APPENDIX H

Drainage Report
AMEC Consulting Engineers

SIERRA CANYON HIGH SCHOOL
DRAINAGE REPORT for EIR STUDY

December 7, 2004

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1.0 INTRODUCTION

The purpose of this Drainage Report ("Report") is to present information pertaining to storm water management for the proposed Sierra Canyon High School Development Project located in the Chatsworth Community of the City of Los Angeles (hereinafter referred to as the "Site"). This Report has been prepared in accordance with the City of Los Angeles Revised Hydrology Standards which is based on the Los Angeles County Department of Public Works (LACDPW) Addendum to the 1991 Hydrology/ Sedimentation Manual dated June 2002.

Specific information contained in this report includes: Site location, existing and proposed site description and drainage patterns, drainage design criteria such as regulations, hydrologic criteria, hydrologic design standards and procedures, pre and post developed run-off calculations, and notes on water quality.

2.0 GENERAL LOCATION AND DESCRIPTION

2.1 Site Location

The proposed project site consists of approximately 4.9 acres of land currently zoned for single family residential estate development (RE11-1). The existing site consists of one single family residential dwelling unit on multiple parcels of land with driveway access off of existing partially improved Lurline Avenue to the east. Construction of the proposed Rinaldi Street Extension is currently underway and is scheduled for completion prior to the planned Buildout of the project site. The Rinaldi Street extension will eliminate the Lurline Avenue frontage to the site on the east and the entire project site will be fronted by the proposed Rinaldi Street extension on the southerly and easterly sides. Additionally, the project site is bounded by a single family residential lot on the west, a City of Los Angeles Department of Water and Power (LADWP) covered reservoir on the northwest, and undeveloped LADWP owned land on the north.

2.2 Existing Site Description and Drainage Patterns

The existing site topography consists of two sloping pad areas separated by an approximately 15 foot high graded slope which runs in an east-westerly direction. The existing site drains in a southerly direction towards the proposed Rinaldi Street Extension.

The undeveloped LADWP property located north of the project site slopes in an easterly direction where historically, storm water runoff has been conveyed via surface flows to partially developed Lurline Avenue. The lack of a storm drainage system in this area together with the large tributary area of the undeveloped LADWP land which conveys storm water runoff directly to Lurline Avenue, has led to drainage problems and concerns along existing Lurline Avenue. Historically, sandbags and other drainage retarding devices have been used along the northerly terminus of Lurline Avenue to mitigate drainage and erosion problems associated with the direct runoff of the undeveloped LADWP property to Lurline Avenue.

As part of the proposed Rinaldi Street Extension Drainage improvements and abandonment of Lurline Avenue, an inlet structure is proposed to be installed at the location where the LADWP undeveloped land currently discharges to existing Lurline Avenue. This inlet structure will route these flows to the proposed storm drain line located in Rinaldi Street and thus eliminate the historic drainage problems. At the time that the Sierra Canyon High school site is developed, the drainage concerns associated with Lurline Avenue and the LADWP property will have already been mitigated as part of the Rinaldi Street Extension project.

The proposed Rinaldi drainage facilities fronting the project site consist of a 96" diameter R.C.P. storm drain main located within the Rinaldi Street right of way. Additionally, three lateral catch basin collectors will be located in the Rinaldi right of way immediately fronting the project site. The three catch basin collector systems in Rinaldi Street will consists of one 30" RCP storm drain lateral servicing two 28 foot wide curb opening catch basins, and two 36" RCP storm drain laterals each servicing two 28 foot wide curb opening catch basins respectively. The hydrologic analysis presented in this report assumes that the proposed Rinaldi Street Extension (together with the proposed drainage facilities associated with the Rinaldi Street Extension) is an existing condition for this project site.

2.3 Proposed Site Description and Drainage Patterns

The proposed development of the project site is to consist of a Private High School Campus. The southerly portion of the site (the lower pad) will consist of a covered on grade parking facility overlaid by a second story concrete deck and building structures. The northerly portion of the site (the upper pad) will consist of proposed buildings, a pool, and open grass areas.

The drainage pattern for the proposed site development will follow the existing drainage pattern of the site and flows from the proposed site will not be diverted. As detailed in the proposed condition Hydrology Map (see Appendix), storm water will flow from the project site to the Rinaldi Street Storm Drainage system.

Storm water runoff from the project site will be collected via a combination of surface flows, gutter flows, roof gutters, catch basins, and an underground storm drainage system. All concentrated drainage from the project site will be outlet to the Rinaldi Extension Storm Drainage system through a direct connection to the catch basin facilities located in Rinaldi Street. A total of three separate tributary catchment areas are shown in the proposed condition Hydrology Map. The three separate catchment areas will be routed independently to each of the three catch basin collector systems located in Rinaldi Street.

3.0 Drainage Design Criteria

3.1 Regulations

The drainage concepts and designs contained in this report have been completed in accordance with the City of Los Angeles Bureau of Engineering flood control standards. Procedures and figures as detailed in the June 2002 revision of the Los Angeles County Department of Public Works (LACDPW) Addendum to the 1991 Hydrology/ Sedimentation Manual was used for analysis.

3.2 Hydrological Criteria

In designing components of the storm water conveyance system and for determining design flows for each tributary area, a 50 year frequency design storm was used for the analysis.

3.3 Hydrologic Design Standards and Procedures

The drainage patterns for the proposed development were determined based on reviewing the proposed grading and drainage plans for the proposed site development. Encatchment areas were broken out for the proposed catch basin tributary areas and the areas were calculated. The average slope for the longest path of travel was determined for each tributary area. Time of concentration and peak design flows were determined for the 50 year storm event using the Los Angeles County Tc Calculator program and checked using the hand calculation method (see Appendix for calculations)

The following parameters were used for the hydrology analysis.

Isoheytal Map . . . Figure 1-H1.35 (Oat Mountain) per the 2002 addendum of the LACDPW Hydology Manual

50 year Isohetal used = 7.4 in.

