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# ***Mayor ED 17-02 Priority permit***

## **GEOTECHNICAL INVESTIGATION MISSION ROCK DEVELOPMENT STREETS San Francisco, California**

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# Mayor ED 17-02 Priority permit

Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California

18 December 2018  
Revised 13 June 2019  
750604203  
Page i

## TABLE OF CONTENTS

|              |  |           |
|--------------|--|-----------|
| <b>1.0</b>   | <b>INTRODUCTION.....</b>   | <b>1</b>  |
| <b>2.0</b>   | <b>SCOPE OF SERVICES .....</b>   | <b>2</b>  |
| <b>3.0</b>   | <b>FIELD EXPLORATION .....</b>   | <b>3</b>  |
| <b>3.1</b>   | <b>Current Investigation.....</b>  | <b>3</b>  |
| <b>3.1.1</b> | <b>Borings.....</b>  | <b>3</b>  |
| <b>3.1.2</b> | <b>Cone Penetration Tests (CPTs).....</b>  | <b>5</b>  |
| <b>3.1.3</b> | <b>Laboratory Testing.....</b>   | <b>6</b>  |
| <b>3.2</b>   | <b>Previous Investigations .....</b>   | <b>6</b>  |
| <b>4.0</b>   | <b>SITE AND SUBSURFACE CONDITIONS .....</b>  | <b>7</b>  |
| <b>4.1</b>   | <b>Site Conditions.....</b>  | <b>7</b>  |
| <b>4.2</b>   | <b>Subsurface Conditions .....</b>   | <b>7</b>  |
| <b>5.0</b>   | <b>GEOLOGY AND SEISMICITY.....</b>   | <b>8</b>  |
| <b>5.1</b>   | <b>Regional Geology.....</b>   | <b>8</b>  |
| <b>5.2</b>   | <b>Regional Seismicity and Faulting .....</b>  | <b>10</b> |
| <b>6.0</b>   | <b>GEOLOGIC HAZARDS .....</b>  | <b>13</b> |
| <b>6.1</b>   | <b>Liquefaction.....</b>   | <b>14</b> |
| <b>6.2</b>   | <b>Lateral Spreading.....</b>  | <b>15</b> |
| <b>6.3</b>   | <b>Seismic Densification .....</b>   | <b>15</b> |
| <b>6.4</b>   | <b>Tsunami.....</b>  | <b>16</b> |
| <b>6.5</b>   | <b>Fault Rupture .....</b>   | <b>16</b> |
| <b>7.0</b>   | <b>DISCUSSION AND CONCLUSIONS.....</b>   | <b>16</b> |
| <b>7.1</b>   | <b>Settlement and Settlement Mitigation .....</b>  | <b>17</b> |
| <b>7.1.1</b> | <b>Settlement and Mitigation Options .....</b>   | <b>17</b> |
| <b>7.1.2</b> | <b>Settlement Mitigation Using Lightweight Cellular Concrete.....</b>                      | <b>19</b> |
| <b>7.2</b>   | <b>Groundwater.....</b>  | <b>20</b> |
| <b>7.3</b>   | <b>Soil Corrosivity .....</b>  | <b>21</b> |
| <b>7.4</b>   | <b>Compensating Lightweight Fill.....</b>  | <b>21</b> |
| <b>7.5</b>   | <b>Ground Improvement.....</b>   | <b>25</b> |
| <b>7.6</b>   | <b>Excavation, Temporary Slopes, and Shoring.....</b>                                      | <b>26</b> |
| <b>7.7</b>   | <b>China Basin Park Design Considerations .....</b>  | <b>26</b> |
| <b>7.7.1</b> | <b>Settlement, Liquefaction/Lateral Spreading, and Ground<br/>        Improvement.....</b> | <b>26</b> |
| <b>7.7.2</b> | <b>Shoreline Slope Stability .....</b>   | <b>27</b> |
| <b>7.8</b>   | <b>Construction Considerations .....</b>   | <b>29</b> |
| <b>8.0</b>   | <b>RECOMMENDATIONS.....</b>  | <b>29</b> |
| <b>8.1</b>   | <b>Ground Improvement.....</b>   | <b>29</b> |
| <b>8.1.1</b> | <b>Ground Improvement Quality Control and Requirements .....</b>                           | <b>30</b> |



# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page ii*

## **TABLE OF CONTENTS (Cont.)**

|             |  |           |
|-------------|--|-----------|
| <b>8.2</b>  | <b>Compensating Lightweight Fill.....</b>    | <b>31</b> |
| <b>8.3</b>  | <b>Excavation and Shoring .....</b>          | <b>32</b> |
| <b>8.4</b>  | <b>Dewatering.....</b>                       | <b>32</b> |
| <b>8.5</b>  | <b>Earthwork.....</b>                        | <b>33</b> |
| <b>8.6</b>  | <b>Utilities .....</b>                       | <b>34</b> |
| <b>8.7</b>  | <b>Structural Soil .....</b>                 | <b>35</b> |
| <b>9.0</b>  | <b>ADDITIONAL GEOTECHNICAL SERVICES.....</b> | <b>35</b> |
| <b>10.0</b> | <b>LIMITATIONS .....</b>                     | <b>36</b> |

**REFERENCES**

**FIGURES**

**APPENDICES**

**DISTRIBUTION**

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page iii*

## **LIST OF FIGURES**

|           |   |
|-----------|---|
| Figure 1  | Site Location Map   |
| Figure 2  | Site Plan   |
| Figure 3  | Idealized Subsurface Profile A-A'   |
| Figure 4  | Idealized Subsurface Profile B-B'   |
| Figure 5  | Idealized Subsurface Profile B-B' cont.                                     |
| Figure 6  | Approximate Elevation of Top of Bay Mud                                     |
| Figure 7  | Approximate Elevation of Bottom of Bay Mud                                  |
| Figure 8  | Approximate Elevation of Top of Bedrock                                     |
| Figure 9  | Map of Major Faults and Earthquake Epicenters in the San Francisco Bay Area |
| Figure 10 | Modified Mercalli Intensity Scale   |
| Figure 11 | Compensating Lightweight Fill Typical Section                               |

## **LIST OF APPENDICES**

|   |
|---|
| Appendix A – Boring Logs from Current Investigation   |
| Appendix B – Cone Penetration Test Results from Current Investigation                                 |
| Appendix C – Laboratory Test Results from Current Investigation                                       |
| Appendix D – Soil Corrosivity Evaluation and Recommendations  |
| Appendix E – Vane Shear Test Results  |
| Appendix F – Borings, Cone Penetration Test, and Laboratory Test Results from Previous Investigations |
| Appendix G – Structured Streets on Piles  |
| Appendix H – Structured Streets on Deep Soil Mixed Elements   |
| Appendix I – Surcharge and Wick Drains beneath Streets  |
| Appendix J – Typical Compensating Lightweight Fill Sections and Calculations                          |
| Appendix K – China Basin Park Slope Stability Analysis  |
| Appendix L – Example Lightweight Fill Specification   |

750604203.14\_PDB\_REPORT\_Mission Rock Streets\_2019.06.13

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 1*

## **GEOTECHNICAL INVESTIGATION MISSION ROCK DEVELOPMENT STREETS San Francisco, California**

### **1.0 INTRODUCTION**

This report presents the results of our geotechnical investigation for the proposed streets at the Mission Rock Development at Seawall Lot 337 (SWL337) in San Francisco, California.

The site is bound by Terry A. Francois Boulevard on the east, Third Street on the west, McCovey Cove to the north, and Mission Rock Street on the south, as shown on Figure 1, with plan dimensions of approximately 630 feet by 1150 feet. Development plans include constructing 11 mixed-use buildings and a parking structure that are 90 to 240 feet in height (Blocks A through K), a park in the central portion of the site (Mission Rock Square), another park at the northern portion of the site (China Basin Park) and new infrastructure and streets, as shown on Figure 2. Site grades will be raised to accommodate future sea level rise; the high point will be at the middle of the site at Mission Rock Square and could be about four to six feet above existing and adjacent Third Street and Terry Francois Boulevard grades. We understand between 1-1/2 and 4-1/2 feet of fill has been placed recently (since 1997) to raise grades along approximately the southern 750 and 800 feet of Third Street adjacent to SWL337 and Mission Rock Street, respectively, and no new fill is planned along either of these streets or along Terry Francois Boulevard. This report addresses only the new streets, sidewalks, and tree planting areas within the 60-foot-wide public right-of-way (ROW) between each block to be developed. These new streets are Exposition Street, Channel Street, Channel Lane, and Long Bridge Street in the east-west direction, and Shared Public Way and Bridgeview Street in the north-south direction.

We have previously studied the Mission Rock development site by performing: 1) a preliminary geotechnical investigation at SWL337, 2) a liquefaction and lateral spreading evaluation for SWL337 and Pier 48 shoreline, 3) a geotechnical evaluation of the shoreline conditions at Pier 48, and 4) additional geotechnical investigation along the west side of the site and around Mission Rock Square. The results of the first two of these evaluations were presented in reports dated 8

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 2*

September 2011 and 23 December 2013, while the third and fourth studies have not been published. In addition to these documents, we provided preliminary geotechnical recommendations and summaries for various aspects of the development, as it was evolving, in letters and memoranda dated 26 January 2016 (Summary Memorandum No. 1, preliminary geotechnical recommendations), 17 March 2016 (Summary Memorandum No. 2, preliminary lateral pile capacities), 1 April 2016 (Summary Memorandum No. 3, site-specific response spectra comparison of effects on design with or without liquefaction), and 23 March 2018 (Summary Memorandum No. 4, preliminary geotechnical recommendations for structured streets, driven steel HP14x7 and 3- and 4-foot-diameter drilled piers).

The intent of previous studies and recommendations was to provide geotechnical guidance for development at SWL337. This report presents the results of the recently completed geotechnical investigation performed for the streets and previous investigations performed at the site, including previously unpublished data.

## **2.0 SCOPE OF SERVICES**

Our geotechnical investigation was performed in general accordance with the scope of services included in our revised proposal dated 30 May 2018. Our scope of services consisted of evaluating the findings from our previous explorations and investigations by others and performing engineering studies to develop conclusions and design-level recommendations for the streets regarding:

- soil, bedrock and groundwater conditions at SWL337
- seismic hazards, including the potential for liquefaction and lateral spreading
- ground improvement design criteria
- settlement
- vertical support of streets
- earthwork
- utilities
- construction considerations.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 3*

Recommendations for retaining walls was originally in our scope, however, based on our understanding of the project, retaining walls will not be needed.

## **3.0 FIELD EXPLORATION**

As briefly described above, we performed geotechnical investigations at the site in 2011, 2013, 2016, and 2018 (current streets investigation). The 2011, 2013, and 2016 investigations were performed to develop preliminary geotechnical guidance for various aspects of the proposed development of SWL337. The current investigation was performed to develop specific recommendations for the development of the new streets at SWL337. Prior to performing our field investigations, we:

- obtained soil boring permits from the Monitoring Wells Section of the San Francisco Department of Public Health (SFPDH)
- obtained encroachment and building permits from the Port of San Francisco, as applicable
- notified Underground Service Alert
- checked the boring locations for underground utilities using an independent utility locating contractor.

Further details of current and previous investigations are presented in the remainder of this section.

## **3.1 Current Investigation**

### **3.1.1 Borings**

From 30 May through 13 June 2018, five borings designated BSWL337-13 through BSWL337-17, were drilled using truck-mounted rotary-wash drill rigs provided by Pitcher Drilling Company of East Palo Alto, California. The borings were all drilled several feet into bedrock; boring depths ranged from approximately 250 to 265 feet below the existing ground surface (bgs). Our field engineers and geologists logged the borings and obtained samples of the material encountered for visual classification and laboratory testing.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 4*

The logs of the borings are presented on Figures A-1 through A-5 in Appendix A. The soil and rock are classified in accordance with the charts shown on Figures A-6 and A-7, respectively.

Soil samples were obtained using four different types of samplers: two split-barrel and three thin-walled samplers. The sampler types are as follows:

- Sprague and Henwood (S&H) split-barrel sampler with a 3.0-inch outside diameter and 2.5-inch-inside diameter, lined with brass tubes with an inside diameter of 2.43 inches
- Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch-outside and 1.5-inch-inside diameter, without liners
- Dames & Moore (D&M) piston sampler with a 2.5-inch-outside and 2.43-inch inside diameter, thin-walled tube, 18 inches in length
- Shelby Tube (ST) sampler, 36 inches in length, with a 3.0-inch outside diameter and a 2.875-inch inside diameter thin-walled tube
- Pitcher Tube (PT) sampler, 36 inches in length, with a 3.0-inch outside diameter and a 2.875-inch inside diameter thin-walled tube

The sampler types were chosen on the basis of soil type and desired sample quality for laboratory testing. In general, the S&H sampler was used to obtain samples in medium stiff to very stiff cohesive soil and the SPT sampler was used to evaluate the relative density of sandy and gravelly soil. The Dames & Moore and Pitcher Tube piston sampler and the hydraulically-pushed Shelby Tube sampler were used to obtain relatively undisturbed samples of soft to medium stiff cohesive soil.

The rigs provided by Pitcher Drilling Company were equipped with automatic safety hammers. The SPT and S&H samplers were driven with a 140-pound automatic hammer falling about 30 inches. The hammer blow counts required to drive the samplers were recorded and are presented on the boring logs. A “blow count” is defined as the number of hammer blows per six inches of penetration or 50 blows for six inches or less of penetration. The driving of samplers is typically discontinued if the observed (recorded) blow count was 50 for six inches or less of

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 5*

penetration. The blow counts required to drive the S&H and SPT samplers were converted to approximate SPT N-values using a factor of 0.7 and 1.2, respectively, to account for sampler type and hammer energy and are shown on the boring logs.

The D&M, ST, and PT sample tubes are pushed hydraulically into the soil; the pressure required to advance those sample tubes, measured in pounds per square inch (psi), is shown on the logs.

Upon completion, the borings were backfilled with grout, per the requirements of the SFDPH.

## **3.1.2 Cone Penetration Tests (CPTs)**

The CPTs, designated as CSWL337-19 through CSWL337-37, SC1 through SC4, C23-A through C23-D, and CTFB-1, -3, and -4, were advanced to depths between 40 and 200 feet bgs. The CPTs were performed by Gregg Drilling and Testing, Inc. of Martinez, California from 11 to 15 June 2018. TFB-2 was attempted but could not be advanced through the rubble in the fill.

The CPTs were performed by hydraulically pushing a 1.7-inch-diameter (15 square centimeters), cone-tipped probe into the ground. The cone on the end of the probe measures tip resistance, and the sleeve behind the cone tip measures friction resistance. Electrical strain gauges within the cone measure soil parameters continuously for the entire depth advanced. Penetration data were transferred to a computer and processed to provide engineering information, such as the type of soil encountered and its approximate strength characteristics. After completion, the CPT holes were backfilled with cement grout per SFDPH requirements.

The CPT logs, which show tip resistance, friction ratio, interpreted SPT N-value, and soil type, are presented in Appendix B.

Preliminary liquefaction analysis was performed using the CPT data to identify the depth of potentially liquefiable soil in the CPTs so that soil samples could be obtained at those depths. The soil samples were collected with hollow stem auger drilling equipment and reexamined in the office for soil classifications, and representative samples were selected for laboratory testing. The drilled holes were also backfilled with cement group per SFDPH requirements.



# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 6*

## **3.1.3 Laboratory Testing**

The soil samples collected from the field exploration program were re-examined in the office for soil classifications, and representative samples were selected for laboratory testing. The laboratory testing program was designed to evaluate engineering properties of the soil at SWL337. Samples were tested to measure moisture content, dry density, plasticity, gradation, shear strength, compressibility, and corrosion characteristics. The results of the laboratory testing are shown on the boring logs and presented in Appendix C as Figures C-1 through C-25. The corrosion test results are presented in Appendix D.

An in-situ vane shear test was performed by Pitcher Drilling next to BSW337-14 to estimate the shear strength of the Bay Mud. The results of the vane shear test and detailed report are presented in Appendix E.

## **3.2 Previous Investigations**

The SWL337 site subsurface conditions were explored in 2011 by drilling five borings, designated BSWL337-1 through BSWL337-5, and six borings, designated as BSWL337-6 through BSWL337-12 in 2016. Additionally, two borings, designated BP48-1 and -2, were drilled near Pier 48 in 2013. The borings were all drilled using truck-mounted, rotary-wash drill rigs provided by Pitcher Drilling Company. The BSWL337 borings were all drilled several feet into bedrock; boring depths ranged from 225 to 270 feet below the existing ground surface. The BP48 borings were advanced through the fill and into Bay Mud to a depth of 56-1/2 feet. Our field engineers logged the borings and obtained samples of the material encountered for visual classification and laboratory testing. In 2013 17 CPTs, designated CSWL337-2 through CSWL337-18, were pushed using a truck mounted CPT rig by Middle Earth Geo Testing Inc. to depths between 12 and 32 feet. The approximate locations of the previous borings and CPTs are shown on Figure 2.

After completion, the borings and CPTs were backfilled with grout consisting of cement, bentonite, and water as required by the SFDPH.

The logs of the borings, CPTs, and laboratory test results from the previous investigations are included in Appendix F.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 7*

## **4.0 SITE AND SUBSURFACE CONDITIONS**

### **4.1 Site Conditions**

Currently, the majority of the SWL337 site is occupied by the Giants Parking Lot A with approximate ground surface elevations varying from Elevation 97 to 100.5 feet<sup>1</sup>. The northwest corner of SWL337 is occupied by restaurants and an outdoor eating area, known as The Yard at Mission Rock. The northern portion of the site is occupied by China Basin Park. A review of historical aerial photograph overlays using Google Earth software indicates there were large warehouse-type structures and what appear to be storage areas present at the site from as early as 1946 until Parking Lot A was constructed in 2000. It is unknown what types of foundations supported these buildings or to what extent they were removed during demolition.

