

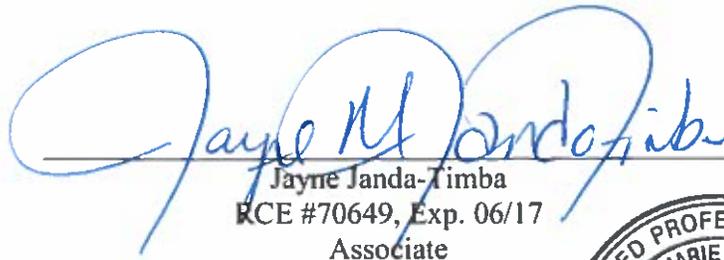
**SUMMARY OF FINDINGS FOR THE
ANNUAL DRAINAGE CHANNEL FIELD
ASSESSMENT AND MAINTENANCE PRIORITIZATION
PROJECT (PHASE 1)
FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER
SYSTEM MAINTENANCE PROGRAM (MMP) MAP 136:
TOCAYO CHANNEL**

**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 136: TOCAYO CHANNEL**

Job Number 17204-D


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August 4, 2015

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1.0 Executive Summary

This report and preliminary analyses concludes that the Channel Prioritization Score for the Tocayo Channel (MMP Map 136) is **74.0 out of 100**. This score is below average and indicates that the channel is not 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 2- to 5-year storm event capacity. In addition to the hydraulic capacity, the analyses considered other factors including water quality, community needs 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 136: Tocayo Channel. Refer to Appendix A for the MMP Storm Water Facilities Key Map and Map 136.

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 needs 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 the table below:

Table 1

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

As part of the channel prioritization analysis, each of the main factors has been divided into subfactors. 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 Needs 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 subfactors 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 the table below:

Table 2

100-year Peak Discharge (Q100) Estimation Based on Watershed Size				
Watershed Area (square miles)	<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: 576 acres						
6-hour Precipitation (in)	1	1.4	1.6	1.8	1.9	2.25
Frequency	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Discharge (cfs)	1024	1434	1638	1843	1946	2304

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 136 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)
504	Less than 2	1343	2 to 5

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 Needs, 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.

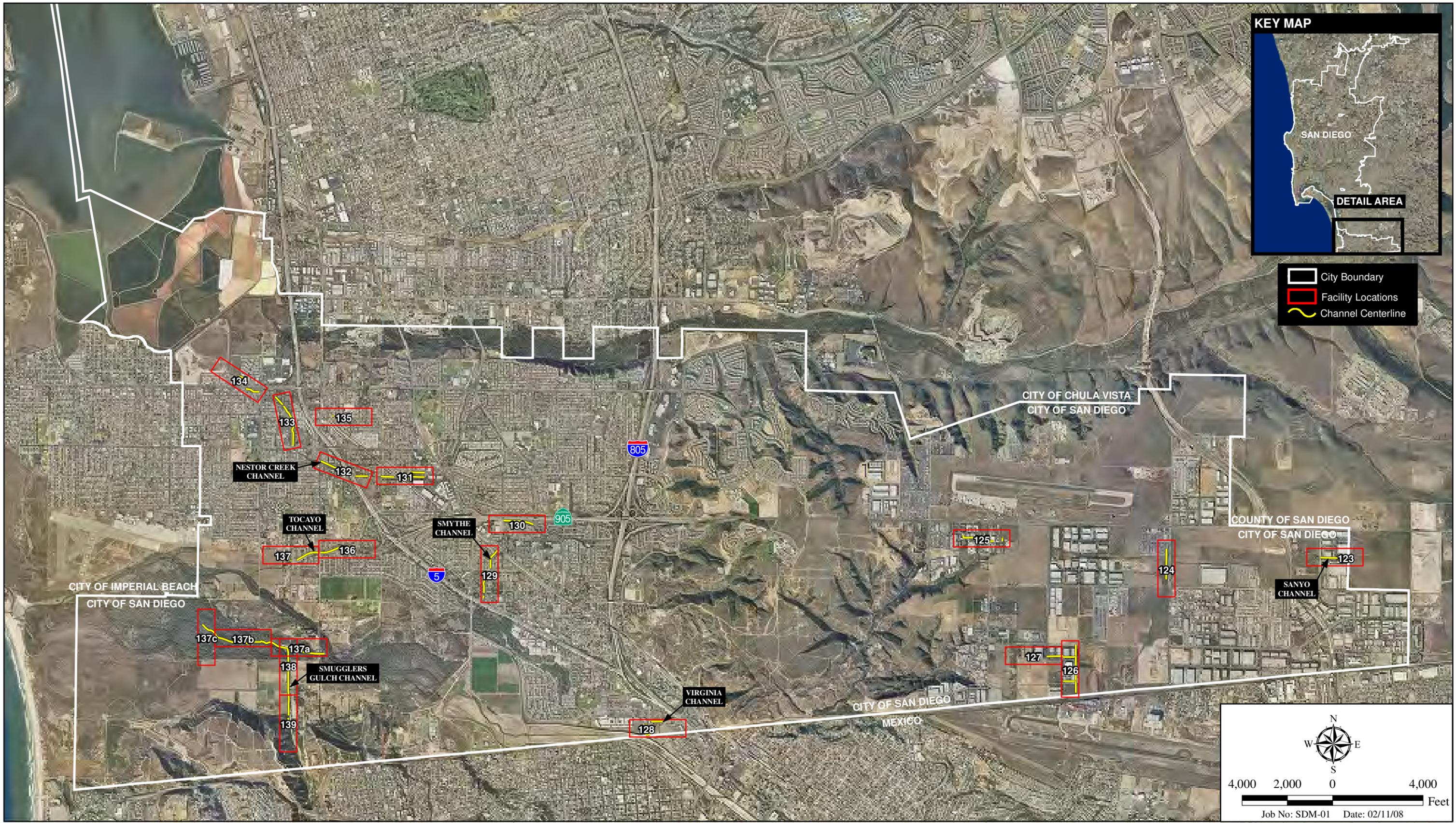
Table 5

Channel Prioritization Assessment Scoring Summary		
Factor	Percent Weighted (%)	Weighted Factor Score/Maximum
Flood Risk	75	65.0/75
Water Quality	10	4/10
Community Needs	10	5/10
Aesthetics	5	0/5
Overall Channel		<i>74.0/100</i>

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 136: Tocayo Channel is **74.0**. 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 2- to 5-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 136: Tocayo Channel



I:\ArcGIS\SDM-01\Map\ENV\SSMP\Fig2e_Otay.mxd -NM

Stormwater Facilities - Otay Mesa Area

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTNANCE PROGRAM

Figure 2e





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Access and Staging Areas

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

Maps #
#136-#137

Operations and Maintenance

Channel Maintenance Inspection Form

Date: 5-16-2015 Time: 9:00 am

Channel Map No.: #136, #137

Watershed: Tijuana

Inspector: E Rodriguez

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		
2. Erosion	1 2 3 N/A	None	
3. Trash/Debris	1 2 3 N/A	Type of trash and source: SOAP CANS.	
4. Water Conveyance/ Volume	1 2 3 N/A	100%	
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	Approx. Coverage/Density of Vegetation: 5%	
A. Invasive (Arundo)	1 2 3 N/A	None	
B. Native	1 2 3 N/A	None	
7. Sediment	1 2 3 N/A	Approx. Depth/Coverage of Sediment: 2%	
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 <u>3</u> N/A	
2. Trash/Debris/Sediment	1 2 <u>3</u> N/A	
3. Clogging	1 2 <u>3</u> N/A	

C. See Map Attached

-Identify Key Issues on Map

-Inspect and take photographs from vantage points identified on Map

Other Comments: *No actions to be taken at this time.*

D. To Be Completed by Management

Follow Up Actions

- 1.
- 2.
- 3.

