

# **BOARD OF EDUCATION AGENDA**

SPECIAL MEETING  
April 28, 2017 - 6:30 PM

Wood Middle School - Multipurpose Room

420 Grand Street Alameda, California 94501

Adjournment will be no later than 10:30 PM for all regular and special meetings, unless extended by a majority vote of the Board. Writings relating to a board meeting agenda item that are distributed to at least a majority of the Board members less than 72 hours before the noticed meeting, and that are public records not otherwise exempt from disclosure, will be available for inspection at the District administrative offices, 2060 Challenger Drive, Alameda, CA. Such writings may also be available on the District's website. (Govt Code 54957.5b).

Individuals who require special accommodations (American Sign Language interpreter, accessible seating, documentation in accessible format, etc.) should contact Kerri Lonergan, Assistant to the Superintendent, at 337-7187 no later than 48 hours preceding the meeting.

## **IF YOU WISH TO ADDRESS THE BOARD OF EDUCATION**

Please submit a "Request to Address the Board" slip to Kerri Lonergan, Assistant to the Superintendent, prior to the introduction of the item. For meeting facilitation, please submit the slip at your earliest possible convenience. Upon recognition by the President of the Board, please come to the podium and identify yourself prior to speaking. The Board of Education reserves the right to limit speaking time to three (3) minutes or fewer per individual. Speakers are permitted to yield their time to one other speaker, however no one speaker shall have more than four (4) minutes.

**Agenda items:** may be addressed after the conclusion of the staff presentation on the item.

### **A. CALL TO ORDER**

### **B. MODIFICATION(S) OF THE AGENDA - The Board may change the order of business including, but not limited to, an announcement that an agenda item will be considered out of order, that consideration of an item has been withdrawn, postponed, rescheduled or removed from the Consent Calendar for separate discussion and possible action**

### **C. COMMUNICATIONS**

1. Pledge of Allegiance - Board Members will lead the Pledge of Allegiance
2. Introduction of Board Members and Staff

### **D. GENERAL BUSINESS – Informational reports and action items are presented under General Business. The public may comment on each item listed under General Business as the item is taken up. The Board reserves the right to limit public comment on General Business items to ten (10) minutes per item. The Board may, with the consent of persons representing both sides of an issue, allocate a block of time to each side to present their issue.**

1. Presentation Regarding Risks of Soil Liquefaction at Lum Elementary School and Expert Recommendations Regarding Future Site Use (45 Mins/Information)
2. Public Comments/Community Input Regarding Presentation on Lum Elementary

School Site Issues

**E. ADJOURNMENT**

ALAMEDA UNIFIED SCHOOL DISTRICT  
SPECIAL AGENDA ITEM

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**Item Title:** Pledge of Allegiance - Board Members will lead the Pledge of Allegiance

**Item Type:**

**Background:** Pledge of Allegiance - Board Members will lead the Pledge of Allegiance

**Goals:**

**Fund:**

**Fund Codes:**

**Fiscal Analysis**

**Amount (Savings) (Cost):**

**Department Budget:**

**Recommendation:**

**AUSD Guiding Principle:**

**Submitted By:**

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ALAMEDA UNIFIED SCHOOL DISTRICT  
SPECIAL AGENDA ITEM

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**Item Title:** Introduction of Board Members and Staff

**Item Type:** Introduction of Board Members and Staff

**Background:** Introduction of Board Members and Staff

**Goals:**

**Fund:**

**Fund Codes:**

**Fiscal Analysis**

**Amount (Savings) (Cost):**

**Department Budget:**

**Recommendation:**

**AUSD Guiding Principle:**

**Submitted By:**

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ALAMEDA UNIFIED SCHOOL DISTRICT  
SPECIAL AGENDA ITEM

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**Item Title:** Presentation Regarding Risks of Soil Liquefaction at Lum Elementary School and Expert Recommendations Regarding Future Site Use (45 Mins/Information)

**Item Type:** Information

**Background:** Recent geotechnical analysis performed on the soil at Lum Elementary revealed that the facilities are not safe for long-term continued use.

Tonight's presentation summarizes the findings by geotechnical and structural engineers as well as defines staff recommendations moving forward.

**Goals:**

**Fund:**

**Fund Codes:**

**Fiscal Analysis**

**Amount (Savings) (Cost):** Unknown

**Department Budget:**

**Recommendation:** This item is presented for information only.

**AUSD Guiding Principle:** #3 - Administrators must have the knowledge, leadership skills and ability to ensure student success.| #4 - Parental involvement and community engagement are integral to student success.| #5 - Accountability, transparency, and trust are necessary at all levels of the organization.| #6 - Allocation of funds must support our vision, mission, and guiding principles.

**Submitted By:** Shariq Khan, CBO

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**ATTACHMENTS:**

Description	Upload Date	Type
❑ Presentation	4/27/2017	Presentation
❑ Press Release	4/27/2017	Backup Material
❑ Geotechnical Report	4/28/2017	Backup Material
❑ Peer Review Letter for Geotechnical Report	4/27/2017	Backup Material
❑ Structural Engineer's Recommendation	4/27/2017	Backup Material

# **Special Board of Education Meeting Regarding the Condition at Lum Elementary School**

**April 28, 2017**

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## Background

- The condition was discovered just recently, as the district was preparing to build a new classroom building on the Lum campus.
- Tests at the school indicate that the soils would be subject to liquefaction and loss of strength during a strong earthquake. This event could cause the school buildings to sink and/or become structurally unsafe.
- As a result, the engineers have recommended that the district develop a plan to provide alternate facilities for students and staff as soon as feasible.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## Overview of Presentation

- Timeline of how we got here and steps District has already taken in response.
- Details from the engineers regarding the hazard and their recommendation that the District “develop a plan to provide suitable alternative facilities as soon as feasible.”
- Update on status of District’s plan and timeline for decisions.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

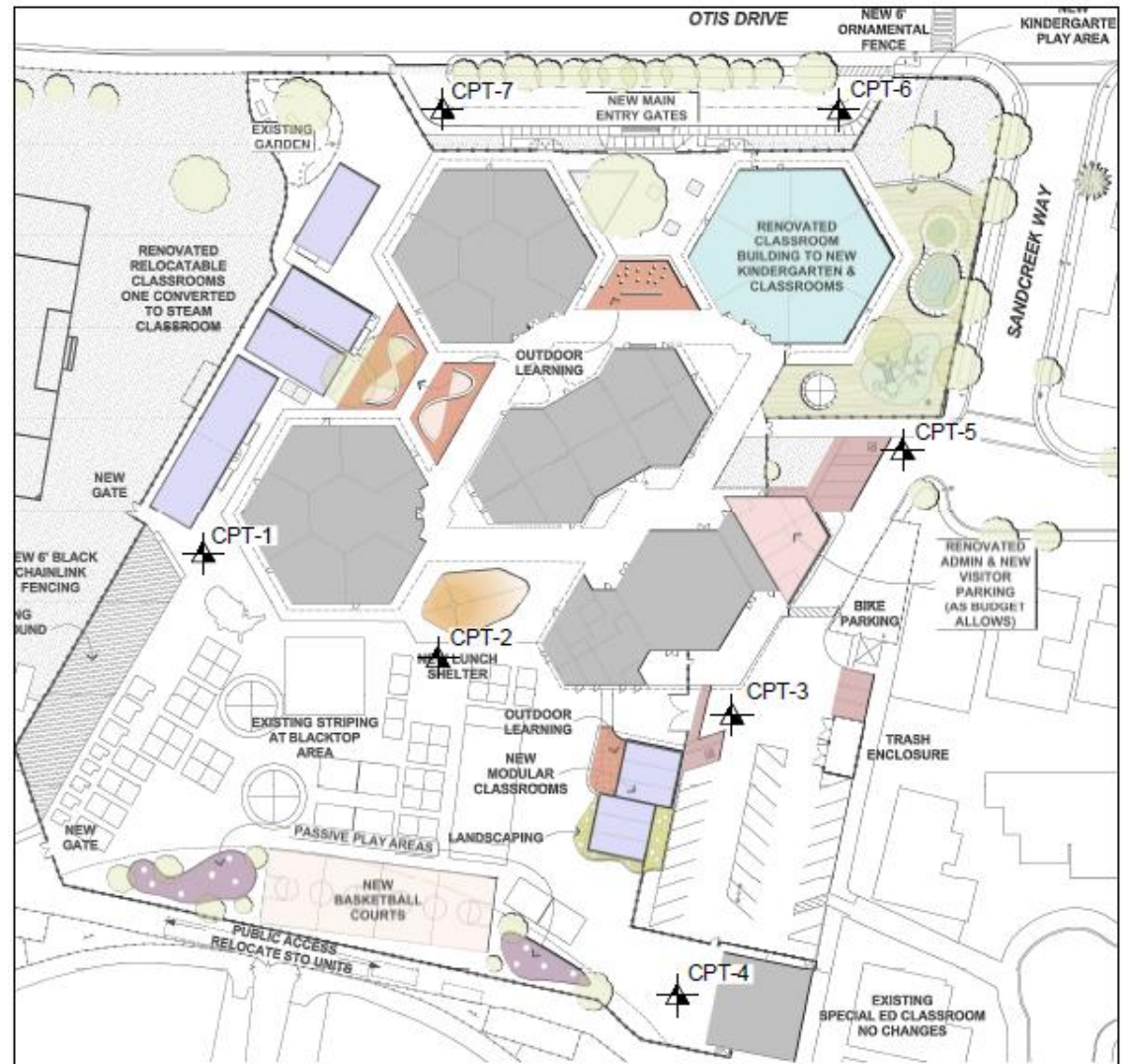
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## Initial Soil Testing

- District's Measure I Bond program called for construction of a new two-classroom building at Lum.
- Division of State Architecture (DSA) requires soil testing before construction of new school facilities. Initial testing was performed in February.
- Test bore was drilled near site of proposed new building.
- Result showed higher-than-anticipated liquefaction risk.
- In response, District commissioned additional test bores near existing buildings to determine extent of problem.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

- Tests at the school site indicate that the soil would be subject to liquefaction during a strong earthquake
- Soils tests were taken at various points and showed the same condition across the site



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## In response, the District:

- Halted all planning and work on proposed Measure I project at Lum.
- Commissioned a structural engineer and architect to determine whether the soil liquefaction findings posed a risk to the existing buildings at Lum.
- Began testing all other school sites to determine whether similar soil issue exists at those sites.
  - Subsequent evaluations have concluded that similar combinations of soil and structural elements do not exist at other District Elementary schools.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

School Site	Cleared	Pending
Bay Farm Elementary	✓	
Earhart Elementary	✓	
Otis Elementary	✓	
Edison Elementary	✓	
Haight Elementary	✓	
Franklin Elementary	✓	
Maya Lin Elementary	✓	
Ruby Bridges Elementary	✓	
Paden Elementary	✓	
Wood Middle - Classrooms	✓	
Wood Middle - Multipurpose Room		✓
Lincoln Middle		✓
Alameda High (Historic Wing)	✓	
Alameda High (Encinal Ave Wing)		✓
Encinal Junior & Senior High	✓	
WoodStock Edu. Center (NEA & ACLC)	✓	
Chipman Campus (AoA)		✓
Longfellow Campus (WCDC & Island High)		✓



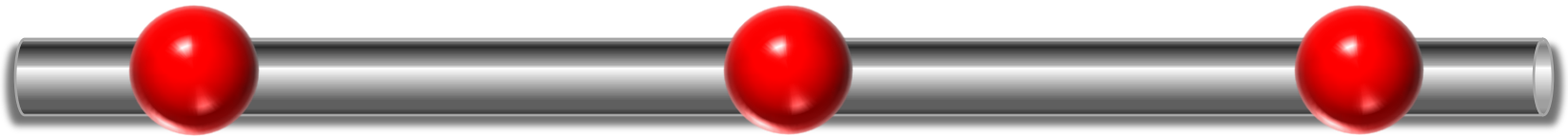
# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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**Late Feb**

**March**

**April**



**Initial soil & ground water evaluation at Lum School.**

**Further soil testing and evaluation at Lum.**

**Preliminary analysis by structural engineer.**

**Soil testing at other sites.**

**Peer review and verification of Lum testing (4/24).**

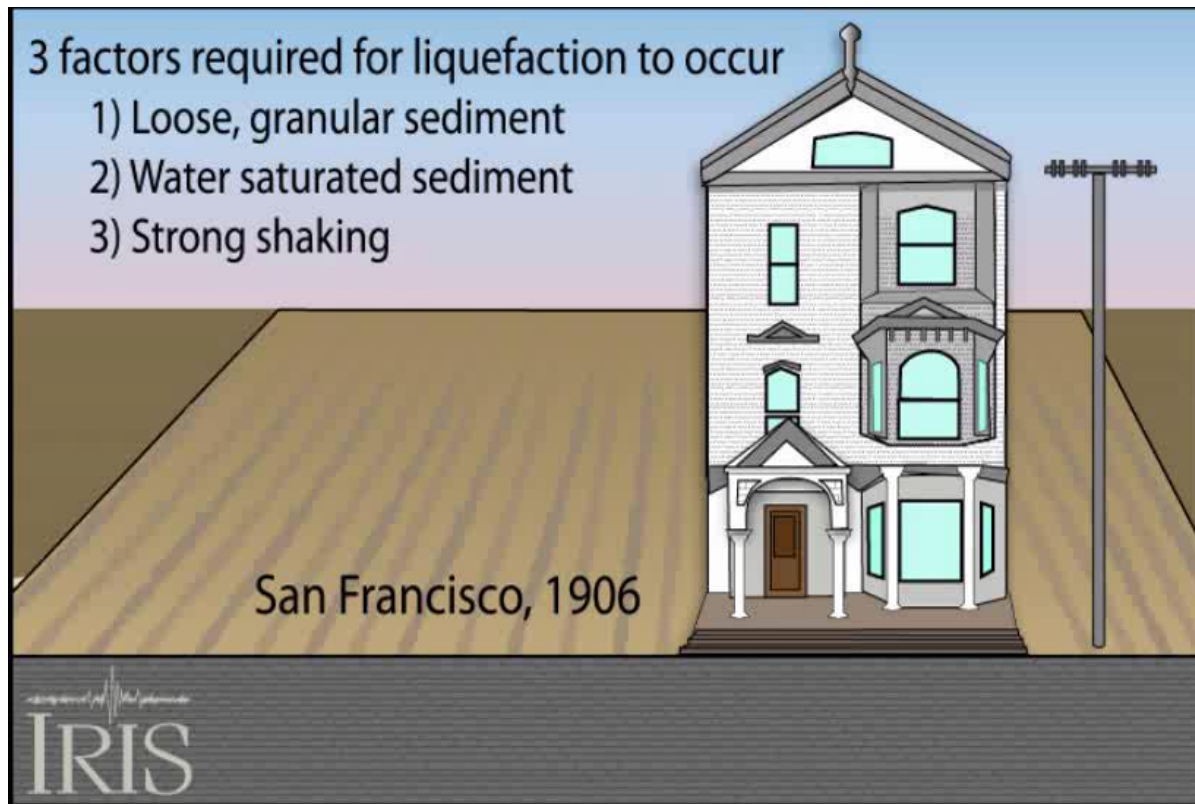
**Soil analyses for other sites.**

**Development of options for student enrollment.**

**Creation of community engagement plan.**

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

## What is Liquefaction?



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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This building is experiencing differential settlement. This type of settlement increases the likelihood of partial collapse.



