LA VISTA DEL OCEANO RESIDENTIAL DEVELOPMENT

Traffic Analysis

September 21, 2005

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CITY OF SANTA BARBARA
PLANNING DIVISION

Prepared By:

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W.O. 15096.01

INTRODUCTION

Penfield & Smith has prepared the following Traffic Analysis for the proposed single family homes to be located on La Vista del Oceano, between Cliff Drive and Ricardo Avenue in Santa Barbara's Mesa neighborhood. Specifically this analysis includes an assessment of the existing traffic conditions within the study area, determines the expected trip generation and distribution for the project, evaluates the potential traffic impacts to the surrounding intersections, and evaluates whether intersection improvements would be warranted at any of the study intersections.

PROJECT DESCRIPTION

The project consists of four vacant lots proposed for development with new single family residences (1568 La Vista del Oceano Dr. (035-180-085); 1570 La Vista del Oceano Dr. (035-180-084); 1575 La Vista del Oceano Dr. (035-170-023 & -022); and 1576 La Vista del Oceano Dr. (035-180-058)). The upper three lots (1568, 1570 and 1576 La Vista del Oceano Dr.) would be accessed from a common private driveway that comes off of La Vista del Oceano Drive.

The proposed lots abut the unimproved portion of La Vista del Oceano Drive (LVDO). The proposal includes raising the La Vista del Oceano Drive road bed a maximum of eight feet at one point and completing the roadway to Ricardo Avenue in order to provide vehicular access to the lots. Due to topographical constraints, the raising of the road bed and the shared driveway for the upper lots, retaining walls (which vary in height) are required for this project. Guard rails are included in specific areas for safety purposes. A vicinity map of the study area is provided as Exhibit 1.

PROJECT STUDY AREA

LVDO currently exists in two sections (upper and lower). The upper section terminates south of Ricardo Avenue at 1585 and 1595 La Vista del Oceano Drive and provides access for 14 single family residences. Currently, upper LVDO gains access to the City street network via Ricardo Avenue and Dolores Drive.

The existing lower section limits are 1562 & 1564 La Vista del Oceano Drive on the north and Cliff Drive (SR 225) to the south. Lower LVDO provides access to approximately 20 single family residences and to parking for 7 units at the SHIFCO Center. Lower LVDO's only access to the City's street network is via Cliff Drive (SR 225).

LVDO, Dolores and Ricardo are all two-lane local streets. Cliff Drive (SR 225) is a four lane, undivided road, which serves as a principal arterial for the Mesa area. Meigs Road in this area is a two-lane arterial connecting the Mesa with Downtown. The intersections of Dolores Drive at Meigs Road and LVDO at Cliff Drive (SR 225) are both controlled with stop signs on Dolores and LVDO respectively. The intersection of Cliff (SR 255) and Meigs Road is controlled with a traffic signal.

EXISTING TRAFFIC CONDITIONS

Existing traffic volumes have been estimated for the upper and lower segments of LVDO using daily and peak hour trip generation rates for Single Family Housing units from the *ITE Trip Generation Manual, 7th Edition.* The rates and number of trips generated are summarized in Table 1 below.

Table 1 – Existing Traffic Volume Estimates

Land Use (ITE Code)	No. of Units	Average Daily Traffic		A.M. Peak		P.M. Peak	
		Rate	Trips	Rate	Trips	Rate	Trips
Upper Section Single Family Detached Housing (210)	14	9.57	**134**	0.75	**10**	1.01	**14**
Lower Section Single Family Detached Housing (210)	20	9.57	**191**	0.75	**15**	1.01	**20**
Senior Adult Housing - Detached (251)	7	3.71	**26**	0.2	**1**	0.26	**2**
TOTAL (lower)			**217**		**16**		**22**

EVALUATION OF PROJECT IMPACTS

Trip Generation

Project traffic volumes have been estimated using daily and peak hour trip generation rates for Single Family Housing units from the *ITE Trip Generation Manual, 7th Edition.* These rates and number of trips generated are summarized in Table 2 below.

Table 2 – Project Traffic Volume Estimates

Land Use (ITE Code)	No. of Units	Average Daily Traffic		A.M. Peak		P.M. Peak	
		Rate	Trips	Rate	Trips	Rate	Trips
The Project Single Family Detached Housing (210)	4	9.57	**38**	0.75	**3**	1.01	**4**

The four new residences included in **the project** are projected to generate **38 daily trips, 3 AM peak hour trips and 4 PM peak hour trips.**

As a part of this project the upper and lower portions of LVDO will be connected, creating the opportunity for traffic from upper LVDO and the surrounding neighborhood to access Cliff Drive (SR 225) directly. After a review of the configuration of roads connecting to Ricardo Avenue and the upper portion of LVDO we have concluded that no traffic except from the upper portion of LVDO would use the connected portion of LVDO to access Cliff Drive.

Trip Distribution

The future distribution of traffic from the upper portion of LVDO that could benefit by the connection was approximated by examining the current traffic patterns at the intersections of:

- Meigs Road and Ricardo Avenue
- Meigs Road and Dolores Drive
- Cliff Drive (SR 225) and Meigs Road
- Cliff Drive (SR 225) and LVDO

The existing turning movement counts at these intersections are summarized in Exhibit 2. Based on this review it is anticipated that approximately **20%** of upper LVDO traffic may find it advantageous to use the proposed connected roadway. Subsequent to the connection of LVDO traffic from the upper section of LVDO would result in an estimated increase **of 27 ADT, 2 AM peak hour and 3 PM peak hour trips** on lower LVDO.

EVALUATION OF CUMULATIVE GROWTH

According to City staff, there are 9 parcels remaining in the project area, with the potential for a total of 9 single family residences. This "build out" scenario is estimated to generate an additional 86 daily, 6 AM peak hour and 9 PM peak hour trips. Assuming the same 20% distribution onto lower LVDO, this "**build out scenario**" would add **17 ADT, 1 AM peak hour and 1 PM peak hour trip.**

REVIEW OF TRAFFIC CONTROL DEVICE WARRANTS

The Manual of Uniform Traffic Control Devices (MUTCD), and the California Supplement to the MUTCD, provide direction and set standards for the evaluation and implementation of traffic control devices on public roads. Two of the most common traffic control devices are all-way stop sign and traffic signal installations.

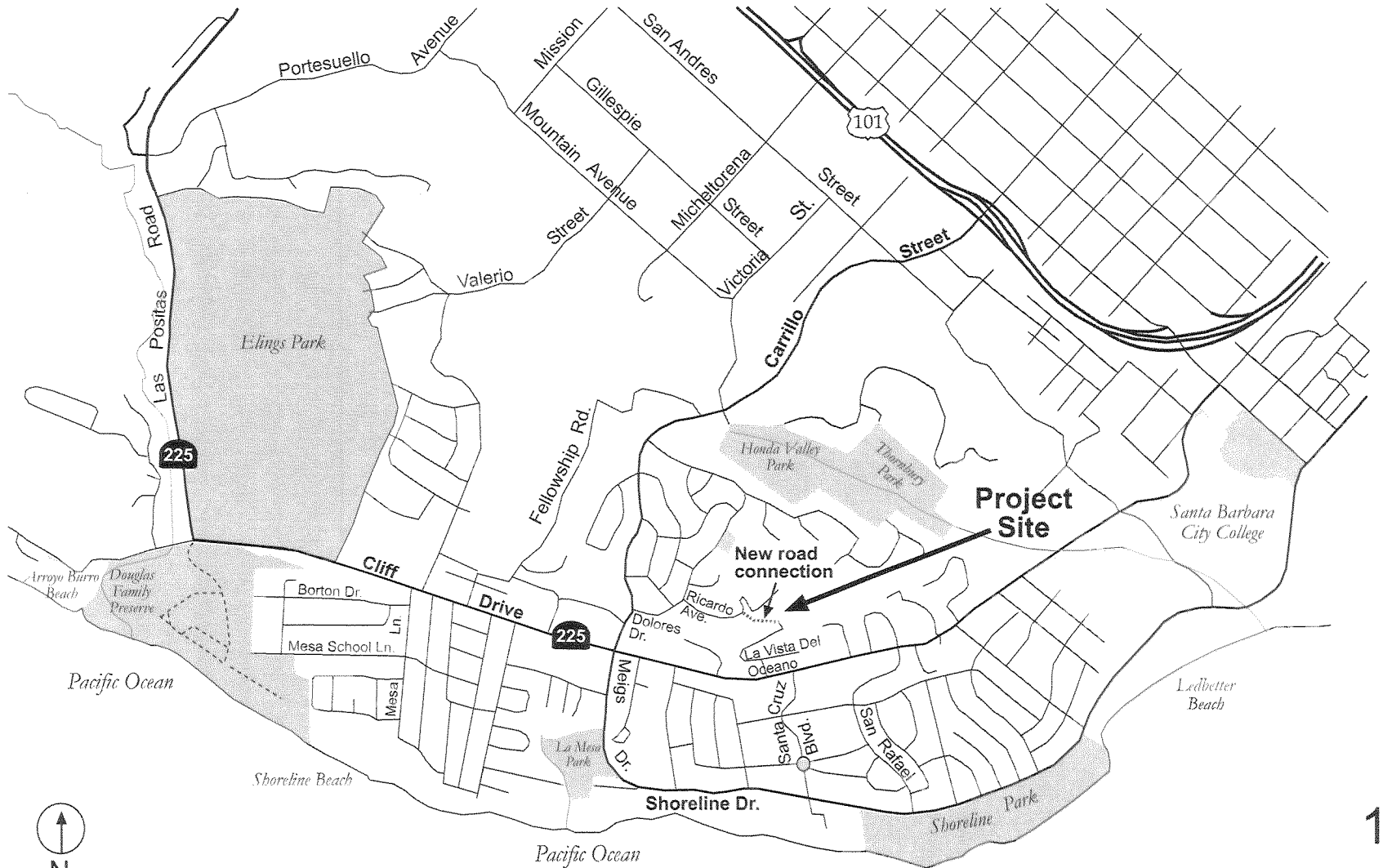
Existing and anticipated future traffic volumes and conditions do not meet any of the MUTCD requirements for the installation of either of these traffic control devices. Further, installation of such devices at Cliff Drive (SR 225) and LVDO could produce the undesired outcome of making LVDO a more convenient and attractive through route.

SUMMARY/CONCLUSIONS

The proposed project is estimated to generate 38 ADT, 3 AM peak hour and 4 PM peak hour trips. Additional traffic will be generated on lower LVDO as a result of the new connection of the upper and lower portion of LVDO as a part of this project. Based on a review of the existing traffic circulation, it is estimated that approximately 20% of upper LVDO traffic would use the connected roadway. The future increase in traffic on lower LVDO from the nine future residences and the existing 14 residences on upper LVDO is projected to be 44 ADT, 3 AM peak hour and 4 PM peak hour trips. Therefore, **the total future increase in traffic on lower LVDO is projected to be 82 ADT, 6 AM peak hour and 8 PM peak hour trips.**

Under these assumptions, none of the project intersections are projected to meet any warrants for additional traffic control devices.