Soil Type = 020

% Impervious for Proposed Site = 81.9%
% Impervious for existing condition = 12.0% (calculated as actual existing)
% Impervious for existing condition = 41.8% (assumes single family residential)

3.4 Existing (Pre-developed) Conditions

The actual site was calculated as 12.0% impervious based on the existing estate development. For purposes of this report however, the existing pre-developed condition assumes that the project site is developed as a single family residential development. The current zoning for the project site is consistent with single family residential development and the Rinaldi Street Storm Drainage facilities were designed with this assumption. This would allow a comparison to be made as to the effects of pre- vs post-development conditions. For both the existing condition (I=12.0%) and existing pre-developed site (single family with I=41.8%), the peak flows were calculated using the Los Angeles County Department of Public Works Tc calculator and checked using the hand calculation method as described above (See Appendix B for hand calculation details).

Three separate Tributary Areas 1, 2, and 3 (identified on the Existing Condition Hydrology Map in Appendix C) were identified as being routed to the existing storm drain catch basin collector systems located in Rinaldi Street. The pre-development peak flows for each tributary area and catch basin collector system are tabulated below:

Table 3.4.A – Existing (Pre-developed) Peak Flows with 12.0% (existing site) and 41.8% Impervious (Single Family Residential existing site)

Area ID	Tributary Area (Acres)	Peak Flow Q50 (cfs) with I=12.0% Impervious	Peak Flow Q50 (cfs) with I=41.8% Impervious
1	1.57	4.4	4.8
2	1.74	4.5	5.4
3	1.59	4.9	5.4
TOTAL	**4.90**	**13.8**	**15.6**

3.5 Post Developed Conditions.

For the proposed Site, the peak flows were similarly calculated using the Los Angeles County Department of Public Works Tc calculator and checked using the hand calculation method as described above (See Appendix B for hand calculation details).

Three separate Tributary Areas 1, 2, and 3 (identified on the Proposed Condition Hydrology Map – see Appendix C) are routed to the existing storm drain catch basin collector systems located in Rinaldi Street. For purposes of comparison, the proposed Tributary area identification numbers 1 through 3 correspond identically to the existing pre-developed condition Tributary area identification numbers.

The post developed peak flows are tabulated below:

Table 3.5.A – Post Developed Peak Flows

Area ID	Tributary Area (Acres)	Peak Flow Q50 (cfs)
1	2.70	9.5
2	0.54	2.1
3	1.66	5.4
TOTALS	**4.90**	**17.0**

3.6 Existing Storm Drain Capacities

The storm drain improvement plans for the Rinaldi Street extension were reviewed to determine capacity for each of the three storm drain collector systems. The capacity for the storm drain collector systems is presented below:

Table 3.6.A – Rinaldi Storm Drain Collector System Capacities

Collector ID	Peak Flow Q50 Capacity (cfs)
1	9.5
2	7.7
3	8.9
TOTALS	**26.1**

The capacities for each catch basin collector system were identified as the maximum peak 50-year flows used for the design of each storm drain lateral connection to the 96" storm drain main line located in Rinaldi Street.

3.7 Water Quality

The area of disturbed soil for the proposed site will be less than 5 acres but greater than 2 acres. Based on the California Regional Water Quality Board National Pollutant Discharge Elimination System (NPDES) Permit issued to the City and County of Los Angeles, a local Storm Water Pollution Prevention Plan (SWPPP) will be required to be submitted for the proposed project during the Building Permit Process. A temporary erosion control plan for construction activities will be required identifying erosion control devices and other Best Management Practices (BMP's) to mitigate water quality issues during construction. Additionally, the SWPPP will identify post-construction BMP's that will be utilized to mitigate Storm Water pollution for the built project. Measures will be included in the design stage for the project in order to capture and treat all of the water originating from the parking areas and trash collection areas. Prior to discharging any of these areas to the storm drainage system in Rinaldi, underground clarifiers and catch basin inserts should be utilized to provide first flush treatment of all run-off.

4.0 CONCLUSIONS

The existing Storm Drainage facilities designed as part of the Rinaldi Street Extension are adequately sized and capable of conveying the post developed runoff flows from the project site. A pre- vs post-developed hydrology study was conducted for the proposed project site and post-development peak flows were compared to pre-development peak flows as well as proposed storm drain facility capacities in Rinaldi Street.

Three separate pre- and post-developed areas were identified based on the existing and proposed grading and storm drainage layout of the site and individually routed to each of three existing catch basin collector systems located in Rinaldi Street immediately fronting the project site. The peak 50-year flows were calculated for each of the three tributary areas for both pre- and post developed conditions and compared to the design capacities for the associated catch basin collector system; the results of the analysis are presented in the table below:

Table 4.0.A – Pre- and Post-Developed Peak Flow and Storm Drain Capacity Comparison

Area ID	Pre-Developed Peak Q50 Flow (cfs)	Post-Developed Peak Q50 Flow (cfs)	Catch Basin Collector Peak Q50 Capacity (cfs)
1	4.8	9.5	9.5
2	5.4	2.1	7.7
3	5.4	5.4	8.9
TOTALS	**15.6**	**17.0**	**26.1**

The comparison of these pre- and post- development conditions indicates that the total post-developed peak runoff from the project site is greater than the pre-developed peak runoff from the project site. A total increase of 1.4 cfs or 9.0% increase of peak run-off flows will be experienced in the post-developed condition as compared to the pre-developed condition. The comparison of post-development peak flows with proposed storm drain peak capacities however indicates that the total project post-developed peak flows are less than available storm drain capacities.

5.0 REFERENCES

City of Los Angeles Storm Drain Design Manual.

