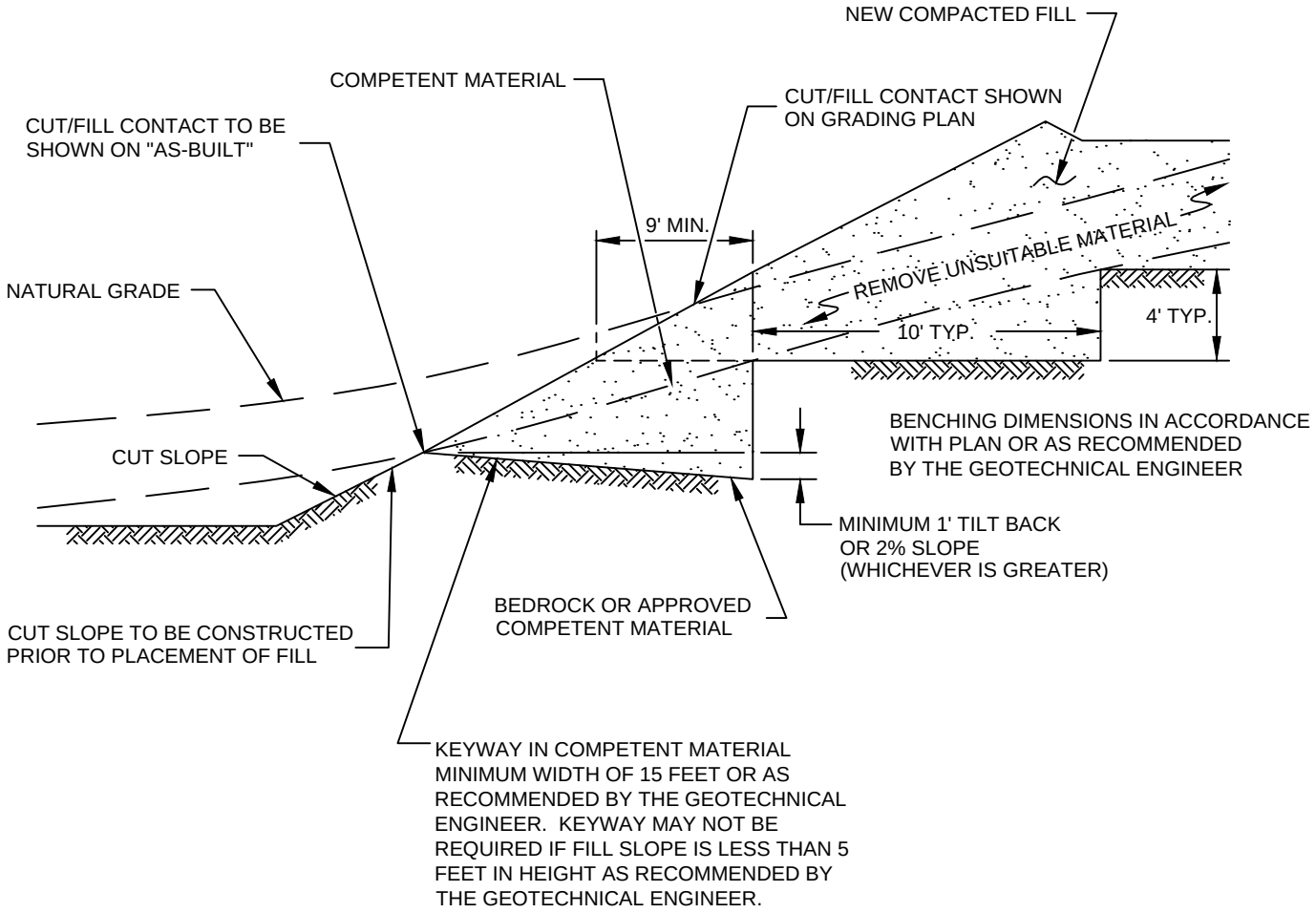
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

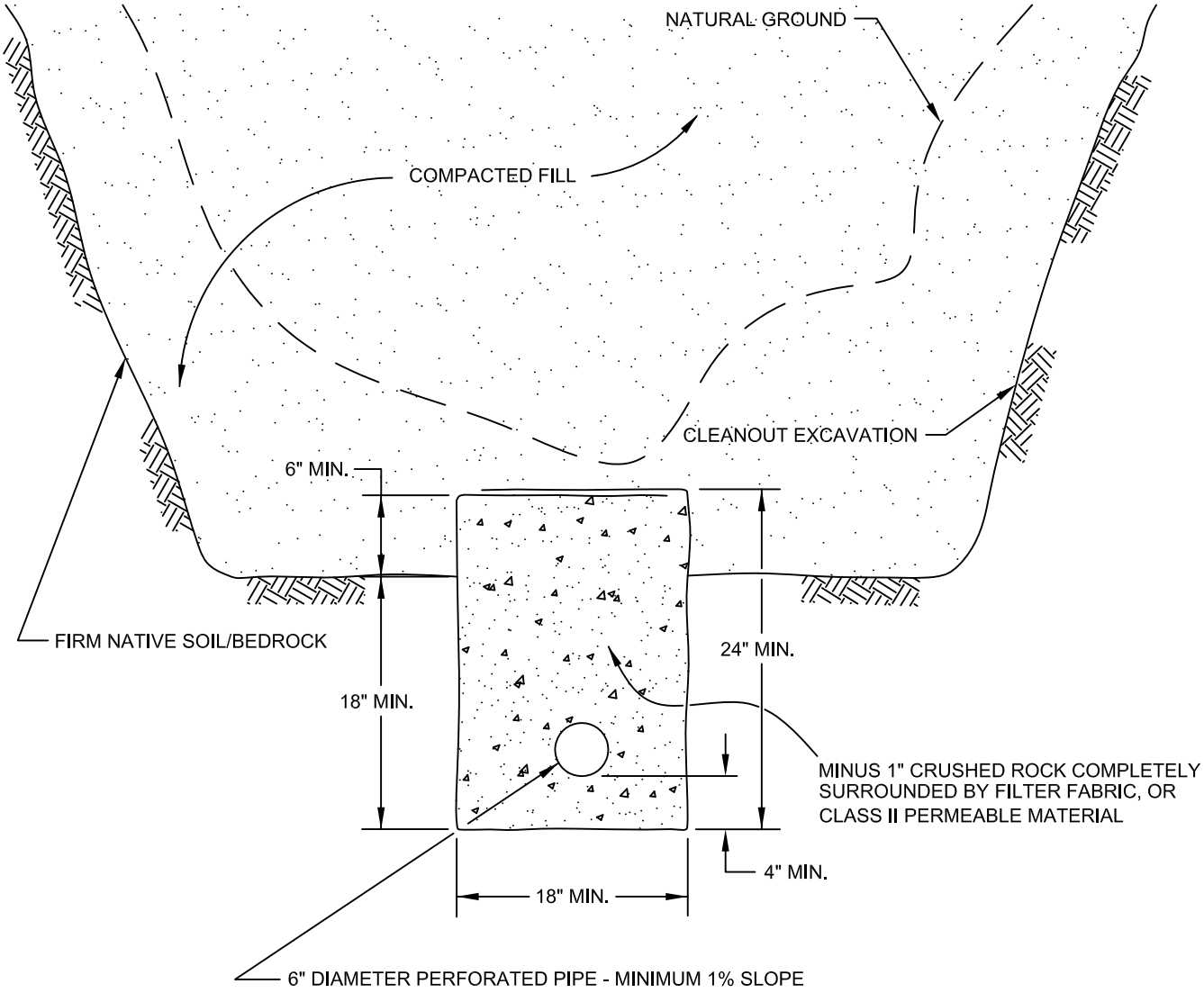
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



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

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

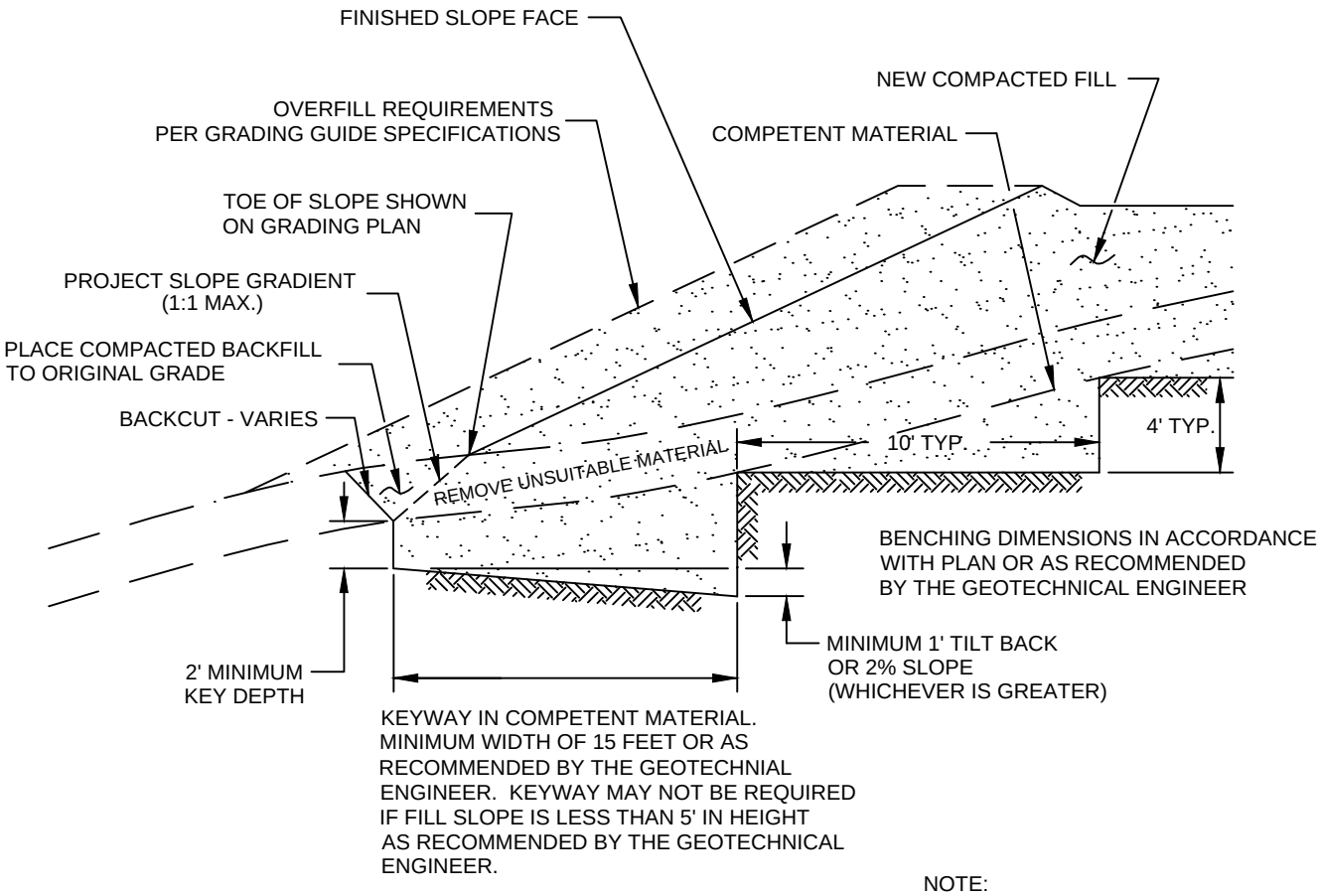
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SOUTHERN CALIFORNIA GEOTECHNICAL



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

FILL ABOVE NATURAL SLOPE DETAIL

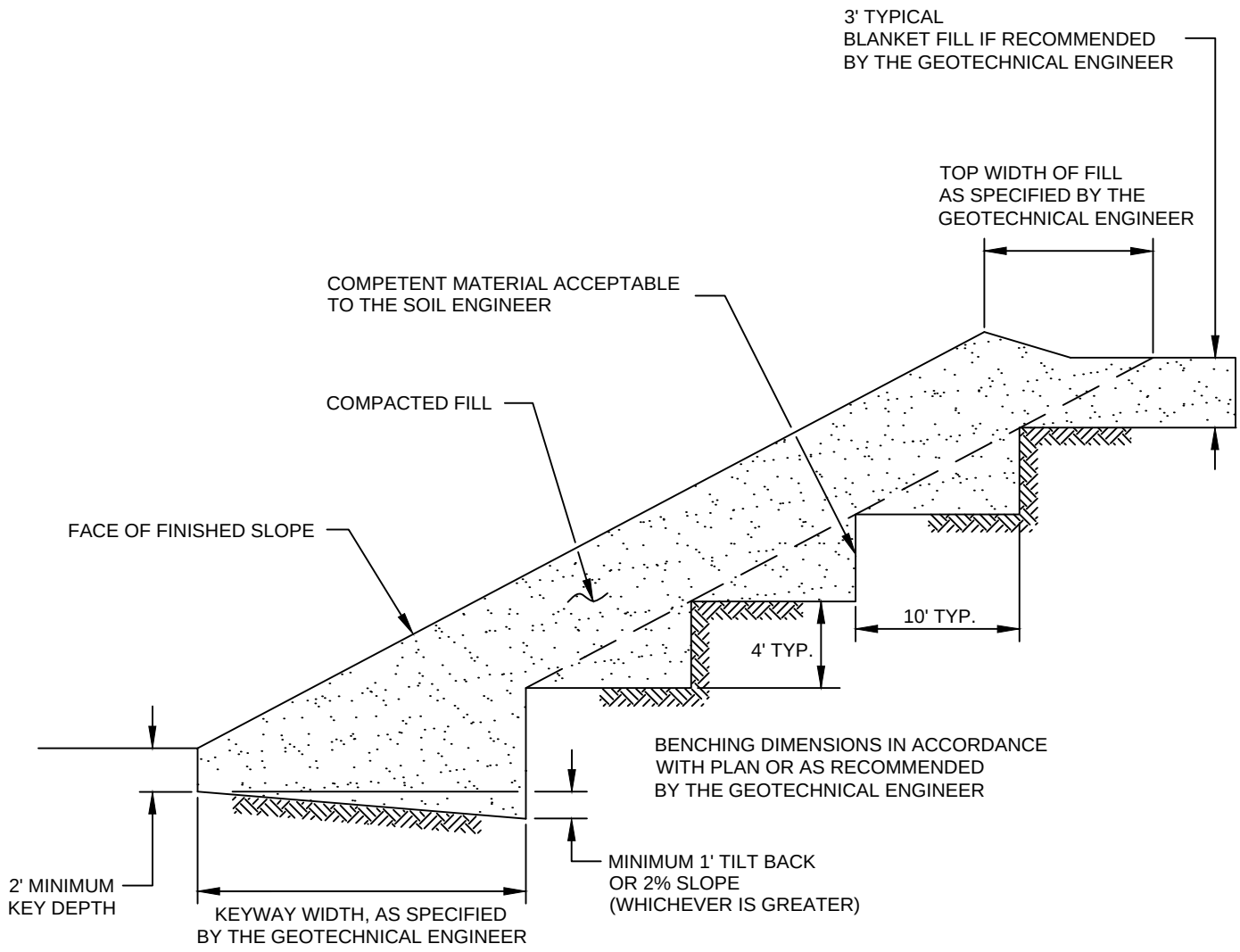
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

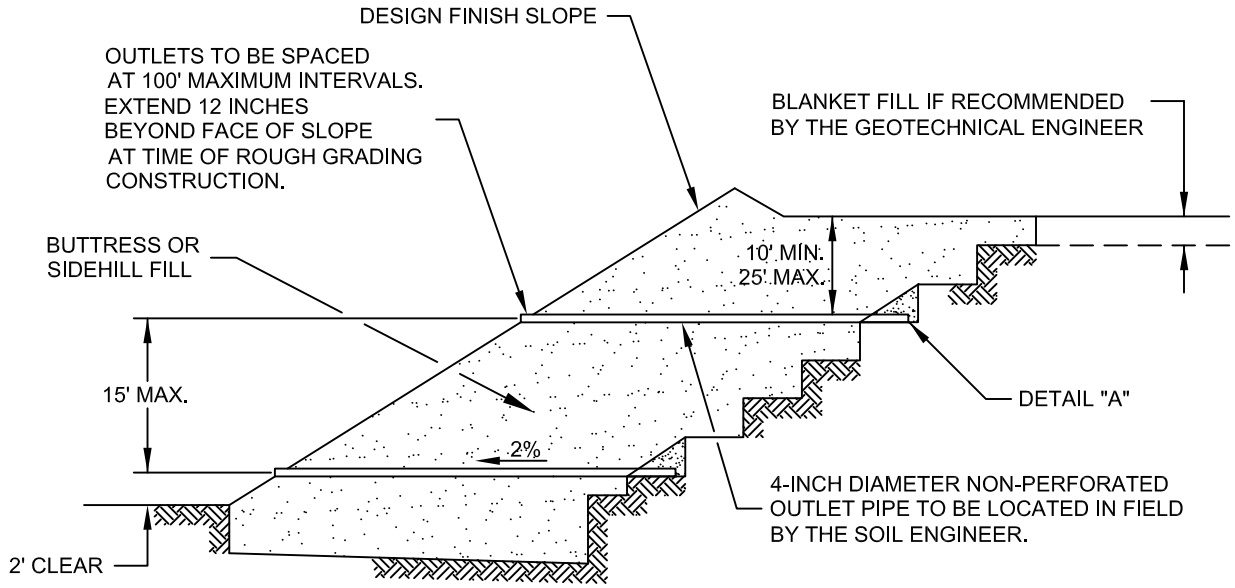
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SOUTHERN CALIFORNIA GEOTECHNICAL



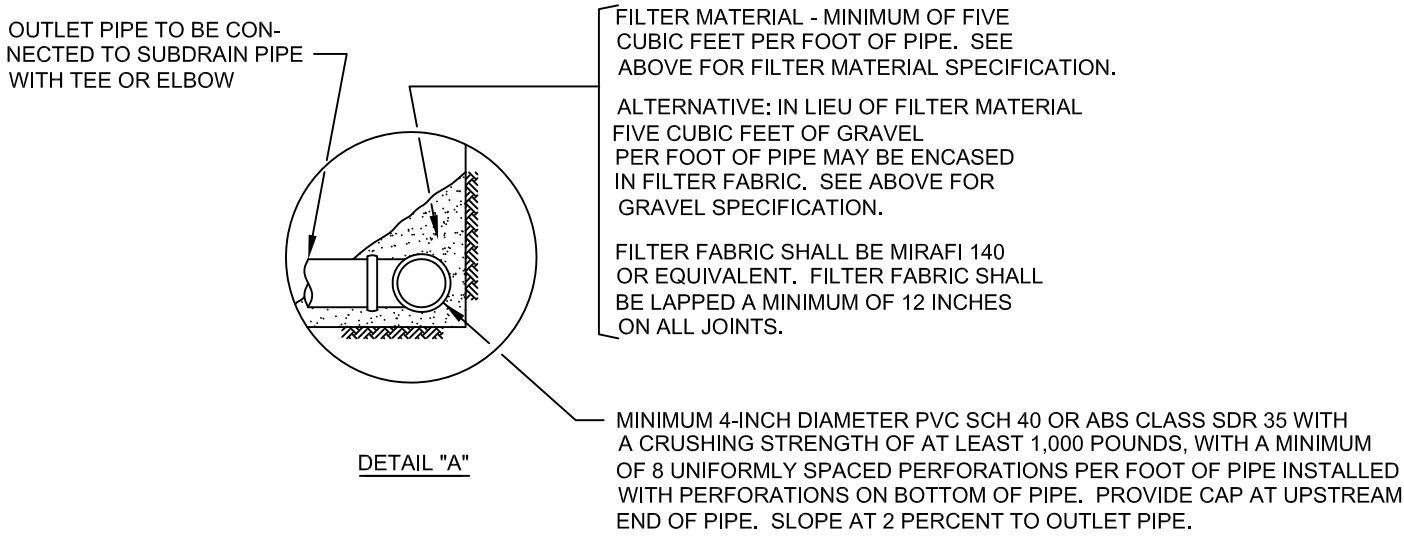
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

