FOR REVIEW ONLY

Oak Valley North - Building 1
DPR No. __-_____, CUP No. _____
City of Calimesa, County of Riverside, California

Preliminary Drainage Study

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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 Oak Valley North - Building 1 project located in the City of Calimesa in the County of Riverside, California. The overall Oak Valley North project site (TPM 38589) consists of approximately 110 acres of predominantly vacant land, with one existing single-family residence in the west-central region of the overall site and a natural watercourse running through the east-central region of the overall site. It is bounded by Calimesa Boulevard along the southwest, vacant land to the northwest, Beckwith Avenue to the northeast, and existing residential tracts to the southeast.

The Oak Valley North – Building 1 project is bounded by Calimesa Boulevard to the southwest, the Oak Valley North – Building 2 development to the southeast, the Oak Valley North – Trailer Lot 1 development to the northeast, and vacant land to the northwest. The project proposes to build an industrial development on approximately 13 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 necessary detention volume required to release flows such that they avoid causing hydromodification impacts and are consistent with the available capacity of the existing culverts.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

DESCRIPTION OF WATERSHED

As previously described, the project is proposing an industrial development on approximately 13 acres of vacant land within the boundaries of the overall Oak Valley North project boundary. The overall Oak Valley North project and all areas within its boundary, including the Oak Valley North – Building 1 project, is located within a proposed Specific Plan within the city of Calimesa.

The currently vacant overall Oak Valley North project site generally drains towards the southwest of the site, where existing culverts convey flows under Calimesa Boulevard and Interstate I-10 highway. The project site is currently impacted by offsite flow from the adjacent San Bernardino Mountains, located northeast of the overall Oak Valley North project site. The offsite flows combine with the existing onsite flows and are conveyed south through the site via existing streambed areas before ultimately discharging into the existing southerly Caltrans culverts. A separate drainage study titled "Hydraulic Analyses for Culverts Crossing I-10" was prepared by JLC Engineering & Consulting for an adjacent project to the south and encompasses the existing condition of the culverts toward which Oak Valley North drain. This report also describes how the project is impacted by offsite flows along Calimesa Boulevard as upstream culverts overflow to the ultimate local low point within the project frontage. This overflow and the existing onsite and offsite tributary flows currently backup onto the project site, causing flooding that does not overtop I-10 highway. Relevant excerpts from this report are included in **Appendix D**.

Existing elevations across the Oak Valley North – Building 1 project site vary from 2318 to 2289 (NAVD88 datum). The site currently slopes down at approximately 3% grade from the northeast to the southwest.

The existing drainage pattern for the site and the general area is characterized by sheet flow. Existing flows outlet into culverts before ultimately discharging into San Timoteo Creek.

The project is located within the currently proposed Oak Valley North Specific Plan and is also within the Santa Ana River watershed area.

PROPOSED CONDITIONS

In the proposed condition of the Oak Valley North – Building 1 project, onsite runoff will be conveyed throughout the site via proposed 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 proposed biotreatment devices for water quality treatment. Modular Wetland System (MWS) vaults are being proposed to provide water quality treatment. (Additional information regarding the MWS vaults can be found in the separate PWQMP Report.) Underground chamber detention systems with orifice outlets are proposed to release onsite flows such that they avoid causing hydromodification impacts for increased runoff and HCOC requirements.

All flows captured onsite are then conveyed towards a proposed storm drain outlet, which will be sized to convey the fully developed, routed flows generated by the Oak Valley North – Building 1 project towards existing culvert outlets. As in the existing condition, these culverts will outlet south of I-10 before ultimately discharging into San Timoteo Creek.

Offsite flows from the northerly mountains will be intercepted by backbone improvements within Beckwith Avenue prior to impacting the Oak Valley North – Building 1 project site. A separate drainage study for the overall Oak Valley North project encompasses these improvements.

This project site exists within the San Timoteo sub-basin of the Santa Ana River Watershed. The onsite and offsite flows will ultimately outlet into an existing unimproved natural channel within the Rivers and Land Conservancy (RLC) parcel. As part of the RLC, the channel will remain undeveloped and is not within the City of Calimesa or Riverside County Flood Control maintenance responsibility. The RLC parcel flows to the San Timoteo Creek and ultimately to the Santa Ana River. A total of 4,600 acres are tributary to the drainages impacted by the project site. Approximately 110 acres are proposed for development with the Oak Valley North project, consisting of less than 3% of the total tributary. The project increased runoff would be inconsequential to the overall drainage of the tributaries into a larger water body. The Oak Valley North project proposes to mitigate flows for HCOC requirements and for the available capacities of the existing culverts that outlet onsite and offsite flows.

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 needed to convey onsite flows through the site to the proposed underground chambers. 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 and 100-year storm events for the site. Calculations were performed for both the existing condition and developed condition to be used in the analysis of the proposed detention systems. See Section 4 for additional information and results regarding the hydrologic analyses performed for this project.

HYDRAULICS

Water quality calculations were performed using spreadsheets that were created by RCFC&WCD. Final calculations and additional details can be found in the Preliminary-WQMP.

Basin routing calculations to determine the proposed detention design will be provided in the Final Drainage Study.

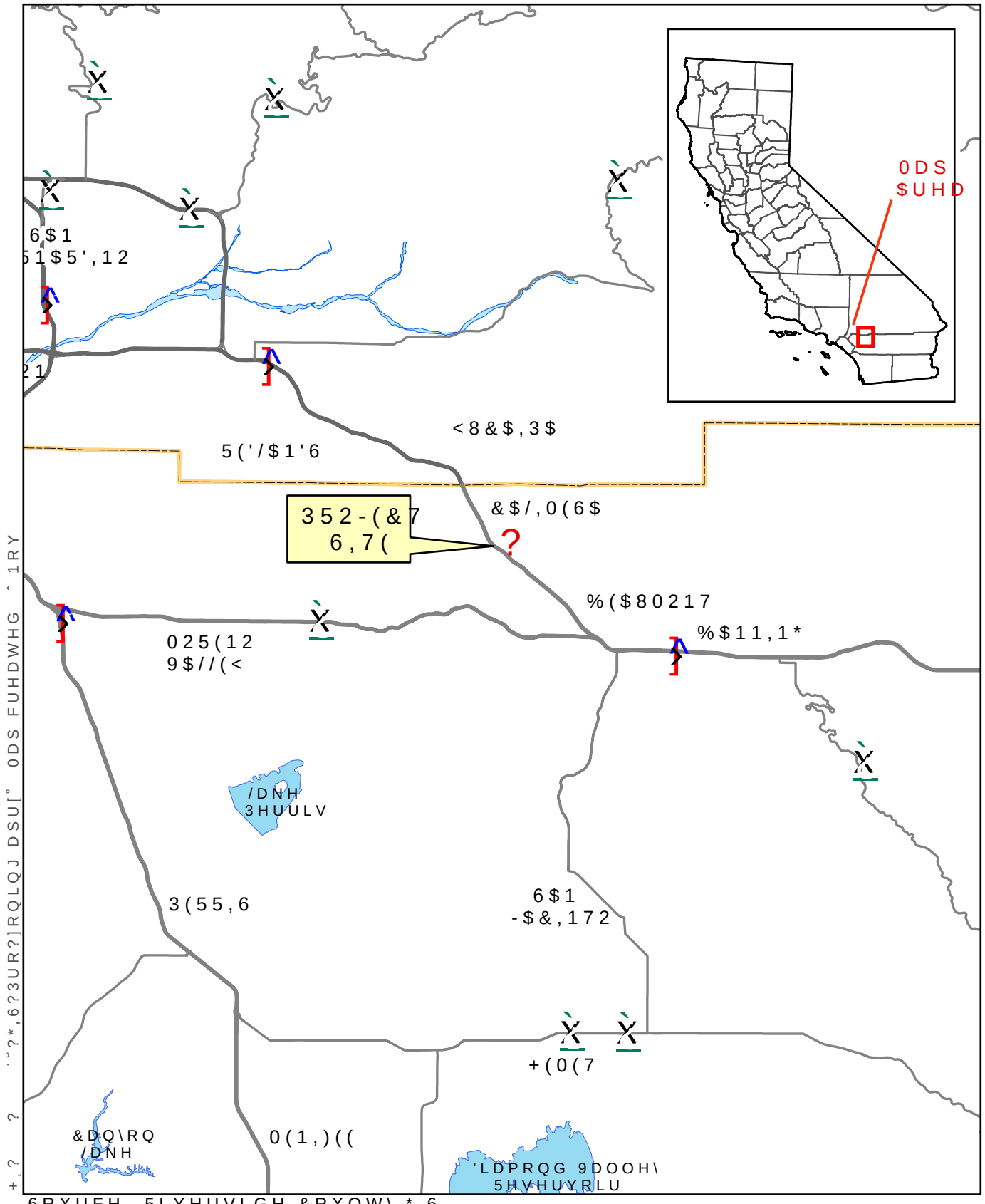
Hydraulic calculations to determine the required pipe sizes of proposed storm drain facilities will be provided in the Final Drainage Study.

FIG. 1 VICINITY MAP

FIG. 2 USGS TOPOGRAPHY MAP

FIG. 3 AERIAL PHOTOGRAPH

FIG. 4 RECEIVING WATERBODIES



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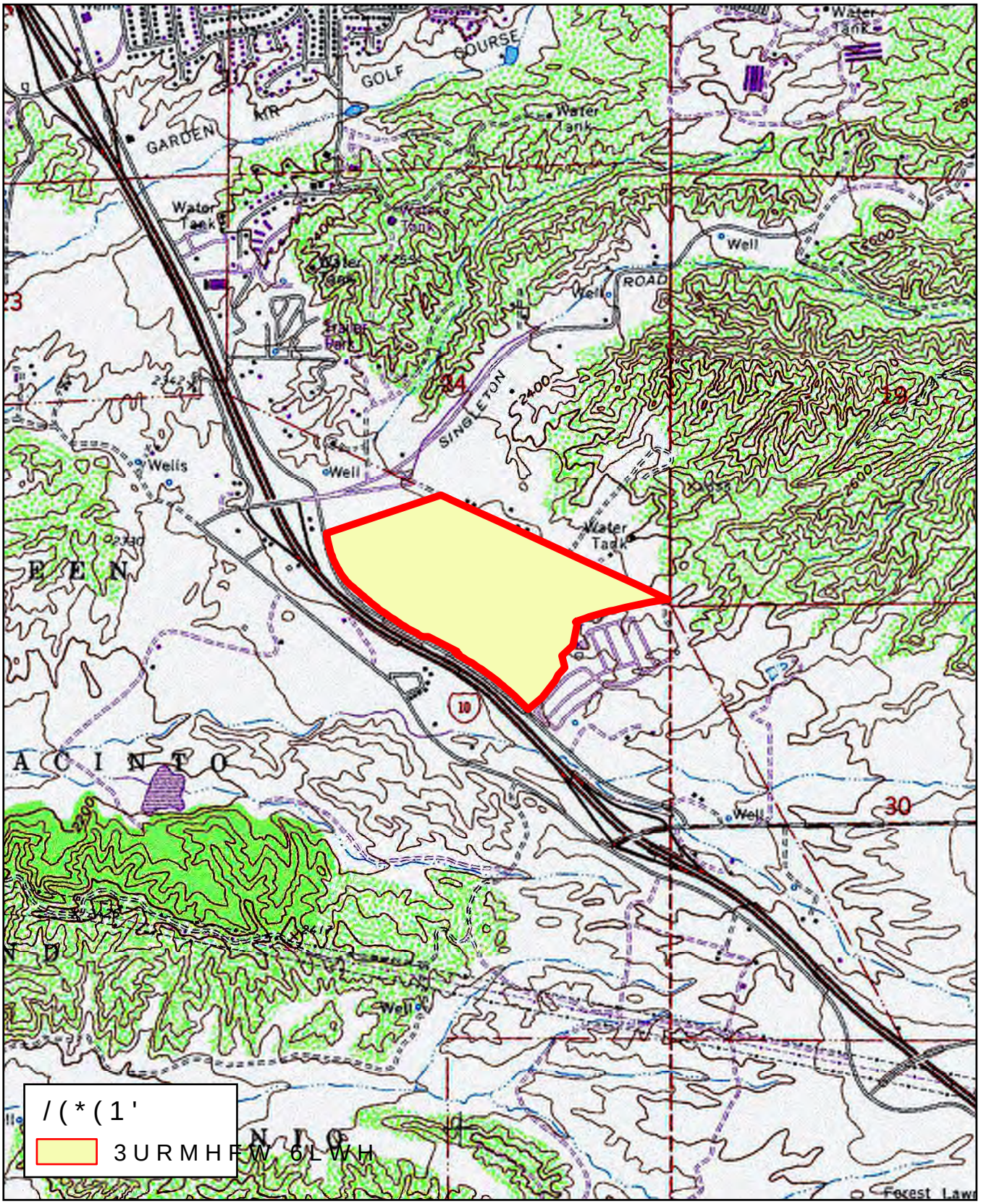

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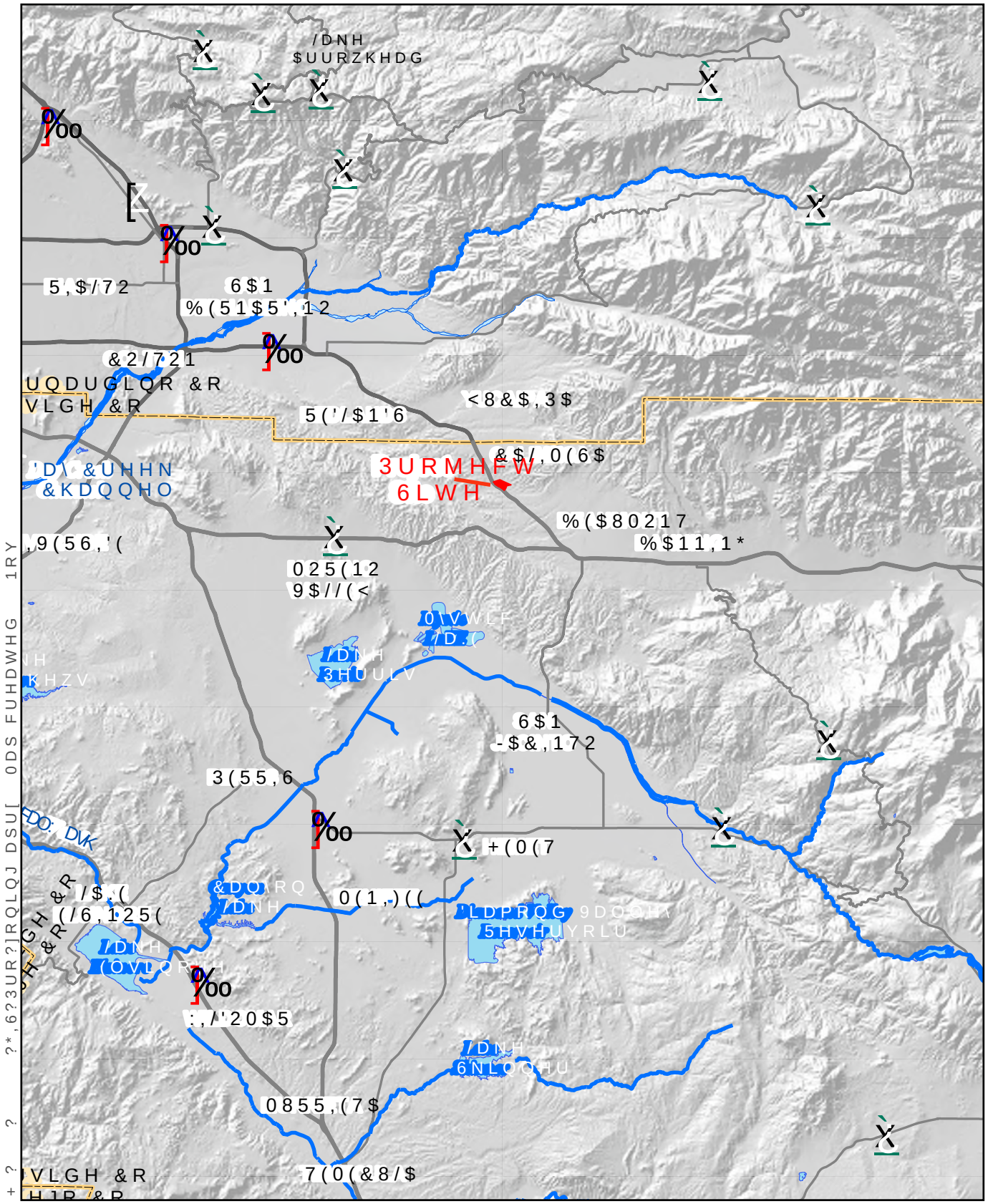

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ALBERT A. WEBB ASSOCIATES

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 Values

	Duration
Storm Event	1-Hour (inches)
10-Year	0.91
100-Year	1.35

The value for slope of intensity was determined to be 0.550. The standard intensity-duration curve data (Plate D-4.1) have been included in Appendix A.

Based on the Plate C-1.18 (El Casco) in the RCFC&WCD Hydrology Manual, the project site is classified as soil type B. 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 'Annual Grasses (Poor)'. The 'Urban, 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
Annual Grasses (Poor)	67	78	86	89	0%
Commercial Landscaping	32	56	67	75	80-100%

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 proposed underground detention chambers. Calculations were performed for approximately 13 acres of total area that is tributary to the proposed storm drain facilities within the Oak Valley North – Building 1 project boundary. A small

portion of the site, consisting mainly of the driveways and adjacent slopes areas will drain towards the frontage street, Calimesa Boulevard, and be captured in proposed catch basins.

The Oak Valley North – Building 1 project onsite flows will outlet to a proposed SD lift station (located on the south side of the project) before entering "Culvert E" (an existing 30" RCP with max capacity of 42 cfs per JLC Report included in Appendix D), which is located south of the project site along Calimesa Boulevard.

Subareas within the rational method calculations for the Oak Valley North – Building 1 project have been broken up based on the area tributary to the local low spots. The B100-series consists of the entirety of the onsite project site area. In final engineering, areas will be further broken up to determine the 100-year flow rates entering any proposed inlets located onsite. The majority of flows are directed towards the proposed inlets and/or curbs and gutters. Most subareas consist of a combination of the proposed building, parking stalls, drive aisles, concrete walkways, and landscaped areas. All onsite areas within the calculations were considered as commercial subarea types.

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

Table 3 – Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 106 – Flows from northwestern portion of Building 1	13.0	19.5
Node 106 – Flows from northeastern porting of Building 1	3.3	4.9
Node 106 – Flows from eastern portion of Building 1	6.3	9.4
Node 106 – Flows from southeastern portion of Building 1	6.5	9.7
Node 106 – Flows from southwestern portion of Building 1	1.5	2.2
Node 115 – Cumulative onsite runoff.	27.8	41.7

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

OFF-SITE RATIONAL METHOD HYDROLOGY

As described in Section 1, the overall Oak Valley North project site is impacted by offsite flows generated by the San Bernardino Mountains located northeast of the project site at Beckwith Avenue. These flows will enter the backbone storm drain facilities and will not impact the Oak Valley North - Building 1 project. Details regarding these offsite flows and the backbone storm drain facilities can be found in the separate drainage study for the overall Oak Valley North project.

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

The project will utilize curbs and gutters to convey onsite flows to the proposed storm drain systems. Storm drain pipes conveys flows to the underground chambers in the truck court area on the east side of the project site. The underground chambers will outlet onsite flows to the proposed SD lift station, which will then outlet to the existing "Culvert E" (an existing 30" RCP with max capacity of 42 cfs) located south of the project site along Calimesa Boulevard.

Onsite Storm Drain

Hydraulic calculations will be performed for all proposed, onsite storm drain facilities, 12 inches in diameter or greater, in the Final Drainage Study.

Underground Chambers

To meet HCOC requirements and the capacity of existing culverts downstream of the project site, an underground detention system is proposed to hold approximately 268,920 cubic feet of runoff. This would require the system to consist of 2,490′ cumulative length x 9′ deep x 12′ wide rectangular chambers, for the 100-year 24-hr storm event. Solid chambers are proposed, as infiltration is not feasible. An outlet structure is proposed to consist of an orifice with the invert at the bottom of the chambers to release flows consistent with the capacity of the existing culvert pipes. Details of the chambers have been included in Appendix B.

Outlet structure orifice sizing will be provided in the Final Drainage Study.

Inlet Capacities

Grate inlets are proposed at the low points within gutters in order to capture onsite flows. For larger flows, a series of 3′x3′ or 2′x3′ grates may be proposed in gutters to prevent excessive ponding from occurring. Hydraulic calculations will be provided in the Final Drainage Study.

OFF-SITE STORM DRAIN FACILITIES

As described in Section 1, the overall Oak Valley North project site is impacted by offsite flows generated by the San Bernardino Mountains located northeast of the project site at Beckwith Avenue. These flows will enter the backbone storm drain facilities and will not impact the Oak Valley North - Building 1 project. Details regarding these offsite flows and the backbone storm drain facilities can be found in the separate drainage study for the overall Oak Valley North project.

SECTION 4 - DETENTION SYSTEM 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 chamber detention system to address HCOC and increased runoff mitigation. Unit hydrographs were performed for both the existing condition and developed condition. The existing condition is used to establish a baseline for comparative purposes.

A routing analysis will be provided in the Final Drainage Study to demonstrate that the underground chamber system contains substantial volume needed to route flows down to existing condition peak flow rates to avoid hydromodification impacts, and to limit flows such that they are consistent with the capacity of the existing culverts.

At this preliminary stage, an underground detention chamber is sized to detain the entire volume of the largest post-development storm event (24-hour, 100-year). In final engineering, storm drain lift stations and/or orifice plates will be designed to outlet onsite flows per the existing capacity of the culverts.

The unit hydrograph models the entire Oak Valley North – Building 1 project site as one drainage area in both the existing and developed conditions. In the existing condition analysis, the 'Annual Grasses (Poor)' cover type was utilized on a 100% pervious area. In the proposed condition analyses, the 'Urban, Commercial Landscaping' cover type was utilized.

The following table summarizes the results of the unit hydrograph analysis:

Table 4 – 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	0.26	0.43	2.2	3.6
100-Year, 1-Hour	1.1	40.2	1.3	41.7
100-Year, 3-Hour	1.3	19.9	1.9	23.0
100-Year, 6-Hour	1.6	18.9	2.8	22.1
100-Year, 24-Hour	3.0	8.7	6.0	10.7

The unit hydrograph output files and hydrology map have been included in Appendix C.

OFF-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

The 100-year flow rates for the existing culverts in Calimesa Boulevard were analyzed using the unit hydrograph method. As mentioned before, this hydrology analysis is presented in a separate drainage study prepared by JLC titled "Hydraulic Analyses for Culverts Crossing I-10." This study encompasses the entire existing condition of the areas tributary to this section of existing culverts.

Relevant excerpts and maps for this separate report have been included in Appendix D.

UNIT HYDROGRAPH ANALYSIS

The following table presents the result of unit hydrograph analysis for the 24-hour 2-year and 1-, 3-, 6-, and 24-hour 100-year storm events to preliminarily size the underground chamber systems to provide the necessary storage volume needed to restrict the outflow to existing condition flow rates.

Table 5 – Unit Hydrograph Analysis

	Existing Condition		Proposed Condition		Unit Hydrograph Analysis Results
Storm Event	Volume (AC-ft)	Peak Flow (cfs)	Volume (AC-ft)	Peak Flow (cfs)	Detention Volume (cf)
2-Year, 24-Hour	0.26	0.43	2.2	3.6	-
100-Year, 1-Hour	1.1	40.2	1.3	41.7	-
100-Year, 3-Hour	1.3	19.9	1.9	23.0	-
100-Year, 6-Hour	1.6	18.9	2.8	22.1	-
100-Year, 24-Hour	3.0	8.7	6.0	10.7	268,920

A routing analysis will be provided in the Final Drainage Study to demonstrate that the underground chamber system contains substantial volume needed to route flows down to existing condition peak flow rates to avoid hydromodification impacts, and to limit flows such that they are consistent with the capacity of the existing culverts.

At this preliminary stage, an underground detention chamber is sized to detain the entire volume of the largest post-development storm event (24-hour, 100-year). In final engineering, storm drain lift stations and/or orifice plates will be designed to outlet onsite flows per the existing capacity of the culverts.

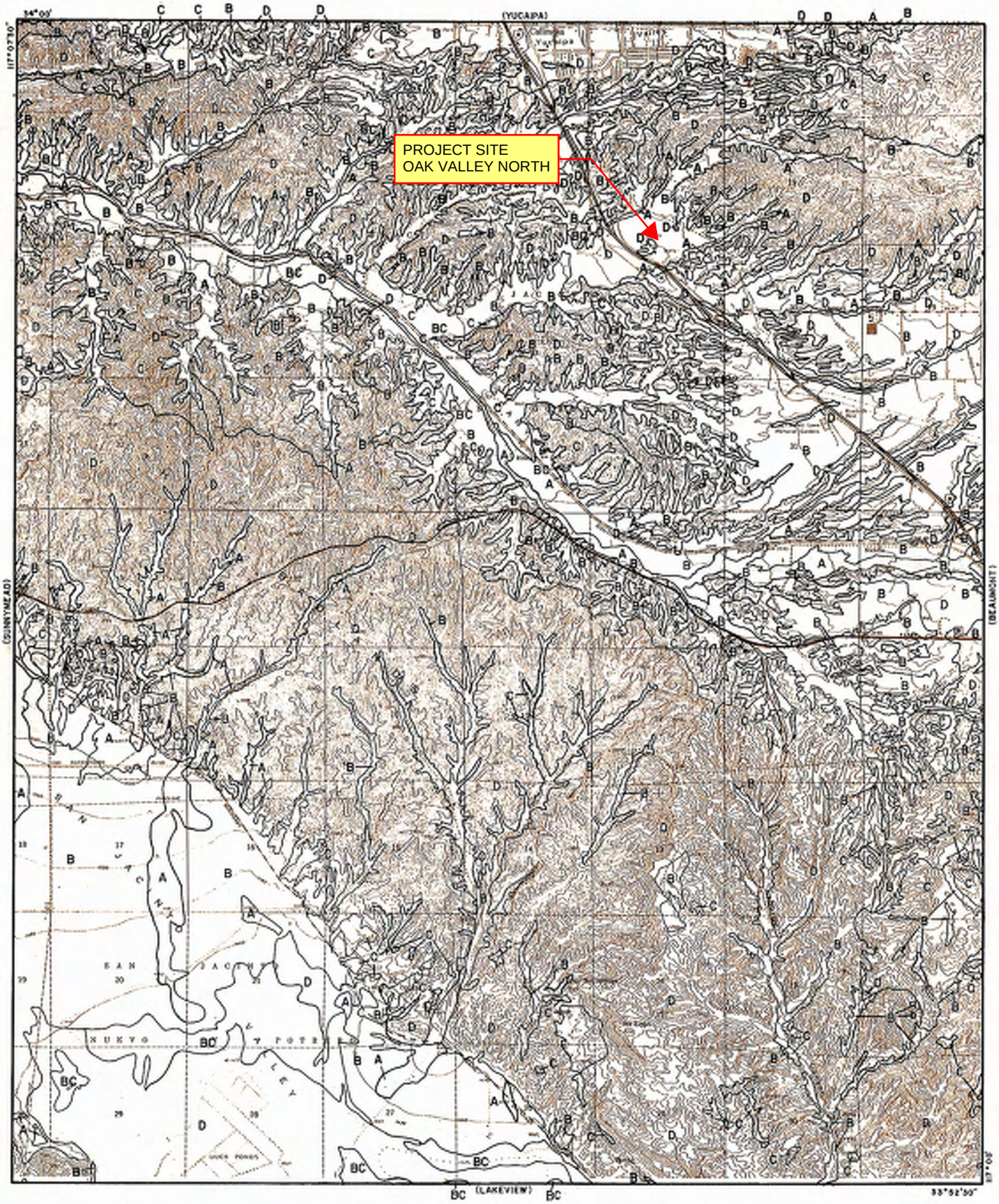
SECTION 5 - CONCLUSION

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 existing culverts and provide flood protection for the 100-year storm event.
- The proposed underground detention chambers will adequately release flows such that they avoid hydromodification impacts and are consistent with the available capacity of the existing culverts.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

HYDROLOGIC SOILS GROUP MAP (PLATE C-1.18 – EL CASCO)



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR EL CASCO

PLATE C-1.18

STANDARD INTENSITY-DURATION CURVE DATA (PLATE D-4.1)

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL INTENSITY–INCHES PER HOUR

ANZA			BANNING			BEAUMONT			CALIMESA			CANYON LAKE		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	4.23	6.85	5	3.32	4.93	5	3.32	4.93	5	3.57	5.30	5	3.07	4.61
6	3.80	6.16	6	3.02	4.47	6	3.02	4.47	6	3.23	4.79	6	2.81	4.23
7	3.48	5.63	7	2.78	4.12	7	2.78	4.12	7	2.97	4.40	7	2.61	3.93
8	3.22	5.21	8	2.59	3.84	8	2.59	3.84	8	2.76	4.09	8	2.45	3.68
9	3.01	4.87	9	2.43	3.61	9	2.43	3.61	9	2.58	3.83	9	2.31	3.48
10	2.83	4.58	10	2.30	3.41	10	2.30	3.41	10	2.44	3.62	10	2.20	3.31
11	2.67	4.33	11	2.19	3.24	11	2.19	3.24	11	2.31	3.43	11	2.10	3.16
12	2.54	4.12	12	2.09	3.10	12	2.09	3.10	12	2.21	3.27	12	2.01	3.03
13	2.43	3.93	13	2.00	2.97	13	2.00	2.97	13	2.11	3.13	13	1.94	2.92
14	2.33	3.77	14	1.92	2.85	14	1.92	2.85	14	2.03	3.01	14	1.87	2.82
15	2.23	3.62	15	1.86	2.75	15	1.86	2.75	15	1.95	2.89	15	1.81	2.72
16	2.15	3.49	16	1.79	2.66	16	1.79	2.66	16	1.88	2.79	16	1.75	2.64
17	2.08	3.37	17	1.74	2.58	17	1.74	2.58	17	1.82	2.70	17	1.70	2.56
18	2.01	3.26	18	1.68	2.50	18	1.68	2.50	18	1.76	2.62	18	1.66	2.50
19	1.95	3.16	19	1.64	2.43	19	1.64	2.43	19	1.71	2.54	19	1.62	2.43
20	1.89	3.06	20	1.59	2.36	20	1.59	2.36	20	1.67	2.47	20	1.58	2.37
22	1.79	2.90	22	1.51	2.25	22	1.51	2.25	22	1.58	2.34	22	1.51	2.27
24	1.70	2.76	24	1.45	2.15	24	1.45	2.15	24	1.51	2.23	24	1.44	2.17
26	1.62	2.63	26	1.39	2.06	26	1.39	2.06	26	1.44	2.14	26	1.39	2.09
28	1.56	2.52	28	1.33	1.98	28	1.33	1.98	28	1.38	2.05	28	1.34	2.02
30	1.49	2.42	30	1.29	1.91	30	1.29	1.91	30	1.33	1.98	30	1.30	1.95
32	1.44	2.33	32	1.24	1.84	32	1.24	1.84	32	1.29	1.91	32	1.26	1.89
34	1.39	2.25	34	1.20	1.78	34	1.20	1.78	34	1.24	1.85	34	1.22	1.84
36	1.34	2.18	36	1.17	1.73	36	1.17	1.73	36	1.21	1.79	36	1.19	1.79
38	1.30	2.11	38	1.13	1.68	38	1.13	1.68	38	1.17	1.74	38	1.16	1.74
40	1.27	2.05	40	1.10	1.64	40	1.10	1.64	40	1.14	1.69	40	1.13	1.70
45	1.18	1.91	45	1.04	1.54	45	1.04	1.54	45	1.07	1.58	45	1.07	1.61
50	1.11	1.80	50	.98	1.45	50	.98	1.45	50	1.01	1.49	50	1.02	1.53
55	1.05	1.70	55	.93	1.38	55	.93	1.38	55	.95	1.42	55	.97	1.46
60	1.00	1.62	60	.89	1.32	60	.89	1.32	60	.91	1.35	60	.93	1.40
65	.95	1.55	65	.85	1.27	65	.85	1.27	65	.87	1.29	65	.89	1.35
70	.91	1.48	70	.82	1.22	70	.82	1.22	70	.84	1.24	70	.86	1.30
75	.88	1.42	75	.79	1.17	75	.79	1.17	75	.80	1.19	75	.84	1.26
80	.85	1.37	80	.76	1.13	80	.76	1.13	80	.78	1.15	80	.81	1.22
85	.82	1.32	85	.74	1.10	85	.74	1.10	85	.75	1.11	85	.79	1.18
SLOPE = .580			SLOPE = .530			SLOPE = .530			SLOPE = .550			SLOPE = .480		

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1 (1 of 6)

10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/14/23 File:B100.out

OAK VALLEY NORTH - BUILDING 1
10-YEAR STORM EVENT B100 SERIES
22-0085 DEVELOPED CONDITION
2023-06-14 AV

********* 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 [Calimesa] area used.
10 year storm 10 minute intensity = 2.440(In/Hr)
10 year storm 60 minute intensity = 0.910(In/Hr)
100 year storm 10 minute intensity = 3.620(In/Hr)
100 year storm 60 minute intensity = 1.350(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.910(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 430.000(Ft.)
Top (of initial area) elevation = 2306.000(Ft.)
Bottom (of initial area) elevation = 2297.800(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.01907 s(percent)= 1.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.489 min.
Rainfall intensity = 2.858(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.013(CFS)
Total initial stream area =        4.000(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2292.800(Ft.)
Downstream point/station elevation =  2290.800(Ft.)
Pipe length  =   400.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.013(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.013(CFS)
Normal flow depth in pipe =   15.49(In.)
Flow top width inside pipe =   18.47(In.)
Critical Depth =   14.14(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    1.27 min.
Time of concentration (TC) =     8.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.000(Ac.)
Runoff from this stream =     10.013(CFS)
Time of concentration =    8.75 min.
Rainfall intensity =     2.623(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  2304.400(Ft.)
Bottom (of initial area) elevation =  2302.000(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.715 min.
Rainfall intensity =      2.812(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.200(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2297.000(Ft.)
Downstream point/station elevation =  2290.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.200(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.200(CFS)
Normal flow depth in pipe =    4.90(In.)
Flow top width inside pipe =    8.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.01(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     7.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      3.200(CFS)
Time of concentration =    7.79 min.
Rainfall intensity =     2.798(In/Hr)
Summary of stream data:

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


1       10.013      8.75                2.623
2        3.200      7.79                2.798
Largest stream flow has longer time of concentration
Qp =     10.013 + sum of
          Qb         Ia/Ib
           3.200 *    0.938 =      3.000
Qp =     13.014

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.013       3.200
Area of streams before confluence:
        4.000        1.300
Results of confluence:
Total flow rate =     13.014(CFS)
Time of concentration =     8.755 min.
Effective stream area after confluence =      5.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2290.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =   420.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.014(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

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Calculated individual pipe flow  =    13.014(CFS)
Normal flow depth in pipe =   14.58(In.)
Flow top width inside pipe =   14.13(In.)
Critical Depth =   16.21(In.)
Pipe flow velocity =      8.49(Ft/s)
Travel time through pipe =    0.82 min.
Time of concentration (TC) =     9.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.300(Ac.)
Runoff from this stream =     13.014(CFS)
Time of concentration =    9.58 min.
Rainfall intensity =     2.496(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   380.000(Ft.)
Top (of initial area) elevation =  2303.700(Ft.)
Bottom (of initial area) elevation =  2297.800(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.01553  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.427 min.
Rainfall intensity =      2.871(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.270(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2297.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.270(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.270(CFS)
Normal flow depth in pipe =    3.73(In.)
Flow top width inside pipe =    8.87(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.90(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.47 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      3.270(CFS)
Time of concentration =    7.47 min.
Rainfall intensity =     2.863(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  2304.400(Ft.)
Bottom (of initial area) elevation =  2296.800(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.02054  s(percent)=       2.05
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.948 min.
Rainfall intensity =      2.978(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.266(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2291.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.266(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.266(CFS)
Normal flow depth in pipe =    6.81(In.)
Flow top width inside pipe =    7.73(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.46(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
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Stream flow area =      2.400(Ac.)
Runoff from this stream =      6.266(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     2.968(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  2302.800(Ft.)
Bottom (of initial area) elevation =  2295.300(Ft.)
Difference in elevation =     7.500(Ft.)
Slope =    0.02027  s(percent)=       2.03
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.967 min.
Rainfall intensity =      2.974(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.517(CFS)
Total initial stream area =        2.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  2290.300(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.517(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.517(CFS)
Normal flow depth in pipe =    5.78(In.)
Flow top width inside pipe =   11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.43(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =      2.500(Ac.)
Runoff from this stream =      6.517(CFS)
Time of concentration =    7.00 min.
Rainfall intensity =     2.965(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  2299.200(Ft.)
Bottom (of initial area) elevation =  2293.100(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.02440  s(percent)=       2.44
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.739 min.
Rainfall intensity =      3.309(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.453(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  2288.100(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.453(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.453(CFS)
Normal flow depth in pipe =    4.54(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    6.66(In.)
Pipe flow velocity =      6.51(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     6.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 5
Stream flow area =      0.500(Ac.)
Runoff from this stream =      1.453(CFS)
Time of concentration =    6.07 min.
Rainfall intensity =     3.208(In/Hr)
Summary of stream data:

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


1       13.014      9.58                2.496
2        3.270      7.47                2.863
3        6.266      6.99                2.968
4        6.517      7.00                2.965
```

```
5        1.453      6.07                 3.208
Largest stream flow has longer time of concentration
Qp =     13.014 + sum of
          Qb         Ia/Ib
           3.270 *    0.872 =      2.851
          Qb         Ia/Ib
           6.266 *    0.841 =      5.270
          Qb         Ia/Ib
           6.517 *    0.842 =      5.487
          Qb         Ia/Ib
           1.453 *    0.778 =      1.131
Qp =     27.752

Total of 5 streams to confluence:
Flow rates before confluence point:
      13.014       3.270       6.266       6.517       1.453
Area of streams before confluence:
        5.300        1.300        2.400        2.500        0.500
Results of confluence:
Total flow rate =     27.752(CFS)
Time of concentration =     9.579 min.
Effective stream area after confluence =     12.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2284.200(Ft.)
Downstream point/station elevation =  2283.500(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.752(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    27.752(CFS)
Normal flow depth in pipe =   23.11(In.)
Flow top width inside pipe =   25.24(In.)
Critical Depth =   21.54(In.)
Pipe flow velocity =      6.84(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     9.91 min.
End of computations, total study area =           12.00 (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 =  56.0
```

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/07/23 File:B100.out

OAK VALLEY NORTH - BUILDING 1
100-YEAR STORM EVENT B100 SERIES
22-0085 DEVELOPED CONDITION
2023-06-07 AV

********* 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 [Calimesa] area used.
10 year storm 10 minute intensity = 2.440(In/Hr)
10 year storm 60 minute intensity = 0.910(In/Hr)
100 year storm 10 minute intensity = 3.620(In/Hr)
100 year storm 60 minute intensity = 1.350(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.350(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 430.000(Ft.)
Top (of initial area) elevation = 2306.000(Ft.)
Bottom (of initial area) elevation = 2297.800(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.01907 s(percent)= 1.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.489 min.
Rainfall intensity = 4.240(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     14.962(CFS)
Total initial stream area =        4.000(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2292.800(Ft.)
Downstream point/station elevation =  2290.800(Ft.)
Pipe length  =   400.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.962(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.962(CFS)
Normal flow depth in pipe =   18.42(In.)
Flow top width inside pipe =   20.27(In.)
Critical Depth =   16.73(In.)
Pipe flow velocity =      5.79(Ft/s)
Travel time through pipe =    1.15 min.
Time of concentration (TC) =     8.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.000(Ac.)
Runoff from this stream =     14.962(CFS)
Time of concentration =    8.64 min.
Rainfall intensity =     3.919(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  2304.400(Ft.)
Bottom (of initial area) elevation =  2302.000(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.715 min.
Rainfall intensity =      4.171(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.782(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2297.000(Ft.)
Downstream point/station elevation =  2290.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.782(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.782(CFS)
Normal flow depth in pipe =    6.44(In.)
Flow top width inside pipe =    8.12(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.14(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      4.782(CFS)
Time of concentration =    7.78 min.
Rainfall intensity =     4.152(In/Hr)
Summary of stream data:

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


1       14.962      8.64                3.919
2        4.782      7.78                4.152
Largest stream flow has longer time of concentration
Qp =     14.962 + sum of
          Qb         Ia/Ib
           4.782 *    0.944 =      4.514
Qp =     19.476

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.962       4.782
Area of streams before confluence:
        4.000        1.300
Results of confluence:
Total flow rate =     19.476(CFS)
Time of concentration =     8.641 min.
Effective stream area after confluence =      5.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2290.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =   420.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.476(CFS)
Nearest computed pipe diameter  =     21.00(In.)
```

```
Calculated individual pipe flow  =    19.476(CFS)
Normal flow depth in pipe =   16.85(In.)
Flow top width inside pipe =   16.72(In.)
Critical Depth =   19.01(In.)
Pipe flow velocity =      9.41(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =     9.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.300(Ac.)
Runoff from this stream =     19.476(CFS)
Time of concentration =    9.38 min.
Rainfall intensity =     3.745(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   380.000(Ft.)
Top (of initial area) elevation =  2303.700(Ft.)
Bottom (of initial area) elevation =  2297.800(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.01553  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.427 min.
Rainfall intensity =      4.260(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.885(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2297.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.885(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.885(CFS)
Normal flow depth in pipe =    4.69(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.95(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.46 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      4.885(CFS)
Time of concentration =    7.46 min.
Rainfall intensity =     4.248(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  2304.400(Ft.)
Bottom (of initial area) elevation =  2296.800(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.02054  s(percent)=       2.05
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.948 min.
Rainfall intensity =      4.419(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.361(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2291.800(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.361(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     9.361(CFS)
Normal flow depth in pipe =    6.97(In.)
Flow top width inside pipe =   11.84(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.77(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
```

```
Stream flow area =      2.400(Ac.)
Runoff from this stream =      9.361(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     4.405(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  2302.800(Ft.)
Bottom (of initial area) elevation =  2295.300(Ft.)
Difference in elevation =     7.500(Ft.)
Slope =    0.02027  s(percent)=       2.03
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.967 min.
Rainfall intensity =      4.412(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.737(CFS)
Total initial stream area =        2.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  2290.300(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.737(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     9.737(CFS)
Normal flow depth in pipe =    7.39(In.)
Flow top width inside pipe =   11.67(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.16(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     7.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =      2.500(Ac.)
Runoff from this stream =      9.737(CFS)
Time of concentration =    7.00 min.
Rainfall intensity =     4.400(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  2299.200(Ft.)
Bottom (of initial area) elevation =  2293.100(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.02440  s(percent)=       2.44
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.739 min.
Rainfall intensity =      4.909(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.170(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  2288.100(Ft.)
Downstream point/station elevation =  2284.200(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.170(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.170(CFS)
Normal flow depth in pipe =    5.85(In.)
Flow top width inside pipe =    8.58(In.)
Critical Depth =    7.95(In.)
Pipe flow velocity =      7.13(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =     6.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 5
Stream flow area =      0.500(Ac.)
Runoff from this stream =      2.170(CFS)
Time of concentration =    6.04 min.
Rainfall intensity =     4.771(In/Hr)
Summary of stream data:

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


1       19.476      9.38                3.745
2        4.885      7.46                4.248
3        9.361      6.99                4.405
4        9.737      7.00                4.400
```

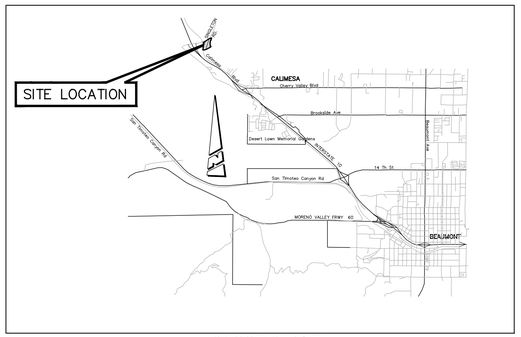
```
5        2.170      6.04                 4.771
Largest stream flow has longer time of concentration
Qp =     19.476 + sum of
          Qb         Ia/Ib
           4.885 *    0.882 =      4.307
          Qb         Ia/Ib
           9.361 *    0.850 =      7.958
          Qb         Ia/Ib
           9.737 *    0.851 =      8.288
          Qb         Ia/Ib
           2.170 *    0.785 =      1.703
Qp =     41.733

Total of 5 streams to confluence:
Flow rates before confluence point:
      19.476       4.885       9.361       9.737       2.170
Area of streams before confluence:
        5.300        1.300        2.400        2.500        0.500
Results of confluence:
Total flow rate =     41.733(CFS)
Time of concentration =     9.385 min.
Effective stream area after confluence =     12.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2284.200(Ft.)
Downstream point/station elevation =  2283.500(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    41.733(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    41.733(CFS)
Normal flow depth in pipe =   25.92(In.)
Flow top width inside pipe =   32.33(In.)
Critical Depth =   25.23(In.)
Pipe flow velocity =      7.65(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =     9.68 min.
End of computations, total study area =           12.00 (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 =  56.0
```

RATIONAL METHOD HYDROLOGY MAPS



VICINITY MAP

N.T.S.