Los Angeles County Department of Public Works – Addendum to the 1991 Hydrology/ Sedimentation Manual – Dated June 2002

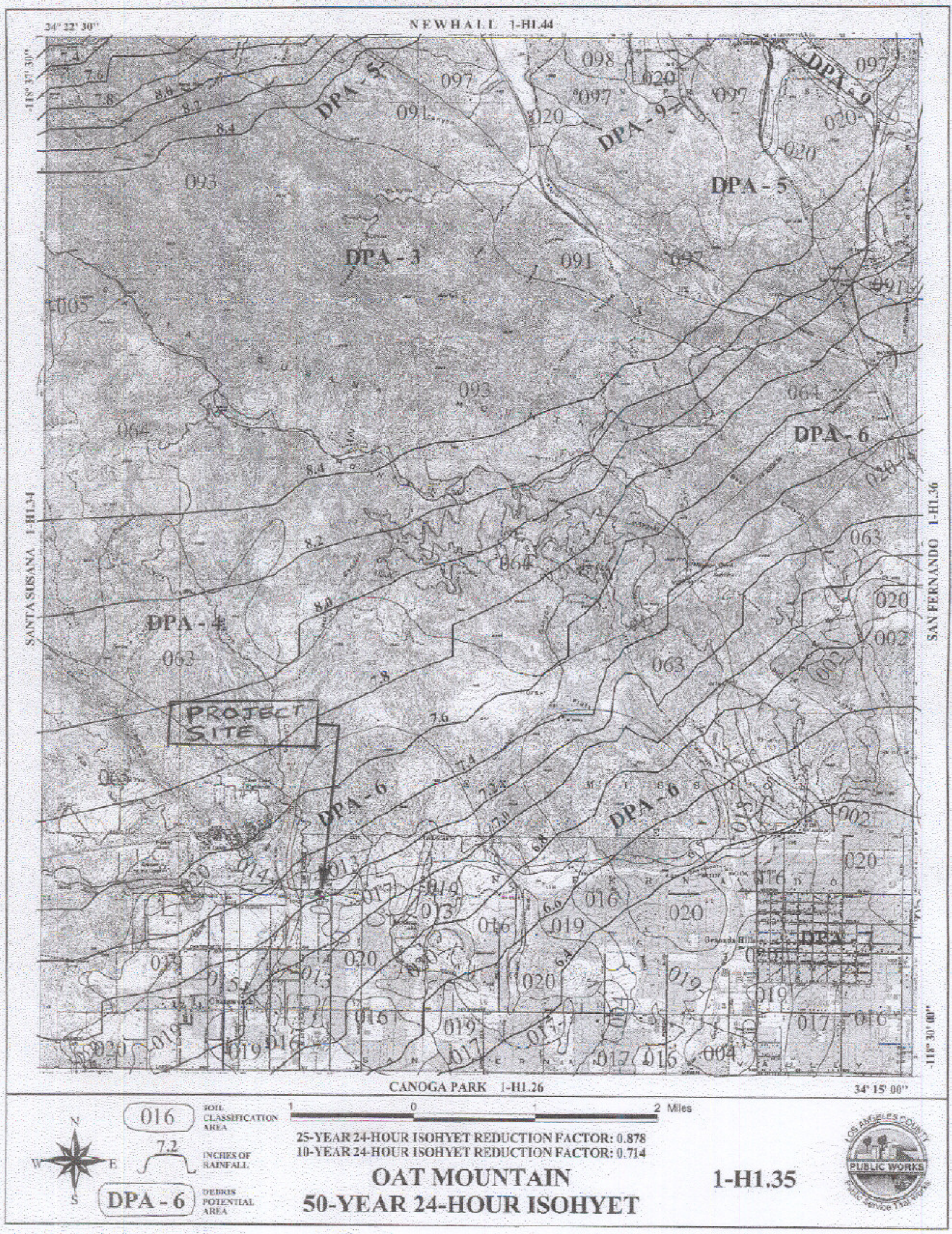
Los Angles County Department of Public Works Tc Calculator (LACDPW Web Site).

Rinaldi Street Extension – Proposed Storm Drain Improvement Plan

6.0 APPENDIX:

APPENDIX A:

(Figures used for Design and Site Drainage Map)


NEWHALL 1-H1.44
SANTA SUSANA 1-H1.34
SAN FERNANDO 1-H1.36
CANOGA PARK 1-H1.26
DPA - 3
DPA - 4
DPA - 5
DPA - 6
DPA - 7
DPA - 9
PROJECT SITE
016 SOIL CLASSIFICATION AREA
7.2 INCHES OF RAINFALL
DPA - 6 DEBRIS POTENTIAL AREA
2 Miles
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
OAT MOUNTAIN
50-YEAR 24-HOUR ISOHYET
1-H1.35
PUBLIC WORKS

APPENDIX E: Proportion Impervious Values

Residential

Single-Family	0.418
Two-Unit	0.418
Three-Unit	0.682
Four-Unit	0.819
Five-Unit	0.855

Commercial

Stores, Office Buildings, Manufacturing Outlets	0.909
Shopping Centers (Regional), Restaurants, Service Shops, Auto Equipment, Parking Lots	0.946
Shopping Centers (Neighborhood), Motels, Hotels, Kennels, Professional Buildings, Banks, Service Stations	0.958
Supermarkets	0.976
Department Stores	0.985

Industrial

Mineral Processing	0.473
Open Storage	0.655
Motion Picture, Radio, Television	0.819
Manufacturing, Warehousing, Storage, Parking	0.909
Food Processing Plants, Lumber Yards	0.958

Institutional Property

Colleges, Universities	0.473
Homes for the Aged	0.682
Hospitals, Cemeteries, Mausoleums, Mortuaries	0.744
Churches, Schools	0.819

Undeveloped Property

Rural	0.01

APPENDIX A: Normalized Rainfall Intensity-Duration

The intensity-duration relationship is as follows:

$$I_t/I_{1440} = (1440/t)^{0.47}$$

Where t = time of concentration in minutes,
And I = the intensity in inches per hour for the duration given.