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

SLOPE FILL SUBDRAINS

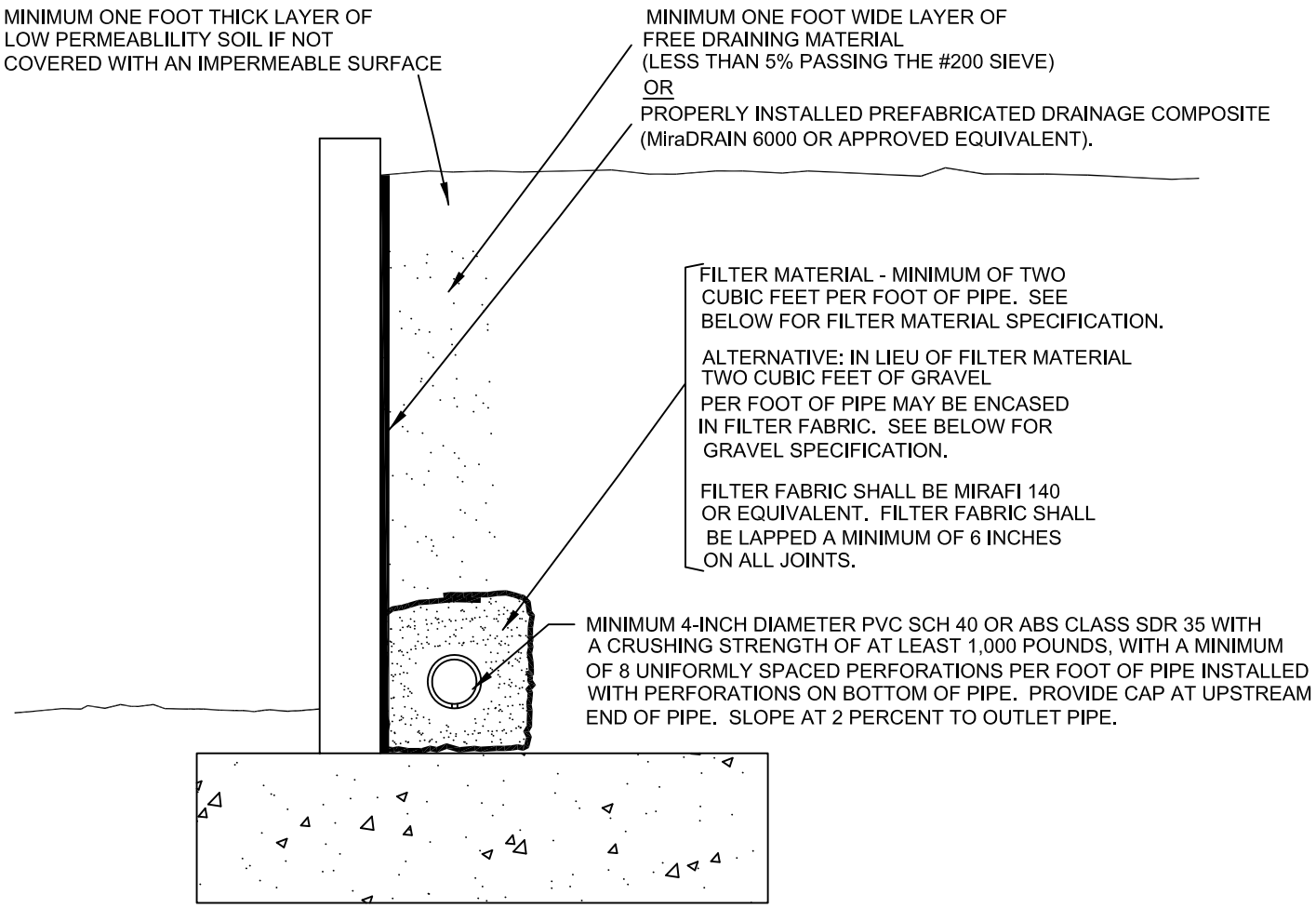
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SOUTHERN CALIFORNIA GEOTECHNICAL



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

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

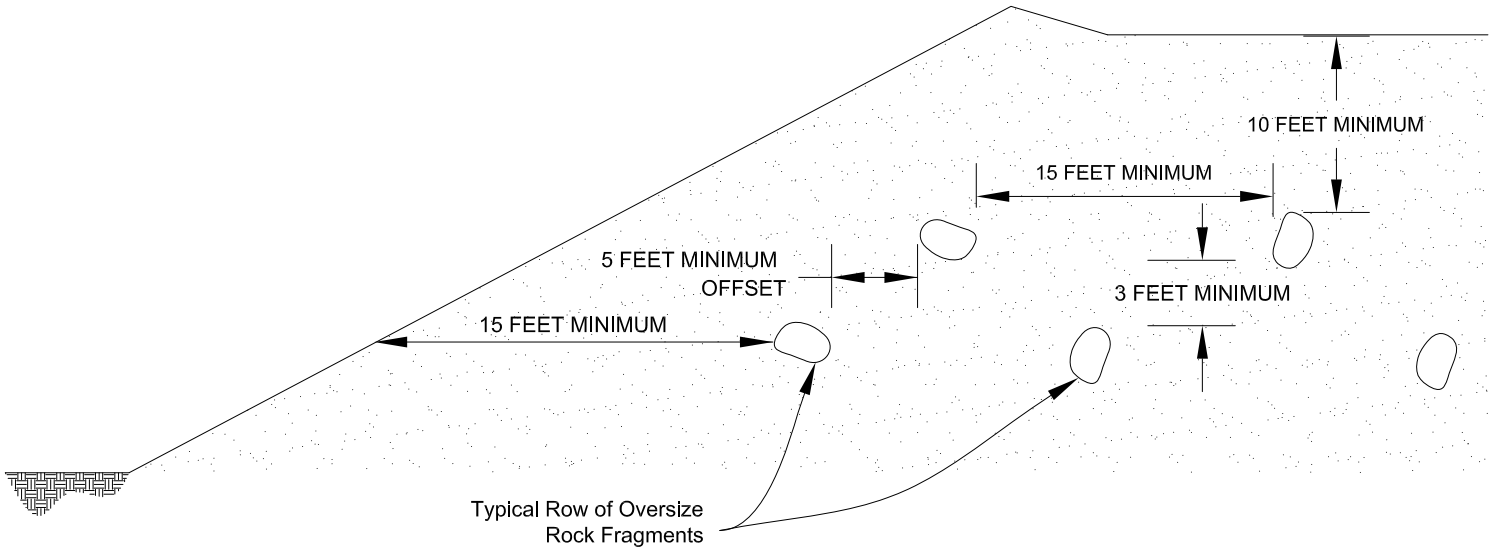
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

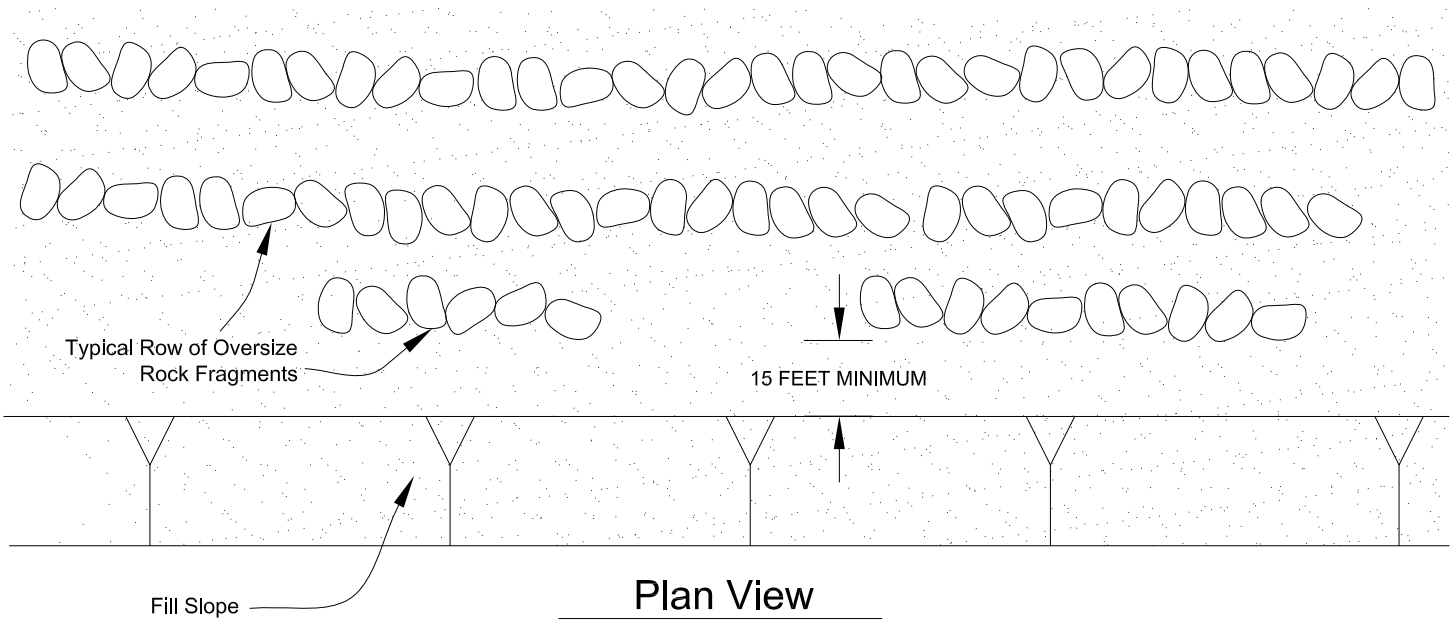
DRAWN: JAS
CHKD: GKM

PLATE D-7

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

OSHPD

Latitude, Longitude: 33.744164, -117.180544

Date	2/23/2022, 10:19:50 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.421	MCE_R ground motion. (for 0.2 second period)
S_1	0.528	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.705	Site-modified spectral acceleration value
S_{M1}	0.777	Site-modified spectral acceleration value
S_{DS}	1.137	Numeric seismic design value at 0.2 second SA
S_{D1}	0.518	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.472	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.421	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.52	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.528	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.575	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.935	Mapped value of the risk coefficient at short periods
C_{R1}	0.918	Mapped value of the risk coefficient at a period of 1 s

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

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

DRAWN: MD
CHKD: DN

SCG PROJECT
22G107-1

PLATE E-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

February 24, 2022

Hillwood
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. John Grace

Project No.: **22G107-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
NWC Ethanac Road and Sherman Road
Perris, California

Reference: Geotechnical Investigation, Proposed Warehouse, NWC Ethanac Road and Sherman Road, Perris, California, prepared for Hillwood, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G107-1, dated February 23, 2022.

Mr. Grace:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P511, dated December 17, 2021. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

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.

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.

The proposed development will include on-site storm water infiltration. Based on conversations with the project civil engineer, we understand that the infiltration system will consist a below-grade chamber system located in the southern area of the site. The bottom of the infiltration system will range from 10 to 12± feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, eight (8) borings were advanced to depths of 10 to 25± feet below existing site grades.

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 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 any of our subsurface explorations. Based on the lack of any water within the borings and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

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.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of two (2) backhoe-excavated trenches, extending to depths of 8 to 9± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 and I-2) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Older native alluvial soils were encountered at the ground surface at both of the infiltration test locations, extending to at least the maximum depths explored of 8 to 9± feet below ground surface. The older alluvium generally consists of very dense clayey fine to medium sands. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at both of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 15-minute increments. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	9	Clayey fine to medium Sand, little coarse Sand, little Silt	0.1
I-2	8	Clayey fine to medium Sand, trace coarse Sand, little Silt	0.2

Design Recommendations

Two (2) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 0.1 to 0.2 inches per hour. The major factors affecting the lack of infiltration at these locations is the presence of dense to very dense older alluvium. **Based on the lack of infiltration at the depths tested, infiltration is not considered feasible for this site. These areas are very likely to be underlain by much less permeable, denser older alluvium, which was encountered at the other boring and trench locations.**

Although infiltration is not considered feasible at the site, the client may desire to use storm water disposal systems that do not rely on infiltration at this site. The design of storm water disposal systems should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. It is recommended any such systems be designed and constructed to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the flow rates through the system. It should be noted that the recommended infiltration rates are based on infiltration testing at two (2) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the

structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

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

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

generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

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,

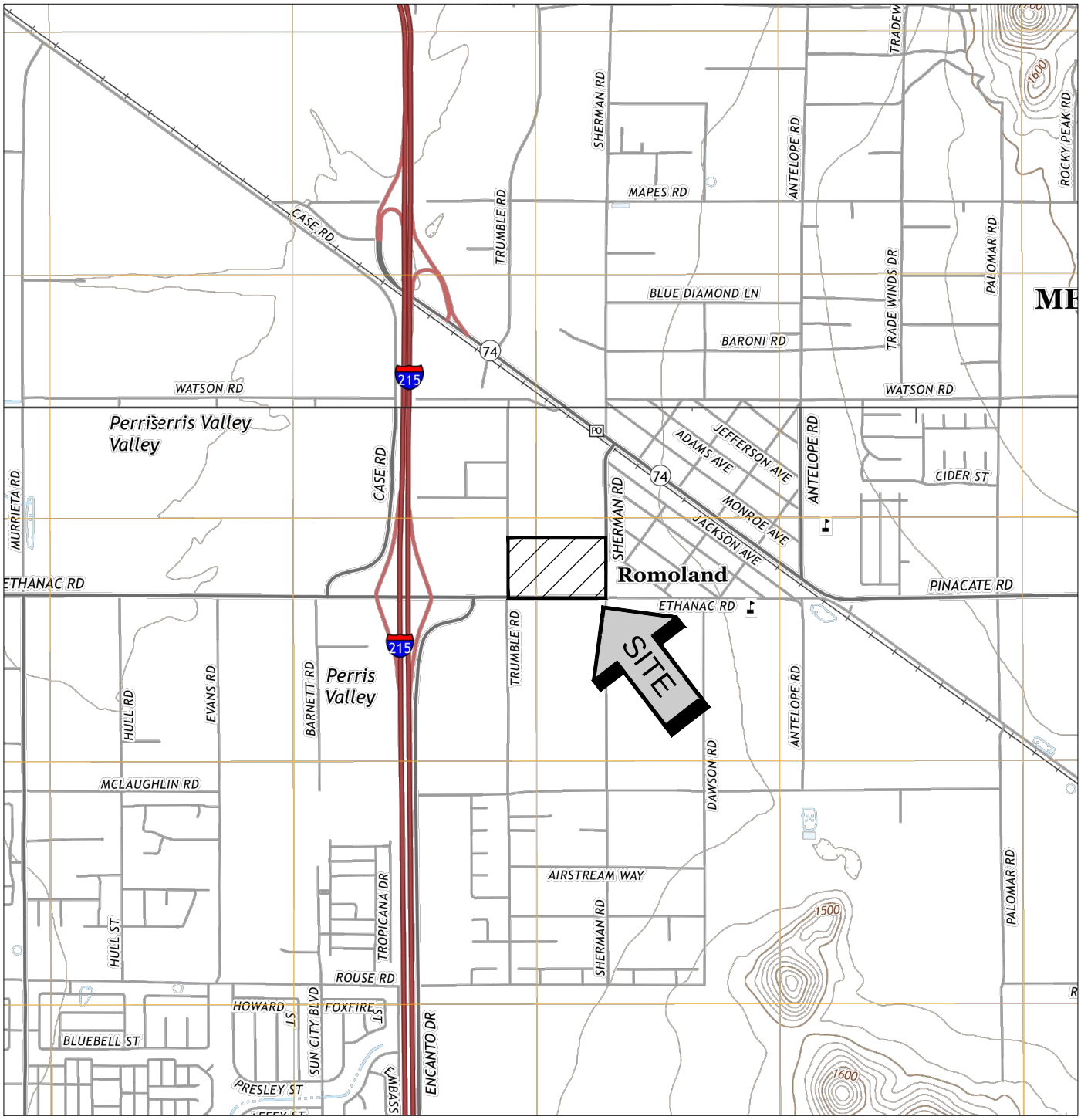
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Oscar Sandoval
Staff Engineer

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

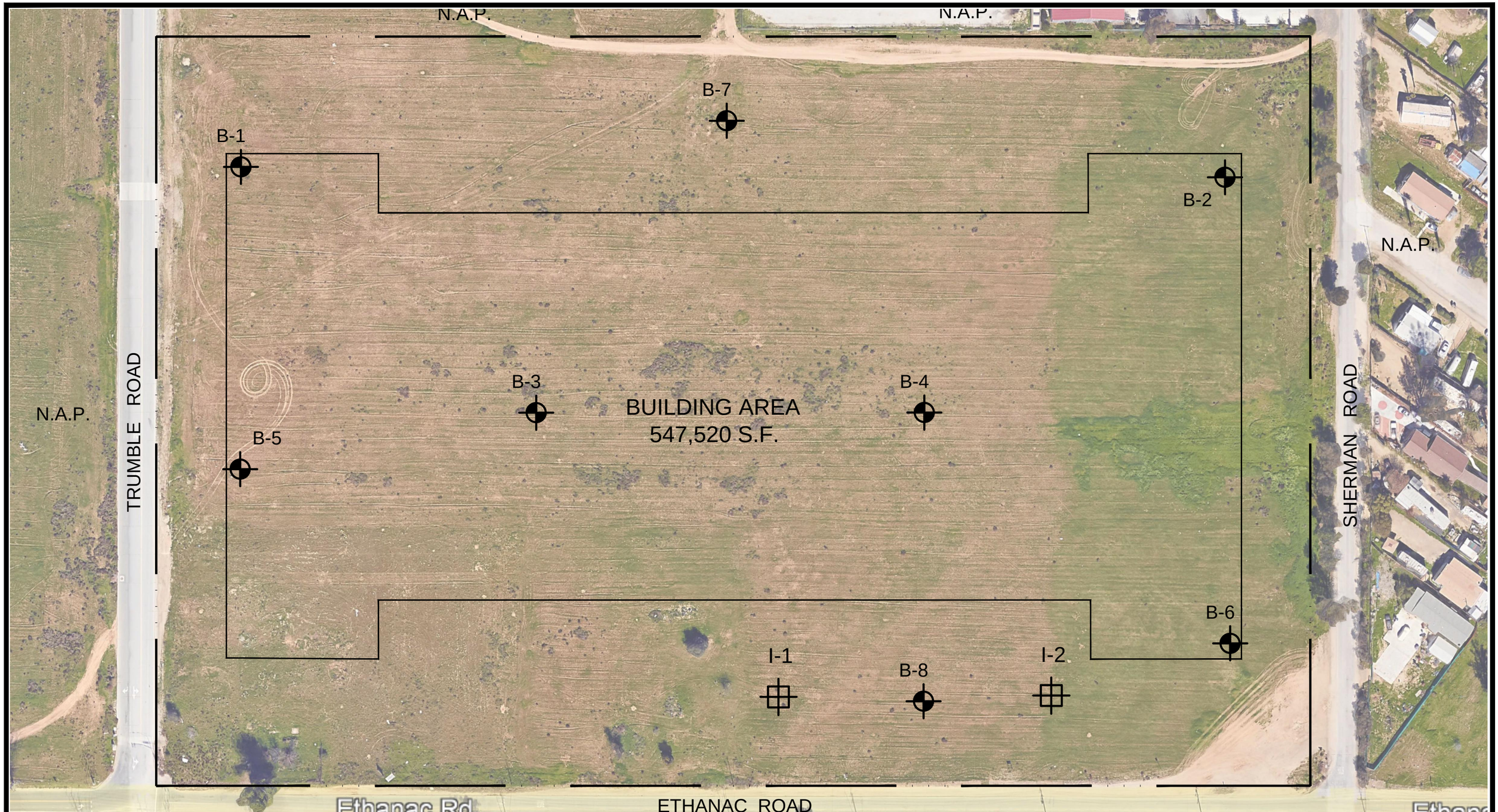
Enclosures: Plate 1: Site Location Map
Plate 2: Infiltration Test Location Plan
Trench Log Legend and Logs (4 pages)
Infiltration Test Results Spreadsheets (2 pages)
Grainsize Distribution Graphs (2 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE ROMOLAND & PERRIS QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA
SCALE: 1" = 2000'
DRAWN: MD CHKD: DN
SCG PROJECT 22G107-2
PLATE 1