### **4.2 Subsurface Conditions**

Originally, the site was below water in a shallow bay known as Mission Bay. Starting in the 1880s, the Bay was reclaimed by placing fill. Based on historic maps, we believe the majority of the site was reclaimed between 1880 and 1906. Some of the material used to reclaim the site is likely building rubble and debris from the 1906 San Francisco earthquake.

Boring logs from investigations of the site and the site vicinity indicate the site is underlain by approximately 10 to 40 feet of heterogeneous fill which varies in density and, in some areas, contains rubble comprised of brick, rock and debris. The fill is underlain by approximately 39.5 to 71 feet of weak, soft to medium stiff, compressible clay, locally referred to as Bay Mud. Where tested, the Bay Mud at the site appears to be normally consolidated to slightly overconsolidated, which indicates that settlement of the Bay Mud is complete under the weight of existing fill. Fill greater than 25 feet thick was encountered adjacent to fill thinner than about 15 feet, which is indicative of a mud wave. A mud wave can occur when heavy fill loads are placed on the Bay Mud and cause a bearing capacity failure of the Bay Mud. As the Bay Mud fails, the fill sinks into the soil and the Bay Mud pushes up around the failure zone, causing the thick and thin fill soil profile. The mud wave fill material encountered at this site is generally comprised of clayey gravel and gravelly clay.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 8*

The borings drilled at the site indicate the Bay Mud is generally underlain by an older marine clay, known as Old Bay Clay that is about 70.5 to 83 feet thick where explored. Old Bay Clay is typically stiff to very stiff and overconsolidated. A 1- to 36-foot-thick layer of dense to very dense sand with varying amounts of fines was encountered between the Bay Mud and Old Bay Clay in several of the borings and CPTs. We anticipate the sand is present beneath the Bay Mud in other unexplored areas of the site, as well.

Alluvial dense to very dense sand and stiff to hard clay layers were typically encountered below the Old Bay Clay. Based on available borings this sand layer is not present across the entire SWL337 and, where present, varies in thickness, fines content, and density.

The top of the bedrock surface was encountered in borings around the site at depths of about 238.5 to 257 feet below the ground surface. The bedrock surface and quality are expected to vary significantly across the site. Idealized subsurface profiles designated A-A' and B-B' are presented on Figures 3 through 5. Top of Bay Mud, bottom of Bay Mud, and top of bedrock contours across the site are presented on Figures 6, 7, and 8, respectively.

Groundwater was encountered at the site and in the site vicinity approximately 5.5 to 14.5 feet bgs, corresponding to approximate Elevations 84.5 to 94 feet<sup>1</sup>, but has been found within five feet of the ground surface at some sites in Mission Bay. No springs or seepages were observed on site.

## **5.0 GEOLOGY AND SEISMICITY**

Our evaluation of the geology and seismicity of the area is based on our review of published reports and information in our files from other sites in the vicinity.

### **5.1 Regional Geology**

The site is in the northeast portion of the San Francisco peninsula, which lies within the Coast Ranges geomorphic province. The northwesterly trend of ridges and valleys characteristic of the Coast Ranges is obscured in San Francisco, except for features such as Russian Hill,

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<sup>1</sup> Elevations reference Mission Bay datum, which is based on San Francisco City datum (SFCD) plus 100 feet.

# Mayor ED 17-02 Priority permit

Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California

18 December 2018  
Revised 13 June 2019  
750604203  
Page 9

Telegraph Hill, Hunters Point, and Potrero Hill. San Francisco Bay and the northern portion of the peninsula lie within a down-dropped crustal block bounded by the East Bay Hills and the Santa Cruz Mountains. The San Francisco Bay depression resulted from interaction between the major faults of the San Andreas fault zone, particularly the Hayward and San Andreas faults east and west of the bay, respectively (Atwater 1979).

San Francisco's topography is characterized by relatively rugged hills formed by Jurassic- to Cretaceous-aged<sup>2</sup> bedrock (Schlocker 1974). The bedrock consists of highly deformed and fractured sedimentary rocks of the Franciscan complex. The present topography resulted mainly from east-west compression of coastal California during the late Pliocene and Pleistocene<sup>3</sup> epochs (Norris and Webb 1990).

The low-lying areas of the San Francisco peninsula are underlain by Quaternary<sup>4</sup> sediments deposited on eroded Franciscan bedrock. Sediment deposition within the pre-historic<sup>5</sup> bay margin was influenced by oscillating late-Quaternary sea levels that resulted from the advance and retreat of glaciers worldwide.

The resulting sequence of alternating estuarine<sup>6</sup> and terrestrial<sup>7</sup> sediments corresponds to high and low sea-level stands, respectively. In contrast, Quaternary sediments in the plains landward of the bay are predominantly terrestrial.

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<sup>2</sup> The Jurassic and Cretaceous periods spanned the time period from approximately 160 to 70 million years ago.

<sup>3</sup> The Pliocene epoch spans from approximately 5 to 2 million years ago, while the Pleistocene epoch spans from approximately 2 million to 11,000 years ago.

<sup>4</sup> The Quaternary period spans from approximately 2 million years ago to present, and includes the Pleistocene and Holocene epochs.

<sup>5</sup> The present margin of San Francisco Bay is generally located seaward of its original location as a result of extensive land reclamation over the last century.

<sup>6</sup> *Estuarine* sediments typically consist of silt and clay, sometimes rich in organic matter and with occasional sand, deposited in inland marine areas affected by fresh water. Represents present environment of San Francisco Bay and includes the bay and adjacent tidal marshlands.

<sup>7</sup> *Terrestrial* sediments generally consist of variable mixtures of clay, silt, sand and gravel deposited by rivers and streams ("alluvial deposits" or "alluvium"), and fine sand deposits deposited by wind ("eolian deposits" such as dune sands).

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 10*

By late Pleistocene time, the high sea level associated with the Sangamon (about 125,000 years ago) interglacial resulted in deposition of the Yerba Buena Mud (Sloan 1992). Also known locally as "Old Bay Clay", the Yerba Buena Mud was deposited in an estuarine environment similar in character and extent to the present bay. Sea level lowering associated with the onset of Wisconsin glaciation exposed the bay floor and resulted in terrestrial sedimentation, such as the Colma formation, on the Yerba Buena Mud. Sea level rose again starting roughly 20,000 years ago, fed by the melting of Wisconsin-age glaciers.

The sea re-entered the Golden Gate about 10,000 years ago (Atwater 1979). Inundation of the present bay resulted in deposition of estuarine sediments, called Bay Mud, which continue to accumulate.

Historical development of the San Francisco Bay area resulted in placement of artificial fill material over substantial portions of modern estuaries, marshlands, tributaries, and creek beds in an effort to reclaim land (Nichols and Wright 1971).

Potrero Hill immediately southwest of the site is comprised of serpentinite. The serpentinite bedrock is associated with ancient shear zones within and bounding portions of the Franciscan Complex bedrock units. The shear zones generally consist of a mixture of hard blocks of bedrock, from less than an inch to 25 feet or more in diameter, contained within a matrix of soft, intensely sheared shale. Serpentinite is the most common rock type; however, hydrothermally altered rocks such as calc-silicate compositions are common locally.

The bedrock underlying Mission Bay predominantly consists of sandstone, serpentinite, greenstone, chert, and shale. It is covered by colluvium and marine deposits. Fill of highly variable quality and density blankets the site.

## **5.2 Regional Seismicity and Faulting**

The major active faults in the area are the San Andreas, San Gregorio, Hayward, and Calaveras faults. These and other faults of the region are shown on Figure 9. For each of the active faults, the distance from the site and estimated mean characteristic moment magnitude<sup>8</sup> [2007 Working

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<sup>8</sup> Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

# Mayor ED 17-02 Priority permit

Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California

18 December 2018  
Revised 13 June 2019  
750604203  
Page 11

Group on California Earthquake Probabilities (WGCEP 2008) and Cao et al. (2003)] are summarized in Table 1.

**TABLE 1**  
**Regional Faults and Seismicity**

| <b>Fault Segment</b>                  | <b>Approx.<br/>Distance from<br/>fault (km)</b> | <b>Direction<br/>from Site</b> | <b>Mean<br/>Characteristic<br/>Moment<br/>Magnitude</b> |
|---------------------------------------|---|--------------------------------|---|
| N. San Andreas – Peninsula            | 13  | West                           | 7.23  |
| N. San Andreas (1906 event)           | 13  | West                           | 8.05  |
| Total Hayward                         | 16  | East                           | 7.00  |
| Total Hayward-Rodgers Creek           | 16  | East                           | 7.33  |
| N. San Andreas – North Coast          | 16  | West                           | 7.51  |
| San Gregorio Connected                | 19  | West                           | 7.50  |
| Mount Diablo Thrust                   | 33  | East                           | 6.70  |
| Total Calaveras                       | 34  | East                           | 7.03  |
| Rodgers Creek                         | 35  | North                          | 7.07  |
| Green Valley Connected                | 38  | East                           | 6.80  |
| Monte Vista-Shannon                   | 39  | Southeast                      | 6.50  |
| Point Reyes                           | 43  | West                           | 6.90  |
| West Napa                             | 45  | Northeast                      | 6.70  |
| Greenville Connected                  | 50  | East                           | 7.00  |
| Great Valley 5, Pittsburg Kirby Hills | 55  | East                           | 6.70  |
| Great Valley 4b, Gordon Valley        | 70  | Northeast                      | 6.80  |
| N. San Andreas – Santa Cruz           | 75  | Southeast                      | 7.12  |
| Great Valley 7                        | 76  | East                           | 6.90  |
| Hunting Creek-Berryessa               | 77  | North                          | 7.10  |
| Zayante-Vergeles                      | 85  | Southeast                      | 7.00  |
| Great Valley 4a, Trout Creek          | 91  | Northeast                      | 6.60  |
| Maacama-Garberville                   | 93  | North                          | 7.40  |
| Monterey Bay-Tularcitos               | 98  | South                          | 7.30  |

# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 12*

Figure 9 also shows the earthquake epicenters for events with magnitude greater than 5.0 from January 1800 through August 2014. Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836 an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale (Figure 10) occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated Moment magnitude,  $M_w$ , for this earthquake is about 6.25. In 1838, an earthquake occurred with an estimated intensity of about VIII-IX (MM), corresponding to an  $M_w$  of about 7.5. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 kilometers in length. It had a maximum intensity of XI (MM), an  $M_w$  of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The Loma Prieta Earthquake occurred on 17 October 1989, in the Santa Cruz Mountains with an  $M_w$  of 6.9, approximately 94 kilometers from the site. In 1868 an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated  $M_w$  for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably an  $M_w$  of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake ( $M_w = 6.2$ ). The most recent significant earthquake to be felt in the Bay Area occurred on 24 August 2014 and was located on the West Napa fault ( $M_w = 6.0$ ).

The 2014 WGCEP (2015 report) at the U.S. Geologic Survey (USGS) predicted a 72 percent chance of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay Area in 30 years. More specific estimates of the probabilities for different faults in the Bay Area are presented in Table 2.



# Mayor ED 17-02 Priority permit

Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California

18 December 2018  
Revised 13 June 2019  
750604203  
Page 13

**TABLE 2**  
**WGCEP (2015) Estimates of 30-Year Probability**  
**of a Magnitude 6.7 or Greater Earthquake**

| <b>Fault</b>          | <b>Probability<br/>(percent)</b> |
|-----------------------|----------------------------------|
| Hayward-Rodgers Creek | 32                               |
| N. San Andreas        | 33                               |
| Calaveras             | 25                               |
| Green Valley          | 7                                |
| San Gregorio          | 6                                |
| Greenville            | 6                                |
| Mount Diablo Trust    | 4                                |

## 6.0 GEOLOGIC HAZARDS

During a major earthquake, strong to violent ground shaking is expected to occur at the project site. Strong ground shaking during an earthquake can result in ground failure such as that associated with soil liquefaction,<sup>9</sup> lateral spreading,<sup>10</sup> and seismic densification<sup>11</sup>. Each of these conditions has been evaluated based on our literature review, field investigations and analysis, and is discussed in this section.

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<sup>9</sup> Liquefaction is a phenomenon in which saturated (submerged), cohesionless soil experiences a temporary loss of strength because of the buildup of excess pore water pressure, especially during cyclic loading such as those induced by earthquake. Soils most susceptible to liquefaction are loose, clean, saturated, uniformly graded, fine-grained sand.

<sup>10</sup> Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

<sup>11</sup> Seismic densification (also referred to as Differential Compaction) is a phenomenon in which non-saturated, cohesionless soil is densified by earthquake vibrations, causing ground-surface settlement.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 14*

## **6.1 Liquefaction**

When a saturated soil with little to no cohesion liquefies during a major earthquake, it experiences a temporary loss of strength as a result of a transient rise in pore water pressure generated by strong ground motion. Flow failure, lateral spreading, differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction. The site is within a liquefaction hazard zone as designated by the California Geological Survey (CGS) seismic hazard zone map for the area titled State of California Seismic Hazard Zones, City and County of San Francisco, Official Map, dated 17 November 2001.

CGS has recommended the content for site investigation reports within seismic hazard zones be performed in accordance with Special Publication 117A titled Guidelines for Evaluating and Mitigating Seismic Hazard Zones in California, dated September 11, 2008. Our evaluation of site seismic hazards was performed in general accordance with these guidelines.

Borings and CPTs at and near the site encountered loose to medium dense sand and gravel layers with varying silt and clay content just above or below the water table between depths of 5 to 31.5 feet bgs, corresponding to Elevations 94 to 61.5 feet, respectively. The combined layer thicknesses at any individual location ranged from about ½ to 9.5 feet thick. The results of our studies indicate these sand and gravel layers could liquefy during a major earthquake. Using the Tokimatsu and Seed (1987) method for evaluating earthquake-induced liquefaction settlement, we estimate settlement ranging from less than an inch to approximately 5 inches may occur, depending upon the layer thickness and relative density. This settlement is expected to be erratic and vary significantly across the site.

Based on the available historical observation of liquefaction and lateral spreading near the site during the 1906 Earthquake and the 1989 Loma Prieta Earthquake, the shallow groundwater table and the relatively shallow liquefiable deposits at the site, we believe that ground failure, such as lurch cracking and/or the development of sand boils, could occur. The ground surface settlement will likely be larger than estimated above the areas where sand boils and associated ground failures occur.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 15*

## **6.2 Lateral Spreading**

Lateral spreading is a phenomenon in which a surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. The surficial blocks are transported downslope or in the direction of a free face, such as a bay, by earthquake and gravitational forces. Lateral spreading is generally the most pervasive and damaging type of liquefaction-induced ground failure generated by earthquakes.

We evaluated the potential for lateral spreading at the site using an empirical relationship developed by Youd, Hansen, and Bartlett (2002). This relationship incorporates the thickness of the liquefiable layer with corrected blow counts  $(N_1)_{60}$  less than 15; the fines content and mean grain-size diameter of the liquefiable soil; the relative density of the liquefiable soil; the magnitude and distance of the earthquake from the site; the slope of the ground surface; and, boundary conditions, such as a free face to estimate the horizontal ground movement. The fill along China Basin Channel and the San Francisco Bay shoreline could liquefy during a major earthquake, resulting in horizontal movements which could also trigger horizontal movements in localized areas within SWL337 where liquefiable soil is present. Using the Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacements (Youd et al. 2002) method to calculate the potential for lateral spreading, we estimate four to six feet of lateral displacement could occur within the localized areas during a large earthquake (Moment Magnitude 7.0 or greater).

In addition, deep seated slope failure within Bay Mud could occur along the San Francisco Bay shoreline during the design earthquake. Seismic slope stability and deformation was not analyzed during this investigation and will be checked during a later investigation.

## **6.3 Seismic Densification**

Seismic densification can also occur during strong ground shaking in loose, clean granular deposits above the water table, resulting in ground surface settlement. In general, granular deposits encountered above the groundwater table were dense or clayey, and therefore, we judge the potential for seismic densification is low.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 16*

## **6.4 Tsunami**

According to published data (URS Blume, 1974) the maximum recorded run-up (tsunami wave) at the Presidio occurred after the 1964 Alaskan earthquake. The wave measured 7.5 feet at the Golden Gate; no damage was reported along the San Francisco shoreline. Based on recent published maps (California Emergency Management Agency (CEMA), 2009), the eastern property line borders the limits of the tsunami inundation area. The tsunami inundation areas presented on the CEMA map “represents the maximum considered tsunami run-up from a number of extreme, yet realistic tsunami sources.” In addition, the map notes that tsunami events are rare, and due to a lack of known occurrences in historic records, the map does not include information about the probability of a tsunami affecting an area within a specific period of time.

## **6.5 Fault Rupture**

Published data indicate neither known active faults nor extensions of active faults exist beneath the site. Therefore, we conclude the potential of surface rupture at the site is low.

## **7.0 DISCUSSION AND CONCLUSIONS**

Geotechnical issues of concern that should be addressed during the design of the streets include:

- static and seismic settlement
- potential for soil liquefaction and lateral spreading
- seismic slope instability and lateral deformation along San Francisco Bay shoreline (this item should be addressed during a future phase of geotechnical study)
- the presence of weak, compressible soils
- hydrostatic uplift
- soil corrosivity.