Tabulated Intensity-Duration Values

Time (min.)	I_t/I_{24}
5	14.32
6	13.14
7	12.22
8	11.48
9	10.86
10	10.34
11	9.89
12	9.49
13	9.14
14	8.83
15	8.54
16	8.29
17	8.06
18	7.84
19	7.65
20	7.46
21	7.29
22	7.14
23	6.99
24	6.85
25	6.72
26	6.60
27	6.48
28	6.37
29	6.27
30	6.17

$C_D = (0.9 * IMP) + (1.0 - IMP) * Cu$

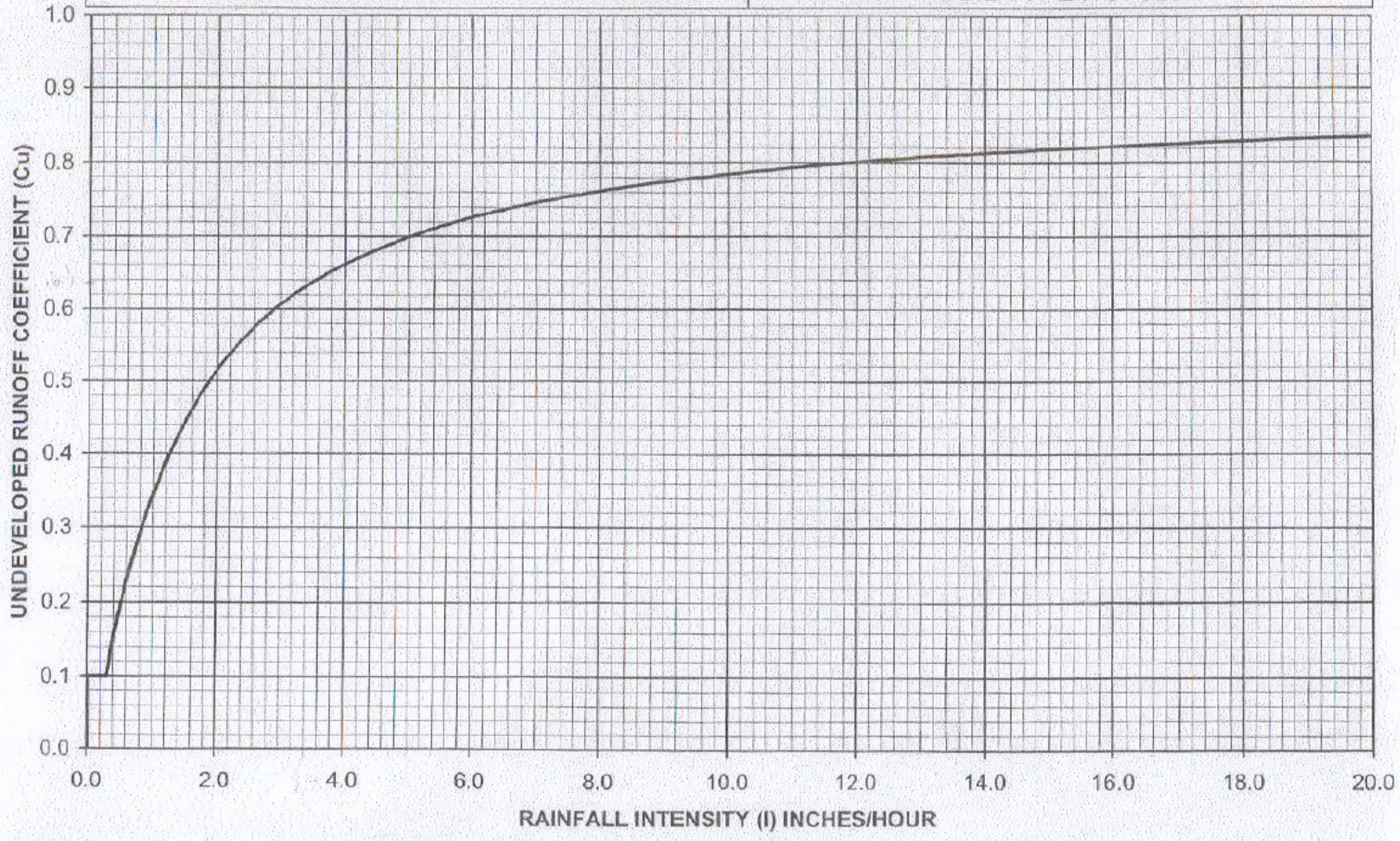
Where: C_D = Developed Runoff Coefficient

IMP = Proportion Impervious

C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 020



File:Soil Curve Data and Graphs 0-24 Tab:GN20 HYDROLOGY APPENDIX D BJW: 5/28/02

APPENDIX B: - Hydrology Calculations

LA COUNTY REVISED HYDROLOGY 2002 ADDENDUM PRE DEVELOPMENT RUNOFF SUMMARY FOR ACTUAL EXISTING SITE CONDITIONS WITH 12% IMPERVIOUS AREA

Area 1

area	68389	sf
area	1.57	ac
flow path	642	ft
high point	1125	
low point	1082	
difference	43	
slope	0.067	
Q=	**4.4**	**cfs**

Area 2

area	75904	sf
area	1.74	ac
flow path	697	ft
high point	1146	
low point	1093	
difference	53	
slope	0.076	
Q=	**4.5**	**cfs**

Area 3

area	69066	sf
area	1.59	ac
flow path	431	ft
high point	1144	
low point	1103	
difference	41	
slope	0.095	
Q=	**4.9**	**cfs**

Total Area

Total Area	**213,359**	**sf**
Area	**4.9**	**ac**
Q=	**13.9**	**cfs**

EXISTING Area 1 - RUNOFF CALCULATIONS (12% IMPERVIOUS)

Area =	68389	sf
	1.57	ac
Proportion Imp (from Appendix E) =	0.120	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	642	ft
Elev @ Boundary =	1125.0	
Elev @ Outlet =	1082.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.120 * 1.57 ac / 1.57 ac = 0.12

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1125 - 1082) / 642 = 0.067

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.120) + ((1 - 0.120) * 0.63) = 0.66

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.66 * 2.93 = 1.94

11 Calculate the Time of Concentration; TC = 0.31 * $(C_d*I_t)^{-0.519}*L^{0.483}*S^{-0.135}$

0.31	*	1.94	^	-0.519	*	642	^	0.483
	*	0.07	^	-0.135	=	7.19	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	7.19	minutes	=	4.81	minutes