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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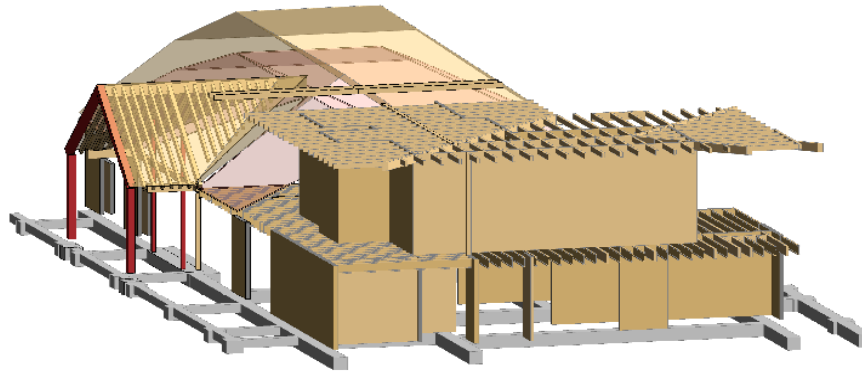
This building is experiencing uniform settlement but the use of the doors has been inhibited.



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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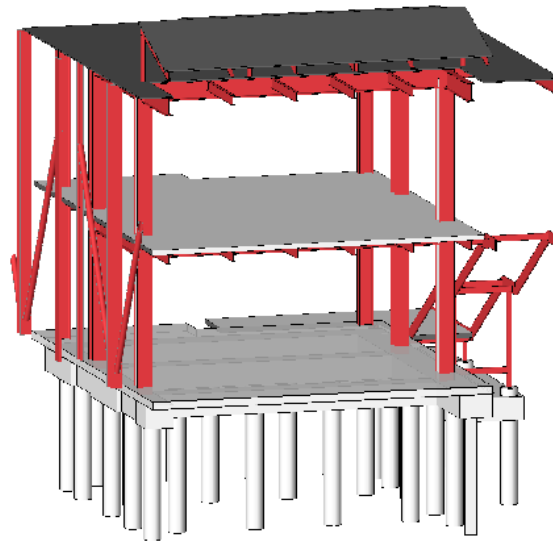
This building has a conventional footing system similar to Lum Elementary which is not designed to accommodate the expected settlement.



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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This building has a pier foundation which would extend through the soil which could liquefy.



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## Why is it a problem at Lum Elementary School?

During the maximum probable earthquake, the settlement could be as much as 10 inches. The top 50 feet of the soil could potentially liquefy. The foundation type at this campus was not designed for nor can it resist settlements of this size.

Liquefaction was not well known when these buildings were designed and built and therefore not accounted for.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## What does this mean?

- ZFA is recommending that the district develop a plan to find alternate arrangements for the students and staff. The Geotechnical Engineer believes that, given the extensive nature of the potentially liquefiable soil, there is not a viable solution to reduce the risk to the existing building.
- It would be possible to design new buildings at the site that could mitigate the liquefaction concerns.



# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## What does this mean (continued)?

- The California Building Code and the Division of State Architects (DSA) would allow continued use of the buildings indefinitely. There would be restrictions on what the district could do however. The district could only do non-structural related projects such as: re-roofing, new windows, new mechanical units, new paint, new cabinets. It could not modify structural walls or other lateral resisting elements.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## **District's Response to Structural Engineering Report**

- Commissioned a peer review of the soil's report, which confirmed the original analysis.
- Determined that site cannot be retrofitted by the start of 2017-18 school year.
- Determined that existing building capacity at other elementary sites is sufficient to accommodate all Lum students and teachers next year.
- Began constructing plan to accommodate Lum students and teachers at other sites beginning in the 2017-18 school year if Board so directs.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## Values Underlying Plan

- Existing Lum students (including K enrollees for next year) and teachers would be reassigned to other sites.
- District would try to minimize disruption to families by:
  - Sending students to nearby sites with capacity to accommodate them without need to transfer again during elementary school.
  - Keeping siblings together.
- District would adopt temporary new school boundaries which would determine neighborhood school assignments for future students.
- District would need to review new boundaries next year.
- District would publicly present plan to comment before adoption.

# Special Board of Education Meeting Regarding the Condition at Lum Elementary School

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## Suggested Schedule

**April 28**

**May 9**

**May 23**

**June - Sep**



**Special Board meeting to share and discuss information on facility issue and possible next steps**

**Board votes on whether Lum will house students next year**

**Detailed enrollment plan provided for Board and public comment**

**Board votes on enrollment plan\***

**\*If needed based on 5/9 vote**

**Implementation of the Board decision**

**Discussion regarding long-term future of Lum site**

**FOR IMMEDIATE RELEASE**

Issued By: Sean McPhetridge, Superintendent (510) 337-7060 and  
Gary Lym, President, Board of Education (510) 337-7187

**Lum Elementary Soil Found to be Vulnerable to Liquefaction**

**Alameda – April 26, 2017** - Alameda Unified School District (AUSD) officials told family and staff at Lum Elementary School today that structural engineers have determined that the school cannot be guaranteed to be safe for long-term continued use because the soil on which it was built has been found to be susceptible to liquefaction in the event of an earthquake.

The risk was discovered just recently as the district was preparing to build a new classroom building on the Lum campus. Tests at the school indicate that during a strong earthquake the soils would be subject to liquefaction (a process by which sandy or silty soils lose their strength during strong ground shaking and behave like a liquid). The structural engineer subsequently determined the building could sink as much as 5 inches in a 100-year earthquake and become structurally unsafe.

The district then ordered five more samples to be taken from around the Lum campus. Each sample came back with similar results, causing concern for the existing campus buildings. As a result, the engineers have recommended that "the district develop a plan to provide suitable alternate facilities for the students as soon as feasible."

A special Board of Education meeting has been scheduled for this Friday, April 28, at 6:30 pm so that the board and community members can learn more about the situation. District staff will be recommending that Lum Elementary School be closed at the end of this school year and that Lum students be enrolled in other, nearby school sites to protect their safety.

"I know this is terrible news to hear," Superintendent Sean McPhetridge said "Our schools are our communities, and Lum Elementary School is a fabulous community. But as staff we will be recommending to the board that we close the site in 2017-18 due to our concern for the safety of students and staff."

Added Board President Gary Lym, "We are fully committed to doing everything in our power to make this process of fact-finding, community engagement, and decision-making as smooth as possible."

Peer review of the findings have confirmed that the Lum soil could be subject to liquefaction. Geotechnical engineers have tested the soil at several other AUSD campuses and found that earthquake-induced settlements do not pose safety concerns at those sites.

"I have seen this community pull together time and time again to take care of each other," McPhetridge said. "If we all work together and support each other, I know we can get through this. We must work together deliberately and thoughtfully to face this challenge, and we must cooperate and coordinate our actions going forward to take care of our community and the Lum Elementary School families we serve."

The district has set up a website with more detailed information on the issue [here](#) and will be adding to it over the next several weeks.

###



March 17, 2017  
File: 1911.027altr.doc

Alameda Unified School District  
2060 Challenger Drive  
Alameda, California 94501

Attention: Chad Pimentel, Legal Counsel for AUSD

Re: Geotechnical Engineering Investigation  
Evaluation of Liquefaction Risk and Liquefaction Induced Settlement Potential  
Donald D. Lum Elementary School Campus  
1801 Sandcreek Way  
Alameda, California

### Introduction

This letter summarizes our geotechnical investigation of the Donald D. Lum Elementary School Campus located at 1801 Sandcreek Way in Alameda, California. The approximate site location is presented on Figure 1, Site Location Map. The purpose of our geotechnical investigation is to evaluate the site soil and groundwater conditions and to assess the liquefaction risk and liquefaction induced settlement potential across the school campus. Our scope includes exploring the subsurface conditions with seven Cone Penetration Tests (CPTs), conducting engineering analyses to evaluate the liquefaction risk and liquefaction induced settlement potential, and presentation of our geotechnical conclusions in this brief letter report.

### Site Description

The Donald D. Lum Elementary School campus is located on the westerly side of Sandcreek Way, south of Otis Drive, in Alameda, as shown on the Site Location Map, Figure 1. The campus consists of numerous permanent and portable buildings, paved driveways, parking areas, and play areas, and landscaping improvements, as shown on the Site Plan, Figure 2. The ground surface at the project site and the surrounding area is characterized by nearly level to slightly sloping terrain.

### Regional Geology

The site is located within the Coast Range Geomorphic Province of California. The regional bedrock geology consists of complexly folded, faulted, sheared, and altered sedimentary, igneous, and metamorphic rock of the Franciscan Complex. Bedrock is characterized by a diverse assemblage of greenstone, sandstone, shale, chert, and melange, with lesser amounts of conglomerate, calc-silicate rock, schist and other metamorphic rocks.

The regional topography is characterized by northwest-southeast trending mountain ridges and intervening valleys that were formed by movement between the North American and the Pacific Plates. Continued deformation and erosion during the late Tertiary and Quaternary Age (the last several million years) formed the prominent coastal ridges and the inland depression that is now the San Francisco Bay. The more recent seismic activity within the Coast Range

Geomorphic Province is concentrated along the San Andreas Fault zone, a complex group of generally north to northwest trending faults.

Geologic mapping<sup>1</sup> indicates the site is located in an area underlain by artificial fill sands, as shown on Figure 3. These artificial (manmade) fills were placed over older dune sands and soft clay (Bay Mud).

### Surface Conditions

The site is currently developed as an elementary school campus. The attached Site Plan, Figure 2, shows the locations of existing buildings, driveways, and play areas. Most of the ground surface around the existing buildings consists of asphalt paved surfaces.

### Seismicity

The San Francisco Bay Region is located in a seismically active area and the proposed improvements will therefore experience the effects of future earthquakes. Such earthquakes could occur on any of several active faults within the region. The active faults are classified into two types. Type A faults are capable of large magnitude earthquakes and have a high rate of seismic activity. Type B faults are also capable of large magnitude earthquakes but with a low rate of seismic activity or are smaller faults with a high rate of seismic activity. These faults are shown on the Active Fault Map, Figure 4.

### Subsurface Exploration and Laboratory Testing

We explored the subsurface soil and groundwater conditions with seven Cone Penetration Tests (CPTs) at the approximate locations shown on the Site Plan, Figure 2. The CPTs were conducted with truck-mounted equipment on February 14, 2017. The CPTs were extended to depths of 49 feet to 70 feet below the ground surface. A schematic of the CPT apparatus is provided on Figure A-1 and a CPT Soil Interpretation Chart is provided on Figure A-2. CPT logs are shown on Figures A-3 through A-9.

### Subsurface Conditions

The subsurface conditions are consistent with the mapped geology. Review of subsurface data collected from the CPTs conducted at the site indicate that the campus is generally underlain by approximately fifteen feet of loose to medium-dense sandy fill over a relatively thin layer of soft clay and organic material, interpreted as Bay Mud or similar marsh deposits. Beneath the soft clay, each CPT encountered predominantly loose to medium-dense silty sand and sandy silt extending to a depth of 50 feet or more.

Groundwater was measured at approximately six feet below the ground surface during our CPT investigation. It is anticipated that the groundwater level beneath the site is influenced by tidal activity in the nearby San Francisco Bay.

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<sup>1</sup> Graymer, R. W., "Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California", 2000, USGS, MF-2342 Version 1.0., Scale 1:50,000.



Given the low site elevations and proximity to San Francisco Bay, the highest historic groundwater elevation is assumed to coincide with the ground surface.

#### Liquefaction Risk and Liquefaction Induced Settlement Potential

The project site lies within a California Seismic Hazard Zone of Required Investigation for Liquefaction, as mapped by CGS (2003).

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits. Recent advances in liquefaction studies indicate that liquefaction can occur in granular materials with a high fines content (35 to 50% clayey and silty materials that pass the #200 sieve) provided the fines exhibit a plasticity less than 7. Granular layers with a potential for liquefaction were observed during our subsurface exploration.

To evaluate soil liquefaction, the seismic energy from an earthquake is compared with the ability of the soil to resist pore pressure generation. The earthquake energy is termed the cyclic stress ratio (CSR) and is a function of the maximum credible earthquake peak ground acceleration (PGA) and depth. The soil resistance to liquefaction is based on the relative density, and the amount and plasticity of the fines (silts and clays). The relative density of cohesionless soil is correlated with Cone Penetration Test data measured in the field.

We analyzed the potential for liquefaction utilizing the CPT Liquefaction Assessment software program CLiq (2007, ver. 1.7.6.49), and the procedures outlined by Idriss and Boulanger (2014). The design seismic conditions consisted of a magnitude 7.3 earthquake producing a PGA of 0.52 g, which corresponds to the  $PGA_M$  per ASCE 7-10 Section 11.8.3. The results of our liquefaction analyses are presented on Figures 5 through 11, and indicate numerous granular soil layers observed between roughly the ground surface and 50 feet below the ground surface classify as liquefiable during the design seismic event. Therefore, we judge the risk of liquefaction at the site is high.

Potential liquefaction of sandy layers between the ground surface and a depth of 50 feet may result in ground surface settlement of between roughly 5-inches (CPT-7) to 10-inches (CPTs 1-6), based on the liquefaction analyses discussed above, and as shown on Figures 5 through 11. Potential liquefaction induced differential settlement within a given building footprint area is estimated to be approximately two-thirds of the total settlement (approximately 3 to 7 inches).

