

WARNING: ALL INDIVIDUALS INTERESTED IN BIDDING ON THIS PROJECT MUST OBTAIN THE FINAL PLANS AND SPECIFICATIONS FROM THE DEPARTMENT MANAGING THE PROJECT OR AS OTHERWISE STATED IN THE ADVERTISEMENT FOR BIDS FOR THE PROJECT. DO NOT USE THE PLANS AND SPECIFICATIONS POSTED ON THE CLERK OF THE BOARD'S WEBSITE FOR BIDDING ON THIS PROJECT.



TECHNICAL MEMO

To: San Bernardino County, Project and Facilities Management Department

From: John Mark Thompson, P.E.
Client Executive, Associate Principal

Subject: Preliminary Hydrology Study

IMEG #: 22006394.00

Project: San Bernadino County Sheriff EVOC Paving Project

Date: November 30, 2022

Dear Ken Hylin,

Pursuant to the contracted scope of work for the subject project, IMEG Corp. (IMEG) has reviewed the following documents provided by San Bernardino County, Project and Facilities Management Department and prepared by IMEG for the hydrology study of the drainage issues at the site.

- A. Grading Plan: Driver Training Facility, Prepared by W. R. Hendrix Engineering & Associates, Dated April 17, 1991.
- B. Sheriff's Driver Training Center Roadways/Parking Lots Improvements, Prepared by CM Engineering Associates, Dated July 31, 1995.
- C. Topographic Survey Prepared by IMEG Corp, Dated November 7, 2022.

In addition, IMEG conducted a field investigation on November 10, 2022 to verify the existing conditions per the aforementioned documents. IMEG is pleased to present a summary of observations, concerns, and recommendations to resolve the drainage issues.

IMEG Observations and Concerns:

1. Offsite drainage from north of perimeter fence is flowing through the project site via a "natural stream" transporting sediment downstream through the project site. Heavy loads of sediment are suspended and transported by the water flow and settles at the outlet area. (See Existing Condition Exhibit Location #1). The concerns are further discussed in observations #2 and #3.
2. The "natural stream" along the east side of the project site was formed by the off-site storm run-on. The slope and depth of the stream cannot contain all the water during a heavy rain event. Location #2 is located at approximately the midpoint of the easterly edge. Storm runoff will flood over the pavement when the natural stream is over capacity. (See Existing Condition Exhibit Location #2)
3. According to conversations with on-site officer, Roger Johnstone, and site observations, off-site storm run-on is flowing from north to south along the east side of the project site, and outlets to

Institution Road. Due to the flat slope at the outlet area, sediment is accumulated with soil erosion caused by rain and with storm runoff that transports sediment particles into the channel. Overtime, sediment will block the outlet and storm runoff will flood over the top of curb. (See Existing Condition Exhibit Location #3)

4. During our field investigation, a retention pond was observed at the north side of the project site. According to the Grading Plan prepared by W. R. Hendrix Engineering & Associates, dated April 17, 1991, an existing power pole should be removed and relocated, and no proposed retention basin was proposed at the north side of project site. Based on the proposed grading contours shown on the Grading Plan As-built, offsite drainage should be flowing towards the swale along the west side of project site. However, a portion of offsite drainage is draining towards the east side, which is causing drainage issue as discussed in observations #2 and #3 above. (See Existing Condition Exhibit Location #4 and Grading Plan As-built C-3)
5. The existing swale, culvert, and underground pipes along west side of project site have not been maintained properly. Vegetation and sediment are occupying the capacity of drainage facilities. Runoff may overflow into the site during a heavy rain event. (See Existing Condition Exhibit Location #5)

IMEG Recommendations to Resolve Concerns:

Based on our observations, it is IMEG's professional opinion that all the drainage issues mentioned above are mainly a result of the lack of maintenance of existing and availability of proper drainage facilities. Although the project site is not experiencing any flooding issues, problems may arise over time. IMEG is presenting these concerns to San Bernardino County Public Works and providing preliminary recommendations below.

Recommendations:

In order to prevent the sediment depositing at the outlet area, IMEG recommends constructing a 2 ft. wide bottom, 1 to 1 side slope, trapezoidal vegetated swale along the chain-link fence at the east side of project site. The swale will begin at the northeast corner (See Location #1) of the project site and have a 2% minimum slope in the direction of flow. Areas requiring cut and fill can modify the slope to keep the top of swale lower than the adjacent pavement.

San Bernardino County Hydrology Manual does not require the off-site drainage to be mitigated. However, because it is transporting heavy loads of sediment, IMEG recommends rerouting the drainage to the existing retention pond via a graded swale (See Location #4), which will function as a sediment basin. Sediment from off-site drainage will be captured and settled in the basin, once the storm water accumulates to the basin's ponding depth limit, it will breach the top and overflow to the existing swale along the west side of the project site. Per Grading Plan As-built, the offsite drainage was bypassed through the existing swale along the west side of the project site. Based on this understanding, it can be assumed the existing swale should have enough capacity to convey the storm water. Please note that a formal hydraulic analysis should be performed to verify its capacity should the County decide to proceed with this recommendation.

According to the site investigation, the existing drainage facilities have not been maintained properly. IMEG recommends to remove the accumulated sediment and maintain the existing swales, underground pipes, and retention ponds on-site on an ongoing basis following an established routine schedule. It is important to keep all these facilities functional to ensure their design flow capacities.

Preliminary Calculations: IMEG has determined the drainage area tributary to the Location #1 outlet, is 4.72 acres. Per San Bernardino County Hydrology Manual, all drainage plans must demonstrate

compliance with the 100-year flood protection criteria. IMEG has calculated the peak flow rate for 10-year, 25-year, and 100-year storm events. Equation D.4 from the San Bernardino County Hydrology Manual was used to estimate the peak discharges from tributary drainage area. Please see Table 1 summary and supporting documents enclosed. Figure 1 shows the design flow capacity for the proposed trapezoidal vegetated swale.