4.81 > 0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.66	1.94	7.19	4.81
2	0.308	6.0	13.14	4.05	0.66	0.69	2.79	5.95	0.05

13 Acceptable TC value; 6

14 Rounded to nearest minute; 6

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	6	13.14	4.05	0.660	0.69	2.79	5.95	0.050

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.69	*	4.05	*	1.57	=	4.38	cfs

EXISTING Area 2 - RUNOFF CALCULATIONS (12% IMPERVIOUS)

Area =	75904	sf
	1.74	ac
Proportion Imp (from Appendix E) =	0.120	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	697	ft
Elev @ Boundary =	1146.0	
Elev @ Outlet =	1093.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.120 * 1.74 ac / 1.74 ac = 0.12

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1146 - 1093) / 697 = 0.076

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type = 020
$I_{12\ minute}$ = 2.93 in/hr
Cu = 0.63

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.120) + ((1 - 0.120) * 0.63) = 0.66

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.66 * 2.93 = 1.94

11 Calculate the Time of Concentration; TC = $0.31 * (C_d*I_t)^{-0.519}*L^{0.483}*S^{-0.135}$

0.31	*	1.94	^	-0.519	*	697	^	0.483
	*	0.08	^	-0.135	=	7.35	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	7.35	minutes	=	4.65	minutes

4.65	>	0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.66	1.94	7.35	4.65
2	0.308	7.0	12.22	3.77	0.66	0.69	2.60	6.32	0.68

13 Acceptable TC value; 7

14 Rounded to nearest minute; 7

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	7	12.22	3.77	0.66	0.69	2.60	6.32	0.681

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.69	*	3.77	*	1.74	=	4.52	cfs

EXISTING Area 3 - RUNOFF CALCULATIONS (12% IMPERVIOUS)

Area =	69066	sf
	1.59	ac
Proportion Imp (from Appendix E) =	0.120	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	431	ft
Elev @ Boundary =	1144.0	
Elev @ Outlet =	1103.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.120 * 1.59 ac / 1.59 ac = 0.12

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1144 - 1103) / 431 = 0.095

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.120) + ((1 - 0.120)
* 0.63) = 0.66

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.66 * 2.93 = 1.94

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519} * L^{0.483} * S^{-0.135}$

0.31	*	1.94	^	-0.519	*	431	^	0.483
	*	0.10	^	-0.135	=	5.66	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	5.66	minutes	=	6.34	minutes

6.34 > 0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.66	1.94	5.66	6.34
2	0.308	5.0	14.32	4.42	0.68	0.71	3.12	4.42	0.58

13 Acceptable TC value; 5

14 Rounded to nearest minute; 5

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	5	14.32	4.42	0.680	0.71	3.12	4.42	0.581

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.71	*	4.42	*	1.59	=	4.94	cfs

LA COUNTY REVISED HYDROLOGY 2002 ADDENDUM PRE DEVELOPMENT RUNOFF SUMMARY FOR SINGLE FAMILY DEVELOPED CONDITION WITH 41.8% IMPERVIOUS AREA

Area 1

area	68389	sf
area	1.57	ac
flow path	642	ft
high point	1125	
low point	1082	
difference	43	
slope	0.067	
Q=	**4.8**	**cfs**

Area 2

area	75904	sf
area	1.74	ac
flow path	697	ft
high point	1146	
low point	1093	
difference	53	
slope	0.076	
Q=	**5.4**	**cfs**

Area 3

area	69066	sf
area	1.59	ac
flow path	431	ft
high point	1144	
low point	1103	
difference	41	
slope	0.095	
Q=	**5.4**	**cfs**

Total Area

Total Area	**213,359**	**sf**
Area	**4.9**	**ac**
Q=	**15.6**	**cfs**

EXISTING Area 1 - RUNOFF CALCULATIONS
(SINGLE FAMILY DEVELOPED CONDITION - 41.8% IMPERVIOUS)

Area =	68389	sf
	1.57	ac
Proportion Imp (from Appendix E) =	0.418	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	642	ft
Elev @ Boundary =	1125.0	
Elev @ Outlet =	1082.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.418 * 1.57 ac / 1.57 ac = 0.418

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1125 - 1082) / 642 = 0.067

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.418) + ((1 - 0.418)
* 0.63) = 0.74

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.74 * 2.93 = 2.17

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519}*L^{0.483}*S^{-0.135}$

0.31	*	2.17	^	-0.519	*	642	^	0.483
	*	0.07	^	-0.135	=	6.78	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	6.78	minutes	=	5.22	minutes

5.22 > 0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.74	2.17	6.78	5.22
2	0.308	6.0	13.14	4.05	0.66	0.76	3.08	5.65	0.35

13 Acceptable TC value; 6

14 Rounded to nearest minute; 6

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	6	13.14	4.05	0.660	0.76	3.08	5.65	0.347

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.76	*	4.05	*	1.57	=	4.84	cfs

EXISTING Area 2 - RUNOFF CALCULATIONS
(SINGLE FAMILY DEVELOPED CONDITION - 41.8% IMPERVIOUS)

Area =	75904	sf
	1.74	ac
Proportion Imp (from Appendix E) =	0.418	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	697	ft
Elev @ Boundary =	1146.0	
Elev @ Outlet =	1093.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.418 * 1.74 ac / 1.74 ac = 0.418

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1146 - 1093) / 697 = 0.076

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.418) + ((1 - 0.418)
* 0.63) = 0.74

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.74 * 2.93 = 2.17

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519}*L^{0.483}*S^{-0.135}$

0.31	*	2.17	^	-0.519	*	697	^	0.483
	*	0.08	^	-0.135	=	6.93	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	6.93	minutes	=	5.07	minutes

5.07	>	0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.74	2.17	6.93	5.07
2	0.308	6.0	13.14	4.05	0.66	0.76	3.08	5.78	0.22

13 Acceptable TC value; 6

14 Rounded to nearest minute; 6

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	6	13.14	4.05	0.66	0.76	3.08	5.78	0.218

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.76	*	4.05	*	1.74	=	5.37	cfs

