

PRELIMINARY DRAINAGE REPORT

for the SKYLINE HEIGHTS PROJECT
in the City of Corona,
County of Riverside, California



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January 21, 2014

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INTRODUCTION

1.1 PURPOSE OF STUDY

The Skyline Heights project, is located within the Sphere of Influence for the City of Corona, California, south of the intersection of Green River Road and Paseo Grande. The purpose of this study is to hydrologically model the project site's onsite and offsite tributary watersheds and to determine the existing and proposed peak runoffs and volumes in order to analyze stormwater mitigation. The hydrologic analysis was prepared using the Rational Method as specified in the Riverside County Hydrology Manual. This report also approximates the peak storage required to mitigate any increased runoff due to development for the most critical storm and duration event using the Unit Hydrograph Method per the Riverside County Rational Method. The flows were used to estimate the above and below ground drainage facilities to support the Skyline Heights project. The storm drain mainlines are proposed as being owned and maintained by City of Corona Public Works.

Development of permanent improved drainage facilities relies in part, on early identification of any adverse drainage conditions that are caused or worsened by new development projects. To avoid sub-standard drainage facilities (difficult and costly to replace) sufficient information is needed early, when the project is being considered for approval. The City of Corona subdivision, zoning and other related ordinances provides for incorporation of drainage facility protection in design of private projects from the early start. The City's application process provides for a preliminary hydrology report / drainage study on all development projects at the time of application. This study provides the needed information to ensure appropriate drainage facilities are proposed and approximately where they will be located. This preliminary hydrology/ drainage study is also part of the full CEQA and public hearing reviews on all discretionary projects. This eliminates the need for CEQA reviews later on when proposed drainage facilities conform to what was previously reviewed and when circumstances have not changed. City of Corona Public Works shall review this preliminary hydrology / drainage study as part of the overall project application. Information from the study shall be used in formulating department CEQA responses and conditions of approval for the project.

1.2 PROJECT DESCRIPTION

The Skyline Heights project is comprised of 270.9 gross acres of vacant land situated in the hills to the southwest of the City of Corona in Western Riverside County, California adjacent to Foothill Parkway. The project area excludes the area set aside for the construction of the future Foothill Parkway westerly extension. The site is located approximately 3 miles south of the 71 and 91 Freeways and approximately 4 miles west of Interstate 15 (I-15). The site is within the City of Corona's Sphere of Influence and is proposed to be annexed to the City during the entitlement process. The City of Corona is currently processing the Capital Improvement Project for the Foothill Parkway Westerly Extension between

Green River Road and Trudy Way. Construction is planned to be completed in the next few years. Foothill Parkway will border the northeastern portion of the project and will be the primary access to the site. **Figure 1** in **Appendix A** shows a vicinity map of the area. Refer to **Figure 2** in **Appendix A** for the City of Corona General Plan Map of the surrounding area.

The Skyline Heights project is generally bounded to the north and east by single-family residences and on the south and west by the Cleveland National Forest and large privately owned parcels. Within the general boundaries of the project is an undeveloped 10.0-acre parcel which is considered "Not a Part" and is owned by the U.S. Forest Service. Adjacent to the southeast portion of the project site is a single-family residential community which is currently graded and under construction (Tract Map 31955). The immediate surrounding area consists of Low Density Residential (2-6 du/ac) as well as undeveloped open space within the City of Corona. Skyline Drive, a graded forest service access road, is located just to the south of the project. This road provides recreational hiking and mountain biking opportunities to residents on a local and regional level.

The City's existing zoning for this project is designated as agriculture. The project proposes to process a General Plan Amendment and zone change, which will be designated as R-1-7.2 Single Family Low Density Residential with 7,200 square feet minimum lots.

There are several existing canyons and ravines that run across the project site. Two of the canyons are shown as blue line streams according to the USGS Quad Maps. Mabey Canyon is one of these blue line streams and is located on the northerly portion of the project. The tributary drainage to this stream is approximately 930 acres and currently drains to the existing Mabey Canyon Debris Basin. The project site is not proposing to grade or alter the Mabey Canyon streambed. The other blue line stream is unnamed and is located in the central portion of the project site. The tributary drainage to this stream is approximately 311 acres and currently drains to the Kroonen Canyon Channel and Oak Street Reservoir located near Chase Drive and Mangular Avenue. The project proposes to fill in this stream with an approximate 72-inch storm drain to convey the storm water runoff underground and discharge back into the existing stream at the easterly terminus of the project site. Several other smaller tributaries are also being filled in within the development. The project proposes a system of storm drain pipes to convey the runoff across the site to the designated discharge points. Two detention basins are proposed within the project site to detain the increased runoff flows from the project development.

The project hydrology and storm drain system will be designed in accordance with recent City of Corona and Riverside County and Water Conservation District design requirements. The onsite storm drain pipes, laterals, catch basins, and inlet and outlet structures are to be publicly maintained by the City of Corona. The proposed detention basins are also to be publicly maintained by the City of Corona.

1.3 STUDY AREA

The project site is located within the Santa Ana River Watershed, the largest watershed in Riverside County. The project site consists of sparsely vegetated and otherwise undeveloped land with the exception of dirt roads. The site is characterized by steep topography, generally increasing in elevation from the northeast to the southwest. Several canyons and ravines are present which will convey natural drainage across the project site. The site generally drains from southwest to northeast, in a natural

canyon flow condition, with the flowline of the streams having an average slope of about 10%-20%. Being undeveloped, there are no major drainage improvements on-site. Stormwater runoff discharges into storm drains in Border Avenue, Lincoln Avenue and the Oak Street Channel before discharging into Temescal Creek – Reach 1, located approximately 3 miles north of the project site.

There are two USGS designated blueline streams onsite (refer to **Figure 3**). Mabey Canyon flows into an existing basin prior to discharging towards Lincoln Avenue. The basin will be upgraded by RCFC&WCD. The other un-named stream flows into Kroonen Channel and the Oak Street Reservoir prior to discharging into the Oak Creek Channel.

1.4 PROPOSED MASTER DRAINAGE FACILITIES

The City of Corona Drainage Master Plan does not identify the drainage facilities for the area surrounding the Skyline Heights project site area. Refer to **Figure 10** for the City of Corona Drainage Master Plan maps for the project area.

1.5 FLOODPLAIN MAPPING

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency which administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there are FIRMs produced by FEMA for the project site:

MAP Number: 06065C1351G and 06065C1353G

MAP Revised: both maps were revised on August 28, 2008.

Figure 11 shows the flood zones designated for the Skyline Heights project site. The project site is located outside the FIRM study limits and currently within an unmapped Zone X area. The proposed Foothill Parkway Westerly Extension project proposes to expand regional storm water facilities, including the Mabey Canyon Debris Basin, prior to the construction of the Skyline Heights project. The area along the northerly channel bank of Mabey Canyon streambed will be graded to create residential lots adjacent to the channel. The lowest proposed pad elevation will be approximately 25 feet higher than the streambed flowline. Given the existing width and configuration of the Mabey Canyon drainage channel, and the elevation of the developed pads throughout the site, the potential for flooding the development is not likely to occur.

1.6 DESIGN CRITERIA

The following are design criteria for this project, based on the Riverside County Hydrology Manual.

Protection Levels

1. The 100-year flood shall be contained with the street R/W limits.
2. The 10-year flood shall be contained within the Top of Curbs.
3. Initiate a storm drain or channel when either condition is exceeded.

Onsite detention facilities were found to be effective in mitigating the impacts of frequent events (i.e., 2-year to 10-year storm events); however, they have little impacts on low frequency events (i.e., 100-year storm event). For this reason, RCFC&WCD released in 1995 the following guidelines for sizing increased runoff detention facilities:

- 1) Storms to be studied are 1-hour, 3-hour, 6-hour, and 24-hour duration events for the 2-year, 5-year, and 10-year return frequencies. Detention basin(s) and outlet sizing(s) will ensure that none of these storm events have higher peak discharge in the "after" condition than in the "before" condition.
- 2) Loss rates are to be determined for the 2- and 5-year events using an AMC I condition, while an AMC II should be used for the 10-year event. All durations should incorporate constant loss rates, except for the 24-hour where a variable loss rate is used.
- 3) A single plot showing the pre-development, post-development and routed hydrographs for each storm event considered shall be included with the submittal of the final hydrology study.
- 4) The detention structure must be capable of passing the 100-year storm without damage to the facility.

HYDROLOGIC DATA AND MODEL DEVELOPMENT

2.1 EXISTING CONDITION MODEL

KWC Engineers has performed a hydrologic analysis for the Skyline Heights project and its tributary watersheds.

The Skyline Heights project site can be divided into four (4) sub-drainage areas to further describe the existing drainage conditions upstream from the site and onsite. Refer to the Existing Condition Hydrology Key Map **Figure 7** in **Appendix F** for locations of the drainage sub-areas, and peak flows at each sub-area. Hydrologic calculations to evaluate surface water runoff associated with the 100-year, and 10-year storms were performed for the drainage areas both onsite and upstream of the site. The Riverside County Rational Method Hydrologic calculations (as described in the Riverside County Hydrology Manual) were performed using the CivilDesign Hydrology / Hydraulics computer program package 2005 by Bonadiman and Associates, Inc. The existing condition watershed boundaries were delineated using aerial topography and US Geological Survey (USGS) topographic maps, see **Figure 3**. The Soil type for the site was assumed to be type D since the project is located outside the limits of the soil type map. The soil type map indicates that the Foothills to the south of Corona are generally type D, since the Skyline Heights project is within the Foothills, therefore type D was used, refer to **Figure 6**. Results of the existing condition hydrologic analysis are summarized in **Table 4** in **Appendix E** along with detailed calculations.

The total site drainage area comprises of 419.67 acres and generates 976.98cfs in the 100-year event, and 594.92cfs in the 10-year event which must be accepted and conveyed through the site. As previously mentioned, there are no existing drainage facilities upstream or within the project boundaries, therefore storm water runoff in the existing condition is conveyed via natural channel flow through the project site.

2.2 PROPOSED CONDITION MODEL

The Skyline Heights project proposes to generally maintain the existing drainage boundaries in the proposed condition. The proposed four (4) drainage areas are described below:

1. Area A: In the Existing Condition the northerly and westerly portion of Area A drains north and west. In the Proposed Condition in order to grade the site for a residential community, mitigate for water quality and mitigate against cross-lot drainage, Area A will drain towards the Mabey Canyon detention basin.
2. Area B: In the Existing Condition the natural canyon flows into an engineered open space west of Cape Drive, into a Concrete Trapezoidal Channel flowing towards Border Avenue. In the Proposed Condition a larger area will drain through a water quality basin and detention basin

prior to entering a storm drain proposed by the Foothill Parkway project which outlets into the same canyon as the Existing Condition.

3. Area C: In the Existing Condition the un-named blue line stream flows into the Oak Street Reservoir via an engineered concrete trapezoidal channel. In the Proposed Condition a smaller area will drain into an extension of the concrete channel constructed with the Foothill Parkway project. Upstream natural canyons will flow into debris basins, and onsite flows will be conveyed via a storm drain pipe system into a water quality basin prior to discharging into the canyon downstream of the project grading limits.
4. Area D: In the Existing Condition the natural canyon drains into a storm drain in Trudy Way which outlets into the Oak Street Reservoir. In the Proposed Condition the storm drain is extended to intercept upstream canyons and convey onsite flows via a water quality basin/detention basin.

The storm drain system and detention basins shall be publicly maintained by the City of Corona Public Works department. However, water quality basins, flow-by basins, and water quality basin piping shall be maintained by the H.O.A.

The proposed hydrology model was based on the Proposed Condition Hydrology Key Map (**Figure 8**) in **Appendix J**. The same soil type as used in the Existing Condition model was used in the Proposed Condition model.

Results of the proposed condition hydrologic analysis are summarized in **Table 5** in **Appendix G** along with detailed calculations. The proposed drainage area comprises of 419.7 acres, the same as in the existing condition since drainage boundaries were protected. The existing condition generates 977.0 cfs in the 100-year event, and 594.9 in the 10-year event. The proposed condition generates 996.8 cfs in the 100-year event, and 614.2 in the 10-year event. Therefore, the proposed discharge from the project site is within 3% of the existing discharge.

The below **Table 1** is a comparison between the Existing Condition and Proposed Condition Rational Method 10 and 100 Year Hydrology results. The difference in peak flow will be mitigated in the proposed detention basins.

TABLE 1 – PEAK FLOW COMPARISON

Area	Existing Q ₁₀ (cfs)	Proposed Q ₁₀ (cfs)	Difference Q ₁₀ (Prop-Exist)	Existing Q ₁₀₀ (cfs)	Proposed Q ₁₀₀ (cfs)	Difference Q ₁₀₀ (Prop-Exist)
A	15.71	31.34	15.63	25.22	49.76	24.54
B	74.19	111.99	37.80	125.48	180.87	55.39
C	412.19	368.21	-43.98	675.81	600.73	-75.08
D	80.81	102.63	21.82	131.32	165.48	34.16
Total	594.92	614.17	19.25	976.98	996.84	19.86

Area A as shown above includes the entire developed area, however only a portion of Area A (subareas A4 and A5) in the existing condition drain towards Mabey Canyon, the outlet of the proposed condition. The following table summarizes the Area A flow difference to Mabey Canyon. RCFC&WCD has indicated to KWC that this flow increase is inconsequential and therefore detention for Area A will not be required.

TABLE 1A – AREA A PEAK FLOW COMPARISON

Area	Existing Q10 (cfs)	Proposed Q10 (cfs)	Difference Q10 (Prop-Exist)	Existing Q100 (cfs)	Proposed Q100 (cfs)	Difference Q100 (Prop-Exist)
A	15.71	31.34	15.63	25.22	49.76	24.54

2.3 ONSITE STORM DRAIN SYSTEM

The onsite storm drain system shall be owned and maintained by the City of Corona Public Works Department, except for the WQMP basins and pipes leading to and from the WQMP basins, which will be maintained by the H.O.A. Preliminary onsite drainage facilities for the proposed Skyline Heights project were calculated by the rational method hydrology program and are presented in **Figure 9, Appendix N**, titled Proposed Storm Drain Facilities. The estimated sizes of these facilities and their approximate locations are intended for conceptual purposes only and will be refined in the design review and final engineering process. Mainline pipe sizes are based on the 100-year storm event with the bulking factor as presented in section 4.3. Pipes will be designed as reinforced concrete pipe while maintaining the HGL 2' below the proposed finish surface, with a roughness coefficient of 0.013 per City standards. Hydraulic calculations will be performed in the Final Engineering phase.

Catch basins and storm drain laterals were placed at locations to keep the 10 year flow below the top of curb and the 100 year flow below the right of way. Catch basins were also placed in locations so that a single 21 foot long (the largest size) catch basin can collect a majority of the current street flow without bypassing to the next downstream catch basin. Preliminary sizing calculations are included in **Table 7 in Appendix L**. Catch basins will also be sized in Final Engineering.

2.4 STREET CAPACITY ANALYSIS

Preliminary onsite street capacities for the proposed Skyline Heights project were calculated by the rational method software. By reviewing street capacity analysis within the rational method, it's concluded that the street sections are sufficient to provide the level of protection required by Riverside County as previously discussed. **Since, the storm drain mainline pipes were sized for the 100-year storm event, the street will only contain local flows until catch basins intercept the 100-year flow.**

2.5 OUTLET ANALYSIS

The proposed development will outlet at four (4) locations, Areas A, B, C and D. Area C will outlet into an existing canyon bottom, however the remaining areas will connect directly to existing storm drains or future storm drain pipes that will be constructed with the Foothill Parkway Westerly Extension project.

For Area C, a concrete impact basin energy dissipator and rip-rap pad will be designed in final engineering to City standards. The outlet velocity shall be at or below the existing condition or to a non-erosive velocity.

DETENTION ANALYSIS

3.1 DETENTION ANALYSIS

The developed tributary areas at the most downstream point for each stream within the proposed project were analyzed for both the existing and proposed conditions. The 2-year, 5-year, and 10-year storms, for the 1-hour, 3-hour, 6-hour and 24-hour events were analyzed using the Riverside County Unit Hydrograph Method. The difference in peak flow and volume were compared to determine if and how much mitigation would be necessary. Refer to the tables on the following pages for the results of the Detention Analysis. Unit Refer to **Appendix I** for the Unit Hydrographs for the Existing Condition and **Appendix J** for the Unit Hydrographs for the Proposed Condition. The same overall tributary drainage boundary for each stream was used in the Rational Method and Unit Hydrograph Method. Refer to the Unit Hydrograph Method Maps for the area delineation, centroids, length and difference in elevation calculation.

The project proposes a detention basin for each drainage area. A combination WQMP and detention basin is proposed for drainage area A, however for drainage areas B, C and D separate WQMP and detention basins are proposed. Refer to the Hydrology Maps and Tentative Tract Map for locations and details of these basins.

**SKYLINE HEIGHTS
DETENTION ANALYSIS**

BASIN A	EXISTING VOLUME (AC-FT)	PROPOSED VOLUME (AC-FT)	DIFFERENCE IN VOLUME (AC-FT)
2Y1H	0.20	0.37	0.18
2Y3H	0.24	0.62	0.38
2Y6H	0.28	0.90	0.62
2Y24H	0.24	1.51	1.27
5Y1H	0.35	0.69	0.33
5Y3H	0.41	0.94	0.53
5Y6H	0.51	1.42	0.91
5Y24H	0.79	2.73	1.95
10Y1H	0.63	1.03	0.40
10Y3H	0.92	1.57	0.65
10Y6H	1.14	2.03	0.89
10Y24H	2.40	4.76	2.36
100Y1H	1.06	1.71	0.65
100Y3H	1.63	2.69	1.06
100Y6H	2.21	3.74	1.53
100Y24H	5.32	9.40	4.08

EXISTING AREA = 9.75 AC

PROPOSED AREA = 15.39 AC

DETENTION REQUIRED = 2.36 AC-FT

BASIN B	EXISTING VOLUME (AC-FT)	PROPOSED VOLUME (AC-FT)	DIFFERENCE IN VOLUME (AC-FT)
2Y1H	0.94	1.39	0.45
2Y3H	1.13	2.33	1.20
2Y6H	1.35	3.23	1.89
2Y24H	1.14	5.56	4.42
5Y1H	1.68	2.64	0.96
5Y3H	1.96	3.74	1.78
5Y6H	2.45	5.24	2.80
5Y24H	3.76	9.48	5.72
10Y1H	3.00	4.19	1.20
10Y3H	4.38	6.26	1.88
10Y6H	5.44	8.06	2.62
10Y24H	11.49	18.63	7.15
100Y1H	5.05	7.02	1.96
100Y3H	7.79	10.92	3.13
100Y6H	10.58	15.02	4.44
100Y24H	25.41	37.83	12.42

EXISTING AREA = 46.60 AC

PROPOSED AREA = 70.84 AC

DETENTION REQUIRED = 7.15 AC-FT

**SKYLINE HEIGHTS
DETENTION ANALYSIS**

BASIN C	EXISTING VOLUME (AC-FT)	PROPOSED VOLUME (AC-FT)	DIFFERENCE IN VOLUME (AC-FT)
2Y1H	6.26	5.72	-0.54
2Y3H	7.51	7.40	-0.11
2Y6H	8.98	9.26	0.28
2Y24H	7.58	9.64	2.06
5Y1H	11.20	9.93	-1.27
5Y3H	13.09	12.19	-0.90
5Y6H	16.34	15.74	-0.59
5Y24H	25.10	25.39	0.29
10Y1H	19.97	17.62	-2.35
10Y3H	29.26	26.06	-3.20
10Y6H	36.32	32.76	-3.56
10Y24H	76.75	70.20	-6.54
100Y1H	33.69	29.42	-4.27
100Y3H	52.03	45.41	-6.62
100Y6H	70.65	61.60	-9.05
100Y24H	169.77	149.45	-20.32

EXISTING AREA = 311.59 AC
PROPOSED AREA = 272.25 AC

DETENTION REQUIRED = 2.06 AC-FT

BASIN D	EXISTING VOLUME (AC-FT)	PROPOSED VOLUME (AC-FT)	DIFFERENCE IN VOLUME (AC-FT)
2Y1H	0.90	1.27	0.37
2Y3H	1.08	1.71	0.64
2Y6H	1.29	2.12	0.83
2Y24H	1.08	2.99	1.91
5Y1H	1.61	2.04	0.43
5Y3H	1.87	2.64	0.76
5Y6H	2.34	2.34	0.00
5Y24H	3.59	5.87	2.28
10Y1H	2.86	3.75	0.89
10Y3H	4.19	5.22	1.03
10Y6H	5.20	6.34	1.14
10Y24H	10.97	14.36	3.39
100Y1H	4.28	6.47	2.18
100Y3H	7.44	9.70	2.26
100Y6H	10.10	12.83	2.73
100Y24H	24.26	31.93	7.66

EXISTING AREA = 44.5 AC
PROPOSED AREA = 61.58 AC

DETENTION REQUIRED = 3.39 AC-FT

DEBRIS BASIN ANALYSIS

4.1 DESIGN CRITERIA

This section determines the debris yield for the undeveloped tributary watershed areas upstream of the development. The corresponding calculated debris yield is then used to determine the size of the debris basin required upstream of the drainage watersheds. To predict debris yield the US Army Corps of Engineers Los Angeles District Method for Prediction of Debris Yield was used as shown below.

4.2 DEBRIS YIELD

LOS ANGELES DISTRICT METHOD FOR PREDICTION OF DEBRIS YIELD

February 1992, updated February 2000

For Watershed areas from 0.1 square mile to 3.0 square miles, use equation 1 as shown on page 15

$$\text{LOG Dy} = 0.65(\text{LOG P}) + 0.62(\text{LOG RR}) + 0.18(\text{LOG A}) + 0.12(\text{FF})$$

Where:

Dy = Unit Debris Yield (yd³/mi²)

P = Maximum 1-Hour Precipitation (inches, taken to two decimal places after the decimal points, times 100)

RR = Relief Ratio (ft/mi) (Highest Watershed Elev-Basin Elev)/Maximum Length

A = Drainage Area (ac)

FF = Non-Dimensional Fire factor

Refer to Appendix N for detailed calculations

4.3 DEBRIS BULKING

The debris factor was calculated by applying the Peak Rate Bulking Factor equation per Section F of the RCFC&WCD Hydrology Manual.

Peak Rate Debris Factor, $F_b = 1 + (D/120,000)$

Where D= Design storm debris production rate for the study watershed in cubic feet per square mile which was estimated based on Tatum regression equation. Per the RCFC&WCD Hydrology Manual debris production rates in Riverside County are generally believed to be lower than those experienced in the western San Gabriel Mountains. Evaluation of the existing condition in the project watershed indicated that the Tatum method is the best suited method for estimating debris production within the project watershed area.

The following table summarizes the bulked flow at each flow-by basin.

Proposed Condition Bulk Peak Flows (100-Year Storm)					
Basin	Node	Dy (CY/mi²)	Fb (Debris Factor)	Clear Water Flow (cfs)	Bulked Flow (cfs)
1	210	7621	1.06	42.15	44.68
2	407	9120	1.07	13.51	14.46
3	501	7998	1.07	20.11	21.52
4	601	7656	1.06	13.76	14.59
5	709	12540	1.10	411.41	452.55
6	804	6950	1.06	53.12	56.31
7	901	8337	1.07	21.24	22.73
8	952	8892	1.07	27.57	29.50

CONCLUSIONS

This preliminary drainage report has evaluated the potential effects of runoff for the proposed project. In addition, this report has addressed the methodology used to analyze the existing and proposed conditions, which was based on the Riverside County Hydrology Manual. This section provides a summary discussion that evaluates the potential effects of the proposed project.

- ❖ The proposed project will not significantly alter drainage patterns on the site. The project will add approximately 40-acres of impervious area, which is about 15% of the site, or about 4% of the total tributary area, in the form of rooftops, driveways, sidewalks and streets.
- ❖ The Rational Method results illustrates that there is an increase in peak flowrate. Thus, with the existing drainage pattern flowing into a downstream properties, detention basins were sized for the project site to mitigate the increase in flowrate. The pre- and post-developed conditions will be met at the outlet of the project.
- ❖ The proposed onsite storm drain mainlines and Detention Basins shall be owned and maintained by City of Corona Public Works.
- ❖ Preliminary alignment and pipe sizes of storm drain lines were presented.
- ❖ A Final Hydrology & Hydraulics Report must be conducted to determine the proposed hydraulic grade lines throughout the storm drain system and final detention basin sizing.

All stormwater run-off will be carried via typical street sections and an onsite storm drain system. The computed 10 year storm event is contained below the top of curb and the computed 100 year storm event is contained within the street right-of-way.

Potential Hydrologic Impacts

Without properly designed and constructed stormwater mitigation measures the following items could be impacted due to the development of this project:

1. Runoff – increase in runoff peak flow and volume will be mitigated by the detention basin
2. Erosion – of existing natural downstream canyons and hillsides will be mitigated by properly designed grading, detention basins, energy dissipators and erosion protection rip-rap pads at the outlet of storm drain system
3. Flooding – of structures due to the 100-year storm event will be mitigated with properly designed grading and sized storm drain system
4. Debris – from existing upstream canyons into the development will be mitigated by flow-by debris basins and debris from the project site into downstream properties will

be mitigated by WQMP basins, trash racks and properly maintained storm drain facilities.

REFERENCES

Riverside County Flood Control and Water Conservation District. *Hydrology Manual*. April 1978

Riverside County Flood Control and Water Conservation District. *Increased Runoff Mitigation Workshop*. August 24, 1995

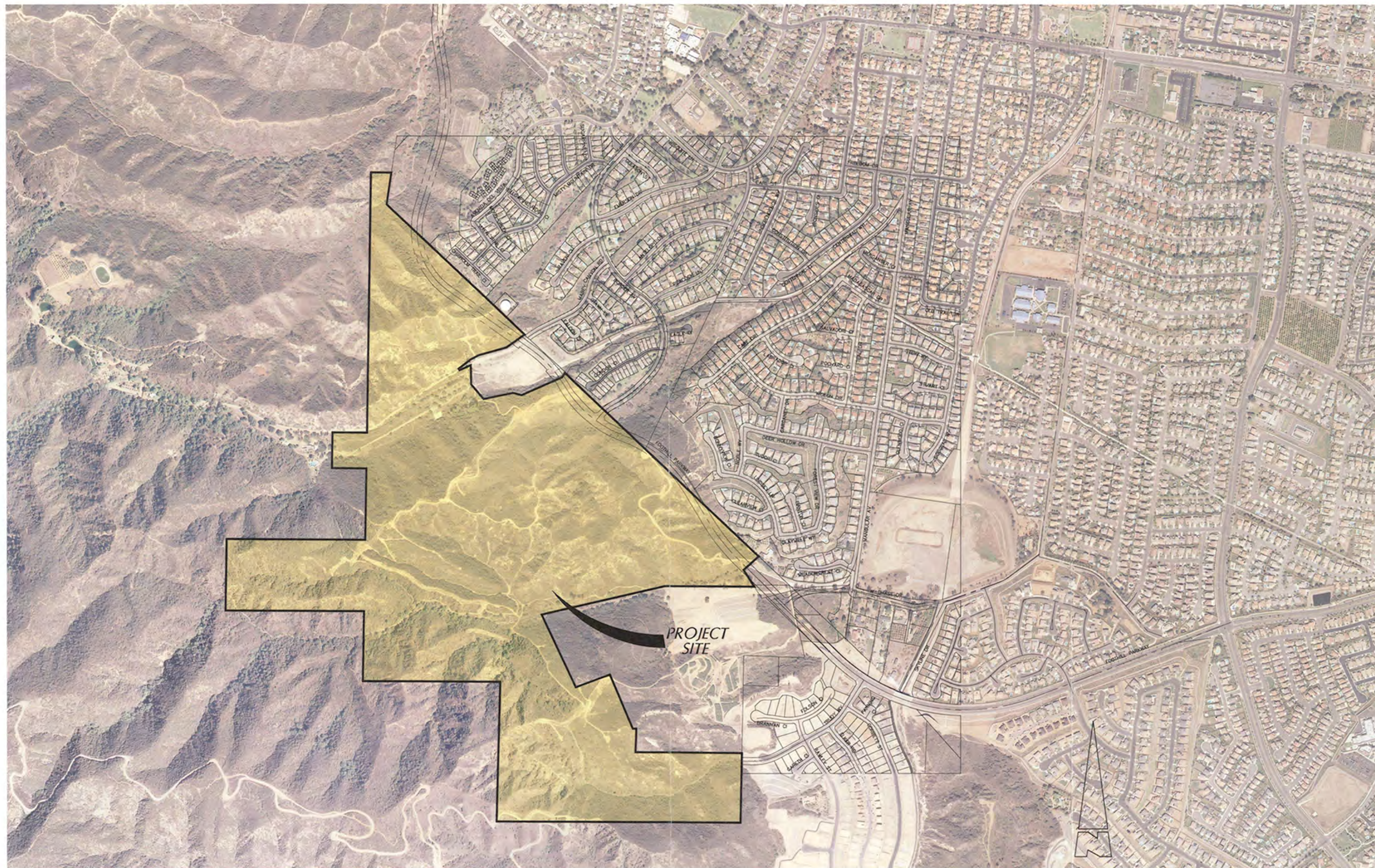
US Army Corps of Engineers, Los Angeles District Method for Prediction of Debris Yield, February 1992, Updated February 2000.

Hydrology Report for Mabey Canyon, *RBF Consulting*, June 28, 2012

A

VICINITY MAPS

- Vicinity Map
- City of Corona Land Use Map
- USGS Topography



400' 0 400' 800' 1200'
SCALE IN FEET

FIGURE 1
VICINITY MAP
HWC ENGINEERS

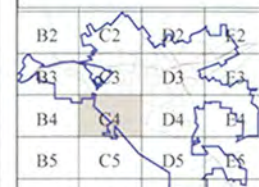
C3

D4

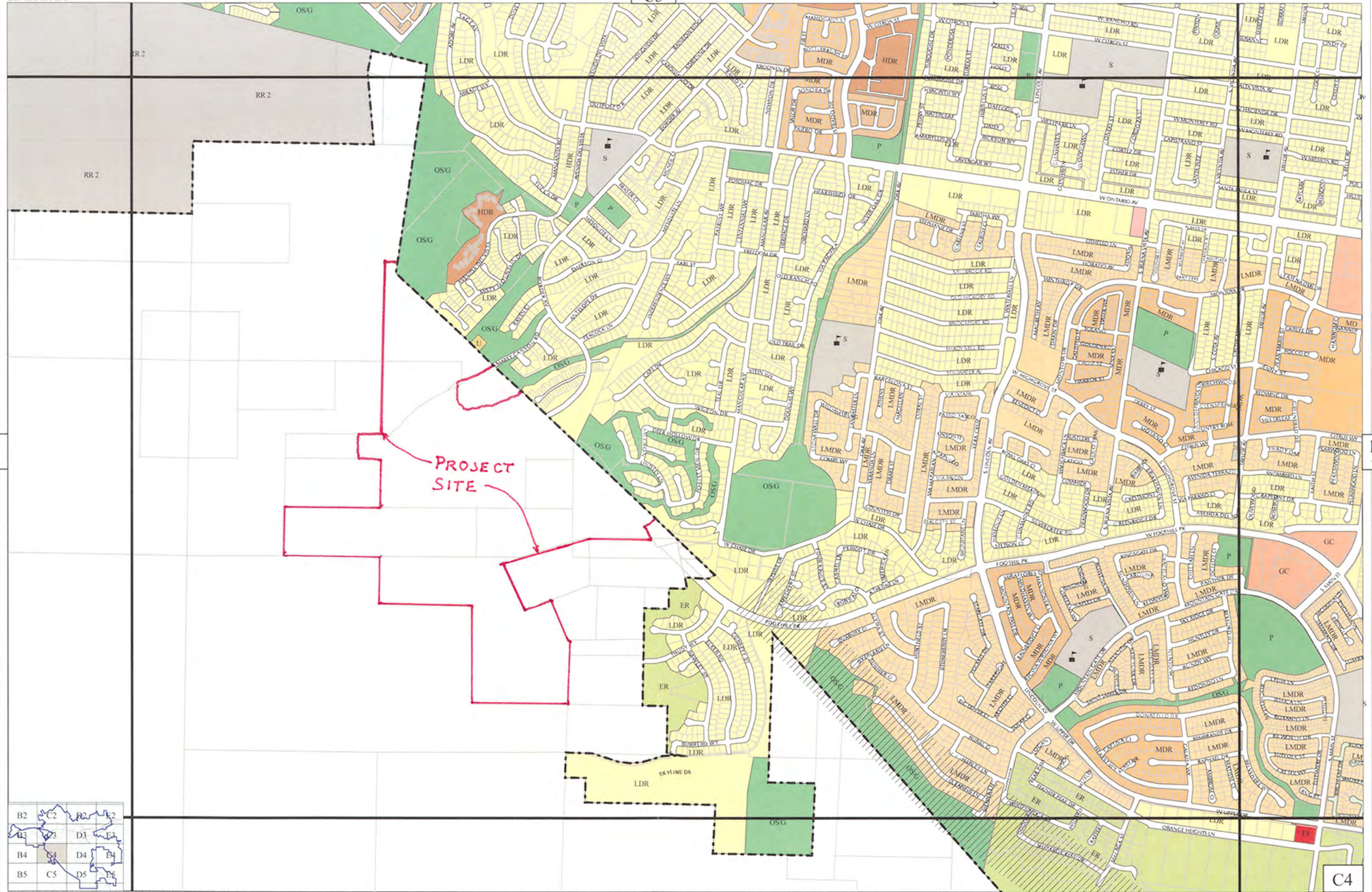
C4

C5

B4



PROJECT
SITE



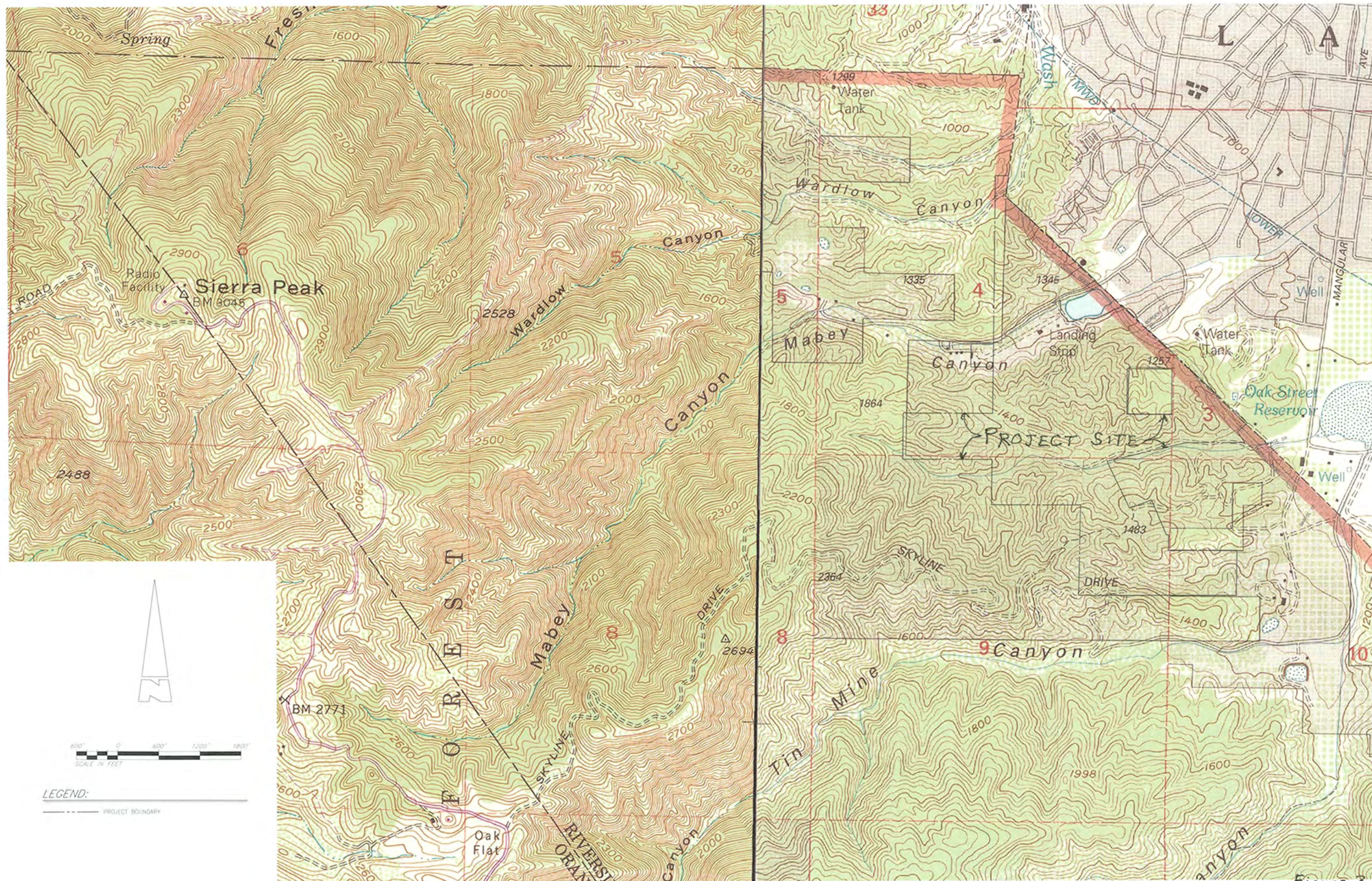


Figure 3

SKYLINE HEIGHTS
USGS MAP

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 • CORONA, CA 92611-5311 • 951-734-2120

SHEET
1 OF 1
SHEETS



Map compiled, edited, and published by the Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs
taken 1946. Field checked 1949. Revised from aerial
photographs taken 1956. Field checked 1967.
Photometric projection. 1927 North American Datum
10,000-foot grid based on California coordinate system, zone 6.
100-meter Universal Transverse Mercator grid ticks,
zone 11, shown in blue.
Five red dashed lines indicate selected fence lines.
Dashed lines indicate selected private lands.
Areas covered by dashed light-blue pattern
are subject to dissection by erosion.
There may be private holdings within the boundaries
of the National or State reservations shown on this map.

