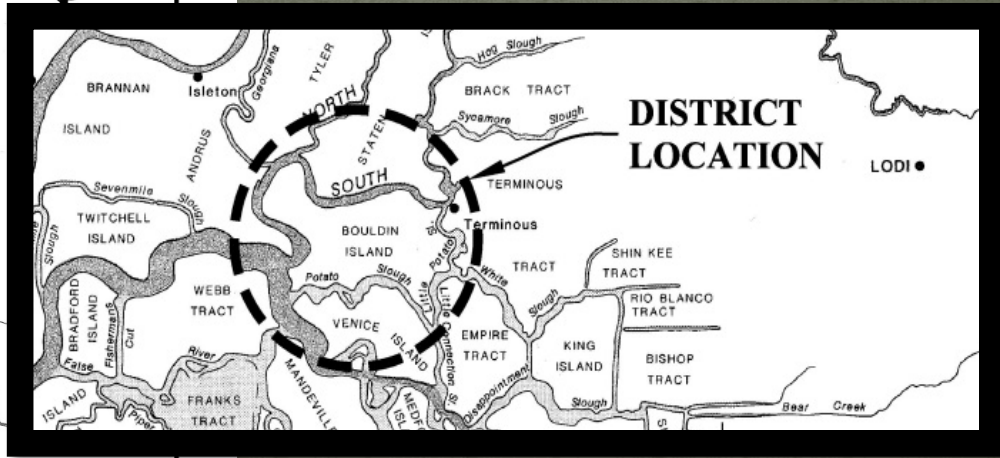
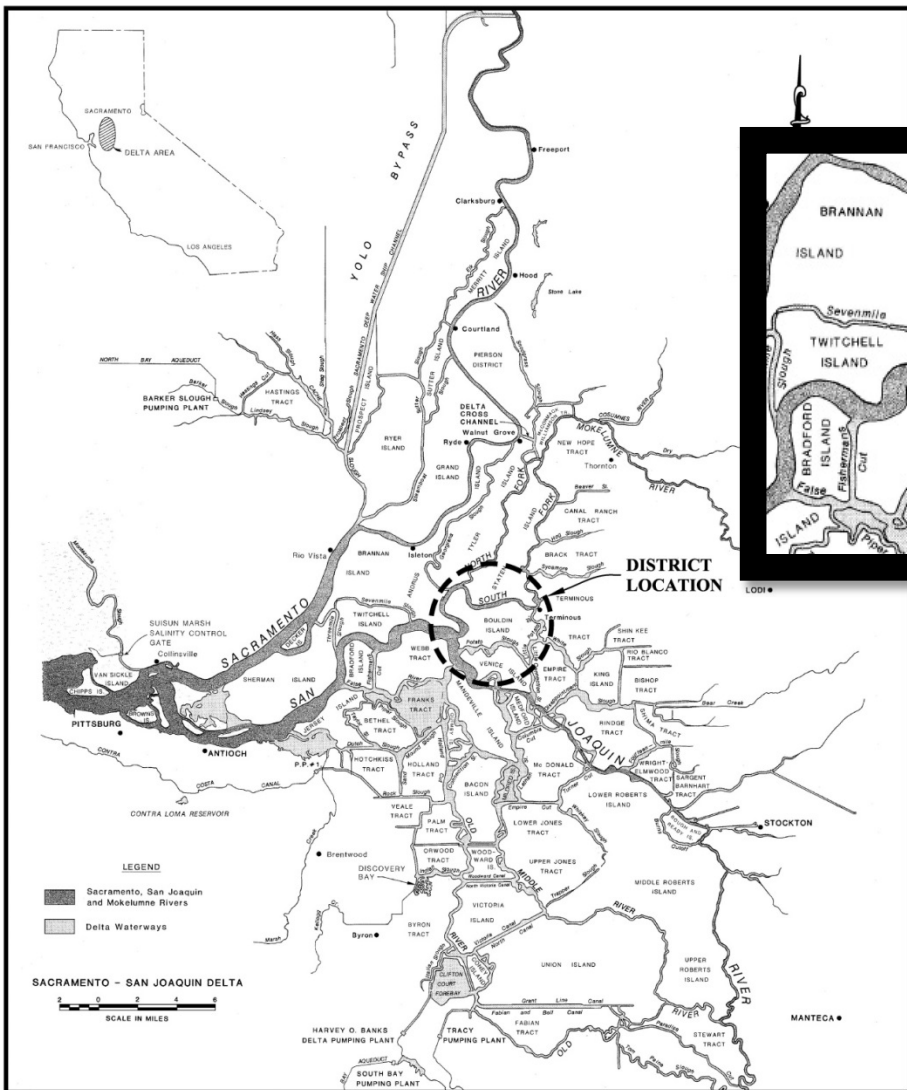