Each of these issues is discussed in the following subsections.

# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 17*

## **7.1 Settlement and Settlement Mitigation**

### 7.1.1 Settlement and Mitigation Options

The results of consolidation testing indicate the Bay Mud is generally normally consolidated to slightly overconsolidated. Accordingly, we judge consolidation is complete under the existing fill loads that were placed in the late 1800s to early 1900s. These results are consistent with the thickness of the Bay Mud, the length of time the fill has been in place, and the history of site use. Therefore, primary settlement is complete under the weight of the existing fill and secondary compression (strain-related movements) is occurring. However some settlement has been observed and is expected to continue at and adjacent to where the grades were recently raised (since 1997) at Mission Rock Street and 3<sup>rd</sup> Street.

Based on our understanding of the project, the site grades, in general, will be raised approximately 4 to 5.5 feet. The loads from this new fill would start a new round of consolidation settlement in the underlying Bay Mud. We estimate up to 22 inches of settlement would occur under the streets, which is unacceptable for the project requirements. Therefore, the project team has evaluated various options to mitigate settlement in the streets due to raising site grades, such that anticipated differential settlements between pile-supported buildings and streets would be on the order of 1-1/2 inches or less. A brief overview of each is provided below:

- Structured streets (buried concrete structures/boxes with walls and floors) supported on piles
  - Driven steel H-piles bearing in bedrock used for vertical and lateral support of the structured street box.
  - 24-inch-diameter, driven steel pipe piles embedded sufficiently to achieve pile fixity for additional lateral support of the box.
  - Stone columns installed to mitigate liquefaction and lateral spreading.
  - The box would be filled with soil and utilities installed within the soil matrix.
- Structured streets supported on deep soil mixed (DSM) ground
  - DSM as vertical load transfer elements, as well as ground improvement to mitigate settlement, liquefaction and lateral spreading.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 18*

- DSM extending 12 feet below the bottom of Bay Mud.
  - DSM elements would be keyed into the box in order to provide shear transfer and resistance.
- On-grade streets with surcharge and wick drains
  - Surcharge loading and wick drains placed for a sufficient length of time to pre-consolidate the Bay Mud beneath the streets such that less than 1-1/2 inches of settlement would remain.
  - Stone columns would be installed to mitigate liquefaction and lateral spreading of the fill
- On-grade streets with compensating lightweight fill (LWF)
  - Overexcavation to a certain depth and replacing and raising grades using LWF to compensate for the weight of additional loads from raising site grades, i.e. no new net loading.
  - Lightweight cellular concrete (LCC) would be used as the LWF.
  - Utilities would be placed within the cellular concrete.
  - Structural soil fill would be used instead of the cellular concrete in landscaping and tree-planting areas along the sides of the streets – additional load compensation will be provided here to achieve no new net loading.
  - Stone columns would be installed to mitigate liquefaction and lateral spreading of the fill remaining below the LWF section.

After evaluation of these options, we understand that the team has selected the option of on-grade streets with compensating lightweight fill. This option is discussed in the remainder of the report. The remaining options are discussed in Appendix G through I.

# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 19*

## 7.1.2 Settlement Mitigation Using Lightweight Cellular Concrete

We have performed settlement analysis using the software Settle 3D. Our Settle 3D model considers:

- 1) Settlement is complete under the weight of the existing fill that was placed by the early 1900's.
- 2) Up to 1-1/2 feet of fill was placed along the southern 700 feet of Third Street adjacent to SWL337 in 1997.
- 3) Up to 4-1/2 feet of fill was placed along Mission Rock Street adjacent to SWL337 in 2008.
- 4) Excavations of the existing fill for new LCC sections stay open for a period of one month.
- 5) Groundwater levels and sea level rise discussed in Section 7.2 and 7.4.
- 6) LCC, soil, and other densities and assumptions discussed in Section 7.4.
- 7) LCC and other fill materials (street pavement, structural soil, trees, utilities, bedding/shading, light poles, etc.) above the LCC weigh 10 percent less than the weight of excavated material.

Based on the results of our Settle 3D analysis, we estimate about ¼ to 1 inch of heave (upward movement) could occur at the site if the excavations are open for a period of one month. After the new LWF and other fill materials are placed, the majority of the observed heave caused by the excavations is recompressed, leaving the potential for approximately ¼ to ½ inch of heave from the original site grades. This heave is expected to occur during LCC placement and before streets are paved; therefore, we do not anticipate long term heave to occur at the site due to the new LWF. However, because of sea level rise, the long term groundwater level is anticipated to rise approximately 5.5 feet, which will reduce the stresses in the Bay Mud and could cause ground heave. Our analysis estimates about ½ to 1½ inch of heave could occur across the site associated with the higher groundwater level.

Because the Mission Rock Street and Third Street grades have been recently raised, we estimate approximately 2 to 3 inches of settlement will occur at Mission Rock Street and up to 1 inch of settlement will occur at Third Street. The additional pressure from raising the grades in the streets will cause an increase in pressure in the Bay Mud within the site. Based on our analysis, the



# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 20*

raising of grades in the adjacent streets will cause settlement within the site as much as 75 feet north of the Mission Rock ROW and 50 feet east of the Third Street ROW. The settlement will decrease with distance from the streets. The LWF fill in these areas will allow for a more gradual differential settlement as opposed to a pile-supported street, where the differential settlement would be abrupt.

## **7.2 Groundwater**

The groundwater level was encountered between Elevation 84.5 to 94 feet during our investigation. In other borings drilled in the surrounding Mission Bay area, groundwater has been encountered several feet higher. The groundwater elevation is likely influenced by tidal fluctuations, as well as by wet and dry seasons and sea level rise. For lightweight fill analysis, we used groundwater at Elevation 94 feet, which is the observed highest groundwater level. Due to predicted sea level rise (SLR), for design purposes, we consider the future high groundwater level could potentially rise to an Elevation of 99.5 feet. This elevation was selected by the team after considering the following:

1. The 2100 estimate of SLR based on equations following FEMA guidelines and adding to the high observed groundwater level to obtain:
  - a. a mean SLR of 36 inches (mid-range SLR to Elevation 97 feet)
  - b. a high SLR of 66 inches (high-range SLR to Elevation 99.5 feet)
2. A decision by the team to design for the estimated high-range SLR
3. A conservative assumption that the high groundwater level within the site could be the same as the estimated high-range SLR

The deeper excavations for the compensating lightweight fill, in areas with grade changes greater than about two feet, will extend below the design groundwater table; therefore, where encountered, groundwater will need to be lowered to below excavation during construction. The rate of groundwater flow through the fill is anticipated to be high; however, the rate of groundwater flow through the Bay Mud will be low. It will be difficult, if not impossible, to lower the groundwater below the surface of Bay Mud. Although it is not expected that excavations will

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 21*

extend into the Bay Mud, if they do, the contractor should be prepared to discharge of water within the excavation. In addition to dewatering wells, localized sumps and pumps could be used for dewatering and managing groundwater conditions during excavation.

## **7.3 Soil Corrosivity**

On the basis of laboratory test results, the near-surface soil was determined to be moderately corrosive to severely corrosive, and may adversely affect below grade improvements, such as foundations and utilities. The results of the tests and more specific commentary and recommendations for protection of buried structures are presented in a report by JDH in Appendix D. A corrosion engineer should be engaged as needed to provide specific recommendations for design.

## **7.4 Compensating Lightweight Fill**

To offset the additional weight caused by raising the site as much as 5-1/2 feet for the new street sections, this selected alternative considers removing existing fill to a certain depth and replacing that section and building up the ROW using lightweight fill composed of cellular concrete. Cellular concrete is a low density material that is a mixture of cement, water, and foam. Within the new 60-foot-wide ROW, there will be new utilities, streets, sidewalks, light poles, and tree planting areas between the blocks to be developed. Cellular concrete is adequate for support of the improvements listed above in the new ROW if the cellular concrete has the appropriate compressive strength. In addition, it can be excavated using standard equipment for future improvements (provided the cellular concrete is not too strong) and can be excavated in vertical cuts. Therefore, it is beneficial for future work in the streets.

To determine the depth of overexcavation needed to fully offset the new loads, the loads from new utilities (filled with water) with bedding and shading around them, the street and sidewalk sections (concrete and base sections), trees, light poles, tree-planting soil, and other collateral loading will be included when calculating the total new composite replacement section loads.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 22*

The following are some of the assumptions considered in calculating the required depth of the compensating LWF section:

- The observed high groundwater level is Elevation 94 feet.
- The future (year 2100) mid-range groundwater level of Elevation 97 feet and high-range groundwater level of 99.5 feet.
- The unit weight of brackish groundwater is 63 pounds per cubic foot (pcf).
- The cured unit weight of the closed cell (impermeable) LCC is 33 pcf with a minimum compressive strength of 80 pounds per square inch (psi); these values are typical for Caltrans Class III LCC. The closed cell LCC will be placed above Elevation 99.5 feet.
- The cured unit weight of the open cell (porous) LCC is 27 pcf with a minimum compressive strength of 40 psi. The open cell LCC will be placed below Elevation 99.5 feet.
- The saturated unit weight of porous LCC below groundwater is 79 pcf and the buoyant unit weight is 16 pcf, which is 79 pcf minus 63 pcf.
- The unit weight of the existing fill varies from 110 (very loose sand) to 140 pcf (concrete and brick debris), with an average of approximately 130 pcf; a unit weight of 125 pcf is recommended to be conservative for load offset calculations.
- The pavement section is comprised of 8 inches of Portland cement concrete overlain by 4 inches of asphalt concrete, both with a unit weight of approximately 150 pcf.
- The structural soil has a unit weight of 110 pcf and will be used in the planter strips section over a 7-foot-wide section to a depth of 6 feet.
- Stone columns, where installed below the LCC section, will increase the overall unit weight of the improved fill section by an average of 10 pcf. This value is based on the soil density results of pre- and post-stone column improvement from test section CPTs on nearby projects.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 23*

The thickness of fill varies across the site from 10 to 40 feet. It is hard to predict where the fill is relatively thin; the new LCC section may extend into the Bay Mud (thin fill section), however, based on the available subsurface data, it appears overexcavation for the new LCC section will not extend into Bay Mud.

The depth of the lightweight fill section should be determined such that the effective weight removed will be at least 10 percent more than the new composite replacement section effective weight; thus, there should be a “factor of safety” for net unloading (removed load/new load) of at least 1.1. We judge that, in utilizing this approach, there would be a net unloading of the Bay Mud and, the potential for inducing an additional cycle of primary consolidation will be nil. In addition, the net unloading would terminate the ongoing secondary compression settlement of the Bay Mud under existing fill load. The 10 percent margin also accounts for the variability of existing fill weight; there is still a factor of safety greater than 1.0 (i.e. a net unload) even if the fill in some areas of the site has a total unit weight as low as 110 pcf.

In addition to checking the factor of safety for net unloading, we considered the following: the new lightweight section 1) will not become buoyant (i.e. be subject to hydrostatic uplift) and 2) will have adequate compressive strength and not be subject to crushing failure under the weight of material above it. To prevent hydrostatic uplift, open cell (porous) LCC will be used below the future high water level of 99.5 feet. The open cell LCC will allow water to flow through the material, preventing hydrostatic pressure from building up at the bottom of the LCC section. For the crushing check, we are considering the actual applied load of the new LCC section at the time of placement, which is the heaviest it will ever be, and are considering the minimum compressive strength of 40 psi. Below is a table with a summary of the unit weights/densities used in the analysis. We note that the values used are the conservative densities for all analysis cases considered and discussed above.

# Mayor ED 17-02 Priority permit

Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California

18 December 2018  
Revised 13 June 2019  
750604203  
Page 24

**TABLE 3**  
**Summary of Densities for Analysis**

| <b>Material</b>                                      | <b>Load Compensation (pcf)</b>                                      | <b>Hydrostatic Uplift (pcf)</b>                 | <b>Crushing (pcf)</b>   |
|--|---|---|---|
| Closed Cell LCC above Elevation 99.5 feet            | Dry density = 33  | Dry density = 33                                | Dry density = 33  |
| Open Cell LCC above Elevation 94 feet                | Dry density = 27  | N/A (Open cell LCC prevents hydrostatic uplift) | Dry density = 27  |
| Open Cell LCC below Elevation 94 feet                | Extreme saturated density less density of water<br>$= 79 - 63 = 16$ | N/A (Open cell LCC prevents hydrostatic uplift) | Extreme saturated density less density of water<br>$= 79 - 63 = 16$ |
| Existing soil above groundwater                      | Total density = 125   | N/A   | N/A   |
| Existing soil below groundwater                      | Saturated density less density of water<br>$= 125 - 63 = 62$        | N/A   | N/A   |
| Other loads (pavement, structural soil, trees, etc.) | Actual weight of each material                                      | Actual weight of each material                  | Actual weight of each material                                      |

Our calculations indicate that to balance out raising the grades with soil and concrete, approximately one foot of existing fill will need to be removed for every 3.5 feet of cellular concrete added above the future design groundwater level (125 pcf / 33 pcf). Below the future design groundwater table, approximately one foot of existing fill below existing groundwater table will need to be replaced for every 3.0 feet of saturated cellular concrete (62 pcf / 16 pcf). If the compensated lightweight fill section extends below the existing fill into the Bay Mud, approximately one foot of Bay Mud will need to be removed for every 1.5 feet of saturated cellular concrete placed  $((95 \text{ pcf} - 63 \text{ pcf}) / 16 \text{ pcf})$ .

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 25*

A typical schematic section developed by the team that shows utilities and planter areas with LCC, and stone columns is presented on Figure 11. At this point we do not anticipate many, if any; LCC sections will extend into the Bay Mud. Appendix J presents a site plan and transverse (T) and longitudinal (L) sections through different areas of the streets presenting the LCC sections. Appendix J also includes spreadsheets with our calculations for the required overexcavation for net unloading and resistance to uplift and crushing for these transverse and longitudinal sections. The information presented in the spreadsheets includes assumptions used in the analysis and demonstrates that adequate factors of safety are calculated considering net unloading, hydrostatic uplift, and crushing conditions.

The compensating LCC could be placed to the perimeter of the site, as there would be no effect on the adjacent streets or other improvements because no additional loads are placed. We understand grades and utility locations and inverts are still being adjusted slightly (+/- 0.5 feet) and are not final. Once these are finalized, we will perform final calculations and present recommendations for final design and construction.

## **7.5 Ground Improvement**

While some of the loose to medium dense sand and gravel layers that are susceptible to liquefaction will be removed (and replaced with cellular concrete) beneath the streets, potentially liquefiable soils will still remain under the majority of the street areas. If liquefaction occurs, settlement of the fill could be on the order of 3 inches. Where fill remains below the new LWF section, these potentially liquefiable soils should be improved to mitigate the potential for liquefaction. On the basis of our experience with different methods of ground improvement and discussion with the design team, we judge that an appropriate method to improve the ground to mitigate liquefaction potential is stone columns.

Installation of stone columns is a ground improvement technique that results in in-situ densification of granular soil. Stone column installation is accomplished using a vibrating probe that is inserted to the desired depth of improvement, displacing and densifying the soil, and is then withdrawn while backfilling with gravel. The gravel is compacted while withdrawing the

# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 26*

probe, leaving a dense stone column typically 3 to 4 feet in diameter surrounded by densified soil. Stone columns also serve as drains to allow dissipation of pore pressures which could develop in adjacent soil during an earthquake.

Installation of stone columns could cause ground heave and/or settlement. Therefore, the site will likely require regrading. Placement of typical fill to bring improved areas to grade would cause additional consolidation of the Bay Mud; however, all fill placed will be LWF to offset loads.

The use of stone columns will increase the overall weight of the fill that it improves; therefore, more overexcavation and replacing with cellular concrete may be needed in some areas to offset the additional weight of the stone columns. As described in Section 7.4, we are using an increase in density of 10 pcf for the fill layers being improved by stone columns in the unload check.

Field verification of the level of ground improvement is necessary to check that the improved conditions meet the desired results.

## **7.6 Excavation, Temporary Slopes, and Shoring**

Where there is not sufficient room to allow temporary, sloped cuts and where excavations extend into Bay Mud, the excavations should be retained by shoring. We understand the plan at this time is to temporarily slope the sides of the excavation and not use shoring. Should shoring be required, we should be consulted to provide parameters and recommendations for its design.

## **7.7 China Basin Park Design Considerations**

### 7.7.1 Settlement, Liquefaction/Lateral Spreading, and Ground Improvement

We understand that the grades for the China Basin Park will be raised several feet. To prevent excessive settlement of the Bay Mud caused by raising grades, the same technique of offsetting new loads with LCC, as discussed in Section 7.4, can also be used here. We understand geofoam is also being considered to offset the weight of new fill.

As discussed in Section 6.2, we anticipate the fill along China Basin Channel (China Basin Park) in the northern portion of the site could liquefy during a major earthquake. This liquefaction could result in horizontal movements on the order of several feet in localized areas within



# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 27*

SWL337. It should be noted that liquefaction, lateral spreading and seismic slope stability have not been specifically studied in the China Basin Park area. These studies will be performed prior to final design and construction.

Ground improvement could be implemented to mitigate the potential for lateral spreading; however, based on discussions with the development team, we understand that because the proposed development will be a park, these seismic hazards will not be mitigated. We understand that performing post-earthquake repairs and maintenance is judged to be a more cost-efficient approach. This approach is consistent with the design approach of other parks recently constructed in Mission Bay along the China Basin Channel, as well as other shoreline park areas in the City. Stone columns will be used, however, to improve the ground at The Promenade just south of the park, as it is desired to maintain its integrity after a seismic event.

