

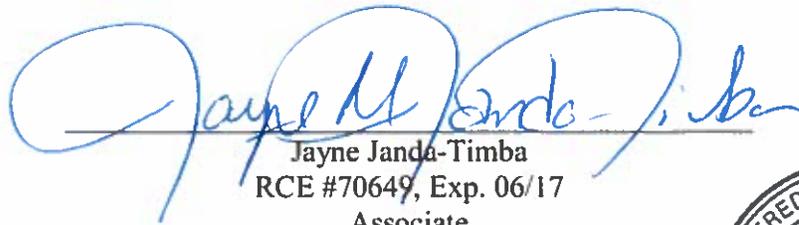
**SUMMARY OF FINDINGS FOR THE
ANNUAL DRAINAGE CHANNEL FIELD
ASSESSMENT AND MAINTENANCE PRIORITIZATION
PROJECT (PHASE 1)
FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER
SYSTEM MAINTENANCE PROGRAM (MMP) MAP 120:
COTTONWOOD CHANNEL**

**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 120: COTTONWOOD 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 Cottonwood Channel (MMP Map 120) is **81.0 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 25- to 50-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 120: Cottonwood Channel. Refer to Appendix A for the MMP Storm Water Facilities Key Map and Map 120.

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
cfs¹ 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: 1536 acres						
6-hour Precipitation	1	1.4	1.6	1.7	2.25	2.5
Frequency	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Discharge (cfs)¹	922	1290	1475	1567	2074	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 120 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)
541.2	Less than 2	1939.6	25 to 50

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:

Table 5

Channel Prioritization Assessment Scoring Summary		
Factor	Percent Weighted (%)	Weighted Factor Score /Maximum Possible Score
Flood Risk	75	70/75
Water Quality	10	6/10
Community Input	10	5/10
Aesthetics	5	0/5
Overall Channel Score:		<i>81.0/100</i>

Additionally, the following items should be noted:

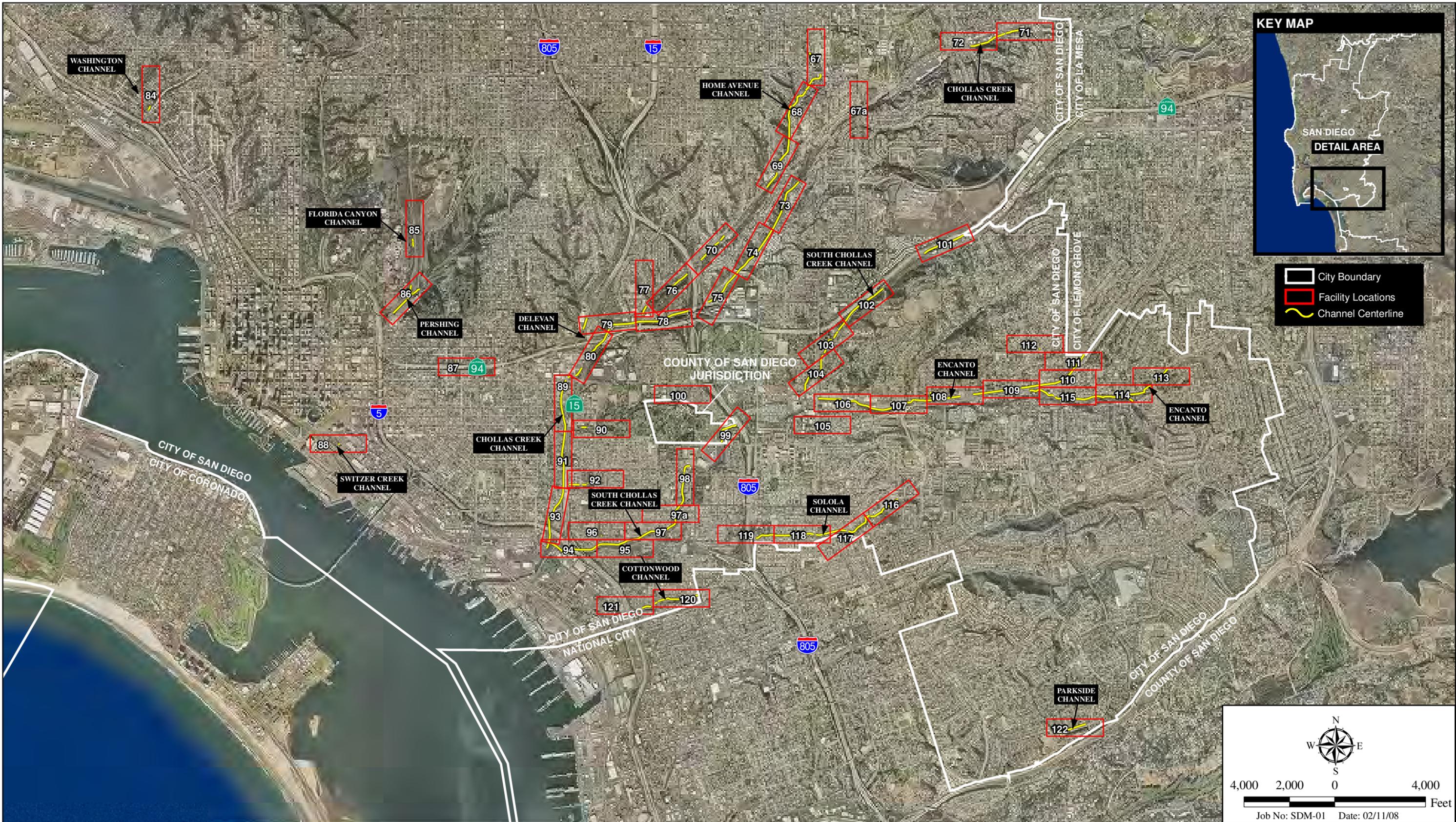
- Based on the site photos taken by the City of San Diego, vegetation has grown down from the top of the channel banks over the concrete side slopes. A high risk of vegetation flowing downstream and clogging the culvert exists.
- Based on site photos taken by the City of San Diego, a high risk of debris or trees flowing downstream and clogging the culvert exists.

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 120: Cottonwood Channel is **81.0**. 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 25- to 50-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 120: Cottonwood Channel

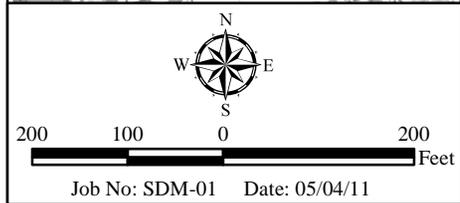
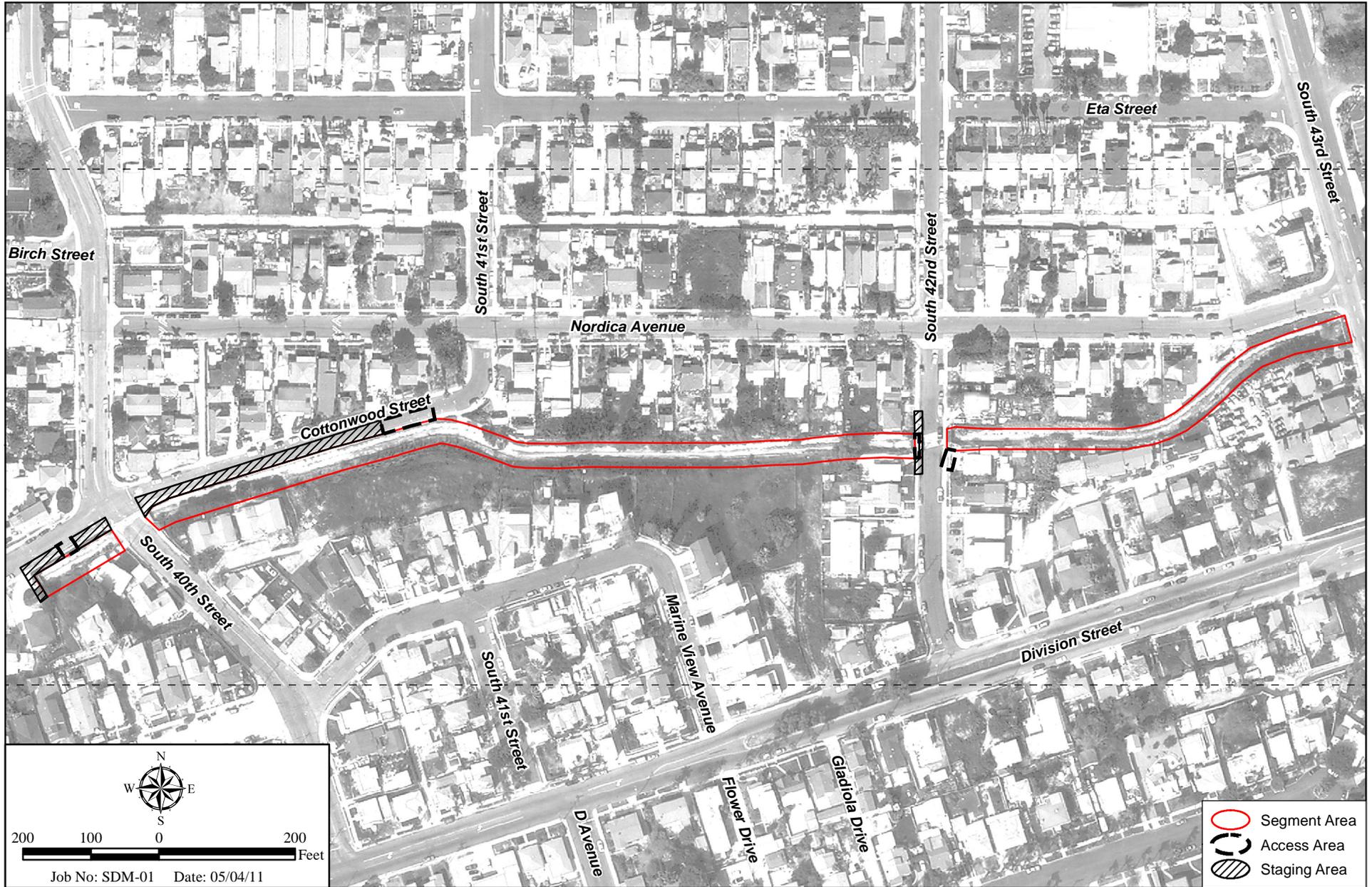