Table 1: Preliminary Hydrology Analysis Summary

	10-year	25-year	100-year
I (inch/hour) for 1 hr. duration	1.68	2.06	2.60
F _P (inch/hour)	0.66	0.41	0.18
F _m (inch/hour)	0.41	0.41	0.41
Q _R (cfs) Required Flow Rate	5.39	7.00	9.30
Q _P (cfs) Provided Flow Rate	15.3	15.3	15.3

Trapezoidal Vegetated Swale

EVOC

Inputs

Bottom width	2	ft	Results	
Side slope 1 (horiz./vert.)	1		Flow area	3.0001 ft ²
Side slope 2 (horiz./vert.)	1		Wetted perimeter	4.6284 ft
Manning roughness, n ? <input type="radio"/> Strickler <input type="radio"/> B/B (See notes)	0.03		Hydraulic radius	0.6213 ft
Channel slope	0.02	rise/run	Velocity, v	5.1003 ft/sec
Flow depth	1	ft	Flow, Q (See notes)	15.3008 cfs
			Velocity head, h _v	0.4043 ft
			Top width, T	4.0000 ft

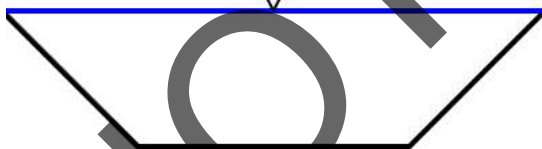


Figure 1: Proposed Vegetated Swale Capacity

IMEG Summary:

According to the preliminary calculation in Figure 1 and preliminary hydrology analysis summary in Table 1, the tributary storm water runoff can be mitigated and conveyed by the proposed vegetated swale.

Enclosed:
 Existing Condition Exhibit
 Supporting Calculation Documents

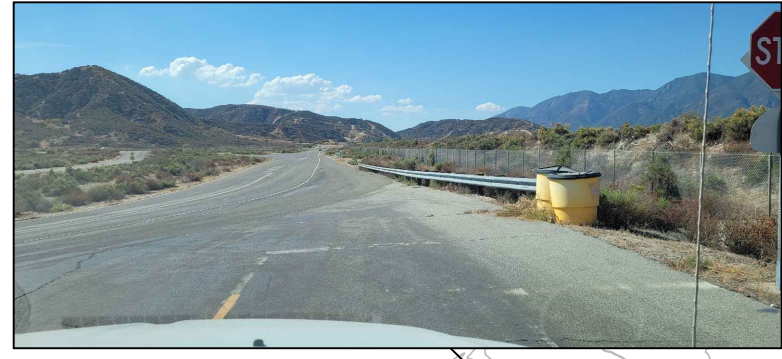
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\\FILES\ACTIVE PROJECTS\2022\22066394\00\DESIGN\CIVIL\C3D PLOT\6394_HYDROLOGY_EXHIBIT.DWG



LOCATION #1
OBSERVATION #1: OFFSITE DRAINAGE



LOCATION #2
OBSERVATION #2: STORM RUNOFF FLOOD OVER THE PAVEMENT



LOCATION #3
OBSERVATION #3: SEDIMENT ACCUMULATES



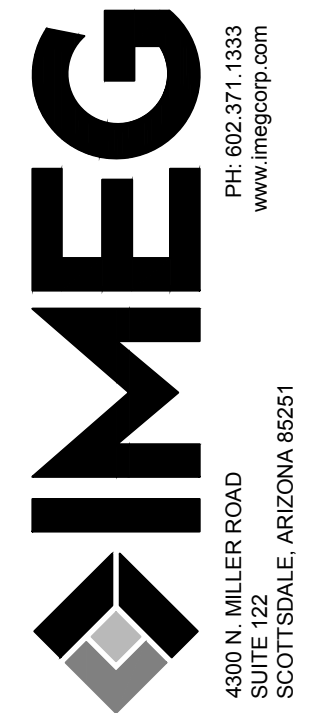
LOCATION #4
OBSERVATION #4: EXISTING POWER POLE AND PONDING AREA



LOCATION #5
OBSERVATION #5: EXISTING DRAINAGE FACILITIES ARE LACK OF MAINTENANCE



REVISIONS	
No.	DATE



EMERGENCY VEHICLE OPERATIONS CENTER
PAVEMENT REHABILITATION AND PARKING LOTS IMPROVEMENTS

EXISTING CONDITION EXHIBIT

IMEG Project No:
22006394

File Name:
6394 Hydrology Exhibit.dwg

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Field Book No: #####

Drawn By: WC

Checked By: KK

Date: 11/30/2022

HYD

Sheet 1 of 1

NOAA Atlas 14, Volume 6, Version 2 DEVORE

C.D.F.

Station ID: 79-2118

Location name: San Bernardino, California, USA*

Latitude: 34.222°, Longitude: -117.4067°

Elevation:

Elevation (station metadata): 2080 ft**

* source: ESRI Maps

** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.160 (0.133-0.195)	0.241 (0.200-0.293)	0.338 (0.280-0.413)	0.413 (0.339-0.508)	0.507 (0.402-0.646)	0.575 (0.446-0.748)	0.640 (0.485-0.854)	0.703 (0.518-0.966)	0.784 (0.553-1.12)	0.843 (0.574-1.25)
10-min	0.230 (0.191-0.279)	0.345 (0.286-0.420)	0.485 (0.401-0.592)	0.592 (0.485-0.728)	0.727 (0.576-0.926)	0.824 (0.640-1.07)	0.917 (0.694-1.22)	1.01 (0.742-1.38)	1.12 (0.793-1.61)	1.21 (0.823-1.79)
15-min	0.278 (0.231-0.338)	0.417 (0.346-0.508)	0.586 (0.485-0.716)	0.715 (0.587-0.881)	0.879 (0.697-1.12)	0.997 (0.774-1.30)	1.11 (0.840-1.48)	1.22 (0.897-1.67)	1.36 (0.959-1.95)	1.46 (0.995-2.17)
30-min	0.420 (0.349-0.511)	0.631 (0.524-0.768)	0.887 (0.734-1.08)	1.08 (0.889-1.33)	1.33 (1.06-1.70)	1.51 (1.17-1.96)	1.68 (1.27-2.24)	1.85 (1.36-2.53)	2.06 (1.45-2.95)	2.21 (1.51-3.28)
60-min	0.651 (0.541-0.791)	0.977 (0.811-1.19)	1.37 (1.14-1.68)	1.68 (1.38-2.06)	2.06 (1.63-2.62)	2.34 (1.81-3.04)	2.60 (1.97-3.47)	2.86 (2.10-3.92)	3.19 (2.25-4.56)	3.42 (2.33-5.08)
2-hr	1.05 (0.868-1.27)	1.44 (1.19-1.75)	1.92 (1.59-2.35)	2.29 (1.88-2.82)	2.76 (2.19-3.52)	3.10 (2.41-4.04)	3.43 (2.59-4.57)	3.74 (2.75-5.14)	4.14 (2.92-5.94)	4.44 (3.02-6.58)
3-hr	1.38 (1.14-1.67)	1.84 (1.52-2.23)	2.40 (1.99-2.93)	2.83 (2.32-3.49)	3.38 (2.68-4.31)	3.78 (2.94-4.92)	4.16 (3.15-5.55)	4.54 (3.34-6.23)	5.01 (3.53-7.17)	5.35 (3.64-7.94)
6-hr	2.10 (1.74-2.55)	2.71 (2.25-3.30)	3.47 (2.87-4.24)	4.06 (3.33-4.99)	4.80 (3.81-6.12)	5.34 (4.15-6.95)	5.86 (4.44-7.82)	6.37 (4.69-8.74)	7.01 (4.95-10.0)	7.48 (5.09-11.1)
12-hr	2.85 (2.37-3.47)	3.69 (3.06-4.49)	4.72 (3.90-5.76)	5.51 (4.52-6.78)	6.53 (5.18-8.32)	7.27 (5.64-9.46)	7.98 (6.04-10.6)	8.68 (6.39-11.9)	9.57 (6.75-13.7)	10.2 (6.96-15.2)
24-hr	3.80 (3.37-4.38)	5.01 (4.43-5.77)	6.51 (5.74-7.52)	7.67 (6.71-8.94)	9.17 (7.77-11.0)	10.3 (8.51-12.6)	11.3 (9.17-14.3)	12.4 (9.74-16.0)	13.7 (10.4-18.5)	14.7 (10.7-20.5)
2-day	4.50 (3.98-5.18)	6.10 (5.39-7.03)	8.10 (7.15-9.37)	9.67 (8.47-11.3)	11.7 (9.93-14.1)	13.2 (11.0-16.3)	14.7 (11.9-18.5)	16.2 (12.8-21.0)	18.1 (13.7-24.4)	19.5 (14.3-27.2)
3-day	4.81 (4.26-5.54)	6.65 (5.88-7.67)	8.98 (7.93-10.4)	10.8 (9.48-12.6)	13.3 (11.2-16.0)	15.1 (12.5-18.5)	16.9 (13.7-21.2)	18.6 (14.7-24.1)	21.0 (15.9-28.3)	22.7 (16.6-31.7)
4-day	5.14 (4.55-5.92)	7.23 (6.40-8.34)	9.89 (8.73-11.4)	12.0 (10.5-14.0)	14.8 (12.6-17.9)	16.9 (14.0-20.8)	19.0 (15.4-24.0)	21.1 (16.6-27.3)	23.9 (18.1-32.2)	26.0 (19.0-36.3)
7-day	5.74 (5.08-6.61)	8.34 (7.38-9.62)	11.7 (10.3-13.5)	14.4 (12.6-16.8)	18.1 (15.3-21.8)	20.8 (17.3-25.6)	23.6 (19.1-29.8)	26.5 (20.8-34.3)	30.3 (22.9-40.8)	33.2 (24.3-46.3)
10-day	6.04 (5.35-6.96)	8.94 (7.91-10.3)	12.7 (11.2-14.7)	15.8 (13.8-18.4)	20.0 (17.0-24.1)	23.2 (19.3-28.6)	26.5 (21.5-33.4)	29.9 (23.6-38.7)	34.5 (26.1-46.5)	38.0 (27.8-53.1)
20-day	7.42 (6.57-8.55)	11.2 (9.91-12.9)	16.3 (14.4-18.8)	20.5 (17.9-23.9)	26.4 (22.3-31.8)	31.0 (25.7-38.1)	35.8 (29.0-45.2)	41.0 (32.3-53.0)	48.1 (36.4-64.9)	53.8 (39.3-75.0)
30-day	8.74 (7.74-10.1)	13.1 (11.6-15.1)	19.1 (16.9-22.1)	24.2 (21.2-28.2)	31.4 (26.6-37.8)	37.2 (30.9-45.8)	43.4 (35.1-54.6)	49.9 (39.4-64.7)	59.3 (44.8-80.0)	66.9 (48.9-93.4)
45-day	10.8 (9.56-12.4)	15.8 (14.0-18.3)	22.9 (20.2-26.5)	29.0 (25.4-33.9)	37.9 (32.1-45.7)	45.2 (37.5-55.6)	53.0 (43.0-66.8)	61.6 (48.5-79.8)	74.1 (56.0-99.9)	84.4 (61.7-118)
60-day	12.9 (11.4-14.9)	18.4 (16.3-21.2)	26.2 (23.2-30.3)	33.1 (29.0-38.6)	43.3 (36.7-52.2)	51.9 (43.0-63.8)	61.2 (49.5-77.1)	71.5 (56.3-92.6)	86.7 (65.6-117)	99.6 (72.8-139)