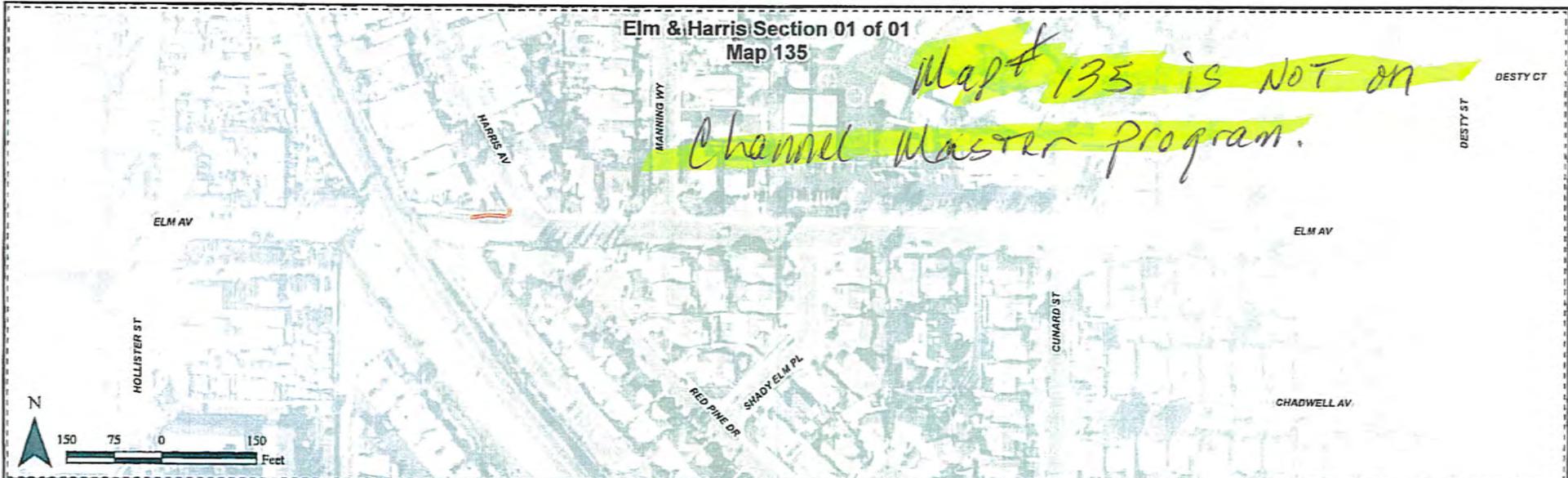
E. Infrastructure Failure Issues		
Item	Condition	Comments
1. Broken Concrete/Gunite?	Y <input checked="" type="radio"/> N N/A	
2. Broken/Missing Trash Fence?	Y <input checked="" type="radio"/> N N/A	
3. Broken/Missing Poles/Supports?	Y <input checked="" type="radio"/> N N/A	
4. Exposed Rebar?	Y <input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

Other Comments/Observations:

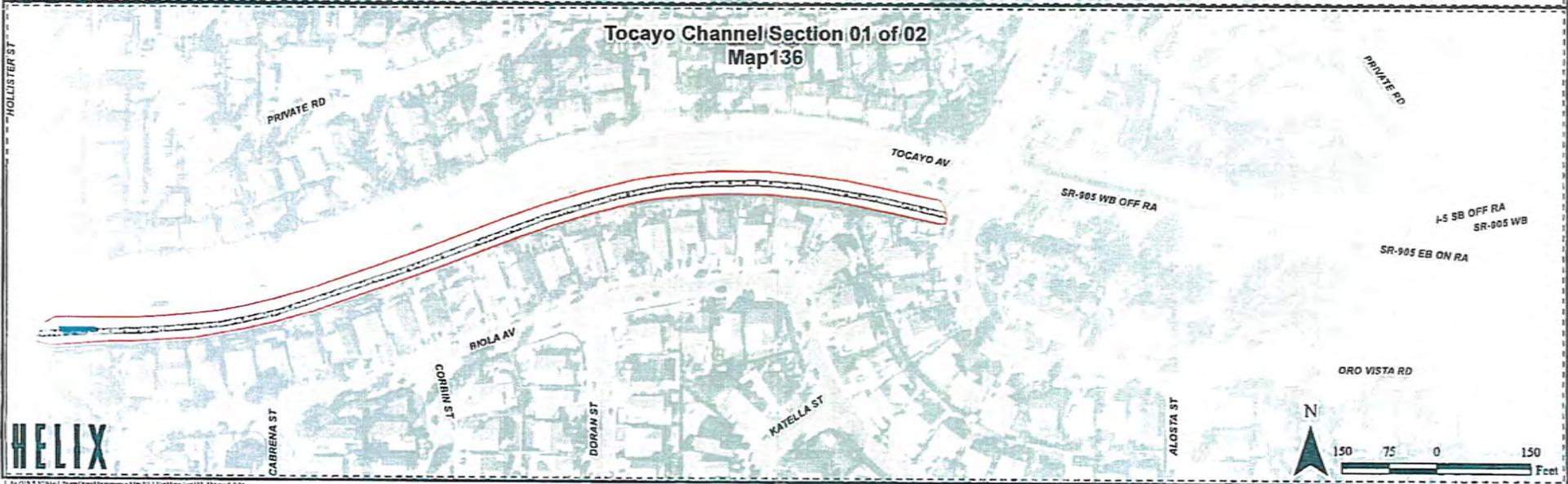
Completed
5-16-2015
E. Rodriguez

Elm & Harris Section 01 of 01
Map 135

Map # 135 is NOT on
Channel Master program.