## 7.7.2 Shoreline Slope Stability

The stability of the existing shoreline north of China Basin Park was evaluated using the results of our field and previous field explorations, bathymetric survey data<sup>12</sup> of the China Basin Channel, geologic interpretation, and engineering analyses. We developed two idealized subsurface profiles along the shoreline, designated Profile 1 and Profile 2, considering the proposed final grades at the park, as shown in Appendix K, Figure K-1. We created simplified two-dimensional models of each soil profile at each section, as shown on Figures K-2 and K-5.

We used the computer program Slope/W (version 9.1.1.16749) by Geo-Slope International, Ltd. (2018) in our analyses. Factors of safety<sup>13</sup> were computed using Spencer's Method, a two-dimensional, limit equilibrium method. Given various parameters, the program internally searched for the most critical failure surface, i.e. lowest factor of safety. We analyzed the stability under static and seismic conditions. For seismic conditions, we used a pseudo-static approach as described below. We also analyzed post-liquefaction stability.

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<sup>12</sup> Bathymetric survey titled "Port of San Francisco, China Basin" prepared by eTrac Engineering, LLC, dated 10 May 2012.

<sup>13</sup> The factor of safety is the ratio of the available resistance to sliding divided by the driving force; the higher the factor of safety, the more stable the slope.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 28*

The engineering properties of the fill, Bay Mud, and Colma Formation used in our stability analyses were based on the results of our field and previous field investigations in the site vicinity, laboratory testing, and engineering judgment. The engineering properties used in the stability analyses, for both static and post-liquefaction conditions are presented in the tables on Figures K-2 through K-5. Appendix K presents specific slope stability results from our analyses for static and post-liquefaction conditions. Each profile was modeled with the groundwater level at Elevation 95 feet and the future high groundwater at Elevation 99.5 feet. It was determined that as the groundwater level rises the slope becomes more stable because the soil inland of the slope becomes more buoyant, resulting in less of a driving force.

Based on the results of our slope stability analyses, we estimate the factor of safety of the critical failure surface under static conditions is approximately 1.3 and 1.4 for Profile 1 and 2, respectively, with the critical failure surfaces presented on Figures K-2 and K-3.

The loose to medium dense sandy fill below the groundwater will likely liquefy in a major seismic event, resulting in significant loss of shear strength within this zone. Therefore, we also performed static slope stability analyses using post-liquefaction residual strengths within the fill below the water table. The post-liquefaction residual strength used in our analyses was correlated from SPT blowcounts using data from various researchers, as summarized by Boulanger & Idriss (2008). The results of our post-liquefaction slope stability analysis for Profile 1 and Profile 2 are presented in Figures K-4 and K-5, respectively. The factor of safety for the post-liquefaction condition is at or just above 1.0, which indicates slope failure is likely to occur following a major earthquake.

We used a pseudo-static approach to evaluate the seismic slope deformation of the two profiles. During a seismic event, the results of our analysis indicate the factor of safety of the slope drops below 1.0, which could result in slope movement. To evaluate the magnitude of the slope movement, we computed slope deformations during a seismic event using Bray and Travarasrou Method (2007). We determined the yield acceleration needed to lower the factor of safety to 1.0, and compared the yield acceleration with the expected accelerations caused by the earthquake. We determined the yield acceleration to be between 0.01g and 0.05g and, using the spectral acceleration at 1.5 second, of 0.89g from site response analysis previously performed for the site, we estimate several feet of displacement may occur at the northern edge of the site. Based

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 29*

on empirical data of lateral spread displacements with distance from a waterfront, the maximum horizontal ground displacement at the shoreline decreases with distance from the shoreline. In addition, the Phase 1 vertical and horizontal development will include ground improvement, therefore the displacements should not pose a risk to the vertical development south of the park.

Future analysis will be performed on the structures within the park to determine the appropriate approach for foundation support and if ground improvement is needed locally to provide adequate structural performance. The results of this analysis will be presented in an addendum to this report.

## **7.8 Construction Considerations**

The fill soil at the site consists mainly of sand, gravel and clay that can be excavated with conventional earth-moving equipment such as loaders and backhoes. Brick, rock, concrete, old foundations and other building rubble may be encountered in the fill. Boulders and cobbles are likely present. Excavation may be difficult in some areas of the site.

## **8.0 RECOMMENDATIONS**

From a geotechnical standpoint, we conclude the streets can be constructed as planned, provided the recommendations presented herein are incorporated into the design and contract documents and are implemented during construction. Criteria for ground improvement and compensating lightweight fill, together with recommendations for site preparation and seismic design are presented in this section of the report.

### **8.1 Ground Improvement**

To increase the strength of the fill and mitigate the potential for liquefaction, the fill that remains under the streets should be improved using stone columns. The ground improvement should be installed by a licensed, specialty contractor experienced in this type of work, who will design the ground improvement. The specialty contractor should develop a plan for ground improvement, including a layout, work plan, and test program. We should review the ground improvement submittal and provide construction observation services during installation.

# **Mayor ED 17-02 Priority permit**

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 30*

We recommend the stone columns extend into the Bay Mud below the potentially liquefiable fill and be installed before the compensating lightweight fill is placed.

## **8.1.1 Ground Improvement Quality Control and Requirements**

A qualified, design-build, specialty contractor, who has previously successfully performed stone columns ground improvement in similar subsurface soil conditions, should perform the design, installation, and testing. We recommend the contractor be presented with our recommendations and the results of our site exploration. The contractor should design the ground improvement, including the installation methodology, techniques, equipment, and the size and spacing of the stone column elements, to adequately mitigate liquefaction potential. We should be retained to provide technical input and review the design prior to construction.

We recommend a preliminary study with test sections in at least two locations be implemented. Pre- and post-improvement CPTs should be performed to confirm that levels of improvement met the criteria. At proposed development parcel G, CPTs have already been advanced in a proposed test section area. Specifically, SC-1 through SC-4 and C23-A through -D, were advanced in Parcel G. Post-improvement CPTs should show that sufficient improvement of the soil between columns has been accomplished such that liquefaction potential has been mitigated. Vibration monitoring should be performed during installation of the stone column test sections. The vibration levels should be assessed to determine if there is a potential for damage to adjacent improvements and if construction setbacks will be necessary.

We should review the ground improvement contractor's submittals for the proposed test sections. We recommend post-improvement CPTs be advanced a minimum of two weeks after the stone columns in the test sections have been completed; a longer time period could be beneficial, to provide time for pore water pressure dissipation, which would give more representative ground improvement results. In addition, we recommend time be included in the construction schedule for the option to install the stone columns with a different spacing or pattern in case the post-improvement CPTs do not show adequate improvement. Improvement of the fill should be verified at the test sections prior to continuing installing stone columns throughout the site.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 31*

We should be involved throughout the ground improvement contractor bidding and selection process and provide additional detailed recommendations and input on specifications and procedures.

## **8.2 Compensating Lightweight Fill**

Based on the compensating fill option chosen by the team, we recommend the load of the proposed improvements and new fill be offset by overexcavating existing soil and replacing and raising grades with lightweight fill. We recommend a net unload/load “factor of safety” of at least 1.1. We also recommend that there be a factor of safety of 1.5 to resistance buoyancy of the new LWF section for the long term mid-range groundwater elevation of 97 feet and approximately 1.1 for the long term high-range groundwater elevation of 99.5 feet. The compensating LCC should have a maximum cured unit weight of 33 pcf and 27 pcf and a minimum compressive strength of 80 psi and 40 psi for closed cell LCC and open cell LCC, respectively. The maximum strength should be determined so that later excavations through the LCC can be performed with standard excavation equipment. Once the actual material is selected and final grading and utility plans are available, we should recalculate and work with the team to develop the final sections and lightweight fill depths.

On a preliminary basis, at the perimeter of the site, we recommend overexcavating 4 feet and increasing the overexcavation to the maximum overexcavation depth approximately 50 to 70 feet from the site perimeter. Further analysis is needed to confirm the dimensions, but these values should be adequate for initial cost estimating.

Overexcavations should be free of slough prior to placement of the cellular concrete. Overexcavations should be temporarily dewatered because the cellular concrete is less dense than water and could float. As the cellular concrete is placed groundwater should be sufficiently lowered until there is enough weight of cellular concrete to prevent it from becoming buoyant.

The compressive strength and unit weights of the cellular concrete should be controlled and checked during and after the installation process. The unit weight should be measured and samples should be obtained for unconfined compression testing. All cellular concrete that does not meet the specifications should be removed and replaced at no cost to the owner.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 32*

For informational purposes, an example specification from Caltrans that outlines the quality control for cellular concrete installation is included in Appendix L. A detailed specification for cellular concrete, tailored to this project should be developed that will be part of the project construction documents.

We note that the use of open cell LCC below the future groundwater level will 1) provide a pervious layer above stone columns and 2) mitigate uplift conditions in general, notably at sections close to 3<sup>rd</sup> Street and Mission Rock Streets, where new fill sections will taper out to match existing grades at the site perimeter.

## **8.3 Excavation and Shoring**

Where space permits, the sides of excavations can be sloped. Temporary excavation slopes should be no steeper than 1½:1 (horizontal to vertical) in the fill above the water table. Where space does not permit a sloped excavation and where excavations are deeper than five feet, shoring will be required. Excavations in Bay Mud, if any, should be shored.

If shoring is used, its design should be checked for base heave. The shoring should be designed for the anticipated depth of excavation. At this time, given the calculated depths of LWF sections and corresponding excavations, we do not anticipate many, if any, sections will extend into Bay Mud, and therefore shoring may not be required. If it is required, we should be consulted to provide design parameters and should review the design before installation.

The design, construction, and performance of a shoring system should be the responsibility of an experienced contractor and should be designed by a structural engineer knowledgeable in this type of construction.

## **8.4 Dewatering**

During excavation the water table within the site should be drawn down to below the bottom of the excavation or to the surface of the Bay Mud, if excavations extend to this layer. Bay Mud has low permeability and is therefore difficult to dewater. Depending on the depth of the excavation, localized dewatering with sumps and pumps may be sufficient to keep free water out of the excavation.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 33*

Groundwater should not be lowered beyond the site limits, or subsidence of the surrounding area could occur due to increases in the stress in the Bay Mud. Groundwater levels outside the excavation and perimeter of the site should be monitored while dewatering is in progress. Should groundwater drawdown be measured, the contractor should be prepared to recharge the groundwater outside the excavation through recharge wells.

We recommend that any dewatering near the perimeter of the site be performed using a cutoff shoring system to prevent or limit any groundwater drawdown under the streets or nearby improvements. If any dewatering is performed at the site, monitoring wells should be installed to observe the water level to confirm the water level is not being lowered beyond the limits of the excavation.

## **8.5 Earthwork**

The excavations should be free of water and slough prior to placement of cellular concrete; because flowable cellular concrete will be placed at the bottom of excavations, no additional subgrade preparation need be performed.

Engineered fill, including structural soil, should be placed in horizontal layers not exceeding eight inches in loose thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction<sup>14</sup>. Fill material besides the structural soil used for planting, should be free of organics, debris, and rocks or lumps larger than four inches in greatest dimension and have a low expansion potential, defined by a liquid limit (LL) less than 40 and a plasticity index (PI) lower than 12. From a geotechnical standpoint, most on-site soil free of organic matter and rocks or lumps larger than four inches in greatest dimension should be suitable for use as fill or backfill provided it is properly moisture conditioned. Bay Mud is not suitable material for use as fill. Samples of all imported fill should be submitted to Langan for testing at least 72 hours before delivery to the site.

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<sup>14</sup> Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557-07 laboratory compaction procedure.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 34*

Backfill against vertical edges of LWF section (in the sloped areas of the excavation) may consist of either on-site suitable material, approved imported fill or cellular concrete. The backfill should be placed in layers of eight-inch maximum thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction.

## **8.6 Utilities**

Utilities should be designed to accommodate the predicted settlement. While our settlement analysis predicts that there will be little settlement at new building/ROW interfaces, because of the variability in materials and possibility for construction activities and foundation installation at the building parcels to disturb the soil at these interfaces and cause some additional settlement, we recommend utilities, and building entrances be designed to accommodate up to 1-1/2 inches of static differential settlement and 1-1/2 inch of heave (upward movement) next to new buildings.

Next to Third Street, an inch of static differential settlement should be designed for in addition to 5 inches of seismically-induced differential settlement, for a total of 6 inches of differential settlement at the street interfaces. Next to Mission Rock Street, 3 inches of static differential settlement should be designed for in addition to 5 inches of seismically-induced differential settlement, for a total of 8 inches of differential settlement at the street interfaces. We recommend that flexible connections be used to accommodate the above differential settlements at 3<sup>rd</sup> Street and Mission Rock street interfaces.

The existing fill is generally corrosive. Corrosion control measures, such as dielectric coated steel and cathodic protection, should be used to protect utility lines. Alternatively, nonmetallic pipes such as PVC may be used (if approved by the City and County of San Francisco) per the recommendations presented in the corrosion study. For more detail, see the recommendations by JDH in Appendix D. A corrosion consultant should be retained during utility design.

The bedding and shading for utility trenches should follow City and County of San Francisco standards. All utility trenches should be backfilled with lightweight fill and placed in accordance with the recommendations in Section 8.2.



# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 35*

## **8.7 Structural Soil**

Structural soil refers to the mixture of rock, soil, organic material, and soil conditioners for the tree wells. We understand structural soil will be placed in discontinuous trenches within the new LWF section for street tree planting. If structural soil is placed in or adjacent to soil then all vertical walls and the bottom of the trenches should be lined with filter fabric to prevent the migration of fines in the soil void spaces surrounding the structural soil. If soil is placed on top of the structural soil, it should be entirely covered with filter fabric as well. The structural soil should be placed in 12-inch thick lifts in loose thickness and compacted. Because of the size of the material (up to 2.5 inches), it will be difficult to develop a laboratory compaction curve in accordance with ASTM standards. Therefore, we recommend a test section be prepared wherein structural soil is placed and compacted. We should obtain several field density tests, after which further compactive effort should be made on the test section. The unit weight should be measured again to evaluate the appropriate "maximum dry density". Once the maximum density is established, the structural soil should be compacted to at least 95 percent of the maximum dry density. The test section may be located in a planned tree trench and used as constructed.

## **9.0 ADDITIONAL GEOTECHNICAL SERVICES**

During final design we should be retained to consult with the design team as geotechnical questions arise. Prior to construction, we should review the project plans and specifications to check their conformance with the intent of our recommendations. We should review ground improvement design and installation submittals, observe ground improvement test section installation, and review results of pre- and post- improvement CPTs. During construction, we should observe site excavation, temporary slopes, shoring installation (if any), installation of production stone columns, and placement of fill, including cellular concrete. These observations will allow us to compare the actual with the anticipated soil and groundwater conditions and to check that the contractors' work conforms to the geotechnical aspects of the plans and specifications.

# ***Mayor ED 17-02 Priority permit***

*Geotechnical Investigation  
Mission Rock Development Streets  
San Francisco, California*

*18 December 2018  
Revised 13 June 2019  
750604203  
Page 36*

## **10.0 LIMITATIONS**

The conclusions and recommendations provided in this report result from our interpretation of the geotechnical conditions existing at the site inferred from a limited number of borings and CPTs as well as information on existing and new grades provided by BKF Engineers. Actual subsurface conditions could vary. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others. Any proposed changes to the grading plans or any other facet of street/ROW construction should be brought to Langan's attention as soon as possible so that we can determine whether such changes affect our recommendations. Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

This report has been prepared to assist the development team in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or depended on by engineers or contractors who are involved in evaluations or designs of facilities on adjacent properties that are beyond the limits of that which is the specific subject of this report.

Environmental issues (such as permitting or potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate evaluation.

