SJAFCA
San Joaquin Area FLOOD CONTROL Agency

October 15, 2010

Kathleen Schaeffer
U.S. Department of Homeland Security
FEMA, Region IX
Mitigation Division
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

RESPONSE TO FEMA COMMENTS ON SMITH CANAL CLOSURE DEVICE CLOMR

This letter is in response to FEMA's comments on the Smith Canal Closure Device CLOMR sent to us via e-mail on June 28, 2010, by FEMA consultant Mr. Wen Chen of Michael Baker Jr., Inc. SJAFCA has been working with our consultant team to address FEMA's comments. We have conducted additional analysis (see Attachments 1 and 2) using newly available LiDAR data. Below are our responses to FEMA's comments. To aid in your review, we have included FEMA's comments (shown in italics), and then immediately inserted SJAFCA's response (shown in bold).

1) *The SFHA for RD 1614 on Panel 0455F cannot be revised until all levees protecting the area are certified, besides the proposed closure structure. These levee segments include: South Calaveras River Levee segments (P1401, P140, P357, and P356) and San Joaquin River Southeast levee segment (P359).*

   Response: We acknowledge that the SFHA for RD 1614 on Panel 0455F cannot be revised until the South Calaveras River Levee segments (P1401, P140, P357, and P356) and San Joaquin River Southeast levee segment (P359) are accredited. As you are aware, SJAFCA has submitted to FEMA a LOMR for these levee segments. We look forward to FEMA's response of our LOMR submittal.

2) *The proposed closure structure doesn't have any backup power sources. Please make sure backup power sources are available for the closure device.*

   Response: The Smith Canal Closure Device design documents will be revised to reflect that a backup power source will be available for the closure device.

3) *The report assumed that 20% of the area are streets and used one half of the street surface areas to store the base flood runoff. Please provide detailed engineering justification to validate the assumption.*

Response: Please see attached analysis demonstrating that this assumption is valid (Attachment 1, Memorandum from Kjeldsen, Sinnock and Neudeck dated October 12, 2010).

4) *Usually a street curb is about 6 inch high and there are both longitudinal and latitudinal slopes on a street. These facts do not support the flood storage calculation in the report by assuming that all streets are capable of holding a depth of 1 foot of the base flood runoff. The proposed amount of flood runoff stored on streets will eventually lead to some areas with more than 1' depth of flooding. Please provide detailed engineering justification to validate the assumption.*

Response: The interior drainage report submitted assumed that half of the streets, not all the streets, could detain water up to 1 foot in depth. We believe this to be a valid assumption because of the relatively flat topography of the Central Valley which requires that streets be designed with alternating high and low points to ensure they drain properly. This alternating high and low point design creates depression storage within streets, which temporarily accommodates runoff in excess of the storm drainage system design capacity. This was the basis for HDR's assertion regarding available street storage made in SJAFCA's Technical Memorandum #6, "Interior Drainage", February 1999, which was prepared in support of the FEMA FIRMs issued on April 2, 2002, for the greater Stockton area. This methodology was reviewed and accepted by FEMA in 1999. Attachment 1 validates this approach for use within the Stockton urban area.

5) *Per 44CFR 65.10 (c)(2) and (d), please address all the requirements for the pumping stations and provide proper documents for review.*

Response: We will provide documentation regarding operation and maintenance of the existing pump stations with the final LOMR submittal.

6) *Please provide the topographical data used for the Smith Canal storage calculation. The topo should be certified by a registered engineer.*

Response: A topographic map of Smith Canal is provided (Attachment 2).

7) *The report concluded that the combined storage capacity of Smith Canal and street networks is adequate for the 50-year flood event. What about the storage capacity for the 100-year flood event?*

Response: Please see Table 2 on Page 10 of the Interior Drainage Report submitted to FEMA on March 25, 2010 which shows that the existing pump stations, together with utilization of temporary street storage, provide sufficient interior drainage capacity to handle a 100-year rainfall event.

8) *Figure 4 in the Interior Drainage Analysis indicated the volume of the inflow hydrograph to Smith Canal is approximately 765 ac-ft during a 100-year storm event. That volume is more than Smith Canal's maximum storage capacity of 472 ac-ft. Please address the inadequacy of flood storage during a 100-year storm event.*

   Response: The Smith Canal Base Flood Elevation is governed by tidal action. The tide cycle is approximately 6 hours from high to low tide and 6 hours from low to high tide. Depending on the water surface elevation within Smith Canal at the time of gate closure, it will take 10-20 hours for the inflow from an 'interior drainage' 100-year storm event to fill the canal to capacity. However, because the Base Flood Elevation is governed by tidal action, the gate can be opened as the tide recedes allowing for evacuation of the interior drainage inflow before the capacity of the Smith Storage is exceeded. Section 2.6.6.2 of the draft Operations and Maintenance manual included in the CLOMR submittal describes how the gate will be operated to allow evacuation of storm drainage runoff from Smith Canal

The additional interior drainage analysis is time consuming but demonstrates that the original assumptions are appropriate in analyzing the interior drainage.

We hope these responses will be sufficient to allow FEMA to issue a CLOMR for the Smith Canal Closure Device as we believe a CLOMR is crucial to developing the project financing and public support that will be needed to construct the project.