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

APPROXIMATE INFILTRATION TEST LOCATION

APPROXIMATE BORING LOCATION

NORTH
SoCalGeo

NOTE: CONCEPTUAL SITE PLAN (SCHEME 7) PREPARED BY HERDMAN ARCHITECTURE + DESIGN.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH (2018)

INFILTRATION TEST LOCATION PLAN

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 100'

DRAWN: OS
CHKD: RGT

SCG PROJECT
22G107-2

PLATE 2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

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

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 22G107-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/24/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					OLDER ALLUVIUM: Light Brown Clayey fine to medium Sand, little Silt, little coarse Sand, trace Calcareous veining, cemented, slightly porous, very dense-damp to moist		11			29		
					Trench Terminated at 9' Due to Refusal on Very Dense Soils							

TBL 22G107-2.GPJ SOCALGEO.GDT 2/24/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-2

JOB NO.: 22G107-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/24/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					OLDER ALLUVIUM: Light Brown Clayey fine to medium Sand, little Silt, trace coarse Sand, cemented, slightly porous, very dense-damp to moist							
							10			26		
					Trench Terminated at 8' Due to Refusal on Very Dense Soils							

TBL 22G107-2.GPJ SOCALGEO.GDT 2/24/22

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, CA
Project Number	22G107-2
Engineer	CB

Infiltration Test No: I-1

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:20 AM	15	0	100	0	8000	0.55	14.62	0.22	5.76
	Final	9:35 AM	**15**	100		8000					
2	Initial	9:35 AM	15	0	0	8	5792	0.00	10.58	0.00	4.17
	Final	9:50 AM	**30**	0		5800					
3	Initial	9:50 AM	15	0	0	0	3900	0.00	7.13	0.00	2.81
	Final	10:05 AM	**45**	0		3900					
4	Initial	10:05 AM	15	0	0	0	3500	0.00	6.40	0.00	2.52
	Final	10:20 AM	**60**	0		3500					
5	Initial	10:20 AM	15	0	100	0	3600	0.55	6.58	0.22	2.59
	Final	10:35 AM	**75**	100		3600					
6	Initial	10:35 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	10:50 AM	**90**	50		3600					
7	Initial	10:50 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	11:05 AM	**105**	50		3600					
8	Initial	11:05 AM	15	0	50	0	3600	0.27	6.58	0.11	2.59
	Final	11:20 AM	**120**	50		3600					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, CA
Project Number	22G107-2
Engineer	CB

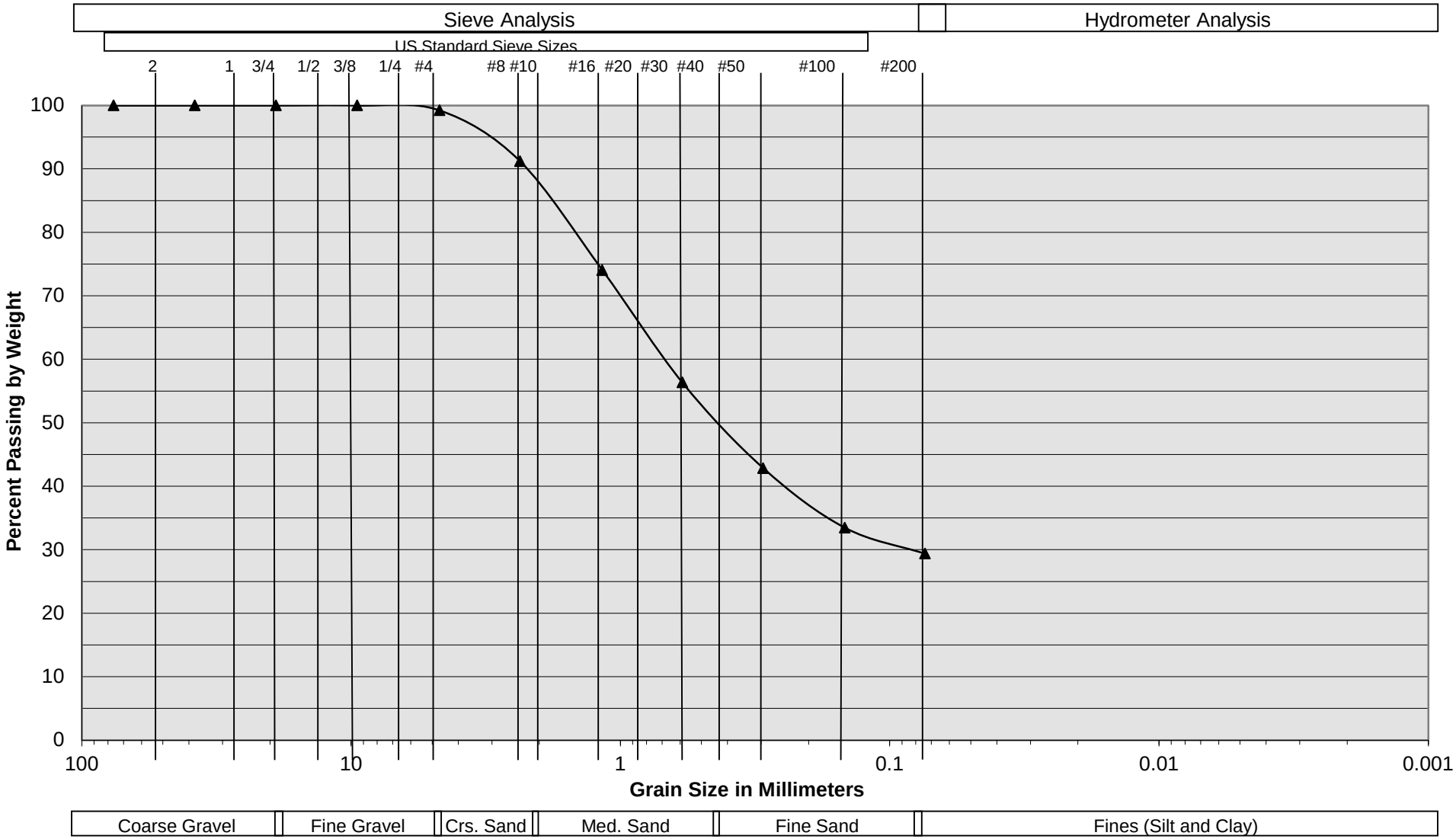
Infiltration Test No: I-2

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	7:00 AM	15	0	200	0	3500	1.10	6.40	0.43	2.52
	Final	7:15 AM	**15**	200		3500					
2	Initial	7:15 AM	15	0	150	0	4200	0.82	7.68	0.32	3.02
	Final	7:30 AM	**30**	150		4200					
3	Initial	7:30 AM	15	0	150	0	3000	0.82	5.48	0.32	2.16
	Final	7:45 AM	**45**	150		3000					
4	Initial	7:45 AM	15	0	100	0	2900	0.55	5.30	0.22	2.09
	Final	8:00 AM	**60**	100		2900					
5	Initial	8:00 AM	15	0	150	0	2900	0.82	5.30	0.32	2.09
	Final	8:15 AM	**75**	150		2900					
6	Initial	8:15 AM	15	0	100	0	2800	0.55	5.12	0.22	2.01
	Final	8:30 AM	**90**	100		2800					
7	Initial	8:30 AM	15	0	100	0	2900	0.55	5.30	0.22	2.09
	Final	8:45 AM	**105**	100		2900					
8	Initial	8:45 AM	15	0	100	0	2800	0.55	5.12	0.22	2.01
	Final	9:00 AM	**120**	100		2800					

Grain Size Distribution

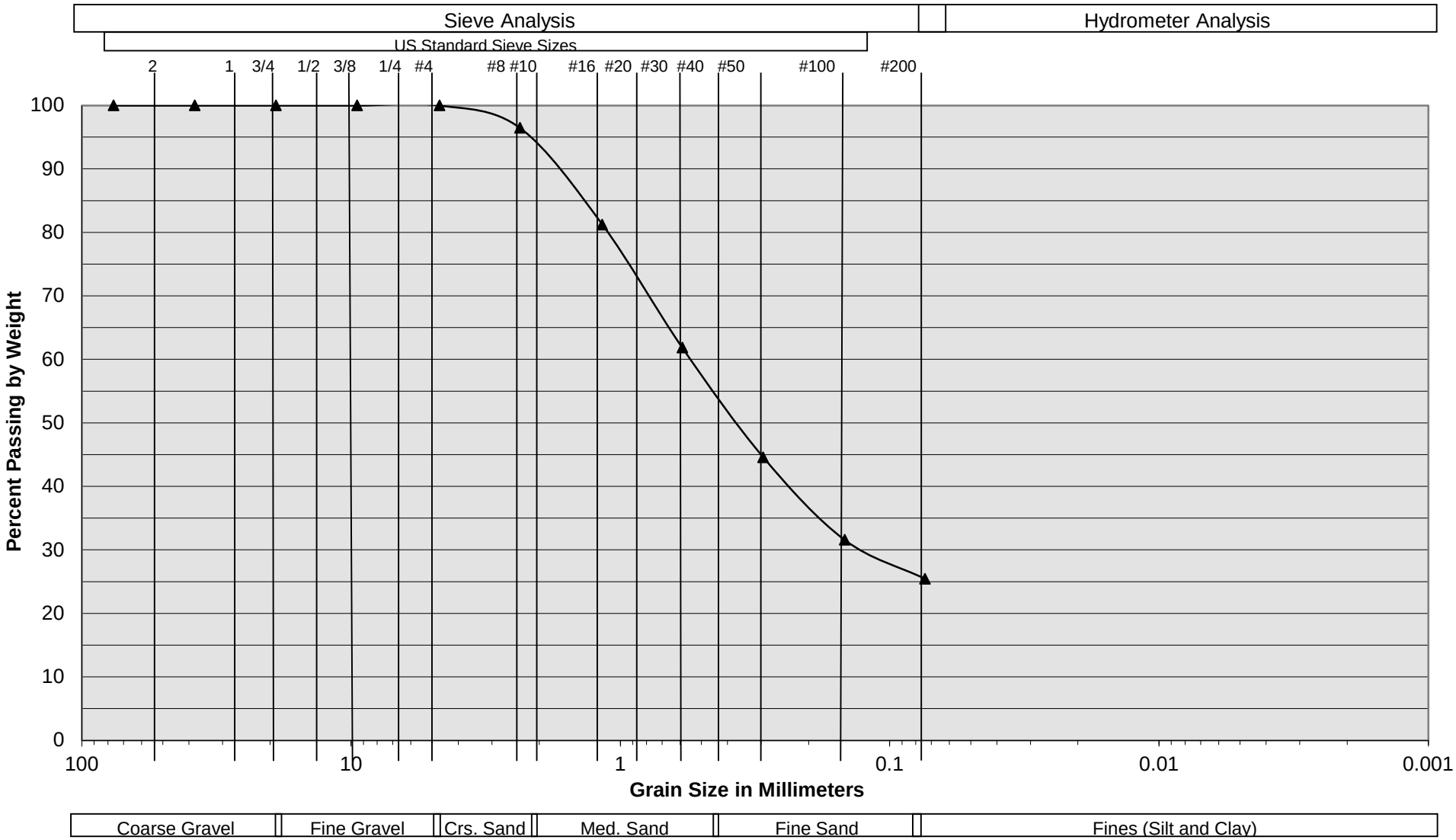


Sample Description	I-1 @ 8'
Soil Classification	Light Brown Clayey fine to medium Sand, little coarse Sand, little Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-2
PLATE C- 1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-2 @ 7'
Soil Classification	Light Brown Clayey fine to medium Sand, trace coarse Sand, little Silt

Proposed Warehouse
Perris, CA
Project No. 22G107-2
PLATE C- 2

SOUTHERN CALIFORNIA GEOTECHNICAL
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Appendix 4: Historical Site Conditions

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

To be provided during final engineering

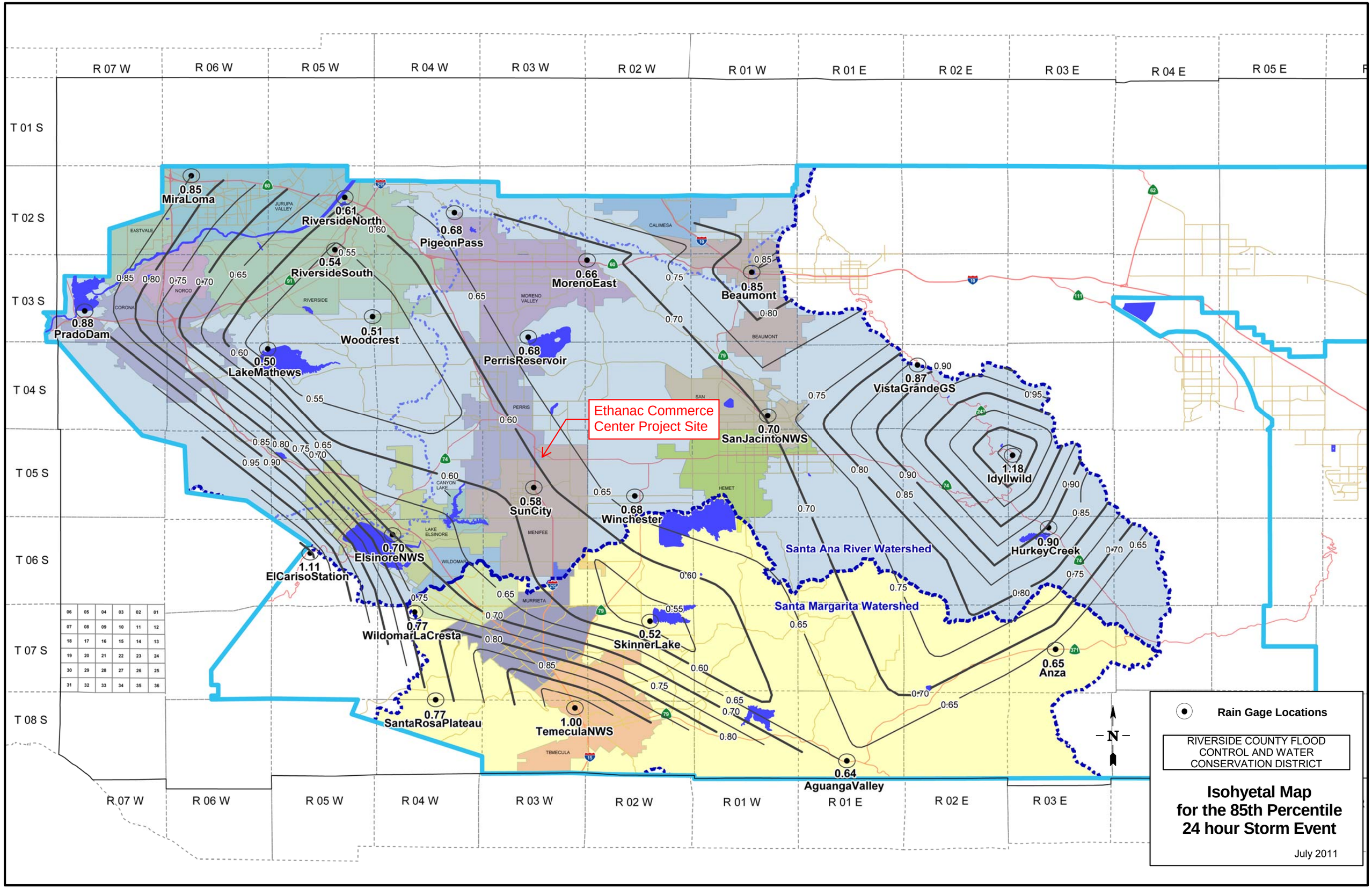
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation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R 03 E
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T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Ethanac Commerce Center Project Site
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name	Albert A. Webb Associates	Date	12/5/2022
Designed by	RSB	Case No	
Company Project Number/Name	2022-0198 Hillwood Ethanac		

BMP Identification

BMP NAME / ID: BMP-A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

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

D_{85}= 0.61 inches

Drainage Management Area Tabulation

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
L-A	*90768*	*Ornamental Landscaping*	*0.1*	*0.11*	*10026.1*			
R-A	*407336*	*Roofs*	*1*	*0.89*	*363343.7*			
H-A	*336463*	*Concrete or Asphalt*	*1*	*0.89*	*300125*			
SR-A	*30358*	*Ornamental Landscaping*	*0.1*	*0.11*	*3353.3*			

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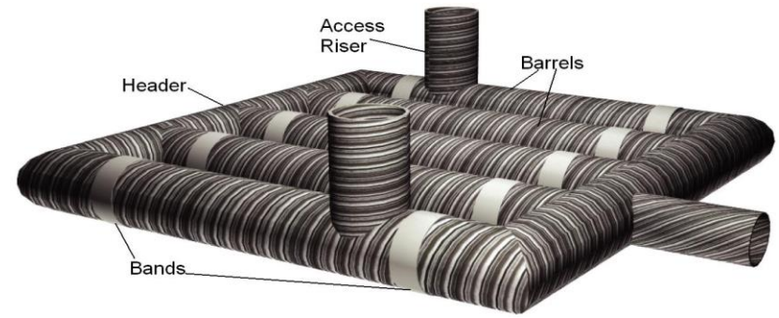
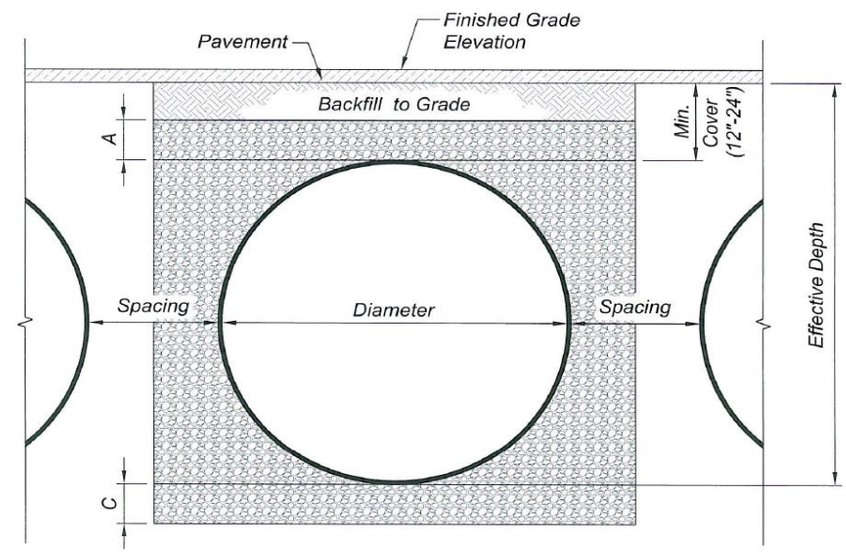