To place on the predicted North American Datum 1983
move the projection lines 1 meter north and
88 meters east as shown by dashed corner ticks.

SCALE 1:24,000
CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC DATUM OF 1929

THIS MAP COMPLETES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY
DENVER, COLORADO 80219, OR RESTON, VIRGINIA 20192
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Topographic names in Spanish and woodland compiled from
aerial photographs taken 1967 and other source data.
Partial check by U. S. Forest Service. Map edited 1968.

ROAD CLASSIFICATION
Primary highway Light-duty road, hard or
hard surface improved surface
Secondary highway
Hard surface Unimproved road
Interstate Route U. S. Route State Route

BLACK STAR CANYON, CALIF.
3317 66-11-024

1967
PHOTOGRAPHED 1968
DMA 2451 1:24,000-SERIES 1965

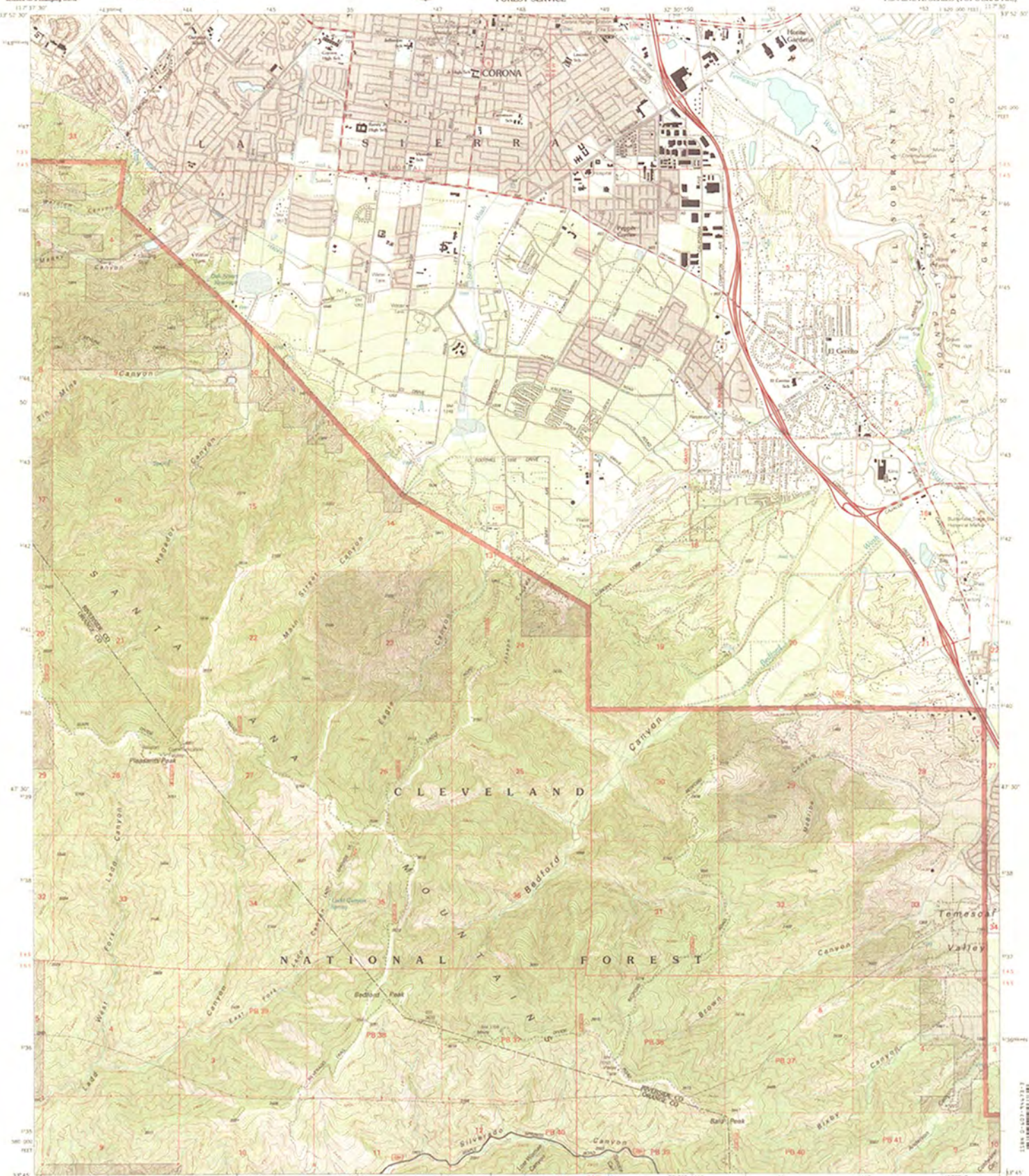


U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

CORONA SOUTH QUADRANGLE
CALIFORNIA
7.5-MINUTE SERIES (TOPOGRAPHIC)



Produced by the United States Geological Survey 1988
Revision by USDA Forest Service 1997

Topography compiled 1952. Photometry derived from imagery taken 1996
and other sources. Public Land Survey System and survey control points
as of 1997.

North American Datum of 1983 (NAD 83). Projection and 10,000-foot scale
California coordinate system, zone 10 (NAD 83).
Blue 1:50,000 scale Universal Transverse Mercator (UTM), zone 11.
North American Datum of 1983 (NAD 83) is shown by dashed corner ticks.
The values of the ticks between NAD 77 and NAD 83 for 7.5-minute
quadrangles are obtainable from National Geographic Survey NADCON software.

Non-National Forest System lands within the National Forest
are indicated by a dashed line.
Buildings may exist in other National or State jurisdictions.
This map is not a legal land title or ownership document. Public lands are
subject to change and leasing, and may have access restrictions. Check
with local offices. Obtain permission before entering private lands.
Published blocks (PB) are uncorrected land of uncertain accuracy.



CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
NO CORRECTION FROM FEET TO METERS, METERS BY 0.3048



1	2	3
4	5	6
7	8	9

- Interstate
U.S.
State
County
National Forest, suitable
for permanent use
National Forest, suitable
for high clearance vehicles
National Forest Trail

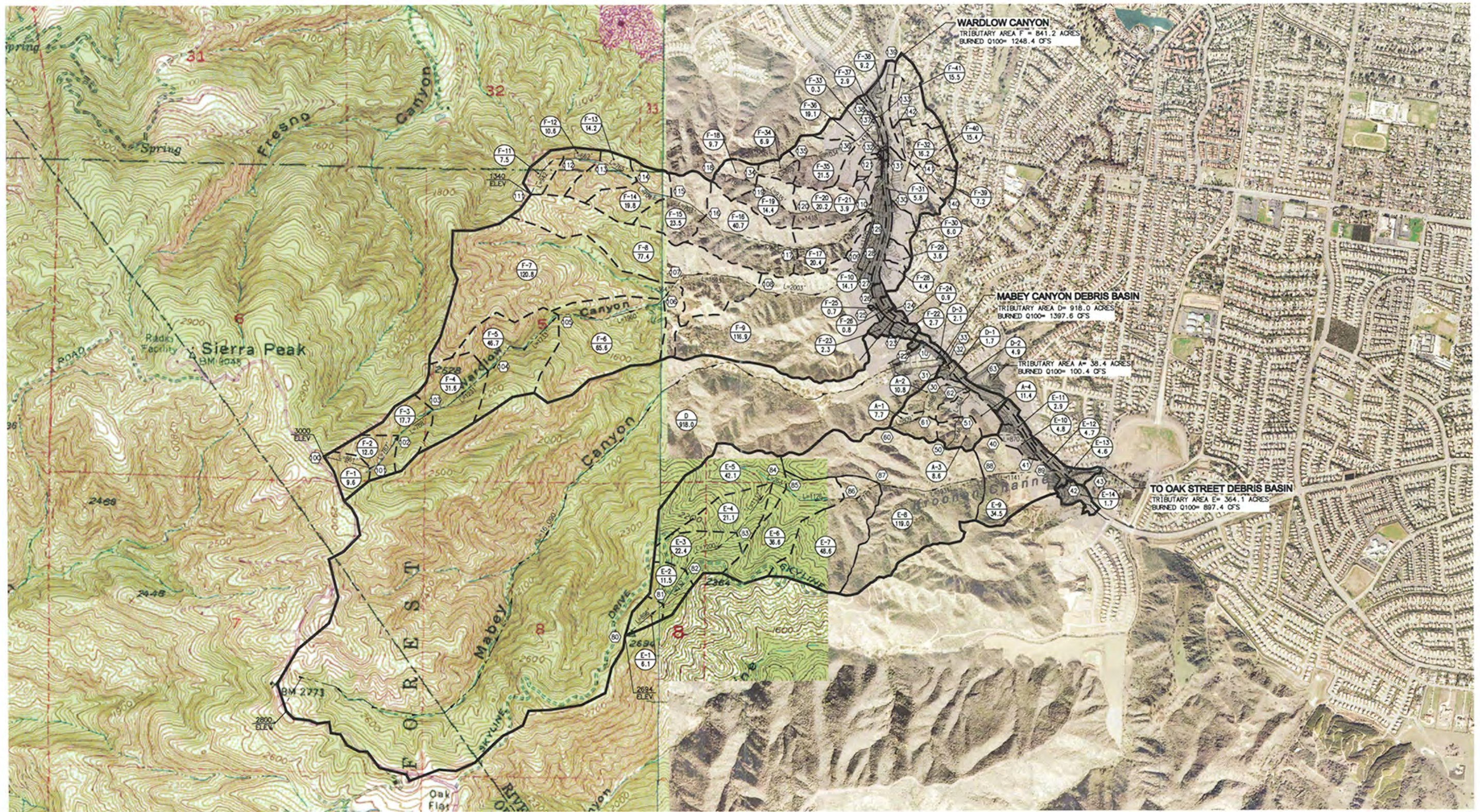
- Primary highway
Secondary highway
Light-duty road
Unimproved
Unimproved, 4-wheel drive
Trail
Game Refuge

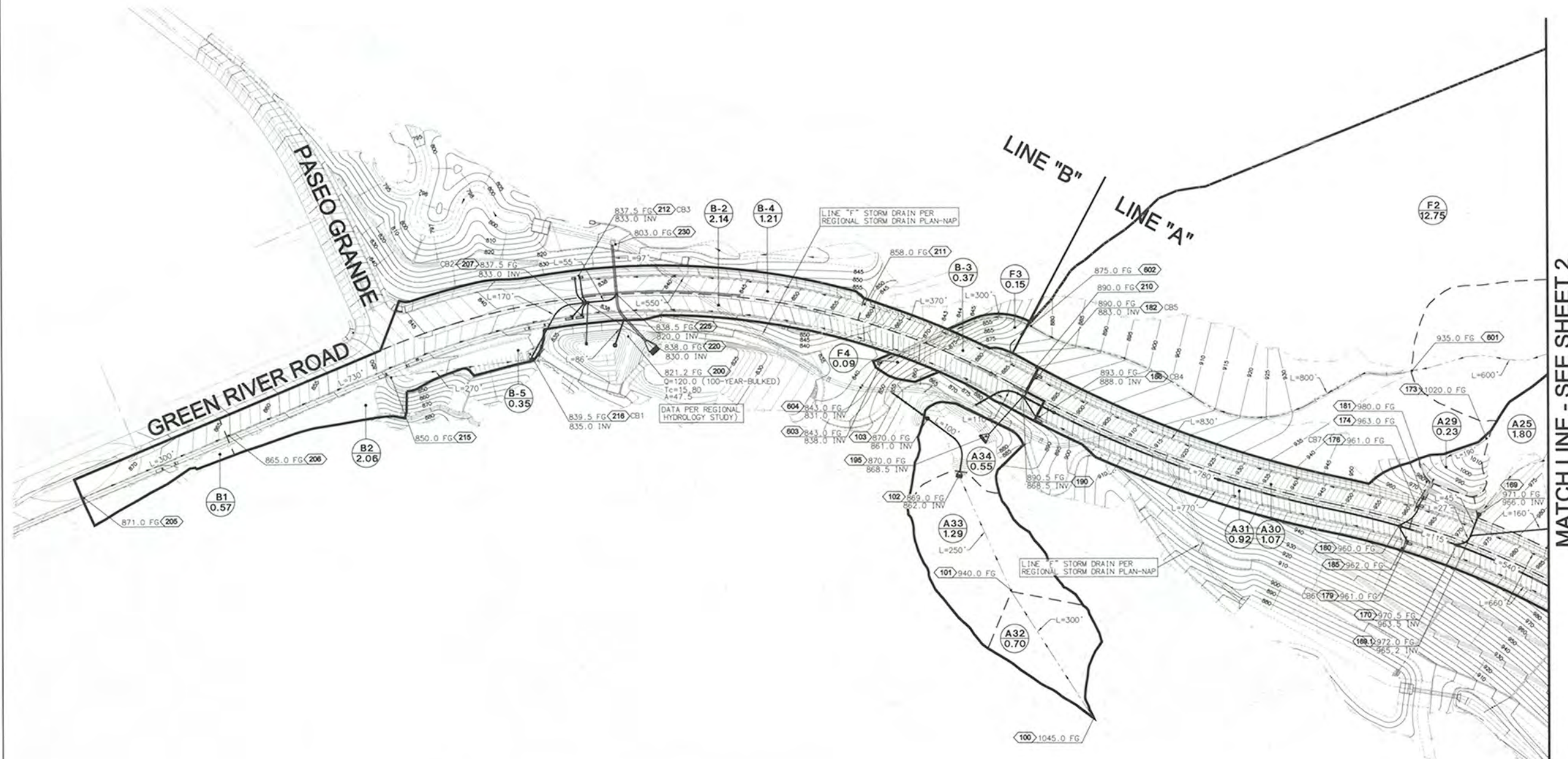
CORONA SOUTH, CA
1997
NADA 2451 1 SE-ADDED 1999

Appendix

B

FOOTHILL PARKWAY HYDROLOGY MAPS





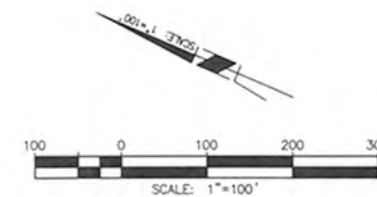
LINE "A"		
NODE	Q ₁₀₀ (cfs)	T _c (min)
CONT. FROM SHEET 2		
169	5.07	9.45
169.1	12.48	12.70
170	57.33	5.63
174	0.86	5.53
176	6.46	6.55
179	3.15	6.63
180	76.05	5.47
182	3.89	6.95
186	3.34	7.01
190	82.16	9.99
195	82.16	10.05

[100.00] = MAIN LINE DATA

LINE "B"		
NODE	Q ₁₀₀ (cfs)	T _c (min)
200	120.00	15.80
206	2.15	6.49
207	8.93	9.25
211	1.54	5.27
212	5.77	7.56
216	1.43	5.45
220	15.33	9.29
225	131.87	15.90
230	131.87	15.95

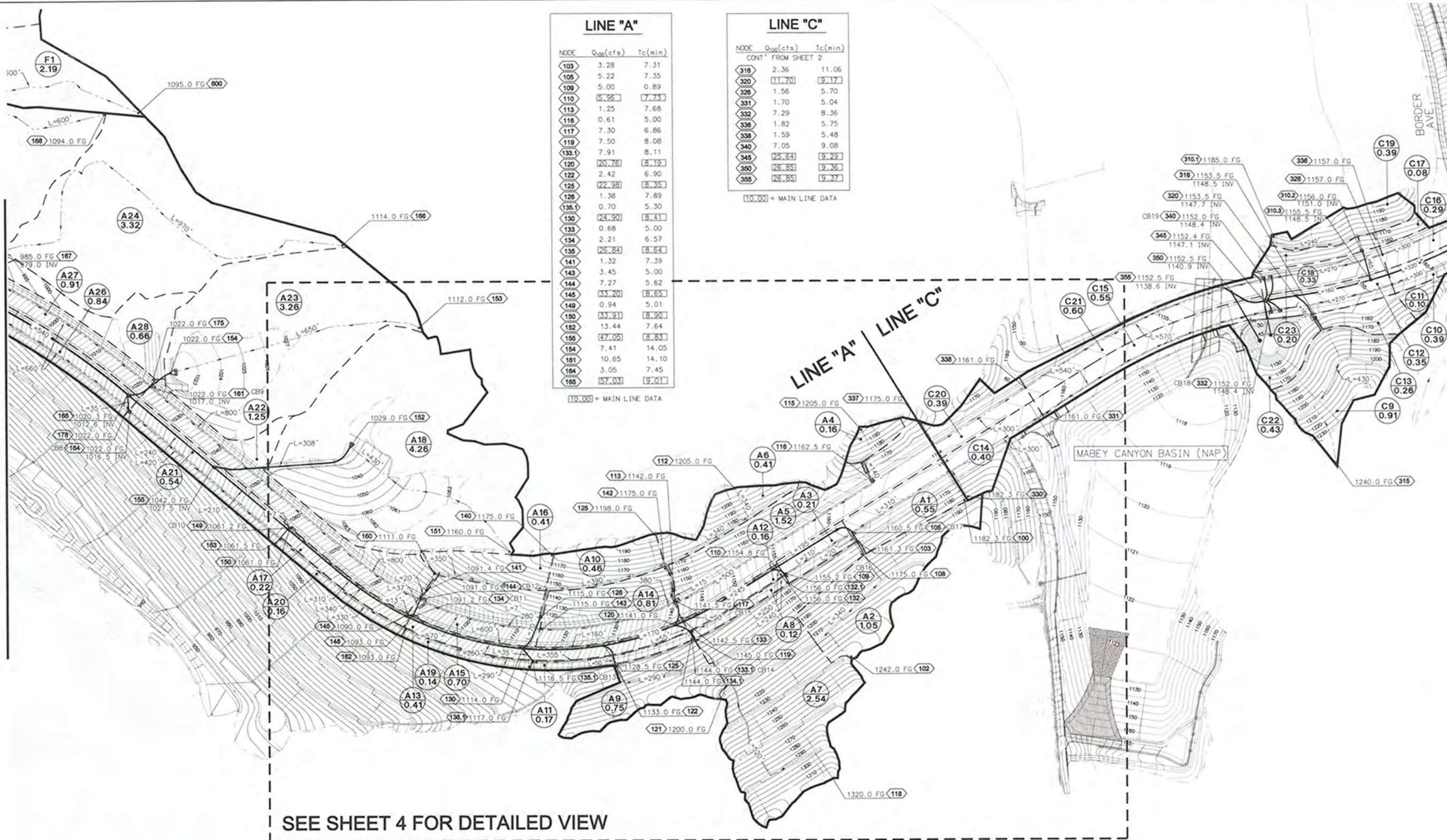
[100.00] = MAIN LINE DATA

LINE "F"		
NODE	Q ₁₀₀ (cfs)	T _c (min)
CONT. FROM SHEET 2		
601	5.44	11.94
602	34.55	12.88
603	35.09	13.16

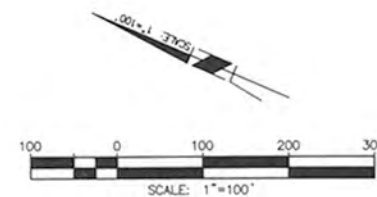


FOOTHILL PARKWAY WESTERLY EXTENSION LOCAL HYDROLOGY STUDY

MATCH LINE - SEE SHEET 1



MATCH LINE - SEE SHEET 3



LINE "C"		
NODE	Q ₁₀₀ (cfs)	T _c (min)
301	3.65	7.72
302	5.99	8.22
306	2.32	6.87
307	3.90	8.22
310	9.87	8.38

CONTINUED ON SHEET 2

[10.00] = MAIN LINE DATA

LINE "E"		
NODE	Q ₁₀₀ (cfs)	T _c (min)
401	1.44	7.15
402	5.93	8.83
406	5.74	11.00
407	11.08	11.12
410	3.88	10.71
412	8.19	11.69
414	2.35	11.11
415	14.00	8.46
420	24.63	11.40
421	24.63	12.16
428	4.01	8.38
431	2.21	5.00
436	0.42	8.01
440	5.22	6.66
450	5.46	6.73
455	32.44	9.29
460	32.44	9.33

[10.00] = MAIN LINE DATA

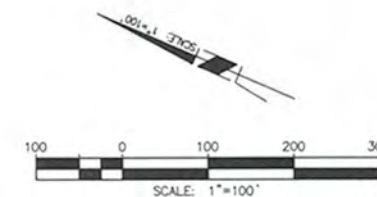
MATCH LINE - SEE SHEET 2

LINE "C" LINE "E"

LINE "D"

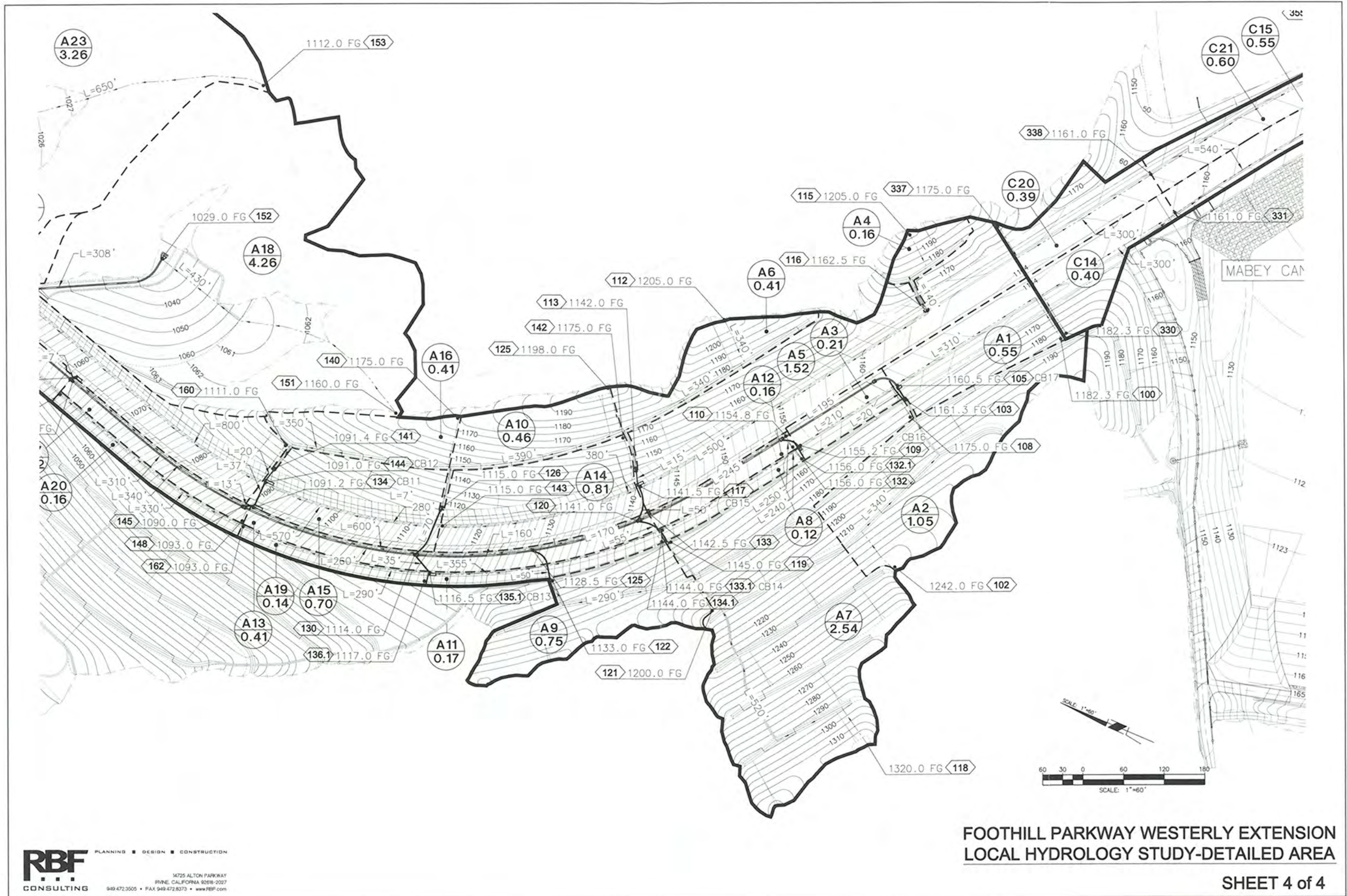
Q=114.6 (100-YEAR-BULKED)
T_c=10.56
A=38.4

DATA PER REGIONAL
HYDROLOGY STUDY



FOOTHILL PARKWAY WESTERLY EXTENSION LOCAL HYDROLOGY STUDY

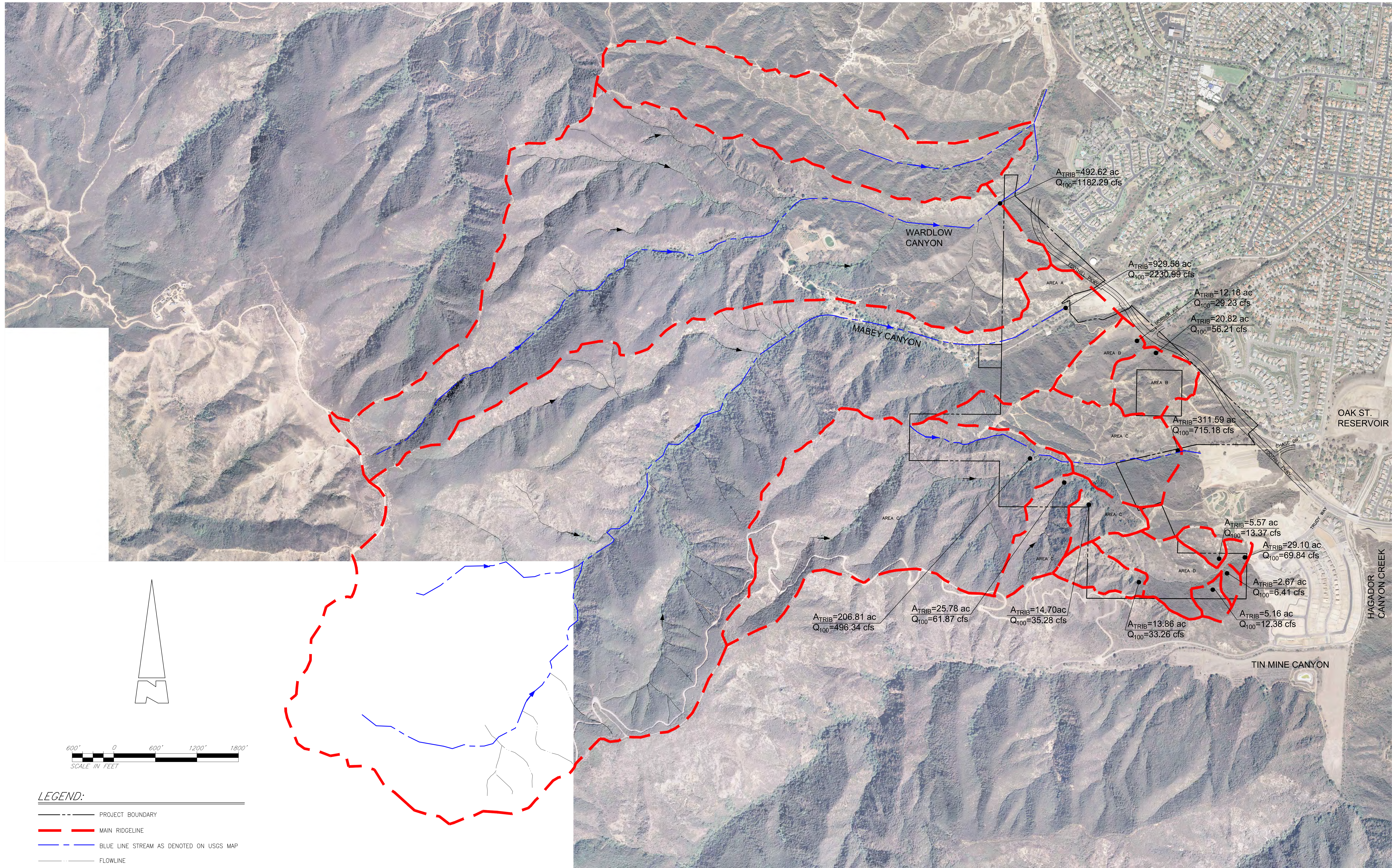
SHEET 3 of 4



Appendix

C

CONCEPTUAL DRAINAGE EXHIBIT



LEGEND:

--- PROJECT BOUNDARY

--- MAIN RIDGELINE

--- BLUE LINE STREAM AS DENOTED ON USGS MAP

--- FLOWLINE

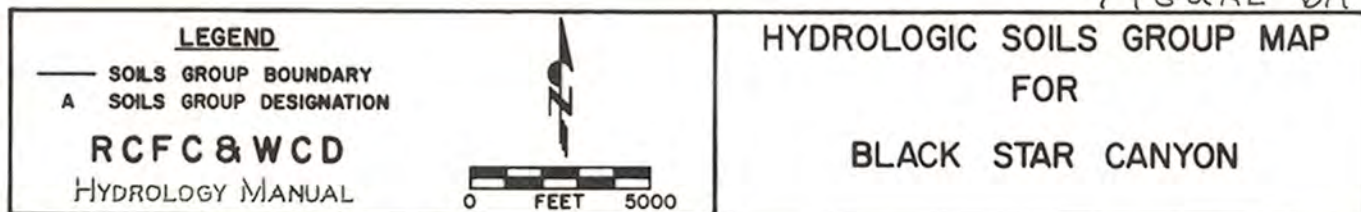
NOTE: 100-YR DRAINAGE FLOWS ARE PRELIMINARY ONLY FOR CONCEPTUAL PURPOSES.
FLOWS WERE DETERMINED BASED ON A RUNOFF INTENSITY OF 3.0 IN/HR AND A RUNOFF FACTOR OF 0.80.
SEE RATIONAL METHOD CALCULATIONS FOR ACTUAL DESIGN FLOWS.

D

HYDROLOGIC CLASSIFICATION OF SOILS



FIGURE 6A



E

EXISTING CONDITION HYDROLOGY RATIONAL METHOD

SKYLINE HEIGHTS

EXISTING CONDITION

TABLE 4 - HYDROLOGY SUMMARY

Sub Area	Area (ac)	Total Area (ac)	Q100 (cfs)	100-Y Tc (min)	Q10 (cfs)	10-Y Tc (min)
A1	2.42	2.42	8.07	7.46	5.07	7.46
A2	0.72	0.72	2.74	5.76	1.72	5.76
A3	2.51	2.51	8.34	7.51	5.24	7.51
A4	1.53	1.53	5.55	6.32	3.49	6.32
A5	8.22	8.22	19.67	14.23	12.22	14.23
Area A	15.39	15.39	44.37	14.23	27.74	14.23
B1	9.28	9.28	22.76	13.58	14.15	13.58
B2	9.99	19.27	45.90	15.13	28.39	15.37
B3	4.50	4.50	11.81	11.91	7.36	11.91
B4	17.20	21.70	55.29	12.79	34.27	12.93
<i>Confluence</i>	40.97	40.97	94.10	12.80	58.17	12.93
B5	7.26	7.26	26.45	6.74	16.02	6.74
Area B	48.23	48.23	125.48	12.80	74.19	12.93
C1	8.17	8.17	19.83	13.85	12.32	13.85
C2	96.72	104.89	232.96	16.64	142.46	17.12
C3	6.64	6.64	16.56	13.14	10.30	13.14
C4	19.65	26.29	63.15	14.48	39.02	14.69
<i>Confluence</i>	131.18	131.18	291.99	16.64	178.71	17.12
C5	9.37	140.55	312.25	13.53	191.05	17.83
C6	6.65	6.65	16.83	12.78	10.47	12.78
C7	10.53	17.18	43.48	12.78	27.06	12.78
C8	2.43	19.61	49.45	13.53	30.75	13.65
C9	13.52	33.13	82.66	13.77	51.31	13.65
C10	5.82	38.95	96.82	17.23	60.06	13.93
<i>Confluence</i>	179.51	179.50	399.10	17.24	244.40	17.83
C11	8.73	188.23	417.69	17.75	255.68	18.43
C12	6.07	6.07	14.86	13.64	9.23	13.63
C13	7.94	14.02	33.11	14.43	20.46	15.61
<i>Confluence</i>	202.26	202.24	448.54	17.75	274.58	18.43
C14	8.88	211.12	467.05	18.47	285.77	19.30
C15	5.58	5.58	13.26	14.43	8.24	14.43
C16	3.84	9.42	22.23	14.92	13.78	15.00
C17	3.97	13.39	31.50	19.42	19.52	15.00
C18	12.39	25.78	58.96	13.63	36.37	16.79
C19	2.84	2.84	7.36	14.62	4.58	12.21
C20	11.86	14.70	37.02	14.92	22.95	13.19
C21	59.97	74.67	675.81	13.06	412.19	20.43
Area C	311.59	311.57	675.81	19.42	412.19	20.43
D1	8.38	8.38	20.04	14.26	12.44	14.26
D2	7.86	7.86	19.52	13.25	12.14	13.25
D3	6.00	13.86	33.96	14.07	21.07	14.19
<i>Confluence</i>	22.24	22.24	53.74	14.07	33.46	14.19
D4	22.24	44.48	77.58	16.27	47.36	16.76
Area D	44.48	44.48	131.32	16.27	80.81	16.76
Total		419.67	976.98		594.92	

10-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10a1.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA A1

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 108.000 to Point/Station 100.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 297.000(Ft.)

Top (of initial area) elevation = 1335.000(Ft.)

Bottom (of initial area) elevation = 1130.000(Ft.)

Difference in elevation = 205.000(Ft.)

Slope = 0.69024 s(percent)= 69.02

TC = $k(0.710) * [(length^3)/(elevation\ change)]^{0.2}$

Initial area time of concentration = 7.457 min.

Rainfall intensity = 2.557(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.819

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 5.067(CFS)
Total initial stream area = 2.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10a2.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA A2

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 106.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 157.000(Ft.)

Top (of initial area) elevation = 1325.000(Ft.)

Bottom (of initial area) elevation = 1215.000(Ft.)

Difference in elevation = 110.000(Ft.)

Slope = 0.70064 s(percent)= 70.06

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 5.761 min.

Rainfall intensity = 2.895(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.827

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.724(CFS)
Total initial stream area = 0.720(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.72 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10a3.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA A3

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 106.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 248.000(Ft.)

Top (of initial area) elevation = 1325.000(Ft.)

Bottom (of initial area) elevation = 1210.000(Ft.)

Difference in elevation = 115.000(Ft.)

Slope = 0.46371 s(percent)= 46.37

TC = $k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 7.513 min.

Rainfall intensity = 2.548(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.818

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 5.235(CFS)
Total initial stream area = 2.510(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.51 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10a4.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA A4

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 107.000 to Point/Station 103.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 161.000(Ft.)

Top (of initial area) elevation = 1285.000(Ft.)

Bottom (of initial area) elevation = 1210.000(Ft.)

Difference in elevation = 75.000(Ft.)

Slope = 0.46584 s(percent)= 46.58

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 6.315 min.

Rainfall intensity = 2.770(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.824

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 3.494(CFS)
Total initial stream area = 1.530(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10a5.out

SKYLINE HEIGHTS
EXISTING CONDITIONS
10 YEAR
AREA A5

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 105.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 827.000(Ft.)
Top (of initial area) elevation = 1330.000(Ft.)
Bottom (of initial area) elevation = 1155.000(Ft.)
Difference in elevation = 175.000(Ft.)
Slope = 0.21161 s(percent)= 21.16
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.228 min.
Rainfall intensity = 1.876(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.793
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 12.220(CFS)
Total initial stream area = 8.220(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 8.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10b.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA B

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 200.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 838.000(Ft.)

Top (of initial area) elevation = 1475.000(Ft.)

Bottom (of initial area) elevation = 1245.000(Ft.)

Difference in elevation = 230.000(Ft.)

Slope = 0.27446 s(percent)= 27.45

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 13.579 min.