Should you have any questions regarding the enclosed documentation or need additional information, please feel free to contact me at (209) 937-8866 or by e-mail at Roger.Churchwell@ci.stockton.ca.us.

ROGER CHURCHWELL
DEPUTY EXECUTIVE DIRECTOR

RC:JJN:cl

Attachments

cc: James Giottonini, SJAFCA
Barry O'Regan, Peterson, Brustad, Inc.
Tom Gau, San Joaquin County Flood Control and Water Conservation District
Mike Niblock, City of Stockton
Wen Chen, Michael Baker, Jr., Inc.

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CHRISTOPHER H. NEUDECK
KENNETH L. KJELDSEN
RETIRED

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2091-0060
05-001

MEMORANDUM

October 12, 2010

To: Barry O'Regan - Peterson, Brustad Inc.

Subject: Interior Drainage / Street Detention Storage

Project: Smith Canal Drainage Shed

From: Erik Almaas - KSN, Inc.

Background

In urban areas within the Central Valley, drainage systems are typically designed to accommodate 10-year storm events with the intention that run-off from events greater than 10-year will be temporarily stored within streets. This approach to handling storm drainage works within the Central Valley because the topography is relatively flat which requires that streets be designed with alternating high and low points to ensure they drain properly. This alternating high and low point design creates depression storage within streets which temporarily accommodates runoff in excess of the 10-year design storm. This was the basis for HDR's assertion made in SJAFCA Technical Memorandum #6, February 1999, that urban drainage sheds utilize temporary street storage to accommodate run-off from 100-year storm events. SJAFCA Technical Memorandum #6, prepared by HDR states that;

> "The ten sub-basins along the lower reach of Mosher Slough are developed as residential areas. An analysis of maps and aerial photographs of the area showed that approximately 20% of the area in these basins is taken up by roads. In general, the roads are lower than the houses, so water would collect in the street network before rising to the level of houses and other structures. An assumption was made that one-half of the street network could fill up with water to a depth of one foot before any houses were exposed to water one foot deep."

Using newly available LiDAR information, this memorandum serves to substantiate the interior drainage assumptions made in SJAFCA Technical Memorandum #6, February 1999, by HDR Engineering, Inc.

Introduction

Kjeldsen, Sinnock & Neudeck, Inc. (KSN) was given the task to analyze interior drainage within the Smith Canal drainage shed in support of the Smith Canal Closure Device CLOMR. The Smith Canal drainage shed consists of thirteen sub-basins mostly developed as residential areas (see Figure 1). Four of the sub-basins are on high ground that gravity discharge directly into Smith Canal. Interior drainage for the other nine sub-basins is routed through nine separate pump stations. Since land use and general topography are similar between the Smith Canal and lower Mosher Slough drainage sheds, the assertion stated above was utilized in analyzing available street detention storage within the Smith Canal sub-basins. This memorandum serves to confirm that this assertion is applicable to the Smith Canal drainage shed.

Analysis

First, two representative sub-basins, Gardena and Buena Vista North, were selected for analysis. Profiles along every street centerline within each sub-basin were developed using GIS parcel data, aerial photography, and LiDAR data. Localized depressions within each street profile that would be able to detain water were identified. See Figures 2 and 3 for sample street profiles and cross sections. Based on the profiles, an average depth of available storage was calculated for each street. Please note that the profiles were taken at the street centerline, not the gutter flowline, thus producing conservative results available storage. Consequently, an average depth of water was calculated for the entire street network for each of the two sub-basins.