Project Summary

Date:	1/9/2023	
Project Name:	Hillwood Ethanac	
City / County:	City of Perris	
State:	CA	
Designed By:	RSB	
Company:	Albert A. Webb Associates	**Enter Information in Blue Cells**
Telephone:		

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	128,034	
Limiting Width (ft):	55.00	
Invert Depth Below Asphalt (ft):	10.00	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	96	50.27 ft^2 Pipe Area
Number Of Headers:	2	
Spacing between Barrels (ft):	3.00	
Stone Width Around Perimeter of System (ft):	1.5	
Depth A: Porous Stone Above Pipe (in):	12	
Depth C: Porous Stone Below Pipe (in):	0	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	92,941	cf	
Porous Stone Storage:	35,688	cf	
Total Storage Provided:	128,629	cf	100.5% Of Required Storage
Number of Barrels:	5	barrels	
Length per Barrel:	349.0	ft	
Length Per Header:	52.0	ft	
Rectangular Footprint (W x L):	55. ft x 368. ft		

CONTECH Materials

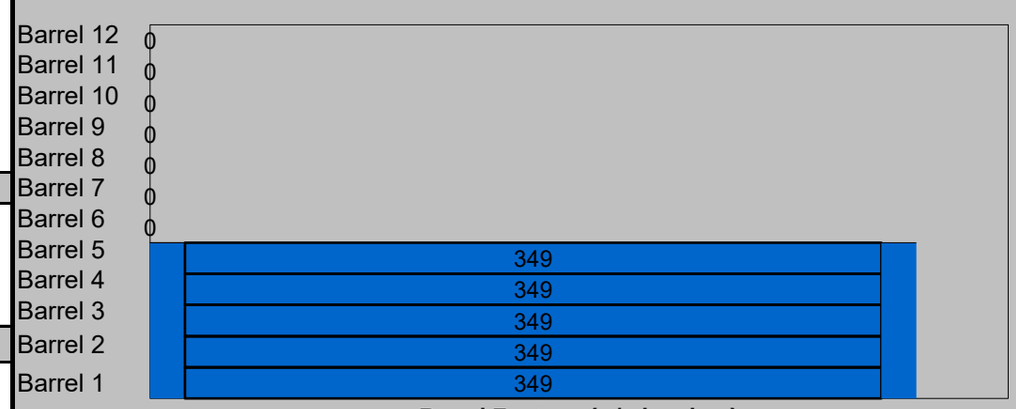
Total CMP Footage:	1,849	ft
Approximate Total Pieces:	81	pcs
Approximate Coupling Bands:	84	bands
Approximate Truckloads:	41	trucks

Construction Quantities**

Total Excavation:	7497	cy
Porous Stone Backfill For Storage:	3304	cy stone
Backfill to Grade Excluding Stone:	750	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



© 2007 CONTECH Stormwater Solutions

Water Quality Pump Rate Calculation

$$\frac{V_{BMP}}{t_{drain}} = Area * i = Q_{pump}$$

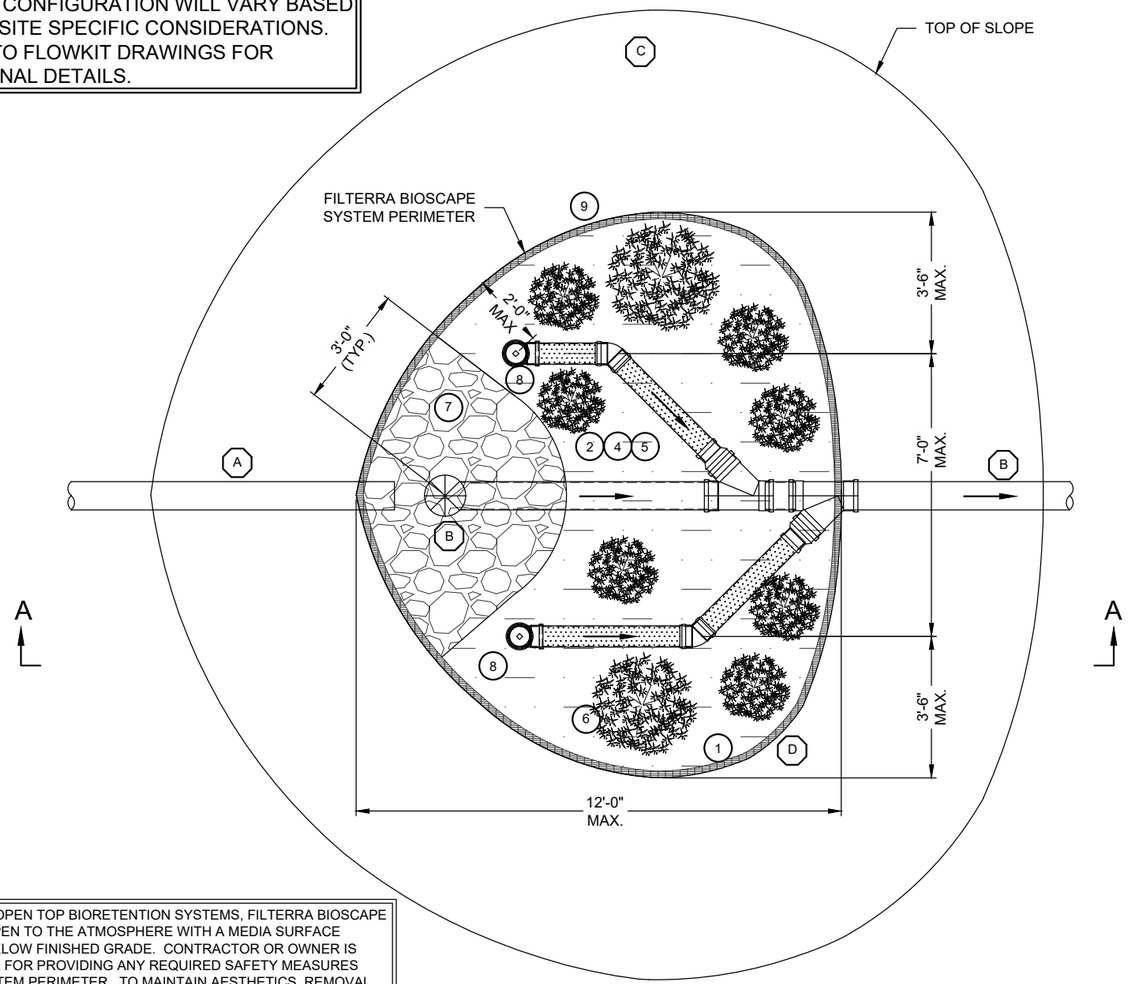
$$\frac{V_{BMP}}{t_{drain}} = Q_{pump}$$

$$Q_{pump} = \frac{ft^3}{hr} * \frac{1\ hr}{3600\ sec} * \frac{449\ gpm}{1\ \frac{ft^3}{sec}}$$

$$Q_{pump} = \frac{33{,}131\ ft^3}{48\ hr} * \frac{449}{3600}\ \frac{gpm}{\frac{ft^3}{hr}} = 86\ gpm$$

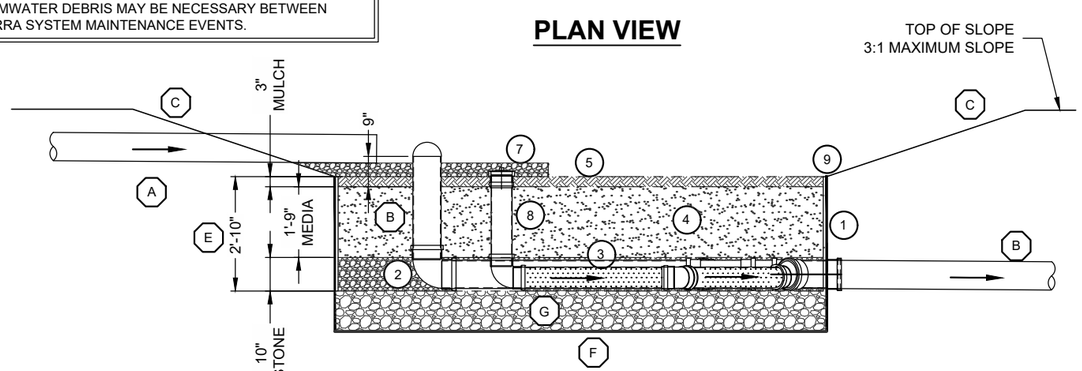
$$\boldsymbol{Q_{pump} = 86\ gpm}$$

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

I:\COMMON\CAD\TREATMENT\54 FILTERRA\40 STANDARD DRAWINGS\FTBS - BIOSCAPE SYSTEM (BOXLESS)\DWG\FILTERRA BIOSCAPE SUPERVISED SYSTEM - STD DETAIL.DWG 5/21/2020 8:57 AM

June 2020

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, and sized based on the water quality design flow rate for an off-line system. Calculate the water quality design flow rates using the following procedures:

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.7.6 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.
   - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
   - Conduct maintenance following manufacturer's guidelines.
7. Filterra systems come in standard sizes.
8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, Phosphorus, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:

1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

<u>Field Testing 2015-2019</u>

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

Contact Information:

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Applicant's Website: http://www.conteches.com

Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Date	**Revision**
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate
February 2020	Revised sizing language to note sizing based on off-line calculations
June 2020	Added Phosphorus to Filterra Shallow sizing table

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  12/14/22 File: ONSITEPRE242.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, 2-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) = 2.00
Area Averaged 2-Year Rainfall = 1.600(In)
Area Averaged 100-Year Rainfall = 4.000(In)

Point rain (area averaged) = 1.600(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.600(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.800	89.00	0.000

Total Area Entered = 19.80(Ac.)

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

Area averaged mean soil loss (F) (In/Hr) = 0.286
Minimum soil loss rate ((In/Hr)) = 0.143
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	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	0.013	(0.508)	0.012	0.001
2	0.17	0.07	0.013	(0.506)	0.012	0.001
3	0.25	0.07	0.013	(0.504)	0.012	0.001
4	0.33	0.10	0.019	(0.502)	0.017	0.002
5	0.42	0.10	0.019	(0.500)	0.017	0.002
6	0.50	0.10	0.019	(0.498)	0.017	0.002
7	0.58	0.10	0.019	(0.496)	0.017	0.002
8	0.67	0.10	0.019	(0.494)	0.017	0.002
9	0.75	0.10	0.019	(0.492)	0.017	0.002
10	0.83	0.13	0.026	(0.490)	0.023	0.003
11	0.92	0.13	0.026	(0.488)	0.023	0.003
12	1.00	0.13	0.026	(0.486)	0.023	0.003
13	1.08	0.10	0.019	(0.485)	0.017	0.002
14	1.17	0.10	0.019	(0.483)	0.017	0.002
15	1.25	0.10	0.019	(0.481)	0.017	0.002
16	1.33	0.10	0.019	(0.479)	0.017	0.002
17	1.42	0.10	0.019	(0.477)	0.017	0.002
18	1.50	0.10	0.019	(0.475)	0.017	0.002
19	1.58	0.10	0.019	(0.473)	0.017	0.002
20	1.67	0.10	0.019	(0.471)	0.017	0.002
21	1.75	0.10	0.019	(0.469)	0.017	0.002
22	1.83	0.13	0.026	(0.467)	0.023	0.003
23	1.92	0.13	0.026	(0.466)	0.023	0.003
24	2.00	0.13	0.026	(0.464)	0.023	0.003
25	2.08	0.13	0.026	(0.462)	0.023	0.003
26	2.17	0.13	0.026	(0.460)	0.023	0.003
27	2.25	0.13	0.026	(0.458)	0.023	0.003
28	2.33	0.13	0.026	(0.456)	0.023	0.003
29	2.42	0.13	0.026	(0.454)	0.023	0.003
30	2.50	0.13	0.026	(0.452)	0.023	0.003
31	2.58	0.17	0.032	(0.451)	0.029	0.003
32	2.67	0.17	0.032	(0.449)	0.029	0.003
33	2.75	0.17	0.032	(0.447)	0.029	0.003
34	2.83	0.17	0.032	(0.445)	0.029	0.003
35	2.92	0.17	0.032	(0.443)	0.029	0.003
36	3.00	0.17	0.032	(0.441)	0.029	0.003
37	3.08	0.17	0.032	(0.440)	0.029	0.003
38	3.17	0.17	0.032	(0.438)	0.029	0.003

39	3.25	0.17	0.032	(0.436)	0.029	0.003
40	3.33	0.17	0.032	(0.434)	0.029	0.003
41	3.42	0.17	0.032	(0.432)	0.029	0.003
42	3.50	0.17	0.032	(0.430)	0.029	0.003
43	3.58	0.17	0.032	(0.429)	0.029	0.003
44	3.67	0.17	0.032	(0.427)	0.029	0.003
45	3.75	0.17	0.032	(0.425)	0.029	0.003
46	3.83	0.20	0.038	(0.423)	0.035	0.004
47	3.92	0.20	0.038	(0.422)	0.035	0.004
48	4.00	0.20	0.038	(0.420)	0.035	0.004
49	4.08	0.20	0.038	(0.418)	0.035	0.004
50	4.17	0.20	0.038	(0.416)	0.035	0.004
51	4.25	0.20	0.038	(0.414)	0.035	0.004
52	4.33	0.23	0.045	(0.413)	0.040	0.004
53	4.42	0.23	0.045	(0.411)	0.040	0.004
54	4.50	0.23	0.045	(0.409)	0.040	0.004
55	4.58	0.23	0.045	(0.407)	0.040	0.004
56	4.67	0.23	0.045	(0.406)	0.040	0.004
57	4.75	0.23	0.045	(0.404)	0.040	0.004
58	4.83	0.27	0.051	(0.402)	0.046	0.005
59	4.92	0.27	0.051	(0.400)	0.046	0.005
60	5.00	0.27	0.051	(0.399)	0.046	0.005
61	5.08	0.20	0.038	(0.397)	0.035	0.004
62	5.17	0.20	0.038	(0.395)	0.035	0.004
63	5.25	0.20	0.038	(0.393)	0.035	0.004
64	5.33	0.23	0.045	(0.392)	0.040	0.004
65	5.42	0.23	0.045	(0.390)	0.040	0.004
66	5.50	0.23	0.045	(0.388)	0.040	0.004
67	5.58	0.27	0.051	(0.387)	0.046	0.005
68	5.67	0.27	0.051	(0.385)	0.046	0.005
69	5.75	0.27	0.051	(0.383)	0.046	0.005
70	5.83	0.27	0.051	(0.382)	0.046	0.005
71	5.92	0.27	0.051	(0.380)	0.046	0.005
72	6.00	0.27	0.051	(0.378)	0.046	0.005
73	6.08	0.30	0.058	(0.376)	0.052	0.006
74	6.17	0.30	0.058	(0.375)	0.052	0.006
75	6.25	0.30	0.058	(0.373)	0.052	0.006
76	6.33	0.30	0.058	(0.371)	0.052	0.006
77	6.42	0.30	0.058	(0.370)	0.052	0.006
78	6.50	0.30	0.058	(0.368)	0.052	0.006
79	6.58	0.33	0.064	(0.366)	0.058	0.006
80	6.67	0.33	0.064	(0.365)	0.058	0.006
81	6.75	0.33	0.064	(0.363)	0.058	0.006
82	6.83	0.33	0.064	(0.362)	0.058	0.006
83	6.92	0.33	0.064	(0.360)	0.058	0.006
84	7.00	0.33	0.064	(0.358)	0.058	0.006
85	7.08	0.33	0.064	(0.357)	0.058	0.006
86	7.17	0.33	0.064	(0.355)	0.058	0.006
87	7.25	0.33	0.064	(0.353)	0.058	0.006
88	7.33	0.37	0.070	(0.352)	0.063	0.007

89	7.42	0.37	0.070	(0.350)	0.063	0.007
90	7.50	0.37	0.070	(0.349)	0.063	0.007
91	7.58	0.40	0.077	(0.347)	0.069	0.008
92	7.67	0.40	0.077	(0.345)	0.069	0.008
93	7.75	0.40	0.077	(0.344)	0.069	0.008
94	7.83	0.43	0.083	(0.342)	0.075	0.008
95	7.92	0.43	0.083	(0.341)	0.075	0.008
96	8.00	0.43	0.083	(0.339)	0.075	0.008
97	8.08	0.50	0.096	(0.337)	0.086	0.010
98	8.17	0.50	0.096	(0.336)	0.086	0.010
99	8.25	0.50	0.096	(0.334)	0.086	0.010
100	8.33	0.50	0.096	(0.333)	0.086	0.010
101	8.42	0.50	0.096	(0.331)	0.086	0.010
102	8.50	0.50	0.096	(0.330)	0.086	0.010
103	8.58	0.53	0.102	(0.328)	0.092	0.010
104	8.67	0.53	0.102	(0.327)	0.092	0.010
105	8.75	0.53	0.102	(0.325)	0.092	0.010
106	8.83	0.57	0.109	(0.323)	0.098	0.011
107	8.92	0.57	0.109	(0.322)	0.098	0.011
108	9.00	0.57	0.109	(0.320)	0.098	0.011
109	9.08	0.63	0.122	(0.319)	0.109	0.012
110	9.17	0.63	0.122	(0.317)	0.109	0.012
111	9.25	0.63	0.122	(0.316)	0.109	0.012
112	9.33	0.67	0.128	(0.314)	0.115	0.013
113	9.42	0.67	0.128	(0.313)	0.115	0.013
114	9.50	0.67	0.128	(0.311)	0.115	0.013
115	9.58	0.70	0.134	(0.310)	0.121	0.013
116	9.67	0.70	0.134	(0.308)	0.121	0.013
117	9.75	0.70	0.134	(0.307)	0.121	0.013
118	9.83	0.73	0.141	(0.305)	0.127	0.014
119	9.92	0.73	0.141	(0.304)	0.127	0.014
120	10.00	0.73	0.141	(0.303)	0.127	0.014
121	10.08	0.50	0.096	(0.301)	0.086	0.010
122	10.17	0.50	0.096	(0.300)	0.086	0.010
123	10.25	0.50	0.096	(0.298)	0.086	0.010
124	10.33	0.50	0.096	(0.297)	0.086	0.010
125	10.42	0.50	0.096	(0.295)	0.086	0.010
126	10.50	0.50	0.096	(0.294)	0.086	0.010
127	10.58	0.67	0.128	(0.292)	0.115	0.013
128	10.67	0.67	0.128	(0.291)	0.115	0.013
129	10.75	0.67	0.128	(0.290)	0.115	0.013
130	10.83	0.67	0.128	(0.288)	0.115	0.013
131	10.92	0.67	0.128	(0.287)	0.115	0.013
132	11.00	0.67	0.128	(0.285)	0.115	0.013
133	11.08	0.63	0.122	(0.284)	0.109	0.012
134	11.17	0.63	0.122	(0.282)	0.109	0.012
135	11.25	0.63	0.122	(0.281)	0.109	0.012
136	11.33	0.63	0.122	(0.280)	0.109	0.012
137	11.42	0.63	0.122	(0.278)	0.109	0.012
138	11.50	0.63	0.122	(0.277)	0.109	0.012