Rainfall intensity = 1.918(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.795

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 14.147(CFS)
Total initial stream area = 9.280(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 202.000 to Point/Station 204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1245.000(Ft.)
End of natural channel elevation = 1105.000(Ft.)
Length of natural channel = 1127.000(Ft.)
Estimated mean flow rate at midpoint of channel = 21.761(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 10.48(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1242
Corrected/adjusted channel slope = 0.1170
Travel time = 1.79 min. TC = 15.37 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.789
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.807(In/Hr) for a 10.0 year storm
Subarea runoff = 14.247(CFS) for 9.990(Ac.)
Total runoff = 28.394(CFS) Total area = 19.270(Ac.)

Process from Point/Station 202.000 to Point/Station 204.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 19.270(Ac.)
Runoff from this stream = 28.394(CFS)
Time of concentration = 15.37 min.
Rainfall intensity = 1.807(In/Hr)

Process from Point/Station 201.000 to Point/Station 203.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 673.000(Ft.)
 Top (of initial area) elevation = 1415.000(Ft.)
 Bottom (of initial area) elevation = 1185.000(Ft.)
 Difference in elevation = 230.000(Ft.)
 Slope = 0.34175 s(percent)= 34.18
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 11.905 min.
 Rainfall intensity = 2.043(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.800
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 7.360(CFS)
 Total initial stream area = 4.500(Ac.)
 Pervious area fraction = 1.000

+++++
 Process from Point/Station 203.000 to Point/Station 204.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1185.000(Ft.)
 End of natural channel elevation = 1105.000(Ft.)
 Length of natural channel = 644.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 21.425(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 10.44(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)
 Normal channel slope = 0.1242
 Corrected/adjusted channel slope = 0.1170
 Travel time = 1.03 min. TC = 12.93 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.797
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.963(In/Hr) for a 10.0 year storm
 Subarea runoff = 26.914(CFS) for 17.200(Ac.)
 Total runoff = 34.273(CFS) Total area = 21.700(Ac.)

 Process from Point/Station 203.000 to Point/Station 204.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 21.700 (Ac.)

Runoff from this stream = 34.273 (CFS)

Time of concentration = 12.93 min.

Rainfall intensity = 1.963 (In/Hr)

Summary of stream data:

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

1	28.394	15.37	1.807
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2	34.273	12.93	1.963
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Largest stream flow has longer or shorter time of concentration

Qp = 34.273 + sum of

Qa Tb/Ta

28.394 * 0.841 = 23.891

Qp = 58.165

Total of 2 streams to confluence:

Flow rates before confluence point:

28.394 34.273

Area of streams before confluence:

19.270 21.700

Results of confluence:

Total flow rate = 58.165 (CFS)

Time of concentration = 12.933 min.

Effective stream area after confluence = 40.970 (Ac.)

End of computations, total study area = 40.97 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction (Ap) = 1.000

Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 02/06/13 File:1344EX10B5.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA B5

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 200.000 to Point/Station 210.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 213.000(Ft.)

Top (of initial area) elevation = 1485.000(Ft.)

Bottom (of initial area) elevation = 1360.000(Ft.)

Difference in elevation = 125.000(Ft.)

Slope = 0.58685 s(percent)= 58.69

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 6.744 min.

Rainfall intensity = 2.684(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.822

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 16.021(CFS)
Total initial stream area = 7.260(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 7.26 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/02/13 File:1344ex10c.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA C

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 2694.000(Ft.)

Bottom (of initial area) elevation = 2340.000(Ft.)

Difference in elevation = 354.000(Ft.)

Slope = 0.35400 s(percent)= 35.40

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 13.850 min.

Rainfall intensity = 1.900(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.794

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 12.323(CFS)
Total initial stream area = 8.170(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 301.000 to Point/Station 310.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 2340.000(Ft.)
End of natural channel elevation = 1432.000(Ft.)
Length of natural channel = 3736.000(Ft.)
Estimated mean flow rate at midpoint of channel = 85.266(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 19.05(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.2430
Corrected/adjusted channel slope = 0.1772
Travel time = 3.27 min. TC = 17.12 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.784
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.716(In/Hr) for a 10.0 year storm
Subarea runoff = 130.137(CFS) for 96.720(Ac.)
Total runoff = 142.460(CFS) Total area = 104.890(Ac.)

Process from Point/Station 301.000 to Point/Station 310.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 104.890(Ac.)
Runoff from this stream = 142.460(CFS)
Time of concentration = 17.12 min.
Rainfall intensity = 1.716(In/Hr)

Process from Point/Station 302.000 to Point/Station 303.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 2320.000(Ft.)
 Bottom (of initial area) elevation = 1860.000(Ft.)
 Difference in elevation = 460.000(Ft.)
 Slope = 0.46000 s(percent)= 46.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.143 min.
 Rainfall intensity = 1.948(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.796
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 10.300(CFS)
 Total initial stream area = 6.640(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 303.000 to Point/Station 310.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1860.000(Ft.)
 End of natural channel elevation = 1432.000(Ft.)
 Length of natural channel = 1323.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 25.542(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 14.28(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.3235
 Corrected/adjusted channel slope = 0.1987
 Travel time = 1.54 min. TC = 14.69 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.791
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.847(In/Hr) for a 10.0 year storm
 Subarea runoff = 28.718(CFS) for 19.650(Ac.)
 Total runoff = 39.019(CFS) Total area = 26.290(Ac.)

 Process from Point/Station 303.000 to Point/Station 310.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 26.290 (Ac.)
 Runoff from this stream = 39.019 (CFS)
 Time of concentration = 14.69 min.
 Rainfall intensity = 1.847 (In/Hr)
 Summary of stream data:

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

1	142.460	17.12	1.716
2	39.019	14.69	1.847

Largest stream flow has longer time of concentration

Qp = 142.460 + sum of
 Qb Ia/Ib
 39.019 * 0.929 = 36.253
 Qp = 178.714

Total of 2 streams to confluence:

Flow rates before confluence point:

142.460 39.019

Area of streams before confluence:

104.890 26.290

Results of confluence:

Total flow rate = 178.714 (CFS)

Time of concentration = 17.118 min.

Effective stream area after confluence = 131.180 (Ac.)

 Process from Point/Station 310.000 to Point/Station 311.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1432.000 (Ft.)
 End of natural channel elevation = 1354.000 (Ft.)
 Length of natural channel = 772.000 (Ft.)
 Estimated mean flow rate at midpoint of channel = 185.097 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 18.17 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1010

Corrected/adjusted channel slope = 0.1007

Travel time = 0.71 min. TC = 17.83 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.782

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.683(In/Hr) for a 10.0 year storm
Subarea runoff = 12.333(CFS) for 9.370(Ac.)
Total runoff = 191.047(CFS) Total area = 140.550(Ac.)

Process from Point/Station 310.000 to Point/Station 311.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 140.550(Ac.)
Runoff from this stream = 191.047(CFS)
Time of concentration = 17.83 min.
Rainfall intensity = 1.683(In/Hr)

Process from Point/Station 304.000 to Point/Station 305.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1985.000(Ft.)
Bottom (of initial area) elevation = 1455.000(Ft.)
Difference in elevation = 530.000(Ft.)
Slope = 0.53000 s(percent)= 53.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 12.776 min.
Rainfall intensity = 1.975(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.797
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 10.474(CFS)
Total initial stream area = 6.650(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 306.000 to Point/Station 305.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.797
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 12.78 min.
Rainfall intensity = 1.975(In/Hr) for a 10.0 year storm
Subarea runoff = 16.584(CFS) for 10.530(Ac.)
Total runoff = 27.058(CFS) Total area = 17.180(Ac.)

Process from Point/Station 305.000 to Point/Station 308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1455.000(Ft.)
End of natural channel elevation = 1387.000(Ft.)
Length of natural channel = 581.000(Ft.)
Estimated mean flow rate at midpoint of channel = 28.972(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.10(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1170
Corrected/adjusted channel slope = 0.1119
Travel time = 0.87 min. TC = 13.65 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.913(In/Hr) for a 10.0 year storm
Subarea runoff = 3.694(CFS) for 2.430(Ac.)
Total runoff = 30.752(CFS) Total area = 19.610(Ac.)

Process from Point/Station 323.000 to Point/Station 308.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 13.65 min.
Rainfall intensity = 1.913(In/Hr) for a 10.0 year storm
Subarea runoff = 20.553(CFS) for 13.520(Ac.)
Total runoff = 51.305(CFS) Total area = 33.130(Ac.)


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Process from Point/Station      308.000 to Point/Station      311.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

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Top of natural channel elevation = 1387.000(Ft.)
End of natural channel elevation = 1354.000(Ft.)
Length of natural channel = 240.000(Ft.)
Estimated mean flow rate at midpoint of channel = 55.812(CFS)

```

```

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 14.20(Ft/s)

```

```

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1375
Corrected/adjusted channel slope = 0.1263
Travel time = 0.28 min. TC = 13.93 min.

```

```

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.895(In/Hr) for a 10.0 year storm
Subarea runoff = 8.751(CFS) for 5.820(Ac.)
Total runoff = 60.057(CFS) Total area = 38.950(Ac.)

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+++++
Process from Point/Station      308.000 to Point/Station      311.000
**** CONFLUENCE OF MINOR STREAMS ****

```

```

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 38.950(Ac.)
Runoff from this stream = 60.057(CFS)
Time of concentration = 13.93 min.
Rainfall intensity = 1.895(In/Hr)
Summary of stream data:

```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	191.047	17.83	1.683
2	60.057	13.93	1.895

```

Largest stream flow has longer time of concentration
Qp = 191.047 + sum of
      Qb      Ia/Ib
      60.057 * 0.888 = 53.353

```


Qp = 244.400

Total of 2 streams to confluence:

Flow rates before confluence point:

191.047 60.057

Area of streams before confluence:

140.550 38.950

Results of confluence:

Total flow rate = 244.400 (CFS)

Time of concentration = 17.826 min.

Effective stream area after confluence = 179.500 (Ac.)

Process from Point/Station 311.000 to Point/Station 314.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1354.000 (Ft.)

End of natural channel elevation = 1303.000 (Ft.)

Length of natural channel = 645.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 250.343 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 17.69 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0791

Corrected/adjusted channel slope = 0.0791

Travel time = 0.61 min. TC = 18.43 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.780

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.656 (In/Hr) for a 10.0 year storm

Subarea runoff = 11.283 (CFS) for 8.730 (Ac.)

Total runoff = 255.683 (CFS) Total area = 188.230 (Ac.)

Process from Point/Station 311.000 to Point/Station 314.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 188.230 (Ac.)

Runoff from this stream = 255.683 (CFS)

Time of concentration = 18.43 min.

Rainfall intensity = 1.656 (In/Hr)

Process from Point/Station 309.000 to Point/Station 320.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 890.000(Ft.)
Top (of initial area) elevation = 1735.000(Ft.)
Bottom (of initial area) elevation = 1465.000(Ft.)
Difference in elevation = 270.000(Ft.)
Slope = 0.30337 s(percent)= 30.34
 $TC = k(0.710) * [(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.634 min.
Rainfall intensity = 1.914(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 9.233(CFS)
Total initial stream area = 6.070(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 320.000 to Point/Station 314.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1465.000(Ft.)
End of natural channel elevation = 1303.000(Ft.)
Length of natural channel = 1175.000(Ft.)
Estimated mean flow rate at midpoint of channel = 15.272(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 9.92(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1379
Corrected/adjusted channel slope = 0.1265
Travel time = 1.97 min. TC = 15.61 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.788
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.794(In/Hr) for a 10.0 year storm
Subarea runoff = 11.230(CFS) for 7.940(Ac.)

Total runoff = 20.464 (CFS) Total area = 14.010 (Ac.)

Process from Point/Station 320.000 to Point/Station 314.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.010 (Ac.)
Runoff from this stream = 20.464 (CFS)
Time of concentration = 15.61 min.
Rainfall intensity = 1.794 (In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	255.683	18.43	1.656
2	20.464	15.61	1.794

Largest stream flow has longer time of concentration

Qp = 255.683 + sum of
Qb Ia/Ib
20.464 * 0.923 = 18.893
Qp = 274.576

Total of 2 streams to confluence:

Flow rates before confluence point:

255.683 20.464

Area of streams before confluence:

188.230 14.010

Results of confluence:

Total flow rate = 274.576 (CFS)

Time of concentration = 18.434 min.

Effective stream area after confluence = 202.240 (Ac.)

Process from Point/Station 314.000 to Point/Station 315.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1303.000 (Ft.)
End of natural channel elevation = 1225.000 (Ft.)
Length of natural channel = 962.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 280.604 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 18.56 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0811

Corrected/adjusted channel slope = 0.0811

Travel time = 0.86 min. TC = 19.30 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.778
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.620(In/Hr) for a 10.0 year storm
 Subarea runoff = 11.195(CFS) for 8.880(Ac.)
 Total runoff = 285.771(CFS) Total area = 211.120(Ac.)

 Process from Point/Station 314.000 to Point/Station 315.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 211.120(Ac.)
 Runoff from this stream = 285.771(CFS)
 Time of concentration = 19.30 min.
 Rainfall intensity = 1.620(In/Hr)
 Program is now starting with Main Stream No. 2

 Process from Point/Station 318.000 to Point/Station 321.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 862.000(Ft.)
 Top (of initial area) elevation = 1680.000(Ft.)
 Bottom (of initial area) elevation = 1495.000(Ft.)
 Difference in elevation = 185.000(Ft.)
 Slope = 0.21462 s(percent)= 21.46
 $TC = k(0.710) * [(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 14.425 min.
 Rainfall intensity = 1.863(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.792
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 8.235(CFS)
 Total initial stream area = 5.580(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 321.000 to Point/Station 307.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1495.000(Ft.)
 End of natural channel elevation = 1400.000(Ft.)

Length of natural channel = 374.000(Ft.)
Estimated mean flow rate at midpoint of channel = 11.068(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 10.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.2540
Corrected/adjusted channel slope = 0.1811
Travel time = 0.57 min. TC = 15.00 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.829(In/Hr) for a 10.0 year storm
Subarea runoff = 5.550(CFS) for 3.840(Ac.)
Total runoff = 13.784(CFS) Total area = 9.420(Ac.)

Process from Point/Station 319.000 to Point/Station 307.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 15.00 min.
Rainfall intensity = 1.829(In/Hr) for a 10.0 year storm
Subarea runoff = 5.738(CFS) for 3.970(Ac.)
Total runoff = 19.522(CFS) Total area = 13.390(Ac.)

Process from Point/Station 307.000 to Point/Station 316.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1400.000(Ft.)
End of natural channel elevation = 1250.000(Ft.)
Length of natural channel = 1212.000(Ft.)
Estimated mean flow rate at midpoint of channel = 28.554(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.28(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1238
Corrected/adjusted channel slope = 0.1166
Travel time = 1.79 min. TC = 16.79 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.785
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.732(In/Hr) for a 10.0 year storm
Subarea runoff = 16.848(CFS) for 12.390(Ac.)
Total runoff = 36.370(CFS) Total area = 25.780(Ac.)

Process from Point/Station 307.000 to Point/Station 316.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 25.780(Ac.)
Runoff from this stream = 36.370(CFS)
Time of concentration = 16.79 min.
Rainfall intensity = 1.732(In/Hr)

Process from Point/Station 313.000 to Point/Station 322.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 712.000(Ft.)
Top (of initial area) elevation = 1605.000(Ft.)
Bottom (of initial area) elevation = 1365.000(Ft.)
Difference in elevation = 240.000(Ft.)
Slope = 0.33708 s(percent) = 33.71
 $TC = k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{.2}$
Initial area time of concentration = 12.210 min.
Rainfall intensity = 2.018(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 4.583(CFS)
Total initial stream area = 2.840(Ac.)
Pervious area fraction = 1.000

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Process from Point/Station      322.000 to Point/Station      316.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

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Top of natural channel elevation = 1365.000(Ft.)
End of natural channel elevation = 1250.000(Ft.)
Length of natural channel = 626.000(Ft.)
Estimated mean flow rate at midpoint of channel = 14.151(CFS)

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Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 10.65(Ft/s)

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Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1837
Corrected/adjusted channel slope = 0.1519
Travel time = 0.98 min. TC = 13.19 min.

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Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.945(In/Hr) for a 10.0 year storm
Subarea runoff = 18.364(CFS) for 11.860(Ac.)
Total runoff = 22.946(CFS) Total area = 14.700(Ac.)

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Process from Point/Station      322.000 to Point/Station      316.000
**** CONFLUENCE OF MINOR STREAMS ****

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Along Main Stream number: 2 in normal stream number 2
Stream flow area = 14.700(Ac.)
Runoff from this stream = 22.946(CFS)
Time of concentration = 13.19 min.
Rainfall intensity = 1.945(In/Hr)
Summary of stream data:

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Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	36.370	16.79	1.732
2	22.946	13.19	1.945

```

Largest stream flow has longer time of concentration
Qp = 36.370 + sum of
      Qb      Ia/Ib
      22.946 * 0.891 = 20.438

```


Qp = 56.808

Total of 2 streams to confluence:

Flow rates before confluence point:

36.370 22.946

Area of streams before confluence:

25.780 14.700

Results of confluence:

Total flow rate = 56.808 (CFS)

Time of concentration = 16.787 min.

Effective stream area after confluence = 40.480 (Ac.)

Process from Point/Station 316.000 to Point/Station 315.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 40.480 (Ac.)

Runoff from this stream = 56.808 (CFS)

Time of concentration = 16.79 min.

Rainfall intensity = 1.732 (In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	285.771	19.30	1.620
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2	56.808	16.79	1.732
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Largest stream flow has longer time of concentration

Qp = 285.771 + sum of

Qb Ia/Ib

56.808 * 0.935 = 53.131

Qp = 338.902

Total of 2 main streams to confluence:

Flow rates before confluence point:

285.771 56.808

Area of streams before confluence:

211.120 40.480

Results of confluence:

Total flow rate = 338.902 (CFS)

Time of concentration = 19.298 min.

Effective stream area after confluence = 251.600 (Ac.)

Process from Point/Station 315.000 to Point/Station 317.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1225.000 (Ft.)

End of natural channel elevation = 1155.000 (Ft.)

Length of natural channel = 1185.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 379.291 (CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 17.43(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0591
Corrected/adjusted channel slope = 0.0591
Travel time = 1.13 min. TC = 20.43 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.775
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.577(In/Hr) for a 10.0 year storm
Subarea runoff = 73.283(CFS) for 59.970(Ac.)
Total runoff = 412.185(CFS) Total area = 311.570(Ac.)
End of computations, total study area = 311.57 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/09/13 File:1344ex10d.out

SKYLINE HEIGHTS
EXISTING CONDITION
10 YEAR
AREA D

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 401.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 999.000(Ft.)

Top (of initial area) elevation = 1565.000(Ft.)

Bottom (of initial area) elevation = 1260.000(Ft.)

Difference in elevation = 305.000(Ft.)

Slope = 0.30531 s(percent)= 30.53

TC = $k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 14.261 min.

Rainfall intensity = 1.874(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.793

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 12.443(CFS)
Total initial stream area = 8.380(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 401.000 to Point/Station 403.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.380(Ac.)
Runoff from this stream = 12.443(CFS)
Time of concentration = 14.26 min.
Rainfall intensity = 1.874(In/Hr)

Process from Point/Station 400.000 to Point/Station 402.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 889.000(Ft.)
Top (of initial area) elevation = 1680.000(Ft.)
Bottom (of initial area) elevation = 1370.000(Ft.)
Difference in elevation = 310.000(Ft.)
Slope = 0.34871 s(percent)= 34.87
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.253 min.
Rainfall intensity = 1.941(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 12.139(CFS)
Total initial stream area = 7.860(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 402.000 to Point/Station 403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1370.000(Ft.)
End of natural channel elevation = 1260.000(Ft.)
Length of natural channel = 621.000(Ft.)
Estimated mean flow rate at midpoint of channel = 16.772(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$

Velocity using mean channel flow = 11.02(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1771

Corrected/adjusted channel slope = 0.1486

Travel time = 0.94 min. TC = 14.19 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.793

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.878(In/Hr) for a 10.0 year storm

Subarea runoff = 8.932(CFS) for 6.000(Ac.)

Total runoff = 21.071(CFS) Total area = 13.860(Ac.)

Process from Point/Station 402.000 to Point/Station 403.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 13.860(Ac.)

Runoff from this stream = 21.071(CFS)

Time of concentration = 14.19 min.

Rainfall intensity = 1.878(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	12.443	14.26	1.874
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2	21.071	14.19	1.878
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Largest stream flow has longer or shorter time of concentration

Qp = 21.071 + sum of

Qa Tb/Ta

12.443 * 0.995 = 12.384

Qp = 33.455

Total of 2 streams to confluence:

Flow rates before confluence point:

12.443 21.071

Area of streams before confluence:

8.380 13.860

Results of confluence:

Total flow rate = 33.455(CFS)

Time of concentration = 14.193 min.

Effective stream area after confluence = 22.240(Ac.)

Process from Point/Station 403.000 to Point/Station 404.000

**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1260.000(Ft.)
End of natural channel elevation = 1155.000(Ft.)
Length of natural channel = 1606.000(Ft.)
Estimated mean flow rate at midpoint of channel = 59.629(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 10.42(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0654

Corrected/adjusted channel slope = 0.0654

Travel time = 2.57 min. TC = 16.76 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.785

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.734(In/Hr) for a 10.0 year storm

Subarea runoff = 47.359(CFS) for 34.800(Ac.)

Total runoff = 80.814(CFS) Total area = 57.040(Ac.)

End of computations, total study area = 57.04 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000

Area averaged RI index number = 84.0

100-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100A1.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA A1

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 108.000 to Point/Station 100.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 297.000(Ft.)

Top (of initial area) elevation = 1335.000(Ft.)

Bottom (of initial area) elevation = 1130.000(Ft.)

Difference in elevation = 205.000(Ft.)

Slope = 0.69024 s(percent)= 69.02

TC = $k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 7.457 min.

Rainfall intensity = 3.945(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.846

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 8.073(CFS)
Total initial stream area = 2.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100A2.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA A2

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

+++++
Process from Point/Station 106.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 157.000(Ft.)

Top (of initial area) elevation = 1325.000(Ft.)

Bottom (of initial area) elevation = 1215.000(Ft.)

Difference in elevation = 110.000(Ft.)

Slope = 0.70064 s(percent)= 70.06

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 5.761 min.

Rainfall intensity = 4.465(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.852

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.738(CFS)
Total initial stream area = 0.720(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.72 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100A3.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA A3

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)
Slope of intensity duration curve = 0.4800

Process from Point/Station 106.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 248.000(Ft.)
Top (of initial area) elevation = 1325.000(Ft.)
Bottom (of initial area) elevation = 1210.000(Ft.)
Difference in elevation = 115.000(Ft.)
Slope = 0.46371 s(percent)= 46.37
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.513 min.
Rainfall intensity = 3.931(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 8.341(CFS)
Total initial stream area = 2.510(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.51 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100A4.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA A4

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 107.000 to Point/Station 103.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 161.000(Ft.)

Top (of initial area) elevation = 1285.000(Ft.)

Bottom (of initial area) elevation = 1210.000(Ft.)

Difference in elevation = 75.000(Ft.)

Slope = 0.46584 s(percent)= 46.58

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 6.315 min.

Rainfall intensity = 4.273(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.850

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 5.554(CFS)
Total initial stream area = 1.530(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100A5.out

SKYLINE HEIGHTS
EXISTING CONDITIONS
100 YEAR
AREA A5

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 105.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 827.000(Ft.)

Top (of initial area) elevation = 1330.000(Ft.)

Bottom (of initial area) elevation = 1155.000(Ft.)

Difference in elevation = 175.000(Ft.)

Slope = 0.21161 s(percent)= 21.16

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 14.228 min.

Rainfall intensity = 2.893(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.827

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 19.676(CFS)
Total initial stream area = 8.220(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 8.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100B5.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA B5

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)
10 year storm 60 minute intensity = 0.940(In/Hr)
100 year storm 10 minute intensity = 3.430(In/Hr)
100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 200.000 to Point/Station 210.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 213.000(Ft.)
Top (of initial area) elevation = 1485.000(Ft.)
Bottom (of initial area) elevation = 1360.000(Ft.)
Difference in elevation = 125.000(Ft.)
Slope = 0.58685 s(percent)= 58.69
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 6.744 min.
Rainfall intensity = 4.140(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 25.488(CFS)
Total initial stream area = 7.260(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 7.26 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344EX100B.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA B

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

+++++
Process from Point/Station 200.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 838.000(Ft.)

Top (of initial area) elevation = 1475.000(Ft.)

Bottom (of initial area) elevation = 1245.000(Ft.)

Difference in elevation = 230.000(Ft.)

Slope = 0.27446 s(percent)= 27.45

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 13.579 min.

Rainfall intensity = 2.959(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.829

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 22.758(CFS)
Total initial stream area = 9.280(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 202.000 to Point/Station 204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1245.000(Ft.)
End of natural channel elevation = 1105.000(Ft.)
Length of natural channel = 1127.000(Ft.)
Estimated mean flow rate at midpoint of channel = 35.008(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.96(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1242
Corrected/adjusted channel slope = 0.1170
Travel time = 1.57 min. TC = 15.15 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.807(In/Hr) for a 100.0 year storm
Subarea runoff = 23.146(CFS) for 9.990(Ac.)
Total runoff = 45.904(CFS) Total area = 19.270(Ac.)

Process from Point/Station 202.000 to Point/Station 204.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 19.270(Ac.)
Runoff from this stream = 45.904(CFS)
Time of concentration = 15.15 min.
Rainfall intensity = 2.807(In/Hr)

Process from Point/Station 201.000 to Point/Station 203.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 673.000(Ft.)
 Top (of initial area) elevation = 1415.000(Ft.)
 Bottom (of initial area) elevation = 1185.000(Ft.)
 Difference in elevation = 230.000(Ft.)
 Slope = 0.34175 s(percent)= 34.18
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 11.905 min.
 Rainfall intensity = 3.152(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.833
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 11.812(CFS)
 Total initial stream area = 4.500(Ac.)
 Pervious area fraction = 1.000

+++++
 Process from Point/Station 203.000 to Point/Station 204.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1185.000(Ft.)
 End of natural channel elevation = 1105.000(Ft.)
 Length of natural channel = 644.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 34.387(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 11.90(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1242
 Corrected/adjusted channel slope = 0.1170
 Travel time = 0.90 min. TC = 12.81 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.831
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 3.043(In/Hr) for a 100.0 year storm
 Subarea runoff = 43.478(CFS) for 17.200(Ac.)
 Total runoff = 55.290(CFS) Total area = 21.700(Ac.)

 Process from Point/Station 203.000 to Point/Station 204.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 21.700 (Ac.)

Runoff from this stream = 55.290 (CFS)

Time of concentration = 12.81 min.

Rainfall intensity = 3.043 (In/Hr)

Summary of stream data:

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

1	45.904	15.15	2.807
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2	55.290	12.81	3.043
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Largest stream flow has longer or shorter time of concentration

Qp = 55.290 + sum of

Qa Tb/Ta

45.904 * 0.845 = 38.806

Qp = 94.096

Total of 2 streams to confluence:

Flow rates before confluence point:

45.904 55.290

Area of streams before confluence:

19.270 21.700

Results of confluence:

Total flow rate = 94.096 (CFS)

Time of concentration = 12.807 min.

Effective stream area after confluence = 40.970 (Ac.)

End of computations, total study area = 40.97 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000

Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344ex100c.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA C

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 2694.000(Ft.)

Bottom (of initial area) elevation = 2340.000(Ft.)

Difference in elevation = 354.000(Ft.)

Slope = 0.35400 s(percent)= 35.40

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 13.850 min.

Rainfall intensity = 2.931(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.828

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 19.831(CFS)
Total initial stream area = 8.170(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 301.000 to Point/Station 310.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 2340.000(Ft.)
End of natural channel elevation = 1432.000(Ft.)
Length of natural channel = 3736.000(Ft.)
Estimated mean flow rate at midpoint of channel = 137.218(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 21.99(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.2430
Corrected/adjusted channel slope = 0.1772
Travel time = 2.83 min. TC = 16.68 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.680(In/Hr) for a 100.0 year storm
Subarea runoff = 213.130(CFS) for 96.720(Ac.)
Total runoff = 232.962(CFS) Total area = 104.890(Ac.)

Process from Point/Station 301.000 to Point/Station 310.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 104.890(Ac.)
Runoff from this stream = 232.962(CFS)
Time of concentration = 16.68 min.
Rainfall intensity = 2.680(In/Hr)

Process from Point/Station 302.000 to Point/Station 303.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 2320.000(Ft.)
 Bottom (of initial area) elevation = 1860.000(Ft.)
 Difference in elevation = 460.000(Ft.)
 Slope = 0.46000 s(percent)= 46.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.143 min.
 Rainfall intensity = 3.005(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.830
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 16.561(CFS)
 Total initial stream area = 6.640(Ac.)
 Pervious area fraction = 1.000

+++++
 Process from Point/Station 303.000 to Point/Station 310.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1860.000(Ft.)
 End of natural channel elevation = 1432.000(Ft.)
 Length of natural channel = 1323.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 41.065(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 16.31(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.3235
 Corrected/adjusted channel slope = 0.1987
 Travel time = 1.35 min. TC = 14.50 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.827
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.867(In/Hr) for a 100.0 year storm
 Subarea runoff = 46.584(CFS) for 19.650(Ac.)
 Total runoff = 63.145(CFS) Total area = 26.290(Ac.)

 Process from Point/Station 303.000 to Point/Station 310.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 26.290 (Ac.)
 Runoff from this stream = 63.145 (CFS)
 Time of concentration = 14.50 min.
 Rainfall intensity = 2.867 (In/Hr)
 Summary of stream data:

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

1	232.962	16.68	2.680
2	63.145	14.50	2.867

Largest stream flow has longer time of concentration

Qp = 232.962 + sum of
 Qb Ia/Ib
 63.145 * 0.935 = 59.027

Qp = 291.989

Total of 2 streams to confluence:

Flow rates before confluence point:

232.962 63.145

Area of streams before confluence:

104.890 26.290

Results of confluence:

Total flow rate = 291.989 (CFS)

Time of concentration = 16.682 min.

Effective stream area after confluence = 131.180 (Ac.)

 Process from Point/Station 310.000 to Point/Station 311.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1432.000 (Ft.)
 End of natural channel elevation = 1354.000 (Ft.)
 Length of natural channel = 772.000 (Ft.)
 Estimated mean flow rate at midpoint of channel = 302.417 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 21.18 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1010

Corrected/adjusted channel slope = 0.1007

Travel time = 0.61 min. TC = 17.29 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.821

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.635(In/Hr) for a 100.0 year storm
Subarea runoff = 20.266(CFS) for 9.370(Ac.)
Total runoff = 312.254(CFS) Total area = 140.550(Ac.)

Process from Point/Station 310.000 to Point/Station 311.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 140.550(Ac.)
Runoff from this stream = 312.254(CFS)
Time of concentration = 17.29 min.
Rainfall intensity = 2.635(In/Hr)

Process from Point/Station 304.000 to Point/Station 305.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1985.000(Ft.)
Bottom (of initial area) elevation = 1455.000(Ft.)
Difference in elevation = 530.000(Ft.)
Slope = 0.53000 s(percent)= 53.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 12.776 min.
Rainfall intensity = 3.047(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 16.831(CFS)
Total initial stream area = 6.650(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 306.000 to Point/Station 305.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 12.78 min.
Rainfall intensity = 3.047(In/Hr) for a 100.0 year storm
Subarea runoff = 26.650(CFS) for 10.530(Ac.)
Total runoff = 43.481(CFS) Total area = 17.180(Ac.)

Process from Point/Station 305.000 to Point/Station 308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1455.000(Ft.)
End of natural channel elevation = 1387.000(Ft.)
Length of natural channel = 581.000(Ft.)
Estimated mean flow rate at midpoint of channel = 46.556(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 12.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1170
Corrected/adjusted channel slope = 0.1119
Travel time = 0.76 min. TC = 13.54 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.963(In/Hr) for a 100.0 year storm
Subarea runoff = 5.968(CFS) for 2.430(Ac.)
Total runoff = 49.449(CFS) Total area = 19.610(Ac.)

Process from Point/Station 323.000 to Point/Station 308.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 13.54 min.
Rainfall intensity = 2.963(In/Hr) for a 100.0 year storm
Subarea runoff = 33.206(CFS) for 13.520(Ac.)
Total runoff = 82.655(CFS) Total area = 33.130(Ac.)

 Process from Point/Station 308.000 to Point/Station 311.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1387.000 (Ft.)
 End of natural channel elevation = 1354.000 (Ft.)
 Length of natural channel = 240.000 (Ft.)
 Estimated mean flow rate at midpoint of channel = 89.915 (CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 16.34 (Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)
 Normal channel slope = 0.1375
 Corrected/adjusted channel slope = 0.1263
 Travel time = 0.24 min. TC = 13.78 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.828
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil (AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.937 (In/Hr) for a 100.0 year storm
 Subarea runoff = 14.162 (CFS) for 5.820 (Ac.)
 Total runoff = 96.817 (CFS) Total area = 38.950 (Ac.)

 Process from Point/Station 308.000 to Point/Station 311.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 38.950 (Ac.)
 Runoff from this stream = 96.817 (CFS)
 Time of concentration = 13.78 min.
 Rainfall intensity = 2.937 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	312.254	17.29	2.635
2	96.817	13.78	2.937

Largest stream flow has longer time of concentration
 $Q_p = 312.254 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $96.817 * 0.897 = 86.840$

Qp = 399.095

Total of 2 streams to confluence:

Flow rates before confluence point:

312.254 96.817

Area of streams before confluence:

140.550 38.950

Results of confluence:

Total flow rate = 399.095 (CFS)

Time of concentration = 17.289 min.

Effective stream area after confluence = 179.500 (Ac.)

+++++
Process from Point/Station 311.000 to Point/Station 314.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1354.000 (Ft.)

End of natural channel elevation = 1303.000 (Ft.)

Length of natural channel = 645.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 408.800 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 20.65 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0791

Corrected/adjusted channel slope = 0.0791

Travel time = 0.52 min. TC = 17.81 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.820

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.598 (In/Hr) for a 100.0 year storm

Subarea runoff = 18.591 (CFS) for 8.730 (Ac.)

Total runoff = 417.686 (CFS) Total area = 188.230 (Ac.)

+++++
Process from Point/Station 311.000 to Point/Station 314.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 188.230 (Ac.)

Runoff from this stream = 417.686 (CFS)

Time of concentration = 17.81 min.

Rainfall intensity = 2.598 (In/Hr)

Process from Point/Station 309.000 to Point/Station 320.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 890.000(Ft.)
Top (of initial area) elevation = 1735.000(Ft.)
Bottom (of initial area) elevation = 1465.000(Ft.)
Difference in elevation = 270.000(Ft.)
Slope = 0.30337 s(percent)= 30.34
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 13.634 min.
Rainfall intensity = 2.953(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 14.855(CFS)
Total initial stream area = 6.070(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 320.000 to Point/Station 314.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1465.000(Ft.)
End of natural channel elevation = 1303.000(Ft.)
Length of natural channel = 1175.000(Ft.)
Estimated mean flow rate at midpoint of channel = 24.570(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1379
Corrected/adjusted channel slope = 0.1265
Travel time = 1.74 min. TC = 15.37 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.788(In/Hr) for a 100.0 year storm
Subarea runoff = 18.258(CFS) for 7.940(Ac.)

Total runoff = 33.113 (CFS) Total area = 14.010 (Ac.)

+++++
Process from Point/Station 320.000 to Point/Station 314.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.010 (Ac.)
Runoff from this stream = 33.113 (CFS)
Time of concentration = 15.37 min.
Rainfall intensity = 2.788 (In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	417.686	17.81	2.598
2	33.113	15.37	2.788

Largest stream flow has longer time of concentration

Qp = 417.686 + sum of
Qb Ia/Ib
33.113 * 0.932 = 30.853
Qp = 448.539

Total of 2 streams to confluence:

Flow rates before confluence point:

417.686 33.113

Area of streams before confluence:

188.230 14.010

Results of confluence:

Total flow rate = 448.539 (CFS)

Time of concentration = 17.810 min.

Effective stream area after confluence = 202.240 (Ac.)

+++++
Process from Point/Station 314.000 to Point/Station 315.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1303.000 (Ft.)
End of natural channel elevation = 1225.000 (Ft.)
Length of natural channel = 962.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 458.386 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 21.69 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0811

Corrected/adjusted channel slope = 0.0811

Travel time = 0.74 min. TC = 18.55 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.818
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.547(In/Hr) for a 100.0 year storm
 Subarea runoff = 18.512(CFS) for 8.880(Ac.)
 Total runoff = 467.051(CFS) Total area = 211.120(Ac.)

 Process from Point/Station 314.000 to Point/Station 315.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 211.120(Ac.)
 Runoff from this stream = 467.051(CFS)
 Time of concentration = 18.55 min.
 Rainfall intensity = 2.547(In/Hr)
 Program is now starting with Main Stream No. 2

 Process from Point/Station 318.000 to Point/Station 321.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 862.000(Ft.)
 Top (of initial area) elevation = 1680.000(Ft.)
 Bottom (of initial area) elevation = 1495.000(Ft.)
 Difference in elevation = 185.000(Ft.)
 Slope = 0.21462 s(percent)= 21.46
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 14.425 min.
 Rainfall intensity = 2.874(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.827
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 13.262(CFS)
 Total initial stream area = 5.580(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 321.000 to Point/Station 307.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1495.000(Ft.)
 End of natural channel elevation = 1400.000(Ft.)

Length of natural channel = 374.000(Ft.)
Estimated mean flow rate at midpoint of channel = 17.825(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 12.36(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2540

Corrected/adjusted channel slope = 0.1811

Travel time = 0.50 min. TC = 14.93 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.826

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.827(In/Hr) for a 100.0 year storm

Subarea runoff = 8.965(CFS) for 3.840(Ac.)

Total runoff = 22.227(CFS) Total area = 9.420(Ac.)

Process from Point/Station 319.000 to Point/Station 307.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.826

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Time of concentration = 14.93 min.

Rainfall intensity = 2.827(In/Hr) for a 100.0 year storm

Subarea runoff = 9.269(CFS) for 3.970(Ac.)

Total runoff = 31.495(CFS) Total area = 13.390(Ac.)

Process from Point/Station 307.000 to Point/Station 316.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1400.000(Ft.)

End of natural channel elevation = 1250.000(Ft.)

Length of natural channel = 1212.000(Ft.)

Estimated mean flow rate at midpoint of channel = 46.067(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 12.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1238
Corrected/adjusted channel slope = 0.1166
Travel time = 1.56 min. TC = 16.49 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.695(In/Hr) for a 100.0 year storm
Subarea runoff = 27.464(CFS) for 12.390(Ac.)
Total runoff = 58.959(CFS) Total area = 25.780(Ac.)

Process from Point/Station 307.000 to Point/Station 316.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 25.780(Ac.)
Runoff from this stream = 58.959(CFS)
Time of concentration = 16.49 min.
Rainfall intensity = 2.695(In/Hr)

Process from Point/Station 313.000 to Point/Station 322.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 712.000(Ft.)
Top (of initial area) elevation = 1605.000(Ft.)
Bottom (of initial area) elevation = 1365.000(Ft.)
Difference in elevation = 240.000(Ft.)
Slope = 0.33708 s(percent)= 33.71
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.210 min.
Rainfall intensity = 3.114(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.832
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 7.358(CFS)
Total initial stream area = 2.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      322.000 to Point/Station      316.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

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Top of natural channel elevation = 1365.000(Ft.)
End of natural channel elevation = 1250.000(Ft.)
Length of natural channel = 626.000(Ft.)
Estimated mean flow rate at midpoint of channel = 22.722(CFS)

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Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 12.09(Ft/s)

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Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1837
Corrected/adjusted channel slope = 0.1519
Travel time = 0.86 min. TC = 13.07 min.

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Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 3.013(In/Hr) for a 100.0 year storm
Subarea runoff = 29.662(CFS) for 11.860(Ac.)
Total runoff = 37.021(CFS) Total area = 14.700(Ac.)

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Process from Point/Station      322.000 to Point/Station      316.000
**** CONFLUENCE OF MINOR STREAMS ****

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Along Main Stream number: 2 in normal stream number 2
Stream flow area = 14.700(Ac.)
Runoff from this stream = 37.021(CFS)
Time of concentration = 13.07 min.
Rainfall intensity = 3.013(In/Hr)
Summary of stream data:

```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	58.959	16.49	2.695
2	37.021	13.07	3.013

Largest stream flow has longer time of concentration

Qp = 58.959 + sum of

Qb	Ia/Ib
37.021 *	0.894 =

33.112

Qp = 92.071

Total of 2 streams to confluence:

Flow rates before confluence point:

58.959 37.021

Area of streams before confluence:

25.780 14.700

Results of confluence:

Total flow rate = 92.071(CFS)

Time of concentration = 16.494 min.

