Appendix E.2 Preliminary Hydrology Report

kpff Consulting Engineers

PRELIMINARY
HYDROLOGY STUDY

HARVARD-WESTLAKE SCHOOL
PARKING STRUCTURE
3700 Coldwater Canyon
North Hollywood, CA 91604
KPFF Job # 109046

August 12, 2013

CLIENT:

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I. INTRODUCTION

The project consists of the design and construction of a new parking structure for Harvard-Westlake School at 3700 Coldwater Canyon, in North Hollywood. The new parking structure will be on the west side of Coldwater Canyon and will be connected to the main campus via a pedestrian bridge that will span over the roadway. A new soccer field and small facilities building will be included on the top level of the parking structure.

The project includes reconfiguration of the existing main campus entrance on the east side of Coldwater as required to accommodate the pedestrian bridge access tower and reconfigured entrance road.

II. HYDROLOGY

The drainage area of the project site is approximately 3.6 acres. The area is on an ascending hill with areas of steep and gradual slope. The area is sloping from south west toward the northeast direction. The drainage area is composed of driveways, small building facilities and dirt. The existing drainage area is approximately 40 % impervious and 60 % pervious while the proposed drainage area is 95% impervious and 5% pervious. The existing run off is draining towards north east direction to Coldwater Canyon Avenue.

With the construction of the underground parking structure, new soccer field construction and small facilities building, the proposed drainage system of the area is described as follows:

The surface runoff will be collected at multiple points through catch basins with filter inserts and discharged in a bio-swale. The bio-swale is designed to treat first flush volume of storm water which is the first 0.75 inches of rainfall. The storm water passes through the grass mix at the top with plant sustaining soil at the top and granular soil at the bottom layer. A 4" perforated pipe runs at the bottom to collect the treated runoff. The sides and bottom of the grassy swale is protected with impermeable membrane to avoid any infiltration to the ground water. The treated storm water will be day lighted to the street through 4" curb drain. If the first flush volume is more than the Bio-swale capacity, a hydrodynamic separator or storm filter system will be added to the system.

III. METHODOLOGY

Except where specified elsewhere in this report, the procedures, criteria, and standards as set forth in the Los Angeles County Hydrology Manual are utilized to perform pre and post construction hydrology study. See Appendix C and D for the calculation result.

Due to the relatively small size of the project area (less than 40 acres), Los Angeles County TC Calculator based on the rational method has been used to compute the peak runoff at pre-determined design points. The runoff analysis is based on the proposed land use, topographic features and proposed grading for the area. The average land slopes and runoff coefficients were used for computing runoff.

The runoff equation for the Rational Method is as follows:

$$Q = CIA$$

Where: Q = Peak runoff rate (CFS)

C = Runoff coefficient

I = Average rainfall intensity (in/hr)

A = Drainage area (acres)

The resulting flows indicate that the discharge flows from the proposed conditions are less than the existing flows due to proposed developed conditions. This is due to the fact that the proposed developed condition deviates significantly from the existing condition as far as the slopes are concerned.

IV. ASSUMPTIONS

Following assumptions are made while preparing this report:

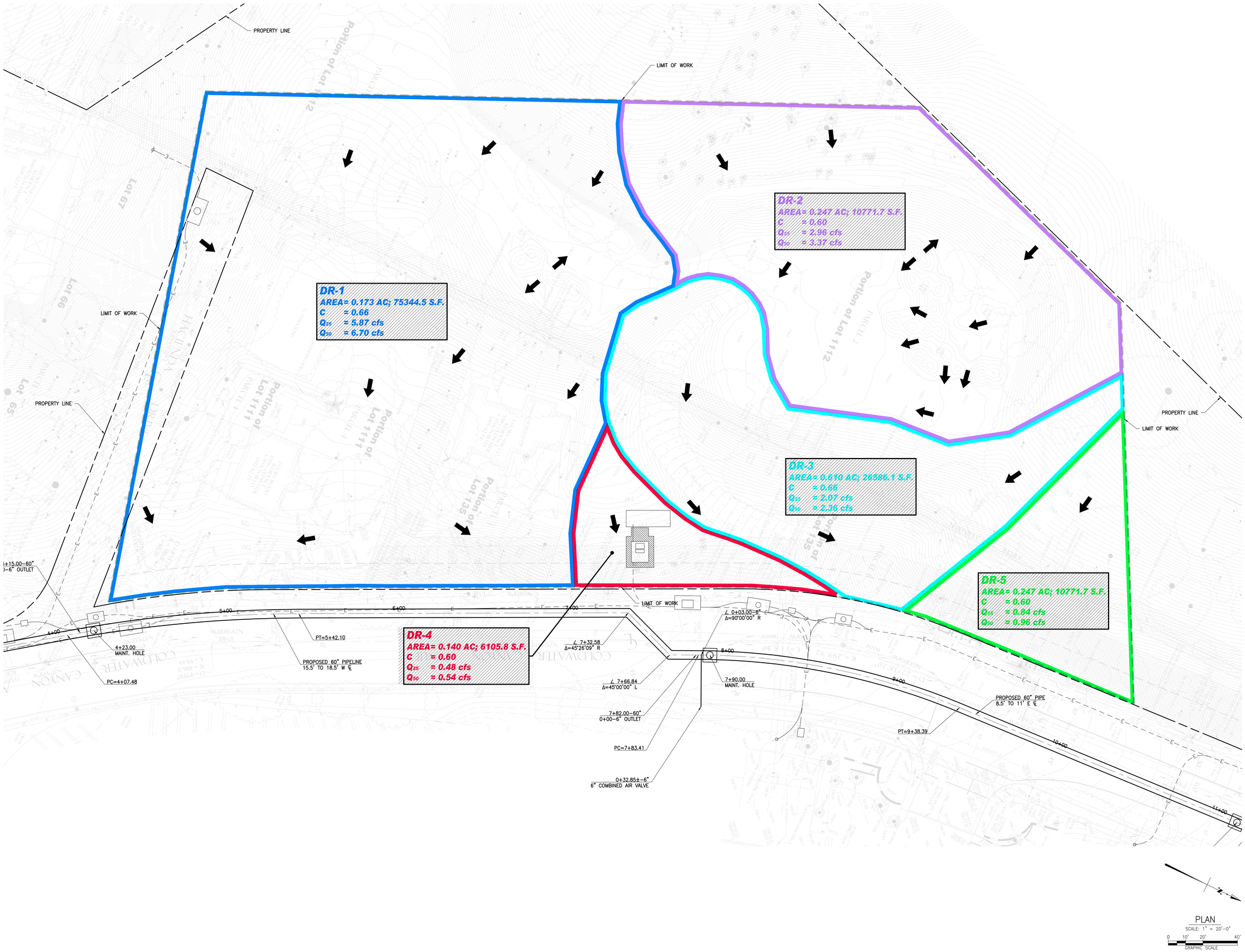
a. The total drainage area for hydrology analysis is taken based on the extent of the proposed development.
b. The run-on to the proposed site development is not taken into account since the purpose of this report is to compare the pre and post construction runoff to find out the impact of the proposed development on the existing stormwater infrastructure.
c. According to the Civil Engineering Reference Manual, the maximum C value for lawns over 7% slope is 0.35. The average slope of lawn area in this project site is more than 50%, therefore, we assumed C value of lawn area to be 0.6.

V. RESULTS & CONCLUSIONS

Using the Rational Method per Los Angeles County Hydrology Manual, the calculated 50, 25, 10, and 2 year storm pre-construction runoff rates are 13.93 cfs, 12.22 cfs, 9.72 cfs, and 4.57 cfs, respectively. The calculated 50, 25, 10, and 2 year storm post-construction runoff rates are 13.76 cfs, 11.35 cfs, 7.56 cfs, and 3.70 cfs, respectively. Therefore, based on the calculations, it is anticipated that the post-construction runoff will be less than the pre-construction runoff.