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Stormwater Facilities - Central San Diego Area

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

Figure 2d



-  Segment Area
-  Access Area
-  Staging Area

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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

Operations and Maintenance

Channel Maintenance Inspection Form

Date: 5/27/15 Time: 11:45

Channel Map No.: 120

Watershed: Pueblo San Diego
Solola Chamme

Inspector: Anthony Jacques

Weather: Good

Initial Inspection

Follow Up Inspection

Item	Condition	Comments
A. Channel Condition		
1= Poor Condition/Needs Immediate Attention		
2= Moderate Condition		
3= Good Condition		
1. Structure Condition	1 2 (3) N/A	
2. Erosion	1 2 3 (N/A)	
3. Trash/Debris	1 (2) 3 N/A	Type of trash and source:
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	Approx. Coverage/Density of Vegetation: 50%
A. Invasive (Arundo)	(1) 2 3 N/A	
B. Native	1 (2) 3 N/A	
7. Sediment	1 (2) 3 N/A	Approx. Depth/Coverage of Sediment: 5%
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	
2. <u>Trash/Debris/Sediment</u>	(1) 2 3 N/A	
3. Clogging	1 (2) 3 N/A	

C. See Map Attached

-Identify Key Issues on Map

-Inspect and take photographs from vantage points identified on Map

Other Comments: *OK: Pictures*

D. To Be Completed by Management

Follow Up Actions

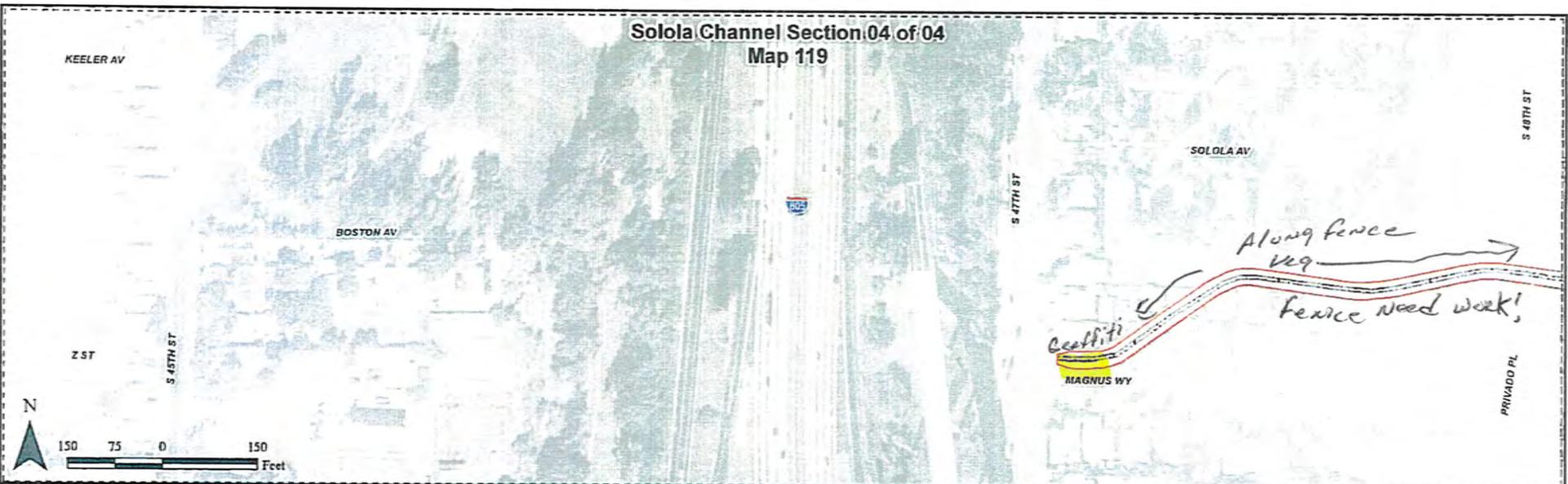
- 1.
- 2.
- 3.

E. Infrastructure Failure Issues

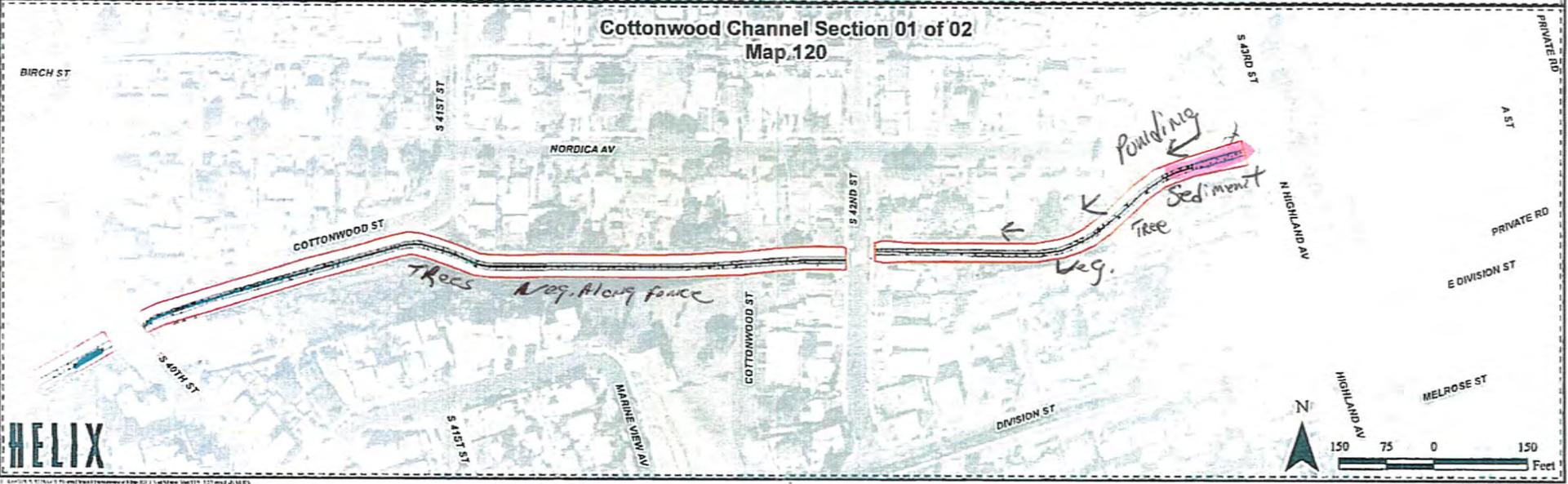
Item	Condition	Comments
1. Broken Concrete/Gunite?	Y <input checked="" type="radio"/> N N/A	
2. Broken/Missing Trash Fence?	Y N <input checked="" type="radio"/> N/A	
3. Broken/Missing Poles/Supports?	Y N <input checked="" type="radio"/> N/A	
4. Exposed Rebar?	Y <input checked="" type="radio"/> N N/A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

Other Comments/Observations:

Solola Channel Section 04 of 04
Map 119



Cottonwood Channel Section 01 of 02
Map 120

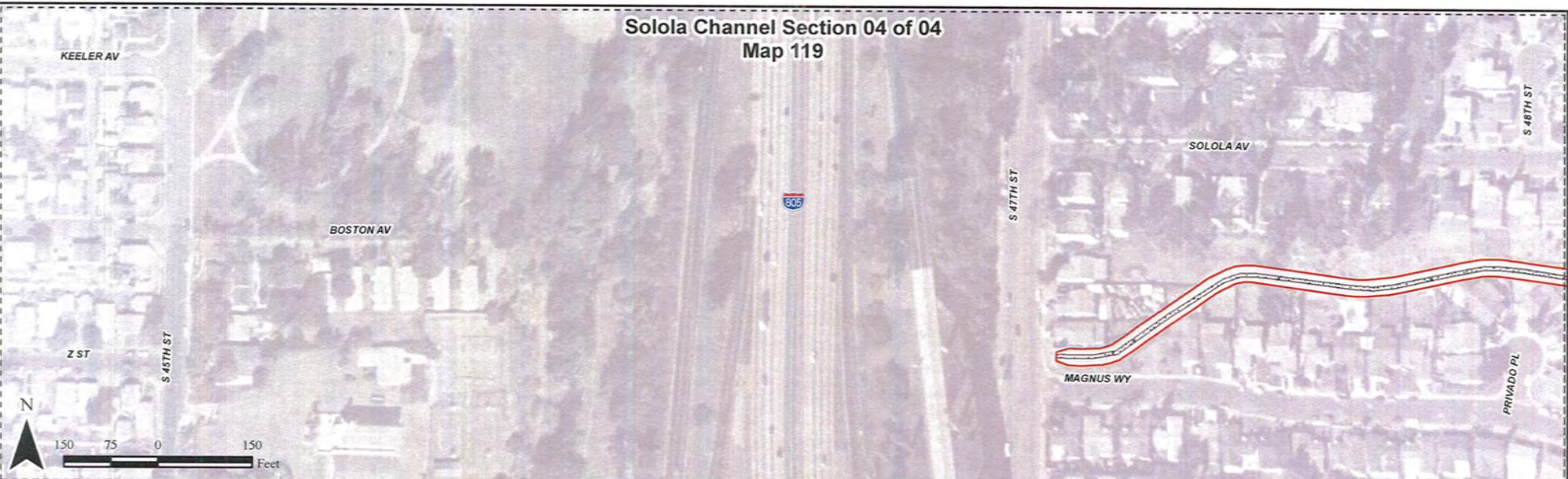


HELIX

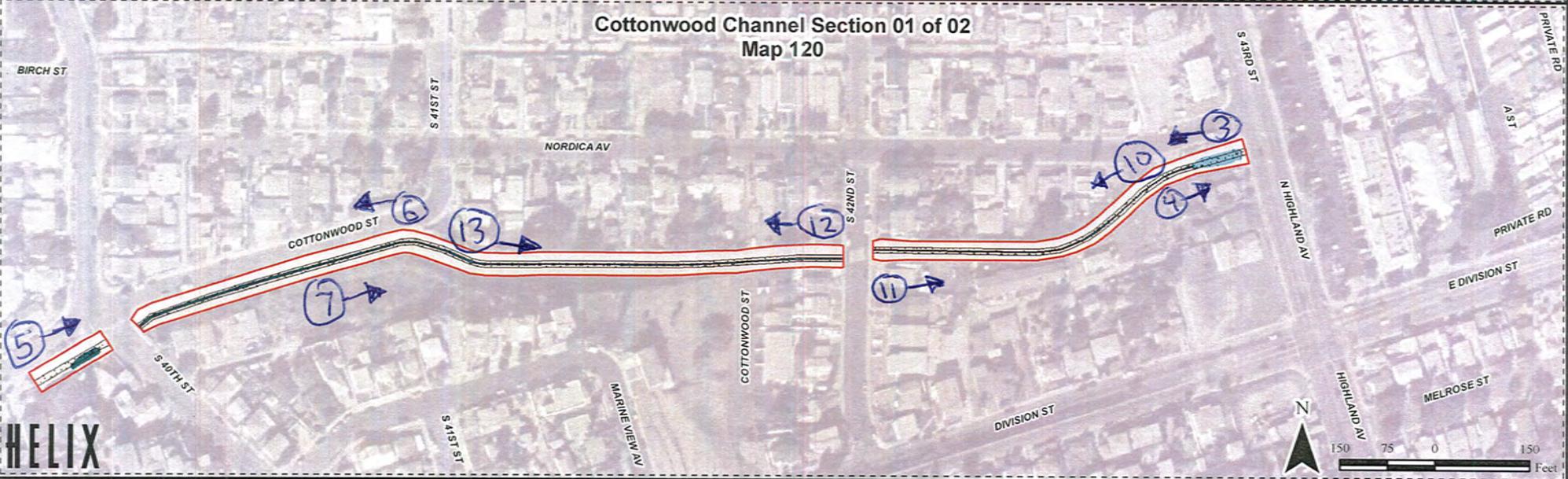
Vegetation/Wetland Delineation - Maps 119 & 120

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

Solola Channel Section 04 of 04
Map 119



Cottonwood Channel Section 01 of 02
Map 120



HELIX



Cottonwood Channel.3 (5-27-2015).JPG



Cottonwood Channel.4 (5-27-2015).JPG



Cottonwood Channel.5 (5-27-2015).JPG



Cottonwood Channel.6 (5-27-2015).JPG



Cottonwood Channel.7 (5-27-2015).JPG



Cottonwood Channel.10 (5-29-2015).JPG



Cottonwood Channel.11 (5-29-2015).JPG



Cottonwood Channel.12 (5-29-2015).JPG

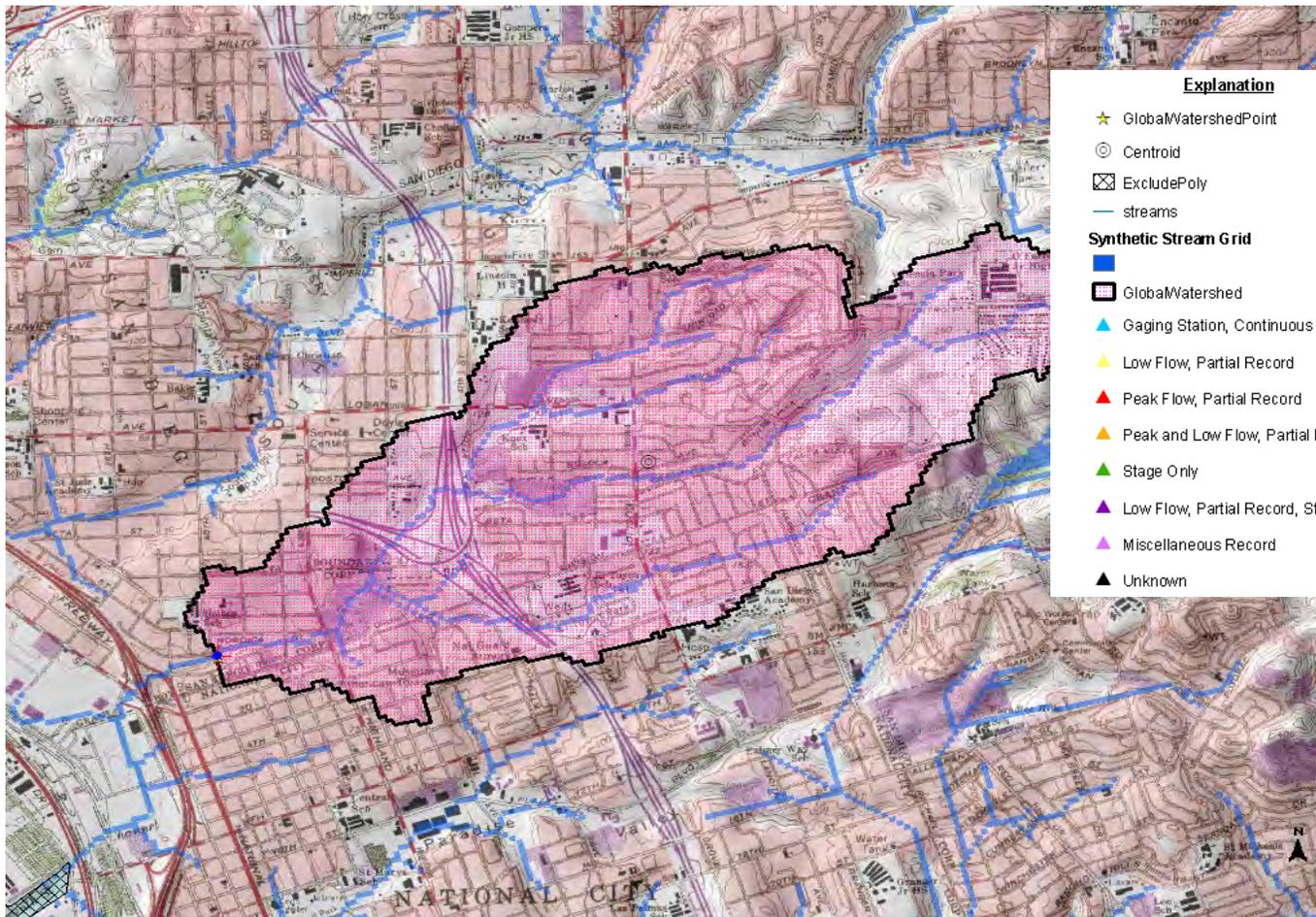


Cottonwood Channel.13 (5-29-2015).JPG

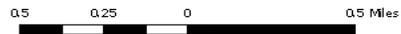
Appendix C
Hydrologic Support Material



StreamStats Print Page



- Explanation**
- ★ GlobalWatershedPoint
 - ⊙ Centroid
 - ⊗ ExcludePoly
 - streams
- Synthetic Stream Grid**
- GlobalWatershed
 - ▲ Gaging Station, Continuous Record
 - ▲ Low Flow, Partial Record
 - ▲ Peak Flow, Partial Record
 - ▲ Peak and Low Flow, Partial Record
 - ▲ Stage Only
 - ▲ Low Flow, Partial Record, Stage
 - ▲ Miscellaneous Record
 - ▲ Unknown