**A PRACTICAL WORKSHOP:  
THE SCIENCE BEHIND CLIMATE CHANGE IMPACTS**

# **DELTA LEVEES**

**Gilbert Cosio  
MBK Engineers  
February 13, 2014**



1771 Tribute Road, Suite A  
 Sacramento, California 95815  
 Phone: (916) 456-4400 • Fax: (916) 456-0253

**RECLAMATION DISTRICT NO. 756  
 BOULDIN ISLAND**

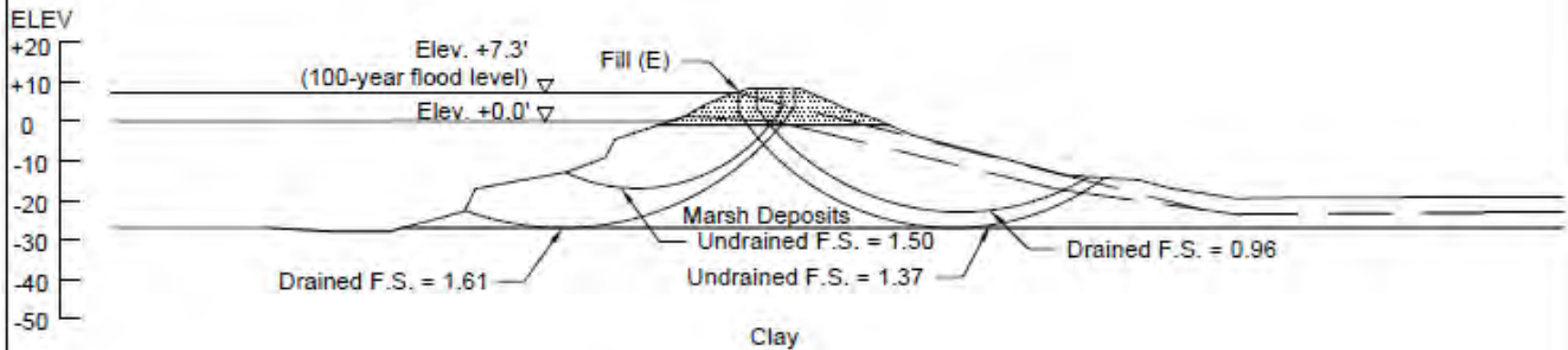
**VICINITY MAP**

SCALE:	AS NOTED
JOB NUMBER:	4125-11
DRAWN BY:	JAB
DATE:	03/10/2010
SHEET:	1 OF 6





Depth in Feet	Samples Type/ Recovery	Blow Count	Graphic	USCS	Water Levels	Date : 9/22/2011 Drilling Method : Rotary Wash Elevation (Feet) : 8.2 Latitude : 38.09178 Longitude : -121.53194				Torque (sf)	Pocket Pen (sf)	Moisture Content (%)	Dry Density (pcf)	Other Laboratory Tests
						Material Description								
0	M	17		SP		gray, saturated, medium dense								
50	M	18		CL		Lean Clay (CL), blue gray, saturated, stiff to very stiff		2.0	24	102				
						Bottom of boring at 52.5 feet Groundwater encountered during rotary wash drilling method								
Bouldin Island Levee Stations 230 to 330 San Joaquin County, California						Log of Boring 2 (Page 2 of 2)								
Hultgren - Tillis Engineers						Project No. 124.11				Plate No. B-4				