T2S, R2W, SECTION 24 & 25

SINGLETON RD

BECKWITH AVE

INTERSTATE 10

CALIMESA BLVD

PARKING LOT 1

PARKING LOT 2

BUILDING 1

BUILDING 2

BUILDING 3

BUILDING 4

FUTURE HDR

SD

FIRE

A

B

C

D

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- NRCS SOIL BOUNDARY
- PROPOSED MWS TREATMENT VAULT (SEE PWQMP)
- PROPOSED UNDERGROUND CHAMBERS

N

W WEBB E

S

1" = 150'

150 0 150 300 450

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

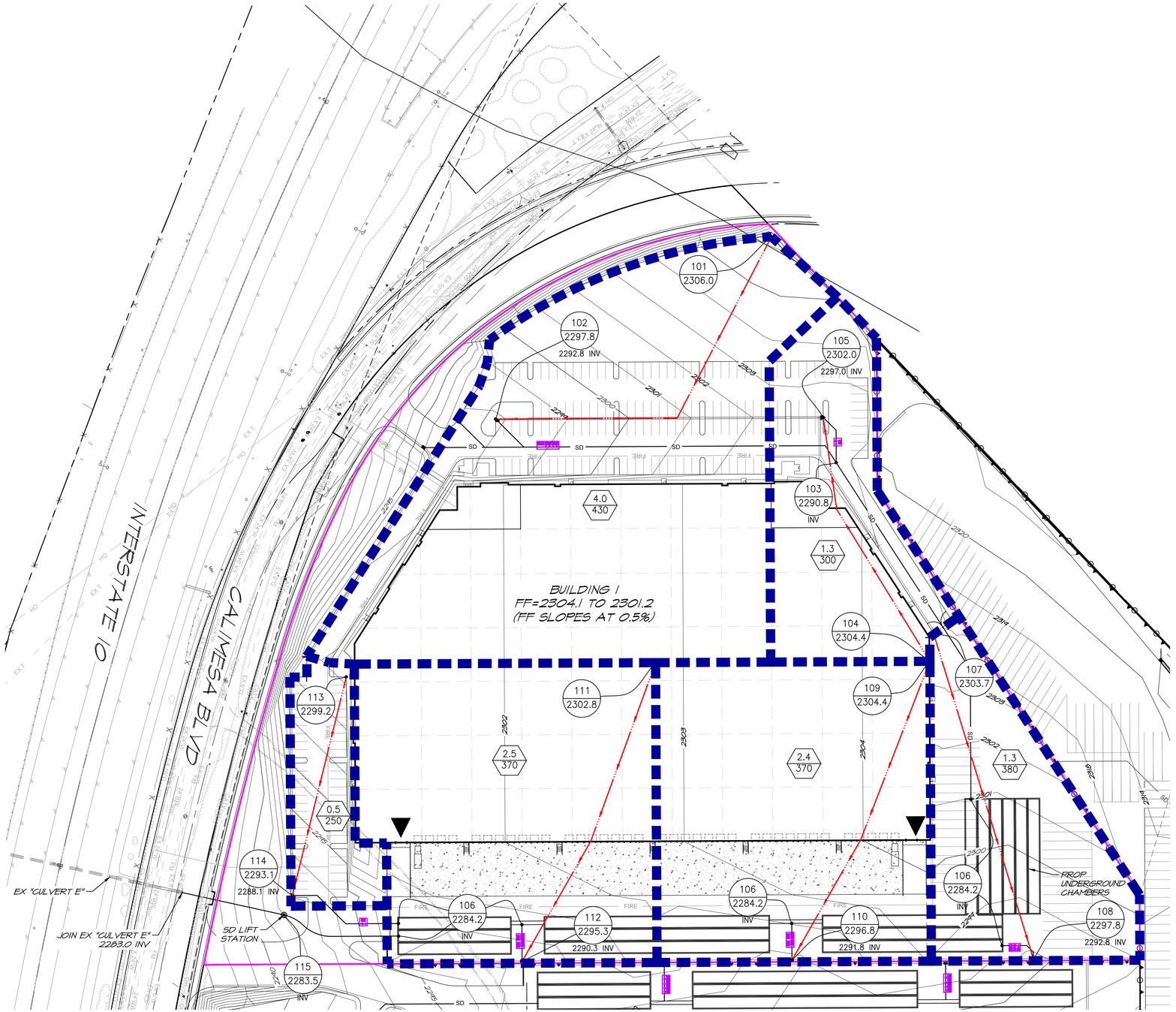
OAK VALLEY NORTH
PRELIMINARY RATIONAL METHOD EXHIBIT
DEVELOPED CONDITION

SCALE:	1" = 150'
DATE:	6/14/2023
DESIGNED:	ABE
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.	2022-0085
SHEET	1
OF	2 SHEETS
DWG. NO.	

H:\2022\22-0085\DRAINAGE\HYD\DWG FOLDER\22-0085-C-PHYD-RAT.DWG 6/14/2023 4:30:26 PM Adrianv



LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- NRCS SOIL BOUNDARY
- PROPOSED MWS TREATMENT VAULT (SEE PWQMP)
- PROPOSED UNDERGROUND CHAMBERS

NOTES:
1. NODE 106 IS MODELED AT ALL CHAMBER INLETS AT A CONSISTENT ELEVATION OF 2284.2 SINCE CHAMBER BOTTOMS ARE FLAT.
2. SOIL TYPE FOR IS 100% TYPE B.

PRELIMINARY

W N S E

1" = 60'

60 0 60 120 180

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH – BUILDING 1
PRELIMINARY RATIONAL METHOD EXHIBIT
DEVELOPED CONDITION

SCALE:	1" = 60'
DATE:	6/14/2023
DESIGNED:	ABE
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.	2022-0085
SHEET	2
OF	2 SHEETS
DWG. NO.	

H:\2022\22-0085\DRAINAGE\HYD\DWG FOLDER\22-0085-C-PHYD-RAT.DWG 6/14/2023 4:30:26 PM Adrianv

APPENDIX B – HYDRAULIC ANALYSIS

Hydraulic calculations to be provided in Final Engineering.

APPENDIX C – UNIT HYDROGRAPH ANALYSIS

ISOHYETALS

Calimesa Project Site
2-Year 1-Hour
Rainfall
0.54 in.

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

APPROVED CHIEF ENGINEER R.E. NO. 8883	DRAWN BY R.A.S.	SHEET NO
DATE	PLATE D-4.3	DR NO

Calimesa Project Site
2-Year 3-Hour Rainfall
0.95 in.

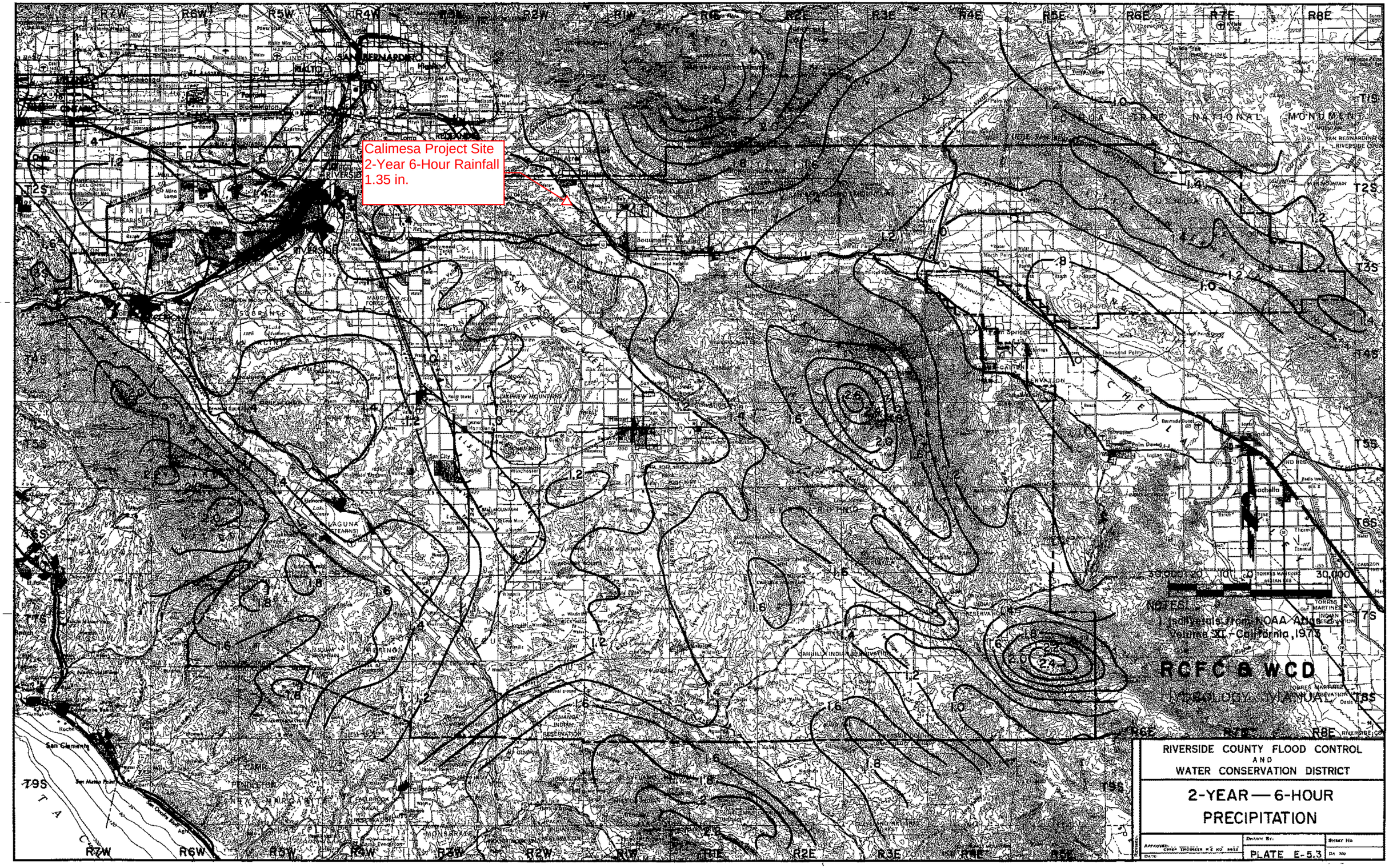
Notes:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 3-HOUR PRECIPITATION

APPROVED CHIEF ENGINEER R.E. NO. 8855	DRAWN BY L.A.S.	SHEET NO
DATE	PLATE E-5.1	DR. NO


Calimesa Project Site
2-Year 6-Hour Rainfall
1.35 in.
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
NOTES
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR PRECIPITATION
PLATE E-5.3

Calimesa Project Site
2-Year 24-Hour
Rainfall
2.4 in.

NOTES:
1. Isohyetals from NOAA Atlas 2
Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 24-HOUR PRECIPITATION

APPROVED CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: R.A.S.	SHEET NO
DATE	PLATE E-5.5	DR. NO

Calimesa Project Site
100-Year 1-Hour
Rainfall
1.28 in.

NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 6855	DRAWN BY: A.A.S.	SHEET NO
DATE	PLATE D-4.4	OF NO

Calimesa Project Site
100-Year 3-Hour
Rainfall
2.0 in.

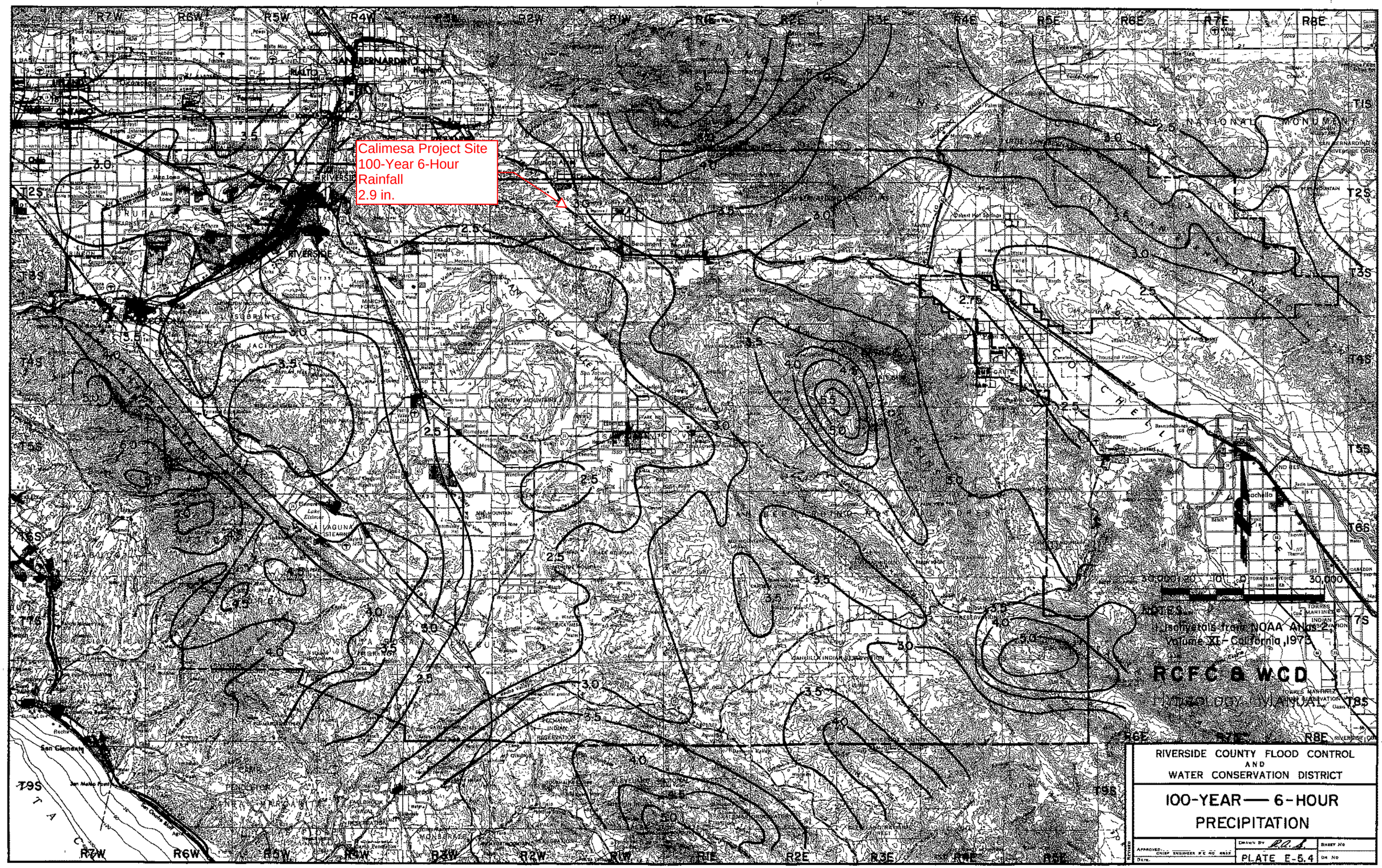
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 3-HOUR PRECIPITATION

APPROVED CHIEF ENGINEER	DRAWN BY	SHEET NO
DATE	PLATE E-5.2	FILE NO


Calimesa Project Site
100-Year 6-Hour
Rainfall
2.9 in.
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR
PRECIPITATION
PLATE E-5.4

Calimesa Project Site
100-Year 24-Hour
Rainfall
6.5 in.

NOTES:
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.C.F.C. & W.C.D.	DRAWN BY	DWG. NO
DATE	PLATE E-5.6	DR. NO

Calimesa Project Site
Slope of Intensity
0.55

NOTES
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SLOPE OF INTENSITY DURATION CURVE

APPROVED CHIEF ENGINEER R.E. NO. 8884	DRAWN BY E.A.S.	SHEET NO
DATE	PLATE D-4.6	DR NO

EXISTING CONDITION UNIT HYDROGRAPHS

EXISTING CONDITION – 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 05/18/23 File: B1ONSITEPRE242.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 2-YEAR 24-HOUR
FN: B1ONSITEPRE242.OUT- ABE

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.40	31.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	6.50	85.80

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
					Sum (F) =	0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464
Minimum soil loss rate ((In/Hr)) = 0.232
(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
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	141.469	28.128	3.742
2	0.167	282.938	54.945	7.309
3	0.250	424.407	12.894	1.715
4	0.333	565.876	2.921	0.389
5	0.417	707.345	1.113	0.148
		Sum = 100.000	Sum=	13.303

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	0.019	(0.822)	0.017	0.002
2	0.17	0.07	0.019	(0.819)	0.017	0.002
3	0.25	0.07	0.019	(0.815)	0.017	0.002
4	0.33	0.10	0.029	(0.812)	0.026	0.003
5	0.42	0.10	0.029	(0.809)	0.026	0.003
6	0.50	0.10	0.029	(0.806)	0.026	0.003
7	0.58	0.10	0.029	(0.803)	0.026	0.003
8	0.67	0.10	0.029	(0.800)	0.026	0.003
9	0.75	0.10	0.029	(0.796)	0.026	0.003
10	0.83	0.13	0.038	(0.793)	0.035	0.004
11	0.92	0.13	0.038	(0.790)	0.035	0.004
12	1.00	0.13	0.038	(0.787)	0.035	0.004
13	1.08	0.10	0.029	(0.784)	0.026	0.003
14	1.17	0.10	0.029	(0.781)	0.026	0.003
15	1.25	0.10	0.029	(0.778)	0.026	0.003
16	1.33	0.10	0.029	(0.775)	0.026	0.003
17	1.42	0.10	0.029	(0.772)	0.026	0.003
18	1.50	0.10	0.029	(0.769)	0.026	0.003

19	1.58	0.10	0.029	(0.765)	0.026	0.003
20	1.67	0.10	0.029	(0.762)	0.026	0.003
21	1.75	0.10	0.029	(0.759)	0.026	0.003
22	1.83	0.13	0.038	(0.756)	0.035	0.004
23	1.92	0.13	0.038	(0.753)	0.035	0.004
24	2.00	0.13	0.038	(0.750)	0.035	0.004
25	2.08	0.13	0.038	(0.747)	0.035	0.004
26	2.17	0.13	0.038	(0.744)	0.035	0.004
27	2.25	0.13	0.038	(0.741)	0.035	0.004
28	2.33	0.13	0.038	(0.738)	0.035	0.004
29	2.42	0.13	0.038	(0.735)	0.035	0.004
30	2.50	0.13	0.038	(0.732)	0.035	0.004
31	2.58	0.17	0.048	(0.729)	0.043	0.005
32	2.67	0.17	0.048	(0.726)	0.043	0.005
33	2.75	0.17	0.048	(0.723)	0.043	0.005
34	2.83	0.17	0.048	(0.720)	0.043	0.005
35	2.92	0.17	0.048	(0.717)	0.043	0.005
36	3.00	0.17	0.048	(0.714)	0.043	0.005
37	3.08	0.17	0.048	(0.711)	0.043	0.005
38	3.17	0.17	0.048	(0.708)	0.043	0.005
39	3.25	0.17	0.048	(0.705)	0.043	0.005
40	3.33	0.17	0.048	(0.702)	0.043	0.005
41	3.42	0.17	0.048	(0.699)	0.043	0.005
42	3.50	0.17	0.048	(0.697)	0.043	0.005
43	3.58	0.17	0.048	(0.694)	0.043	0.005
44	3.67	0.17	0.048	(0.691)	0.043	0.005
45	3.75	0.17	0.048	(0.688)	0.043	0.005
46	3.83	0.20	0.058	(0.685)	0.052	0.006
47	3.92	0.20	0.058	(0.682)	0.052	0.006
48	4.00	0.20	0.058	(0.679)	0.052	0.006
49	4.08	0.20	0.058	(0.676)	0.052	0.006
50	4.17	0.20	0.058	(0.673)	0.052	0.006
51	4.25	0.20	0.058	(0.670)	0.052	0.006
52	4.33	0.23	0.067	(0.668)	0.060	0.007
53	4.42	0.23	0.067	(0.665)	0.060	0.007
54	4.50	0.23	0.067	(0.662)	0.060	0.007
55	4.58	0.23	0.067	(0.659)	0.060	0.007
56	4.67	0.23	0.067	(0.656)	0.060	0.007
57	4.75	0.23	0.067	(0.653)	0.060	0.007
58	4.83	0.27	0.077	(0.651)	0.069	0.008
59	4.92	0.27	0.077	(0.648)	0.069	0.008
60	5.00	0.27	0.077	(0.645)	0.069	0.008
61	5.08	0.20	0.058	(0.642)	0.052	0.006
62	5.17	0.20	0.058	(0.639)	0.052	0.006
63	5.25	0.20	0.058	(0.637)	0.052	0.006
64	5.33	0.23	0.067	(0.634)	0.060	0.007
65	5.42	0.23	0.067	(0.631)	0.060	0.007
66	5.50	0.23	0.067	(0.628)	0.060	0.007
67	5.58	0.27	0.077	(0.626)	0.069	0.008
68	5.67	0.27	0.077	(0.623)	0.069	0.008
69	5.75	0.27	0.077	(0.620)	0.069	0.008
70	5.83	0.27	0.077	(0.617)	0.069	0.008
71	5.92	0.27	0.077	(0.615)	0.069	0.008
72	6.00	0.27	0.077	(0.612)	0.069	0.008
73	6.08	0.30	0.086	(0.609)	0.078	0.009
74	6.17	0.30	0.086	(0.606)	0.078	0.009
75	6.25	0.30	0.086	(0.604)	0.078	0.009
76	6.33	0.30	0.086	(0.601)	0.078	0.009
77	6.42	0.30	0.086	(0.598)	0.078	0.009
78	6.50	0.30	0.086	(0.596)	0.078	0.009
79	6.58	0.33	0.096	(0.593)	0.086	0.010

80	6.67	0.33	0.096	(0.590)	0.086	0.010
81	6.75	0.33	0.096	(0.588)	0.086	0.010
82	6.83	0.33	0.096	(0.585)	0.086	0.010
83	6.92	0.33	0.096	(0.582)	0.086	0.010
84	7.00	0.33	0.096	(0.580)	0.086	0.010
85	7.08	0.33	0.096	(0.577)	0.086	0.010
86	7.17	0.33	0.096	(0.574)	0.086	0.010
87	7.25	0.33	0.096	(0.572)	0.086	0.010
88	7.33	0.37	0.106	(0.569)	0.095	0.011
89	7.42	0.37	0.106	(0.567)	0.095	0.011
90	7.50	0.37	0.106	(0.564)	0.095	0.011
91	7.58	0.40	0.115	(0.561)	0.104	0.012
92	7.67	0.40	0.115	(0.559)	0.104	0.012
93	7.75	0.40	0.115	(0.556)	0.104	0.012
94	7.83	0.43	0.125	(0.554)	0.112	0.012
95	7.92	0.43	0.125	(0.551)	0.112	0.012
96	8.00	0.43	0.125	(0.549)	0.112	0.012
97	8.08	0.50	0.144	(0.546)	0.130	0.014
98	8.17	0.50	0.144	(0.543)	0.130	0.014
99	8.25	0.50	0.144	(0.541)	0.130	0.014
100	8.33	0.50	0.144	(0.538)	0.130	0.014
101	8.42	0.50	0.144	(0.536)	0.130	0.014
102	8.50	0.50	0.144	(0.533)	0.130	0.014
103	8.58	0.53	0.154	(0.531)	0.138	0.015
104	8.67	0.53	0.154	(0.528)	0.138	0.015
105	8.75	0.53	0.154	(0.526)	0.138	0.015
106	8.83	0.57	0.163	(0.523)	0.147	0.016
107	8.92	0.57	0.163	(0.521)	0.147	0.016
108	9.00	0.57	0.163	(0.518)	0.147	0.016
109	9.08	0.63	0.182	(0.516)	0.164	0.018
110	9.17	0.63	0.182	(0.514)	0.164	0.018
111	9.25	0.63	0.182	(0.511)	0.164	0.018
112	9.33	0.67	0.192	(0.509)	0.173	0.019
113	9.42	0.67	0.192	(0.506)	0.173	0.019
114	9.50	0.67	0.192	(0.504)	0.173	0.019
115	9.58	0.70	0.202	(0.501)	0.181	0.020
116	9.67	0.70	0.202	(0.499)	0.181	0.020
117	9.75	0.70	0.202	(0.497)	0.181	0.020
118	9.83	0.73	0.211	(0.494)	0.190	0.021
119	9.92	0.73	0.211	(0.492)	0.190	0.021
120	10.00	0.73	0.211	(0.489)	0.190	0.021
121	10.08	0.50	0.144	(0.487)	0.130	0.014
122	10.17	0.50	0.144	(0.485)	0.130	0.014
123	10.25	0.50	0.144	(0.482)	0.130	0.014
124	10.33	0.50	0.144	(0.480)	0.130	0.014
125	10.42	0.50	0.144	(0.478)	0.130	0.014
126	10.50	0.50	0.144	(0.475)	0.130	0.014
127	10.58	0.67	0.192	(0.473)	0.173	0.019
128	10.67	0.67	0.192	(0.471)	0.173	0.019
129	10.75	0.67	0.192	(0.468)	0.173	0.019
130	10.83	0.67	0.192	(0.466)	0.173	0.019
131	10.92	0.67	0.192	(0.464)	0.173	0.019
132	11.00	0.67	0.192	(0.462)	0.173	0.019
133	11.08	0.63	0.182	(0.459)	0.164	0.018
134	11.17	0.63	0.182	(0.457)	0.164	0.018
135	11.25	0.63	0.182	(0.455)	0.164	0.018
136	11.33	0.63	0.182	(0.453)	0.164	0.018
137	11.42	0.63	0.182	(0.450)	0.164	0.018
138	11.50	0.63	0.182	(0.448)	0.164	0.018
139	11.58	0.57	0.163	(0.446)	0.147	0.016
140	11.67	0.57	0.163	(0.444)	0.147	0.016

141	11.75	0.57	0.163	(0.441)	0.147	0.016
142	11.83	0.60	0.173	(0.439)	0.156	0.017
143	11.92	0.60	0.173	(0.437)	0.156	0.017
144	12.00	0.60	0.173	(0.435)	0.156	0.017
145	12.08	0.83	0.240	(0.433)	0.216	0.024
146	12.17	0.83	0.240	(0.431)	0.216	0.024
147	12.25	0.83	0.240	(0.428)	0.216	0.024
148	12.33	0.87	0.250	(0.426)	0.225	0.025
149	12.42	0.87	0.250	(0.424)	0.225	0.025
150	12.50	0.87	0.250	(0.422)	0.225	0.025
151	12.58	0.93	0.269	(0.420)	0.242	0.027
152	12.67	0.93	0.269	(0.418)	0.242	0.027
153	12.75	0.93	0.269	(0.416)	0.242	0.027
154	12.83	0.97	0.278	(0.413)	0.251	0.028
155	12.92	0.97	0.278	(0.411)	0.251	0.028
156	13.00	0.97	0.278	(0.409)	0.251	0.028
157	13.08	1.13	0.326	(0.407)	0.294	0.033
158	13.17	1.13	0.326	(0.405)	0.294	0.033
159	13.25	1.13	0.326	(0.403)	0.294	0.033
160	13.33	1.13	0.326	(0.401)	0.294	0.033
161	13.42	1.13	0.326	(0.399)	0.294	0.033
162	13.50	1.13	0.326	(0.397)	0.294	0.033
163	13.58	0.77	0.221	(0.395)	0.199	0.022
164	13.67	0.77	0.221	(0.393)	0.199	0.022
165	13.75	0.77	0.221	(0.391)	0.199	0.022
166	13.83	0.77	0.221	(0.389)	0.199	0.022
167	13.92	0.77	0.221	(0.387)	0.199	0.022
168	14.00	0.77	0.221	(0.385)	0.199	0.022
169	14.08	0.90	0.259	(0.383)	0.233	0.026
170	14.17	0.90	0.259	(0.381)	0.233	0.026
171	14.25	0.90	0.259	(0.379)	0.233	0.026
172	14.33	0.87	0.250	(0.377)	0.225	0.025
173	14.42	0.87	0.250	(0.375)	0.225	0.025
174	14.50	0.87	0.250	(0.373)	0.225	0.025
175	14.58	0.87	0.250	(0.371)	0.225	0.025
176	14.67	0.87	0.250	(0.370)	0.225	0.025
177	14.75	0.87	0.250	(0.368)	0.225	0.025
178	14.83	0.83	0.240	(0.366)	0.216	0.024
179	14.92	0.83	0.240	(0.364)	0.216	0.024
180	15.00	0.83	0.240	(0.362)	0.216	0.024
181	15.08	0.80	0.230	(0.360)	0.207	0.023
182	15.17	0.80	0.230	(0.358)	0.207	0.023
183	15.25	0.80	0.230	(0.356)	0.207	0.023
184	15.33	0.77	0.221	(0.355)	0.199	0.022
185	15.42	0.77	0.221	(0.353)	0.199	0.022
186	15.50	0.77	0.221	(0.351)	0.199	0.022
187	15.58	0.63	0.182	(0.349)	0.164	0.018
188	15.67	0.63	0.182	(0.347)	0.164	0.018
189	15.75	0.63	0.182	(0.346)	0.164	0.018
190	15.83	0.63	0.182	(0.344)	0.164	0.018
191	15.92	0.63	0.182	(0.342)	0.164	0.018
192	16.00	0.63	0.182	(0.340)	0.164	0.018
193	16.08	0.13	0.038	(0.339)	0.035	0.004
194	16.17	0.13	0.038	(0.337)	0.035	0.004
195	16.25	0.13	0.038	(0.335)	0.035	0.004
196	16.33	0.13	0.038	(0.333)	0.035	0.004
197	16.42	0.13	0.038	(0.332)	0.035	0.004
198	16.50	0.13	0.038	(0.330)	0.035	0.004
199	16.58	0.10	0.029	(0.328)	0.026	0.003
200	16.67	0.10	0.029	(0.327)	0.026	0.003
201	16.75	0.10	0.029	(0.325)	0.026	0.003

202	16.83	0.10	0.029	(0.323)	0.026	0.003
203	16.92	0.10	0.029	(0.322)	0.026	0.003
204	17.00	0.10	0.029	(0.320)	0.026	0.003
205	17.08	0.17	0.048	(0.319)	0.043	0.005
206	17.17	0.17	0.048	(0.317)	0.043	0.005
207	17.25	0.17	0.048	(0.315)	0.043	0.005
208	17.33	0.17	0.048	(0.314)	0.043	0.005
209	17.42	0.17	0.048	(0.312)	0.043	0.005
210	17.50	0.17	0.048	(0.311)	0.043	0.005
211	17.58	0.17	0.048	(0.309)	0.043	0.005
212	17.67	0.17	0.048	(0.308)	0.043	0.005
213	17.75	0.17	0.048	(0.306)	0.043	0.005
214	17.83	0.13	0.038	(0.304)	0.035	0.004
215	17.92	0.13	0.038	(0.303)	0.035	0.004
216	18.00	0.13	0.038	(0.301)	0.035	0.004
217	18.08	0.13	0.038	(0.300)	0.035	0.004
218	18.17	0.13	0.038	(0.299)	0.035	0.004
219	18.25	0.13	0.038	(0.297)	0.035	0.004
220	18.33	0.13	0.038	(0.296)	0.035	0.004
221	18.42	0.13	0.038	(0.294)	0.035	0.004
222	18.50	0.13	0.038	(0.293)	0.035	0.004
223	18.58	0.10	0.029	(0.291)	0.026	0.003
224	18.67	0.10	0.029	(0.290)	0.026	0.003
225	18.75	0.10	0.029	(0.289)	0.026	0.003
226	18.83	0.07	0.019	(0.287)	0.017	0.002
227	18.92	0.07	0.019	(0.286)	0.017	0.002
228	19.00	0.07	0.019	(0.284)	0.017	0.002
229	19.08	0.10	0.029	(0.283)	0.026	0.003
230	19.17	0.10	0.029	(0.282)	0.026	0.003
231	19.25	0.10	0.029	(0.280)	0.026	0.003
232	19.33	0.13	0.038	(0.279)	0.035	0.004
233	19.42	0.13	0.038	(0.278)	0.035	0.004
234	19.50	0.13	0.038	(0.277)	0.035	0.004
235	19.58	0.10	0.029	(0.275)	0.026	0.003
236	19.67	0.10	0.029	(0.274)	0.026	0.003
237	19.75	0.10	0.029	(0.273)	0.026	0.003
238	19.83	0.07	0.019	(0.272)	0.017	0.002
239	19.92	0.07	0.019	(0.270)	0.017	0.002
240	20.00	0.07	0.019	(0.269)	0.017	0.002
241	20.08	0.10	0.029	(0.268)	0.026	0.003
242	20.17	0.10	0.029	(0.267)	0.026	0.003
243	20.25	0.10	0.029	(0.266)	0.026	0.003
244	20.33	0.10	0.029	(0.264)	0.026	0.003
245	20.42	0.10	0.029	(0.263)	0.026	0.003
246	20.50	0.10	0.029	(0.262)	0.026	0.003
247	20.58	0.10	0.029	(0.261)	0.026	0.003
248	20.67	0.10	0.029	(0.260)	0.026	0.003
249	20.75	0.10	0.029	(0.259)	0.026	0.003
250	20.83	0.07	0.019	(0.258)	0.017	0.002
251	20.92	0.07	0.019	(0.257)	0.017	0.002
252	21.00	0.07	0.019	(0.256)	0.017	0.002
253	21.08	0.10	0.029	(0.255)	0.026	0.003
254	21.17	0.10	0.029	(0.254)	0.026	0.003
255	21.25	0.10	0.029	(0.253)	0.026	0.003
256	21.33	0.07	0.019	(0.252)	0.017	0.002
257	21.42	0.07	0.019	(0.251)	0.017	0.002
258	21.50	0.07	0.019	(0.250)	0.017	0.002
259	21.58	0.10	0.029	(0.249)	0.026	0.003
260	21.67	0.10	0.029	(0.248)	0.026	0.003
261	21.75	0.10	0.029	(0.247)	0.026	0.003
262	21.83	0.07	0.019	(0.246)	0.017	0.002

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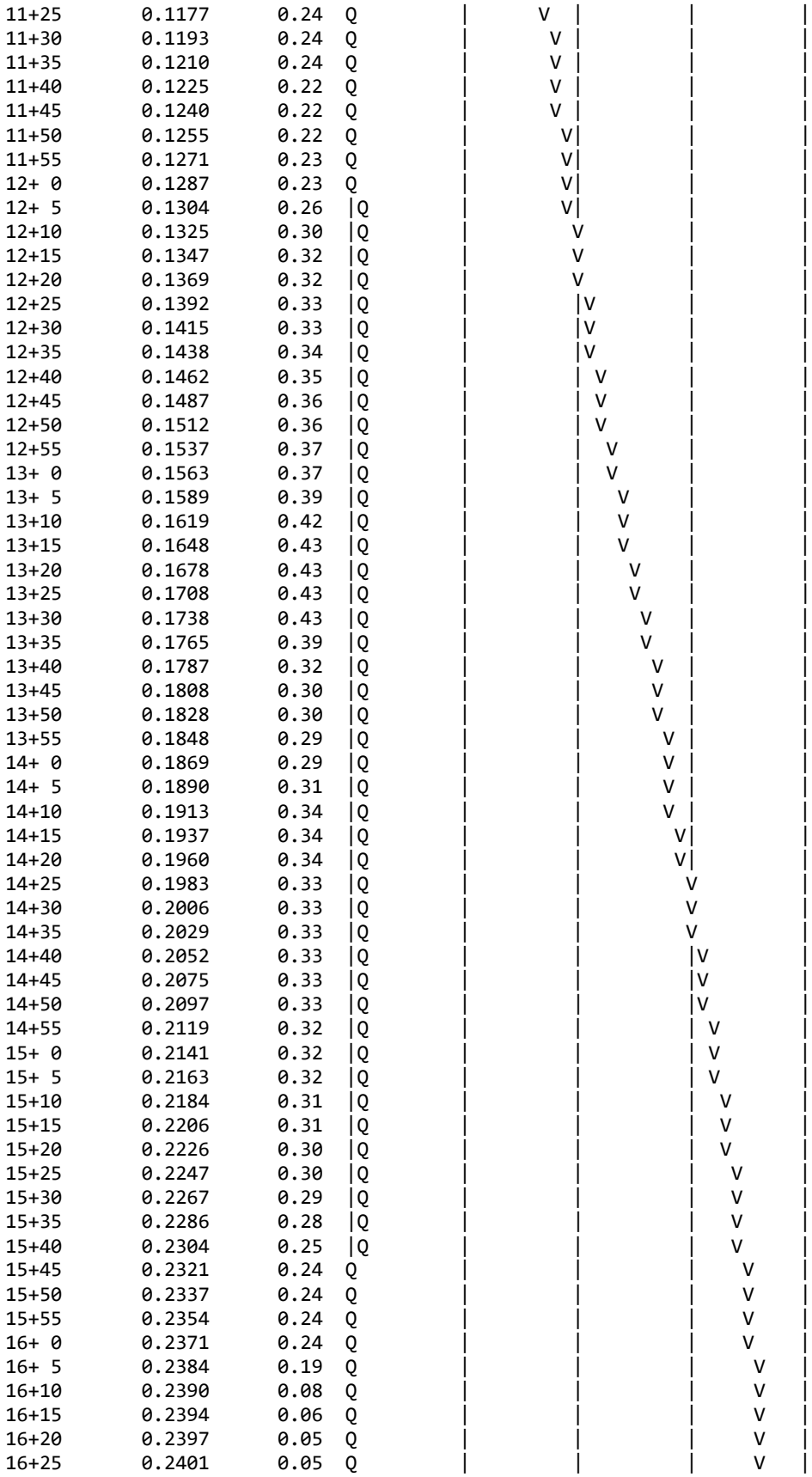
263  21.92     0.07      0.019       (  0.246)       0.017        0.002
264  22.00     0.07      0.019       (  0.245)       0.017        0.002
265  22.08     0.10      0.029       (  0.244)       0.026        0.003
266  22.17     0.10      0.029       (  0.243)       0.026        0.003
267  22.25     0.10      0.029       (  0.242)       0.026        0.003
268  22.33     0.07      0.019       (  0.242)       0.017        0.002
269  22.42     0.07      0.019       (  0.241)       0.017        0.002
270  22.50     0.07      0.019       (  0.240)       0.017        0.002
271  22.58     0.07      0.019       (  0.239)       0.017        0.002
272  22.67     0.07      0.019       (  0.239)       0.017        0.002
273  22.75     0.07      0.019       (  0.238)       0.017        0.002
274  22.83     0.07      0.019       (  0.238)       0.017        0.002
275  22.92     0.07      0.019       (  0.237)       0.017        0.002
276  23.00     0.07      0.019       (  0.236)       0.017        0.002
277  23.08     0.07      0.019       (  0.236)       0.017        0.002
278  23.17     0.07      0.019       (  0.235)       0.017        0.002
279  23.25     0.07      0.019       (  0.235)       0.017        0.002
280  23.33     0.07      0.019       (  0.234)       0.017        0.002
281  23.42     0.07      0.019       (  0.234)       0.017        0.002
282  23.50     0.07      0.019       (  0.233)       0.017        0.002
283  23.58     0.07      0.019       (  0.233)       0.017        0.002
284  23.67     0.07      0.019       (  0.233)       0.017        0.002
285  23.75     0.07      0.019       (  0.232)       0.017        0.002
286  23.83     0.07      0.019       (  0.232)       0.017        0.002
287  23.92     0.07      0.019       (  0.232)       0.017        0.002
288  24.00     0.07      0.019       (  0.232)       0.017        0.002
              (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     2.9
      Flood volume = Effective rainfall      0.24(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      2.16(In)
      Total soil loss =     2.376(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       11499.5 Cubic Feet
      Total soil loss =      103495.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.434(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0004      0.02  Q         |         |         |         |
   0+20       0.0006      0.03  Q         |         |         |         |
   0+25       0.0008      0.04  Q         |         |         |         |
   0+30       0.0011      0.04  Q         |         |         |         |
   0+35       0.0013      0.04  Q         |         |         |         |
   0+40       0.0016      0.04  Q         |         |         |         |
   0+45       0.0019      0.04  Q         |         |         |         |
   0+50       0.0022      0.04  Q         |         |         |         |
   0+55       0.0025      0.05  Q         |         |         |         |
   1+ 0       0.0028      0.05  Q         |         |         |         |
   1+ 5       0.0032      0.05  Q         |         |         |         |
   1+10       0.0034      0.04  Q         |         |         |         |
```

1+15	0.0037	0.04	Q	|	|	|	|
1+20	0.0040	0.04	Q	|	|	|	|
1+25	0.0042	0.04	Q	|	|	|	|
1+30	0.0045	0.04	Q	|	|	|	|
1+35	0.0048	0.04	Q	|	|	|	|
1+40	0.0050	0.04	Q	|	|	|	|
1+45	0.0053	0.04	Q	|	|	|	|
1+50	0.0056	0.04	Q	|	|	|	|
1+55	0.0059	0.05	Q	|	|	|	|
2+ 0	0.0063	0.05	Q	|	|	|	|
2+ 5	0.0066	0.05	QV	|	|	|	|
2+10	0.0070	0.05	QV	|	|	|	|
2+15	0.0073	0.05	QV	|	|	|	|
2+20	0.0077	0.05	QV	|	|	|	|
2+25	0.0080	0.05	QV	|	|	|	|
2+30	0.0084	0.05	QV	|	|	|	|
2+35	0.0088	0.05	QV	|	|	|	|
2+40	0.0092	0.06	QV	|	|	|	|
2+45	0.0096	0.06	QV	|	|	|	|
2+50	0.0101	0.06	QV	|	|	|	|
2+55	0.0105	0.06	QV	|	|	|	|
3+ 0	0.0109	0.06	QV	|	|	|	|
3+ 5	0.0114	0.06	QV	|	|	|	|
3+10	0.0118	0.06	QV	|	|	|	|
3+15	0.0123	0.06	QV	|	|	|	|
3+20	0.0127	0.06	QV	|	|	|	|
3+25	0.0131	0.06	QV	|	|	|	|
3+30	0.0136	0.06	Q V	|	|	|	|
3+35	0.0140	0.06	Q V	|	|	|	|
3+40	0.0145	0.06	Q V	|	|	|	|
3+45	0.0149	0.06	Q V	|	|	|	|
3+50	0.0154	0.07	Q V	|	|	|	|
3+55	0.0159	0.07	Q V	|	|	|	|
4+ 0	0.0164	0.08	Q V	|	|	|	|
4+ 5	0.0169	0.08	Q V	|	|	|	|
4+10	0.0175	0.08	Q V	|	|	|	|
4+15	0.0180	0.08	Q V	|	|	|	|
4+20	0.0185	0.08	Q V	|	|	|	|
4+25	0.0191	0.09	Q V	|	|	|	|
4+30	0.0197	0.09	Q V	|	|	|	|
4+35	0.0204	0.09	Q V	|	|	|	|
4+40	0.0210	0.09	Q V	|	|	|	|
4+45	0.0216	0.09	Q V	|	|	|	|
4+50	0.0222	0.09	Q V	|	|	|	|
4+55	0.0229	0.10	Q V	|	|	|	|
5+ 0	0.0236	0.10	Q V	|	|	|	|
5+ 5	0.0243	0.09	Q V	|	|	|	|
5+10	0.0248	0.08	Q V	|	|	|	|
5+15	0.0254	0.08	Q V	|	|	|	|
5+20	0.0259	0.08	Q V	|	|	|	|
5+25	0.0265	0.09	Q V	|	|	|	|
5+30	0.0271	0.09	Q V	|	|	|	|
5+35	0.0278	0.09	Q V	|	|	|	|
5+40	0.0285	0.10	Q V	|	|	|	|
5+45	0.0292	0.10	Q V	|	|	|	|
5+50	0.0299	0.10	Q V	|	|	|	|
5+55	0.0306	0.10	Q V	|	|	|	|
6+ 0	0.0313	0.10	Q V	|	|	|	|
6+ 5	0.0320	0.11	Q V	|	|	|	|
6+10	0.0328	0.11	Q V	|	|	|	|
6+15	0.0336	0.11	Q V	|	|	|	|

```
 6+20       0.0344      0.11  Q    V    |          |          |          |
 6+25       0.0352      0.11  Q    V    |          |          |          |
 6+30       0.0360      0.11  Q    V    |          |          |          |
 6+35       0.0368      0.12  Q    V    |          |          |          |
 6+40       0.0376      0.13  Q    V    |          |          |          |
 6+45       0.0385      0.13  Q    V    |          |          |          |
 6+50       0.0394      0.13  Q    V    |          |          |          |
 6+55       0.0403      0.13  Q     V   |          |          |          |
 7+ 0       0.0411      0.13  Q     V   |          |          |          |
 7+ 5       0.0420      0.13  Q     V   |          |          |          |
 7+10       0.0429      0.13  Q     V   |          |          |          |
 7+15       0.0438      0.13  Q     V   |          |          |          |
 7+20       0.0447      0.13  Q     V   |          |          |          |
 7+25       0.0456      0.14  Q     V   |          |          |          |
 7+30       0.0466      0.14  Q      V  |          |          |          |
 7+35       0.0476      0.14  Q      V  |          |          |          |
 7+40       0.0486      0.15  Q      V  |          |          |          |
 7+45       0.0497      0.15  Q      V  |          |          |          |
 7+50       0.0508      0.16  Q      V  |          |          |          |
 7+55       0.0519      0.16  Q      V  |          |          |          |
 8+ 0       0.0530      0.17  Q       V |          |          |          |
 8+ 5       0.0542      0.17  Q       V |          |          |          |
 8+10       0.0555      0.19  Q       V |          |          |          |
 8+15       0.0568      0.19  Q       V |          |          |          |
 8+20       0.0582      0.19  Q       V |          |          |          |
 8+25       0.0595      0.19  Q        V|          |          |          |
 8+30       0.0608      0.19  Q        V|          |          |          |
 8+35       0.0621      0.20  Q        V|          |          |          |
 8+40       0.0635      0.20  Q        V|          |          |          |
 8+45       0.0649      0.20  Q        V|          |          |          |
 8+50       0.0664      0.21  Q         V          |          |          |
 8+55       0.0679      0.22  Q         V          |          |          |
 9+ 0       0.0693      0.22  Q         V          |          |          |
 9+ 5       0.0709      0.22  Q         V          |          |          |
 9+10       0.0725      0.24  Q         V          |          |          |
 9+15       0.0742      0.24  Q         |V         |          |          |
 9+20       0.0759      0.25  Q         |V         |          |          |
 9+25       0.0776      0.25  |Q        |V         |          |          |
 9+30       0.0794      0.26  |Q        | V        |          |          |
 9+35       0.0812      0.26  |Q        | V        |          |          |
 9+40       0.0830      0.27  |Q        | V        |          |          |
 9+45       0.0849      0.27  |Q        | V        |          |          |
 9+50       0.0867      0.27  |Q        |  V       |          |          |
 9+55       0.0886      0.28  |Q        |  V       |          |          |
10+ 0       0.0906      0.28  |Q        |  V       |          |          |
10+ 5       0.0923      0.26  |Q        |  V       |          |          |
10+10       0.0938      0.21  Q         |   V      |          |          |
10+15       0.0951      0.20  Q         |   V      |          |          |
10+20       0.0964      0.19  Q         |   V      |          |          |
10+25       0.0978      0.19  Q         |   V      |          |          |
10+30       0.0991      0.19  Q         |    V     |          |          |
10+35       0.1005      0.21  Q         |    V     |          |          |
10+40       0.1022      0.24  Q         |    V     |          |          |
10+45       0.1039      0.25  |Q        |    V     |          |          |
10+50       0.1057      0.25  |Q        |     V    |          |          |
10+55       0.1075      0.26  |Q        |     V    |          |          |
11+ 0       0.1092      0.26  |Q        |     V    |          |          |
11+ 5       0.1110      0.25  |Q        |     V    |          |          |
11+10       0.1126      0.24  Q         |      V   |          |          |
11+15       0.1143      0.24  Q         |      V   |          |          |
11+20       0.1160      0.24  Q         |      V   |          |          |
```



