

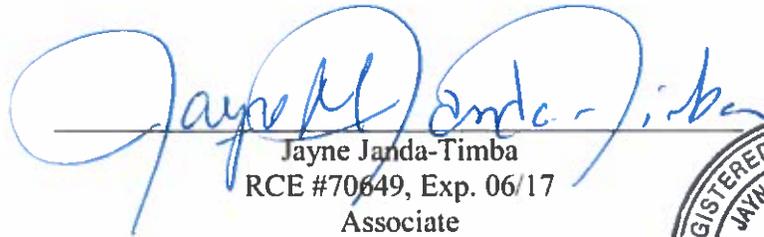
**SUMMARY OF FINDINGS FOR THE
ANNUAL DRAINAGE CHANNEL FIELD
ASSESSMENT AND MAINTENANCE PRIORITIZATION
PROJECT (PHASE 1)
FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER
SYSTEM MAINTENANCE PROGRAM (MMP) MAP 95:
SOUTH CHOLLAS CREEK CHANNEL**

**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
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FOR
THE CITY OF SAN DIEGO – MASTER STORM WATER SYSTEM MAINTENANCE
PROGRAM (MMP) MAP 95: SOUTH CHOLLAS CREEK CHANNEL**

Job Number 17204-D


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RCE #70649, Exp. 06/17
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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 South Chollas Creek Channel (MMP Map 95) is **72.0 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 5-year storm event capacity to a 25-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 95: South Chollas Creek Channel. Refer to Appendix A for the MMP Storm Water Facilities Key Map and Map 95.

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

Federal Emergency Management Agency (FEMA) Peak Discharges

A drainage study for the channel was not available at the authorship of this report. The drainage channel is a Federal Emergency Management Agency (FEMA) defined channel. Peak flow rates for the channel are based on the FEMA Flood Insurance Study (FIS) for San Diego County dated May 16, 2012 (2012 San Diego FIS). The 10-, 50-, and 100-year storm event peak discharges used for the analysis were taken directly from the 2012 San Diego FIS. Estimates of the 2-, 5-, and 25-year storm event peak discharges were extrapolated from the FEMA discharges using logarithmic plotting paper. Hydrologic support material including excerpts from the 2012 San Diego FIS and an excerpt of the Flood Insurance Rate Map (FIRMette) showing the channel are located in Appendix C. A summary of the peak discharges are provided in Table 2 below:

Table 2

Summary of Peak Discharges						
Drainage Area: 10.9 square miles						
Above confluence with Las Chollas Creek						
Frequency	2-yr²	5-yr²	10-yr³	25-yr²	50-yr³	100-yr³
Discharge (cfs)¹ at downstream point of channel assessment limit	540	1,250	2,000	3,000	3,900	5,300

1. cfs = cubic feet per second
2. Estimated based on extrapolation using logarithmic plotting paper
3. Peak Discharge also shown on available as-built plans

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 95 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 3

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)
1,250	5	3,000	25

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 4

Channel Prioritization Assessment Scoring Summary		
Factor	Percent Weighted (%)	Weighted Factor Score/Maximum
Flood Risk	75	65.0/75
Water Quality	10	2/10
Community Input	10	5/10
Aesthetics	5	0/5
Overall Channel		<i>72.0/100</i>

Additionally, the following items should be noted:

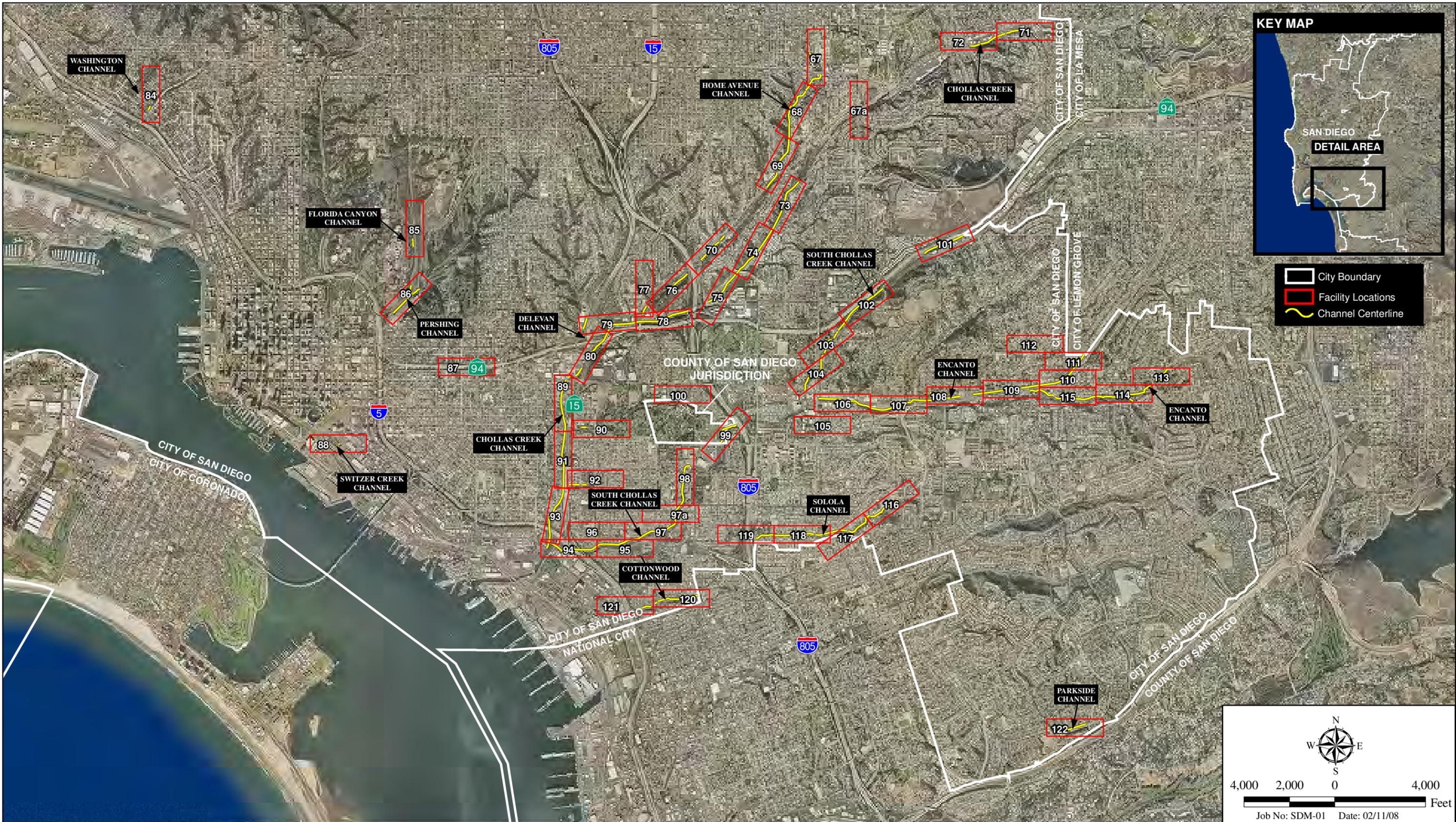
- It was noted on the O&M Channel Maintenance Inspection Form completed for the channel by the City of San Diego that there is heavy vegetation in the majority of the channel reach. A high risk of vegetation flowing downstream and clogging the culvert exists.
- It was noted on the O&M Channel Maintenance Inspection Form completed for the channel by the City of San Diego that there is moderate erosion at the west end of the channel near the foot bridge.

