SAN JOAQUIN RIVER RESTORATION PROGRAM

Geotechnical Investigations

Scope of Work

1. LEVEE INVESTIGATIONS
   4 Proposed Alignments

2. IN-CHANNEL IMPROVEMENT INVESTIGATIONS

   Chowchilla Bifurcation Structures
   San Mateo Road
   Mendota Pool

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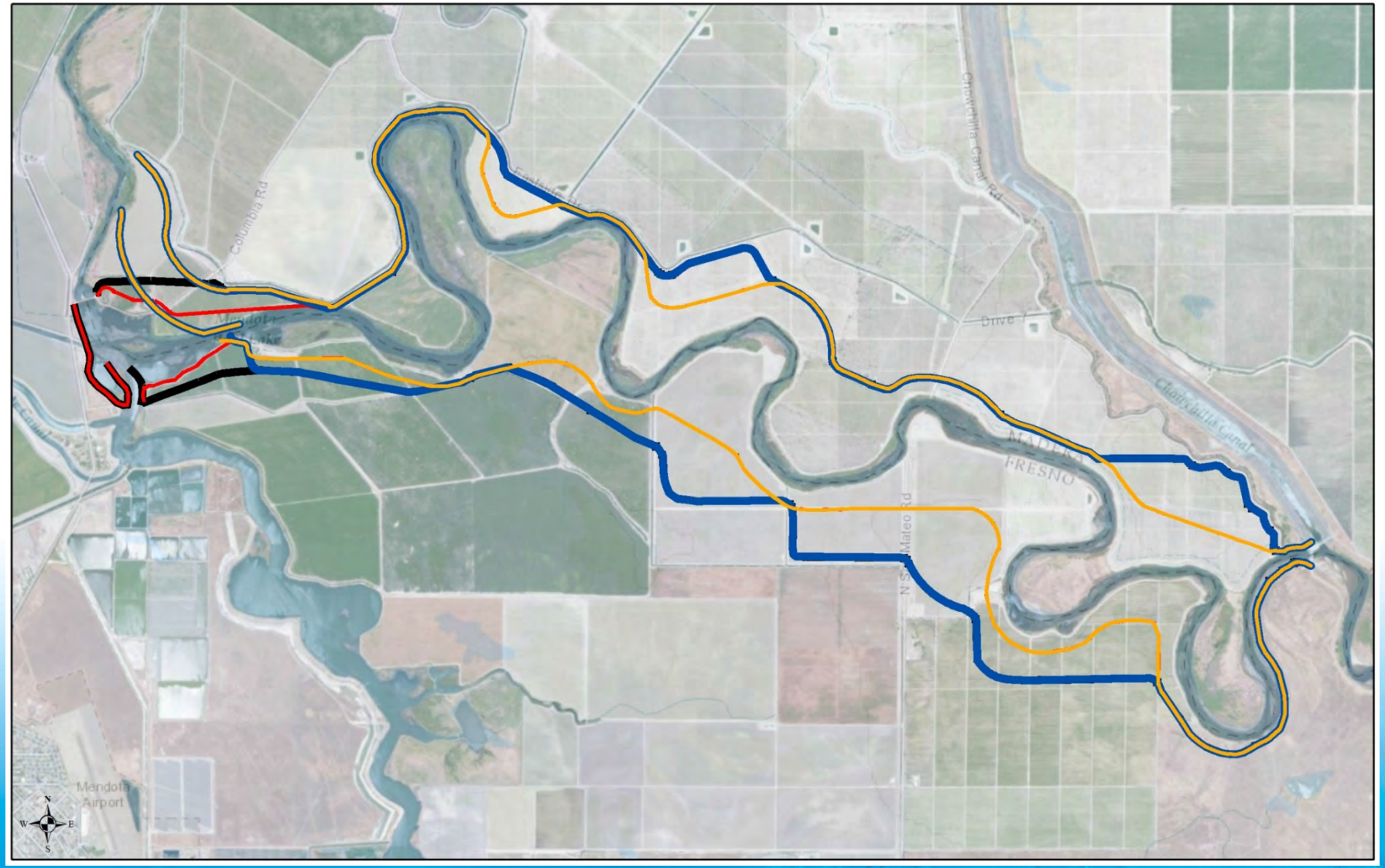
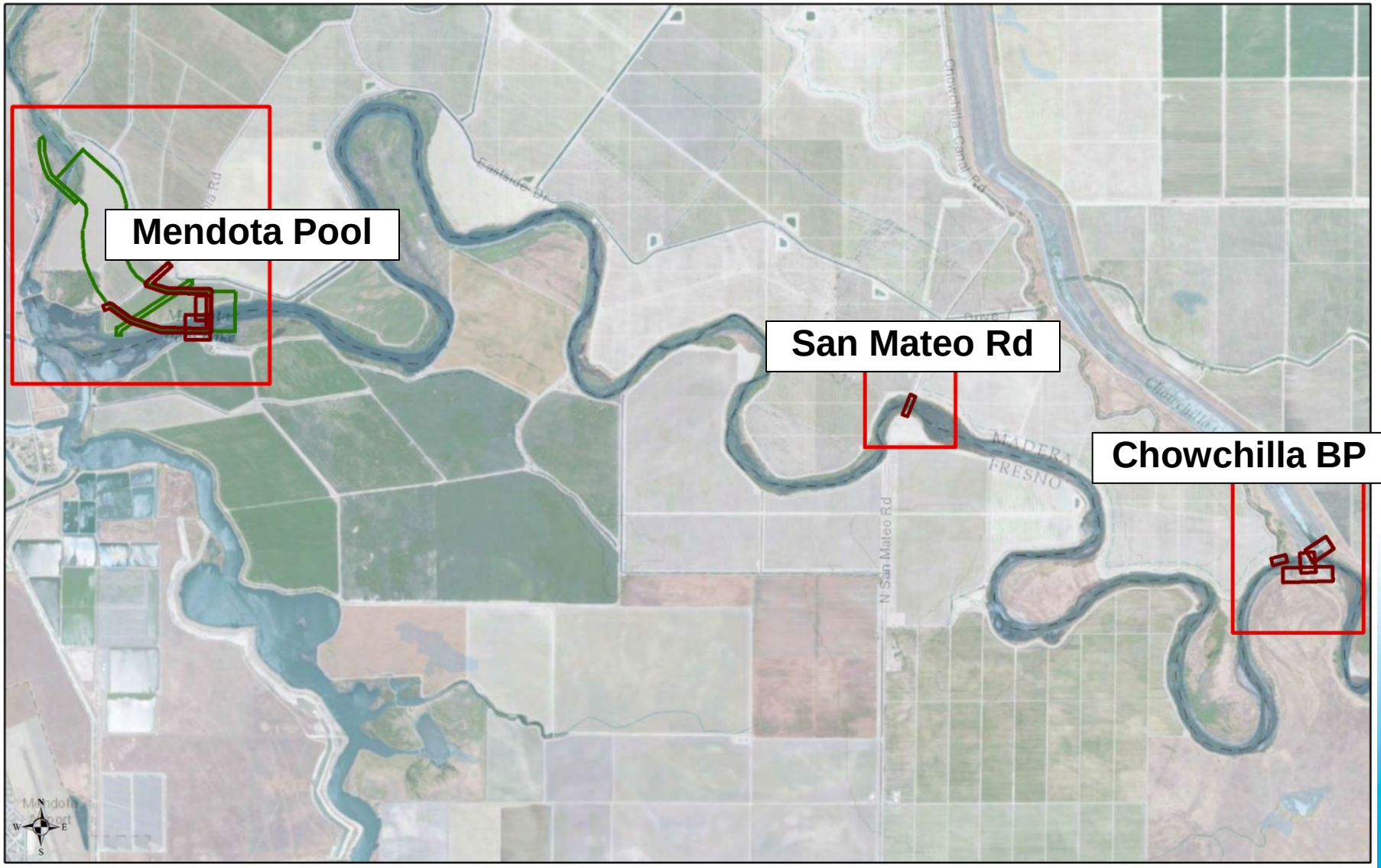
Proposed Levee Alignments