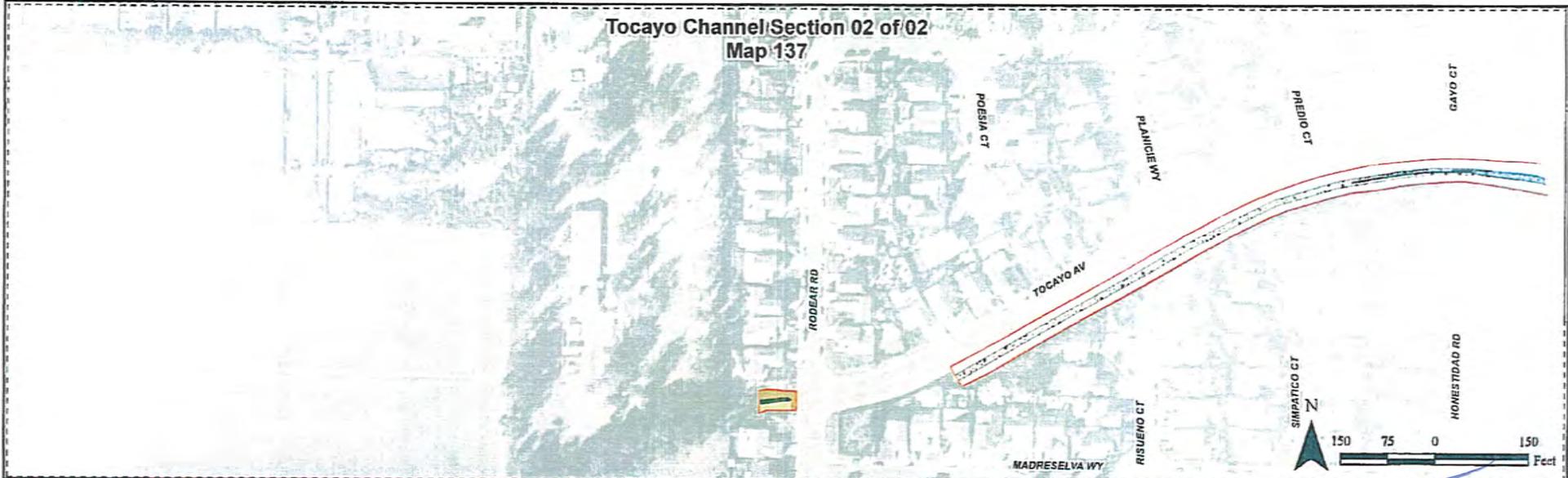
Tocayo Channel Section 01 of 02
Map 136



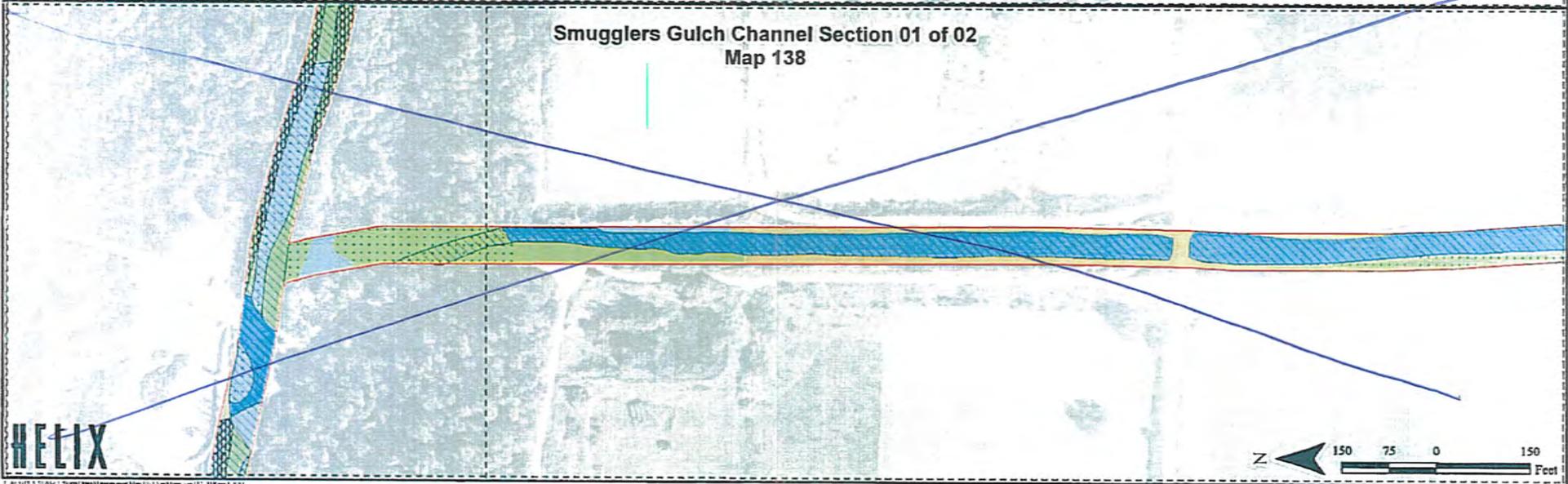
HELIX

Completed
5-16-2015
E. Rodden

Tocayo Channel Section 02 of 02
Map 137



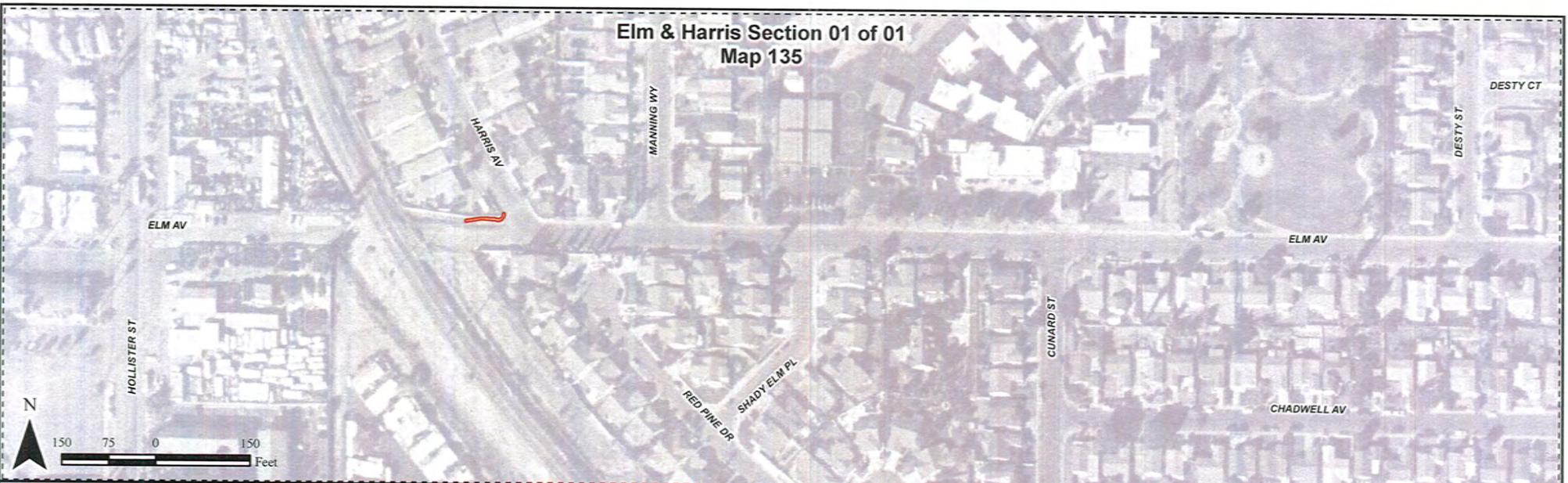
Smugglers Gulch Channel Section 01 of 02
Map 138



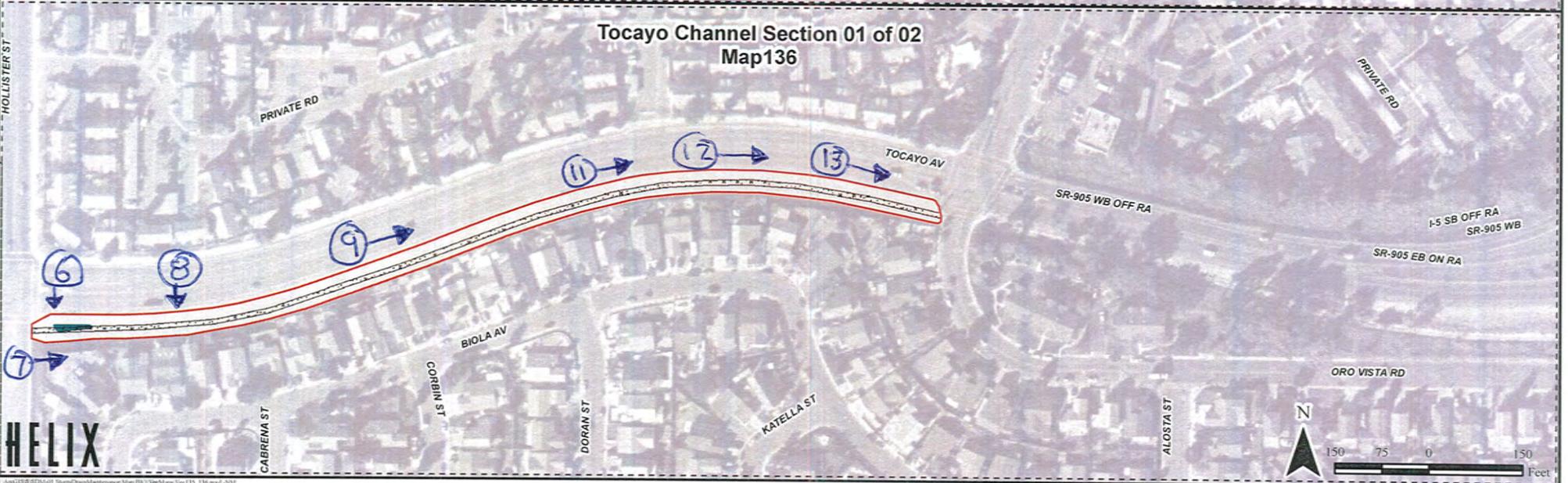
Vegetation/Wetland Delineation - Maps 137 & 138