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 95: South Chollas Creek Channel is **72.0**. 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 a 5-year storm event back to a 25-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 95: South Chollas Creek Channel



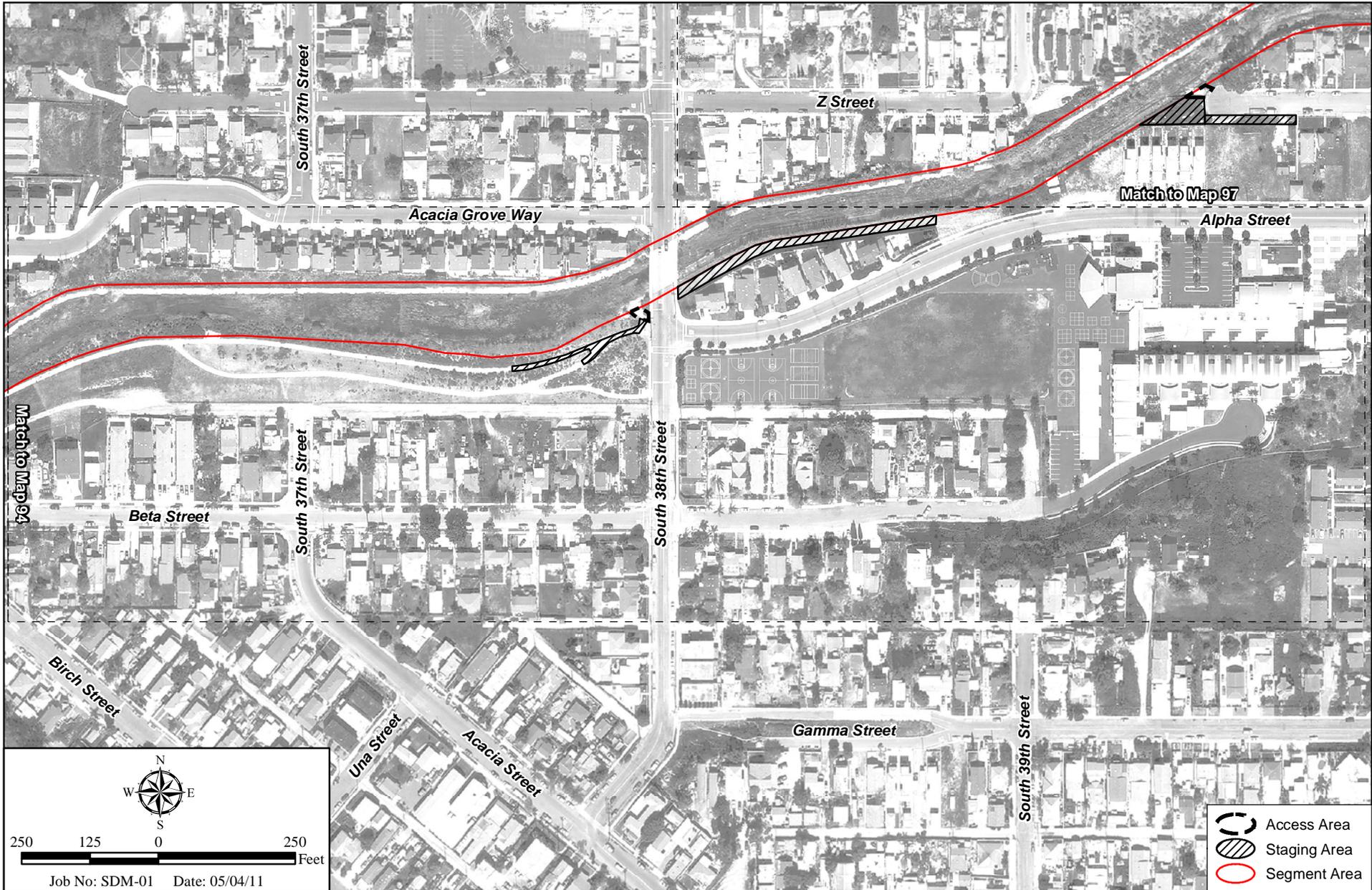
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Stormwater Facilites - Central San Diego Area

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

Figure 2d





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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: 5/5/15 Time: Am

Channel Map No.: 95 South chollas creek Watershed: Pueblo S.D

Inspector: Sam Richard

Weather: cloudy

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 <input checked="" type="radio"/> 3 N/A	
2. Erosion	1 <input checked="" type="radio"/> 2 3 N/A	west end channel by old foot bridge
3. Trash/Debris	1 2 <input checked="" type="radio"/> 3 N/A	Type of trash and source: light homeless camp
4. Water Conveyance	1 <input checked="" type="radio"/> 2 3 N/A	
4. Standing Water	Y <input checked="" type="radio"/> N	
A. Ponding	Y <input checked="" type="radio"/> N	
B. Noticeable odors	Y <input checked="" type="radio"/> N	
C. Algae	Y <input checked="" type="radio"/> N	
5. Vegetation	<input checked="" type="radio"/> 1 2 3 N/A	Approx. Coverage/Density of Vegetation: 70%
A. Invasive (Arundo)	<input checked="" type="radio"/> 1 2 3 N/A	
B. Native	<input checked="" type="radio"/> 1 2 3 N/A	
6. Sediment	1 <input checked="" type="radio"/> 2 3 N/A	Approx. Depth/Coverage of Sediment: 20%
7. Transients/encampments	<input checked="" type="radio"/> 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. Trash/Debris/Sediment	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: 1 Homeless camp at west end
of channel inside out fall pipe
+ trash