In-Channel Improvements



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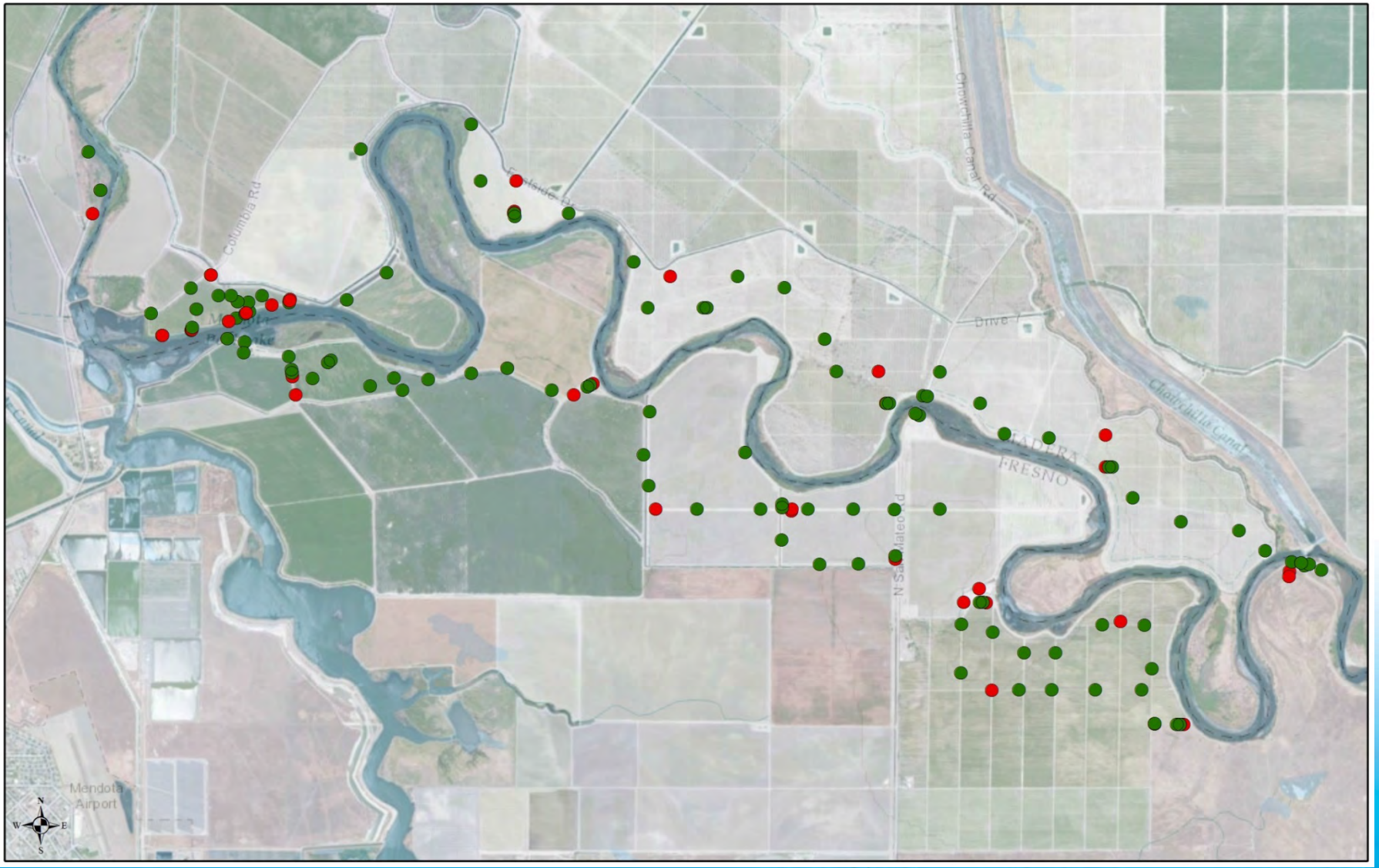
Completed Investigations



Completed Investigations

- 108 Cone Penetration Test (**CPT**) Holes

- 55 Drill Holes
  - Standard Penetration Test (**SPT**)
  - Undisturbed Samples
  - 3 Completed as Observation Wells

Landowner Coordination

Harvesting Schedules

Thank You for taking my calls.