6/5/2015 10:32:06 AM

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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D	Worksheets for NRCS Hydrologic Method Calculations	D-1
E	85 th Percentile Precipitation Isopluvial Map	E-1

County of San Diego Hydrology Manual

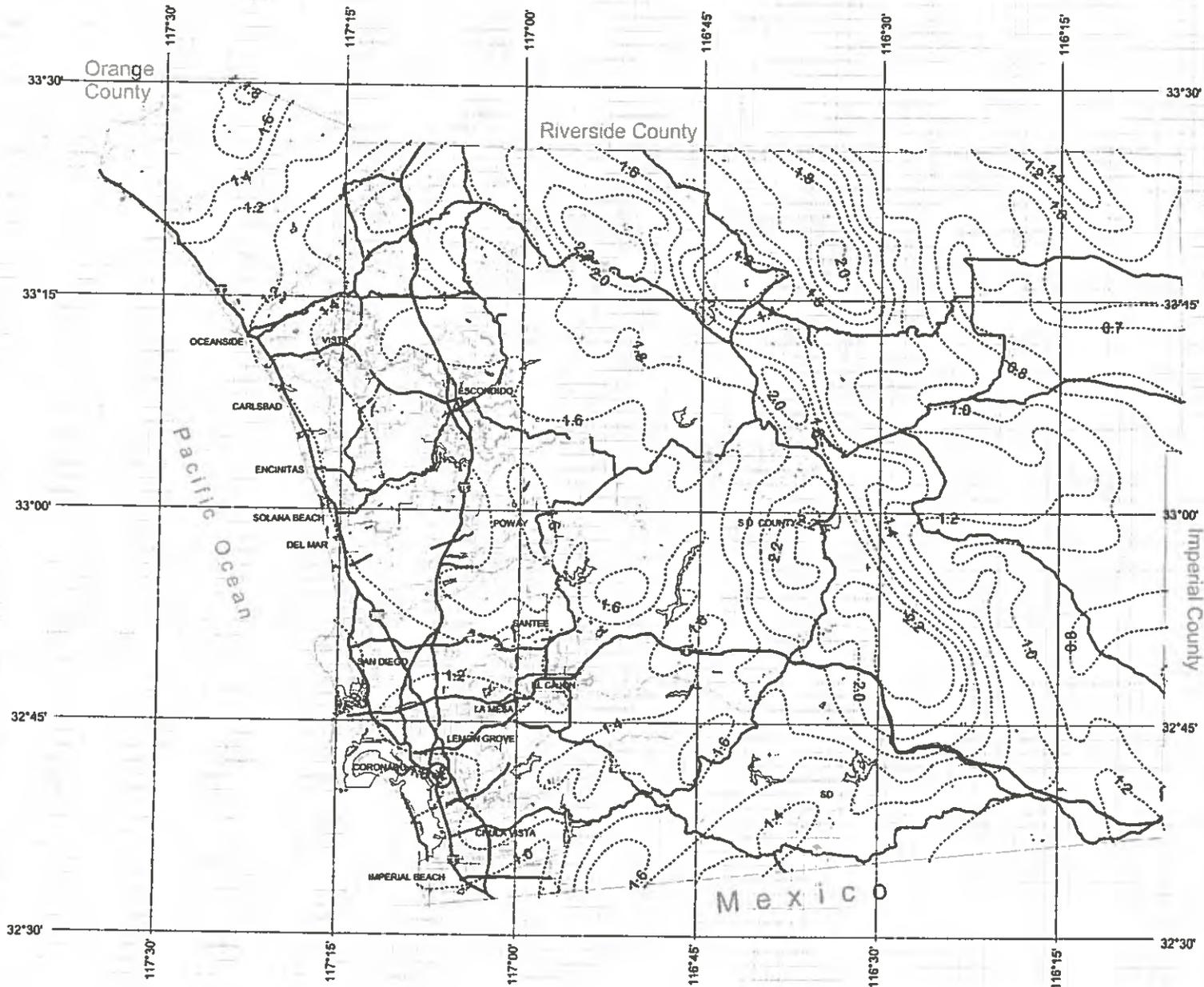


Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

*** P₆ = 1.0 inch**



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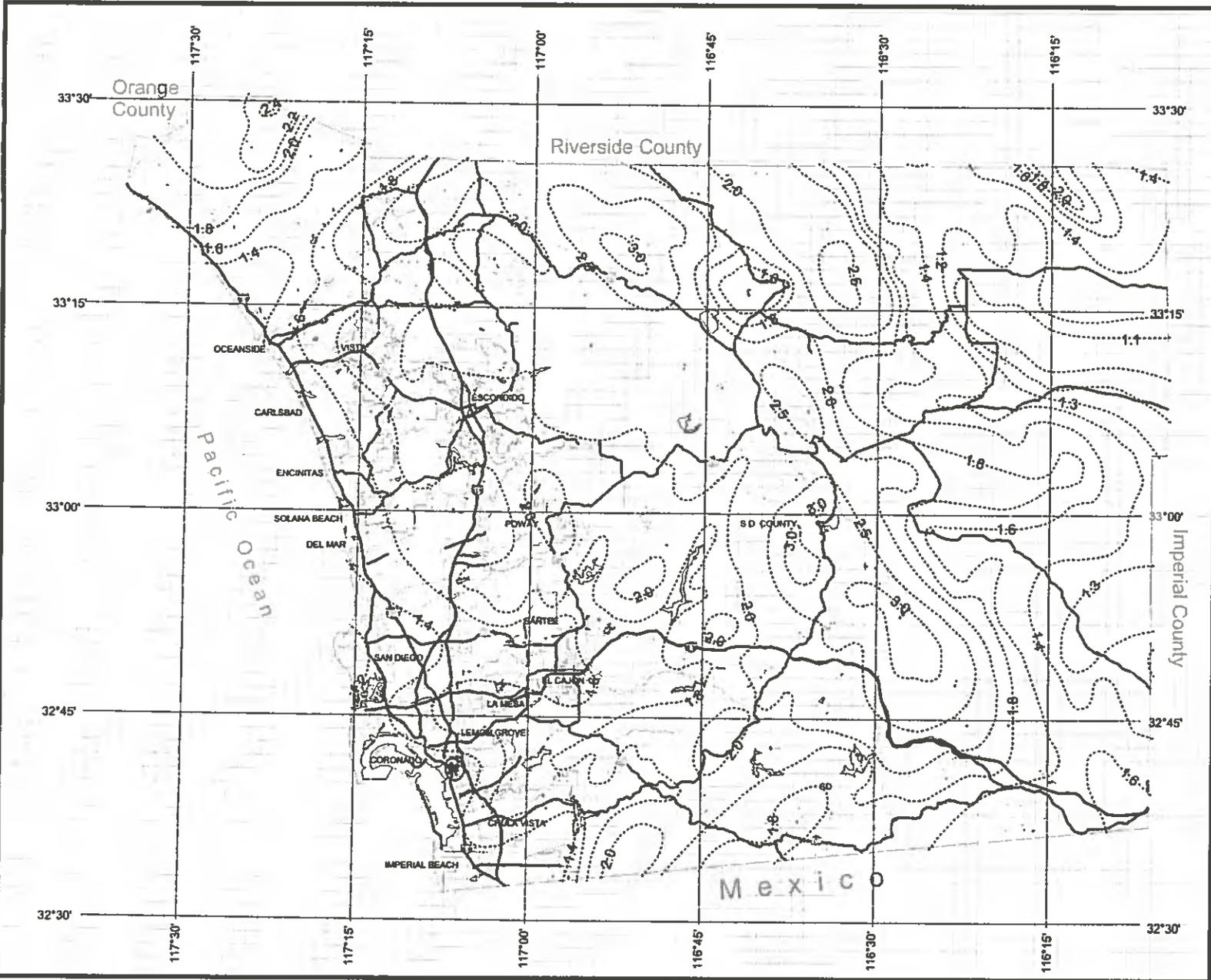