Vicinity Map



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LA VISTA DEL OCEANO DEVELOPMENT
SANTA BARBARA, CA

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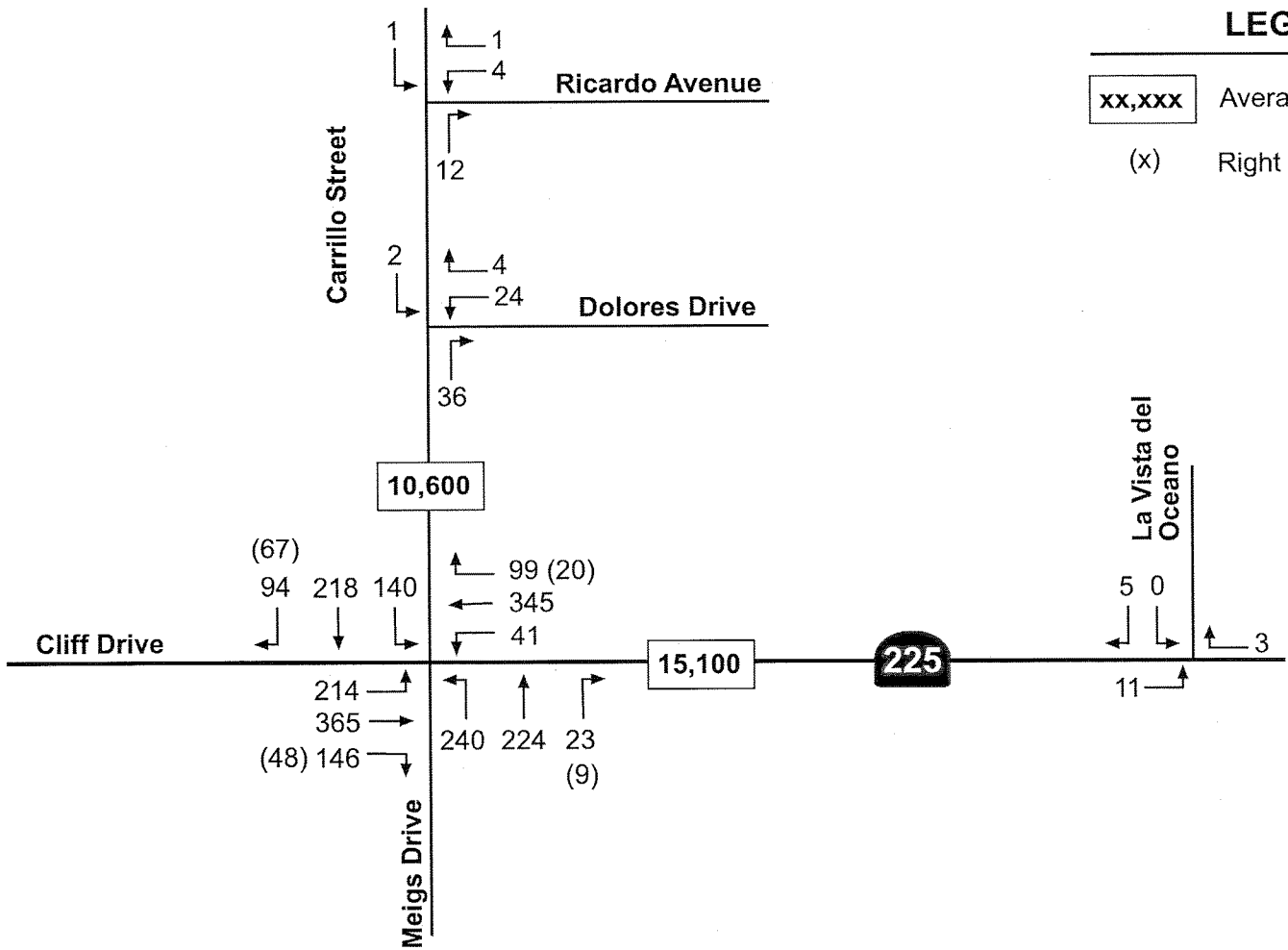
Existing PM Peak Hour Traffic Volumes



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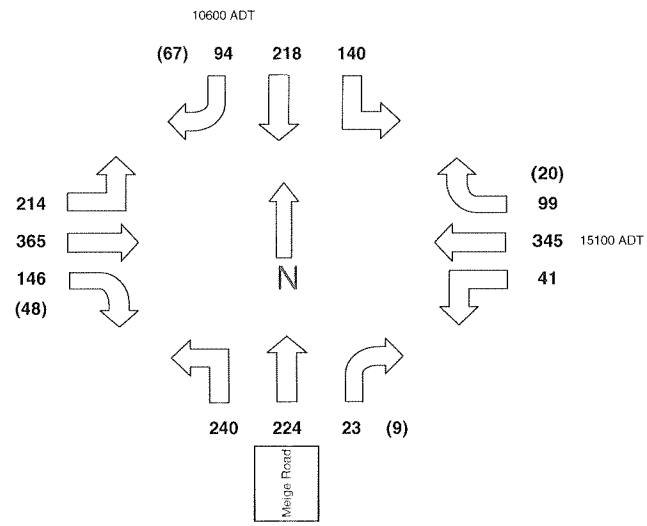
INTERSECTION TURNING MOVEMENT COUNT

LOCATION:	E-W	Cliff Drive	N-S	Meige Road
TIME:	4:30 to 5:30			
DATE:	7-Mar-02			
DAY OF WEEK:	Thrusday			
OBSERVERS:	DR- JR			
WEATHER:	Cloudy			
ROAD CONDITIONS:	Dry			
HOLIDAY/EVENTS:				
NOTES:				



PEAK HOUR SUMMARY (VEH/HOUR)

15 MINUTES COUNT DATA

		EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				TOTAL
15 Min.Periods	STARTING TIME	LEFT	THRU	RIGHT	RR	LEFT	THRU	RIGHT	RR	LEFT	THRU	RIGHT	RR	LEFT	THRU	RIGHT	RR	
1st Period		51	92	40	10	11	67	27	8	58	60	5	1	28	48	20	15	541
2nd Period		59	90	35	13	8	105	22	3	62	59	8	2	36	49	18	16	585
3rd Period		51	94	27	16	8	90	24	7	54	51	6	3	34	62	29	19	575
4th Period		53	89	44	9	14	83	26	2	66	54	4	3	42	59	27	17	592
5th Period																		0
6th Period																		0
7th Period																		0
8th Period																		0
PEAK HOUR TOTAL		214	365	146	48	41	345	99	20	240	224	23	9	140	218	94	67	2293

EXHIBIT 2

1568-1576 La Vista Del Oceano Drive

PRELIMINARY DRAINAGE REPORT

Santa Barbara, California

December 13, 2004

CLIENT:	David Geyer, et al
PREPARED BY:	Penfield & Smith 101 East Victoria Street Santa Barbara, California 93101 (805) 963-9532
WORK ORDER NO.:	15,096.02
PROJECT MANAGER:	Kevin Connors, P.E.

PURPOSE OF REPORT

The purpose of this report is to outline the existing drainage condition and describe the post-project drainage condition for the development of five undeveloped parcels and improvement of an unimproved portion of the1500 block of La Vista Del Oceano Drive. On-site and off-site facilities, as applicable, are described and analyzed. Peak 25-year and 100-year flow rates were calculated.

LOCATION

The project site is located on the lower portion of Lavigia Hill in the Mesa area of the City of Santa Barbara. The lower portion of La Vista Del Oceano Drive connects to Cliff Drive approximately 600 feet east of Meigs Road. The project site is located approximately one-quarter mile north of Cliff Drive. See Figure A.

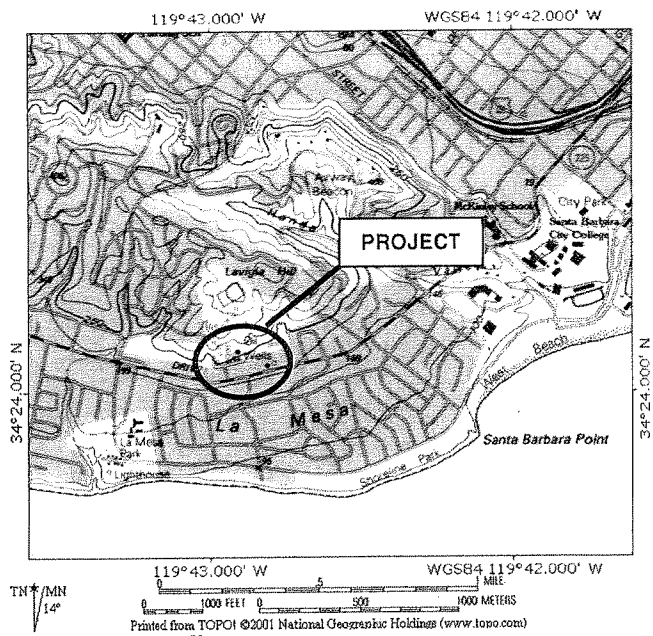


Figure A - Vicinity Map

BACKGROUND

The Owners of the affected undeveloped parcels are: Jane and David Geyer (APN's 035-180-058 and 035-170-022), Pamela and Sid Macofsky (APN 035-180-084), Eugene and Patricia Bucciarelli (APN 035-180-85), and Gene Schechter (APN-035-170-23). The Owners have submitted plans to City of Santa Barbara (City) for the development of the five parcels. The proposed development includes the construction of four single-family residences along with improvements to an unimproved portion of La Vista Del Oceano Drive.

The undeveloped parcels encompass approximately 1 acre and are zoned E-1. The parcels are covered with natural vegetation and slope generally to the south with an average slope of approximately 30%. The surrounding area consists of large single-family residences with a mixture of lots sizes less than and greater than 10,000 square

feet with similar average slopes. An unimproved portion of La Vista Del Oceano Drive, a public road, fronts the parcels to the south. Adjacent to the eastern edge of the project site La Vista Del Oceano Drive is a 20-foot wide paved road with an asphalt concrete berm along the southern edge.

There is an 8-foot wide drainage easement running north to south along the eastern property line of the Bucciarelli (APN 035-180-85). This drainage easement serves several lots to the north of the Bucciarelli parcel. There are currently no drainage improvements within the easement. There are no other known drainage facilities located on or fronting the parcels.

METHOD OF ANALYSIS

A detailed site topographic map was prepared to locate as many of the surface features as feasible. Existing storm drain systems were identified by review of the City storm drain atlas and field investigation. A site visit was made to determine the existing off-site and on-site drainage.

The pre and post project watershed areas for the site and peak storm flows for the 25-year and 100-year storm events were calculated using the Rational Method using Santa Barbara County Flood Control Design programs. Weighted Runoff Coefficients "C" were calculated to determine peak flows for each drainage area. The weighted "C" factors were calculated based on the existing and proposed surface condition for the various drainage areas. The watershed area for La Vista Del Oceano Drive at Cliff Drive is shown in Exhibit "A" titled "PROJECT CONTRIBUTARY AREAS". The Total watershed area that drains to Cliff Drive at the intersection of La Vista Del Oceano Drive was analyzed for the project and is identified as Areas 1-7 on Exhibit "A". The peak flow rates of storm water runoff for the 25-year and 100-year storm events were calculated for the pre and post project watershed. These flow rates are listed in the Table 1 below:

The capacity of existing and proposed storm drain facilities from the project site to Cliff Drive were analyzed to determine the post project impact on existing facilities. Santa Barbara County Flood Control nomographs and computer programs were used to calculate the capacity of the existing storm drain systems for the pre and post-project condition. Calculations are attached.