We also evaluated the liquefaction induced settlement potential at the Lum Elementary School Campus for a seismic event producing a PGA of 0.28 g, which corresponds to an expected return interval of approximately 90 to 100 years. Our analyses indicate that numerous granular soil layers between the ground surface and a depth of 50 feet still classify as liquefiable during this smaller seismic event, producing a predicted potential ground surface settlement of between roughly 4-inches (CPT-7) to 8-inches (CPTs 1-6). In this case, potential liquefaction induced differential settlement within a given building footprint area is estimated to be approximately 3 to 5 inches.

Alameda Unified School District  
Page 4 of 4

March 17, 2017

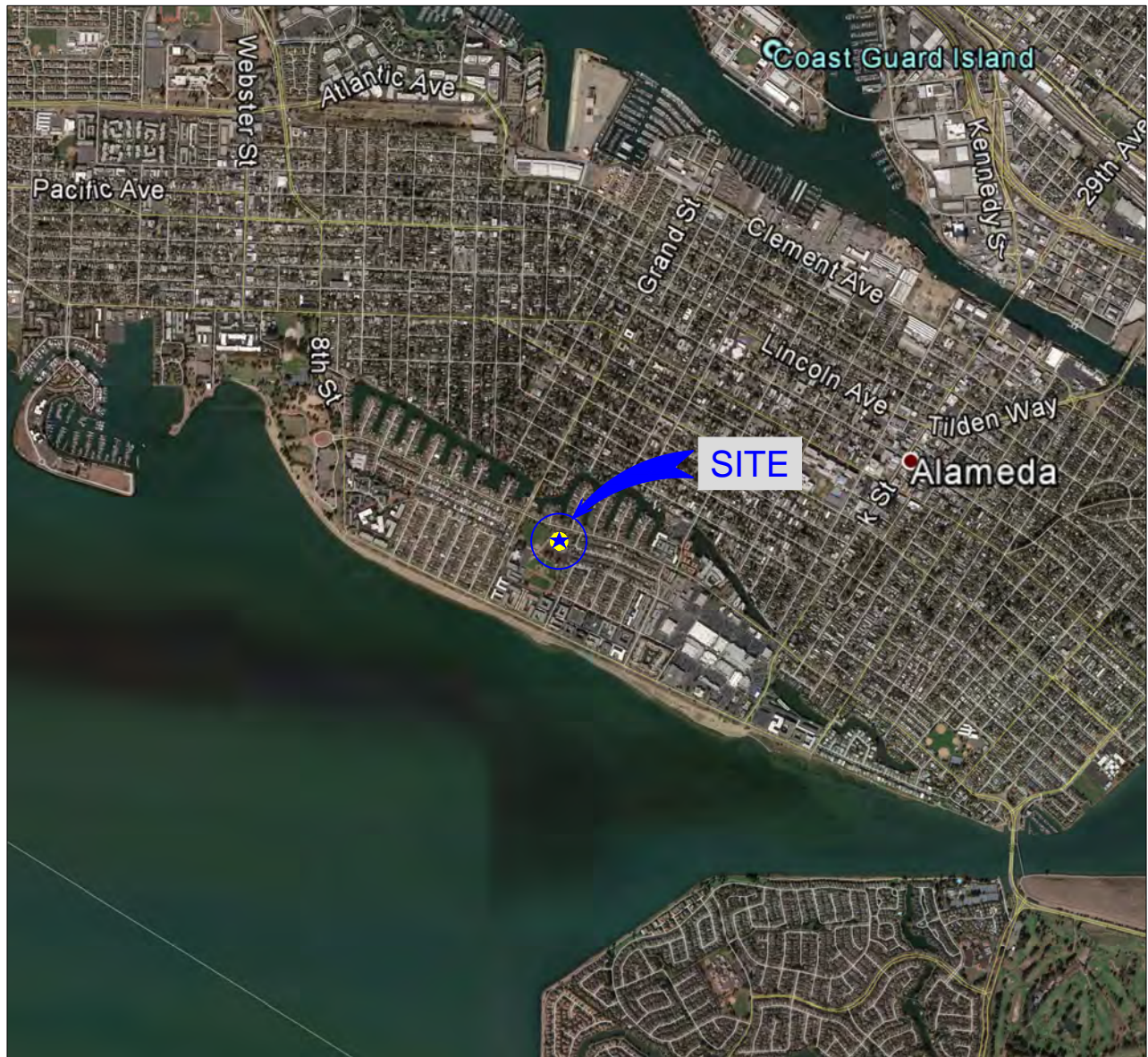
If you have any questions, or if we can be of further assistance, please call us at your convenience.

Yours very truly,  
MILLER PACIFIC ENGINEERING GROUP



Daniel S. Caldwell  
Geotechnical Engineer #2006  
(Expires 9/30/17)

Attachments: Figures 1 through 11, A-1 through A-9



SITE: LATITUDE, 37.7618°  
LONGITUDE, -122.2601°

SITE LOCATION  
N.T.S.



REFERENCE: Google Earth, 2017



**MILLER PACIFIC**  
**ENGINEERING GROUP**

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FILE: 1911.027 Figures.dwg

504 Redwood Blvd.  
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Novato, CA 94947  
T 415 / 382-3444  
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www.millerpac.com

#### SITE LOCATION MAP

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

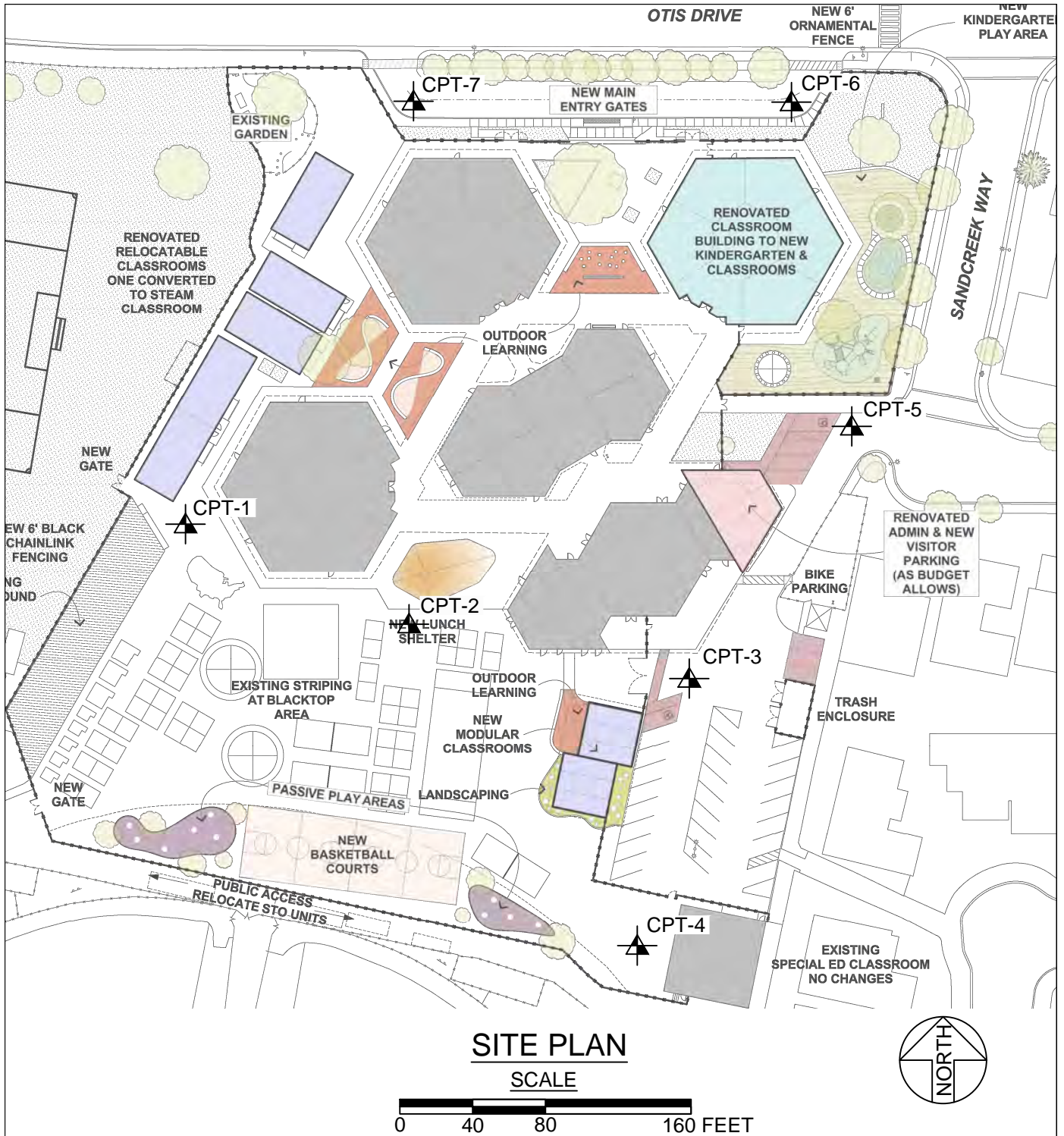
Project No. 1911.027

Date: 2/24/17

Drawn MMT  
Checked

**1**  
**FIGURE**





REFERENCE: Site Plan provided by QKA.



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## SITE PLAN

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn MMT  
Checked

**2**  
FIGURE



## REGIONAL GEOLOGIC MAP (NOT TO SCALE)



### LEGEND

af

#### ARTIFICIAL FILL (HOLOCENE)

Man made deposit of various materials and ages. Some are compacted and quite firm, but fills made before 1865 are nearly everywhere not compacted and consist simply of dumped materials.

Qds

#### DUNE SAND (HOLOCENE AND PLEISTOCENE)

Fine-grained, very well sorted, well-drained, eolian deposits. They occur mainly in large sheets, as well as many small hills, most displaying Barchan morphology. Dunes display as much as 30 m of erosional relief and are presently being buried by basin deposits (Qhb) and bay mud (Qhbm). They probably began accumulating after the last interglacial high stand of sea level began to recede about 71 ka, continued to form when sea level dropped to its Wisconsin minimum about 18 ka, and probably ceased to accumulate after sea level reached its present elevation (about 6 ka). Atwater (1982) recognized buried paleosols in the dunes, indicating periods of nondeposition

REFERENCE: Graymer, R.W. (2000), "Geologic Map of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California", United States Geological Survey Miscellaneous Field Studies Map MF-2342, Version 1.0, Map Scale 1:50,000.



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### REGIONAL GEOLOGIC MAP

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

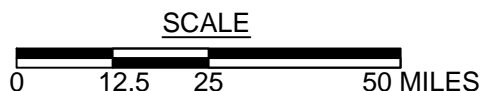
3

FIGURE





SITE COORDINATES: LAT. 37.7618° LON. -122.2601°



**DATA SOURCE:**

1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Known Active Faults in the San Francisco Bay Region, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).