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

Elm & Harris Section 01 of 01
Map 135



Tocayo Channel Section 01 of 02
Map 136





Tocayo.5 (5-16-2015).JPG



Tocayo.6 (5-16-2015).JPG



Tocayo.8 (5-16-2015).JPG



Tocayo.9 (5-16-2015).JPG



Tocayo.11 (5-16-2015).JPG



Tocayo.12 (5-16-2015).JPG

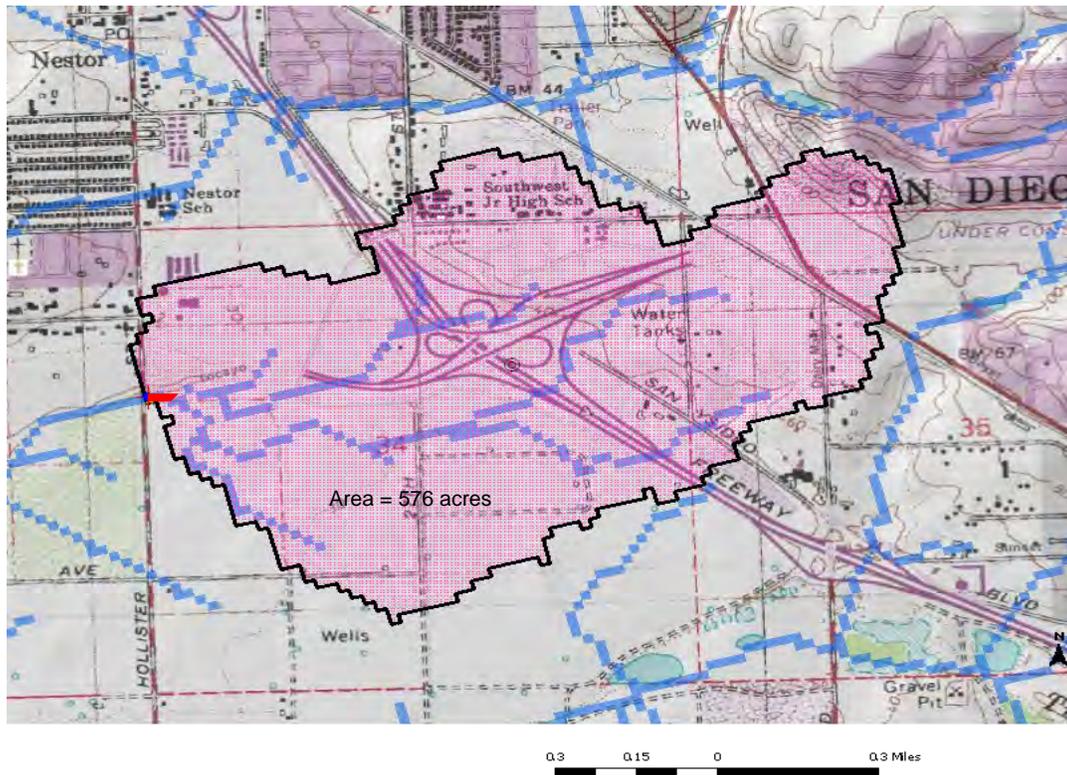


Tocayo.13 (5-16-2015).JPG

Appendix C
Hydrologic Support Material



Tocayo Channel Watershed MMP Map 136



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 | |



San Diego County Hydrology Manual



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

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E	85 th Percentile Precipitation Isopluvial Map	E-1