TABLE 1 - WATERSHED PEAK FLOWS

WATERSHED #	AREA (ACRES)	25 YEAR		100 YEAR	
		PRE PROJ.	POST PROJ.	PRE PROJ.	POST PROJ.
1	1.90	3.9 cfs	3.9 cfs	5.4 cfs	5.4 cfs
2	0.93	1.9 cfs	1.9 cfs	2.6 cfs	2.6 cfs
3	1.34	2.8 cfs	2.8 cfs	3.8 cfs	3.8 cfs
4	1.00	2.1 cfs	2.1 cfs	2.8 cfs	2.8 cfs
5	1.22	2.3 cfs	2.5 cfs	3.2 cfs	3.4 cfs
6	2.04	4.2 cfs	4.2 cfs	5.8 cfs	5.8 cfs
7	10.12	20.8 cfs	20.8 cfs	28.5 cfs	28.5 cfs
TOTAL	18.55	38.0 cfs	38.2 cfs	52.1 cfs	52.3 cfs

RESULTS

Existing Drainage Facilities:

Storm water runoff from the site currently drains from the parcels through surface runoff to the unimproved portion of La Vista Del Oceano Drive where it drains to the improved portion of La Vista Del Oceano Drive. Storm water runoff then drains via a combination of asphalt concrete and Portland cement concrete curb and gutters to the lower portion of La Vista Del Oceano Drive. The portion of La Vista Del Oceano Drive directly below the site has a transverse slope that varies from 2.5% to 0.2% towards the ocean side of the road. Due to this transverse slope, water running down this portion of La Vista Del Oceano flows in the gutter on the downhill side of the road and down the adjacent driveways when the gutter flow is high enough to overtop the driveway apron. The lower portion of La Vista Del Oceano Drive does not have a standard City street configuration. The roadway does not have curb and gutter on either side of the street. Walls built along the various property lines contain the flow within the street area. There is a slight swale within the roadway area that directs water to Cliff Drive.

At the intersection of Cliff Drive there are two 6.5' long and one 10' long curb drain inlets in a sump condition. The two 6.5' curb drain inlets are located on the north side of Cliff Drive, one on each side of the intersection with La Vista Del Oceano Drive, and the 10' curb drain inlet is located on the south side of Cliff Drive. The two 6.5' curb drain inlets are connected by an 18" reinforced concrete pipe (RCP) and drain to the 10' curb drain inlet on the south side of Cliff Drive via an 18" RCP. At the 10' curb inlet, the storm

drain pipe increases to a 30" RCP. The 30" RCP drains to Santa Cruz Avenue where the storm water is released as surface flow, from a 29' long curb outlet drain, onto Santa Cruz Avenue. The storm water is then directed down Santa Cruz Avenue as surface flow towards the ocean.

Proposed Project Drainage:

The project area used to calculate the pre and post project site runoff is 2.56 acres (Areas 3 and 5) and includes the five residential parcels and the portion of La Vista Del Oceano Drive that is to be improved with the project. Our review of the pre and post project hydrology shows an increase in peak flow rates from the site to La Vista Del Oceano Drive of 0.2 cfs for both the 25-year and 100 year storm event. The 0.2 cfs increase in peak flow rate represents a 1 percent increase in flow directed to La Vista Del Oceano Drive from the site and a 0.5 percent increase in flow to storm drain system on Cliff Drive.

The proposed roadway extension is designed to direct runoff water to the inside of the curve and into a concrete gutter on the uphill side of the roadway to the southwestern most property line of the project site. This will improve the drainage on the lower portion of La Vista Del Oceano Drive by directing water away from the properties on the downhill side of the road below the project site.

Analysis of the 25-year flow capacity of La Vista Del Oceano Drive and the Cliff Drive storm drain system was performed. Several roadway cross-sections of La Vista Del Ocean Drive were analyzed to determine the surface flow capacity of the road (calculations are attached). Accurate hydraulic modeling of the lower portion of La Vista Del Oceano Drive is difficult to perform due to the nonstandard roadway cross section and boundary walls. However, modeling of the gutter flow on La Vista Del Oceano Drive was performed based on field measurements to match existing conditions as closely as possible. Gutter flow analysis for La Vista Del Oceano Drive shows that the roadway has the capacity to handle the 25-year storm event for both the pre and post project condition.

The storm drain system, within Caltrans right of way, on Cliff Drive was modeled to determine the capacity of the system. The Cliff Drive storm drain system model shows that the system does not have the capacity to handle the 25-year storm event peak flow for either the pre or post project condition without flooding all four driving lanes on Cliff Drive at the intersection. The three curb inlets on Cliff Drive, which are in a sump condition, can handle approximately 30 cfs, at which point the water level on Cliff Drive becomes high enough to break out of the sump and flow down Santa Cruz Avenue towards the Shoreline Drive.

Detention Basin:

The post-construction peak runoff from both the 25-year and the 100-year storm events will exceed the pre-construction condition by 0.20 cubic feet per second. In order to mitigate this, a detention basin will be constructed on the lot identified as APN 35-170-22. This detention basin will be constructed underground using three fifty foot long pieces of three-foot diameter high density polyethylene pipe. The three pipes will be connected at each end to a manhole structure. The outlet will discharge to the reverse flow catch basin located at the southeast corner of the lot. Storm water runoff from APN 35-180-58 and a western portion of APN 35-180-84 will be collected into a storm drain system that will discharge into the detention basin. An exhibit map of the contributing area is included in this report.

The detention basin was analyzed using the County of Santa Barbara FC&WC District's Urban Hydrograph program. In order to facilitate the use of the County computer program, the three circular pipes were converted to a box culvert with the same cross sectional area and length. Both 25-year and 100-year events were analyzed. The analysis shows that, for the 25-year event with a 3.5 inch discharge orifice, the peak runoff leaving the basin will be reduced by 0.35 cubic feet per second. For the 100-year storm event, using a 5 inch discharge orifice will reduce the peak runoff by 0.22 cubic feet per second. The outlet structure of the detention basin will be designed to accommodate both conditions.

The contributory area for the detention basin is shown on Exhibit "B".

Upper Lot Drainage:

There is an existing 8-foot wide drainage easement running along the eastern property boundary of the Bucciarelli parcel (APN 035-180-85) that provides for a overland escape route for a 100-year storm event for the five parcels (APN 035-180-79, 035-180-80, 035-180-81, 035-180-82, 035-180-83) above the Bucciarelli parcel. The calculated runoff from a 25-year and 100-year storm event for the upper lots was 2.40 cfs and 3.30 cfs respectively. A rock or geotextile lined vegetated earthen swale was designed and analyzed for the easement to provide the overland escape route for the 100-year storm event for the upper parcels as part of this project. The swale would direct storm runoff from the upper lots down to the lower part of La Vista Del Oceano Drive. The calculated runoff from a 25-year and 100-year storm event for the upper lots was 2.40 cfs and 3.30 cfs respectively.

The contributory area for the upper lots is shown on Exhibit "C".

CONCLUSIONS

La Vista Del Oceano Drive has adequate surface flow capacity within the roadway area to handle the 25-year storm peak flow for both the pre and post project condition. The existing storm drain system at Cliff Drive was analyzed and determined to be inadequate to handle the 25-year storm peak flow for both the pre and post project condition. The three existing curb drain inlets and the 18" storm pipes at the Cliff Drive intersection do not have the capacity to handle the peak flow for the 25-year event for the pre and post project conditions. Since the inlets are in a sump condition, the entire roadway on Cliff Drive floods when the system reaches capacity. Once the system reaches capacity and the water depth is approximately 0.75' at the south inlet, the water breaks out of the sump and flows down Santa Cruz Avenue.

The drainage analysis of the proposed project shows that additional storm water would be directed to the existing storm drain system on Cliff Drive. Analysis of the existing storm drain system on Cliff Drive shows that the system does not have sufficient capacity to handle the pre and post project peak storm flows without flooding Cliff Drive. However, the system has an overland escape to Santa Cruz Avenue that retains the storm flows within the public right of way. Due to the under capacity of existing drainage system, a portion of the project runoff will be routed through a subterranean detention basin so that the post-construction peak runoff from the site is no larger than the pre-construction peak runoff.

APPENDIX

EXHIBIT "A", CALCULATIONS, AND PHOTOS

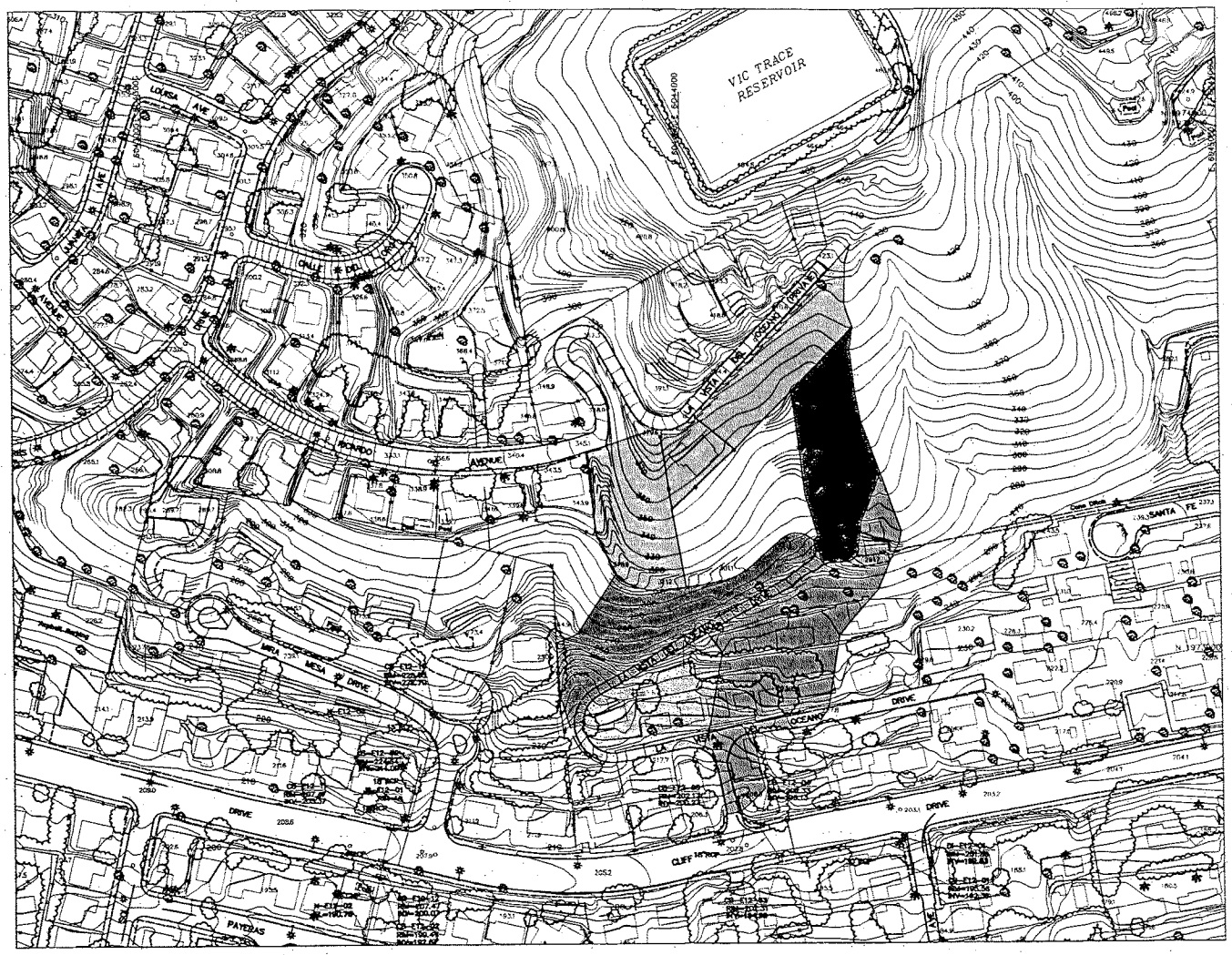


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EXHIBIT "A"
PROJECT CONTRIBUTARY AREAS