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**ACTIVE FAULT MAP**

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn MMT  
Checked

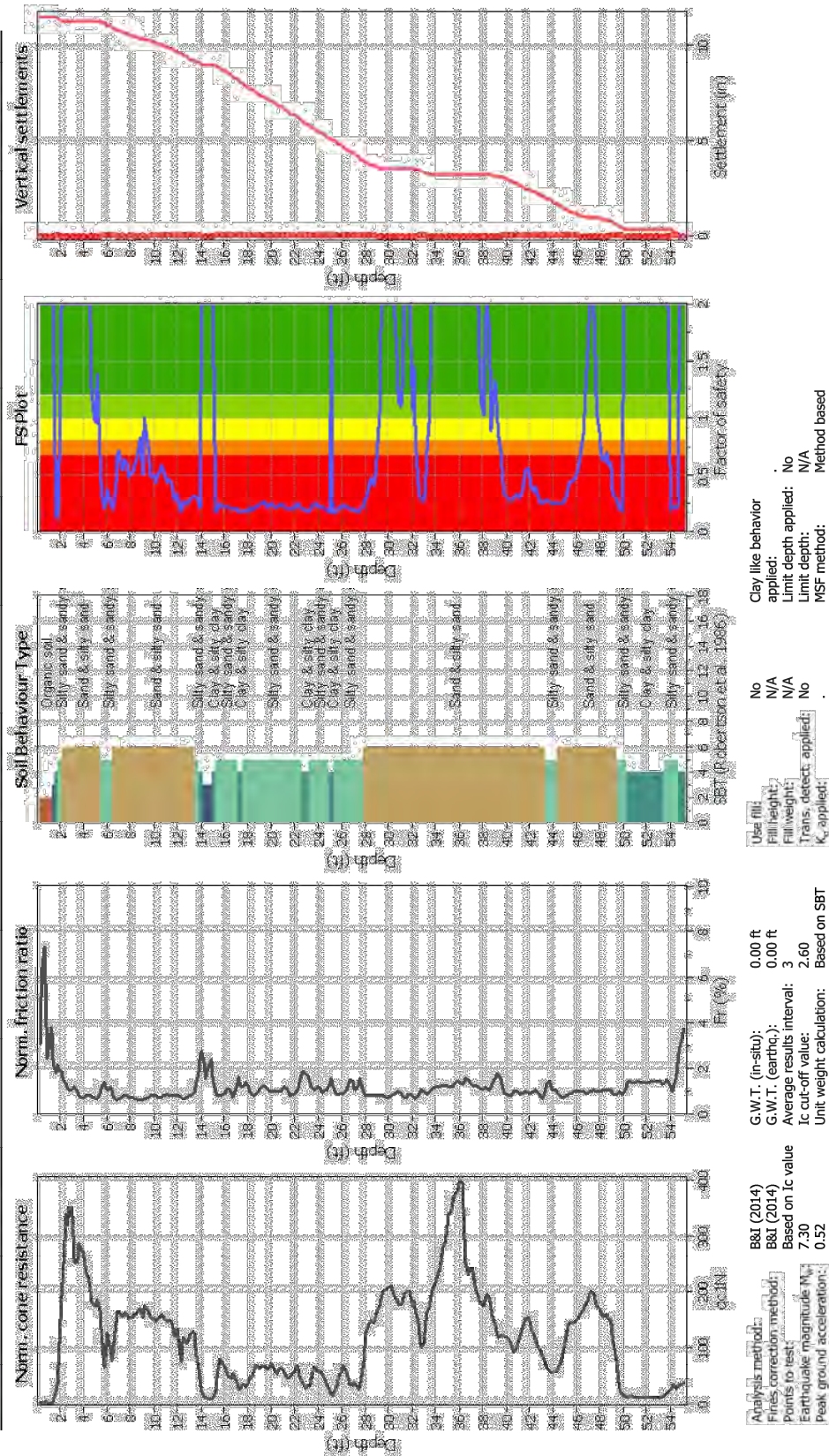
**4**  
FIGURE



**504 Redwood Boulevard, Suite 220**  
 Phone: 415.382.3444  
 Fax: 415.382.3450  
 www.millerpac.com

**Project: 1911.027 Donald Lum Elementary**  
**Location: Alameda, California**

**CPT: CPT-01**  
 Total depth: 55.12 ft



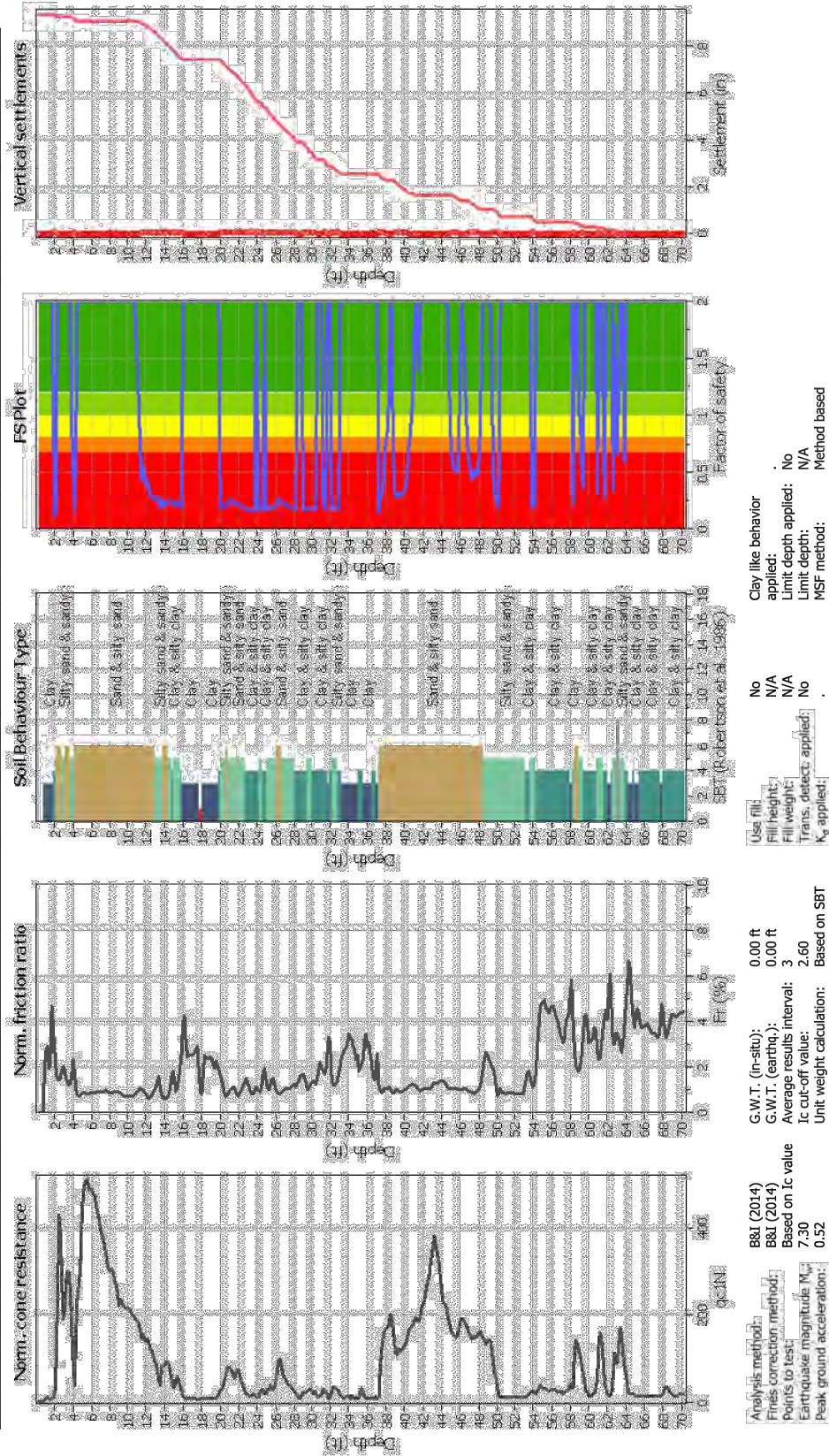




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Phone: 415.382.3444  
Fax: 415.382.3450  
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Project: 1911.027 Donald Lum Elementary  
Location: Alameda, California

CPT: CPT-02  
Total depth: 70.21 ft



CPT-IT v.2.0.6.94 - CPTU data presentation & interpretation software - Report created on: 2/23/2017, 11:27:01 AM  
Project file: H:\jobs\1900-1999\1911.027 Lum School\1911.027 Clq.cq



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## CPT-2 LIQUEFACTION ANALYSIS

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn: MMT  
Checked:

6  
FIGURE

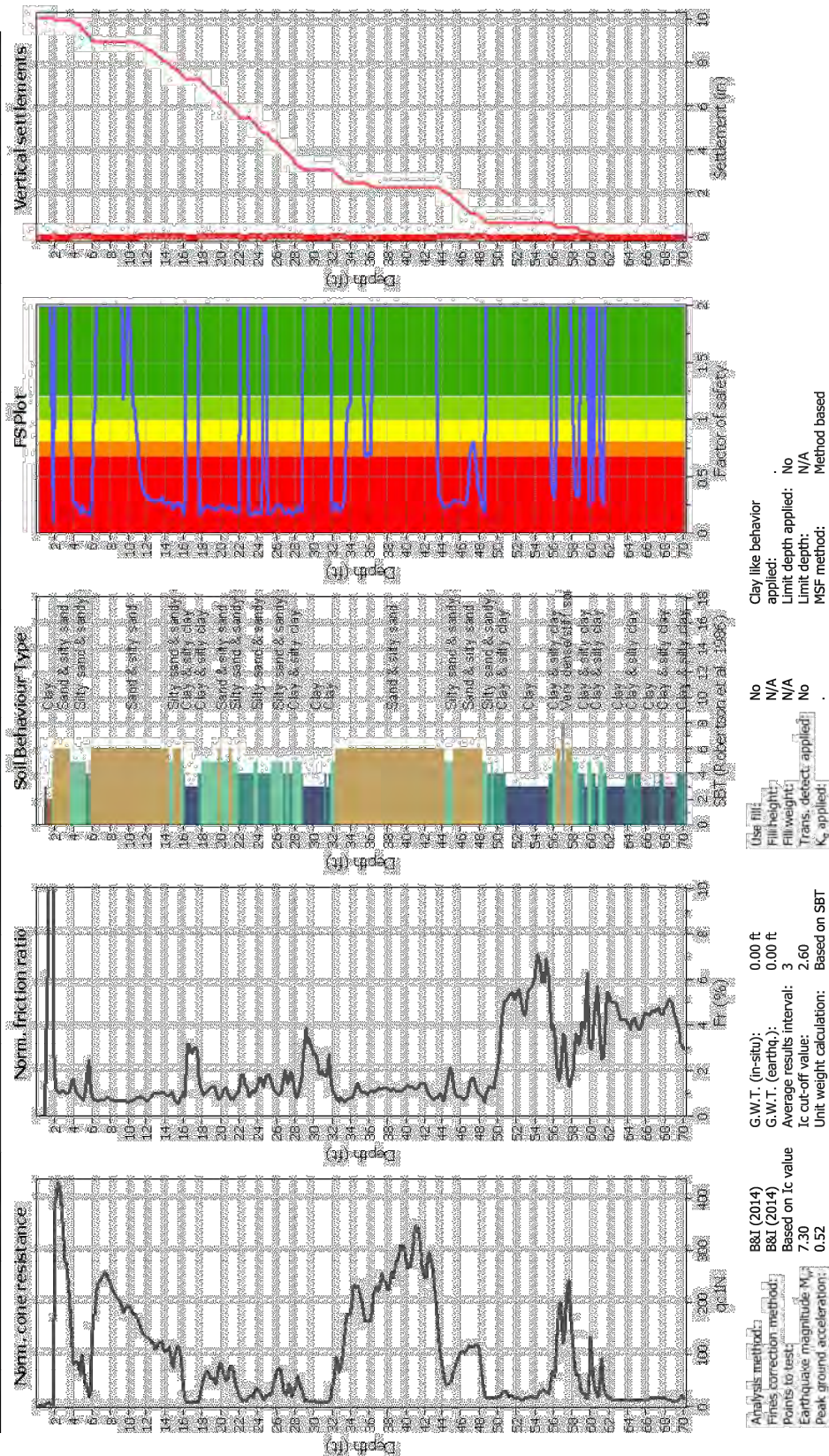


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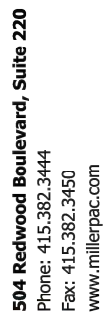
**Project:** 1911.027 Donald Lum Elementary  
**Location:** Alameda, California

**CPT: CPT-03**  
Total depth: 70.05 ft

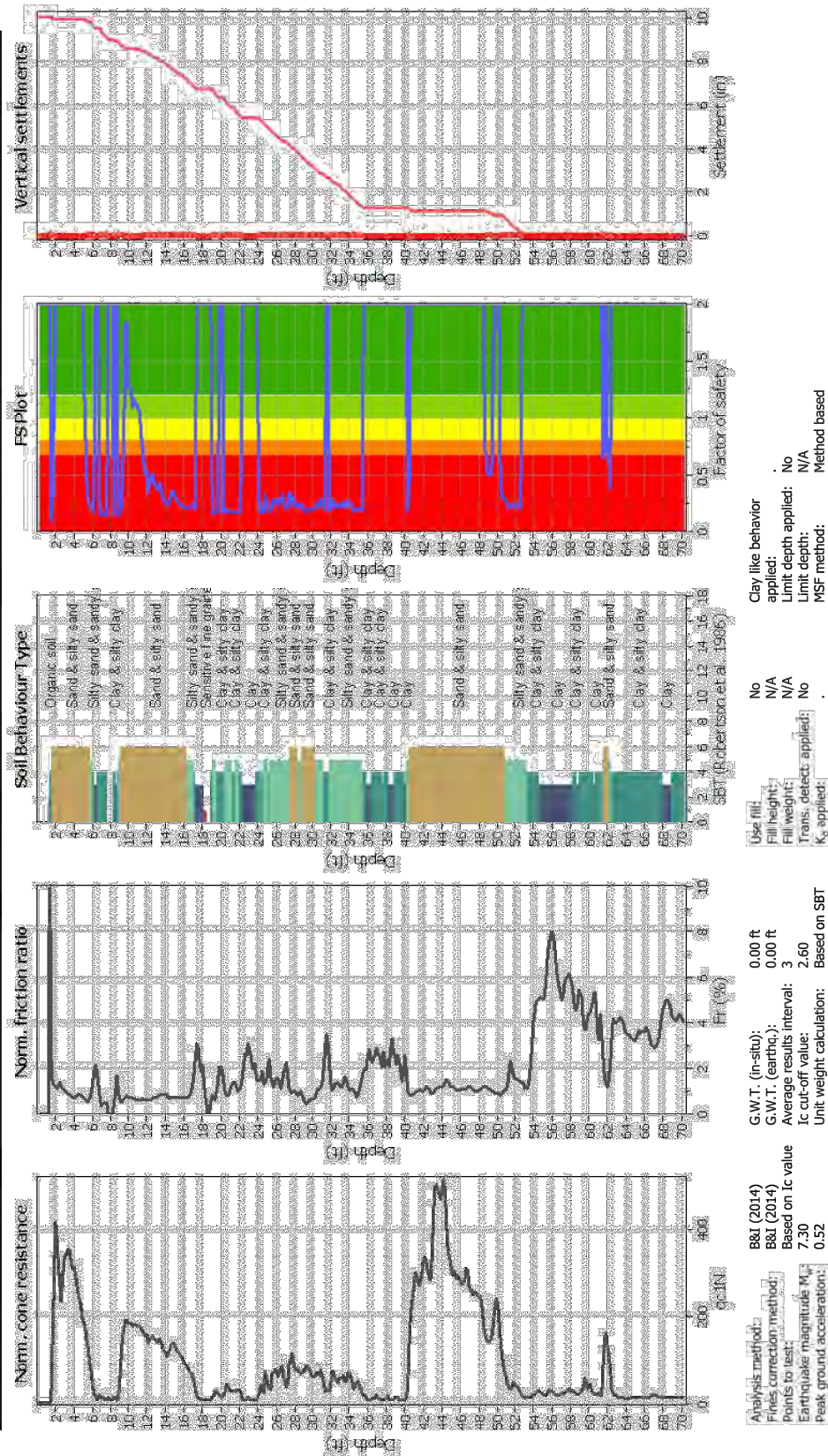


CPeT-IT v2.0.6.94 - CPTU data presentation & interpretation software - Report created on: 2/23/2017, 11:27:02 AM  
Project file: H:\jobs\19000-1999\191.027 Lum School\liq\1911.027 Cliq.clg





**CPT: CPT-04**  
Total depth: 70.21 ft



CPeT-IT v.2.0.6.94 - CPTU data presentation & interpretation software - Report created on: 2/23/2017, 11:27:03 AM  
Project file: H:\Jobs\1900-1999\1911.027 Lum School\Liq\1911.027 Clq.clq



## CPT-4 LIQUEFACTION ANALYSIS

Project No. 1911.027 Date: 2/24/17

Drawn **MMT**  
Checked

8  
FIGURE





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FILE: 1911.027 Figures.dwg

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## CPT-5 LIQUEFACTION ANALYSIS

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

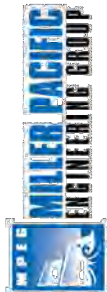
Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