County of San Diego Hydrology Manual



Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

* $P_0 = 1.0$ inches

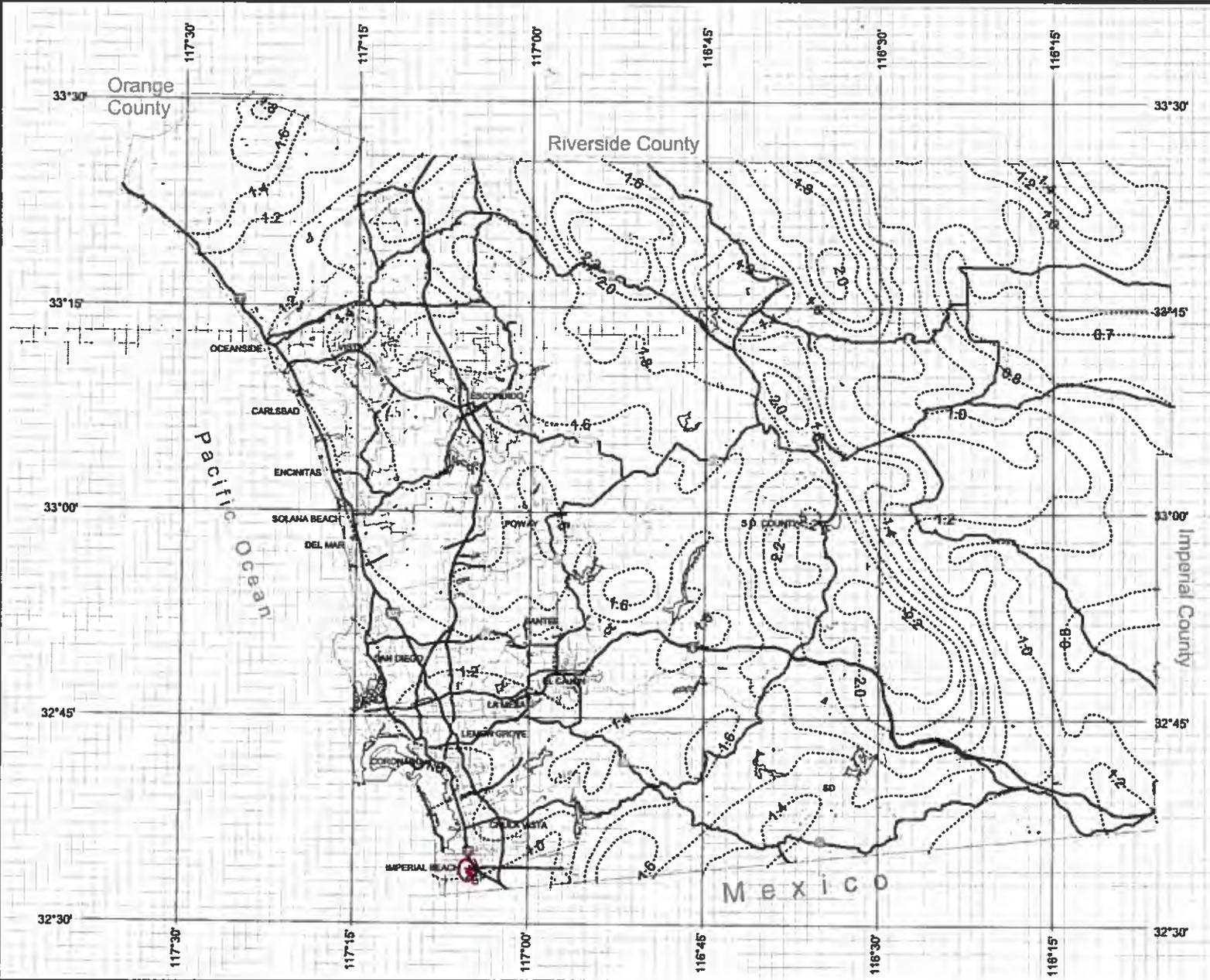


3 0 3 Miles

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Rainfall Isopluvials

5 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

$\otimes P_6 = 1.4$ inches

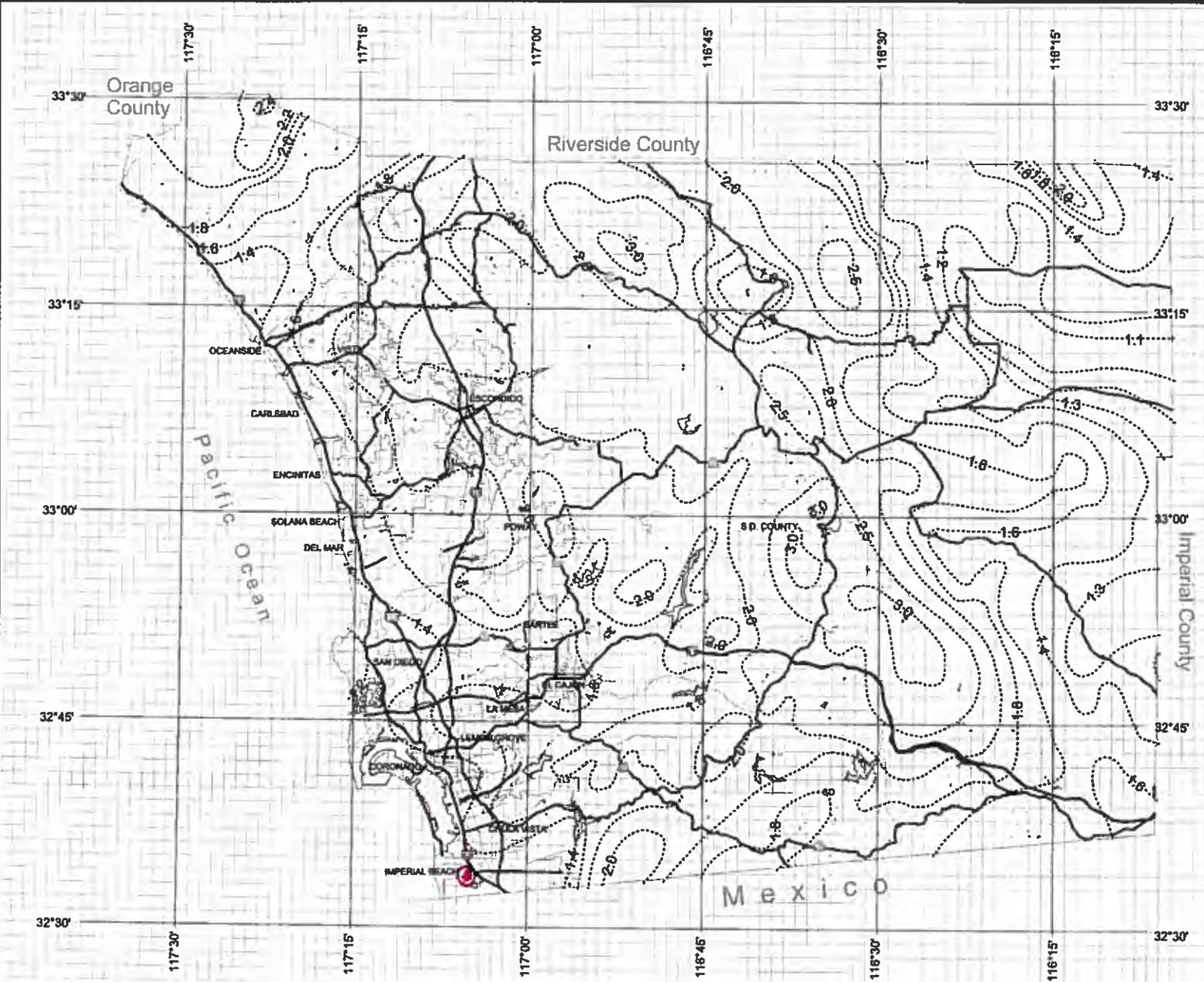


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3 0 3 Miles



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Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

() P₆ = 1.6 inches*

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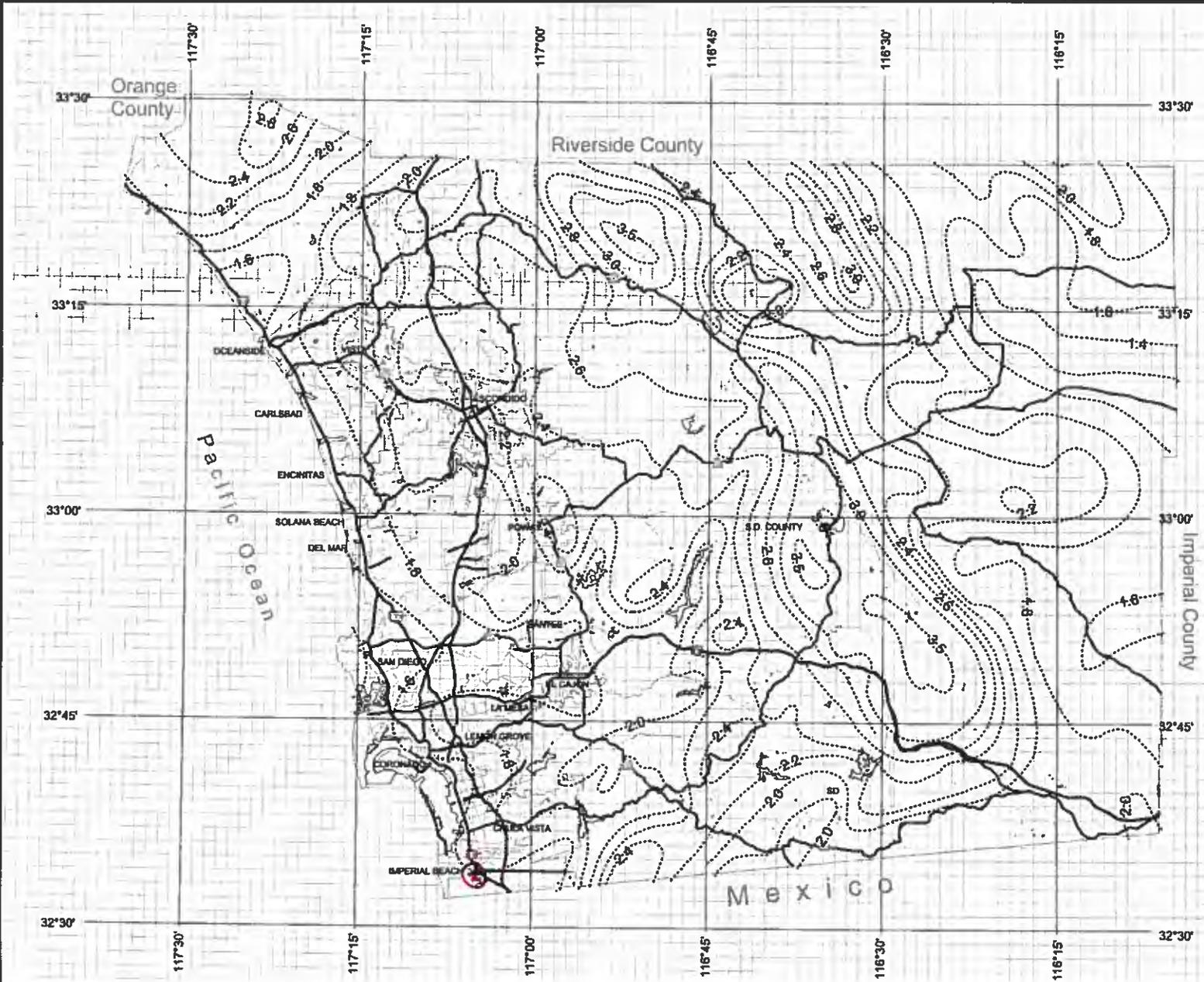