139	11.58	0.57	0.109	(0.276)	0.098	0.011
140	11.67	0.57	0.109	(0.274)	0.098	0.011
141	11.75	0.57	0.109	(0.273)	0.098	0.011
142	11.83	0.60	0.115	(0.271)	0.104	0.012
143	11.92	0.60	0.115	(0.270)	0.104	0.012
144	12.00	0.60	0.115	(0.269)	0.104	0.012
145	12.08	0.83	0.160	(0.267)	0.144	0.016
146	12.17	0.83	0.160	(0.266)	0.144	0.016
147	12.25	0.83	0.160	(0.265)	0.144	0.016
148	12.33	0.87	0.166	(0.263)	0.150	0.017
149	12.42	0.87	0.166	(0.262)	0.150	0.017
150	12.50	0.87	0.166	(0.261)	0.150	0.017
151	12.58	0.93	0.179	(0.259)	0.161	0.018
152	12.67	0.93	0.179	(0.258)	0.161	0.018
153	12.75	0.93	0.179	(0.257)	0.161	0.018
154	12.83	0.97	0.186	(0.256)	0.167	0.019
155	12.92	0.97	0.186	(0.254)	0.167	0.019
156	13.00	0.97	0.186	(0.253)	0.167	0.019
157	13.08	1.13	0.218	(0.252)	0.196	0.022
158	13.17	1.13	0.218	(0.250)	0.196	0.022
159	13.25	1.13	0.218	(0.249)	0.196	0.022
160	13.33	1.13	0.218	(0.248)	0.196	0.022
161	13.42	1.13	0.218	(0.247)	0.196	0.022
162	13.50	1.13	0.218	(0.245)	0.196	0.022
163	13.58	0.77	0.147	(0.244)	0.132	0.015
164	13.67	0.77	0.147	(0.243)	0.132	0.015
165	13.75	0.77	0.147	(0.242)	0.132	0.015
166	13.83	0.77	0.147	(0.240)	0.132	0.015
167	13.92	0.77	0.147	(0.239)	0.132	0.015
168	14.00	0.77	0.147	(0.238)	0.132	0.015
169	14.08	0.90	0.173	(0.237)	0.156	0.017
170	14.17	0.90	0.173	(0.236)	0.156	0.017
171	14.25	0.90	0.173	(0.234)	0.156	0.017
172	14.33	0.87	0.166	(0.233)	0.150	0.017
173	14.42	0.87	0.166	(0.232)	0.150	0.017
174	14.50	0.87	0.166	(0.231)	0.150	0.017
175	14.58	0.87	0.166	(0.230)	0.150	0.017
176	14.67	0.87	0.166	(0.228)	0.150	0.017
177	14.75	0.87	0.166	(0.227)	0.150	0.017
178	14.83	0.83	0.160	(0.226)	0.144	0.016
179	14.92	0.83	0.160	(0.225)	0.144	0.016
180	15.00	0.83	0.160	(0.224)	0.144	0.016
181	15.08	0.80	0.154	(0.223)	0.138	0.015
182	15.17	0.80	0.154	(0.221)	0.138	0.015
183	15.25	0.80	0.154	(0.220)	0.138	0.015
184	15.33	0.77	0.147	(0.219)	0.132	0.015
185	15.42	0.77	0.147	(0.218)	0.132	0.015
186	15.50	0.77	0.147	(0.217)	0.132	0.015
187	15.58	0.63	0.122	(0.216)	0.109	0.012
188	15.67	0.63	0.122	(0.215)	0.109	0.012

189	15.75	0.63	0.122	(0.214)	0.109	0.012
190	15.83	0.63	0.122	(0.213)	0.109	0.012
191	15.92	0.63	0.122	(0.211)	0.109	0.012
192	16.00	0.63	0.122	(0.210)	0.109	0.012
193	16.08	0.13	0.026	(0.209)	0.023	0.003
194	16.17	0.13	0.026	(0.208)	0.023	0.003
195	16.25	0.13	0.026	(0.207)	0.023	0.003
196	16.33	0.13	0.026	(0.206)	0.023	0.003
197	16.42	0.13	0.026	(0.205)	0.023	0.003
198	16.50	0.13	0.026	(0.204)	0.023	0.003
199	16.58	0.10	0.019	(0.203)	0.017	0.002
200	16.67	0.10	0.019	(0.202)	0.017	0.002
201	16.75	0.10	0.019	(0.201)	0.017	0.002
202	16.83	0.10	0.019	(0.200)	0.017	0.002
203	16.92	0.10	0.019	(0.199)	0.017	0.002
204	17.00	0.10	0.019	(0.198)	0.017	0.002
205	17.08	0.17	0.032	(0.197)	0.029	0.003
206	17.17	0.17	0.032	(0.196)	0.029	0.003
207	17.25	0.17	0.032	(0.195)	0.029	0.003
208	17.33	0.17	0.032	(0.194)	0.029	0.003
209	17.42	0.17	0.032	(0.193)	0.029	0.003
210	17.50	0.17	0.032	(0.192)	0.029	0.003
211	17.58	0.17	0.032	(0.191)	0.029	0.003
212	17.67	0.17	0.032	(0.190)	0.029	0.003
213	17.75	0.17	0.032	(0.189)	0.029	0.003
214	17.83	0.13	0.026	(0.188)	0.023	0.003
215	17.92	0.13	0.026	(0.187)	0.023	0.003
216	18.00	0.13	0.026	(0.186)	0.023	0.003
217	18.08	0.13	0.026	(0.185)	0.023	0.003
218	18.17	0.13	0.026	(0.185)	0.023	0.003
219	18.25	0.13	0.026	(0.184)	0.023	0.003
220	18.33	0.13	0.026	(0.183)	0.023	0.003
221	18.42	0.13	0.026	(0.182)	0.023	0.003
222	18.50	0.13	0.026	(0.181)	0.023	0.003
223	18.58	0.10	0.019	(0.180)	0.017	0.002
224	18.67	0.10	0.019	(0.179)	0.017	0.002
225	18.75	0.10	0.019	(0.178)	0.017	0.002
226	18.83	0.07	0.013	(0.177)	0.012	0.001
227	18.92	0.07	0.013	(0.177)	0.012	0.001
228	19.00	0.07	0.013	(0.176)	0.012	0.001
229	19.08	0.10	0.019	(0.175)	0.017	0.002
230	19.17	0.10	0.019	(0.174)	0.017	0.002
231	19.25	0.10	0.019	(0.173)	0.017	0.002
232	19.33	0.13	0.026	(0.173)	0.023	0.003
233	19.42	0.13	0.026	(0.172)	0.023	0.003
234	19.50	0.13	0.026	(0.171)	0.023	0.003
235	19.58	0.10	0.019	(0.170)	0.017	0.002
236	19.67	0.10	0.019	(0.169)	0.017	0.002
237	19.75	0.10	0.019	(0.169)	0.017	0.002
238	19.83	0.07	0.013	(0.168)	0.012	0.001

239	19.92	0.07	0.013	(0.167)	0.012	0.001
240	20.00	0.07	0.013	(0.166)	0.012	0.001
241	20.08	0.10	0.019	(0.166)	0.017	0.002
242	20.17	0.10	0.019	(0.165)	0.017	0.002
243	20.25	0.10	0.019	(0.164)	0.017	0.002
244	20.33	0.10	0.019	(0.163)	0.017	0.002
245	20.42	0.10	0.019	(0.163)	0.017	0.002
246	20.50	0.10	0.019	(0.162)	0.017	0.002
247	20.58	0.10	0.019	(0.161)	0.017	0.002
248	20.67	0.10	0.019	(0.161)	0.017	0.002
249	20.75	0.10	0.019	(0.160)	0.017	0.002
250	20.83	0.07	0.013	(0.159)	0.012	0.001
251	20.92	0.07	0.013	(0.159)	0.012	0.001
252	21.00	0.07	0.013	(0.158)	0.012	0.001
253	21.08	0.10	0.019	(0.157)	0.017	0.002
254	21.17	0.10	0.019	(0.157)	0.017	0.002
255	21.25	0.10	0.019	(0.156)	0.017	0.002
256	21.33	0.07	0.013	(0.156)	0.012	0.001
257	21.42	0.07	0.013	(0.155)	0.012	0.001
258	21.50	0.07	0.013	(0.155)	0.012	0.001
259	21.58	0.10	0.019	(0.154)	0.017	0.002
260	21.67	0.10	0.019	(0.153)	0.017	0.002
261	21.75	0.10	0.019	(0.153)	0.017	0.002
262	21.83	0.07	0.013	(0.152)	0.012	0.001
263	21.92	0.07	0.013	(0.152)	0.012	0.001
264	22.00	0.07	0.013	(0.151)	0.012	0.001
265	22.08	0.10	0.019	(0.151)	0.017	0.002
266	22.17	0.10	0.019	(0.150)	0.017	0.002
267	22.25	0.10	0.019	(0.150)	0.017	0.002
268	22.33	0.07	0.013	(0.149)	0.012	0.001
269	22.42	0.07	0.013	(0.149)	0.012	0.001
270	22.50	0.07	0.013	(0.148)	0.012	0.001
271	22.58	0.07	0.013	(0.148)	0.012	0.001
272	22.67	0.07	0.013	(0.148)	0.012	0.001
273	22.75	0.07	0.013	(0.147)	0.012	0.001
274	22.83	0.07	0.013	(0.147)	0.012	0.001
275	22.92	0.07	0.013	(0.146)	0.012	0.001
276	23.00	0.07	0.013	(0.146)	0.012	0.001
277	23.08	0.07	0.013	(0.146)	0.012	0.001
278	23.17	0.07	0.013	(0.145)	0.012	0.001
279	23.25	0.07	0.013	(0.145)	0.012	0.001
280	23.33	0.07	0.013	(0.145)	0.012	0.001
281	23.42	0.07	0.013	(0.145)	0.012	0.001
282	23.50	0.07	0.013	(0.144)	0.012	0.001
283	23.58	0.07	0.013	(0.144)	0.012	0.001
284	23.67	0.07	0.013	(0.144)	0.012	0.001
285	23.75	0.07	0.013	(0.144)	0.012	0.001
286	23.83	0.07	0.013	(0.143)	0.012	0.001
287	23.92	0.07	0.013	(0.143)	0.012	0.001
288	24.00	0.07	0.013	(0.143)	0.012	0.001

```
              (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     1.9
      Flood volume = Effective rainfall      0.16(In)
       times area      19.8(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      1.44(In)
      Total soil loss =     2.376(Ac.Ft)
      Total rainfall =      1.60(In)
      Flood volume =       11499.4 Cubic Feet
      Total soil loss =      103494.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.430(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0001      0.01  Q         |         |         |         |
  0+15       0.0002      0.02  Q         |         |         |         |
  0+20       0.0004      0.02  Q         |         |         |         |
  0+25       0.0006      0.03  Q         |         |         |         |
  0+30       0.0008      0.03  Q         |         |         |         |
  0+35       0.0011      0.04  Q         |         |         |         |
  0+40       0.0013      0.04  Q         |         |         |         |
  0+45       0.0016      0.04  Q         |         |         |         |
  0+50       0.0019      0.04  Q         |         |         |         |
  0+55       0.0022      0.04  Q         |         |         |         |
  1+ 0       0.0025      0.05  Q         |         |         |         |
  1+ 5       0.0028      0.05  Q         |         |         |         |
  1+10       0.0031      0.04  Q         |         |         |         |
  1+15       0.0034      0.04  Q         |         |         |         |
  1+20       0.0037      0.04  Q         |         |         |         |
  1+25       0.0039      0.04  Q         |         |         |         |
  1+30       0.0042      0.04  Q         |         |         |         |
  1+35       0.0045      0.04  Q         |         |         |         |
  1+40       0.0047      0.04  Q         |         |         |         |
  1+45       0.0050      0.04  Q         |         |         |         |
  1+50       0.0053      0.04  Q         |         |         |         |
  1+55       0.0056      0.05  Q         |         |         |         |
  2+ 0       0.0059      0.05  Q         |         |         |         |
  2+ 5       0.0063      0.05  Q         |         |         |         |
  2+10       0.0066      0.05  Q         |         |         |         |
  2+15       0.0069      0.05  QV        |         |         |         |
  2+20       0.0073      0.05  QV        |         |         |         |
  2+25       0.0076      0.05  QV        |         |         |         |
```

2+30	0.0080	0.05	QV				
2+35	0.0084	0.05	QV				
2+40	0.0088	0.06	QV				
2+45	0.0092	0.06	QV				
2+50	0.0096	0.06	QV				
2+55	0.0100	0.06	QV				
3+ 0	0.0105	0.06	QV				
3+ 5	0.0109	0.06	QV				
3+10	0.0113	0.06	QV				
3+15	0.0118	0.06	QV				
3+20	0.0122	0.06	QV				
3+25	0.0127	0.06	QV				
3+30	0.0131	0.06	QV				
3+35	0.0135	0.06	Q V				
3+40	0.0140	0.06	Q V				
3+45	0.0144	0.06	Q V				
3+50	0.0149	0.07	Q V				
3+55	0.0153	0.07	Q V				
4+ 0	0.0159	0.07	Q V				
4+ 5	0.0164	0.07	Q V				
4+10	0.0169	0.08	Q V				
4+15	0.0174	0.08	Q V				
4+20	0.0179	0.08	Q V				
4+25	0.0185	0.08	Q V				
4+30	0.0191	0.09	Q V				
4+35	0.0197	0.09	Q V				
4+40	0.0203	0.09	Q V				
4+45	0.0209	0.09	Q V				
4+50	0.0215	0.09	Q V				
4+55	0.0222	0.10	Q V				
5+ 0	0.0229	0.10	Q V				
5+ 5	0.0236	0.10	Q V				
5+10	0.0242	0.09	Q V				
5+15	0.0247	0.08	Q V				
5+20	0.0253	0.08	Q V				
5+25	0.0259	0.09	Q V				
5+30	0.0265	0.09	Q V				
5+35	0.0271	0.09	Q V				
5+40	0.0278	0.10	Q V				
5+45	0.0284	0.10	Q V				
5+50	0.0291	0.10	Q V				
5+55	0.0298	0.10	Q V				
6+ 0	0.0305	0.10	Q V				
6+ 5	0.0312	0.10	Q V				
6+10	0.0320	0.11	Q V				
6+15	0.0327	0.11	Q V				
6+20	0.0335	0.11	Q V				
6+25	0.0343	0.11	Q V				
6+30	0.0351	0.11	Q V				
6+35	0.0359	0.12	Q V				

