

INFORMATION HANDOUT

For Contract No. 04-1J7604

At 04-Sol-80-39.8

Identified by

Project ID 0414000349

MATERIALS INFORMATION

Foundation Report dated August 27, 2014

MEMORANDUM

*Serious drought
Help save water!*

To: MR. ROBERT E. TRAVIS JR
Office Chief
Office of Transportation Architecture

Attention: Joe Esfandiary
Edgardo Isidro

Date: August 27, 2014

File: 04-SOL-80 PM 39.8
EA 04-1J7601
E-FIS 0414000349
Dixon Maintenance Station

From: SUNNY YANG
Transportation Engineer
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Geotechnical Services
Division of Engineering Services

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Office of Geotechnical Design – West
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Subject: FOUNDATION REPORT

This Foundation Report is prepared in response to your recent request to provide geotechnical recommendations for constructing a new material storage bins with canopy at Dixon Maintenance Station, located adjacent to I-80 (PM 39.8) in Solano County.

1. SCOPE OF WORK

The following tasks were performed for the preparation of this FR:

- Review of recent geotechnical field investigations conducted at the site,
- Development of soil engineering parameters and foundation design analysis,
- Selection of seismic design parameters, and
- Preparation of this FR.

2. PROJECT DESCRIPTION

Figure 1 shows the location of the new storage bins at Dixon Maintenance Station. The structure plans provided by your Office indicate the new structure will be founded on shallow foundations, including reinforced concrete square and strip footings.

Incidentally, we conducted extensive geotechnical field investigations last year at this station for another project (EA 04-3E6400; E-FIS 0412000500). The field investigation program included two auger borings drilled to 21.5' depth and a number of shallow test holes drilled to 5.5' depth. The locations of the two auger borings are shown in Figure 1. Because these borings and test holes show a very consistent soil profile, this information was used to develop foundation design parameters for the current project; no additional field exploration was conducted.

3. EXCEPTION TO POLICY

There is no known exception to Department policy relating to the investigation or design of the proposed structures.

4. FIELD INVESTIGATION AND TESTING PROGRAM

As mentioned above, two geotechnical exploratory borings were drilled earlier to investigate subsurface soil conditions at the site (Figure 1). The borings were auger borings. Table 1 lists depths of these borings and the dates they were drilled.

All samples were visually identified and recorded in the field log using standard method. For all borings, Standard Penetration Tests (SPT) were performed at 5-foot interval. Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion.

Table 1. Summary of Field Borings

Boring ID	Total depth (ft)	Date of completion	Groundwater
A-13-001	21.5	8-15-13	Not observed
A-13-002	21.5	8-28-13	Not observed

5. LABORATORY TESTING PROGRAM

Laboratory tests were conducted on one soil sample collected at a depth of 3'. The tests included Atterberg Limits tests and moisture content test.

6. SITE GEOLOGY AND SUBSURFACE CONDITIONS

Regional Geology

The project is located in the Coast Range Geomorphic Province of Central California, a series of northwest-trending mountain ranges (2,000 to 4,000, occasionally 6,000 feet elevation above sea level), and intermountain valleys, bounded in the east by the Great Valley and to the west by the Pacific Ocean. The Coast Ranges are composed of thick Mesozoic and Cenozoic metamorphic and sedimentary strata. The northern and southern ranges are separated by a depression containing the San Francisco Bay. The Coast Ranges are subparallel to the active San Andreas Fault, which is more than 600 miles long, extending from Pt. Arena to the Gulf of California.

Site Geology

According to the Geologic Map of the Northeastern San Francisco Bay Region, California, the site is underlain by natural levee deposits (Qh1) (Graymer, Jones, and Brabb, 2002). These deposits are generally described as loose, moderately-sorted to well-sorted sandy or clayey silt grading to sandy or silty clay. These deposits are porous and permeable and provide conduits for transport of ground water. Levee deposits border stream channels, usually both banks, and slope

away to flatter floodplains and basins. A relevant portion of this map is included as Figure 2, Vicinity Geologic Map.