D. To Be Completed by Management

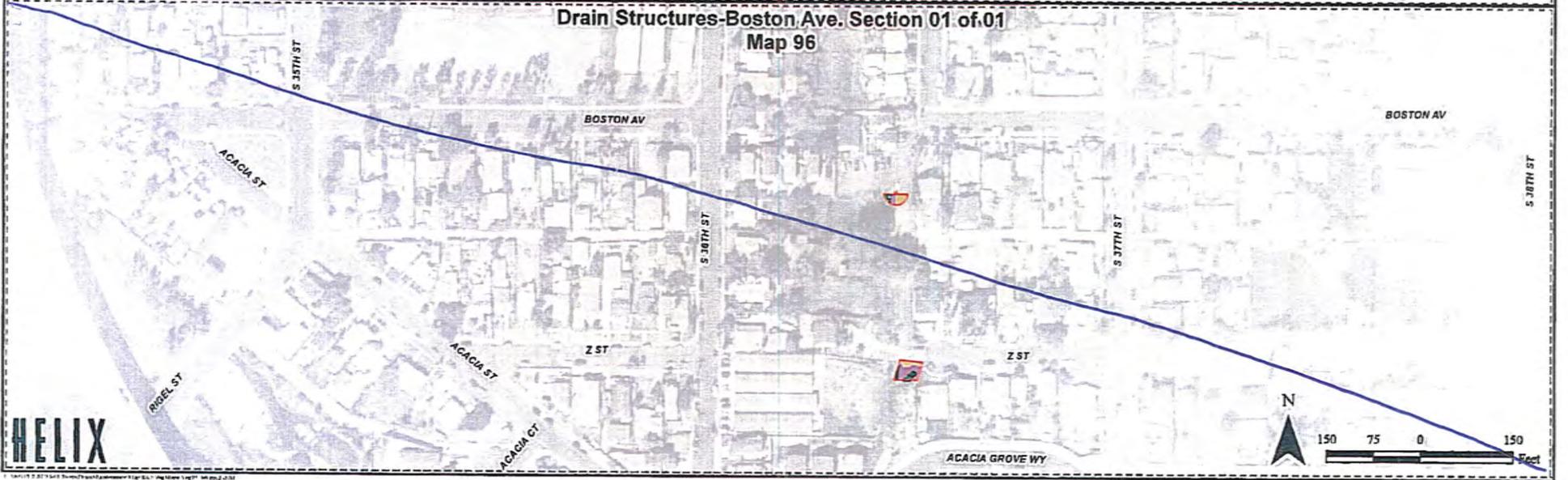
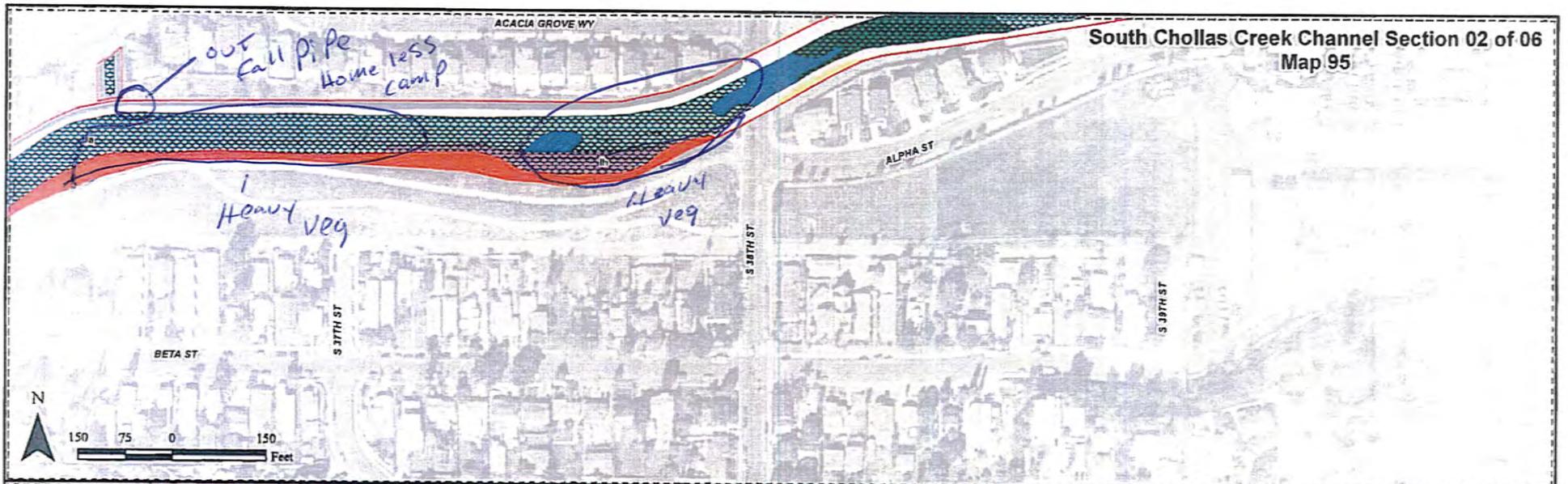
Follow Up Actions

- 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:

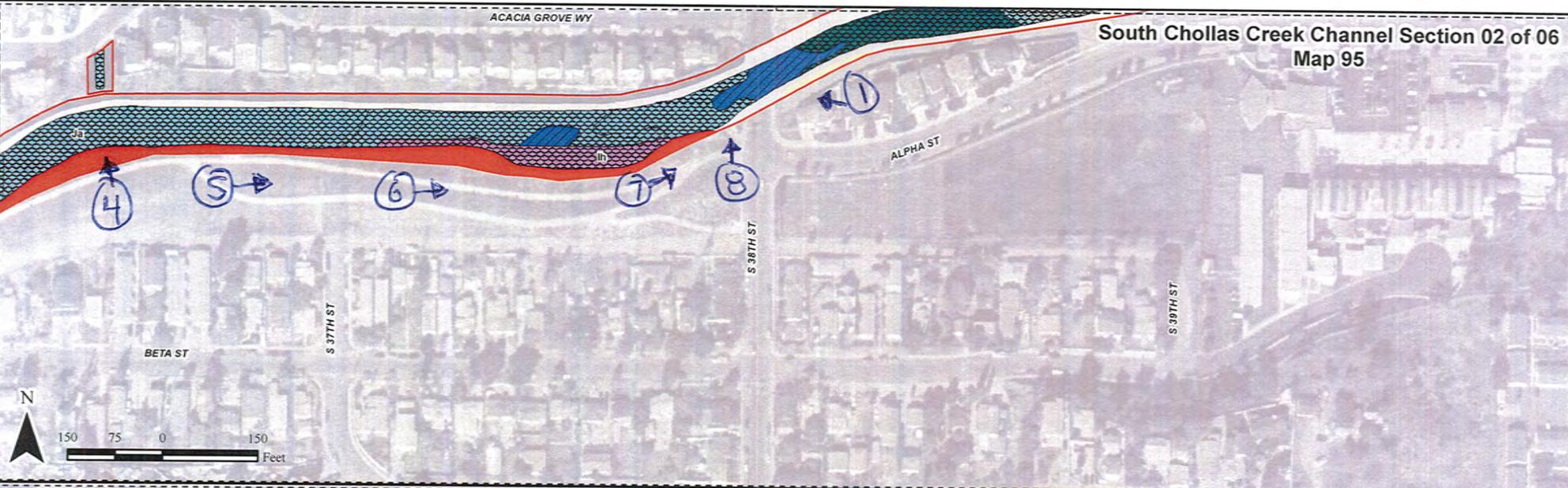


HELIX

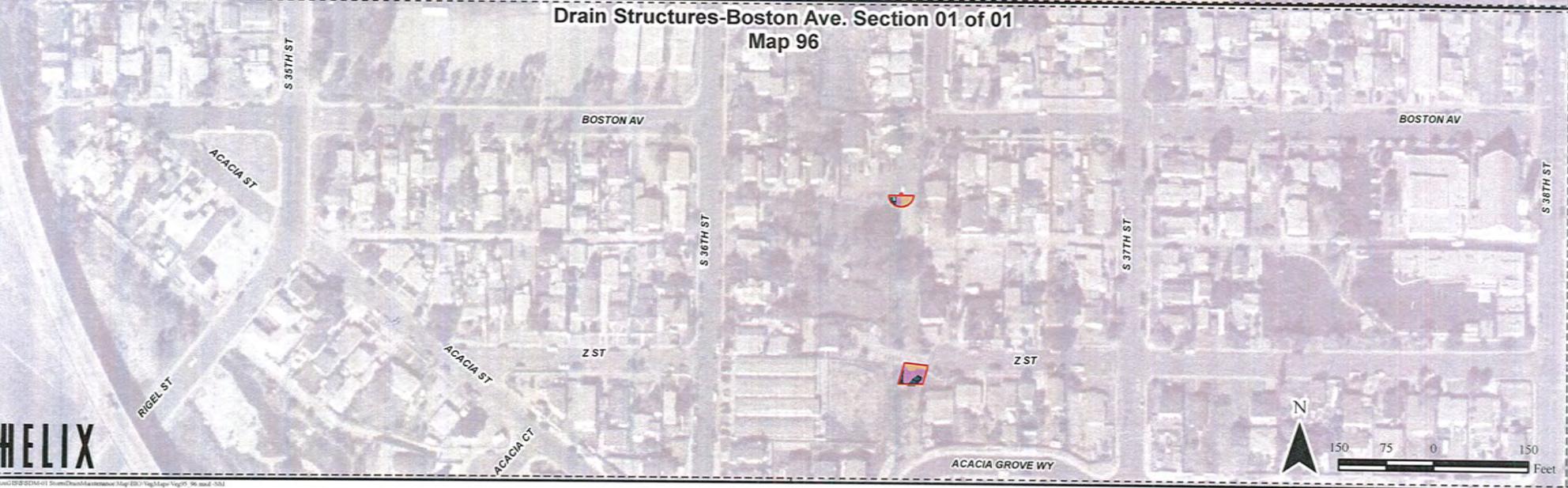
Vegetation/Wetland Delineation - Maps 95 & 96

CITY OF SAN DIEGO MASTER STORMWATER SYSTEM MAINTENANCE PROGRAM

South Chollas Creek Channel Section 02 of 06
Map 95



Drain Structures-Boston Ave. Section 01 of 01
Map 96



HELIX

Vegetation/Wetland Delineation - Maps 95 & 96



South Chollas Creek.1 (5-5-2015)



South Chollas Creek.4 (5-5-2015)



South Chollas Creek.5 (5-5-2015)2015-06-05



South Chollas Creek.6 (5-5-2015)2015-06-05



South Chollas Creek.7 (5-5-2015)



South Chollas Creek.8 (5-5-2015)