Irrigation Schedules

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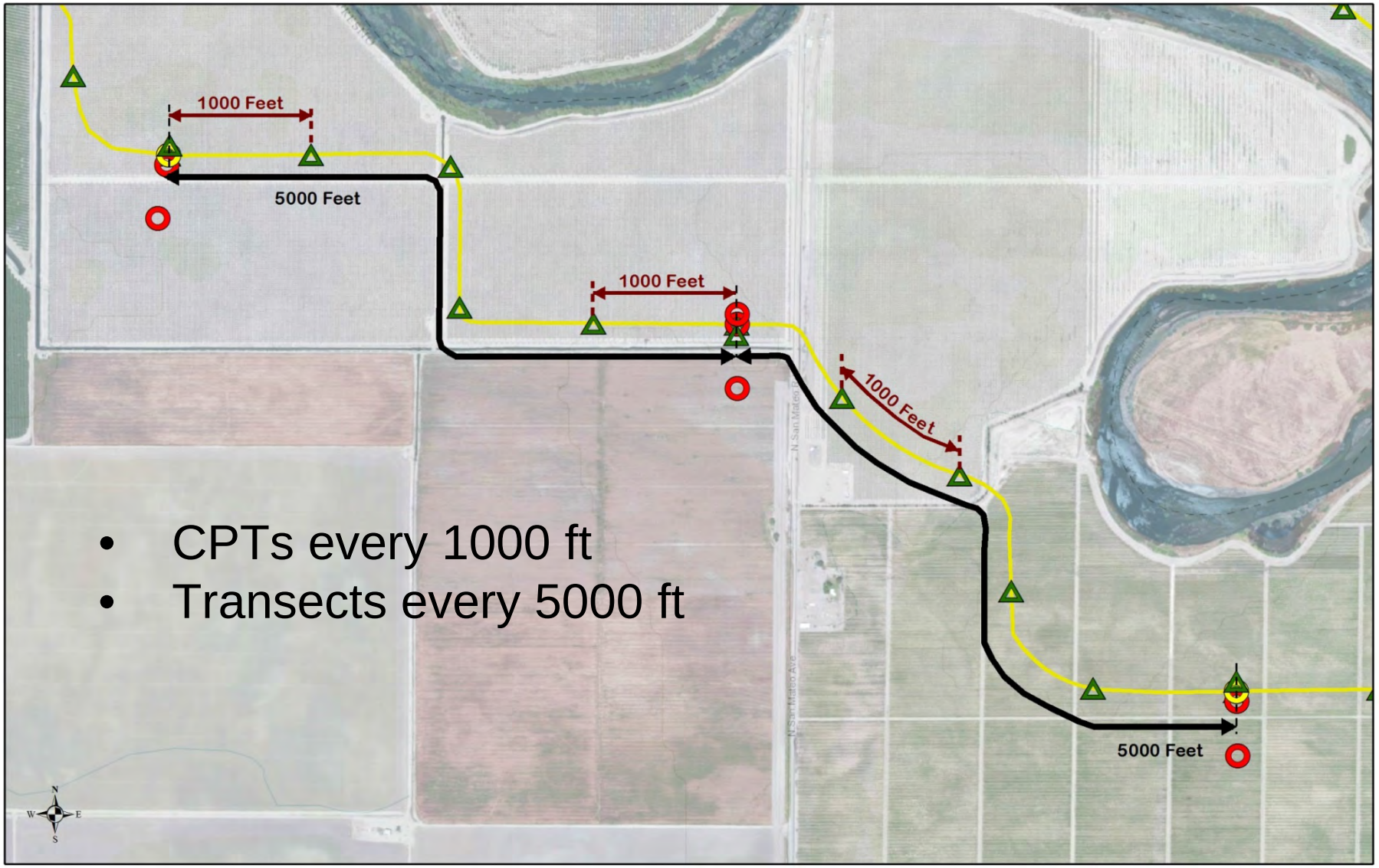
Scope of Work



- CPTs every 1000 ft
- Transects every 5000 ft

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Transects

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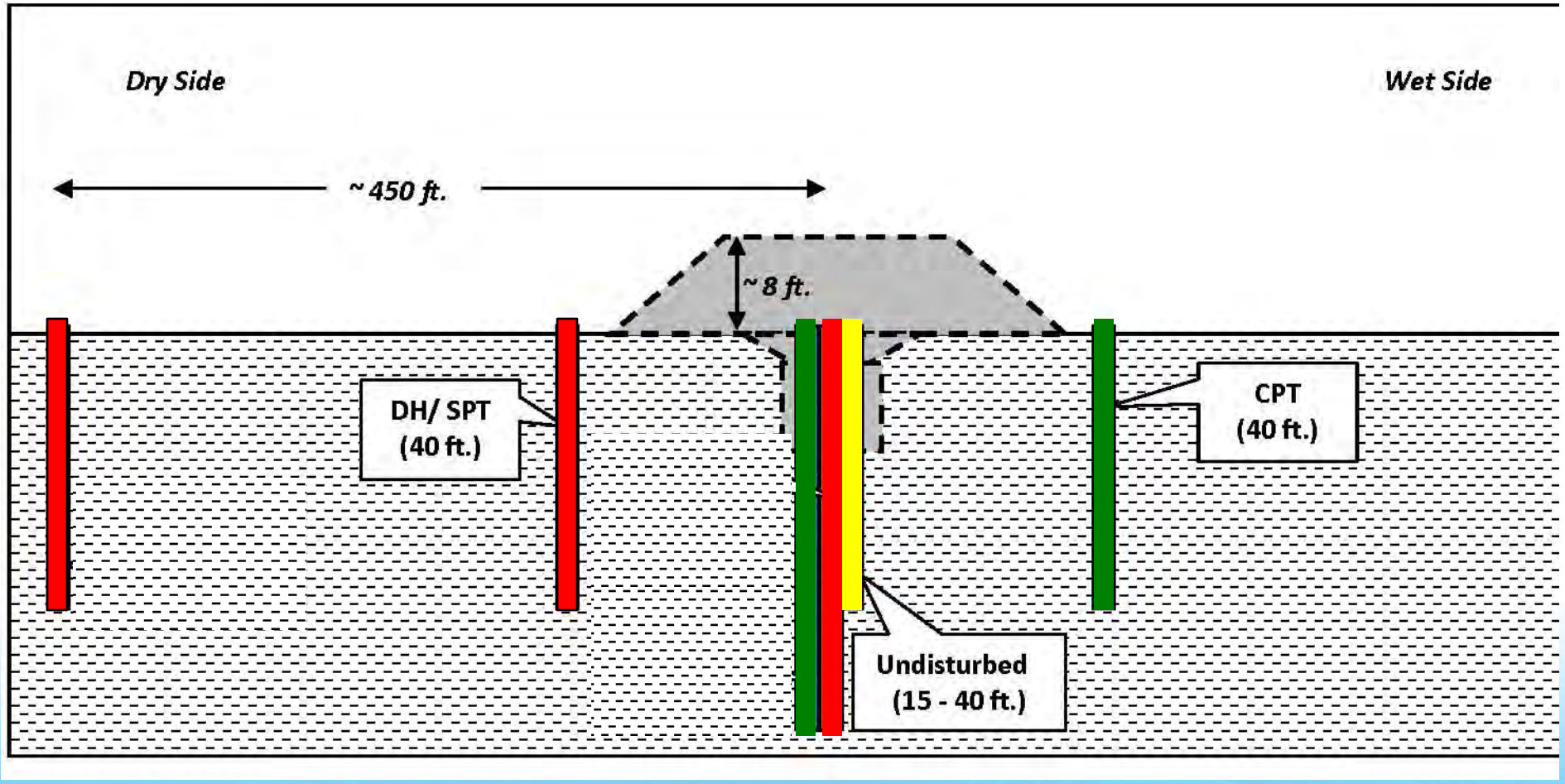
Cross Section Along Transect



Drilling Methods

- **Cone Penetration Test (CPT) Holes**
  1½-inch diameter
  60 feet deep
- **Drill Holes/Standard Penetration Test (SPT)**
  8½-inch diameter
  20 - 60 feet deep
- **Drill Holes/Undisturbed Sampling**
  10½-inch diameter
  20 - 60 feet deep