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Existing Fill	115	500	0	50	28
Marsh Deposits	70	140	20	100	32
Clay	125	1000	0	50	30
New Fill	115	-	-	50	32

SCALE  
0 40 feet  
1 inch = 40 feet

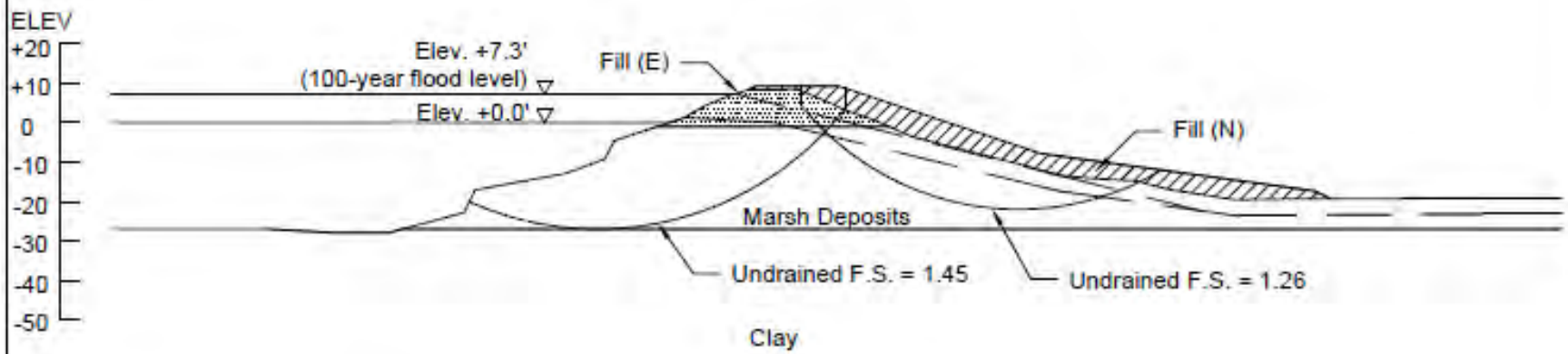
Bouldin Island Levee  
Stations 230 to 330  
San Joaquin County, California

Slope Stability Results  
Existing Configuration  
Station 319

Hultgren - Tillis Engineers

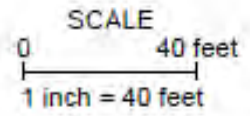
Project No. 124.11

Plate No. E-21



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Existing Fill	115	500	0	50	28
Marsh Deposits	70	140	20	100	32
Clay	125	1000	0	50	30
New Fill	115	-	-	50	32