Rainfall Isopluvials

5 Year Rainfall Event - 6 Hours



P₆ = 1.4 inches



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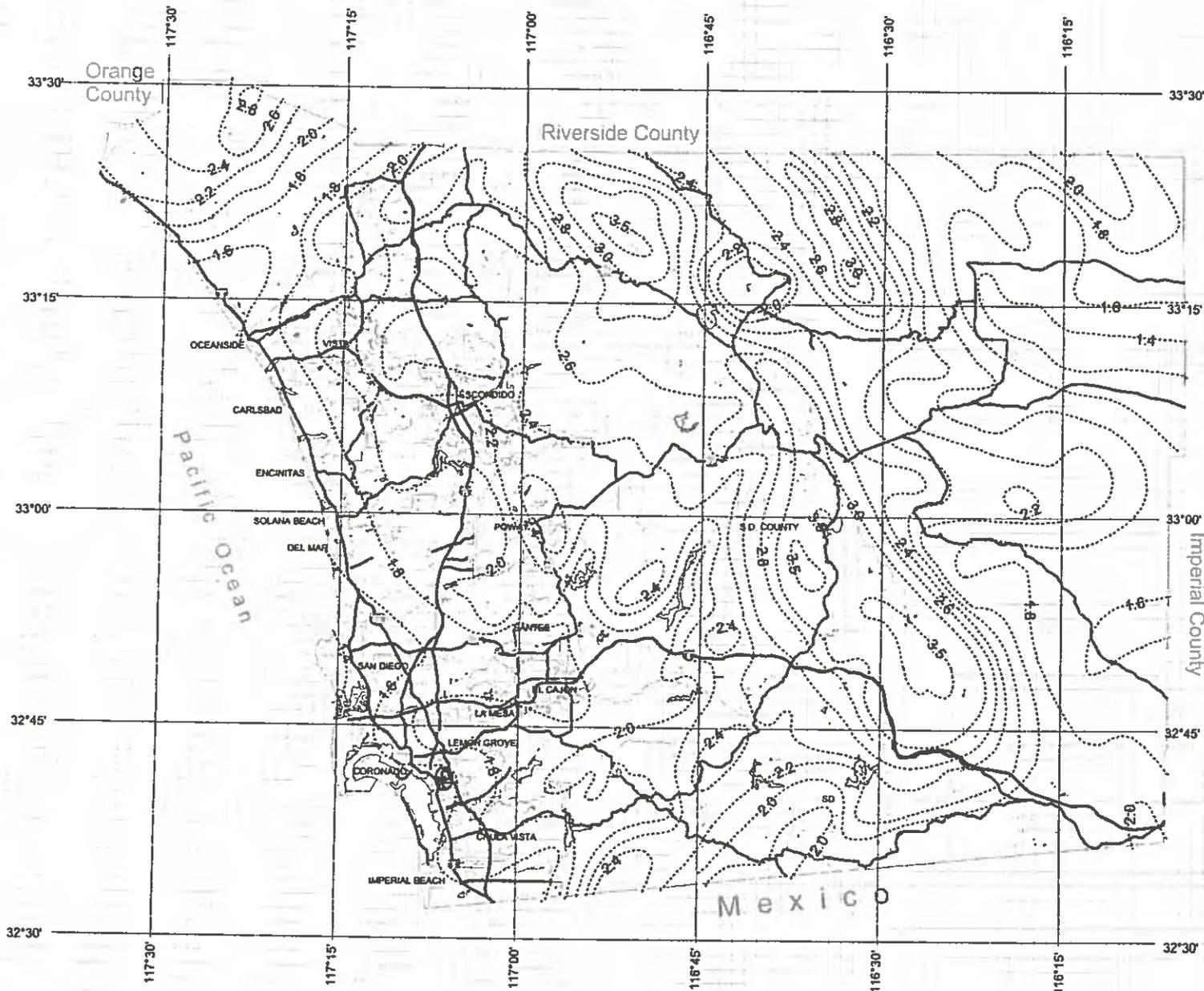


Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

** P₆ = 1.6 inches*



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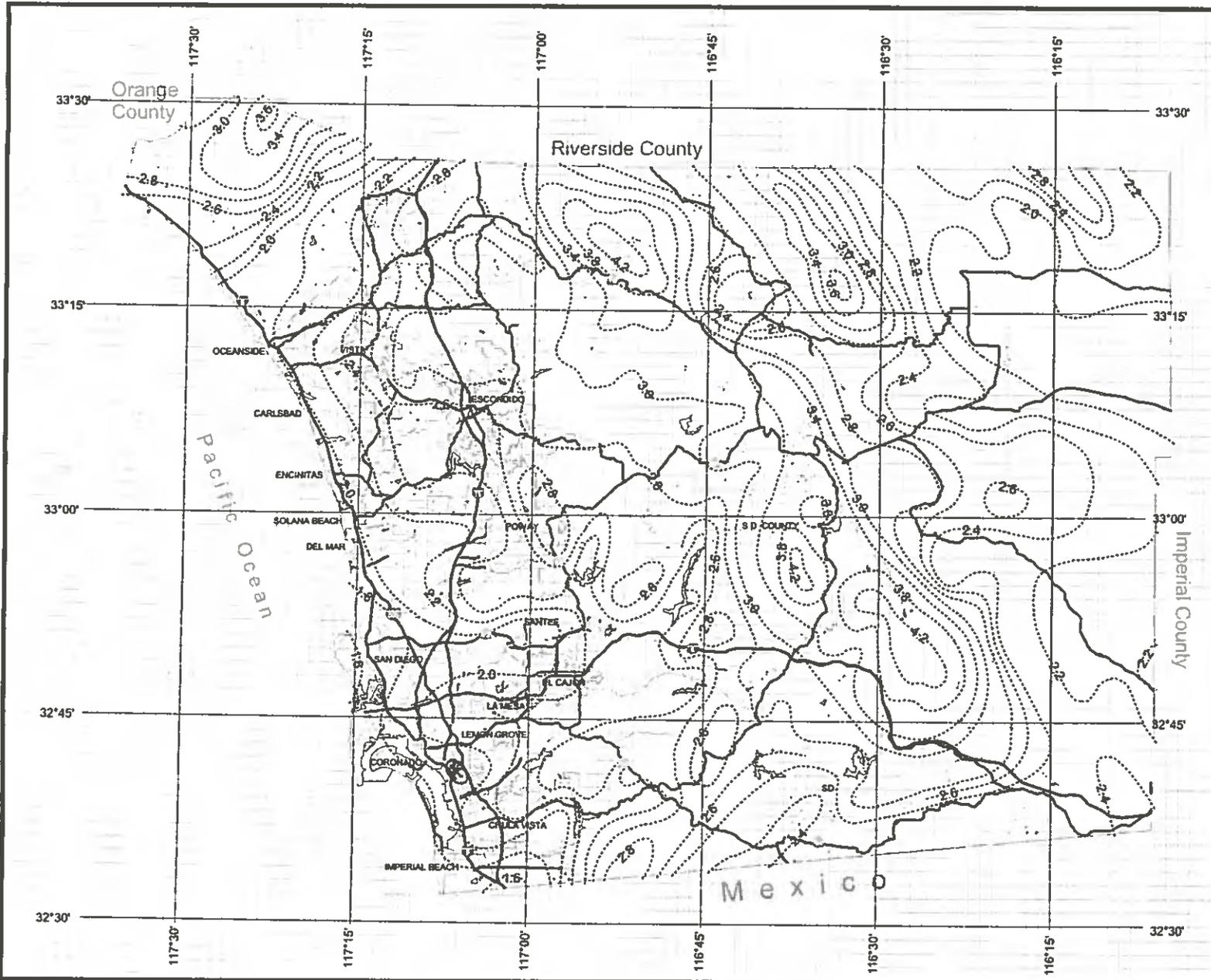