EXHIBITS

Existing & Proposed Drainage Area Maps



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CONSULTANTS:

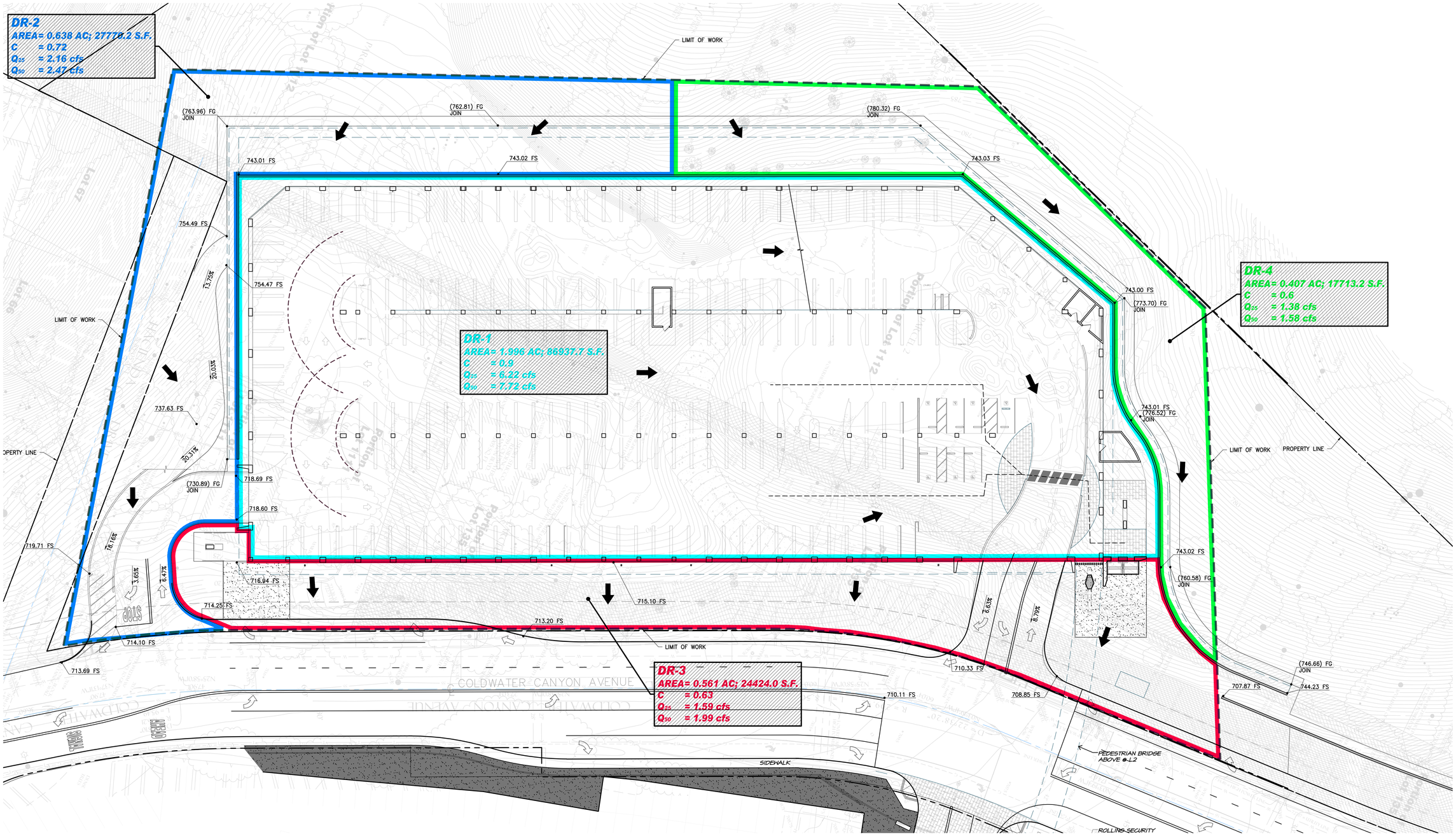
DATE	△	ISSUED FOR:

Date: 08-12-13
Project Number: 109046
Drawn By: ID
Checked By: DC
Scale: AS SPECIFIED

EXISTING DRAINAGE

SHEET:

EXBT-1



PLAN
SCALE: 1" = 20'-0"
0 10' 20' 40'
GRAPHIC SCALE

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Drawn By: ID
Checked By: DC
Scale: AS SPECIFIED

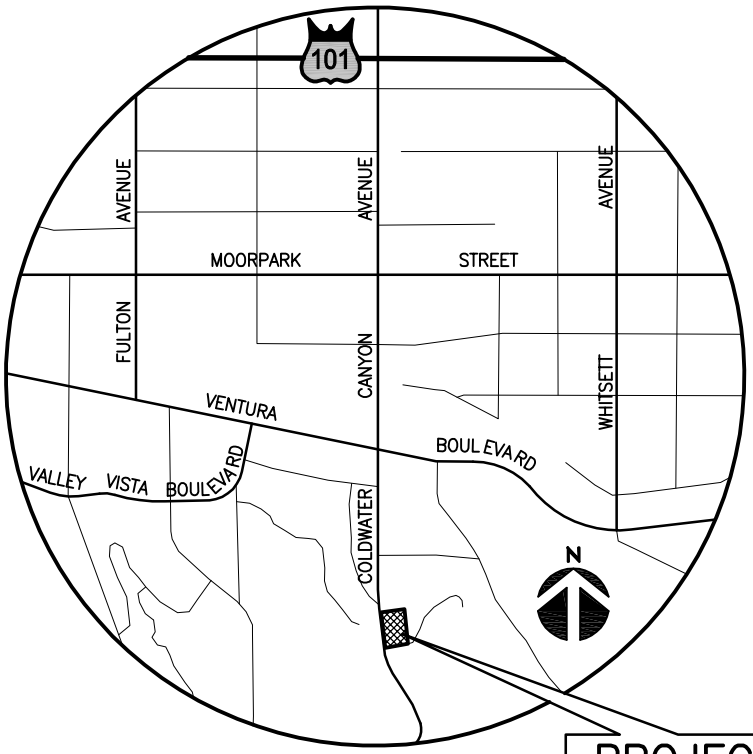
PROPOSED DRAINAGE

SHEET:

EXBT-2

Appendix “A”