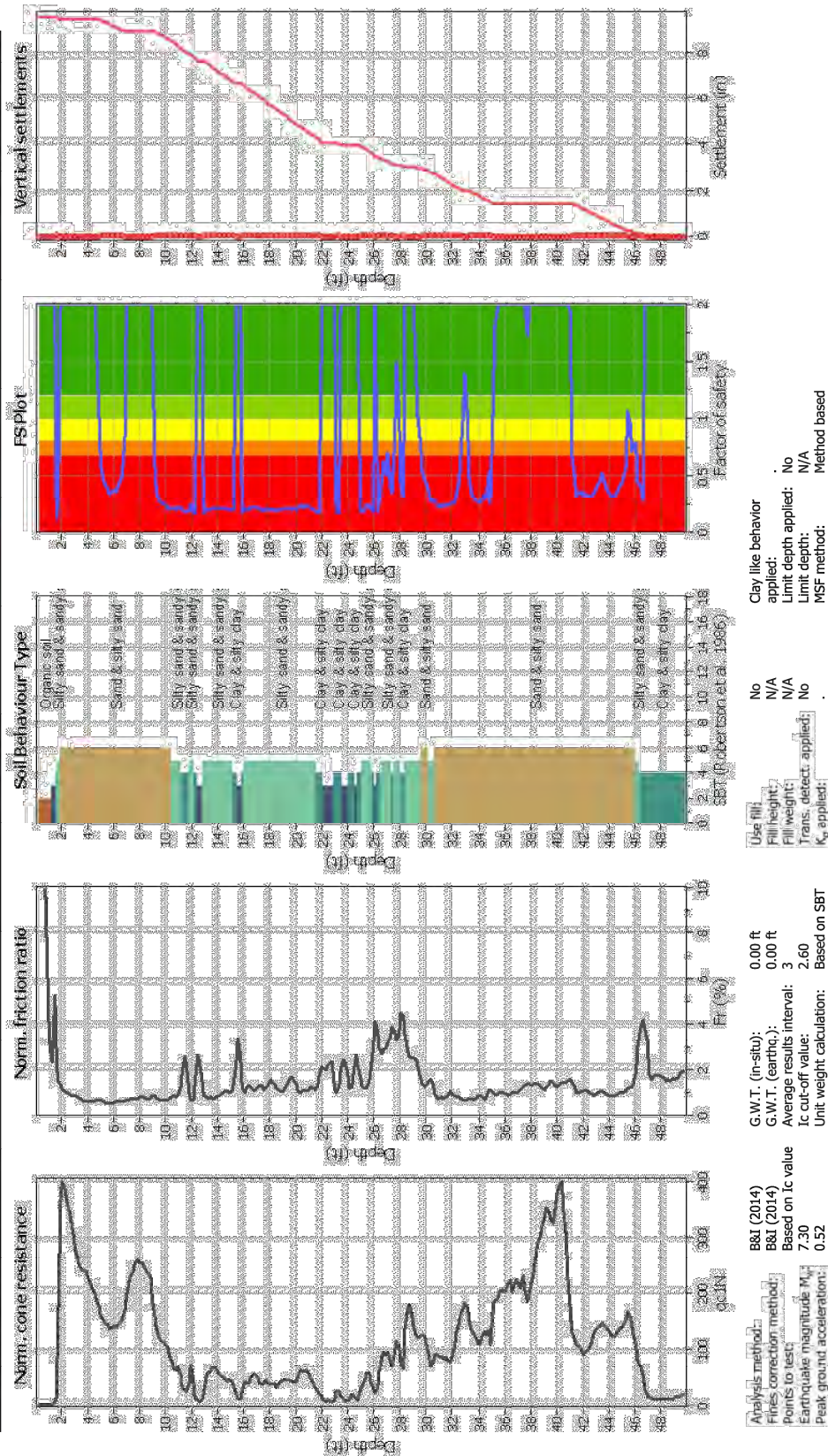
9  
FIGURE



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Project: 1911.027 Donald Lum Elementary  
Location: Alameda, California

CPT: CPT-05  
Total depth: 49.71 ft



CPeT v.2.0.6.94 - CPTU data presentation & interpretation software - Report created on: 2/23/2017, 11:27:04 AM  
Project file: H:\Jobs\1900-1999\1911.027 Lum School\1911.027 Clq.clq





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Fax: 415.382.3450

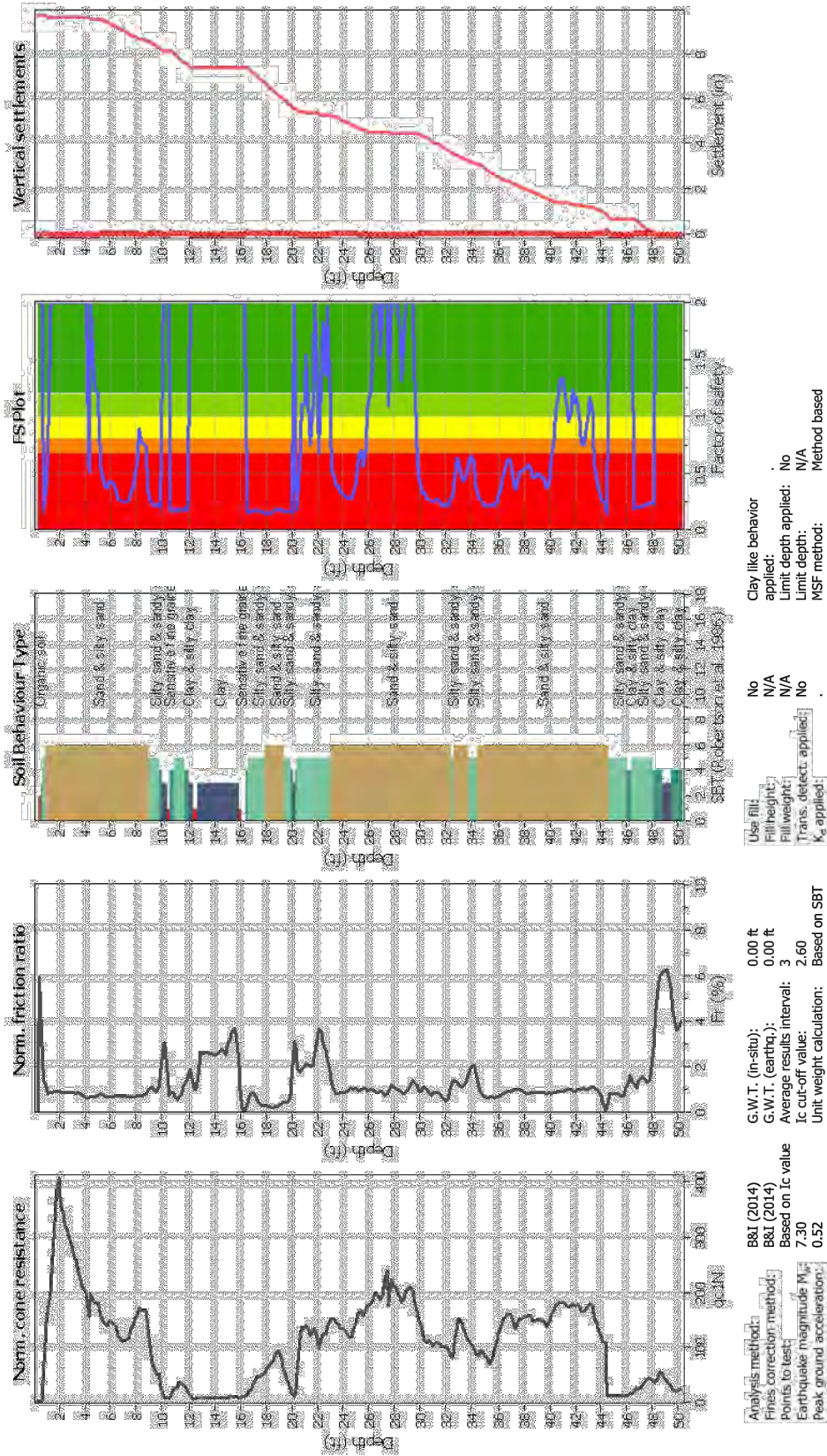
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Project: 1911.027 Donald Lum Elementary

Location: Alameda, California

CPT: CPT-06

Total depth: 50.20 ft



CPT-IT v.2.0.6.94 - CPTU data presentation & interpretation software - Report created on: 2/23/2017, 11:27:05 AM  
Project file: H:\Jobs\1900-1999\1911.027 Lum School\LiQ\1911.027 Clq.cq



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FILE: 1911.027 Figures.dwg

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## CPT-6 LIQUEFACTION ANALYSIS

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn: MMT  
Checked:

10  
FIGURE

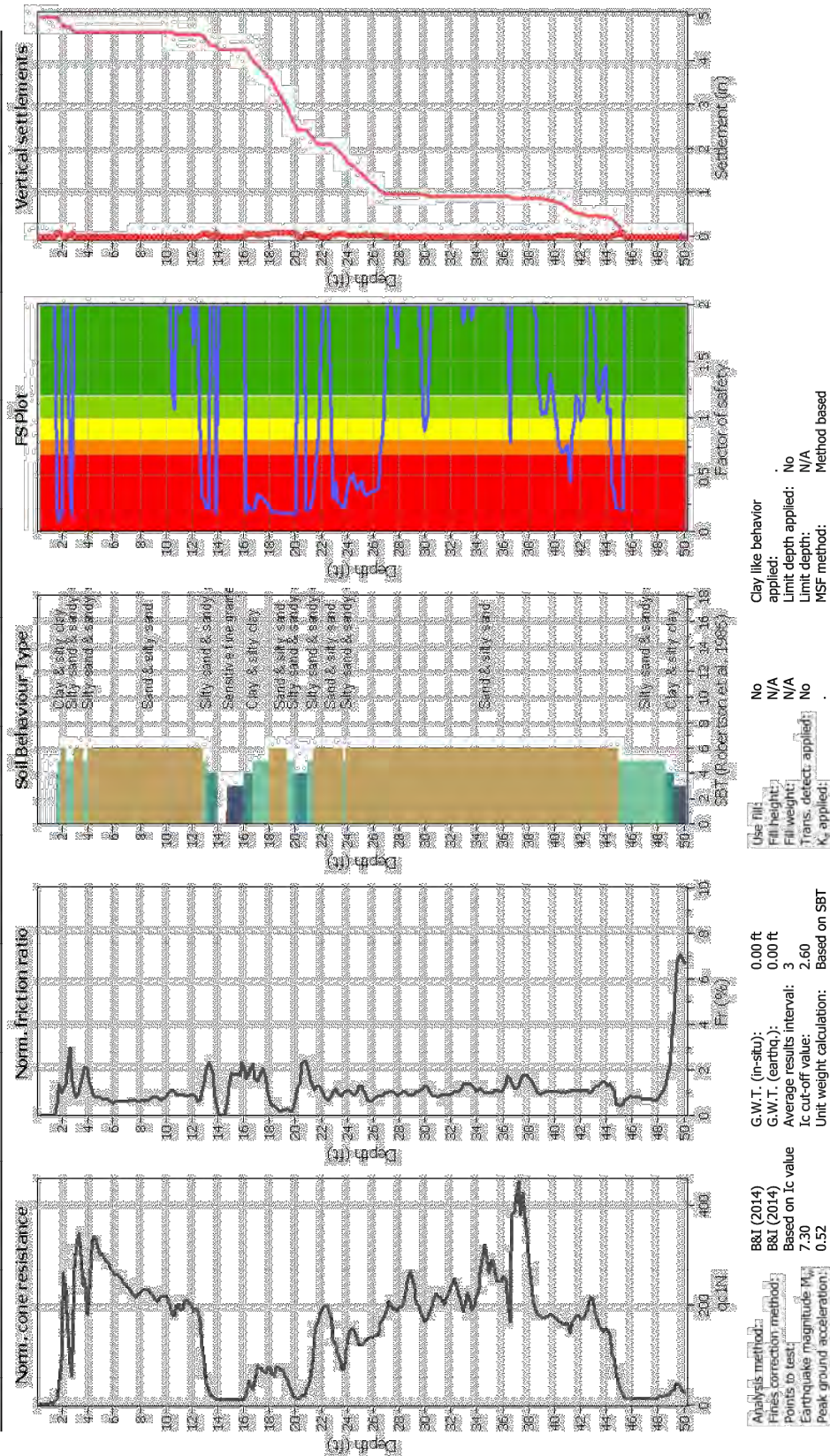


**MILLER PACIFIC**  
**ENGINEERING GROUP**

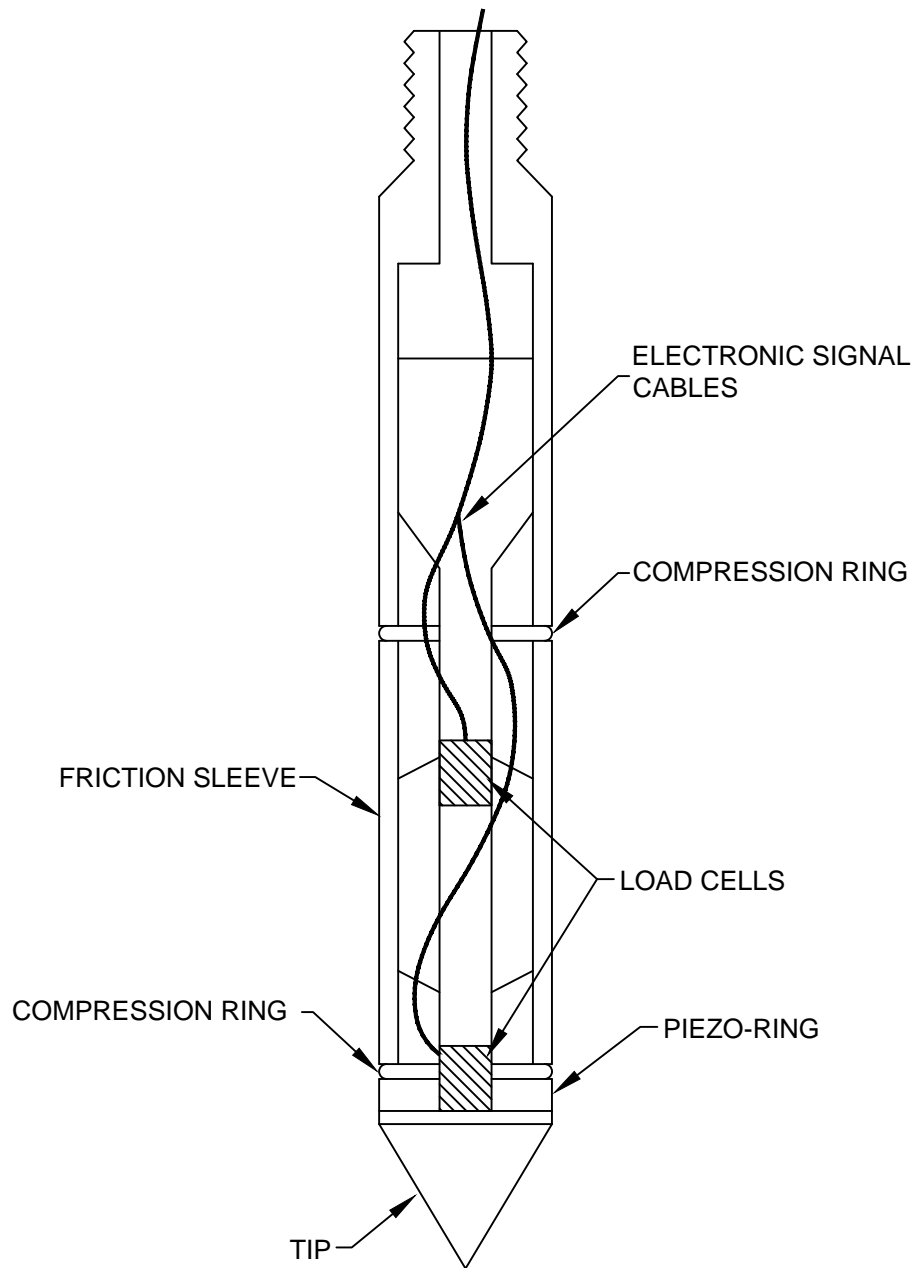
504 Redwood Boulevard, Suite 220  
 Phone: 415.382.3444  
 Fax: 415.382.3450  
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Project: 1911.027 Donald Lum Elementary  
 Location: Alameda, California