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 6+40       0.0367      0.12  Q    V    |          |          |          |
 6+45       0.0376      0.12  Q    V    |          |          |          |
 6+50       0.0384      0.13  Q    V    |          |          |          |
 6+55       0.0393      0.13  Q    V    |          |          |          |
 7+ 0       0.0402      0.13  Q     V   |          |          |          |
 7+ 5       0.0411      0.13  Q     V   |          |          |          |
 7+10       0.0419      0.13  Q     V   |          |          |          |
 7+15       0.0428      0.13  Q     V   |          |          |          |
 7+20       0.0437      0.13  Q     V   |          |          |          |
 7+25       0.0446      0.13  Q     V   |          |          |          |
 7+30       0.0456      0.14  Q     V   |          |          |          |
 7+35       0.0465      0.14  Q      V  |          |          |          |
 7+40       0.0475      0.15  Q      V  |          |          |          |
 7+45       0.0486      0.15  Q      V  |          |          |          |
 7+50       0.0496      0.15  Q      V  |          |          |          |
 7+55       0.0507      0.16  Q      V  |          |          |          |
 8+ 0       0.0518      0.16  Q      V  |          |          |          |
 8+ 5       0.0530      0.17  Q       V |          |          |          |
 8+10       0.0542      0.18  Q       V |          |          |          |
 8+15       0.0555      0.18  Q       V |          |          |          |
 8+20       0.0568      0.19  Q       V |          |          |          |
 8+25       0.0580      0.19  Q       V |          |          |          |
 8+30       0.0594      0.19  Q       V |          |          |          |
 8+35       0.0607      0.19  Q        V|          |          |          |
 8+40       0.0620      0.20  Q        V|          |          |          |
 8+45       0.0634      0.20  Q        V|          |          |          |
 8+50       0.0648      0.20  Q        V|          |          |          |
 8+55       0.0663      0.21  Q         V          |          |          |
 9+ 0       0.0677      0.21  Q         V          |          |          |
 9+ 5       0.0692      0.22  Q         V          |          |          |
 9+10       0.0708      0.23  Q         V          |          |          |
 9+15       0.0724      0.24  Q         V          |          |          |
 9+20       0.0741      0.24  Q         |V         |          |          |
 9+25       0.0758      0.25  Q         |V         |          |          |
 9+30       0.0775      0.25  |Q        |V         |          |          |
 9+35       0.0792      0.25  |Q        | V        |          |          |
 9+40       0.0810      0.26  |Q        | V        |          |          |
 9+45       0.0829      0.26  |Q        | V        |          |          |
 9+50       0.0847      0.27  |Q        | V        |          |          |
 9+55       0.0866      0.27  |Q        |  V       |          |          |
10+ 0       0.0885      0.28  |Q        |  V       |          |          |
10+ 5       0.0903      0.27  |Q        |  V       |          |          |
10+10       0.0919      0.23  Q         |  V       |          |          |
10+15       0.0934      0.21  Q         |   V      |          |          |
10+20       0.0948      0.21  Q         |   V      |          |          |
10+25       0.0962      0.20  Q         |   V      |          |          |
10+30       0.0975      0.20  Q         |   V      |          |          |
10+35       0.0989      0.20  Q         |   V      |          |          |
10+40       0.1005      0.23  Q         |    V     |          |          |
10+45       0.1022      0.24  Q         |    V     |          |          |
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10+50       0.1039      0.25  Q         |    V    |         |         |
10+55       0.1056      0.25  Q         |    V    |         |         |
11+ 0       0.1073      0.25  |Q        |     V   |         |         |
11+ 5       0.1090      0.25  |Q        |     V   |         |         |
11+10       0.1107      0.25  Q         |     V   |         |         |
11+15       0.1124      0.24  Q         |      V  |         |         |
11+20       0.1141      0.24  Q         |      V  |         |         |
11+25       0.1158      0.24  Q         |      V  |         |         |
11+30       0.1175      0.24  Q         |      V  |         |         |
11+35       0.1191      0.24  Q         |       V |         |         |
11+40       0.1207      0.23  Q         |       V |         |         |
11+45       0.1223      0.22  Q         |       V |         |         |
11+50       0.1238      0.22  Q         |       V |         |         |
11+55       0.1253      0.23  Q         |       V |         |         |
12+ 0       0.1269      0.23  Q         |        V|         |         |
12+ 5       0.1286      0.24  Q         |        V|         |         |
12+10       0.1305      0.28  |Q        |        V|         |         |
12+15       0.1325      0.30  |Q        |         V         |         |
12+20       0.1346      0.31  |Q        |         V         |         |
12+25       0.1368      0.32  |Q        |         V         |         |
12+30       0.1390      0.32  |Q        |         |V        |         |
12+35       0.1413      0.33  |Q        |         |V        |         |
12+40       0.1437      0.34  |Q        |         |V        |         |
12+45       0.1461      0.35  |Q        |         | V       |         |
12+50       0.1485      0.35  |Q        |         | V       |         |
12+55       0.1510      0.36  |Q        |         | V       |         |
13+ 0       0.1535      0.37  |Q        |         |  V      |         |
13+ 5       0.1561      0.37  |Q        |         |  V      |         |
13+10       0.1588      0.40  |Q        |         |   V     |         |
13+15       0.1617      0.42  |Q        |         |   V     |         |
13+20       0.1646      0.42  |Q        |         |   V     |         |
13+25       0.1676      0.43  |Q        |         |    V    |         |
13+30       0.1705      0.43  |Q        |         |    V    |         |
13+35       0.1734      0.41  |Q        |         |     V   |         |
13+40       0.1759      0.36  |Q        |         |     V   |         |
13+45       0.1781      0.33  |Q        |         |     V   |         |
13+50       0.1803      0.32  |Q        |         |      V  |         |
13+55       0.1824      0.31  |Q        |         |      V  |         |
14+ 0       0.1845      0.30  |Q        |         |      V  |         |
14+ 5       0.1866      0.31  |Q        |         |       V |         |
14+10       0.1889      0.33  |Q        |         |       V |         |
14+15       0.1912      0.33  |Q        |         |       V |         |
14+20       0.1935      0.34  |Q        |         |        V|         |
14+25       0.1958      0.33  |Q        |         |        V|         |
14+30       0.1981      0.33  |Q        |         |         V         |
14+35       0.2003      0.33  |Q        |         |         V         |
14+40       0.2026      0.33  |Q        |         |         V         |
14+45       0.2049      0.33  |Q        |         |         |V        |
14+50       0.2072      0.33  |Q        |         |         |V        |
14+55       0.2094      0.33  |Q        |         |         |V        |
```

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15+ 0       0.2117      0.32  |Q        |         |         | V       |
15+ 5       0.2139      0.32  |Q        |         |         | V       |
15+10       0.2160      0.31  |Q        |         |         | V       |
15+15       0.2182      0.31  |Q        |         |         |  V      |
15+20       0.2203      0.31  |Q        |         |         |  V      |
15+25       0.2224      0.30  |Q        |         |         |  V      |
15+30       0.2244      0.30  |Q        |         |         |   V     |
15+35       0.2264      0.29  |Q        |         |         |   V     |
15+40       0.2283      0.27  |Q        |         |         |   V     |
15+45       0.2300      0.26  |Q        |         |         |   V     |
15+50       0.2318      0.25  |Q        |         |         |    V    |
15+55       0.2335      0.25  Q         |         |         |    V    |
16+ 0       0.2352      0.25  Q         |         |         |    V    |
16+ 5       0.2367      0.22  Q         |         |         |    V    |
16+10       0.2377      0.14  Q         |         |         |     V   |
16+15       0.2384      0.10  Q         |         |         |     V   |
16+20       0.2390      0.08  Q         |         |         |     V   |
16+25       0.2394      0.07  Q         |         |         |     V   |
16+30       0.2399      0.07  Q         |         |         |     V   |
16+35       0.2403      0.06  Q         |         |         |     V   |
16+40       0.2406      0.05  Q         |         |         |     V   |
16+45       0.2410      0.05  Q         |         |         |     V   |
16+50       0.2412      0.04  Q         |         |         |     V   |
16+55       0.2415      0.04  Q         |         |         |     V   |
17+ 0       0.2418      0.04  Q         |         |         |     V   |
17+ 5       0.2421      0.04  Q         |         |         |     V   |
17+10       0.2424      0.05  Q         |         |         |     V   |
17+15       0.2428      0.06  Q         |         |         |     V   |
17+20       0.2433      0.06  Q         |         |         |     V   |
17+25       0.2437      0.06  Q         |         |         |     V   |
17+30       0.2441      0.06  Q         |         |         |     V   |
17+35       0.2445      0.06  Q         |         |         |      V  |
17+40       0.2450      0.06  Q         |         |         |      V  |
17+45       0.2454      0.06  Q         |         |         |      V  |
17+50       0.2458      0.06  Q         |         |         |      V  |
17+55       0.2462      0.06  Q         |         |         |      V  |
18+ 0       0.2466      0.05  Q         |         |         |      V  |
18+ 5       0.2470      0.05  Q         |         |         |      V  |
18+10       0.2473      0.05  Q         |         |         |      V  |
18+15       0.2477      0.05  Q         |         |         |      V  |
18+20       0.2480      0.05  Q         |         |         |      V  |
18+25       0.2484      0.05  Q         |         |         |      V  |
18+30       0.2487      0.05  Q         |         |         |      V  |
18+35       0.2491      0.05  Q         |         |         |      V  |
18+40       0.2494      0.04  Q         |         |         |      V  |
18+45       0.2497      0.04  Q         |         |         |      V  |
18+50       0.2500      0.04  Q         |         |         |      V  |
18+55       0.2502      0.03  Q         |         |         |      V  |
19+ 0       0.2504      0.03  Q         |         |         |      V  |
19+ 5       0.2506      0.03  Q         |         |         |      V  |
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19+10       0.2508      0.03  Q          |          |          |        V |
19+15       0.2511      0.04  Q          |          |          |        V |
19+20       0.2513      0.04  Q          |          |          |        V |
19+25       0.2516      0.04  Q          |          |          |        V |
19+30       0.2520      0.05  Q          |          |          |        V |
19+35       0.2523      0.05  Q          |          |          |        V |
19+40       0.2526      0.04  Q          |          |          |        V |
19+45       0.2529      0.04  Q          |          |          |        V |
19+50       0.2531      0.04  Q          |          |          |        V |
19+55       0.2533      0.03  Q          |          |          |        V |
20+ 0       0.2535      0.03  Q          |          |          |        V |
20+ 5       0.2538      0.03  Q          |          |          |        V |
20+10       0.2540      0.03  Q          |          |          |        V |
20+15       0.2542      0.04  Q          |          |          |        V |
20+20       0.2545      0.04  Q          |          |          |        V |
20+25       0.2548      0.04  Q          |          |          |        V |
20+30       0.2550      0.04  Q          |          |          |        V |
20+35       0.2553      0.04  Q          |          |          |        V |
20+40       0.2555      0.04  Q          |          |          |        V |
20+45       0.2558      0.04  Q          |          |          |        V |
20+50       0.2560      0.04  Q          |          |          |        V |
20+55       0.2563      0.03  Q          |          |          |        V |
21+ 0       0.2565      0.03  Q          |          |          |        V |
21+ 5       0.2567      0.03  Q          |          |          |        V |
21+10       0.2569      0.03  Q          |          |          |        V |
21+15       0.2571      0.04  Q          |          |          |        V |
21+20       0.2574      0.04  Q          |          |          |        V |
21+25       0.2576      0.03  Q          |          |          |         V|
21+30       0.2578      0.03  Q          |          |          |         V|
21+35       0.2580      0.03  Q          |          |          |         V|
21+40       0.2582      0.03  Q          |          |          |         V|
21+45       0.2585      0.04  Q          |          |          |         V|
21+50       0.2587      0.04  Q          |          |          |         V|
21+55       0.2589      0.03  Q          |          |          |         V|
22+ 0       0.2591      0.03  Q          |          |          |         V|
22+ 5       0.2593      0.03  Q          |          |          |         V|
22+10       0.2595      0.03  Q          |          |          |         V|
22+15       0.2598      0.04  Q          |          |          |         V|
22+20       0.2600      0.04  Q          |          |          |         V|
22+25       0.2602      0.03  Q          |          |          |         V|
22+30       0.2604      0.03  Q          |          |          |         V|
22+35       0.2606      0.03  Q          |          |          |         V|
22+40       0.2608      0.03  Q          |          |          |         V|
22+45       0.2610      0.03  Q          |          |          |         V|
22+50       0.2612      0.03  Q          |          |          |         V|
22+55       0.2613      0.03  Q          |          |          |         V|
23+ 0       0.2615      0.03  Q          |          |          |         V|
23+ 5       0.2617      0.03  Q          |          |          |         V|
23+10       0.2619      0.03  Q          |          |          |         V|
23+15       0.2620      0.03  Q          |          |          |         V|
```

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   23+20       0.2622      0.03  Q         |         |         |        V|
   23+25       0.2624      0.03  Q         |         |         |        V|
   23+30       0.2626      0.03  Q         |         |         |        V|
   23+35       0.2627      0.03  Q         |         |         |        V|
   23+40       0.2629      0.03  Q         |         |         |        V|
   23+45       0.2631      0.03  Q         |         |         |        V|
   23+50       0.2633      0.03  Q         |         |         |        V|
   23+55       0.2635      0.03  Q         |         |         |        V|
   24+ 0       0.2636      0.03  Q         |         |         |        V|
   24+ 5       0.2638      0.02  Q         |         |         |        V|
   24+10       0.2639      0.01  Q         |         |         |        V|
   24+15       0.2639      0.01  Q         |         |         |        V|
   24+20       0.2639      0.00  Q         |         |         |        V|
   24+25       0.2640      0.00  Q         |         |         |        V|
   24+30       0.2640      0.00  Q         |         |         |        V|
   24+35       0.2640      0.00  Q         |         |         |        V|
   24+40       0.2640      0.00  Q         |         |         |        V|
   24+45       0.2640      0.00  Q         |         |         |        V|
   24+50       0.2640      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

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                Study date  12/14/22 File: ONSITEPROP242.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, 2-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) =    2.00
Area Averaged 2-Year Rainfall =    1.600(In)
Area Averaged 100-Year Rainfall =    4.000(In)

Point rain (area averaged) =    1.600(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.600(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-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.900        0.095       1.000      0.095
                                                  Sum (F) =   0.095
Area averaged mean soil loss (F) (In/Hr) =  0.095
Minimum soil loss rate ((In/Hr)) =  0.048
(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	0.013	(0.169)	0.002	0.010
2	0.17	0.07	0.013	(0.168)	0.002	0.010
3	0.25	0.07	0.013	(0.167)	0.002	0.010
4	0.33	0.10	0.019	(0.167)	0.003	0.016
5	0.42	0.10	0.019	(0.166)	0.003	0.016
6	0.50	0.10	0.019	(0.165)	0.003	0.016
7	0.58	0.10	0.019	(0.165)	0.003	0.016
8	0.67	0.10	0.019	(0.164)	0.003	0.016
9	0.75	0.10	0.019	(0.163)	0.003	0.016
10	0.83	0.13	0.026	(0.163)	0.005	0.021
11	0.92	0.13	0.026	(0.162)	0.005	0.021
12	1.00	0.13	0.026	(0.162)	0.005	0.021
13	1.08	0.10	0.019	(0.161)	0.003	0.016
14	1.17	0.10	0.019	(0.160)	0.003	0.016
15	1.25	0.10	0.019	(0.160)	0.003	0.016
16	1.33	0.10	0.019	(0.159)	0.003	0.016
17	1.42	0.10	0.019	(0.158)	0.003	0.016
18	1.50	0.10	0.019	(0.158)	0.003	0.016
19	1.58	0.10	0.019	(0.157)	0.003	0.016
20	1.67	0.10	0.019	(0.156)	0.003	0.016
21	1.75	0.10	0.019	(0.156)	0.003	0.016
22	1.83	0.13	0.026	(0.155)	0.005	0.021
23	1.92	0.13	0.026	(0.155)	0.005	0.021
24	2.00	0.13	0.026	(0.154)	0.005	0.021
25	2.08	0.13	0.026	(0.153)	0.005	0.021
26	2.17	0.13	0.026	(0.153)	0.005	0.021
27	2.25	0.13	0.026	(0.152)	0.005	0.021
28	2.33	0.13	0.026	(0.151)	0.005	0.021
29	2.42	0.13	0.026	(0.151)	0.005	0.021
30	2.50	0.13	0.026	(0.150)	0.005	0.021
31	2.58	0.17	0.032	(0.150)	0.006	0.026
32	2.67	0.17	0.032	(0.149)	0.006	0.026
33	2.75	0.17	0.032	(0.148)	0.006	0.026
34	2.83	0.17	0.032	(0.148)	0.006	0.026
35	2.92	0.17	0.032	(0.147)	0.006	0.026
36	3.00	0.17	0.032	(0.147)	0.006	0.026
37	3.08	0.17	0.032	(0.146)	0.006	0.026
38	3.17	0.17	0.032	(0.145)	0.006	0.026
39	3.25	0.17	0.032	(0.145)	0.006	0.026
40	3.33	0.17	0.032	(0.144)	0.006	0.026
41	3.42	0.17	0.032	(0.144)	0.006	0.026
42	3.50	0.17	0.032	(0.143)	0.006	0.026
43	3.58	0.17	0.032	(0.142)	0.006	0.026
44	3.67	0.17	0.032	(0.142)	0.006	0.026
45	3.75	0.17	0.032	(0.141)	0.006	0.026
46	3.83	0.20	0.038	(0.141)	0.007	0.031
47	3.92	0.20	0.038	(0.140)	0.007	0.031

48	4.00	0.20	0.038	(0.139)	0.007	0.031
49	4.08	0.20	0.038	(0.139)	0.007	0.031
50	4.17	0.20	0.038	(0.138)	0.007	0.031
51	4.25	0.20	0.038	(0.138)	0.007	0.031
52	4.33	0.23	0.045	(0.137)	0.008	0.037
53	4.42	0.23	0.045	(0.136)	0.008	0.037
54	4.50	0.23	0.045	(0.136)	0.008	0.037
55	4.58	0.23	0.045	(0.135)	0.008	0.037
56	4.67	0.23	0.045	(0.135)	0.008	0.037
57	4.75	0.23	0.045	(0.134)	0.008	0.037
58	4.83	0.27	0.051	(0.134)	0.009	0.042
59	4.92	0.27	0.051	(0.133)	0.009	0.042
60	5.00	0.27	0.051	(0.132)	0.009	0.042
61	5.08	0.20	0.038	(0.132)	0.007	0.031
62	5.17	0.20	0.038	(0.131)	0.007	0.031
63	5.25	0.20	0.038	(0.131)	0.007	0.031
64	5.33	0.23	0.045	(0.130)	0.008	0.037
65	5.42	0.23	0.045	(0.129)	0.008	0.037
66	5.50	0.23	0.045	(0.129)	0.008	0.037
67	5.58	0.27	0.051	(0.128)	0.009	0.042
68	5.67	0.27	0.051	(0.128)	0.009	0.042
69	5.75	0.27	0.051	(0.127)	0.009	0.042
70	5.83	0.27	0.051	(0.127)	0.009	0.042
71	5.92	0.27	0.051	(0.126)	0.009	0.042
72	6.00	0.27	0.051	(0.126)	0.009	0.042
73	6.08	0.30	0.058	(0.125)	0.010	0.047
74	6.17	0.30	0.058	(0.124)	0.010	0.047
75	6.25	0.30	0.058	(0.124)	0.010	0.047
76	6.33	0.30	0.058	(0.123)	0.010	0.047
77	6.42	0.30	0.058	(0.123)	0.010	0.047
78	6.50	0.30	0.058	(0.122)	0.010	0.047
79	6.58	0.33	0.064	(0.122)	0.012	0.052
80	6.67	0.33	0.064	(0.121)	0.012	0.052
81	6.75	0.33	0.064	(0.121)	0.012	0.052
82	6.83	0.33	0.064	(0.120)	0.012	0.052
83	6.92	0.33	0.064	(0.119)	0.012	0.052
84	7.00	0.33	0.064	(0.119)	0.012	0.052
85	7.08	0.33	0.064	(0.118)	0.012	0.052
86	7.17	0.33	0.064	(0.118)	0.012	0.052
87	7.25	0.33	0.064	(0.117)	0.012	0.052
88	7.33	0.37	0.070	(0.117)	0.013	0.058
89	7.42	0.37	0.070	(0.116)	0.013	0.058
90	7.50	0.37	0.070	(0.116)	0.013	0.058
91	7.58	0.40	0.077	(0.115)	0.014	0.063
92	7.67	0.40	0.077	(0.115)	0.014	0.063
93	7.75	0.40	0.077	(0.114)	0.014	0.063
94	7.83	0.43	0.083	(0.114)	0.015	0.068
95	7.92	0.43	0.083	(0.113)	0.015	0.068
96	8.00	0.43	0.083	(0.113)	0.015	0.068
97	8.08	0.50	0.096	(0.112)	0.017	0.079

98	8.17	0.50	0.096	(0.112)	0.017	0.079
99	8.25	0.50	0.096	(0.111)	0.017	0.079
100	8.33	0.50	0.096	(0.110)	0.017	0.079
101	8.42	0.50	0.096	(0.110)	0.017	0.079
102	8.50	0.50	0.096	(0.109)	0.017	0.079
103	8.58	0.53	0.102	(0.109)	0.018	0.084
104	8.67	0.53	0.102	(0.108)	0.018	0.084
105	8.75	0.53	0.102	(0.108)	0.018	0.084
106	8.83	0.57	0.109	(0.107)	0.020	0.089
107	8.92	0.57	0.109	(0.107)	0.020	0.089
108	9.00	0.57	0.109	(0.106)	0.020	0.089
109	9.08	0.63	0.122	(0.106)	0.022	0.100
110	9.17	0.63	0.122	(0.105)	0.022	0.100
111	9.25	0.63	0.122	(0.105)	0.022	0.100
112	9.33	0.67	0.128	(0.104)	0.023	0.105
113	9.42	0.67	0.128	(0.104)	0.023	0.105
114	9.50	0.67	0.128	(0.103)	0.023	0.105
115	9.58	0.70	0.134	(0.103)	0.024	0.110
116	9.67	0.70	0.134	(0.102)	0.024	0.110
117	9.75	0.70	0.134	(0.102)	0.024	0.110
118	9.83	0.73	0.141	(0.101)	0.025	0.115
119	9.92	0.73	0.141	(0.101)	0.025	0.115
120	10.00	0.73	0.141	(0.100)	0.025	0.115
121	10.08	0.50	0.096	(0.100)	0.017	0.079
122	10.17	0.50	0.096	(0.099)	0.017	0.079
123	10.25	0.50	0.096	(0.099)	0.017	0.079
124	10.33	0.50	0.096	(0.099)	0.017	0.079
125	10.42	0.50	0.096	(0.098)	0.017	0.079
126	10.50	0.50	0.096	(0.098)	0.017	0.079
127	10.58	0.67	0.128	(0.097)	0.023	0.105
128	10.67	0.67	0.128	(0.097)	0.023	0.105
129	10.75	0.67	0.128	(0.096)	0.023	0.105
130	10.83	0.67	0.128	(0.096)	0.023	0.105
131	10.92	0.67	0.128	(0.095)	0.023	0.105
132	11.00	0.67	0.128	(0.095)	0.023	0.105
133	11.08	0.63	0.122	(0.094)	0.022	0.100
134	11.17	0.63	0.122	(0.094)	0.022	0.100
135	11.25	0.63	0.122	(0.093)	0.022	0.100
136	11.33	0.63	0.122	(0.093)	0.022	0.100
137	11.42	0.63	0.122	(0.092)	0.022	0.100
138	11.50	0.63	0.122	(0.092)	0.022	0.100
139	11.58	0.57	0.109	(0.091)	0.020	0.089
140	11.67	0.57	0.109	(0.091)	0.020	0.089
141	11.75	0.57	0.109	(0.091)	0.020	0.089
142	11.83	0.60	0.115	(0.090)	0.021	0.094
143	11.92	0.60	0.115	(0.090)	0.021	0.094
144	12.00	0.60	0.115	(0.089)	0.021	0.094
145	12.08	0.83	0.160	(0.089)	0.029	0.131
146	12.17	0.83	0.160	(0.088)	0.029	0.131
147	12.25	0.83	0.160	(0.088)	0.029	0.131

