Hydrology Report
For
Lane Ranch Towne Center
City of Lancaster, California

Hunsaker Project No:
0055-003-001
Prepared: 9/10/2008

Christopher Joseph & Associates
30851 Agoura Road, #210
Agoura, California 91301

Prepared by:

Hunsaker & Associates, Los Angeles, Inc.
26074 Avenue Hall Suite 22
Valencia CA 91355
Telephone: (661) 294-2211 Fax: (661) 294-9890

Under the direction of:

Jason H. Fukumitsu, P.E. RCE 40695 Exp: 03/13/09

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1. INTRODUCTION

1.1 Project Description

The proposed Lane Ranch project is located in the southwesterly corner (Quartz Hill) of the City of Lancaster.. The proposed project consists of a 407,000 square foot commercial development located on approximately 38 acres at the southeast corner of 60th Street West and Avenue L.

The site is currently undeveloped and adjacent (east of) to the Quartz Hill High School. Immediately north and west of the site, future residential and commercial projects are currently under development. South of the site, a mixture of developed and undeveloped parcels currently exist within the limits of the Cities of Lancaster and Palmdale.

1.2 Report Summary

This report summarizes the hydrologic analysis for the proposed expansion of the Lane Ranch Towne Center. The pre and post-development onsite 50-Year, 24-Hour, and 25-Year, 24-Hour Peak Flows, and debris generation were calculated for the project. Offsite runoff rates and drainage systems are based upon The City of Lancaster Master Plan of Drainage dated January 2005, and the approved Hydrology for Tract 53229 (Prepared by CCL Engineering). Additional discussions were held with Mr. Carlyle S. Workman of the City of Lancaster

The methodology and assumptions used for this analysis is described in the following section.. Lastly, a conclusion of the results in included, with recommendations and a brief contrast of the existing condition versus the proposed design.

2. METHODOLOGY

A preliminary engineering analysis was performed to understand the existing hydrology and drainage of the site and its contributing tributary watersheds. Research was done at the City of Lancaster to obtain information on the surrounding site conditions. A field reconnaissance of the project site helped to further understand the existing hydrology of the site.

As previously stated, all offsite hydrology analysis is based upon the City's Master Plan of Drainage and the Approved Hydrology for Tract 53229. The onsite hydrology was calculated per the methods outlined in the 2006 Los Angeles County DPW Hydrology Manual. Analysis of the debris production was based on the Debris Production Rate Curves obtained from the LACDPW Sedimentation Manual, dated June 1993.

The Rational Method Time of Concentration methodology was applied to determine the individual sub-area's time of concentrations. Calculations were done with the LACDPW Tc Calculator .

Offsite flows from the areas south east of the site are routed in an existing storm drain located in 57th Street West. The existing storm drain extends northerly past Avenue L and then westerly to an existing detention basin. The detention basin is located at the northwest corner of Avenue L and 57th Street West. The existing drain then continues northerly in 57th Street West, then westerly in Avenue K-12 to the northeast corner of The Commons site, then northerly in 60th Street West.

Runoff from the site is assumed to be collected at the north westerly corner of the site and outletted into the existing detention basin.

The City of Lancaster design standards require that the site release no more than 85% of the pre-development peak 50-year runoff rate. All flow in excess of that amount must be detained. Lane Ranch will be required to contribute (see attached letter in Appendix) to the construction cost of the existing detention basin, which will serve as the mitigation for their onsite detention requirements. Any additional detention (if required) must be provided for in the site design or offsite improvements.

The City of Lancaster, while not a co-permittee with Los Angeles County for NPDES purposes, still requires treatment of the "First Flush" runoff. Water Quality (first flush) calculations are based upon the SUSMP calculations in the LACDPW SUSMP Manual for the 0.75 inch storm.

3. CONCLUSIONS & RECOMMENDATIONS

The proposed Lane Ranch Towne Center expansion would result in an overall increase in runoff from the site, with an overall decrease in debris. A summary of runoff rates follows in Table 3.1. The calculations can be found in the Appendix.

Table 3.1 Onsite Runoff Summary

Storm Event	Pre-development Runoff (cfs)	85 % Pre-development Runoff (cfs)	Post-development Runoff (cfs)	Peak Detention Rate (cfs)
2-year	3.1 cfs		13.7 cfs	
10-year	5.8 cfs	n/a	23.3 cfs	n/a
25-year	7.3 cfs	n/a	28.7 cfs	n/a
50-year	8.5 cfs	7.2 cfs	33.1cfs	Not required

The site will be required to construct the proposed 60 inch storm drain along the site in 60th Street West, and approximately 1300 feet westerly in Avenue L. At the terminus, the drain will connect into a proposed storm drain, or outlet through an energy dissipating structure.

