

**SUMMARY OF FINDINGS FOR THE
ANNUAL DRAINAGE CHANNEL FIELD
ASSESSMENT AND MAINTENANCE PRIORITIZATION
PROJECT (PHASE 1)
FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER
SYSTEM MAINTENANCE PROGRAM (MMP) MAP 3:
RANCHO BERNARDO**

**Job Number 17204-D
August 4, 2015**

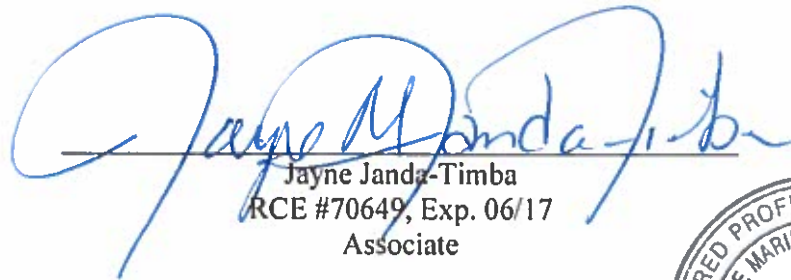
RICK
RICK ENGINEERING COMPANY

ENGINEERING COMPANY

RICK ENGINEERING CO

**SUMMARY OF FINDINGS FOR THE
ANNUAL DRAINAGE CHANNEL FIELD
ASSESSMENT AND MAINTENANCE PRIORITIZATION PROJECT (PHASE 1)
FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER SYSTEM MAINTENANCE
PROGRAM (MMP) MAP 3: RANCHO BERNARDO**

Job Number 17204-D


Jayne Janda-Timba
RCE #70649, Exp. 06/17
Associate



Prepared For:
City of San Diego
2781 Caminito Chollas
San Diego, California 92105

Prepared By:
Rick Engineering Company
Water Resources Division
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

August 4, 2015

TABLE OF CONTENTS

1.0 Executive Summary	1
2.0 Introduction.....	1
3.0 Desktop Channel Maintenance Prioritization Analysis	1
4.0 Hydrologic Summary.....	2
5.0 Hydraulic Analysis.....	3
6.0 Other Channel Prioritization Factors	4
7.0 Summary of Findings and Recommendations	4

Tables

Table 1: Channel Prioritization Assessment Factors and Weighting	2
Table 2: 100-year Peak Discharge (Q100) Estimation Based on Watershed Size	2
Table 3: Summary of Approximate Hydrologic Data	3
Table 4: Summary of Hydraulic Analysis Results	3
Table 5: Channel Prioritization Assessment Scoring Summary.....	4

Appendices

Appendix A: Master Storm Water System Maintenance Program (MMP), dated October 2011, Storm Water Facilities Key Map and Map 3: Rancho Bernardo	
Appendix B: City of San Diego Operations and Maintenance (O&M) Channel Maintenance Inspection Forms completed for the channel and Site photos taken by the City of San Diego	
Appendix C: Hydrologic Support Material	
Appendix D: Hydraulic Analysis Output	
Appendix E: Channel Prioritization Assessment Sheet	
Appendix F: Channel Maintenance Prioritization Summary Sheet	
Appendix G: Available As-built plans	
Appendix H: Compact Disc: PDF Version of Full Report	

1.0 Executive Summary

This report and preliminary analyses concludes that the Channel Prioritization Score for the Rancho Bernardo (MMP Map 3) is **88.6 out of 100**. This score is above average and indicates that the channel is highly recommended for maintenance. If the channel is maintained to reflect the as-built condition, the hydraulic capacity of the channel will increase from the current less than 2-year storm event capacity to a 100-year storm event capacity. In addition to the hydraulic capacity, the analyses considered other factors including water quality, community input and aesthetics. The analyses concluded that these other factors are generally in good condition and the benefits of maintaining the channel are mainly to reduce the flood risk.

2.0 Introduction

This report summarizes the findings for the Annual Drainage Channel Field Assessment and Maintenance Prioritization Project (Phase 1) for the City of San Diego for Master Storm Water System Maintenance Program (MMP), dated October 2011, Map 3: Rancho Bernardo. Refer to Appendix A for the MMP Storm Water Facilities Key Map and Map 3.

Purpose

As part of the Master Storm Water System Maintenance Program (MMP), the City of San Diego performed site visits to drainage channels within the MMP and designated several drainage channels as maintenance priorities. The purpose of Phase 1 of this project is to perform a desktop analysis to evaluate the drainage channels identified by the City of San Diego and rank them in order of significance for the purposes of City of San Diego maintenance activities.

3.0 Desktop Channel Maintenance Prioritization Analysis

The desktop channel maintenance prioritization analysis is based on the following items which were reviewed and evaluated to determine the maintenance priority:

- City of San Diego Operations and Maintenance (O&M) Channel Maintenance Inspection Forms completed for the channel by the City of San Diego (Refer to Appendix B)
- Site photos taken by the City of San Diego (Refer to Appendix B)
- Available as-built plans (Refer to Appendix G)
- Hydraulic Analysis (Refer to Section 5.0 and Appendix D for detailed output)

Section 5.1 of the MMP discusses the Annual Maintenance Needs Determination Process. As part of the determination process, the MMP recommends that certain factors be evaluated including flood risk to life and property, water quality, community input and aesthetics. These four factors were utilized for this channel maintenance prioritization analysis. For the purposes of prioritizing the channel for maintenance activities, each main factor is weighted as shown in Table 1 below:

Table 1

Channel Prioritization Assessment Factors and Weighting	
Factor	Percent Weighted (%)
Flood Risk	75
Water Quality	10
Community Input	10
Aesthetics	5

As part of the channel prioritization analysis, each of the main factors has been divided into sub-factors. To determine the Flood Risk factor, a basic hydraulic analysis was performed for the channel. The hydraulic analysis is described in more detail in the Hydraulic Analysis section (Section 5.0) of this report. The remaining factors, Water Quality, Community Input and Aesthetics were assessed based on the site photos and the information provided on the (O&M) Channel Maintenance Inspection Form completed for the channel provided by the City of San Diego. These factors and sub-factors and how they relate to the Channel Prioritization Score are shown in more detail on the Channel Prioritization Assessment Sheet located in Appendix E.

4.0 Hydrologic Summary

Estimated Peak Discharges

A drainage study for the channel was not available at the authorship of this report. The drainage channel is not a Federal Emergency Management Agency (FEMA) defined channel and no detailed hydrologic analysis was available. Therefore, the 100-year storm event peak discharge (Q100) for the channel was estimated based on the size of the watershed tributary to the channel as shown in Table 2 below:

Table 2

100-year Peak Discharge (Q100) Estimation Based on Watershed Size				
Watershed Area (square	<1	1	2	>4
cfs per acre	4	2	1.5	1

cfs = cubic feet per second

The 2-, 5-, 10-, 25-, and 50-year storm event flow rates were then approximated by taking the ratio of the unknown storm event 6-hour precipitation and the 100-year storm event 6-hour precipitation, and then multiplying Q100 by the ratio to estimate the flow rate for the unknown storm event. Hydrologic support material is located in Appendix C. A summary of the estimated peak discharges are provided in the table below:

Table 3

Summary of Approximate Hydrologic Data						
Drainage Area: 2880 acres						
6-hour Precipitation	1.4	1.8	2	2.4	2.9	3
Frequency	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Discharge (cfs)	1344	1728	1920	2304	2784	2880

cfs = cubic feet per second

5.0 Hydraulic Analysis

A basic hydraulic analysis of the channel was performed to assess the Flood Risk factor. The channel assessment limits are shown on Map 3 located in Appendix A. Manning's equation was utilized to calculate the capacity of the channel under two conditions:

1. As-built Conditions: based on the material and geometry as shown on the available as-built plans. (Refer to Appendix G)
2. Current Conditions: based on the vegetation and sediment levels estimated from the site photos taken by the City of San Diego and information provided on the (O&M) Channel Maintenance Inspection Form prepared by the City of San Diego.

Culvert crossings that may exist within the channel reach were not analyzed as part of this hydraulic analysis. Existing culverts may be inefficient or undersized, however the culvert hydraulics were not considered as part of this analysis.

The multiple storm event peak discharges previously calculated in Section 4.0 were evaluated under each condition to assess the capacity of the channel and evaluate the benefit of performing maintenance activities on the channel. See the table below for a summary of the hydraulic results and Appendix D for detailed hydraulic output.

Table 4

Summary of Hydraulic Analysis Results			
CURRENT CHANNEL CAPACITY		AS-BUILT CHANNEL CAPACITY	
Current Condition (cfs)	Equivalent Storm Event (year)	As-built Condition (cfs)	Equivalent Storm Event (year)
1187.7	<2	6152.2	100

cfs = cubic feet per second

6.0 Other Channel Prioritization Factors

Sections 4.0 and 5.0 above discuss the determination process for the Flood Risk factor. For more information on the assessment of the Water Quality, Community Input, and Aesthetics factors please refer to the Channel Prioritization Assessment Sheet in Attachment E. The Channel Prioritization Assessment Sheet lists and describes the sub-factors that are considered in the determination of the four main channel assessment factors.