Vicinity Map



VICINITY MAP

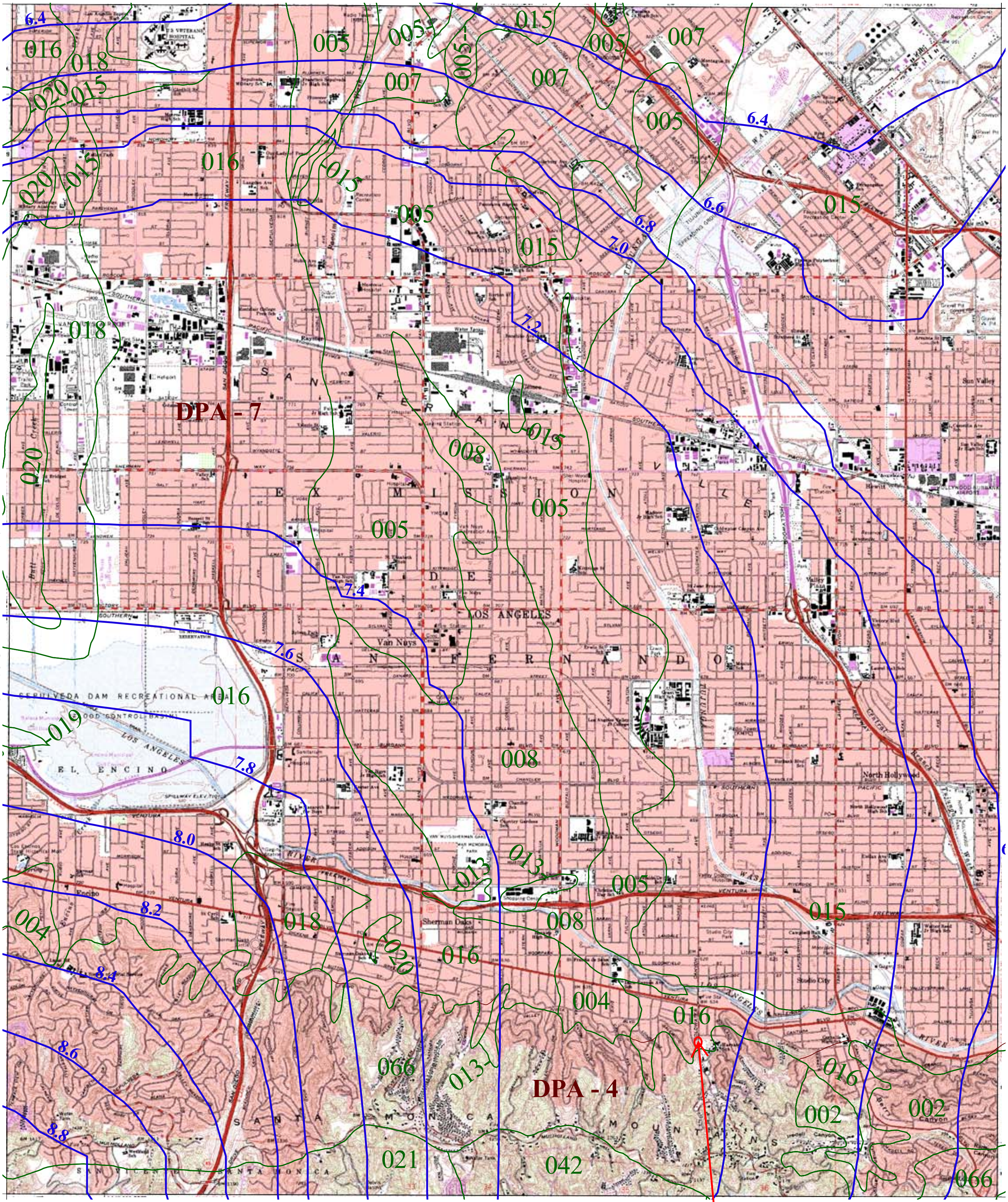
NOT TO SCALE

THOMAS GUIDE **LOS ANGELES** EDITION

PAGE: **562** GRID: **E6**

Appendix “B”

Los Angeles County 50-year 24-hour Isohyet



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

VAN NUYS
50-YEAR 24-HOUR ISOHYET

1-H1.27

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Appendix “C”

Pre-Construction Hydrology Calculation

(50 years, 25 years, 10 years, and 2 years)

Harvard Westlake
KPFF Job # 109046

PRE-CONSTRUCTION HYDROLOGY

50 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.73	0.66	50	16	415.38	0.202	7.2	5	4.3	0.9	0.9	6.7	0.69
109046	2	0.871	0.61	50	16	218.91	0.174	7.2	5	4.3	0.9	0.9	3.37	0.33
109046	3	0.61	0.66	50	16	212.24	0.226	7.2	5	4.3	0.9	0.9	2.36	0.24
109046	4	0.14	0.6	50	16	170.02	0.194	7.2	5	4.3	0.9	0.9	0.54	0.05
109046	5	0.247	0.6	50	16	172.07	0.523	7.2	5	4.3	0.9	0.9	0.96	0.09

13.93 CFS

25 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.73	0.66	25	16	415.38	0.202	6.3216	5	3.77	0.9	0.9	5.87	0.6
109046	2	0.871	0.61	25	16	218.91	0.174	6.3216	5	3.77	0.9	0.9	2.96	0.29
109046	3	0.61	0.66	25	16	212.24	0.226	6.3216	5	3.77	0.9	0.9	2.07	0.21
109046	4	0.14	0.6	25	16	170.02	0.194	6.3216	5	3.77	0.9	0.9	0.48	0.05
109046	5	0.247	0.6	25	16	172.07	0.523	6.3216	5	3.77	0.9	0.9	0.84	0.08