3 0 3 Miles

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Rainfall Isopluvials

25 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

P₆ = 1.8 inches

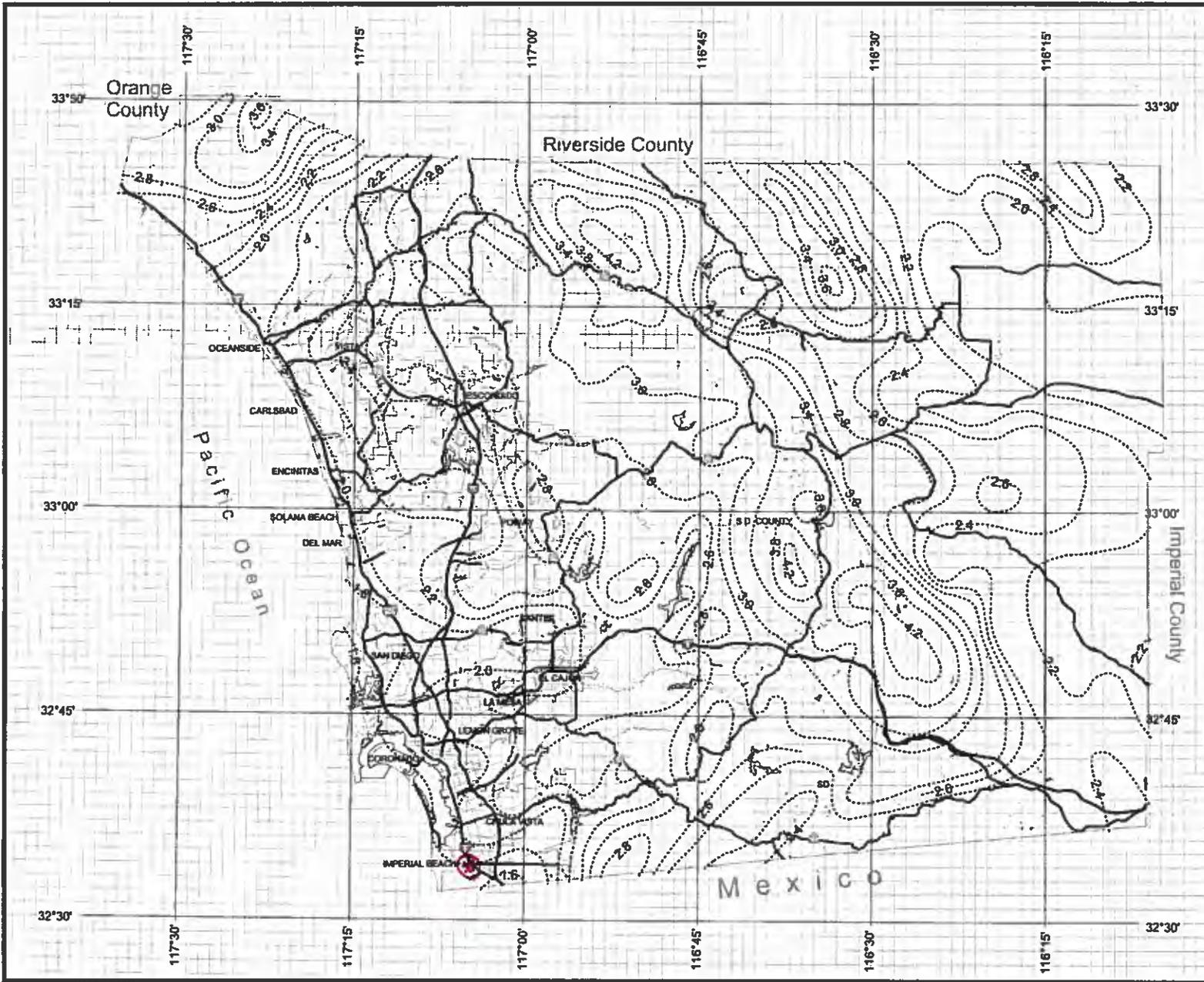


3 0 3 Miles

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Rainfall Isopleths

50 Year Rainfall Event - 6 Hours

----- Isopleth (inches)

⊗ P₆ = 1.9 inches

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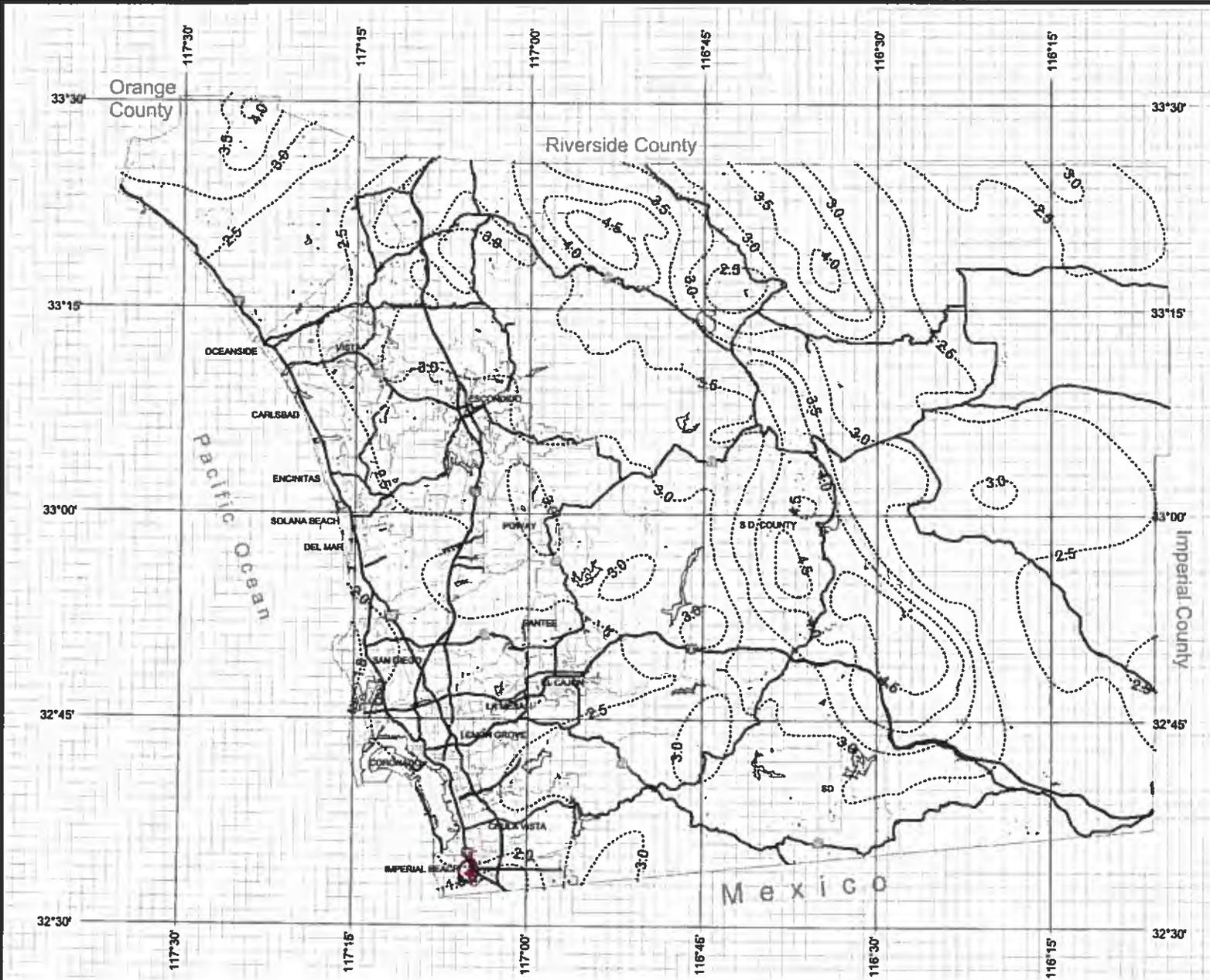


3 0 3 Miles

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County of San Diego Hydrology Manual