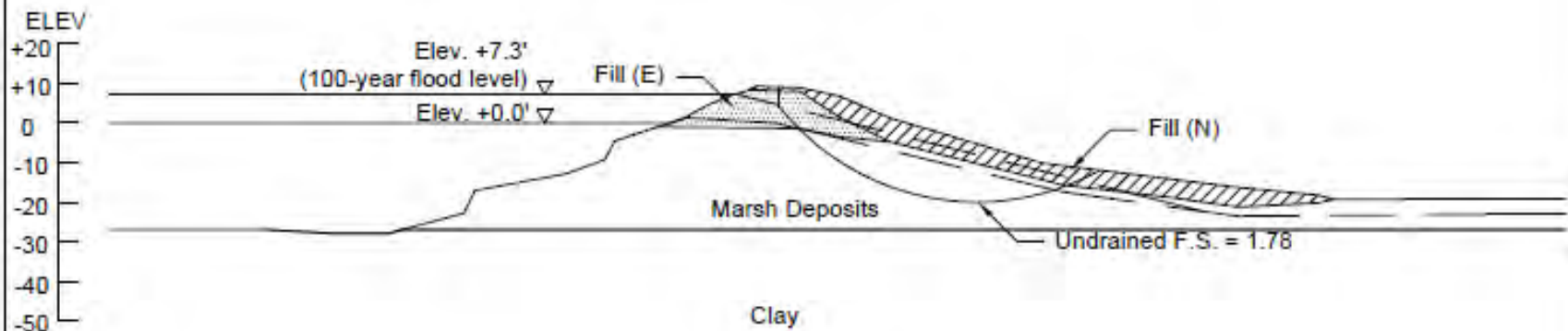
Bouldin Island Levee  
Stations 230 to 330  
San Joaquin County, California

**Slope Stability Results  
After Construction  
Station 319**

**Hultgren - Tillis Engineers**

Project No. 124.11

Plate No. E-22



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Existing Fill	115	500	0	50	28
Marsh Deposits	70	140	20	100	32
Clay	125	1000	0	50	30
New Fill	115	-	-	50	32