Rainfall Isopluvials

25 Year Rainfall Event - 6 Hours



** P₆ = 1.7 inches*



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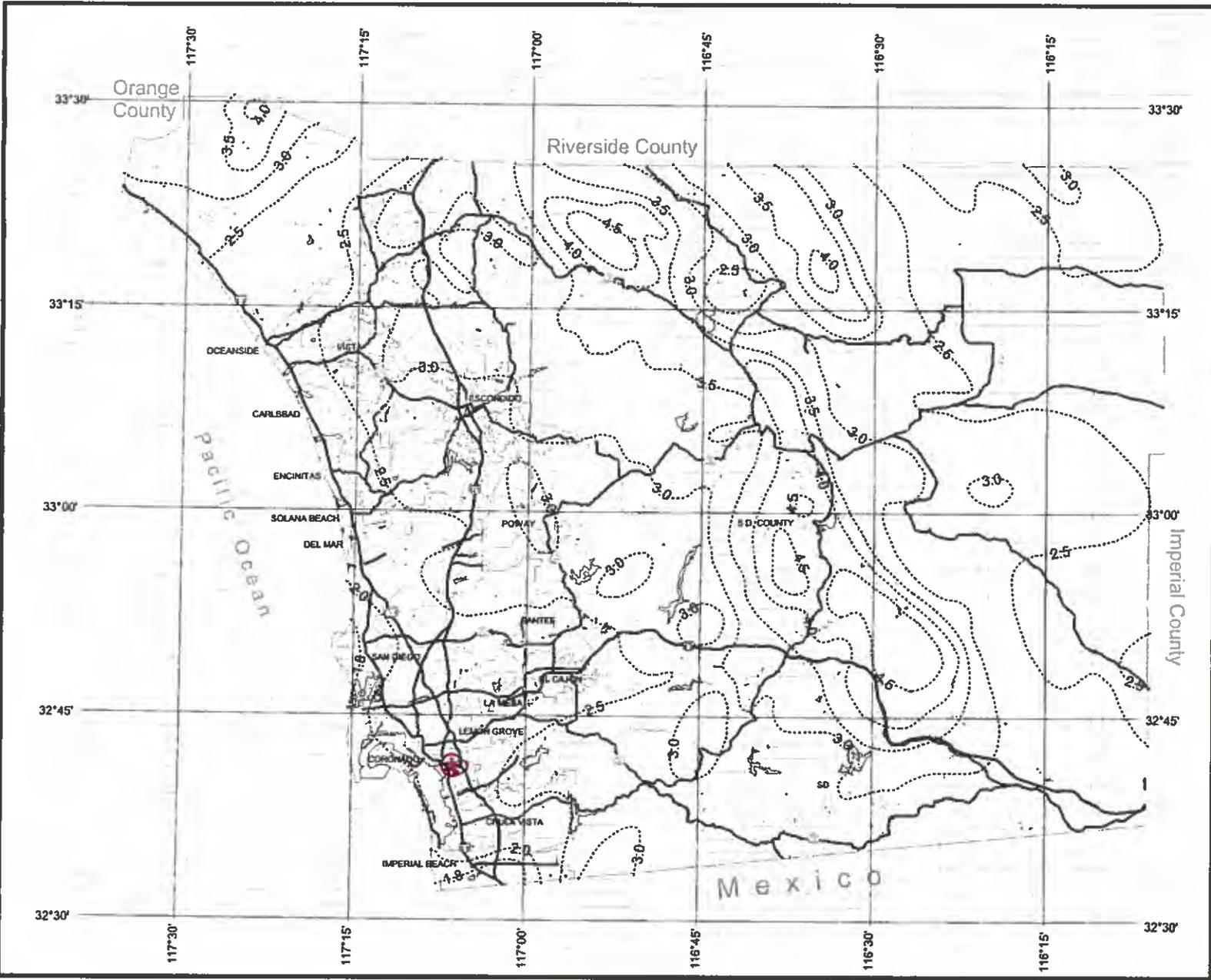


Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours



** P₆ = 2.25 inches*



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3 0 3 Miles

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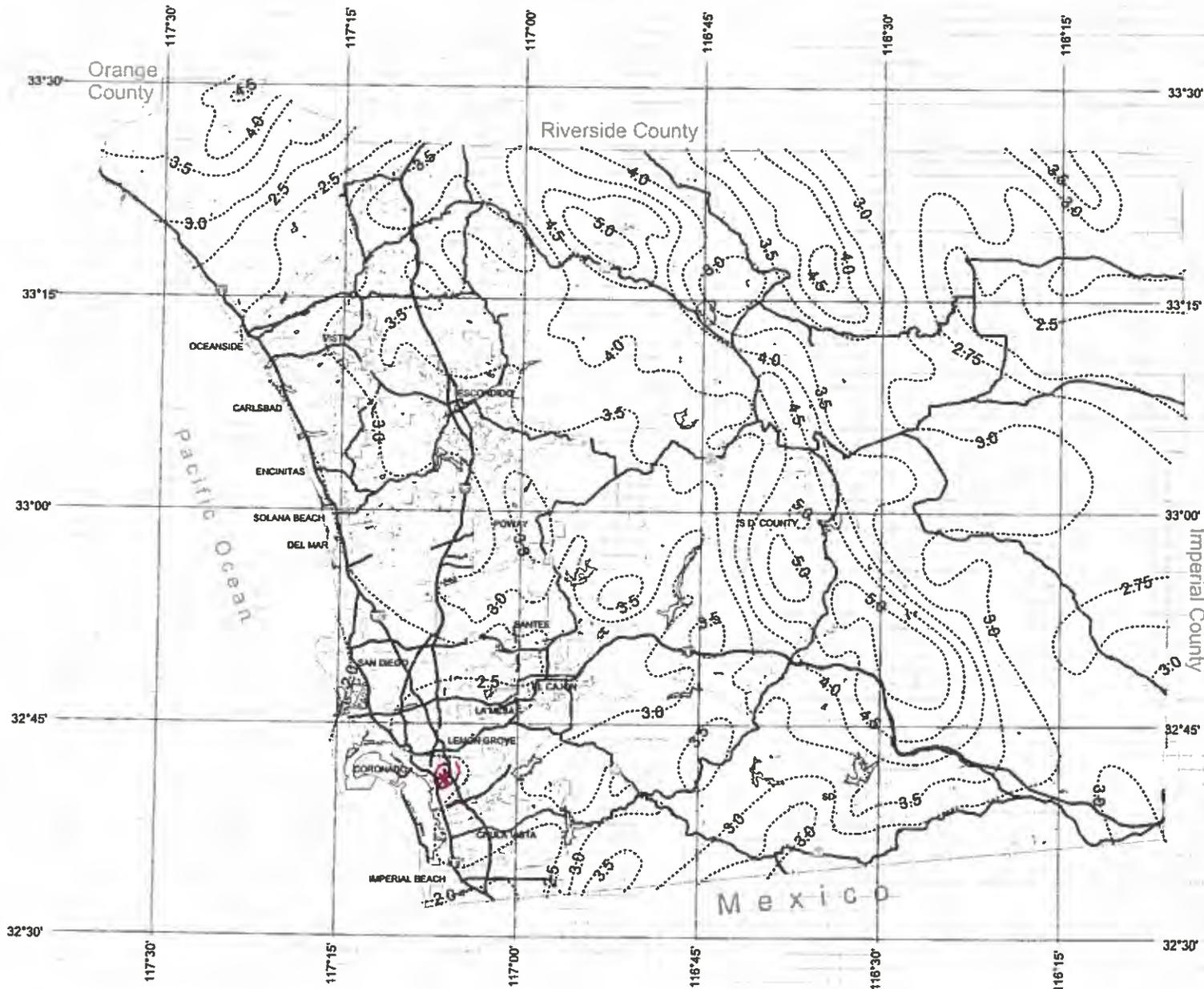


Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)

() P₆ = 2.5 inches*



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The Data San Diego provides



3 0 3 Miles

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Appendix D
Hydraulic Analysis Output

Hydraulic Analysis Report

Project Data

Project Title: Project - Cottonwood Channel Map 120
Designer: Rick Engineering Company J-17204-D
Project Date: Thursday, July 16, 2015
Project Units: U.S. Customary Units

Channel Analysis: As-built_Cottonwood_25-50

Notes: The cross-section of the channel on the as-built plans show an 11-foot wide concrete bottom, 5.5 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 the channel side slopes and channel bottom are 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: 11.0000 (ft)
Longitudinal Slope: 0.0066 (ft/ft)
Manning's n: 0.0150
Depth: 5.5000 (ft)

Result Parameters

Flow: 1939.5510 (cfs)
Area of Flow: 105.8750 (ft²)
Wetted Perimeter: 30.8305 (ft)
Hydraulic Radius: 3.4341 (ft)
Average Velocity: 18.3193 (ft/s)
Top Width: 27.5000 (ft)
Froude Number: 1.6453
Critical Depth: 7.1718 (ft)
Critical Velocity: 12.4298 (ft/s)
Critical Slope: 0.0023 (ft/ft)
Critical Top Width: 32.5153 (ft)
Calculated Max Shear Stress: 2.2651 (lb/ft²)
Calculated Avg Shear Stress: 1.4143 (lb/ft²)

Channel Analysis: Current_Cottonwood_<2

Notes: The cross-section of the channel on the as-built plans show an 11-foot wide concrete bottom, 5.5 feet high with 1.5:1 concrete side slopes. Based on the site photos provided to us and discussion with City of San Diego, there are areas in which vegetation has grown down over the side slopes from the top of the channel banks with one side having heavier vegetation than the other. Additionally there are weeds and trees within the channel. The sediment depth in order for these trees to grow was assumed to be 0.2 feet. 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 $n = 0.06$, $n=0.03$, and $n=0.075$, respectively. The roughness coefficient used for one of the side slopes is based on some weeds, heavy brush on banks ($n=0.06$). The roughness coefficient used for the other side slope is based on some grass and weeds, little brush ($n=0.03$). The roughness coefficient used for the channel bottom is based on some weeds, heavy brush on banks with trees in channel, branches submerged at flood stage ($n=0.075$).

