FOR CONTRACT NO.: 09-352304

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION REPORT

ROUTE: 09-Mno-395-51.5

Memorandum

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To: **SEAN SAMUEL**
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Date: August 12, 2011

File: 09-MN0-395
0900020099
Lee Vining MS
Mechanics and Crew Buildings

Attention: Edward Zhang

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

Introduction

Per your request, the Office of Geotechnical Design – North (OGDN) has prepared this Foundation Report (FR) for the proposed mechanics building and crew building project in Lee Vining Maintenance Station located on Highway 395 in Mono County.

The purpose of this report is to document and discuss site subsurface geotechnical conditions, and provide geotechnical design and construction recommendations.

Existing Facilities and Proposed Improvement

The existing facilities at Lee Vining MS include an equipment building, a warehouse/crew building, a sand storage building, an oil storage building, and two fuel canopies. All of these structures are steel framed structures supported on conventional spread footing foundations.

The proposed project will add a mechanics building and a crew building to the station in the areas adjacent to the existing warehouse building. The mechanics building will be a pre-engineered steel framed building and the crew building will be a wood framed building. Spreading footing foundation is considered for supports of both buildings.

Pertinent Report and Investigation

The following documents and maps were reviewed to assist m assessment of the proposed project site conditions:

- Geology Map of California, Walker Lake Sheet, Scale 1:250,000, CDMG, 1963,
- State of California Special Studies Zones, Delineated in Compliance with Chapter 7.5,

Division 2 of the California Public Resources Code (Alquist Priolo Special Studies Zones Act), NE Mono Craters Quadrangle, Official Map, Effective January 1, 1985, CDMG,

- Groundwater level Data of Well 01S26E03C001M, Department of Water Resource, 1965 - 1984,
- Geotechnical Services Design Manual, V1.0, August 2009,
- 2007 California Building Code (2007 CBC) January 2008 Revision, CBSC, 2008,
- As-Built, Foundation Plan, Details & Notes, New Storage Buildings At Lee Vining and Mojave Maintenance Stations; April 1977

Physical Setting

Topography and Drainage

The site is located in the Sierra Nevada Mountain Range. The general terrain is mountainous with an average elevation of approximately 6766 feet above mean sea level (MSL) in the project area. The immediate project site is essentially flat with gentle downward slope toward northeast. No drainage feature is observed in the immediate project area.

Geology

The site is in the northern portion of the Sierra Nevada Mountain range of California. The Sierra is about 400 miles long north to south and about 70 miles wide east to west. The granitic rocks of the Sierra formed deep underground at more than 100 million years ago. Uplift of these rocks due to tectonic movements formed the Sierra Nevada at about 4 million years ago. At about 2.5 million years ago, glaciers carved out deep canyons throughout the Sierra. Glacier erosion also exposed the granite and formed the light-colored mountains and cliffs that make up the range. Locally, the project area is underlain by Quaternary Recent Alluvium and Quaternary Lake Deposits.

Seismicity

Based on the Seismic Design Procedure, the nearest active fault for the site is the Mono Lake fault (Fault ID 170) located west of the project site. The Mono Lake fault is a normal fault with a maximum magnitude (Mmax) of 6.6. Based on the Alquist – Priolo Earthquake Zones map, the site is not in a special study zone. The potential for subsurface rupture due to fault movement is considered insignificant since there is no known fault projecting toward or passing through the project site. Liquefaction potential is considered negligible due to groundwater being absent or significantly deep in the project area. The project site and its immediate vicinity are essentially flat. Therefore, lateral spreading potential is considered limited at the site.

Project Site Conditions

Surface Condition

The areas to receive the proposed buildings are in the northeast comer of the MS. Currently, the area is partially paved with asphalt concrete and partially covered with gravelly fill materials. The area is essentially flat and is used as a lay-down storage ground. A surface runoff collection unit and its associated underground conduit are located near the northeast boundary comer of the site. Overhead lighting and its associated underground electrical lines are located along the northern and eastern boundary fence. Several above-ground electrical control units exist in the area to the east of existing warehouse building.