7.0 Summary of Findings and Recommendations

A summary of the Channel Assessment is shown in the table below:

Factor	Percent Weighted (%)	Weighted Factor Score/Maximum
Flood Risk	75	73.8/75
Water Quality	10	6/10
Community Input	10	5/10
Aesthetics	5	3.8/5
Overall Channel		88.6/100

Additionally, the following items should be noted:

- The channel has holes and cracks in the concrete sides and bottoms throughout portions of its reach. It is recommended that these areas be maintained to prevent continuous vegetation growth from exacerbating these areas. It is also recommended that the holes and cracks be repaired to prevent water from potentially flowing through them and undermining the channel.

Based on the evaluation of the four weighted channel prioritization factors described in Section 3.0 of this report, the Channel Prioritization Score for MMP Map 3: Rancho Bernardo is **88.6**. Refer to the Channel Prioritization Assessment Sheet located in Appendix E for details on the evaluation of the weighted factors and resulting score for this channel.

It is recommended that this drainage channel be maintained to increase the current capacity of the channel from less than a 2-year storm event back to a 100-year storm event capacity.

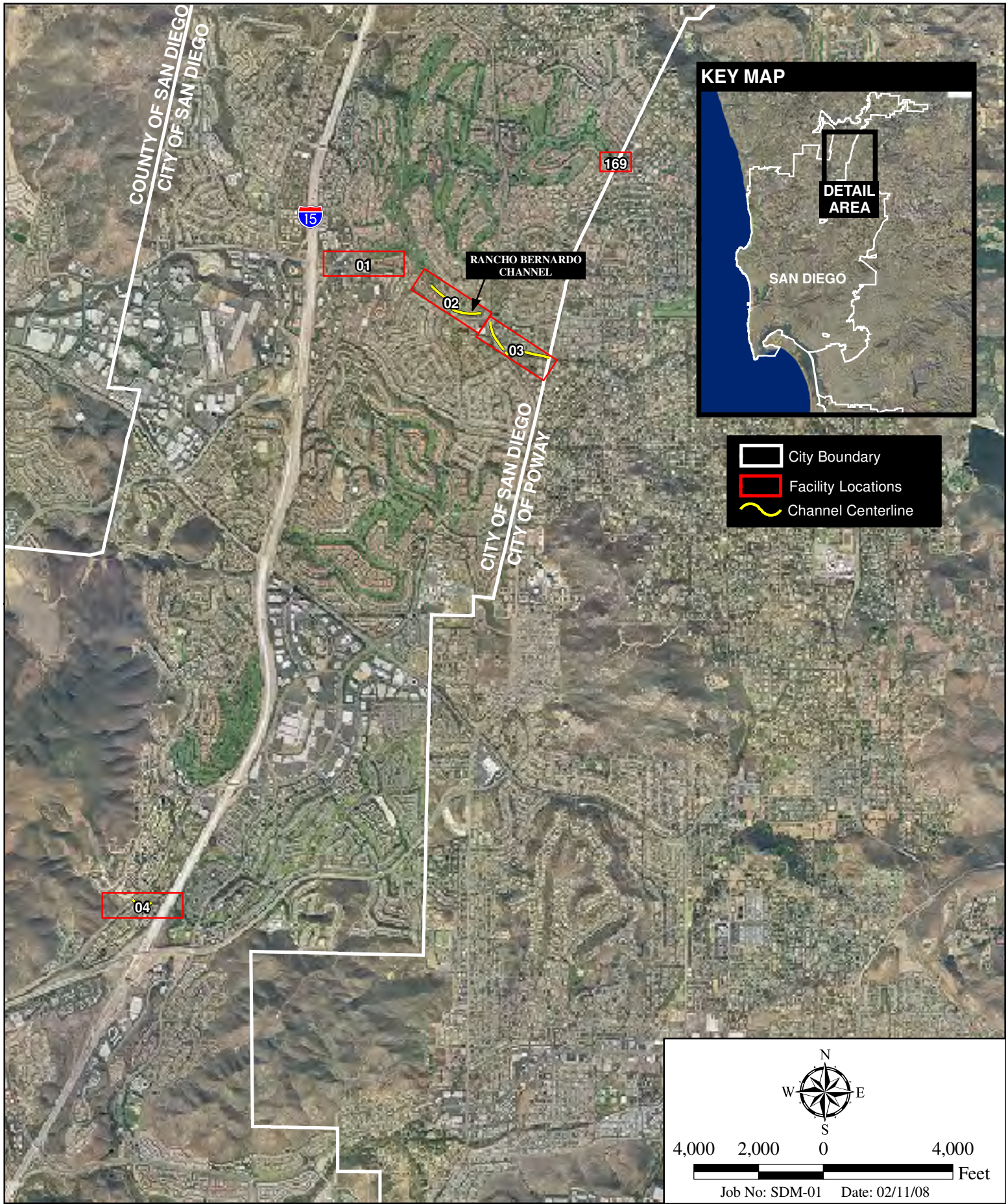
A summary of the channel including an aerial map, channel prioritization score, and other pertinent information is shown on the exhibit titled “Channel Maintenance Prioritization Summary Sheet” located in Appendix F.

Appendix A
Master Storm Water System Maintenance Program (MMP),
dated October 2011, Storm Water Facilities
Key Map and Map 3: Rancho Bernardo



Access and Staging Areas

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM



I:\ArcGIS\SDM-01\Map\ENV\MSSMP\Fig2a_RB.mxd -NM

Stormwater Facilities - Rancho Bernardo Area

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

Appendix B
City of San Diego Operations and Maintenance (O&M)
Channel Maintenance Inspection Forms completed
for the channel and Site photos taken by the City of San Diego

Operations and Maintenance

Channel Maintenance Inspection Form

Date: 5-9-15 Time: 10:00

Channel Map No.: 03

Watershed: San Dieguito

Inspector: Anthony + Kenny

Weather: Cloudy

Initial Inspection

Follow Up Inspection

A. Channel Condition 1=Poor Condition/Needs Immediate Attention 2= Moderate Condition 3= Good Condition		
Item	Condition	Comments
1. Structure Condition	1 (2) 3 N/A	Type of trash and source: Rocks, Wood Approx. Coverage/Density of Vegetation: 25% Approx. Depth/Coverage of Sediment: 40%
2. Erosion	1 2 (3) N/A	
3. Trash/Debris	1 (2) 3 N/A	
4. Water Conveyance/ Volume	1 (2) 3 N/A	
5. Standing Water	(Y) N	
A. Ponding	(Y) N	
B. Noticeable odors	Y (N)	
C. Algae	Y (N)	
6. Vegetation	1 (2) 3 N/A	
A. Invasive (Arundo)	1 (2) 3 N/A	
B. Native	1 2 (3) N/A	
7. Sediment	1 (2) 3 N/A	
8. Transients/ encampments	Y (N)	

B. Culverts and Outfalls

1= Poor Condition/Needs Immediate Attention

2= Moderate Condition

3= Good Condition

Item	Condition	Comments
1. Structure Condition	1 (2) 3 N/A	CHANNEL HAS WHOLLS SEE PICTURES
2. Trash/Debris/Sediment	1 (2) 3 N/A	
3. Clogging	1 (2) 3 N/A	Potential Flooding

C. See Map Attached

-Identify Key Issues on Map

-Inspect and take photographs from vantage points identified on Map

Other Comments:

D. To Be Completed by Management**Follow Up Actions**

1.

2.

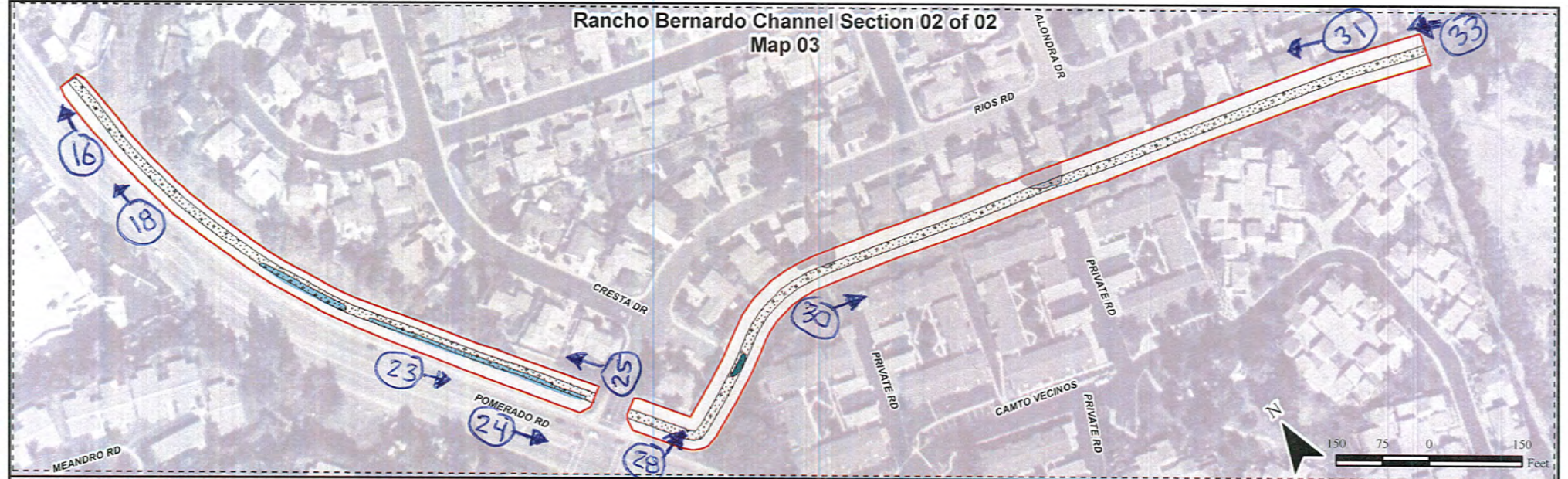
3.