Soils

According to the Soil Survey Map of Solano County, the northeast and southeast corners of the project are Capay Clay and the remainder of the site is underlain by Capay Silty Clay Loam. The Capay Clay was formed in alluvium derived by sedimentary rock. The capacity of the most limiting layer to transmit water is moderately low to moderately high (0.06 to 0.20 in/hr). The Capay Silty Clay Loam was also formed in alluvium derived by sedimentary rock. These soils are underlain by alluvium from basic sedimentary rock. The capacity of the most limiting layer to transmit water is also moderately low to moderately high (0.06 to 0.20 in/hr) (USDA, 1977). A relevant portion of soil map is included as Figure 3, Vicinity Soils Map.

Subsurface Conditions

Borings A-13-001 and A-13-002 indicate that subsurface soil is predominantly very stiff to hard low-plasticity silt with a Plasticity Index of 3. Pocket penetrometer values ranged from 3.5 to greater than 4.5 tsf in the top 20 feet of the profile, and reduce to 1.0 to 2.0 tsf below 20 feet depth. Due to its low plasticity, the soil has low swelling potential.

Groundwater

Groundwater was not encountered at both boreholes up to 21.5' depth.

7. SEISMIC RECOMMENDATIONS

Table 2 lists the major faults near the project site and the maximum magnitudes these faults are capable to generate. Using Caltrans ARS online (v2.2.06), the ARS curves were calculated. Based on our geotechnical investigations (Section 4), the site may be considered Soil Profile C, per Caltrans Seismic Design Criteria. Hence, a shear wave velocity of 1850 ft/s was used for the top 100 feet of soil profile (V_{s30}). The controlling curve is USGS probabilistic curve with peak ground acceleration of 0.33g (Figure 4). Per 2010 California Building Code, seismic parameters S_s and S_1 are 0.79 and 0.32, respectively.

Table 2. Faults near Project Site

Fault	Distance (mile)	Maximum Magnitude (Mw)
Green Valley, Dunnigan Hilles	10.3	6.4
Green Valley, Gordon Valley	13.9	6.7
Green Valley, Trout Creek	12.5	6.5

8. FOUNDATION RECOMMENDATIONS

For foundation design purposes, the foundation soil can be considered as cohesive material with unit weight of 110 pcf, cohesion of 2.5 ksf, and zero friction angle. Using these parameters, the

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allowable bearing pressure for the square footing was calculated to be 5.3 ksf, and the allowable bearing pressure for the strip footings is 4.3 ksf. Modulus of subgrade reaction can be assumed to be 100 pci.

9. DISCLAIMER AND CONTACT INFORMATION

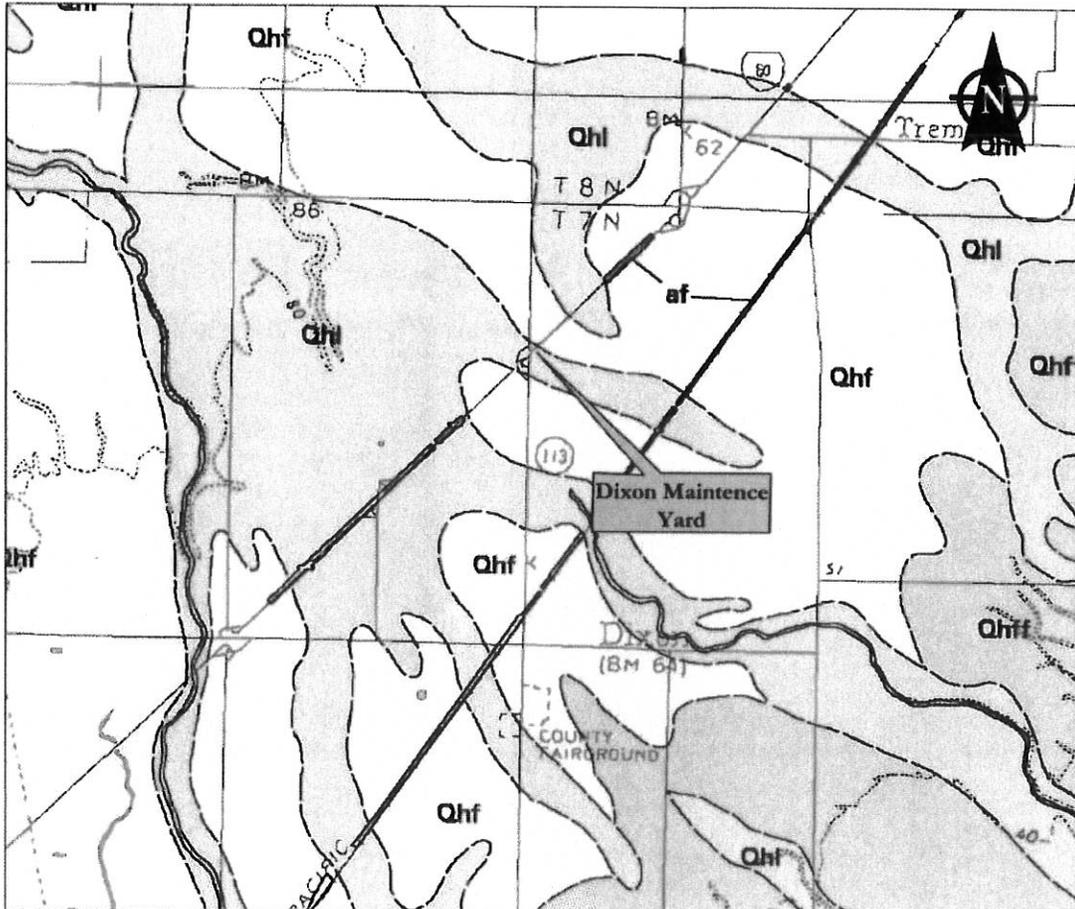
The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by your Office. If any conceptual changes are made during final project design, the Office of Geotechnical Design West, Design Branch A should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hooshmand Nikoui at (510) 286-4811.