148	12.33	0.87	0.166	(0.087)	0.030	0.136
149	12.42	0.87	0.166	(0.087)	0.030	0.136
150	12.50	0.87	0.166	(0.087)	0.030	0.136
151	12.58	0.93	0.179	(0.086)	0.032	0.147
152	12.67	0.93	0.179	(0.086)	0.032	0.147
153	12.75	0.93	0.179	(0.085)	0.032	0.147
154	12.83	0.97	0.186	(0.085)	0.033	0.152
155	12.92	0.97	0.186	(0.084)	0.033	0.152
156	13.00	0.97	0.186	(0.084)	0.033	0.152
157	13.08	1.13	0.218	(0.084)	0.039	0.178
158	13.17	1.13	0.218	(0.083)	0.039	0.178
159	13.25	1.13	0.218	(0.083)	0.039	0.178
160	13.33	1.13	0.218	(0.082)	0.039	0.178
161	13.42	1.13	0.218	(0.082)	0.039	0.178
162	13.50	1.13	0.218	(0.081)	0.039	0.178
163	13.58	0.77	0.147	(0.081)	0.026	0.121
164	13.67	0.77	0.147	(0.081)	0.026	0.121
165	13.75	0.77	0.147	(0.080)	0.026	0.121
166	13.83	0.77	0.147	(0.080)	0.026	0.121
167	13.92	0.77	0.147	(0.079)	0.026	0.121
168	14.00	0.77	0.147	(0.079)	0.026	0.121
169	14.08	0.90	0.173	(0.079)	0.031	0.142
170	14.17	0.90	0.173	(0.078)	0.031	0.142
171	14.25	0.90	0.173	(0.078)	0.031	0.142
172	14.33	0.87	0.166	(0.077)	0.030	0.136
173	14.42	0.87	0.166	(0.077)	0.030	0.136
174	14.50	0.87	0.166	(0.077)	0.030	0.136
175	14.58	0.87	0.166	(0.076)	0.030	0.136
176	14.67	0.87	0.166	(0.076)	0.030	0.136
177	14.75	0.87	0.166	(0.075)	0.030	0.136
178	14.83	0.83	0.160	(0.075)	0.029	0.131
179	14.92	0.83	0.160	(0.075)	0.029	0.131
180	15.00	0.83	0.160	(0.074)	0.029	0.131
181	15.08	0.80	0.154	(0.074)	0.028	0.126
182	15.17	0.80	0.154	(0.074)	0.028	0.126
183	15.25	0.80	0.154	(0.073)	0.028	0.126
184	15.33	0.77	0.147	(0.073)	0.026	0.121
185	15.42	0.77	0.147	(0.072)	0.026	0.121
186	15.50	0.77	0.147	(0.072)	0.026	0.121
187	15.58	0.63	0.122	(0.072)	0.022	0.100
188	15.67	0.63	0.122	(0.071)	0.022	0.100
189	15.75	0.63	0.122	(0.071)	0.022	0.100
190	15.83	0.63	0.122	(0.071)	0.022	0.100
191	15.92	0.63	0.122	(0.070)	0.022	0.100
192	16.00	0.63	0.122	(0.070)	0.022	0.100
193	16.08	0.13	0.026	(0.069)	0.005	0.021
194	16.17	0.13	0.026	(0.069)	0.005	0.021
195	16.25	0.13	0.026	(0.069)	0.005	0.021
196	16.33	0.13	0.026	(0.068)	0.005	0.021
197	16.42	0.13	0.026	(0.068)	0.005	0.021

198	16.50	0.13	0.026	(0.068)	0.005	0.021
199	16.58	0.10	0.019	(0.067)	0.003	0.016
200	16.67	0.10	0.019	(0.067)	0.003	0.016
201	16.75	0.10	0.019	(0.067)	0.003	0.016
202	16.83	0.10	0.019	(0.066)	0.003	0.016
203	16.92	0.10	0.019	(0.066)	0.003	0.016
204	17.00	0.10	0.019	(0.066)	0.003	0.016
205	17.08	0.17	0.032	(0.065)	0.006	0.026
206	17.17	0.17	0.032	(0.065)	0.006	0.026
207	17.25	0.17	0.032	(0.065)	0.006	0.026
208	17.33	0.17	0.032	(0.064)	0.006	0.026
209	17.42	0.17	0.032	(0.064)	0.006	0.026
210	17.50	0.17	0.032	(0.064)	0.006	0.026
211	17.58	0.17	0.032	(0.063)	0.006	0.026
212	17.67	0.17	0.032	(0.063)	0.006	0.026
213	17.75	0.17	0.032	(0.063)	0.006	0.026
214	17.83	0.13	0.026	(0.062)	0.005	0.021
215	17.92	0.13	0.026	(0.062)	0.005	0.021
216	18.00	0.13	0.026	(0.062)	0.005	0.021
217	18.08	0.13	0.026	(0.062)	0.005	0.021
218	18.17	0.13	0.026	(0.061)	0.005	0.021
219	18.25	0.13	0.026	(0.061)	0.005	0.021
220	18.33	0.13	0.026	(0.061)	0.005	0.021
221	18.42	0.13	0.026	(0.060)	0.005	0.021
222	18.50	0.13	0.026	(0.060)	0.005	0.021
223	18.58	0.10	0.019	(0.060)	0.003	0.016
224	18.67	0.10	0.019	(0.059)	0.003	0.016
225	18.75	0.10	0.019	(0.059)	0.003	0.016
226	18.83	0.07	0.013	(0.059)	0.002	0.010
227	18.92	0.07	0.013	(0.059)	0.002	0.010
228	19.00	0.07	0.013	(0.058)	0.002	0.010
229	19.08	0.10	0.019	(0.058)	0.003	0.016
230	19.17	0.10	0.019	(0.058)	0.003	0.016
231	19.25	0.10	0.019	(0.058)	0.003	0.016
232	19.33	0.13	0.026	(0.057)	0.005	0.021
233	19.42	0.13	0.026	(0.057)	0.005	0.021
234	19.50	0.13	0.026	(0.057)	0.005	0.021
235	19.58	0.10	0.019	(0.056)	0.003	0.016
236	19.67	0.10	0.019	(0.056)	0.003	0.016
237	19.75	0.10	0.019	(0.056)	0.003	0.016
238	19.83	0.07	0.013	(0.056)	0.002	0.010
239	19.92	0.07	0.013	(0.055)	0.002	0.010
240	20.00	0.07	0.013	(0.055)	0.002	0.010
241	20.08	0.10	0.019	(0.055)	0.003	0.016
242	20.17	0.10	0.019	(0.055)	0.003	0.016
243	20.25	0.10	0.019	(0.055)	0.003	0.016
244	20.33	0.10	0.019	(0.054)	0.003	0.016
245	20.42	0.10	0.019	(0.054)	0.003	0.016
246	20.50	0.10	0.019	(0.054)	0.003	0.016
247	20.58	0.10	0.019	(0.054)	0.003	0.016

248	20.67	0.10	0.019	(0.053)	0.003	0.016
249	20.75	0.10	0.019	(0.053)	0.003	0.016
250	20.83	0.07	0.013	(0.053)	0.002	0.010
251	20.92	0.07	0.013	(0.053)	0.002	0.010
252	21.00	0.07	0.013	(0.052)	0.002	0.010
253	21.08	0.10	0.019	(0.052)	0.003	0.016
254	21.17	0.10	0.019	(0.052)	0.003	0.016
255	21.25	0.10	0.019	(0.052)	0.003	0.016
256	21.33	0.07	0.013	(0.052)	0.002	0.010
257	21.42	0.07	0.013	(0.051)	0.002	0.010
258	21.50	0.07	0.013	(0.051)	0.002	0.010
259	21.58	0.10	0.019	(0.051)	0.003	0.016
260	21.67	0.10	0.019	(0.051)	0.003	0.016
261	21.75	0.10	0.019	(0.051)	0.003	0.016
262	21.83	0.07	0.013	(0.051)	0.002	0.010
263	21.92	0.07	0.013	(0.050)	0.002	0.010
264	22.00	0.07	0.013	(0.050)	0.002	0.010
265	22.08	0.10	0.019	(0.050)	0.003	0.016
266	22.17	0.10	0.019	(0.050)	0.003	0.016
267	22.25	0.10	0.019	(0.050)	0.003	0.016
268	22.33	0.07	0.013	(0.050)	0.002	0.010
269	22.42	0.07	0.013	(0.049)	0.002	0.010
270	22.50	0.07	0.013	(0.049)	0.002	0.010
271	22.58	0.07	0.013	(0.049)	0.002	0.010
272	22.67	0.07	0.013	(0.049)	0.002	0.010
273	22.75	0.07	0.013	(0.049)	0.002	0.010
274	22.83	0.07	0.013	(0.049)	0.002	0.010
275	22.92	0.07	0.013	(0.049)	0.002	0.010
276	23.00	0.07	0.013	(0.048)	0.002	0.010
277	23.08	0.07	0.013	(0.048)	0.002	0.010
278	23.17	0.07	0.013	(0.048)	0.002	0.010
279	23.25	0.07	0.013	(0.048)	0.002	0.010
280	23.33	0.07	0.013	(0.048)	0.002	0.010
281	23.42	0.07	0.013	(0.048)	0.002	0.010
282	23.50	0.07	0.013	(0.048)	0.002	0.010
283	23.58	0.07	0.013	(0.048)	0.002	0.010
284	23.67	0.07	0.013	(0.048)	0.002	0.010
285	23.75	0.07	0.013	(0.048)	0.002	0.010
286	23.83	0.07	0.013	(0.048)	0.002	0.010
287	23.92	0.07	0.013	(0.048)	0.002	0.010
288	24.00	0.07	0.013	(0.048)	0.002	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)
times area 19.8(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.475(Ac.Ft)
Total rainfall = 1.60(In)
Flood volume = 94295.0 Cubic Feet
Total soil loss = 20698.9 Cubic Feet

```
      ----------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.562(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       0.0010      0.15  Q         |         |         |         |
  0+10       0.0024      0.21  Q         |         |         |         |
  0+15       0.0039      0.21  Q         |         |         |         |
  0+20       0.0058      0.28  VQ        |         |         |         |
  0+25       0.0080      0.31  VQ        |         |         |         |
  0+30       0.0102      0.31  VQ        |         |         |         |
  0+35       0.0123      0.31  VQ        |         |         |         |
  0+40       0.0145      0.31  VQ        |         |         |         |
  0+45       0.0167      0.31  VQ        |         |         |         |
  0+50       0.0193      0.39  VQ        |         |         |         |
  0+55       0.0222      0.42  VQ        |         |         |         |
  1+ 0       0.0251      0.42  VQ        |         |         |         |
  1+ 5       0.0275      0.35  VQ        |         |         |         |
  1+10       0.0296      0.31  VQ        |         |         |         |
  1+15       0.0318      0.31  VQ        |         |         |         |
  1+20       0.0340      0.31  VQ        |         |         |         |
  1+25       0.0361      0.31  VQ        |         |         |         |
  1+30       0.0383      0.31  VQ        |         |         |         |
  1+35       0.0405      0.31  VQ        |         |         |         |
  1+40       0.0426      0.31  VQ        |         |         |         |
  1+45       0.0448      0.31  VQ        |         |         |         |
  1+50       0.0475      0.39  VQ        |         |         |         |
  1+55       0.0503      0.42  VQ        |         |         |         |
  2+ 0       0.0532      0.42  VQ        |         |         |         |
  2+ 5       0.0561      0.42  |Q        |         |         |         |
  2+10       0.0590      0.42  |Q        |         |         |         |
  2+15       0.0619      0.42  |Q        |         |         |         |
  2+20       0.0648      0.42  |Q        |         |         |         |
  2+25       0.0677      0.42  |Q        |         |         |         |
  2+30       0.0706      0.42  |Q        |         |         |         |
  2+35       0.0739      0.49  |Q        |         |         |         |
  2+40       0.0775      0.52  |VQ       |         |         |         |
  2+45       0.0812      0.52  |VQ       |         |         |         |
  2+50       0.0848      0.52  |VQ       |         |         |         |
  2+55       0.0884      0.52  |VQ       |         |         |         |
  3+ 0       0.0920      0.52  |VQ       |         |         |         |
  3+ 5       0.0956      0.52  |VQ       |         |         |         |
  3+10       0.0992      0.52  |VQ       |         |         |         |
```

3+15	0.1028	0.52	VQ			
3+20	0.1064	0.52	VQ			
3+25	0.1100	0.52	Q			
3+30	0.1136	0.52	Q			
3+35	0.1172	0.52	Q			
3+40	0.1208	0.52	Q			
3+45	0.1244	0.52	Q			
3+50	0.1286	0.60	Q			
3+55	0.1329	0.63	Q			
4+ 0	0.1372	0.63	Q			
4+ 5	0.1415	0.63	Q			
4+10	0.1459	0.63	Q			
4+15	0.1502	0.63	Q			
4+20	0.1550	0.70	Q			
4+25	0.1601	0.73	Q			
4+30	0.1651	0.73	QV			
4+35	0.1702	0.73	QV			
4+40	0.1752	0.73	QV			
4+45	0.1803	0.73	QV			
4+50	0.1858	0.81	Q			
4+55	0.1916	0.84	Q			
5+ 0	0.1974	0.84	Q			
5+ 5	0.2022	0.69	QV			
5+10	0.2065	0.63	QV			
5+15	0.2108	0.63	QV			
5+20	0.2156	0.70	QV			
5+25	0.2207	0.73	Q V			
5+30	0.2257	0.73	Q V			
5+35	0.2313	0.81	QV			
5+40	0.2371	0.84	QV			
5+45	0.2428	0.84	QV			
5+50	0.2486	0.84	QV			
5+55	0.2544	0.84	QV			
6+ 0	0.2602	0.84	QV			
6+ 5	0.2664	0.91	QV			
6+10	0.2729	0.94	Q V			
6+15	0.2794	0.94	Q V			
6+20	0.2859	0.94	Q V			
6+25	0.2924	0.94	Q V			
6+30	0.2989	0.94	Q V			
6+35	0.3059	1.02	QV			
6+40	0.3131	1.05	QV			
6+45	0.3203	1.05	QV			
6+50	0.3275	1.05	Q V			
6+55	0.3348	1.05	Q V			
7+ 0	0.3420	1.05	Q V			
7+ 5	0.3492	1.05	Q V			
7+10	0.3564	1.05	Q V			
7+15	0.3636	1.05	Q V			
7+20	0.3713	1.12	Q V			

```
 7+25       0.3793      1.15  |   Q  V  |          |          |          |
 7+30       0.3872      1.15  |   Q  V  |          |          |          |
 7+35       0.3957      1.23  |   Q  V  |          |          |          |
 7+40       0.4043      1.26  |    Q V  |          |          |          |
 7+45       0.4130      1.26  |    Q V  |          |          |          |
 7+50       0.4221      1.33  |    Q V  |          |          |          |
 7+55       0.4315      1.36  |    Q V  |          |          |          |
 8+ 0       0.4409      1.36  |    Q  V |          |          |          |
 8+ 5       0.4513      1.51  |     Q V |          |          |          |
 8+10       0.4621      1.57  |     Q V |          |          |          |
 8+15       0.4729      1.57  |     Q V |          |          |          |
 8+20       0.4837      1.57  |     Q V |          |          |          |
 8+25       0.4946      1.57  |     Q  V|          |          |          |
 8+30       0.5054      1.57  |     Q  V|          |          |          |
 8+35       0.5167      1.64  |     Q  V|          |          |          |
 8+40       0.5283      1.68  |     Q  V|          |          |          |
 8+45       0.5398      1.68  |     Q  V|          |          |          |
 8+50       0.5518      1.75  |     Q   V          |          |          |
 8+55       0.5641      1.78  |      Q  V          |          |          |
 9+ 0       0.5764      1.78  |      Q  V          |          |          |
 9+ 5       0.5896      1.93  |      Q  V          |          |          |
 9+10       0.6034      1.99  |      Q  |V         |          |          |
 9+15       0.6171      1.99  |      Q  |V         |          |          |
 9+20       0.6313      2.06  |       Q |V         |          |          |
 9+25       0.6457      2.10  |       Q |V         |          |          |
 9+30       0.6601      2.10  |       Q | V        |          |          |
 9+35       0.6751      2.17  |       Q | V        |          |          |
 9+40       0.6902      2.20  |       Q | V        |          |          |
 9+45       0.7054      2.20  |       Q |  V       |          |          |
 9+50       0.7210      2.27  |        Q|  V       |          |          |
 9+55       0.7369      2.30  |        Q|  V       |          |          |
10+ 0       0.7528      2.30  |        Q|  V       |          |          |
10+ 5       0.7652      1.80  |      Q  |   V      |          |          |
10+10       0.7760      1.57  |     Q   |   V      |          |          |
10+15       0.7868      1.57  |     Q   |   V      |          |          |
10+20       0.7976      1.57  |     Q   |   V      |          |          |
10+25       0.8084      1.57  |     Q   |   V      |          |          |
10+30       0.8193      1.57  |     Q   |    V     |          |          |
10+35       0.8326      1.93  |      Q  |    V     |          |          |
10+40       0.8470      2.10  |       Q |    V     |          |          |
10+45       0.8615      2.10  |       Q |    V     |          |          |
10+50       0.8759      2.10  |       Q |     V    |          |          |
10+55       0.8903      2.10  |       Q |     V    |          |          |
11+ 0       0.9048      2.10  |       Q |     V    |          |          |
11+ 5       0.9187      2.02  |       Q |     V    |          |          |
11+10       0.9324      1.99  |      Q  |      V   |          |          |
11+15       0.9461      1.99  |      Q  |      V   |          |          |
11+20       0.9598      1.99  |      Q  |      V   |          |          |
11+25       0.9735      1.99  |      Q  |      V   |          |          |
11+30       0.9872      1.99  |      Q  |       V  |          |          |
```

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11+35       0.9999      1.85  |      Q  |       V |         |         |
11+40       1.0122      1.78  |      Q  |       V |         |         |
11+45       1.0245      1.78  |      Q  |       V |         |         |
11+50       1.0372      1.85  |      Q  |        V|         |         |
11+55       1.0502      1.89  |      Q  |        V|         |         |
12+ 0       1.0632      1.89  |      Q  |        V|         |         |
12+ 5       1.0797      2.39  |        Q|        V|         |         |
12+10       1.0977      2.62  |         Q        V         |         |
12+15       1.1158      2.62  |         Q        V         |         |
12+20       1.1343      2.69  |         Q        V         |         |
12+25       1.1531      2.72  |         Q        |V        |         |
12+30       1.1718      2.72  |         Q        |V        |         |
12+35       1.1916      2.87  |         |Q       | V       |         |
12+40       1.2118      2.93  |         |Q       | V       |         |
12+45       1.2320      2.93  |         |Q       | V       |         |
12+50       1.2527      3.01  |         | Q      |  V      |         |
12+55       1.2736      3.04  |         | Q      |  V      |         |
13+ 0       1.2946      3.04  |         | Q      |  V      |         |
13+ 5       1.3180      3.40  |         |  Q     |   V     |         |
13+10       1.3425      3.56  |         |   Q    |   V     |         |
13+15       1.3671      3.56  |         |   Q    |    V    |         |
13+20       1.3916      3.56  |         |   Q    |    V    |         |
13+25       1.4161      3.56  |         |   Q    |     V   |         |
13+30       1.4407      3.56  |         |   Q    |     V   |         |
13+35       1.4597      2.76  |         |Q       |     V   |         |
13+40       1.4763      2.41  |        Q|        |      V  |         |
13+45       1.4929      2.41  |        Q|        |      V  |         |
13+50       1.5095      2.41  |        Q|        |      V  |         |
13+55       1.5261      2.41  |        Q|        |       V |         |
14+ 0       1.5427      2.41  |        Q|        |       V |         |
14+ 5       1.5613      2.70  |         Q        |       V |         |
14+10       1.5808      2.83  |         |Q       |        V|         |
14+15       1.6002      2.83  |         |Q       |        V|         |
14+20       1.6192      2.76  |         |Q       |        V|         |
14+25       1.6380      2.72  |         Q        |         V         |
14+30       1.6567      2.72  |         Q        |         V         |
14+35       1.6755      2.72  |         Q        |         V         |
14+40       1.6943      2.72  |         Q        |         |V        |
14+45       1.7130      2.72  |         Q        |         |V        |
14+50       1.7313      2.65  |         Q        |         |V        |
14+55       1.7493      2.62  |         Q        |         | V       |
15+ 0       1.7674      2.62  |         Q        |         | V       |
15+ 5       1.7849      2.55  |         Q        |         | V       |
15+10       1.8022      2.51  |         Q        |         |  V      |
15+15       1.8195      2.51  |         Q        |         |  V      |
15+20       1.8364      2.44  |        Q|        |         |  V      |
15+25       1.8530      2.41  |        Q|        |         |   V     |
15+30       1.8696      2.41  |        Q|        |         |   V     |
15+35       1.8841      2.12  |       Q |        |         |   V     |
15+40       1.8979      1.99  |      Q  |        |         |    V    |
```