Rainfall Isopleths

100 Year Rainfall Event - 6 Hours



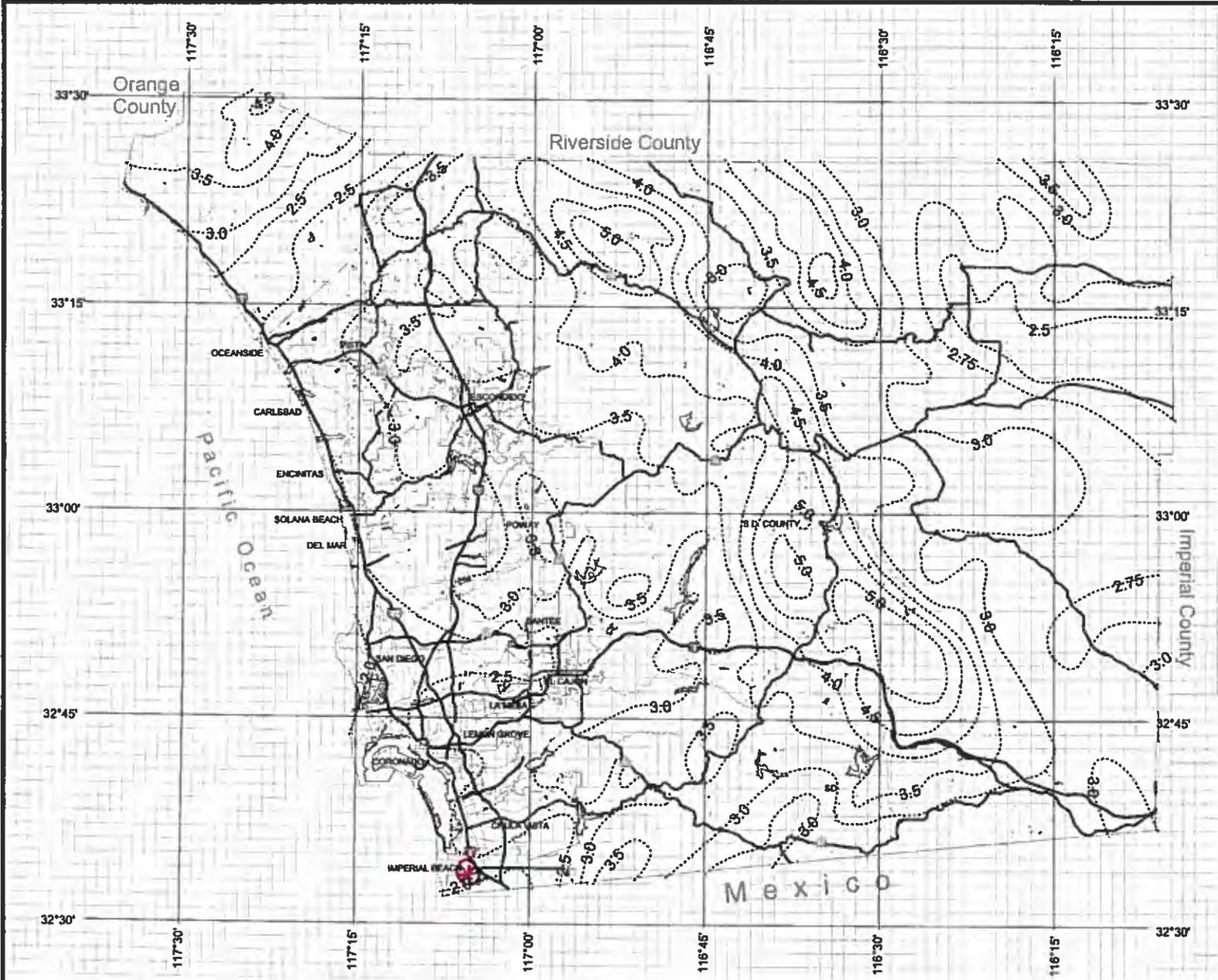
P₆ = 2.25 inches



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Appendix D
Hydraulic Analysis Output

Hydraulic Analysis Report

Project Data

Project Title: Tocayo Channel Map 136
Designer: Rick Engineering Company J-17205-D
Project Date: Tuesday, July 07, 2015
Project Units: U.S. Customary Units

Channel Analysis: Asbuilt Condition

Notes: The cross-section of the channel on the as-built plans show a 6-foot wide concrete bottom with 1.5:1 concrete side slopes and a 6 foot depth. Pursuant to Table 1-104.14A of the City of San Diego Drainage Design Manual, dated April 1984, the roughness coefficient used for each of the channel side slopes and channel bottom is $n = 0.015$.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 1.5000 (ft/ft)
Side Slope 2 (Z2): 1.5000 (ft/ft)
Channel Width: 6.0000 (ft)
Longitudinal Slope: 0.0047 (ft/ft)
Manning's n: 0.0150
Depth: 6.0000 (ft)

Result Parameters

Flow: 1343.0497 (cfs)
Area of Flow: 90.0000 (ft²)
Wetted Perimeter: 27.6333 (ft)
Hydraulic Radius: 3.2569 (ft)
Average Velocity: 14.9228 (ft/s)
Top Width: 24.0000 (ft)
Froude Number: 1.3580
Critical Depth: 6.9660 (ft)
Critical Velocity: 11.7211 (ft/s)
Critical Slope: 0.0025 (ft/ft)
Critical Top Width: 26.8980 (ft)
Calculated Max Shear Stress: 1.7597 (lb/ft²)
Calculated Avg Shear Stress: 0.9552 (lb/ft²)

Channel Analysis: Current Condition

Notes: The cross-section of the channel on the as-built plans show a 6-foot wide concrete bottom with 1.5:1 concrete side slopes and a 6 foot depth. Based on the information provided to us by the City of San Diego, and aerial imagery (Google Earth Imagery dated April 2015), there are areas of vegetation in the channel bottom and on the banks. Pursuant to Table 1-104.14A of the City of San Diego Drainage Design Manual, dated April 1984, the roughness coefficient used for each of the channel side slopes and channel bottom is $n = 0.04$, respectively. This roughness coefficient is based on some weeds, light brush on banks.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 1.5000 (ft/ft)
Side Slope 2 (Z2): 1.5000 (ft/ft)
Channel Width: 6.0000 (ft)
Longitudinal Slope: 0.0047 (ft/ft)
Manning's n: 0.0400
Depth: 6.0000 (ft)

Result Parameters

Flow: 503.6436 (cfs)
Area of Flow: 90.0000 (ft²)
Wetted Perimeter: 27.6333 (ft)
Hydraulic Radius: 3.2569 (ft)
Average Velocity: 5.5960 (ft/s)
Top Width: 24.0000 (ft)
Froude Number: 0.5093
Critical Depth: 4.2668 (ft)
Critical Velocity: 9.5191 (ft/s)
Critical Slope: 0.0196 (ft/ft)
Critical Top Width: 18.8004 (ft)
Calculated Max Shear Stress: 1.7597 (lb/ft²)
Calculated Avg Shear Stress: 0.9552 (lb/ft²)

CITY OF SAN DIEGO



**DRAINAGE DESIGN
MANUAL**

APRIL • 1984

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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 Assessment Sheet for Tocayo Channel MMP Map 136

Total Channel Score: 74.0 /100

Flood Hazard (75% of total weight)			Score	factor weight	Weighted Points
Δ capacity			Sum of sub-factor a-c scores:	7	8.75
a. Risk of flooding	Current Channel Normal depth capacity ¹ :	504 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	(out of 15)	
b. Increase in storm event capacity	Channel As-Built normal depth capacity ¹ :	1343 cfs 2- to 5 -yr. storm event	1 point given for every level increase in -year storm event capacity, post-maintenance		
c. Net percent increase in channel capacity post-maintenance		166%	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		
Consequence of flooding adjacent areas					
Surrounding area land use: (area within 100 feet of the channel or area in which more than 10,000 ft ² 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	0 1 2 3 4	50%
Is there open space surrounding the channel?		No	If yes, subtract land use score by 1		
Clogging Potential					
Are there trees/large debris that have potential to flow D/S and clog culverts/the channel?		No large debris/tress in the channel, but potential for vegetation and sediment to flow downstream and clog.		0 1 2 3 4	25%
			Total Weighted Flood Hazard Points		65.0
Water Quality/Channel Condition (10% of total weight)					
Trash/Debris					
Type of trash and Source:	Aluminum cans and misc. trash. Most likely from the street, or from a pipe outletting into the channel.			0 1 2 3 4	20%
Standing water					
Ponding?		Yes		0 1 2 3 4	15%
Noticeable odors?		No			
Algae?		No			
Sediment					
Approx. sediment coverage: (Based on information provided on City of San Diego O&M Channel Maintenance Inspection Form)		2%		0 1 2 3 4	35%
Rock/debris Accumulation?		No			
Transients/encampments					
Culverts and Outfalls				0 1 2 3 4	10%
Infrastructure Issues					
Culvert structure condition		Good		0 1 2 3 4	10%
Broken concrete/gunite?		No			
Broken or missing trash fence/fence poles/supports?		No			
Slope failure?		No			
			Total Weighted Water Quality Points		4.0
Community Input (10% of total weight)					
Community Complaints Received				YES NO	50%
Community Outreach Input				0 1 2 3 4	50%
			Total Weighted Community Input Points		5.0
Aesthetics (5% of total weight)					
Aesthetics					
Are the aesthetics of the channel compromised?		No		0 1 2 3 4	100%
			Total Weighted Aesthetics Points		0.0

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:**
74.0 out of 100
 - **Flood Hazard Score:**
65.0 out of 75
 - **Water Quality Score:**
4 out of 10
 - **Community Input Score:**
5 out of 10
 - **Aesthetics Score:**
0 out of 5
- **Capacity Prior to Maintenance:**
Less than 2-year storm event
- **Capacity After Maintenance (As-built Capacity) :**
2- to 5-year storm event
- **Clogging Potential:** *MEDIUM*
- **Approximate Vegetation Coverage:** *MEDIUM*
- **Surrounding Area:** *Residential*
- **Infrastructure Failures:**
None
- **Site Evaluation Date:**
May 16, 2015
- **Notes/Comments:**

Legend

- Photo Location
- Channel Survey
- City Storm Drain Structure
- City Storm Drain