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CPT Rig

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CPT Rig Equipment

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”The Cone”

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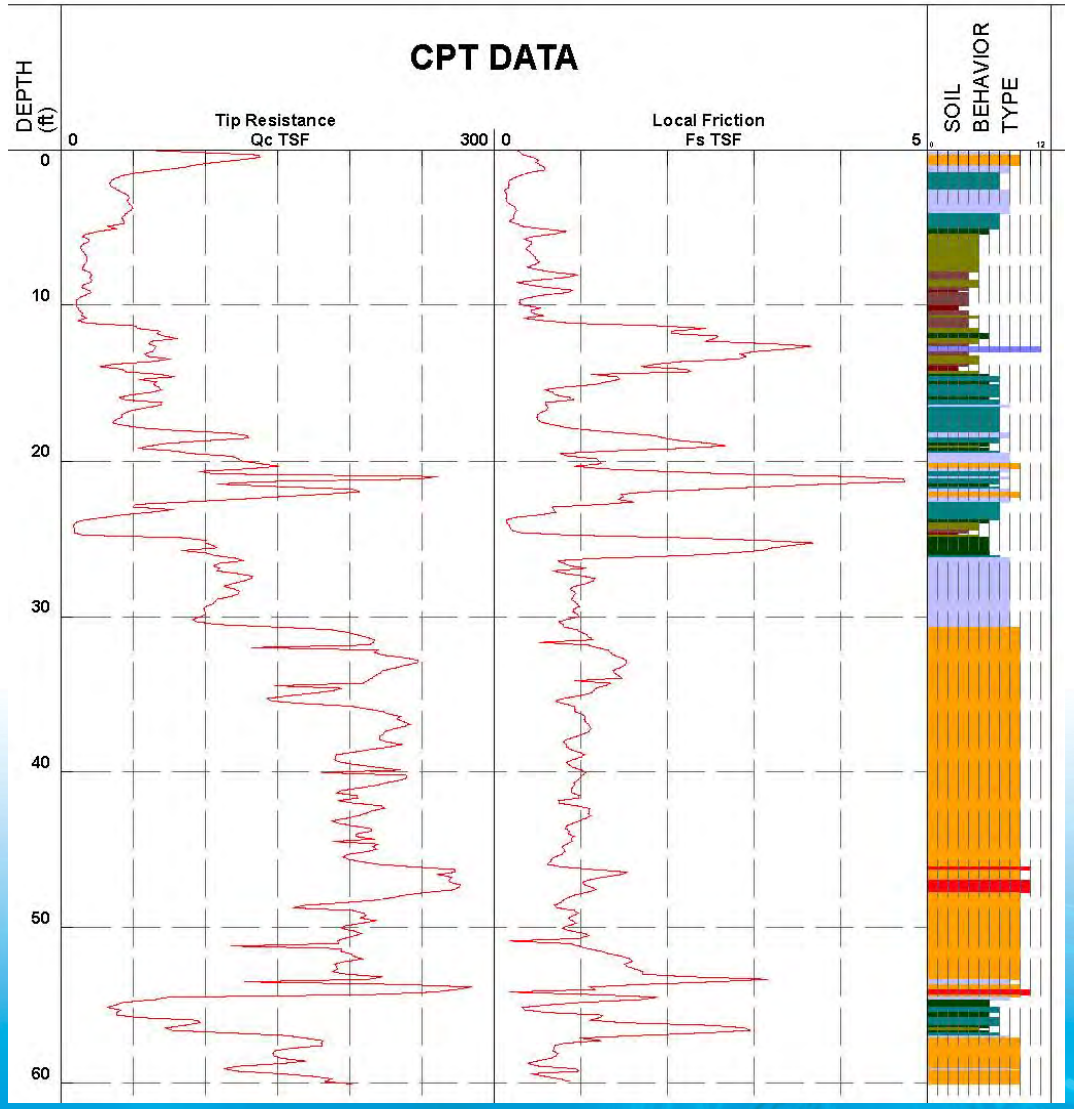
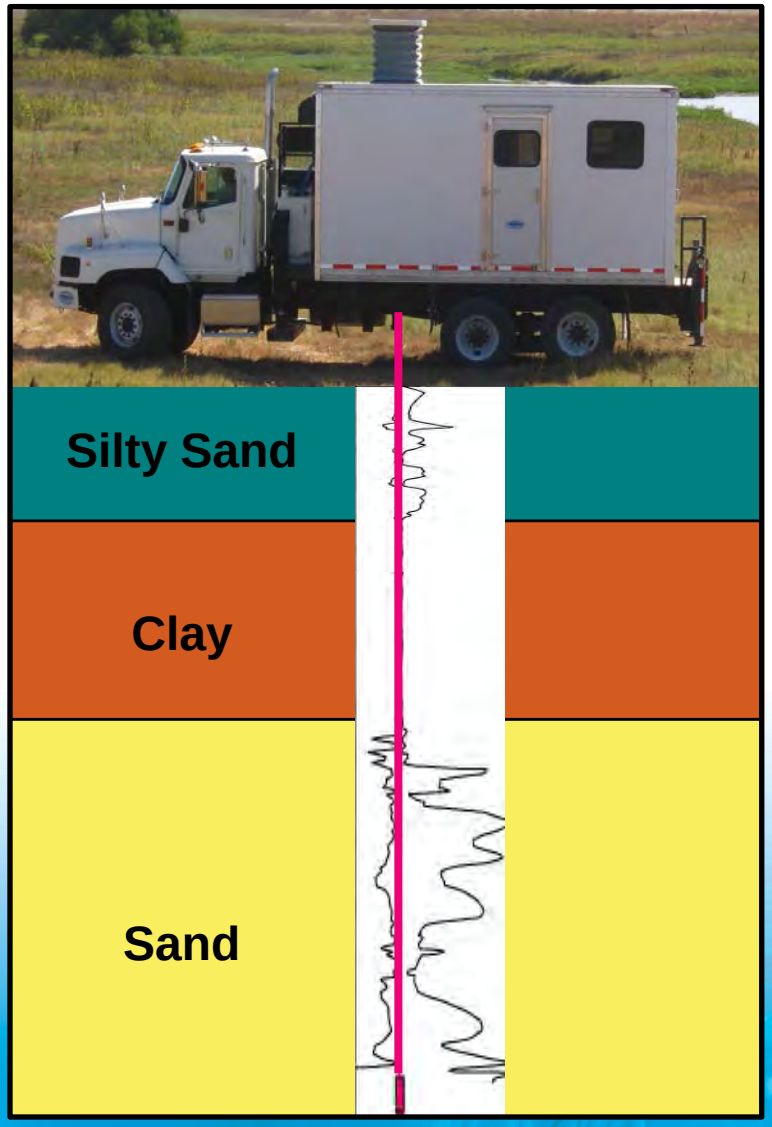
CPT LOG