Input Parameters

Channel Type: Custom Cross Section

Station (ft)	Elevation (ft)	Manning's n
0.00	5.50	0.0300
7.95	0.20	0.0750
19.55	0.20	0.0600
27.50	5.50	-----

Cross Section Data

Longitudinal Slope: 0.0066 (ft/ft)

Depth: 5.3000 (ft)

Result Parameters

Flow: 516.2540 (cfs)

Area of Flow: 103.6150 (ft²)

Wetted Perimeter: 30.7094 (ft)

Hydraulic Radius: 3.3740 (ft)

Average Velocity: 4.9824 (ft/s)

Top Width: 27.5000 (ft)

Froude Number: 0.4523

Critical Depth: 3.3858 (ft)

Critical Velocity: 9.1419 (ft/s)

Critical Slope: 0.0408 (ft/ft)

Critical Top Width: 21.7575 (ft)

Calculated Max Shear Stress: 0.0000 (lb/ft²)

Calculated Avg Shear Stress: 0.0000 (lb/ft²)

Composite Manning's n Equation: Lotter method

Manning's n: 0.0545

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 <u>Cottonwood Channel MMP Map 120</u>							Total Channel Score:		81.0 /100		
Flood Hazard (75% of total weight)							Score	factor weight	Weighted Points		
Δ capacity							Sum of sub-factor a-c scores:	11	25%	13.75	
a. Risk of flooding							Current Channel Normal depth capacity ¹ : 516.3 cfs <2 -yr. storm event	(out of 15)	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		
b. Increase in storm event capacity							Channel As-Built normal depth capacity ¹ : 1939.6 cfs 25- to 50 -yr. storm event				
c. Net percent increase in channel capacity post-maintenance							276%				
Consequence of flooding adjacent areas							Residential	0 1 2 3 4	50%	37.5	
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.)							No	Residential = score of 4; Commercial = score of 4; Roads = score of 2; Agriculture = score of 1; Other = score of 1			
Is there open space surrounding the channel?							Yes. Many trees and large debris in the channel	If yes, subtract land use score by 1			
Clogging Potential							0 1 2 3 4	25%	18.75		
Are there trees/large debris that have potential to flow D/S and clog culverts/the channel?											
							Total Weighted Flood Hazard Points		70.0		
Water Quality/Channel Condition (10% of total weight)											
Trash/Debris							0 1 2 3 4	20%	2		
Type of trash and Source: Various trash and debris from unknown source.											
Standing water							0 1 2 3 4	15%	1		
Ponding?							Yes				
Noticeable odors?							No				
Algae?							No				
Sediment							0 1 2 3 4	35%	3		
Approx. sediment coverage: (Based on information provided on City of San Diego O&M Channel Maintenance Inspection Form)							5%				
Rock/debris Accumulation?							Yes, in one spot only				
Transients/encampments							0 1 2 3 4	10%	0		
Culverts and Outfalls							0 1 2 3 4	10%	0		
Infrastructure Issues							0 1 2 3 4	10%	0		
Culvert structure condition							Good				
Broken concrete/gunite?							No				
Broken or missing trash fence/fence poles/supports?							Not indicated on City O&M forms				
Slope failure?							No				
							Total Weighted Water Quality Points		6.0		
Community Input (10% of total weight)											
Community Complaints Received							YES	NO	50%	5	
Community Outreach Input							0 1 2 3 4	50%	0		
							Total Weighted Community Input Points		5.0		
Aesthetics (5% of total weight)											
Aesthetics							0 1 2 3 4	100%	0		
Are the aesthetics of the channel compromised?							No				
							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

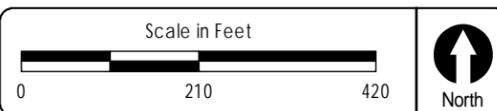


Photos:



Assessment Results

- **Channel Prioritization Score:**
81.0 out of 100
 - **Flood Hazard Score:**
70.0 out of 75
 - **Water Quality Score:**
6 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) :**
25- to 50-year storm event
- **Clogging Potential:** *HIGH*
- **Approximate Vegetation Coverage:** *HIGH*
- **Surrounding Area:** *Residential*
- **Infrastructure Failures:**
None
- **Site Evaluation Date:**
May 27, 2015
- **Notes/Comments:**
Vegetation has grown down from the top of the channel banks over the concrete side slopes. A high risk of vegetation flowing downstream and clogging the culvert exists.



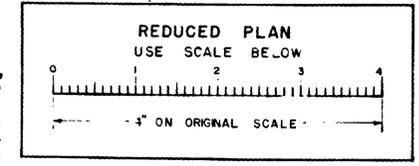
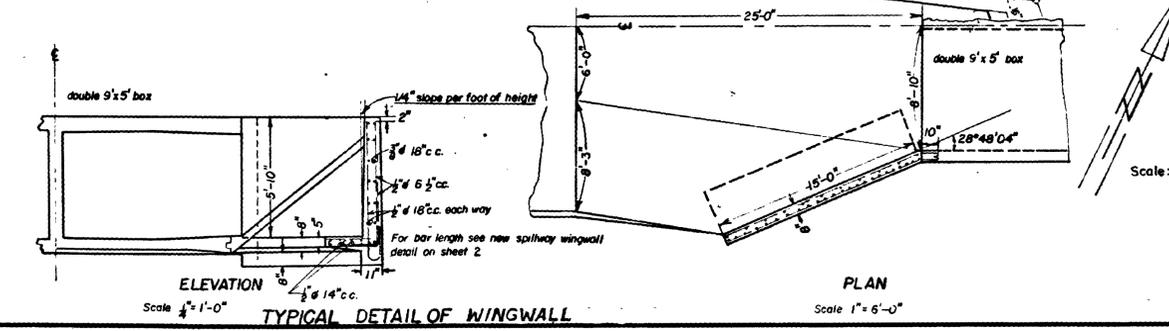
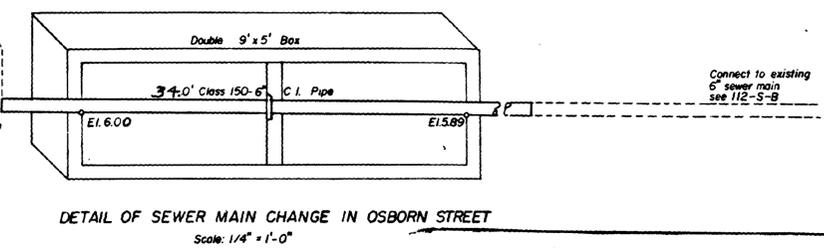
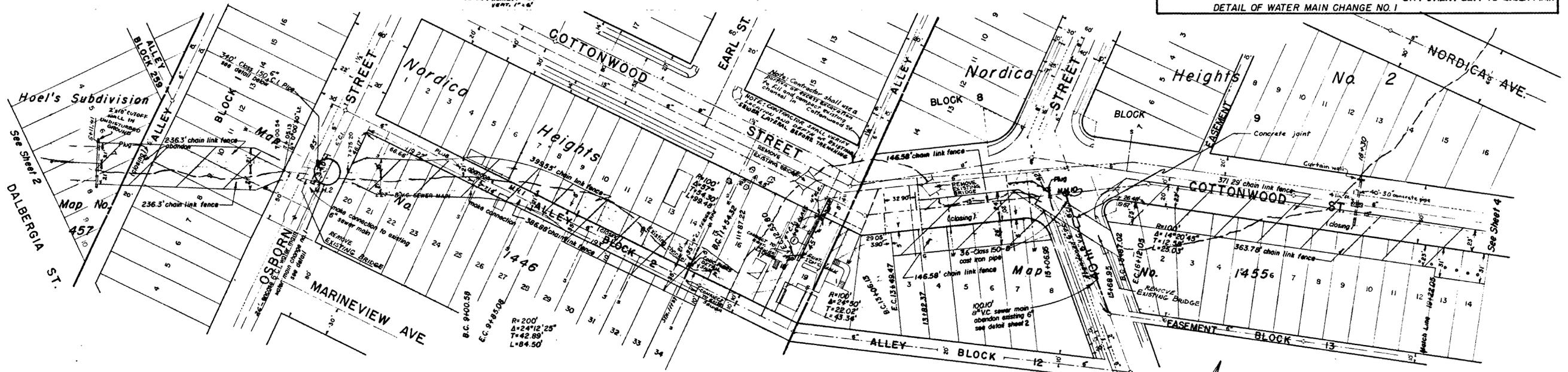
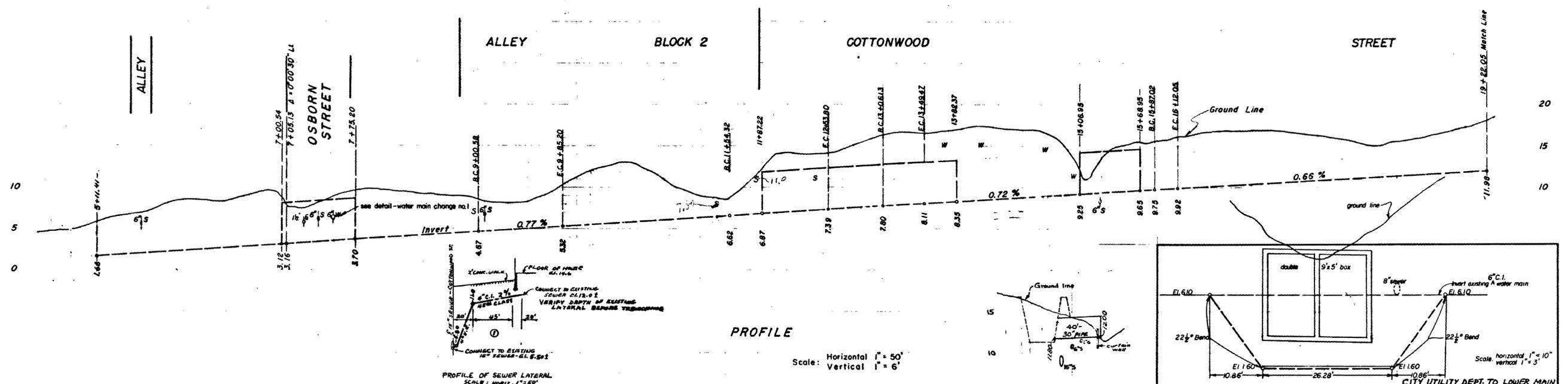
Channel: Cottonwood