Effective stream area after confluence = 40.480(Ac.)

Process from Point/Station 316.000 to Point/Station 315.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 40.480(Ac.)

Runoff from this stream = 92.071(CFS)

Time of concentration = 16.49 min.

Rainfall intensity = 2.695(In/Hr)

Summary of stream data:

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

1	467.051	18.55	2.547
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2	92.071	16.49	2.695
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Largest stream flow has longer time of concentration

Qp = 467.051 + sum of

Qb Ia/Ib

92.071 * 0.945 = 87.025

Qp = 554.076

Total of 2 main streams to confluence:

Flow rates before confluence point:

467.051 92.071

Area of streams before confluence:

211.120 40.480

Results of confluence:

Total flow rate = 554.076(CFS)

Time of concentration = 18.549 min.

Effective stream area after confluence = 251.600(Ac.)

Process from Point/Station 315.000 to Point/Station 317.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1225.000(Ft.)

End of natural channel elevation = 1155.000(Ft.)

Length of natural channel = 1185.000(Ft.)

Estimated mean flow rate at midpoint of channel = 620.110(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

$$\text{Velocity (ft/s)} = (7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$$

Velocity using mean channel flow = 20.40 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0591

Corrected/adjusted channel slope = 0.0591

Travel time = 0.97 min. TC = 19.52 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.817

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.486 (In/Hr) for a 100.0 year storm

Subarea runoff = 121.732 (CFS) for 59.970 (Ac.)

Total runoff = 675.808 (CFS) Total area = 311.570 (Ac.)

End of computations, total study area = 311.57 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000

Area averaged RI index number = 84.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344ex100d.out

SKYLINE HEIGHTS
EXISTING CONDITION
100 YEAR
AREA D

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 401.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 999.000(Ft.)

Top (of initial area) elevation = 1565.000(Ft.)

Bottom (of initial area) elevation = 1260.000(Ft.)

Difference in elevation = 305.000(Ft.)

Slope = 0.30531 s(percent)= 30.53

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 14.261 min.

Rainfall intensity = 2.890(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.827

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 20.036(CFS)
Total initial stream area = 8.380(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 401.000 to Point/Station 403.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.380(Ac.)
Runoff from this stream = 20.036(CFS)
Time of concentration = 14.26 min.
Rainfall intensity = 2.890(In/Hr)

Process from Point/Station 400.000 to Point/Station 402.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 889.000(Ft.)
Top (of initial area) elevation = 1680.000(Ft.)
Bottom (of initial area) elevation = 1370.000(Ft.)
Difference in elevation = 310.000(Ft.)
Slope = 0.34871 s(percent)= 34.87
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 13.253 min.
Rainfall intensity = 2.993(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 19.519(CFS)
Total initial stream area = 7.860(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 402.000 to Point/Station 403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1370.000(Ft.)
End of natural channel elevation = 1260.000(Ft.)
Length of natural channel = 621.000(Ft.)
Estimated mean flow rate at midpoint of channel = 26.969(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$

Velocity using mean channel flow = 12.53(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1771

Corrected/adjusted channel slope = 0.1486

Travel time = 0.83 min. TC = 14.08 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.828

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.908(In/Hr) for a 100.0 year storm

Subarea runoff = 14.441(CFS) for 6.000(Ac.)

Total runoff = 33.960(CFS) Total area = 13.860(Ac.)

Process from Point/Station 402.000 to Point/Station 403.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 13.860(Ac.)

Runoff from this stream = 33.960(CFS)

Time of concentration = 14.08 min.

Rainfall intensity = 2.908(In/Hr)

Summary of stream data:

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

1	20.036	14.26	2.890
---	--------	-------	-------

2	33.960	14.08	2.908
---	--------	-------	-------

Largest stream flow has longer or shorter time of concentration

Qp = 33.960 + sum of

Qa Tb/Ta

20.036 * 0.987 = 19.781

Qp = 53.741

Total of 2 streams to confluence:

Flow rates before confluence point:

20.036 33.960

Area of streams before confluence:

8.380 13.860

Results of confluence:

Total flow rate = 53.741(CFS)

Time of concentration = 14.079 min.

Effective stream area after confluence = 22.240(Ac.)

Process from Point/Station 403.000 to Point/Station 404.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1260.000(Ft.)
End of natural channel elevation = 1155.000(Ft.)
Length of natural channel = 1606.000(Ft.)
Estimated mean flow rate at midpoint of channel = 95.786(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.98(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0654
Corrected/adjusted channel slope = 0.0654
Travel time = 2.23 min. TC = 16.31 min.

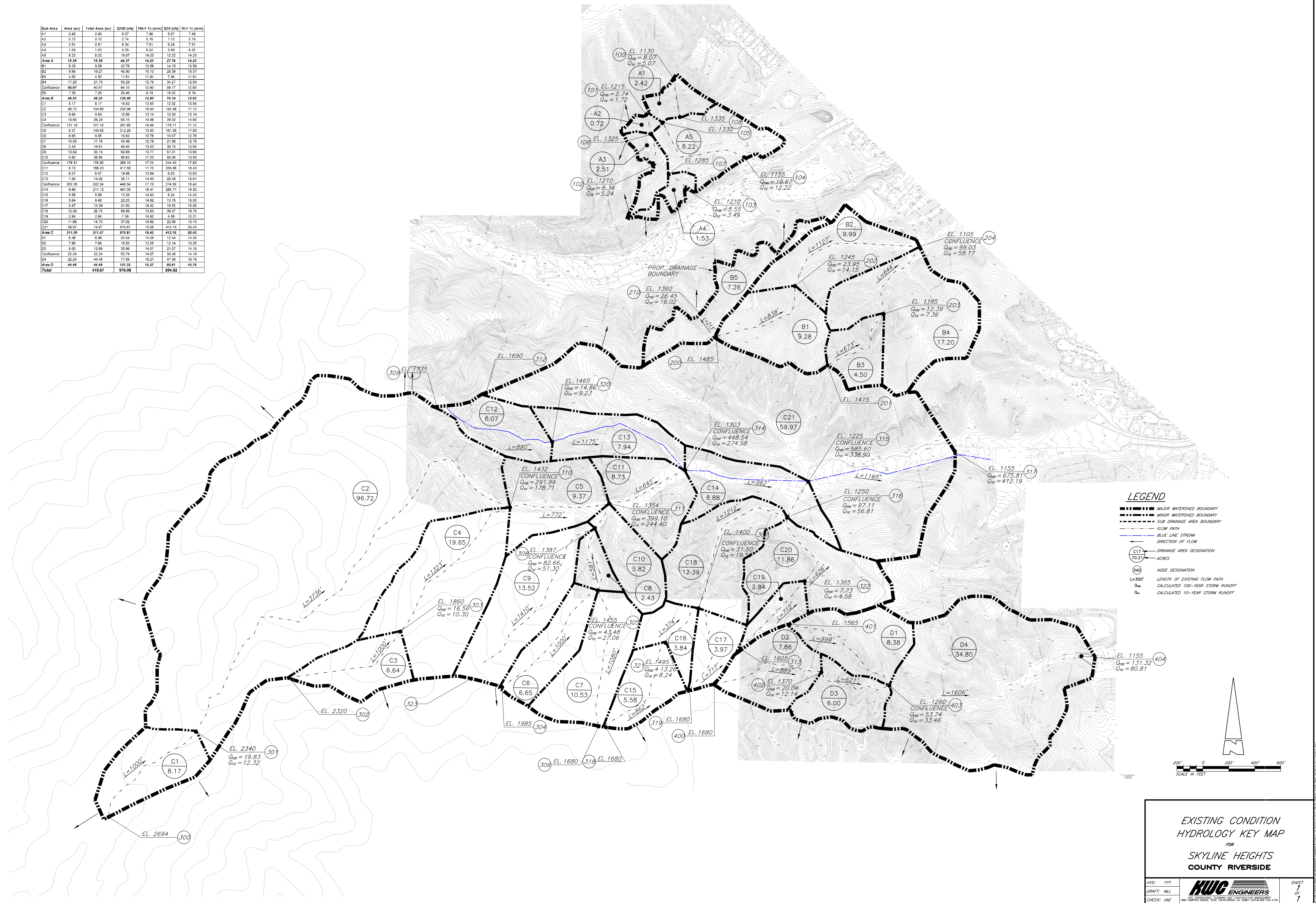
Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.709(In/Hr) for a 100.0 year storm
Subarea runoff = 77.583(CFS) for 34.800(Ac.)
Total runoff = 131.324(CFS) Total area = 57.040(Ac.)
End of computations, total study area = 57.04 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 84.0

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**EXISTING CONDITION HYDROLOGIC
KEY MAP**

Sub Area	Area (ac)	Total Area (ac)	Q100 (cfs)	100% T (cfs)	Q10 (cfs)	50% T (cfs)	10% T (cfs)
A1	2.42	2.42	8.07	7.46	5.07	4.76	
A2	0.72	0.72	2.74	5.76	1.72	5.76	
A3	2.51	2.51	8.34	7.52	5.24	5.76	
A4	1.53	1.53	5.55	6.32	3.49	6.32	
A5	8.22	8.22	16.67	14.23	12.22	14.23	
Area A	15.39	15.39	34.27	14.23	27.74	14.23	
B1	2.28	2.28	22.73	13.58	14.41	13.58	
B2	9.90	19.20	22.73	15.51	28.39	13.58	
B3	4.50	4.50	11.81	11.91	7.36	11.91	
B4	40.87	40.87	34.12	22.89	19.27	12.95	
Confidence	7.70	7.70	20.45	6.74	16.02	6.74	
C1	48.23	48.23	128.48	12.80	74.19	12.93	
Area B	81.7	81.7	16.83	13.85	12.32	13.85	
B2	96.78	96.78	31.25	13.85	14.27	13.85	
C4	6.64	6.64	16.56	13.4	10.30	13.4	
C4	19.65	26.29	63.15	14.48	39.02	14.48	
Confidence	131.18	131.18	219.25	13.85	176.67	13.85	
C6	3.97	140.55	31.25	13.85	19.01	13.85	
C6	6.65	6.65	16.83	12.78	10.47	12.78	
C7	10.53	17.19	43.48	12.78	27.08	12.78	
C8	19.65	19.65	62.66	13.77	53.15	13.65	
C9	13.52	33.13	62.66	13.77	21.51	13.65	
Confidence	59.81	59.81	96.82	17.23	60.06	13.65	
C10	1.82	17.51	39.50	17.24	24.44	17.83	
C11	4.70	18.23	37.75	17.25	24.63	17.83	
C12	6.07	6.07	14.86	13.94	9.23	13.65	
C13	7.94	14.02	33.11	14.43	20.45	15.61	
Confidence	202.58	202.24	448.64	17.75	214.98	18.47	
C14	3.89	10.25	18.47	17.75	12.95	17.83	
C15	5.00	5.00	13.26	14.43	8.24	14.43	
C16	3.84	9.42	22.22	14.92	13.73	15.00	
C19	3.97	3.97	31.50	14.92	14.62	15.00	
C19	12.39	25.78	58.96	13.63	36.57	17.91	
C20	2.84	2.84	7.30	14.62	4.58	12.21	
C20	11.86	14.40	37.02	14.62	22.95	13.10	
C21	24.67	24.67	137.61	13.06	141.42	12.04	
Area C	311.59	311.57	676.81	19.42	412.19	20.45	
D1	8.38	8.38	20.04	14.28	12.14	14.28	
D2	7.66	7.66	19.52	13.28	12.14	13.25	
D3	13.56	13.56	33.96	14.07	21.47	13.14	
Confidence	22.24	22.24	53.74	14.07	23.15	14.07	
D4	22.48	44.48	77.58	16.27	60.81	16.78	
Area D	44.48	44.48	126.38	16.27	80.81	16.78	
Confidence	118.87	118.87	976.98	19.42	594.92	20.45	



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PROPOSED CONDITION HYDROLOGY RATIONAL METHOD

Sub Area	Area (ac)	Total Area (ac)	Q100 (cfs)	100-Y Tc (min)	Q10 (cfs)	10-Y Tc (min)
A1	7.35	7.35	23.71	8.14	14.98	8.14
A2	7.07	14.42	45.99	8.52	29.01	8.57
A3	0.97	0.97	3.77	5.91	2.33	5.91
Area A		15.39	49.76		31.34	
B1	4.40	4.40	13.31	9.24	8.40	9.24
B2	7.93	12.33	36.67	9.74	23.08	9.81
B3	4.91	21.13	12.83	10.32	8.07	12.35
B4	6.26	27.39	28.61	13.24	17.94	13.35
B5	3.89	16.22	38.14	13.99	23.89	14.20
B6	6.38	33.77	84.96	14.38	53.22	14.65
B7	13.74	47.51	117.45	14.97	73.38	15.35
B8	4.06	51.57	10.71	11.80	6.67	11.80
B9	2.75	54.32	17.96	11.80	11.19	11.80
B10	2.47	56.79	24.11	13.16	14.99	13.36
B11	7.24	64.03	42.15	13.16	26.12	13.36
B12	6.81	6.81	23.12	7.64	13.69	7.64
Area B		70.84	180.87	14.98	111.99	15.35
C1	8.17	8.17	19.83	13.85	12.32	13.85
C2	96.72	104.89	232.96	16.64	142.46	17.12
C3	6.64	111.53	16.56	13.14	10.30	13.14
C4	19.65	131.18	63.15	14.48	39.02	14.69
C5	9.37	140.55	312.25	17.23	191.05	17.83
C6	6.65	147.20	16.83	12.78	10.47	12.78
C7	10.53	157.73	43.48	12.78	27.06	12.78
C8	2.43	160.16	49.47	13.42	30.77	13.53
C9	13.52	173.68	82.82	13.52	51.42	13.53
C10	5.82	179.50	97.05	13.64	60.22	13.79
C11	5.82	185.32	411.41	17.49	251.87	18.13
Detention Basin 1		185.32	411.41		251.87	
C12	20.88	206.20	455.91	18.39	279.19	19.10
C13	5.61	5.61	13.76	13.58	8.55	13.58
C14	5.60	11.21	27.40	14.16	17.09	14.24
C15	8.43	19.64	20.11	14.32	12.49	14.32
C16	5.83	25.47	60.03	15.21	37.35	15.46
Subtotal		25.47	60.03	15.47	37.35	15.46
C17	5.58	5.58	13.26	14.43	8.24	14.43
C18	3.84	9.42	22.23	14.92	13.78	15.00
C19	3.97	13.39	31.50	14.92	19.52	15.00
C20	9.44	22.83	53.12	15.48	32.86	15.63
Subtotal		22.83	53.12	16.54	32.86	15.63
C21	8.70	8.70	21.24	16.54	13.20	13.70
Confluence		263.20	73.00	16.54	356.42	19.10
C22	9.05	272.25	19.21	18.49	11.79	19.26
Area C		272.25	600.73	18.49	368.21	19.26
D1	2.17	2.17	6.63	8.85	4.15	8.85
D2	8.75	10.92	25.28	9.87	19.84	10.02
D3	3.56	14.48	8.60	13.97	5.35	13.97
D4	5.97	20.45	17.13	10.02	10.73	10.02
D5	7.43	27.88	37.77	10.92	23.67	11.04
D6	24.50	52.38	138.93	11.09	86.00	11.37
D7	5.20	57.58	13.51	12.15	8.41	12.15
D8	3.61	61.19	9.74	11.29	6.02	11.58
Area D		61.19	160.64	11.27	99.63	11.58
Total	419.67	419.67	992.00		611.17	

10-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/09/13 File:1344prop10a.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10 YEAR
AREA A

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 809.000(Ft.)

Top (of initial area) elevation = 1340.000(Ft.)

Bottom (of initial area) elevation = 1206.000(Ft.)

Difference in elevation = 134.000(Ft.)

Slope = 0.16564 s(percent)= 16.56

TC = $k(0.390)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 8.136 min.

Rainfall intensity = 2.453(In/Hr) for a 10.0 year storm

SINGLE FAMILY (1/4 Acre Lot)

Runoff Coefficient = 0.831

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 14.980(CFS)
Total initial stream area = 7.350(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1196.000(Ft.)
Downstream point/station elevation = 1172.000(Ft.)
Pipe length = 388.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 14.980(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 14.980(CFS)
Normal flow depth in pipe = 11.47(In.)
Flow top width inside pipe = 12.72(In.)
Critical depth could not be calculated.
Pipe flow velocity = 14.87(Ft/s)
Travel time through pipe = 0.43 min.
Time of concentration (TC) = 8.57 min.

Process from Point/Station 103.000 to Point/Station 102.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 8.57 min.
Rainfall intensity = 2.392(In/Hr) for a 10.0 year storm
Subarea runoff = 14.029(CFS) for 7.070(Ac.)
Total runoff = 29.009(CFS) Total area = 14.420(Ac.)

Process from Point/Station 102.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1172.000(Ft.)
Downstream point/station elevation = 1147.000(Ft.)
Pipe length = 121.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 29.009(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 29.009(CFS)
Normal flow depth in pipe = 12.14(In.)
Flow top width inside pipe = 11.78(In.)

Critical depth could not be calculated.

Pipe flow velocity = 27.28 (Ft/s)

Travel time through pipe = 0.07 min.

Time of concentration (TC) = 8.64 min.

End of computations, total study area = 14.42 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.500

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/09/13 File:1344prop101.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10 YEAR
AREA A3

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 102.000 to Point/Station 150.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 243.000(Ft.)

Top (of initial area) elevation = 1182.000(Ft.)

Bottom (of initial area) elevation = 1164.000(Ft.)

Difference in elevation = 18.000(Ft.)

Slope = 0.07407 s(percent)= 7.41

TC = $k(0.390)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 5.907 min.

Rainfall intensity = 2.860(In/Hr) for a 10.0 year storm

SINGLE FAMILY (1/4 Acre Lot)

Runoff Coefficient = 0.839

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 2.329(CFS)
Total initial stream area = 0.970(Ac.)
Pervious area fraction = 0.500
End of computations, total study area = 0.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/09/13 File:1344prop10b.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10 YEAR
AREA B

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 391.000(Ft.)

Top (of initial area) elevation = 1412.000(Ft.)

Bottom (of initial area) elevation = 1404.000(Ft.)

Difference in elevation = 8.000(Ft.)

Slope = 0.02046 s(percent)= 2.05

TC = $k(0.390)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 9.242 min.

Rainfall intensity = 2.307(In/Hr) for a 10.0 year storm

SINGLE FAMILY (1/4 Acre Lot)

Runoff Coefficient = 0.827

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 8.399(CFS)
Total initial stream area = 4.400(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1394.000(Ft.)
Downstream point/station elevation = 1338.000(Ft.)
Pipe length = 542.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.399(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 8.399(CFS)
Normal flow depth in pipe = 7.63(In.)
Flow top width inside pipe = 11.55(In.)
Critical depth could not be calculated.
Pipe flow velocity = 15.93(Ft/s)
Travel time through pipe = 0.57 min.
Time of concentration (TC) = 9.81 min.

Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 9.81 min.
Rainfall intensity = 2.242(In/Hr) for a 10.0 year storm
Subarea runoff = 14.679(CFS) for 7.930(Ac.)
Total runoff = 23.077(CFS) Total area = 12.330(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1338.000(Ft.)
Downstream point/station elevation = 1317.000(Ft.)
Pipe length = 411.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 23.077(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 23.077(CFS)
Normal flow depth in pipe = 14.32(In.)
Flow top width inside pipe = 14.52(In.)

Critical depth could not be calculated.
Pipe flow velocity = 15.31(Ft/s)
Travel time through pipe = 0.45 min.
Time of concentration (TC) = 10.26 min.

Process from Point/Station 202.000 to Point/Station 203.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 12.330(Ac.)
Runoff from this stream = 23.077(CFS)
Time of concentration = 10.26 min.
Rainfall intensity = 2.195(In/Hr)

Process from Point/Station 204.000 to Point/Station 211.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 659.000(Ft.)
Top (of initial area) elevation = 1364.000(Ft.)
Bottom (of initial area) elevation = 1355.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01366 s(percent)= 1.37
 $TC = k(0.390)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 12.347 min.
Rainfall intensity = 2.008(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.818
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 8.068(CFS)
Total initial stream area = 4.910(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 211.000 to Point/Station 205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1355.000(Ft.)
End of street segment elevation = 1352.000(Ft.)
Length of street segment = 199.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 22.000(Ft.)
Distance from crown to crossfall grade break = 10.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 12.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 2.000(Ft.)

Gutter hike from flowline = 2.000(In.)
 Manning's N in gutter = 0.0150
 Manning's N from gutter to grade break = 0.0150
 Manning's N from grade break to crown = 0.0150
 Estimated mean flow rate at midpoint of street = 13.058(CFS)
 Depth of flow = 0.399(Ft.), Average velocity = 3.298(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 13.612(Ft.)
 Flow velocity = 3.30(Ft/s)
 Travel time = 1.01 min. TC = 13.35 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.816
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 1.934(In/Hr) for a 10.0 year storm
 Subarea runoff = 9.876(CFS) for 6.260(Ac.)
 Total runoff = 17.944(CFS) Total area = 11.170(Ac.)
 Street flow at end of street = 17.944(CFS)
 Half street flow at end of street = 8.972(CFS)
 Depth of flow = 0.436(Ft.), Average velocity = 3.560(Ft/s)
 Flow width (from curb towards crown)= 15.471(Ft.)

 Process from Point/Station 205.000 to Point/Station 203.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1352.000(Ft.)
 End of street segment elevation = 1327.000(Ft.)
 Length of street segment = 342.000(Ft.)
 Height of curb above gutter flowline = 6.0(In.)
 Width of half street (curb to crown) = 22.000(Ft.)
 Distance from crown to crossfall grade break = 10.000(Ft.)
 Slope from gutter to grade break (v/hz) = 0.020
 Slope from grade break to crown (v/hz) = 0.020
 Street flow is on [2] side(s) of the street
 Distance from curb to property line = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 Gutter width = 2.000(Ft.)
 Gutter hike from flowline = 2.000(In.)
 Manning's N in gutter = 0.0150
 Manning's N from gutter to grade break = 0.0150
 Manning's N from grade break to crown = 0.0150
 Estimated mean flow rate at midpoint of street = 20.992(CFS)
 Depth of flow = 0.366(Ft.), Average velocity = 6.740(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 11.961(Ft.)
 Flow velocity = 6.74(Ft/s)
 Travel time = 0.85 min. TC = 14.20 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.814
 Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 1.877(In/Hr) for a 10.0 year storm
 Subarea runoff = 5.944(CFS) for 3.890(Ac.)
 Total runoff = 23.888(CFS) Total area = 15.060(Ac.)
 Street flow at end of street = 23.888(CFS)
 Half street flow at end of street = 11.944(CFS)
 Depth of flow = 0.379(Ft.), Average velocity = 6.949(Ft/s)
 Flow width (from curb towards crown)= 12.618(Ft.)

 Process from Point/Station 205.000 to Point/Station 203.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 15.060(Ac.)
 Runoff from this stream = 23.888(CFS)
 Time of concentration = 14.20 min.
 Rainfall intensity = 1.877(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	23.077	10.26	2.195
2	23.888	14.20	1.877

Largest stream flow has longer time of concentration

Qp = 23.888 + sum of
 Qb Ia/Ib
 23.077 * 0.855 = 19.742
 Qp = 43.630

Total of 2 streams to confluence:

Flow rates before confluence point:

23.077 23.888

Area of streams before confluence:

12.330 15.060

Results of confluence:

Total flow rate = 43.630(CFS)
 Time of concentration = 14.198 min.
 Effective stream area after confluence = 27.390(Ac.)

 Process from Point/Station 203.000 to Point/Station 212.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1317.000(Ft.)
 Downstream point/station elevation = 1264.000(Ft.)
 Pipe length = 600.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 43.630(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 43.630(CFS)

Normal flow depth in pipe = 15.96(In.)
Flow top width inside pipe = 17.94(In.)
Critical depth could not be calculated.
Pipe flow velocity = 22.23(Ft/s)
Travel time through pipe = 0.45 min.
Time of concentration (TC) = 14.65 min.

Process from Point/Station 203.000 to Point/Station 212.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.813
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 14.65 min.
Rainfall intensity = 1.850(In/Hr) for a 10.0 year storm
Subarea runoff = 9.591(CFS) for 6.380(Ac.)
Total runoff = 53.221(CFS) Total area = 33.770(Ac.)

Process from Point/Station 212.000 to Point/Station 206.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1264.000(Ft.)
Downstream point/station elevation = 1156.000(Ft.)
Pipe length = 1022.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 53.221(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 53.221(CFS)
Normal flow depth in pipe = 17.91(In.)
Flow top width inside pipe = 14.89(In.)
Critical depth could not be calculated.
Pipe flow velocity = 24.35(Ft/s)
Travel time through pipe = 0.70 min.
Time of concentration (TC) = 15.35 min.

Process from Point/Station 212.000 to Point/Station 206.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.811
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 15.35 min.
Rainfall intensity = 1.809(In/Hr) for a 10.0 year storm

Subarea runoff = 20.159(CFS) for 13.740(Ac.)
Total runoff = 73.381(CFS) Total area = 47.510(Ac.)

Process from Point/Station 212.000 to Point/Station 206.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 47.510(Ac.)
Runoff from this stream = 73.381(CFS)
Time of concentration = 15.35 min.
Rainfall intensity = 1.809(In/Hr)

Process from Point/Station 207.000 to Point/Station 208.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 658.000(Ft.)
Top (of initial area) elevation = 1410.000(Ft.)
Bottom (of initial area) elevation = 1185.000(Ft.)
Difference in elevation = 225.000(Ft.)
Slope = 0.34195 s(percent)= 34.19
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 11.797 min.
Rainfall intensity = 2.052(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 6.673(CFS)
Total initial stream area = 4.060(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 209.000 to Point/Station 208.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 11.80 min.
Rainfall intensity = 2.052(In/Hr) for a 10.0 year storm
Subarea runoff = 4.520(CFS) for 2.750(Ac.)
Total runoff = 11.192(CFS) Total area = 6.810(Ac.)

Process from Point/Station 208.000 to Point/Station 210.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1185.000(Ft.)
End of natural channel elevation = 1165.000(Ft.)
Length of natural channel = 503.000(Ft.)
Estimated mean flow rate at midpoint of channel = 13.222(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 5.35(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0398
Corrected/adjusted channel slope = 0.0398
Travel time = 1.57 min. TC = 13.36 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.933(In/Hr) for a 10.0 year storm
Subarea runoff = 3.798(CFS) for 2.470(Ac.)
Total runoff = 14.990(CFS) Total area = 9.280(Ac.)

Process from Point/Station 211.000 to Point/Station 210.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 13.36 min.
Rainfall intensity = 1.933(In/Hr) for a 10.0 year storm
Subarea runoff = 11.132(CFS) for 7.240(Ac.)
Total runoff = 26.122(CFS) Total area = 16.520(Ac.)

Process from Point/Station 210.000 to Point/Station 206.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1165.000(Ft.)

Downstream point/station elevation = 1156.000(Ft.)
 Pipe length = 111.00(Ft.) Manning's N = 0.130
 No. of pipes = 1 Required pipe flow = 26.122(CFS)
 Nearest computed pipe diameter = 42.00(In.)
 Calculated individual pipe flow = 26.122(CFS)
 Normal flow depth in pipe = 31.50(In.)
 Flow top width inside pipe = 36.37(In.)
 Critical Depth = 18.92(In.)
 Pipe flow velocity = 3.38(Ft/s)
 Travel time through pipe = 0.55 min.
 Time of concentration (TC) = 13.91 min.

++++++
 Process from Point/Station 210.000 to Point/Station 206.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 16.520(Ac.)
 Runoff from this stream = 26.122(CFS)
 Time of concentration = 13.91 min.
 Rainfall intensity = 1.896(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	73.381	15.35	1.809
2	26.122	13.91	1.896

Largest stream flow has longer time of concentration

Qp = 73.381 + sum of
 Qb Ia/Ib
 26.122 * 0.954 = 24.918
 Qp = 98.299

Total of 2 streams to confluence:

Flow rates before confluence point:

73.381	26.122
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Area of streams before confluence:

47.510	16.520
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Results of confluence:

Total flow rate = 98.299(CFS)

Time of concentration = 15.347 min.

Effective stream area after confluence = 64.030(Ac.)

End of computations, total study area = 64.03 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.629

Area averaged RI index number = 77.3

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 04/22/13 File:1344PROP10B12.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10-YEAR
AREA B12 REMAINDER AREA

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 212.000 to Point/Station 213.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 130.000(Ft.)

Top (of initial area) elevation = 1222.000(Ft.)

Bottom (of initial area) elevation = 1160.000(Ft.)

Difference in elevation = 62.000(Ft.)

Slope = 0.47692 s(percent)= 47.69

$TC = k(0.940) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 7.639 min.

Rainfall intensity = 2.528(In/Hr) for a 10.0 year storm

UNDEVELOPED (good cover) subarea

Runoff Coefficient = 0.795

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 80.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 13.690(CFS)
Total initial stream area = 6.810(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 6.81 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 80.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/09/13 File:1344prop10c.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10 YEAR
AREA C

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 700.000 to Point/Station 701.000
**** INITIAL AREA EVALUATION ****

C1

Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 2694.000(Ft.)

Bottom (of initial area) elevation = 2340.000(Ft.)

Difference in elevation = 354.000(Ft.)

Slope = 0.35400 s(percent)= 35.40

TC = $k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 13.850 min.

Rainfall intensity = 1.900(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.794

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 12.323(CFS)
Total initial stream area = 8.170(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 701.000 to Point/Station 702.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C2

Top of natural channel elevation = 2340.000(Ft.)
End of natural channel elevation = 1432.000(Ft.)
Length of natural channel = 3736.000(Ft.)
Estimated mean flow rate at midpoint of channel = 85.266(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 19.05(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2430
Corrected/adjusted channel slope = 0.1772
Travel time = 3.27 min. TC = 17.12 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.784
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.716(In/Hr) for a 10.0 year storm
Subarea runoff = 130.137(CFS) for 96.720(Ac.)
Total runoff = 142.460(CFS) Total area = 104.890(Ac.)

Process from Point/Station 701.000 to Point/Station 702.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 104.890(Ac.)
Runoff from this stream = 142.460(CFS)
Time of concentration = 17.12 min.
Rainfall intensity = 1.716(In/Hr)

Process from Point/Station 703.000 to Point/Station 704.000

**** INITIAL AREA EVALUATION ****

C3

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 2320.000(Ft.)
 Bottom (of initial area) elevation = 1860.000(Ft.)
 Difference in elevation = 460.000(Ft.)
 Slope = 0.46000 s(percent)= 46.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.143 min.
 Rainfall intensity = 1.948(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.796
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 10.300(CFS)
 Total initial stream area = 6.640(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 704.000 to Point/Station 702.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C4

Top of natural channel elevation = 1860.000(Ft.)
 End of natural channel elevation = 1432.000(Ft.)
 Length of natural channel = 1323.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 25.542(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 14.28(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.3235
 Corrected/adjusted channel slope = 0.1987
 Travel time = 1.54 min. TC = 14.69 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.791
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.847(In/Hr) for a 10.0 year storm
 Subarea runoff = 28.718(CFS) for 19.650(Ac.)
 Total runoff = 39.019(CFS) Total area = 26.290(Ac.)

 Process from Point/Station 704.000 to Point/Station 702.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 26.290 (Ac.)
 Runoff from this stream = 39.019 (CFS)
 Time of concentration = 14.69 min.
 Rainfall intensity = 1.847 (In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	142.460	17.12	1.716
2	39.019	14.69	1.847

Largest stream flow has longer time of concentration

Qp = 142.460 + sum of
 Qb Ia/Ib
 39.019 * 0.929 = 36.253

Qp = 178.714

Total of 2 streams to confluence:

Flow rates before confluence point:

142.460 39.019

Area of streams before confluence:

104.890 26.290

Results of confluence:

Total flow rate = 178.714 (CFS)

Time of concentration = 17.118 min.

Effective stream area after confluence = 131.180 (Ac.)

 Process from Point/Station 702.000 to Point/Station 708.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C5

Top of natural channel elevation = 1432.000 (Ft.)
 End of natural channel elevation = 1354.000 (Ft.)
 Length of natural channel = 772.000 (Ft.)
 Estimated mean flow rate at midpoint of channel = 185.097 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 18.17 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1010

Corrected/adjusted channel slope = 0.1007

Travel time = 0.71 min. TC = 17.83 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.782

Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.683(In/Hr) for a 10.0 year storm
 Subarea runoff = 12.333(CFS) for 9.370(Ac.)
 Total runoff = 191.047(CFS) Total area = 140.550(Ac.)

++++++
 Process from Point/Station 702.000 to Point/Station 708.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 140.550(Ac.)
 Runoff from this stream = 191.047(CFS)
 Time of concentration = 17.83 min.
 Rainfall intensity = 1.683(In/Hr)

++++++
 Process from Point/Station 705.000 to Point/Station 706.000
 **** INITIAL AREA EVALUATION ****

C6

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 1985.000(Ft.)
 Bottom (of initial area) elevation = 1455.000(Ft.)
 Difference in elevation = 530.000(Ft.)
 Slope = 0.53000 s(percent)= 53.00
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 12.776 min.
 Rainfall intensity = 1.975(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.797
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 10.474(CFS)
 Total initial stream area = 6.650(Ac.)
 Pervious area fraction = 1.000

++++++
 Process from Point/Station 709.000 to Point/Station 706.000
 **** SUBAREA FLOW ADDITION ****

C7

UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.797
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 12.78 min.
 Rainfall intensity = 1.975(In/Hr) for a 10.0 year storm
 Subarea runoff = 16.584(CFS) for 10.530(Ac.)
 Total runoff = 27.058(CFS) Total area = 17.180(Ac.)