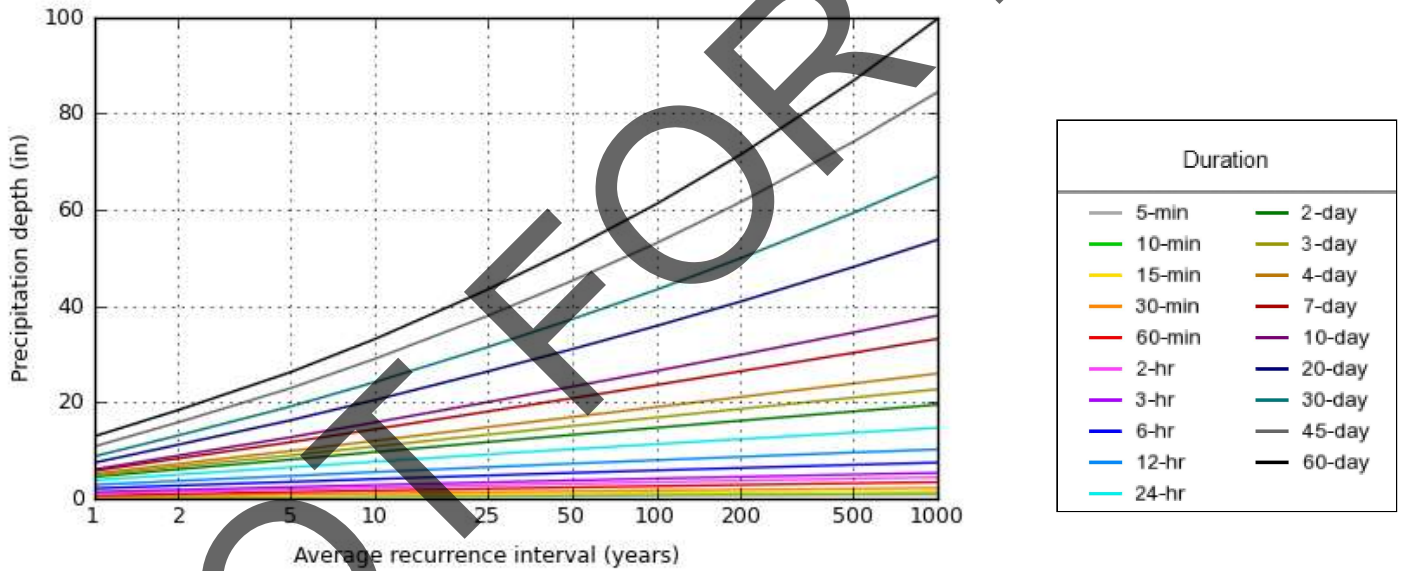
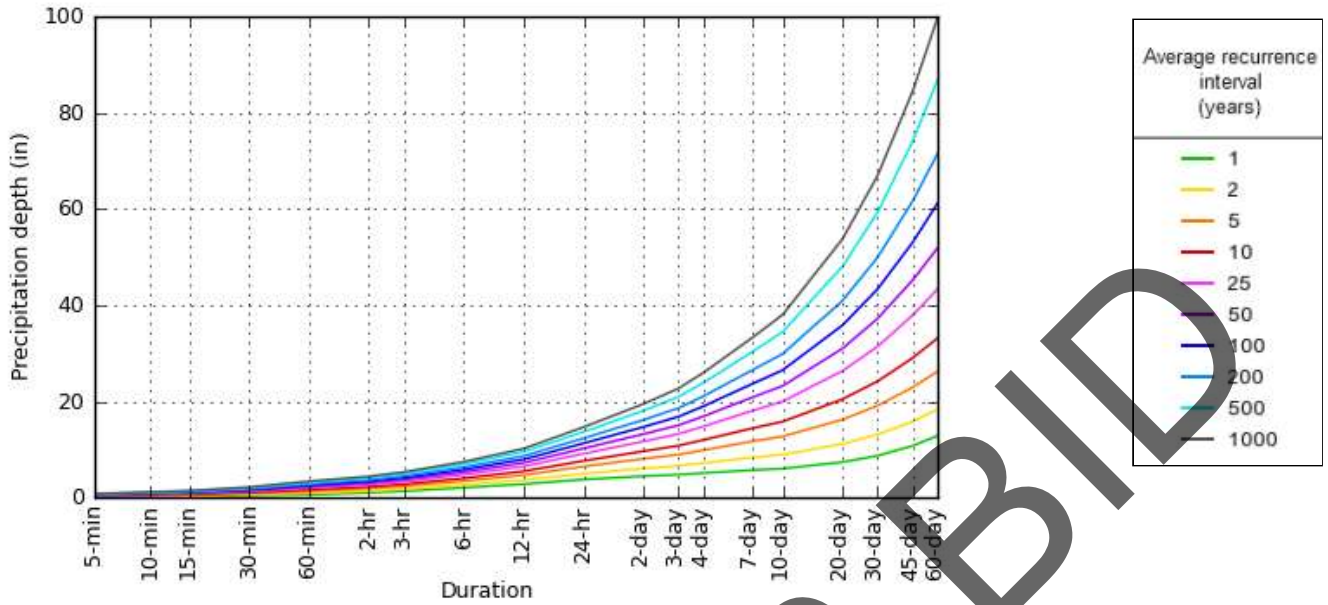
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.2220°, Longitude: -117.4067°