12.22 CFS

Harvard Westlake
KPFF Job # 109046

PRE-CONSTRUCTION HYDROLOGY

10 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.73	0.66	10	16	415.38	0.202	5.1408	5	3.07	0.9	0.9	4.67	0.48
109046	2	0.871	0.61	10	16	218.91	0.174	5.1408	5	3.07	0.9	0.9	2.35	0.23
109046	3	0.61	0.66	10	16	212.24	0.226	5.1408	5	3.07	0.9	0.9	1.65	0.17
109046	4	0.14	0.6	10	16	170.02	0.194	5.1408	5	3.07	0.9	0.9	0.38	0.04
109046	5	0.247	0.6	10	16	172.07	0.523	5.1408	5	3.07	0.9	0.9	0.67	0.06

9.72 CFS

2 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.73	0.66	2	16	415.38	0.202	2.7864	7	1.42	0.7	0.8	2.01	0.26
109046	2	0.871	0.61	2	16	218.91	0.174	2.7864	5	1.66	0.7	0.8	1.19	0.12
109046	3	0.61	0.66	2	16	212.24	0.226	2.7864	5	1.66	0.7	0.8	0.84	0.09
109046	4	0.14	0.6	2	16	170.02	0.194	2.7864	5	1.66	0.7	0.8	0.19	0.02
109046	5	0.247	0.6	2	16	172.07	0.523	2.7864	5	1.66	0.7	0.8	0.34	0.03

4.57 CFS

Appendix “D”

Post-Construction Hydrology Calculation

(50 years, 25 years, 10 years, and 2 years)

Harvard Westlake
KPFF Job # 109046

POST-CONSTRUCTION HYDROLOGY

50 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.996	0.9	50	16	467.6	0.017	7.2	5	4.3	0.9	0.9	7.72	0.99
109046	2	0.638	0.57	50	16	426.8	0.21	7.2	5	4.3	0.9	0.9	2.47	0.23
109046	3	0.561	0.53	50	16	545.9	0.013	7.2	6	3.94	0.9	0.9	1.99	0.19
109046	4	0.407	0.6	50	16	408.3	0.14	7.2	5	4.3	0.9	0.9	1.58	0.15

13.76 CFS

25 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.996	0.9	25	16	467.6	0.017	6.3216	6	3.46	0.9	0.9	6.22	0.86
109046	2	0.638	0.57	25	16	426.8	0.21	6.3216	5	3.77	0.9	0.9	2.16	0.2
109046	3	0.561	0.53	25	16	545.9	0.013	6.3216	7	3.22	0.9	0.9	1.59	0.17
109046	4	0.407	0.6	25	16	408.3	0.14	6.3216	5	3.77	0.9	0.9	1.38	0.13

11.35 CFS

Harvard Westlake
KPFF Job # 109046

POST-CONSTRUCTION HYDROLOGY

10 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.996	0.9	10	16	467.6	0.017	5.1408	7	2.62	0.8	0.9	4.65	0.71
109046	2	0.638	0.57	10	16	426.8	0.21	5.1408	5	3.07	0.9	0.9	1.72	0.16
109046	3	0.561	0.53	10	16	545.9	0.013	5.1408	8	2.46	0.8	0.9	1.19	0.13
109046	4	0.407	0.6	10	16	408.3	0.14	5.1408	5	3.07	0.9	0.9	1.1	0.11

7.56 CFS

2 year 24 Hours Rainfall Event
(By TC Calculator Method)

Project ID	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Volume (acre-ft)
109046	1	1.996	0.9	2	16	467.6	0.017	2.7864	10	1.2	0.6	0.9	2.08	0.38
109046	2	0.638	0.57	2	16	426.8	0.21	2.7864	7	1.42	0.7	0.8	0.72	0.09
109046	3	0.561	0.53	2	16	545.9	0.013	2.7864	13	1.06	0.6	0.7	0.44	0.07
109046	4	0.407	0.6	2	16	408.3	0.14	2.7864	7	1.42	0.7	0.8	0.46	0.06

3.70 CFS