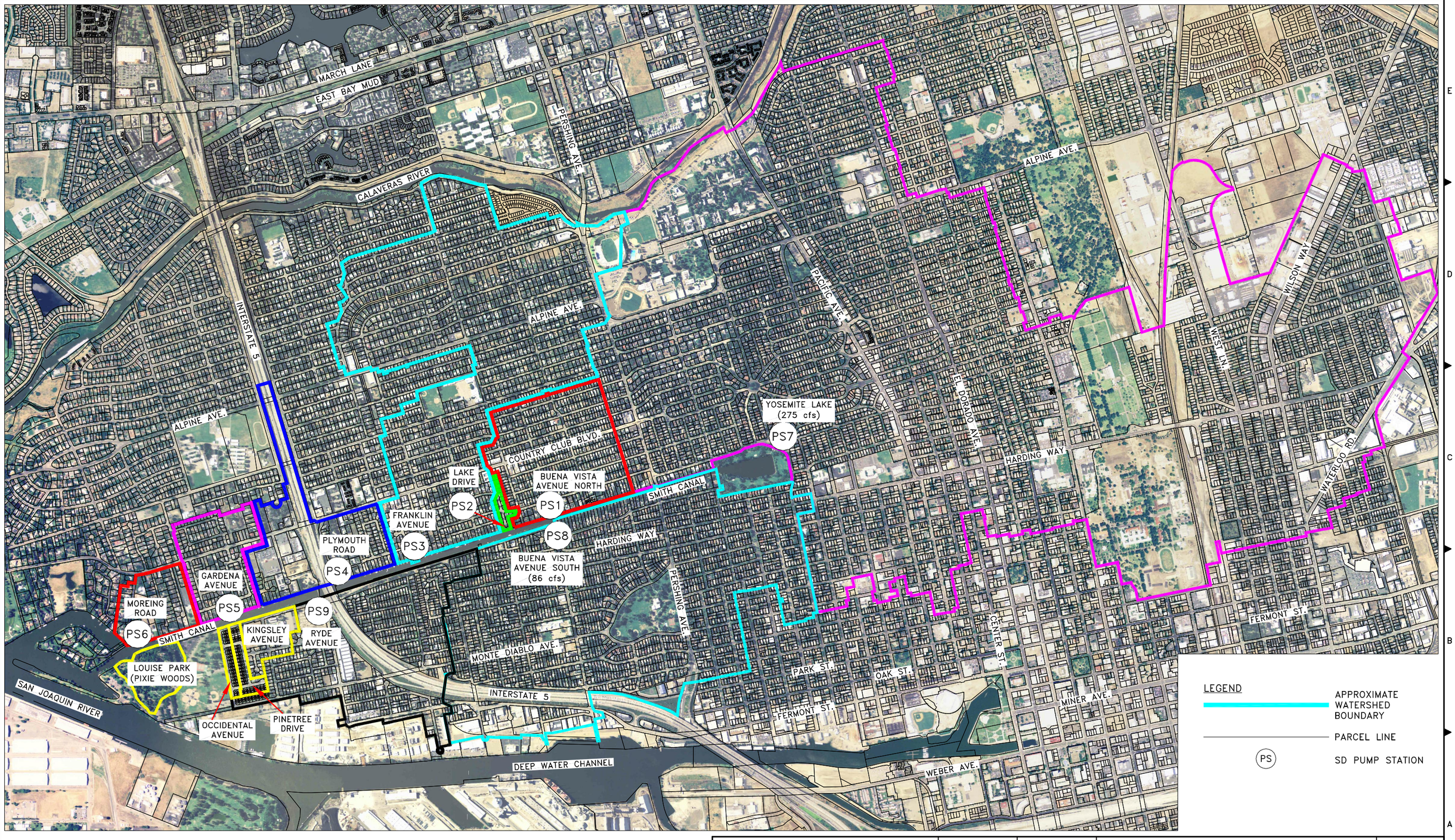
Furthermore, an analysis using the GIS parcel data was performed on each sub-basin to determine the area of streets, measured from back of sidewalk to back of sidewalk, as a percentage of the entire sub-basin area. For the Gardena sub-basin, the area of streets is 575,381 square feet and the total area is 2,414,333 square feet. For the Buena Vista North sub-basin, the area of streets is 1,114,094 square feet and the total area is 4,765,043 square feet.

A storage factor was used as a means to compare the HDR assertion and the data compiled from the two Smith Canal sub-basins. This storage factor is defined as the product of the percentage of total drainage shed area that is streets *and* the average depth of available storage within those streets. For the HDR study, this factor equaled 10% of the drainage shed times 1.0', or 0.10.

Based upon the analysis described above, we determined that 23.8% of the Gardena sub-basin is made of streets and that the average depth of available street storage is 0.63 feet. This produces a storage factor of 23.8% x 0.63', or 0.15. For the Buena Vista North sub-basin our analysis shows that 23.4% of the sub-basin is made of streets and that the average depth of available storage is 0.41 feet. This produces a storage factor of 23.4% x 0.41', or 0.10. See Figure 4 for a summary of the storage factors.

Conclusion

Based on the summary in Figure 4, the storage factors for each of the two representative sub-basins equal or exceed the HDR assumed storage factor. Therefore, the assumptions made in SJAFCA Technical Memorandum #6 do apply to the Smith Canal watershed with regards to interior drainage and temporary street storage. Furthermore, we believe it is reasonable to assume that these storage factors would also apply to other watersheds of similar topography and land use.



KSN INC. KJELDSEN SINNOCK NEUDECK Civil Engineers and Land Surveyors — Post Office Box 844, 711 N. Pershing Avenue, Stockton, CA 95201-0844, Office: (209) 946-0268, Faxes: (209) 946-0296, E-mail: KSN@ksninc.com	Scale 1" = 800'	N	SMITH CANAL INTERIOR DRAINAGE ANALYSIS	FIGURE 1
	Original Drawing Scale 0 ½" 1"			PAGE 1