```
16+30       0.2404      0.05  Q        |         |         |     V   |
16+35       0.2408      0.05  Q        |         |         |     V   |
16+40       0.2410      0.04  Q        |         |         |     V   |
16+45       0.2413      0.04  Q        |         |         |     V   |
16+50       0.2416      0.04  Q        |         |         |     V   |
16+55       0.2418      0.04  Q        |         |         |     V   |
17+ 0       0.2421      0.04  Q        |         |         |     V   |
17+ 5       0.2424      0.05  Q        |         |         |     V   |
17+10       0.2428      0.06  Q        |         |         |     V   |
17+15       0.2433      0.06  Q        |         |         |     V   |
17+20       0.2437      0.06  Q        |         |         |     V   |
17+25       0.2441      0.06  Q        |         |         |     V   |
17+30       0.2446      0.06  Q        |         |         |      V  |
17+35       0.2450      0.06  Q        |         |         |      V  |
17+40       0.2455      0.06  Q        |         |         |      V  |
17+45       0.2459      0.06  Q        |         |         |      V  |
17+50       0.2463      0.06  Q        |         |         |      V  |
17+55       0.2467      0.05  Q        |         |         |      V  |
18+ 0       0.2470      0.05  Q        |         |         |      V  |
18+ 5       0.2474      0.05  Q        |         |         |      V  |
18+10       0.2477      0.05  Q        |         |         |      V  |
18+15       0.2481      0.05  Q        |         |         |      V  |
18+20       0.2484      0.05  Q        |         |         |      V  |
18+25       0.2488      0.05  Q        |         |         |      V  |
18+30       0.2491      0.05  Q        |         |         |      V  |
18+35       0.2495      0.05  Q        |         |         |      V  |
18+40       0.2497      0.04  Q        |         |         |      V  |
18+45       0.2500      0.04  Q        |         |         |      V  |
18+50       0.2503      0.03  Q        |         |         |      V  |
18+55       0.2504      0.03  Q        |         |         |      V  |
19+ 0       0.2506      0.03  Q        |         |         |      V  |
19+ 5       0.2508      0.03  Q        |         |         |       V |
19+10       0.2511      0.04  Q        |         |         |       V |
19+15       0.2513      0.04  Q        |         |         |       V |
19+20       0.2516      0.04  Q        |         |         |       V |
19+25       0.2520      0.05  Q        |         |         |       V |
19+30       0.2523      0.05  Q        |         |         |       V |
19+35       0.2526      0.05  Q        |         |         |       V |
19+40       0.2529      0.04  Q        |         |         |       V |
19+45       0.2532      0.04  Q        |         |         |       V |
19+50       0.2534      0.03  Q        |         |         |       V |
19+55       0.2536      0.03  Q        |         |         |       V |
20+ 0       0.2538      0.03  Q        |         |         |       V |
20+ 5       0.2540      0.03  Q        |         |         |       V |
20+10       0.2542      0.04  Q        |         |         |       V |
20+15       0.2545      0.04  Q        |         |         |       V |
20+20       0.2548      0.04  Q        |         |         |       V |
20+25       0.2550      0.04  Q        |         |         |       V |
20+30       0.2553      0.04  Q        |         |         |       V |
20+35       0.2556      0.04  Q        |         |         |       V |
20+40       0.2558      0.04  Q        |         |         |       V |
20+45       0.2561      0.04  Q        |         |         |       V |
20+50       0.2563      0.03  Q        |         |         |       V |
20+55       0.2565      0.03  Q        |         |         |       V |
21+ 0       0.2567      0.03  Q        |         |         |       V |
21+ 5       0.2569      0.03  Q        |         |         |       V |
21+10       0.2571      0.04  Q        |         |         |       V |
21+15       0.2574      0.04  Q        |         |         |        V|
21+20       0.2576      0.03  Q        |         |         |        V|
21+25       0.2578      0.03  Q        |         |         |        V|
21+30       0.2580      0.03  Q        |         |         |        V|
```

```
  21+35      0.2582     0.03  Q        |         |         |        V|
  21+40      0.2585     0.04  Q        |         |         |        V|
  21+45      0.2587     0.04  Q        |         |         |        V|
  21+50      0.2590     0.03  Q        |         |         |        V|
  21+55      0.2592     0.03  Q        |         |         |        V|
  22+ 0      0.2593     0.03  Q        |         |         |        V|
  22+ 5      0.2595     0.03  Q        |         |         |        V|
  22+10      0.2598     0.04  Q        |         |         |        V|
  22+15      0.2601     0.04  Q        |         |         |        V|
  22+20      0.2603     0.03  Q        |         |         |        V|
  22+25      0.2605     0.03  Q        |         |         |        V|
  22+30      0.2607     0.03  Q        |         |         |        V|
  22+35      0.2608     0.03  Q        |         |         |        V|
  22+40      0.2610     0.03  Q        |         |         |        V|
  22+45      0.2612     0.03  Q        |         |         |        V|
  22+50      0.2614     0.03  Q        |         |         |        V|
  22+55      0.2615     0.03  Q        |         |         |        V|
  23+ 0      0.2617     0.03  Q        |         |         |        V|
  23+ 5      0.2619     0.03  Q        |         |         |        V|
  23+10      0.2621     0.03  Q        |         |         |        V|
  23+15      0.2622     0.03  Q        |         |         |        V|
  23+20      0.2624     0.03  Q        |         |         |        V|
  23+25      0.2626     0.03  Q        |         |         |        V|
  23+30      0.2628     0.03  Q        |         |         |        V|
  23+35      0.2629     0.03  Q        |         |         |        V|
  23+40      0.2631     0.03  Q        |         |         |        V|
  23+45      0.2633     0.03  Q        |         |         |        V|
  23+50      0.2635     0.03  Q        |         |         |        V|
  23+55      0.2637     0.03  Q        |         |         |        V|
  24+ 0      0.2638     0.03  Q        |         |         |        V|
  24+ 5      0.2640     0.02  Q        |         |         |        V|
  24+10      0.2640     0.00  Q        |         |         |        V|
  24+15      0.2640     0.00  Q        |         |         |        V|
  24+20      0.2640     0.00  Q        |         |         |         V
-------------------------------------------------------------------------
```

EXISTING CONDITION – 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 - 2008, Version 8.1
Study date 05/22/23 File: B1ONSITEPRE1100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 1-HOUR
FN: B1ONSITEPRE1100.OUT- AV

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 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]
13.20	0.54	7.13

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	1.28	16.90

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.540(In)
Area Averaged 100-Year Rainfall = 1.280(In)

Point rain (area averaged) = 1.280(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.280(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

```
      78.0  78.0      0.268     0.000        0.268       1.000      0.268
                                                        Sum (F) =   0.268
      Area averaged mean soil loss (F) (In/Hr) =  0.268
      Minimum soil loss rate ((In/Hr)) =  0.134
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ------------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5500
      ------------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                         FOOTHILL S-Curve
      ------------------------------------------------------------------------
                  Unit Hydrograph Data
      ------------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                          Graph %           (CFS)
      ------------------------------------------------------------------------
          1   0.083        141.469         28.128             3.742
          2   0.167        282.938         54.945             7.309
          3   0.250        424.407         12.894             1.715
          4   0.333        565.876          2.921             0.389
          5   0.417        707.345          1.113             0.148
                                   Sum = 100.000    Sum=      13.303
-------------------------------------------------------------------------------


 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   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     3.30      0.507          0.268    (  0.456)        0.239
   2   0.17     4.20      0.645          0.268    (  0.581)        0.377
   3   0.25     4.40      0.676          0.268    (  0.608)        0.408
   4   0.33     4.80      0.737          0.268    (  0.663)        0.470
   5   0.42     5.20      0.799          0.268    (  0.719)        0.531
   6   0.50     6.20      0.952          0.268    (  0.857)        0.685
   7   0.58     6.80      1.044          0.268    (  0.940)        0.777
   8   0.67     8.80      1.352          0.268    (  1.216)        1.084
   9   0.75    13.90      2.135          0.268    (  1.921)        1.867
  10   0.83    31.40      4.822          0.268    (  4.340)        4.555
  11   0.92     7.20      1.106          0.268    (  0.995)        0.838
  12   1.00     3.80      0.584          0.268    (  0.525)        0.316
               (Loss Rate Not Used)
     Sum =     100.0                                 Sum =    12.1
        Flood volume = Effective rainfall      1.01(In)
         times area      13.2(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
        Total soil loss =      0.27(In)
        Total soil loss =     0.294(Ac.Ft)
        Total rainfall =      1.28(In)
        Flood volume =       48502.8 Cubic Feet
        Total soil loss =       12822.3 Cubic Feet
        ------------------------------------------------------------------------
         Peak flow rate of this hydrograph =     40.189(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       0.0062      0.90  Q         |         |         |         |
    0+10       0.0279      3.16  |VQ       |         |         |         |
    0+15       0.0603      4.70  | VQ      |         |         |         |
    0+20       0.0981      5.48  |  VQ     |         |         |         |
    0+25       0.1415      6.30  |    Q    |         |         |         |
    0+30       0.1929      7.47  |    QV   |         |         |         |
    0+35       0.2554      9.07  |      Q V|         |         |         |
    0+40       0.3324     11.19  |       Q |V        |         |         |
    0+45       0.4467     16.60  |         |  Q  V   |         |         |
    0+50       0.6738     32.97  |         |         |   V Q   |         |
```

```
    0+55       0.9506     40.19  |         |         |         | Q V     |
    1+ 0       1.0609     16.02  |         | Q       |         |       V |
    1+ 5       1.1008      5.80  |   Q     |         |         |        V|
    1+10       1.1114      1.54  |Q        |         |         |        V|
    1+15       1.1131      0.25  Q         |         |         |        V|
    1+20       1.1135      0.05  Q         |         |         |         V
-------------------------------------------------------------------------
```

EXISTING CONDITION – 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

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Study date 05/22/23 File: B1ONSITEPRE3100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 3-HOUR
FN: B1ONSITEPRE3100.OUT- AV

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 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]
13.20	0.95	12.54

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.00	26.40

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.950(In)

Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(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
FOOTHILL S-Curve

Unit Hydrograph Data

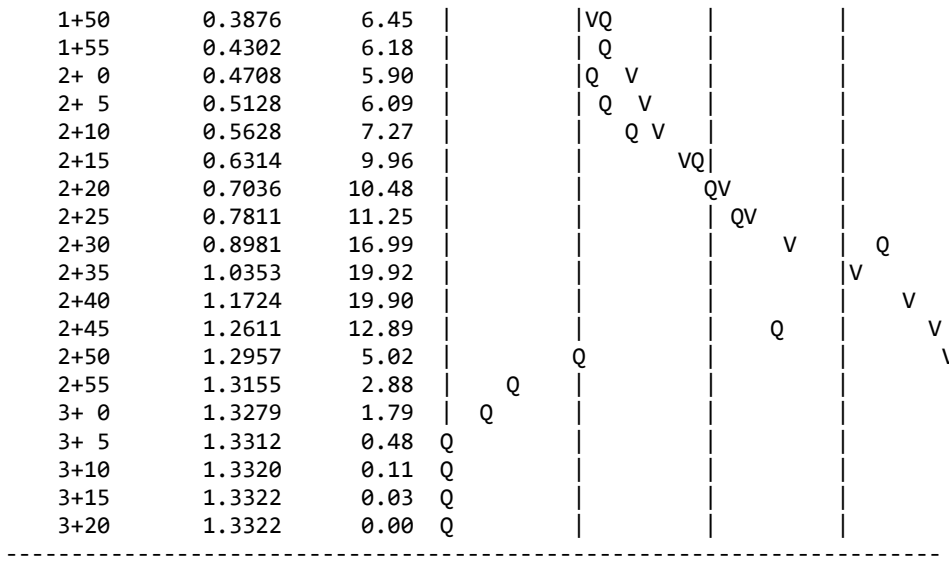
Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	141.469	28.128	3.742
2	0.167	282.938	54.945	7.309
3	0.250	424.407	12.894	1.715
4	0.333	565.876	2.921	0.389
5	0.417	707.345	1.113	0.148
		Sum = 100.000	Sum=	13.303

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	0.312	0.268	(0.281)	0.044
2	0.17	1.30	0.312	0.268	(0.281)	0.044
3	0.25	1.10	0.264	(0.268)	0.238	0.026
4	0.33	1.50	0.360	0.268	(0.324)	0.092
5	0.42	1.50	0.360	0.268	(0.324)	0.092
6	0.50	1.80	0.432	0.268	(0.389)	0.164
7	0.58	1.50	0.360	0.268	(0.324)	0.092
8	0.67	1.80	0.432	0.268	(0.389)	0.164
9	0.75	1.80	0.432	0.268	(0.389)	0.164
10	0.83	1.50	0.360	0.268	(0.324)	0.092
11	0.92	1.60	0.384	0.268	(0.346)	0.116
12	1.00	1.80	0.432	0.268	(0.389)	0.164
13	1.08	2.20	0.528	0.268	(0.475)	0.260
14	1.17	2.20	0.528	0.268	(0.475)	0.260
15	1.25	2.20	0.528	0.268	(0.475)	0.260
16	1.33	2.00	0.480	0.268	(0.432)	0.212
17	1.42	2.60	0.624	0.268	(0.562)	0.356