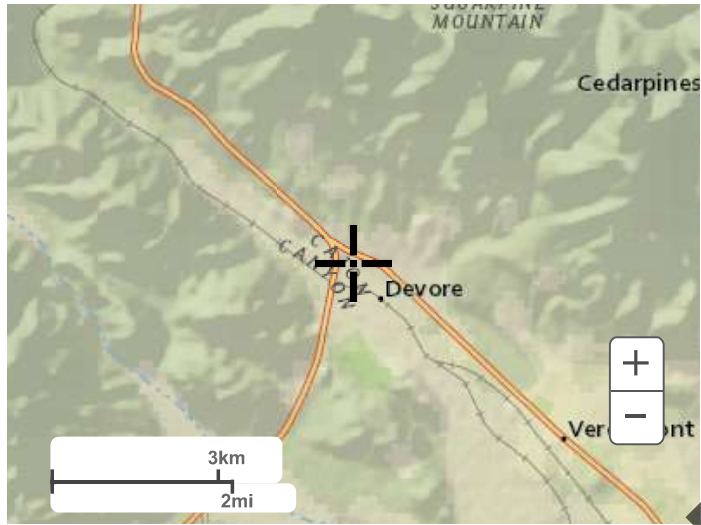
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Maps & aerials

Small scale terrain



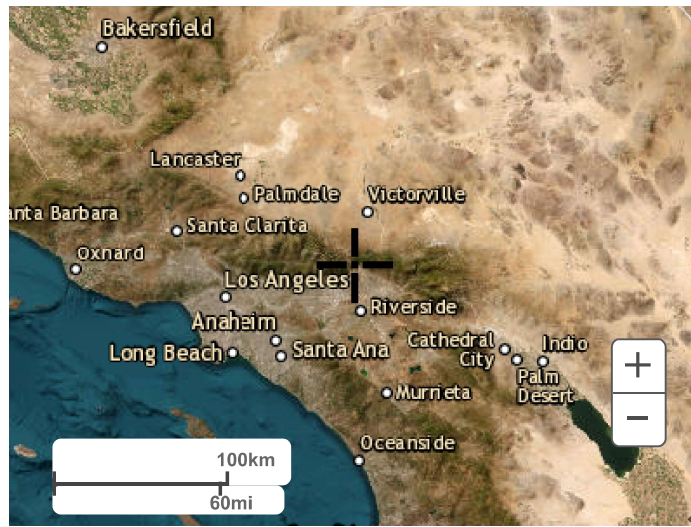
Large scale terrain



Large scale map



Large scale aerial



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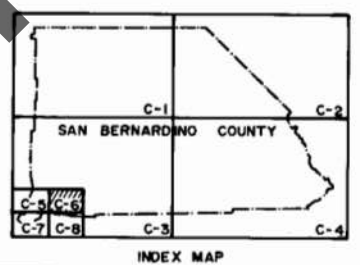
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SOURCE: GEOLOGY MAP

Project Site (Type A)

SOURCE: GEOLOGY MAP
SOURCE: 1971 SCS SURVEY



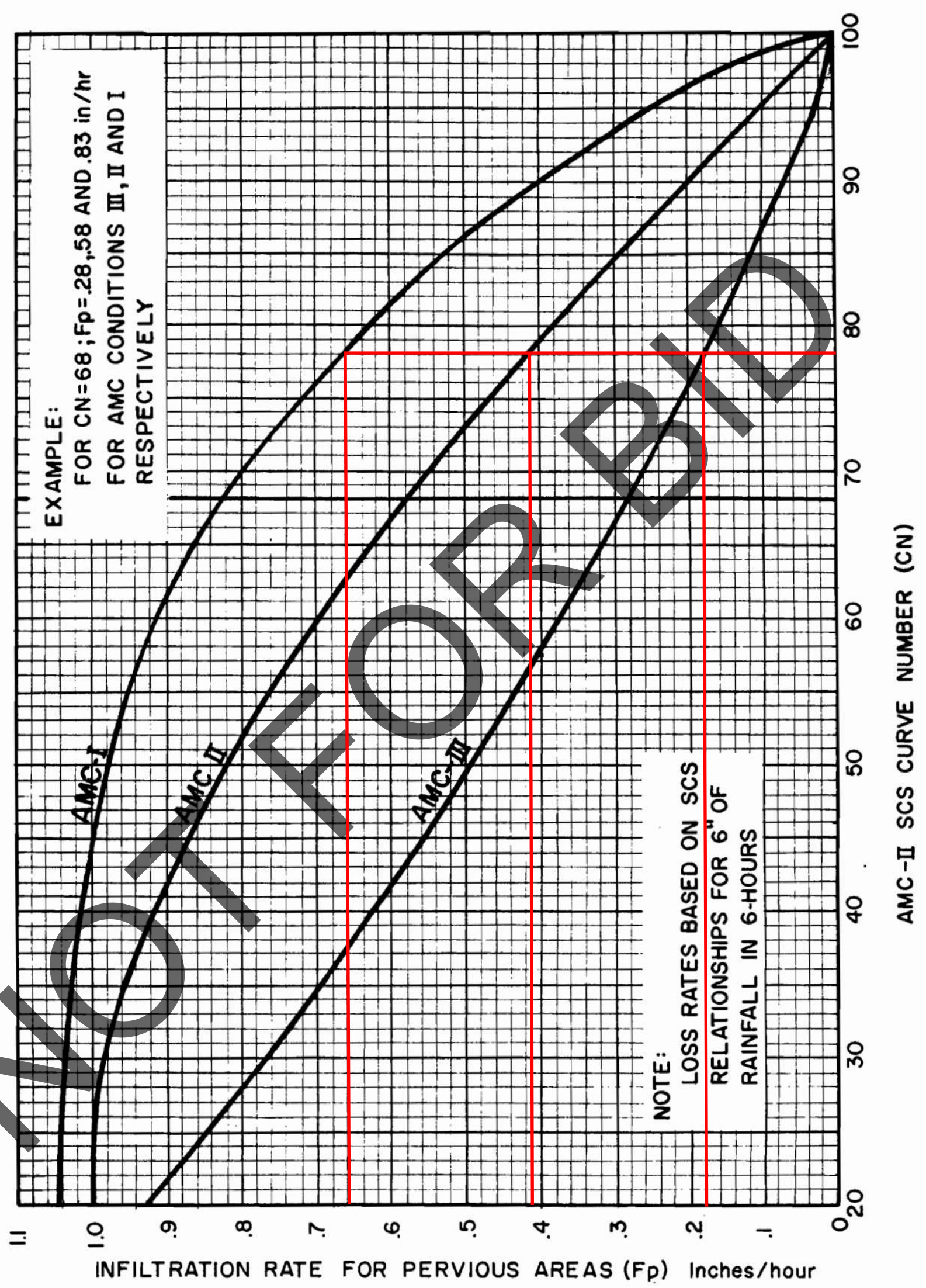
- LEGEND
- SOIL GROUP BOUNDARY
 - A SOIL GROUP DESIGNATION
 - - - BOUNDARY OF INDICATED SOURCE