Onsite water quality treatment can be performed by a number of methods, with the approval of the City of Lancaster Engineering Department, including water quality basins, bio-swales, bio-retention, continuous deflection systems, catch basin inserts, or other proprietary solutions. The peak design flow rate and volume is as follows:

Peak Mitigation Flow Rate: Qpm =6.1 cfs
Mitigation Volume: Vm = 85,806 ft^3

4. REFERENCES

Los Angeles County Department of Public Works Hydrology Manual, January 2006

Los Angeles County Department of Public Works Sedimentation Manual, June 1993

Hydrology Study Tract No. 53229, Approved October 7, 2005

5. APPENDICES

A: Time of Concentration Calculations Pre-Development Condition

- 2-year
- 10-year
- 25-year
- 50-year

Project	Subarea	Area (acre	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.	Tc-calculat	Intensity (ir	Cu	Cd	Flow rate (	Tc Equatio	Fire Factor	Burned flo	Volume (acre-ft)
LR	E	40.2	0.02	2	134	1768	0.008	1.5	30	0.39	0.1	0.12	1.88	Tc=(10)^-0	0.34	3.07	0.6
LR	E	40.2	0.02	10	134	1768	0.008	2.7	30	0.69	0.1	0.12	3.33	Tc=(10)^-0	0.34	5.79	1.07
LR	E	40.2	0.02	25	134	1768	0.008	3.3	30	0.85	0.1	0.12	4.1	Tc=(10)^-0	0.34	7.28	1.31
LR	E	40.2	0.02	50	134	1768	0.008	3.8	30	0.98	0.1	0.12	4.73	Tc=(10)^-0	0.34	8.51	1.51

B: Time of Concentration Calculations Post-Development Condition

- 2-year
- 10-year
- 25-year
- 50-year

Project	Subarea	Area (acre	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.	Tc-calculat	Intensity (ir	Cu	Cd	Flow rate (	Tc Equation
LR	P	40.2	0.92	2	134	2592	0.006	1.5	30	0.39	0.1	0.84	13.17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
LR	P	40.2	0.92	10	134	2592	0.006	2.7	30	0.69	0.1	0.84	23.3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
LR	P	40.2	0.92	25	134	2592	0.006	3.3	30	0.85	0.1	0.84	28.7	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
LR	P	40.2	0.92	50	134	2592	0.006	3.8	30	0.98	0.1	0.84	33.09	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

C. Water Quality Calculations

- SUSMP Calculations

SUSUMP Calculations - LA county manual for standard Urban Storm Water mitigation plan

From Appendix A - Volume and Flow Rate Calculations

Enter Ix from Table 1 - Appendix A based on assumed Tc

Cu From Runoff Coefficient Curve - Hydrology Manual Appendix C

LR

Ix	**Cu**	**IMP%**	**Length**	**Slope**	**Total Area**
0.193	0.1	0.92	480	0.008	37.7

	Ap	
34.684	3.016	0

Cd	Formula	Cd = (0.9 x IMP.) +[(1.0-IMP.)xCu]
0.836		

Cd x Ix
0.161348

Tc	Formula	10^-.507x(CdxIx)^-.519 x length^0.483 x slope^-.135
30.35939		

Qpm	Formula	Cd x Ix x Atotal x 1.008333
6.133508		
	Formula	(2722.5*[(Ai)(0.9)+(Ap+Au)(Cu)]

Vm
85805.58

D. City Detention Letter to Lane Ranch LLC

City of Lancaster

44933 North Fern Avenue
Lancaster, California 93534-2461
805-723-6000

July 17, 1998

Mr. George Lane
44909 N. 10th Street West
Lancaster, California 93534

Re: Detention Basin Construction at Avenue L and 57th Street West

Dear Mr. Lane:

As we discussed in our recent meeting, Stratham is proposing to construct a basin on the 5 acre parcel on the north side of Avenue L at approximately 57th Street West. In order to proceed, the one-third interest the Lanes have in this property needs to be granted to the City of Lancaster.

The basin, as currently designed, has a capacity of 20.6 acre-feet and will cost approximately $70,000 to construct. Stratham will build the basin and install a chain link fence around the perimeter.

At the time the Lane Ranch property is developed, the City would require that the basin be enclosed with a block wall and wrought iron fence combination. These improvements, along with the one-third interest in the property, will constitute the Lane's contribution to the basin project. The block wall improvements and directing the runoff to the basin will also satisfy the requirement of mitigating the developmental runoff for the Lane Ranch project.

The cost to construct the block wall and wrought iron fence combination has been estimated at approximately $50,000. The City of Lancaster will construct the street improvements along the Avenue L frontage when the property on the east or west is developed.

The City hereby requests that the Lanes grant their interest in the property to the City and give Stratham permission to begin dewatering the basin. Your prompt attention to this matter is greatly appreciated. Should you need any additional information regarding this request, please contact Mr. Carlyle S. Workman at (805) 723-6079.

Sincerely,

Neil K. Hudson
City Engineer

CSW:lt

E. Lane Ranch Hydrology Map

F. Approved Offsite Hydrology Map Tract 53229