FILE SPEC: P:\2091_SJAFCA_IDIQ\0060-Smith_Canal_Closure_Structure\05_Interior_Drainage\Street Volume Calc\Drainage_Areas-Smith_Canal.dwg
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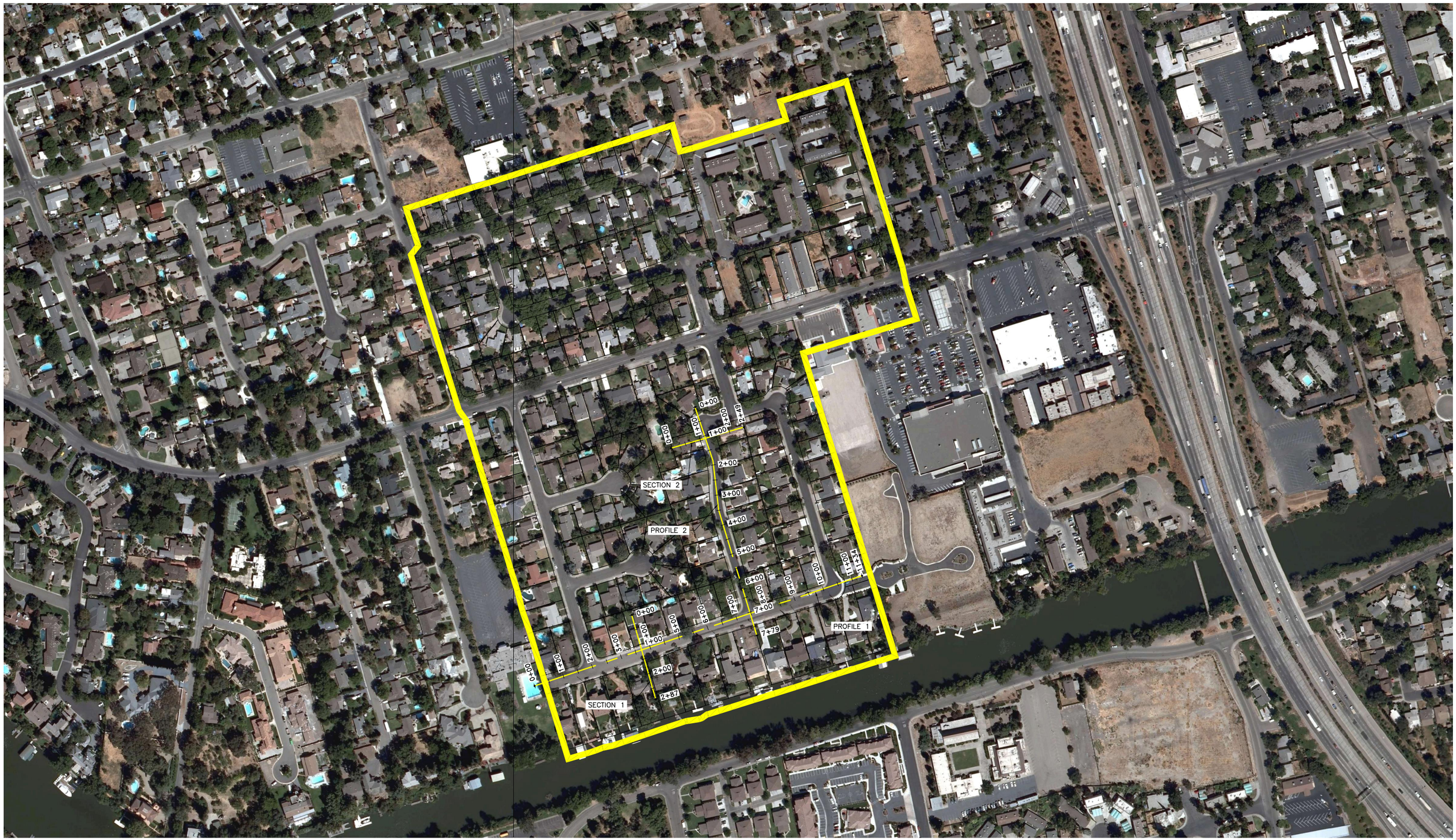

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FIGURE 2

PAGE 1

FILE SPEC: P:\2091_SJAFCA_IDIQ\0060-Smith_Canal_Closure_Structure\05_Interior_Drainage\Street Volume Calc\Street Profile_Memo_Gardena.dwg
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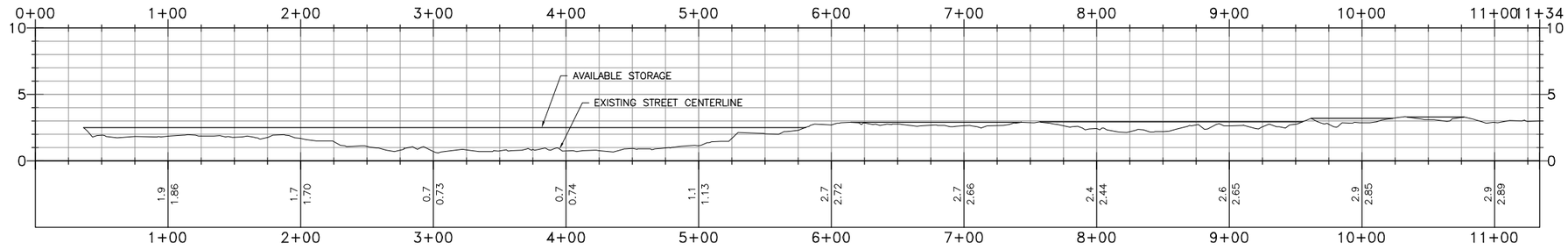

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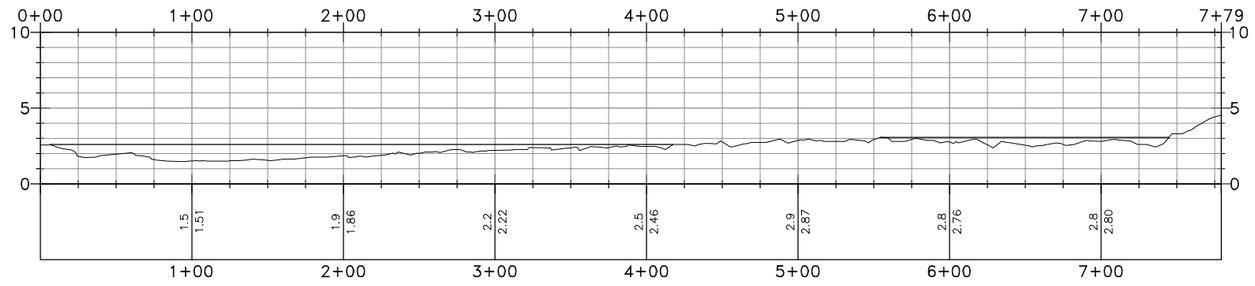