Tip Resistance Sleeve Friction



CPT



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Backfilled CPT Hole

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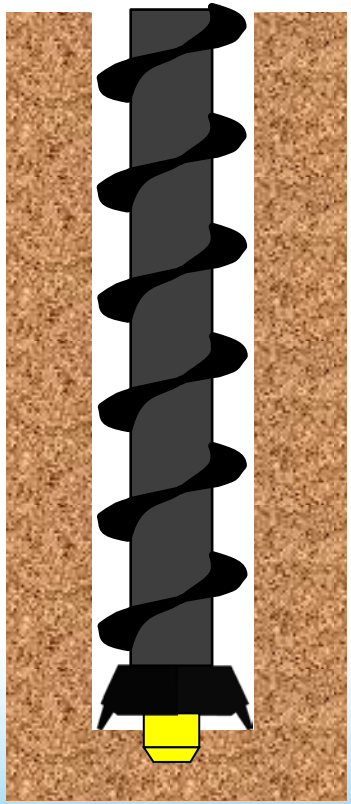
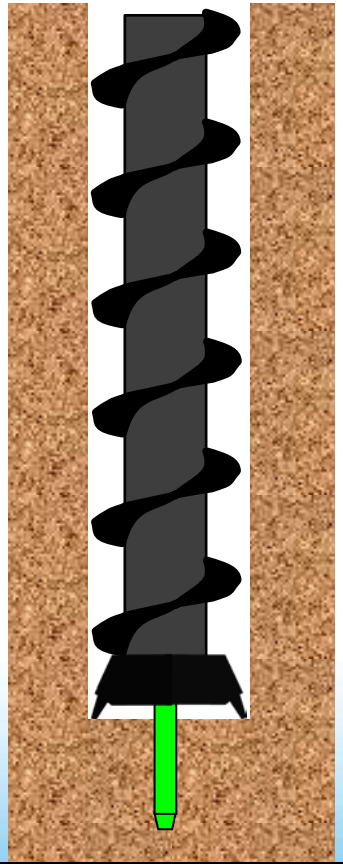
Hollow Stem Auger Drilling

Soil Logging, Sampling, Testing



Dry Core Sampler



SPT Sampler

Standard Penetration Test

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Standard Penetration Test

Standard Penetration Test

SPT provides way to determine relative density

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Standard Penetration Test

SPT provides way to determine relative density

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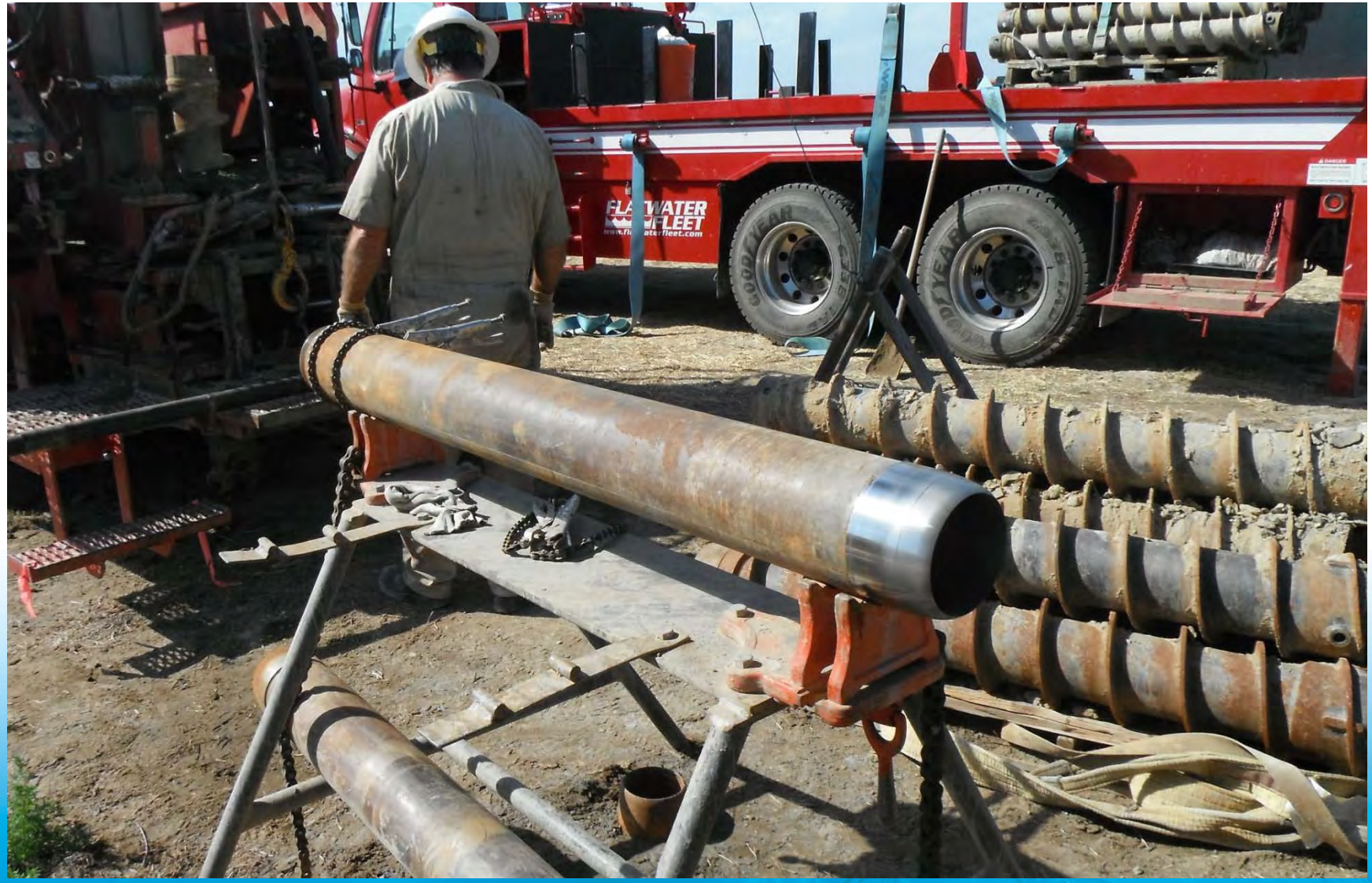
Dry Core Sampling