EXISTING Area 3 - RUNOFF CALCULATIONS
(SINGLE FAMILY DEVELOPED CONDITION - 41.8% IMPERVIOUS)

Area =	69066	sf
	1.59	ac
Proportion Imp (from Appendix E) =	0.418	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	431	ft
Elev @ Boundary =	1144.0	
Elev @ Outlet =	1103.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.418 * 1.59 ac / 1.59 ac = 0.418

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1144 - 1103) / 431 = 0.095

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.418) + ((1 - 0.418)
* 0.63) = 0.74

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.74 * 2.93 = 2.17

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519} * L^{0.483} * S^{-0.135}$

0.31	*	2.17	^	-0.519	*	431	^	0.483
	*	0.10	^	-0.135	=	5.33	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	5.33	minutes	=	6.67	minutes

6.67 > 0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.74	2.17	5.33	6.67
2	0.308	5.0	14.32	4.42	0.68	0.77	3.41	4.22	0.78

13 Acceptable TC value; 5

14 Rounded to nearest minute; 5

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	5	14.32	4.42	0.680	0.77	3.41	4.22	0.780

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.77 * 4.42 * 1.59 = 5.40 cfs

LA COUNTY REVISED HYDROLOGY 2002 ADDENDUM
POST DEVELOPMENT RUNOFF SUMMARY

Area 1

area	117617	sf
area	2.70	ac
flow path	692	ft
high point	1145	
low point	1082	
difference	63	
slope	0.091	
Q=	**9.5**	**cfs**

Area 2

area	23420	sf
area	0.54	ac
flow path	400	ft
high point	1127	
low point	1088.8	
difference	38.2	
slope	0.096	
Q=	**2.1**	**cfs**

Area 3

area	72209	sf
area	1.66	ac
flow path	830	ft
high point	1135	
low point	1098	
difference	37	
slope	0.045	
Q=	**5.4**	**cfs**

Total Area

Total Area	**213,245**	**sf**
Area	**4.9**	**ac**
Q=	**16.9**	**cfs**

PROPOSED Area 1 - RUNOFF CALCULATIONS

Area =	117617	sf
	2.70	ac
Proportion Imp (from Appendix E) =	0.819	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	692	ft
Elev @ Boundary =	1145.0	
Elev @ Outlet =	1082.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.819 * 2.70 ac / 2.70 ac = 0.819

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1145 - 1082) / 692 = 0.091

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.819) + ((1 - 0.819)
* 0.63) = 0.85

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.85 * 2.93 = 2.49

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519} * L^{0.483} * S^{-0.135}$

0.31	*	2.49	^	-0.519	*	692	^	0.483
	*	0.09	^	-0.135	=	6.28	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	6.28	minutes	=	5.72	minutes

5.72	>	0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.85	2.49	6.28	5.72
2	0.308	6.0	13.14	4.05	0.70	0.86	3.50	5.26	0.74

13 Acceptable TC value; 6

14 Rounded to nearest minute; 6

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	6	13.14	4.05	0.70	0.86	3.50	5.26	0.737

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.86	*	4.05	*	2.70	=	9.45	cfs

PROPOSED Area 2 - RUNOFF CALCULATIONS

Area =	23420	sf
	0.54	ac
Proportion Imp (from Appendix E) =	0.819	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	400	ft
Elev @ Boundary =	1127.0	
Elev @ Outlet =	1088.8	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.819 * 0.54 ac / 0.54 ac = 0.819

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1127 - 1089) / 400 = 0.096

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.819) + ((1 - 0.819)
* 0.63) = 0.85

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.85 * 2.93 = 2.49

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519}*L^{0.483}*S^{-0.135}$

0.31	*	2.49	^	-0.519	*	400	^	0.483
	*	0.10	^	-0.135	=	4.79	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	4.79	minutes	=	7.21	minutes

7.21 > 0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.85	2.49	4.79	7.21
2	0.308	5.0	14.32	4.42	0.70	0.86	3.81	3.84	1.16

13 Acceptable TC value; 5

14 Rounded to nearest minute; 5

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	5	14.32	4.42	0.70	0.86	3.81	3.84	1.162

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.86	*	4.42	*	0.54	=	2.05	cfs

PROPOSED Area 3 - RUNOFF CALCULATIONS

Area =	72209	sf
	1.66	ac
Proportion Imp (from Appendix E) =	0.819	
Soil Type (from Appendix G) =	020	
Longest Flow Path =	830	ft
Elev @ Boundary =	1135.0	
Elev @ Outlet =	1098.0	
Avg. 50 yr, 24 hr rainfall depth =	7.4	in

1 Calculate the average proportion impervious values from the table in Appendix E:

0.819 * 1.66 ac / 1.66 ac = 0.819

2 Calculate the average 50-yr 24-hr rainfall depth using the Isohyetal method described in Section C-4;

7.4 in

3 Calculate the slope of the longest flow path;

(1135 - 1098) / 830 = 0.045

4 Calculate the 24-hour intensity in inches/hr; I_{1440} = Rainfall Depth / 24hr

7.4 in / 24 hr = 0.308 in/hr

5 Assume an initial TC value; 12 minutes

6 Using TC = 12 minutes, determine $I_{12\ minute} / I_{1440}$ from the "(I_t / I_{1440}) vs. TC" curve from Appendix A or the equation $I_t / I_{1440} = (1440/t)^{0.47}$; $i_{12\ minute} / I_{1440}$ = 9.49