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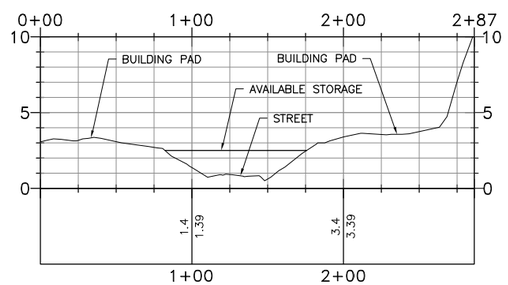

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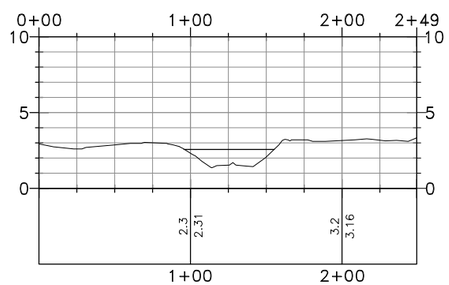

SECTION 2

KSN KJELDSEN SINNOCK NEUDECK INC.
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Scale 1" = 50'

Original Drawing Scale 0 ½" 1"

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SMITH CANAL WATERSHED
GARDENA
STREET DETENTION
STREET PROFILES

FIGURE 2

PAGE 2

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KSN INC. KJELDSEN SINNOCK NEUDECK Civil Engineers and Land Surveyors	Post Office Box 844 711 N. Pershing Avenue Stockton, CA 95201-0844 Office: (209) 946-0268 Faxes: (209) 946-0296 E-mail: KSN@ksninc.com	Scale 1" = 200' Original Drawing Scale 0 ½" 1"	SMITH CANAL WATERSHED BUENA VISTA NORTH STREET DETENTION STREET PROFILES	FIGURE 3 PAGE 1

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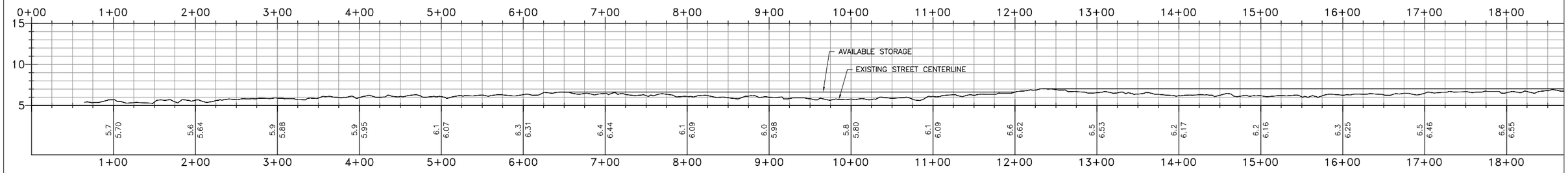

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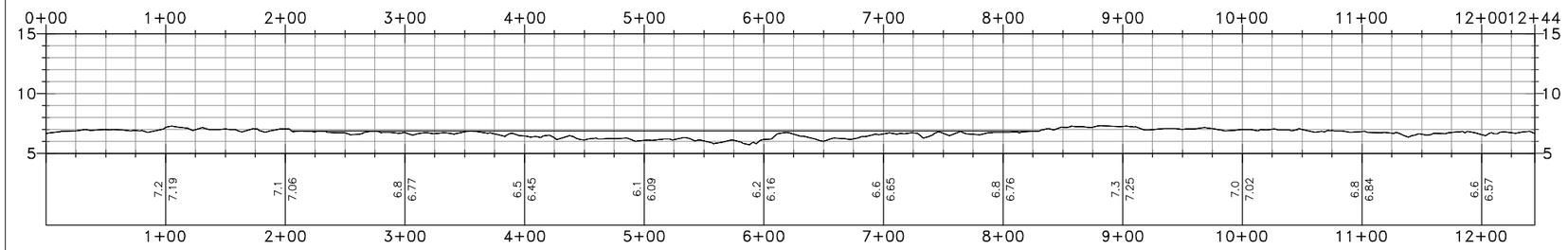

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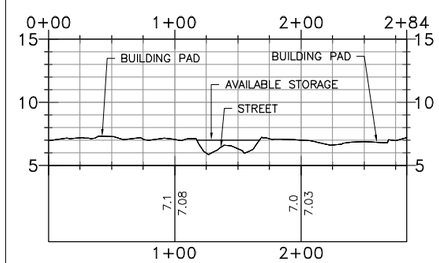

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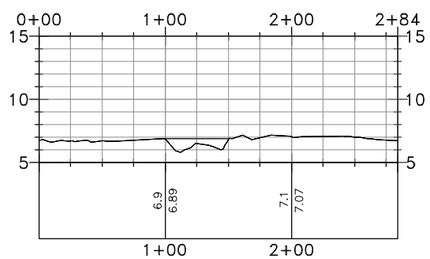