CPT: CPT-07  
 Total depth: 50.04 ft



## **APPENDIX A**



# **CONE PENETROMETER**

(NO SCALE)



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## **CONE PENETROMETER**

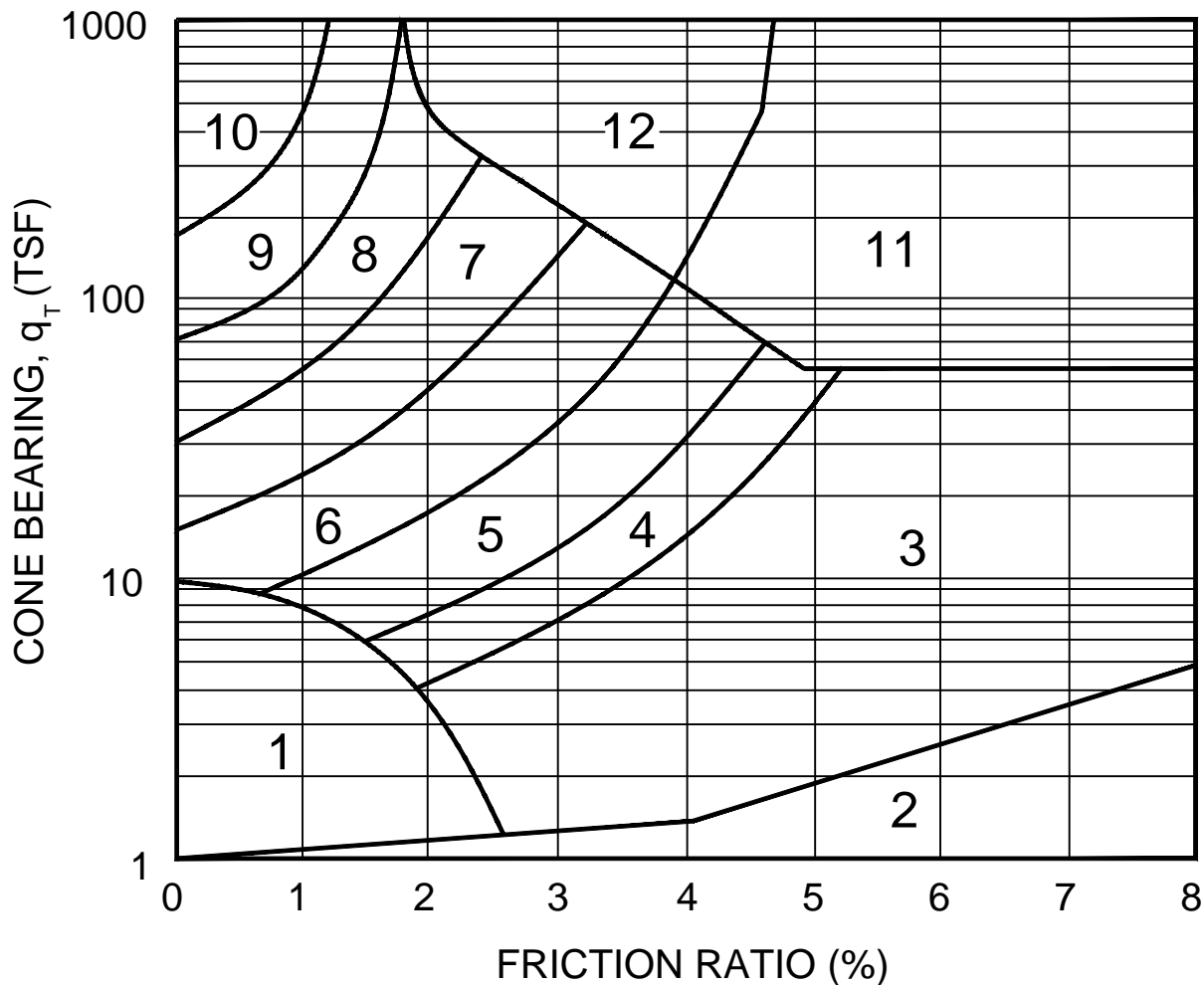
Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn MMT  
Checked \_\_\_\_\_

**A-1**  
**FIGURE**



Zone:	Qc/N	Soil Behavior Type:
1)	2	Sensitive Fine Grained
2)	1	Organic Material
3)	1	Clay
4)	1.5	Silty Clay to Clay
5)	2	Clayey Silt to Silty Clay
6)	2.5	Sandy Silt to Clayey Silt
7)	3	Silty Sand to Sandy Silt
8)	4	Sand to Silty Sand
9)	5	Sand
10)	6	Gravelly Sand to Sand
11)	1	Very Stiff Fine Grained (*)
12)	2	Sand to Clayey Sand (*)

(\*) Overconsolidated or Cemented

Reference: Robertson, P.K. (1986), "In-Situ Testing and Its Application to Geotechnical Engineering," Canadian Geotechnical Journal, Vol. 23; No. 23; No. 4, pp. 573-594



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#### CPT SOIL INTERPRETATION CHART

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn MMT  
Checked

**A-2**  
FIGURE



# Miller Pacific Engineering Group



Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-01

Operator  
Cone Number  
Date and Time  
6.00 ft

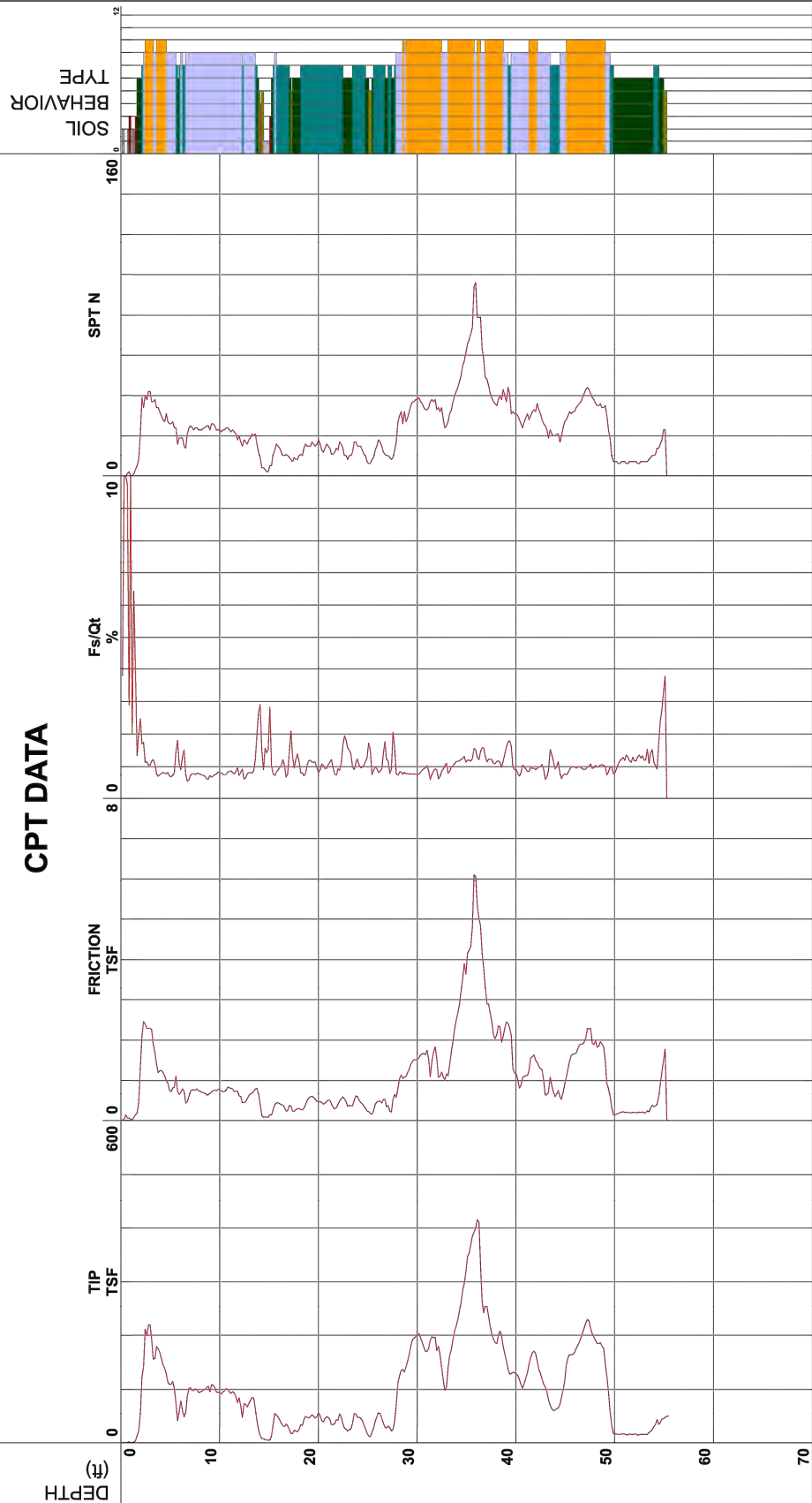
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DDG1333  
2/14/2017 9:44:45 AM

Filename  
GPS  
Maximum Depth

SDF(105).cpt  
55.45 ft

Net Area Ratio .8

## CPT DATA



\*Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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## CPT-1 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

A-3  
FIGURE



## Miller Pacific Engineering Group

Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-02

Operator  
Cone Number  
Date and Time  
6.30 ft

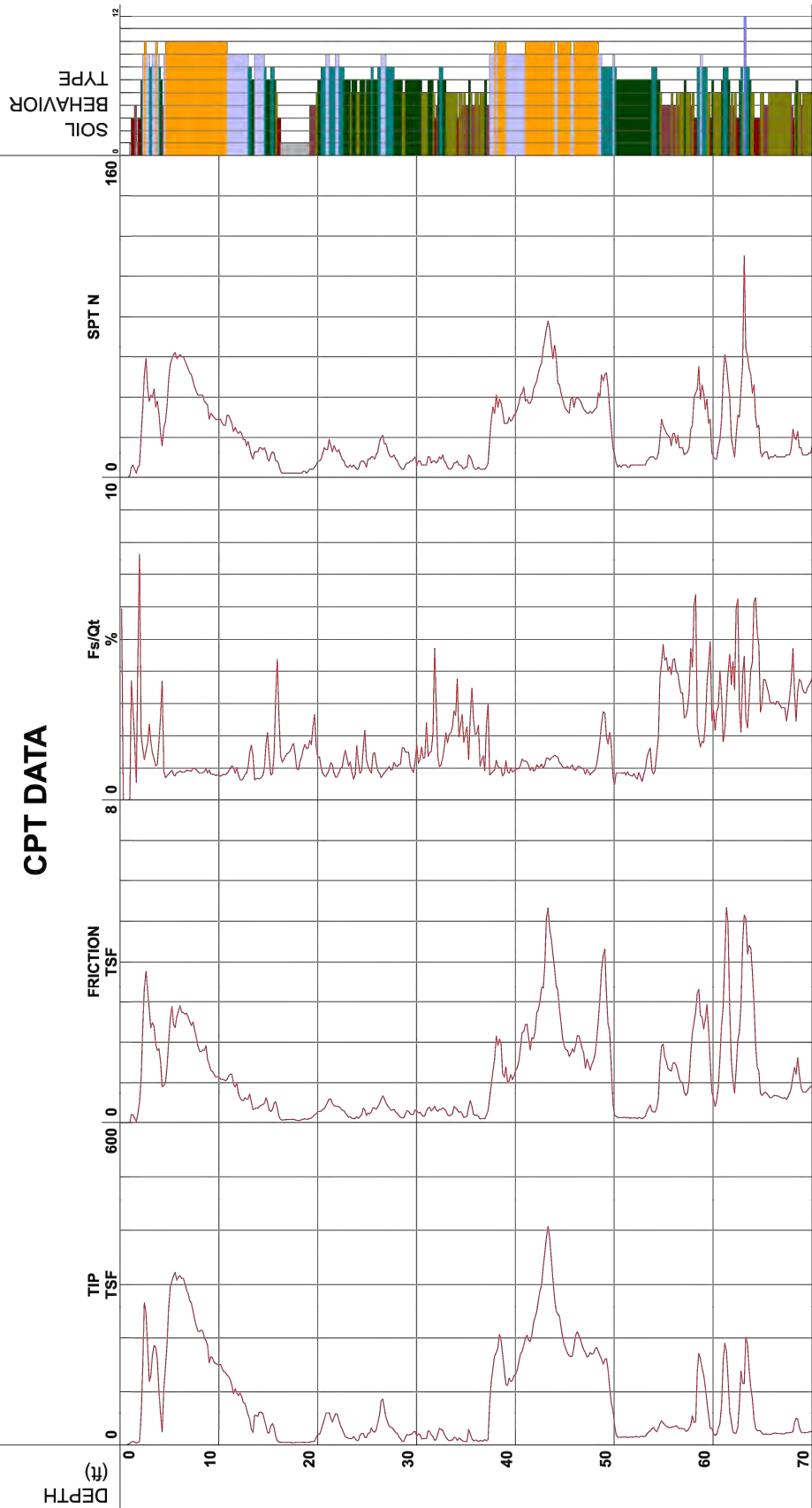
RB KK  
DDG1333  
2/14/2017 11:19:05 AM

Filename  
GPS  
Maximum Depth

SDF(106).cpt  
70.54 ft

Net Area Ratio .8

### CPT DATA



S<sup>o</sup>Soil behavior type and SPT based on data from UBC-1983



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### CPT-2 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