c: TJPokrywka, HNikoui, Daily File, Route File, Translab File.

SYang/mm



Figure 1: Project area and boring locations.



LEGEND

- Qhf** Alluvial fan deposits (Holocene)
- Qpf** Alluvial fan deposits (late Pleistocene)
- Qhl** Natural levee deposits (Holocene)

Base: Geologic Map and Map Database of Northeastern San Francisco Bay Region, California
 (Graymer, Jones and Brabb, 2002)

Not to scale

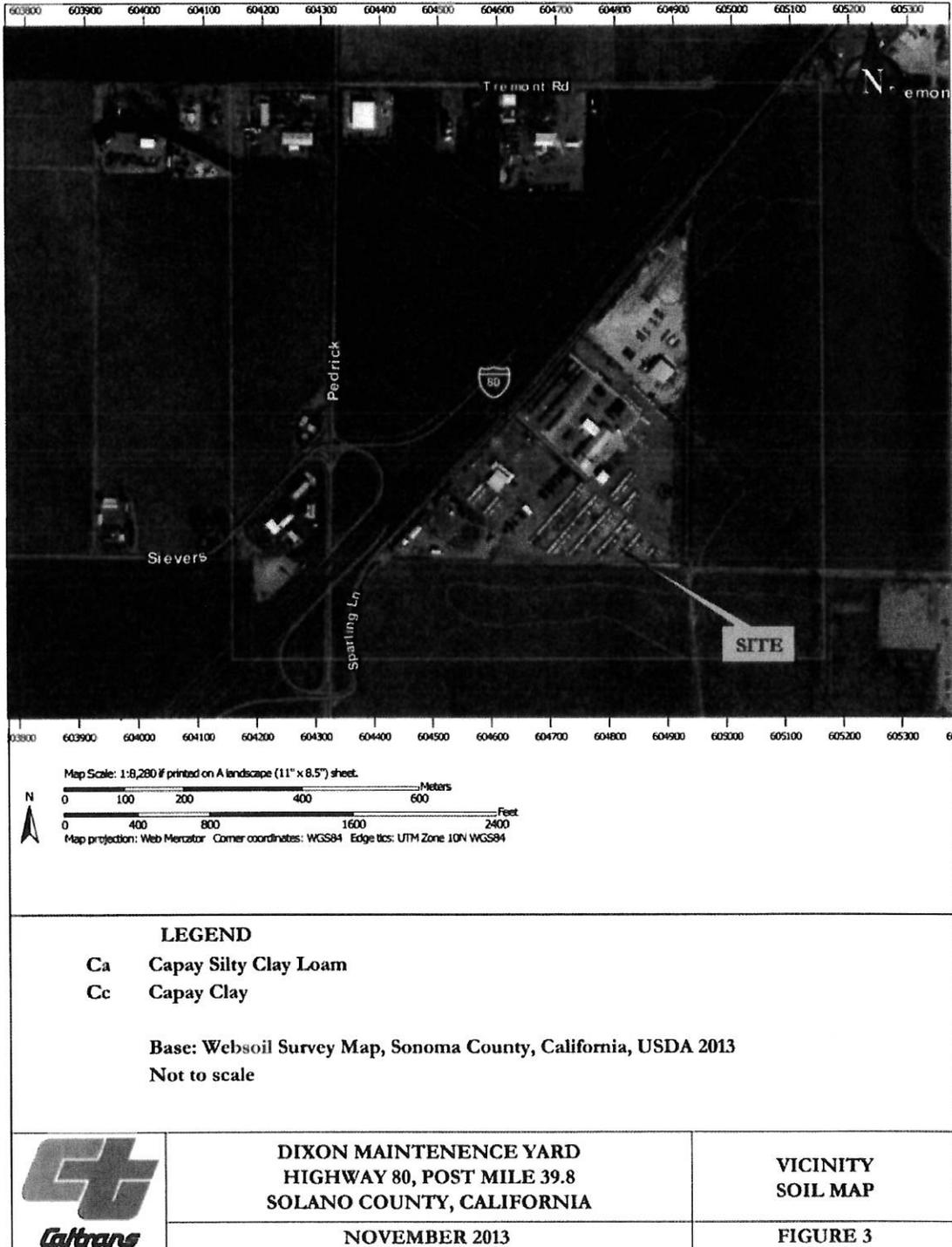


**DIXON MAINTENECE YARD
 HIGHWAY 80, POST MILE 39.8
 SOLANO COUNTY, CALIFORNIA**

NOVEMBER 2013

**VICINITY
 GEOLOGIC MAP**

FIGURE 2



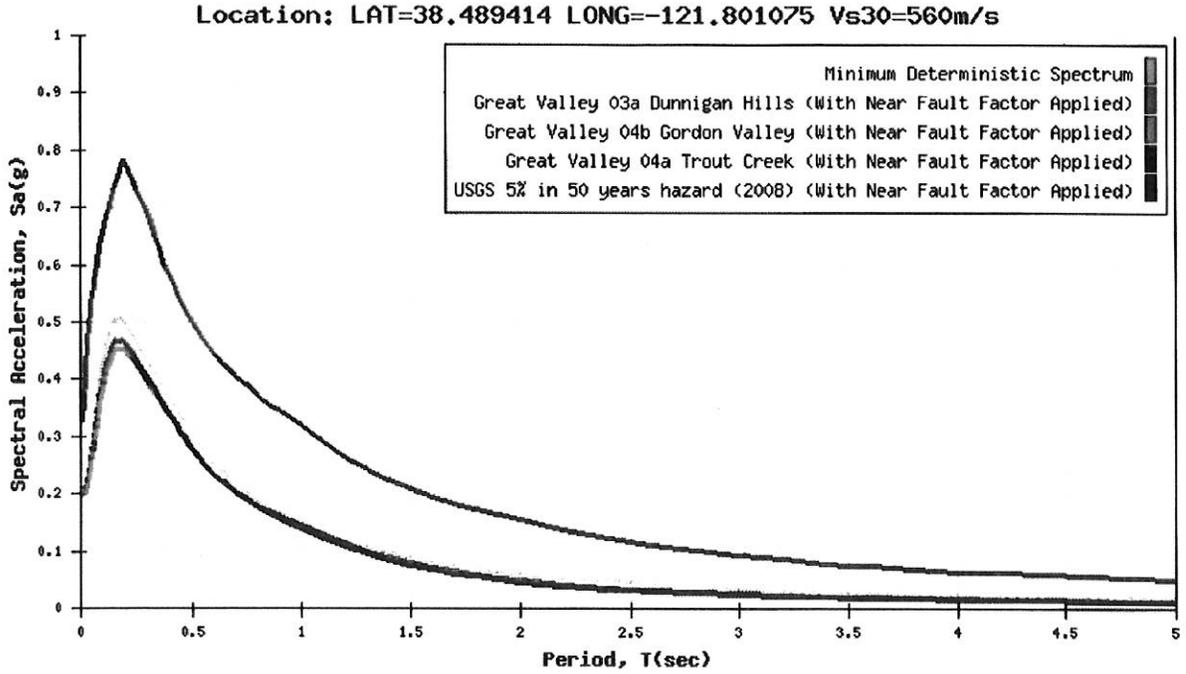


Figure 4: Calculated ARS curves (Caltrans ARS Online v2.2.06).