Appendix C
Hydrologic Support Material

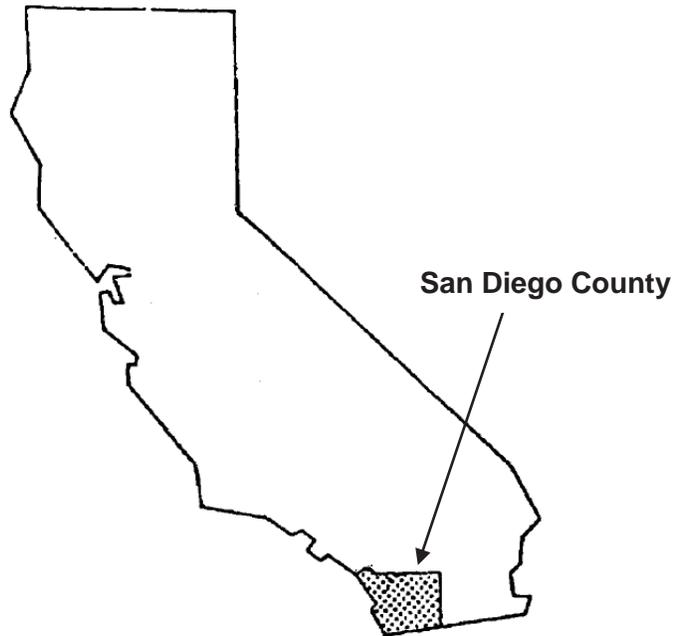
FLOOD INSURANCE STUDY



SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

VOLUME 1 OF 11

Community Name	Community Number
SAN DIEGO COUNTY, UNINCORPORATED AREAS	060284
CARLSBAD, CITY OF	060285
CHULA VISTA, CITY OF	065021
CORONADO, CITY OF	060287
DEL MAR, CITY OF	060288
EL CAJON, CITY OF	060289
ENCINITAS, CITY OF	060726
ESCONDIDO, CITY OF	060290
IMPERIAL BEACH, CITY OF	060291
LA MESA, CITY OF	060292
LEMON GROVE, CITY OF	060723
NATIONAL CITY, CITY OF	060293
OCEANSIDE, CITY OF	060294
POWAY, CITY OF	060702
SAN DIEGO, CITY OF	060295
SAN MARCOS, CITY OF	060296
SANTEE, CITY OF	060703
SOLANA BEACH, CITY OF	060725
VISTA, CITY OF	060297



REVISED
May 16, 2012



Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
06073CV001C

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TABLES

TABLE 13 - FLOODWAY DATA

TABLE 8: SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cubic feet per second)			
		10% Annual- Chance	2% Annual- Chance	1% Annual- Chance	0.2% Annual- Chance
0.3 Mile Above Mouth	7.1	1,200 ¹	3,400	5,200 ¹	10,400
At Oak Shadows Drive	4.3	700	2,100	3,200	6,500
South Las Chollas Creek					
Above Confluence with Las Chollas Creek	10.9	2,000	3,900	5,300	9,500
Above Confluence with Encanto Branch	3.3	730	1,400	1,900	3,400
At Kelton Road	2.6	580	1,100	1,500	2,700
South Tributary to Santa Maria Creek					
At Mouth	9.3	700	3,400	5,800	15,000
Spring Valley Creek					
Below Confluence with Casa de Oro Creek	7.1	1,300	2,600	3,600	9,300
Steele Canyon Creek					
At Mouth	2.7	--	--	2,980	--
Stevenson Creek					

¹Flow Partially Controlled by Turner Dam
 -- Data Not Available

Appendix D
Hydraulic Analysis Output

Hydraulic Analysis Report

Project Data

Project Title: SouthChollas_Map95
Designer: Rick Engineering Company J-17204-D
Project Date: Thursday, June 25, 2015
Project Units: U.S. Customary Units

Channel Analysis: DS_38th_asbuilt_25

Notes: The cross-section of the channel on the as-built plans show a 56-foot wide earthen bottom with 1.5:1 side slopes that are lined with Class A Portland Cement Concrete. Based on the site photos provided to us that were taken by the City of San Diego, the channel bottom consists of cobbles. 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 $n = 0.015$ and 0.04 respectively.

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Station (ft)	Elevation (ft)	Manning's n
0.00	7.00	0.0150
10.50	0.00	0.0400
66.50	0.00	0.0150
77.00	7.00	-----

Longitudinal Slope: 0.0022 (ft/ft)

Flow: 3000.0000 (cfs)

Result Parameters

Depth: 6.7685 (ft)

Area of Flow: 447.7552 (ft²)

Wetted Perimeter: 80.4042 (ft)

Hydraulic Radius: 5.5688 (ft)

Average Velocity: 6.7001 (ft/s)

Top Width: 76.3055 (ft)

Froude Number: 0.4874

Critical Depth: 4.2902 (ft)

Critical Velocity: 11.1998 (ft/s)

Critical Slope: 0.0118 (ft/ft)

Critical Top Width: 68.8707 (ft)

Calculated Max Shear Stress: 0.9292 (lb/ft²)

Calculated Avg Shear Stress: 0.7645 (lb/ft²)

Composite Manning's n Equation: Lotter method

Manning's n: 0.0327

Channel Analysis: DS_38th_current_5

Notes: The cross-section of the channel on the as-built plans show a 56-foot wide earthen bottom with 1.5:1 side slopes that are lined with Class A Portland Cement Concrete. Based on the site photos provided to us that were taken by the City of San Diego, there are areas of heavy vegetation in the channel bottom. 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 $n = 0.015$ and 0.1 respectively. The n -value for the channel bottom is based on medium to dense brush with trees in the channel with branches submerged at flood stage.

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Station (ft)	Elevation (ft)	Manning's n
0.00	7.00	0.0150
10.50	0.00	0.1000
66.50	0.00	0.0150
77.00	7.00	-----

Longitudinal Slope: 0.0022 (ft/ft)

Flow: 1250.0000 (cfs)

Result Parameters

Depth: 6.0356 (ft)

Area of Flow: 392.6354 (ft²)

Wetted Perimeter: 77.7616 (ft)

Hydraulic Radius: 5.0492 (ft)

Average Velocity: 3.1836 (ft/s)

Top Width: 74.1068 (ft)

Froude Number: 0.2437

Critical Depth: 2.4369 (ft)

Critical Velocity: 8.5987 (ft/s)

Critical Slope: 0.0751 (ft/ft)

Critical Top Width: 63.3106 (ft)

Calculated Max Shear Stress: 0.8286 (lb/ft²)

Calculated Avg Shear Stress: 0.6932 (lb/ft²)

Composite Manning's n Equation: Lotter method

Manning's n: 0.0644

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)

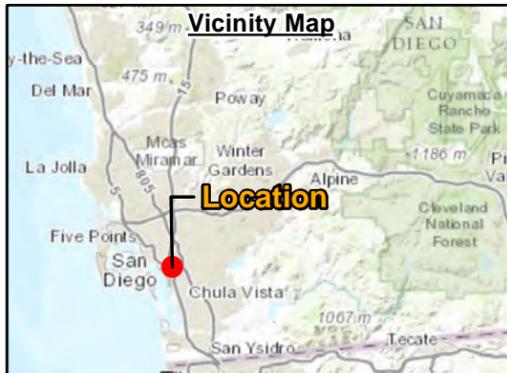
2.	Irregular section, with pools, slight channel meander increase all values listed in 1. Regular Section, by	0.015
----	--	-------