SCALE  
 0 ——— 40 feet  
 1 inch = 40 feet

Bouldin Island Levee  
 Stations 230 to 330  
 San Joaquin County, California

**Slope Stability Results**  
 Long-Term Consolidated  
 Station 319

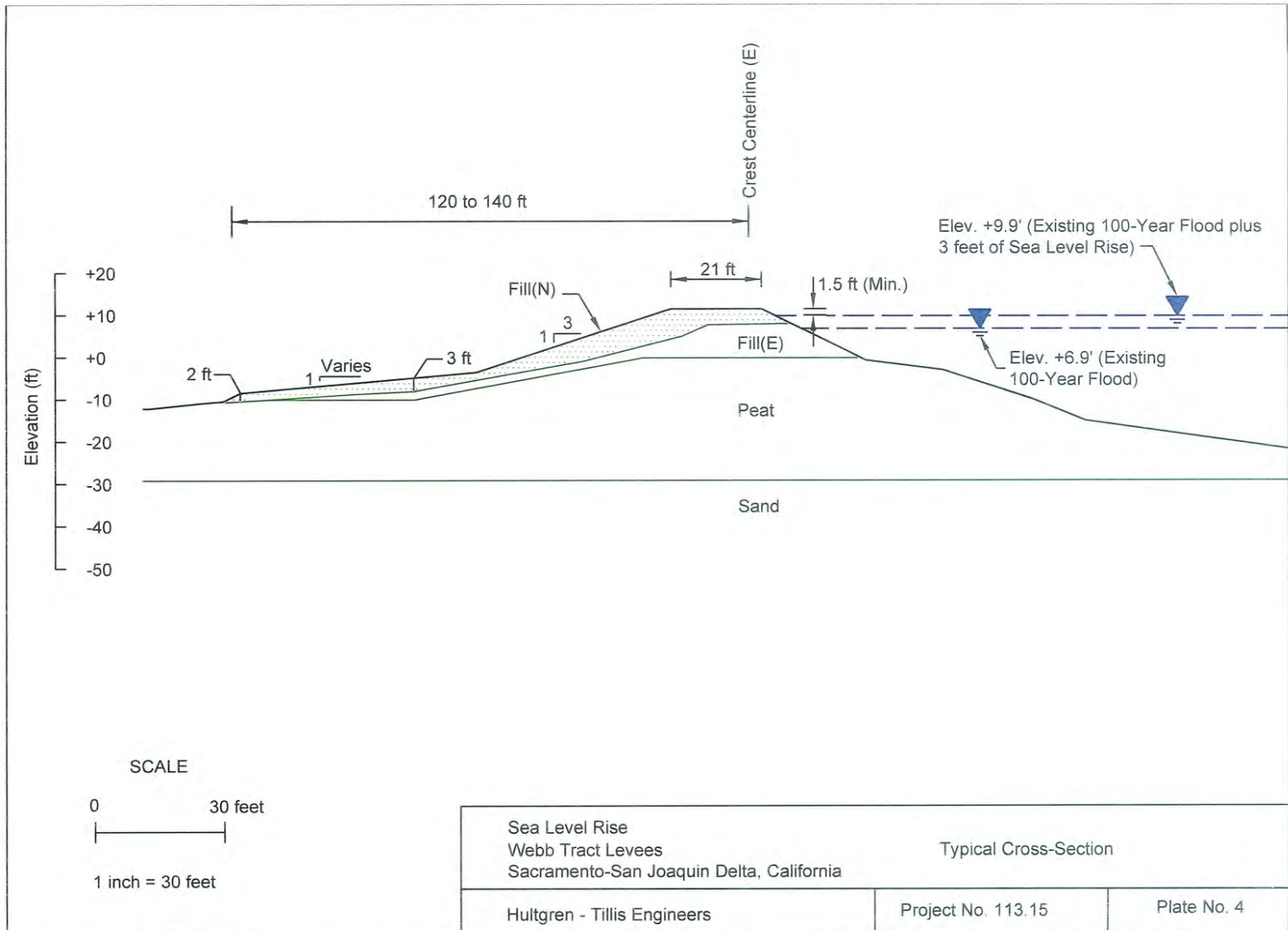
Hultgren - Tillis Engineers

Project No. 124.11

Plate No. E-23

# SEA LEVEL RISE





# SUBSIDENCE



Image Source: 2009 NAIP imagery (1m resolution)