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Soil Sampling & Logging

Dry Core Sampler

Soil Sampling & Logging

Dry Core Sampler

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Boxed Core

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Box O' Bees

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Lots of Boxed Core

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Materials Testing

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Materials Testing

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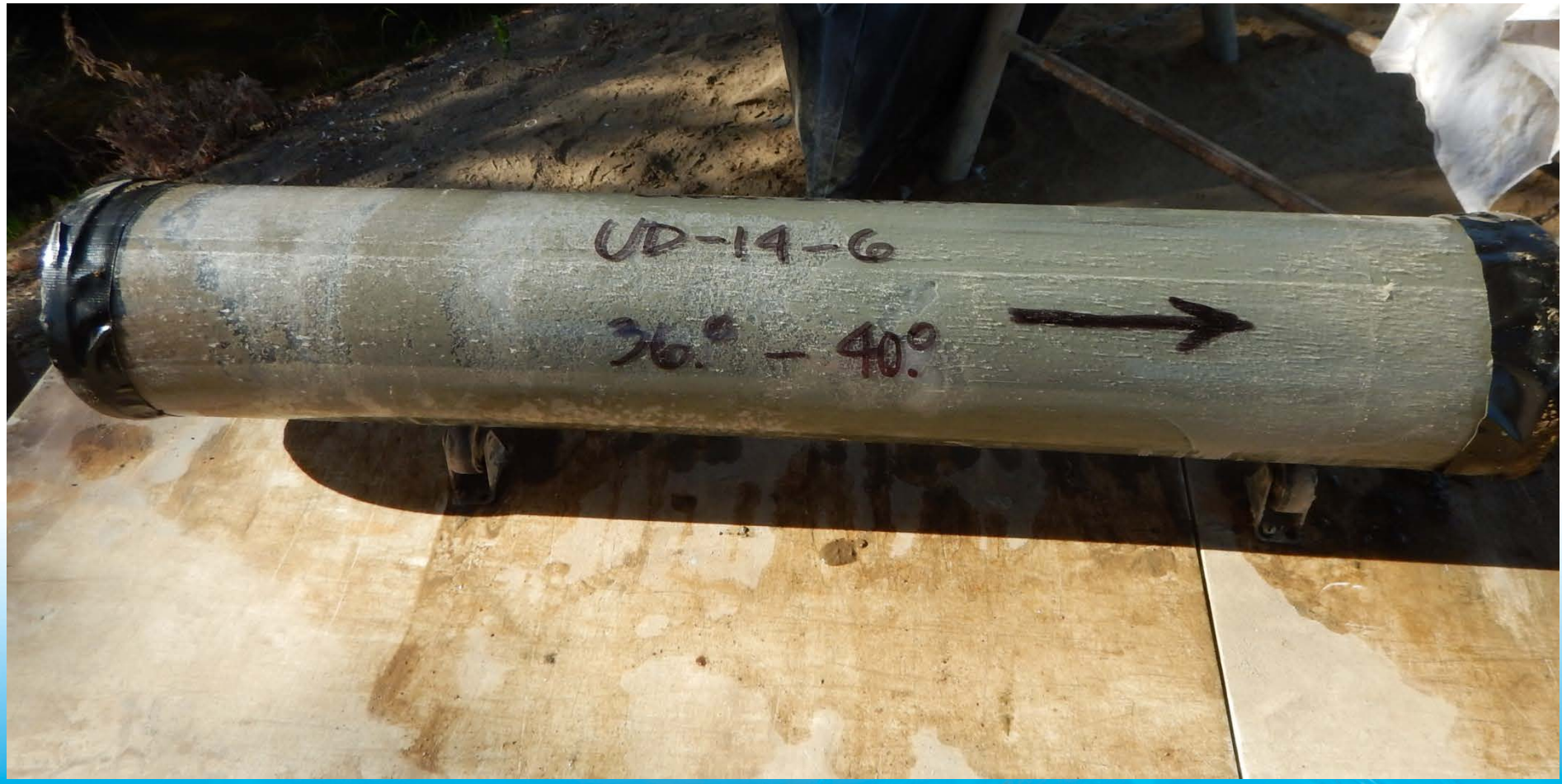
Undisturbed Sampling



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Samples Shipped to Lab

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Sample Processing

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Sample Processing

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Permeability Testing

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Consolidation Testing

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Consolidation Testing

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Observation Wells

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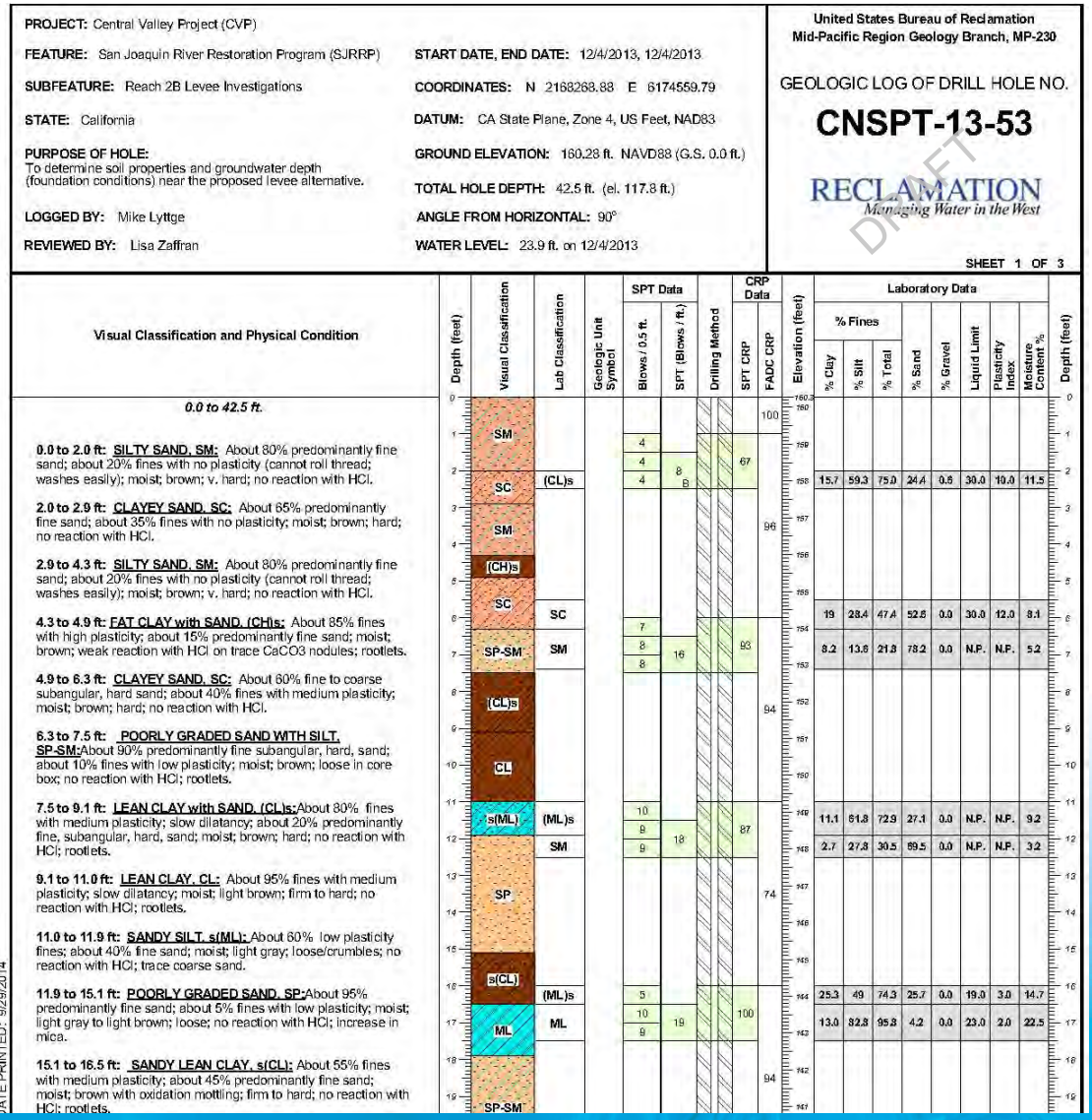
Drill Log