# ***Mayor ED 17-02 Priority permit***

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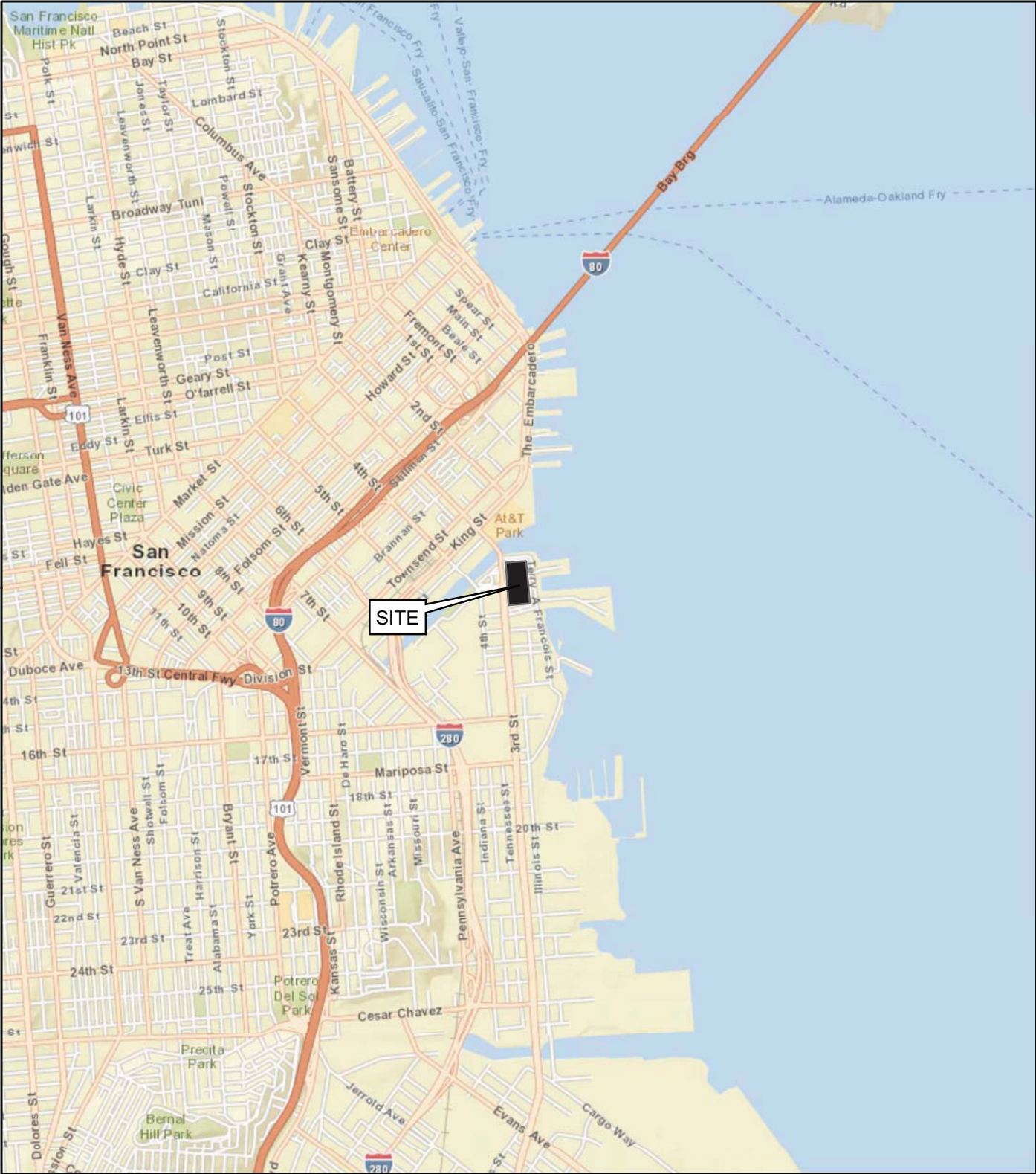
Youngs, R. R., and Coppersmith, K. J. (1985). "Implications of fault slip rates and earthquake recurrence models to probabilistic seismic hazard estimates." *Bulletin of the Seismological Society of America*, 75( ), 939-964.

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# ***Mayor ED 17-02 Priority permit***

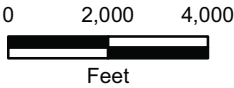
## **FIGURES**

# Mayor ED 17-02 Priority permit



**NOTES:**

World street basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.  
Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN.



**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

**SITE LOCATION MAP**

**LANGAN**

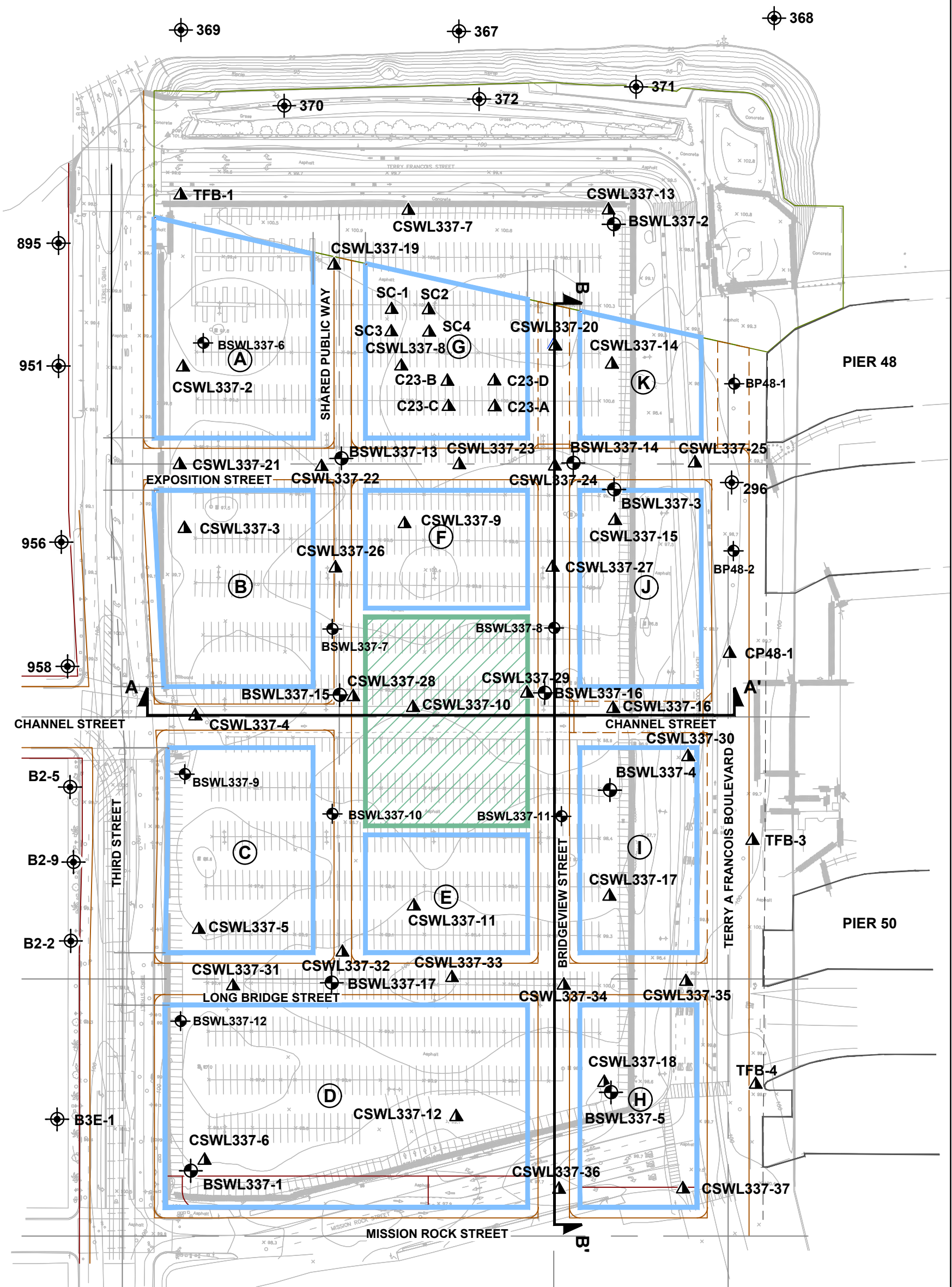
Date 07/09/18

Project No. 750604203

Figure 1

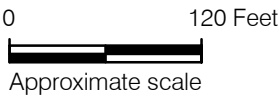


Mayor ED 17-02 Priority permit



EXPLANATION

- BSWL337-1** Approximate location of boring
- CSWL337-02** Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Idealized subsurface profile location



|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| SITE PLAN   |                       |          |
| Date 07/09/18   | Project No. 750604203 | Figure 2 |
| LANGAN  |                       |          |

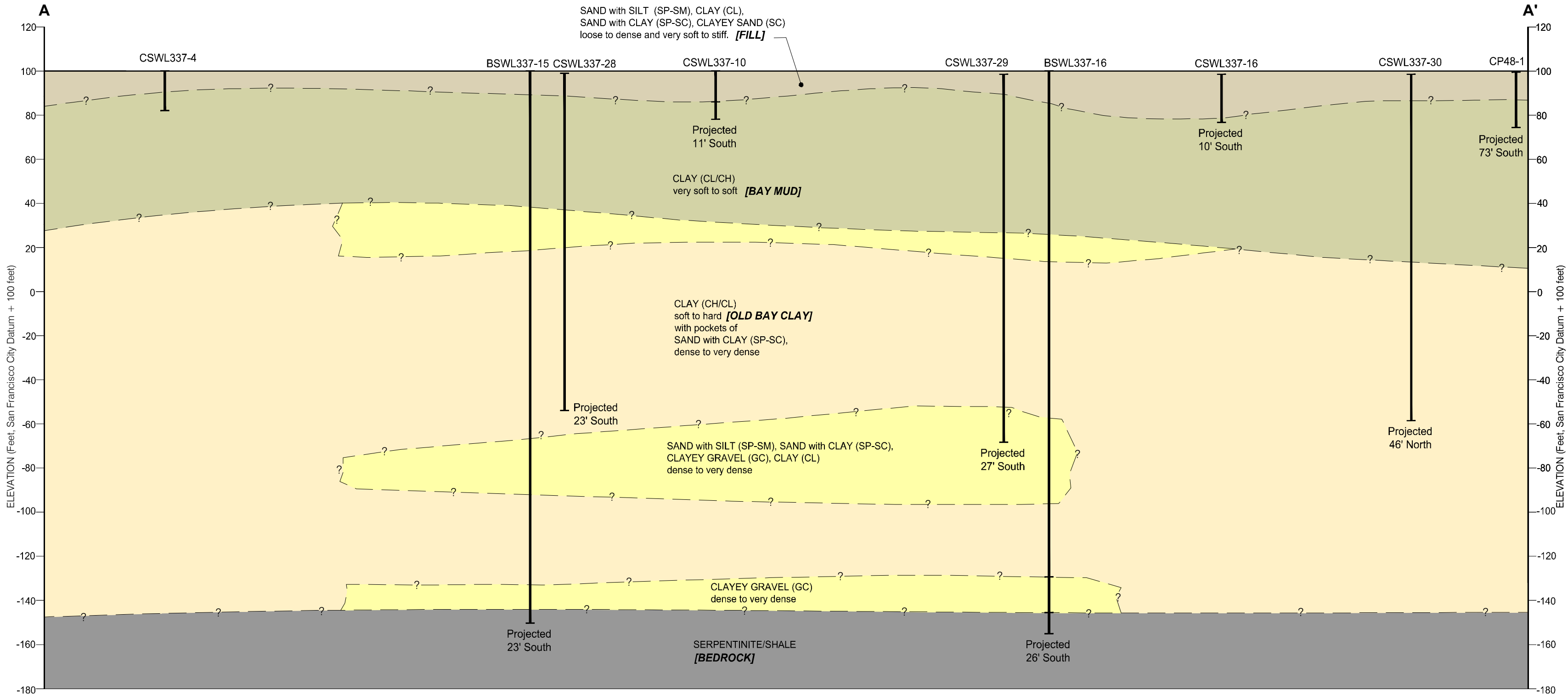
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References: Base map from a drawing titled "Seawall Lot 337, Working Exhibit", by BKF Engineers, dated 07/19/2011 and "SWL 337/Parcel Plan", by Perkins + Will, undated.

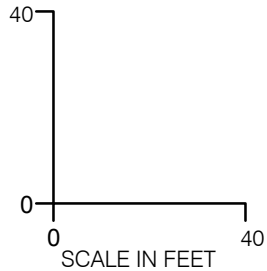


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Mayor ED 17-02 Priority permit

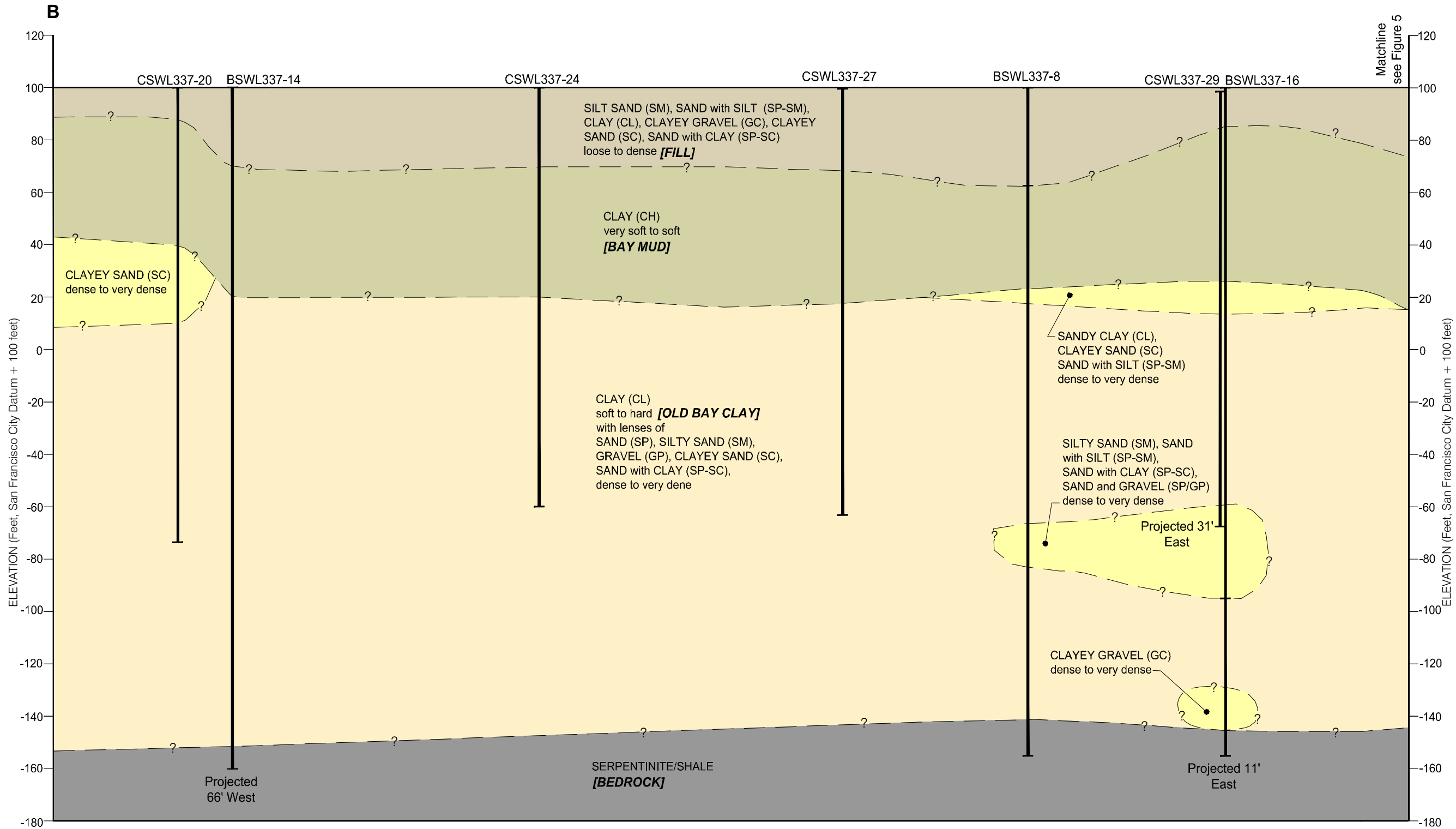


Notes:  
1. The above profile represents a generalized soil cross section interpreted from widely spaced borings and cone penetration tests. Soil deposits may vary in type, strength, and other important properties between points of exploration.

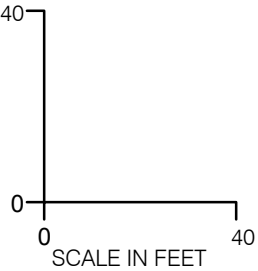


|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| IDEALIZED SUBSURFACE PROFILE<br>A-A'                          |                       |          |
| Date 8/20/18  | Project No. 750604203 | Figure 3 |
| LANGAN  |                       |          |

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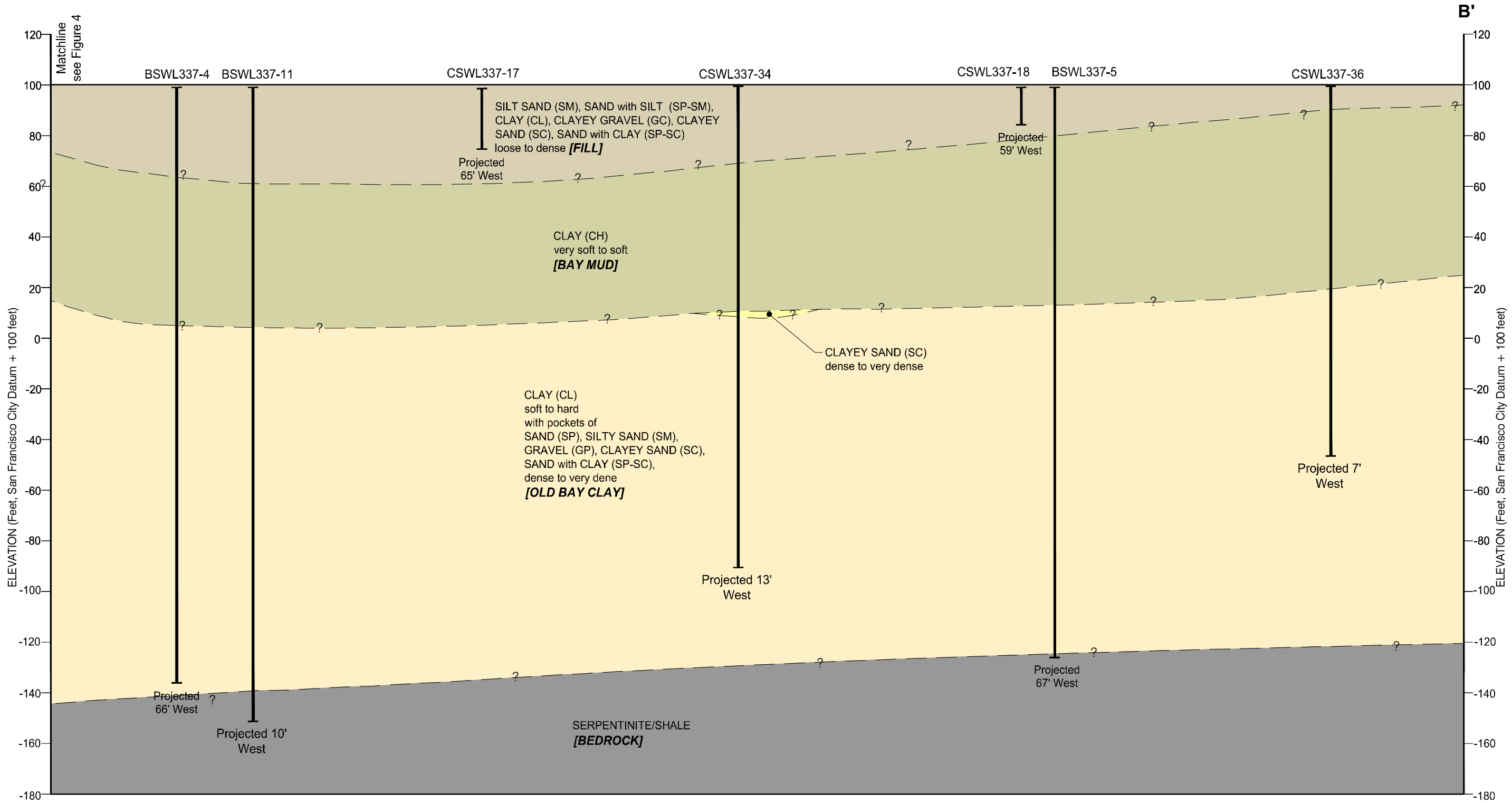


Notes:  
1. The above profile represents a generalized soil cross section interpreted from widely spaced borings and cone penetration tests. Soil deposits may vary in type, strength, and other important properties between points of exploration.