Flood Plains: (adjacent to natural streams)

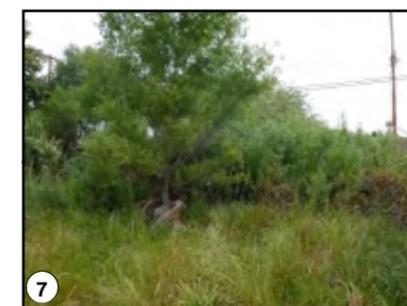
1.	Pasture, no brush	
	a. Short grass	0.030
	b. High grass	0.040
2.	Cultivated areas	
	a. No crop	0.040
	b. Mature row crops	0.040
	c. Mature field crops	0.050
3.	Heavy weeds, scattered brush	0.050
4.	Light brush and trees	0.060
5.	Medium to dense brush	0.090
6.	Dense willows	0.170
7.	Cleared land with 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

Appendix F
Channel Maintenance Prioritization Summary Sheet



Photos:



Assessment Results

- **Channel Prioritization Score:**
72.0 out of 100
 - **Flood Hazard Score:**
65.0 out of 75
 - **Water Quality Score:**
2 out of 10
 - **Community Input Score:**
5 out of 10
 - **Aesthetics Score:**
0 out of 5
- **Capacity Prior to Maintenance:**
5-year storm event
- **Capacity After Maintenance (As-built Capacity):**
25-year storm event
- **Clogging Potential:** *HIGH*
- **Approximate Vegetation Coverage:** *HIGH*
- **Surrounding Area:** *Residential*
- **Infrastructure Failures:**
None
- **Site Evaluation Date:**
May 5, 2015
- **Notes/Comments:**
Moderate erosion in west end of channel near the foot bridge

Legend

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

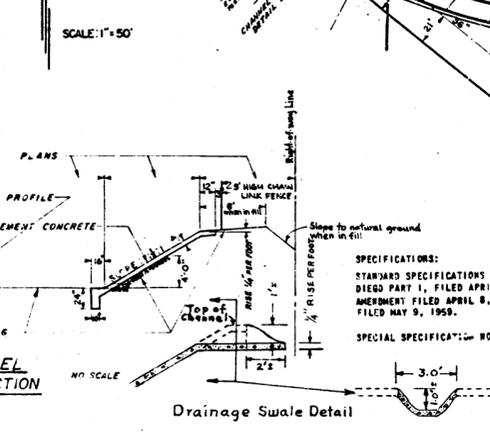
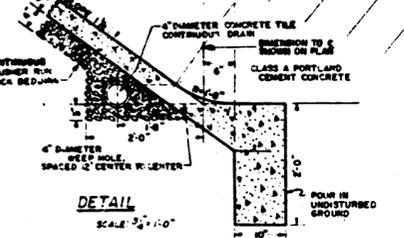
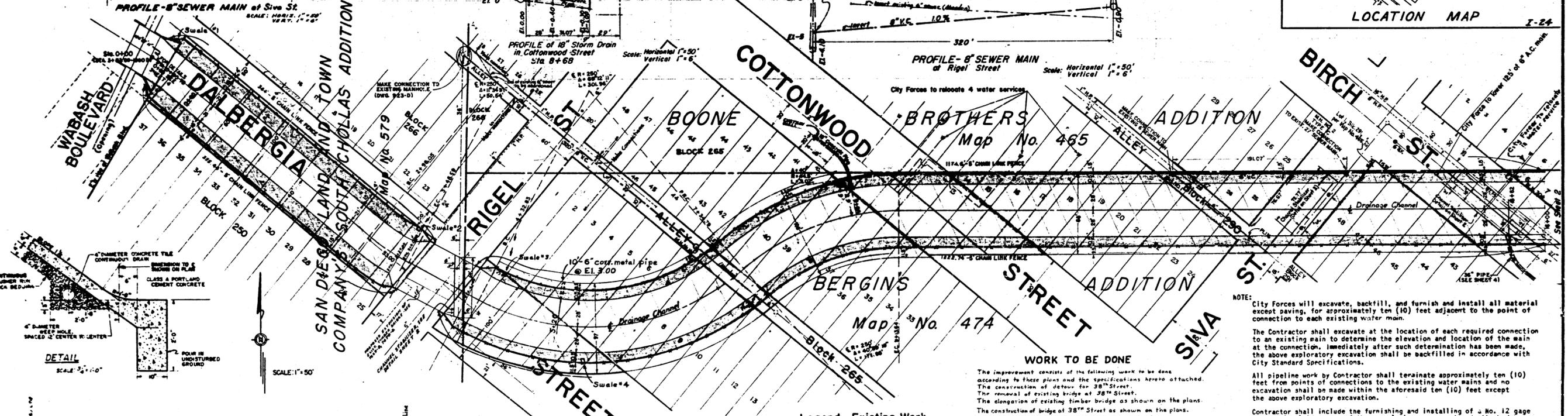
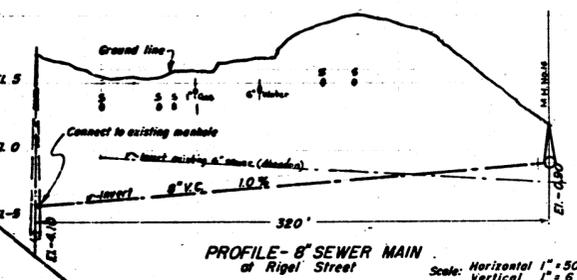
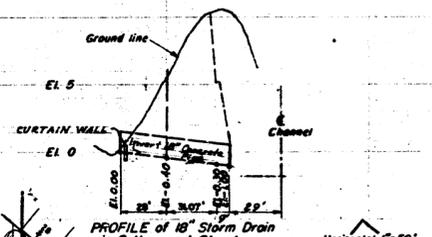
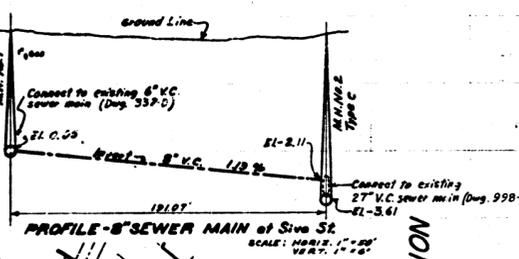
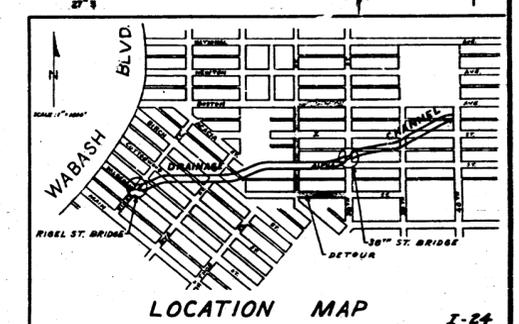
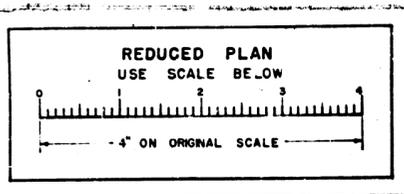
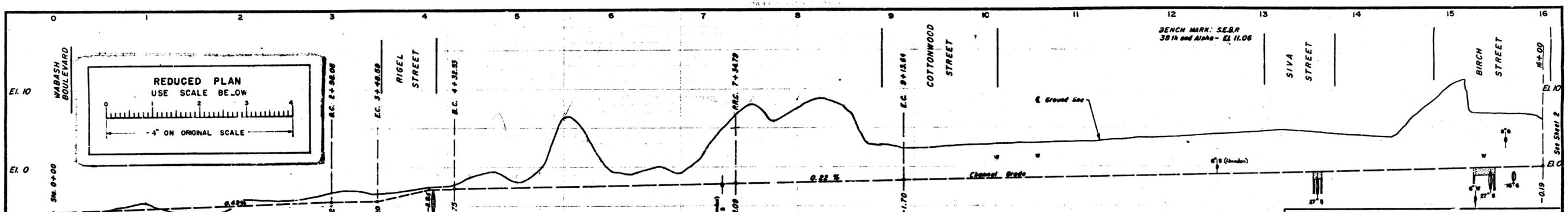
Scale in Feet