1771 Tribute Road, Suite A  
 Sacramento, California 95815  
 Phone: (916) 456-4400 • Fax: (916) 456-0253

RECLAMATION DISTRICT NO. 2044  
 KING ISLAND

**AERIAL MAP WITH  
 STATIONING**

SCALE:	1" = 2000'
JOB NUMBER:	2044
DRAWN BY:	—
DATE:	02/04/2010
SHEET:	2 OF 7



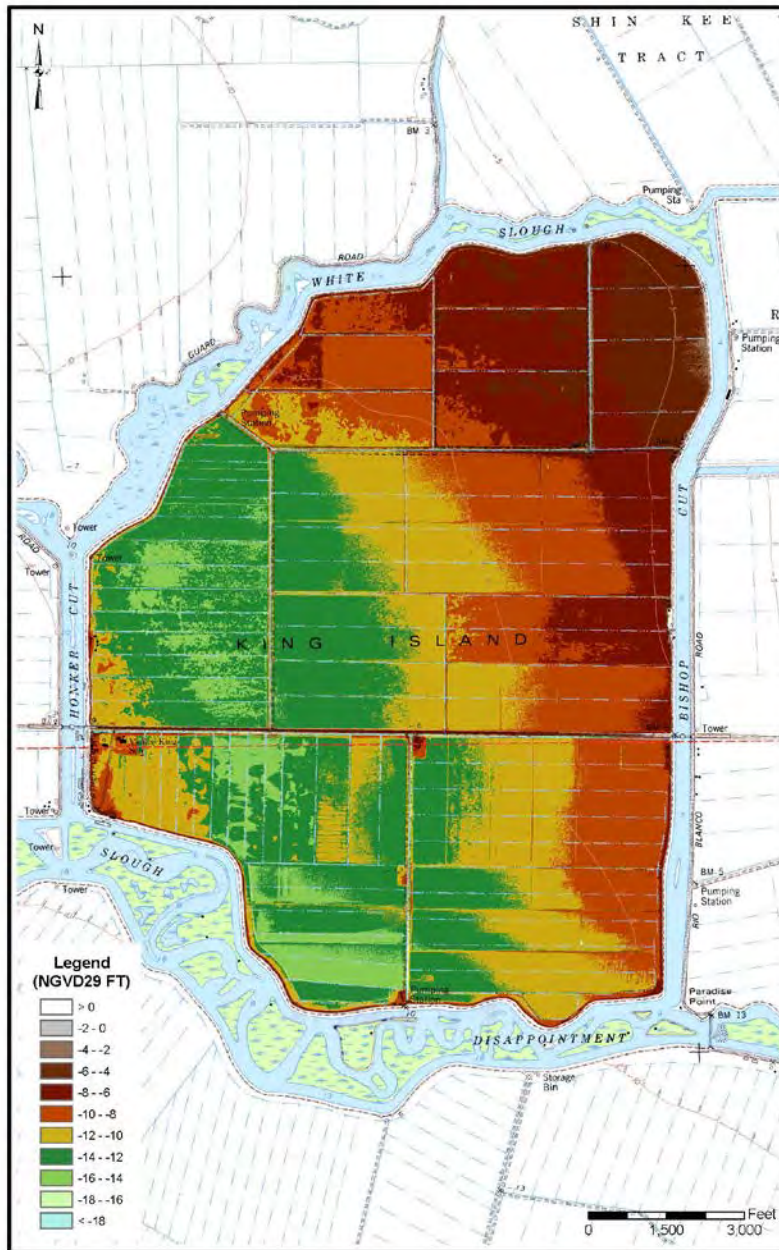
LOG OF BORING B-8		DRILLING DATE: 11/29/04 DRILLING METHOD: Solid Flight Auger and Rotary Wash DRILL RIG TYPE: Diedrich D-120 HAMMER TYPE: 140-lb falling 30 inches		SURFACE ELEVATION: -5.0 ft DATUM: NAD83 LOGGED BY: DH CHECKED BY: MV						
DEPTH (FEET)	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNT	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	ADDITIONAL TESTS
0					SANDY SILT (ML), black, fine-grained sand, trace clay, organic odor, moist, soft to medium stiff.					
5		1	4 3 3		becoming dark brown, increasing clay		23			WA (77)
10		2A B	20 27 35		SANDY CLAY (CL), greenish-gray, fine to medium-grained sand, moist, medium stiff.					
15		3	12 17 20		SILTY SAND (SM), dark greenish-gray, fine to medium-grained, trace angular to subrounded fine gravel, wet, very dense.	115	16			WA (45)
20		4A B	4 10 18		increasing sand, trace coarse-grained sand dense					
25		5	5 7 9		CLAY (CL), greenish-gray, trace fine-grained sand, moist, very stiff.					
30		6	12 17 22		change to trace fine to medium-grained sand, stiff					
35		7A B	8 14 19		SANDY SILT (ML), dark greenish-gray, fine-grained sand, moist, hard.					
40					SAND (SW), dark greenish-gray, fine to coarse-grained, trace angular to subangular fine gravel, wet, dense.					
					increasing silt					
					SAND WITH SILT (SP-SM), dark brown, fine to medium-grained, trace coarse-grained sand and subangular to well-rounded fine		21			WA (15)
					SILTY SAND (SM), dark brown, fine-grained, trace medium to coarse-grained, wet, dense.					

JOB NO. KD0101

PROJECT: Stockton Delta Water Supply Project

SHEET 1 OF 2

PLATE A-1.8



**Legend  
(NGVD29 FT)**

> 0
-2 - 0
-4 - -2
-6 - -4
-8 - -6
-10 - -8
-12 - -10
-14 - -12
-16 - -14
-18 - -16
< -18

**Legend  
(NGVD29 FT)**

> 0
-2 - 0
-4 - -2
-6 - -4
-8 - -6
-10 - -8
-12 - -10
-14 - -12
-16 - -14
-18 - -16
< -18