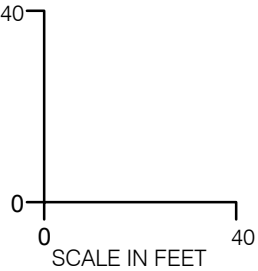


|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| IDEALIZED SUBSURFACE PROFILE<br>B-B'                          |                       |          |
| Date 8/16/18  | Project No. 750604203 | Figure 4 |
| <b>LANGAN</b>   |                       |          |

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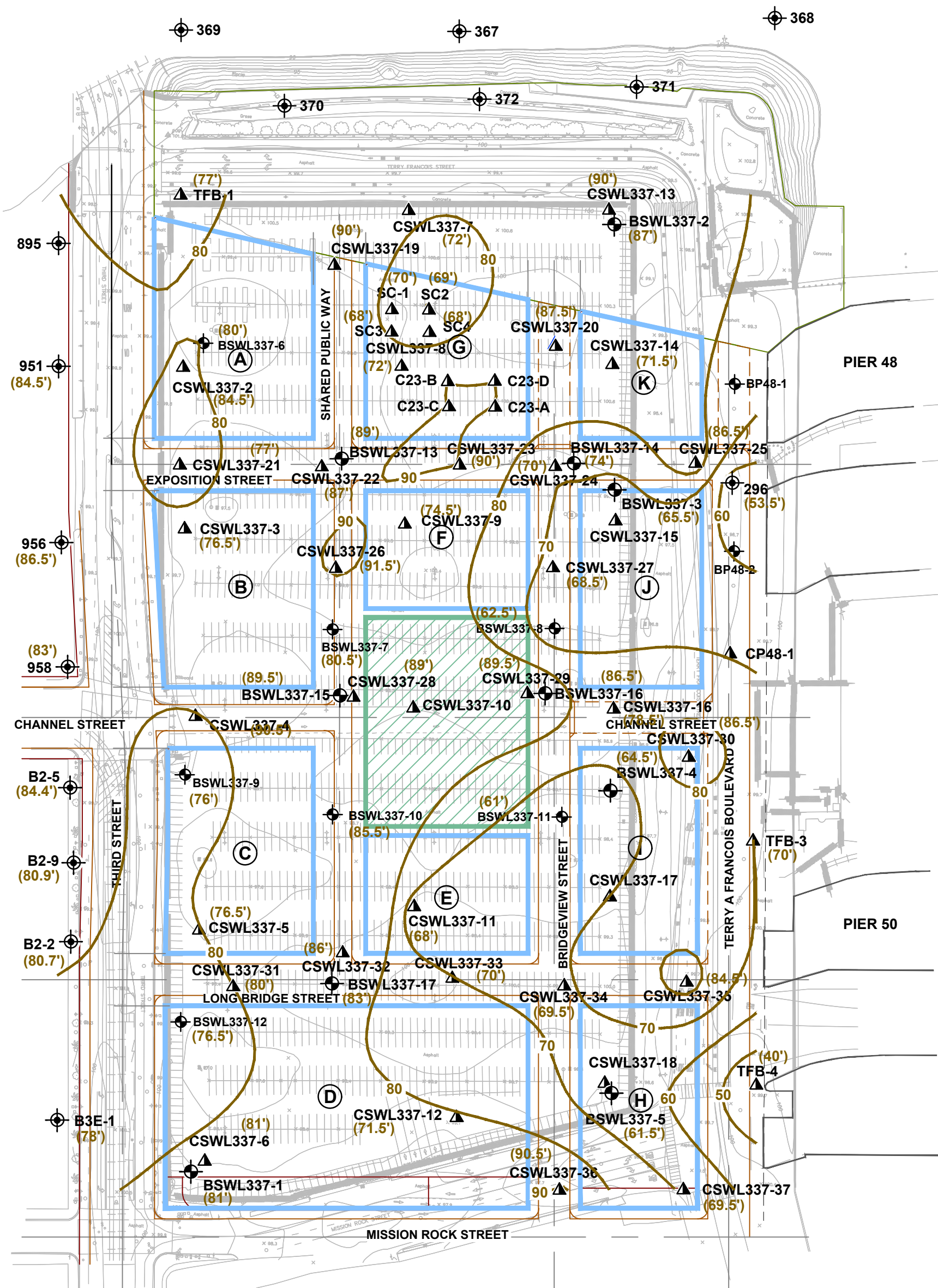


Notes:  
1. The above profile represents a generalized soil cross section interpreted from widely spaced borings and cone penetration tests. Soil deposits may vary in type, strength, and other important properties between points of exploration.



|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| IDEALIZED SUBSURFACE PROFILE<br>B-B'                          |                       |          |
| Date 8/16/18  | Project No. 750604203 | Figure 5 |
| <b>LANGAN</b>   |                       |          |

Mayor ED 17-02 Priority permit



EXPLANATION

- BSWL337-1 Approximate location of boring
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Idealized subsurface profile location
- Approximate Elevation of top of bay mud contour (feet, SFCD + 100 feet)
- Elevation of top of bay mud (feet, SFCD + 100 feet)

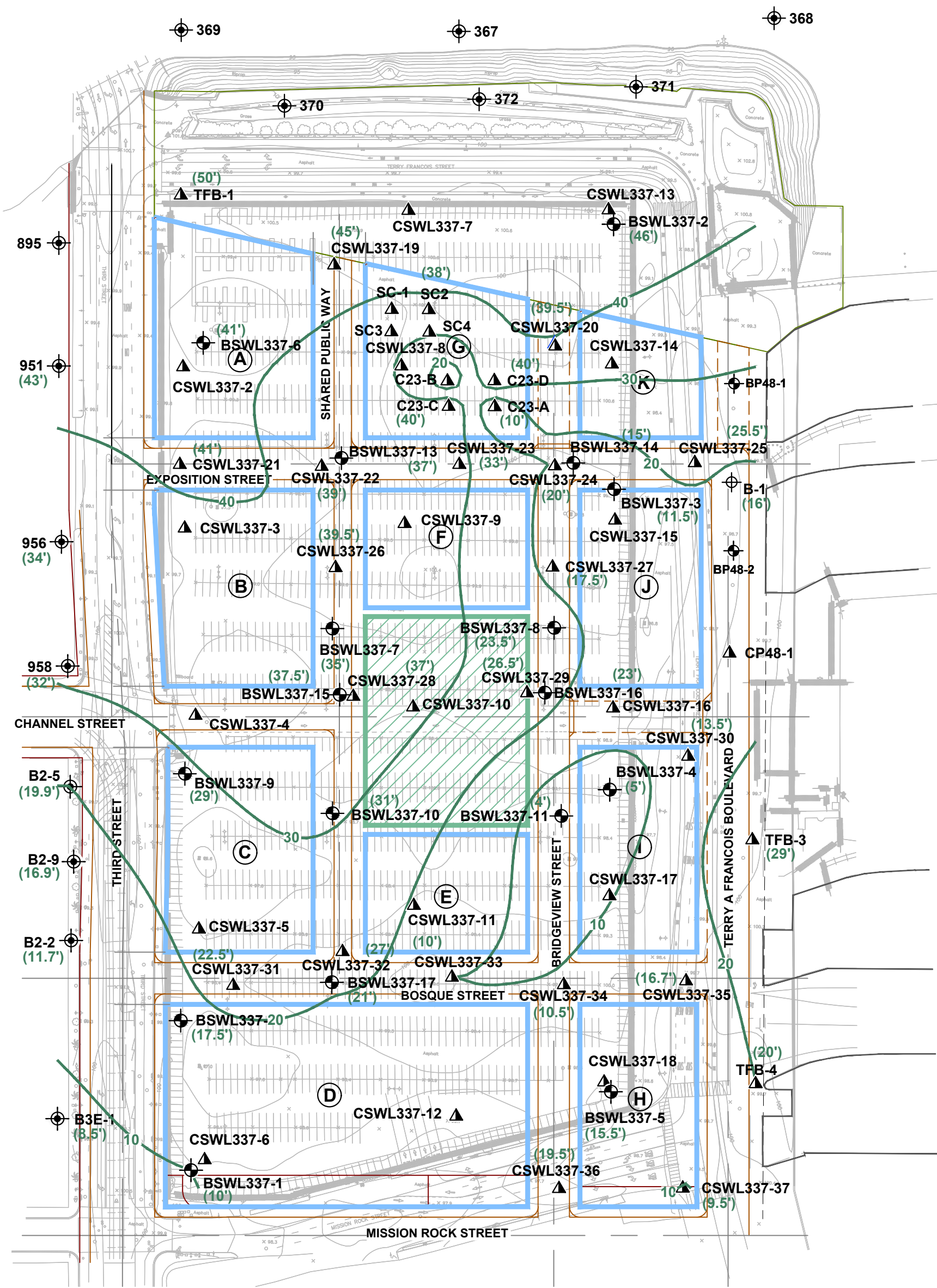
|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| APPROXIMATE ELEVATION OF<br>TOP OF BAY MUD                    |                       |          |
| Date 07/09/18   | Project No. 750604203 | Figure 6 |
| <b>LANGAN</b>   |                       |          |

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References: Base map from a drawing titled "Seawall Lot 337, Working Exhibit", by BKF Engineers, dated 07/19/2011 and "SWL 337/Parcel Plan", by Perkins + Will, undated.

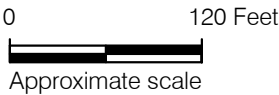


Mayor ED 17-02 Priority permit



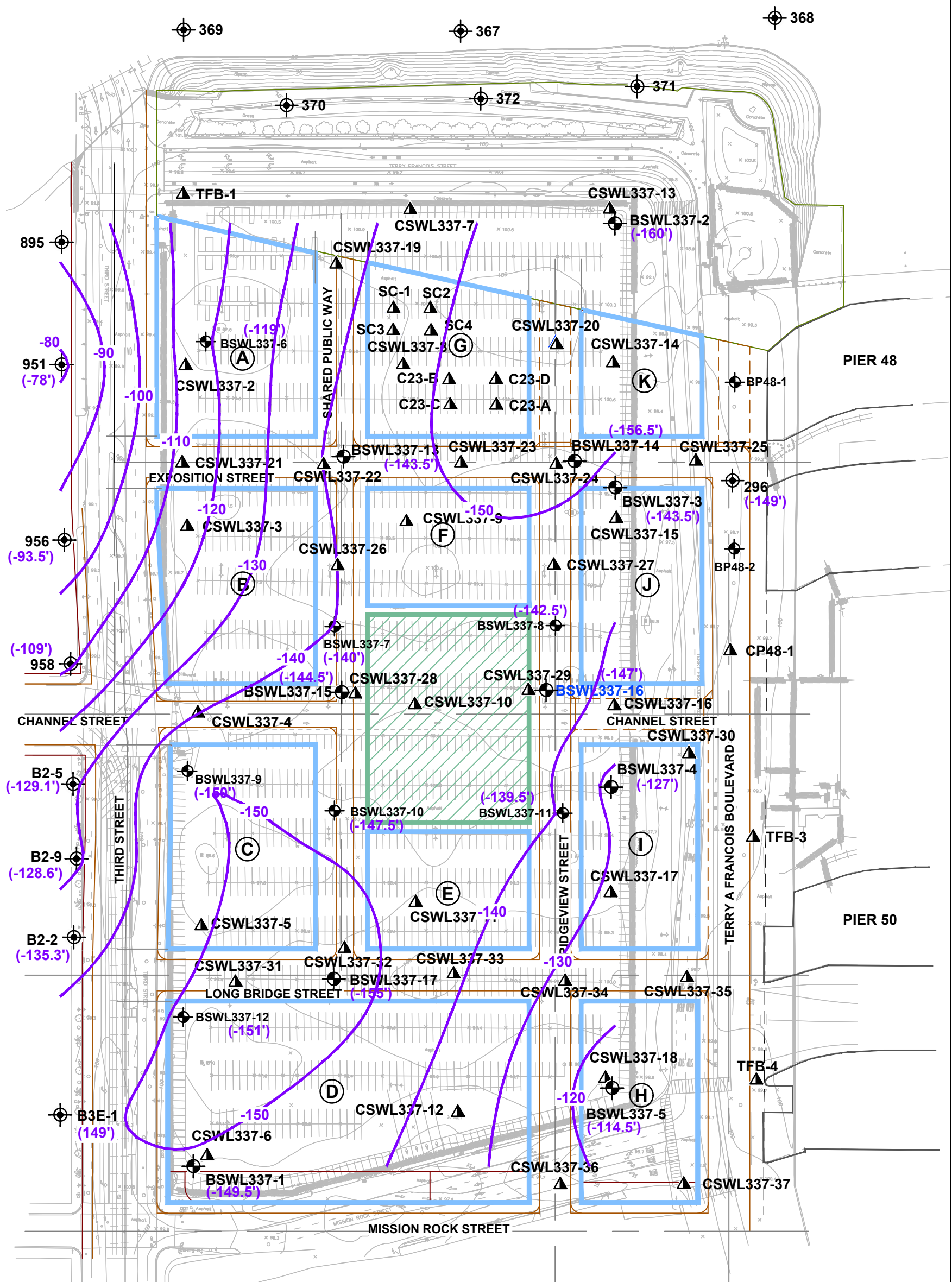
EXPLANATION

- BSWL337-1 Approximate location of boring
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Bottom of bay mud contour (feet, SFCD + 100 feet)
- Elevation of bottom of bay mud (feet, SFCD + 100 feet)



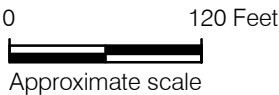
|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| APPROXIMATE ELEVATION OF<br>BOTTOM OF BAY MUD                 |                       |          |
| Date 03/01/18   | Project No. 750604203 | Figure 7 |
| LANGAN  |                       |          |

Mayor ED 17-02 Priority permit



EXPLANATION

- BSWL337-1 Approximate location of boring
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Approximate Elevation of top of bedrock contour (feet, SFCD + 100 feet)
- Elevation of top of rock (feet, SFCD + 100 feet)

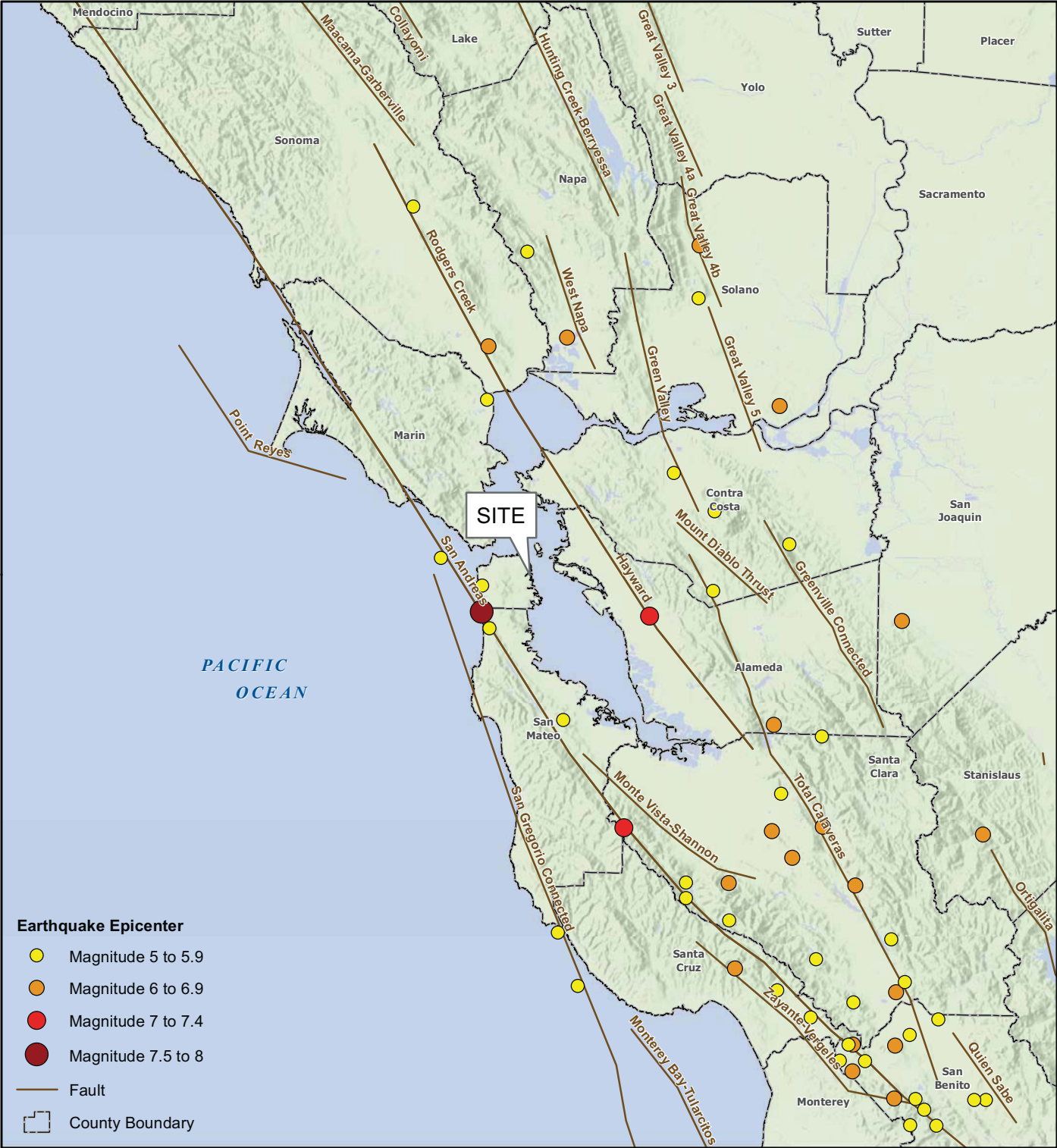


|   |                       |          |
|---|-----------------------|----------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |          |
| APPROXIMATE ELEVATION OF<br>TOP OF BEDROCK                    |                       |          |
| Date 06/20/18   | Project No. 750604203 | Figure 8 |
| LANGAN  |                       |          |

References: Base map from a drawing titled "Seawall Lot 337, Working Exhibit", by BKF Engineers, dated 07/19/2011 and "SWL 337/Parcel Plan", by Perkins + Will, undated.