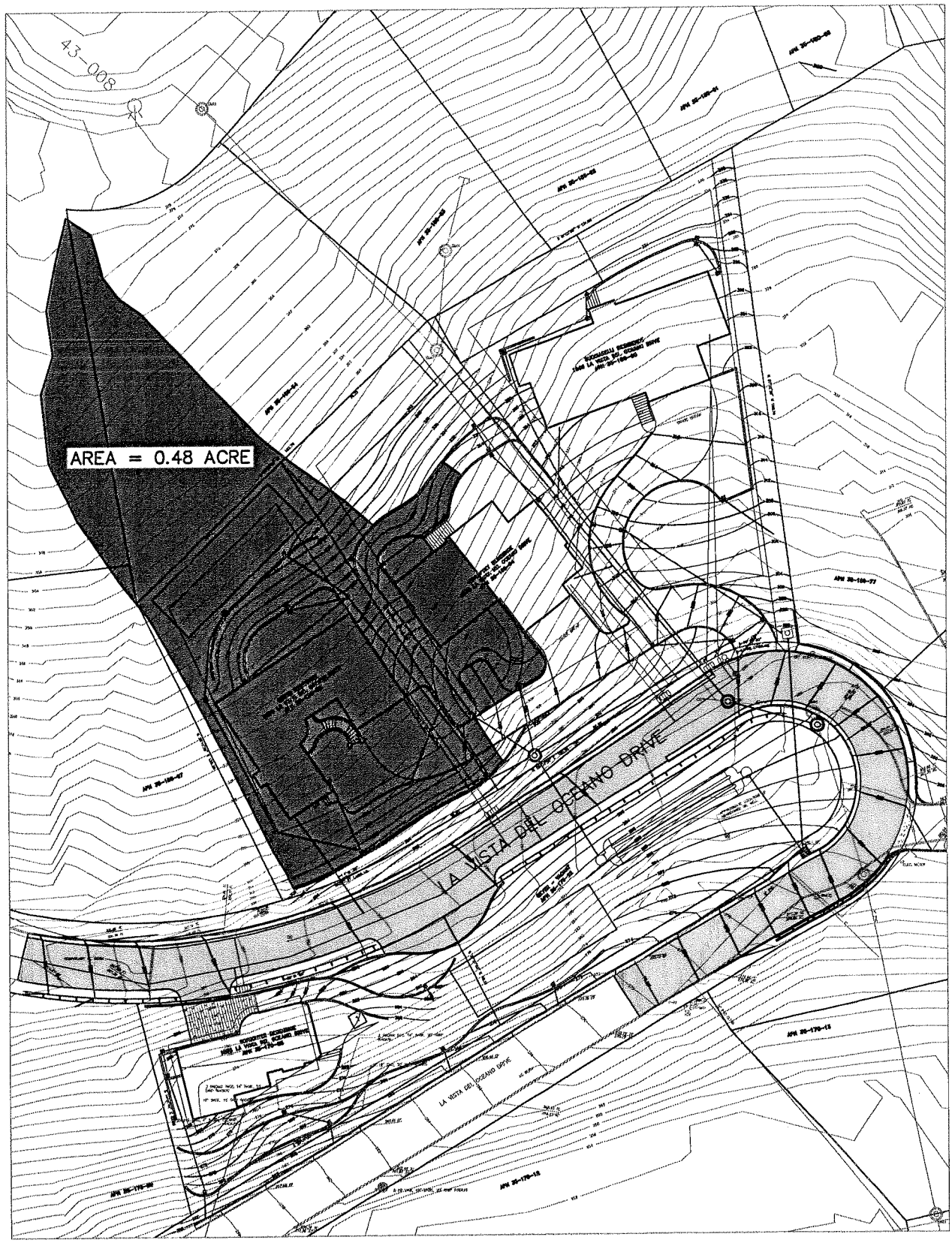

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EXHIBIT "B"
CONTRIBUTING AREA FOR DETENTION BASIN

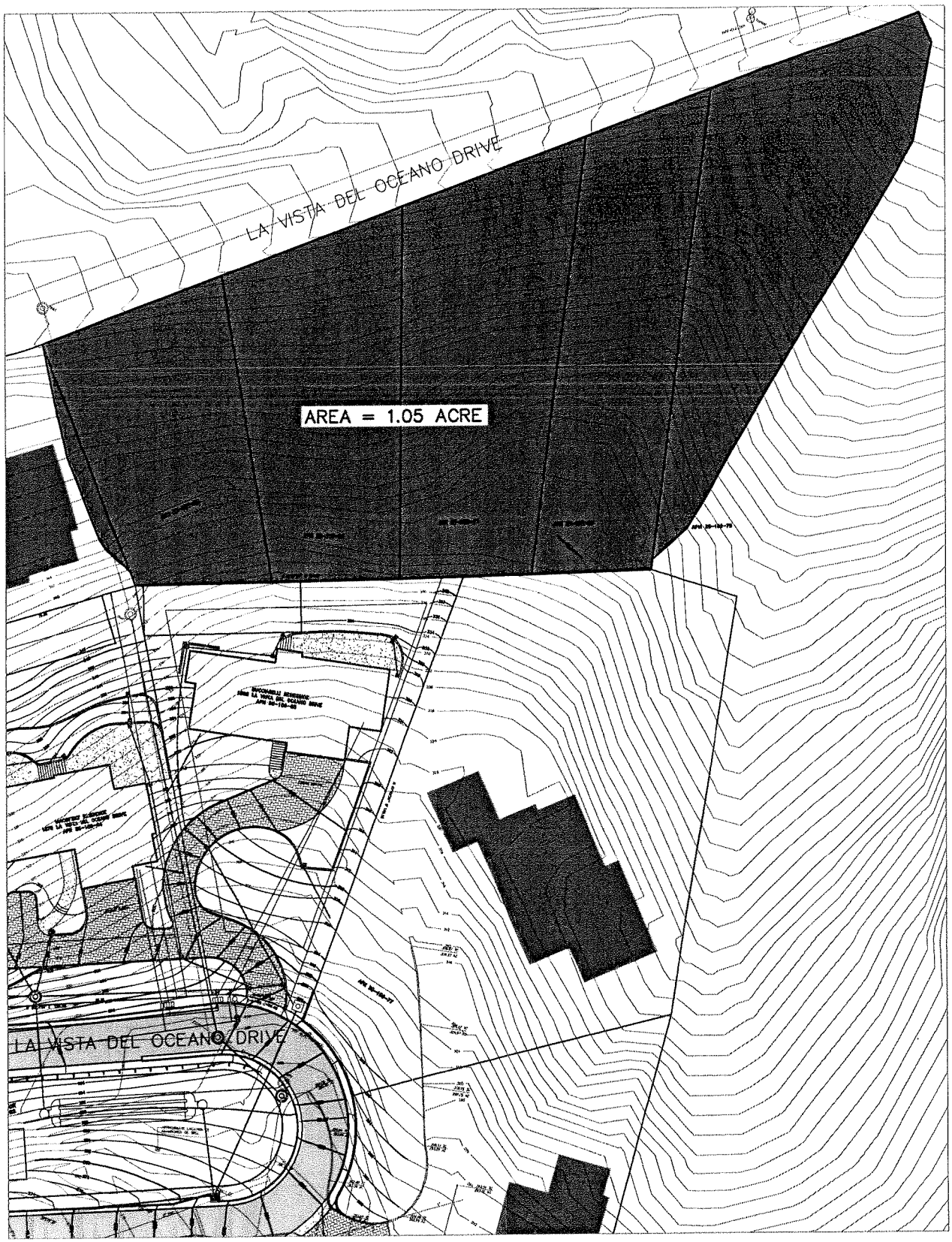

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EXHIBIT "C"
CONTRIBUTING AREA FOR ADJACENT PROPERTIES

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 1 Existing & Proposed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	1.9	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:	
Calculated Runnoff Coefficient:					Calculate
User Selected Runoff Coefficient (Optional):					

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:	
Q10:	0.62	0.68	0.62	
Q25:	0.68	0.72	0.68	Enter Selection
Q50:	0.72	0.76	0.72	
Q100:	0.74	0.78	0.74	

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):		
Q10:	2.61	0.62	3	View RI Curves	Print
Q25:	3.18	0.68	4		
Q50:	3.68	0.72	5	View RC Curves	Exit
Q100:	4.03	0.74	6		

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 2 Existing & Proposed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	0.93	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:
Calculated Runnoff Coefficient:				
User Selected Runoff Coefficient (Optional):				

Calculate

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:
Q10:	0.62	0.68	0.62
Q25:	0.68	0.72	0.68
Q50:	0.72	0.76	0.72
Q100:	0.74	0.78	0.74

Enter Selection

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):
Q10:	2.61	0.62	2
Q25:	3.18	0.68	2
Q50:	3.68	0.72	2
Q100:	4.03	0.74	3

View RI Curves

Print

View RC Curves

Exit

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 4 Existing & Proposed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	1.00	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:
Calculated Runnoff Coefficient:				
User Selected Runoff Coefficient (Optional):				

Calculate

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:
Q10:	0.62	0.68	0.62
Q25:	0.68	0.72	0.68
Q50:	0.72	0.76	0.72
Q100:	0.74	0.78	0.74

Enter Selection

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):
Q10:	2.61	0.62	2
Q25:	3.18	0.68	2
Q50:	3.68	0.72	3
Q100:	4.03	0.74	3

View RI Curves

Print

View RC Curves

Exit

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 5 Existing Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	1.22	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:	
Calculated Runnoff Coefficient:					Calculate
User Selected Runoff Coefficient (Optional):					

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:	
Q10:	0.62	0.68	0.62	
Q25:	0.68	0.72	0.68	Enter Selection
Q50:	0.72	0.76	0.72	
Q100:	0.74	0.78	0.74	

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):		
Q10:	2.61	0.62	2 (1.97)	View RI Curves	Print
Q25:	3.18	0.68	3 (2.64)		
Q50:	3.68	0.72	3 (3.23)	View RC Curves	Exit
Q100:	4.03	0.74	4 (3.64)		

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 5 Propsed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	1.22	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:
Calculated Runnoff Coefficient:				
User Selected Runoff Coefficient (Optional):				

Calculate

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:
Q10:	0.62	0.68	0.68
Q25:	0.68	0.72	0.72
Q50:	0.72	0.76	0.76
Q100:	0.74	0.78	0.78

Enter Selection

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):
Q10:	2.61	0.68	2 (2.16)
Q25:	3.18	0.72	3 (2.79)
Q50:	3.68	0.76	3 (3.41)
Q100:	4.03	0.78	4 (3.83)

View RI Curves

Print

View RC Curves

Exit

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 6 Existing & Propsed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	2.04	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:
Calculated Runnoff Coefficient:				
User Selected Runoff Coefficient (Optional):				

Calculate

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:
Q10:	0.62	0.68	0.62
Q25:	0.68	0.72	0.68
Q50:	0.72	0.76	0.72
Q100:	0.74	0.78	0.74

Enter Selection

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):
Q10:	2.61	0.62	3
Q25:	3.18	0.68	4
Q50:	3.68	0.72	5
Q100:	4.03	0.74	6

View RI Curves

View RC Curves

Print

Exit

Program Rational - XL

User Data:

Project Name:	LVDO Road		5-Lot Development
Date of Run:	4/19/2004	Run By:	K. Connors
Notes:	Area 7 Existing & Propsed Condition		

Input Data:

Location:	South Coast	Land Use Type:	Large Lot Subdivisions (>10,000 sq. ft.
Area (Acres):	10.12	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:
Calculated Runnoff Coefficient:				
User Selected Runoff Coefficient (Optional):				

Calculate

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected:
Q10:	0.62	0.68	0.62
Q25:	0.68	0.72	0.68
Q50:	0.72	0.76	0.72
Q100:	0.74	0.78	0.74

Enter Selection

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):
Q10:	2.61	0.62	16
Q25:	3.18	0.68	22
Q50:	3.68	0.72	27
Q100:	4.03	0.74	30