SCALE 1"=48,000
SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-B AREA

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II					
Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94
SAN BERNARDINO COUNTY		CURVE NUMBERS			
HYDROLOGY MANUAL		FOR			
		PERVIOUS AREAS			



**SAN BERNARDINO COUNTY
 HYDROLOGY MANUAL**

**INFILTRATION RATE FOR
 PERVIOUS AREAS VERSUS
 SCS CURVE NUMBERS**

TABLE C.2. Fm (in/hr) VALUES
FOR TYPICAL COVER TYPES

<u>COVER TYPE</u>	<u>SOIL GROUP</u>				
	$A_p^{(1)}$	A	B	C	D
NATURAL:					
Barren	1.0	0.41	0.27	0.18	0.14
Row Crops (good)	1.0	0.59	0.41	0.29	0.22
Grass (fair)	1.0	0.82	0.56	0.40	0.31
Orchards (fair)	1.0	0.88	0.62	0.43	0.34
Woodland (fair)	1.0	0.95	0.69	0.50	0.40
URBAN:					
Residential (1 DU/AC)	0.80	0.78	0.60	0.45	0.37
Residential (2 DU/AC)	0.70	0.68	0.53	0.39	0.32
Residential (4 DU/AC)	0.60	0.58	0.45	0.34	0.28
Residential (10 DU/AC)	0.40	0.39	0.30	0.22	0.18
Condominium	0.35	0.34	0.26	0.20	0.16
Mobile Home Park	0.25	0.24	0.19	0.14	0.12
Apartments	0.20	0.19	0.15	0.11	0.09
Commercial/Industrial	0.10	0.10	0.08	0.06	0.05

NOTES:

- (1) Recommended a_p values from Figure C-4
- (2) AMC II assumed for all Fm values
- (3) CN values obtained from Figure C-3
- (4) DU/AC=dwelling unit per acre

F_p , for the pervious area, and the effects of watershed detention. Runoff coefficient curves are developed using the relationship:

$$C = \begin{cases} 0.90 \left(a_i + \frac{(I - F_p)a_p}{I} \right), & \text{for } I \text{ greater than } F_p; \\ 0.90 a_i, & \text{for } I \text{ less than or equal to } F_p \end{cases} \quad (D.3)$$

where the proportion factor of 0.90 is a calibration constant determined by an average fit between the rational method and design storm unit hydrograph (see Section E) peak flow rate estimates, and where

- C = runoff coefficient
- I = rainfall intensity (inches/hour)
- F_p = infiltration rate for pervious areas (inches/hour) (see section C.6.4)
- a_i = ratio of impervious area to total area (decimal fraction)
- a_p = ratio of pervious area to total area (decimal fraction), ($a_p = 1 - a_i$)