```
18   1.50     2.70      0.648          0.268    (  0.583)        0.380
19   1.58     2.40      0.576          0.268    (  0.518)        0.308
20   1.67     2.70      0.648          0.268    (  0.583)        0.380
21   1.75     3.30      0.792          0.268    (  0.713)        0.524
22   1.83     3.10      0.744          0.268    (  0.670)        0.476
23   1.92     2.90      0.696          0.268    (  0.626)        0.428
24   2.00     3.00      0.720          0.268    (  0.648)        0.452
25   2.08     3.10      0.744          0.268    (  0.670)        0.476
26   2.17     4.20      1.008          0.268    (  0.907)        0.740
27   2.25     5.00      1.200          0.268    (  1.080)        0.932
28   2.33     3.50      0.840          0.268    (  0.756)        0.572
29   2.42     6.80      1.632          0.268    (  1.469)        1.364
30   2.50     7.30      1.752          0.268    (  1.577)        1.484
31   2.58     8.20      1.968          0.268    (  1.771)        1.700
32   2.67     5.90      1.416          0.268    (  1.274)        1.148
33   2.75     2.00      0.480          0.268    (  0.432)        0.212
34   2.83     1.80      0.432          0.268    (  0.389)        0.164
35   2.92     1.80      0.432          0.268    (  0.389)        0.164
36   3.00     0.60      0.144       (  0.268)       0.130        0.014
            (Loss Rate Not Used)
   Sum =     100.0                                  Sum =    14.5
     Flood volume = Effective rainfall      1.21(In)
      times area      13.2(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
     Total soil loss =      0.79(In)
     Total soil loss =     0.868(Ac.Ft)
     Total rainfall =      2.00(In)
     Flood volume =       58030.4 Cubic Feet
     Total soil loss =       37796.1 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =     19.922(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        5.0      10.0      15.0      20.0
-------------------------------------------------------------------------
  0+ 5       0.0011      0.17  Q         |         |         |         |
  0+10       0.0045      0.49  Q         |         |         |         |
  0+15       0.0080      0.50  Q         |         |         |         |
  0+20       0.0123      0.63  VQ        |         |         |         |
  0+25       0.0198      1.09  V Q       |         |         |         |
  0+30       0.0299      1.47  V Q       |         |         |         |
  0+35       0.0420      1.75  |V Q      |         |         |         |
  0+40       0.0531      1.62  |V Q      |         |         |         |
  0+45       0.0673      2.05  | V Q     |         |         |         |
  0+50       0.0803      1.89  | VQ      |         |         |         |
  0+55       0.0904      1.47  | Q       |         |         |         |
  1+ 0       0.1022      1.71  |  Q      |         |         |         |
  1+ 5       0.1190      2.44  |  VQ     |         |         |         |
  1+10       0.1412      3.22  |   V Q   |         |         |         |
  1+15       0.1646      3.41  |   V Q   |         |         |         |
  1+20       0.1872      3.27  |    VQ   |         |         |         |
  1+25       0.2111      3.47  |     Q   |         |         |         |
  1+30       0.2423      4.53  |      V Q|         |         |         |
  1+35       0.2745      4.67  |       VQ|         |         |         |
  1+40       0.3055      4.50  |        Q|         |         |         |
  1+45       0.3432      5.47  |         Q         |         |         |
```


1+50 0.3876 6.45
1+55 0.4302 6.18
2+ 0 0.4708 5.90
2+ 5 0.5128 6.09
2+10 0.5628 7.27
2+15 0.6314 9.96
2+20 0.7036 10.48
2+25 0.7811 11.25
2+30 0.8981 16.99
2+35 1.0353 19.92
2+40 1.1724 19.90
2+45 1.2611 12.89
2+50 1.2957 5.02
2+55 1.3155 2.88
3+ 0 1.3279 1.79
3+ 5 1.3312 0.48
3+10 1.3320 0.11
3+15 1.3322 0.03
3+20 1.3322 0.00

EXISTING CONDITION – 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

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Study date 05/22/23 File: B1ONSITEPRE6100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 6-HOUR
FN: B1ONSITEPRE6100.OUT- AV

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 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]
13.20	1.35	17.82

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.90	38.28

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.350(In)

Area Averaged 100-Year Rainfall = 2.900(In)

Point rain (area averaged) = 2.900(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(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
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	141.469	28.128	3.742
2	0.167	282.938	54.945	7.309
3	0.250	424.407	12.894	1.715
4	0.333	565.876	2.921	0.389
5	0.417	707.345	1.113	0.148
		Sum = 100.000	Sum=	13.303

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	0.174	(0.268)	0.157	0.017
2	0.17	0.60	0.209	(0.268)	0.188	0.021
3	0.25	0.60	0.209	(0.268)	0.188	0.021
4	0.33	0.60	0.209	(0.268)	0.188	0.021
5	0.42	0.60	0.209	(0.268)	0.188	0.021
6	0.50	0.70	0.244	(0.268)	0.219	0.024
7	0.58	0.70	0.244	(0.268)	0.219	0.024
8	0.67	0.70	0.244	(0.268)	0.219	0.024
9	0.75	0.70	0.244	(0.268)	0.219	0.024
10	0.83	0.70	0.244	(0.268)	0.219	0.024
11	0.92	0.70	0.244	(0.268)	0.219	0.024
12	1.00	0.80	0.278	(0.268)	0.251	0.028
13	1.08	0.80	0.278	(0.268)	0.251	0.028
14	1.17	0.80	0.278	(0.268)	0.251	0.028
15	1.25	0.80	0.278	(0.268)	0.251	0.028
16	1.33	0.80	0.278	(0.268)	0.251	0.028
17	1.42	0.80	0.278	(0.268)	0.251	0.028

18	1.50	0.80	0.278	(	0.268)	0.251		0.028
19	1.58	0.80	0.278	(	0.268)	0.251		0.028
20	1.67	0.80	0.278	(	0.268)	0.251		0.028
21	1.75	0.80	0.278	(	0.268)	0.251		0.028
22	1.83	0.80	0.278	(	0.268)	0.251		0.028
23	1.92	0.80	0.278	(	0.268)	0.251		0.028
24	2.00	0.90	0.313		0.268	(	0.282)	0.046
25	2.08	0.80	0.278	(	0.268)	0.251		0.028
26	2.17	0.90	0.313		0.268	(	0.282)	0.046
27	2.25	0.90	0.313		0.268	(	0.282)	0.046
28	2.33	0.90	0.313		0.268	(	0.282)	0.046
29	2.42	0.90	0.313		0.268	(	0.282)	0.046
30	2.50	0.90	0.313		0.268	(	0.282)	0.046
31	2.58	0.90	0.313		0.268	(	0.282)	0.046
32	2.67	0.90	0.313		0.268	(	0.282)	0.046
33	2.75	1.00	0.348		0.268	(	0.313)	0.080
34	2.83	1.00	0.348		0.268	(	0.313)	0.080
35	2.92	1.00	0.348		0.268	(	0.313)	0.080
36	3.00	1.00	0.348		0.268	(	0.313)	0.080
37	3.08	1.00	0.348		0.268	(	0.313)	0.080
38	3.17	1.10	0.383		0.268	(	0.345)	0.115
39	3.25	1.10	0.383		0.268	(	0.345)	0.115
40	3.33	1.10	0.383		0.268	(	0.345)	0.115
41	3.42	1.20	0.418		0.268	(	0.376)	0.150
42	3.50	1.30	0.452		0.268	(	0.407)	0.185
43	3.58	1.40	0.487		0.268	(	0.438)	0.220
44	3.67	1.40	0.487		0.268	(	0.438)	0.220
45	3.75	1.50	0.522		0.268	(	0.470)	0.254
46	3.83	1.50	0.522		0.268	(	0.470)	0.254
47	3.92	1.60	0.557		0.268	(	0.501)	0.289
48	4.00	1.60	0.557		0.268	(	0.501)	0.289
49	4.08	1.70	0.592		0.268	(	0.532)	0.324
50	4.17	1.80	0.626		0.268	(	0.564)	0.359
51	4.25	1.90	0.661		0.268	(	0.595)	0.394
52	4.33	2.00	0.696		0.268	(	0.626)	0.428
53	4.42	2.10	0.731		0.268	(	0.658)	0.463
54	4.50	2.10	0.731		0.268	(	0.658)	0.463
55	4.58	2.20	0.766		0.268	(	0.689)	0.498
56	4.67	2.30	0.800		0.268	(	0.720)	0.533
57	4.75	2.40	0.835		0.268	(	0.752)	0.568
58	4.83	2.40	0.835		0.268	(	0.752)	0.568
59	4.92	2.50	0.870		0.268	(	0.783)	0.602
60	5.00	2.60	0.905		0.268	(	0.814)	0.637
61	5.08	3.10	1.079		0.268	(	0.971)	0.811
62	5.17	3.60	1.253		0.268	(	1.127)	0.985
63	5.25	3.90	1.357		0.268	(	1.221)	1.090
64	5.33	4.20	1.462		0.268	(	1.315)	1.194
65	5.42	4.70	1.636		0.268	(	1.472)	1.368
66	5.50	5.60	1.949		0.268	(	1.754)	1.681
67	5.58	1.90	0.661		0.268	(	0.595)	0.394
68	5.67	0.90	0.313		0.268	(	0.282)	0.046
69	5.75	0.60	0.209	(	0.268)	0.188		0.021
70	5.83	0.50	0.174	(	0.268)	0.157		0.017
71	5.92	0.30	0.104	(	0.268)	0.094		0.010
72	6.00	0.20	0.070	(	0.268)	0.063		0.007

(Loss Rate Not Used)

Sum = 100.0 Sum = 17.0

Flood volume = Effective rainfall 1.42(In)
times area 13.2(Ac.)/[(In)/(Ft.)] = 1.6(Ac.Ft)
Total soil loss = 1.48(In)
Total soil loss = 1.628(Ac.Ft)

Total rainfall = 2.90(In)
Flood volume = 68049.4 Cubic Feet
Total soil loss = 70900.7 Cubic Feet

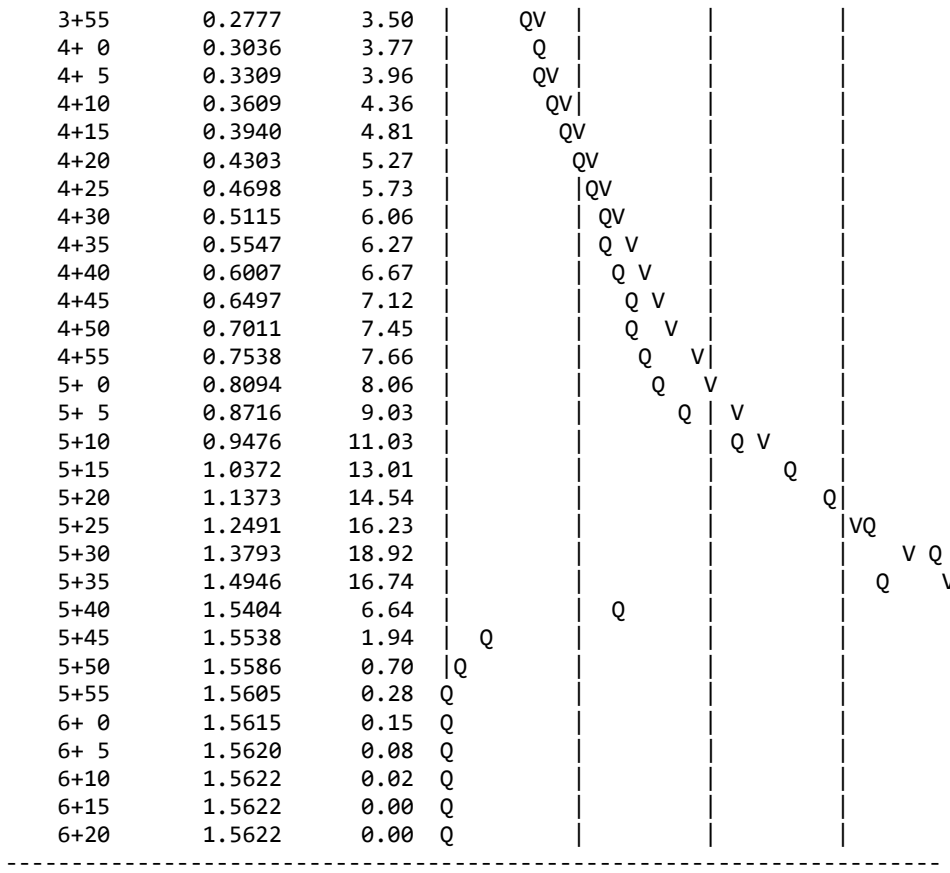
Peak flow rate of this hydrograph = 18.916(CFS)

++

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 5.0 10.0 15.0 20.0
0+ 5	0.0004	0.07	Q
0+10	0.0019	0.21	Q
0+15	0.0037	0.26	Q
0+20	0.0055	0.27	Q
0+25	0.0075	0.28	Q
0+30	0.0095	0.29	Q
0+35	0.0116	0.32	Q
0+40	0.0139	0.32	Q
0+45	0.0161	0.32	Q
0+50	0.0183	0.32	Q
0+55	0.0206	0.32	Q
1+ 0	0.0229	0.34	Q
1+ 5	0.0254	0.36	Q
1+10	0.0279	0.37	Q
1+15	0.0305	0.37	Q
1+20	0.0330	0.37	Q
1+25	0.0356	0.37	Q
1+30	0.0381	0.37	Q
1+35	0.0407	0.37	QV
1+40	0.0432	0.37	QV
1+45	0.0458	0.37	QV
1+50	0.0483	0.37	QV
1+55	0.0509	0.37	QV
2+ 0	0.0539	0.44	QV
2+ 5	0.0573	0.50	|Q
2+10	0.0605	0.47	QV
2+15	0.0645	0.57	|Q
2+20	0.0686	0.60	|Q
2+25	0.0728	0.60	|Q
2+30	0.0770	0.61	|Q
2+35	0.0811	0.61	|QV
2+40	0.0853	0.61	|QV
2+45	0.0904	0.74	|QV
2+50	0.0972	0.99	|QV
2+55	0.1045	1.05	| Q
3+ 0	0.1118	1.06	| Q
3+ 5	0.1192	1.07	| QV
3+10	0.1274	1.20	| QV
3+15	0.1375	1.45	| QV
3+20	0.1479	1.51	| Q
3+25	0.1593	1.66	| QV
3+30	0.1734	2.05	| Q
3+35	0.1906	2.49	| Q
3+40	0.2100	2.82	| Q
3+45	0.2309	3.03	| VQ
3+50	0.2536	3.30	| Q


3+55 0.2777 3.50
4+ 0 0.3036 3.77
4+ 5 0.3309 3.96
4+10 0.3609 4.36
4+15 0.3940 4.81
4+20 0.4303 5.27
4+25 0.4698 5.73
4+30 0.5115 6.06
4+35 0.5547 6.27
4+40 0.6007 6.67
4+45 0.6497 7.12
4+50 0.7011 7.45
4+55 0.7538 7.66
5+ 0 0.8094 8.06
5+ 5 0.8716 9.03
5+10 0.9476 11.03
5+15 1.0372 13.01
5+20 1.1373 14.54
5+25 1.2491 16.23
5+30 1.3793 18.92
5+35 1.4946 16.74
5+40 1.5404 6.64
5+45 1.5538 1.94
5+50 1.5586 0.70
5+55 1.5605 0.28
6+ 0 1.5615 0.15
6+ 5 1.5620 0.08
6+10 1.5622 0.02
6+15 1.5622 0.00
6+20 1.5622 0.00

EXISTING CONDITION – 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 05/22/23 File: B1ONSITEPRE24100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 24-HOUR
FN: B1ONSITEPRE24100.OUT- AV

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.40	31.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	6.50	85.80

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 6.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 6.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(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
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	141.469	28.128	3.742
2	0.167	282.938	54.945	7.309
3	0.250	424.407	12.894	1.715
4	0.333	565.876	2.921	0.389
5	0.417	707.345	1.113	0.148
			Sum = 100.000 Sum=	13.303

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	0.052	(0.474)	0.047	0.005
2	0.17	0.07	0.052	(0.473)	0.047	0.005
3	0.25	0.07	0.052	(0.471)	0.047	0.005
4	0.33	0.10	0.078	(0.469)	0.070	0.008
5	0.42	0.10	0.078	(0.467)	0.070	0.008
6	0.50	0.10	0.078	(0.465)	0.070	0.008
7	0.58	0.10	0.078	(0.463)	0.070	0.008
8	0.67	0.10	0.078	(0.462)	0.070	0.008
9	0.75	0.10	0.078	(0.460)	0.070	0.008
10	0.83	0.13	0.104	(0.458)	0.094	0.010
11	0.92	0.13	0.104	(0.456)	0.094	0.010
12	1.00	0.13	0.104	(0.454)	0.094	0.010
13	1.08	0.10	0.078	(0.453)	0.070	0.008
14	1.17	0.10	0.078	(0.451)	0.070	0.008
15	1.25	0.10	0.078	(0.449)	0.070	0.008
16	1.33	0.10	0.078	(0.447)	0.070	0.008
17	1.42	0.10	0.078	(0.445)	0.070	0.008
18	1.50	0.10	0.078	(0.444)	0.070	0.008
19	1.58	0.10	0.078	(0.442)	0.070	0.008
20	1.67	0.10	0.078	(0.440)	0.070	0.008
21	1.75	0.10	0.078	(0.438)	0.070	0.008
22	1.83	0.13	0.104	(0.437)	0.094	0.010
23	1.92	0.13	0.104	(0.435)	0.094	0.010
24	2.00	0.13	0.104	(0.433)	0.094	0.010
25	2.08	0.13	0.104	(0.431)	0.094	0.010
26	2.17	0.13	0.104	(0.430)	0.094	0.010
27	2.25	0.13	0.104	(0.428)	0.094	0.010
28	2.33	0.13	0.104	(0.426)	0.094	0.010
29	2.42	0.13	0.104	(0.424)	0.094	0.010
30	2.50	0.13	0.104	(0.423)	0.094	0.010
31	2.58	0.17	0.130	(0.421)	0.117	0.013
32	2.67	0.17	0.130	(0.419)	0.117	0.013
33	2.75	0.17	0.130	(0.417)	0.117	0.013
34	2.83	0.17	0.130	(0.416)	0.117	0.013
35	2.92	0.17	0.130	(0.414)	0.117	0.013
36	3.00	0.17	0.130	(0.412)	0.117	0.013
37	3.08	0.17	0.130	(0.411)	0.117	0.013
38	3.17	0.17	0.130	(0.409)	0.117	0.013
39	3.25	0.17	0.130	(0.407)	0.117	0.013
40	3.33	0.17	0.130	(0.405)	0.117	0.013
41	3.42	0.17	0.130	(0.404)	0.117	0.013
42	3.50	0.17	0.130	(0.402)	0.117	0.013
43	3.58	0.17	0.130	(0.400)	0.117	0.013
44	3.67	0.17	0.130	(0.399)	0.117	0.013
45	3.75	0.17	0.130	(0.397)	0.117	0.013

46	3.83	0.20	0.156	(	0.395)		0.140		0.016
47	3.92	0.20	0.156	(	0.394)		0.140		0.016
48	4.00	0.20	0.156	(	0.392)		0.140		0.016
49	4.08	0.20	0.156	(	0.390)		0.140		0.016
50	4.17	0.20	0.156	(	0.389)		0.140		0.016
51	4.25	0.20	0.156	(	0.387)		0.140		0.016
52	4.33	0.23	0.182	(	0.385)		0.164		0.018
53	4.42	0.23	0.182	(	0.384)		0.164		0.018
54	4.50	0.23	0.182	(	0.382)		0.164		0.018
55	4.58	0.23	0.182	(	0.381)		0.164		0.018
56	4.67	0.23	0.182	(	0.379)		0.164		0.018
57	4.75	0.23	0.182	(	0.377)		0.164		0.018
58	4.83	0.27	0.208	(	0.376)		0.187		0.021
59	4.92	0.27	0.208	(	0.374)		0.187		0.021
60	5.00	0.27	0.208	(	0.372)		0.187		0.021
61	5.08	0.20	0.156	(	0.371)		0.140		0.016
62	5.17	0.20	0.156	(	0.369)		0.140		0.016
63	5.25	0.20	0.156	(	0.368)		0.140		0.016
64	5.33	0.23	0.182	(	0.366)		0.164		0.018
65	5.42	0.23	0.182	(	0.364)		0.164		0.018
66	5.50	0.23	0.182	(	0.363)		0.164		0.018
67	5.58	0.27	0.208	(	0.361)		0.187		0.021
68	5.67	0.27	0.208	(	0.360)		0.187		0.021
69	5.75	0.27	0.208	(	0.358)		0.187		0.021
70	5.83	0.27	0.208	(	0.356)		0.187		0.021
71	5.92	0.27	0.208	(	0.355)		0.187		0.021
72	6.00	0.27	0.208	(	0.353)		0.187		0.021
73	6.08	0.30	0.234	(	0.352)		0.211		0.023
74	6.17	0.30	0.234	(	0.350)		0.211		0.023
75	6.25	0.30	0.234	(	0.349)		0.211		0.023
76	6.33	0.30	0.234	(	0.347)		0.211		0.023
77	6.42	0.30	0.234	(	0.345)		0.211		0.023
78	6.50	0.30	0.234	(	0.344)		0.211		0.023
79	6.58	0.33	0.260	(	0.342)		0.234		0.026
80	6.67	0.33	0.260	(	0.341)		0.234		0.026
81	6.75	0.33	0.260	(	0.339)		0.234		0.026
82	6.83	0.33	0.260	(	0.338)		0.234		0.026
83	6.92	0.33	0.260	(	0.336)		0.234		0.026
84	7.00	0.33	0.260	(	0.335)		0.234		0.026
85	7.08	0.33	0.260	(	0.333)		0.234		0.026
86	7.17	0.33	0.260	(	0.332)		0.234		0.026
87	7.25	0.33	0.260	(	0.330)		0.234		0.026
88	7.33	0.37	0.286	(	0.329)		0.257		0.029
89	7.42	0.37	0.286	(	0.327)		0.257		0.029
90	7.50	0.37	0.286	(	0.326)		0.257		0.029
91	7.58	0.40	0.312	(	0.324)		0.281		0.031
92	7.67	0.40	0.312	(	0.323)		0.281		0.031
93	7.75	0.40	0.312	(	0.321)		0.281		0.031
94	7.83	0.43	0.338	(	0.320)		0.304		0.034
95	7.92	0.43	0.338	(	0.318)		0.304		0.034
96	8.00	0.43	0.338	(	0.317)		0.304		0.034
97	8.08	0.50	0.390		0.315	(	0.351)		0.075
98	8.17	0.50	0.390		0.314	(	0.351)		0.076
99	8.25	0.50	0.390		0.312	(	0.351)		0.078
100	8.33	0.50	0.390		0.311	(	0.351)		0.079
101	8.42	0.50	0.390		0.309	(	0.351)		0.081
102	8.50	0.50	0.390		0.308	(	0.351)		0.082
103	8.58	0.53	0.416		0.306	(	0.374)		0.110
104	8.67	0.53	0.416		0.305	(	0.374)		0.111
105	8.75	0.53	0.416		0.304	(	0.374)		0.112
106	8.83	0.57	0.442		0.302	(	0.398)		0.140
107	8.92	0.57	0.442		0.301	(	0.398)		0.141
108	9.00	0.57	0.442		0.299	(	0.398)		0.143
109	9.08	0.63	0.494		0.298	(	0.445)		0.196
110	9.17	0.63	0.494		0.296	(	0.445)		0.197
111	9.25	0.63	0.494		0.295	(	0.445)		0.199
112	9.33	0.67	0.520		0.294	(	0.468)		0.226
113	9.42	0.67	0.520		0.292	(	0.468)		0.228
114	9.50	0.67	0.520		0.291	(	0.468)		0.229
115	9.58	0.70	0.546		0.289	(	0.491)		0.257
116	9.67	0.70	0.546		0.288	(	0.491)		0.258
117	9.75	0.70	0.546		0.287	(	0.491)		0.259
118	9.83	0.73	0.572		0.285	(	0.515)		0.287
119	9.92	0.73	0.572		0.284	(	0.515)		0.288
120	10.00	0.73	0.572		0.283	(	0.515)		0.289

121	10.08	0.50	0.390	0.281	(0.351)	0.109
122	10.17	0.50	0.390	0.280	(0.351)	0.110
123	10.25	0.50	0.390	0.278	(0.351)	0.111
124	10.33	0.50	0.390	0.277	(0.351)	0.113
125	10.42	0.50	0.390	0.276	(0.351)	0.114
126	10.50	0.50	0.390	0.274	(0.351)	0.116
127	10.58	0.67	0.520	0.273	(0.468)	0.247
128	10.67	0.67	0.520	0.272	(0.468)	0.248
129	10.75	0.67	0.520	0.270	(0.468)	0.250
130	10.83	0.67	0.520	0.269	(0.468)	0.251
131	10.92	0.67	0.520	0.268	(0.468)	0.252
132	11.00	0.67	0.520	0.266	(0.468)	0.253
133	11.08	0.63	0.494	0.265	(0.445)	0.229
134	11.17	0.63	0.494	0.264	(0.445)	0.230
135	11.25	0.63	0.494	0.263	(0.445)	0.231
136	11.33	0.63	0.494	0.261	(0.445)	0.233
137	11.42	0.63	0.494	0.260	(0.445)	0.234
138	11.50	0.63	0.494	0.259	(0.445)	0.235
139	11.58	0.57	0.442	0.257	(0.398)	0.185
140	11.67	0.57	0.442	0.256	(0.398)	0.186
141	11.75	0.57	0.442	0.255	(0.398)	0.187
142	11.83	0.60	0.468	0.254	(0.421)	0.214
143	11.92	0.60	0.468	0.252	(0.421)	0.216
144	12.00	0.60	0.468	0.251	(0.421)	0.217
145	12.08	0.83	0.650	0.250	(0.585)	0.400
146	12.17	0.83	0.650	0.249	(0.585)	0.401
147	12.25	0.83	0.650	0.247	(0.585)	0.403
148	12.33	0.87	0.676	0.246	(0.608)	0.430
149	12.42	0.87	0.676	0.245	(0.608)	0.431
150	12.50	0.87	0.676	0.244	(0.608)	0.432
151	12.58	0.93	0.728	0.242	(0.655)	0.486
152	12.67	0.93	0.728	0.241	(0.655)	0.487
153	12.75	0.93	0.728	0.240	(0.655)	0.488
154	12.83	0.97	0.754	0.239	(0.679)	0.515
155	12.92	0.97	0.754	0.238	(0.679)	0.516
156	13.00	0.97	0.754	0.236	(0.679)	0.518
157	13.08	1.13	0.884	0.235	(0.796)	0.649
158	13.17	1.13	0.884	0.234	(0.796)	0.650
159	13.25	1.13	0.884	0.233	(0.796)	0.651
160	13.33	1.13	0.884	0.232	(0.796)	0.652
161	13.42	1.13	0.884	0.230	(0.796)	0.654
162	13.50	1.13	0.884	0.229	(0.796)	0.655
163	13.58	0.77	0.598	0.228	(0.538)	0.370
164	13.67	0.77	0.598	0.227	(0.538)	0.371
165	13.75	0.77	0.598	0.226	(0.538)	0.372
166	13.83	0.77	0.598	0.225	(0.538)	0.373
167	13.92	0.77	0.598	0.223	(0.538)	0.375
168	14.00	0.77	0.598	0.222	(0.538)	0.376
169	14.08	0.90	0.702	0.221	(0.632)	0.481
170	14.17	0.90	0.702	0.220	(0.632)	0.482
171	14.25	0.90	0.702	0.219	(0.632)	0.483
172	14.33	0.87	0.676	0.218	(0.608)	0.458
173	14.42	0.87	0.676	0.217	(0.608)	0.459
174	14.50	0.87	0.676	0.216	(0.608)	0.460
175	14.58	0.87	0.676	0.214	(0.608)	0.462
176	14.67	0.87	0.676	0.213	(0.608)	0.463
177	14.75	0.87	0.676	0.212	(0.608)	0.464
178	14.83	0.83	0.650	0.211	(0.585)	0.439
179	14.92	0.83	0.650	0.210	(0.585)	0.440
180	15.00	0.83	0.650	0.209	(0.585)	0.441
181	15.08	0.80	0.624	0.208	(0.562)	0.416
182	15.17	0.80	0.624	0.207	(0.562)	0.417
183	15.25	0.80	0.624	0.206	(0.562)	0.418
184	15.33	0.77	0.598	0.205	(0.538)	0.393
185	15.42	0.77	0.598	0.204	(0.538)	0.394
186	15.50	0.77	0.598	0.203	(0.538)	0.395
187	15.58	0.63	0.494	0.202	(0.445)	0.292
188	15.67	0.63	0.494	0.201	(0.445)	0.293
189	15.75	0.63	0.494	0.200	(0.445)	0.294
190	15.83	0.63	0.494	0.199	(0.445)	0.295
191	15.92	0.63	0.494	0.198	(0.445)	0.296
192	16.00	0.63	0.494	0.197	(0.445)	0.297
193	16.08	0.13	0.104	(0.196)	0.094	0.010
194	16.17	0.13	0.104	(0.195)	0.094	0.010
195	16.25	0.13	0.104	(0.194)	0.094	0.010

196	16.33	0.13	0.104	(0.193)	0.094	0.010
197	16.42	0.13	0.104	(0.192)	0.094	0.010
198	16.50	0.13	0.104	(0.191)	0.094	0.010
199	16.58	0.10	0.078	(0.190)	0.070	0.008
200	16.67	0.10	0.078	(0.189)	0.070	0.008
201	16.75	0.10	0.078	(0.188)	0.070	0.008
202	16.83	0.10	0.078	(0.187)	0.070	0.008
203	16.92	0.10	0.078	(0.186)	0.070	0.008
204	17.00	0.10	0.078	(0.185)	0.070	0.008
205	17.08	0.17	0.130	(0.184)	0.117	0.013
206	17.17	0.17	0.130	(0.183)	0.117	0.013
207	17.25	0.17	0.130	(0.182)	0.117	0.013
208	17.33	0.17	0.130	(0.181)	0.117	0.013
209	17.42	0.17	0.130	(0.180)	0.117	0.013
210	17.50	0.17	0.130	(0.179)	0.117	0.013
211	17.58	0.17	0.130	(0.178)	0.117	0.013
212	17.67	0.17	0.130	(0.178)	0.117	0.013
213	17.75	0.17	0.130	(0.177)	0.117	0.013
214	17.83	0.13	0.104	(0.176)	0.094	0.010
215	17.92	0.13	0.104	(0.175)	0.094	0.010
216	18.00	0.13	0.104	(0.174)	0.094	0.010
217	18.08	0.13	0.104	(0.173)	0.094	0.010
218	18.17	0.13	0.104	(0.172)	0.094	0.010
219	18.25	0.13	0.104	(0.172)	0.094	0.010
220	18.33	0.13	0.104	(0.171)	0.094	0.010
221	18.42	0.13	0.104	(0.170)	0.094	0.010
222	18.50	0.13	0.104	(0.169)	0.094	0.010
223	18.58	0.10	0.078	(0.168)	0.070	0.008
224	18.67	0.10	0.078	(0.167)	0.070	0.008
225	18.75	0.10	0.078	(0.167)	0.070	0.008
226	18.83	0.07	0.052	(0.166)	0.047	0.005
227	18.92	0.07	0.052	(0.165)	0.047	0.005
228	19.00	0.07	0.052	(0.164)	0.047	0.005
229	19.08	0.10	0.078	(0.163)	0.070	0.008
230	19.17	0.10	0.078	(0.163)	0.070	0.008
231	19.25	0.10	0.078	(0.162)	0.070	0.008
232	19.33	0.13	0.104	(0.161)	0.094	0.010
233	19.42	0.13	0.104	(0.160)	0.094	0.010
234	19.50	0.13	0.104	(0.160)	0.094	0.010
235	19.58	0.10	0.078	(0.159)	0.070	0.008
236	19.67	0.10	0.078	(0.158)	0.070	0.008
237	19.75	0.10	0.078	(0.157)	0.070	0.008
238	19.83	0.07	0.052	(0.157)	0.047	0.005
239	19.92	0.07	0.052	(0.156)	0.047	0.005
240	20.00	0.07	0.052	(0.155)	0.047	0.005
241	20.08	0.10	0.078	(0.155)	0.070	0.008
242	20.17	0.10	0.078	(0.154)	0.070	0.008
243	20.25	0.10	0.078	(0.153)	0.070	0.008
244	20.33	0.10	0.078	(0.153)	0.070	0.008
245	20.42	0.10	0.078	(0.152)	0.070	0.008
246	20.50	0.10	0.078	(0.151)	0.070	0.008
247	20.58	0.10	0.078	(0.151)	0.070	0.008
248	20.67	0.10	0.078	(0.150)	0.070	0.008
249	20.75	0.10	0.078	(0.150)	0.070	0.008
250	20.83	0.07	0.052	(0.149)	0.047	0.005
251	20.92	0.07	0.052	(0.148)	0.047	0.005
252	21.00	0.07	0.052	(0.148)	0.047	0.005
253	21.08	0.10	0.078	(0.147)	0.070	0.008
254	21.17	0.10	0.078	(0.147)	0.070	0.008
255	21.25	0.10	0.078	(0.146)	0.070	0.008
256	21.33	0.07	0.052	(0.145)	0.047	0.005
257	21.42	0.07	0.052	(0.145)	0.047	0.005
258	21.50	0.07	0.052	(0.144)	0.047	0.005
259	21.58	0.10	0.078	(0.144)	0.070	0.008
260	21.67	0.10	0.078	(0.143)	0.070	0.008
261	21.75	0.10	0.078	(0.143)	0.070	0.008
262	21.83	0.07	0.052	(0.142)	0.047	0.005
263	21.92	0.07	0.052	(0.142)	0.047	0.005
264	22.00	0.07	0.052	(0.141)	0.047	0.005
265	22.08	0.10	0.078	(0.141)	0.070	0.008
266	22.17	0.10	0.078	(0.140)	0.070	0.008
267	22.25	0.10	0.078	(0.140)	0.070	0.008
268	22.33	0.07	0.052	(0.139)	0.047	0.005
269	22.42	0.07	0.052	(0.139)	0.047	0.005
270	22.50	0.07	0.052	(0.139)	0.047	0.005

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271  22.58     0.07      0.052       (  0.138)       0.047        0.005
272  22.67     0.07      0.052       (  0.138)       0.047        0.005
273  22.75     0.07      0.052       (  0.137)       0.047        0.005
274  22.83     0.07      0.052       (  0.137)       0.047        0.005
275  22.92     0.07      0.052       (  0.137)       0.047        0.005
276  23.00     0.07      0.052       (  0.136)       0.047        0.005
277  23.08     0.07      0.052       (  0.136)       0.047        0.005
278  23.17     0.07      0.052       (  0.136)       0.047        0.005
279  23.25     0.07      0.052       (  0.136)       0.047        0.005
280  23.33     0.07      0.052       (  0.135)       0.047        0.005
281  23.42     0.07      0.052       (  0.135)       0.047        0.005
282  23.50     0.07      0.052       (  0.135)       0.047        0.005
283  23.58     0.07      0.052       (  0.135)       0.047        0.005
284  23.67     0.07      0.052       (  0.134)       0.047        0.005
285  23.75     0.07      0.052       (  0.134)       0.047        0.005
286  23.83     0.07      0.052       (  0.134)       0.047        0.005
287  23.92     0.07      0.052       (  0.134)       0.047        0.005
288  24.00     0.07      0.052       (  0.134)       0.047        0.005
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    32.7
      Flood volume = Effective rainfall      2.72(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       3.0(Ac.Ft)
      Total soil loss =      3.78(In)
      Total soil loss =     4.157(Ac.Ft)
      Total rainfall =      6.50(In)
      Flood volume =      130371.9 Cubic Feet
      Total soil loss =      181074.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      8.700(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      0.02  Q         |         |         |         |
   0+10       0.0005      0.06  Q         |         |         |         |
   0+15       0.0010      0.07  Q         |         |         |         |
   0+20       0.0015      0.08  Q         |         |         |         |
   0+25       0.0022      0.10  Q         |         |         |         |
   0+30       0.0029      0.10  Q         |         |         |         |
   0+35       0.0036      0.10  Q         |         |         |         |
   0+40       0.0043      0.10  Q         |         |         |         |
   0+45       0.0050      0.10  Q         |         |         |         |
   0+50       0.0058      0.11  Q         |         |         |         |
   0+55       0.0067      0.13  Q         |         |         |         |
   1+ 0       0.0077      0.14  Q         |         |         |         |
   1+ 5       0.0086      0.13  Q         |         |         |         |
   1+10       0.0093      0.11  Q         |         |         |         |
   1+15       0.0101      0.11  Q         |         |         |         |
   1+20       0.0108      0.10  Q         |         |         |         |
   1+25       0.0115      0.10  Q         |         |         |         |
   1+30       0.0122      0.10  Q         |         |         |         |
   1+35       0.0129      0.10  Q         |         |         |         |
   1+40       0.0136      0.10  Q         |         |         |         |
   1+45       0.0143      0.10  Q         |         |         |         |
   1+50       0.0151      0.11  Q         |         |         |         |
   1+55       0.0160      0.13  Q         |         |         |         |
   2+ 0       0.0170      0.14  Q         |         |         |         |
   2+ 5       0.0179      0.14  Q         |         |         |         |
   2+10       0.0189      0.14  Q         |         |         |         |
   2+15       0.0198      0.14  Q         |         |         |         |
   2+20       0.0208      0.14  Q         |         |         |         |
   2+25       0.0217      0.14  Q         |         |         |         |
   2+30       0.0227      0.14  Q         |         |         |         |
   2+35       0.0237      0.15  Q         |         |         |         |
   2+40       0.0249      0.17  Q         |         |         |         |
   2+45       0.0261      0.17  Q         |         |         |         |
   2+50       0.0272      0.17  Q         |         |         |         |
   2+55       0.0284      0.17  Q         |         |         |         |
   3+ 0       0.0296      0.17  Q         |         |         |         |
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3+ 5       0.0308      0.17  Q          |          |          |          |
3+10       0.0320      0.17  Q          |          |          |          |
3+15       0.0332      0.17  Q          |          |          |          |
3+20       0.0344      0.17  Q          |          |          |          |
3+25       0.0356      0.17  Q          |          |          |          |
3+30       0.0368      0.17  Q          |          |          |          |
3+35       0.0380      0.17  Q          |          |          |          |
3+40       0.0392      0.17  Q          |          |          |          |
3+45       0.0403      0.17  Q          |          |          |          |
3+50       0.0416      0.18  Q          |          |          |          |
3+55       0.0430      0.20  Q          |          |          |          |
4+ 0       0.0444      0.21  Q          |          |          |          |
4+ 5       0.0458      0.21  Q          |          |          |          |
4+10       0.0473      0.21  Q          |          |          |          |
4+15       0.0487      0.21  Q          |          |          |          |
4+20       0.0502      0.22  Q          |          |          |          |
4+25       0.0518      0.24  Q          |          |          |          |
4+30       0.0535      0.24  Q          |          |          |          |
4+35       0.0552      0.24  Q          |          |          |          |
4+40       0.0568      0.24  Q          |          |          |          |
4+45       0.0585      0.24  Q          |          |          |          |
4+50       0.0602      0.25  VQ         |          |          |          |
4+55       0.0621      0.27  VQ         |          |          |          |
5+ 0       0.0640      0.28  VQ         |          |          |          |
5+ 5       0.0658      0.26  VQ         |          |          |          |
5+10       0.0673      0.22  Q          |          |          |          |
5+15       0.0687      0.21  Q          |          |          |          |
5+20       0.0702      0.22  Q          |          |          |          |
5+25       0.0718      0.24  Q          |          |          |          |
5+30       0.0735      0.24  Q          |          |          |          |
5+35       0.0752      0.25  |Q         |          |          |          |
5+40       0.0771      0.27  |Q         |          |          |          |
5+45       0.0790      0.28  |Q         |          |          |          |
5+50       0.0809      0.28  |Q         |          |          |          |
5+55       0.0828      0.28  |Q         |          |          |          |
6+ 0       0.0847      0.28  |Q         |          |          |          |
6+ 5       0.0867      0.29  |Q         |          |          |          |
6+10       0.0888      0.31  |Q         |          |          |          |
6+15       0.0909      0.31  |Q         |          |          |          |
6+20       0.0931      0.31  |Q         |          |          |          |
6+25       0.0952      0.31  |Q         |          |          |          |
6+30       0.0974      0.31  |Q         |          |          |          |
6+35       0.0996      0.32  |Q         |          |          |          |
6+40       0.1019      0.34  |Q         |          |          |          |
6+45       0.1043      0.34  |Q         |          |          |          |
6+50       0.1067      0.35  |Q         |          |          |          |
6+55       0.1091      0.35  |Q         |          |          |          |
7+ 0       0.1114      0.35  |Q         |          |          |          |
7+ 5       0.1138      0.35  |Q         |          |          |          |
7+10       0.1162      0.35  |Q         |          |          |          |
7+15       0.1186      0.35  |Q         |          |          |          |
7+20       0.1210      0.36  |Q         |          |          |          |
7+25       0.1236      0.37  |Q         |          |          |          |
7+30       0.1262      0.38  |Q         |          |          |          |
7+35       0.1289      0.39  |Q         |          |          |          |
7+40       0.1317      0.41  |Q         |          |          |          |
7+45       0.1346      0.41  |Q         |          |          |          |
7+50       0.1375      0.42  |Q         |          |          |          |
7+55       0.1406      0.44  |Q         |          |          |          |
8+ 0       0.1437      0.45  |Q         |          |          |          |
8+ 5       0.1478      0.60  |VQ        |          |          |          |
8+10       0.1541      0.91  | VQ       |          |          |          |
8+15       0.1609      0.99  | VQ       |          |          |          |
8+20       0.1680      1.03  | V Q      |          |          |          |
8+25       0.1753      1.05  | V Q      |          |          |          |
8+30       0.1827      1.07  | V Q      |          |          |          |
8+35       0.1909      1.19  | V Q      |          |          |          |
8+40       0.2005      1.40  | V  Q     |          |          |          |
8+45       0.2106      1.46  | V  Q     |          |          |          |
8+50       0.2215      1.59  | V   Q    |          |          |          |
8+55       0.2340      1.80  |  V   Q   |          |          |          |
9+ 0       0.2468      1.87  |  V   Q   |          |          |          |
9+ 5       0.2612      2.09  |  V    Q  |          |          |          |
9+10       0.2784      2.49  |  V     Q|          |          |          |
9+15       0.2963      2.60  |  V      Q          |          |          |
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9+20	0.3152	2.74	
9+25	0.3355	2.95	
9+30	0.3563	3.02	
9+35	0.3780	3.14	
9+40	0.4011	3.36	
9+45	0.4246	3.42	
9+50	0.4491	3.55	
9+55	0.4749	3.76	
10+ 0	0.5012	3.82	
10+ 5	0.5231	3.17	
10+10	0.5359	1.86	
10+15	0.5466	1.56	
10+20	0.5571	1.51	
10+25	0.5674	1.50	
10+30	0.5779	1.52	
10+35	0.5918	2.03	
10+40	0.6125	2.99	
10+45	0.6347	3.23	
10+50	0.6575	3.30	
10+55	0.6805	3.34	
11+ 0	0.7036	3.36	
11+ 5	0.7262	3.28	
11+10	0.7476	3.11	
11+15	0.7688	3.08	
11+20	0.7900	3.09	
11+25	0.8113	3.10	
11+30	0.8328	3.12	
11+35	0.8530	2.94	
11+40	0.8708	2.58	
11+45	0.8880	2.50	
11+50	0.9059	2.60	
11+55	0.9252	2.80	
12+ 0	0.9448	2.86	
12+ 5	0.9694	3.57	
12+10	1.0033	4.92	
12+15	1.0394	5.25	
12+20	1.0768	5.43	
12+25	1.1158	5.66	
12+30	1.1552	5.73	
12+35	1.1962	5.95	
12+40	1.2399	6.35	
12+45	1.2844	6.45	
12+50	1.3297	6.59	
12+55	1.3766	6.80	
13+ 0	1.4238	6.86	
13+ 5	1.4746	7.37	
13+10	1.5321	8.34	
13+15	1.5912	8.58	
13+20	1.6507	8.65	
13+25	1.7106	8.68	
13+30	1.7705	8.70	
13+35	1.8231	7.65	
13+40	1.8615	5.57	
13+45	1.8966	5.09	
13+50	1.9310	5.00	
13+55	1.9652	4.97	
14+ 0	1.9996	4.99	
14+ 5	2.0367	5.39	
14+10	2.0792	6.17	
14+15	2.1230	6.36	
14+20	2.1665	6.32	
14+25	2.2089	6.16	
14+30	2.2511	6.13	
14+35	2.2933	6.13	
14+40	2.3356	6.14	
14+45	2.3781	6.16	
14+50	2.4199	6.08	
14+55	2.4605	5.90	
15+ 0	2.5010	5.87	
15+ 5	2.5408	5.78	
15+10	2.5793	5.60	
15+15	2.6176	5.57	
15+20	2.6553	5.47	
15+25	2.6918	5.29	
15+30	2.7280	5.26	

15+35	2.7616	4.88	|	|	Q|	|	V |
15+40	2.7900	4.13	|	|	Q |	|	V |
15+45	2.8173	3.96	|	|	Q |	|	V |
15+50	2.8444	3.94	|	|	Q |	|	V |
15+55	2.8715	3.93	|	|	Q |	|	V |
16+ 0	2.8987	3.95	|	|	Q |	|	V |
16+ 5	2.9185	2.88	|	Q|	|	|	V|
16+10	2.9239	0.78	| Q	|	|	|	V|
16+15	2.9260	0.29	|Q	|	|	|	V|
16+20	2.9272	0.18	Q	|	|	|	V|
16+25	2.9282	0.14	Q	|	|	|	V|
16+30	2.9291	0.14	Q	|	|	|	V|
16+35	2.9300	0.13	Q	|	|	|	V|
16+40	2.9308	0.11	Q	|	|	|	V|
16+45	2.9315	0.11	Q	|	|	|	V|
16+50	2.9322	0.10	Q	|	|	|	V|
16+55	2.9329	0.10	Q	|	|	|	V|
17+ 0	2.9336	0.10	Q	|	|	|	V|
17+ 5	2.9345	0.12	Q	|	|	|	V|
17+10	2.9356	0.16	Q	|	|	|	V|
17+15	2.9368	0.17	Q	|	|	|	V|
17+20	2.9379	0.17	Q	|	|	|	V|
17+25	2.9391	0.17	Q	|	|	|	V|
17+30	2.9403	0.17	Q	|	|	|	V|
17+35	2.9415	0.17	Q	|	|	|	V|
17+40	2.9427	0.17	Q	|	|	|	V|
17+45	2.9439	0.17	Q	|	|	|	V|
17+50	2.9450	0.16	Q	|	|	|	V|
17+55	2.9460	0.14	Q	|	|	|	V|
18+ 0	2.9470	0.14	Q	|	|	|	V|
18+ 5	2.9479	0.14	Q	|	|	|	V|
18+10	2.9489	0.14	Q	|	|	|	V|
18+15	2.9498	0.14	Q	|	|	|	V|
18+20	2.9508	0.14	Q	|	|	|	V|
18+25	2.9518	0.14	Q	|	|	|	V|
18+30	2.9527	0.14	Q	|	|	|	V|
18+35	2.9536	0.13	Q	|	|	|	V|
18+40	2.9543	0.11	Q	|	|	|	V|
18+45	2.9551	0.11	Q	|	|	|	V|
18+50	2.9557	0.09	Q	|	|	|	V|
18+55	2.9562	0.08	Q	|	|	|	V|
19+ 0	2.9567	0.07	Q	|	|	|	V|
19+ 5	2.9573	0.08	Q	|	|	|	V|
19+10	2.9579	0.10	Q	|	|	|	V|
19+15	2.9587	0.10	Q	|	|	|	V|
19+20	2.9594	0.11	Q	|	|	|	V|
19+25	2.9603	0.13	Q	|	|	|	V|
19+30	2.9613	0.14	Q	|	|	|	V|
19+35	2.9622	0.13	Q	|	|	|	V|
19+40	2.9629	0.11	Q	|	|	|	V|
19+45	2.9637	0.11	Q	|	|	|	V|
19+50	2.9643	0.09	Q	|	|	|	V|
19+55	2.9648	0.08	Q	|	|	|	V|
20+ 0	2.9653	0.07	Q	|	|	|	V|
20+ 5	2.9659	0.08	Q	|	|	|	V|
20+10	2.9665	0.10	Q	|	|	|	V|
20+15	2.9672	0.10	Q	|	|	|	V|
20+20	2.9679	0.10	Q	|	|	|	V|
20+25	2.9687	0.10	Q	|	|	|	V|
20+30	2.9694	0.10	Q	|	|	|	V|
20+35	2.9701	0.10	Q	|	|	|	V|
20+40	2.9708	0.10	Q	|	|	|	V|
20+45	2.9715	0.10	Q	|	|	|	V|
20+50	2.9722	0.09	Q	|	|	|	V|
20+55	2.9727	0.08	Q	|	|	|	V|
21+ 0	2.9732	0.07	Q	|	|	|	V|
21+ 5	2.9737	0.08	Q	|	|	|	V|
21+10	2.9744	0.10	Q	|	|	|	V|
21+15	2.9751	0.10	Q	|	|	|	V|
21+20	2.9757	0.09	Q	|	|	|	V|
21+25	2.9763	0.08	Q	|	|	|	V|
21+30	2.9767	0.07	Q	|	|	|	V|
21+35	2.9773	0.08	Q	|	|	|	V|
21+40	2.9780	0.10	Q	|	|	|	V|
21+45	2.9787	0.10	Q	|	|	|	V|

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   21+50       2.9793      0.09  Q          |          |          |         v|
   21+55       2.9798      0.08  Q          |          |          |         v|
   22+ 0       2.9803      0.07  Q          |          |          |         v|
   22+ 5       2.9809      0.08  Q          |          |          |         v|
   22+10       2.9815      0.10  Q          |          |          |         v|
   22+15       2.9822      0.10  Q          |          |          |         v|
   22+20       2.9829      0.09  Q          |          |          |         v|
   22+25       2.9834      0.08  Q          |          |          |         v|
   22+30       2.9839      0.07  Q          |          |          |         v|
   22+35       2.9844      0.07  Q          |          |          |         v|
   22+40       2.9849      0.07  Q          |          |          |         v|
   22+45       2.9853      0.07  Q          |          |          |         v|
   22+50       2.9858      0.07  Q          |          |          |         v|
   22+55       2.9863      0.07  Q          |          |          |         v|
   23+ 0       2.9868      0.07  Q          |          |          |         v|
   23+ 5       2.9872      0.07  Q          |          |          |         v|
   23+10       2.9877      0.07  Q          |          |          |         v|
   23+15       2.9882      0.07  Q          |          |          |         v|
   23+20       2.9887      0.07  Q          |          |          |         v|
   23+25       2.9891      0.07  Q          |          |          |         v|
   23+30       2.9896      0.07  Q          |          |          |         v|
   23+35       2.9901      0.07  Q          |          |          |         v|
   23+40       2.9906      0.07  Q          |          |          |         v|
   23+45       2.9910      0.07  Q          |          |          |         v|
   23+50       2.9915      0.07  Q          |          |          |         v|
   23+55       2.9920      0.07  Q          |          |          |         v|
   24+ 0       2.9925      0.07  Q          |          |          |         v|
   24+ 5       2.9928      0.05  Q          |          |          |         v|
   24+10       2.9929      0.01  Q          |          |          |         v|
   24+15       2.9929      0.00  Q          |          |          |         v|
   24+20       2.9929      0.00  Q          |          |          |          v
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PROPOSED CONDITION UNIT HYDROGRAPHS

PROPOSED CONDITION – 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

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Study date 06/12/23 File: B1ONSITEPROP242.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 2-YEAR 24-HOUR
FN: B1ONSITEPROP242.OUT- ABE

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1240.00(Ft.)
Length along longest watercourse measured to centroid = 710.00(Ft.)
Length along longest watercourse = 0.235 Mi.
Length along longest watercourse measured to centroid = 0.134 Mi.
Difference in elevation = 21.80(Ft.)
Slope along watercourse = 92.8258 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.46 Min.
25% of lag time = 0.61 Min.
40% of lag time = 0.98 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.40	31.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	6.50	85.80

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	56.00	0.900

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

56.0	36.0	0.706	0.900	0.134	1.000	0.134
					Sum (F) =	0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134
Minimum soil loss rate ((In/Hr)) = 0.067
(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
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	203.515	42.976	5.717
2	0.167	407.030	49.679	6.609
3	0.250	610.545	6.320	0.841
4	0.333	814.060	1.024	0.136
			Sum = 100.000 Sum=	13.303

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	0.019	(0.238)	0.003	0.016
2	0.17	0.07	0.019	(0.237)	0.003	0.016
3	0.25	0.07	0.019	(0.236)	0.003	0.016
4	0.33	0.10	0.029	(0.235)	0.005	0.024
5	0.42	0.10	0.029	(0.234)	0.005	0.024
6	0.50	0.10	0.029	(0.233)	0.005	0.024
7	0.58	0.10	0.029	(0.232)	0.005	0.024
8	0.67	0.10	0.029	(0.231)	0.005	0.024
9	0.75	0.10	0.029	(0.230)	0.005	0.024
10	0.83	0.13	0.038	(0.230)	0.007	0.031
11	0.92	0.13	0.038	(0.229)	0.007	0.031
12	1.00	0.13	0.038	(0.228)	0.007	0.031
13	1.08	0.10	0.029	(0.227)	0.005	0.024
14	1.17	0.10	0.029	(0.226)	0.005	0.024
15	1.25	0.10	0.029	(0.225)	0.005	0.024
16	1.33	0.10	0.029	(0.224)	0.005	0.024
17	1.42	0.10	0.029	(0.223)	0.005	0.024
18	1.50	0.10	0.029	(0.222)	0.005	0.024
19	1.58	0.10	0.029	(0.222)	0.005	0.024
20	1.67	0.10	0.029	(0.221)	0.005	0.024
21	1.75	0.10	0.029	(0.220)	0.005	0.024
22	1.83	0.13	0.038	(0.219)	0.007	0.031
23	1.92	0.13	0.038	(0.218)	0.007	0.031
24	2.00	0.13	0.038	(0.217)	0.007	0.031
25	2.08	0.13	0.038	(0.216)	0.007	0.031
26	2.17	0.13	0.038	(0.215)	0.007	0.031
27	2.25	0.13	0.038	(0.214)	0.007	0.031
28	2.33	0.13	0.038	(0.214)	0.007	0.031
29	2.42	0.13	0.038	(0.213)	0.007	0.031
30	2.50	0.13	0.038	(0.212)	0.007	0.031
31	2.58	0.17	0.048	(0.211)	0.009	0.039
32	2.67	0.17	0.048	(0.210)	0.009	0.039
33	2.75	0.17	0.048	(0.209)	0.009	0.039
34	2.83	0.17	0.048	(0.208)	0.009	0.039
35	2.92	0.17	0.048	(0.208)	0.009	0.039
36	3.00	0.17	0.048	(0.207)	0.009	0.039
37	3.08	0.17	0.048	(0.206)	0.009	0.039
38	3.17	0.17	0.048	(0.205)	0.009	0.039
39	3.25	0.17	0.048	(0.204)	0.009	0.039
40	3.33	0.17	0.048	(0.203)	0.009	0.039
41	3.42	0.17	0.048	(0.202)	0.009	0.039
42	3.50	0.17	0.048	(0.202)	0.009	0.039
43	3.58	0.17	0.048	(0.201)	0.009	0.039
44	3.67	0.17	0.048	(0.200)	0.009	0.039
45	3.75	0.17	0.048	(0.199)	0.009	0.039
46	3.83	0.20	0.058	(0.198)	0.010	0.047

47	3.92	0.20	0.058	(0.197)	0.010	0.047
48	4.00	0.20	0.058	(0.197)	0.010	0.047
49	4.08	0.20	0.058	(0.196)	0.010	0.047
50	4.17	0.20	0.058	(0.195)	0.010	0.047
51	4.25	0.20	0.058	(0.194)	0.010	0.047
52	4.33	0.23	0.067	(0.193)	0.012	0.055
53	4.42	0.23	0.067	(0.192)	0.012	0.055
54	4.50	0.23	0.067	(0.192)	0.012	0.055
55	4.58	0.23	0.067	(0.191)	0.012	0.055
56	4.67	0.23	0.067	(0.190)	0.012	0.055
57	4.75	0.23	0.067	(0.189)	0.012	0.055
58	4.83	0.27	0.077	(0.188)	0.014	0.063
59	4.92	0.27	0.077	(0.187)	0.014	0.063
60	5.00	0.27	0.077	(0.187)	0.014	0.063
61	5.08	0.20	0.058	(0.186)	0.010	0.047
62	5.17	0.20	0.058	(0.185)	0.010	0.047
63	5.25	0.20	0.058	(0.184)	0.010	0.047
64	5.33	0.23	0.067	(0.183)	0.012	0.055
65	5.42	0.23	0.067	(0.183)	0.012	0.055
66	5.50	0.23	0.067	(0.182)	0.012	0.055
67	5.58	0.27	0.077	(0.181)	0.014	0.063
68	5.67	0.27	0.077	(0.180)	0.014	0.063
69	5.75	0.27	0.077	(0.179)	0.014	0.063
70	5.83	0.27	0.077	(0.179)	0.014	0.063
71	5.92	0.27	0.077	(0.178)	0.014	0.063
72	6.00	0.27	0.077	(0.177)	0.014	0.063
73	6.08	0.30	0.086	(0.176)	0.016	0.071
74	6.17	0.30	0.086	(0.175)	0.016	0.071
75	6.25	0.30	0.086	(0.175)	0.016	0.071
76	6.33	0.30	0.086	(0.174)	0.016	0.071
77	6.42	0.30	0.086	(0.173)	0.016	0.071
78	6.50	0.30	0.086	(0.172)	0.016	0.071
79	6.58	0.33	0.096	(0.172)	0.017	0.079
80	6.67	0.33	0.096	(0.171)	0.017	0.079
81	6.75	0.33	0.096	(0.170)	0.017	0.079
82	6.83	0.33	0.096	(0.169)	0.017	0.079
83	6.92	0.33	0.096	(0.169)	0.017	0.079
84	7.00	0.33	0.096	(0.168)	0.017	0.079
85	7.08	0.33	0.096	(0.167)	0.017	0.079
86	7.17	0.33	0.096	(0.166)	0.017	0.079
87	7.25	0.33	0.096	(0.165)	0.017	0.079
88	7.33	0.37	0.106	(0.165)	0.019	0.087
89	7.42	0.37	0.106	(0.164)	0.019	0.087
90	7.50	0.37	0.106	(0.163)	0.019	0.087
91	7.58	0.40	0.115	(0.162)	0.021	0.094
92	7.67	0.40	0.115	(0.162)	0.021	0.094
93	7.75	0.40	0.115	(0.161)	0.021	0.094
94	7.83	0.43	0.125	(0.160)	0.022	0.102
95	7.92	0.43	0.125	(0.159)	0.022	0.102
96	8.00	0.43	0.125	(0.159)	0.022	0.102
97	8.08	0.50	0.144	(0.158)	0.026	0.118
98	8.17	0.50	0.144	(0.157)	0.026	0.118
99	8.25	0.50	0.144	(0.157)	0.026	0.118
100	8.33	0.50	0.144	(0.156)	0.026	0.118
101	8.42	0.50	0.144	(0.155)	0.026	0.118
102	8.50	0.50	0.144	(0.154)	0.026	0.118
103	8.58	0.53	0.154	(0.154)	0.028	0.126
104	8.67	0.53	0.154	(0.153)	0.028	0.126
105	8.75	0.53	0.154	(0.152)	0.028	0.126
106	8.83	0.57	0.163	(0.151)	0.029	0.134
107	8.92	0.57	0.163	(0.151)	0.029	0.134
108	9.00	0.57	0.163	(0.150)	0.029	0.134
109	9.08	0.63	0.182	(0.149)	0.033	0.150
110	9.17	0.63	0.182	(0.149)	0.033	0.150
111	9.25	0.63	0.182	(0.148)	0.033	0.150
112	9.33	0.67	0.192	(0.147)	0.035	0.157
113	9.42	0.67	0.192	(0.147)	0.035	0.157
114	9.50	0.67	0.192	(0.146)	0.035	0.157
115	9.58	0.70	0.202	(0.145)	0.036	0.165
116	9.67	0.70	0.202	(0.144)	0.036	0.165
117	9.75	0.70	0.202	(0.144)	0.036	0.165
118	9.83	0.73	0.211	(0.143)	0.038	0.173
119	9.92	0.73	0.211	(0.142)	0.038	0.173
120	10.00	0.73	0.211	(0.142)	0.038	0.173
121	10.08	0.50	0.144	(0.141)	0.026	0.118

122	10.17	0.50	0.144	(0.140)	0.026	0.118
123	10.25	0.50	0.144	(0.140)	0.026	0.118
124	10.33	0.50	0.144	(0.139)	0.026	0.118
125	10.42	0.50	0.144	(0.138)	0.026	0.118
126	10.50	0.50	0.144	(0.138)	0.026	0.118
127	10.58	0.67	0.192	(0.137)	0.035	0.157
128	10.67	0.67	0.192	(0.136)	0.035	0.157
129	10.75	0.67	0.192	(0.136)	0.035	0.157
130	10.83	0.67	0.192	(0.135)	0.035	0.157
131	10.92	0.67	0.192	(0.134)	0.035	0.157
132	11.00	0.67	0.192	(0.134)	0.035	0.157
133	11.08	0.63	0.182	(0.133)	0.033	0.150
134	11.17	0.63	0.182	(0.132)	0.033	0.150
135	11.25	0.63	0.182	(0.132)	0.033	0.150
136	11.33	0.63	0.182	(0.131)	0.033	0.150
137	11.42	0.63	0.182	(0.130)	0.033	0.150
138	11.50	0.63	0.182	(0.130)	0.033	0.150
139	11.58	0.57	0.163	(0.129)	0.029	0.134
140	11.67	0.57	0.163	(0.128)	0.029	0.134
141	11.75	0.57	0.163	(0.128)	0.029	0.134
142	11.83	0.60	0.173	(0.127)	0.031	0.142
143	11.92	0.60	0.173	(0.126)	0.031	0.142
144	12.00	0.60	0.173	(0.126)	0.031	0.142
145	12.08	0.83	0.240	(0.125)	0.043	0.197
146	12.17	0.83	0.240	(0.125)	0.043	0.197
147	12.25	0.83	0.240	(0.124)	0.043	0.197
148	12.33	0.87	0.250	(0.123)	0.045	0.205
149	12.42	0.87	0.250	(0.123)	0.045	0.205
150	12.50	0.87	0.250	(0.122)	0.045	0.205
151	12.58	0.93	0.269	(0.121)	0.048	0.220
152	12.67	0.93	0.269	(0.121)	0.048	0.220
153	12.75	0.93	0.269	(0.120)	0.048	0.220
154	12.83	0.97	0.278	(0.120)	0.050	0.228
155	12.92	0.97	0.278	(0.119)	0.050	0.228
156	13.00	0.97	0.278	(0.118)	0.050	0.228
157	13.08	1.13	0.326	(0.118)	0.059	0.268
158	13.17	1.13	0.326	(0.117)	0.059	0.268
159	13.25	1.13	0.326	(0.117)	0.059	0.268
160	13.33	1.13	0.326	(0.116)	0.059	0.268
161	13.42	1.13	0.326	(0.115)	0.059	0.268
162	13.50	1.13	0.326	(0.115)	0.059	0.268
163	13.58	0.77	0.221	(0.114)	0.040	0.181
164	13.67	0.77	0.221	(0.114)	0.040	0.181
165	13.75	0.77	0.221	(0.113)	0.040	0.181
166	13.83	0.77	0.221	(0.113)	0.040	0.181
167	13.92	0.77	0.221	(0.112)	0.040	0.181
168	14.00	0.77	0.221	(0.111)	0.040	0.181
169	14.08	0.90	0.259	(0.111)	0.047	0.213
170	14.17	0.90	0.259	(0.110)	0.047	0.213
171	14.25	0.90	0.259	(0.110)	0.047	0.213
172	14.33	0.87	0.250	(0.109)	0.045	0.205
173	14.42	0.87	0.250	(0.109)	0.045	0.205
174	14.50	0.87	0.250	(0.108)	0.045	0.205
175	14.58	0.87	0.250	(0.107)	0.045	0.205
176	14.67	0.87	0.250	(0.107)	0.045	0.205
177	14.75	0.87	0.250	(0.106)	0.045	0.205
178	14.83	0.83	0.240	(0.106)	0.043	0.197
179	14.92	0.83	0.240	(0.105)	0.043	0.197
180	15.00	0.83	0.240	(0.105)	0.043	0.197
181	15.08	0.80	0.230	(0.104)	0.041	0.189
182	15.17	0.80	0.230	(0.104)	0.041	0.189
183	15.25	0.80	0.230	(0.103)	0.041	0.189
184	15.33	0.77	0.221	(0.103)	0.040	0.181
185	15.42	0.77	0.221	(0.102)	0.040	0.181
186	15.50	0.77	0.221	(0.102)	0.040	0.181
187	15.58	0.63	0.182	(0.101)	0.033	0.150
188	15.67	0.63	0.182	(0.101)	0.033	0.150
189	15.75	0.63	0.182	(0.100)	0.033	0.150
190	15.83	0.63	0.182	(0.100)	0.033	0.150
191	15.92	0.63	0.182	(0.099)	0.033	0.150
192	16.00	0.63	0.182	(0.099)	0.033	0.150
193	16.08	0.13	0.038	(0.098)	0.007	0.031
194	16.17	0.13	0.038	(0.098)	0.007	0.031
195	16.25	0.13	0.038	(0.097)	0.007	0.031
196	16.33	0.13	0.038	(0.097)	0.007	0.031

197	16.42	0.13	0.038	(0.096)	0.007	0.031
198	16.50	0.13	0.038	(0.096)	0.007	0.031
199	16.58	0.10	0.029	(0.095)	0.005	0.024
200	16.67	0.10	0.029	(0.095)	0.005	0.024
201	16.75	0.10	0.029	(0.094)	0.005	0.024
202	16.83	0.10	0.029	(0.094)	0.005	0.024
203	16.92	0.10	0.029	(0.093)	0.005	0.024
204	17.00	0.10	0.029	(0.093)	0.005	0.024
205	17.08	0.17	0.048	(0.092)	0.009	0.039
206	17.17	0.17	0.048	(0.092)	0.009	0.039
207	17.25	0.17	0.048	(0.091)	0.009	0.039
208	17.33	0.17	0.048	(0.091)	0.009	0.039
209	17.42	0.17	0.048	(0.090)	0.009	0.039
210	17.50	0.17	0.048	(0.090)	0.009	0.039
211	17.58	0.17	0.048	(0.089)	0.009	0.039
212	17.67	0.17	0.048	(0.089)	0.009	0.039
213	17.75	0.17	0.048	(0.089)	0.009	0.039
214	17.83	0.13	0.038	(0.088)	0.007	0.031
215	17.92	0.13	0.038	(0.088)	0.007	0.031
216	18.00	0.13	0.038	(0.087)	0.007	0.031
217	18.08	0.13	0.038	(0.087)	0.007	0.031
218	18.17	0.13	0.038	(0.086)	0.007	0.031
219	18.25	0.13	0.038	(0.086)	0.007	0.031
220	18.33	0.13	0.038	(0.086)	0.007	0.031
221	18.42	0.13	0.038	(0.085)	0.007	0.031
222	18.50	0.13	0.038	(0.085)	0.007	0.031
223	18.58	0.10	0.029	(0.084)	0.005	0.024
224	18.67	0.10	0.029	(0.084)	0.005	0.024
225	18.75	0.10	0.029	(0.084)	0.005	0.024
226	18.83	0.07	0.019	(0.083)	0.003	0.016
227	18.92	0.07	0.019	(0.083)	0.003	0.016
228	19.00	0.07	0.019	(0.082)	0.003	0.016
229	19.08	0.10	0.029	(0.082)	0.005	0.024
230	19.17	0.10	0.029	(0.082)	0.005	0.024
231	19.25	0.10	0.029	(0.081)	0.005	0.024
232	19.33	0.13	0.038	(0.081)	0.007	0.031
233	19.42	0.13	0.038	(0.080)	0.007	0.031
234	19.50	0.13	0.038	(0.080)	0.007	0.031
235	19.58	0.10	0.029	(0.080)	0.005	0.024
236	19.67	0.10	0.029	(0.079)	0.005	0.024
237	19.75	0.10	0.029	(0.079)	0.005	0.024
238	19.83	0.07	0.019	(0.079)	0.003	0.016
239	19.92	0.07	0.019	(0.078)	0.003	0.016
240	20.00	0.07	0.019	(0.078)	0.003	0.016
241	20.08	0.10	0.029	(0.078)	0.005	0.024
242	20.17	0.10	0.029	(0.077)	0.005	0.024
243	20.25	0.10	0.029	(0.077)	0.005	0.024
244	20.33	0.10	0.029	(0.077)	0.005	0.024
245	20.42	0.10	0.029	(0.076)	0.005	0.024
246	20.50	0.10	0.029	(0.076)	0.005	0.024
247	20.58	0.10	0.029	(0.076)	0.005	0.024
248	20.67	0.10	0.029	(0.075)	0.005	0.024
249	20.75	0.10	0.029	(0.075)	0.005	0.024
250	20.83	0.07	0.019	(0.075)	0.003	0.016
251	20.92	0.07	0.019	(0.074)	0.003	0.016
252	21.00	0.07	0.019	(0.074)	0.003	0.016
253	21.08	0.10	0.029	(0.074)	0.005	0.024
254	21.17	0.10	0.029	(0.073)	0.005	0.024
255	21.25	0.10	0.029	(0.073)	0.005	0.024
256	21.33	0.07	0.019	(0.073)	0.003	0.016
257	21.42	0.07	0.019	(0.073)	0.003	0.016
258	21.50	0.07	0.019	(0.072)	0.003	0.016
259	21.58	0.10	0.029	(0.072)	0.005	0.024
260	21.67	0.10	0.029	(0.072)	0.005	0.024
261	21.75	0.10	0.029	(0.072)	0.005	0.024
262	21.83	0.07	0.019	(0.071)	0.003	0.016
263	21.92	0.07	0.019	(0.071)	0.003	0.016
264	22.00	0.07	0.019	(0.071)	0.003	0.016
265	22.08	0.10	0.029	(0.071)	0.005	0.024
266	22.17	0.10	0.029	(0.070)	0.005	0.024
267	22.25	0.10	0.029	(0.070)	0.005	0.024
268	22.33	0.07	0.019	(0.070)	0.003	0.016
269	22.42	0.07	0.019	(0.070)	0.003	0.016
270	22.50	0.07	0.019	(0.069)	0.003	0.016
271	22.58	0.07	0.019	(0.069)	0.003	0.016

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272  22.67     0.07      0.019       (  0.069)       0.003        0.016
273  22.75     0.07      0.019       (  0.069)       0.003        0.016
274  22.83     0.07      0.019       (  0.069)       0.003        0.016
275  22.92     0.07      0.019       (  0.069)       0.003        0.016
276  23.00     0.07      0.019       (  0.068)       0.003        0.016
277  23.08     0.07      0.019       (  0.068)       0.003        0.016
278  23.17     0.07      0.019       (  0.068)       0.003        0.016
279  23.25     0.07      0.019       (  0.068)       0.003        0.016
280  23.33     0.07      0.019       (  0.068)       0.003        0.016
281  23.42     0.07      0.019       (  0.068)       0.003        0.016
282  23.50     0.07      0.019       (  0.068)       0.003        0.016
283  23.58     0.07      0.019       (  0.067)       0.003        0.016
284  23.67     0.07      0.019       (  0.067)       0.003        0.016
285  23.75     0.07      0.019       (  0.067)       0.003        0.016
286  23.83     0.07      0.019       (  0.067)       0.003        0.016
287  23.92     0.07      0.019       (  0.067)       0.003        0.016
288  24.00     0.07      0.019       (  0.067)       0.003        0.016
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    23.6
      Flood volume = Effective rainfall      1.97(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       2.2(Ac.Ft)
      Total soil loss =      0.43(In)
      Total soil loss =     0.475(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       94296.3 Cubic Feet
      Total soil loss =       20699.2 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       0.0006      0.09  Q         |         |         |         |
   0+10       0.0020      0.19  Q         |         |         |         |
   0+15       0.0034      0.21  Q         |         |         |         |
   0+20       0.0051      0.25  VQ        |         |         |         |
   0+25       0.0073      0.31  VQ        |         |         |         |
   0+30       0.0094      0.31  VQ        |         |         |         |
   0+35       0.0116      0.31  VQ        |         |         |         |
   0+40       0.0137      0.31  VQ        |         |         |         |
   0+45       0.0159      0.31  VQ        |         |         |         |
   0+50       0.0184      0.36  VQ        |         |         |         |
   0+55       0.0212      0.41  VQ        |         |         |         |
   1+ 0       0.0241      0.42  VQ        |         |         |         |
   1+ 5       0.0267      0.37  VQ        |         |         |         |
   1+10       0.0289      0.32  VQ        |         |         |         |
   1+15       0.0311      0.32  VQ        |         |         |         |
   1+20       0.0332      0.31  VQ        |         |         |         |
   1+25       0.0354      0.31  VQ        |         |         |         |
   1+30       0.0375      0.31  VQ        |         |         |         |
   1+35       0.0397      0.31  VQ        |         |         |         |
   1+40       0.0419      0.31  VQ        |         |         |         |
   1+45       0.0440      0.31  VQ        |         |         |         |
   1+50       0.0465      0.36  VQ        |         |         |         |
   1+55       0.0494      0.41  VQ        |         |         |         |
   2+ 0       0.0522      0.42  VQ        |         |         |         |
   2+ 5       0.0551      0.42  |Q        |         |         |         |
   2+10       0.0580      0.42  |Q        |         |         |         |
   2+15       0.0609      0.42  |Q        |         |         |         |
   2+20       0.0638      0.42  |Q        |         |         |         |
   2+25       0.0667      0.42  |Q        |         |         |         |
   2+30       0.0695      0.42  |Q        |         |         |         |
   2+35       0.0727      0.46  |Q        |         |         |         |
   2+40       0.0763      0.52  |VQ       |         |         |         |
   2+45       0.0799      0.52  |VQ       |         |         |         |
   2+50       0.0835      0.52  |VQ       |         |         |         |
   2+55       0.0871      0.52  |VQ       |         |         |         |
   3+ 0       0.0907      0.52  |VQ       |         |         |         |
   3+ 5       0.0943      0.52  |VQ       |         |         |         |
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3+10       0.0979      0.52  |VQ        |          |          |          |
3+15       0.1015      0.52  |VQ        |          |          |          |
3+20       0.1052      0.52  |VQ        |          |          |          |
3+25       0.1088      0.52  | Q        |          |          |          |
3+30       0.1124      0.52  | Q        |          |          |          |
3+35       0.1160      0.52  | Q        |          |          |          |
3+40       0.1196      0.52  | Q        |          |          |          |
3+45       0.1232      0.52  | Q        |          |          |          |
3+50       0.1271      0.57  | Q        |          |          |          |
3+55       0.1314      0.62  | Q        |          |          |          |
4+ 0       0.1357      0.63  | Q        |          |          |          |
4+ 5       0.1400      0.63  | Q        |          |          |          |
4+10       0.1444      0.63  | Q        |          |          |          |
4+15       0.1487      0.63  | Q        |          |          |          |
4+20       0.1533      0.67  | Q        |          |          |          |
4+25       0.1583      0.73  | Q        |          |          |          |
4+30       0.1634      0.73  | QV       |          |          |          |
4+35       0.1684      0.73  | QV       |          |          |          |
4+40       0.1735      0.73  | QV       |          |          |          |
4+45       0.1785      0.73  | QV       |          |          |          |
4+50       0.1839      0.78  |  Q       |          |          |          |
4+55       0.1896      0.83  |  Q       |          |          |          |
5+ 0       0.1954      0.84  |  Q       |          |          |          |
5+ 5       0.2005      0.75  | QV       |          |          |          |
5+10       0.2050      0.64  | QV       |          |          |          |
5+15       0.2093      0.63  | QV       |          |          |          |
5+20       0.2140      0.67  | QV       |          |          |          |
5+25       0.2190      0.73  | Q V      |          |          |          |
5+30       0.2240      0.73  | Q V      |          |          |          |
5+35       0.2294      0.78  |  QV      |          |          |          |
5+40       0.2351      0.83  |  QV      |          |          |          |
5+45       0.2408      0.84  |  QV      |          |          |          |
5+50       0.2466      0.84  |  QV      |          |          |          |
5+55       0.2524      0.84  |  QV      |          |          |          |
6+ 0       0.2582      0.84  |  QV      |          |          |          |
6+ 5       0.2642      0.88  |  QV      |          |          |          |
6+10       0.2707      0.94  |  Q V     |          |          |          |
6+15       0.2772      0.94  |  Q V     |          |          |          |
6+20       0.2837      0.94  |  Q V     |          |          |          |
6+25       0.2902      0.94  |  Q V     |          |          |          |
6+30       0.2967      0.94  |  Q V     |          |          |          |
6+35       0.3035      0.99  |  Q V     |          |          |          |
6+40       0.3106      1.04  |   QV     |          |          |          |
6+45       0.3178      1.05  |   QV     |          |          |          |
6+50       0.3250      1.05  |   Q V    |          |          |          |
6+55       0.3323      1.05  |   Q V    |          |          |          |
7+ 0       0.3395      1.05  |   Q V    |          |          |          |
7+ 5       0.3467      1.05  |   Q V    |          |          |          |
7+10       0.3539      1.05  |   Q V    |          |          |          |
7+15       0.3611      1.05  |   Q V    |          |          |          |
7+20       0.3686      1.09  |   Q V    |          |          |          |
7+25       0.3765      1.14  |   Q V    |          |          |          |
7+30       0.3845      1.15  |   Q  V   |          |          |          |
7+35       0.3927      1.20  |   Q  V   |          |          |          |
7+40       0.4013      1.25  |   Q  V   |          |          |          |
7+45       0.4100      1.26  |    Q V   |          |          |          |
7+50       0.4189      1.30  |    Q V   |          |          |          |
7+55       0.4283      1.35  |    Q V   |          |          |          |
8+ 0       0.4376      1.36  |    Q  V  |          |          |          |
8+ 5       0.4476      1.45  |    Q  V  |          |          |          |
8+10       0.4584      1.56  |     Q V  |          |          |          |
8+15       0.4692      1.57  |     Q V  |          |          |          |
8+20       0.4800      1.57  |     Q V  |          |          |          |
8+25       0.4908      1.57  |     Q  V|          |          |          |
8+30       0.5016      1.57  |     Q  V|          |          |          |
8+35       0.5128      1.62  |     Q  V|          |          |          |
8+40       0.5243      1.67  |     Q  V|          |          |          |
8+45       0.5358      1.68  |     Q  V|          |          |          |
8+50       0.5477      1.72  |     Q   V          |          |          |
8+55       0.5599      1.77  |      Q  V          |          |          |
9+ 0       0.5721      1.78  |      Q  V          |          |          |
9+ 5       0.5850      1.87  |      Q  V          |          |          |
9+10       0.5986      1.98  |      Q  |V         |          |          |
9+15       0.6123      1.99  |      Q  |V         |          |          |
9+20       0.6263      2.04  |       Q |V         |          |          |
```