**A-4**  
FIGURE

# Miller Pacific Engineering Group



Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-03

Operator  
Cone Number  
Date and Time

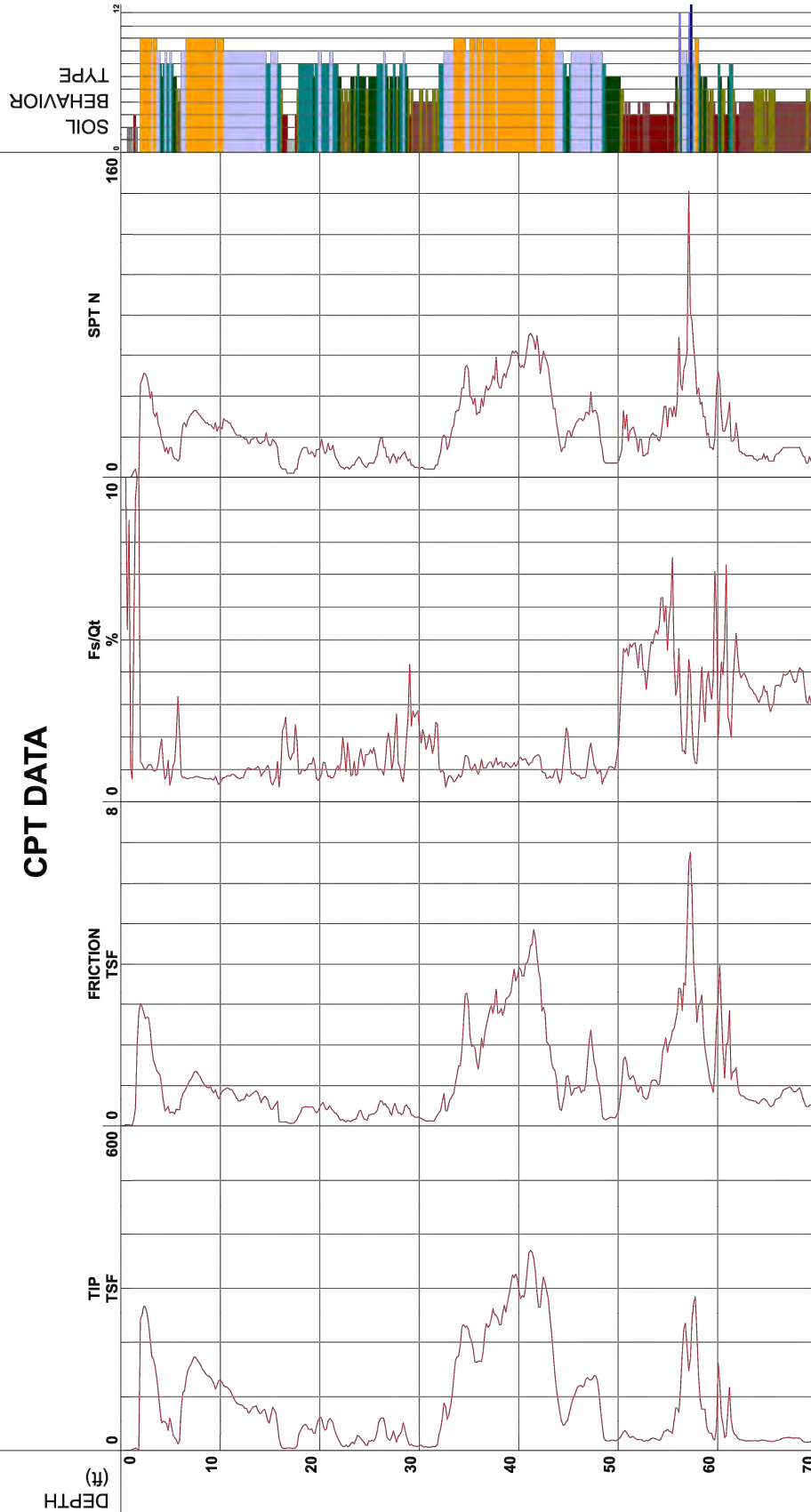
RB KK  
DDG1333  
2/14/2017 3:19:13 PM

Filename  
GPS  
Maximum Depth

SDF(110).cpt  
70.37 ft

Net Area Ratio .8

## CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (\*)
- 12 - sand to clayey sand (\*)

S\*Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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## CPT-3 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

**A-5**  
FIGURE

# Miller Pacific Engineering Group



Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-04

Operator  
Cone Number  
Date and Time  
6.00 ft

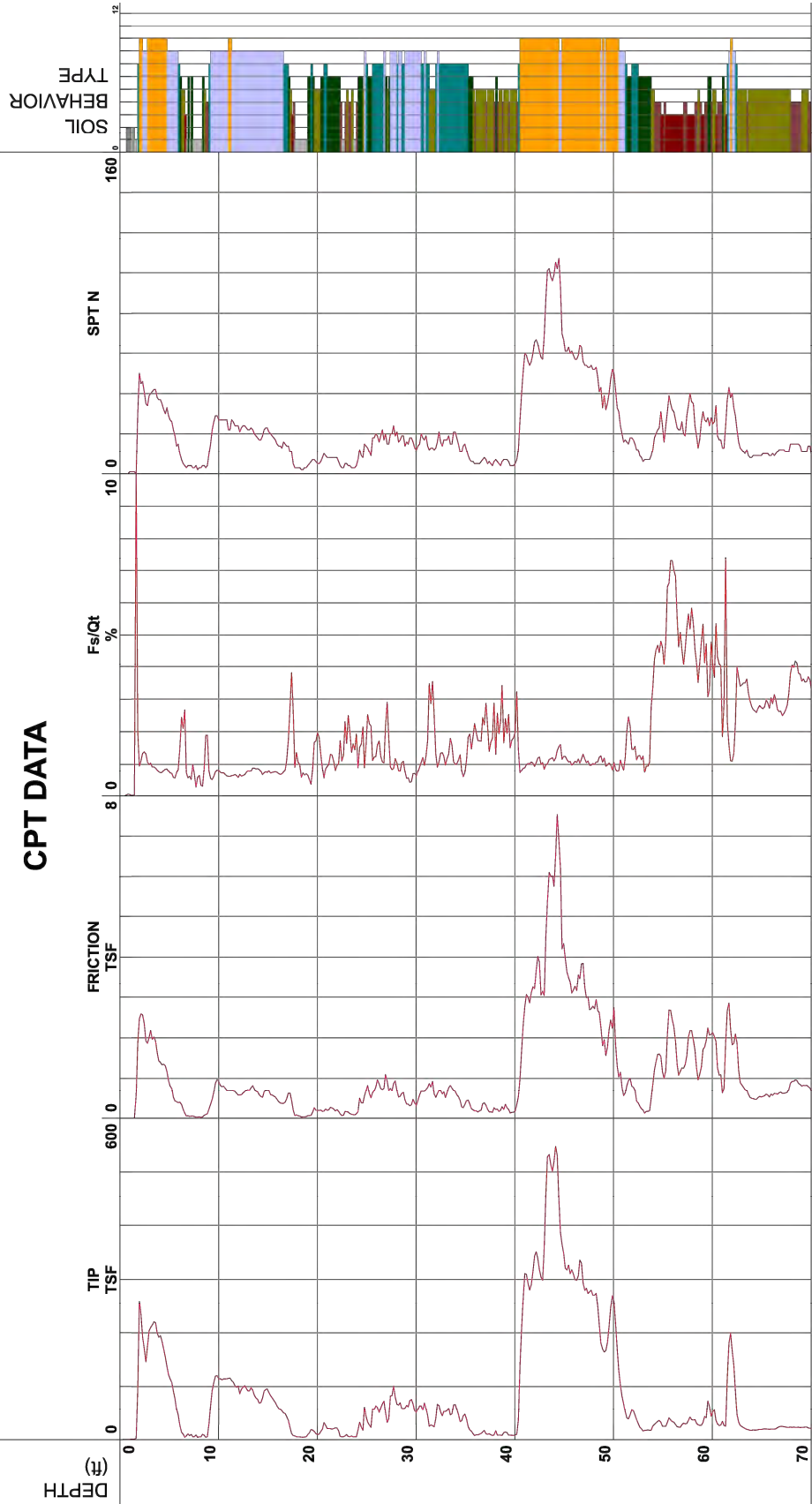
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2/14/2017 2:21:08 PM

Filename  
GPS  
Maximum Depth

SDF(109).cpt  
70.54 ft

Net Area Ratio .8

## CPT DATA



S<sup>o</sup>Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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ENGINEERING GROUP

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## CPT-4 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

**A-6**  
FIGURE



## Miller Pacific Engineering Group

Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-05

Operator  
Cone Number  
Date and Time  
6.00 ft

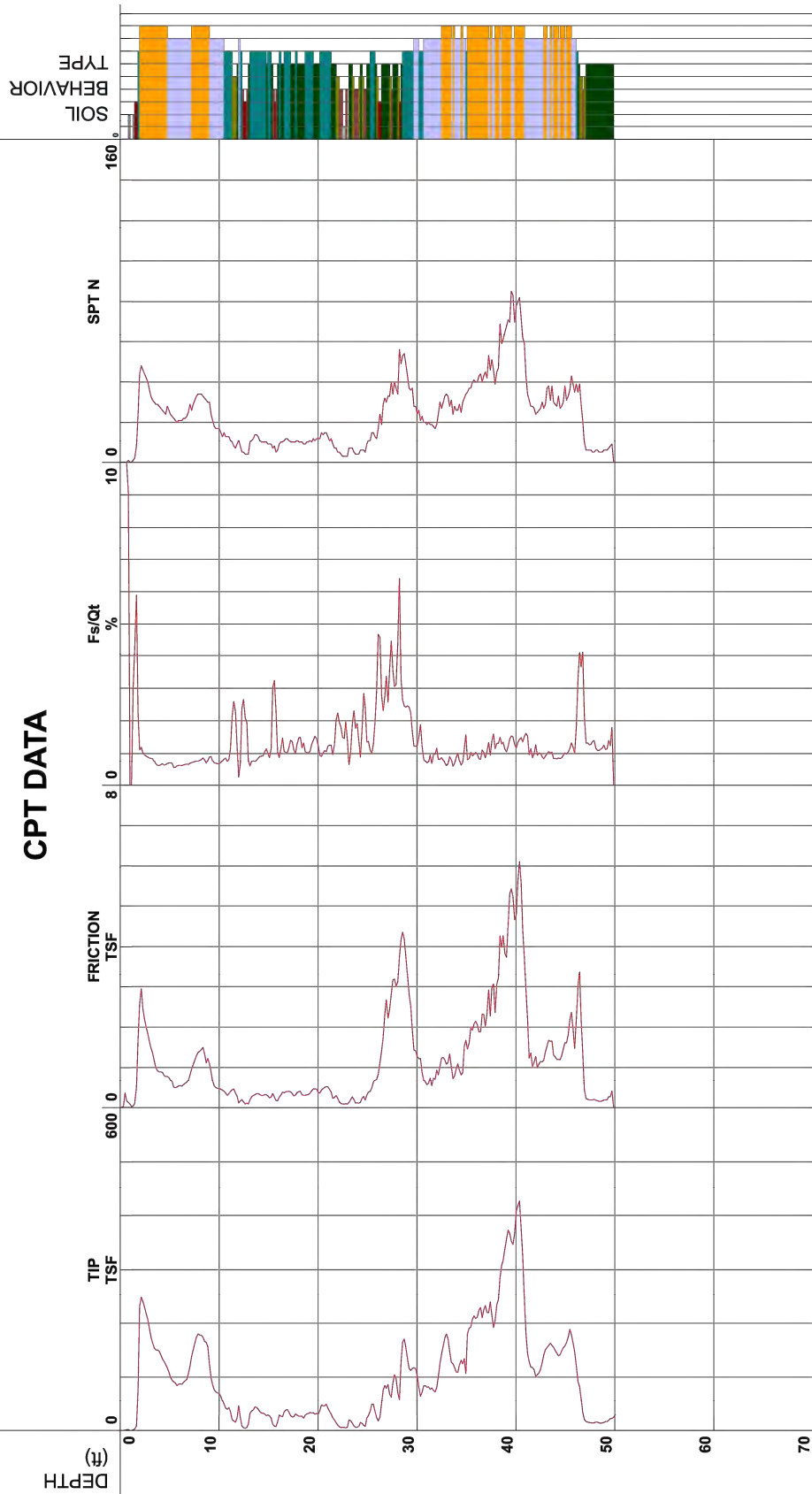
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DDG1333  
2/14/2017 4:16:07 PM

Filename  
GPS  
Maximum Depth

SDF(111).cpt  
50.03 ft

Net Area Ratio .8

### CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (\*)
- 12 - sand to clayey sand (\*)

Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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### CPT-5 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