D.6. PEAK FLOW RATE FORMULA

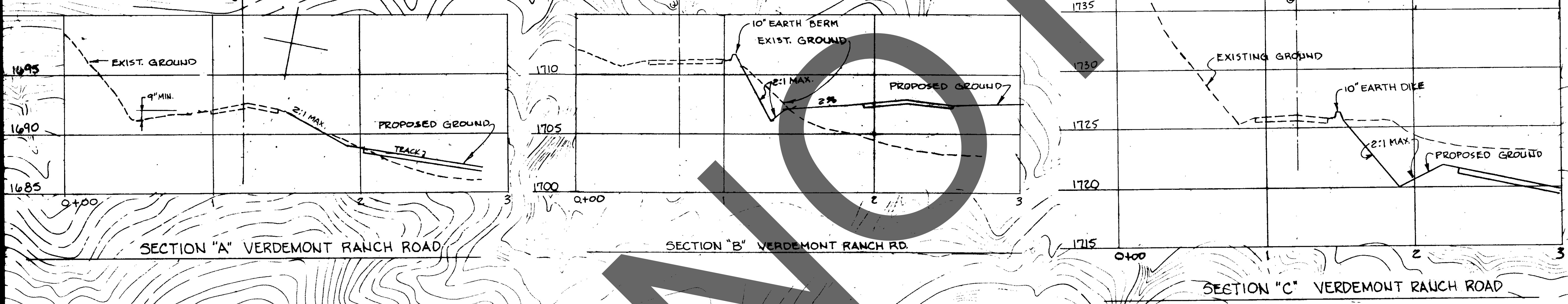
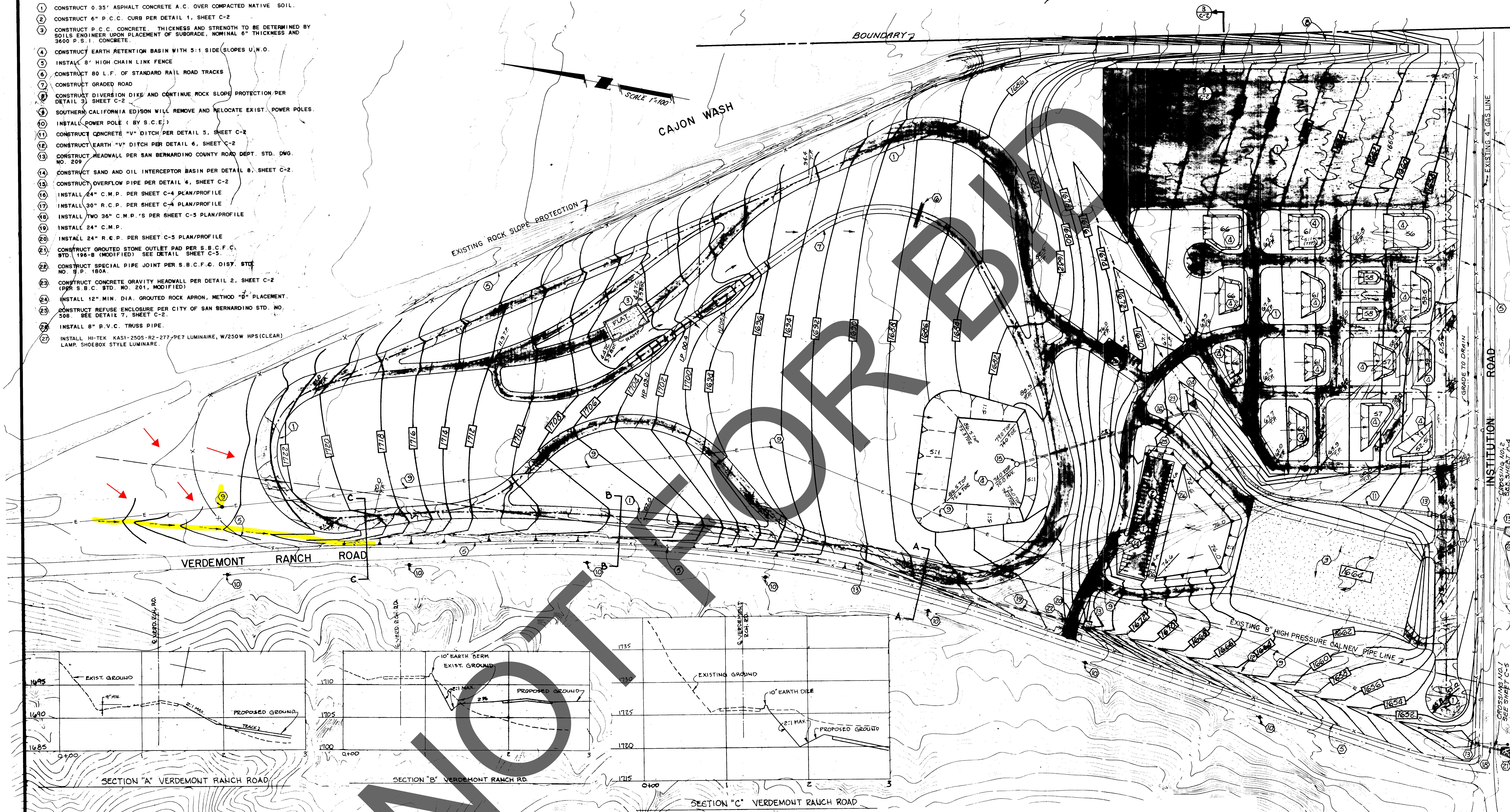
Combining Equations (D.1) and (D.3), the peak flow estimate for Q is written in simpler terms by

$$Q = .90 (I - F_m)A \quad (D.4)$$

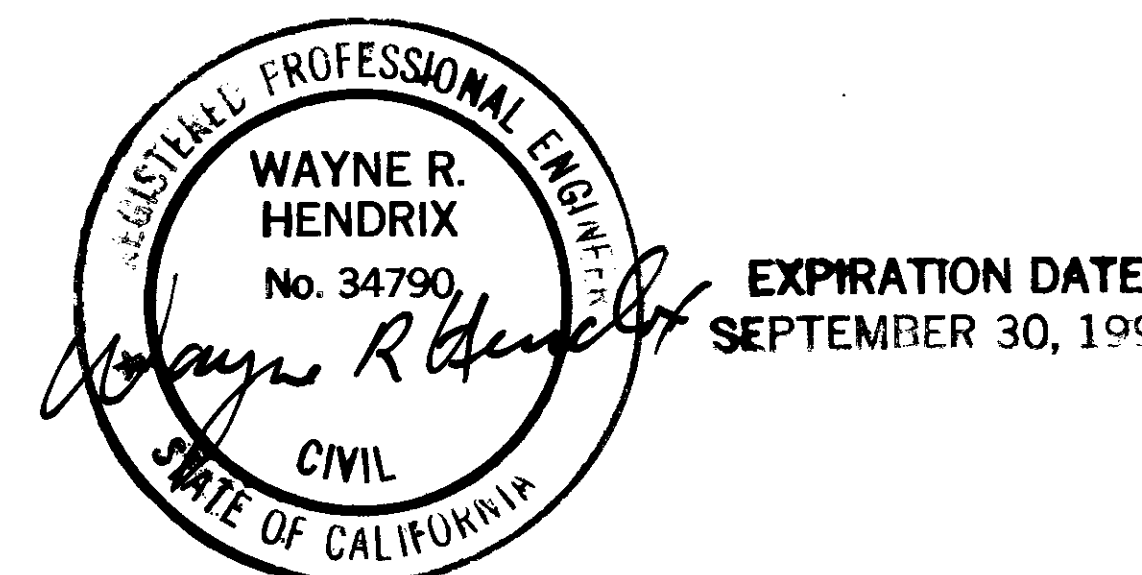
where $F_m = a_p F_p$ (see section C.6.5), and where in (D.4) it is understood that I is greater than F_p (otherwise $Q = .90 a_i IA$).