View RI Curves

Print

View RC Curves

Exit

LA VISTA DEL OCEANO DRAINAGE ANALYSIS W.O. 15,096.01
Performed by: KJC
Date: April 20, 2004
Location: LVDO at Cliff Drive

Hydraulic properties of Full Street Section:
n = .025
Street X-section Properties
Z(0)=99.00/ Gutter= 1.0 Z(1)=0.001/ L(2)= 1.0 Z(2)=0.001/ L(3)=18.0 Z(3)=0.001
Inlet Capacities Based on 3 inch Local Depression.
Slope = 9.6% Crown Height = 0.02 ft Width = 20.0 ft

D	Q	V	V	Spread	Curb Opening Inlet Lengths for % Intercep	
(ft)	(cfs)	(Avg)	(Gutter)	(ft)	100%	75%
0.05	1.73	2.16	2.41	20.0	40.6	33.1
0.10	6.65	3.69	3.71	20.0	78.2	57.4
0.15	13.86	4.95	4.71	20.0	108.7	75.1
0.20	23.01	6.06	5.52	20.0	135.3	89.5
0.25	33.90	7.06	6.20	20.0	159.5	102.1
0.30	46.39	8.00	6.78	20.0	181.9	113.3
0.35	60.37	8.88	7.29	20.0	202.9	123.5
0.40	75.75	9.71	7.72	20.0	222.8	132.9
0.45	92.45	10.51	8.10	20.0	241.7	141.6
0.50	110.42	11.27	8.43	20.0	259.8	149.9
0.55	129.61	12.00	8.72	20.0	277.2	157.6
0.60	149.96	12.71	8.98	20.0	294.0	165.0
0.65	171.45	13.39	9.21	20.0	310.3	172.1
0.70	194.02	14.06	9.41	20.0	326.1	178.8
0.75	217.66	14.71	9.60	20.0	341.4	185.3

LA VISTA DEL OCEANO DRAINAGE ANALYSIS W.O. 15,096.01
Performed by: KJC
Date: April 20, 2004
Location: LVDO Downstream of Curve

Hydraulic properties of Full Street Section:
n = .025
Street X-section Properties
Z(0)=99.00/ Gutter= 1.0 Z(1)=0.005/ L(2)= 1.0 Z(2)=0.005/ L(3)=18.0 Z(3)=0.005
Inlet Capacities Based on 3 inch Local Depression.
Slope = 6% Crown Height = 0.52 ft Width = 20.0 ft

D	Q	V	V	Spread	Curb Opening Inlet Lengths for % Intercep	
(ft)	(cfs)	(Avg)	(Gutter)	(ft)	100%	75%
0.05	0.34	1.34	1.85	10.0	7.9	6.4
0.10	2.05	2.05	2.89	20.0	24.1	17.7
0.15	6.30	3.15	3.69	20.0	49.4	34.1
0.20	12.29	4.10	4.33	20.0	72.3	47.8
0.25	19.78	4.94	4.88	20.0	93.1	59.6
0.30	28.61	5.72	5.34	20.0	112.2	69.9
0.35	38.69	6.45	5.74	20.0	130.0	79.1
0.40	49.92	7.13	6.08	20.0	146.8	87.6
0.45	62.24	7.78	6.38	20.0	162.7	95.3
0.50	75.60	8.40	6.65	20.0	177.9	102.6
0.55	89.95	8.99	6.88	20.0	192.4	109.4
0.60	105.25	9.57	7.09	20.0	206.4	115.8
0.65	121.47	10.12	7.27	20.0	219.8	121.9
0.70	138.57	10.66	7.43	20.0	232.9	127.7
0.75	156.53	11.18	7.57	20.0	245.5	133.2

LA VISTA DEL OCEANO DRAINAGE ANALYSIS W.O. 15,096.02
Performed by: KJC
Date: April 20, 2004
Location: LVDO @ Curve

Hydraulic properties of Full Street Section:
n = .025
Street X-section Properties
Z(0)=99.00/ Gutter= 1.0 Z(1)=0.026/ L(2)= 1.0 Z(2)=0.026/ L(3)=18.0 Z(3)=0.026
Inlet Capacities Based on 3 inch Local Depression.
Slope = 9.6% Crown Height = 0.52 ft Width = 20.0 ft

D	Q	V	V	Spread	Curb Opening Inlet Lengths for % Intercep	
(ft)	(cfs)	(Avg)	(Gutter)	(ft)	100%	75%
0.05	0.08	1.75	1.98	1.9	2.0	1.6
0.10	0.54	2.79	3.39	3.8	6.3	4.6
0.15	1.53	3.55	4.44	5.8	12.0	8.3
0.20	3.23	4.20	5.29	7.7	19.0	12.6
0.25	5.75	4.79	5.99	9.6	27.1	17.3
0.30	9.24	5.34	6.59	11.5	36.2	22.5
0.35	13.80	5.86	7.11	13.5	46.4	28.2
0.40	19.55	6.35	7.56	15.4	57.5	34.3
0.45	26.60	6.83	7.95	17.3	69.5	40.7
0.50	35.05	7.29	8.29	19.2	82.5	47.6
0.55	46.26	7.98	8.59	20.0	99.0	56.3
0.60	59.79	8.79	8.86	20.0	117.2	65.8
0.65	74.71	9.58	9.09	20.0	135.2	75.0
0.70	90.95	10.34	9.30	20.0	152.9	83.9
0.75	108.45	11.07	9.49	20.0	170.1	92.3

LA VISTA DEL OCEANO DRAINAGE ANALYSIS W.O. 15,096.02
Performed by: KJC
Date: April 20, 2004
Location: LVDO Upstream of Curve

Hydraulic properties of Full Street Section:
n = .025
Street X-section Properties
Z(0)=99.00/ Gutter= 1.0 Z(1)=0.002/ L(2)= 1.0 Z(2)=0.002/ L(3)=18.0 Z(3)=0.002
Inlet Capacities Based on 3 inch Local Depression.
Slope = 10% Crown Height = 0.04 ft Width = 20.0 ft

D	Q	V	V	Spread	Curb Opening Inlet Lengths for % Intercep	
(ft)	(cfs)	(Avg)	(Gutter)	(ft)	100%	75%
0.05	1.11	1.85	2.44	20.0	26.1	21.3
0.10	5.58	3.49	3.77	20.0	65.7	48.2
0.15	12.50	4.81	4.79	20.0	98.0	67.7
0.20	21.46	5.96	5.62	20.0	126.2	83.5
0.25	32.22	7.00	6.32	20.0	151.6	97.0
0.30	44.64	7.97	6.92	20.0	175.1	109.0
0.35	58.60	8.88	7.43	20.0	197.0	119.9
0.40	74.00	9.74	7.87	20.0	217.6	129.8
0.45	90.76	10.55	8.26	20.0	237.3	139.1
0.50	108.84	11.34	8.60	20.0	256.1	147.7
0.55	128.16	12.09	8.90	20.0	274.1	155.9
0.60	148.68	12.82	9.16	20.0	291.5	163.6
0.65	170.36	13.52	9.40	20.0	308.3	171.0
0.70	193.16	14.20	9.60	20.0	324.6	178.0
0.75	217.06	14.87	9.79	20.0	340.5	184.8

LA VISTA DEL OCEANO DRAINAGE ANALYSIS W.O. 15,096.02
Performed by: KJC
Date: April 20, 2004
Location: LVDO 200' ± Upstream of Curve

Hydraulic properties of Full Street Section:
n = .025
Street X-section Properties
Z(0)=99.00/ Gutter= 1.0 Z(1)=0.007/ L(2)= 1.0 Z(2)=0.007/ L(3)=18.0 Z(3)=0.007
Inlet Capacities Based on 3 inch Local Depression.
Slope = 10% Crown Height = 0.04 ft Width = 20.0 ft

D	Q	V	V	Spread	Curb Opening Inlet Lengths for % Intercep	
(ft)	(cfs)	(Avg)	(Gutter)	(ft)	100%	75%
0.05	0.32	1.77	2.35	7.1	7.4	6.0
0.10	1.91	2.68	3.71	14.3	22.5	16.5
0.15	5.72	3.57	4.74	20.0	44.8	31.0
0.20	12.57	4.84	5.58	20.0	74.0	49.0
0.25	21.47	5.96	6.28	20.0	101.0	64.6
0.30	32.17	6.99	6.88	20.0	126.1	78.5
0.35	44.52	7.95	7.39	20.0	149.6	91.0
0.40	58.40	8.85	7.84	20.0	171.8	102.5
0.45	73.72	9.70	8.23	20.0	192.7	112.9
0.50	90.40	10.51	8.57	20.0	212.7	122.7
0.55	108.39	11.29	8.87	20.0	231.9	131.9
0.60	127.62	12.04	9.14	20.0	250.2	140.4
0.65	148.05	12.76	9.37	20.0	268.0	148.6
0.70	169.64	13.46	9.58	20.0	285.1	156.4
0.75	192.35	14.14	9.77	20.0	301.7	163.8

FULL FLOW STORM DRAIN HYDRAULICS

PROJECT: 1568-1576 La Vista Del Oceano Road
LOCATION: 1568-1576 La Vista Del Oceano Road
CLIENT: David Geyer
W.O. #: 15096

CALCULATED BY: KJC DATE: 29-Jun-04
CHECKED BY: * DATE: *
DIRECTORY NAME: W:\15096\Drainage STORM FREQ.: 25 YEAR

LINE											
STATION									HGL	Hv	EGL
0									195.56	0.58	196.14
STATION	Q	DIA	A	N	V	Sf	L	Hf	HGL	Hv	EGL
58	30	30	4.91	0.013	6.11	0.005	58.0	0.31	195.87	0.58	196.45
STATION	Q	DIA		Kmh	V			Hmh	HGL	Hv	EGL
60	30	30		0.05	6.11			0.03	195.90	0.58	196.48
STATION	Q	DIA	A	N	V	Sf	L	Hf	HGL	Hv	EGL
234	30	30	4.91	0.031	6.11	0.030	174.0	5.30	201.20	0.58	201.78
STATION	Qu	DIA-u	Qd	DIA-d	Q3	DIA-3	ANGLE3				
	Q4	DIA-4	ANGLE4		Q5	DIA-5	ANGLE5	ΔY	HGL	Hv	EGL
	10	18	30	30	20	30	90				
236	0	18	90		0	18	90	1.18	202.38	0.50	202.88
STATION	Q	DIA	A	N	V	Sf	L	Hf	HGL	Hv	EGL
304	10	18	1.77	0.013	5.66	0.009	68.0	0.62	202.99	0.50	203.49
STATION	Qu	DIA-u	Qd	DIA-d	Q3	DIA-3	ANGLE3				
	Q4	DIA-4	ANGLE4		Q5	DIA-5	ANGLE5	ΔY	HGL	Hv	EGL
	3	18	10	18	7	30	90				
306	0	18	90		0	18	90	0.91	203.90	0.04	203.95
STATION	Q	DIA	A	N	V	Sf	L	Hf	HGL	Hv	EGL
387	3	18	1.77	0.013	1.70	0.001	81.0	0.07	203.97	0.04	204.01
STATION	Q	DIA		Ke	V			He	HGL	Hv	EGL
389	3	30		0.5	0.61			0.00	204.01	0.01	204.01

ANTA BARBARA COUNTY FC&WCD URBAN HYDROGRAPH, Version 1.2.1
10-03-2004
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COMPUTATION of a Runoff Hydrograph

ydrd num	Return Period	Drainage Area	--24 hr Rain-- 100yr	Used	Imper-vious	Loss in/hr	T(c) min	Runoff Depth	Vol ac-ft	Peak Flow	Unit q
1	25yrs	0.5ac	8.20in	6.56in	0.20	0.32	12.0	2.92in	0.1	0.7cfs	1.50