E. Infrastructure Failure Issues

Item	Condition			Comments
1. <u>Broken Concrete</u> /Gunite?	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	See Pictures
2. Broken/Missing Trash Fence?	<input type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	
3. Broken/Missing Poles/Supports?	<input type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	
4. Exposed Rebar?	<input type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	
5. Rock/Debris Accumulation?	<input type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	
6. Potential Flooding/Litigation?	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	
7. Slope Failure?	<input type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	

Other Comments/Observations:

Rancho Bernardo Channel Section 02 of 02
Map 03



11044 Via San Marco Section 01 of 01
Map 04



Vegetation/Wetland Delineation - Maps 03 & 04

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM



Rancho Bernardo Channel.16 (5-9-2015).JPG



Rancho Bernardo Channel.18 (5-9-2015).JPG



Rancho Bernardo Channel.23 (5-9-2015).JPG



Rancho Bernardo Channel.24 (5-9-2015).JPG



Rancho Bernardo Channel.25 (5-9-2015).JPG



Rancho Bernardo Channel.28 (5-9-2015).JPG



Rancho Bernardo Channel.30 (5-9-2015).JPG



Rancho Bernardo Channel.31 (5-9-2015).JPG



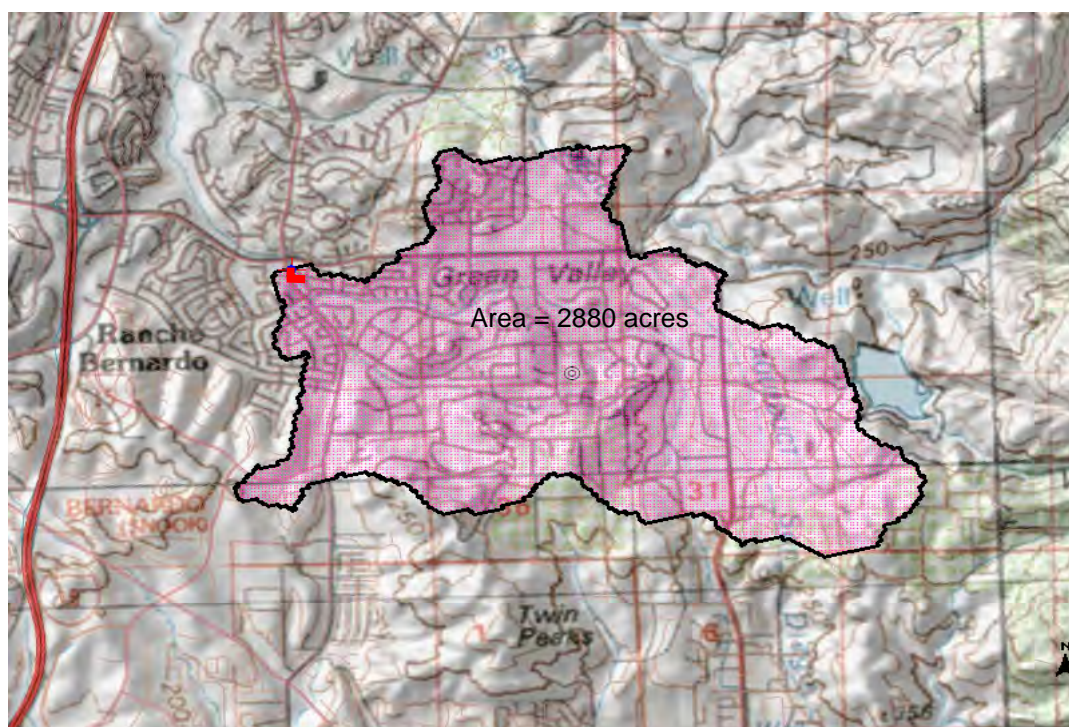
Rancho Bernardo Channel.33 (5-9-2015).JPG

Appendix C
Hydrologic Support Material



California StreamStats

Rancho Bernardo Channel Watershed MMP Map 3



Explanation

★ GlobalWatershedPoint	▲ Gaging Station, Continuous Record	□ hucpoly
⊙ Centroid	▲ Low Flow, Partial Record	— streams
◆ huc_net_Junctions	▲ Peak Flow, Partial Record	⊗ ExcludePoly
■ GlobalWatershed	▲ Peak and Low Flow, Partial Record	— Approximate channel location
Synthetic Stream Grid	▲ Stage Only	
■	▲ Low Flow, Partial Record, Stage	
	▲ Miscellaneous Record	
	▲ Unknown	

U.S. Department of the Interior | U.S. Geological Survey

URL: http://streamstatsags.cr.usgs.gov/ca_ss/default.aspx

Page Contact Information: streamstats@usgs.gov

Printed: 7/1/2015 11:50:15



San Diego County Hydrology Manual



Prepared by the County of San Diego
Department of Public Works
Flood Control Section
June 2003

LIST OF APPENDICES

<u>LETTER</u>	<u>TITLE</u>	
A	Hydrologic Soil Groups Map	A-1
B	Isopluvial Maps	B-1
C	Precipitation Zone Number (PZN) Map	C-1
D	Worksheets for NRCS Hydrologic Method Calculations	D-1
E	85 th Percentile Precipitation Isopluvial Map	E-1