SECTION 2

KSN INC. KJELDSEN SINNOCK NEUDECK Civil Engineers and Land Surveyors	Post Office Box 844 711 N. Pershing Avenue Stockton, CA 95201-0844 Office: (209) 946-0268 Faxes: (209) 946-0296 E-mail: KSN@ksninc.com	Scale 1" = 60' Original Drawing Scale 0 ½" 1"	N	SMITH CANAL WATERSHED BUENA VISTA NORTH STREET DETENTION STREET PROFILES	FIGURE 3 PAGE 2

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KJELDSEN, SINNOCK & NEUDECK, INC. – CIVIL ENGINEERS & LAND SURVEYORS

BY: EEA	DATE: 9-29-10	JOB:	DESC:	NO.
CK:	DATE:	SMITH CANAL WATERSHED	INTERIOR DRAINAGE / STREET DETENTION STORAGE	PAGE 1 / 1

HDR TECH MEMO

% OF AREA THAT IS STREETS

AVERAGE DEPTH IN STREETS

AREA (ACRES) × 20% × 0.50' = VOLUME (AC-FT)

FACTOR = 0.10

GARDENA

AREA (ACRES) × 23.8% × 0.63' = VOLUME (AC-FT)

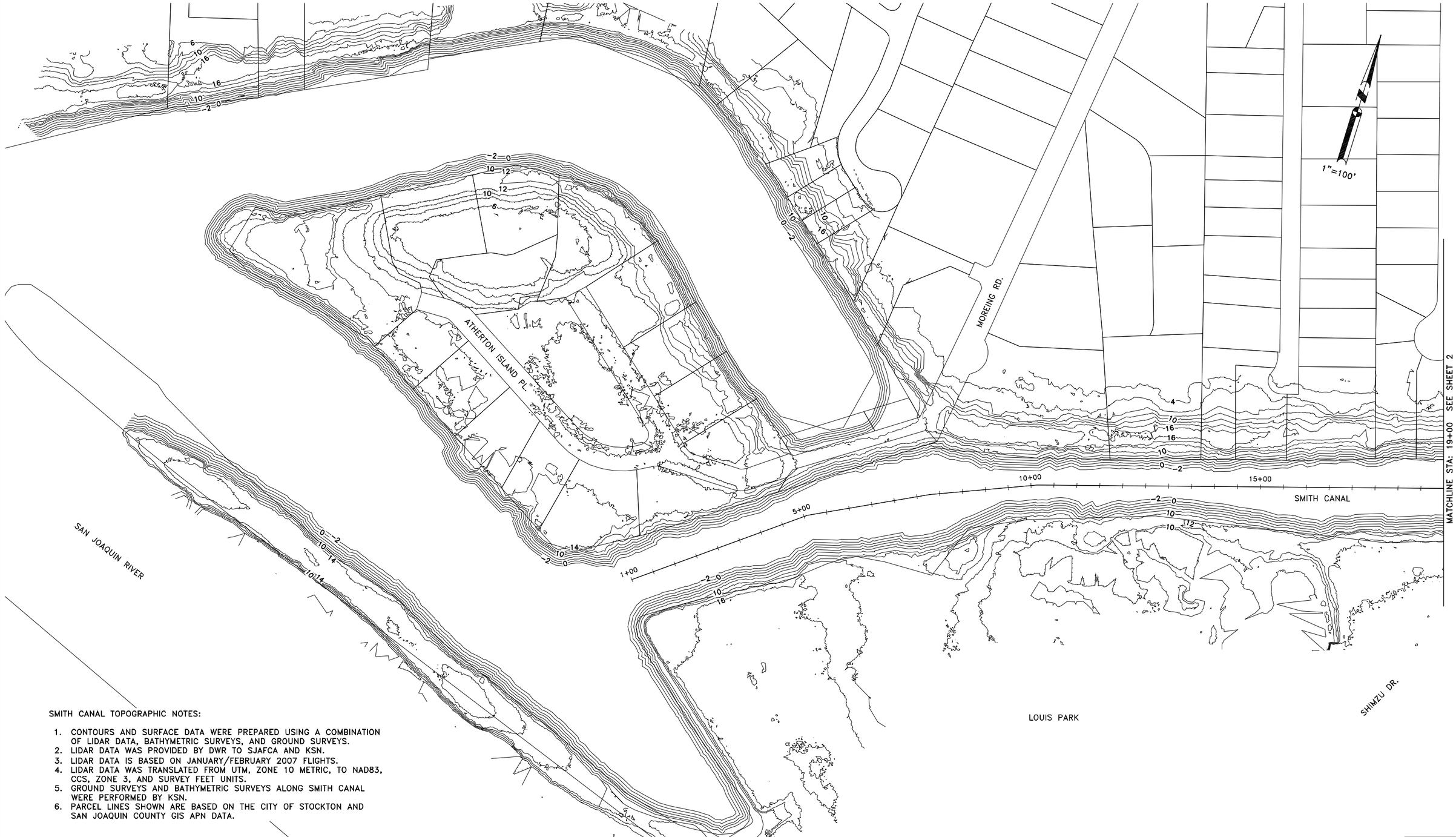
FACTOR = 0.15

BUENA VISTA NORTH

AREA (ACRES) × 23.4% × 0.41' = VOLUME (AC-FT)