SANTA BARBARA COUNTY FC&WCD URBAN HYDROGRAPH, Version 1.2.1
Licensed to Penfield & Smith Engineers, Inc.
ROUTING Hydrograph 1 [Hydgph] thru a Basin, Outflow Hydrograph is 2

Outlet Pipe(s) : Diameter = 3.5 in
Btm Slope = .02 Length = 35 ft
Manning's n = .013 Entrance Loss Ke = .5
No. of Pipes = 1 Pipe Inv below Basin Btm = 0

Storage data entered from keyboard

Depth (ft)	Storage Volume (cu ft)	(ac-ft)
1	118	0.00
2	471	0.01
3	825	0.02

Time (hrs)	Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Water Depth (ft)	Flow Over Weir (cfs)
0.25	0.00	0.00	0.00	0.00	
0.50	0.00	0.00	0.00	0.00	
0.75	0.00	0.00	0.00	0.00	
1.00	0.00	0.00	0.00	0.01	
1.25	0.00	0.00	0.00	0.01	
1.50	0.01	0.01	0.00	0.02	
1.75	0.01	0.01	0.00	0.03	
2.00	0.01	0.01	0.00	0.04	
2.25	0.01	0.01	0.00	0.04	
2.50	0.01	0.01	0.00	0.05	
2.75	0.01	0.01	0.00	0.05	
3.00	0.01	0.01	0.00	0.05	
3.25	0.01	0.01	0.00	0.05	
3.50	0.01	0.01	0.00	0.05	
3.75	0.01	0.01	0.00	0.06	
4.00	0.01	0.01	0.00	0.06	
4.25	0.01	0.01	0.00	0.06	
4.50	0.01	0.01	0.00	0.06	
4.75	0.01	0.01	0.00	0.06	
5.00	0.01	0.01	0.00	0.06	
5.25	0.01	0.01	0.00	0.06	
5.50	0.02	0.01	0.00	0.06	
5.75	0.02	0.02	0.00	0.06	
6.00	0.02	0.02	0.00	0.06	
6.25	0.02	0.02	0.00	0.07	
6.50	0.02	0.02	0.00	0.07	
6.75	0.02	0.02	0.00	0.07	
7.00	0.02	0.02	0.00	0.07	
7.25	0.02	0.02	0.00	0.07	
7.50	0.02	0.02	0.00	0.08	
7.75	0.02	0.02	0.00	0.08	
8.00	0.02	0.02	0.00	0.08	
8.25	0.02	0.02	0.00	0.09	
8.50	0.03	0.02	0.00	0.10	
8.75	0.03	0.03	0.00	0.11	
9.00	0.03	0.03	0.00	0.11	
9.25	0.04	0.03	0.00	0.14	
9.50	0.06	0.05	0.00	0.21	
9.75	0.07	0.06	0.00	0.26	

10.00	0.07	0.07	0.00	0.27
10.25	0.09	0.08	0.00	0.33
10.50	0.12	0.10	0.00	0.44
10.75	0.13	0.12	0.00	0.52
11.00	0.13	0.13	0.00	0.54
11.25	0.13	0.13	0.00	0.54
11.50	0.13	0.13	0.00	0.54
11.75	0.13	0.13	0.00	0.54
12.00	0.13	0.13	0.00	0.54
12.25	0.18	0.15	0.00	0.64
12.50	0.24	0.21	0.00	0.86
12.75	0.25	0.24	0.00	1.01
13.00	0.26	0.24	0.00	1.04
13.25	0.26	0.25	0.00	1.08
13.50	0.35	0.26	0.00	1.22
13.75	0.72	0.30	0.01	1.87
14.00	0.66	0.36	0.02	2.78
14.25	0.23	0.37	0.02	2.98
14.50	0.10	0.34	0.01	2.50
14.75	0.08	0.31	0.01	1.90
15.00	0.07	0.27	0.01	1.36
15.25	0.05	0.19	0.00	0.79
15.50	0.03	0.05	0.00	0.20
15.75	0.03	0.03	0.00	0.12
16.00	0.03	0.03	0.00	0.11
16.25	0.02	0.02	0.00	0.10
16.50	0.02	0.02	0.00	0.09
16.75	0.02	0.02	0.00	0.08
17.00	0.02	0.02	0.00	0.08
17.25	0.02	0.02	0.00	0.08
17.50	0.02	0.02	0.00	0.07
17.75	0.02	0.02	0.00	0.07
18.00	0.02	0.02	0.00	0.07
18.25	0.02	0.02	0.00	0.07
18.50	0.02	0.02	0.00	0.07
18.75	0.02	0.02	0.00	0.07
19.00	0.02	0.02	0.00	0.07
19.25	0.02	0.02	0.00	0.07
19.50	0.01	0.02	0.00	0.06
19.75	0.01	0.01	0.00	0.06
20.00	0.01	0.01	0.00	0.06
20.25	0.01	0.01	0.00	0.06
20.50	0.01	0.01	0.00	0.06
20.75	0.01	0.01	0.00	0.05
21.00	0.01	0.01	0.00	0.05
21.25	0.01	0.01	0.00	0.05
21.50	0.01	0.01	0.00	0.05
21.75	0.01	0.01	0.00	0.05
22.00	0.01	0.01	0.00	0.05
22.25	0.01	0.01	0.00	0.04
22.50	0.01	0.01	0.00	0.04
22.75	0.01	0.01	0.00	0.03
23.00	0.01	0.01	0.00	0.03
23.25	0.00	0.01	0.00	0.03
23.50	0.00	0.00	0.00	0.01
23.75	0.00	0.00	0.00	0.01
24.00	0.00	0.00	0.00	0.00

$\Delta Q = 0.72 - 0.37$
$= 0.35$ cfs

<<< Summary of Results >>>

Max INFLOW = 1 cfs at 13.75 hrs
Max OUTFLOW = 0 cfs at 14.25 hrs
Max STORAGE = 0.02 ac-ft at 14.25 hrs
Max DEPTH = 2.98 ft at 14.25 hrs
Total INFLOW Volume = 0.12 ac-ft
Total OUTFLOW Volume = 0.12 ac-ft
Storage at end of 24 hours = 0.00 ac-ft

Hydrograph # 2 Calced

SANTA BARBARA COUNTY FC&WCD URBAN HYDROGRAPH, Version 1.2.1
10-03-2004
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COMPUTATION of a Runoff Hydrograph

Hyd Num	Return Period	Drainage Area	--24 hr Rain-- 100yr	Used	Imper-vious	Loss in/hr	T(c) min	Runoff Depth	Vol ac-ft	Peak Flow	Unit q
1	100yrs	0.5ac	8.20in	8.20in	0.20	0.28	12.0	4.33in	0.2	0.9cfs	1.97

SANTA BARBARA COUNTY FC&WCD URBAN HYDROGRAPH, Version 1.2.1
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OUTING Hydrograph 1 [Hydgph] thru a Basin, Outflow Hydrograph is 2

utlet Pipe(s) :
Btm Slope = .02
Manning's n = .013
No. of Pipes = 1
Diameter = 5 in
Length = 35 ft
Entrance Loss Ke = .5
Pipe Inv below Basin Btm = 0

torage data entered from keyboard

Depth (ft)	Storage Volume (cu ft)	(ac-ft)
1	118	0.00
2	471	0.01
3	825	0.02

Time (hrs)	Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Water Depth (ft)	Flow Over Weir (cfs)
0.25	0.00	0.00	0.00	0.00	
0.50	0.00	0.00	0.00	0.00	
0.75	0.00	0.00	0.00	0.00	
1.00	0.00	0.00	0.00	0.00	
1.25	0.01	0.00	0.00	0.01	
1.50	0.01	0.01	0.00	0.02	
1.75	0.01	0.01	0.00	0.02	
2.00	0.01	0.01	0.00	0.02	
2.25	0.01	0.01	0.00	0.02	
2.50	0.01	0.01	0.00	0.03	
2.75	0.01	0.01	0.00	0.03	
3.00	0.02	0.02	0.00	0.03	
3.25	0.02	0.02	0.00	0.03	
3.50	0.02	0.02	0.00	0.03	
3.75	0.02	0.02	0.00	0.03	
4.00	0.02	0.02	0.00	0.03	
4.25	0.02	0.02	0.00	0.03	
4.50	0.02	0.02	0.00	0.03	
4.75	0.02	0.02	0.00	0.03	
5.00	0.02	0.02	0.00	0.03	
5.25	0.02	0.02	0.00	0.03	
5.50	0.02	0.02	0.00	0.03	
5.75	0.02	0.02	0.00	0.03	
6.00	0.02	0.02	0.00	0.03	
6.25	0.02	0.02	0.00	0.04	
6.50	0.02	0.02	0.00	0.04	
6.75	0.02	0.02	0.00	0.04	
7.00	0.02	0.02	0.00	0.04	
7.25	0.02	0.02	0.00	0.04	
7.50	0.02	0.02	0.00	0.04	
7.75	0.02	0.02	0.00	0.04	
8.00	0.02	0.02	0.00	0.04	
8.25	0.04	0.03	0.00	0.06	
8.50	0.06	0.05	0.00	0.09	
8.75	0.06	0.06	0.00	0.11	
9.00	0.06	0.06	0.00	0.11	
9.25	0.09	0.08	0.00	0.14	
9.50	0.12	0.11	0.00	0.20	
9.75	0.13	0.13	0.00	0.23	

10.00	0.13	0.13	0.00	0.23
10.25	0.16	0.15	0.00	0.27
10.50	0.20	0.19	0.00	0.34
10.75	0.21	0.21	0.00	0.37
11.00	0.21	0.21	0.00	0.37
11.25	0.21	0.21	0.00	0.37
11.50	0.21	0.21	0.00	0.37
11.75	0.21	0.21	0.00	0.37
12.00	0.21	0.21	0.00	0.37
12.25	0.27	0.25	0.00	0.45
12.50	0.35	0.33	0.00	0.59
12.75	0.36	0.36	0.00	0.65
13.00	0.37	0.37	0.00	0.65
13.25	0.37	0.37	0.00	0.66
13.50	0.49	0.45	0.00	0.80
13.75	0.95	0.63	0.01	1.38
14.00	0.87	0.73	0.01	1.95
14.25	0.33	0.68	0.01	1.67
14.50	0.18	0.42	0.00	0.75
14.75	0.14	0.06	0.00	0.11
15.00	0.13	0.16	0.00	0.29
15.25	0.10	0.10	0.00	0.18
15.50	0.06	0.07	0.00	0.13
15.75	0.05	0.05	0.00	0.09
16.00	0.05	0.05	0.00	0.09
16.25	0.04	0.04	0.00	0.08
16.50	0.03	0.03	0.00	0.05
16.75	0.02	0.02	0.00	0.04
17.00	0.02	0.02	0.00	0.04
17.25	0.02	0.02	0.00	0.04
17.50	0.02	0.02	0.00	0.04
17.75	0.02	0.02	0.00	0.04
18.00	0.02	0.02	0.00	0.04
18.25	0.02	0.02	0.00	0.04
18.50	0.02	0.02	0.00	0.04
18.75	0.02	0.02	0.00	0.04
19.00	0.02	0.02	0.00	0.04
19.25	0.02	0.02	0.00	0.03
19.50	0.02	0.02	0.00	0.03
19.75	0.02	0.02	0.00	0.03
20.00	0.02	0.02	0.00	0.03
20.25	0.02	0.02	0.00	0.03
20.50	0.02	0.02	0.00	0.03
20.75	0.02	0.02	0.00	0.03
21.00	0.02	0.02	0.00	0.03
21.25	0.02	0.02	0.00	0.03
21.50	0.01	0.01	0.00	0.03
21.75	0.01	0.01	0.00	0.03
22.00	0.01	0.01	0.00	0.03
22.25	0.01	0.01	0.00	0.02
22.50	0.01	0.01	0.00	0.02
22.75	0.01	0.01	0.00	0.02
23.00	0.01	0.01	0.00	0.02
23.25	0.01	0.01	0.00	0.01
23.50	0.00	0.00	0.00	0.01
23.75	0.00	0.00	0.00	0.00
24.00	0.00	0.00	0.00	0.00