County of San Diego Hydrology Manual

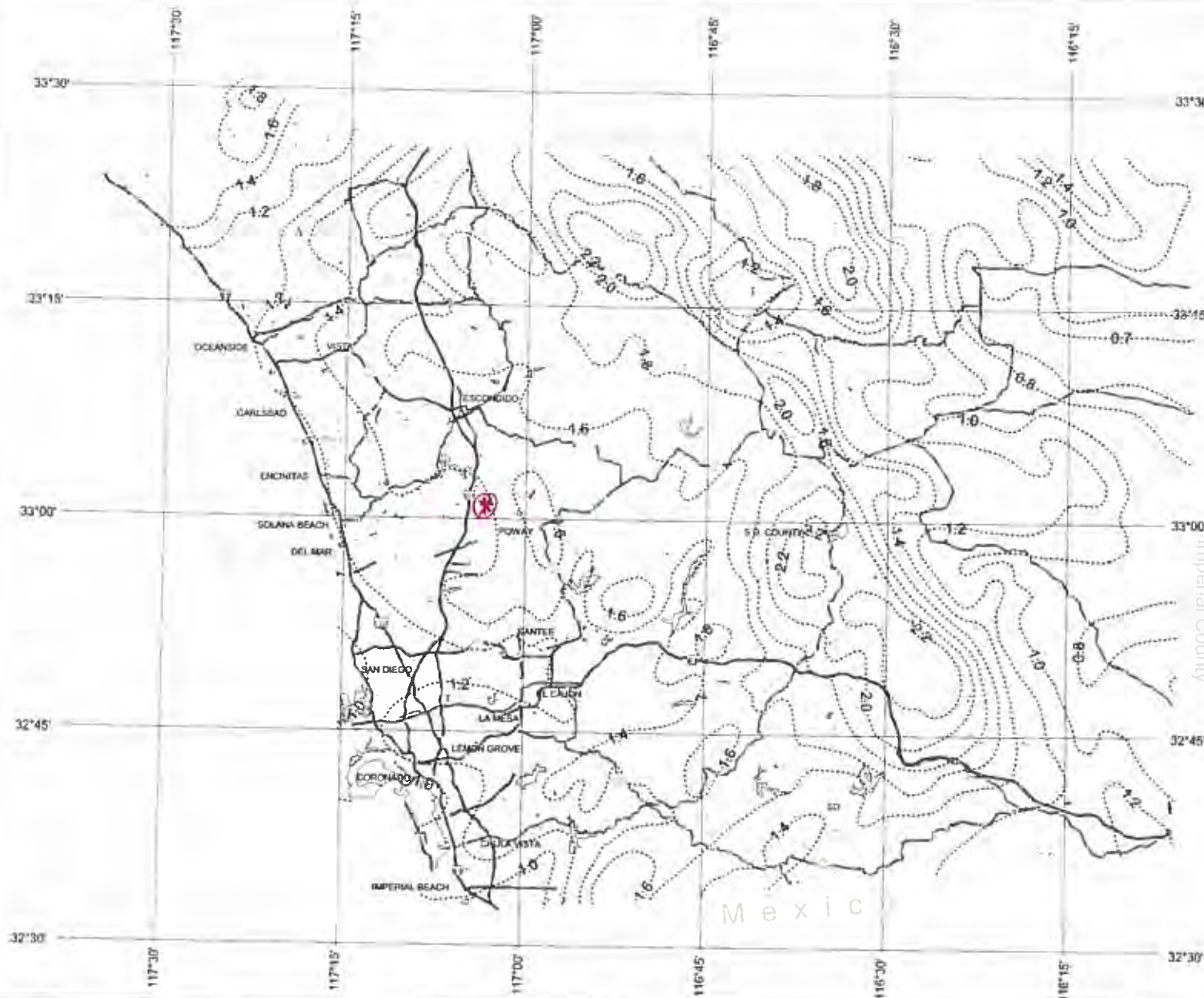


Rainfall Isophyvals

2 Year Rainfall Event - 6 Hours



$\textcircled{*} P_6 = 1.4 \text{ inches}$



County of San Diego Hydrology Manual

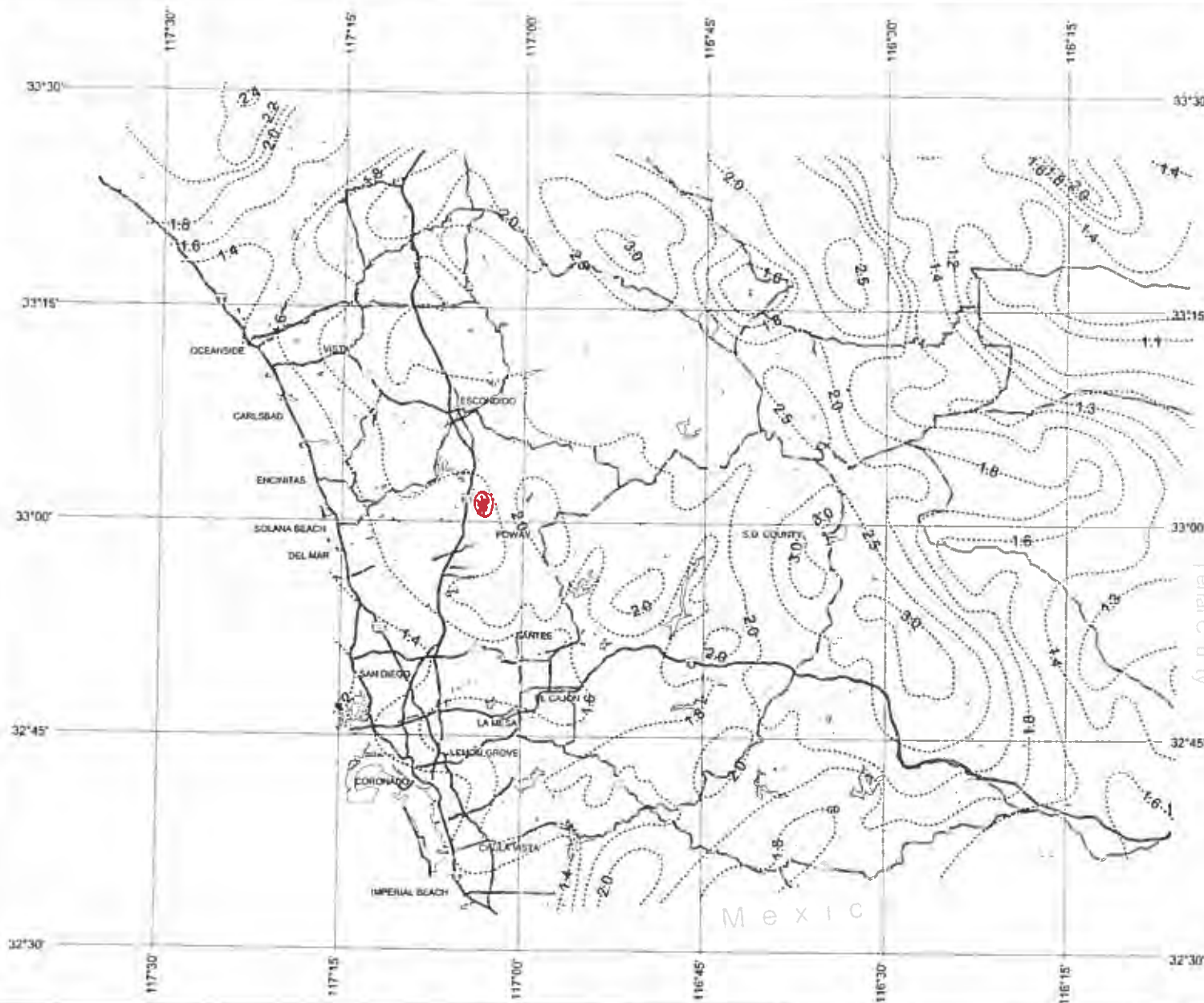


Rainfall Isopluvials

5 Year Rainfall Event - 6 Hours

(isopluvial (inches))

$\otimes P_6 = 1.8$ inches



GIS
Department of Public Works

GIS

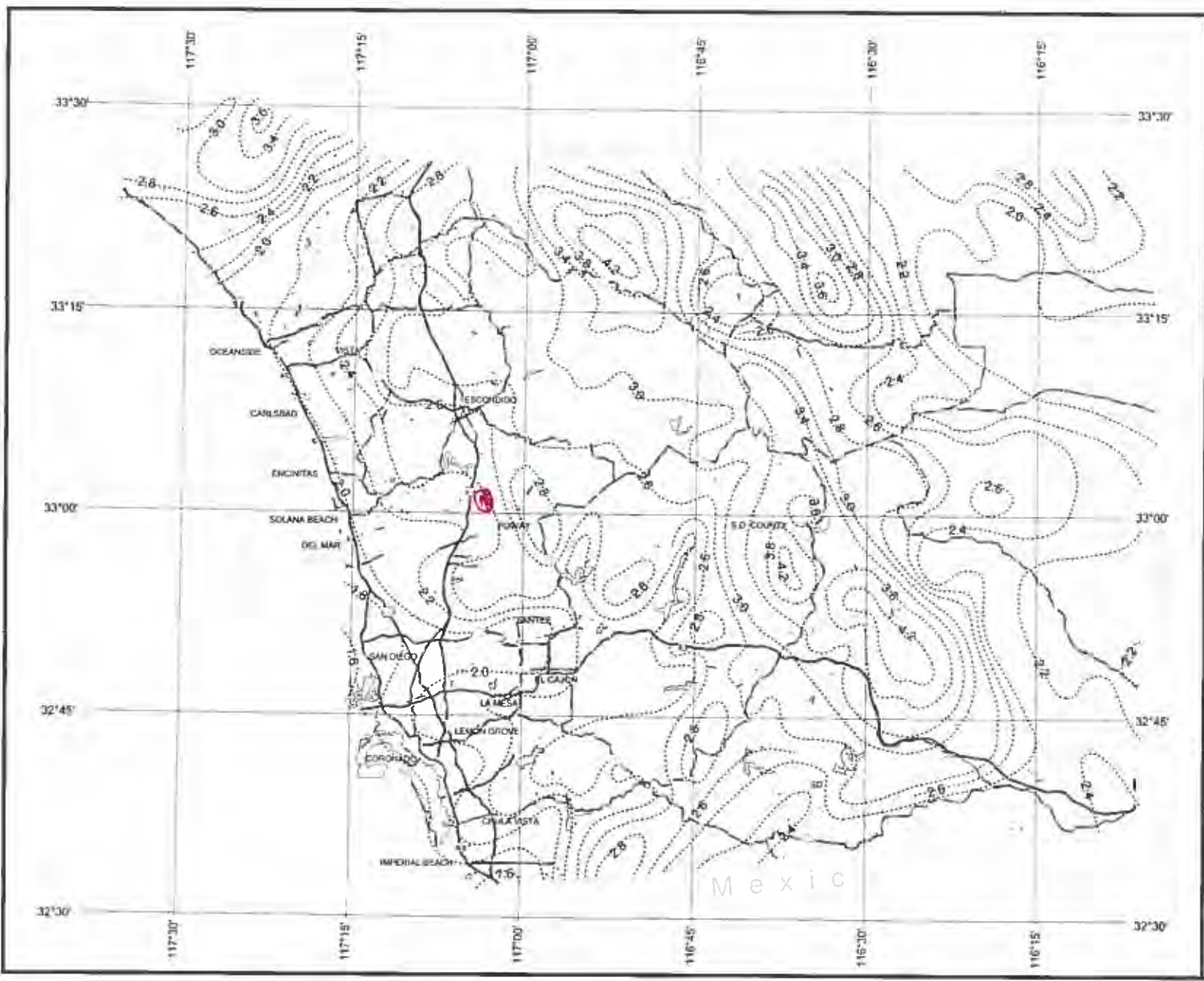


3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright © 2005. All Rights Reserved.