In (D.4), F_m represents the loss rate for the total watershed tributary to the point of concentration. Should the tributary area contain several runoff surfaces, an area-averaged F_m is calculated. Table D.1 illustrates such an area-averaged F_m computation.

- CONSTRUCTION NOTES
1. CONSTRUCT 0.35" ASPHALT CONCRETE A.C. OVER COMPACTED NATIVE SOIL.
 2. CONSTRUCT 6" P.C.C. CURB PER DETAIL 1, SHEET C-2
 3. CONSTRUCT P.C.C. CONCRETE. THICKNESS AND STRENGTH TO BE DETERMINED BY SOILS ENGINEER UPON PLACEMENT OF SUBGRADE, NOMINAL 6" THICKNESS AND 3600 P.S.I. CONCRETE.
 4. CONSTRUCT EARTH RETENTION BASIN WITH 5:1 SIDE SLOPES U.W.O.
 5. INSTALL 8' HIGH CHAIN LINK FENCE
 6. CONSTRUCT 80 L.F. OF STANDARD RAIL ROAD TRACKS
 7. CONSTRUCT GRADED ROAD
 8. CONSTRUCT DIVERSION DIKE AND CONTINUE ROCK SLOPE PROTECTION PER DETAIL 3, SHEET C-2
 9. SOUTHERN CALIFORNIA EDISON WILL REMOVE AND RELOCATE EXIST. POWER POLES.
 10. INSTALL POWER POLE (BY S.C.E.)
 11. CONSTRUCT CONCRETE "V" DITCH PER DETAIL 5, SHEET C-2
 12. CONSTRUCT EARTH "V" DITCH PER DETAIL 6, SHEET C-2
 13. CONSTRUCT HEADWALL PER SAN BERNARDINO COUNTY ROAD DEPT. STD. DWG. NO. 209
 14. CONSTRUCT SAND AND OIL INTERCEPTOR BASIN PER DETAIL 8, SHEET C-2.
 15. CONSTRUCT OVERFLOW PIPE PER DETAIL 4, SHEET C-2
 16. INSTALL 24" C.M.P. PER SHEET C-4 PLAN/PROFILE
 17. INSTALL 30" R.C.P. PER SHEET C-4 PLAN/PROFILE
 18. INSTALL TWO 36" C.M.P.'S PER SHEET C-5 PLAN/PROFILE
 19. INSTALL 24" C.M.P.
 20. INSTALL 24" R.C.P. PER SHEET C-5 PLAN/PROFILE
 21. CONSTRUCT GROUTED STONE OUTLET PAD PER S.B.C.F.C. STD. 198-B (MODIFIED) SEE DETAIL SHEET C-5
 22. CONSTRUCT SPECIAL PIPE JOINT PER S.B.C.F.C. DISY. STD. NO. S.P. 180A.
 23. CONSTRUCT CONCRETE GRAVITY HEADWALL PER DETAIL 2, SHEET C-2 (PER S.B.C. STD. NO. 201, MODIFIED)
 24. INSTALL 12" MIN. DIA. GROUTED ROCK APRON, METHOD "D" PLACEMENT.
 25. CONSTRUCT REFUSE ENCLOSURE PER CITY OF SAN BERNARDINO STD. NO. 308. SEE DETAIL 7, SHEET C-2.
 26. INSTALL 8" R.V.C. TRUSS PIPE.
 27. INSTALL HI-TEK KASI-2505-R2-277-DET LUMINAIRE, W/250W HPS (CLEAR) LAMP. SHOEBOX STYLE LUMINAIRE.



BENCH MARK
 BRASS DISK U.S.C.&G.S. D. 40
 2.9 miles southeast along the Atchison, Topeka and Santa Fe Railway from the siding sign at Devore, 0.45 mile southeast of the Verdmont siding, 3 1/2 poles northwest to milepost 74, 0.15 mile northwest of the crossing of Palm Avenue, 10.5 feet southwest of the southwest rail of track in the top of the southwest concrete headwall of a triple 36" concrete pipe culvert, 60 1/2 feet northeast of the center of Cajon Boulevard, 7.2 feet southeast of the northwest end of the headwall, and about 1 foot lower than the track.



UNDERGROUND SERVICE ALERT

CALL: TOLL FREE
 1-800
 422-4133

TWO WORKING DAYS BEFORE YOU DIG.

CAUTION:
 CALNEV PIPE LINE COMPANY HAS AN 8" HIGH PRESSURE JET FUEL LINE TRAVERSING THE SITE. CONTRACTOR SHALL HAVE A COPY OF THE "CONDITIONS FOR CONSTRUCTION NEAR CALNEV PIPE LINE COMPANY'S UNDERGROUND FACILITIES" DOCUMENT. ALL BRUSH SHALL BE CLEARED FROM ABOVE THE PIPE LINE TO A MINIMUM WIDTH OF 20' EACH SIDE OF THE CENTERLINE OF THE PIPE LINE. NO EXCAVATION SHALL OCCUR WITHIN 30' OF THE PIPE LINE WITHOUT A CALNEV INSPECTOR PRESENT.

WRHENDRIX ENGINEERING & ASSOCIATES

SAN BERNARDINO COUNTY
 SHERIFF'S
 DRIVER TRAINING CENTER

GRADING PLAN

SAN BERNARDINO COUNTY, CALIFORNIA

DRAWN BY: GD
 DESIGNED BY: THS
 PROJECT NO. 10860