$\Delta Q = 0.95 - 0.73$
$= 0.22$ cfs

<<< Summary of Results >>>

Max INFLOW = 1 cfs at 13.75 hrs
Max OUTFLOW = 1 cfs at 14.00 hrs
Max STORAGE = 0.01 ac-ft at 14.00 hrs
Max DEPTH = 1.95 ft at 14.00 hrs
Total INFLOW Volume = 0.17 ac-ft
Total OUTFLOW Volume = 0.17 ac-ft
Storage at end of 24 hours = 0.00 ac-ft

"ydrograph # 2 Calced

Santa Barbara County Flood Control and Water Conservation District

Program Rational - XL

User Data:

Project Name:	O DRIVE UPPER LOTS		15096.02
Date of Run:	10/15/2004	Run By:	K. CONNORS
Notes:	ANALYSIS OF UPPER LOT DRAINAGE FOR V-DITCH & PIPE SIZING		

Input Data:

Location:	South Coast	Land Use Type:	Single Family (<10,000 sq. ft.)
Area (Acres):	1.05	Time of Concentration (Min.):	12

	Q10:	Q25:	Q50:	Q100:	
Calculated Runnoff Coefficient:	0.68	0.72	0.76	0.78	Calculate
User Selected Runoff Coefficient (Optional):					

For Large Lot Subdivisions (>10,000 sq. ft.):

	Low Value:	High Value:	User Selected	
Q10:				Enter Selection
Q25:				
Q50:				
Q100:				

Results:

	Rainfall Intensity:	Runoff Coef:	Q (cfs):		
Q10:	2.61	0.68	2	View RI Curves	Print
Q25:	3.18	0.72	2 2.40		
Q50:	3.68	0.76	3	View RC Curves	Exit
Q100:	4.03	0.78	3 3.30		

$Q = CIA$

Analysis of Earthen Swale for 100-Year Storm Overland Escape Route using SBCFCD Programs
Proposed Swale is 8' Wide and 8" Deep with a 27% Slope
Q100 of 3.3 cfs used for sizing swale

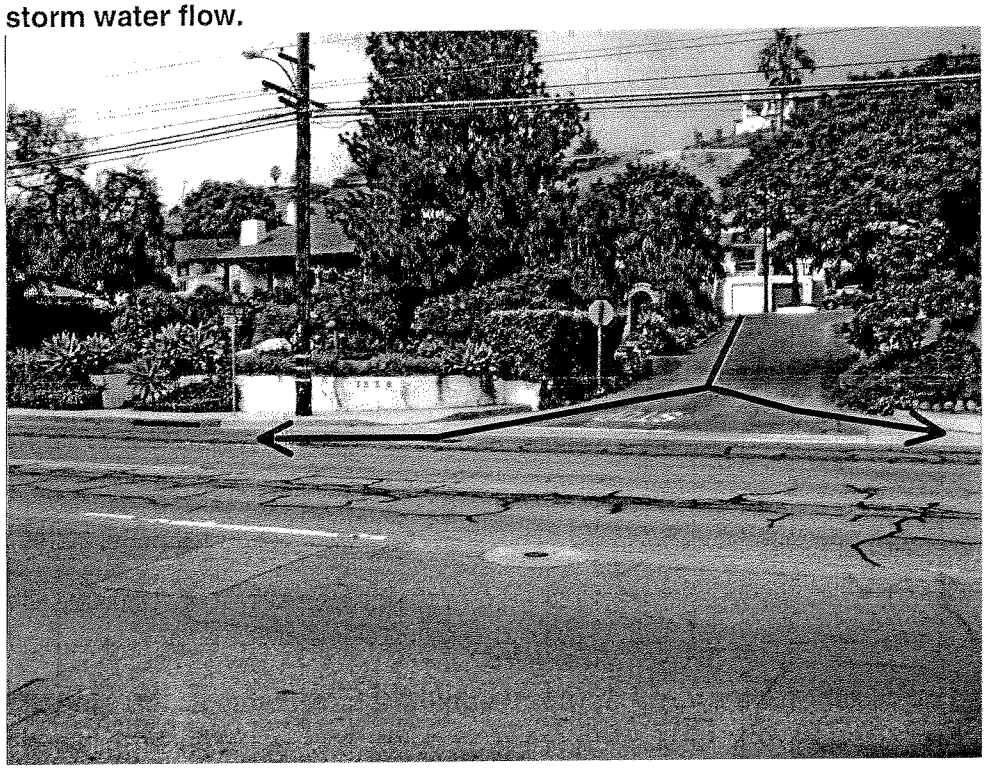
Program C H A N N E L . E X E SBCFCD
Flow= 3cfs Base= 2.0ft
Side Slope= 1.80 n=0.050
Btm Slope=0.27000, Dn= 0.25 ft, Vn= 5.28 ft/sec, P+M= 1 cu ft, Fr= 2.01
Dc= 0.39 ft

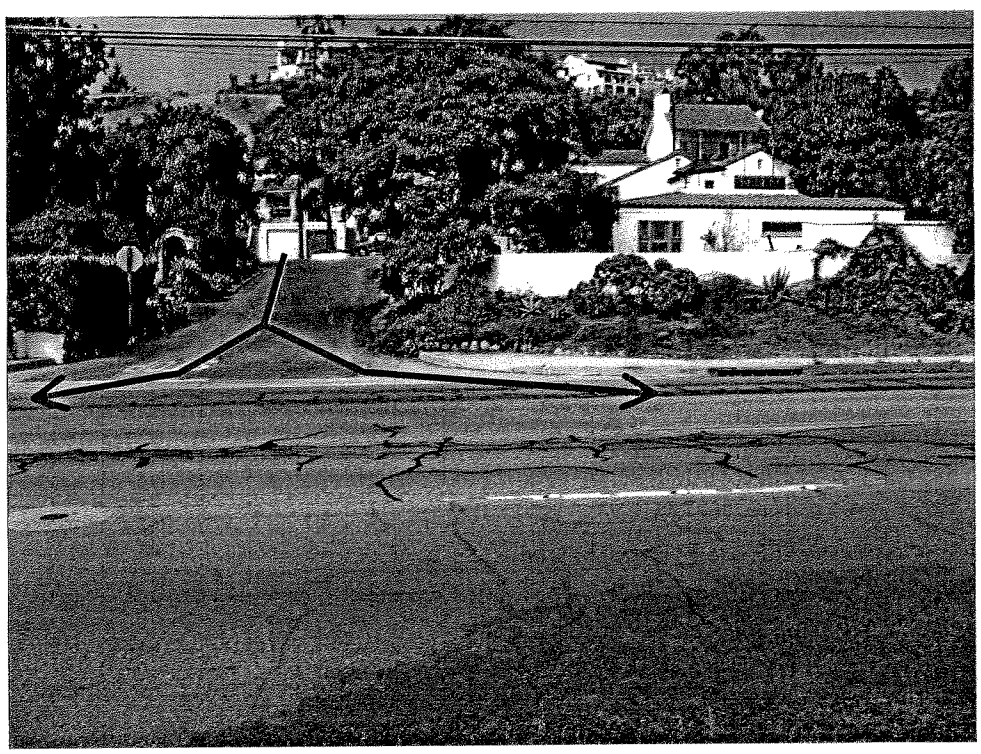
Flow in TRAPEZOIDAL Channel

Normal Depth = 0.25 ft
Normal Vel = 5.28 ft/sec
V*V/2G = 0.43 ft
V*V/2G+Depth = 0.69 ft
P + M = 1 cu-ft
Froude Nr. = 2.01
Critical Depth = 0.39 ft

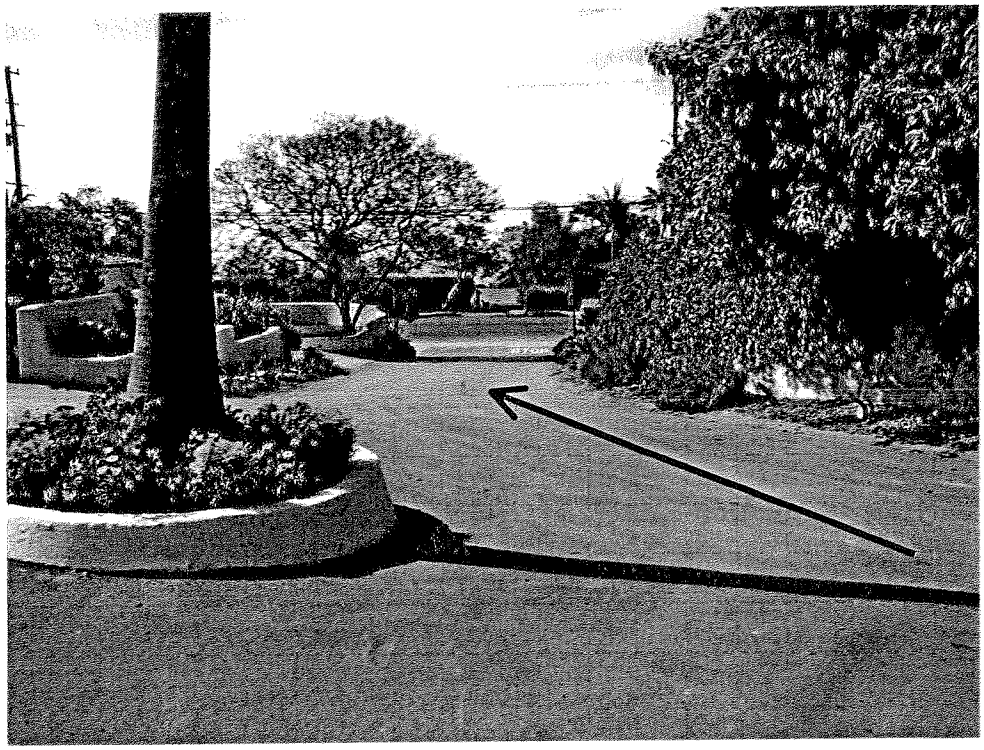
Earthen Swale has Adequate Capacity for 100-Year Storm Flows.

La Vista Del Oceano Road Drainage Photos - Arrows show direction of storm water flow.