7 Calculate the 12 minute intensity in inches/hr; $I_{12\ minute} = I_{1440} * (I_{12\ minute} / I_{1440})$ =

0.308 in/hr * 9.49 = 2.93 in/hr

8 Using the Runoff Coefficient Curves found in Appendix D, determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the following;

soil type =	020	
$I_{12\ minute}$ =	2.93	in/hr
Cu =	0.63	

9 Calculate the Developed Runoff Coefficient; Cd = (0.9*%imp) + ((1-%imp)*Cu)

(0.9 * 0.819) + ((1 - 0.819)
* 0.63) = 0.85

10 Calculate the value for rainfall excess; $C_d * I_{12\ minute}$,

0.85 * 2.93 = 2.49

11 Calculate the Time of Concentration; $TC = 0.31 * (C_d*I_t)^{-0.519} * L^{0.483} * S^{-0.135}$

0.31	*	2.49	^	-0.519	*	830	^	0.483
	*	0.04	^	-0.135	=	7.55	minutes	

12 Calculate the difference between the intially assumed TC and the calculated TC;

12	minutes	-	7.55	minutes	=	4.45	minutes

4.45	>	0.50

Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
1	0.308	12	9.49	2.93	0.63	0.85	2.49	7.55	4.45
2	0.308	7.0	12.22	3.77	0.70	0.86	3.26	6.57	0.43

13 Acceptable TC value; 7

14 Rounded to nearest minute; 7

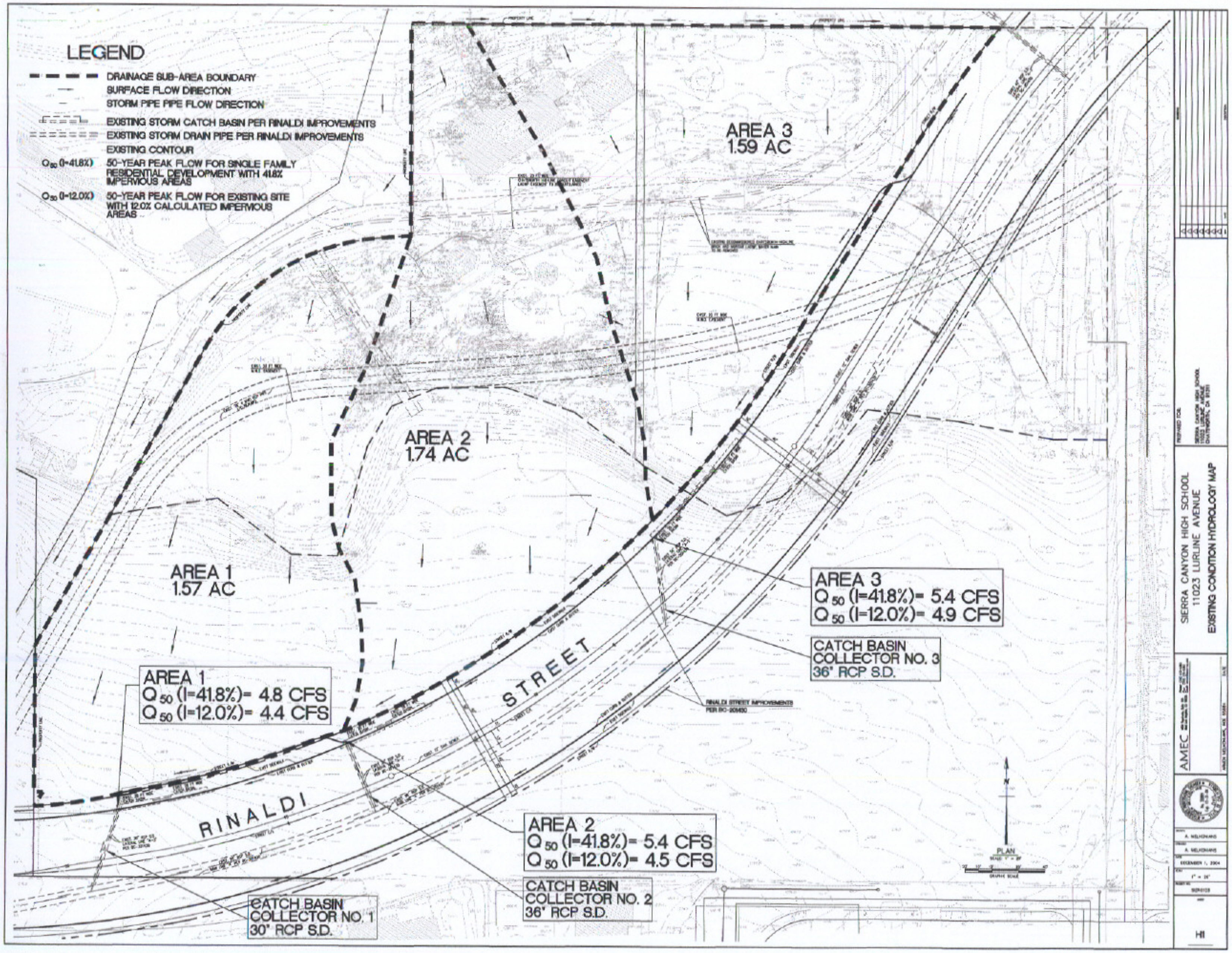
Iteration #	I_{1440} (in/hr)	Initial TC (min)	(I_t / I_{1440}) (from curve)	I_t (in/hr)	Cu (from curve)	Cd	Cd*It	Calculated TC (min)	Difference (min)
2	0.308	7	12.22	3.77	0.700	0.86	3.26	6.57	0.430

15 The peak flow rate in cubic feet per second (cfs) of the subarea can be calculated using the rational method by multiplying the developed runoff coefficient by the rainfall intensity in inches per hour and area of catchment in acres;