Subsurface Soil Conditions

The proposed project site was explored with two hand auger borings HA-11-001 and HA-11-002. The borings were extended to depths of 6 and 8 feet below the existing ground surface. The borings encountered fill materials consisting predominantly of medium dense sands with varying gravel contents.

The full sized LOTB of the two hand auger borings which is to be incorporated in the project plans is being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. lima Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on theLOTB.

Groundwater

Groundwater was not encountered in the hand auger borings at the time of our field exploration. A groundwater monitoring well (Well No. 01S26E03C001M) of Department of Water Resources (DWR) is located at about 6 miles south of the project site. Based on the data recorded in the well, ground water varied from 33 to 119 feet below the ground surface in the area between 1965 and 1984.

Corrosi vity

Samples collected from the site are being tested for corrosion evaluation, results of which will be provided upon availability. Based on previous projects in the area, the subsurface materials are considered non-corrosive to the proposed concrete foundation elements.

Design Recommendations

Seismic Design

Based on Table 1613.5.2 of 2007 CBC, the site is judged to be *Class D.*

The following mapped spectral response accelerations and site coefficients were interpreted based on Figures 1613.5(3) and 1613.5(4) and Tables 1613.5.3(1) and 1613.5.3(2) of 2007 CBC.

Mapped 0.2 second spectral acceleration, Ss,	1.78g
Mapped 1.0 second spectral acceleration, S_1,	0.62g
Site Coefficient, Fv,	1.0
Site Coefficient, Fa,	1.5

The following five-percent damped design spectral response acceleration parameters are recommended based on Equations 16-37, 16-38, 16-39, and 16-40 of 2007 CBC.

Design spectral acceleration at short period, S_{DS},	1.19g
Design spectral acceleration at 1-second period, S_{D1},	0.62g

Frost Depth

According to Mono County Building Code, the frost depth is 18 inches below finish grade at the site.

Footing Foundations

The proposed Mechanics building and the crew building can be supported on conventional spread and strip footing foundations using an allowable soil bearing pressure of 2,000 pounds per square foot (psf).

The footing should have a minimum width of 12 inches and should be founded at least 18 inches below the adjacent finish grade to prevent frost effect. Footing excavation should be inspected and approved by the Engineer prior to placement of concrete.

Total and differential settlements of the footings constructed per recommendations are estimated to be on the order of% and Y2 inch, respectively.

Lateral Earth Pressure and Resistance

An active earth pressure equal to an equivalent fluid pressure of 36 pounds per square foot per foot (psf/ft) and a passive earth pressure equal to an equivalent fluid pressure of 360 (psf/ft) may be used for design. A friction coefficient of 0.4 may be used for sliding resistance between foundation bottom and subgrade soil.

Slab-on-Grade

Soil supported slab may be designed using a subgrade reaction modulus, k, of 120 pounds per square inch per inch (pci).

Due to elevated moisture by snow in winter season, a moisture barrier may be implemented. A vinyl membrane with a minimum thickness of 6 mils may be placed over 4 inches of clean sand. The membrane should be covered by 3 inches of sand to aid in a uniform concrete cure.

Construction Considerations

The site should be cleared of all obstructions, including asphalt concrete, concrete, and utilities. All underground utilities should be properly removed or abandoned prior to foundation construction at the site. Excavation resulted from utility removal should be properly backfilled according to Caltrans Standard Specification.

All footing excavation shall be inspected and approved by the Engineer prior to the placement of concrete. The bottoms of the footing excavations shall be level, smooth, and clear of loose materials, water, and other debris prior to placement of concrete.

The recommendations contained in this memorandum are based on specific project information regarding structure type, location, and design loads. If any changes to the structure are proposed during final project design, OGDN should review the changes to determine if the recommendations contained herein are still applicable.

If you have any questions or comments, please contact me at (916) 227-1054 or Mr. Qiang Huang at (916) 227-1037.

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