Mayor ED 17-02 Priority permit



Earthquake Epicenter

- Magnitude 5 to 5.9
- Magnitude 6 to 6.9
- Magnitude 7 to 7.4
- Magnitude 7.5 to 8

- Fault
- County Boundary

Notes:

- Quaternary fault data displayed are based on a generalized version of USGS Quaternary Fault and fold database, 2010. For cartographic purposes only.
- The Earthquake Epicenter (Magnitude) data is provided by the U.S Geological Survey (USGS) and is current through 08/26/2014.
- Basemap hillshade and County boundaries provided by USGS and California Department of Transportation.
- Map displayed in California State Coordinate System, California (Teale) Albers, North American Datum of 1983 (NAD83), Meters.



MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

**LANGAN**

MAP OF MAJOR FAULTS AND  
EARTHQUAKE EPICENTERS IN  
THE SAN FRANCISCO BAY AREA

Date 10/09/18

Project No. 750604203

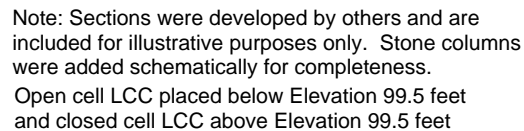
Figure 9

# Mayor ED 17-02 Priority permit

|   |   |  |  |
|---|---|--|--|
| <p><b>I Not felt by people, except under especially favorable circumstances. However, dizziness or nausea may be experienced.</b><br/>Sometimes birds and animals are uneasy or disturbed. Trees, structures, liquids, bodies of water may sway gently, and doors may swing very slowly.</p> <p><b>II Felt indoors by a few people, especially on upper floors of multi-story buildings, and by sensitive or nervous persons.</b><br/>As in Grade I, birds and animals are disturbed, and trees, structures, liquids and bodies of water may sway. Hanging objects swing, especially if they are delicately suspended.</p> <p><b>III Felt indoors by several people, usually as a rapid vibration that may not be recognized as an earthquake at first. Vibration is similar to that of a light, or lightly loaded trucks, or heavy trucks some distance away. Duration may be estimated in some cases.</b><br/>Movements may be appreciable on upper levels of tall structures. Standing motor cars may rock slightly.</p> <p><b>IV Felt indoors by many, outdoors by a few. Awakens a few individuals, particularly light sleepers, but frightens no one except those apprehensive from previous experience. Vibration like that due to passing of heavy, or heavily loaded trucks. Sensation like a heavy body striking building, or the falling of heavy objects inside.</b><br/>Dishes, windows and doors rattle; glassware and crockery clink and clash. Walls and house frames creak, especially if intensity is in the upper range of this grade. Hanging objects often swing. Liquids in open vessels are disturbed slightly. Stationary automobiles rock noticeably.</p> <p><b>V Felt indoors by practically everyone, outdoors by most people. Direction can often be estimated by those outdoors. Awakens many, or most sleepers. Frightens a few people, with slight excitement; some persons run outdoors.</b><br/>Buildings tremble throughout. Dishes and glassware break to some extent. Windows crack in some cases, but not generally. Vases and small or unstable objects overturn in many instances, and a few fall. Hanging objects and doors swing generally or considerably. Pictures knock against walls, or swing out of place. Doors and shutters open or close abruptly. Pendulum clocks stop, or run fast or slow. Small objects move, and furnishings may shift to a slight extent. Small amounts of liquids spill from well-filled open containers. Trees and bushes shake slightly.</p> <p><b>VI Felt by everyone, indoors and outdoors. Awakens all sleepers. Frightens many people; general excitement, and some persons run outdoors.</b><br/>Persons move unsteadily. Trees and bushes shake slightly to moderately. Liquids are set in strong motion. Small bells in churches and schools ring. Poorly built buildings may be damaged. Plaster falls in small amounts. Other plaster cracks somewhat. Many dishes and glasses, and a few windows break. Knickknacks, books and pictures fall. Furniture overturns in many instances. Heavy furnishings move.</p> <p><b>VII Frightens everyone. General alarm, and everyone runs outdoors.</b><br/>People find it difficult to stand. Persons driving cars notice shaking. Trees and bushes shake moderately to strongly. Waves form on ponds, lakes and streams. Water is muddied. Gravel or sand stream banks cave in. Large church bells ring. Suspended objects quiver. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Plaster and some stucco fall. Many windows and some furniture break. Loosened brickwork and tiles shake down. Weak chimneys break at the roofline. Cornices fall from towers and high buildings. Bricks and stones are dislodged. Heavy furniture overturns. Concrete irrigation ditches are considerably damaged.</p> <p><b>VIII General fright, and alarm approaches panic.</b><br/>Persons driving cars are disturbed. Trees shake strongly, and branches and trunks break off (especially palm trees). Sand and mud erupts in small amounts. Flow of springs and wells is temporarily and sometimes permanently changed. Dry wells renew flow. Temperatures of spring and well waters varies. Damage slight in brick structures built especially to withstand earthquakes; considerable in ordinary substantial buildings, with some partial collapse; heavy in some wooden houses, with some tumbling down. Panel walls break away in frame structures. Decayed pilings break off. Walls fall. Solid stone walls crack and break seriously. Wet grounds and steep slopes crack to some extent. Chimneys, columns, monuments and factory stacks and towers twist and fall. Very heavy furniture moves conspicuously or overturns.</p> <p><b>IX Panic is general.</b><br/>Ground cracks conspicuously. Damage is considerable in masonry structures built especially to withstand earthquakes; great in other masonry buildings - some collapse in large part. Some wood frame houses built especially to withstand earthquakes are thrown out of plumb, others are shifted wholly off foundations. Reservoirs are seriously damaged and underground pipes sometimes break.</p> <p><b>X Panic is general.</b><br/>Ground, especially when loose and wet, cracks up to widths of several inches; fissures up to a yard in width run parallel to canal and stream banks. Landsliding is considerable from river banks and steep coasts. Sand and mud shifts horizontally on beaches and flat land. Water level changes in wells. Water is thrown on banks of canals, lakes, rivers, etc. Dams, dikes, embankments are seriously damaged. Well-built wooden structures and bridges are severely damaged, and some collapse. Dangerous cracks develop in excellent brick walls. Most masonry and frame structures, and their foundations are destroyed. Railroad rails bend slightly. Pipe lines buried in earth tear apart or are crushed endwise. Open cracks and broad wavy folds open in cement pavements and asphalt road surfaces.</p> <p><b>XI Panic is general.</b><br/>Disturbances in ground are many and widespread, varying with the ground material. Broad fissures, earth slumps, and land slips develop in soft, wet ground. Water charged with sand and mud is ejected in large amounts. Sea waves of significant magnitude may develop. Damage is severe to wood frame structures, especially near shock centers, great to dams, dikes and embankments, even at long distances. Few if any masonry structures remain standing. Supporting piers or pillars of large, well-built bridges are wrecked. Wooden bridges that "give" are less affected. Railroad rails bend greatly and some thrust endwise. Pipe lines buried in earth are put completely out of service.</p> <p><b>XII Panic is general.</b><br/>Damage is total, and practically all works of construction are damaged greatly or destroyed. Disturbances in the ground are great and varied, and numerous shearing cracks develop. Landslides, rock falls, and slumps in river banks are numerous and extensive. Large rock masses are wrenched loose and torn off. Fault slips develop in firm rock, and horizontal and vertical offset displacements are notable. Water channels, both surface and underground, are disturbed and modified greatly. Lakes are dammed, new waterfalls are produced, rivers are deflected, etc. Surface waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown upward into the air.</p> | <p><b>MISSION ROCK DEVELOPMENT STREETS</b><br/>San Francisco, California</p> <p><b>MODIFIED MERCALLI INTENSITY SCALE</b></p> <p>Date 10/09/18    Project No. 731604203    Figure 10</p> |  |  |
| <p><b>LANGAN</b></p>  |   |  |  |



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**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

### COMPENSATING LIGHTWEIGHT FILL TYPICAL SECTION

|               |                       |           |
|---------------|-----------------------|-----------|
| Date 10/11/18 | Project No. 750604203 | Figure 11 |
|---------------|-----------------------|-----------|

# LANGAN

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX A**

### **BORING LOGS FROM CURRENT INVESTIGATION**

# Mayor ED 17-02 Priority permit

| <b>PROJECT: MISSION ROCK DEVELOPMENT STREETS</b><br>San Francisco, California   |                 |        |                        |           |  | <b>Log of Boring BSWL-13</b><br>PAGE 1 OF 9 |                                    |                             |            |                                   |                          |
|---|-----------------|--------|------------------------|-----------|--|---|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 |        |                        |           |  | Logged by: B. Murphy                        |                                    |                             |            |                                   |                          |
| Date started: 5/30/18   |                 |        | Date finished: 6/4/18  |           |  |   |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches  |                 |        | Hammer type: Automatic |           |  | <b>LABORATORY TEST DATA</b>                 |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST), Pitcher Barrel (PT) |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |        |                        | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test                 | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample | Blows/ 6"              |           |  |   |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~99 feet <sup>2</sup>   |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 1   |                 |        |                        |           | 2 inches asphalt concrete (AC)   |   |                                    |                             |            |                                   |                          |
| 2   |                 |        |                        |           | 2.5 feet aggregate base (AB)   |   |                                    |                             |            |                                   |                          |
| 3   |                 |        |                        |           | 3 inches asphalt concrete (AC)   |   |                                    |                             |            |                                   |                          |
| 4   |                 |        |                        |           | SAND (SP)  |   |                                    |                             |            |                                   |                          |
| 5   |                 |        |                        |           | brown, moist, with coarse angular to subrounded gravel, brick and concrete fragments |   |                                    |                             |            |                                   |                          |
| 6   |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 7   |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 8   |                 |        |                        |           | SANDY CLAY with GRAVEL (CL-ML)   |   |                                    |                             |            |                                   |                          |
| 9   |                 |        |                        |           | olive-gray, medium stiff, moist  |   |                                    |                             |            |                                   |                          |
| 10  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 11  | S&H             |        | 0                      | 0         | CLAY (CH)  |   |                                    |                             |            |                                   |                          |
| 12  |                 |        | 0                      | 0         | dark gray, very soft, wet, with shell fragments                                      |   |                                    |                             |            |                                   |                          |
| 13  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 14  |                 |        |                        |           | ▽ (05/31/18, 6:00 a.m.)  |   |                                    |                             |            |                                   |                          |
| 15  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 16  | D&M             |        |                        | 50        |  |   |                                    |                             |            |                                   |                          |
| 17  |                 |        |                        | psi       |  |   |                                    |                             |            |                                   |                          |
| 18  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 19  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 20  |                 |        |                        |           | CH   |   |                                    |                             |            |                                   |                          |
| 21  |                 |        |                        |           | soft   |   |                                    |                             |            |                                   |                          |
| 22  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 23  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 24  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 25  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 26  | D&M             |        |                        | 75        | Triaxial Test, see Figure C-11   |   |                                    |                             |            |                                   |                          |
| 27  |                 |        |                        | psi       |  |   |                                    |                             |            |                                   |                          |
| 28  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 29  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
| 30  |                 |        |                        |           |  |   |                                    |                             |            |                                   |                          |
|   |                 |        |                        |           |  | <b>LANGAN</b>                               |                                    |                             |            |                                   |                          |
|   |                 |        |                        |           |  | Project No.: 750604203                      |                                    | Figure: A-1a                |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-13

PAGE 2 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                          | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31              |              |        |           |                          |           | CLAY (CH) (continued)                         |                        |                              |                          |         |                             |                       |
| 32              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 33              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 34              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 35              |              |        |           |                          |           | olive-gray                                    |                        |                              |                          |         |                             |                       |
| 36              | ST           |        |           | 100 psi                  |           |   | TV                     |                              | 300                      |         |                             |                       |
| 37              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 38              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 39              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 40              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 41              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 42              |              |        |           |                          |           | organics in cuttings, trace fine-grained sand |                        |                              |                          |         |                             |                       |
| 43              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 44              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 45              |              |        |           |                          | CH        |   |                        |                              |                          |         |                             |                       |
| 46              | D&M          |        |           | 105 psi                  |           |   |                        |                              |                          |         |                             |                       |
| 47              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 48              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 49              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 50              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 51              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 52              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 53              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 54              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 55              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 56              | ST           |        |           | 175 psi                  |           |   | TV                     |                              | 300                      |         |                             |                       |
| 57              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 58              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 59              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 60              |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |   | <b>LANGAN</b>          |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |   | Project No.: 750604203 |                              | Figure: A-1b             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-13

PAGE 3 OF 9

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

| DEPTH<br>(feet) | SAMPLES      |        |                     |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|---------------------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/6"            | SPT N-value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61              |              |        |                     |                          | CH        | CLAY (CH) (continued)   |                       |                              |                          |         |                             |                       |
| 62              |              |        |                     |                          |           | angular coarse gravel less than 1.2 inch in diameter in cuttings                          |                       |                              |                          |         |                             |                       |
| 63              |              |        |                     |                          |           | SAND with CLAY (SP-SC)  |                       |                              |                          |         |                             |                       |
| 64              | SPT          |        | 3<br>6<br>18        | 29                       | SP-SC     | olive, medium dense, wet, fine-grained, trace subangular gravel                           |                       |                              |                          |         |                             |                       |
| 65              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 66              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 67              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 68              | SPT          |        | 24<br>35<br>43      | 93                       |           | SAND with SILT (SP-SM)  |                       |                              |                          |         |                             |                       |
| 69              |              |        |                     |                          |           | yellow-brown, very dense, wet, fine-grained sand  |                       |                              |                          |         |                             |                       |
| 70              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 71              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 72              |              |        |                     |                          | SP-SM     |   |                       |                              |                          |         |                             |                       |
| 73              | SPT          |        | 20<br>37<br>40      | 92                       |           |   |                       |                              |                          |         |                             |                       |
| 74              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 75              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 76              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 77              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 78              | SPT          |        | 20<br>30<br>32      | 74                       |           | SAND with CLAY (SP-SC)  |                       |                              |                          |         |                             |                       |
| 79              |              |        |                     |                          |           | olive and yellow-brown with red-yellow mottling, very dense, wet, trace subangular gravel |                       |                              |                          |         |                             |                       |
| 80              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 81              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 82              |              |        |                     |                          | SP-SC     |   |                       |                              |                          |         |                             |                       |
| 83              | SPT          |        | 13<br>26<br>50/3.5" | 60/3.5"                  |           | olive, fine-grained   |                       |                              |                          |         |                             |                       |
| 84              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 85              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 86              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 87              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
| 88              |              |        |                     |                          |           | CLAY (CH)   |                       |                              |                          |         |                             |                       |
| 89              | PT           |        |                     | 120 psi                  | CH        | olive gray, medium stiff, wet   | TV                    |                              | 1,200                    |         |                             |                       |
| 90              |              |        |                     |                          |           |   |                       |                              |                          |         |                             |                       |
|                 |              |        |                     |                          |           |   | <b>LANGAN</b>         |                              |                          |         |                             |                       |
|                 |              |        |                     |                          |           |   | Project No.:          | Figure:                      |                          |         |                             |                       |
|                 |              |        |                     |                          |           |   | 750604203             | A-1c                         |                          |         |                             |                       |