 Process from Point/Station 706.000 to Point/Station 707.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C8

Top of natural channel elevation = 1455.000(Ft.)
 End of natural channel elevation = 1387.000(Ft.)
 Length of natural channel = 521.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 28.972(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{.5}))$
 Velocity using mean channel flow = 11.55(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1305
 Corrected/adjusted channel slope = 0.1214
 Travel time = 0.75 min. TC = 13.53 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.795
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.922(In/Hr) for a 10.0 year storm
 Subarea runoff = 3.712(CFS) for 2.430(Ac.)
 Total runoff = 30.770(CFS) Total area = 19.610(Ac.)

 Process from Point/Station 710.000 to Point/Station 707.000
 **** SUBAREA FLOW ADDITION ****

C9

UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.795
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 13.53 min.
 Rainfall intensity = 1.922(In/Hr) for a 10.0 year storm
 Subarea runoff = 20.652(CFS) for 13.520(Ac.)
 Total runoff = 51.422(CFS) Total area = 33.130(Ac.)

 Process from Point/Station 707.000 to Point/Station 708.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C10

Top of natural channel elevation = 1387.000(Ft.)
 End of natural channel elevation = 1354.000(Ft.)
 Length of natural channel = 225.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 55.938(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{.5}))$
 Velocity using mean channel flow = 14.56(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)
 Normal channel slope = 0.1467
 Corrected/adjusted channel slope = 0.1327
 Travel time = 0.26 min. TC = 13.79 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.794
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 1.904(In/Hr) for a 10.0 year storm
 Subarea runoff = 8.801(CFS) for 5.820(Ac.)
 Total runoff = 60.222(CFS) Total area = 38.950(Ac.)

 Process from Point/Station 707.000 to Point/Station 708.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 38.950(Ac.)
 Runoff from this stream = 60.222(CFS)
 Time of concentration = 13.79 min.
 Rainfall intensity = 1.904(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	191.047	17.83	1.683
2	60.222	13.79	1.904

Largest stream flow has longer time of concentration
 $Q_p = 191.047 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $60.222 * 0.884 = 53.231$

Qp = 244.278

Total of 2 streams to confluence:

Flow rates before confluence point:

191.047 60.222

Area of streams before confluence:

140.550 38.950

Results of confluence:

Total flow rate = 244.278 (CFS)

Time of concentration = 17.826 min.

Effective stream area after confluence = 179.500 (Ac.)

Process from Point/Station 708.000 to Point/Station 709.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C11

Top of natural channel elevation = 1354.000 (Ft.)

End of natural channel elevation = 1345.000 (Ft.)

Length of natural channel = 225.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 248.239 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 12.55 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0400

Corrected/adjusted channel slope = 0.0400

Travel time = 0.30 min. TC = 18.13 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.781

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.670 (In/Hr) for a 10.0 year storm

Subarea runoff = 7.592 (CFS) for 5.820 (Ac.)

Total runoff = 251.870 (CFS) Total area = 185.320 (Ac.)

Process from Point/Station 709.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1345.000 (Ft.)

Downstream point/station elevation = 1330.000 (Ft.)

Pipe length = 1002.00 (Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 251.870 (CFS)

Nearest computed pipe diameter = 54.00 (In.)

Calculated individual pipe flow = 251.870 (CFS)

Normal flow depth in pipe = 46.97(In.)
Flow top width inside pipe = 36.35(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.15(Ft/s)
Travel time through pipe = 0.97 min.
Time of concentration (TC) = 19.10 min.

Process from Point/Station 709.000 to Point/Station 302.000
**** SUBAREA FLOW ADDITION ****

C12

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 19.10 min.
Rainfall intensity = 1.628(In/Hr) for a 10.0 year storm
Subarea runoff = 27.320(CFS) for 20.880(Ac.)
Total runoff = 279.190(CFS) Total area = 206.200(Ac.)

Process from Point/Station 709.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 206.200(Ac.)
Runoff from this stream = 279.190(CFS)
Time of concentration = 19.10 min.
Rainfall intensity = 1.628(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 600.000 to Point/Station 601.000
**** INITIAL AREA EVALUATION ****

C13

Initial area flow distance = 862.000(Ft.)
Top (of initial area) elevation = 1735.000(Ft.)
Bottom (of initial area) elevation = 1485.000(Ft.)
Difference in elevation = 250.000(Ft.)
Slope = 0.29002 s(percent)= 29.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.582 min.
Rainfall intensity = 1.918(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 8.551(CFS)
Total initial stream area = 5.610(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 601.000 to Point/Station 300.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1485.000(Ft.)
Downstream point/station elevation = 1388.000(Ft.)
Pipe length = 709.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.551(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 8.551(CFS)
Normal flow depth in pipe = 7.04(In.)
Flow top width inside pipe = 11.82(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.86(Ft/s)
Travel time through pipe = 0.66 min.
Time of concentration (TC) = 14.24 min.

Process from Point/Station 601.000 to Point/Station 300.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.814
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 14.24 min.
Rainfall intensity = 1.875(In/Hr) for a 10.0 year storm
Subarea runoff = 8.542(CFS) for 5.600(Ac.)
Total runoff = 17.093(CFS) Total area = 11.210(Ac.)

Process from Point/Station 601.000 to Point/Station 300.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 11.210(Ac.)
Runoff from this stream = 17.093(CFS)
Time of concentration = 14.24 min.
Rainfall intensity = 1.875(In/Hr)

Process from Point/Station 500.000 to Point/Station 501.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 1690.000(Ft.)
 Bottom (of initial area) elevation = 1390.000(Ft.)
 Difference in elevation = 300.000(Ft.)
 Slope = 0.30000 s(percent)= 30.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 14.316 min.
 Rainfall intensity = 1.870(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.792
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 12.491(CFS)
 Total initial stream area = 8.430(Ac.)
 Pervious area fraction = 1.000

++++++
 Process from Point/Station 501.000 to Point/Station 300.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1390.000(Ft.)
 Downstream point/station elevation = 1388.000(Ft.)
 Pipe length = 308.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 12.491(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 12.491(CFS)
 Normal flow depth in pipe = 16.83(In.)
 Flow top width inside pipe = 16.76(In.)
 Critical Depth = 15.80(In.)
 Pipe flow velocity = 6.05(Ft/s)
 Travel time through pipe = 0.85 min.
 Time of concentration (TC) = 15.16 min.

++++++
 Process from Point/Station 501.000 to Point/Station 300.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 8.430(Ac.)
 Runoff from this stream = 12.491(CFS)
 Time of concentration = 15.16 min.
 Rainfall intensity = 1.819(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	17.093	14.24	1.875
2	12.491	15.16	1.819

Largest stream flow has longer or shorter time of concentration
 $Q_p = 17.093 + \text{sum of}$
 $Q_a \quad T_b/T_a$

12.491 * 0.939 = 11.733
Qp = 28.826

Total of 2 streams to confluence:
Flow rates before confluence point:
17.093 12.491

Area of streams before confluence:
11.210 8.430

Results of confluence:

Total flow rate = 28.826(CFS)
Time of concentration = 14.244 min.
Effective stream area after confluence = 19.640(Ac.)

Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1388.000(Ft.)
Downstream point/station elevation = 1358.000(Ft.)
Pipe length = 964.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.826(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 28.826(CFS)
Normal flow depth in pipe = 17.86(In.)
Flow top width inside pipe = 14.98(In.)
Critical depth could not be calculated.
Pipe flow velocity = 13.22(Ft/s)
Travel time through pipe = 1.22 min.
Time of concentration (TC) = 15.46 min.

Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****

C16

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.811
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 15.46 min.
Rainfall intensity = 1.802(In/Hr) for a 10.0 year storm
Subarea runoff = 8.521(CFS) for 5.830(Ac.)
Total runoff = 37.347(CFS) Total area = 25.470(Ac.)

Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1358.000(Ft.)
Downstream point/station elevation = 1330.000(Ft.)
Pipe length = 354.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 37.347(CFS)

Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 37.347(CFS)
Normal flow depth in pipe = 14.72(In.)
Flow top width inside pipe = 19.23(In.)
Critical depth could not be calculated.
Pipe flow velocity = 20.75(Ft/s)
Travel time through pipe = 0.28 min.
Time of concentration (TC) = 15.74 min.

Process from Point/Station 301.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 25.470(Ac.)
Runoff from this stream = 37.347(CFS)
Time of concentration = 15.74 min.
Rainfall intensity = 1.787(In/Hr)
Program is now starting with Main Stream No. 3

Process from Point/Station 800.000 to Point/Station 801.000
**** INITIAL AREA EVALUATION ****

C17

Initial area flow distance = 862.000(Ft.)
Top (of initial area) elevation = 1680.000(Ft.)
Bottom (of initial area) elevation = 1495.000(Ft.)
Difference in elevation = 185.000(Ft.)
Slope = 0.21462 s(percent)= 21.46
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 14.425 min.
Rainfall intensity = 1.863(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.792
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 8.235(CFS)
Total initial stream area = 5.580(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 801.000 to Point/Station 802.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C18

Top of natural channel elevation = 1495.000(Ft.)
End of natural channel elevation = 1400.000(Ft.)
Length of natural channel = 374.000(Ft.)
Estimated mean flow rate at midpoint of channel = 11.068(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 10.91(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2540
Corrected/adjusted channel slope = 0.1811
Travel time = 0.57 min. TC = 15.00 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.829(In/Hr) for a 10.0 year storm
Subarea runoff = 5.550(CFS) for 3.840(Ac.)
Total runoff = 13.784(CFS) Total area = 9.420(Ac.)

Process from Point/Station 803.000 to Point/Station 802.000
**** SUBAREA FLOW ADDITION ****

C19

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 15.00 min.
Rainfall intensity = 1.829(In/Hr) for a 10.0 year storm
Subarea runoff = 5.738(CFS) for 3.970(Ac.)
Total runoff = 19.522(CFS) Total area = 13.390(Ac.)

Process from Point/Station 802.000 to Point/Station 804.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C20

Top of natural channel elevation = 1400.000(Ft.)
End of natural channel elevation = 1335.000(Ft.)
Length of natural channel = 446.000(Ft.)
Estimated mean flow rate at midpoint of channel = 26.403(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 11.74(Ft/s)

Correction to map slope used on extremely rugged channels with

drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1457
Corrected/adjusted channel slope = 0.1320
Travel time = 0.63 min. TC = 15.63 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.788
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.793(In/Hr) for a 10.0 year storm
Subarea runoff = 13.342(CFS) for 9.440(Ac.)
Total runoff = 32.864(CFS) Total area = 22.830(Ac.)

Process from Point/Station 804.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1335.000(Ft.)
Downstream point/station elevation = 1332.000(Ft.)
Pipe length = 516.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 32.864(CFS)
Nearest computed pipe diameter = 30.00(In.)
Calculated individual pipe flow = 32.864(CFS)
Normal flow depth in pipe = 26.25(In.)
Flow top width inside pipe = 19.84(In.)
Critical Depth = 23.41(In.)
Pipe flow velocity = 7.22(Ft/s)
Travel time through pipe = 1.19 min.
Time of concentration (TC) = 16.82 min.

Process from Point/Station 804.000 to Point/Station 303.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 3 in normal stream number 1
Stream flow area = 22.830(Ac.)
Runoff from this stream = 32.864(CFS)
Time of concentration = 16.82 min.
Rainfall intensity = 1.731(In/Hr)

Process from Point/Station 900.000 to Point/Station 901.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 886.000(Ft.)
Top (of initial area) elevation = 1600.000(Ft.)
Bottom (of initial area) elevation = 1340.000(Ft.)
Difference in elevation = 260.000(Ft.)
Slope = 0.29345 s(percent)= 29.35

C21

$TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.700 min.
 Rainfall intensity = 1.910(In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.794
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 13.199(CFS)
 Total initial stream area = 8.700(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 901.000 to Point/Station 303.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1340.000(Ft.)
 Downstream point/station elevation = 1332.000(Ft.)
 Pipe length = 428.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 13.199(CFS)
 Nearest computed pipe diameter = 18.00(In.)
 Calculated individual pipe flow = 13.199(CFS)
 Normal flow depth in pipe = 13.59(In.)
 Flow top width inside pipe = 15.48(In.)
 Critical Depth = 16.30(In.)
 Pipe flow velocity = 9.22(Ft/s)
 Travel time through pipe = 0.77 min.
 Time of concentration (TC) = 14.47 min.

 Process from Point/Station 901.000 to Point/Station 303.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 3 in normal stream number 2
 Stream flow area = 8.700(Ac.)
 Runoff from this stream = 13.199(CFS)
 Time of concentration = 14.47 min.
 Rainfall intensity = 1.860(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	32.864	16.82	1.731
2	13.199	14.47	1.860

Largest stream flow has longer time of concentration
 $Q_p = 32.864 + \text{sum of } Q_b \text{ Ia/Ib}$
 $13.199 * 0.930 = 12.281$
 $Q_p = 45.145$

Total of 2 streams to confluence:

Flow rates before confluence point:

32.864 13.199

Area of streams before confluence:

22.830 8.700

Results of confluence:

Total flow rate = 45.145(CFS)

Time of concentration = 16.821 min.

Effective stream area after confluence = 31.530(Ac.)

Process from Point/Station 303.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1332.000(Ft.)
Downstream point/station elevation = 1330.000(Ft.)
Pipe length = 296.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 45.145(CFS)
Nearest computed pipe diameter = 33.00(In.)
Calculated individual pipe flow = 45.145(CFS)
Normal flow depth in pipe = 28.36(In.)
Flow top width inside pipe = 22.94(In.)
Critical Depth = 26.71(In.)
Pipe flow velocity = 8.31(Ft/s)
Travel time through pipe = 0.59 min.
Time of concentration (TC) = 17.41 min.

Process from Point/Station 303.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
Stream flow area = 31.530(Ac.)
Runoff from this stream = 45.145(CFS)
Time of concentration = 17.41 min.
Rainfall intensity = 1.702(In/Hr)
Summary of stream data:

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

1	279.190	19.10	1.628
2	37.347	15.74	1.787
3	45.145	17.41	1.702

Largest stream flow has longer time of concentration

Qp = 279.190 + sum of
Qb Ia/Ib
37.347 * 0.911 = 34.040
Qb Ia/Ib
45.145 * 0.957 = 43.188
Qp = 356.417

Total of 3 main streams to confluence:

Flow rates before confluence point:

279.190 37.347 45.145

Area of streams before confluence:
206.200 25.470 31.530

Results of confluence:

Total flow rate = 356.417(CFS)
Time of concentration = 19.099 min.
Effective stream area after confluence = 263.200(Ac.)

Process from Point/Station 302.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1330.000(Ft.)
Downstream point/station elevation = 1210.000(Ft.)
Pipe length = 532.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 356.417(CFS)
Nearest computed pipe diameter = 39.00(In.)
Calculated individual pipe flow = 356.417(CFS)
Normal flow depth in pipe = 29.16(In.)
Flow top width inside pipe = 33.88(In.)
Critical depth could not be calculated.
Pipe flow velocity = 53.56(Ft/s)
Travel time through pipe = 0.17 min.
Time of concentration (TC) = 19.26 min.

Process from Point/Station 302.000 to Point/Station 304.000
**** SUBAREA FLOW ADDITION ****

C22

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.803
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 19.26 min.
Rainfall intensity = 1.622(In/Hr) for a 10.0 year storm
Subarea runoff = 11.788(CFS) for 9.050(Ac.)
Total runoff = 368.205(CFS) Total area = 272.250(Ac.)
End of computations, total study area = 272.25 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.924
Area averaged RI index number = 82.6

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/13/14 File:1344prop10d.out

SKYLINE HEIGHTS
PROPOSED CONDITION
10 YEAR
AREA D

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.940(In/Hr)

Slope of intensity duration curve = 0.4800

+++++
Process from Point/Station 950.000 to Point/Station 951.000
**** INITIAL AREA EVALUATION ****

01

Initial area flow distance = 419.000(Ft.)

Top (of initial area) elevation = 1680.000(Ft.)

Bottom (of initial area) elevation = 1435.000(Ft.)

Difference in elevation = 245.000(Ft.)

Slope = 0.58473 s(percent)= 58.47

TC = $k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 8.846 min.

Rainfall intensity = 2.356(In/Hr) for a 10.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.812

Decimal fraction soil group A = 0.000

100-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344prop100a.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100 YEAR
AREA A

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 809.000(Ft.)

Top (of initial area) elevation = 1340.000(Ft.)

Bottom (of initial area) elevation = 1206.000(Ft.)

Difference in elevation = 134.000(Ft.)

Slope = 0.16564 s(percent)= 16.56

$TC = k(0.390)*[(length^3)/(elevation\ change)]^{0.2}$

Initial area time of concentration = 8.136 min.

Rainfall intensity = 3.783(In/Hr) for a 100.0 year storm

SINGLE FAMILY (1/4 Acre Lot)

Runoff Coefficient = 0.853

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 23.712(CFS)
Total initial stream area = 7.350(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1196.000(Ft.)
Downstream point/station elevation = 1172.000(Ft.)
Pipe length = 388.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 23.712(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 23.712(CFS)
Normal flow depth in pipe = 13.45(In.)
Flow top width inside pipe = 15.64(In.)
Critical depth could not be calculated.
Pipe flow velocity = 16.75(Ft/s)
Travel time through pipe = 0.39 min.
Time of concentration (TC) = 8.52 min.

Process from Point/Station 103.000 to Point/Station 102.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 8.52 min.
Rainfall intensity = 3.700(In/Hr) for a 100.0 year storm
Subarea runoff = 22.282(CFS) for 7.070(Ac.)
Total runoff = 45.993(CFS) Total area = 14.420(Ac.)

Process from Point/Station 102.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1172.000(Ft.)
Downstream point/station elevation = 1147.000(Ft.)
Pipe length = 121.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 45.993(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 45.993(CFS)
Normal flow depth in pipe = 14.20(In.)
Flow top width inside pipe = 14.69(In.)

Critical depth could not be calculated.
Pipe flow velocity = 30.78 (Ft/s)
Travel time through pipe = 0.07 min.
Time of concentration (TC) = 8.59 min.
End of computations, total study area = 14.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 04/22/13 File:1344PROP100L.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100 YEAR
AREA A3

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

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

Program License Serial Number 6062

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)

For the [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 102.000 to Point/Station 150.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 243.000(Ft.)

Top (of initial area) elevation = 1182.000(Ft.)

Bottom (of initial area) elevation = 1164.000(Ft.)

Difference in elevation = 18.000(Ft.)

Slope = 0.07407 s(percent)= 7.41

$TC = k(0.390) * [(length^3)/(elevation\ change)]^{0.2}$

Initial area time of concentration = 5.907 min.

Rainfall intensity = 4.412(In/Hr) for a 100.0 year storm

SINGLE FAMILY (1/4 Acre Lot)

Runoff Coefficient = 0.882

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3) = 88.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.775(CFS)
Total initial stream area = 0.970(Ac.)
Pervious area fraction = 0.500
End of computations, total study area = 0.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344prop100b.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100 YEAR
AREA B

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 391.000(Ft.)
Top (of initial area) elevation = 1412.000(Ft.)
Bottom (of initial area) elevation = 1404.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.02046 s(percent)= 2.05
 $TC = k(0.390)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 9.242 min.
Rainfall intensity = 3.559(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 13.311(CFS)
Total initial stream area = 4.400(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1394.000(Ft.)
Downstream point/station elevation = 1338.000(Ft.)
Pipe length = 542.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.311(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 13.311(CFS)
Normal flow depth in pipe = 8.73(In.)
Flow top width inside pipe = 14.80(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.96(Ft/s)
Travel time through pipe = 0.50 min.
Time of concentration (TC) = 9.74 min.

Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

B2

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 9.74 min.
Rainfall intensity = 3.470(In/Hr) for a 100.0 year storm
Subarea runoff = 23.356(CFS) for 7.930(Ac.)
Total runoff = 36.667(CFS) Total area = 12.330(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1338.000(Ft.)
Downstream point/station elevation = 1317.000(Ft.)
Pipe length = 411.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 36.667(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 36.667(CFS)
Normal flow depth in pipe = 17.72(In.)
Flow top width inside pipe = 15.25(In.)

Critical depth could not be calculated.
Pipe flow velocity = 16.95(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 10.15 min.

Process from Point/Station 202.000 to Point/Station 203.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 12.330(Ac.)
Runoff from this stream = 36.667(CFS)
Time of concentration = 10.15 min.
Rainfall intensity = 3.403(In/Hr)

Process from Point/Station 204.000 to Point/Station 211.000
**** INITIAL AREA EVALUATION ****

C3

Initial area flow distance = 659.000(Ft.)
Top (of initial area) elevation = 1364.000(Ft.)
Bottom (of initial area) elevation = 1355.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01366 s(percent)= 1.37
 $TC = k(0.390) * [(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 12.347 min.
Rainfall intensity = 3.097(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 12.827(CFS)
Total initial stream area = 4.910(Ac.)
Pervious area fraction = 0.500

Process from Point/Station 211.000 to Point/Station 205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

C4

Top of street segment elevation = 1355.000(Ft.)
End of street segment elevation = 1352.000(Ft.)
Length of street segment = 199.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 22.000(Ft.)
Distance from crown to crossfall grade break = 10.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 12.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 2.000(Ft.)

Gutter hike from flowline = 2.000(In.)
 Manning's N in gutter = 0.0150
 Manning's N from gutter to grade break = 0.0150
 Manning's N from grade break to crown = 0.0150
 Estimated mean flow rate at midpoint of street = 20.788(CFS)
 Depth of flow = 0.455(Ft.), Average velocity = 3.689(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 16.404(Ft.)
 Flow velocity = 3.69(Ft/s)
 Travel time = 0.90 min. TC = 13.25 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.842
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 2.994(In/Hr) for a 100.0 year storm
 Subarea runoff = 15.779(CFS) for 6.260(Ac.)
 Total runoff = 28.606(CFS) Total area = 11.170(Ac.)
 Street flow at end of street = 28.606(CFS)
 Half street flow at end of street = 14.303(CFS)
 Depth of flow = 0.499(Ft.), Average velocity = 3.987(Ft/s)
 Flow width (from curb towards crown)= 18.602(Ft.)

 Process from Point/Station 205.000 to Point/Station 203.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

85

Top of street segment elevation = 1352.000(Ft.)
 End of street segment elevation = 1327.000(Ft.)
 Length of street segment = 342.000(Ft.)
 Height of curb above gutter flowline = 6.0(In.)
 Width of half street (curb to crown) = 22.000(Ft.)
 Distance from crown to crossfall grade break = 10.000(Ft.)
 Slope from gutter to grade break (v/hz) = 0.020
 Slope from grade break to crown (v/hz) = 0.020
 Street flow is on [2] side(s) of the street
 Distance from curb to property line = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 Gutter width = 2.000(Ft.)
 Gutter hike from flowline = 2.000(In.)
 Manning's N in gutter = 0.0150
 Manning's N from gutter to grade break = 0.0150
 Manning's N from grade break to crown = 0.0150
 Estimated mean flow rate at midpoint of street = 33.426(CFS)
 Depth of flow = 0.416(Ft.), Average velocity = 7.529(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 14.467(Ft.)
 Flow velocity = 7.53(Ft/s)
 Travel time = 0.76 min. TC = 14.00 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.840
 Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 2.915(In/Hr) for a 100.0 year storm
 Subarea runoff = 9.532(CFS) for 3.890(Ac.)
 Total runoff = 38.138(CFS) Total area = 15.060(Ac.)
 Street flow at end of street = 38.138(CFS)
 Half street flow at end of street = 19.069(CFS)
 Depth of flow = 0.432(Ft.), Average velocity = 7.772(Ft/s)
 Flow width (from curb towards crown) = 15.254(Ft.)

 Process from Point/Station 205.000 to Point/Station 203.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 15.060(Ac.)
 Runoff from this stream = 38.138(CFS)
 Time of concentration = 14.00 min.
 Rainfall intensity = 2.915(In/Hr)
 Summary of stream data:

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

1	36.667	10.15	3.403
2	38.138	14.00	2.915

Largest stream flow has longer time of concentration

Qp = 38.138 + sum of
 Qb Ia/Ib
 36.667 * 0.857 = 31.418
 Qp = 69.556

Total of 2 streams to confluence:

Flow rates before confluence point:

36.667	38.138
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Area of streams before confluence:

12.330	15.060
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Results of confluence:

Total flow rate = 69.556(CFS)

Time of concentration = 14.003 min.

Effective stream area after confluence = 27.390(Ac.)

 Process from Point/Station 203.000 to Point/Station 212.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1317.000(Ft.)
 Downstream point/station elevation = 1264.000(Ft.)
 Pipe length = 600.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 69.556(CFS)
 Nearest computed pipe diameter = 24.00(In.)
 Calculated individual pipe flow = 69.556(CFS)

Normal flow depth in pipe = 20.53(In.)
Flow top width inside pipe = 16.88(In.)
Critical depth could not be calculated.
Pipe flow velocity = 24.32(Ft/s)
Travel time through pipe = 0.41 min.
Time of concentration (TC) = 14.41 min.

Process from Point/Station 203.000 to Point/Station 212.000
**** SUBAREA FLOW ADDITION ****

B6

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 14.41 min.
Rainfall intensity = 2.875(In/Hr) for a 100.0 year storm
Subarea runoff = 15.404(CFS) for 6.380(Ac.)
Total runoff = 84.960(CFS) Total area = 33.770(Ac.)

Process from Point/Station 212.000 to Point/Station 206.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1264.000(Ft.)
Downstream point/station elevation = 1156.000(Ft.)
Pipe length = 1022.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 84.960(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 84.960(CFS)
Normal flow depth in pipe = 19.01(In.)
Flow top width inside pipe = 24.65(In.)
Critical depth could not be calculated.
Pipe flow velocity = 28.39(Ft/s)
Travel time through pipe = 0.60 min.
Time of concentration (TC) = 15.01 min.

Process from Point/Station 212.000 to Point/Station 206.000
**** SUBAREA FLOW ADDITION ****

B7

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 15.01 min.
Rainfall intensity = 2.819(In/Hr) for a 100.0 year storm

Subarea runoff = 32.492 (CFS) for 13.740 (Ac.)
Total runoff = 117.452 (CFS) Total area = 47.510 (Ac.)

Process from Point/Station 212.000 to Point/Station 206.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 47.510 (Ac.)
Runoff from this stream = 117.452 (CFS)
Time of concentration = 15.01 min.
Rainfall intensity = 2.819 (In/Hr)

Process from Point/Station 207.000 to Point/Station 208.000
**** INITIAL AREA EVALUATION ****

B8

Initial area flow distance = 658.000 (Ft.)
Top (of initial area) elevation = 1410.000 (Ft.)
Bottom (of initial area) elevation = 1185.000 (Ft.)
Difference in elevation = 225.000 (Ft.)
Slope = 0.34195 s(percent) = 34.19
TC = $k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 11.797 min.
Rainfall intensity = 3.165 (In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil (AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 10.708 (CFS)
Total initial stream area = 4.060 (Ac.)
Pervious area fraction = 1.000

Process from Point/Station 209.000 to Point/Station 208.000
**** SUBAREA FLOW ADDITION ****

B9

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil (AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 11.80 min.
Rainfall intensity = 3.165 (In/Hr) for a 100.0 year storm
Subarea runoff = 7.253 (CFS) for 2.750 (Ac.)
Total runoff = 17.960 (CFS) Total area = 6.810 (Ac.)

Process from Point/Station 208.000 to Point/Station 210.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

B10

Top of natural channel elevation = 1185.000 (Ft.)
End of natural channel elevation = 1165.000 (Ft.)
Length of natural channel = 503.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 21.217 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 6.07 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0398

Corrected/adjusted channel slope = 0.0398

Travel time = 1.38 min. TC = 13.18 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.830

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 3.002 (In/Hr) for a 100.0 year storm

Subarea runoff = 6.152 (CFS) for 2.470 (Ac.)

Total runoff = 24.112 (CFS) Total area = 9.280 (Ac.)

Process from Point/Station 211.000 to Point/Station 210.000
**** SUBAREA FLOW ADDITION ****

B11

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.830

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Time of concentration = 13.18 min.

Rainfall intensity = 3.002 (In/Hr) for a 100.0 year storm

Subarea runoff = 18.033 (CFS) for 7.240 (Ac.)

Total runoff = 42.145 (CFS) Total area = 16.520 (Ac.)

Process from Point/Station 210.000 to Point/Station 206.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1165.000 (Ft.)

Downstream point/station elevation = 1156.000(Ft.)
 Pipe length = 111.00(Ft.) Manning's N = 0.130
 No. of pipes = 1 Required pipe flow = 42.145(CFS)
 Nearest computed pipe diameter = 48.00(In.)
 Calculated individual pipe flow = 42.145(CFS)
 Normal flow depth in pipe = 40.78(In.)
 Flow top width inside pipe = 34.32(In.)
 Critical Depth = 23.29(In.)
 Pipe flow velocity = 3.70(Ft/s)
 Travel time through pipe = 0.50 min.
 Time of concentration (TC) = 13.68 min.

++++++
 Process from Point/Station 210.000 to Point/Station 206.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 16.520(Ac.)
 Runoff from this stream = 42.145(CFS)
 Time of concentration = 13.68 min.
 Rainfall intensity = 2.949(In/Hr)
 Summary of stream data:

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

1	117.452	15.01	2.819
2	42.145	13.68	2.949

Largest stream flow has longer time of concentration

$Q_p = 117.452 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $42.145 * 0.956 = 40.301$
 $Q_p = 157.752$

Total of 2 streams to confluence:

Flow rates before confluence point:

117.452 42.145

Area of streams before confluence:

47.510 16.520

Results of confluence:

Total flow rate = 157.752(CFS)

Time of concentration = 15.014 min.

Effective stream area after confluence = 64.030(Ac.)

End of computations, total study area = 64.03 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.629

Area averaged RI index number = 77.3

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 04/22/13 File:1344PROP100B12.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100-YEAR
AREA B12 REMAINDER AREA

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

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

Program License Serial Number 6062

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)

For the [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 212.000 to Point/Station 213.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 130.000(Ft.)

Top (of initial area) elevation = 1222.000(Ft.)

Bottom (of initial area) elevation = 1160.000(Ft.)

Difference in elevation = 62.000(Ft.)

Slope = 0.47692 s(percent)= 47.69

$TC = k(0.940) * [(length^3) / (elevation\ change)]^{0.2}$

Initial area time of concentration = 7.639 min.

Rainfall intensity = 3.900(In/Hr) for a 100.0 year storm

UNDEVELOPED (good cover) subarea

Runoff Coefficient = 0.871

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3) = 91.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 23.120(CFS)
Total initial stream area = 6.810(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 6.81 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 80.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/01/13 File:1344PROP100C.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100 YEAR
AREA C

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

Process from Point/Station 700.000 to Point/Station 701.000
**** INITIAL AREA EVALUATION ****

----- C1 -----
Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 2694.000(Ft.)
Bottom (of initial area) elevation = 2340.000(Ft.)
Difference in elevation = 354.000(Ft.)
Slope = 0.35400 s(percent)= 35.40
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.850 min.
Rainfall intensity = 2.931(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 19.831(CFS)
Total initial stream area = 8.170(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 701.000 to Point/Station 702.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C2

Top of natural channel elevation = 2340.000(Ft.)
End of natural channel elevation = 1432.000(Ft.)
Length of natural channel = 3736.000(Ft.)
Estimated mean flow rate at midpoint of channel = 137.218(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 21.99(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2430
Corrected/adjusted channel slope = 0.1772
Travel time = 2.83 min. TC = 16.68 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.680(In/Hr) for a 100.0 year storm
Subarea runoff = 213.130(CFS) for 96.720(Ac.)
Total runoff = 232.962(CFS) Total area = 104.890(Ac.)

Process from Point/Station 701.000 to Point/Station 702.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 104.890(Ac.)
Runoff from this stream = 232.962(CFS)
Time of concentration = 16.68 min.
Rainfall intensity = 2.680(In/Hr)

Process from Point/Station 703.000 to Point/Station 704.000

**** INITIAL AREA EVALUATION ****

C3

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 2320.000(Ft.)
 Bottom (of initial area) elevation = 1860.000(Ft.)
 Difference in elevation = 460.000(Ft.)
 Slope = 0.46000 s(percent)= 46.00
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.143 min.
 Rainfall intensity = 3.005(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.830
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 16.561(CFS)
 Total initial stream area = 6.640(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 704.000 to Point/Station 702.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C4

Top of natural channel elevation = 1860.000(Ft.)
 End of natural channel elevation = 1432.000(Ft.)
 Length of natural channel = 1323.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 41.065(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 16.31(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.3235
 Corrected/adjusted channel slope = 0.1987
 Travel time = 1.35 min. TC = 14.50 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.827
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.867(In/Hr) for a 100.0 year storm
 Subarea runoff = 46.584(CFS) for 19.650(Ac.)
 Total runoff = 63.145(CFS) Total area = 26.290(Ac.)

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+++++
Process from Point/Station      704.000 to Point/Station      702.000
**** CONFLUENCE OF MINOR STREAMS ****

```

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 26.290 (Ac.)
 Runoff from this stream = 63.145 (CFS)
 Time of concentration = 14.50 min.
 Rainfall intensity = 2.867 (In/Hr)

Summary of stream data:

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

1	232.962	16.68	2.680
2	63.145	14.50	2.867

Largest stream flow has longer time of concentration

Qp = 232.962 + sum of
 Qb Ia/Ib
 63.145 * 0.935 = 59.027
 Qp = 291.989

Total of 2 streams to confluence:

Flow rates before confluence point:

232.962 63.145

Area of streams before confluence:

104.890 26.290

Results of confluence:

Total flow rate = 291.989 (CFS)

Time of concentration = 16.682 min.

Effective stream area after confluence = 131.180 (Ac.)

```

+++++
Process from Point/Station      702.000 to Point/Station      708.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

```

C5

Top of natural channel elevation = 1432.000 (Ft.)

End of natural channel elevation = 1354.000 (Ft.)

Length of natural channel = 772.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 302.417 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = (7 + 8(q(English Units)^{.352})(slope^{0.5}))

Velocity using mean channel flow = 21.18 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1010

Corrected/adjusted channel slope = 0.1007

Travel time = 0.61 min. TC = 17.29 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.821

Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.635(In/Hr) for a 100.0 year storm
 Subarea runoff = 20.266(CFS) for 9.370(Ac.)
 Total runoff = 312.254(CFS) Total area = 140.550(Ac.)

++++++
 Process from Point/Station 702.000 to Point/Station 708.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 140.550(Ac.)
 Runoff from this stream = 312.254(CFS)
 Time of concentration = 17.29 min.
 Rainfall intensity = 2.635(In/Hr)

++++++
 Process from Point/Station 705.000 to Point/Station 706.000
 **** INITIAL AREA EVALUATION ****

C6

Initial area flow distance = 1000.000(Ft.)
 Top (of initial area) elevation = 1985.000(Ft.)
 Bottom (of initial area) elevation = 1455.000(Ft.)
 Difference in elevation = 530.000(Ft.)
 Slope = 0.53000 s(percent) = 53.00
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 12.776 min.
 Rainfall intensity = 3.047(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.831
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 16.831(CFS)
 Total initial stream area = 6.650(Ac.)
 Pervious area fraction = 1.000

++++++
 Process from Point/Station 709.000 to Point/Station 706.000
 **** SUBAREA FLOW ADDITION ****

C7

UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.831
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 12.78 min.
 Rainfall intensity = 3.047(In/Hr) for a 100.0 year storm
 Subarea runoff = 26.650(CFS) for 10.530(Ac.)
 Total runoff = 43.481(CFS) Total area = 17.180(Ac.)

 Process from Point/Station 706.000 to Point/Station 707.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C 8

Top of natural channel elevation = 1455.000(Ft.)
 End of natural channel elevation = 1387.000(Ft.)
 Length of natural channel = 521.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 46.556(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{.5}))$
 Velocity using mean channel flow = 13.21(Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)
 Normal channel slope = 0.1305
 Corrected/adjusted channel slope = 0.1214
 Travel time = 0.66 min. TC = 13.43 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.829
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.974(In/Hr) for a 100.0 year storm
 Subarea runoff = 5.993(CFS) for 2.430(Ac.)
 Total runoff = 49.473(CFS) Total area = 19.610(Ac.)

 Process from Point/Station 710.000 to Point/Station 707.000
 **** SUBAREA FLOW ADDITION ****

C 9

UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.829
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 13.43 min.
 Rainfall intensity = 2.974(In/Hr) for a 100.0 year storm
 Subarea runoff = 33.341(CFS) for 13.520(Ac.)
 Total runoff = 82.815(CFS) Total area = 33.130(Ac.)

```

+++++
Process from Point/Station      707.000 to Point/Station      708.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

```

C10

```

Top of natural channel elevation = 1387.000 (Ft.)
End of natural channel elevation = 1354.000 (Ft.)
Length of natural channel = 225.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 90.089 (CFS)

```

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity (ft/s) = (7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
 Velocity using mean channel flow = 16.76 (Ft/s)

Correction to map slope used on extremely rugged channels with
 drops and waterfalls (Plate D-6.2)
 Normal channel slope = 0.1467
 Corrected/adjusted channel slope = 0.1327
 Travel time = 0.22 min. TC = 13.66 min.

Adding area flow to channel
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.829
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.951 (In/Hr) for a 100.0 year storm
 Subarea runoff = 14.230 (CFS) for 5.820 (Ac.)
 Total runoff = 97.045 (CFS) Total area = 38.950 (Ac.)