MMP Map # 120

Channel Maintenance Prioritization Summary Sheet

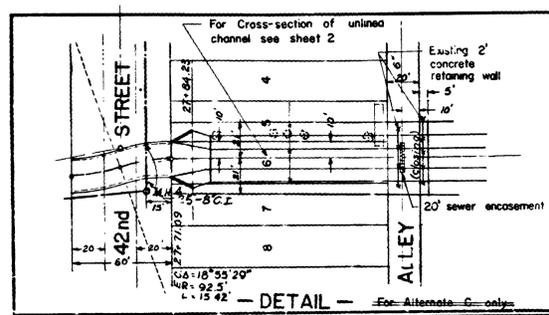
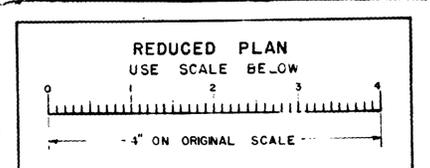
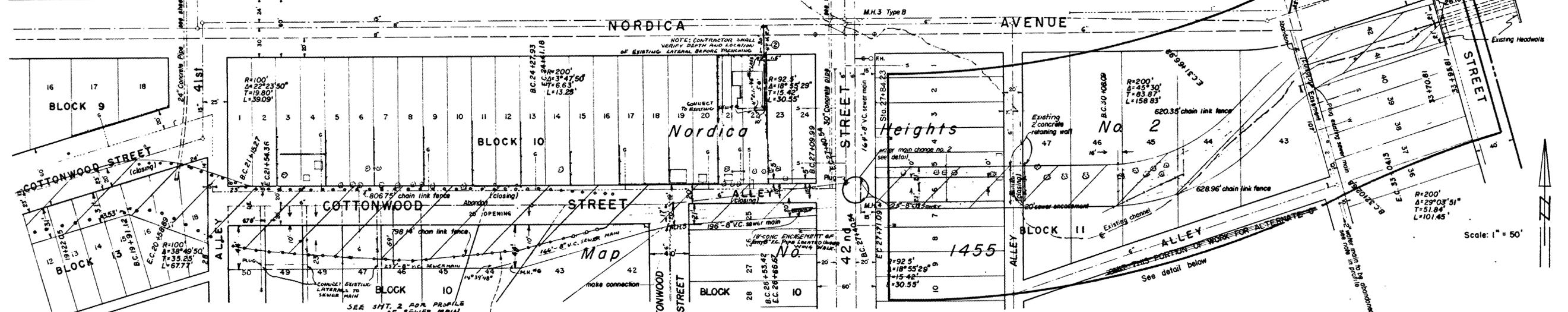
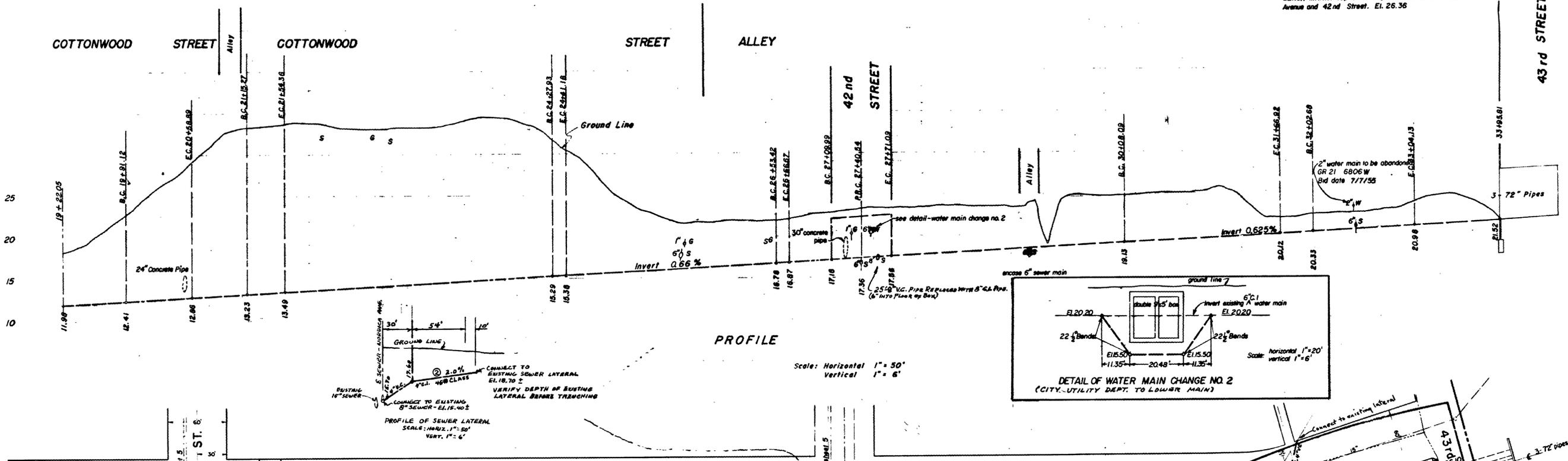
Appendix G
Available As-built plans

5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



WATER DEPARTMENT	ENGINEERING DEPARTMENT	5 Sheets
Sheet 3		CITY OF SAN DIEGO
(Nordica Heights Drain)		MICROFILM
APPROVED: <i>E. J. [Signature]</i>		DATE: 7/12/59
CITY ENGINEER		SCALE: NOTED
DESIGNED BY: SOTIOPIS	CHECKED BY: [Signature]	DRAWING NUMBER: 3020-D
DATE: 7-11-59	FILE NO.: 1717, 2169	2212, 2214, 2240
CONSTRUCTION	RECORD	W. O. No. 20477
CONTRACTOR: HEC Co.	INSPECTOR: ENNS	
DATE COMPLETED: 7-23-59	REVISION: AS BUILT with 11-12-59	

BENCH MARK: Top of fire hydrant S.E. corner Nordica Avenue and 42nd Street. El. 26.36



Sheet 4	CITY OF SAN DIEGO ENGINEERING DEPARTMENT	5 Sheets
(Nordica Heights Drain)		MICROFILM
APPROVED	<i>B. F. [Signature]</i>	DATE 1/1/77
CITY ENGINEER	CITY ENGINEER	SCALE NOTED
DRAWN BY SOMERS	CHANGED	DATE
TRACED BY	DATE	DEPARTING NUMBER
CHECKED BY	DATE	3021-D
FIELD NUMBER 2189-1717		
2212, 2214, 2214		
CONSTRUCTION RECORD	W. O. No. 22477	
CONTRACTOR KEC O.	INSPECTOR FINNS	
DATE STARTED 2-11-77	REVISIONS AS BUILT	DATE 11-2-77
DATE COMPLETED 7-23-77		

Appendix H
Compact Disc
PDF Version of Full Report