This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.



County of San Diego Hydrology Manual

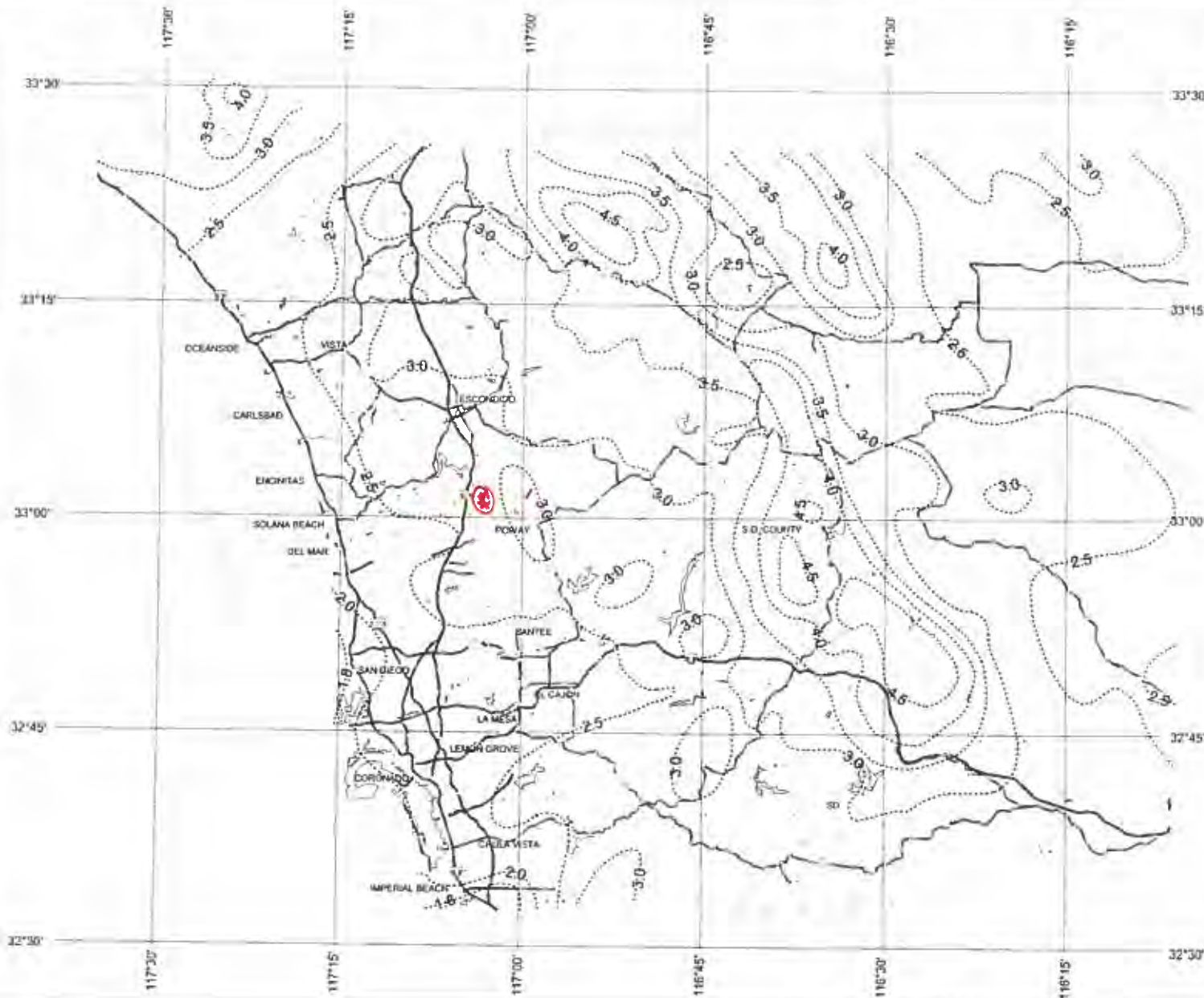


Rainfall Isophinals

50 Year Rainfall Event - 6 Hours

..... Isophanal (Inches)

$\otimes P_6 = 2.9$ inches



GIS
Geographic Information Systems

GIS



3 0 3 Miles

This map is provided as a service to the public and is not intended to be used for any purpose other than that for which it was prepared. The County of San Diego does not warrant the accuracy or completeness of the information contained herein. The County of San Diego is not responsible for any errors or omissions in this map. The County of San Diego is not responsible for any damages or losses resulting from the use of this map. The County of San Diego is not responsible for any claims or liabilities arising from the use of this map.

Appendix D
Hydraulic Analysis Output

Hydraulic Analysis Report

Project Data

Project Title: Project - Rancho Bernardo Channel
Designer: Rick Engineering Company J-17204-D
Project Date: Tuesday, June 30, 2015
Project Units: U.S. Customary Units

Channel Analysis: Rancho_Bernardo_As-built Condition_100

Notes: The cross-section of the channel on the as-built plans show a 7.5-foot wide concrete bottom, 7.5 feet high with 1.5:1 concrete side slopes. Pursuant to Table 1-104.14A of the City of San Diego Drainage Design Manual, dated April 1984, the roughness coefficients used for each of the channel side slopes and channel bottom are $n = 0.015$ (concrete lined).

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 1.5000 (ft/ft)
Side Slope 2 (Z2): 1.5000 (ft/ft)
Channel Width: 7.5000 (ft)
Longitudinal Slope: 0.0300 (ft/ft)
Manning's n: 0.0150
Depth: 7.5000 (ft)

Result Parameters

Flow: 6152.2005 (cfs)
Area of Flow: 140.6250 (ft²)
Wetted Perimeter: 34.5416 (ft)
Hydraulic Radius: 4.0712 (ft)
Average Velocity: 43.7490 (ft/s)
Top Width: 30.0000 (ft)
Froude Number: 3.5610
Critical Depth: 13.7228 (ft)
Critical Velocity: 15.9633 (ft/s)
Critical Slope: 0.0020 (ft/ft)
Critical Top Width: 48.6685 (ft)
Calculated Max Shear Stress: 14.0400 (lb/ft²)
Calculated Avg Shear Stress: 7.6212 (lb/ft²)

Channel Analysis: Rancho_Bernardo_Current_Condition_Less_2

Notes: The cross-section of the channel on the as-built plans show a 7.5-foot wide concrete bottom, 7.5 feet high with 1.5:1 concrete side slopes. Based on the site photos provided to us that were taken by the City of San Diego, the channel has areas of heavy brush and trees. Pursuant to Table 1-104.14A of the City of San Diego Drainage Design Manual, dated April 1984, the roughness coefficient used is $n = 0.075$ (0.06 for some weeds with heavy brush on banks and an additional 0.015 for trees in the channel).

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 1.5000 (ft/ft)
Side Slope 2 (Z2): 1.5000 (ft/ft)
Channel Width: 7.0000 (ft)
Longitudinal Slope: 0.0300 (ft/ft)
Manning's n: 0.0750
Depth: 7.5000 (ft)

Result Parameters

Flow: 1187.7311 (cfs)
Area of Flow: 136.8750 (ft²)
Wetted Perimeter: 34.0416 (ft)
Hydraulic Radius: 4.0208 (ft)
Average Velocity: 8.6775 (ft/s)
Top Width: 29.5000 (ft)
Froude Number: 0.7099
Critical Depth: 6.3305 (ft)
Critical Velocity: 11.3740 (ft/s)
Critical Slope: 0.0620 (ft/ft)
Critical Top Width: 25.9914 (ft)
Calculated Max Shear Stress: 14.0400 (lb/ft²)
Calculated Avg Shear Stress: 7.5270 (lb/ft²)

CITY OF SAN DIEGO



DRAINAGE DESIGN MANUAL

APRIL • 1984

TABLE OF CONTENTS (Continued)

1-104.12	Chart/Gutter and Roadway Discharge - Velocity Chart . .	70A
1-104.13	Channel Easements	71
1-104.14	Mannings Roughness coefficient	73
1-104.14A	Table/Design Values for Mannings Roughness Coefficient (n)	74
1-104.14B	Chart/Nomograph for Solution of Manning Equation . . .	76
1-104.15	Design Guides	77
1-104-15A	Figure/Typical Channel Plan	78
1-104.15B	Figure/Typical Channel Profile	79
 APPENDIX I		
	Rational Method	80 thru 87
 APPENDIX II		
	Modified Rational Method	88 thru 92
 APPENDIX III		
	SCS Method	93 thru 119
 SEDIMENT DETENTION		
	Basin Desilting	120 thru 126
 APPENDIX IV		
	What pH Values Mean	131
	Definitions (CALTRANS-Highway Design Manual).	132 thru 138
	Department Instructionf for C.I.P.C.P.	139 thru 142
 INDEX		
	Index	143 thru 146

TABLE 1-104.14A

DESIGN VALUES FOR MANNINGS ROUGHNESS COEFFICIENT (n)