FACTOR = 0.10

FIGURE 4



SMITH CANAL TOPOGRAPHIC NOTES:

1. CONTOURS AND SURFACE DATA WERE PREPARED USING A COMBINATION OF LIDAR DATA, BATHYMETRIC SURVEYS, AND GROUND SURVEYS.
2. LIDAR DATA WAS PROVIDED BY DWR TO SJAFCA AND KSN.
3. LIDAR DATA IS BASED ON JANUARY/FEBRUARY 2007 FLIGHTS.
4. LIDAR DATA WAS TRANSLATED FROM UTM, ZONE 10 METRIC, TO NAD83, CCS, ZONE 3, AND SURVEY FEET UNITS.
5. GROUND SURVEYS AND BATHYMETRIC SURVEYS ALONG SMITH CANAL WERE PERFORMED BY KSN.
6. PARCEL LINES SHOWN ARE BASED ON THE CITY OF STOCKTON AND SAN JOAQUIN COUNTY GIS APN DATA.

CALL BEFORE YOU DIG — 800 227 2600 — UNDERGROUND SERVICE ALERT

Submittal	
#	Date

PROJECT ENGINEER — REGISTERED PROFESSIONAL ENGINEER — MICHAEL R. CONLEY — No. 32921 — EXP. 6/30/2012 — CIVIL — STATE OF CALIFORNIA — 7/13/2010

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SMITH CANAL
INTERIOR DRAINAGE ANALYSIS

SMITH CANAL TOPO

Revisions				
No.	Description	Date	By	Aprvd. By

Design MRC
Drawn TCR
Check

Scale 1" = 100'
Original Drawing Scale 0 ½" 1"

Date JULY 2010
Sheet Number 1 Of 3
Project File No. 2091-0060

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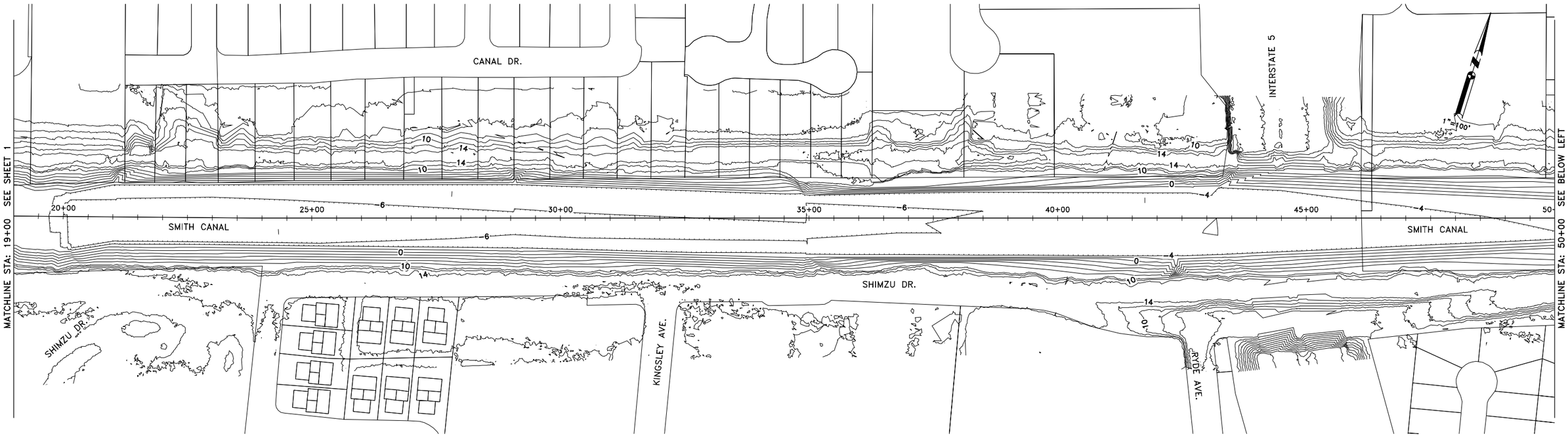