Channel: South Chollas Creek

MMP Map # 95

Channel Maintenance Prioritization Summary Sheet

Appendix G
Available As-built plans



Standard Drawings

4-EB, 9-EB, 10-EB, 105-EB, 107-EB, 108-EB, 129-EB, 132-EB, 119-EB, 206-W-B, 200-W-B, 301-EB, 311-EB, 303-E-B, 309-E-B, 504-EB, 505-EB, 702-EB

Legend - Existing Work

8" curb	Water main	5"
Type G curb	Water service	W
Sidewalk	Sewer main	S
Curb inlet	Sewer lateral	S
Edge of pavement	Gas main	2" G.E.
Sewer manhole	Gas service	G

WORK TO BE DONE

The improvement consists of the following work to be done according to these plans and the specifications hereto attached:

- The construction of details for 38th Street.
- The removal of existing bridge at 38th Street.
- The elongation of existing timber bridge as shown on the plans.
- The construction of bridge at 38th Street as shown on the plans.
- The construction of maintenance ramp as shown on the plans.
- The construction of chain link gate as shown on the plans.
- The construction of chain link fence as shown thus: [Symbol]
- The lining of the drainage channels as shown shaded thus: [Symbol]
- The construction of crusher run rock bedding as shown on the plans.
- The construction of concrete tile drain as shown on the plans.
- The construction of concrete wall as shown on the plans.
- The construction of curb and gutter as shown on the plans.
- The construction of verified city pipe sewer mains as shown thus: [Symbol]
- The construction of cast iron water main as shown on the plans.
- The construction of manholes as shown thus: [Symbol]
- The construction of outlet structures as shown on the plans.
- The construction of storm drain cleanout as shown thus: [Symbol]
- The construction of drop manhole as shown thus: [Symbol]
- The construction of gravity type headwall as shown thus: [Symbol]
- The construction of concrete encasement as shown thus: [Symbol]
- The construction of asbestos cement pipe water main as shown thus: [Symbol]
- The construction of water main appurtenances as shown on the plans.
- The construction of cast iron gate valves and steel valve boxes with cast iron covers as shown thus: [Symbol]
- The construction of 1/2" copper water services as shown thus: [Symbol]
- The construction of sidewalks as shown on the plans.
- The construction of 6" curb as shown on the plans.
- The paving of the portion of the street shown on the plans.

NOTE:

City Forces will excavate, backfill, and furnish and install all material except paving, for approximately ten (10) feet adjacent to the point of connection to each existing water main.

The Contractor shall excavate at the location of each required connection to an existing main to determine the elevation and location of the main at the connection. Immediately after such determination has been made, the above exploratory excavation shall be backfilled in accordance with City Standard Specifications.

All pipeline work by Contractor shall terminate approximately ten (10) feet from points of connections to the existing water mains and no excavation shall be made within the aforesaid ten (10) feet except the above exploratory excavation.

Contractor shall include the furnishing and installing of a No. 12 gage copper wire laid on top of the normal pipe encasement and attached by looping the wire around the bonnet of gate valves other than those on fire hydrant laterals.