**A-7**  
FIGURE

# Miller Pacific Engineering Group



Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-06

Operator  
Cone Number  
Date and Time

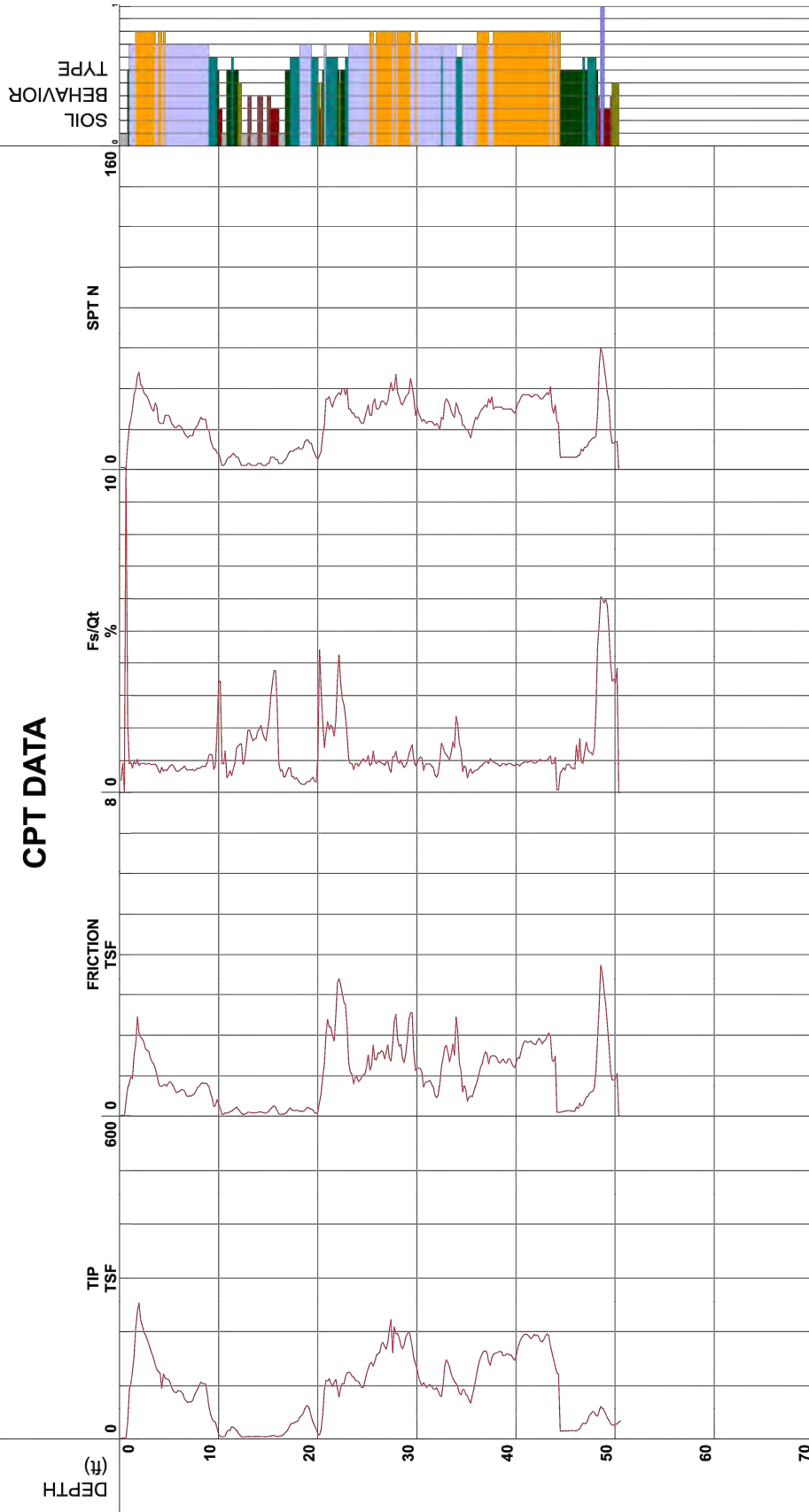
RB KK  
DDG1333  
2/14/2017 1:35:11 PM

Filename  
GPS  
Maximum Depth

SDF(108).cpt  
50.52 ft

Net Area Ratio .8

## CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (\*)
- 12 - sand to clayey sand (\*)

S\*Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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ENGINEERING GROUP

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## CPT-6 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

**A-8**  
FIGURE



# Miller Pacific Engineering Group



Project  
Job Number  
Hole Number  
EST GW Depth During Test

Donald Lum Elementary School  
1911.027  
CPT-07

Operator  
Cone Number  
Date and Time  
6.00 ft

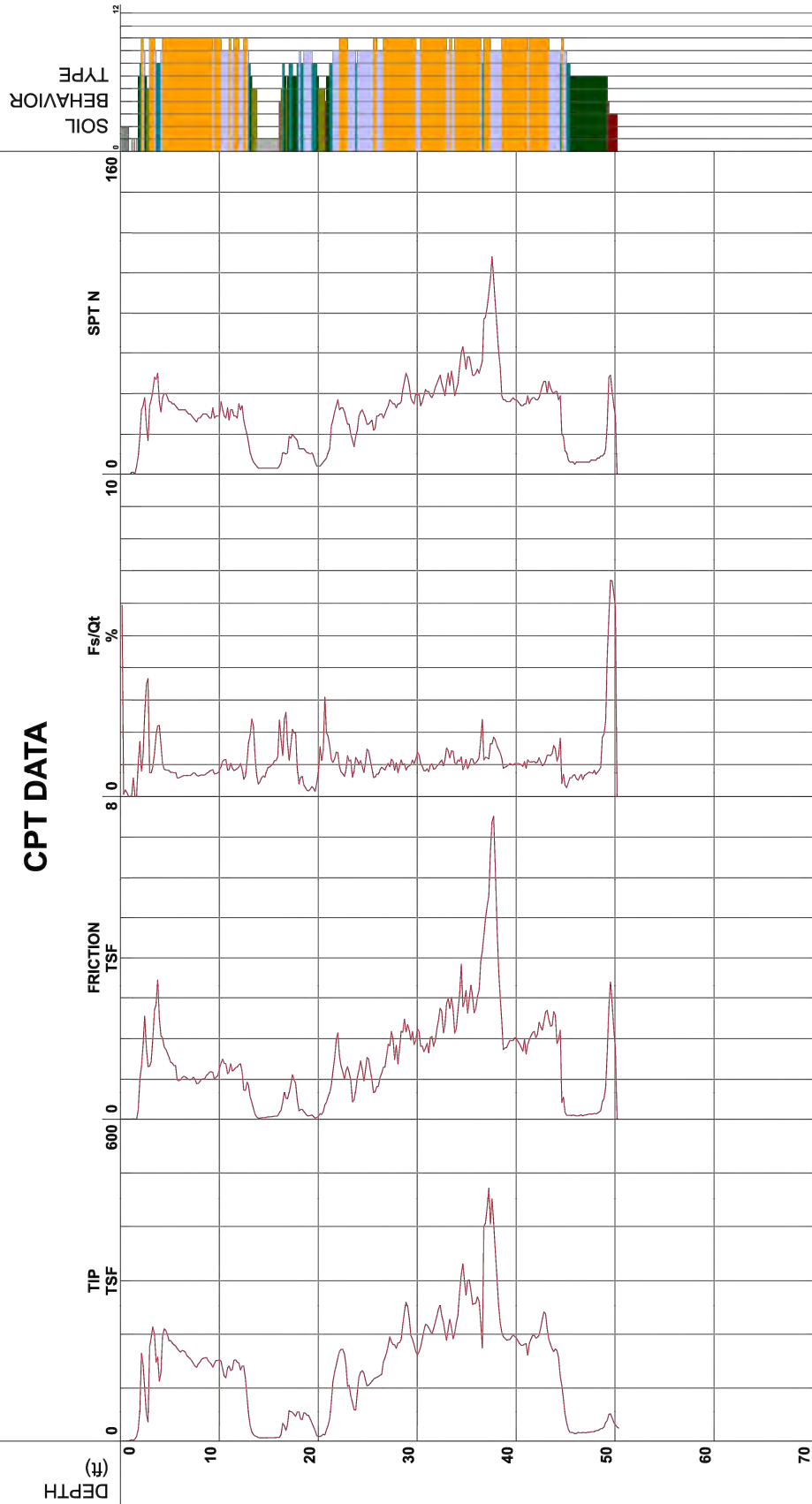
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DDG1333  
2/14/2017 12:52:40 PM

Filename  
GPS  
Maximum Depth

SDF(107).cpt  
50.36 ft

Net Area Ratio .8

## CPT DATA



\*Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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## CPT-7 PLOT

Lum Elementary School  
1801 Sandcreek Way  
Alameda, California

Project No. 1911.027

Date: 2/24/17

Drawn  
Checked

MMT

A-9  
FIGURE



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Santa Rosa, CA 95401  
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F: 707-544-1082

**Napa Office**  
1041 Jefferson St, Suite 4  
Napa, CA 94559  
P: 707-252-8105  
F: 707-544-1082

**Middletown Office**  
P.O. Box 852  
Middletown, CA 95461  
P: 707-987-4602  
F: 707-987-4603

April 24, 2017

Alameda Unified School District  
Attention: Robbie Lyng  
2060 Challenger Drive  
Alameda, CA 94501  
[rl yng@alameda.k12.ca.us](mailto:rl yng@alameda.k12.ca.us)

Geotechnical Peer Review  
Liquefaction Evaluation  
Donald D. Lum Elementary School Campus  
1801 Sandcreek Way  
Alameda, California

Project Number: 3523.01.06.1

As requested, this letter presents the results of our geotechnical peer review of a liquefaction evaluation report prepared by Miller Pacific Engineering Group (Miller Pacific) titled "Geotechnical Engineering Investigation, Evaluation of Liquefaction Risk and Liquefaction Induced Settlement Potential, Donald D. Lum Elementary School Campus," dated March 17, 2017. The school is located at 1801 Sandcreek Way in Alameda, California. This letter has been prepared in accordance with our Professional Services Agreement with Alameda Unified School District. The scope of RGH's services included reviewing the referenced report and performing an independent analysis of the data.

Miller Pacific performed seven Cone Penetration Tests (CPT's) at the elementary school campus to depths ranging from 49 to 70 feet. The CPT data was analyzed using the CPT Liquefaction Assessment software program CLiq (2007, ver. 1.7.6.49) and the procedures outlined by Idriss and Boulanger (2014). The design seismic conditions analyzed consisted of a magnitude 7.3 earthquake and a peak ground acceleration (PGA) of 0.52g. The latter of which corresponds to the  $PGA_M$  per ASCE 7-10 Section 11.8.3. Miller Pacific's analysis concluded that several granular soil layers between the ground surface and about 50 feet below the ground surface are susceptible to liquefaction. The report also concluded that liquefaction-induced settlement that ranged from 5 to 10 inches with differential settlement for a given building footprint estimated to be on the order 3 to 7 inches. Miller Pacific evaluated the liquefaction-induced settlement potential at the school for a seismic event producing a PGA of 0.28g, which reportedly corresponds to an expected return interval of approximately 90 to 100 years. That analysis concluded that the same granular layers were susceptible to liquefaction. This liquefaction resulted in settlement ranging from 4 to 8 inches with differential settlement estimated to be approximately 3 to 5 inches.

Our review confirmed that the design earthquake magnitude of 7.3 is within the range of values predicted for the Hayward fault. In addition, we confirmed the  $PGA_M$  of 0.52g is correct based on ASCE Standard 7-10. With this information, we analyzed the CPT data using CLiq, as we use the same software program as Miller Pacific for our CPT liquefaction analysis. In our analysis, we also used the procedures outlined by Idriss and Boulanger (2014). Our research found this to be the



most current publication regarding liquefaction analysis of CPT data. It also appears to update the most commonly used liquefaction analysis methods making it an appropriate analysis procedure. Our analysis found the same potential for liquefaction and calculated similar settlement to those in the Miller Pacific report. We also varied the groundwater level to see how it impacted the calculated settlement and found a difference ranging from about ½ to 1 inch.

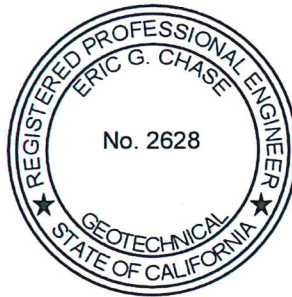
Based on the results of our review and analysis, RGH is in agreement with the results and conclusions regarding the potential for liquefaction and the resulting settlement presented in the Miller Pacific report.

We trust this provides the information you require at this time. Please call if you have questions.

Very truly yours,  
RGH Consultants



Eric G. Chase  
Senior Associate Engineer



cc:

[MarkQ@qka.com](mailto:MarkQ@qka.com)

[stlee@alameda.k12.ca.us](mailto:stlee@alameda.k12.ca.us)

[nicks@qka.com](mailto:nicks@qka.com)

EGC:TAW:ec:ejw  
Electronically submitted

s:\project files\3501-3750\3523\3523.01.06.1 geotech eng peer review-lum elem school liquefaction\peer review letter.doc

Attachment: References

### **REFERENCES**

American Society of Civil Engineers, 2010, Minimum Design Loads for Buildings and Other Structures, ASCE Standard ASCE/SEI 7-10.

Idriss, I.M. and Boulanger, R.W., 2014, CPT and SPT Based Liquefaction Triggering Procedures.

Chad Pimentel, Legal Counsel for AUSD  
Alameda Unified School District  
2060 Challenger Drive  
Alameda, California 94501

April 24, 2017

**RE: Donald Lum Elementary School Liquefaction Settlement**

Chad,

ZFA has reviewed the report titled "Geotechnical Engineering Investigation-Evaluation of Liquefaction Risk and Liquefaction Induced Settlement Potential at Donald D. Lum Elementary School Campus" written by Miller Pacific dated March 17, 2017. The significant findings of the report indicate that the site has earthquake induced settlement potential from 5 to 10 inches due to soil liquefaction with differential settlement of 3 to 7 inches. It should be noted that this is for a very large earthquake that would happen, on average, approximately every 2500 years. Additional analysis shows with even a smaller earthquake, which might occur approximately every 100 years, significant differential settlement of 3 to 5 inches could occur.

The existing buildings located on the Lum campus consist of shallow continuous spread footings. This foundation type is not appropriate for potential settlements of this magnitude. Typically, we would only use this foundation type if the total settlement was around 3" and if differential settlement was approximately 2" or less. The effects of liquefaction on lightly framed structures are not well studied; however at these levels the buildings will sustain more damage than they would otherwise be expected to during a large seismic event including partial building collapse and inoperable doors, thus severely limiting emergency exiting from the buildings. Both of these impacts are potential life-safety concerns. Unfortunately, given that the liquefiable soil occurs from near the surface down to approximately 50 feet, there does not appear to be a feasible mitigation technique for these existing buildings.

It should be noted that the California Building Code would not require that the buildings or site be vacated by the district. However, this new information will limit the work that can be performed to the existing buildings to that which is non-structural in nature. We recommend that the district develop a plan to provide suitable alternate facilities for students and staff as soon as feasible.

Should you have questions, please contact the undersigned.

Regards,



Chris Warner, SE  
**ZFA STRUCTURAL ENGINEERS**  
Senior Principal

ALAMEDA UNIFIED SCHOOL DISTRICT  
SPECIAL AGENDA ITEM

---

**Item Title:** Public Comments/Community Input Regarding Presentation on Lum Elementary School Site Issues

**Item Type:** Information

**Background:**

**Goals:**

**Fund:**

**Fund Codes:**

**Fiscal Analysis**

**Amount (Savings) (Cost):**

**Department Budget:**

**Recommendation:** This item is presented for information only.

**AUSD Guiding Principle:** #3 - Administrators must have the knowledge, leadership skills and ability to ensure student success.| #4 - Parental involvement and community engagement are integral to student success.| #5 - Accountability, transparency, and trust are necessary at all levels of the organization.| #6 - Allocation of funds must support our vision, mission, and guiding principles.

**Submitted By:**

---