```

+++++
Process from Point/Station      707.000 to Point/Station      708.000
**** CONFLUENCE OF MINOR STREAMS ****

```

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 38.950 (Ac.)
 Runoff from this stream = 97.045 (CFS)
 Time of concentration = 13.66 min.
 Rainfall intensity = 2.951 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	312.254	17.29	2.635
2	97.045	13.66	2.951

Largest stream flow has longer time of concentration
 $Q_p = 312.254 + \text{sum of } Q_b \text{ Ia/Ib}$
 $97.045 * 0.893 = 86.659$

Qp = 398.913

Total of 2 streams to confluence:

Flow rates before confluence point:

312.254 97.045

Area of streams before confluence:

140.550 38.950

Results of confluence:

Total flow rate = 398.913 (CFS)

Time of concentration = 17.289 min.

Effective stream area after confluence = 179.500 (Ac.)

Process from Point/Station 708.000 to Point/Station 709.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1354.000 (Ft.)

End of natural channel elevation = 1345.000 (Ft.)

Length of natural channel = 225.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 405.380 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 14.65 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0400

Corrected/adjusted channel slope = 0.0400

Travel time = 0.26 min. TC = 17.55 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.820

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil (AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.616 (In/Hr) for a 100.0 year storm

Subarea runoff = 12.491 (CFS) for 5.820 (Ac.)

Total runoff = 411.405 (CFS) Total area = 185.320 (Ac.)

Process from Point/Station 709.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1345.000 (Ft.)

Downstream point/station elevation = 1330.000 (Ft.)

Pipe length = 1002.00 (Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 411.405 (CFS)

Nearest computed pipe diameter = 66.00 (In.)

Calculated individual pipe flow = 411.405 (CFS)

Normal flow depth in pipe = 54.19(In.)
Flow top width inside pipe = 50.60(In.)
Critical Depth = 62.65(In.)
Pipe flow velocity = 19.71(Ft/s)
Travel time through pipe = 0.85 min.
Time of concentration (TC) = 18.39 min.

Process from Point/Station 709.000 to Point/Station 302.000
**** SUBAREA FLOW ADDITION ****

C12

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 18.39 min.
Rainfall intensity = 2.558(In/Hr) for a 100.0 year storm
Subarea runoff = 44.507(CFS) for 20.880(Ac.)
Total runoff = 455.911(CFS) Total area = 206.200(Ac.)

Process from Point/Station 709.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 206.200(Ac.)
Runoff from this stream = 455.911(CFS)
Time of concentration = 18.39 min.
Rainfall intensity = 2.558(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 600.000 to Point/Station 601.000
**** INITIAL AREA EVALUATION ****

C13

Initial area flow distance = 862.000(Ft.)
Top (of initial area) elevation = 1735.000(Ft.)
Bottom (of initial area) elevation = 1485.000(Ft.)
Difference in elevation = 250.000(Ft.)
Slope = 0.29002 s(percent)= 29.00
 $TC = k(0.710) * [(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 13.582 min.
Rainfall intensity = 2.958(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00

Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 13.756(CFS)
Total initial stream area = 5.610(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 601.000 to Point/Station 300.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1485.000(Ft.)
Downstream point/station elevation = 1388.000(Ft.)
Pipe length = 709.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.756(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 13.756(CFS)
Normal flow depth in pipe = 8.17(In.)
Flow top width inside pipe = 14.94(In.)
Critical depth could not be calculated.
Pipe flow velocity = 20.16(Ft/s)
Travel time through pipe = 0.59 min.
Time of concentration (TC) = 14.17 min.

Process from Point/Station 601.000 to Point/Station 300.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 14.17 min.
Rainfall intensity = 2.899(In/Hr) for a 100.0 year storm
Subarea runoff = 13.640(CFS) for 5.600(Ac.)
Total runoff = 27.396(CFS) Total area = 11.210(Ac.)

Process from Point/Station 601.000 to Point/Station 300.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 11.210(Ac.)
Runoff from this stream = 27.396(CFS)
Time of concentration = 14.17 min.
Rainfall intensity = 2.899(In/Hr)

Process from Point/Station 500.000 to Point/Station 501.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 1690.000(Ft.)
 Bottom (of initial area) elevation = 1390.000(Ft.)
 Difference in elevation = 300.000(Ft.)
 Slope = 0.30000 s(percent)= 30.00
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 14.316 min.
 Rainfall intensity = 2.885(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.827
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 20.114(CFS)
 Total initial stream area = 8.430(Ac.)
 Pervious area fraction = 1.000

++++++
 Process from Point/Station 501.000 to Point/Station 300.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1390.000(Ft.)
 Downstream point/station elevation = 1388.000(Ft.)
 Pipe length = 308.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 20.114(CFS)
 Nearest computed pipe diameter = 27.00(In.)
 Calculated individual pipe flow = 20.114(CFS)
 Normal flow depth in pipe = 18.38(In.)
 Flow top width inside pipe = 25.18(In.)
 Critical Depth = 18.84(In.)
 Pipe flow velocity = 6.98(Ft/s)
 Travel time through pipe = 0.74 min.
 Time of concentration (TC) = 15.05 min.

++++++
 Process from Point/Station 501.000 to Point/Station 300.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 8.430(Ac.)
 Runoff from this stream = 20.114(CFS)
 Time of concentration = 15.05 min.
 Rainfall intensity = 2.816(In/Hr)
 Summary of stream data:

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

1	27.396	14.17	2.899
2	20.114	15.05	2.816

Largest stream flow has longer or shorter time of concentration
 $Q_p = 27.396 + \text{sum of } Q_a \text{ Tb/Ta}$

20.114 * 0.941 = 18.934
Qp = 46.330

Total of 2 streams to confluence:
Flow rates before confluence point:
27.396 20.114

Area of streams before confluence:
11.210 8.430

Results of confluence:

Total flow rate = 46.330 (CFS)
Time of concentration = 14.169 min.
Effective stream area after confluence = 19.640 (Ac.)

Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1388.000 (Ft.)
Downstream point/station elevation = 1358.000 (Ft.)
Pipe length = 964.00 (Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 46.330 (CFS)
Nearest computed pipe diameter = 27.00 (In.)
Calculated individual pipe flow = 46.330 (CFS)
Normal flow depth in pipe = 19.08 (In.)
Flow top width inside pipe = 24.59 (In.)
Critical depth could not be calculated.
Pipe flow velocity = 15.42 (Ft/s)
Travel time through pipe = 1.04 min.
Time of concentration (TC) = 15.21 min.

Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****

C16

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil (AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 15.21 min.
Rainfall intensity = 2.802 (In/Hr) for a 100.0 year storm
Subarea runoff = 13.695 (CFS) for 5.830 (Ac.)
Total runoff = 60.025 (CFS) Total area = 25.470 (Ac.)

Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1358.000 (Ft.)
Downstream point/station elevation = 1330.000 (Ft.)
Pipe length = 354.00 (Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 60.025 (CFS)

Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 60.025(CFS)
Normal flow depth in pipe = 18.56(In.)
Flow top width inside pipe = 20.09(In.)
Critical depth could not be calculated.
Pipe flow velocity = 23.03(Ft/s)
Travel time through pipe = 0.26 min.
Time of concentration (TC) = 15.47 min.

Process from Point/Station 301.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 25.470(Ac.)
Runoff from this stream = 60.025(CFS)
Time of concentration = 15.47 min.
Rainfall intensity = 2.780(In/Hr)
Program is now starting with Main Stream No. 3

Process from Point/Station 800.000 to Point/Station 801.000
**** INITIAL AREA EVALUATION ****

C17

Initial area flow distance = 862.000(Ft.)
Top (of initial area) elevation = 1680.000(Ft.)
Bottom (of initial area) elevation = 1495.000(Ft.)
Difference in elevation = 185.000(Ft.)
Slope = 0.21462 s(percent)= 21.46
 $TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 14.425 min.
Rainfall intensity = 2.874(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.827
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 13.262(CFS)
Total initial stream area = 5.580(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 801.000 to Point/Station 802.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C18

Top of natural channel elevation = 1495.000(Ft.)
End of natural channel elevation = 1400.000(Ft.)
Length of natural channel = 374.000(Ft.)
Estimated mean flow rate at midpoint of channel = 17.825(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 12.36(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2540
Corrected/adjusted channel slope = 0.1811
Travel time = 0.50 min. TC = 14.93 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.827(In/Hr) for a 100.0 year storm
Subarea runoff = 8.965(CFS) for 3.840(Ac.)
Total runoff = 22.227(CFS) Total area = 9.420(Ac.)

Process from Point/Station 803.000 to Point/Station 802.000
**** SUBAREA FLOW ADDITION ****

C19

UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 14.93 min.
Rainfall intensity = 2.827(In/Hr) for a 100.0 year storm
Subarea runoff = 9.269(CFS) for 3.970(Ac.)
Total runoff = 31.495(CFS) Total area = 13.390(Ac.)

Process from Point/Station 802.000 to Point/Station 804.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

C20

Top of natural channel elevation = 1400.000(Ft.)
End of natural channel elevation = 1335.000(Ft.)
Length of natural channel = 446.000(Ft.)
Estimated mean flow rate at midpoint of channel = 42.597(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 13.43(Ft/s)

Correction to map slope used on extremely rugged channels with

drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.1457
Corrected/adjusted channel slope = 0.1320
Travel time = 0.55 min. TC = 15.48 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.778(In/Hr) for a 100.0 year storm
Subarea runoff = 21.626(CFS) for 9.440(Ac.)
Total runoff = 53.121(CFS) Total area = 22.830(Ac.)

Process from Point/Station 804.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1335.000(Ft.)
Downstream point/station elevation = 1332.000(Ft.)
Pipe length = 516.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 53.121(CFS)
Nearest computed pipe diameter = 36.00(In.)
Calculated individual pipe flow = 53.121(CFS)
Normal flow depth in pipe = 31.22(In.)
Flow top width inside pipe = 24.43(In.)
Critical Depth = 28.43(In.)
Pipe flow velocity = 8.16(Ft/s)
Travel time through pipe = 1.05 min.
Time of concentration (TC) = 16.54 min.

Process from Point/Station 804.000 to Point/Station 303.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 3 in normal stream number 1
Stream flow area = 22.830(Ac.)
Runoff from this stream = 53.121(CFS)
Time of concentration = 16.54 min.
Rainfall intensity = 2.692(In/Hr)

Process from Point/Station 900.000 to Point/Station 901.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 886.000(Ft.)
Top (of initial area) elevation = 1600.000(Ft.)
Bottom (of initial area) elevation = 1340.000(Ft.)
Difference in elevation = 260.000(Ft.)
Slope = 0.29345 s(percent)= 29.35

C 21

$TC = k(0.710) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.700 min.
 Rainfall intensity = 2.946 (In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.829
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 84.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 21.238 (CFS)
 Total initial stream area = 8.700 (Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 901.000 to Point/Station 303.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1340.000 (Ft.)
 Downstream point/station elevation = 1332.000 (Ft.)
 Pipe length = 428.00 (Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 21.238 (CFS)
 Nearest computed pipe diameter = 21.00 (In.)
 Calculated individual pipe flow = 21.238 (CFS)
 Normal flow depth in pipe = 16.85 (In.)
 Flow top width inside pipe = 16.72 (In.)
 Critical Depth = 19.50 (In.)
 Pipe flow velocity = 10.27 (Ft/s)
 Travel time through pipe = 0.69 min.
 Time of concentration (TC) = 14.39 min.

 Process from Point/Station 901.000 to Point/Station 303.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 3 in normal stream number 2
 Stream flow area = 8.700 (Ac.)
 Runoff from this stream = 21.238 (CFS)
 Time of concentration = 14.39 min.
 Rainfall intensity = 2.877 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	53.121	16.54	2.692
2	21.238	14.39	2.877