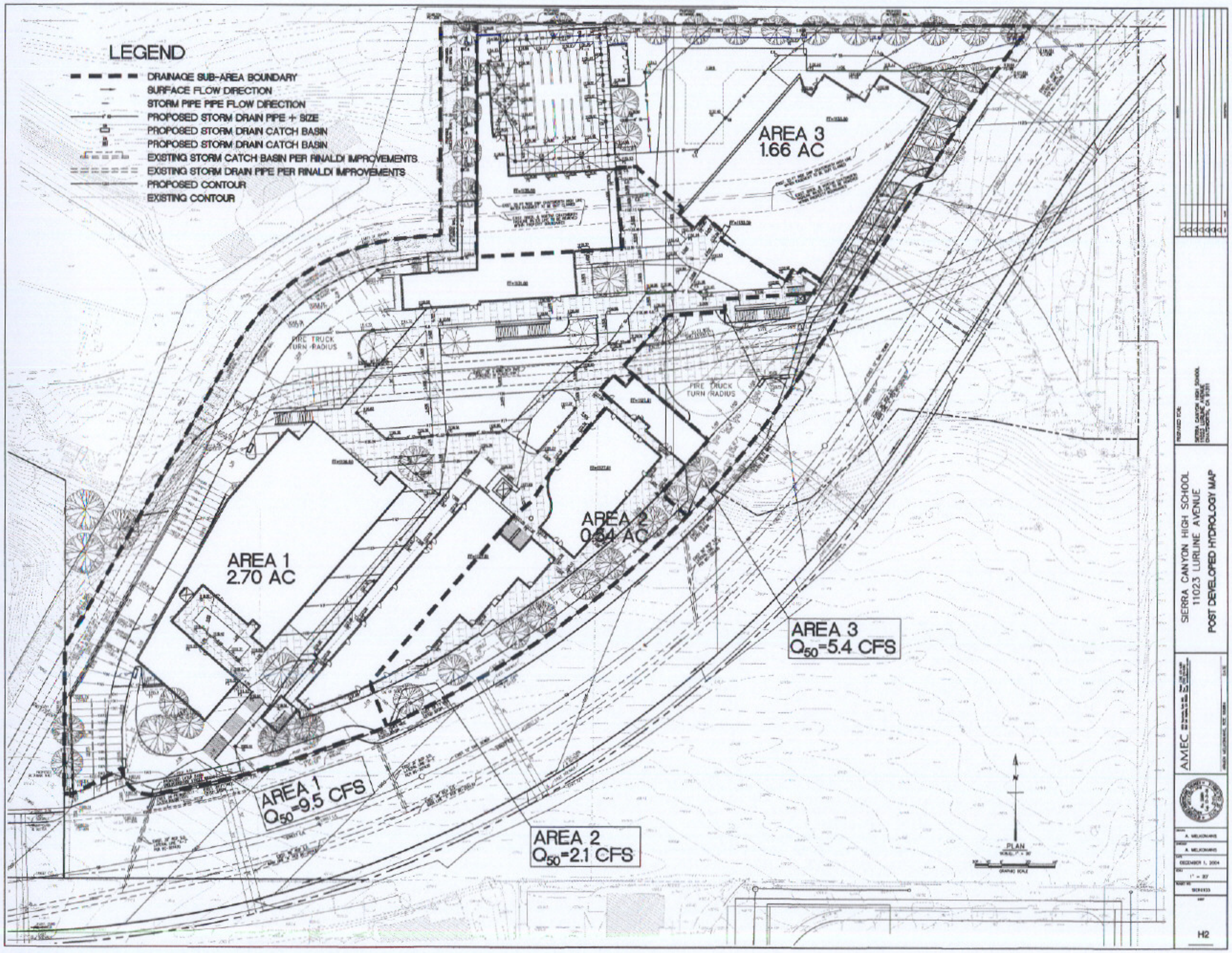
Qpeak (cfs) = Cd * It (in/hr) * Area (ac)

0.86	*	3.77	*	1.66	=	5.40	cfs

APPENDIX C: - Hydrology Maps



LEGEND
DRAINAGE SUB-AREA BOUNDARY
SURFACE FLOW DIRECTION
STORM PIPE PIPE FLOW DIRECTION
EXISTING STORM CATCH BASIN PER RINALDI IMPROVEMENTS
EXISTING STORM DRAIN PIPE PER RINALDI IMPROVEMENTS
EXISTING CONTOUR
Q50 (I=41.8%) 50-YEAR PEAK FLOW FOR SINGLE FAMILY RESIDENTIAL DEVELOPMENT WITH 41.8% IMPERVIOUS AREAS
Q50 (I=12.0%) 50-YEAR PEAK FLOW FOR EXISTING SITE WITH 12.0% CALCULATED IMPERVIOUS AREAS
AREA 3
1.59 AC
AREA 2
1.74 AC
AREA 1
1.57 AC
AREA 3
Q 50 (I=41.8%)= 5.4 CFS
Q 50 (I=12.0%)= 4.9 CFS
CATCH BASIN
COLLECTOR NO. 3
36" RCP S.D.
RINALDI STREET IMPROVEMENTS
AREA 1
Q 50 (I=41.8%)= 4.8 CFS
Q 50 (I=12.0%)= 4.4 CFS
STREET
RINALDI
AREA 2
Q 50 (I=41.8%)= 5.4 CFS
Q 50 (I=12.0%)= 4.5 CFS
CATCH BASIN
COLLECTOR NO. 2
36" RCP S.D.
CATCH BASIN
COLLECTOR NO. 1
30" RCP S.D.
PLAN
SIERRA CANYON HIGH SCHOOL
11023 LURLINE AVENUE
EXISTING CONDITION HYDROLOGY MAP
AMEC
DECEMBER 1, 2004
H1


LEGEND
DRAINAGE SUB-AREA BOUNDARY
SURFACE FLOW DIRECTION
STORM PIPE PIPE FLOW DIRECTION
PROPOSED STORM DRAIN PIPE + SIZE
PROPOSED STORM DRAIN CATCH BASIN
PROPOSED STORM DRAIN CATCH BASIN
EXISTING STORM CATCH BASIN PER RINALDI IMPROVEMENTS
EXISTING STORM DRAIN PIPE PER RINALDI IMPROVEMENTS
PROPOSED CONTOUR
EXISTING CONTOUR
AREA 3
1.66 AC
FIRE TRUCK
TURN RADIUS
FIRE TRUCK
TURN RADIUS
AREA 1
2.70 AC
AREA 2
0.54 AC
AREA 3
Q50=5.4 CFS
AREA 1
Q50=9.5 CFS
AREA 2
Q50=2.1 CFS
PLAN
SIERRA CANYON HIGH SCHOOL
11023 LURLINE AVENUE
POST DEVELOPED HYDROLOGY MAP
AMEC
A. MELKONIANS
A. MELKONIANS
DECEMBER 1, 2004
1" = 20'
H2