<u>TYPE OF CHANNEL</u>	<u>N VALUE</u>
Unlined Channels:	
Clay Loam;	0.023
Sand	0.020
Gravel	0.030
Rock	0.040
Lined Channels:	
Portland Cement Concrete	0.015
Air Blown Mortar	0.018
Asphalt Concrete	0.018
Grass Lined Channels: (Shallow depths)	
2 inch length	0.050
4 - 6 inch length	0.060
6 - 12 inch length	0.120
12 - 24 inch + length	0.200
Pavement and Gutters:	
Concrete	0.015
Asphalt Concrete	0.018
Natural Streams: (Less than 100 feet wide at flood stage)	
1. Regular section	
a. Some grass and weeds, little or no brush	0.030
b. Dense growth of weeds, depth of flow substantially greater than weed height	0.040
c. Some weeds, light brush on bank	0.040
d. Some weeds, heavy brush on banks	0.060
e. With trees in channel, branches submerged at flood stage, increase above values by	0.015

TABLE 1-104.14A (Continued)

2.	Irregular section, with pools, slight channel meander increase all values listed in 1. Regular Section, by	0.015
----	--	-------

Flood Plains: (adjacent to natural streams)

1.	Pasture, no brush	
	a. Short grass	0.030
	b. High grass	0.040
2.	Cultivated areas	
	a. No crop	0.040
	b. Mature row crops	0.040
	c. Mature field crops	0.050
3.	Heavy weeds, scattered brush	0.050
4.	Light brush and trees	0.060
5.	Medium to dense brush	0.090
6.	Dense willows	0.170
7.	Cleared land with tree stumps, 100-150 per acre	0.060
8.	Heavy stand of timer, little undergrowth	
	a. Flood depth below branches	0.110
	b. Flood depth reaches branches	0.140

Appendix E
Channel Prioritization Assessment Sheet

Channel Prioritization Assesment Sheet for <u>Rancho Bernardo MMP Map 3</u>							Total Channel Score:		88.6 /100	
Flood Hazard (75% of total weight)							Score	factor weight	Weighted Points	
<i>Δ capacity</i>	a. Risk of flooding	Current Channel Normal depth capacity ¹ :	1187.7 cfs	<2 -yr. storm event	2-yr.=score of 5; 5-yr.=score of 4; 10-yr.=score of 3; 25-yr.=score of 2; 50-yr.=score of 1; 100-yr.=score of 0	Sum of sub-factor a-c scores:		14	25%	17.5
						(out of 15)				
	b. Increase in storm event capacity	Channel As-Built normal depth capacity ¹ :	6152.2 cfs	100 -yr. storm event	1 point given for every level increase in -year storm event capacity, post-maintenance					
<i>Consequence of flooding adjacent areas</i>	c. Net percent increase in channel capacity post-maintenance		418%		Less than 100% = score of 0; 100%-199% = score of 1; 200%-299% = score of 2; 300%-399% = score of 3; 400%-500%= score of 4; Over 500% = score of 5					
	Surrounding area land use: (area within 100 feet of the channel or area in which more than 10,000 ft² is impacted from flooding.)		Residential		Residential = score of 4; Commercial = score of 4; Roads = score of 2; Agriculture = score of 1; Other = score of 1					37.5
<i>Clogging Potential</i>	Is there open space surrounding the channel?		No		If yes, subtract land use score by 1					
	Are there trees/large debris that have potential to flow D/S and clog culverts/the channel?		Yes							18.75
Total Weighted Flood Hazard Points									73.8	
Water Quality/Channel Condition (10% of total weight)										
<i>Trash/Debris</i>	Type of trash and Source:	None				0 1 2 3 4		20%	0	
<i>Standing water</i>	Ponding?		Yes			0 1 2 3 4		15%	1	
			No							
			No							
<i>Sediment</i>	Approx. sediment coverage: (Based on information provided on City of San Diego O&M Channel Maintenance Inspection Form)					0 1 2 3 4		35%	3	
			40%							
			Yes							
<i>Transients/encampments</i>	Rock/debris Accumulation?					0 1 2 3 4		10%	0	
						0 1 2 3 4		10%	1	
<i>Culverts and Outfalls</i>	Culvert structure condition		Good							
<i>Infrastructure Issues</i>	Broken concrete/gunite?		Yes			0 1 2 3 4		10%	1	
			No							
			No							
Total Weighted Water Quality Points									6.0	
Community Input (10% of total weight)										
<i>Community Complaints Received</i>						YES NO		50%	5	
						0 1 2 3 4		50%	0	
Total Weighted Community Input Points									5.0	
Aesthetics (5% of total weight)										
<i>Aesthetics</i>	Are the aesthetics of the channel compromised?		Yes			0 1 2 3 4		100%	3.75	
Total Weighted Aesthetics Points									3.8	

1. See appendix D for geometry parameters

Scoring Legend	
0	Factor is in good condition and does not need attention
1	Factor is in good condition, but will eventually need attention
2	Factor needs attention
3	Factor is in bad condition and needs attention
4	Factor is in severe condition and needs immediate attention

Appendix F
Channel Maintenance Prioritization Summary Sheet



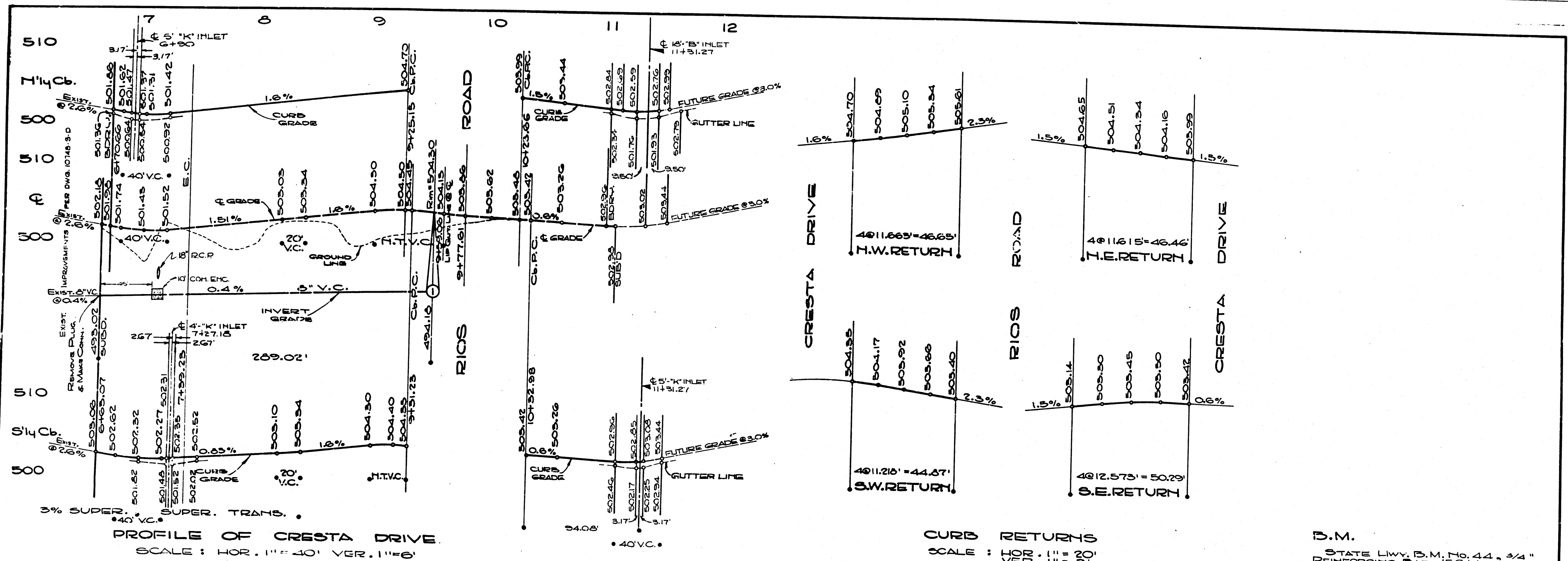
Photos:



Assessment Results

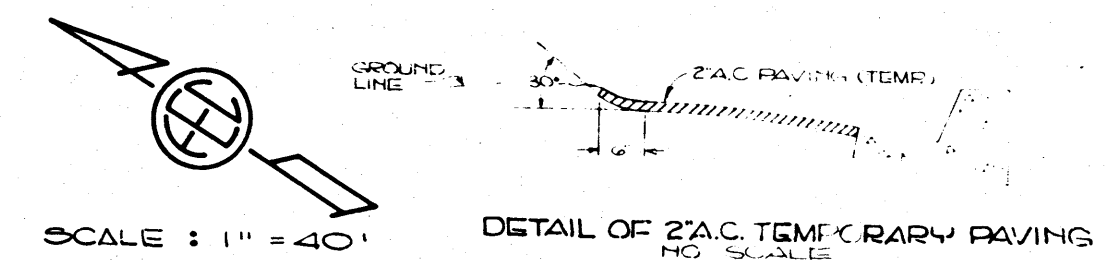
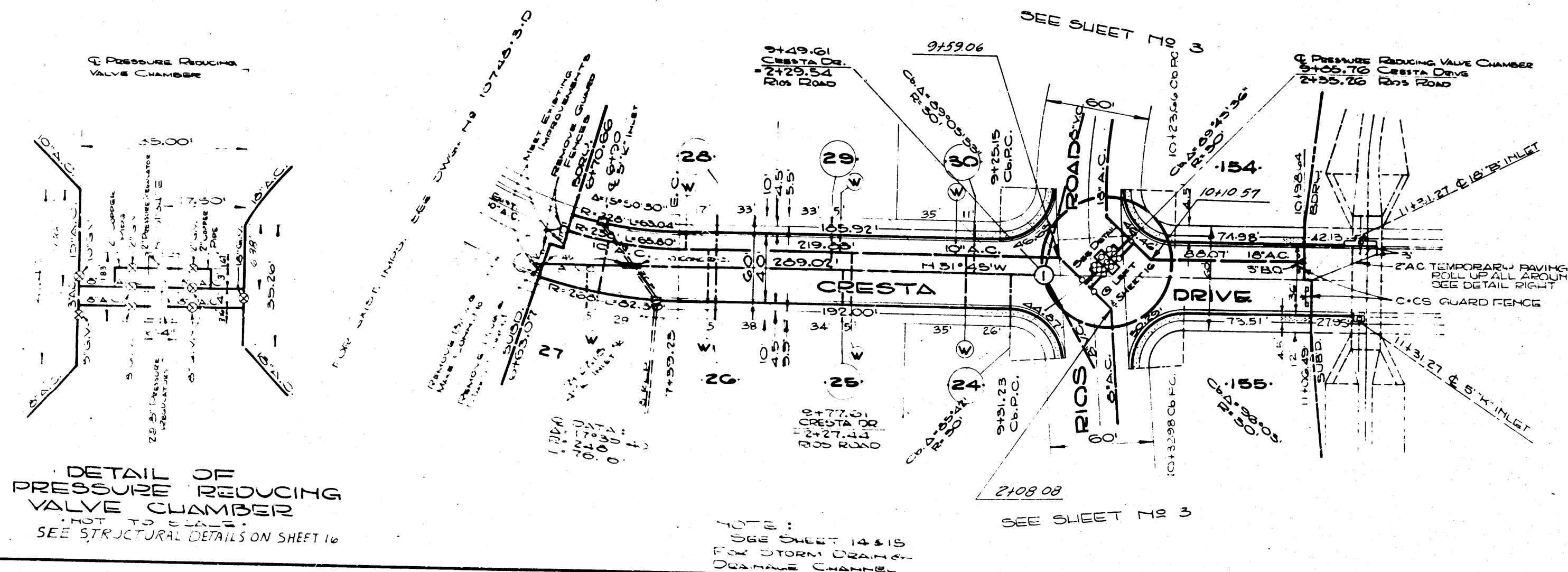
- Channel Prioritization Score:
88.6 out of 100
 - Flood Hazard Score:
73.8 out of 75
 - Water Quality Score:
6 out of 10
 - Community Input Score:
5 out of 10
 - Aesthetics Score:
3.8 out of 5
- Capacity Prior to Maintenance:
Less than 2-year storm event
- Capacity After Maintenance (As-built Capacity) :
100-year storm event
- Clogging Potential: *HIGH*
- Approximate Vegetation Coverage: *HIGH*
- Surrounding Area: *Residential*
- Infrastructure Failures:
Yes
- Site Evaluation Date:
May 9, 2015
- Notes/Comments:
The channel has holes and cracks in the concrete throughout portions of the channel. It is recommended that these areas be maintained to prevent continuous vegetation growth to exacerbate these areas.

Appendix G
Available As-built plans



CURB RETURNS
SCALE: HOR. 1" = 20' VER. 1" = 3'

D.M.
STATE HWY. D.M. NO. 44, 3/4" REINFORCING BAR, 156' LEFT OF HWY. 395 STA 408+02 ELEV. 439.76 (U.S.G.S. DATUM)



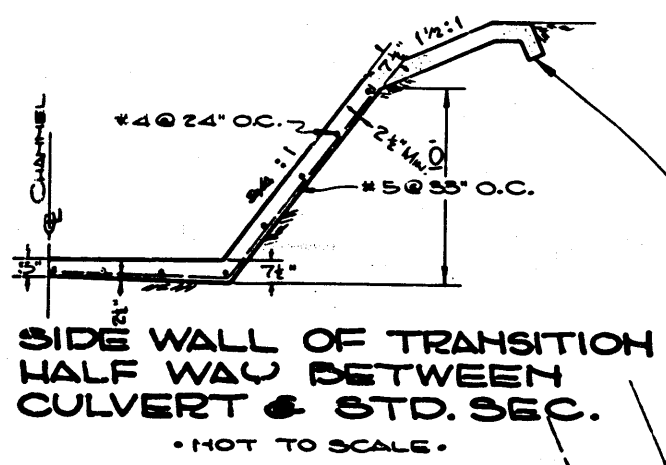
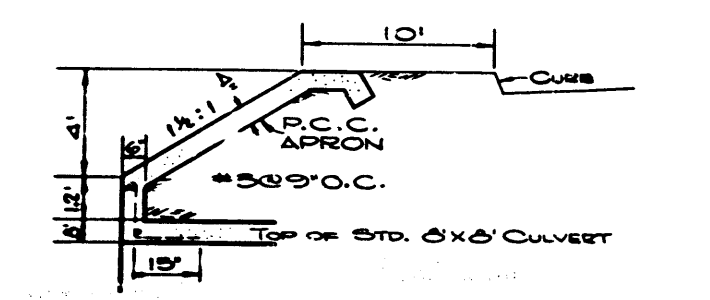
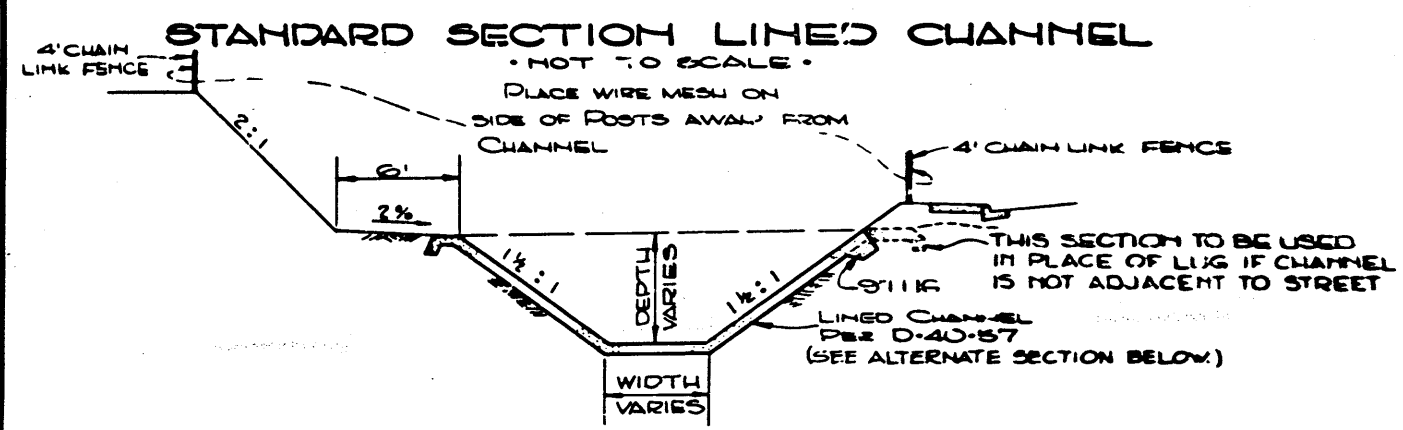
PRIVATE CONTRACT ENGINEER OF DESIGN
FREELAND, EVINSON & CHRISTENSEN
Bill A. Hambley, P.E., 2002