Largest stream flow has longer time of concentration
 $Q_p = 53.121 + \text{sum of } Q_b \cdot I_a/I_b$
 $21.238 * 0.936 = 19.870$
 $Q_p = 72.991$

Total of 2 streams to confluence:

Flow rates before confluence point:

53.121 21.238

Area of streams before confluence:

22.830 8.700

Results of confluence:

Total flow rate = 72.991(CFS)

Time of concentration = 16.537 min.

Effective stream area after confluence = 31.530(Ac.)

Process from Point/Station 303.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1332.000(Ft.)
Downstream point/station elevation = 1330.000(Ft.)
Pipe length = 296.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 72.991(CFS)
Nearest computed pipe diameter = 42.00(In.)
Calculated individual pipe flow = 72.991(CFS)
Normal flow depth in pipe = 30.66(In.)
Flow top width inside pipe = 37.30(In.)
Critical Depth = 32.12(In.)
Pipe flow velocity = 9.70(Ft/s)
Travel time through pipe = 0.51 min.
Time of concentration (TC) = 17.05 min.

Process from Point/Station 303.000 to Point/Station 302.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3

Stream flow area = 31.530(Ac.)

Runoff from this stream = 72.991(CFS)

Time of concentration = 17.05 min.

Rainfall intensity = 2.653(In/Hr)

Summary of stream data:

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

1	455.911	18.39	2.558
2	60.025	15.47	2.780
3	72.991	17.05	2.653

Largest stream flow has longer time of concentration

Qp = 455.911 + sum of
Qb Ia/Ib
60.025 * 0.920 = 55.235
Qb Ia/Ib
72.991 * 0.964 = 70.373
Qp = 581.520

Total of 3 main streams to confluence:

Flow rates before confluence point:

455.911 60.025 72.991

Area of streams before confluence:
206.200 25.470 31.530

Results of confluence:

Total flow rate = 581.520 (CFS)
Time of concentration = 18.393 min.
Effective stream area after confluence = 263.200 (Ac.)

Process from Point/Station 302.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1330.000 (Ft.)
Downstream point/station elevation = 1210.000 (Ft.)
Pipe length = 532.00 (Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 581.520 (CFS)
Nearest computed pipe diameter = 45.00 (In.)
Calculated individual pipe flow = 581.520 (CFS)
Normal flow depth in pipe = 37.41 (In.)
Flow top width inside pipe = 33.71 (In.)
Critical depth could not be calculated.
Pipe flow velocity = 59.25 (Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 18.54 min.

Process from Point/Station 302.000 to Point/Station 304.000
**** SUBAREA FLOW ADDITION ****

C22

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil (AMC 2) = 75.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Time of concentration = 18.54 min.
Rainfall intensity = 2.548 (In/Hr) for a 100.0 year storm
Subarea runoff = 19.211 (CFS) for 9.050 (Ac.)
Total runoff = 600.730 (CFS) Total area = 272.250 (Ac.)
End of computations, total study area = 272.25 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction (Ap) = 0.924
Area averaged RI index number = 82.6

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/13/14 File:1344prop100d.out

SKYLINE HEIGHTS
PROPOSED CONDITION
100 YEAR
AREA D

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

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

Program License Serial Number 6062

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 [Corona] area used.

10 year storm 10 minute intensity = 2.220(In/Hr)

10 year storm 60 minute intensity = 0.940(In/Hr)

100 year storm 10 minute intensity = 3.430(In/Hr)

100 year storm 60 minute intensity = 1.450(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.450(In/Hr)

Slope of intensity duration curve = 0.4800

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Process from Point/Station 950.000 to Point/Station 951.000 D1
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 419.000(Ft.)

Top (of initial area) elevation = 1680.000(Ft.)

Bottom (of initial area) elevation = 1435.000(Ft.)

Difference in elevation = 245.000(Ft.)

Slope = 0.58473 s(percent)= 58.47

TC = $k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 8.846 min.

Rainfall intensity = 3.634(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.841

Decimal fraction soil group A = 0.000

H

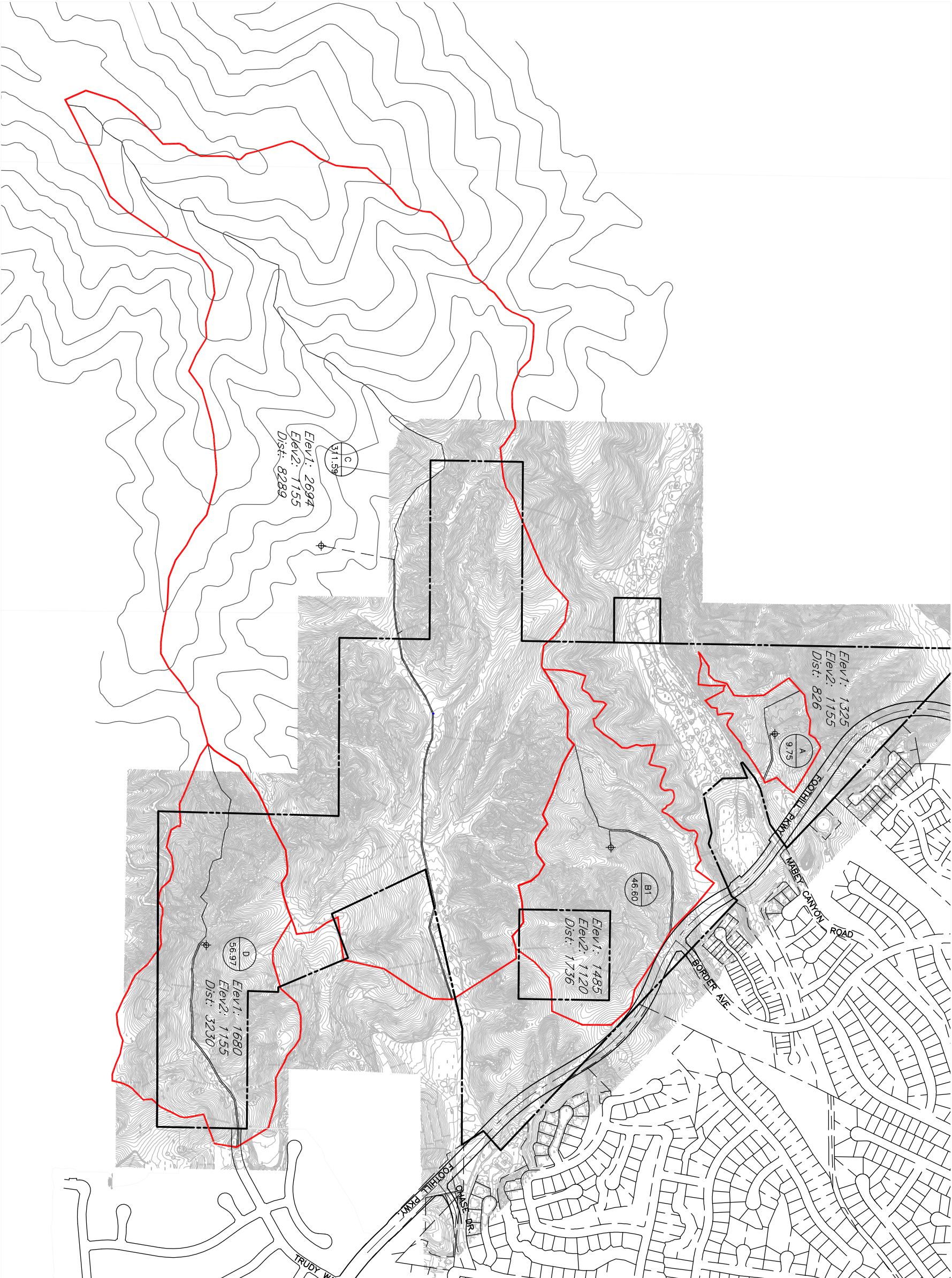
**PROPOSED CONDITION HYDROLOGIC
KEY MAPS**

Sub Area	Area (sq ft)	Total Area (sq ft)	Q ₁₀₀ (cfs)	Q ₅₀ (cfs)	Q ₂₅ (cfs)
A1	7,35	7,35	23.71	8.14	8.07
A2	7,07	14,42	45.90	8.02	7.97
A3	5,07	19,49	3.97	21.44	5.07
Area A	4,40	4,40	13.31	3.24	3.24
B1	4,40	8,80	13.31	3.24	3.24
B2	4,40	13,20	13.31	3.24	3.24
B3	4,40	17,60	13.31	3.24	3.24
B4	4,40	22,00	13.31	3.24	3.24
B5	4,40	26,40	13.31	3.24	3.24
B6	4,40	30,80	13.31	3.24	3.24
B7	4,40	35,20	13.31	3.24	3.24
B8	4,40	39,60	13.31	3.24	3.24
B9	4,40	44,00	13.31	3.24	3.24
B10	4,40	48,40	13.31	3.24	3.24
B11	4,40	52,80	13.31	3.24	3.24
B12	4,40	57,20	13.31	3.24	3.24
B13	4,40	61,60	13.31	3.24	3.24
B14	4,40	66,00	13.31	3.24	3.24
B15	4,40	70,40	13.31	3.24	3.24
B16	4,40	74,80	13.31	3.24	3.24
B17	4,40	79,20	13.31	3.24	3.24
B18	4,40	83,60	13.31	3.24	3.24
B19	4,40	88,00	13.31	3.24	3.24
B20	4,40	92,40	13.31	3.24	3.24
B21	4,40	96,80	13.31	3.24	3.24
B22	4,40	101,20	13.31	3.24	3.24
B23	4,40	105,60	13.31	3.24	3.24
B24	4,40	110,00	13.31	3.24	3.24
B25	4,40	114,40	13.31	3.24	3.24
B26	4,40	118,80	13.31	3.24	3.24
B27	4,40	123,20	13.31	3.24	3.24
B28	4,40	127,60	13.31	3.24	3.24
B29	4,40	132,00	13.31	3.24	3.24
B30	4,40	136,40	13.31	3.24	3.24
B31	4,40	140,80	13.31	3.24	3.24
B32	4,40	145,20	13.31	3.24	3.24
B33	4,40	149,60	13.31	3.24	3.24
B34	4,40	154,00	13.31	3.24	3.24
B35	4,40	158,40	13.31	3.24	3.24
B36	4,40	162,80	13.31	3.24	3.24
B37	4,40	167,20	13.31	3.24	3.24
B38	4,40	171,60	13.31	3.24	3.24
B39	4,40	176,00	13.31	3.24	3.24
B40	4,40	180,40	13.31	3.24	3.24
B41	4,40	184,80	13.31	3.24	3.24
B42	4,40	189,20	13.31	3.24	3.24
B43	4,40	193,60	13.31	3.24	3.24
B44	4,40	198,00	13.31	3.24	3.24
B45	4,40	202,40	13.31	3.24	3.24
B46	4,40	206,80	13.31	3.24	3.24
B47	4,40	211,20	13.31	3.24	3.24
B48	4,40	215,60	13.31	3.24	3.24
B49	4,40	220,00	13.31	3.24	3.24
B50	4,40	224,40	13.31	3.24	3.24
B51	4,40	228,80	13.31	3.24	3.24
B52	4,40	233,20	13.31	3.24	3.24
B53	4,40	237,60	13.31	3.24	3.24
B54	4,40	242,00	13.31	3.24	3.24
B55	4,40	246,40	13.31	3.24	3.24
B56	4,40	250,80	13.31	3.24	3.24
B57	4,40	255,20	13.31	3.24	3.24
B58	4,40	259,60	13.31	3.24	3.24
B59	4,40	264,00	13.31	3.24	3.24
B60	4,40	268,40	13.31	3.24	3.24
B61	4,40	272,80	13.31	3.24	3.24
B62	4,40	277,20	13.31	3.24	3.24
B63	4,40	281,60	13.31	3.24	3.24
B64	4,40	286,00	13.31	3.24	3.24
B65	4,40	290,40	13.31	3.24	3.24
B66	4,40	294,80	13.31	3.24	3.24
B67	4,40	299,20	13.31	3.24	3.24
B68	4,40	303,60	13.31	3.24	3.24
B69	4,40	308,00	13.31	3.24	3.24
B70	4,40	312,40	13.31	3.24	3.24
B71	4,40	316,80	13.31	3.24	3.24
B72	4,40	321,20	13.31	3.24	3.24
B73	4,40	325,60	13.31	3.24	3.24
B74	4,40	330,00	13.31	3.24	3.24
B75	4,40	334,40	13.31	3.24	3.24
B76	4,40	338,80	13.31	3.24	3.24
B77	4,40	343,20	13.31	3.24	3.24
B78	4,40	347,60	13.31	3.24	3.24
B79	4,40	352,00	13.31	3.24	3.24
B80	4,40	356,40	13.31	3.24	3.24
B81	4,40	360,80	13.31	3.24	3.24
B82	4,40	365,20	13.31	3.24	3.24
B83	4,40	369,60	13.31	3.24	3.24
B84	4,40	374,00	13.31	3.24	3.24
B85	4,40	378,40	13.31	3.24	3.24
B86	4,40	382,80	13.31	3.24	3.24
B87	4,40	387,20	13.31	3.24	3.24
B88	4,40	391,60	13.31	3.24	3.24
B89	4,40	396,00	13.31	3.24	3.24
B90	4,40	400,40	13.31	3.24	3.24
B91	4,40	404,80	13.31	3.24	3.24
B92	4,40	409,20	13.31	3.24	3.24
B93	4,40	413,60	13.31	3.24	3.24
B94	4,40	418,00	13.31	3.24	3.24
B95	4,40	422,40	13.31	3.24	3.24
B96	4,40	426,80	13.31	3.24	3.24
B97	4,40	431,20	13.31	3.24	3.24
B98	4,40	435,60	13.31	3.24	3.24
B99	4,40	440,00	13.31	3.24	3.24
B100	4,40	444,40	13.31	3.24	3.24
B101	4,40	448,80	13.31	3.24	3.24
B102	4,40	453,20	13.31	3.24	3.24
B103	4,40	457,60	13.31	3.24	3.24
B104	4,40	462,00	13.31	3.24	3.24
B105	4,40	466,40	13.31	3.24	3.24
B106	4,40	470,80	13.31	3.24	3.24
B107	4,40	475,20	13.31	3.24	3.24
B108	4,40	479,60	13.31	3.24	3.24
B109	4,40	484,00	13.31	3.24	3.24
B110	4,40	488,40	13.31	3.24	3.24
B111	4,40	492,80	13.31	3.24	3.24
B112	4,40	497,20	13.31	3.24	3.24
B113	4,40	501,60	13.31	3.24	3.24
B114	4,40	506,00	13.31	3.24	3.24
B115	4,40	510,40	13.31	3.24	3.24
B116	4,40	514,80	13.31	3.24	3.24
B117	4,40	519,20	13.31	3.24	3.24
B118	4,40	523,60	13.31	3.24	3.24
B119	4,40	528,00	13.31	3.24	3.24
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B121	4,40	536,80	13.31	3.24	3.24
B122	4,40	541,20	13.31	3.24	3.24
B123	4,40	545,60	13.31	3.24	3.24
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B131	4,40	580,80	13.31	3.24	3.24
B132	4,40	585,20	13.31	3.24	3.24
B133	4,40	589,60	13.31	3.24	3.24
B134	4,40	594,00	13.31	3.24	3.24
B135	4,40	598,40	13.31	3.24	3.24
B136	4,40	602,80	13.31	3.24	3.24
B137	4,40	607,20	13.31	3.24	3.24
B138	4,40	611,60	13.31	3.24	3.24
B139	4,40	616,00	13.31	3.24	3.24
B140	4,40	620,40	13.31	3.24	3.24
B141	4,40	624,80	13.31	3.24	3.24
B142	4,40	629,20	13.31	3.24	3.24
B143	4,40	633,60	13.31	3.24	3.24
B144	4,40	638,00	13.31	3.24	3.24
B145	4,40	642,40	13.31	3.24	3.24
B146	4,40	646,80	13.31	3.24	3.24
B147	4,40	651,20	13.31	3.24	3.24
B148	4,40	655,60	13.31	3.24	3.24
B149	4,40	660,00	13.31	3.24	3.24
B150	4,40	664,40	13.31	3.24	3.24
B151	4,40	668,80	13.31	3.24	3.24
B152	4,40	673,20	13.31	3.24	3.24
B153	4,40	677,60	13.31	3.24	3.24
B154	4,40	682,00	13.31	3.24	3.24
B155	4,40	686,40	13.31	3.24	3.24
B156	4,40	690,80	13.31	3.24	3.24
B157	4,40	695,20	13.31	3.24	3.24
B158	4,40	699,60	13.31	3.24	3.24
B159	4,40	704,00	13.31	3.24	3.24
B160	4,40	708,40	13.31	3.24	3.24
B161	4,40	712,80	13.31	3.24	3.24
B162	4,40	717,20	13.31	3.24	3.24
B163	4,40	721,60	13.31	3.24	3.24
B164	4,40	726,00	13.31	3.24	3.24
B165	4,40	730,40	13.31	3.24	3.24
B166	4,40	734,80	13.31	3.24	3.24
B167	4,40	739,20	13.31	3.24	3.24
B168	4,40	743,60	13.31	3.24	3.24
B169	4,40	748,00	13.31	3.24	3.24
B170	4,40	752,40	13.31	3.24	3.24
B171	4,40	756,80	13.31	3.24	3.24
B172	4,40	761,20	13.31	3.24	3.24
B173	4,40	765,60	13.31	3.24	3.24
B174	4,40	770,00	13.31	3.24	3.24
B175	4,40	774,40	13.31	3.24	3.24
B176	4,40	778,80	13.31	3.24	3.24
B177	4,40	783,20	13.31	3.24	3.24
B178	4,40	787,60	13.31	3.24	3.24
B179	4,40	792,00	13.31	3.24	3.24
B180	4,40	796,40	13.31	3.24	3.24
B181	4,40	800,80	13.31	3.24	3.24
B182	4,40	805,20	13.31	3.24	3.24
B183	4,40	809,60	13.31	3.24	3.24
B184	4,40	814,00	13.31	3.24	3.24
B185	4,40	818,40	13.31	3.24	3.24
B186	4,40	822,80	13.31	3.24	3.24
B187	4,40	827,20	13.31	3.24	3.24
B188	4,40	831,60	13.31	3.24	3.24
B189	4,40	836,00	13.31	3.24	3.24
B190	4,40	840,40	13.31	3.24	3.24
B191	4,40	844,80	13.31	3.24	3.24
B192	4,40	849,20	13.31	3.24	3.24
B193	4,40	853,60	13.31	3.24	3.24
B194	4,40	858,00	13.31	3.24	3.24
B195	4,40	862,40	13.31	3.24	3.24
B196	4,40	866,80	13.31	3.24	3.24
B197	4,40	871,20	13.31	3.24	3.24
B198	4,40	875,60	13.31	3.24	3.24
B199	4,40	880,00	13.31	3.24	3.24
B200	4,40	884,40	13.31	3.24	3.24
B201	4,40	888,80	13.31	3.24	3.24
B202	4,40	893,20	13.31	3.24	3.24
B203	4,40	897,60	13.31	3.24	3.24

I

EXISTING CONDITION HYDROLOGY UNIT HYDROGRAPH METHOD

REFER TO CD FOR CALCULATIONS



LEGEND



CENTROID

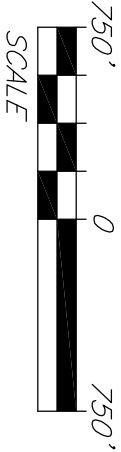
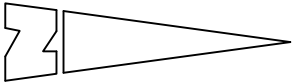


BASIN TRIBUTARY AREA BOUNDARY



BASIN NUMBER
TRIBUTARY AREA (ACRES)

HYDROGRAPH FLOW LENGTHS



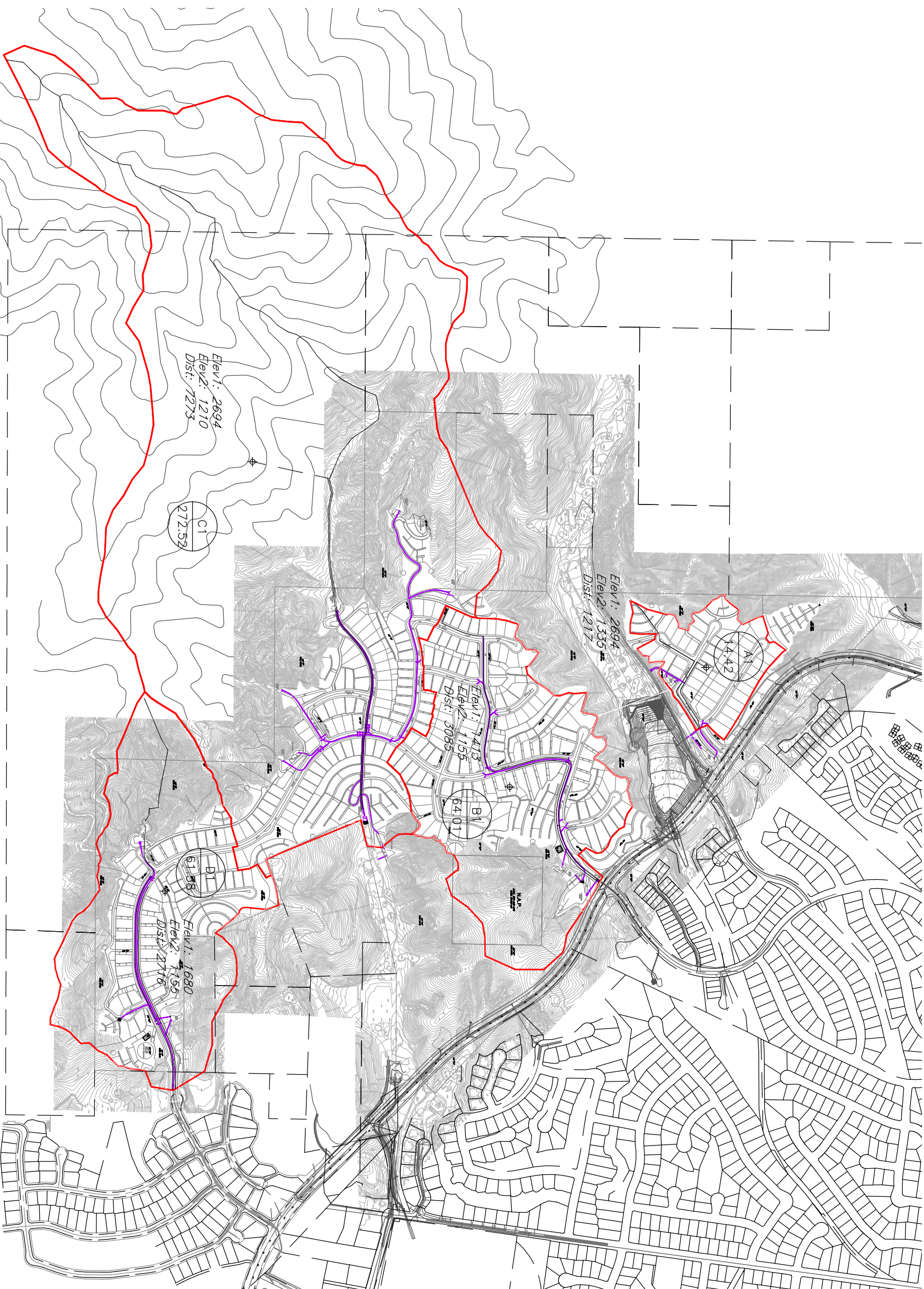
UNIT HYDROGRAPH MAP
EXISTING CONDITION
FOR
SKYLINE HEIGHTS
COUNTY RIVERSIDE

HYD:	IAE	RWC ENGINEERS CIVIL ENGINEERING, PLANNING AND CONSTRUCTION MANAGEMENT 1880 COMMON AVENUE, SUITE 100 • COSTA MESA, CA 92626 • 949.234.2130	SHEET 1 of 1
DRAFT:	MLL		
CHECK:	IAE		

J

PROPOSED CONDITION HYDROLOGY UNIT HYDROGRAPH METHOD

REFER TO CD FOR CALCULATIONS



LEGEND



CENTROID



WQMP BASIN TRIBUTARY
AREA BOUNDARY



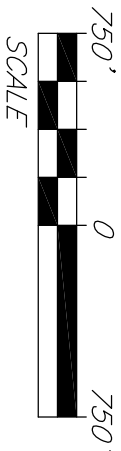
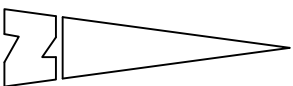
BASIN NUMBER
TRIBUTARY AREA (ACRES)



PROPOSED STORM DRAIN



HYDROGRAPH FLOW LENGTHS



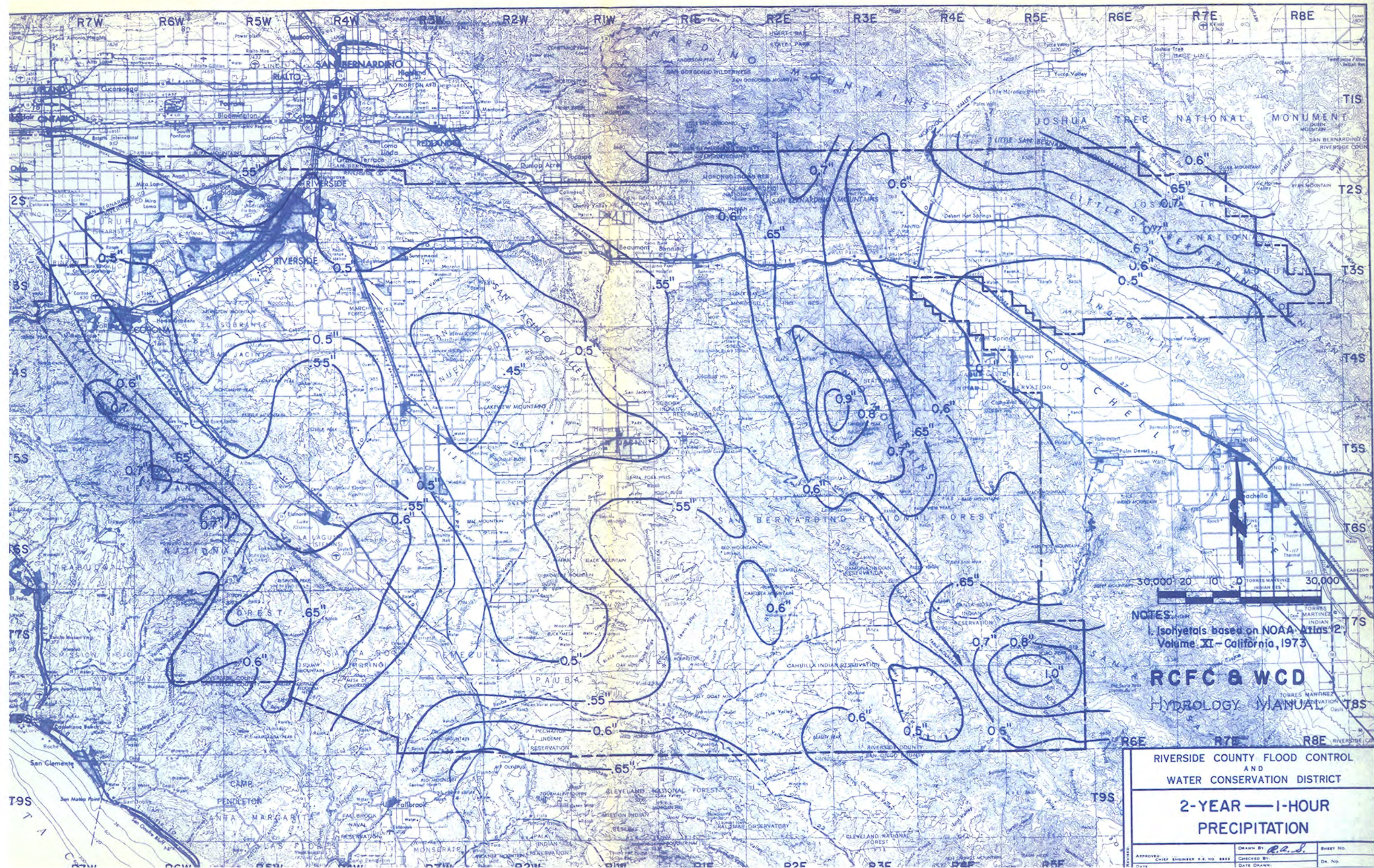
UNIT HYDROGRAPH MAP
PROPOSED CONDITION
FOR
SKYLINE HEIGHTS
COUNTY RIVERSIDE

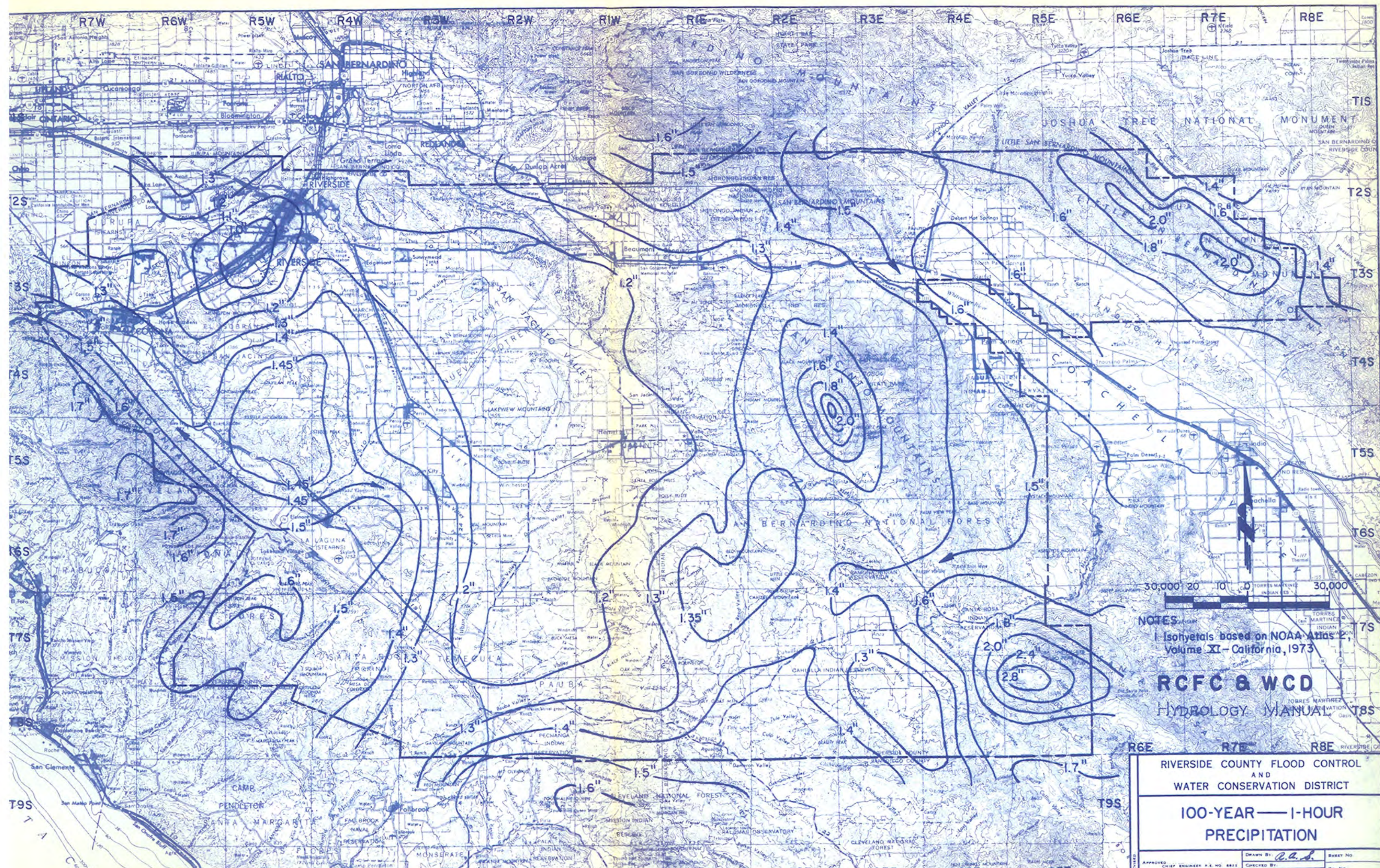
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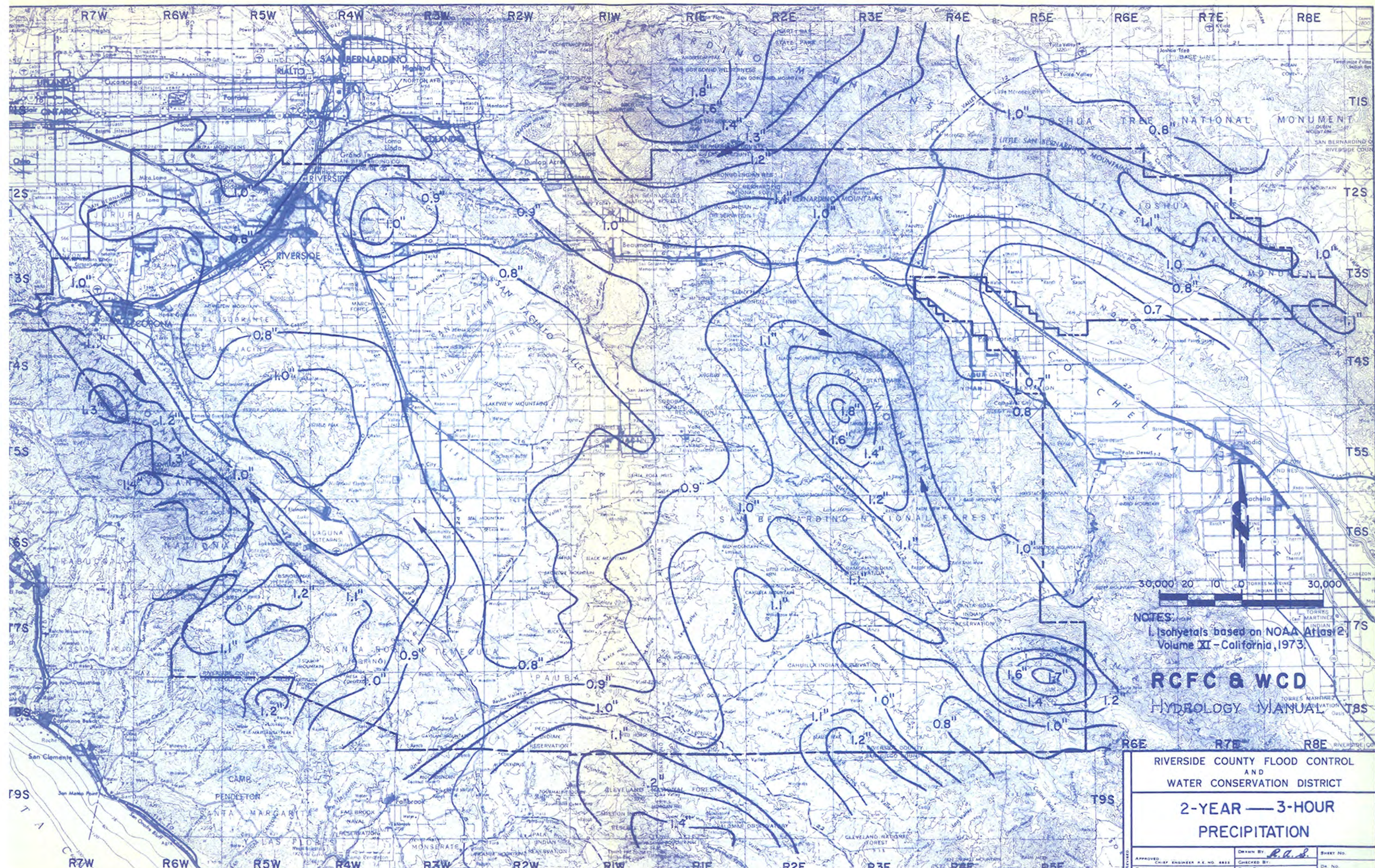
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1880 Cowdrey Avenue, Suite 100 • Corona, CA 92681-3370 • 951-754-2130

K

PRECIPITATION MAPS



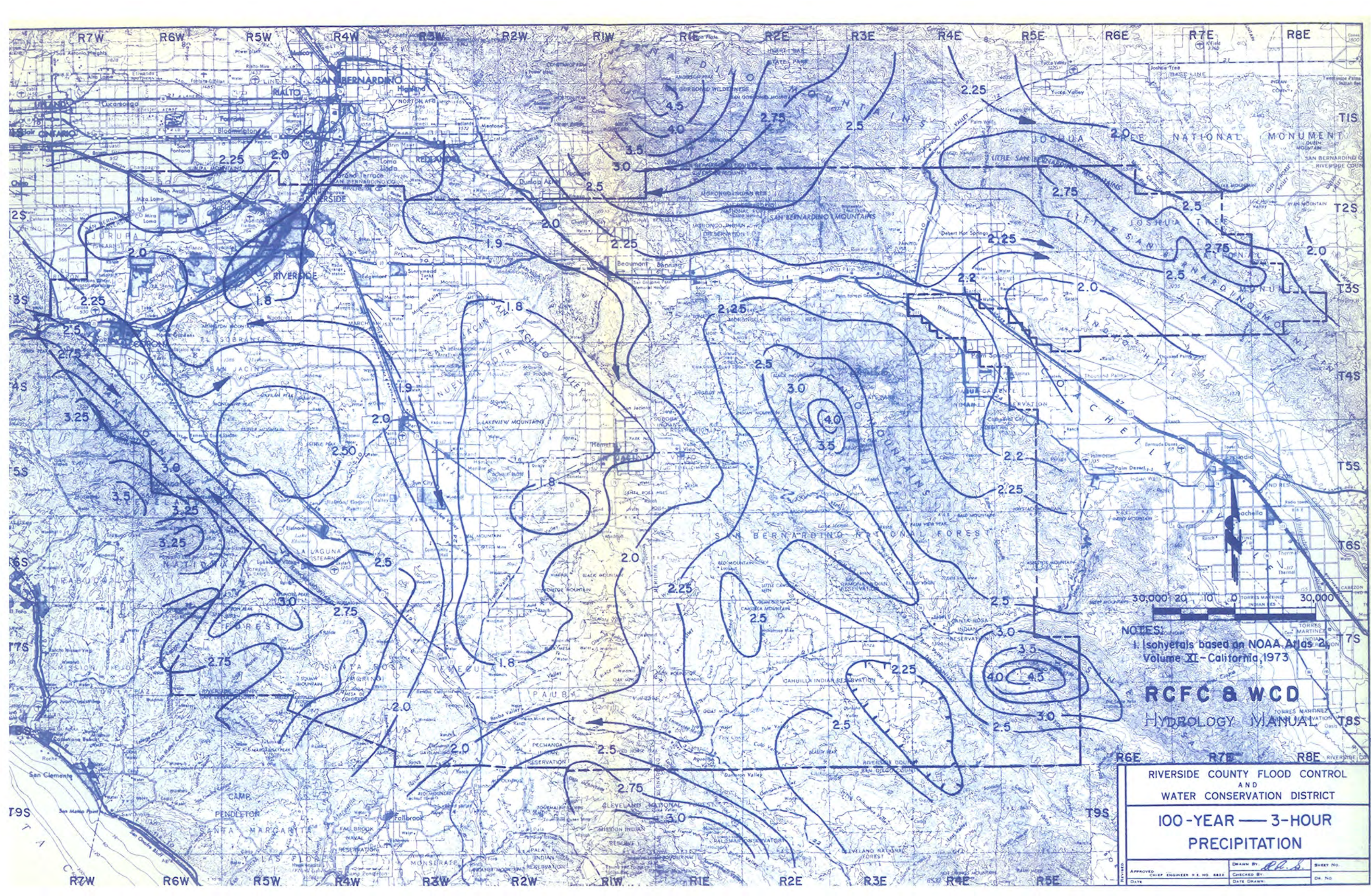




NOTES:
1. Isohyets based on NOAA Atlas 2,
Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 3-HOUR PRECIPITATION		
APPROVED CHIEF ENGINEER P.E. NO. 8832	DRAWN BY R.A.S.	SHEET NO.
CHECKED BY	DATE DRAWN	OR NO.

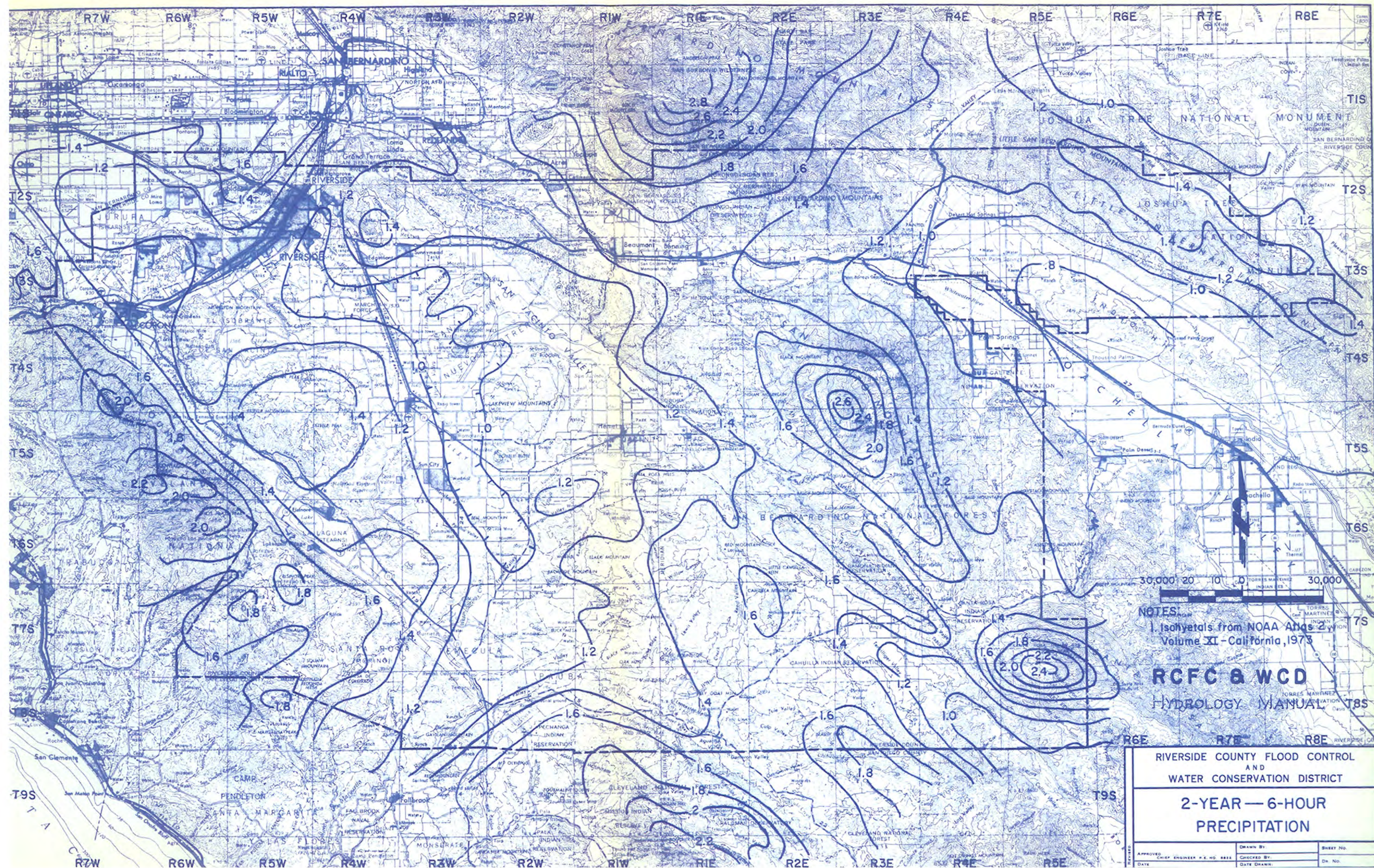


NOTES:
1. Isohyets based on NOAA Atlas 2,
Volume XI - California, 1973

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HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
**100-YEAR — 3-HOUR
PRECIPITATION**

APPROVED:	CHIEF ENGINEER R.E. NO. 8822	DRAWN BY:	DATE:	CHECKED BY:	DATE:	SHEET NO.:	OF NO.:
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NOTES:
1. Isohyets from NOAA Atlas 2,
Volume XI - California, 1973

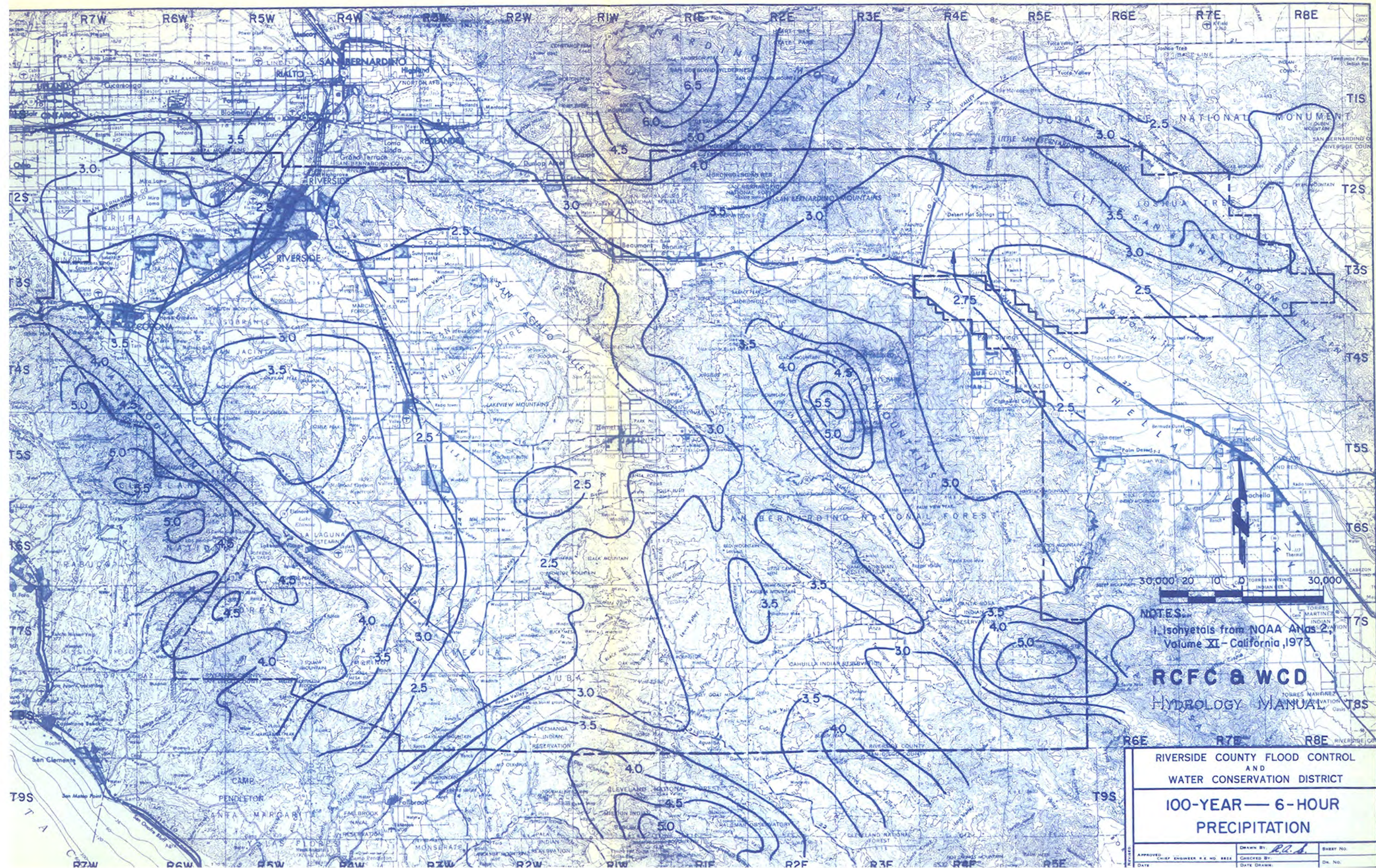
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HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 6-HOUR PRECIPITATION

APPROVED DATE	CHIEF ENGINEER F.E. NO. 8815	CHECKED BY DATE	DRAWN BY DATE	SHEET NO. OF
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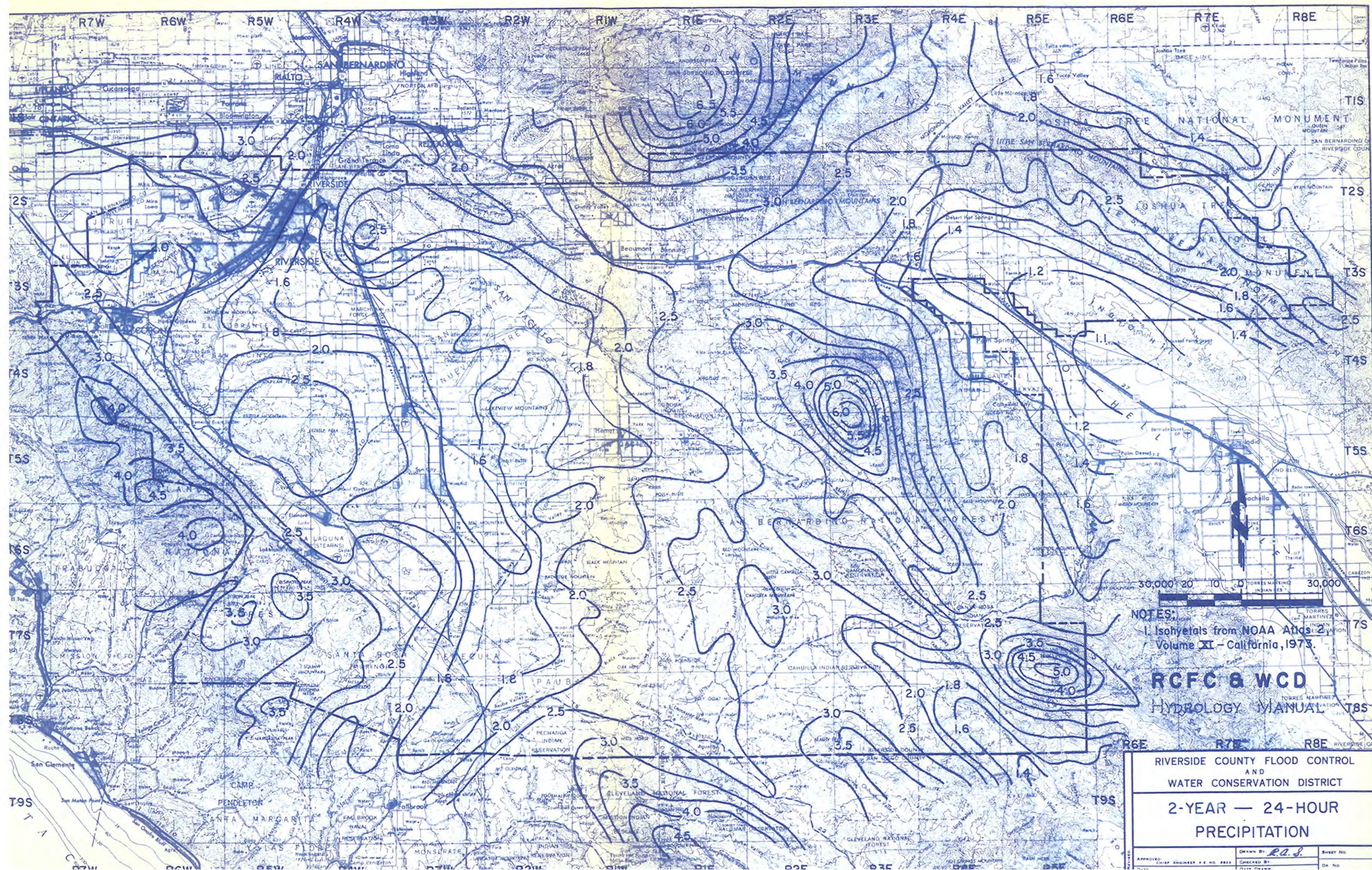
NOTES:
1. Isohyets from NOAA Atlas 2,
Volume XI - California, 1973

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RIVERSIDE COUNTY FLOOD CONTROL
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WATER CONSERVATION DISTRICT

**100-YEAR — 6-HOUR
PRECIPITATION**

APPROVED CHIEF ENGINEER R. E. NO. 882	DRAWN BY R. E. A.	SHEET NO.
DATE	CHECKED BY	DR. NO.



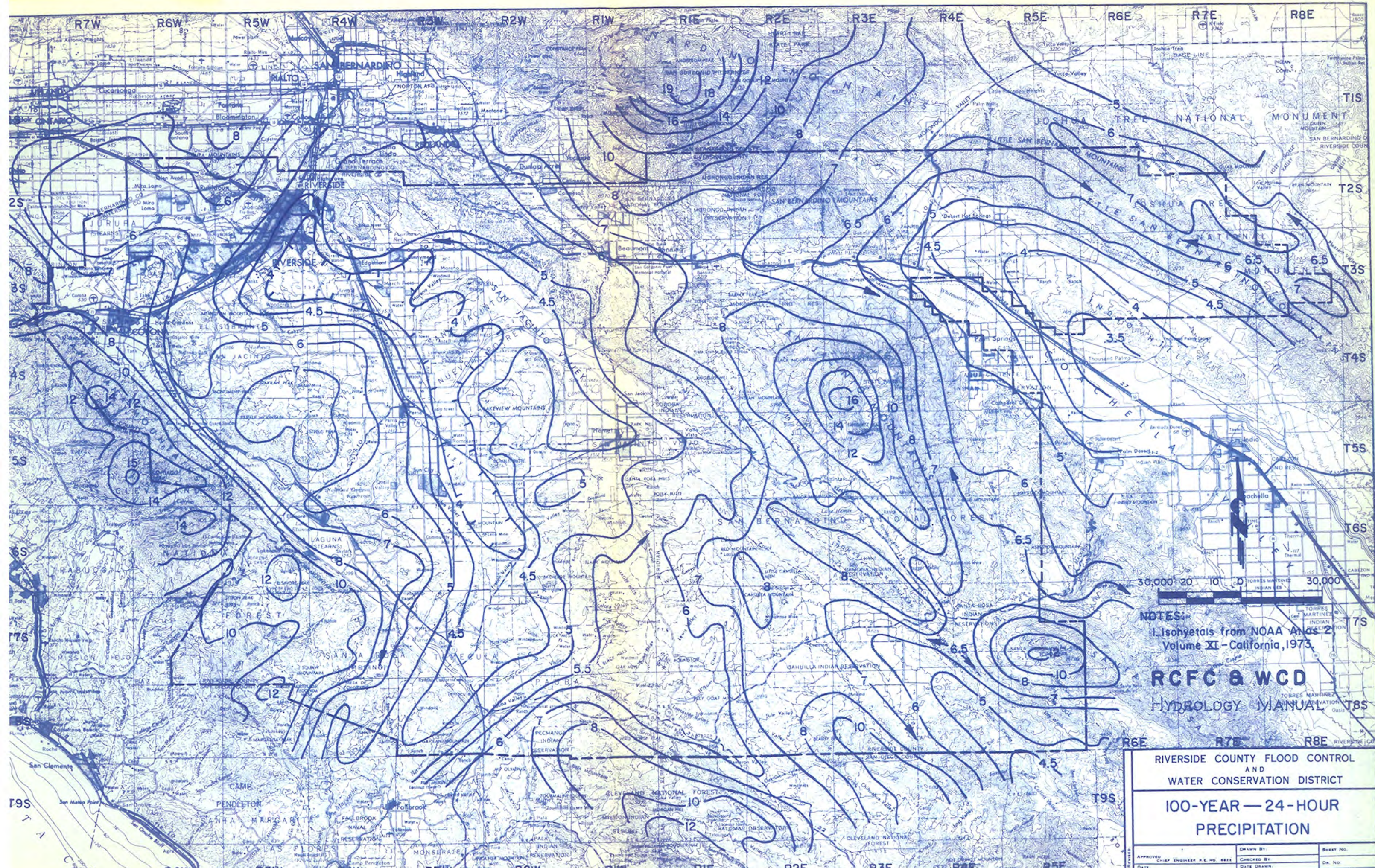
NOTES:
1. Isohyets from NOAA Atlas 2
Volume XI - California, 1973.

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RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

**2-YEAR — 24-HOUR
PRECIPITATION**

APPROVED: _____ CHIEF ENGINEER R.E. NO. 8888	DRAWN BY: <u>P.A.S.</u> CHECKED BY: _____ DATE: _____	SHEET NO. _____ OF _____ DATE: _____
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NOTES:
1. Isohyets from NOAA Atlas 2,
Volume XI - California, 1973.

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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
100-YEAR — 24-HOUR PRECIPITATION		
APPROVED DATE	CHIEF ENGINEER P.E. NO. 8822 CHECKED BY DATE DRAWN	DRAWN BY: SHEET NO. Dr. No.

CATCH BASIN SIZING SUMMARY TABLE

Street Slope	C.B. Width	Flow Intercepted
(%)	(ft.)	(cfs)
2	21	31
3	21	26
4	21	23
5	21	22
6	21	21
7	21	20
8	21	19
9	21	18
10	21	17
Sump	21	30

M

STORM DRAIN PIPE SIZING EXHIBIT



LEGEND

-  EXISTING BLUELINE STREAM
 PER USGS MAP
 PROPOSED PUBLIC STORM DRAIN LINE
 PROPOSED PRIVATE STORM DRAIN LINE
 EXISTING STORM DRAIN PIPE
 12" PIPE SIZE (INCHES)

NOTES:

1. PIPE SIZES BASED ON 100 YEAR STORM EVENT
2. FILL OVER BLUELINE STREAMS IS SUBJECT TO RESOURCE AGENCY APPROVAL.

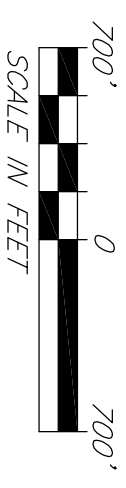
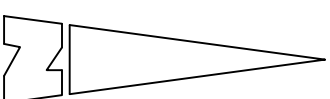


FIGURE 9

SKYLINE HEIGHTS

PROPOSED STORM DRAIN FACILITIES



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Appendix

N

DEBRIS BASIN SIZING

LOS ANGELES DISTRICT METHOD FOR PREDICTION OF DEBRIS YIELD

February 1992, updated February 2000

For Watershed areas from 0.1 square mile to 3.0 square miles, use equation 1 as shown on page 15

$$\text{LOG Dy} = 0.65(\text{LOG P}) + 0.62(\text{LOG RR}) + 0.18(\text{LOG A}) + 0.12(\text{FF})$$

Where:

Dy = Unit Debris Yield (yd^3/mi^2)

P = Maximum 1-Hour Precipitation (inches, taken to two decimal places after the decimal points, times 100)

RR = Relief Ratio (ft/mi) (Highest Watershed Elev-Basin Elev)/Maximum Length

A = Drainage Area (ac)

FF = Non-Dimensional Fire factor

UNDEVELOPED TRIBUTARY AREA (BASIN #1)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = $1410 - 1165 \text{ ft} / 0.22 \text{ mi} = 1113.63 \text{ ft}/\text{mi}$

A = $16.52 \text{ acres} = 0.026 \text{ mi}^2$

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.047

LOG(A) = 1.218

LOG (Dy) = $0.65(2.176) + 0.62(3.047) + 0.18(1.218) + 0.12(3.0)$

LOG (Dy) = $1.414 + 1.889 + 0.219 + 0.36 = 3.882$

Dy = $7621 \text{ CY}/\text{mi}^2$

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 198 CY

DEBRIS YIELD = 198 CY = 0.123 AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 248 CY

USE DEBRIS YIELD = 248 CY = 0.154 AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #2)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1485-1185 ft/ 0.14mi = 2081 ft/mi

A = 5.20 acres = 0.0081 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.318

LOG(A) = 0.716

LOG (Dy) = 0.65(2.176) + 0.62(3.318) + 0.18(0.716) + 0.12(3.0)

LOG (Dy) = 1.414 + 2.057 + 0.129 + 0.36 = 3.960

Dy = 9120CY/mi²

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 74 CY

DEBRIS YIELD = 74 CY = 0.046 AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 93 CY

USE DEBRIS YIELD = 93 CY = 0.058AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #3)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1690-1390 ft/ .21 mi = 1459 ft/mi

A = 8.43 acres = 0.013 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.164

LOG(A) = 0.926

LOG (Dy) = 0.65(2.176) + 0.62(3.164) + 0.18(0.926) + 0.12(3.0)

LOG (Dy) = 1.414 + 1.962 + 0.167 + 0.36 = 3.903

Dy = 7998CY/mi²

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 104 CY

DEBRIS YIELD = 104 CY = 0.064AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 130 CY

USE DEBRIS YIELD = 130 CY = 0.080AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #4)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1735-1485 ft/ 0.16 mi = 1531 ft/mi

A = 5.61 acres = 0.0088 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.185

LOG(A) = 0.749

LOG (Dy) = 0.65(2.176) + 0.62(3.185) + 0.18(0.749) + 0.12(3.0)

LOG (Dy) = 1.414 + 1.975 + 0.135 + 0.36 = 3.884

Dy = 7656CY/mi²

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 67 CY

DEBRIS YIELD = 67 CY = 0.041AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 84 CY

USE DEBRIS YIELD = 84 CY = 0.052AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #5)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 2694-1354 ft/ 1.09 mi = 1229 ft/mi

A = 185.32 acres = 0.29 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.089

$$\text{LOG}(A) = 2.267$$

$$\text{LOG} (Dy) = 0.65(2.176) + 0.62(3.089) + 0.18(2.267) + 0.12(3.0)$$

$$\text{LOG} (Dy) = 1.414 + 1.916 + 0.408 + 0.36 = 4.098$$

$$Dy = 12540\text{CY}/\text{mi}^2$$

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 3631 CY

DEBRIS YIELD = 3631 CY = 2.25 AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 4538 CY

USE DEBRIS YIELD = 4538 CY = 2.81AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #6)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1680-1335 ft/ 0.395 mi = 873 ft/mi

A = 22.83 acres = 0.036mi²

FF = 3.0 (Debris Method Figure 2)

$$\text{LOG}(P) = 2.176$$

$$\text{LOG}(RR) = 2.941$$

$$\text{LOG}(A) = 1.359$$

$$\text{LOG} (Dy) = 0.65(2.176) + 0.62(2.941) + 0.18(1.359) + 0.12(3.0)$$

$$\text{LOG} (Dy) = 1.414 + 1.823 + 0.245 + 0.36 = 3.842$$

$$Dy = 6950\text{CY}/\text{mi}^2$$

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 250 CY

DEBRIS YIELD = 250 CY = 0.155AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 313CY

USE DEBRIS YIELD = 313 CY = 0.194AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #7)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1600-1340 ft/ 0.168 mi = 1549 ft/mi

A = 8.70 acres = 0.0136 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.190

LOG(A) = 0.940

LOG (Dy) = 0.65(2.176) + 0.62(3.190) + 0.18(0.940) + 0.12(3.0)

LOG (Dy) = 1.414 + 1.978 + 0.169 + 0.36 = 3.921

Dy = 8337CY/mi²

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 113 CY

DEBRIS YIELD = 113 CY = 0.070AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 141 CY

USE DEBRIS YIELD = 141 CY = 0.087AC-FT

UNDEVELOPED TRIBUTARY AREA (BASIN #8)

P = 150 (RC Hydrology Manual Figure D-4.4)

RR = 1680-1340 ft/ 0.23 mi = 1478 ft/mi

A = 14.73 acres = 0.023 mi²

FF = 3.0 (Debris Method Figure 2)

LOG(P) = 2.176

LOG(RR) = 3.170

LOG(A) = 1.168

LOG (Dy) = 0.65(2.176) + 0.62(3.170) + 0.18(1.168) + 0.12(3.0)

LOG (Dy) = 1.414 + 1.965 + 0.210 + 0.36 = 3.949

O

MASTER PLAN EXHIBITS

$$Dy = 8892CY/mi^2$$

REDUCED ADJUSTED UNIT DEBRIS BY STUDY ACREAGE

THEREFORE DY = 205 CY

DEBRIS YIELD = 205 CY = 0.127 AC-FT

SAFETY FACTOR IS 1.25, THEREFORE THE TOTAL DEBRIS YIELD IS: 256 CY

USE DEBRIS YIELD = 256 CY = 0.159AC-FT

CITY OF CORONA Drainage Master Plan



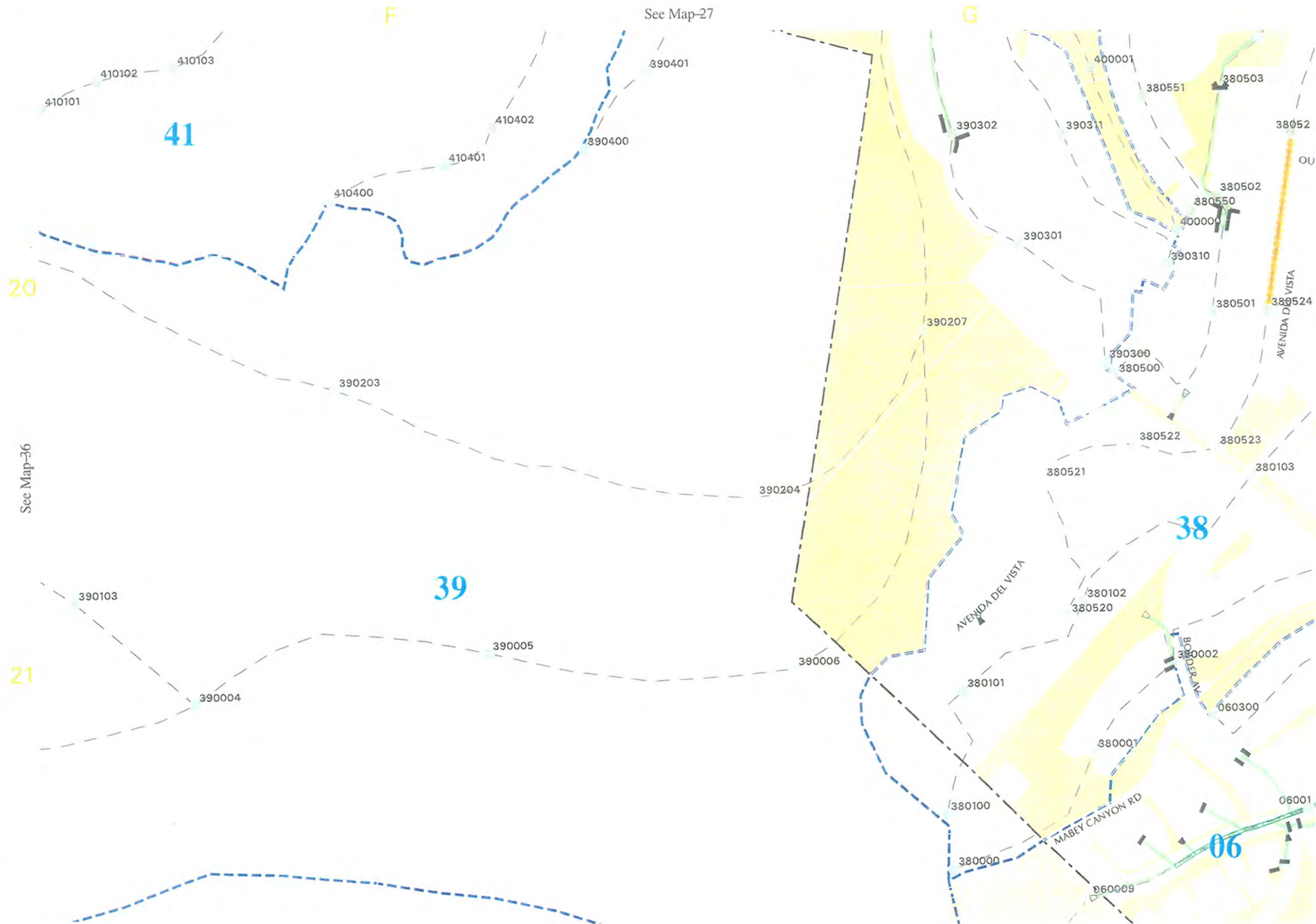
- Master Plan Drainage Links
- Master Plan Drainage Nodes
- Existing Storm Drain
- Existing Storm Channels
- Deficient Storm Lines
- Missing Storm Lines
- Insufficient Street Capacity
- Storm Catch Basin
- Storm Drop Inlet
- Storm Inlet
- Storm Outlet
- Detention Basins
- Parks/Open Space
- Corona City Limits
- Drainage Area Boundary
- Drainage Area No.



1 Inch = 500 Feet

CITY OF CORONA
Geographic Information Services
Public Works Department
Created: April 29, 2003
ArcIMS1-Masterplan-Drainage99-gis

MAP NO. 37
FIGURE 10



See Map-45

See Map-27

See Map-36

See Map-38

CITY OF CORONA Drainage Master Plan



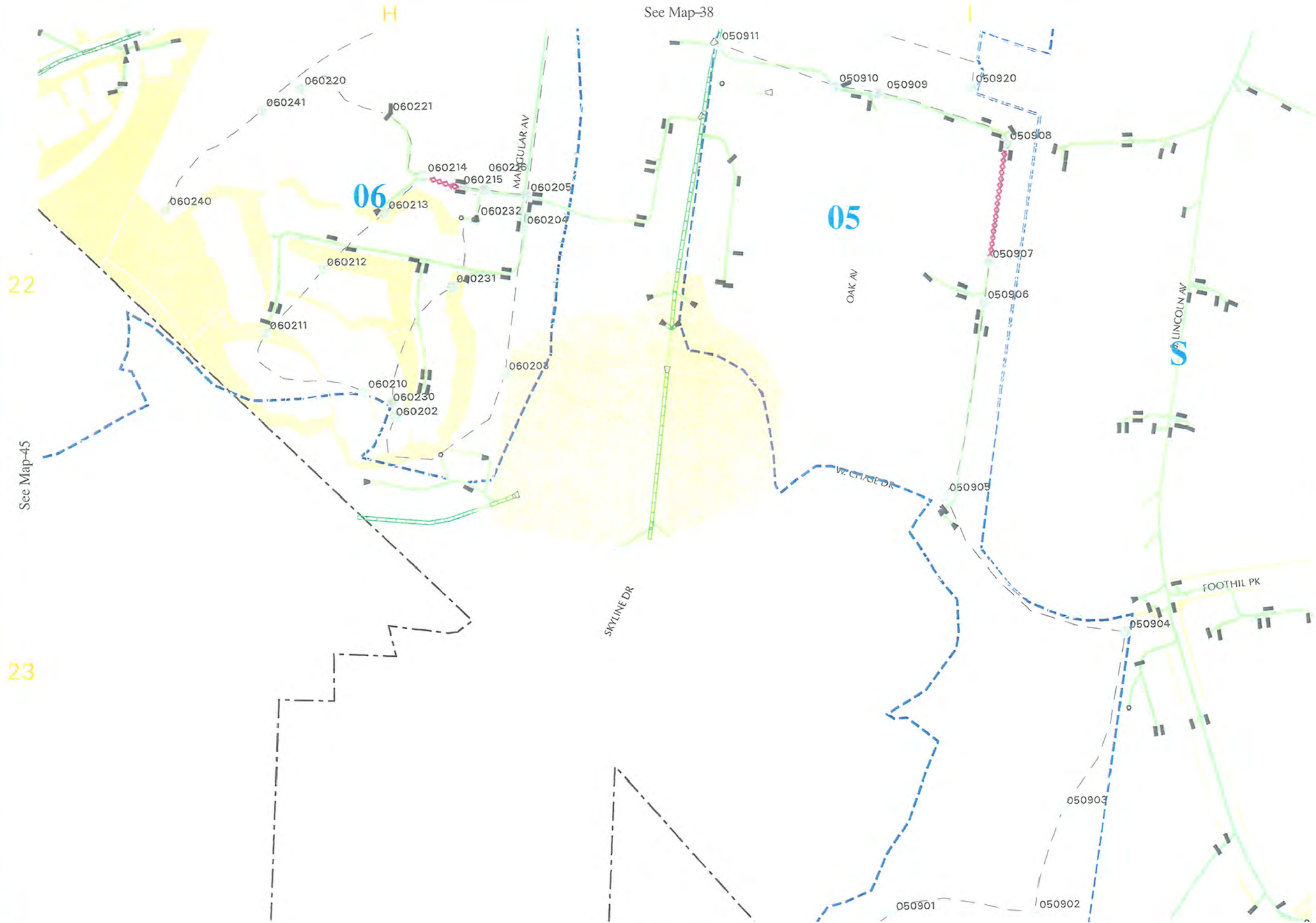
- Master Plan Drainage Links
- Master Plan Drainage Nodes
- Existing Storm Drain
- Existing Storm Channels
- Deficient Storm Lines
- Missing Storm Lines Insufficient Street Capacity
- Storm Catch Basin
- Storm Drop Inlet
- Storm Inlet
- Storm Outlet
- Detention Basins
- Parks/Open Space
- Corona City Limits
- Drainage Area Boundary
- Drainage Area No.

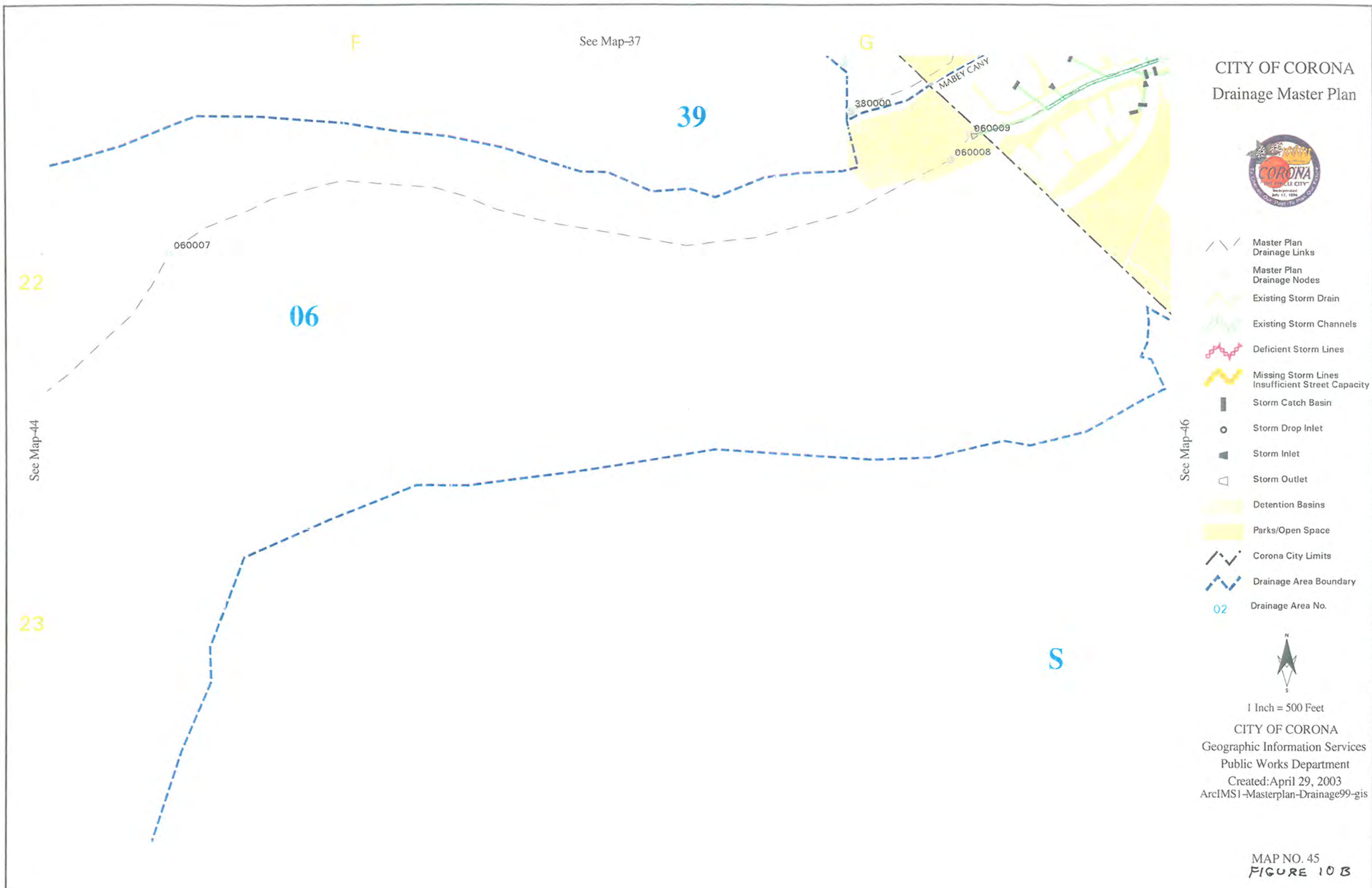


1 Inch = 500 Feet

CITY OF CORONA
Geographic Information Services
Public Works Department
Created: April 29, 2003
ArcIMS1-Masterplan-Drainage99-gis

MAP NO. 46
FIGURE 10A





CITY OF CORONA Drainage Master Plan



- Master Plan Drainage Links
- Master Plan Drainage Nodes
- Existing Storm Drain
- Existing Storm Channels
- Deficient Storm Lines
- Missing Storm Lines
Insufficient Street Capacity
- Storm Catch Basin
- Storm Drop Inlet
- Storm Inlet
- Storm Outlet
- Detention Basins
- Parks/Open Space
- Corona City Limits
- Drainage Area Boundary
- Drainage Area No.

See Map-54



1 Inch = 500 Feet

CITY OF CORONA
Geographic Information Services
Public Works Department
Created: April 29, 2003
ArcIMS1-Masterplan-Drainage99-gis

MAP NO. 53
FIGURE 10C

See Map-46

05

050901

050902

050900

LINCOLN AV

H

S

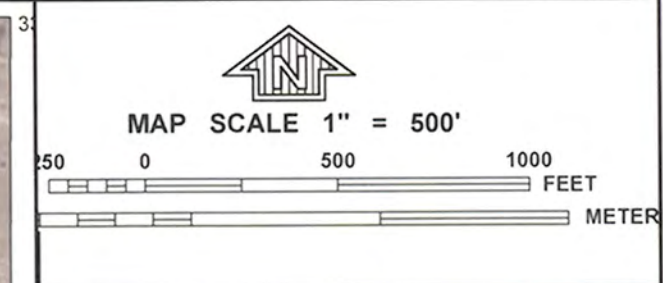
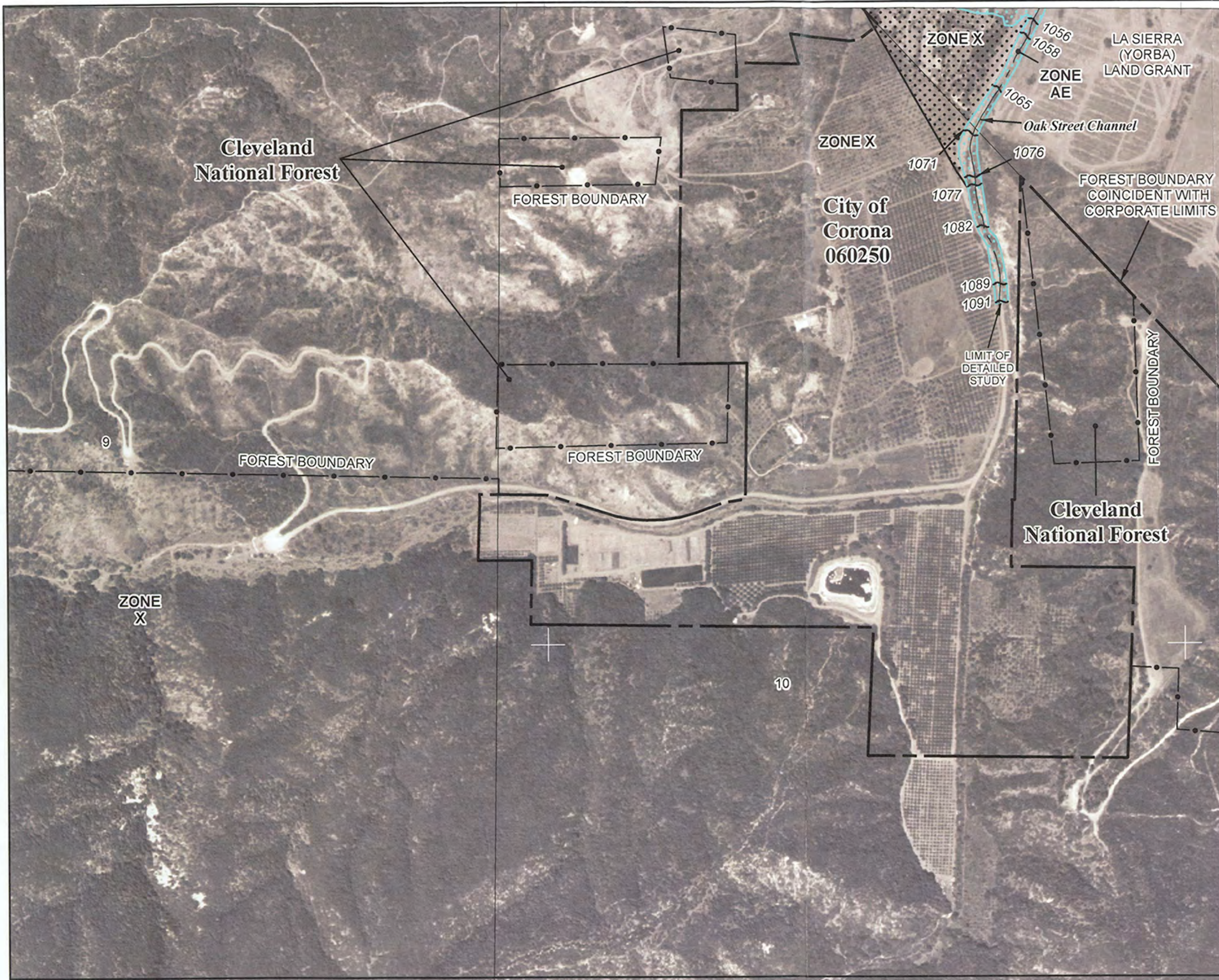
24

25

Appendix

P

FEMA FIRM PANELS



NFIP

PANEL 1353G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1353 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CORONA, CITY OF	060250	1353	G
RIVERSIDE COUNTY	060245	1353	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C1353G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

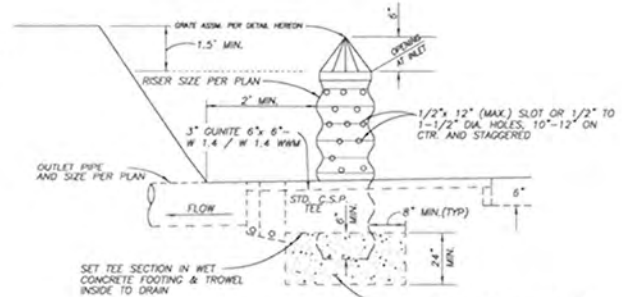
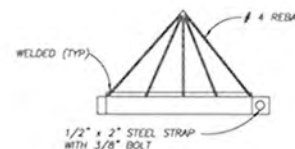
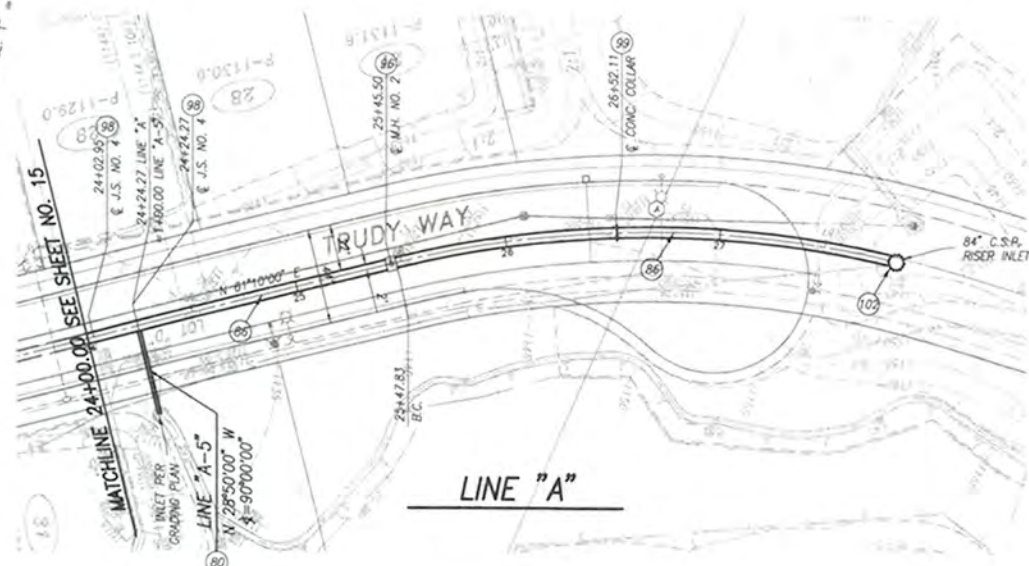
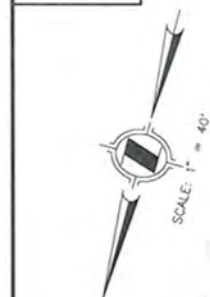
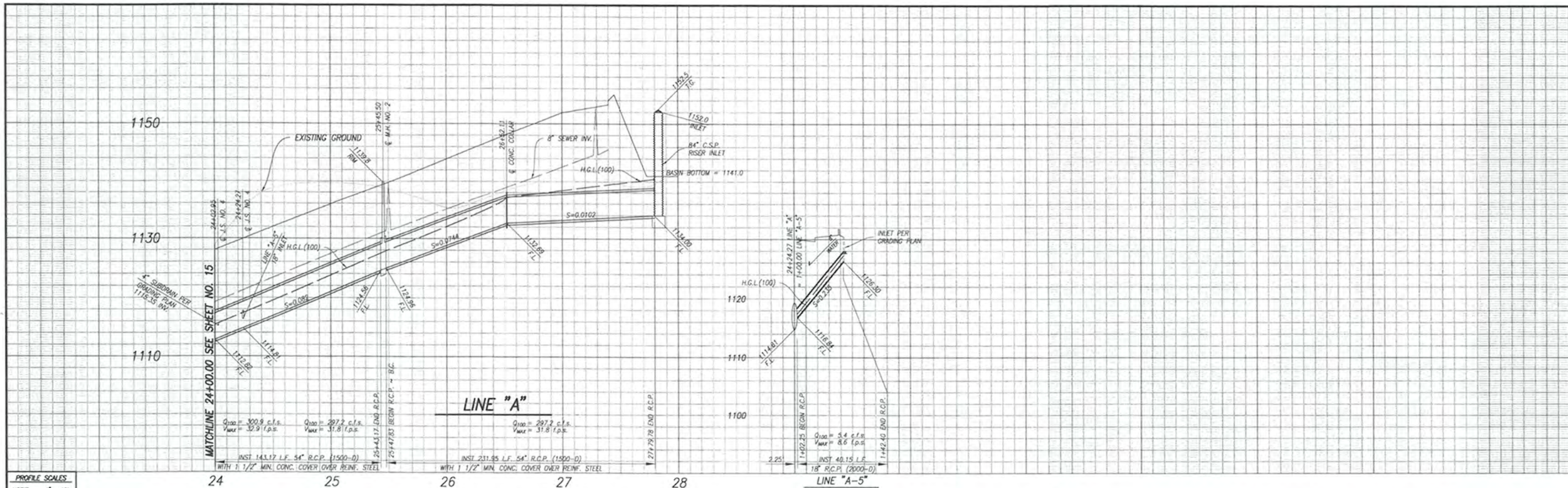
FIGURE 11A

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix

Q

REFERENCE MATERIALS



- CONSTRUCTION NOTES
- 80 INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD)
 - 85 INST. 54" R.C.P. (SEE PROFILE FOR D-LOAD)
 - 96 CONST. M.H. NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. NO. MH 252
 - 98 CONST. J.S. NO. 4 PER R.C.F.C. & W.C.D. STD. DWG. NO. JS 229
 - 99 CONST. CONCRETE COLLAR PER CITY OF CORONA STD. PLAN 209-0
 - 100 CONST. C.S.P. RISER INLET PER DETAIL HEREON



CURVE DATA				
BEARING/DELTA	RADIUS	LENGTH	TANGENT	
26°41'12"	498.00'	231.95'	118.12'	

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH (949) 583-1010 • FX (949) 583-0799

Designed by: P.P.
Drawn by: P.P.
Checked by: K.K.
PLANS PREPARED UNDER SUPERVISION OF
Date: 5/4/06
R.C.E. No. 24068 EXP. 12/31/07

Reference Plans for these improvements

REVISIONS

SEE SHEET 1
AS NOTED

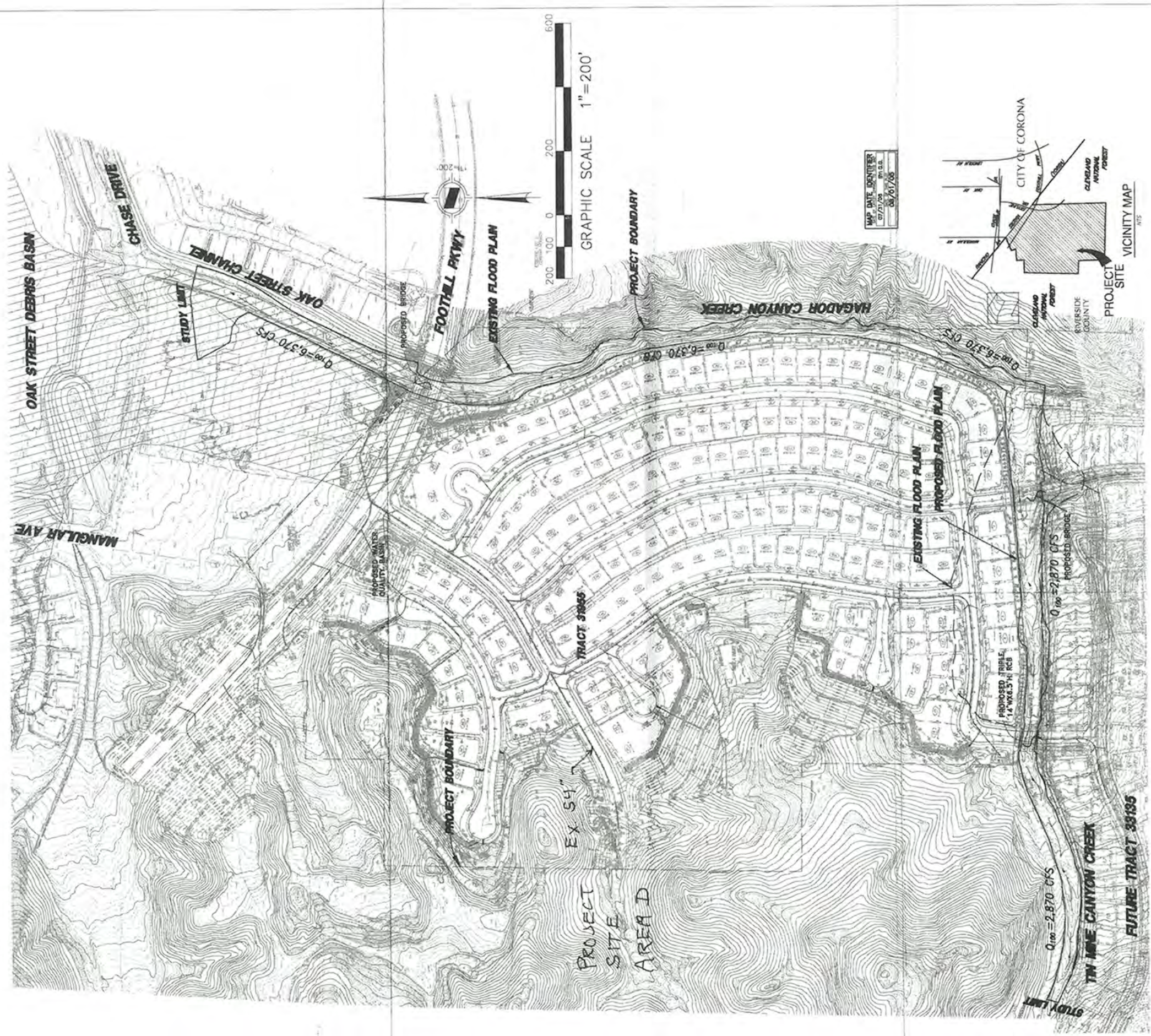
Engineering: SPCH JK
Utilities: dy
File: 5-09-2006

Approved: 5-09-2006
By: Amir A. Gattian, Director of public works

CITY OF CORONA: TRACT NO. 31955
STORM DRAIN IMPROVEMENT PLANS
LINE "A" STA. 24+00.00 TO STA. 27+79.78

Drawing No. 05-0875
Sh 16 of 23





LEGEND

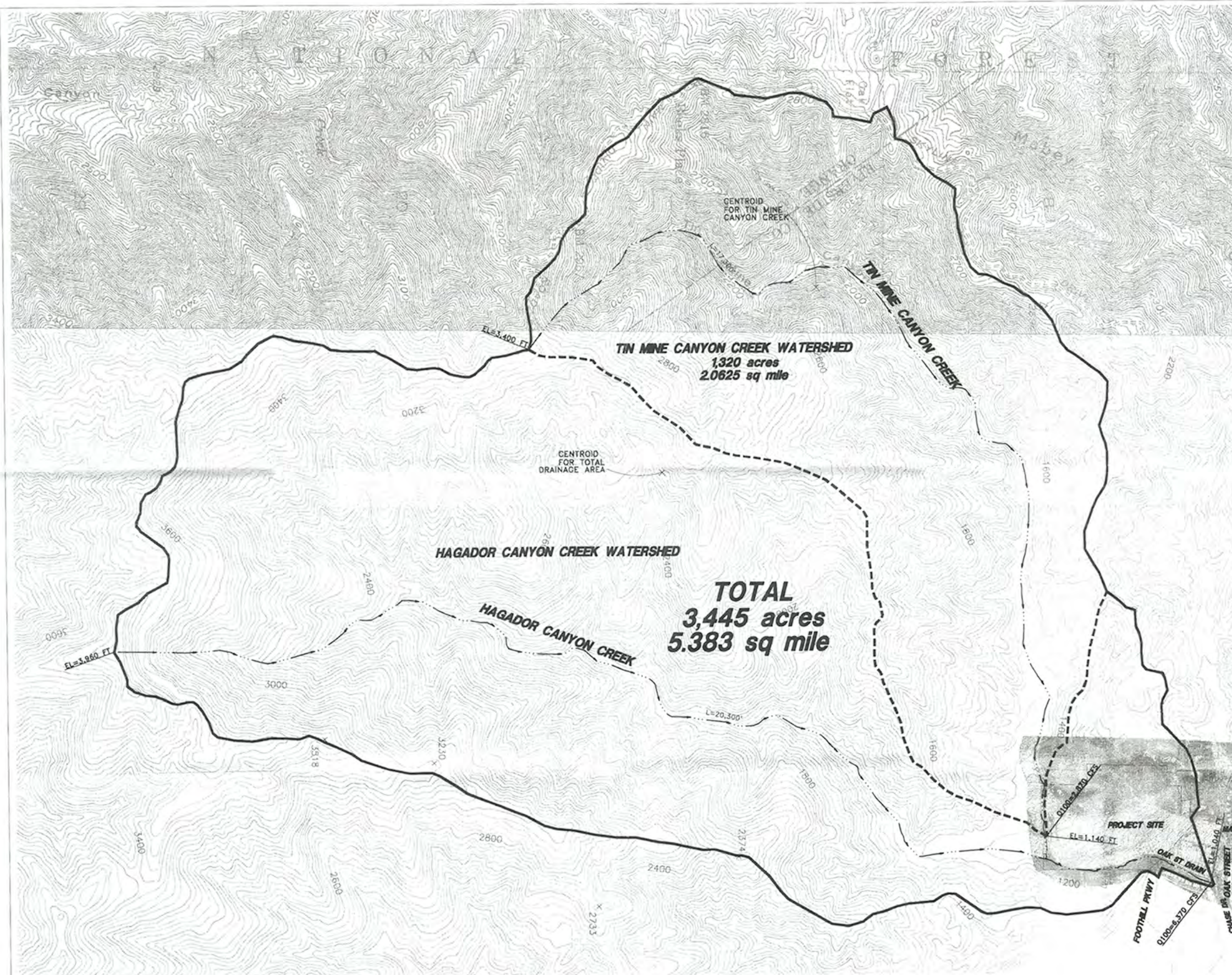
- EXISTING FLOOD PLAN
- PROPOSED FLOOD PLAN
- FLOW LINE
- PROPOSED ON-SITE STORM DRAIN
- EFFECTIVE FLOOD PLAN

PREPARED FOR:
CENTEX HOMES
 20 CORPORATE PARK
 IRVINE, CA 92606
 PHONE: (949) 453-0113
 FAX: (949) 453-8994

PREPARED BY:
H&A
HUNSAKER & ASSOCIATES
 PLANNING • ENGINEERING • SURVEYING
 Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

FIGURE 4 FLOOD PLAIN EXHIBIT TRACT 31955

AUG 01 2005



NOTE:

OFF-SITE TOPOGRAPHIC DATA IS BASED ON:
U.S.G.S. MAPS FOR CORONA SOUTH DATED 1997
AND BLACK STAR CANYON DATED 1982

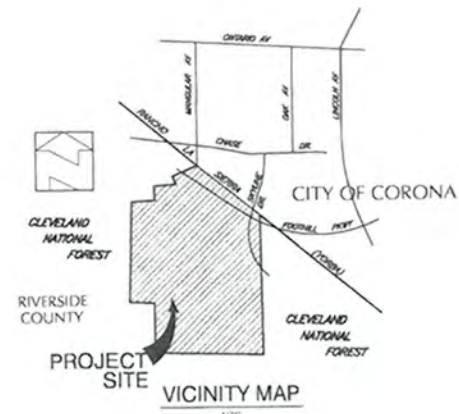
HYDROLOGY RESULTS FOR 100-YEAR STORM

CREEK	CLEAR FLOW	FLOW USED IN HYDRAULIC STUDY
TIN MINE CANYON CREEK	1,913 CFS	2,870 CFS ⁽¹⁾
HAGADOR CANYON CREEK	4,243 CFS	6,370 CFS ⁽¹⁾

(1) 1.5 BULKING FACTOR WAS APPLIED

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- FLOW LINE
- SOIL GROUP



PREPARED FOR:

CENTEX HOMES

20 CORPORATE PARK
IRVINE, CA 92606
PHONE: (949) 453-0113
FAX: (949) 453-8994

MAP DATE	IDENTIFIER
07/15/05	BY: G.G.
07/31/05	

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

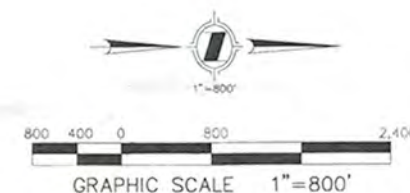


FIGURE 1
HYDROLOGY MAP
FOR TIN MINE CANYON
AND HAGADOR CANYON CREEK
FOR TRACT 31955, CITY OF CORONA