PROJECT: Central Valley Project (CVP)

FEATURE: San Joaquin River Restoration Program (SJRRP)

SUBFEATURE: Reach 2B Levee Investigations

STATE: California

PURPOSE OF HOLE:
To determine soil properties and groundwater depth (foundation conditions) near the proposed levee alternative.

LOGGED BY: Mike Lyttge

REVIEWED BY: Lisa Zaffran

START DATE, END DATE: 12/4/2013, 12/4/2013

COORDINATES: N 2168268.88 E 6174559.79

DATUM: CA State Plane, Zone 4, US Feet, NAD83

GROUND ELEVATION: 160.28 ft. NAVD88 (G.S. 0.0 ft.)

TOTAL HOLE DEPTH: 42.5 ft. (el. 117.8 ft.)

ANGLE FROM HORIZONTAL: 90°

WATER LEVEL: 23.9 ft. on 12/4/2013

United States Bureau of Reclamation
Mid-Pacific Region Geology Branch, MP-230

GEOLOGIC LOG OF DRILL HOLE NO.

CNSPT-13-53

RECLAMATION
Managing Water in the West

DRAFT

SHEET 1 OF 3

Visual Classification and Physical Condition

0.0 to 42.5 ft.

0.0 to 2.0 ft: SILTY SAND, SM: About 80% predominantly fine sand; about 20% fines with no plasticity (cannot roll thread; washes easily); moist; brown; v. hard; no reaction with HCl.

2.0 to 2.9 ft: CLAYEY SAND, SC: About 65% predominantly fine sand; about 35% fines with no plasticity; moist; brown; hard; no reaction with HCl.

2.9 to 4.3 ft: SILTY SAND, SM: About 80% predominantly fine sand; about 20% fines with no plasticity (cannot roll thread; washes easily); moist; brown; v. hard; no reaction with HCl.

4.3 to 4.9 ft: FAT CLAY with SAND, (CH)s: About 85% fines with high plasticity; about 15% predominantly fine sand; moist; brown; weak reaction with HCl on trace CaCO3 nodules; rootlets.

4.9 to 6.3 ft: CLAYEY SAND, SC: About 60% fine to coarse subangular, hard sand; about 40% fines with medium plasticity; moist; brown; hard; no reaction with HCl.

6.3 to 7.5 ft: POORLY GRADED SAND WITH SILT, SP-SM: About 90% predominantly fine subangular, hard, sand; about 10% fines with low plasticity; moist; brown; loose in core box; no reaction with HCl; rootlets.

7.5 to 9.1 ft: LEAN CLAY with SAND, (CL)s: About 80% fines with medium plasticity; slow dilatancy; about 20% predominantly fine, subangular, hard, sand; moist; brown; hard; no reaction with HCl; rootlets.

9.1 to 11.0 ft: LEAN CLAY, CL: About 95% fines with medium plasticity; slow dilatancy; moist; light brown; firm to hard; no reaction with HCl; rootlets.

11.0 to 11.9 ft: SANDY SILT, s(ML): About 60% low plasticity fines; about 40% fine sand; moist; light gray; loose/crumbles; no reaction with HCl; trace coarse sand.

11.9 to 15.1 ft: POORLY GRADED SAND, SP: About 95% predominantly fine sand; about 5% fines with low plasticity; moist; light gray to light brown; loose; no reaction with HCl; increase in mica.

15.1 to 16.5 ft: SANDY LEAN CLAY, s(CL): About 55% fines with medium plasticity; about 45% predominantly fine sand; moist; brown with oxidation mottling; firm to hard; no reaction with HCl; rootlets.

Depth (feet)	Visual Classification	Lab Classification	Geologic Unit Symbol	SPT Data: Blows / 0.5 ft.	SPT Data: SPT (Blows / ft.)	Drilling Method	CRP Data: SPT CRP	CRP Data: FADC CRP	Elevation (feet)	Laboratory Data: % Fines: % Clay	% Silt	% Total	% Sand	% Gravel	Liquid Limit	Plasticity Index	Moisture Content %	Depth (feet)
0								100	160.3									0
1	SM			4					159									1
2		(CL)s		4	8		67		158	15.7	59.3	75.0	24.4	0.6	30.0	10.0	11.5	2
3	SC			4	8				157									3
4	SM							96	156									4
5	(CH)s								155									5
6	SC	SC		7					154	19	28.4	47.4	52.6	0.0	30.0	12.0	8.1	6
7	SP-SM	SM		8	16		93		153	8.2	13.6	21.8	78.2	0.0	N.P.	N.P.	5.2	7
8	(CL)s			8				94	152									8
9									151									9
10	CL								150									10
11	s(ML)	(ML)s		10					149	11.1	61.8	72.9	27.1	0.0	N.P.	N.P.	9.2	11
12		SM		9	18		87		148	2.7	27.8	30.5	69.5	0.0	N.P.	N.P.	3.2	12
13	SP			9					147									13
14								74	146									14
15									145									15
16	s(CL)	(ML)s		5					144	25.3	49	74.3	25.7	0.0	19.0	3.0	14.7	16
17	ML	ML		10	19		100		143	13.0	82.8	95.8	4.2	0.0	23.0	2.0	22.5	17
18				9				94	142									18
19	SP-SM								141									19