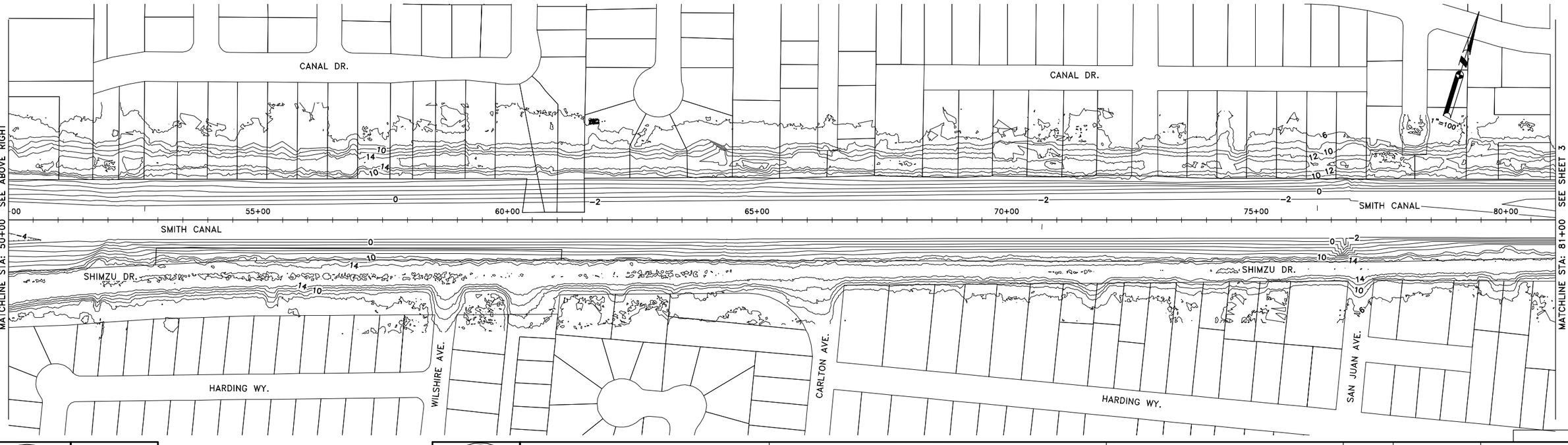

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SEE SHEET 1 FOR SMITH CANAL TOPOGRAPHIC NOTES.

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SMITH CANAL
INTERIOR DRAINAGE ANALYSIS

SMITH CANAL TOPO

Revisions				
No.	Description	Date	By	Aprvd. By

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Sheet Number 2 Of 3
Project File No. 2091-0060

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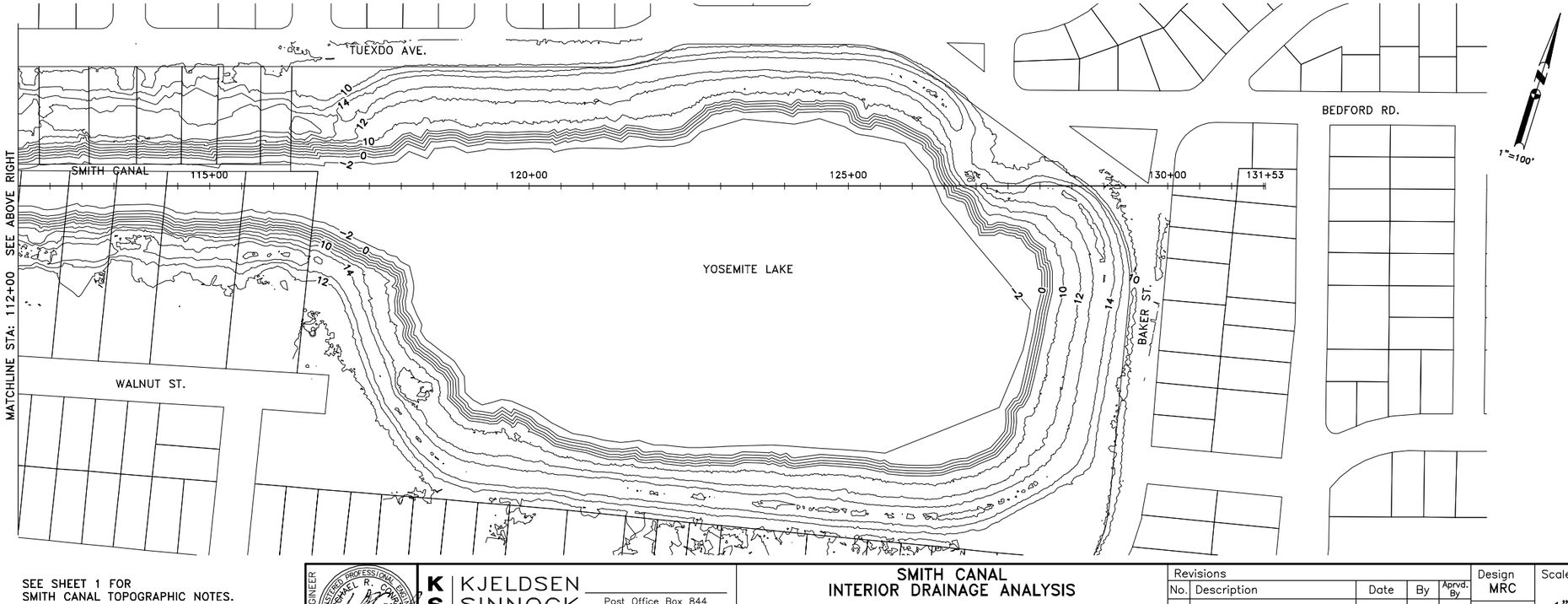

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Submittal	
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PROJECT ENGINEER — REGISTERED PROFESSIONAL ENGINEER — RAPHAEL R. CASTRO — NO. 32921 — EXP. 6/30/2012 — CIVIL — STATE OF CALIFORNIA — 7/13/2010

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SMITH CANAL
INTERIOR DRAINAGE ANALYSIS

SMITH CANAL TOPO

Revisions				
No.	Description	Date	By	Aprvd. By

Design: MRC
Drawn: TCR
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Scale: 1" = 100'
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Date: JULY 2010
Sheet Number: 3 Of 3
Project File No.: 2091-0060

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