CITY CONTRACT

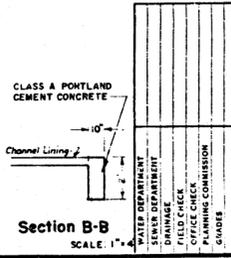
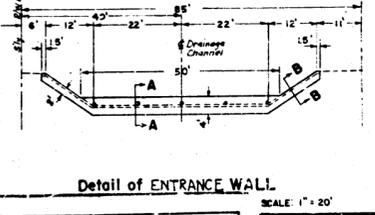
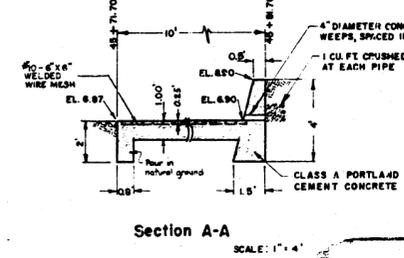
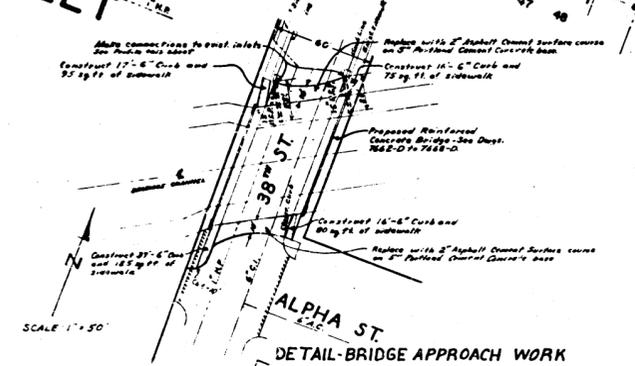
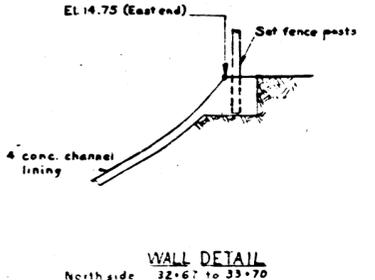
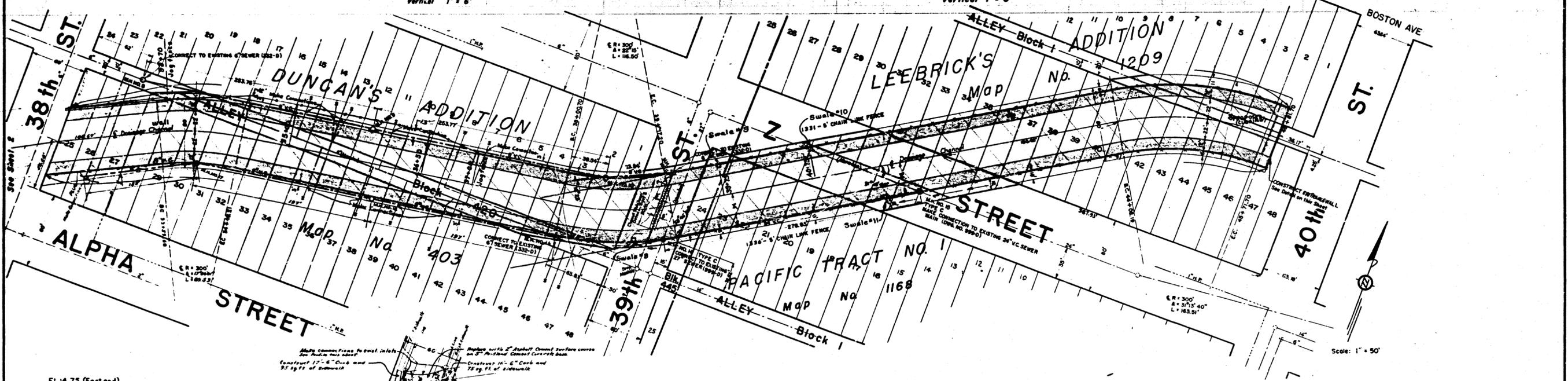
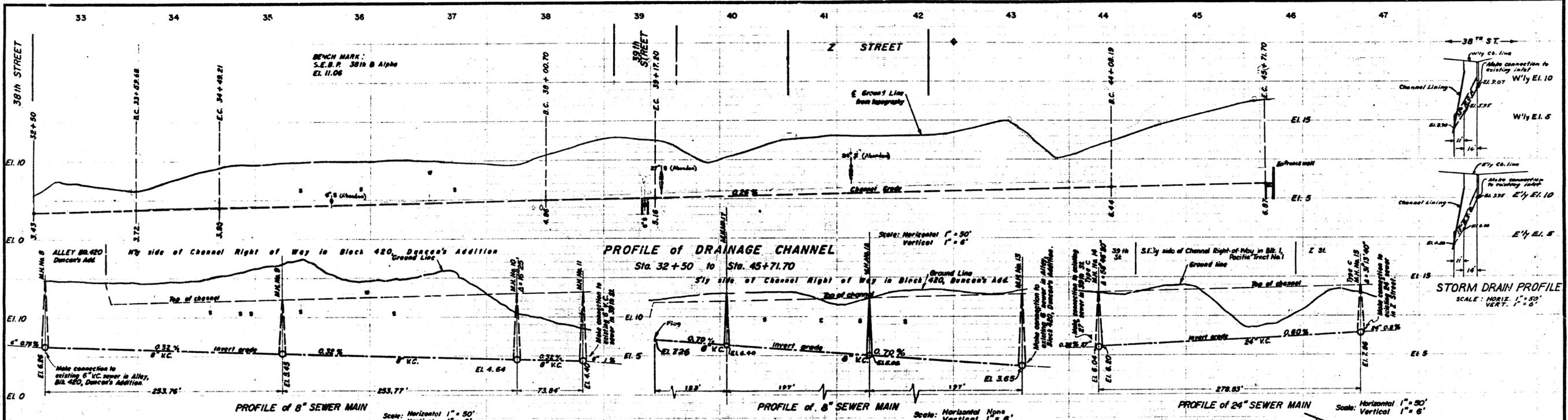
SHEET 1 CITY OF SAN DIEGO ENGINEERING DEPARTMENT 114 SHEETS

PLANS FOR THE CONSTRUCTION OF SOUTH CHOLLAS DRAINAGE CHANNEL

APPROVED: [Signature] DATE: 7-30-59

CONTRACTOR: MUNN CONSTR. INC. DRAWING NUMBER: 2420-D

DATE: 11-2-53



Sheet 3	CITY OF SAN DIEGO ENGINEERING DEPARTMENT	14 Sheets
MICROFILMED		
SOUTH CHOLLAS CHANNEL		
APPROVED	DATE	SCALE
<i>[Signature]</i>	7/25/59	NOTED
DESIGNED BY	CHECKED BY	DRAWING NUMBER
TRACED BY	FIELD NOTES	2422-D

Appendix H
Compact Disc
PDF Version of Full Report