CITY OF SAN DIEGO ENGINEERING DEPARTMENT				SHEET 5 OF 25 SHEETS		W.D. NO. 76736	
CHANGE	BY	DATE	APPROVAL	APPROVAL	APPROVAL	APPROVAL	APPROVAL
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33
34	34	34	34	34	34	34	34
35	35	35	35	35	35	35	35
36	36	36	36	36	36	36	36
37	37	37	37	37	37	37	37
38	38	38	38	38	38	38	38
39	39	39	39	39	39	39	39
40	40	40	40	40	40	40	40
41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42
43	43	43	43	43	43	43	43
44	44	44	44	44	44	44	44
45	45	45	45	45	45	45	45
46	46	46	46	46	46	46	46
47	47	47	47	47	47	47	47
48	48	48	48	48	48	48	48
49	49	49	49	49	49	49	49
50	50	50	50	50	50	50	50
51	51	51	51	51	51	51	51
52	52	52	52	52	52	52	52
53	53	53	53	53	53	53	53
54	54	54	54	54	54	54	54
55	55	55	55	55	55	55	55
56	56	56	56	56	56	56	56
57	57	57	57	57	57	57	57
58	58	58	58	58	58	58	58
59	59	59	59	59	59	59	59
60	60	60	60	60	60	60	60
61	61	61	61	61	61	61	61
62	62	62	62	62	62	62	62
63	63	63	63	63	63	63	63
64	64	64	64	64	64	64	64
65	65	65	65	65	65	65	65
66	66	66	66	66	66	66	66
67	67	67	67	67	67	67	67
68	68	68	68	68	68	68	68
69	69	69	69	69	69	69	69
70	70	70	70	70	70	70	70
71	71	71	71	71	71	71	71
72	72	72	72	72	72	72	72
73	73	73	73	73	73	73	73
74	74	74	74	74	74	74	74
75	75	75	75	75	75	75	75
76	76	76	76	76	76	76	76
77	77	77	77	77	77	77	77
78	78	78	78	78	78	78	78
79	79	79	79	79	79	79	79
80	80	80	80	80	80	80	80
81	81	81	81	81	81	81	81
82	82	82	82	82	82	82	82
83	83	83	83	83	83	83	83
84	84	84	84	84	84	84	84
85	85	85	85	85	85	85	85
86	86	86	86	86	86	86	86
87	87	87	87	87	87	87	87
88	88	88	88	88	88	88	88
89	89	89	89	89	89	89	89
90	90	90	90	90	90	90	90
91	91	91	91	91	91	91	91
92	92	92	92	92	92	92	92
93	93	93	93	93	93	93	93
94	94	94	94	94	94	94	94
95	95	95	95	95	95	95	95
96	96	96	96	96	96	96	96
97	97	97	97	97	97	97	97
98	98	98	98	98	98	98	98
99	99	99	99	99	99	99	99
100	100	100	100	100	100	100	100

1"=20'

1"=10'

1"=50'

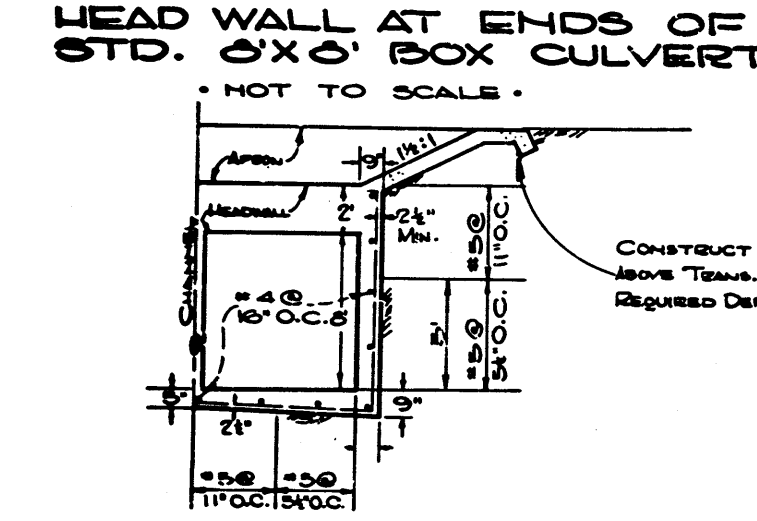


CHANNEL "A"

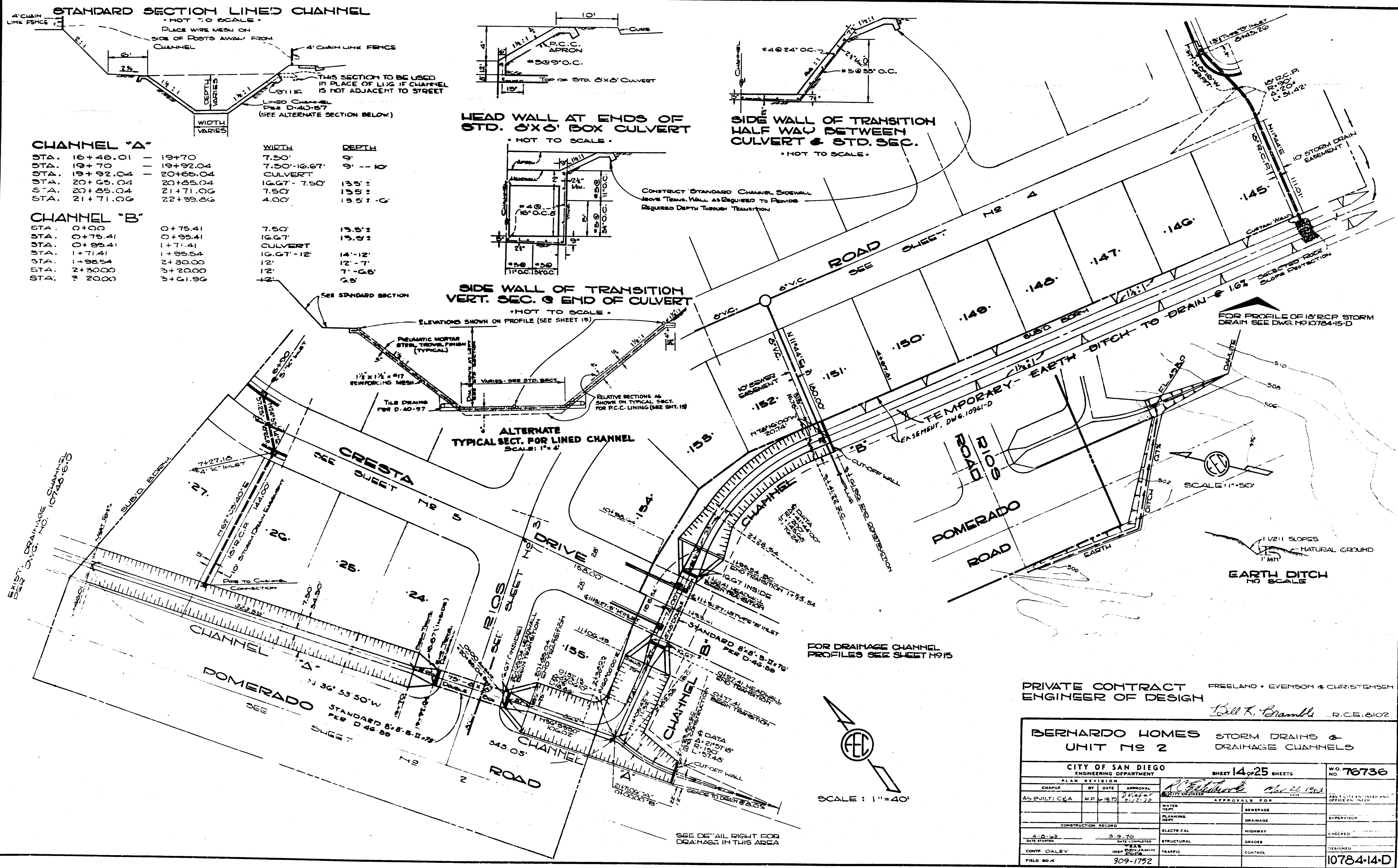
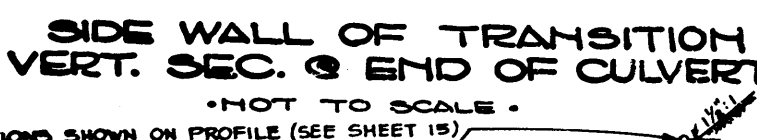
STA.	16+48.01	19+70
STA.	19+70	19+92.04
STA.	19+92.04	20+65.04
STA.	20+65.04	20+85.04
STA.	20+85.04	21+71.06
STA.	21+71.06	22+39.86

WIDTH	DEPTH
7.50'	9'
7.50'-16.67'	9' -- 10'
CULVERT	
16.67' - 7.50'	13.5'
7.50'	13.5'
4.00'	13.5' - 0'

WIDTH	DEPTH
7.50'	9' - 10'
7.50' - 16.67'	
CULVERT	13.5' - 13.5' - 0'
16.67' - 7.50'	
7.50'	
4.00'	



CONSTRUCT STANDARD CHANNEL SIDEWALL ABOVE TRANS. WALL AS REQUIRED TO PROVIDE REQUIRED DEPTH THROUGH TRANSITION



PRIVATE CONTRACT ENGINEER OF DESIGN
FREELAND • EVENSON & CHRISTENSEN
Bill K. Bramble R.C.E. 8102

BERNARDO HOMES UNIT NO 2		STORM DRAINS & DRAINAGE CHANNELS	
CITY OF SAN DIEGO ENGINEERING DEPARTMENT		SHEET 14 OF 25 SHEETS	
W.O. NO. 76736			
CHANGE	BY	DATE	APPROVAL
AS BUILT: CUA	MP	1/18/78	1/17/78
CONSTRUCTION RECORD		APPROVALS FOR	
DATE STARTED	DATE COMPLETED	STRUCTURAL	GRADES
CONTR. DALEY	INSPECTION	TRAFFIC	CONTROL
FIELD BOOK	309-1752		

Appendix H
Compact Disc
PDF Version of Full Report