RICK ENGINEERING COMPANY

Scale in Feet
0 290 580

North

Channel: Tocayo

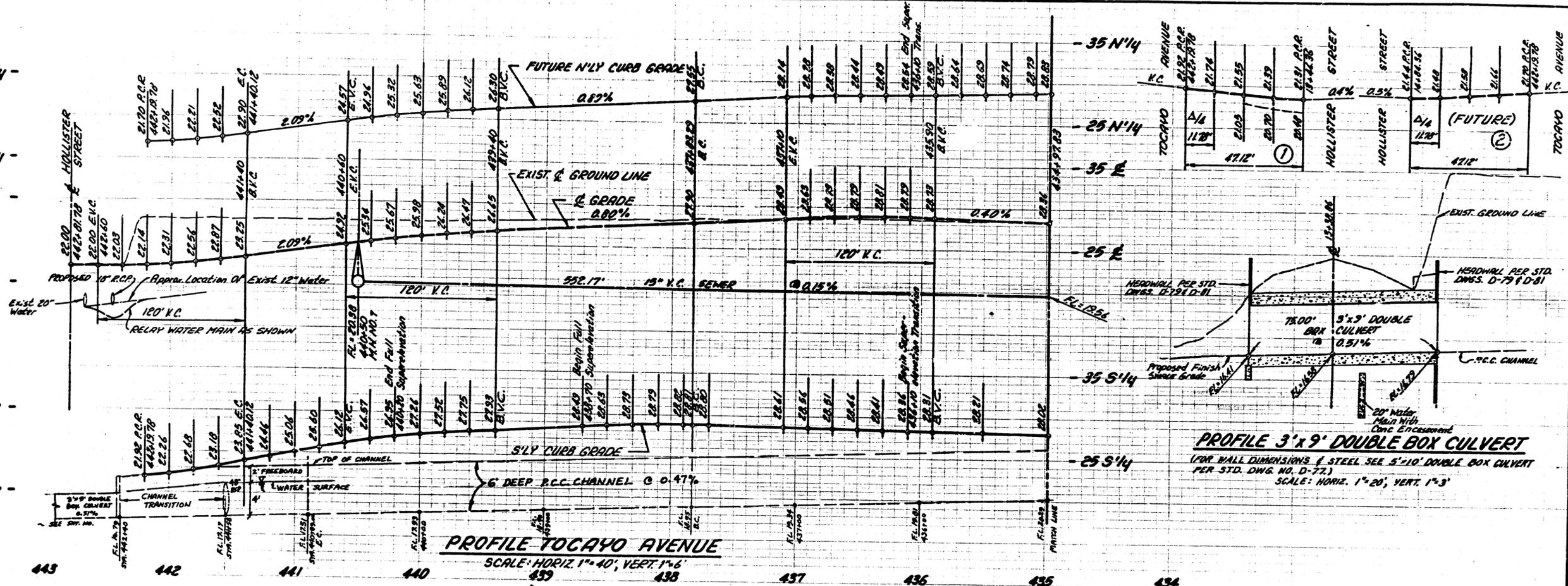
MMP Map # 136

Channel Maintenance Prioritization Summary Sheet

Appendix G
Available As-built plans

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

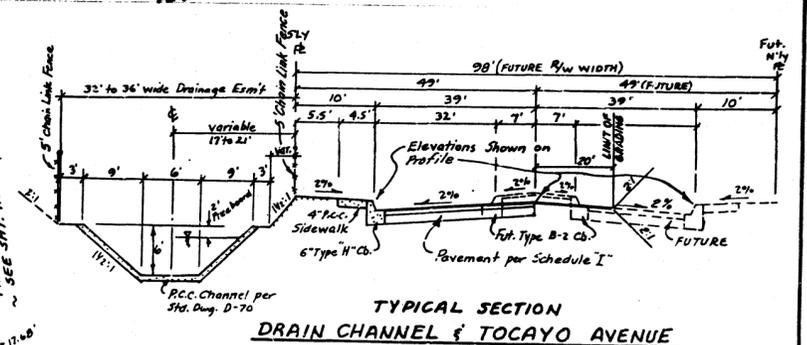
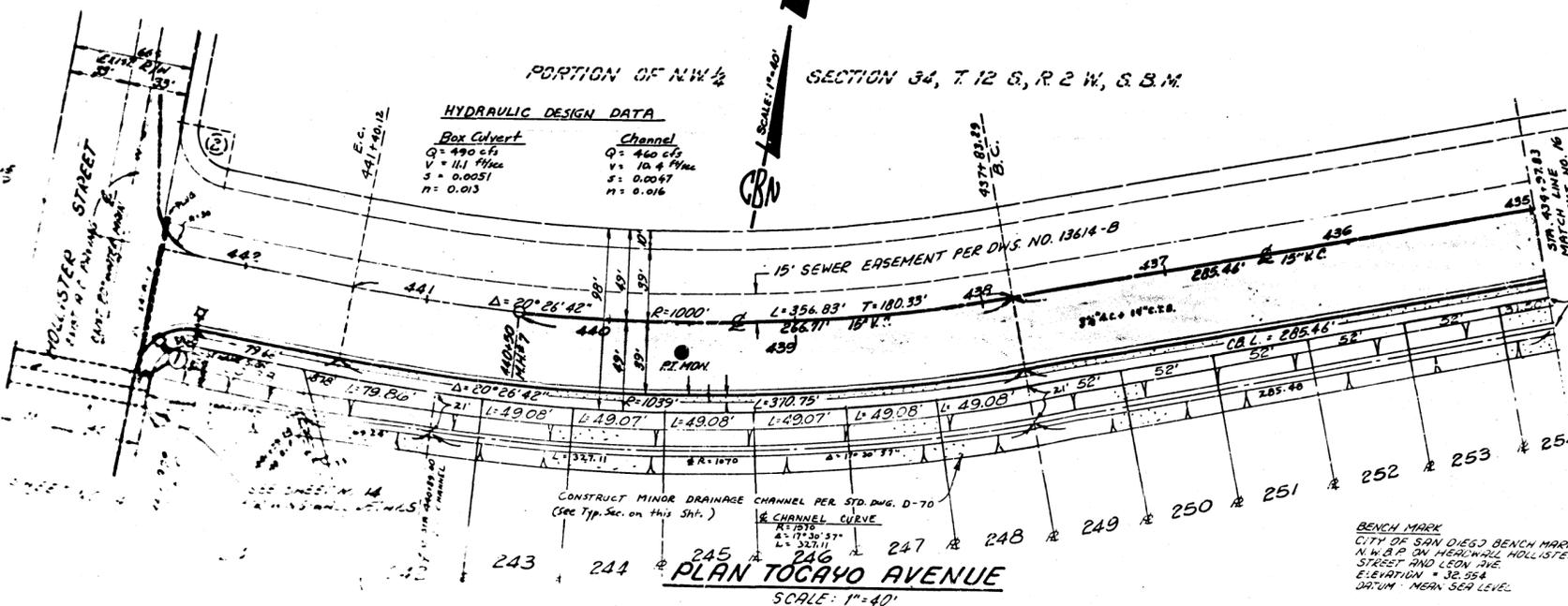
30 N¹/₄ -
20 N¹/₄ -
30 E -
20 E -
30 S¹/₄ -
20 S¹/₄ -



PORTION OF NW 1/4 SECTION 34, T. 12 S., R. 2 W., S. B. M.

HYDRAULIC DESIGN DATA

Box Culvert	Channel
Q = 490 cfs	Q = 460 cfs
V = 14.1 ft/sec	V = 10.4 ft/sec
S = 0.0051	S = 0.0067
n = 0.013	n = 0.016



PRIVATE CONTRACT

PLANS FOR THE PUBLIC IMPROVEMENT OF TOCAYO AVENUE IN AND ADJOINING SUNRISE ADDITION

CITY OF SAN DIEGO, CALIFORNIA

SHEET 10 OF 27 SHEETS

W.O. 70590	T.M. 76-148
11-1-76	11-17-76

DESCRIPTION BY APPROVED DATE FILED

ORIGINAL

PLANS PREPARED BY: CRAIG, BULTHUIS & NOTHOMB
Civil Engineering
2811 Adams Ave.
San Diego, California 92116
BY: [Signature]
DATE: Oct. 1, 1976

CONTRACT NO. 17042-15-D

Appendix H
Compact Disc
PDF Version of Full Report