```
15+45        1.9116       1.99  |       Q  |          |          |     V    |
15+50        1.9253       1.99  |       Q  |          |          |     V    |
15+55        1.9390       1.99  |       Q  |          |          |     V    |
16+ 0        1.9527       1.99  |       Q  |          |          |      V   |
16+ 5        1.9589       0.90  |   Q      |          |          |      V   |
16+10        1.9618       0.42  |Q         |          |          |      V   |
16+15        1.9647       0.42  |Q         |          |          |      V   |
16+20        1.9676       0.42  |Q         |          |          |      V   |
16+25        1.9704       0.42  |Q         |          |          |      V   |
16+30        1.9733       0.42  |Q         |          |          |      V   |
16+35        1.9757       0.35  |Q         |          |          |      V   |
16+40        1.9779       0.31  |Q         |          |          |      V   |
16+45        1.9801       0.31  |Q         |          |          |      V   |
16+50        1.9822       0.31  |Q         |          |          |      V   |
16+55        1.9844       0.31  |Q         |          |          |      V   |
17+ 0        1.9865       0.31  |Q         |          |          |      V   |
17+ 5        1.9897       0.46  |Q         |          |          |      V   |
17+10        1.9933       0.52  | Q        |          |          |      V   |
17+15        1.9969       0.52  | Q        |          |          |      V   |
17+20        2.0005       0.52  | Q        |          |          |      V   |
17+25        2.0041       0.52  | Q        |          |          |       V  |
17+30        2.0077       0.52  | Q        |          |          |       V  |
17+35        2.0114       0.52  | Q        |          |
17+40        2.0150       0.52  | Q        |          |
17+45        2.0186       0.52  | Q        |          |
17+50        2.0217       0.45  |Q         |          |
17+55        2.0246       0.42  |Q         |          |
18+ 0        2.0275       0.42  |Q         |          |          |       V  |
18+ 5        2.0303       0.42  |Q         |          |          |       V  |
18+10        2.0332       0.42  |Q         |          |          |       V  |
18+15        2.0361       0.42  |Q         |          |          |       V  |
18+20        2.0390       0.42  |Q         |          |          |       V  |
18+25        2.0419       0.42  |Q         |          |          |       V  |
18+30        2.0448       0.42  |Q         |          |          |       V  |
18+35        2.0472       0.35  |Q         |          |          |       V  |
18+40        2.0493       0.31  |Q         |          |          |       V  |
18+45        2.0515       0.31  |Q         |          |          |       V  |
18+50        2.0532       0.24  Q          |          |          |       V  |
18+55        2.0546       0.21  Q          |          |          |       V  |
19+ 0        2.0560       0.21  Q          |          |          |       V  |
19+ 5        2.0580       0.28  |Q         |          |          |        V |
19+10        2.0601       0.31  |Q         |          |          |        V |
19+15        2.0623       0.31  |Q         |          |          |        V |
19+20        2.0650       0.39  |Q         |          |          |        V |
19+25        2.0679       0.42  |Q         |          |          |        V |
19+30        2.0707       0.42  |Q         |          |          |        V |
19+35        2.0731       0.35  |Q         |          |          |        V |
19+40        2.0753       0.31  |Q         |          |          |        V |
19+45        2.0775       0.31  |Q         |          |          |        V |
19+50        2.0791       0.24  Q          |          |          |        V |
```

Qpeak,pre = 0.43 cfs
2.0246-0.0706=1.954 ac-ft
85,116 cf
110% preliminary
93,628 cf

```
19+55       2.0806      0.21  Q          |          |          |        V |
20+ 0       2.0820      0.21  Q          |          |          |        V |
20+ 5       2.0840      0.28  |Q         |          |          |        V |
20+10       2.0861      0.31  |Q         |          |          |        V |
20+15       2.0883      0.31  |Q         |          |          |        V |
20+20       2.0905      0.31  |Q         |          |          |        V |
20+25       2.0926      0.31  |Q         |          |          |        V |
20+30       2.0948      0.31  |Q         |          |          |        V |
20+35       2.0969      0.31  |Q         |          |          |        V |
20+40       2.0991      0.31  |Q         |          |          |        V |
20+45       2.1013      0.31  |Q         |          |          |        V |
20+50       2.1029      0.24  Q          |          |          |        V |
20+55       2.1044      0.21  Q          |          |          |        V |
21+ 0       2.1058      0.21  Q          |          |          |        V |
21+ 5       2.1078      0.28  |Q         |          |          |        V |
21+10       2.1099      0.31  |Q         |          |          |        V |
21+15       2.1121      0.31  |Q         |          |          |         V|
21+20       2.1138      0.24  Q          |          |          |         V|
21+25       2.1152      0.21  Q          |          |          |         V|
21+30       2.1166      0.21  Q          |          |          |         V|
21+35       2.1186      0.28  |Q         |          |          |         V|
21+40       2.1208      0.31  |Q         |          |          |         V|
21+45       2.1229      0.31  |Q         |          |          |         V|
21+50       2.1246      0.24  Q          |          |          |         V|
21+55       2.1260      0.21  Q          |          |          |         V|
22+ 0       2.1275      0.21  Q          |          |          |         V|
22+ 5       2.1294      0.28  |Q         |          |          |         V|
22+10       2.1316      0.31  |Q         |          |          |         V|
22+15       2.1337      0.31  |Q         |          |          |         V|
22+20       2.1354      0.24  Q          |          |          |         V|
22+25       2.1369      0.21  Q          |          |          |         V|
22+30       2.1383      0.21  Q          |          |          |         V|
22+35       2.1397      0.21  Q          |          |          |         V|
22+40       2.1412      0.21  Q          |          |          |         V|
22+45       2.1426      0.21  Q          |          |          |         V|
22+50       2.1441      0.21  Q          |          |          |         V|
22+55       2.1455      0.21  Q          |          |          |         V|
23+ 0       2.1470      0.21  Q          |          |          |         V|
23+ 5       2.1484      0.21  Q          |          |          |         V|
23+10       2.1498      0.21  Q          |          |          |         V|
23+15       2.1513      0.21  Q          |          |          |         V|
23+20       2.1527      0.21  Q          |          |          |         V|
23+25       2.1542      0.21  Q          |          |          |         V|
23+30       2.1556      0.21  Q          |          |          |         V|
23+35       2.1571      0.21  Q          |          |          |         V|
23+40       2.1585      0.21  Q          |          |          |         V|
23+45       2.1599      0.21  Q          |          |          |         V|
23+50       2.1614      0.21  Q          |          |          |         V|
23+55       2.1628      0.21  Q          |          |          |         V|
24+ 0       2.1643      0.21  Q          |          |          |         V|
```

```
   24+ 5       2.1647      0.06  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                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

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      ----------------------------------------------------------------------
       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 |
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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|
```

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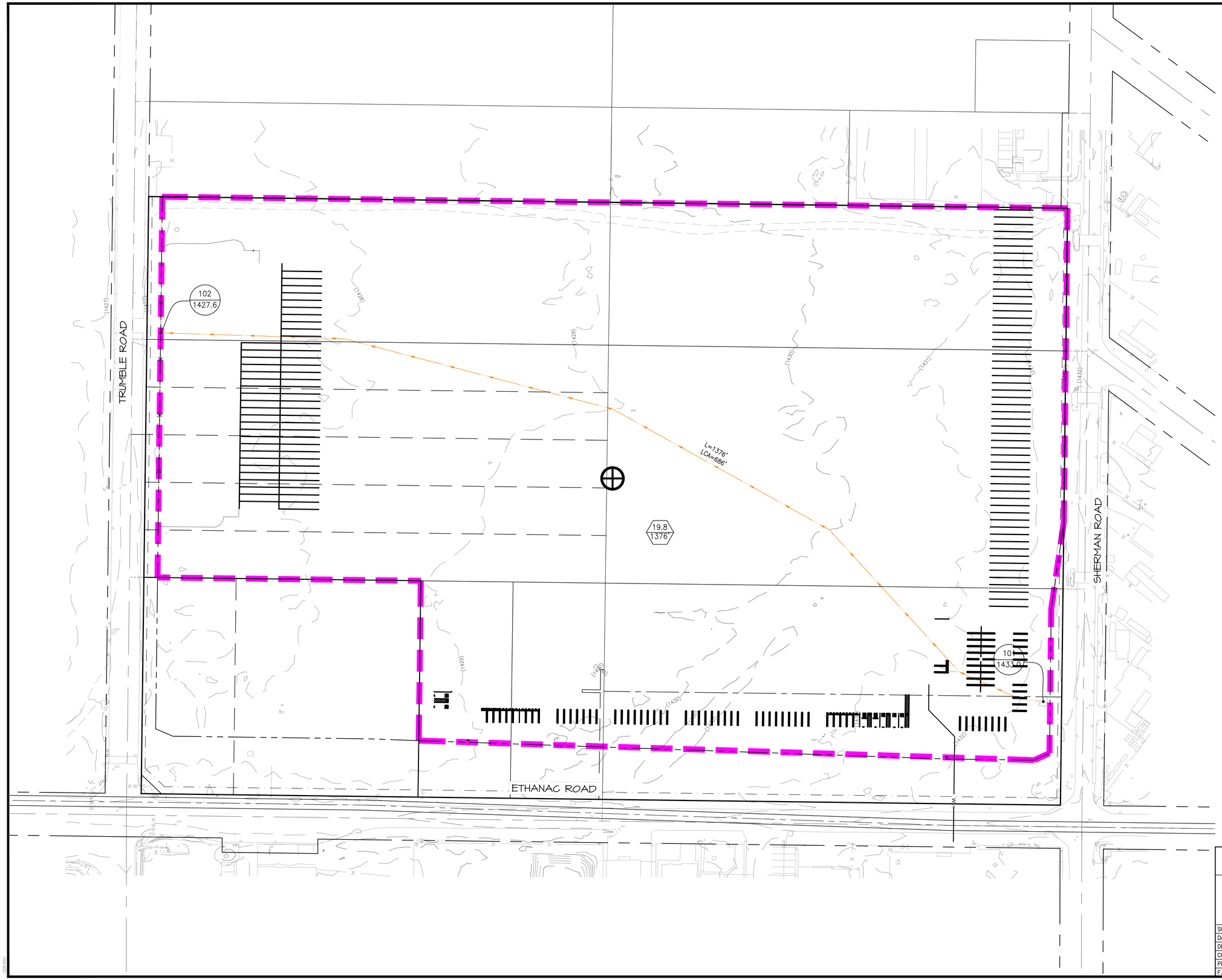

LEGEND

- 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

N W E S

1" = 60'

30 0 60 120 180

CITY OF PERRIS

COUNTY OF RIVERSIDE
EXISTING UNIT HYDROGRAPH HYDROLOGY
ETHANAC COMMERCE CENTER
P 22-00030

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: 4/14/23			SHEET 1
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

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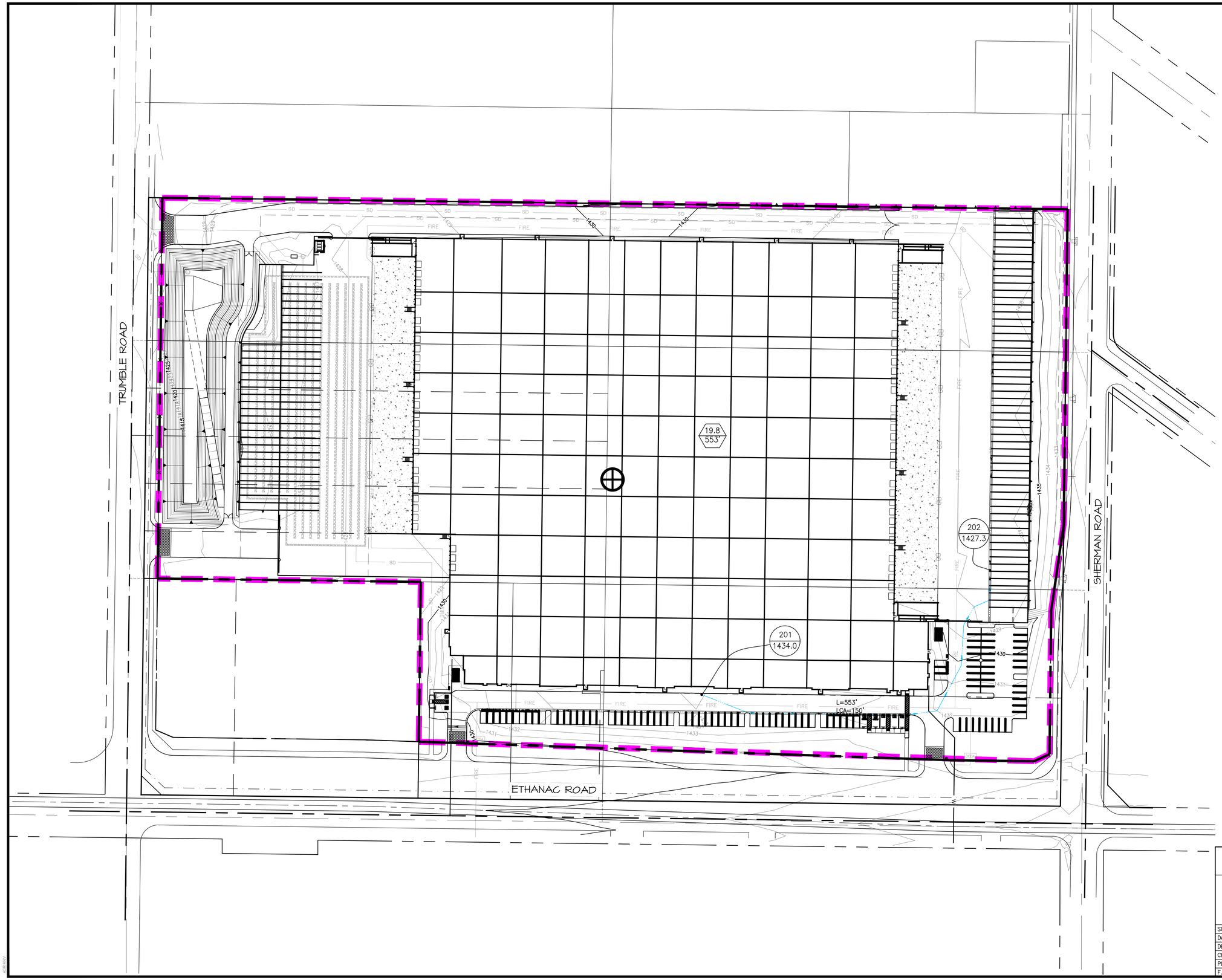
ANSI-B(11"X17")



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

N
W WEBB E
S

1" = 60'

30 0 60 120 180

CITY OF PERRIS

COUNTY OF RIVERSIDE
PROPOSED UNIT HYDROGRAPH HYDROLOGY
ETHANAC COMMERCE CENTER
P 22-00030

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: 4/14/23			SHEET 2 OF 3 SHEETS
DESIGNED: RSB			
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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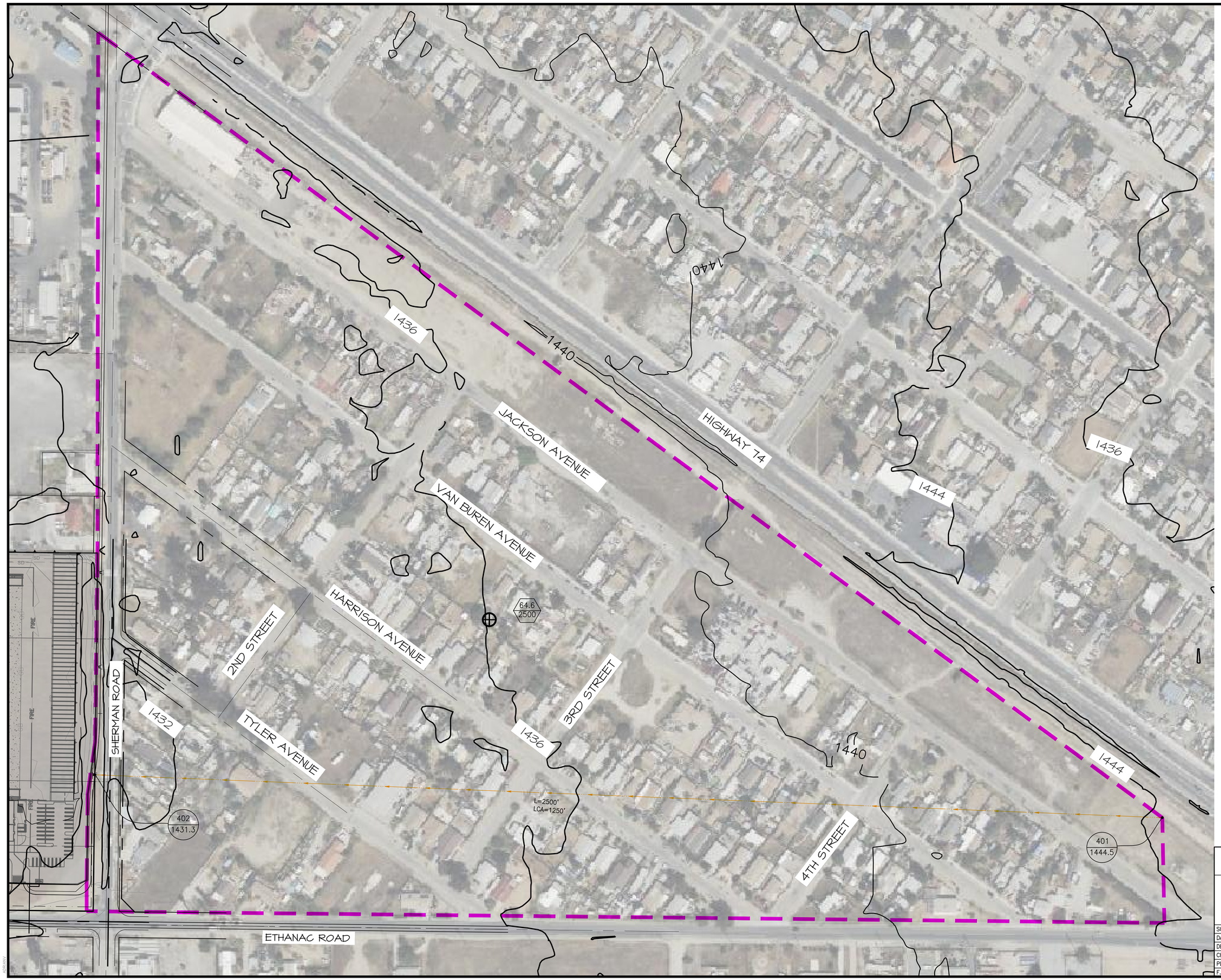
ADRIANA



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

N W E S

1" = 100'

50 0 100 200 300

CITY OF PERRIS

COUNTY OF RIVERSIDE
OFFSITE UNIT HYDROGRAPH HYDROLOGY
ETHANAC COMMERCE CENTER
P 22-00030

SCALE: 1"=100'	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: 4/14/23			SHEET 3
DESIGNED: RSB			OF 3 SHEETS
CHECKED: SKK			DWG. NO.
PLN CK REF:			
F.B.			

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

***To be provided during final engineering**

Appendix 9: O&M

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

***To be provided during final engineering**

Appendix 10: Educational Materials

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

***To be provided during final engineering**