DATE PRINTED: 9/29/2014

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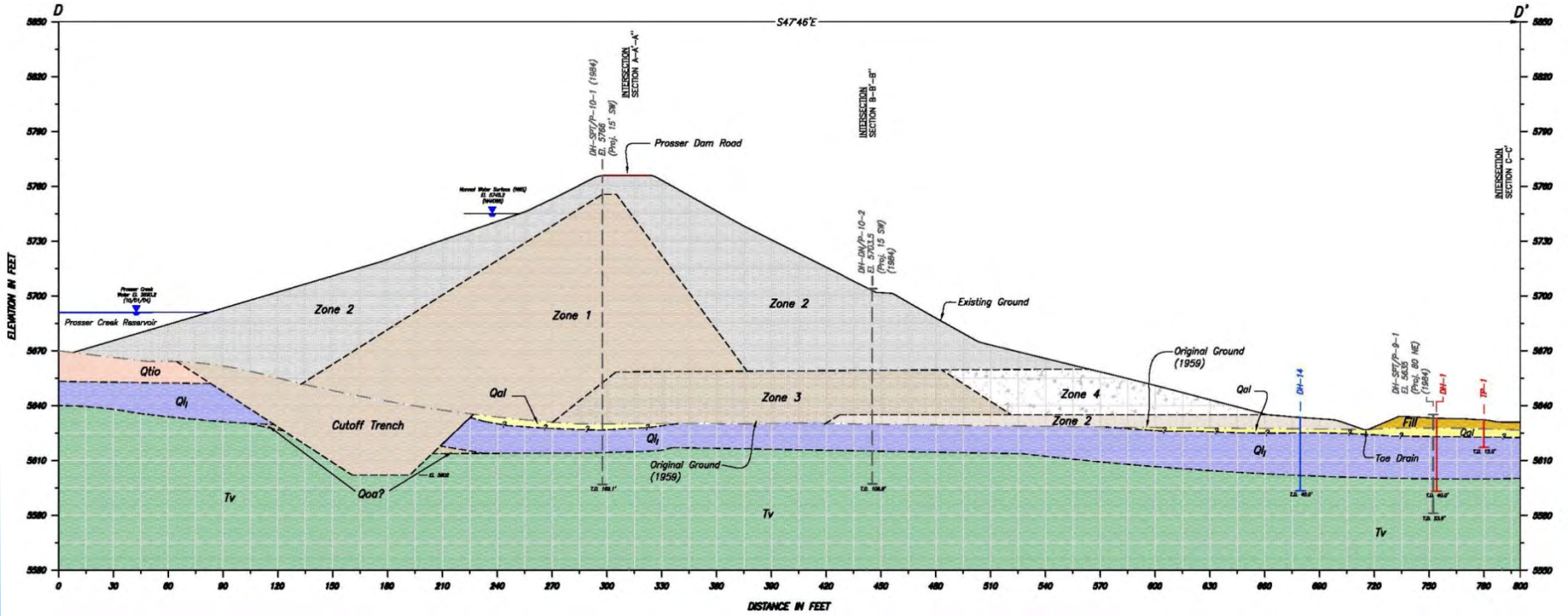
Geologic Interpretation



Example Cross Section

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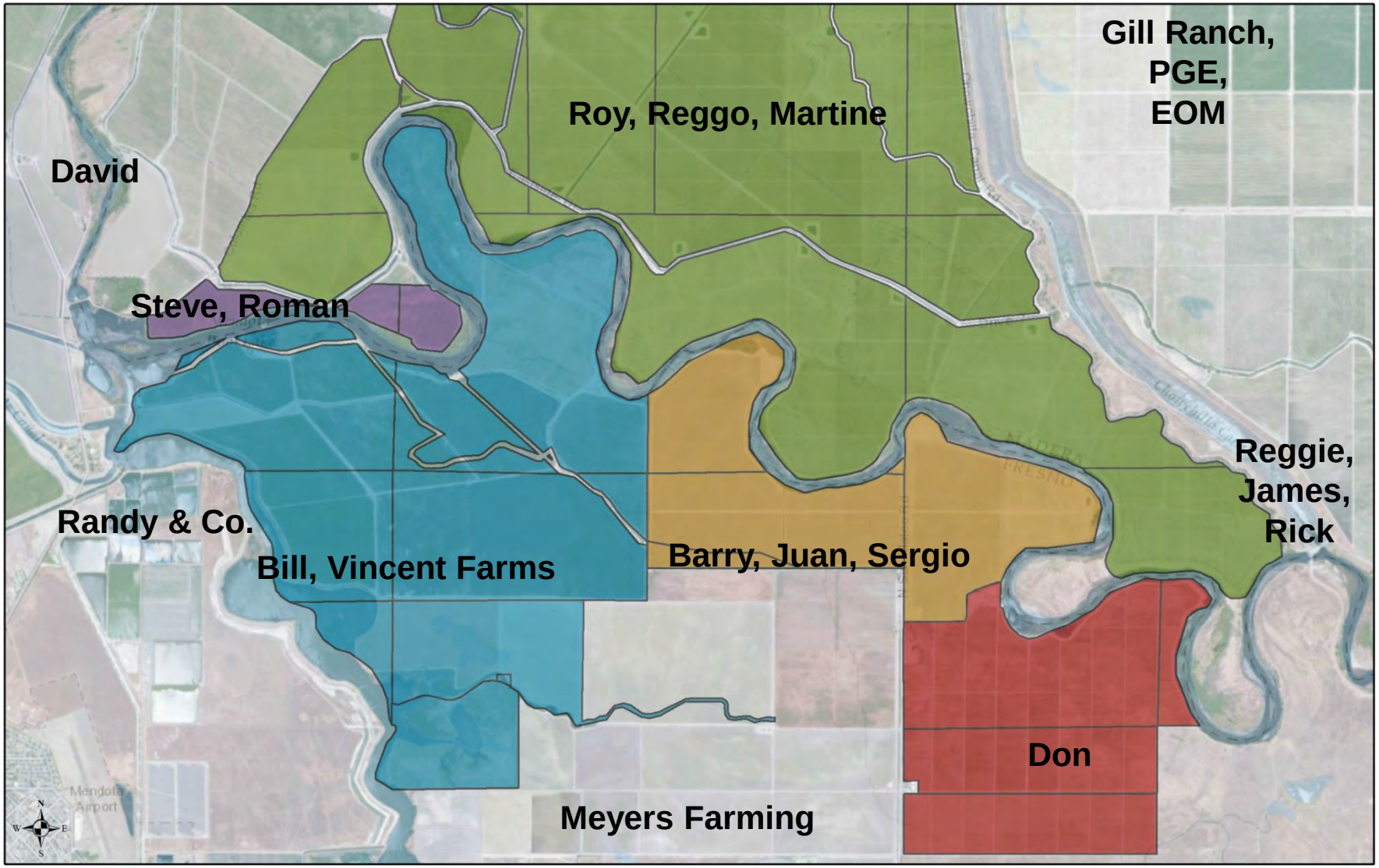
Remaining Investigations

Gracias


Gill Ranch,
PGE,
EOM
Roy, Reggo, Martine
David
Steve, Roman
Reggie,
James,
Rick
Randy & Co.
Bill, Vincent Farms
Barry, Juan, Sergio
Don
Meyers Farming

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Questions?