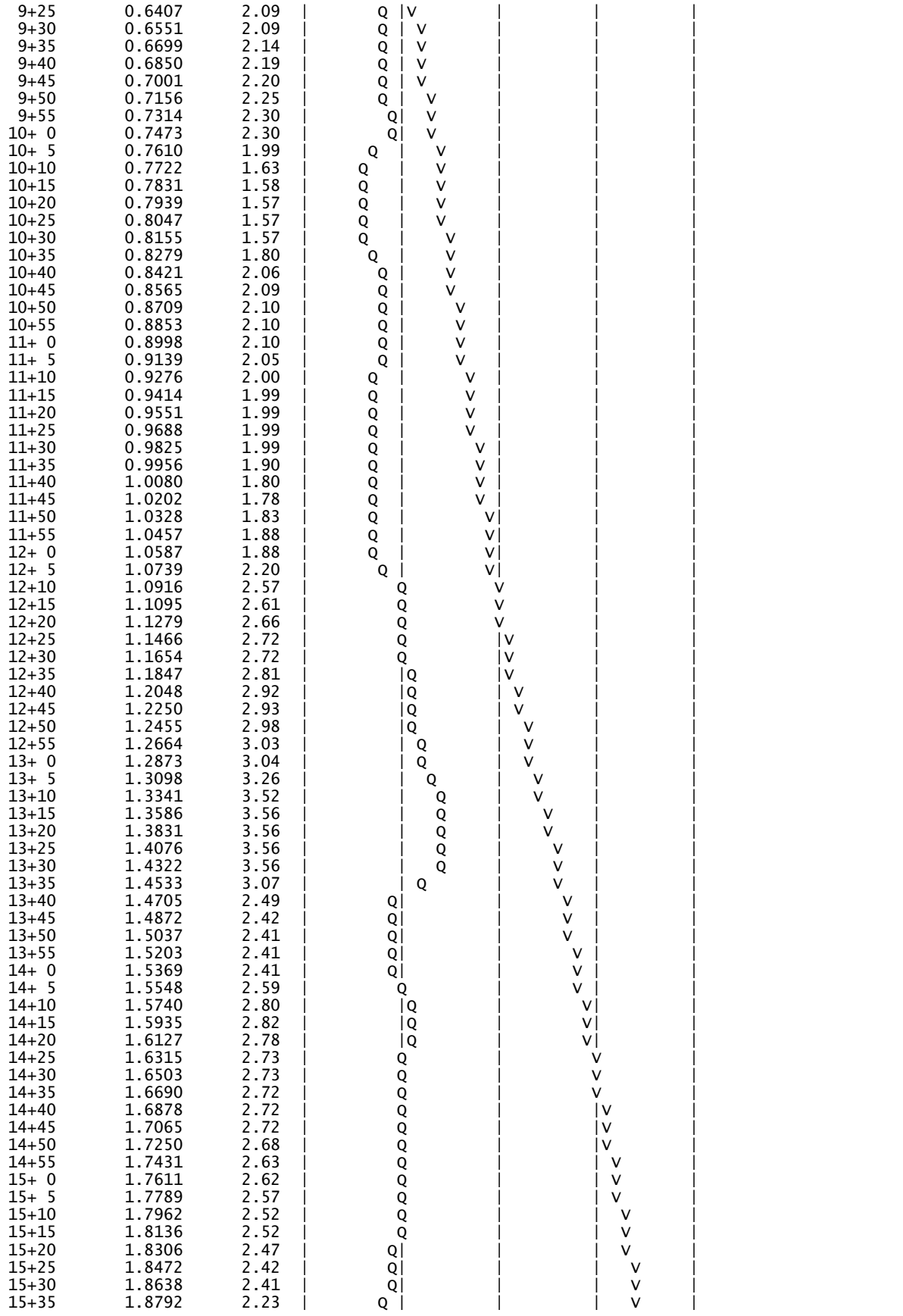

15+40	1.8931	2.02	| Q |	|	|	| V |
15+45	1.9068	1.99	| Q |	|	|	| V |
15+50	1.9205	1.99	| Q |	|	|	| V |
15+55	1.9343	1.99	| Q |	|	|	| V |
16+ 0	1.9480	1.99	| Q |	|	|	| V |
16+ 5	1.9570	1.32	| Q |	|	|	| V |
16+10	1.9607	0.53	| Q |	|	|	| V |
16+15	1.9637	0.44	|Q |	|	|	| V |
16+20	1.9666	0.42	|Q |	|	|	| V |
16+25	1.9695	0.42	|Q |	|	|	| V |
16+30	1.9724	0.42	|Q |	|	|	| V |
16+35	1.9749	0.37	|Q |	|	|	| V |
16+40	1.9772	0.32	|Q |	|	|	| V |
16+45	1.9793	0.32	|Q |	|	|	| V |
16+50	1.9815	0.31	|Q |	|	|	| V |
16+55	1.9837	0.31	|Q |	|	|	| V |
17+ 0	1.9858	0.31	|Q |	|	|	| V |
17+ 5	1.9886	0.40	|Q |	|	|	| V |
17+10	1.9921	0.51	| Q |	|	|	| V |
17+15	1.9957	0.52	| Q |	|	|	| V |
17+20	1.9993	0.52	| Q |	|	|	| V |
17+25	2.0029	0.52	| Q |	|	|	| V |
17+30	2.0065	0.52	| Q |	|	|	| V |
17+35	2.0101	0.52	| Q |	|	|	| V |
17+40	2.0137	0.52	| Q |	|	|	| V |
17+45	2.0173	0.52	| Q |	|	|	| V |
17+50	2.0206	0.48	|Q |	|	|	| V |
17+55	2.0236	0.43	|Q |	|	|	| V |
18+ 0	2.0265	0.42	|Q |	|	|	| V |
18+ 5	2.0294	0.42	|Q |	|	|	| V |
18+10	2.0323	0.42	|Q |	|	|	| V |
18+15	2.0351	0.42	|Q |	|	|	| V |
18+20	2.0380	0.42	|Q |	|	|	| V |
18+25	2.0409	0.42	|Q |	|	|	| V |
18+30	2.0438	0.42	|Q |	|	|	| V |
18+35	2.0464	0.37	|Q |	|	|	| V |
18+40	2.0486	0.32	|Q |	|	|	| V |
18+45	2.0508	0.32	|Q |	|	|	| V |
18+50	2.0526	0.27	|Q |	|	|	| V |
18+55	2.0541	0.22	| Q |	|	|	| V |
19+ 0	2.0556	0.21	| Q |	|	|	| V |
19+ 5	2.0573	0.25	|Q |	|	|	| V |
19+10	2.0594	0.31	|Q |	|	|	| V |
19+15	2.0616	0.31	|Q |	|	|	| V |
19+20	2.0641	0.36	|Q |	|	|	| V |
19+25	2.0669	0.41	|Q |	|	|	| V |
19+30	2.0698	0.42	|Q |	|	|	| V |
19+35	2.0723	0.37	|Q |	|	|	| V |
19+40	2.0746	0.32	|Q |	|	|	| V |
19+45	2.0767	0.32	|Q |	|	|	| V |
19+50	2.0786	0.27	|Q |	|	|	| V |
19+55	2.0801	0.22	| Q |	|	|	| V |
20+ 0	2.0815	0.21	| Q |	|	|	| V |
20+ 5	2.0833	0.25	|Q |	|	|	| V |
20+10	2.0854	0.31	|Q |	|	|	| V |
20+15	2.0876	0.31	|Q |	|	|	| V |
20+20	2.0897	0.31	|Q |	|	|	| V |
20+25	2.0919	0.31	|Q |	|	|	| V |
20+30	2.0941	0.31	|Q |	|	|	| V |
20+35	2.0962	0.31	|Q |	|	|	| V |
20+40	2.0984	0.31	|Q |	|	|	| V |
20+45	2.1006	0.31	|Q |	|	|	| V |
20+50	2.1024	0.27	|Q |	|	|	| V |
20+55	2.1039	0.22	| Q |	|	|	| V |
21+ 0	2.1054	0.21	| Q |	|	|	| V |
21+ 5	2.1071	0.25	|Q |	|	|	| V |
21+10	2.1092	0.31	|Q |	|	|	| V |
21+15	2.1114	0.31	|Q |	|	|	| V|
21+20	2.1132	0.27	|Q |	|	|	| V|
21+25	2.1147	0.22	| Q |	|	|	| V|
21+30	2.1162	0.21	| Q |	|	|	| V|
21+35	2.1179	0.25	|Q |	|	|	| V|
21+40	2.1200	0.31	|Q |	|	|	| V|
21+45	2.1222	0.31	|Q |	|	|	| V|
21+50	2.1241	0.27	|Q |	|	|	| V|

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   21+55       2.1255      0.22  Q          |          |          |         V|
   22+ 0       2.1270      0.21  Q          |          |          |         V|
   22+ 5       2.1288      0.25  |Q         |          |          |         V|
   22+10       2.1309      0.31  |Q         |          |          |         V|
   22+15       2.1330      0.31  |Q         |          |          |         V|
   22+20       2.1349      0.27  |Q         |          |          |         V|
   22+25       2.1364      0.22  Q          |          |          |         V|
   22+30       2.1378      0.21  Q          |          |          |         V|
   22+35       2.1393      0.21  Q          |          |          |         V|
   22+40       2.1407      0.21  Q          |          |          |         V|
   22+45       2.1422      0.21  Q          |          |          |         V|
   22+50       2.1436      0.21  Q          |          |          |         V|
   22+55       2.1450      0.21  Q          |          |          |         V|
   23+ 0       2.1465      0.21  Q          |          |          |         V|
   23+ 5       2.1479      0.21  Q          |          |          |         V|
   23+10       2.1494      0.21  Q          |          |          |         V|
   23+15       2.1508      0.21  Q          |          |          |         V|
   23+20       2.1523      0.21  Q          |          |          |         V|
   23+25       2.1537      0.21  Q          |          |          |         V|
   23+30       2.1551      0.21  Q          |          |          |         V|
   23+35       2.1566      0.21  Q          |          |          |         V|
   23+40       2.1580      0.21  Q          |          |          |         V|
   23+45       2.1595      0.21  Q          |          |          |         V|
   23+50       2.1609      0.21  Q          |          |          |         V|
   23+55       2.1624      0.21  Q          |          |          |         V|
   24+ 0       2.1638      0.21  Q          |          |          |         V|
   24+ 5       2.1646      0.12  Q          |          |          |         V|
   24+10       2.1647      0.02  Q          |          |          |         V|
   24+15       2.1647      0.00  Q          |          |          |          V
-------------------------------------------------------------------------------
```

PROPOSED CONDITION – 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

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Study date 06/08/23 File: B1ONSITEPROP1100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 1-HOUR
FN: B1ONSITEPROP1100.OUT- ABE

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1240.00(Ft.)
Length along longest watercourse measured to centroid = 710.00(Ft.)
Length along longest watercourse = 0.235 Mi.
Length along longest watercourse measured to centroid = 0.134 Mi.
Difference in elevation = 21.80(Ft.)
Slope along watercourse = 92.8258 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.46 Min.
25% of lag time = 0.61 Min.
40% of lag time = 0.98 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]
13.20	0.54	7.13

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	1.28	16.90

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.540(In)
Area Averaged 100-Year Rainfall = 1.280(In)

Point rain (area averaged) = 1.280(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.280(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	56.00	0.900

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

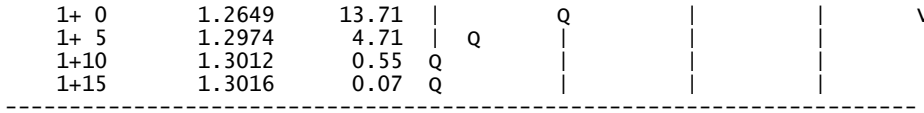
```
      56.0  56.0      0.511     0.900        0.097       1.000      0.097
                                                        Sum (F) =   0.097
      Area averaged mean soil loss (F) (In/Hr) =  0.097
      Minimum soil loss rate ((In/Hr)) =  0.049
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.180
      ------------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5500
      ------------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                         FOOTHILL S-Curve
      ------------------------------------------------------------------------
                  Unit Hydrograph Data
      ------------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                          Graph %           (CFS)
      ------------------------------------------------------------------------
          1   0.083        203.515         42.976             5.717
          2   0.167        407.030         49.679             6.609
          3   0.250        610.545          6.320             0.841
          4   0.333        814.060          1.024             0.136
                                  Sum = 100.000   Sum=      13.303
------------------------------------------------------------------------

 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   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     3.30      0.507       (  0.097)       0.091        0.416
   2   0.17     4.20      0.645          0.097    (  0.116)        0.548
   3   0.25     4.40      0.676          0.097    (  0.122)        0.579
   4   0.33     4.80      0.737          0.097    (  0.133)        0.640
   5   0.42     5.20      0.799          0.097    (  0.144)        0.702
   6   0.50     6.20      0.952          0.097    (  0.171)        0.855
   7   0.58     6.80      1.044          0.097    (  0.188)        0.947
   8   0.67     8.80      1.352          0.097    (  0.243)        1.254
   9   0.75    13.90      2.135          0.097    (  0.384)        2.038
  10   0.83    31.40      4.822          0.097    (  0.868)        4.725
  11   0.92     7.20      1.106          0.097    (  0.199)        1.009
  12   1.00     3.80      0.584          0.097    (  0.105)        0.487
             (Loss Rate Not Used)
     Sum =     100.0                                  Sum =    14.2
       Flood volume = Effective rainfall      1.18(In)
        times area      13.2(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
       Total soil loss =      0.10(In)
       Total soil loss =     0.106(Ac.Ft)
       Total rainfall =      1.28(In)
       Flood volume =       56698.1 Cubic Feet
       Total soil loss =        4627.1 Cubic Feet
       ------------------------------------------------------------------------
        Peak flow rate of this hydrograph =     41.688(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       0.0164      2.38  VQ        |         |         |         |
    0+10       0.0569      5.88  |V  Q     |         |         |         |
    0+15       0.1070      7.28  |  V Q    |         |         |         |
    0+20       0.1622      8.01  |   V Q   |         |         |         |
    0+25       0.2228      8.81  |     VQ  |         |         |         |
    0+30       0.2927     10.15  |       Q |         |         |         |
    0+35       0.3737     11.75  |        Q|V        |         |         |
    0+40       0.4718     14.25  |         |Q  V     |         |         |
    0+45       0.6155     20.86  |         |     Q V |         |         |
    0+50       0.9026     41.69  |         |         |      V  |  Q      |
    0+55       1.1706     38.90  |         |         |         |Q   V    |
```


1+ 0 1.2649 13.71 | Q | | V |
1+ 5 1.2974 4.71 | Q | | | V|
1+10 1.3012 0.55 Q | | | V|
1+15 1.3016 0.07 Q | | | V

PROPOSED CONDITION – 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

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Study date 05/22/23 File: B1ONSITEPRE3100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 100-YEAR 3-HOUR
FN: B1ONSITEPRE3100.OUT- AV

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1070.00(Ft.)
Length along longest watercourse measured to centroid = 430.00(Ft.)
Length along longest watercourse = 0.203 Mi.
Length along longest watercourse measured to centroid = 0.081 Mi.
Difference in elevation = 29.10(Ft.)
Slope along watercourse = 143.5963 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.059 Hr.
Lag time = 3.53 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.41 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]
13.20	0.95	12.54

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.00	26.40

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.950(In)

Area Averaged 100-Year Rainfall = 2.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	78.00	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(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
FOOTHILL S-Curve

Unit Hydrograph Data

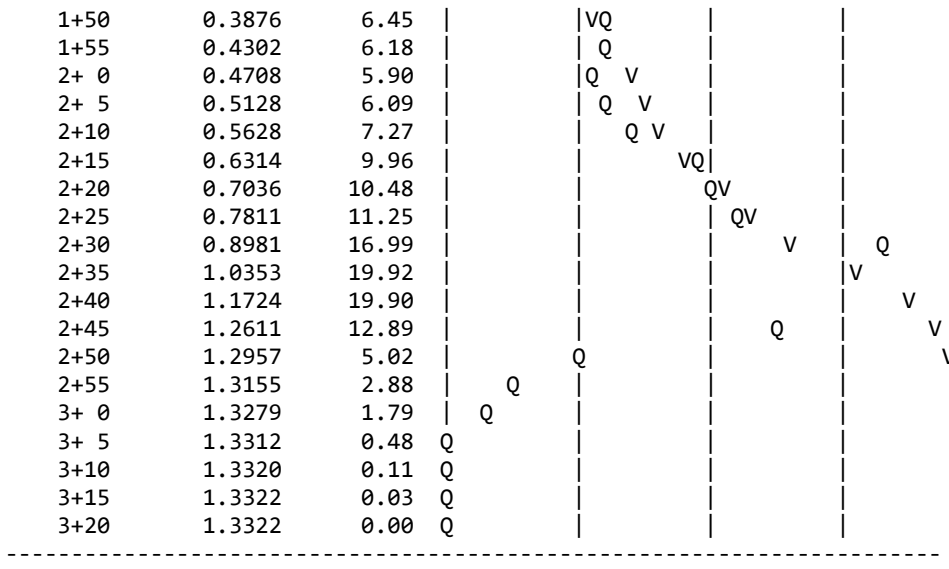
Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	141.469	28.128	3.742
2	0.167	282.938	54.945	7.309
3	0.250	424.407	12.894	1.715
4	0.333	565.876	2.921	0.389
5	0.417	707.345	1.113	0.148
		Sum = 100.000	Sum=	13.303

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	0.312	0.268	(0.281)	0.044
2	0.17	1.30	0.312	0.268	(0.281)	0.044
3	0.25	1.10	0.264	(0.268)	0.238	0.026
4	0.33	1.50	0.360	0.268	(0.324)	0.092
5	0.42	1.50	0.360	0.268	(0.324)	0.092
6	0.50	1.80	0.432	0.268	(0.389)	0.164
7	0.58	1.50	0.360	0.268	(0.324)	0.092
8	0.67	1.80	0.432	0.268	(0.389)	0.164
9	0.75	1.80	0.432	0.268	(0.389)	0.164
10	0.83	1.50	0.360	0.268	(0.324)	0.092
11	0.92	1.60	0.384	0.268	(0.346)	0.116
12	1.00	1.80	0.432	0.268	(0.389)	0.164
13	1.08	2.20	0.528	0.268	(0.475)	0.260
14	1.17	2.20	0.528	0.268	(0.475)	0.260
15	1.25	2.20	0.528	0.268	(0.475)	0.260
16	1.33	2.00	0.480	0.268	(0.432)	0.212
17	1.42	2.60	0.624	0.268	(0.562)	0.356

```
18   1.50     2.70      0.648          0.268    (  0.583)        0.380
19   1.58     2.40      0.576          0.268    (  0.518)        0.308
20   1.67     2.70      0.648          0.268    (  0.583)        0.380
21   1.75     3.30      0.792          0.268    (  0.713)        0.524
22   1.83     3.10      0.744          0.268    (  0.670)        0.476
23   1.92     2.90      0.696          0.268    (  0.626)        0.428
24   2.00     3.00      0.720          0.268    (  0.648)        0.452
25   2.08     3.10      0.744          0.268    (  0.670)        0.476
26   2.17     4.20      1.008          0.268    (  0.907)        0.740
27   2.25     5.00      1.200          0.268    (  1.080)        0.932
28   2.33     3.50      0.840          0.268    (  0.756)        0.572
29   2.42     6.80      1.632          0.268    (  1.469)        1.364
30   2.50     7.30      1.752          0.268    (  1.577)        1.484
31   2.58     8.20      1.968          0.268    (  1.771)        1.700
32   2.67     5.90      1.416          0.268    (  1.274)        1.148
33   2.75     2.00      0.480          0.268    (  0.432)        0.212
34   2.83     1.80      0.432          0.268    (  0.389)        0.164
35   2.92     1.80      0.432          0.268    (  0.389)        0.164
36   3.00     0.60      0.144       (  0.268)       0.130        0.014
            (Loss Rate Not Used)
   Sum =     100.0                                  Sum =    14.5
     Flood volume = Effective rainfall      1.21(In)
      times area      13.2(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
     Total soil loss =      0.79(In)
     Total soil loss =     0.868(Ac.Ft)
     Total rainfall =      2.00(In)
     Flood volume =       58030.4 Cubic Feet
     Total soil loss =       37796.1 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =     19.922(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        5.0      10.0      15.0      20.0
-------------------------------------------------------------------------
  0+ 5       0.0011      0.17  Q         |         |         |         |
  0+10       0.0045      0.49  Q         |         |         |         |
  0+15       0.0080      0.50  Q         |         |         |         |
  0+20       0.0123      0.63  VQ        |         |         |         |
  0+25       0.0198      1.09  V Q       |         |         |         |
  0+30       0.0299      1.47  V Q       |         |         |         |
  0+35       0.0420      1.75  |V Q      |         |         |         |
  0+40       0.0531      1.62  |V Q      |         |         |         |
  0+45       0.0673      2.05  | V Q     |         |         |         |
  0+50       0.0803      1.89  | VQ      |         |         |         |
  0+55       0.0904      1.47  | Q       |         |         |         |
  1+ 0       0.1022      1.71  |  Q      |         |         |         |
  1+ 5       0.1190      2.44  |  VQ     |         |         |         |
  1+10       0.1412      3.22  |   V Q   |         |         |         |
  1+15       0.1646      3.41  |   V Q   |         |         |         |
  1+20       0.1872      3.27  |    VQ   |         |         |         |
  1+25       0.2111      3.47  |     Q   |         |         |         |
  1+30       0.2423      4.53  |      V Q|         |         |         |
  1+35       0.2745      4.67  |       VQ|         |         |         |
  1+40       0.3055      4.50  |        Q|         |         |         |
  1+45       0.3432      5.47  |         Q         |         |         |
```


1+50 0.3876 6.45
1+55 0.4302 6.18
2+ 0 0.4708 5.90
2+ 5 0.5128 6.09
2+10 0.5628 7.27
2+15 0.6314 9.96
2+20 0.7036 10.48
2+25 0.7811 11.25
2+30 0.8981 16.99
2+35 1.0353 19.92
2+40 1.1724 19.90
2+45 1.2611 12.89
2+50 1.2957 5.02
2+55 1.3155 2.88
3+ 0 1.3279 1.79
3+ 5 1.3312 0.48
3+10 1.3320 0.11
3+15 1.3322 0.03
3+20 1.3322 0.00

PROPOSED CONDITION – 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

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Study date 06/12/23 File: B1ONSITEPROP6100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 6-HOUR
FN: B1ONSITEPROP6100.OUT- ABE

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1240.00(Ft.)
Length along longest watercourse measured to centroid = 710.00(Ft.)
Length along longest watercourse = 0.235 Mi.
Length along longest watercourse measured to centroid = 0.134 Mi.
Difference in elevation = 21.80(Ft.)
Slope along watercourse = 92.8258 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.46 Min.
25% of lag time = 0.61 Min.
40% of lag time = 0.98 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]
13.20	1.35	17.82

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.90	38.28

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.350(In)
Area Averaged 100-Year Rainfall = 2.900(In)

Point rain (area averaged) = 2.900(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	56.00	0.900

Total Area Entered = 13.20(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	0.900	0.097	1.000	0.097
					Sum (F) =	0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097
Minimum soil loss rate ((In/Hr)) = 0.049
(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
FOOTHILL S-Curve

Unit Hydrograph Data

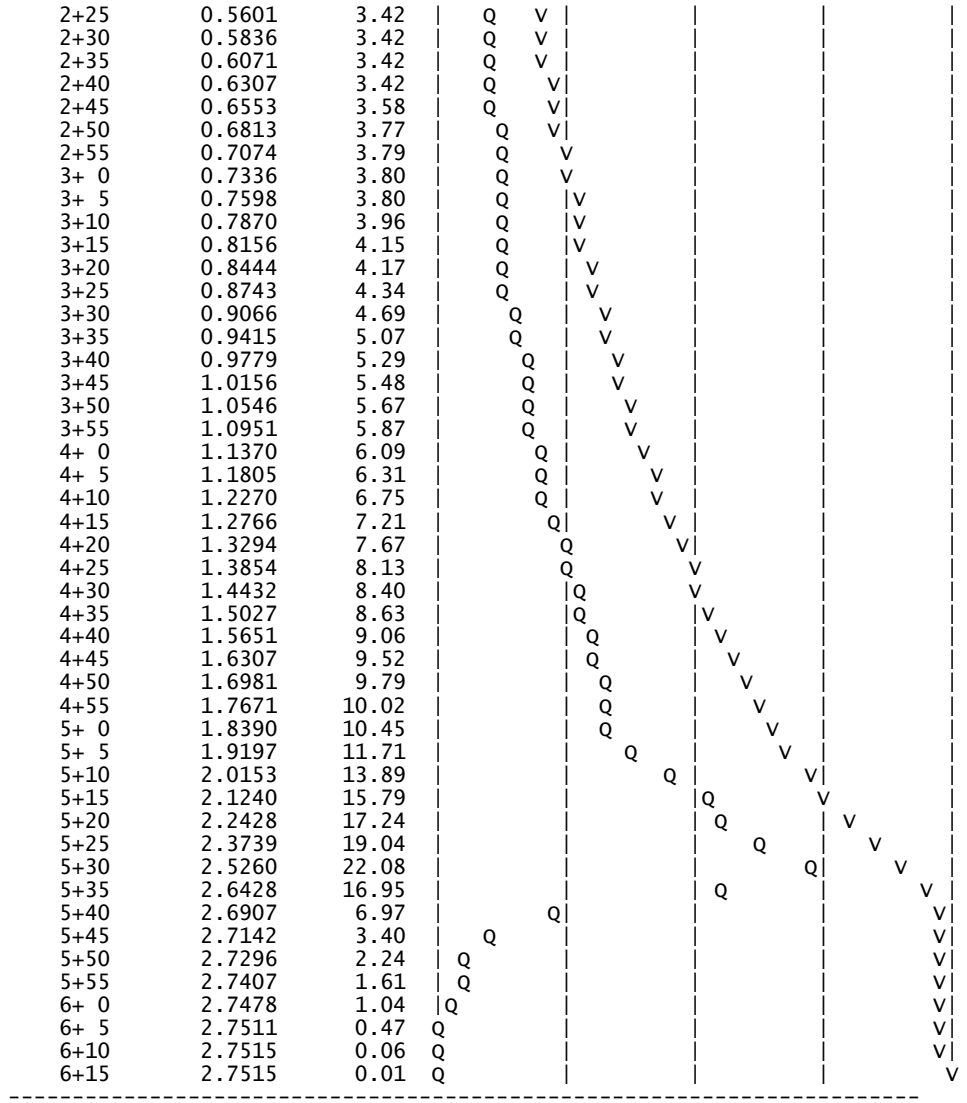
Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	203.515	42.976	5.717
2	0.167	407.030	49.679	6.609
3	0.250	610.545	6.320	0.841
4	0.333	814.060	1.024	0.136
			Sum = 100.000 Sum=	13.303

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	0.174	(0.097)	0.031	0.143
2	0.17	0.60	0.209	(0.097)	0.038	0.171
3	0.25	0.60	0.209	(0.097)	0.038	0.171
4	0.33	0.60	0.209	(0.097)	0.038	0.171
5	0.42	0.60	0.209	(0.097)	0.038	0.171
6	0.50	0.70	0.244	(0.097)	0.044	0.200
7	0.58	0.70	0.244	(0.097)	0.044	0.200
8	0.67	0.70	0.244	(0.097)	0.044	0.200
9	0.75	0.70	0.244	(0.097)	0.044	0.200
10	0.83	0.70	0.244	(0.097)	0.044	0.200
11	0.92	0.70	0.244	(0.097)	0.044	0.200
12	1.00	0.80	0.278	(0.097)	0.050	0.228
13	1.08	0.80	0.278	(0.097)	0.050	0.228
14	1.17	0.80	0.278	(0.097)	0.050	0.228
15	1.25	0.80	0.278	(0.097)	0.050	0.228
16	1.33	0.80	0.278	(0.097)	0.050	0.228
17	1.42	0.80	0.278	(0.097)	0.050	0.228
18	1.50	0.80	0.278	(0.097)	0.050	0.228
19	1.58	0.80	0.278	(0.097)	0.050	0.228
20	1.67	0.80	0.278	(0.097)	0.050	0.228
21	1.75	0.80	0.278	(0.097)	0.050	0.228
22	1.83	0.80	0.278	(0.097)	0.050	0.228
23	1.92	0.80	0.278	(0.097)	0.050	0.228
24	2.00	0.90	0.313	(0.097)	0.056	0.257
25	2.08	0.80	0.278	(0.097)	0.050	0.228
26	2.17	0.90	0.313	(0.097)	0.056	0.257
27	2.25	0.90	0.313	(0.097)	0.056	0.257
28	2.33	0.90	0.313	(0.097)	0.056	0.257
29	2.42	0.90	0.313	(0.097)	0.056	0.257
30	2.50	0.90	0.313	(0.097)	0.056	0.257
31	2.58	0.90	0.313	(0.097)	0.056	0.257
32	2.67	0.90	0.313	(0.097)	0.056	0.257
33	2.75	1.00	0.348	(0.097)	0.063	0.285
34	2.83	1.00	0.348	(0.097)	0.063	0.285
35	2.92	1.00	0.348	(0.097)	0.063	0.285
36	3.00	1.00	0.348	(0.097)	0.063	0.285
37	3.08	1.00	0.348	(0.097)	0.063	0.285
38	3.17	1.10	0.383	(0.097)	0.069	0.314
39	3.25	1.10	0.383	(0.097)	0.069	0.314
40	3.33	1.10	0.383	(0.097)	0.069	0.314
41	3.42	1.20	0.418	(0.097)	0.075	0.342
42	3.50	1.30	0.452	(0.097)	0.081	0.371
43	3.58	1.40	0.487	(0.097)	0.088	0.399
44	3.67	1.40	0.487	(0.097)	0.088	0.399
45	3.75	1.50	0.522	(0.097)	0.094	0.428
46	3.83	1.50	0.522	(0.097)	0.094	0.428