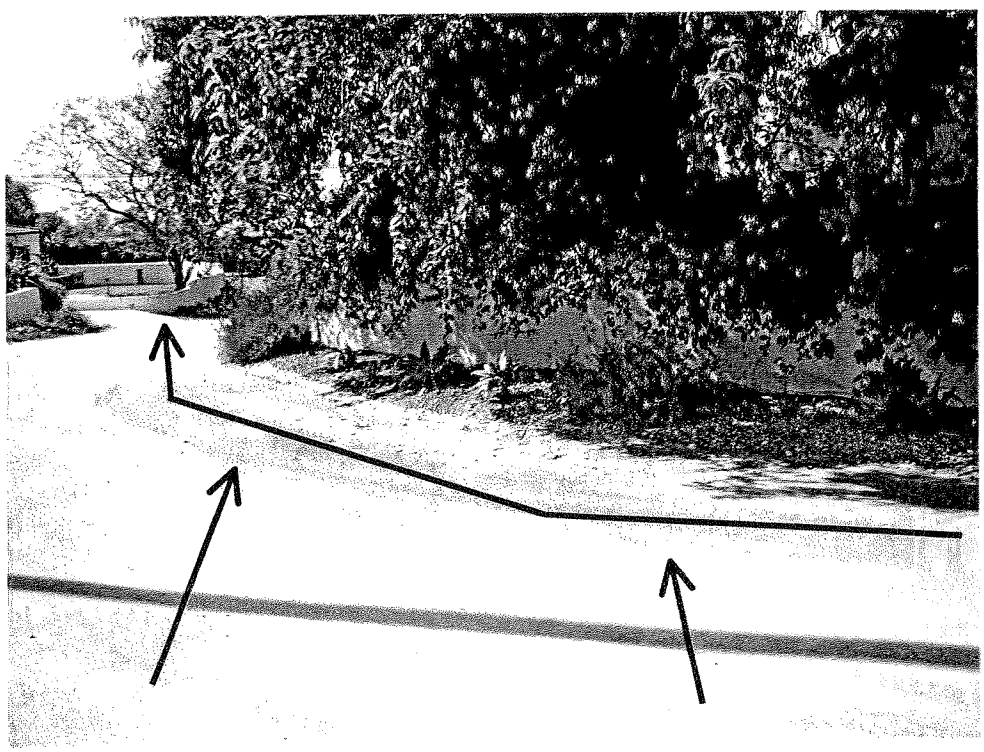




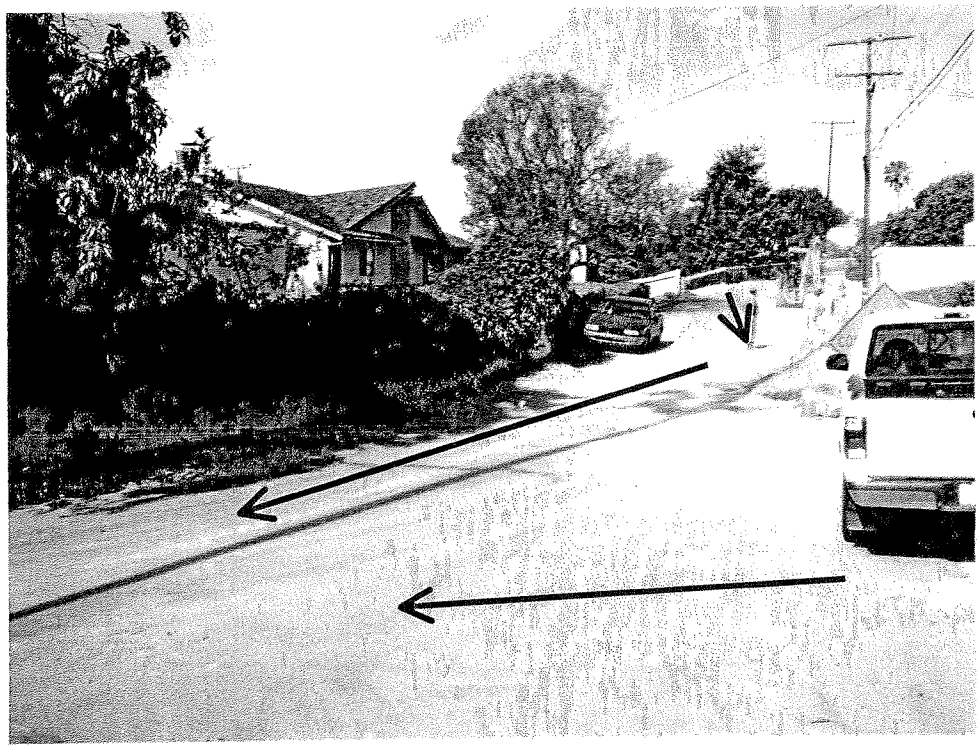
Intersection of La Vista Del Oceano Road and Cliff Drive with existing drainage inlets on north side of Cliff Drive.



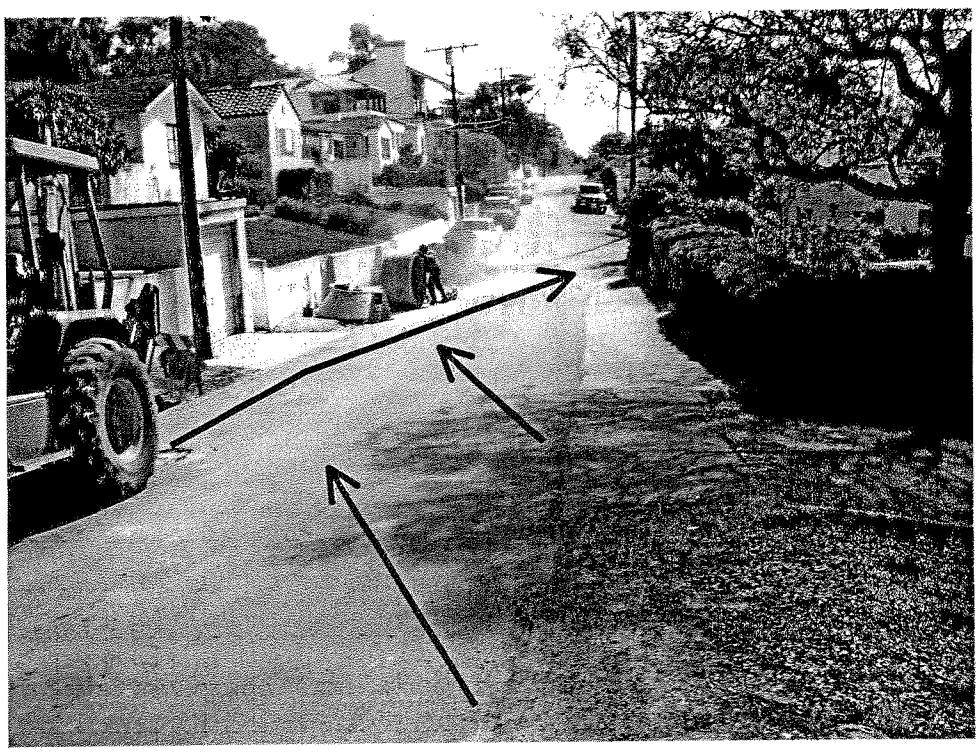
Intersection of La Vista Del Oceano Road and Cliff Drive viewed from the north at Del Oceano Street.



La Vista Del Oceano Road looking south at Del Oceano Street.

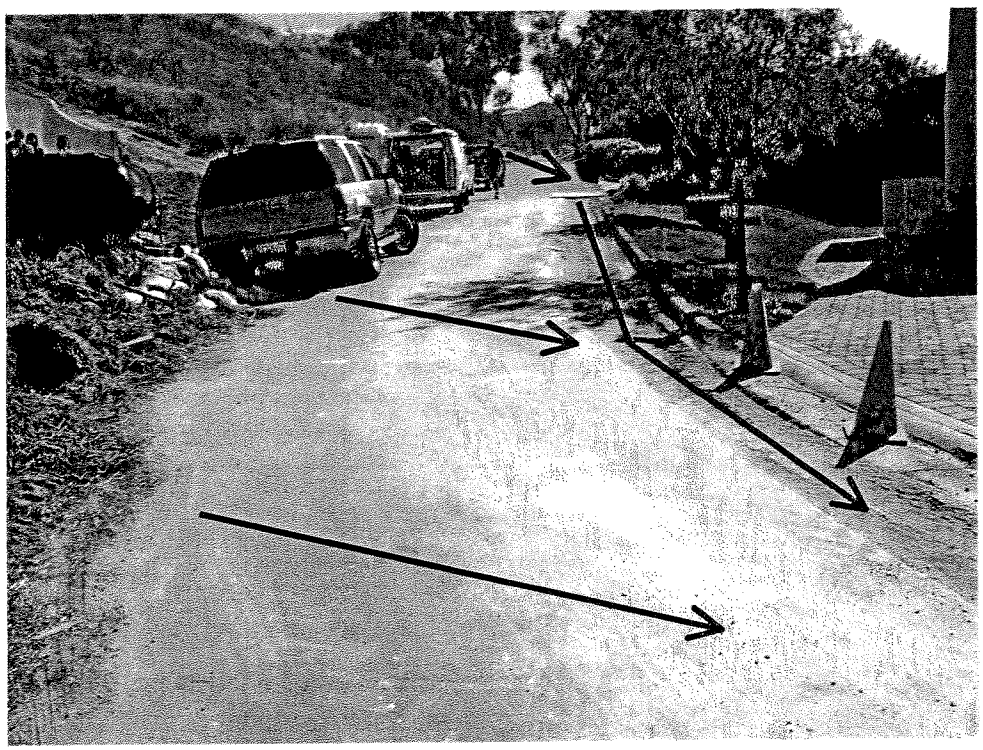


La Vista Del Oceano Road looking west at Del Oceano Street.

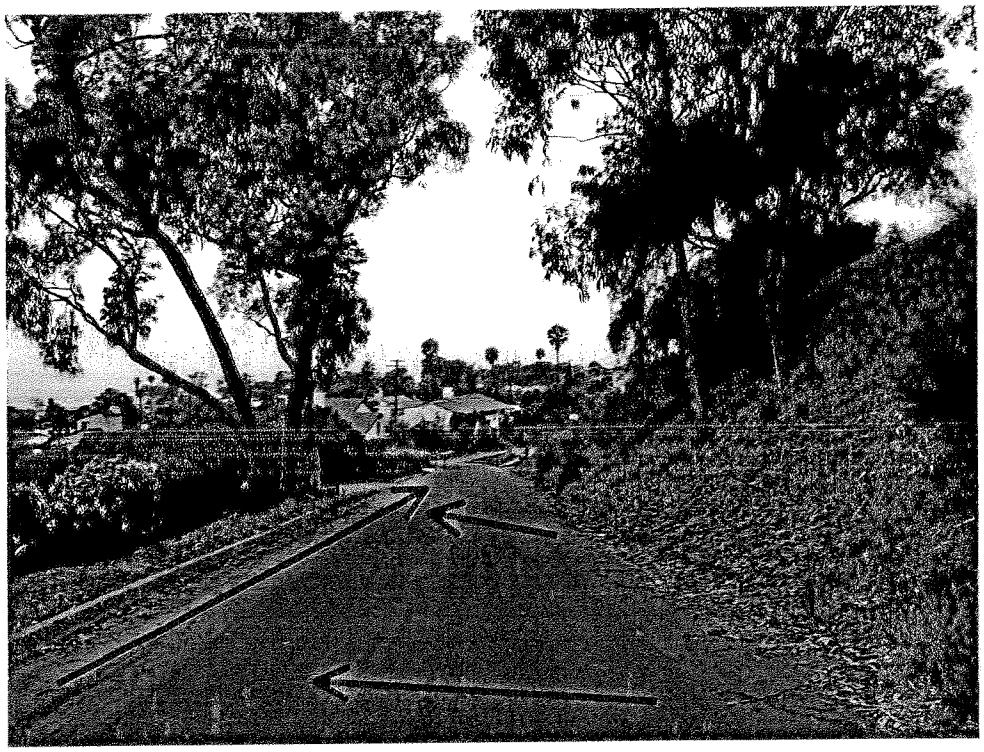


La Vista Del Oceano Road looking east towards Del Oceano Street.

La Vista Del Oceano Road looking southwest at lower curve.



La Vista Del Oceano Road looking northeast above lower curve.



La Vista Del Oceano Road looking west toward lower curve.

La Vista Del Oceano Road looking east toward end of existing road.

La Vista Del Oceano Road looking at upper end of existing road.

Upper end of La Vista Del Oceano Road.