```
47   3.92     1.60      0.557          0.097    (  0.100)        0.460
48   4.00     1.60      0.557          0.097    (  0.100)        0.460
49   4.08     1.70      0.592          0.097    (  0.106)        0.495
50   4.17     1.80      0.626          0.097    (  0.113)        0.529
51   4.25     1.90      0.661          0.097    (  0.119)        0.564
52   4.33     2.00      0.696          0.097    (  0.125)        0.599
53   4.42     2.10      0.731          0.097    (  0.132)        0.634
54   4.50     2.10      0.731          0.097    (  0.132)        0.634
55   4.58     2.20      0.766          0.097    (  0.138)        0.669
56   4.67     2.30      0.800          0.097    (  0.144)        0.703
57   4.75     2.40      0.835          0.097    (  0.150)        0.738
58   4.83     2.40      0.835          0.097    (  0.150)        0.738
59   4.92     2.50      0.870          0.097    (  0.157)        0.773
60   5.00     2.60      0.905          0.097    (  0.163)        0.808
61   5.08     3.10      1.079          0.097    (  0.194)        0.982
62   5.17     3.60      1.253          0.097    (  0.225)        1.156
63   5.25     3.90      1.357          0.097    (  0.244)        1.260
64   5.33     4.20      1.462          0.097    (  0.263)        1.364
65   5.42     4.70      1.636          0.097    (  0.294)        1.538
66   5.50     5.60      1.949          0.097    (  0.351)        1.852
67   5.58     1.90      0.661          0.097    (  0.119)        0.564
68   5.67     0.90      0.313       (  0.097)       0.056        0.257
69   5.75     0.60      0.209       (  0.097)       0.038        0.171
70   5.83     0.50      0.174       (  0.097)       0.031        0.143
71   5.92     0.30      0.104       (  0.097)       0.019        0.086
72   6.00     0.20      0.070       (  0.097)       0.013        0.057
            (Loss Rate Not Used)
   Sum =     100.0                                    Sum =    30.0
      Flood volume = Effective rainfall      2.50(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       2.8(Ac.Ft)
      Total soil loss =      0.40(In)
      Total soil loss =     0.438(Ac.Ft)
      Total rainfall =      2.90(In)
      Flood volume =      119857.2 Cubic Feet
      Total soil loss =       19092.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     22.084(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       0.0056      0.82  VQ        |          |          |          |
  0+10       0.0189      1.92  V Q       |          |          |          |
  0+15       0.0342      2.23  V Q       |          |          |          |
  0+20       0.0499      2.27  V  Q      |          |          |          |
  0+25       0.0656      2.28  V  Q      |          |          |          |
  0+30       0.0824      2.44  |V Q      |          |          |          |
  0+35       0.1005      2.63  |V Q      |          |          |          |
  0+40       0.1188      2.65  |V Q      |          |          |          |
  0+45       0.1371      2.66  |V Q      |          |          |          |
  0+50       0.1554      2.66  | VQ      |          |          |          |
  0+55       0.1737      2.66  | VQ      |          |          |          |
  1+ 0       0.1932      2.82  | VQ      |          |          |          |
  1+ 5       0.2139      3.01  |  VQ     |          |          |          |
  1+10       0.2348      3.03  |  VQ     |          |          |          |
  1+15       0.2557      3.04  |  VQ     |          |          |          |
  1+20       0.2767      3.04  |   Q     |          |          |          |
  1+25       0.2976      3.04  |   Q     |          |          |          |
  1+30       0.3185      3.04  |   Q     |          |          |          |
  1+35       0.3394      3.04  |   Q     |          |          |          |
  1+40       0.3604      3.04  |   QV    |          |          |          |
  1+45       0.3813      3.04  |   QV    |          |          |          |
  1+50       0.4022      3.04  |   QV    |          |          |          |
  1+55       0.4231      3.04  |   Q V   |          |          |          |
  2+ 0       0.4452      3.20  |   Q V   |          |          |          |
  2+ 5       0.4674      3.23  |   Q V   |          |          |          |
  2+10       0.4896      3.23  |   Q  V  |          |          |          |
  2+15       0.5130      3.39  |   Q  V  |          |          |          |
  2+20       0.5365      3.41  |   Q  V  |          |          |          |
```



PROPOSED CONDITION – 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 06/12/23 File: B1ONSITEPROP24100.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

22-0085 - OAK VALLEY NORTH BUILDING 1
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 100-YEAR 24-HOUR
FN: B1ONSITEPROP24100.OUT- ABE

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1240.00(Ft.)
Length along longest watercourse measured to centroid = 710.00(Ft.)
Length along longest watercourse = 0.235 Mi.
Length along longest watercourse measured to centroid = 0.134 Mi.
Difference in elevation = 21.80(Ft.)
Slope along watercourse = 92.8258 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.46 Min.
25% of lag time = 0.61 Min.
40% of lag time = 0.98 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.40	31.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	6.50	85.80

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 6.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 6.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	56.00	0.900

Total Area Entered = 13.20(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	0.900	0.097	1.000	0.097
					Sum (F) =	0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097
Minimum soil loss rate ((In/Hr)) = 0.049
(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
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	203.515	42.976	5.717
2	0.167	407.030	49.679	6.609
3	0.250	610.545	6.320	0.841
4	0.333	814.060	1.024	0.136
			Sum = 100.000 Sum=	13.303

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	0.052	(0.172)	0.009	0.043
2	0.17	0.07	0.052	(0.171)	0.009	0.043
3	0.25	0.07	0.052	(0.171)	0.009	0.043
4	0.33	0.10	0.078	(0.170)	0.014	0.064
5	0.42	0.10	0.078	(0.169)	0.014	0.064
6	0.50	0.10	0.078	(0.169)	0.014	0.064
7	0.58	0.10	0.078	(0.168)	0.014	0.064
8	0.67	0.10	0.078	(0.167)	0.014	0.064
9	0.75	0.10	0.078	(0.167)	0.014	0.064
10	0.83	0.13	0.104	(0.166)	0.019	0.085
11	0.92	0.13	0.104	(0.165)	0.019	0.085
12	1.00	0.13	0.104	(0.165)	0.019	0.085
13	1.08	0.10	0.078	(0.164)	0.014	0.064
14	1.17	0.10	0.078	(0.163)	0.014	0.064
15	1.25	0.10	0.078	(0.163)	0.014	0.064
16	1.33	0.10	0.078	(0.162)	0.014	0.064
17	1.42	0.10	0.078	(0.162)	0.014	0.064
18	1.50	0.10	0.078	(0.161)	0.014	0.064
19	1.58	0.10	0.078	(0.160)	0.014	0.064
20	1.67	0.10	0.078	(0.160)	0.014	0.064
21	1.75	0.10	0.078	(0.159)	0.014	0.064
22	1.83	0.13	0.104	(0.158)	0.019	0.085
23	1.92	0.13	0.104	(0.158)	0.019	0.085
24	2.00	0.13	0.104	(0.157)	0.019	0.085
25	2.08	0.13	0.104	(0.156)	0.019	0.085
26	2.17	0.13	0.104	(0.156)	0.019	0.085
27	2.25	0.13	0.104	(0.155)	0.019	0.085
28	2.33	0.13	0.104	(0.155)	0.019	0.085
29	2.42	0.13	0.104	(0.154)	0.019	0.085
30	2.50	0.13	0.104	(0.153)	0.019	0.085
31	2.58	0.17	0.130	(0.153)	0.023	0.107
32	2.67	0.17	0.130	(0.152)	0.023	0.107
33	2.75	0.17	0.130	(0.151)	0.023	0.107
34	2.83	0.17	0.130	(0.151)	0.023	0.107
35	2.92	0.17	0.130	(0.150)	0.023	0.107
36	3.00	0.17	0.130	(0.150)	0.023	0.107
37	3.08	0.17	0.130	(0.149)	0.023	0.107
38	3.17	0.17	0.130	(0.148)	0.023	0.107
39	3.25	0.17	0.130	(0.148)	0.023	0.107
40	3.33	0.17	0.130	(0.147)	0.023	0.107
41	3.42	0.17	0.130	(0.146)	0.023	0.107
42	3.50	0.17	0.130	(0.146)	0.023	0.107
43	3.58	0.17	0.130	(0.145)	0.023	0.107
44	3.67	0.17	0.130	(0.145)	0.023	0.107
45	3.75	0.17	0.130	(0.144)	0.023	0.107
46	3.83	0.20	0.156	(0.143)	0.028	0.128

47	3.92	0.20	0.156	(0.143)	0.028	0.128
48	4.00	0.20	0.156	(0.142)	0.028	0.128
49	4.08	0.20	0.156	(0.142)	0.028	0.128
50	4.17	0.20	0.156	(0.141)	0.028	0.128
51	4.25	0.20	0.156	(0.140)	0.028	0.128
52	4.33	0.23	0.182	(0.140)	0.033	0.149
53	4.42	0.23	0.182	(0.139)	0.033	0.149
54	4.50	0.23	0.182	(0.139)	0.033	0.149
55	4.58	0.23	0.182	(0.138)	0.033	0.149
56	4.67	0.23	0.182	(0.137)	0.033	0.149
57	4.75	0.23	0.182	(0.137)	0.033	0.149
58	4.83	0.27	0.208	(0.136)	0.037	0.171
59	4.92	0.27	0.208	(0.136)	0.037	0.171
60	5.00	0.27	0.208	(0.135)	0.037	0.171
61	5.08	0.20	0.156	(0.134)	0.028	0.128
62	5.17	0.20	0.156	(0.134)	0.028	0.128
63	5.25	0.20	0.156	(0.133)	0.028	0.128
64	5.33	0.23	0.182	(0.133)	0.033	0.149
65	5.42	0.23	0.182	(0.132)	0.033	0.149
66	5.50	0.23	0.182	(0.132)	0.033	0.149
67	5.58	0.27	0.208	(0.131)	0.037	0.171
68	5.67	0.27	0.208	(0.130)	0.037	0.171
69	5.75	0.27	0.208	(0.130)	0.037	0.171
70	5.83	0.27	0.208	(0.129)	0.037	0.171
71	5.92	0.27	0.208	(0.129)	0.037	0.171
72	6.00	0.27	0.208	(0.128)	0.037	0.171
73	6.08	0.30	0.234	(0.128)	0.042	0.192
74	6.17	0.30	0.234	(0.127)	0.042	0.192
75	6.25	0.30	0.234	(0.126)	0.042	0.192
76	6.33	0.30	0.234	(0.126)	0.042	0.192
77	6.42	0.30	0.234	(0.125)	0.042	0.192
78	6.50	0.30	0.234	(0.125)	0.042	0.192
79	6.58	0.33	0.260	(0.124)	0.047	0.213
80	6.67	0.33	0.260	(0.124)	0.047	0.213
81	6.75	0.33	0.260	(0.123)	0.047	0.213
82	6.83	0.33	0.260	(0.122)	0.047	0.213
83	6.92	0.33	0.260	(0.122)	0.047	0.213
84	7.00	0.33	0.260	(0.121)	0.047	0.213
85	7.08	0.33	0.260	(0.121)	0.047	0.213
86	7.17	0.33	0.260	(0.120)	0.047	0.213
87	7.25	0.33	0.260	(0.120)	0.047	0.213
88	7.33	0.37	0.286	(0.119)	0.051	0.235
89	7.42	0.37	0.286	(0.119)	0.051	0.235
90	7.50	0.37	0.286	(0.118)	0.051	0.235
91	7.58	0.40	0.312	(0.118)	0.056	0.256
92	7.67	0.40	0.312	(0.117)	0.056	0.256
93	7.75	0.40	0.312	(0.116)	0.056	0.256
94	7.83	0.43	0.338	(0.116)	0.061	0.277
95	7.92	0.43	0.338	(0.115)	0.061	0.277
96	8.00	0.43	0.338	(0.115)	0.061	0.277
97	8.08	0.50	0.390	(0.114)	0.070	0.320
98	8.17	0.50	0.390	(0.114)	0.070	0.320
99	8.25	0.50	0.390	(0.113)	0.070	0.320
100	8.33	0.50	0.390	(0.113)	0.070	0.320
101	8.42	0.50	0.390	(0.112)	0.070	0.320
102	8.50	0.50	0.390	(0.112)	0.070	0.320
103	8.58	0.53	0.416	(0.111)	0.075	0.341
104	8.67	0.53	0.416	(0.111)	0.075	0.341
105	8.75	0.53	0.416	(0.110)	0.075	0.341
106	8.83	0.57	0.442	(0.110)	0.080	0.362
107	8.92	0.57	0.442	(0.109)	0.080	0.362
108	9.00	0.57	0.442	(0.109)	0.080	0.362
109	9.08	0.63	0.494	(0.108)	0.089	0.405
110	9.17	0.63	0.494	(0.108)	0.089	0.405
111	9.25	0.63	0.494	(0.107)	0.089	0.405
112	9.33	0.67	0.520	(0.107)	0.094	0.426
113	9.42	0.67	0.520	(0.106)	0.094	0.426
114	9.50	0.67	0.520	(0.105)	0.094	0.426
115	9.58	0.70	0.546	(0.105)	0.098	0.448
116	9.67	0.70	0.546	(0.104)	0.098	0.448
117	9.75	0.70	0.546	(0.104)	0.098	0.448
118	9.83	0.73	0.572	(0.103)	0.103	0.469
119	9.92	0.73	0.572	(0.103)	0.103	0.469
120	10.00	0.73	0.572	0.102	(0.103)	0.469
121	10.08	0.50	0.390	(0.102)	0.070	0.320

122	10.17	0.50	0.390	(0.101)	0.070	0.320
123	10.25	0.50	0.390	(0.101)	0.070	0.320
124	10.33	0.50	0.390	(0.101)	0.070	0.320
125	10.42	0.50	0.390	(0.100)	0.070	0.320
126	10.50	0.50	0.390	(0.100)	0.070	0.320
127	10.58	0.67	0.520	(0.099)	0.094	0.426
128	10.67	0.67	0.520	(0.099)	0.094	0.426
129	10.75	0.67	0.520	(0.098)	0.094	0.426
130	10.83	0.67	0.520	(0.098)	0.094	0.426
131	10.92	0.67	0.520	(0.097)	0.094	0.426
132	11.00	0.67	0.520	(0.097)	0.094	0.426
133	11.08	0.63	0.494	(0.096)	0.089	0.405
134	11.17	0.63	0.494	(0.096)	0.089	0.405
135	11.25	0.63	0.494	(0.095)	0.089	0.405
136	11.33	0.63	0.494	(0.095)	0.089	0.405
137	11.42	0.63	0.494	(0.094)	0.089	0.405
138	11.50	0.63	0.494	(0.094)	0.089	0.405
139	11.58	0.57	0.442	(0.093)	0.080	0.362
140	11.67	0.57	0.442	(0.093)	0.080	0.362
141	11.75	0.57	0.442	(0.092)	0.080	0.362
142	11.83	0.60	0.468	(0.092)	0.084	0.384
143	11.92	0.60	0.468	(0.092)	0.084	0.384
144	12.00	0.60	0.468	(0.091)	0.084	0.384
145	12.08	0.83	0.650	0.091	(0.117)	0.559
146	12.17	0.83	0.650	0.090	(0.117)	0.560
147	12.25	0.83	0.650	0.090	(0.117)	0.560
148	12.33	0.87	0.676	0.089	(0.122)	0.587
149	12.42	0.87	0.676	0.089	(0.122)	0.587
150	12.50	0.87	0.676	0.088	(0.122)	0.588
151	12.58	0.93	0.728	0.088	(0.131)	0.640
152	12.67	0.93	0.728	0.087	(0.131)	0.641
153	12.75	0.93	0.728	0.087	(0.131)	0.641
154	12.83	0.97	0.754	0.087	(0.136)	0.667
155	12.92	0.97	0.754	0.086	(0.136)	0.668
156	13.00	0.97	0.754	0.086	(0.136)	0.668
157	13.08	1.13	0.884	0.085	(0.159)	0.799
158	13.17	1.13	0.884	0.085	(0.159)	0.799
159	13.25	1.13	0.884	0.084	(0.159)	0.800
160	13.33	1.13	0.884	0.084	(0.159)	0.800
161	13.42	1.13	0.884	0.084	(0.159)	0.800
162	13.50	1.13	0.884	0.083	(0.159)	0.801
163	13.58	0.77	0.598	0.083	(0.108)	0.515
164	13.67	0.77	0.598	0.082	(0.108)	0.516
165	13.75	0.77	0.598	0.082	(0.108)	0.516
166	13.83	0.77	0.598	0.081	(0.108)	0.517
167	13.92	0.77	0.598	0.081	(0.108)	0.517
168	14.00	0.77	0.598	0.081	(0.108)	0.517
169	14.08	0.90	0.702	0.080	(0.126)	0.622
170	14.17	0.90	0.702	0.080	(0.126)	0.622
171	14.25	0.90	0.702	0.079	(0.126)	0.623
172	14.33	0.87	0.676	0.079	(0.122)	0.597
173	14.42	0.87	0.676	0.079	(0.122)	0.597
174	14.50	0.87	0.676	0.078	(0.122)	0.598
175	14.58	0.87	0.676	0.078	(0.122)	0.598
176	14.67	0.87	0.676	0.077	(0.122)	0.599
177	14.75	0.87	0.676	0.077	(0.122)	0.599
178	14.83	0.83	0.650	0.077	(0.117)	0.573
179	14.92	0.83	0.650	0.076	(0.117)	0.574
180	15.00	0.83	0.650	0.076	(0.117)	0.574
181	15.08	0.80	0.624	0.075	(0.112)	0.549
182	15.17	0.80	0.624	0.075	(0.112)	0.549
183	15.25	0.80	0.624	0.075	(0.112)	0.549
184	15.33	0.77	0.598	0.074	(0.108)	0.524
185	15.42	0.77	0.598	0.074	(0.108)	0.524
186	15.50	0.77	0.598	0.073	(0.108)	0.524
187	15.58	0.63	0.494	0.073	(0.089)	0.421
188	15.67	0.63	0.494	0.073	(0.089)	0.421
189	15.75	0.63	0.494	0.072	(0.089)	0.422
190	15.83	0.63	0.494	0.072	(0.089)	0.422
191	15.92	0.63	0.494	0.072	(0.089)	0.422
192	16.00	0.63	0.494	0.071	(0.089)	0.423
193	16.08	0.13	0.104	(0.071)	0.019	0.085
194	16.17	0.13	0.104	(0.071)	0.019	0.085
195	16.25	0.13	0.104	(0.070)	0.019	0.085
196	16.33	0.13	0.104	(0.070)	0.019	0.085

197	16.42	0.13	0.104	(0.069)	0.019	0.085
198	16.50	0.13	0.104	(0.069)	0.019	0.085
199	16.58	0.10	0.078	(0.069)	0.014	0.064
200	16.67	0.10	0.078	(0.068)	0.014	0.064
201	16.75	0.10	0.078	(0.068)	0.014	0.064
202	16.83	0.10	0.078	(0.068)	0.014	0.064
203	16.92	0.10	0.078	(0.067)	0.014	0.064
204	17.00	0.10	0.078	(0.067)	0.014	0.064
205	17.08	0.17	0.130	(0.067)	0.023	0.107
206	17.17	0.17	0.130	(0.066)	0.023	0.107
207	17.25	0.17	0.130	(0.066)	0.023	0.107
208	17.33	0.17	0.130	(0.066)	0.023	0.107
209	17.42	0.17	0.130	(0.065)	0.023	0.107
210	17.50	0.17	0.130	(0.065)	0.023	0.107
211	17.58	0.17	0.130	(0.065)	0.023	0.107
212	17.67	0.17	0.130	(0.064)	0.023	0.107
213	17.75	0.17	0.130	(0.064)	0.023	0.107
214	17.83	0.13	0.104	(0.064)	0.019	0.085
215	17.92	0.13	0.104	(0.063)	0.019	0.085
216	18.00	0.13	0.104	(0.063)	0.019	0.085
217	18.08	0.13	0.104	(0.063)	0.019	0.085
218	18.17	0.13	0.104	(0.063)	0.019	0.085
219	18.25	0.13	0.104	(0.062)	0.019	0.085
220	18.33	0.13	0.104	(0.062)	0.019	0.085
221	18.42	0.13	0.104	(0.062)	0.019	0.085
222	18.50	0.13	0.104	(0.061)	0.019	0.085
223	18.58	0.10	0.078	(0.061)	0.014	0.064
224	18.67	0.10	0.078	(0.061)	0.014	0.064
225	18.75	0.10	0.078	(0.060)	0.014	0.064
226	18.83	0.07	0.052	(0.060)	0.009	0.043
227	18.92	0.07	0.052	(0.060)	0.009	0.043
228	19.00	0.07	0.052	(0.060)	0.009	0.043
229	19.08	0.10	0.078	(0.059)	0.014	0.064
230	19.17	0.10	0.078	(0.059)	0.014	0.064
231	19.25	0.10	0.078	(0.059)	0.014	0.064
232	19.33	0.13	0.104	(0.058)	0.019	0.085
233	19.42	0.13	0.104	(0.058)	0.019	0.085
234	19.50	0.13	0.104	(0.058)	0.019	0.085
235	19.58	0.10	0.078	(0.058)	0.014	0.064
236	19.67	0.10	0.078	(0.057)	0.014	0.064
237	19.75	0.10	0.078	(0.057)	0.014	0.064
238	19.83	0.07	0.052	(0.057)	0.009	0.043
239	19.92	0.07	0.052	(0.057)	0.009	0.043
240	20.00	0.07	0.052	(0.056)	0.009	0.043
241	20.08	0.10	0.078	(0.056)	0.014	0.064
242	20.17	0.10	0.078	(0.056)	0.014	0.064
243	20.25	0.10	0.078	(0.056)	0.014	0.064
244	20.33	0.10	0.078	(0.055)	0.014	0.064
245	20.42	0.10	0.078	(0.055)	0.014	0.064
246	20.50	0.10	0.078	(0.055)	0.014	0.064
247	20.58	0.10	0.078	(0.055)	0.014	0.064
248	20.67	0.10	0.078	(0.054)	0.014	0.064
249	20.75	0.10	0.078	(0.054)	0.014	0.064
250	20.83	0.07	0.052	(0.054)	0.009	0.043
251	20.92	0.07	0.052	(0.054)	0.009	0.043
252	21.00	0.07	0.052	(0.054)	0.009	0.043
253	21.08	0.10	0.078	(0.053)	0.014	0.064
254	21.17	0.10	0.078	(0.053)	0.014	0.064
255	21.25	0.10	0.078	(0.053)	0.014	0.064
256	21.33	0.07	0.052	(0.053)	0.009	0.043
257	21.42	0.07	0.052	(0.053)	0.009	0.043
258	21.50	0.07	0.052	(0.052)	0.009	0.043
259	21.58	0.10	0.078	(0.052)	0.014	0.064
260	21.67	0.10	0.078	(0.052)	0.014	0.064
261	21.75	0.10	0.078	(0.052)	0.014	0.064
262	21.83	0.07	0.052	(0.052)	0.009	0.043
263	21.92	0.07	0.052	(0.051)	0.009	0.043
264	22.00	0.07	0.052	(0.051)	0.009	0.043
265	22.08	0.10	0.078	(0.051)	0.014	0.064
266	22.17	0.10	0.078	(0.051)	0.014	0.064
267	22.25	0.10	0.078	(0.051)	0.014	0.064
268	22.33	0.07	0.052	(0.051)	0.009	0.043
269	22.42	0.07	0.052	(0.050)	0.009	0.043
270	22.50	0.07	0.052	(0.050)	0.009	0.043
271	22.58	0.07	0.052	(0.050)	0.009	0.043

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272  22.67     0.07      0.052       (  0.050)       0.009        0.043
273  22.75     0.07      0.052       (  0.050)       0.009        0.043
274  22.83     0.07      0.052       (  0.050)       0.009        0.043
275  22.92     0.07      0.052       (  0.050)       0.009        0.043
276  23.00     0.07      0.052       (  0.049)       0.009        0.043
277  23.08     0.07      0.052       (  0.049)       0.009        0.043
278  23.17     0.07      0.052       (  0.049)       0.009        0.043
279  23.25     0.07      0.052       (  0.049)       0.009        0.043
280  23.33     0.07      0.052       (  0.049)       0.009        0.043
281  23.42     0.07      0.052       (  0.049)       0.009        0.043
282  23.50     0.07      0.052       (  0.049)       0.009        0.043
283  23.58     0.07      0.052       (  0.049)       0.009        0.043
284  23.67     0.07      0.052       (  0.049)       0.009        0.043
285  23.75     0.07      0.052       (  0.049)       0.009        0.043
286  23.83     0.07      0.052       (  0.049)       0.009        0.043
287  23.92     0.07      0.052       (  0.049)       0.009        0.043
288  24.00     0.07      0.052       (  0.049)       0.009        0.043
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    65.9
      Flood volume = Effective rainfall      5.49(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       6.0(Ac.Ft)
      Total soil loss =      1.01(In)
      Total soil loss =     1.113(Ac.Ft)
      Total rainfall =      6.50(In)
      Flood volume =      262981.8 Cubic Feet
      Total soil loss =       48464.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =     10.656(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        5.0      10.0      15.0      20.0
 ---------------------------------------------------------------------------
   0+ 5       0.0017      0.24  Q         |          |          |          |
   0+10       0.0053      0.53  VQ        |          |          |          |
   0+15       0.0092      0.56  VQ        |          |          |          |
   0+20       0.0139      0.69  VQ        |          |          |          |
   0+25       0.0196      0.83  VQ        |          |          |          |
   0+30       0.0255      0.85  VQ        |          |          |          |
   0+35       0.0313      0.85  VQ        |          |          |          |
   0+40       0.0372      0.85  VQ        |          |          |          |
   0+45       0.0431      0.85  VQ        |          |          |          |
   0+50       0.0498      0.97  VQ        |          |          |          |
   0+55       0.0574      1.11  V Q       |          |          |          |
   1+ 0       0.0652      1.13  V Q       |          |          |          |
   1+ 5       0.0722      1.01  V Q       |          |          |          |
   1+10       0.0782      0.87  VQ        |          |          |          |
   1+15       0.0841      0.85  VQ        |          |          |          |
   1+20       0.0900      0.85  VQ        |          |          |          |
   1+25       0.0958      0.85  VQ        |          |          |          |
   1+30       0.1017      0.85  VQ        |          |          |          |
   1+35       0.1076      0.85  VQ        |          |          |          |
   1+40       0.1134      0.85  VQ        |          |          |          |
   1+45       0.1193      0.85  VQ        |          |          |          |
   1+50       0.1260      0.97  VQ        |          |          |          |
   1+55       0.1337      1.11  V Q       |          |          |          |
   2+ 0       0.1415      1.13  V Q       |          |          |          |
   2+ 5       0.1493      1.14  V Q       |          |          |          |
   2+10       0.1571      1.14  |VQ       |          |          |          |
   2+15       0.1649      1.14  |VQ       |          |          |          |
   2+20       0.1727      1.14  |VQ       |          |          |          |
   2+25       0.1805      1.14  |VQ       |          |          |          |
   2+30       0.1884      1.14  |VQ       |          |          |          |
   2+35       0.1970      1.26  |VQ       |          |          |          |
   2+40       0.2066      1.40  |VQ       |          |          |          |
   2+45       0.2164      1.42  |VQ       |          |          |          |
   2+50       0.2262      1.42  |VQ       |          |          |          |
   2+55       0.2359      1.42  |VQ       |          |          |          |
   3+ 0       0.2457      1.42  |VQ       |          |          |          |
   3+ 5       0.2555      1.42  |VQ       |          |          |          |
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3+10       0.2653      1.42  |VQ        |          |          |          |
3+15       0.2750      1.42  |VQ        |          |          |          |
3+20       0.2848      1.42  |VQ        |          |          |          |
3+25       0.2946      1.42  |VQ        |          |          |          |
3+30       0.3043      1.42  | Q        |          |          |          |
3+35       0.3141      1.42  | Q        |          |          |          |
3+40       0.3239      1.42  | Q        |          |          |          |
3+45       0.3337      1.42  | Q        |          |          |          |
3+50       0.3443      1.54  | VQ       |          |          |          |
3+55       0.3558      1.68  | VQ       |          |          |          |
4+ 0       0.3676      1.70  | VQ       |          |          |          |
4+ 5       0.3793      1.70  | VQ       |          |          |          |
4+10       0.3910      1.70  | VQ       |          |          |          |
4+15       0.4027      1.70  | VQ       |          |          |          |
4+20       0.4153      1.82  | VQ       |          |          |          |
4+25       0.4288      1.97  | VQ       |          |          |          |
4+30       0.4425      1.98  | VQ       |          |          |          |
4+35       0.4562      1.99  |  Q       |          |          |          |
4+40       0.4699      1.99  |  Q       |          |          |          |
4+45       0.4835      1.99  |  Q       |          |          |          |
4+50       0.4981      2.11  |  VQ      |          |          |          |
4+55       0.5135      2.25  |  VQ      |          |          |          |
5+ 0       0.5292      2.27  |  VQ      |          |          |          |
5+ 5       0.5431      2.03  |  VQ      |          |          |          |
5+10       0.5551      1.74  |  Q       |          |          |          |
5+15       0.5669      1.71  |  Q       |          |          |          |
5+20       0.5795      1.82  |  Q       |          |          |          |
5+25       0.5930      1.97  |  Q       |          |          |          |
5+30       0.6067      1.98  |  QV      |          |          |          |
5+35       0.6212      2.11  |   Q      |          |          |          |
5+40       0.6367      2.25  |   Q      |          |          |          |
5+45       0.6523      2.27  |   Q      |          |          |          |
5+50       0.6679      2.27  |   Q      |          |          |          |
5+55       0.6835      2.27  |   Q      |          |          |          |
6+ 0       0.6992      2.27  |   Q      |          |          |          |
6+ 5       0.7157      2.39  |   Q      |          |          |          |
6+10       0.7331      2.53  |   VQ     |          |          |          |
6+15       0.7507      2.55  |   VQ     |          |          |          |
6+20       0.7683      2.55  |    Q     |          |          |          |
6+25       0.7858      2.55  |    Q     |          |          |          |
6+30       0.8034      2.55  |    Q     |          |          |          |
6+35       0.8219      2.68  |    Q     |          |          |          |
6+40       0.8413      2.82  |    Q     |          |          |          |
6+45       0.8608      2.83  |    Q     |          |          |          |
6+50       0.8803      2.84  |    Q     |          |          |          |
6+55       0.8999      2.84  |    Q     |          |          |          |
7+ 0       0.9194      2.84  |    QV    |          |          |          |
7+ 5       0.9390      2.84  |    QV    |          |          |          |
7+10       0.9585      2.84  |    QV    |          |          |          |
7+15       0.9780      2.84  |    QV    |          |          |          |
7+20       0.9984      2.96  |    QV    |          |          |          |
7+25       1.0198      3.10  |     Q    |          |          |          |
7+30       1.0413      3.12  |     Q    |          |          |          |
7+35       1.0636      3.24  |     QV   |          |          |          |
7+40       1.0869      3.38  |     QV   |          |          |          |
7+45       1.1103      3.40  |     QV   |          |          |          |
7+50       1.1346      3.53  |      Q   |          |          |          |
7+55       1.1599      3.67  |      Q   |          |          |          |
8+ 0       1.1853      3.69  |      Q   |          |          |          |
8+ 5       1.2124      3.93  |      QV  |          |          |          |
8+10       1.2414      4.21  |       Q  |          |          |          |
8+15       1.2707      4.25  |       Q  |          |          |          |
8+20       1.3000      4.26  |       Q  |          |          |          |
8+25       1.3293      4.26  |       Q  |          |          |          |
8+30       1.3586      4.26  |       QV |          |          |          |
8+35       1.3888      4.38  |       QV |          |          |          |
8+40       1.4199      4.52  |        Q |          |          |          |
8+45       1.4511      4.54  |        Q |          |          |          |
8+50       1.4832      4.66  |        Q |          |          |          |
8+55       1.5163      4.80  |        QV          |          |          |
9+ 0       1.5495      4.82  |        QV          |          |          |
9+ 5       1.5844      5.07  |         Q          |          |          |
9+10       1.6213      5.35  |         Q          |          |          |
9+15       1.6584      5.39  |         Q          |          |          |
9+20       1.6963      5.51  |          |Q        |          |          |
```
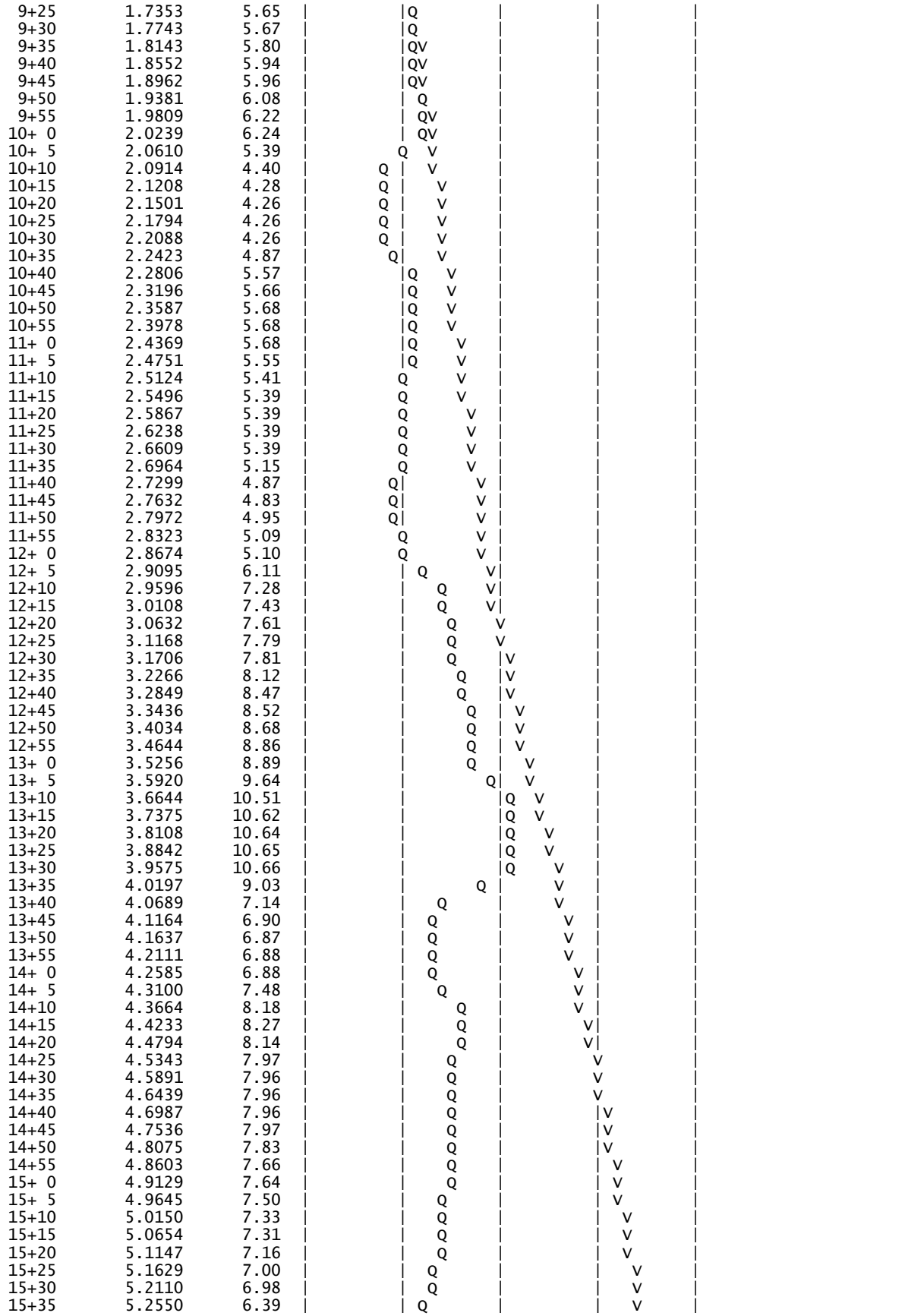
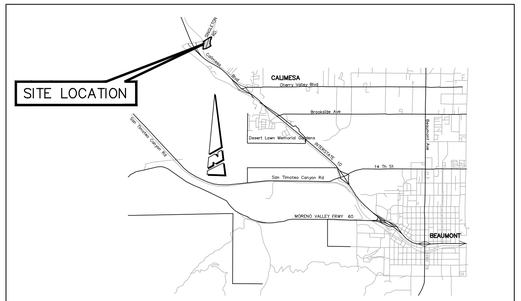



15+40	5.2943	5.71	|	Q	|	|	V |
15+45	5.3330	5.62	|	Q	|	|	V |
15+50	5.3716	5.61	|	Q	|	|	V |
15+55	5.4103	5.62	|	Q	|	|	V |
16+ 0	5.4491	5.62	|	Q	|	|	V |
16+ 5	5.4745	3.70	| Q	|	|	|	V |
16+10	5.4846	1.46	| Q	|	|	|	V |
16+15	5.4927	1.18	| Q	|	|	|	V |
16+20	5.5006	1.14	| Q	|	|	|	V |
16+25	5.5084	1.14	| Q	|	|	|	V |
16+30	5.5162	1.14	| Q	|	|	|	V |
16+35	5.5232	1.01	| Q	|	|	|	V |
16+40	5.5292	0.87	|Q	|	|	|	V |
16+45	5.5351	0.85	|Q	|	|	|	V |
16+50	5.5409	0.85	|Q	|	|	|	V |
16+55	5.5468	0.85	|Q	|	|	|	V |
17+ 0	5.5526	0.85	|Q	|	|	|	V |
17+ 5	5.5602	1.10	| Q	|	|	|	V |
17+10	5.5697	1.38	| Q	|	|	|	V |
17+15	5.5794	1.41	| Q	|	|	|	V |
17+20	5.5892	1.42	| Q	|	|	|	V |
17+25	5.5989	1.42	| Q	|	|	|	V |
17+30	5.6087	1.42	| Q	|	|	|	V |
17+35	5.6185	1.42	| Q	|	|	|	V |
17+40	5.6283	1.42	| Q	|	|	|	V |
17+45	5.6380	1.42	| Q	|	|	|	V |
17+50	5.6470	1.30	| Q	|	|	|	V |
17+55	5.6549	1.16	| Q	|	|	|	V |
18+ 0	5.6628	1.14	| Q	|	|	|	V |
18+ 5	5.6706	1.14	| Q	|	|	|	V |
18+10	5.6784	1.14	| Q	|	|	|	V |
18+15	5.6862	1.14	| Q	|	|	|	V |
18+20	5.6940	1.14	| Q	|	|	|	V |
18+25	5.7018	1.14	| Q	|	|	|	V |
18+30	5.7097	1.14	| Q	|	|	|	V |
18+35	5.7166	1.01	| Q	|	|	|	V |
18+40	5.7226	0.87	|Q	|	|	|	V |
18+45	5.7285	0.85	|Q	|	|	|	V |
18+50	5.7336	0.73	|Q	|	|	|	V |
18+55	5.7376	0.59	|Q	|	|	|	V |
19+ 0	5.7415	0.57	|Q	|	|	|	V |
19+ 5	5.7463	0.69	|Q	|	|	|	V |
19+10	5.7520	0.83	|Q	|	|	|	V |
19+15	5.7578	0.85	|Q	|	|	|	V |
19+20	5.7645	0.97	|Q	|	|	|	V |
19+25	5.7722	1.11	| Q	|	|	|	V |
19+30	5.7800	1.13	| Q	|	|	|	V |
19+35	5.7870	1.01	| Q	|	|	|	V |
19+40	5.7930	0.87	|Q	|	|	|	V |
19+45	5.7989	0.85	|Q	|	|	|	V |
19+50	5.8039	0.73	|Q	|	|	|	V |
19+55	5.8080	0.59	|Q	|	|	|	V |
20+ 0	5.8119	0.57	|Q	|	|	|	V |
20+ 5	5.8166	0.69	|Q	|	|	|	V |
20+10	5.8224	0.83	|Q	|	|	|	V |
20+15	5.8282	0.85	|Q	|	|	|	V |
20+20	5.8341	0.85	|Q	|	|	|	V |
20+25	5.8399	0.85	|Q	|	|	|	V |
20+30	5.8458	0.85	|Q	|	|	|	V |
20+35	5.8516	0.85	|Q	|	|	|	V |
20+40	5.8575	0.85	|Q	|	|	|	V |
20+45	5.8634	0.85	|Q	|	|	|	V |
20+50	5.8684	0.73	|Q	|	|	|	V |
20+55	5.8724	0.59	|Q	|	|	|	V |
21+ 0	5.8764	0.57	|Q	|	|	|	V |
21+ 5	5.8811	0.69	|Q	|	|	|	V |
21+10	5.8868	0.83	|Q	|	|	|	V|
21+15	5.8927	0.85	|Q	|	|	|	V|
21+20	5.8977	0.73	|Q	|	|	|	V|
21+25	5.9018	0.59	|Q	|	|	|	V|
21+30	5.9057	0.57	|Q	|	|	|	V|
21+35	5.9104	0.69	|Q	|	|	|	V|
21+40	5.9162	0.83	|Q	|	|	|	V|
21+45	5.9220	0.85	|Q	|	|	|	V|
21+50	5.9270	0.73	|Q	|	|	|	V|

```
   21+55       5.9311      0.59  |Q        |         |         |        V|
   22+ 0       5.9350      0.57  |Q        |         |         |        V|
   22+ 5       5.9398      0.69  |Q        |         |         |        V|
   22+10       5.9455      0.83  |Q        |         |         |        V|
   22+15       5.9513      0.85  |Q        |         |         |        V|
   22+20       5.9563      0.73  |Q        |         |         |        V|
   22+25       5.9604      0.59  |Q        |         |         |        V|
   22+30       5.9643      0.57  |Q        |         |         |        V|
   22+35       5.9682      0.57  |Q        |         |         |        V|
   22+40       5.9721      0.57  |Q        |         |         |        V|
   22+45       5.9760      0.57  |Q        |         |         |        V|
   22+50       5.9800      0.57  |Q        |         |         |        V|
   22+55       5.9839      0.57  |Q        |         |         |        V|
   23+ 0       5.9878      0.57  |Q        |         |         |        V|
   23+ 5       5.9917      0.57  |Q        |         |         |        V|
   23+10       5.9956      0.57  |Q        |         |         |        V|
   23+15       5.9995      0.57  |Q        |         |         |        V|
   23+20       6.0034      0.57  |Q        |         |         |        V|
   23+25       6.0073      0.57  |Q        |         |         |        V|
   23+30       6.0112      0.57  |Q        |         |         |        V|
   23+35       6.0151      0.57  |Q        |         |         |        V|
   23+40       6.0190      0.57  |Q        |         |         |        V|
   23+45       6.0229      0.57  |Q        |         |         |        V|
   23+50       6.0269      0.57  |Q        |         |         |        V|
   23+55       6.0308      0.57  |Q        |         |         |        V|
   24+ 0       6.0347      0.57  |Q        |         |         |        V|
   24+ 5       6.0369      0.32  Q         |         |         |        V|
   24+10       6.0372      0.04  Q         |         |         |        V|
   24+15       6.0372      0.01  Q         |         |         |        V|
-------------------------------------------------------------------------
```

UNIT HYDROGRAPH HYDROLOGY MAPS



VICINITY MAP
N.T.S.
T2S, R2W, SECTION 24 & 25

SINGLETON RD
BECKWITH AVE
INTERSTATE 10
CALIMESA BLVD
TRAILER LOT 1
TRAILER LOT 2
BUILDING 1
BUILDING 2
BUILDING 3
BUILDING 4
NOT A PART SURROUNDING PARCEL

EXISTING CONDITION						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA (AC)	13.2	15.9	13.7	15.6	10.1	27.2
L_T (FT)	1,010	1,310	850	1,100	1,020	1530
L_{CA} (FT)	430	750	370	360	580	520
Δ H	29.1	34.8	30.4	51.2	27.0	72.8

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION (FT)
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- FLOWLINE (PROPOSED)
- PROJECT BOUNDARY
- NRCS SOIL BOUNDARY

N W E S WEBB

1" = 150'
150 0 150 300 450

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH
PRELIMINARY UNIT HYDROGRAPH EXHIBIT
EXISTING CONDITION

SCALE:	1" = 150'
DATE:	5/18/2023
DESIGNED:	AV
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.	2022-0085
SHEET	1
OF	2 SHEETS
DWG. NO.	

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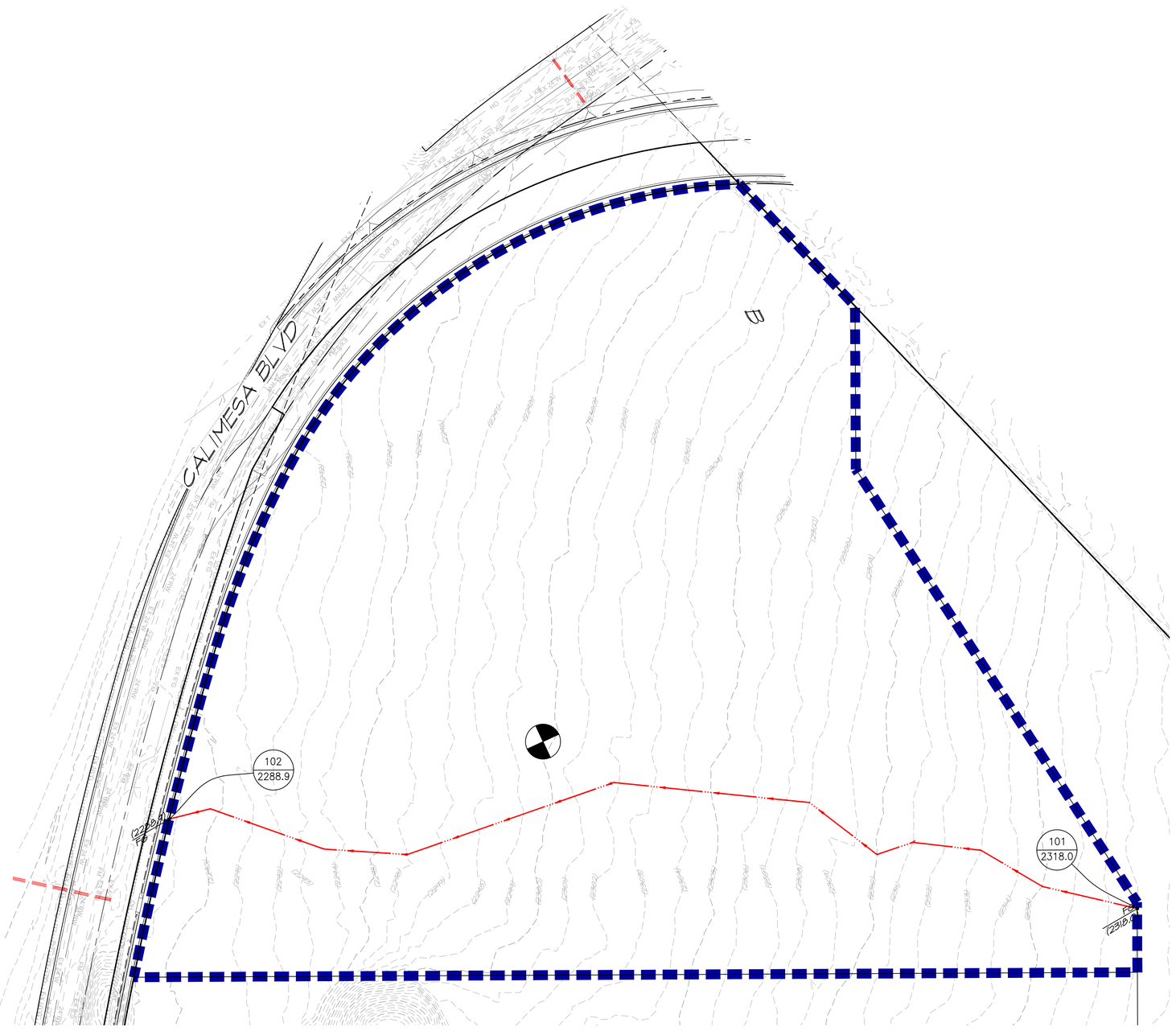

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION (FT)
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- FLOWLINE (PROPOSED)
- PROJECT BOUNDARY
- NRCS SOIL BOUNDARY

EXISTING CONDITION	
DRAINAGE AREA	1
TOTAL AREA (AC)	13.2
L_T (FT)	1,070
L_{CA} (FT)	430
Δ H	29.1

SOIL TYPE (%)	
A	0
B	100
C	0
D	0

1" = 60'
60 0 60 120 180

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH – BUILDING 1
PRELIMINARY UNIT HYDROGRAPH EXHIBIT
EXISTING CONDITION

SCALE:	1" = 60'
DATE:	5/18/2023
DESIGNED:	AV
CHECKED:	SKK
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.	2022-0085
SHEET	2
OF	2 SHEETS
DWG. NO.	

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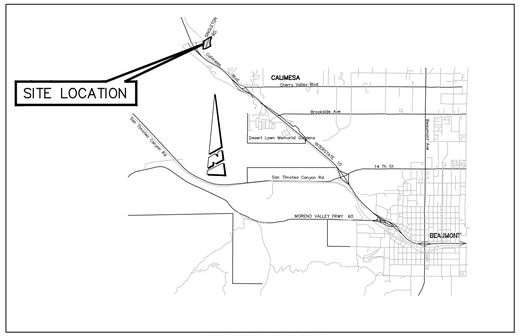

VICINITY MAP

N.T.S.

T2S, R2W, SECTION 24 & 25

SINGLETON RD

BECKWITH AVE

INTERSTATE 10

CALIMESA BLVD

BUILDING 1

BUILDING 2

BUILDING 3

BUILDING 4

TRAILER LOT 1

TRAILER LOT 2

FUTURE HDR

101	2306.0
102	2284.2
201	2302.6
202	2283.7
301	2314.1
302	2291.0
401	2307.0
402	2290.3
501	2321.3
502	2303.9
601	2382.7
602	2302.4

EXISTING CONDITION						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA (AC)	13.2	15.9	13.7	15.6	10.1	27.2
L_T (FT)	1,240	890	800	1,580	860	1,550
L_{CA} (FT)	710	400	350	710	210	510
Δ H	21.8	18.9	23.1	16.7	17.4	80.3

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION (FT)
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- FLOWLINE (PROPOSED)
- PROJECT BOUNDARY
- NRCS SOIL BOUNDARY

1" = 150'

150 0 150 300 450

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH

PRELIMINARY UNIT HYDROGRAPH EXHIBIT

DEVELOPED CONDITION CONDITION

SCALE:	1" = 150'
DATE:	6/14/2023
DESIGNED:	AV
CHECKED:	SKK
PLN CK REF:	
F.B.	

ALBERT A. WEBB ASSOCIATES
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RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O.	2022-0085
SHEET	1
OF	2 SHEETS
DWG. NO.	

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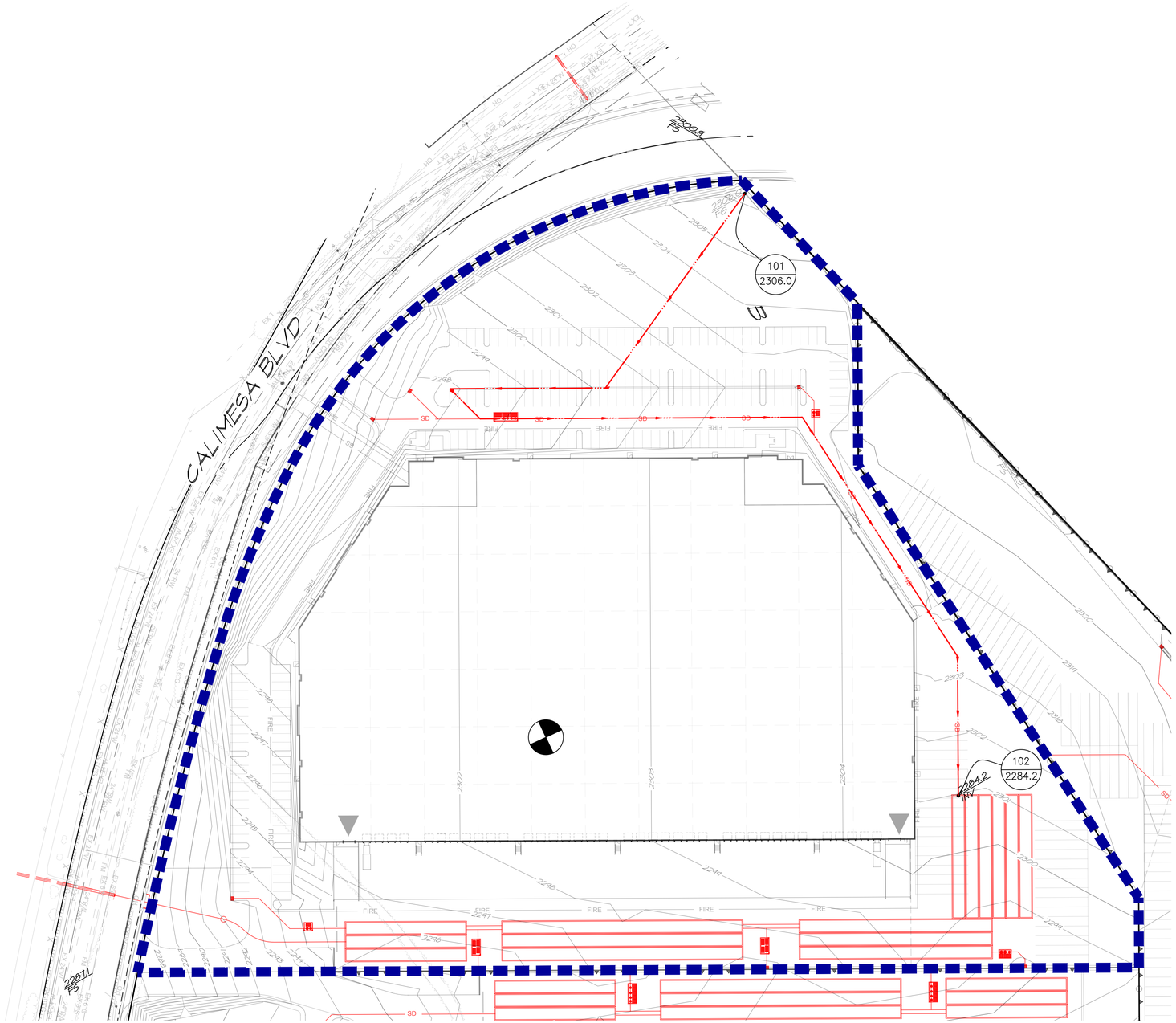
CALIMESA BLVD
101
2306.0
102
2284.2
2284.2
2287.1
FF
SD
FIRE
2300
2301
2302
2303
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APPENDIX D – REFERENCES

RELEVANT EXCERPTS AND MAPS FROM "HYDRAULIC ANALYSES FOR CULVERTS CROSSING I-10" BY JLC ENGINEERING AND CONSULTING

HYDRAULIC ANALYSES FOR CULVERTS CROSSING I-10 TPM 37862

COUNTY OF RIVERSIDE
CALIFORNIA

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DATE PREPARED:
NOVEMBER 9, 2020
REVISED:
APRIL 12, 2021

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

11/9/2020

Joseph L. Castaneda RCE 59835 | Date | Seal
Registered Civil Engineer

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I. INTRODUCTION

The purpose of this study is to analyze the existing culvert capacities crossing Interstate 10 and discharging into Tentative Tract Map 37862. The existing culverts are located along Interstate 10 between Cherry Valley Boulevard and just north of Singleton Road in the unincorporated area of Calimesa in the County of Riverside. The scope of this report will include the following:

- Determine the 100-year flow rates for the 3-hour, 6-hour and 24-hour storm durations for the existing condition watersheds tributary to the existing culverts using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Unit Hydrograph Method.
- Determine the maximum capacity for each culvert crossing Interstate 10 based upon the maximum ponded depth at the upstream culvert entrance.
- Determine the available storage upstream of the two culverts located at the low point of the freeway, and develop a storage volume vs. outflow table to be utilized in a basin routing analyses.
- Perform a routing in series analyses that incorporates the flows through the culverts to determine the actual flow rate discharging through the culverts into Tentative Tract Map 37862.

II. PROJECT SITE AND DRAINAGE OVERVIEW

A commercial development is proposed on the south easterly side of Interstate 10 between Cherry Valley Boulevard and Singleton Road, including a portion north of Singleton Road. Based upon the area of the project, a total of 8 culverts currently cross Interstate 10 and discharge into the property. Additionally, due to the larger culvert crossing in the south portion of the project site, an existing stream traverses the project site from east to west. In order to accurately model the existing stream and pipes required to connect to the existing culverts, a hydraulic analysis was required.

Figure 2 shows the location of each culvert in relation to the proposed project, Tentative Tract Map 37862. Culvert A is located at the southerly project boundary, and discharges directly into the stream traversing the site. Flows in excess of the capacity of Culvert A are conveyed to Culvert B3. Culverts D1, D2, and C collect flows and discharge to the northerly portion of the project site. Flows in excess of the capacity for Culverts D1, D2, and C will overflow to Culvert E. Flows in excess of the capacity of Culvert E and Culvert B3 will be conveyed to the low point at Culverts B1 and B2.

III. HYDROLOGY ANALYSIS

The RCFC & WCD Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the unit hydrograph method. The calculations were performed using the computer program developed by Civil Cadd/Civil Design.

The rainfall values were obtained from the Riverside County Hydrology Manual, and are summarized below:

Duration	2-Year Rainfall	100-Year Rainfall
1-Hour	0.58	1.30
3-Hour	0.90	2.13
6-Hour	1.50	3.10
24-Hour	2.75	7.00

The rainfall maps have been included as Exhibit E. The hydrologic soils were obtained from the USDA's Natural Resources Conservation Service Websoil Survey (see Exhibit D).

Five unit hydrograph watersheds were analyzed, and are shown on Exhibit A. The watersheds have been designated as Areas A, B, C, D and E. The watershed areas represent the naming convention for the downstream culverts in which the watersheds are tributary to (see Figure 2).

The unit hydrograph calculations were based upon the existing land use as determined by aerial imagery, and have been delineated on Exhibit C. The existing land uses and their corresponding impervious area and runoff index numbers are summarized below:

Land Use	Impervious Fraction	Soil "A" Runoff Index	Soil "B" Runoff Index	Soil "C" Runoff Index	Soil "D" Runoff Index
Open Space – Fair Cover	0	46	66	77	83
Open Space – Poor Cover	0	62	76	84	88
Rural Residential	0.05	46	66	77	83
1 Acre Residential	0.20	32	56	69	75
Residential Low	0.45	32	56	69	75
Residential Low Medium	0.55	32	56	69	75
Residential High	0.80	32	56	69	75
Commercial	0.90	32	56	69	75

The unit hydrograph calculations were performed for the 100-year, 3-hour, 6-hour and 24-hour duration. These unit hydrographs were used to perform basin routing in series in order to determine which duration would result in the largest flow rates through the systems. The unit hydrograph calculations have been included in Appendix A. The unit hydrograph hydrology map has been included as Exhibit A.

IV. CULVERT CAPACITIES

In order to perform the routing in series, the capacities for the culverts not located at the low point were necessary. The capacities for Culverts A, B3, C, D1, D2 and E were determined using Water Surface Profile Gradient Program iterations until the upstream water surface elevation was equal to the maximum upstream ponded depth (which was determined by the topographic mapping).

Culvert A is a double 10'W x 7'H reinforced concrete box with an existing tributary flow rate of 2,695.4 ft^3/s. A HEC-RAS analyses was performed for the channel downstream of Culvert A, and including the Culvert A crossing, as well as a portion of the channel upstream of Culvert A. A lateral weir was modeled at the culvert where flows would leave the system. Based upon the HEC-RAS results included in Appendix E, the Culvert can convey 2,633.4 ft^3/s and 62.0 ft^3/s will leave the system and be conveyed to Culvert B3.

Culvert B3 is a double 42" CMP culvert. A flow rate for Culvert B3 was not determined since it is included in the Area B watershed, therefore a capacity was determined based upon the maximum allowable ponded depth before flows would overtop to the low point for Culverts B1 and B2. The maximum allowable ponded depth is 2284.00, and the maximum flow through the culverts with an upstream elevation of 2284.00 is 236 ft^3/s per the WSPG analysis (see Appendix B.2) and the upstream water surface elevation analyses. The WSPG analyses utilized a pressure momentum calculation at the upstream end of the analyses that did not accurately represent the upstream water surface elevation, therefore a hand calculation was done and resulted in a lower water surface elevation than the WSPG analyses calculated, shown in the table below:

CULVERT B3 UPSTREAM WSE CALCULATION

WSPG US INV	Dc	Vel. Head	1.5 Vh	Dc + 1.5 Vh	Actual US WSE
2278.67	3.27	1.37	2.055	5.325	2284.00

The flows that overtop Culvert A are tributary to Culvert B3. Since only 62.0 ft^3/s is tributary to Culvert B3 and the capacity is 236 ft^3/s, the entire tributary flow will enter Culvert B3. Therefore, no flows will bypass from Culvert B3 to Culverts B1 and B2.

Culvert D1 and D2 are 30" CMP and 36" RCP, respectively, and were analyzed the same as Culvert B3 since individual flow rates to each culvert was not determined (both Culverts D1 and D2 are within the Area D watershed). Therefore, the maximum ponded depth that was contained at the upstream end of the culverts was utilized as the maximum ponded depth for the WSPG analyses. Culvert D1 can pond to elevation 2293.00 and Culvert D2 can pond to elevation 2291.00. The resulting maximum flow rates based upon these upstream elevations is 43 ft^3/s for Culvert D1 and 104 ft^3/s for

Culvert D2. The WSPG calculations have been included in Appendix B.4 and B.5, respectively. Flows that cannot be conveyed through Culverts D1 and D2 will flow along the freeway to Culvert E.

Culvert C is an 6'W x 8'H RCB with a tributary flow rate of 1,325.0 ft^3/s from Area C. A weir was analyzed at the breakout point for Culvert C, which is adjacent to Calimesa Boulevard (see Figure 3). The weir elevation is 2303.00, and based upon the WSPG Analyses, upstream water surface elevation analyses, and Weir Analyses, the maximum flow through the culvert is 914 ft^3/s with a ponded elevation of 2306.14, while the weir will convey 411 ft^3/s with a water surface elevation of 2306.14 as well. The WSPG calculations are included in Appendix B.3 and the weir analysis is included in Appendix C.2. The upstream water surface elevation based upon the WSPG calculations included a pressure/momentum calculation that raised the WSE higher than it actually is. Therefore, a hand calculation was included on the Weir Equation Analyses that more accurately represents the upstream water surface elevation, however, it is only lower by approximately 1 foot. Flows that overtop Culvert C will will overflow to Culverts D1 and D2, and then due to the limited capacity of these culverts, the flows will ultimately be conveyed along the freeway to Culvert E.

Culvert E is a 30" RCP with a tributary flow rate of 62.0 ft^3/s from Area E. A weir was analyzed with an invert elevation of 2285.00. Based upon the WSPG for Culvert E, the maximum flow rate through the culvert is 42 ft^3/s with a water surface elevation of 2285.67, while the weir can pass 20 ft^3/s with a water surface elevation of 2285.67. The WSPG calculations are included in Appendix B.6 and the weir analysis is included in Appendix C.3. Flows that cannot be conveyed through Culvert E will be conveyed to Culverts B1 and B2.

Culverts B1 and B2 are located within a low point that pass under the low point of the freeway. The culverts were used as the outflow for the final stage of the routing in series analyses. A volume vs. outflow table had to be compiled in order to accurately route the tributary flows and volume to Culverts B1 and B2. Culvert B1 is an existing double 48" CMP with an invert elevation of 2268.93 (the inverts of the two CMP culverts comprising of Culvert B1 differ slightly, so the higher of the two was utilized), and Culvert B2 is an existing 48" CMP with an invert of 2268.38. For depths above the soffit of the pipe (elevation 2273.00 and above), orifice equations were utilized to determine the flow through the culverts. However, for depths less than the soffit of the pipe, a different methodology had to be utilized. Critical depth analyses were performed for varying flow rates in the pipe to determine the water surface elevation that corresponds to that flow rate. The critical depth analysis was based upon the following equation:

$$\text{Depth} = Y_C + 1.5\,(V_C^2 / 2g)$$

Where:

Y_C = Depth of flow at critical depth
V_C = Velocity at critical depth

The spreadsheets included in Appendix D.1 iterate using the goal seek function to solve for the Depth value. Once the equivalent depths for the corresponding flow rates were determined, the flow rates corresponding to water surface elevations 2269, 2270, 2271 and 2272 were interpolated and utilized as the outflow for the culverts at these elevations. A weir was also analyzed for flows that could potentially overtop the freeway. The freeway low point is at elevation 2279.00, and includes a 3 foot barrier between the two travel ways. This barrier was added to the low point to include a weir flow line elevation of 2282.00 and a length of 877 feet, which represents the length along the low point of the freeway. A composite outflow was developed (shown on Table 4 of the Culvert B1 and B2 outflow calculations included in Appendix D.2) that represents the total flow rate from the low point through the culverts and overtopping the freeway. The storage upstream of Culverts B1 and B2 was developed using the existing contours, and is shown on Figure 3.

The hydraulic analyses for the culverts was used in the basin routing in series analyses discussed below.

V. ROUTING IN SERIES

Using the unit hydrographs prepared for the watershed, and the culvert analyses, a routing in series was performed using the CivilD program. This would give the most accurate representation of what will be conveyed through culverts B1 and B2, as well as overtop the freeway. The analyses were performed for the 3-hour, 6-hour and 24-hour storm durations for the 100-year storm event. The process of routing the unit hydrographs in series is described blow.

Since the flows that overtop Culvert A of 62 ft^3/s are tributary to Culvert B3, which has a capacity of 236 ft^3/s, the entirety of these bypass flows can be conveyed through Culvert B3. Therefore, Culvert A, Culvert B3 and Area A unit hydrograph were not included in the routing in series analyses since flows would not be tributary to Culverts B1 and B2.

The analyses started with Area C, in which the unit hydrograph was added from a file. A flowby basin was then used to model the 914 ft^3/s leaving through Culvert C. The excess flow will bypass to Culverts D1 and D2, and was stored as stream 1. The Area D hydrograph was then added to Stream 1 at Culverts D1 and D2. A flowby was then modeled for the 147 ft^3/s leaving through Culverts D1 and D2, and the overflow was stored in Stream 1, and is tributary to Culvert E. Area E was input and added to Stream 1, and then a flowby was modeled for 42 ft^3/s leaving through Culvert E. The remaining flows are tributary to Culverts B1 and B2, and was stored as Stream 1. This stream was then combined with the Area B unit hydrograph for a total tributary flow

rate tributary to Culverts B1 and B2. This hydrograph is then routed through a retarding basing using the volume vs. outflow table developed for Culverts B1 and B2. The results of the routing in series for the outflow and upstream ponded depth for Culverts B1 and B2 are summarized below:

Storm Duration	Flow Rate through Culverts B1 and B2	Upstream Ponded Depth for Culverts B1 and B2
100-Year, 3-Hour	557.30 ft^3/s	2278.55
100-Year, 6-Hour	556.53 ft^3/s	2278.53
100-Year, 24-Hour	342.41 ft^3/s	2273.71

Based upon the results, the 100-year, 3-hour storm event will result in the highest flow rate through the culverts of 565.96 ft^3/s, and the highest ponded depth of 2278.55. Based upon this depth, the flows will not pond within the freeway which is at elevation 2279.00 and will not overtop the freeway.

The routing in series calculations have been included in Appendix D.

VI. CONCLUSIONS AND RECOMMENDATIONS

Hydrology and hydraulic analyses were performed for the culverts crossing Interstate 10 upstream of Tentative Tract Map 37862 to determine the maximum flow rates conveyed by the culverts, and if flows would overtop the freeway. Based upon the analyses, the following can be concluded:

1. Based upon the culvert capacities and the routing in series analyses, the maximum flow rate within the stream traversing the project site will be 4,355.7 ft^3/s, which is the sum of the flows conveyed through Culverts A, B3, C, D1, D2, and E, plus the routed flow through Culverts B1 and B2.
2. The maximum water surface elevation at the low point is 2278.55. The freeway roadway is at 2279.00 and the 3 foot median barrier is at 2282.00, therefore flows will not pond over the roadway or overtop the freeway barrier.

VII. REFERENCES

1. Riverside County Flood Control and Water Conservation District Hydrology Manual, April 1978.
2. Los Angeles County Flood Control Design Manual, March 1982

FIGURES

FIGURE 1: VICINITY MAP

TRACT MAP 37862
VICINITY MAP

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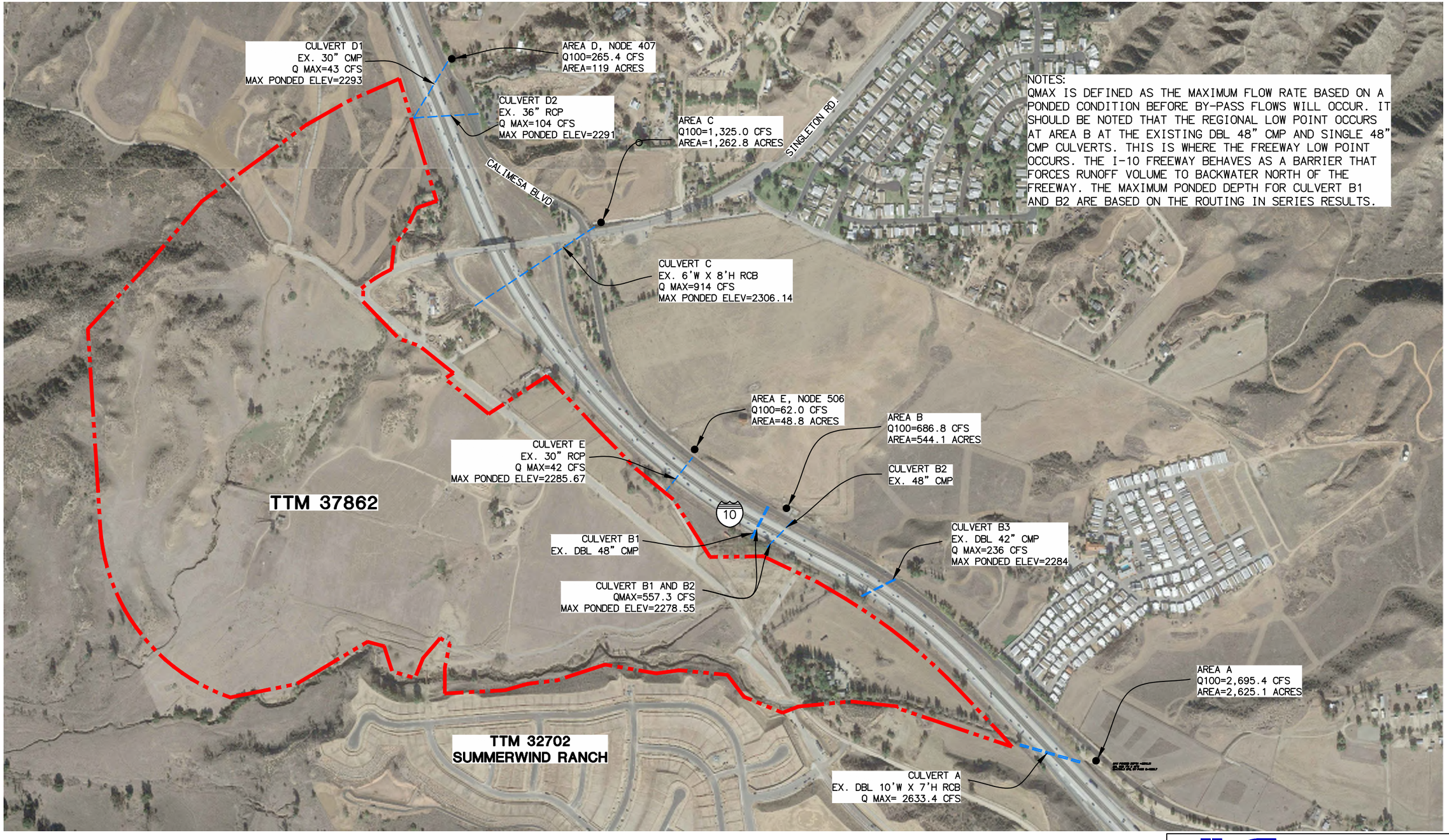
FIGURE 1

Drawing Name: O:\221.03.20\Engineering\Hydrology_Plan\Exhibits\FIGURE_1.dwg
Last Opened: Nov 04, 2020 - 12:34pm by jcarver

FIGURE 2: EXISTING I-10 CALTRANS CULVERTS



TRACT MAP 37862
EXISTING I-10 CALTRANS CULVERTS

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FIGURE 2

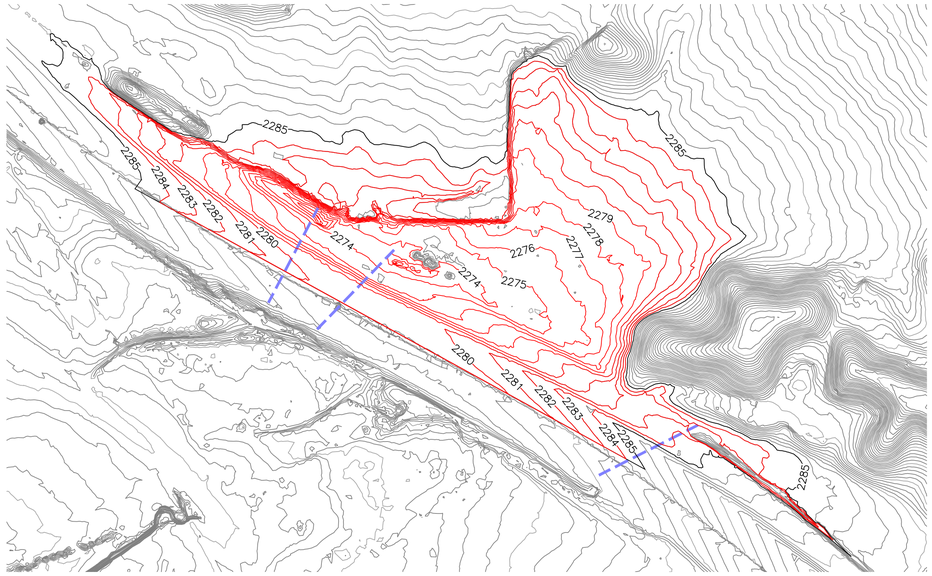
Drawing Name: O:\221.03.20\Engineering\Hydrology_Plan\Exhibits\FIGURE_2_EX_CALTRANS_CULVERTS-updated.dwg
Last Opened: Apr 12, 2021 - 3:16pm by jcarver

FIGURE 3: CULVERT WEIRS AND UPSTREAM STORAGE

TRACT MAP NO. 37862

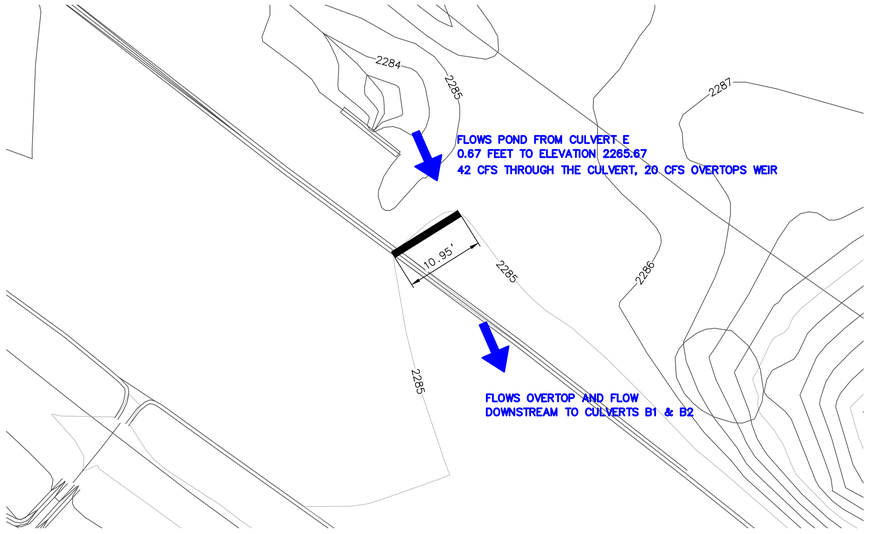
CITY OF CALIMESA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

CULVERT WEIRS AND UPSTREAM STORAGE



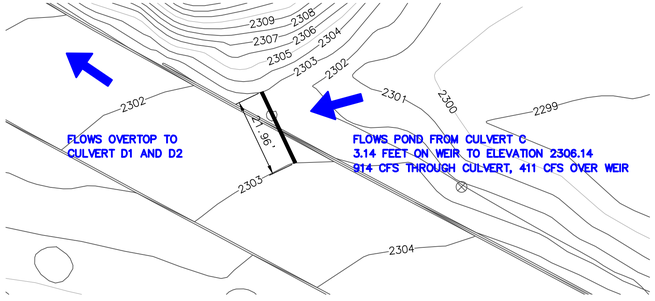
CULVERTS B1 AND B2 UPSTREAM STORAGE

SCALE: 1" = 150'



CULVERT E WEIR

SCALE: 1" = 10'



CULVERT C WEIR

SCALE: 1" = 20'

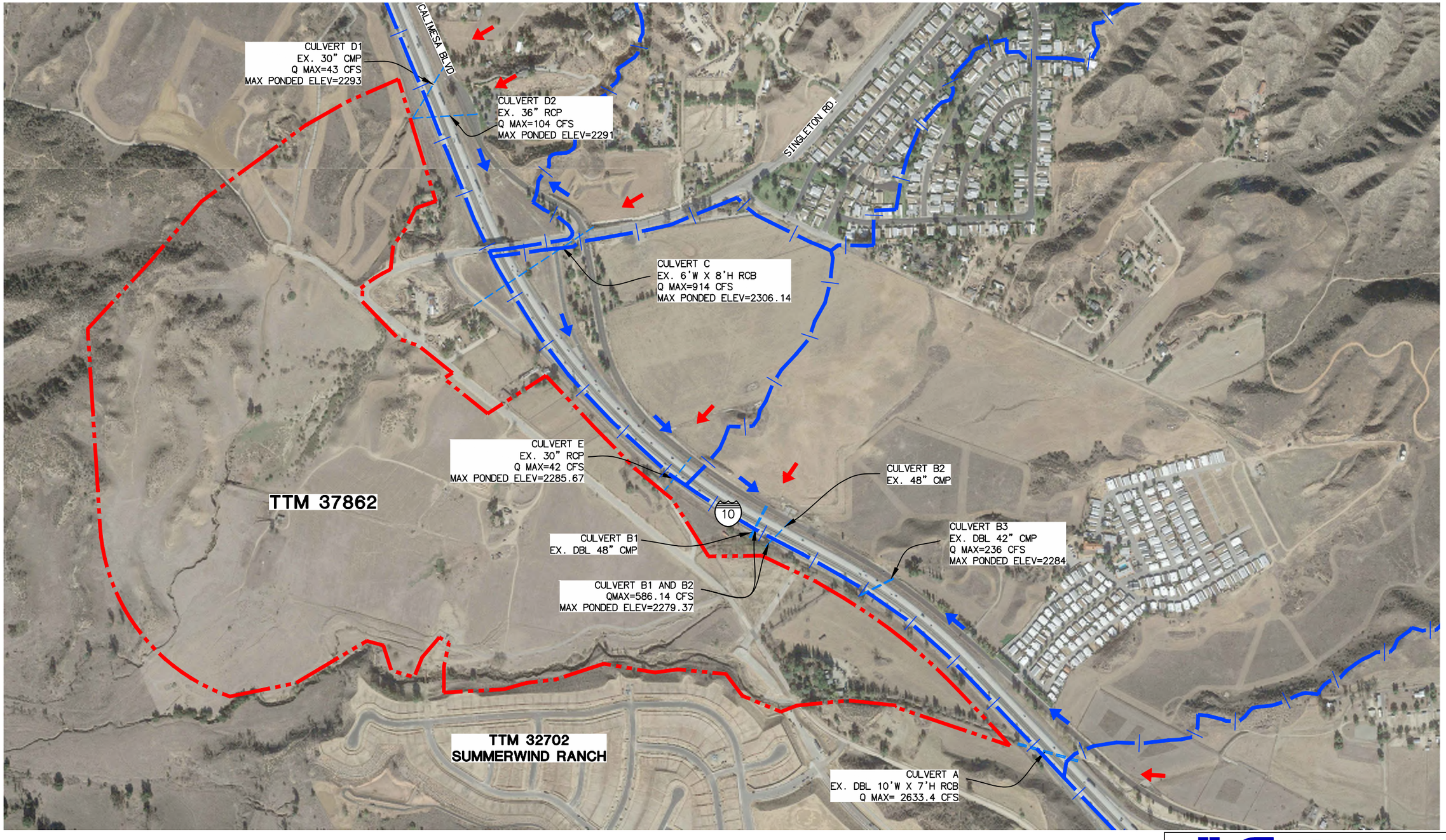
FIGURE 3

TRACT MAP NO. 37862

CULVERT WEIRS AND UPSTREAM STORAGE

Drawing Name: G:\221.63.20\Engineering\Hydrology_Plan\Exhibits\Figure 3 - Culvert weirs and storage.dwg
Last Opened: Apr 12, 2021 - 3:29pm by jporter

FIGURE 4: EXISTING FLOW SCHEMATIC



OVERFLOW DIRECTION

RUNOFF FROM WATERSHED

TRACT MAP 37862
EXISTING FLOW SCHEMATIC

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FIGURE 5

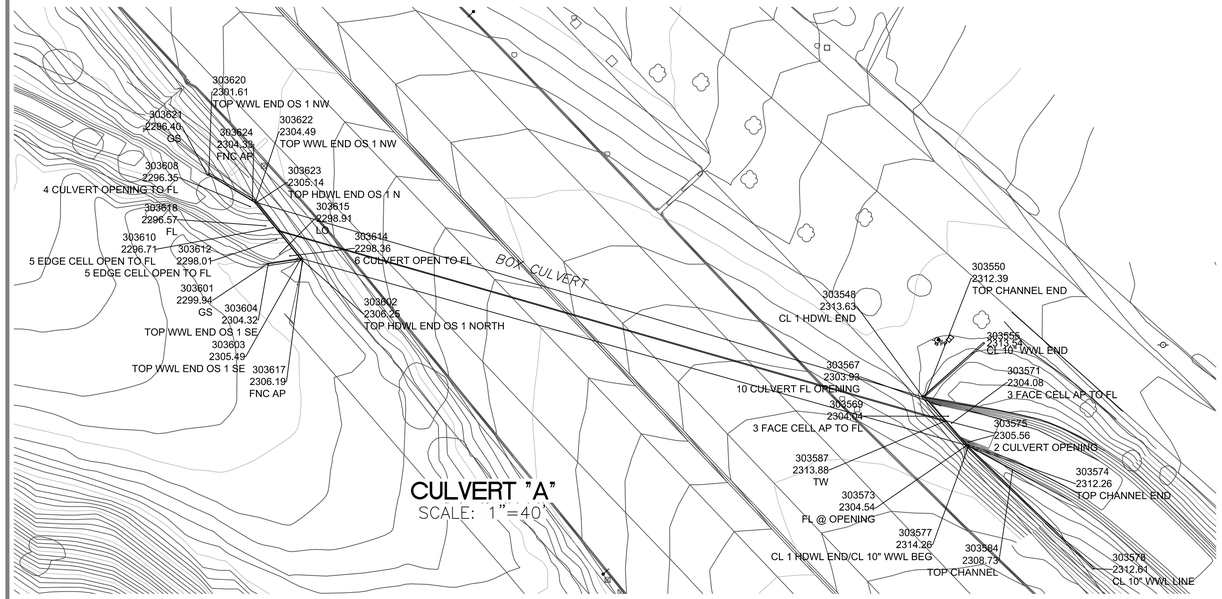
Drawing Name: O:\221.03.20\Engineering\Hydrology_Plan\Exhibits\FIGURE_4_flow schematic.dwg
Last Opened: Apr 12, 2021 - 2:18pm by jcarver

FIGURE 5: CULVERT SURVEY DATA

TENTATIVE PARCEL MAP 37862

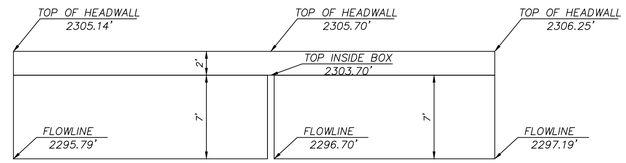
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

EXISTING CULVERT SURVEY DATA



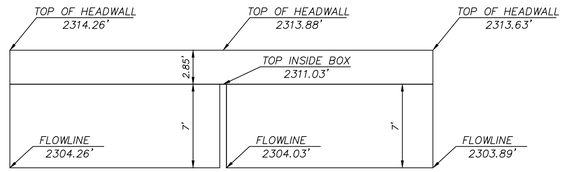
CULVERT "A"
SCALE: 1"=40'

SIDEVIEW
LOOKING NORHEAST

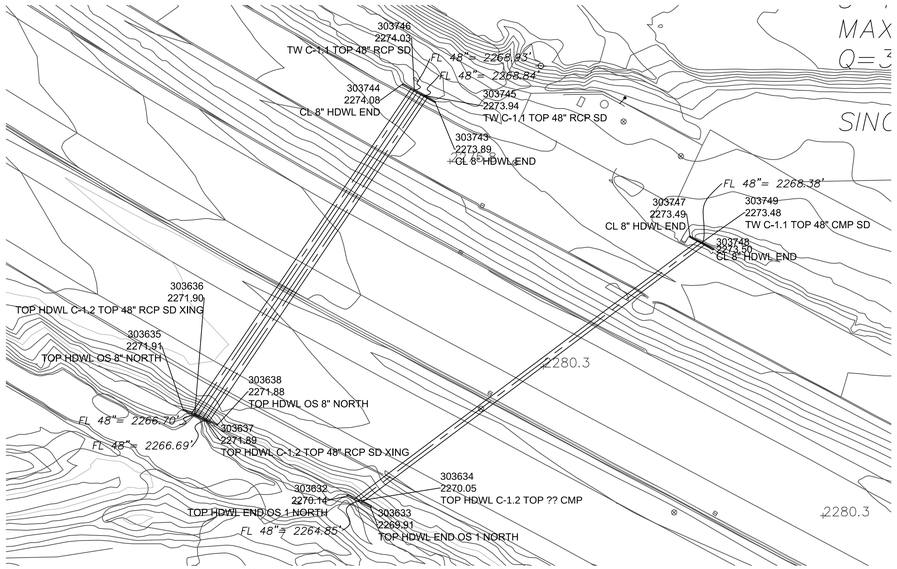


CULVERT "A" DOWNSTREAM
SCALE: 1"=6'

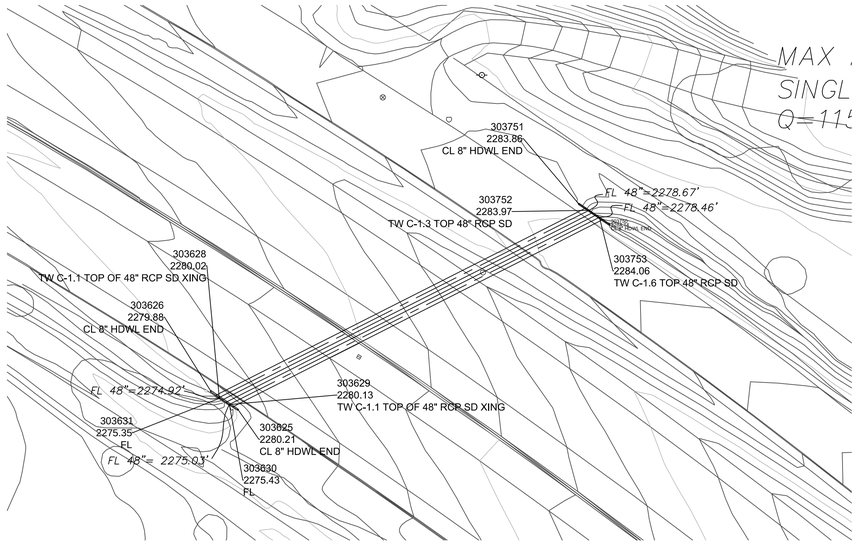
SIDEVIEW
LOOKING SOUTHWEST



CULVERT "A" UPSTREAM
SCALE: 1"=6'



CULVERT "B1" AND "B2"
SCALE: 1"=40'



CULVERT "B3"
SCALE: 1"=40'

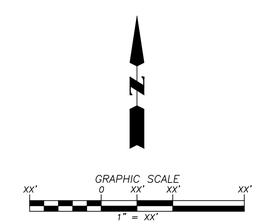


FIGURE 5A

TPM NO. 37862

EXISTING CULVERT SURVEY DATA

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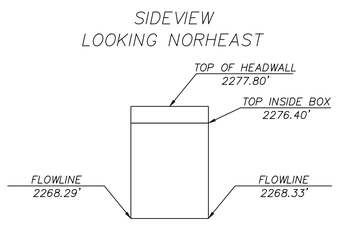
Drawing Name: O:\221.03.20\Engineering\Hydrology_Plan\Exhibits\Figure 5-Culvert Survey Data.dwg
Last Opened: Apr 12, 2021 - 2:31pm by jcarver

TENTATIVE PARCEL MAP 37862

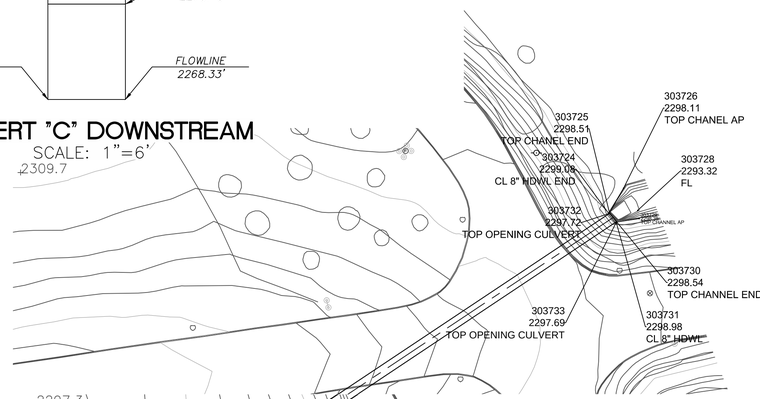
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

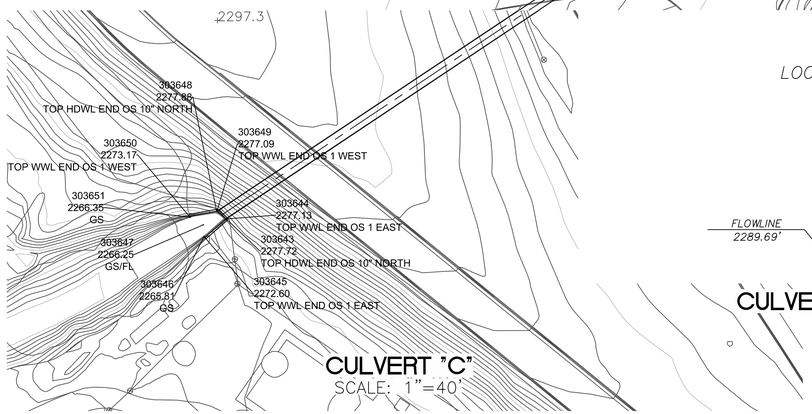
EXISTING CULVERT SURVEY DATA



CULVERT "C" DOWNSTREAM

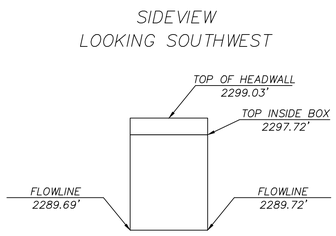
SCALE: 1"=6'





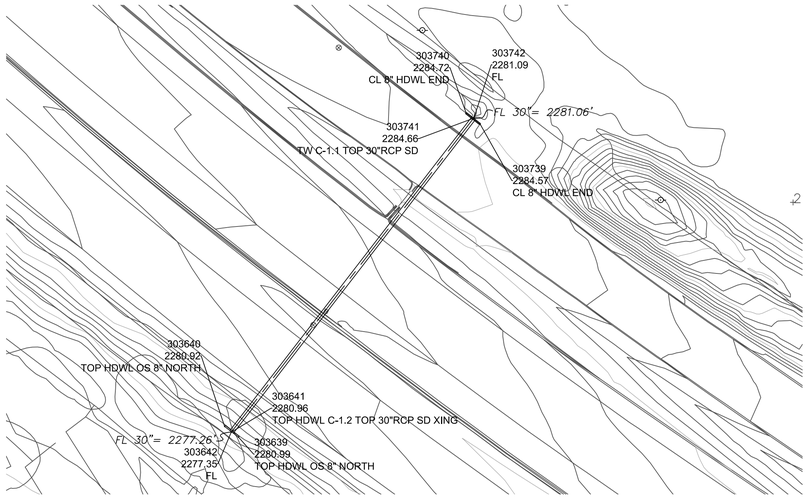
CULVERT "C"

SCALE: 1"=40'



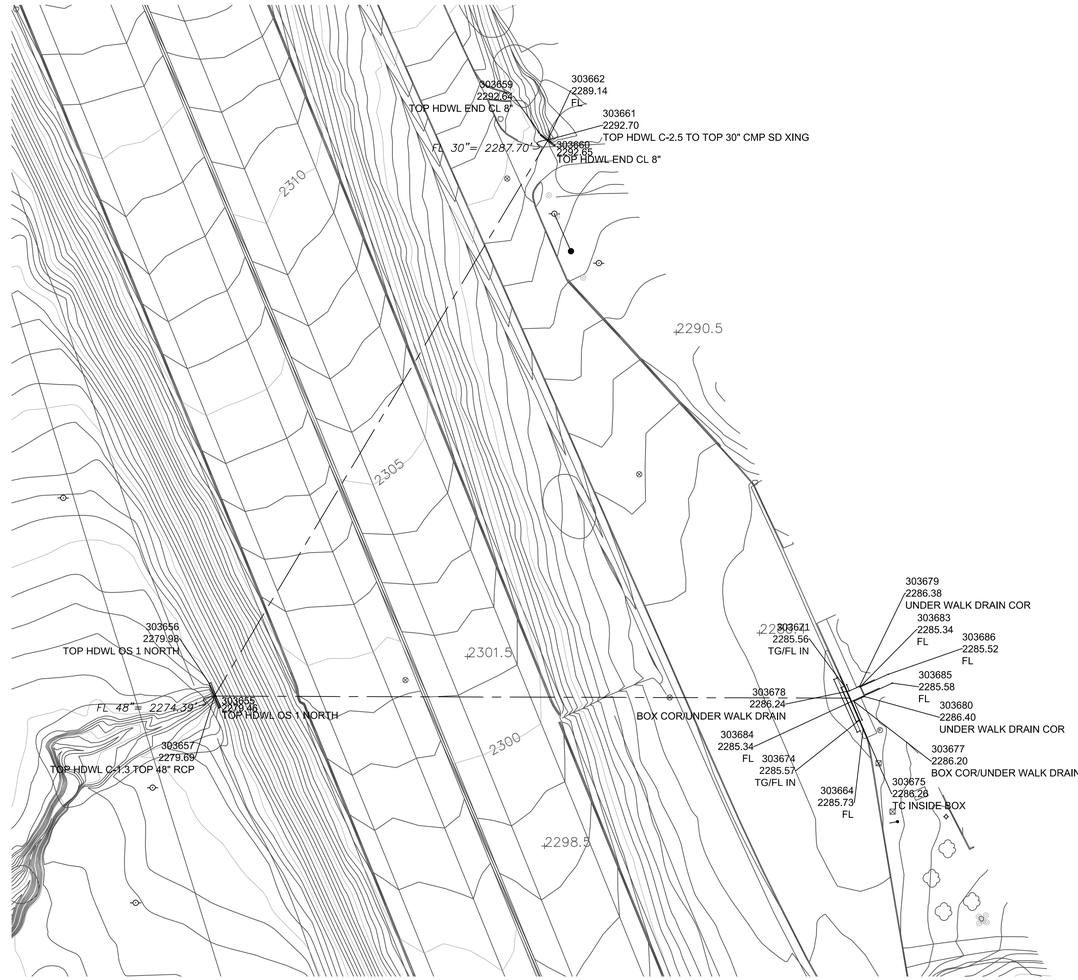
CULVERT "C" UPSTREAM

SCALE: 1"=6'



CULVERT "E"

SCALE: 1"=40'



CULVERT "D1" AND "D2"

SCALE: 1"=40'

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FIGURE 5B

TPM NO. 37862

EXISTING CULVERT SURVEY DATA

Drawing Name: D:\221.03.20\Engineering\Hydrology_Plan\Exhibits\Figure 5-Culvert Survey Data.dwg
Last Opened: Apr 12, 2021 - 2:47pm by jperez

EXHIBITS

EXHIBIT A: OFFSITE WATERSHED AREA MAP

SHEET 1 OF 1

TRACT MAP NO. 37862

CITY OF CALIMESA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

OFFSITE HYDROLOGY MAP

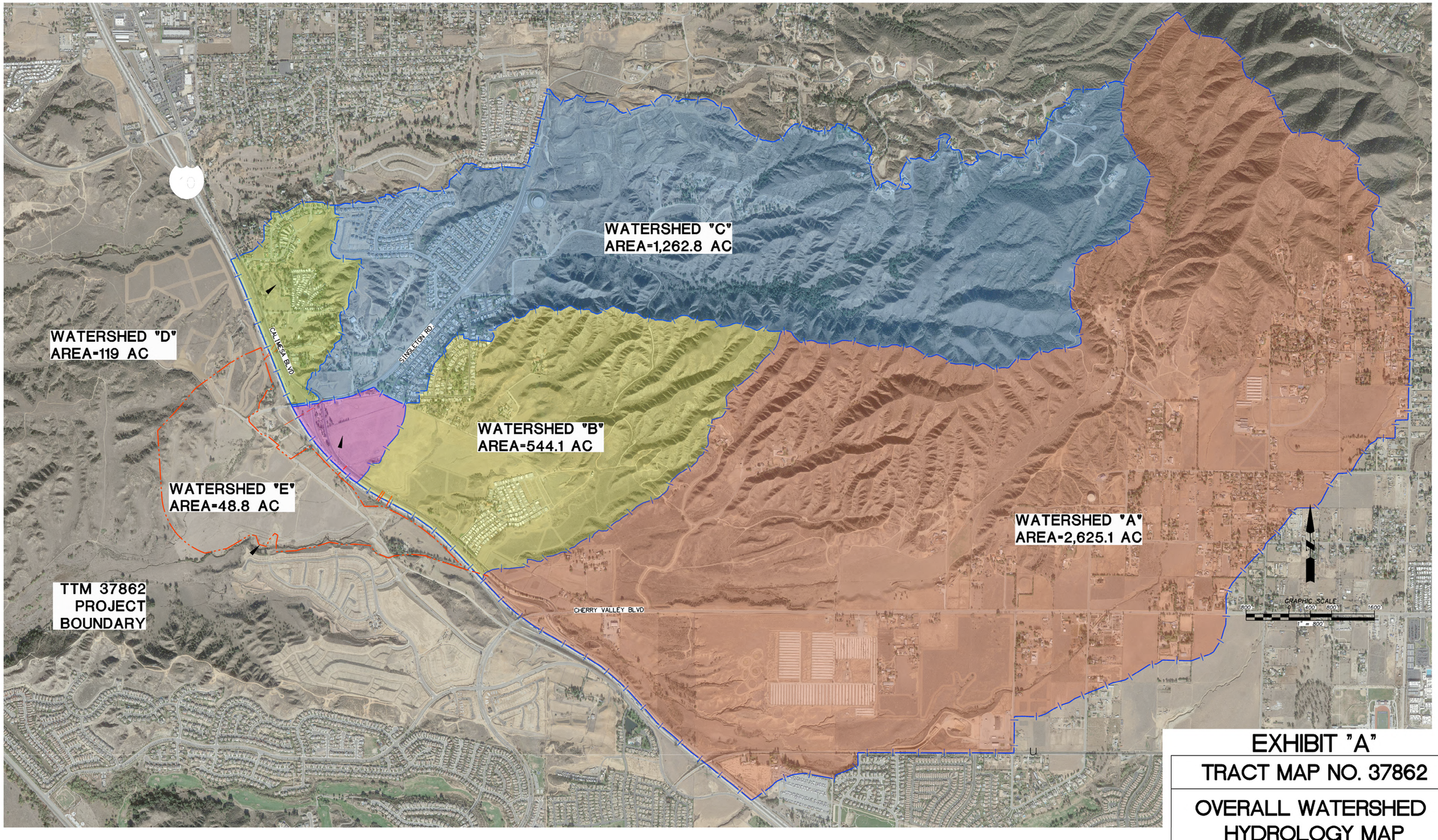


EXHIBIT "A"

TRACT MAP NO. 37862

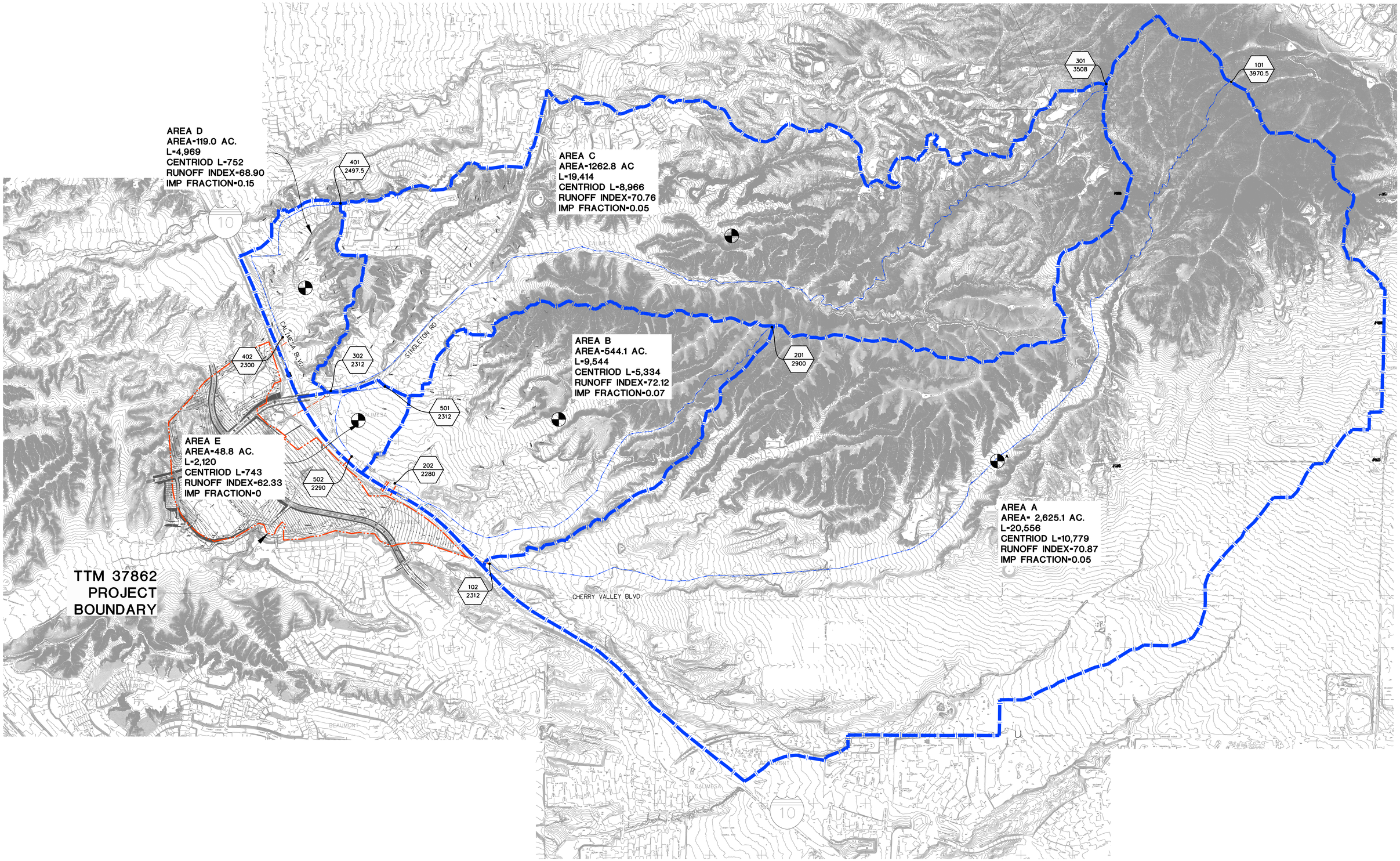
OVERALL WATERSHED HYDROLOGY MAP

EXHIBIT B: UNIT HYDROGRAPH HYDROLOGY MAP

TRACT MAP NO. 37862

CITY OF CALIMESA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

UNIT HYDROGRAPH HYDROLOGY MAP



GRAPHIC SCALE
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1" = 600'

EXHIBIT "B"

TRACT MAP NO. 37862

UNIT HYDROGRAPH
HYDROLOGY MAP

EXHIBIT C: EXISTING CONDITION LAND USE MAP

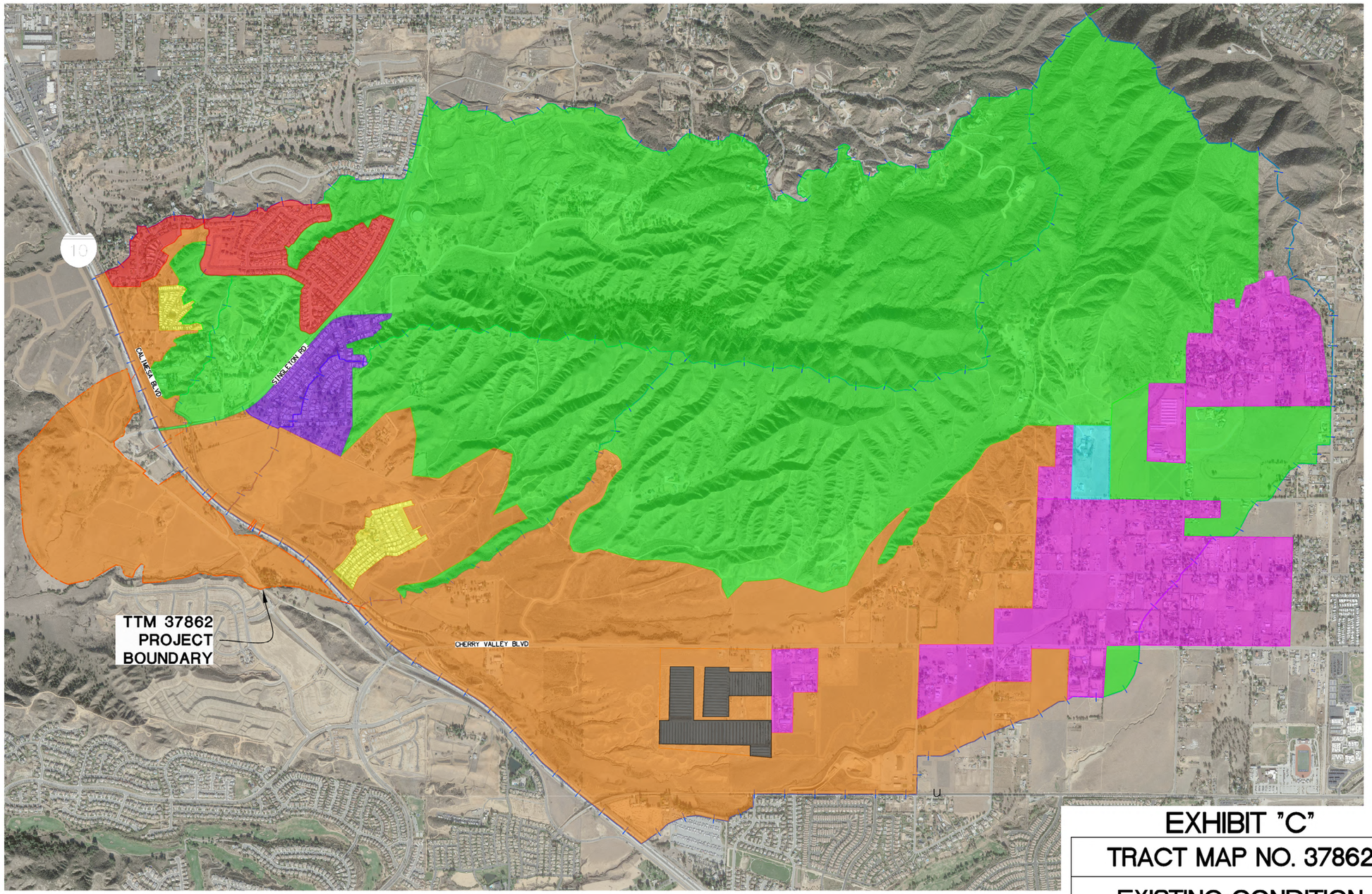
TRACT MAP NO. 37862

CITY OF CALIMESA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

EXISTING LAND USE MAP

LEGEND:

- OPEN SPACE – FAIR COVER
- OPEN SPACE – POOR COVER
- RURAL RESIDENTIAL
- 1 ACRE RESIDENTIAL
- RESIDENTIAL LOW
- RESIDENTIAL LOW MEDIUM
- RESIDENTIAL HIGH
- COMMERCIAL



N

GRAPHIC SCALE
900' 0 450' 900' 1,800'
1" = 900'

EXHIBIT "C"

TRACT MAP NO. 37862

EXISTING CONDITION
LAND USE MAP

EXHIBIT D: HYDROLOGIC SOILS MAP

SHEET 1 OF 1

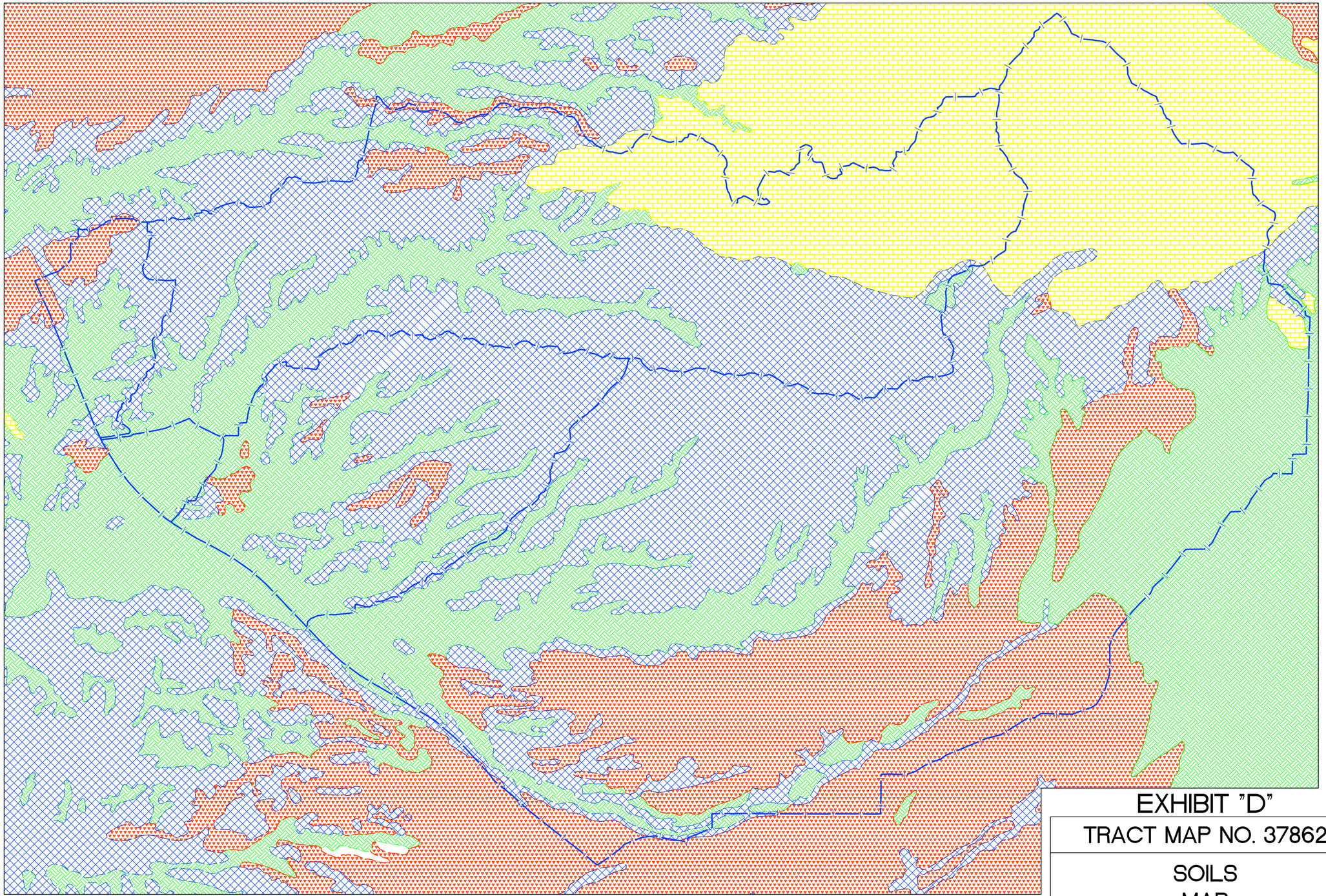
TRACT MAP NO. 37862

CITY OF CALIMESA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

SOILS MAP

LEGEND:

- SOIL A
- SOIL B
- SOIL C
- SOIL D



N

GRAPHIC SCALE

800' 0 400' 800' 1600'

1" = 800'

EXHIBIT "D"

TRACT MAP NO. 37862

SOILS MAP

Drawing Name: G:\221.03.20\Engineering\Hydrology_Plan\Exhibits\SOILS MAP.dwg
Last Opened: Apr 12, 2021 - 8:53am by jporter

RELEVANT EXCERPTS AND MAPS FROM "HYDROLOGY AND HYDRAULICS STUDY: OAK VALLEY TOWN CENTER PARCEL MAP NO. 37862 MASS GRADING PLAN" BY PROACTIVE ENGINEERING

OAK VALLEY TOWN CENTER
HYDROLOGY AND HYDRAULICS STUDY

PARCEL MAP NO. 37862

CITY OF CALIMESA, CALIFORNIA

PREPARED FOR:

OAK VALLEY DEVELOPMENT PARTNERS
10140 ROBERTS ROAD
CALIMESA, CA 92320

PREPARED BY:

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25109 JEFFERSON AVENUE, SUITE 200
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DATE PREPARED:

July 2021

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II.	Project Site	1
III.	Hydrology	2-4
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V.	Water Quality	6
VI.	Summary	6-7
VII.	References	7

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FIGURE 2 Site Plan

APPENDICES

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APPENDIX A-3: Slope of Intensity Duration Curve
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APPENDIX B: Undeveloped Condition Rational Method Hydrology Analysis
APPENDIX B-1: Area A
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APPENDIX E: Water Surface Pressure Gradient Calculations
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APPENDIX E-7: CP-03

APPENDIX E-8: CP-04
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APPENDIX E-10: CP-06
APPENDIX E-11: CP-07
APPENDIX E-12: CP-08
APPENDIX E-13: CP-09
APPENDIX E-14: CP-10
APPENDIX E-15: CP-11
APPENDIX E-16: CP-12
APPENDIX E-17: CP-13
APPENDIX E-18: CP-14
APPENDIX E-19: CP-15
APPENDIX E-20: CP-16
APPENDIX E-21: CP-17
APPENDIX E-22: CP-18
APPENDIX E-23: CP-19
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APPENDIX E-28: CP-24

APPENDIX F: Velocity Calculations
APPENDIX F-1: Area A/Line A Point of Discharge Velocity Calculation – Undeveloped Condition
APPENDIX F-2: Area B Point of Discharge Velocity Calculation – Undeveloped Condition
APPENDIX F-3: Line A Point of Discharge Velocity Calculation – Developed Condition
APPENDIX F-4: Line B Point of Discharge Velocity Calculation – Developed Condition
APPENDIX F-5: Line B Point of Discharge Velocity Calculation – Undeveloped Condition

EXHIBITS

EXHIBIT A: Undeveloped Condition Hydrology Index Map

EXHIBIT B: Developed Condition Hydrology Index Map

EXHIBIT C: Drainage Facilities Map

I. INTRODUCTION

Oak Valley Town Center (OVTC), Parcel Map No. 37862, is a proposed development in the City of Calimesa, lying southwesterly of the Interstate 10 Freeway (I-10) off the Singleton Road exit. The project is roughly 230 acres and will develop business park and commercial land use areas, as well as the infrastructure Singleton and Roberts Road. Oak Valley Town Center is a part of the Summerwind Ranch at Oak Valley Specific Plan that proposes the development of residential, business park, commercial and open space land use areas across roughly 2,600 acres of land.

The purpose of this study is to determine the existing and proposed hydrologic conditions to properly size the necessary drainage improvements to support the construction of Oak Valley Town Center. The scope of this report will include:

- Determine peak 100-year flow rates for the construction of the project's ultimate developed condition using the Rational Method outlined in the Riverside County Flood Control and Water Conservation District
- Based on the ultimate developed condition, determine the necessary drainage improvements that will properly convey the calculated 100-year flow rates
- Summarize analyses and proposed infrastructure storm drain improvements

II. PROJECT SITE

Oak Valley Town Center is part of the Summerwind Ranch at Oak Valley Specific plan that lies within the San Timoteo sub-basin of the Santa Ana River Watershed. The project site lies within an open grassland valley that is bounded by the I-10 freeway to the east and rolling hills and ridgelines to the west and south. Most of the project is undeveloped. There are a handful of existing properties that are fairly spread apart from each other along the I-10, as well as a couple of properties within the central portion of the valley.

Large off-site tributary areas on the east side of the I-10 contribute significant drainage to the project site through multiple pipe and box culverts. Drainage from these tributary areas begin in the San Bernardino Mountain ranges and flow in a southwesterly manner, ultimately, flowing through the proposed project site until it reaches the San Timoteo Creek. The proposed storm drain system will maintain the existing drainage course and outlet on-site, as well, as intercepted off-site drainage, into the natural streambed areas leading to the San Timoteo Creek; ultimately joining the Santa Ana River. See Figures 1 and 2 for the project Vicinity Map and Site Plan, respectively.

III. HYDROLOGY

The rational design parameters and methodologies outlined in the Riverside County Flood Control and Water Conservation District's (RCFCWCD) *Hydrology Manual*[1] were used to determine the 100-year design flow rates for the project. Calculations for the rational methodology were performed using the CivilDesign computer software.

Two hydrology analyses will be performed for this project site:

- On-site hydrology
  - The rational method was used to calculate the 100-year flow rates for the on-site tributary areas. We assume the ultimate developed condition to determine the peak flow rates tributary to the proposed OVTC storm drain infrastructure. This includes the OVTC project site, as well as future Summerwind developments located north of OVTC.
- Off-site hydrology
  - The unit hydrograph method will be used to calculate the 100-year flow rates for the off-site tributary areas. Off-site refers to the large tributary areas east of the I-10, where their respective flow rates are collected via pipe and box culverts that cross the I-10 and outlet onto the OVTC project site.

On-site Hydrology

The 100-year flow rates for Areas A and B, as shown on Exhibit B, will be analyzed using the rational method.

As directed by the *Hydrology Manual*[1], Antecedent Moisture Condition II (AMC II) was used for all rational method analyses.

Soil classification for the project site is based on the Hydrologic Soils Group Map for El Casco (Plate C-1.18) of the *Hydrology Manual*[1], as shown on Appendix A-4 of this report. Hydrologic soils group (HSG) "B" and "D" are what primarily occupies the project site. There are small patches of areas within the rolling hills and ridgelines where HSG "A" and "C" are present. Soil "B" is described as soils with a moderate rate of water transmission and soil "D" is described as soils with high runoff potential.

The rainfall values and slope of intensity duration curve were obtained from the isohyetal maps in the *Hydrology Manual*[1], as shown on Appendices A-1 to A-3. Below is a summary of the design parameters used for calculation.

2-Year-1-Hour Precipitation per Plate D-4.3 (Appendix A-1)	0.54”
100-Year-1-Hour Precipitation per Plate D-4.4 (Appendix A-2)	1.33”
Slope of Intensity Duration Curve per Plate D-4.6 (Appendix A-3)	0.55

For rational method purposes, the project site was analyzed as an undeveloped area – poor cover for the undeveloped condition. Since the hydrology study is split up into two parts (On-site and Off-site) for the undeveloped condition, the flow rates calculated in each report were simply added together to compute a total Q for each drainage area. Refer to Exhibit A for the total Q and on-site drainage area delineation.

The areas tributary to storm drain Line A are designated as Drainage Area A and Areas C, D and E, as shown on Exhibit B. Areas C, D and E are off-site tributary areas, while Drainage Area A is on-site. As mentioned before, off-site tributary areas are analyzed by the unit hydrograph method, per a separate study. The off-site areas were included in the rational method calculations as a user defined entry to account for the drainage coming from existing culverts crossing the I-10. The portion of Drainage Area A, where the OVTC project site is located, consists of industrial parcels, a commercial parcel and the infrastructure Singleton and Roberts Road streets for the ultimate developed condition. See Figure 2 for the Project Site plan. For hydrology purposes, the industrial parcels were analyzed as commercial land use. Since the ultimate developed condition is assumed to determine the peak 100-year flow rates tributary to the OVTC infrastructure storm drain system, Drainage Area A includes future Summerwind developments. Per Tentative Tract Map No. 33536, planning areas E-1, E-2 and D-1, which are delineated as Garden Courts, Townhomes and Community Recreation land use, respectively, are tributary to the OVTC storm drain infrastructure and are included in the rational method analysis calculations. For hydrology purposes, the Garden Courts and Townhomes were analyzed as commercial land use and the Community Recreation as condominium land use. See Exhibit B for the on-site hydrology map.

The areas tributary to storm drain line B are designated as Drainage Area B and Areas A and B, as shown on Exhibit B. Areas A and B are off-site tributary areas, while Drainage Area B is on-site. As mentioned before, off-site tributary areas are analyzed by the unit hydrograph method, per a separate study. Like Line A, the off-site drainage was used as a user defined entry to account for the drainage coming from the existing culverts crossing the I-10. Drainage Area B only consists of a commercial parcel for the developed condition. See Exhibit B for the Drainage Area B on-site hydrology map.

Calculations for the undeveloped and developed rational method analyses can be found in Appendix B and C, respectively, of this report.

Off-site Hydrology

The 100-year flow rates for Areas A, B, C, D and E, as shown on Exhibit B, were analyzed using the unit hydrograph method. These areas are tributary to existing pipe and box culverts that cross the I-10 and outlet onto the OVTC project site. As mentioned before, the off-site hydrology analysis is presented in a separate study, *Hydraulic Analyses for Culverts Crossing I-10 TTM 37862*[2].

IV. STORM DRAIN HYDRAULICS

Storm Drain

Three mainline storm drain systems (Lines A, B and C) are proposed to support the construction of OVTC.

Line A is a proposed reinforced box culvert (RCB) that runs through the infrastructure Singleton Road. It is the main storm drain system that is responsible for most of the on-site drainage but also takes on significant off-site drainage, as shown as Drainage Area A and Areas C, D and E per Exhibit B. The existing 72" CMP culvert that currently runs under the existing Roberts Road intercepts off-site drainage coming from the 6'x8' RCB crossing the I-10. The project will remove and replace the existing 72" CMP with an 8'x8' (WxH) RCB, where Line A begins. The upstream 72" CMP survey flowline elevation of 2249.61 was maintained to begin the Line A design. As you move downstream in Line A, two sub-mainline storm drain systems, Lines A1 and A2, confluence with Line A at the major intersection of Singleton and Roberts Road. As mentioned before, most of the on-site drainage are collected and conveyed in these storm drain systems (A, A1 and A2). Storm drain lateral stub outs are provided for the commercial and business park parcels. The locations of these lateral stub outs are based on the low points of the rough grading, where it is assumed the private storm drain systems within the parcels will join the infrastructure storm drain system. CP-09 is the only storm drain lateral that collects off-site drainage. It connects to the existing 48" RCP that crosses the I-10 near the eastbound Singleton off-ramp, where it intercepts off-site drainage from Area D. Line A

discharges in the southwest corner of the project site, where it joins the existing watercourse that leads to the San Timoteo Creek.

Line B is a proposed double 6'x4' (WxH) box culvert that crosses the proposed Roberts Road. It collects off-site drainage from Areas B and E that are tributary to four existing culverts that cross the I-10, as well as on-site drainage from a portion of a commercial parcel. Drainage from the four culverts confluence at the current OVTC project boundary where the existing Roberts Road and Cooper Drive intersect. For the rough grade condition, a trapezoidal channel conveys the off-site drainage from this confluence point to the starting point of Line B. The developer of the commercial parcel will be responsible to construct storm drain that collects off-site drainage from the confluence point to the double box culvert once the site plan is finalized. The double box culvert alignment roughly starts from the northerly Roberts Road right-of-way (ROW) line and ends roughly at the southerly ROW line where the collected drainage outlets into the existing watercourse that runs along the southside of the OVTC project site.

Line C is a proposed arch culvert. Like Line B, this culvert crosses Roberts Road and outlets into the existing watercourse that runs along the southside of the OVTC project site. It serves as a by-pass line for the off-site drainage tributary to the existing double 7'x10' box culvert (Culvert A) crossing the I-10 onto the project site.

The Water Surface Profile Gradient Program (WSPG) software was used to analyze the proposed storm drain lines and laterals. The hydraulics is based on the storm drain profile design and the 100-year flow rate calculations per the studies performed for this project site. The WSPG calculations can be found in Appendix E of this report.

Velocity calculations for Drainage Areas A and B for the undeveloped condition and the point of discharge for Lines A and B were calculated using the CivilDesign computer software.The increase in velocity at the point of discharge for Lines A and B will be mitigated by properly sized riprap aprons that contain 2-ton riprap. A manning's number of 0.04 was used for the riprap apron for the developed condition and 0.025 for the undeveloped condition. Calculations for the exit velocities can be found in Appendix F.

The proposed storm drain alignments, pipe sizing and calculated flow rates can be found on the drainage facilities map, as shown on Exhibit C.

Catch Basins

Twelve catch basins are proposed to support the construction of OVTC. Of the twelve proposed catch basins, four are sump and eight are on-grade. The AutoCAD Civil3D Hydraflow Express extension was used to properly size catch basins and determine their efficiency. The curb opening design parameters used in calculation are consistent with the Riverside County Transportation Department catch basin standard details. The flow rates captured by the catch basin are used for the WSPG calculations for their respective storm drain laterals.

A summary table for the proposed catch basins is provided on the next page and the catch basin calculations can be found in Appendix D of this report.

CB #	HYDRO MAP NODE	CATCH BASIN TYPE	SIZE (FEET)	Q_{100} (CFS)	UPSTREAM Q_{BYPASS}	$Q_{TRIBUTARY}$ (CFS)	$Q_{CAPTURED}$ (CFS)	Q_{BYPASS} (CFS)	Q_{BYPASS} TO CB #
1	10.2	On-Grade	21	12.1	0	12.1	12.1	0	N/A
2	10.4	On-Grade	14	6.3	0.71	7.01	7.01	0	N/A
3	4.3	On-Grade	14	7	0	7	5.97	1.03	12
4	6.24	Sag	14	7.6	0	7.6	7.6	0	N/A
5	6.17	Sag	14	6.7	1.3	8	8	0	N/A
6	6.17	Sag	4	3.5	0.53	4.03	4.03	0	N/A
7	6.11	On-Grade	10	7.1	1.36	8.46	7.16	1.3	5
8	6.11	On-Grade	10	5.2	1.31	6.51	5.98	0.53	6
9	6.3	On-Grade	10	5.7	0	5.7	4.39	1.31	8
10	6.3	On-Grade	10	5.8	0	5.8	4.44	1.36	7
11	7.1	On-Grade	10	5.9	0	5.9	5.19	0.71	2
12	7.13	Sag	7	4.4	1.03	5.43	5.43	0	N/A

V. WATER QUALITY

The developers of the proposed industrial and commercial parcels for OVTC will be responsible for treating their runoff before joining the infrastructure storm drain systems delineated in this drainage study. Catch basin inserts will be installed in all catch basin locations for treating street runoff. Refer to the OVTC Water Quality Management Plan report for more details.

VI. SUMMARY

The developed and undeveloped hydrology conditions were analyzed in this study. All proposed storm drain systems (Line A, B & C) intercept off-site drainage crossing the I-

10 freeway onto the project site. Lines A and B also convey on-site drainage from the proposed developments. On-site drainage from the proposed developments and streets will be treated by approved BMPs prior to discharging into the storm drain systems. The increased velocities at the point of discharge for both Lines A and B will be mitigated by properly sized riprap aprons.

Below are summary tables comparing the flow rates and exit velocities at the point of discharge for Lines A and B.

Flow Rate

Storm Drain Line	A	B
Undeveloped Flow Rate (CFS)	1,593	768
Developed Flow Rate (CFS)	1,775	829
Difference (CFS)	+182	+61

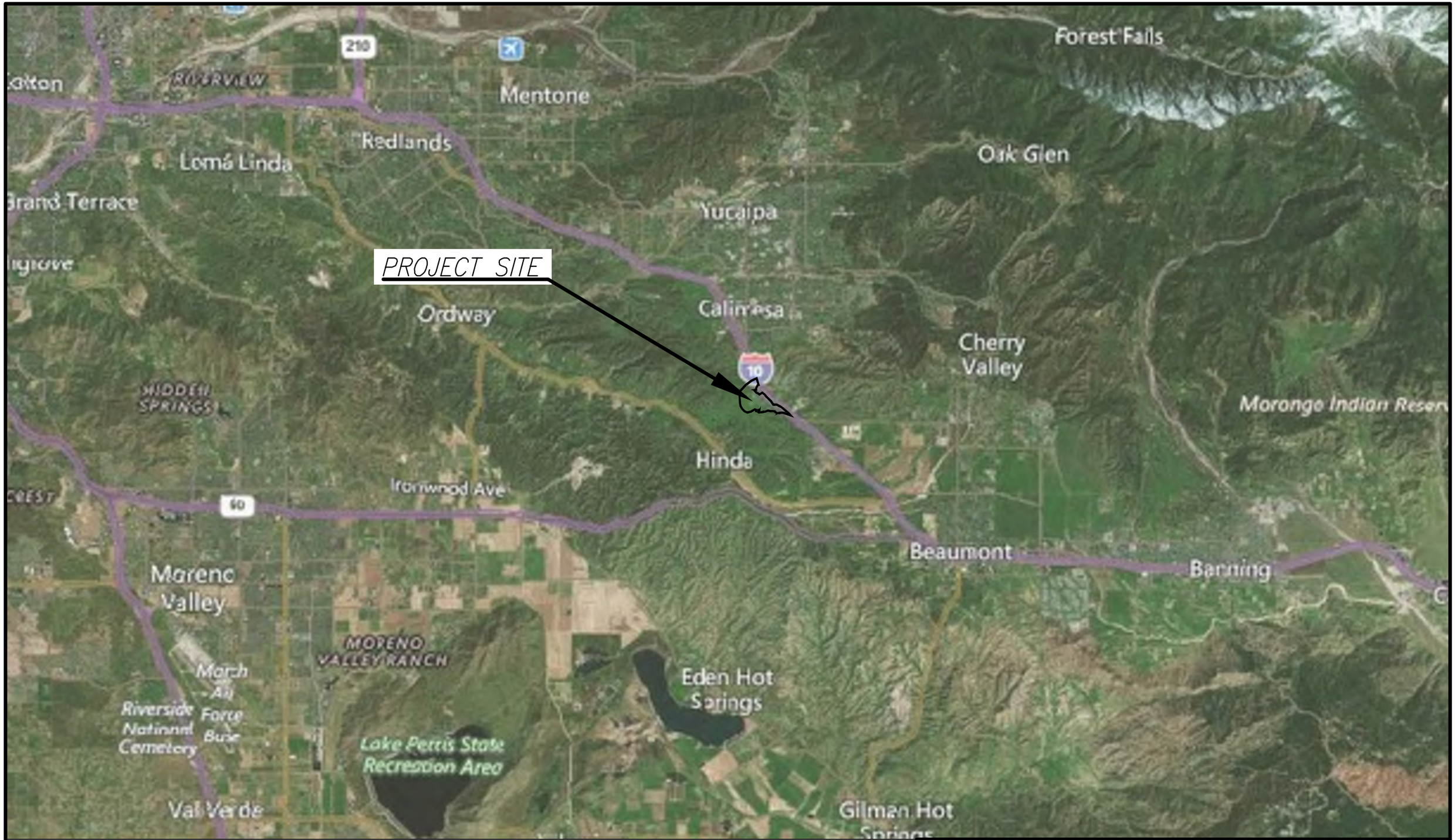
Velocity

Storm Drain Line	A	B
Undeveloped Exist Velocity (Feet per Second)	16.2	14.2
Developed Exist Velocity (Feet per Second)	8.5	6.6
Difference (Feet per Second)	-7.7	-7.6

VII. REFERENCES

1. Riverside County Flood Control and Water Conservation District Hydrology Manual, April 1978
2. JLC Engineering & Consulting, Inc. Hydraulic Analyses for Culverts Crossing I-10 TTM 37862, November 2020.

FIGURE 1: Vicinity Map



SCALE: 1"=10,000'

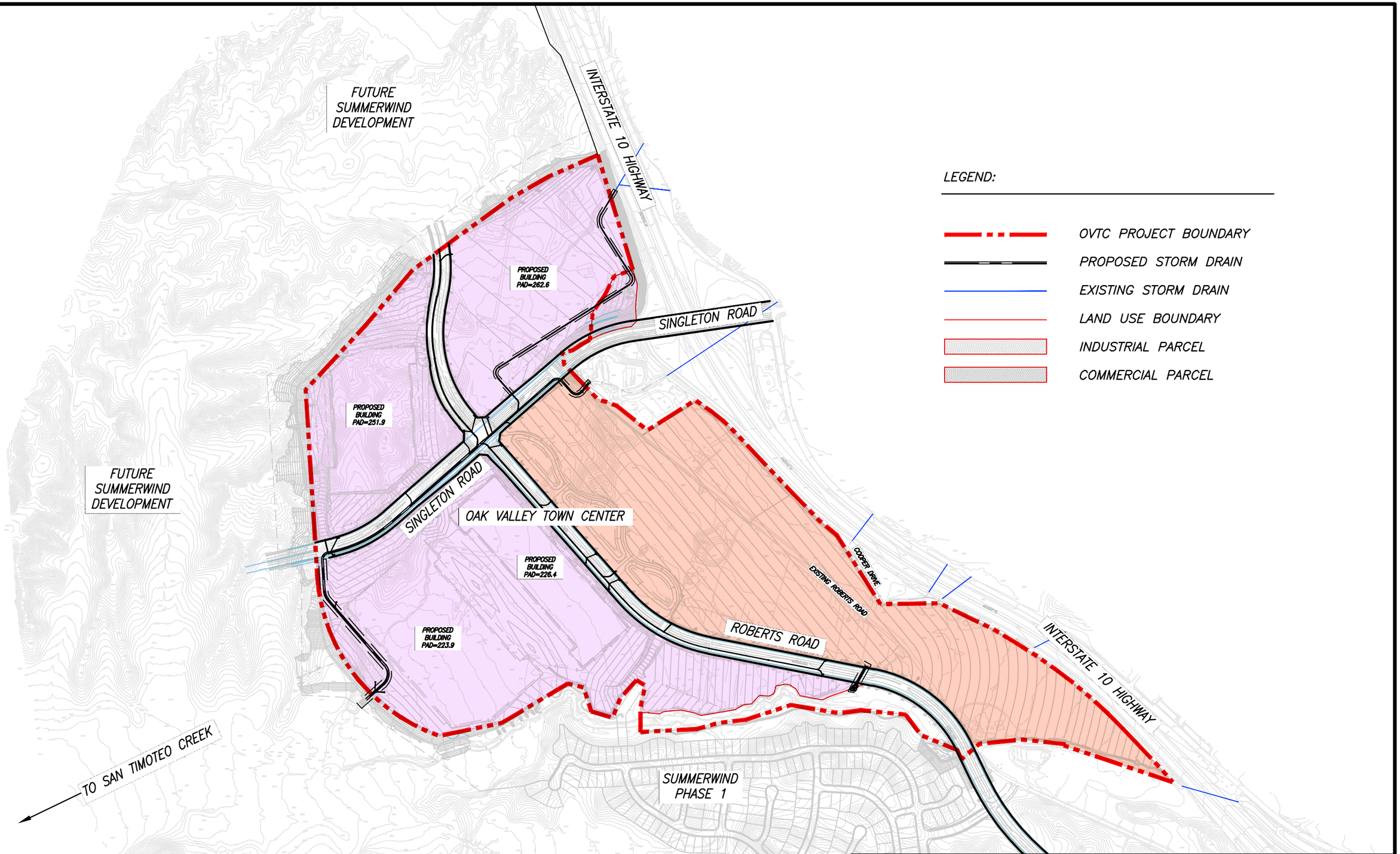
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

FIGURE 1

OAK VALLEY TOWN CENTER
VICINITY MAP

Plotted: Apr 08, 2020 - 8:32am By: PEC West-DMC: C:\Users\PEC West-User\Desktop\WFH\1-Working Folder\01.168.000 Oak Valley Town Center\Hydro\Drainage\Drawings\Vicinity Map.dwg

FIGURE 2: Site Plan



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PROACTIVE ENGINEERING WEST

FIGURE 2
OAK VALLEY TOWN CENTER
SITE PLAN

Plotted: Jun 14, 2021 - 8:41am By: ajboylon DWG: N:\01.169.000 Oak Valley Town Center\Hydro\Drainage - Ultimate Condition\Drawings\Site Plan.dwg

EXHIBIT A: Undeveloped Condition Hydrology Map

AREA "D"
(PER CULVERT ANALYSIS)

AREA "C"
(PER CULVERT ANALYSIS)

AREA "B"
(PER CULVERT ANALYSIS)

AREA "A"
(PER CULVERT ANALYSIS)

AREA "E"
(PER CULVERT ANALYSIS)

INTERSTATE 10 HIGHWAY

INTERSTATE 10 HIGHWAY

CULVERT D1
EX. 30" CMP
Q_{MAX}=43 CFS

CULVERT D2
EX. 36" RCP
Q_{MAX}=104 CFS

CULVERT C
EX. 6'Wx8'H RCB
Q_{MAX}=910 CFS

CULVERT E
EX. 30" RCP
Q_{MAX}=42 CFS

CULVERT B1 & B2
Q_{MAX}=586.14 CFS

CULVERT B1
EX. DBL 48" CMP

CULVERT B2
EX. 48" CMP

CULVERT B3
EX. DBL 48" RCP
Q_{MAX}=140 CFS

CULVERT A
EX. DBL 10'Wx7'H
Q_{MAX}=1905 CFS

SINGLETON ROAD

ROBERTS ROAD

ROBERTS ROAD

A

B

1
0.7 AC

1
374

2
372

101
156.7 AC

100
0.4 AC

101
378

102
376

2
230.1 AC

1
178

103
171

Q_{100}=786 CFS TOTAL; V_{AVG}=14.2 FT/S
(CULVERTS B-3, E)

Q_{100}=1,593 CFS TOTAL; V_{AVG}=16.2 FT/S
Q_{100}=535.6 CFS (ONSITE AREA A)
Q_{100}=1,057 CFS (CULVERTS C, D1, D2)

Q_{100}=3,016 CFS TOTAL; V_{AVG}=18.1 FT/S
Q_{100}=343 CFS (ONSITE AREA B)
Q_{100}=2,673 CFS (CULVERTS A, B-3, E)

SUMMERWIND PHASE 1

SUMMERWIND PHASE 1

TO SAN TIMOTEO CREEK

LEGEND:

- A — DRAINAGE AREA
- OVTC PROJECT BOUNDARY
- WATERSHED BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN
- X-X / XX AC — SUBAREA NAME / ACREAGE
- XX / XXX.X / *XXX.X — NODE: FLOWLINE ELEVATION / * INVERT ELEVATION (IF SHOWN)

NOTE: CULVERT DATA PER SEPARATE STUDY. SEE TTM 37862 HYDRAULIC ANALYSES FOR CULVERTS CROSSING 1-10

250' 0 250' 500' 750'
SCALE: 1"=250'

EXHIBIT A

PROACTIVE ENGINEERING CONSULTANTS WEST
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PROACTIVE
ENGINEERING WEST

CITY OF CALIMESA

OAK VALLEY TOWN CENTER

UNDEVELOPED CONDITION
ONSITE HYDROLOGY MAP

EXHIBIT B: Developed Condition Hydrology Index Map

AREA "D"
(PER CULVERT ANALYSIS)

AREA "C"
(PER CULVERT ANALYSIS)

AREA "E"
(PER CULVERT ANALYSIS)

AREA "B"
(PER CULVERT ANALYSIS)

CULVERT D1
EX. 30" CMP
Q_{MAX}=43 CFS

CULVERT D2
EX. 36" RCP
Q_{MAX}=104 CFS

CULVERT C
EX. 6'Wx8'H RCB
Q_{MAX}=910 CFS

CULVERT E
EX. 30" RCP
Q_{MAX}=42 CFS

CULVERT B1 & B2
Q_{MAX}=586.14 CFS

CULVERT B1
EX. DBL 48" CMP

CULVERT B2
EX. 48" CMP

CULVERT B3
EX. DBL 48" RCP
Q_{MAX}=140 CFS

CULVERT A
EX. DBL 10'Wx7'H
Q_{MAX}=1905 CFS

INTERSTATE 10 HIGHWAY

SINGLETON ROAD

ROBERTS RD

FUTURE SUMMERWIND DEVELOPMENT
PLANNING AREA E-1 GARDEN COURTS PER SPECIFIC PLAN

FUTURE SUMMERWIND DEVELOPMENT
PLANNING AREA E-2 TOWNHOMES PER SPECIFIC PLAN

FUTURE SUMMERWIND DEVELOPMENT
STREET - ROBERTS ROAD

FUTURE SUMMERWIND DEVELOPMENT

FUTURE SUMMERWIND DEVELOPMENT
PLANNING AREA B-1 COMMUNITY RECREATION PER SPECIFIC PLAN

FUTURE SUMMERWIND DEVELOPMENT

EXISTING SUMMERWIND PHASE 1

LEGEND:

- A — DRAINAGE AREA
- OVTC PROJECT BOUNDARY
- WATERSHED BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- X-X / XX AC — SUBAREA NAME / ACREAGE
- XX / XXX.X / *XXX.X — NODE: FLOWLINE ELEVATION, * INVERT ELEVATION (IF SHOWN)
- FUTURE SUMMERWIND DEVELOPMENT TRIBUTARY TO THE OVTC STORM DRAIN INFRASTRUCTURE

NOTE: CULVERT DATA PER SEPARATE STUDY. SEE TTM 37862 HYDRAULIC ANALYSES FOR CULVERTS CROSSING 1-10

200' 0 200' 400' 600'
SCALE: 1"=200'

EXHIBIT B

CITY OF CALIMESA

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 Jefferson Ave. Suite 200
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PROACTIVE ENGINEERING WEST

OAK VALLEY TOWN CENTER

DEVELOPED CONDITION
ONSITE HYDROLOGY MAP

EXHIBIT C: Drainage Facilities Map

CULVERT D1
EX. 30" CMP
Q_{MAX}=43 CFS

CULVERT D2
EX. 36" RCP
Q_{MAX}=104 CFS

CULVERT C
EX. 6'Wx8'H RCB
Q_{MAX}=910 CFS

CULVERT E
EX. 30" RCP
Q_{MAX}=42 CFS

CULVERT B1 & B2
Q_{MAX}=586.14 CFS

CULVERT B1
EX. DBL 48" CMP

CULVERT B2
EX. 48" CMP

CULVERT B3
EX. DBL 48" RCP
Q_{MAX}=140 CFS

CULVERT A
EX. DBL 10'Wx7'H
Q_{MAX}=1905 CFS

INTERSTATE 10 HIGHWAY

INTERSTATE 10 HIGHWAY

SINGLETON ROAD

ROBERTS ROAD

FUTURE SUMMERWIND DEVELOPMENT

FUTURE SUMMERWIND DEVELOPMENT

FUTURE SUMMERWIND DEVELOPMENT

SUMMERWIND PHASE 1

A

B

A

A

A

CP-09 (R7)
48" RCP
Q_{100}=147 CFS

CP-09 (R1-6)
60" RCP
Q_{100}=147 CFS

30' PUBLIC SD ESMT

30' PUBLIC SD ESMT

EXISTING CULVERT
Q_{MAX}=910 CFS

40' PUBLIC SD ESMT

CP-22
30" RCP
Q_{100}=10.4 CFS

CP-08
18" RCP
Q_{100}=10 CFS

LINE A2
66" RCP
Q_{100}=203.2 CFS

LINE A (R17)
10x8 RCB
Q_{100}=1,053 CFS

CATCH BASIN 3
W=14'
Q_{100}=7.0 CFS

CP-07
18" RCP

CP-06
30" RCP
Q_{100}=70 CFS

LINE A2
66" RCP
Q_{100}=213.6 CFS

CATCH BASIN 12
W=14' (SAG)
Q_{100}=4.4 CFS

CP-21
18" RCP

CATCH BASIN 11
W=10'
Q_{100}=5.9 CFS

CP-20
18" RCP

LINE A2 (R1)
66" RCP
Q_{100}=222.8 CFS

CP-05
18" RCP
Q_{100}=27.9 CFS

LINE A
12x10 RCB
Q_{100}=1,474 CFS

CP-10
18" RCP
Q_{100}=6.7 CFS

LINE A
12x10 RCB
Q_{100}=1,481 CFS

CATCH BASIN 2
W=14'
Q_{100}=6.3 CFS

CP-04
18" RCP

LINE A
12x10 RCB
Q_{100}=1,497 CFS

CATCH BASIN 1
W=14'
Q_{100}=12.1 CFS

CP-03
18" RCP

CP-02
30" RCP
Q_{100}=27.7 CFS

LINE A
12x10 RCB
Q_{100}=1,520 CFS

CP-23
42" RCP
Q_{100}=57.1 CFS

LINE A
10x8 RCB
Q_{100}=1,045 CFS

LINE A
8x10 RCB
Q_{100}=1,058 CFS

LINE A
10x8 RCB
Q_{100}=1,128 CFS

LINE A
12x10 RCB
Q_{100}=1,128 CFS

CATCH BASIN 4
W=14' (SAG)
Q_{100}=7.6 CFS

LATERAL CP-11
18" RCP

LINE A1
66" RCP
Q_{100}=145.6 CFS

LINE A
12x10 RCB
Q_{100}=1,253 CFS

LINE A
12x10 RCB
Q_{100}=1,446 CFS

LINE A
12x10 RCB
Q_{100}=1,567 CFS

40' PUBLIC SD ESMT

CP-24
24" RCP
Q_{100}=23.9 CFS

CP-01
42" RCP
Q_{100}=101.4 CFS

50' PUBLIC SD ESMT

LINE A
12'x10' (WxH) RCB
Q_{100}=1,675 CFS

CP-12
24" RCP
Q_{100}=21.2 CFS

LINE A1
66" RCP
Q_{100}=110.3 CFS

CATCH BASIN 5
W=14' (SAG)
Q_{100}=6.7 CFS

CP-13
18" RCP

LINE A1
66" RCP
Q_{100}=140.4 CFS

CATCH BASIN 6
W=4' (SAG)
Q_{100}=3.5 CFS

CP-14
18" RCP

LINE A1
66" RCP
Q_{100}=119.2 CFS

CP-15
30" RCP
Q_{100}=31 CFS

CATCH BASIN 7
W=10'
Q_{100}=7.1 CFS

CP-16
18" RCP

CATCH BASIN 8
W=10'
Q_{100}=5.2 CFS

CP-17
18" RCP

LINE A1
48" RCP
Q_{100}=79.4 CFS

LINE A1
48" RCP
Q_{100}=67.3 CFS

CP-18
36" RCP
Q_{100}=56.1 CFS

LINE A1
18" RCP
Q_{100}=11.2 CFS

CATCH BASIN 10
W=10'
Q_{100}=5.8 CFS

CP-19
18" RCP

LINE B
DOUBLE 6x4 CULVERT
Q_{100}=828.8 CFS

CATCH BASIN 9
W=10'
Q_{100}=5.7 CFS

LINE A1
18" RCP

LINE C
ARCH CULVERIT
Q_{100}=1,905 CFS

WQB

WQB

WQB

LEGEND:

A — DRAINAGE AREA

OVTC PROJECT BOUNDARY

WATERSHED BOUNDARY

PROPOSED STORM DRAIN

EXISTING STORM DRAIN

NOTE: CULVERT DATA PER SEPARATE STUDY. SEE TTM 37862 HYDRAULIC ANALYSES FOR CULVERTS CROSSING 1-10

200' 0 200' 400' 600'

SCALE: 1"=200'

EXHIBIT C

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

CITY OF CALIMESA

OAK VALLEY TOWN CENTER

PRELIMINARY DRAINAGE FACILITIES MAP

OAK VALLEY NORTH PROJECT SITE

Figure 2 shows the location of each culvert in relation to the proposed project, Tentative Tract Map 37862. Culvert A is located at the southerly project boundary, and discharges directly into the stream traversing the site. Flows in excess of the capacity of Culvert A are conveyed to Culvert B3. Culverts D1, D2, and C collect flows and discharge to the northerly portion of the project site. Flows in excess of the capacity for Culverts D1, D2, and C will overflow to Culvert E. Flows in excess of the capacity of Culvert E and Culvert B3 will be conveyed to the low point at Culverts B1 and B2.

SCREENSHOTS FROM THE JLC CULVERT ANALYSIS REPORT

NOTES:
QMAX IS DEFINED AS THE MAXIMUM FLOW RATE BASED ON A PONDED CONDITION BEFORE BY-PASS FLOWS WILL OCCUR. IT SHOULD BE NOTED THAT THE REGIONAL LOW POINT OCCURS AT AREA B AT THE EXISTING DBL 48" CMP AND SINGLE 48" CMP CULVERTS. THIS IS WHERE THE FREEWAY LOW POINT OCCURS. THE I-10 FREEWAY BEHAVES AS A BARRIER THAT FORCES RUNOFF VOLUME TO BACKWATER NORTH OF THE FREEWAY. THE MAXIMUM PONDED DEPTH FOR CULVERT B1 AND B2 ARE BASED ON THE ROUTING IN SERIES RESULTS.

AREA "A" (PER CULVERT ANALYSIS)

AREA "B" (PER CULVERT ANALYSIS)

AREA "C" (PER CULVERT ANALYSIS)

AREA "D" (PER CULVERT ANALYSIS)

AREA "E" (PER CULVERT ANALYSIS)

INTERSTATE 10 HIGHWAY

CULVERT A
EX. DBL 10'Wx7'H
Q_{MAX}=1905 CFS

CULVERT B1 & B2
Q_{MAX}=586.14 CFS

CULVERT B1
EX. DBL 48" CMP

CULVERT B2
EX. SGL 48" CMP

CULVERT B3
EX. DBL 48" RCP
Q_{MAX}=140 CFS

CULVERT C
EX. 6'Wx8'H RCB
Q_{MAX}=910 CFS

CULVERT D1
EX. 30" CMP
Q_{MAX}=43 CFS

CULVERT D2
EX. 36" RCP
Q_{MAX}=104 CFS

SINGLETON ROAD

ROBERTS ROAD

MY CONCERN IS THAT IF WE HAVE DIRECT CONNECTIONS TO THE CULVERTS THAT ACCEPT OVERLAND EXCESS FLOWS, WE WILL BE EXACERBATING THE FLOODING CONDITION FOR THE PROJECT SITE (2022-10-25 ABE)

A

B

Q_{100}=786 CFS TOTAL; (CULVERTS B-3, E)

SUMMERWIND

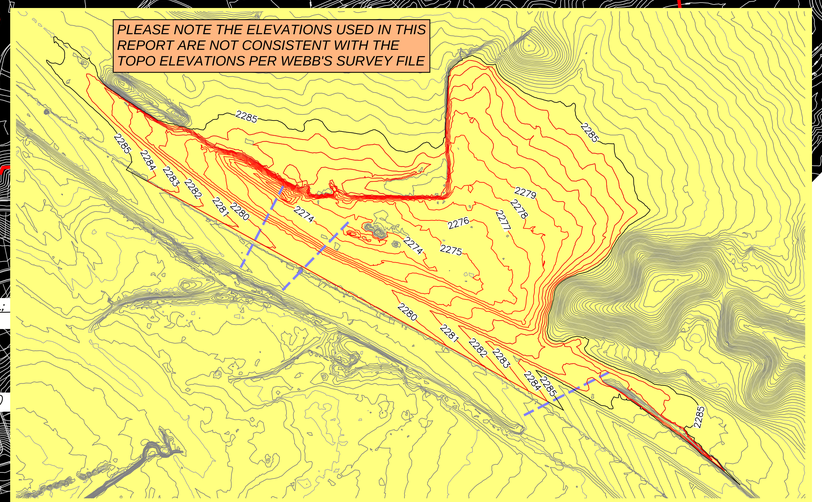
SUMMERWIND PHASE 1

Q_{100}=1,593 CFS TOTAL; V_{AVG}=16.2 FT/S
Q_{100}=535.6 CFS (ONSITE AREA A)
Q_{100}=1,057 CFS (CULVERTS C, D1, D2)

Q_{100}=3,016 CFS TOTAL; V_{AVG}=18.1 FT/S
Q_{100}=343 CFS (ONSITE AREA B)
Q_{100}=2,673 CFS (CULVERTS A, B-3, E)

TO SAN TIMOTEO CREEK

PLEASE NOTE THE ELEVATIONS USED IN THIS REPORT ARE NOT CONSISTENT WITH THE TOPO ELEVATIONS PER WEBB'S SURVEY FILE



CULVERTS B1 AND B2 UPSTREAM STORAGE
SCALE: 1" = 150'

LEGEND:

- A — DRAINAGE AREA
- OVTC PROJECT BOUNDARY
- WATERSHED BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN
- X-X / XX AC — SUBAREA NAME / ACREAGE
- XX / XXX.X / *XXX.X — NODE / FLOWLINE ELEVATION / * INVERT ELEVATION (IF SHOWN)

NOTE: CULVERT DATA PER SEPARATE STUDY. SEE TTM 37862 HYDRAULIC ANALYSES FOR CULVERTS CROSSING I-10

ANALYSIS PREPARED BY JLC ENGINEERING. REQUESTED INTERNALLY 10/17/2022

250' 0 250' 500' 750'
SCALE: 1"=250'

EXHIBIT A

CITY OF CALIMESA

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

OAK VALLEY TOWN CENTER

UNDEVELOPED CONDITION ONSITE HYDROLOGY MAP