BAY MUD

OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-13

PAGE 4 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-value <sup>1</sup> |           |                                | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91              |              |        |           |                          |           | CLAY (CH) (continued)          |                           |                              |                          |         |                             |                       |
| 92              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 93              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 94              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 95              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 96              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 97              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 98              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 99              |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 100             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 101             | PT           |        |           | 155 psi                  |           |                                | TV                        |                              | 1,000                    |         |                             |                       |
| 102             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 103             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 104             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 105             |              |        |           |                          | CH        |                                |                           |                              |                          |         |                             |                       |
| 106             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 107             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 108             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 109             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 110             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 111             | PT           |        |           | 145 psi                  |           | Triaxial Test, see Figure C-12 | TxUU                      | 11,000                       | 2,110                    |         | 49.5                        | 70                    |
| 112             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 113             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 114             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 115             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 116             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 117             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 118             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 119             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 120             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                | Project No.:<br>750604203 | Figure:<br>A-1d              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-13

PAGE 5 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121             | PT           |        |           | 95 psi                   |           | CLAY (CH) (continued)          | TxUU                  | 12,000                       | 1,960                    |         | 52.2                        | 68                    |
| 122             |              |        |           |                          |           | Triaxial Test, see Figure C-13 |                       |                              |                          |         |                             |                       |
| 123             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 124             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 125             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 126             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 127             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 128             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 129             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 130             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 131             | PT           |        |           | 95 psi                   |           |                                | TV                    |                              | 1,000                    |         |                             |                       |
| 132             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 133             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 134             |              |        |           |                          | CH        |                                |                       |                              |                          |         |                             |                       |
| 135             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 136             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 137             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 138             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 139             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 140             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 141             | PT           |        |           | 85 psi                   |           |                                |                       |                              |                          |         |                             |                       |
| 142             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 143             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 144             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 145             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 146             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 147             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 148             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 149             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 150             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |

OLD BAY CLAY

**LANGAN**

Project No.:  
750604203

Figure:  
A-1e

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-13

PAGE 6 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-value <sup>1</sup> |           |                                | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151             | PT           |        |           | 95 psi                   |           | CLAY (CH) (continued)          | TV                        |                              | 900                      |         |                             |                       |
| 152             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 153             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 154             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 155             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 156             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 157             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 158             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 159             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 160             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 161             | PT           |        |           | 155 psi                  |           |                                | TV                        |                              | 1,500                    |         |                             |                       |
| 162             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 163             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 164             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 165             |              |        |           |                          | CH        |                                |                           |                              |                          |         |                             |                       |
| 166             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 167             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 168             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 169             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 170             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 171             | PT           |        |           | 135 psi                  |           | Triaxial Test, see Figure C-14 | TxUU                      | 17,000                       | 2,620                    |         | 49.4                        | 69                    |
| 172             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 173             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 174             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 175             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 176             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 177             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 178             |              |        |           |                          |           | olive-gray                     |                           |                              |                          |         |                             |                       |
| 179             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 180             |              |        |           |                          |           |                                |                           |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                | Project No.:<br>750604203 | Figure:<br>A-1f              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

OLD BAY CLAY



# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |                |   | Log of Boring BSWL-13<br>PAGE 7 OF 9 |  |                           |                              |                          |         |                             |                       |
|--|--------------|--------|----------------|---|--------------------------------------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |                |   | LITHOLOGY                            | MATERIAL DESCRIPTION                                 | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6"      | SPT N-Value¹  |                                      |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181  | PT           |        |                | 175 psi   | CH                                   | CLAY (CH) (continued)                                | TV                        | 1,500                        |                          |         |                             |                       |
| 182  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 183  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 184  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 185  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 186  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 187  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 188  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 189  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 190  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 191  | PT           |        | 50 psi         | olive to olive-gray, medium stiff                                 |                                      | TV   | 1,500                     | 43.5                         | 77                       |         |                             |                       |
| 192  |              |        |                | trace organics<br>Consolidtion Test, see Figure C-5               |                                      |  |                           |                              |                          |         |                             |                       |
| 193  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 194  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 195  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 196  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 197  |              |        |                | SILTY CLAYEY SAND (SC-SM)<br>olive, very dense, wet, fine-grained |                                      |  |                           |                              |                          |         |                             |                       |
| 198  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 199  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 200  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 201  | PT           |        | 190 psi        | SC-SM   |                                      |  |                           |                              |                          |         |                             |                       |
| 202  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 203  | SPT          |        | 13<br>24<br>25 |   |                                      |  |                           |                              |                          |         |                             |                       |
| 204  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 205  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 206  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 207  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 208  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
| 209  |              |        |                |   | CL                                   | SANDY CLAY (CL)<br>olive, stiff, wet, trace organics |                           |                              |                          |         |                             |                       |
| 210  |              |        |                |   |                                      |  |                           |                              |                          |         |                             |                       |
|  |              |        |                |   |                                      |  | LANGAN                    |                              |                          |         |                             |                       |
|  |              |        |                |   |                                      |  | Project No.:<br>750604203 |                              | Figure:<br>A-1g          |         |                             |                       |




TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California



## Log of Boring BSWL-13

PAGE 8 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |                |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|---|----------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/6"       | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211             |              |   |                |                          |           | SANDY CLAY (CL) (continued)   |                           |                              |                          |         |                             |                       |
| 212             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 213             |              |   |                |                          | CL        |   |                           |                              |                          |         |                             |                       |
| 214             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 215             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 216             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 217             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 218             |              |   |                |                          |           | SANDY SILTY CLAY (CL-ML)<br>olive, hard, wet<br>yellow-brown, red-brown, dark gray<br>fine angular gravel, yellow-brown, olive          |                           |                              |                          |         |                             |                       |
| 219             | PT           |    |                | 195 psi                  |           |   |                           |                              |                          |         |                             |                       |
| 220             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 221             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 222             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 223             |              |   |                |                          | CL-ML     |   |                           |                              |                          |         |                             |                       |
| 224             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 225             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 226             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 227             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 228             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 229             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 230             |              |   |                |                          |           | CLAYEY GRAVEL with SAND (GC)<br>yellow-brown matrix, wet, yellow-red rounded<br>sandstone clasts, olive and red-brown angular<br>gravel |                           |                              |                          |         |                             |                       |
| 231             | SPT          |  | 22<br>31<br>28 | 59                       |           |   |                           |                              |                          |         |                             |                       |
| 232             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 233             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 234             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 235             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 236             | SPT          |  | 28<br>33<br>37 | 84                       | GC        |   |                           |                              |                          |         |                             |                       |
| 237             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 238             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 239             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 240             |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
|                 |              |   |                |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |   |                |                          |           |   | Project No.:<br>750604203 | Figure:<br>A-1h              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |  |   |             |                          | Log of Boring BSWL-13<br>PAGE 9 OF 9                             |  |                       |                              |                          |         |                             |                       |
|--|--|---|-------------|--------------------------|--|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES  |   |             |                          | LITHOLOGY  | MATERIAL DESCRIPTION                     | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|  | Sampler Type   | Sample  | Blows/ 6"   | SPT N-Value <sup>1</sup> |  |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241  | SPT  |  | 50/<br>5.5" | 60/<br>5.5"              | GC   | CLAYEY GRAVEL with SAND (GC) (continued) | <div>BEDROCK</div>    |                              |                          |         |                             |                       |
| 242  |  |   |             |                          | SHALE<br>Dark gray to black, friable to weak, slightly weathered |  |                       |                              |                          |         |                             |                       |
| 243  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 244  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 245  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 246  | SPT  |  | 50/<br>3"   | 60/<br>3"                |  |  |                       |                              |                          |         |                             |                       |
| 247  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 248  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 249  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 250  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 251  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 252  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 253  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 254  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 255  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 256  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 257  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 258  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 259  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 260  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 261  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 262  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 263  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 264  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 265  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 266  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 267  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 268  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 269  |  |   |             |                          |  |  |                       |                              |                          |         |                             |                       |
| 270  | <div><div><div>Boring terminated at a depth of 249.3 feet below ground surface.<br/>Boring backfilled with cement grout.<br/>Groundwater encountered at 14.5 feet below ground surface during drilling.<br/>TV = torvane.</div><div><div><sup>1</sup> S&amp;H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br/><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.</div><div><div>LANGAN</div><div>Project No.: 750604203</div></div><div>Figure: A-1i</div></div></div></div> |   |             |                          |  |  |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT: MISSION ROCK DEVELOPMENT STREETS</b><br>San Francisco, California   |                 |        |                        |                             |           | <b>Log of Boring BSWL-14</b><br>PAGE 1 OF 9   |                             |                                    |                             |            |                                   |                          |
|---|-----------------|--------|------------------------|-----------------------------|-----------|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 |        |                        |                             |           | Logged by: B. Murphy  |                             |                                    |                             |            |                                   |                          |
| Date started: 6/4/18  |                 |        | Date finished: 6/8/18  |                             |           |   |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches  |                 |        | Hammer type: Automatic |                             |           | <b>LABORATORY TEST DATA</b>   |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST), Pitcher Barrel (PT) |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |        |                        |                             | LITHOLOGY | MATERIAL DESCRIPTION  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample | Blows/ 6"              | SPT<br>N-value <sup>1</sup> |           |   |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~100 feet <sup>2</sup>  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 1   |                 |        |                        |                             | SP        | 3 inches asphalt concrete (AC)  |                             |                                    |                             |            |                                   |                          |
| 2   |                 |        |                        |                             |           | 5 inches aggregate base (AB)  |                             |                                    |                             |            |                                   |                          |
| 3   |                 |        |                        |                             |           | SAND with GRAVEL (SP)<br>olive-gray to gray, medium dense, moist, medium-<br>to fine-grained, subrounded gravel   |                             |                                    |                             |            |                                   |                          |
| 4   | SPT             |        | 4<br>6<br>6            | 14                          |           |   |                             |                                    |                             |            |                                   |                          |
| 5   |                 |        |                        |                             | SM        | SILTY SAND (SM)<br>olive-gray with lenses of red-brown mottling,<br>(06/04/18, 1:35)  |                             |                                    |                             | 17.2       | 8.8                               |                          |
| 6   | SPT             |        | 3<br>2<br>4            | 7                           |           | moist, fine-grained   |                             |                                    |                             |            |                                   |                          |
| 7   |                 |        |                        |                             |           | CLAY with GRAVEL (CL)<br>olive to olive-gray, medium stiff, moist, angular<br>gravel  |                             |                                    |                             |            |                                   |                          |
| 8   |                 |        |                        |                             | CL        |   |                             |                                    |                             |            |                                   |                          |
| 9   |                 |        |                        |                             |           | CLAYEY SAND with GRAVEL (SC)<br>olive-gray, loose, fine-grained, wet, coarse<br>subangular gravel   |                             |                                    |                             |            |                                   |                          |
| 10  |                 |        |                        |                             |           | LL = 25, PI = 14, see Figure C-3  |                             |                                    |                             | 15.2       | 12.8                              |                          |
| 11  | SPT             |        | 2<br>5<br>2            | 8                           |           |   |                             |                                    |                             |            |                                   |                          |
| 12  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 13  |                 |        |                        |                             | SC        |   |                             |                                    |                             |            |                                   |                          |
| 14  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 15  |                 |        |                        |                             |           | medium dense  |                             |                                    |                             |            |                                   |                          |
| 16  | S&H             | ●      | 11<br>8<br>18          | 18                          |           |   |                             |                                    |                             |            |                                   |                          |
| 17  |                 |        |                        |                             | CL        |   |                             |                                    |                             |            |                                   |                          |
| 18  | ST              |        |                        | 250<br>psi                  |           | SANDY CLAY with GRAVEL (CL)<br>yellow-brown, soft to medium stiff, wet, coarse<br>sand, fine subangular gravel, angular coarse<br>gravel to cobbles of greenstone |                             |                                    |                             |            |                                   |                          |
| 19  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 20  |                 |        |                        |                             | CL        |   |                             |                                    |                             |            |                                   |                          |
| 21  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 22  |                 |        |                        |                             |           | LL = 39, PI = 22, see Figure C-4  |                             |                                    |                             | 50.9       | 22.1                              | 108                      |
| 23  | S&H             |        | 1<br>4<br>8            | 8                           |           |   |                             |                                    |                             |            |                                   |                          |
| 24  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 25  |                 |        |                        |                             | CH        |   |                             |                                    |                             |            |                                   |                          |
| 26  |                 |        |                        |                             |           | CLAY (CH)<br>olive to dark gray, soft, wet, trace organics, shell<br>fragments  |                             |                                    |                             |            |                                   |                          |
| 27  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 28  | S&H             |        | 1<br>1<br>1            | 2                           |           |   |                             |                                    |                             |            |                                   |                          |
| 29  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |
| 30  |                 |        |                        |                             |           |   |                             |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

FILL

BAY MUD



Project No.: 750604203
Figure: A-2a

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-14

PAGE 2 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |           |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|---|-----------|--------------------------|-----------|--------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/ 6" | SPT N-value <sup>1</sup> |           |                                | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31              |              |   |           |                          |           | CLAY (CH) (continued)          |                           |                              |                          |         |                             |                       |
| 32              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 33              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 34              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 35              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 36              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 37              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 38              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 39              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 40              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 41              | D&M          |   |           | 75 psi                   |           |                                |                           |                              |                          |         |                             |                       |
| 42              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 43              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 44              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 45              |              |   |           |                          | CH        |                                |                           |                              |                          |         |                             |                       |
| 46              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 47              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 48              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 49              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 50              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 51              | ST           |  |           | 155 psi                  |           | Triaxial Test, see Figure C-15 | TxUU                      | 5,000                        | 710                      |         | 53.7                        | 67                    |
| 52              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 53              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 54              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 55              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 56              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 57              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 58              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 59              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
| 60              |              |   |           |                          |           |                                |                           |                              |                          |         |                             |                       |
|                 |              |   |           |                          |           |                                | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |   |           |                          |           |                                | Project No.:<br>750604203 | Figure:<br>A-2b              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |           |                          | Log of Boring BSWL-14<br>PAGE 3 OF 9 |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
|--|--------------|--------|-----------|--------------------------|--------------------------------------|---------------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|------------------------|--|--------------|--|--|--|--|--|--|--|
| DEPTH<br>(feet)  | SAMPLES      |        |           |                          | LITHOLOGY                            | MATERIAL DESCRIPTION                  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |                                      |                                       | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |                        |  |              |  |  |  |  |  |  |  |
| 61   | ST           |        |           | 100 psi                  | CH                                   | CLAY (CH) (continued)                 | TV                    | 200                          |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 62   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 63   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 64   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 65   | ST           |        |           | 125 psi                  | CH                                   | very soft                             |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 66   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 67   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 68   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 69   | ST           |        |           | 210 psi                  | CH                                   | Triaxial Test, see Figure C-16        | TxUU                  | 8,000                        | 1,080                    |         | 29.3                        | 92                    |                        |  |              |  |  |  |  |  |  |  |
| 70   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 71   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 72   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 73   | ST           |        |           |                          | CH                                   | CLAY (CH)<br>olive, medium stiff, wet |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 74   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 75   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 76   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 77   | ST           |        |           |                          | CH                                   |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 78   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 79   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 80   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 81   | ST           |        |           |                          | CH                                   |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 82   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 83   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 84   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 85   | ST           |        |           |                          | CH                                   |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 86   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 87   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 88   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 89   | ST           |        |           |                          | CH                                   |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
| 90   |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |
|  |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       | LANGAN                 |  |              |  |  |  |  |  |  |  |
|  |              |        |           |                          |                                      |                                       |                       |                              |                          |         |                             |                       | Project No.: 750604203 |  | Figure: A-2c |  |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-14

PAGE 4 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION            | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|---------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                 | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91              | ST           |        |           | 125 psi                  |           | CLAY (CH) (continued)           | TxUU                      | 9,000                        | 1,070                    |         | 44.2                        | 75                    |
| 92              |              |        |           |                          |           | Triaxial Test , see Figure C-17 |                           |                              |                          |         |                             |                       |
| 93              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 94              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 95              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 96              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 97              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 98              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 99              |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 100             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 101             | PT           |        |           | 185 psi                  |           |                                 | TV                        |                              | 1,000                    |         |                             |                       |
| 102             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 103             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 104             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 105             |              |        |           |                          | CH        |                                 |                           |                              |                          |         |                             |                       |
| 106             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 107             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 108             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 109             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 110             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 111             | PT           |        |           | 85 psi                   |           |                                 | TV                        |                              | 1,000                    |         |                             |                       |
| 112             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 113             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 114             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 115             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 116             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 117             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 118             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 119             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
| 120             |              |        |           |                          |           |                                 |                           |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                 | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                 | Project No.:<br>750604203 | Figure:<br>A-2d              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

OLD BAY CLAY

Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL-14<br>PAGE 5 OF 9   |                        |                              |                          |              |                             |                       |
|--|--------------|--------|-----------|--------------------------|-----------|--|------------------------|------------------------------|--------------------------|--------------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |              |                             |                       |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines %      | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121  | PT           |        |           | 85 psi                   | CH        | CLAY (CH) (continued)  | TV                     | 1,000                        |                          |              |                             |                       |
| 122  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 123  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 124  | PT           |        |           | 185 psi                  | CH        | very stiff<br>Triaxial Test, see Figure C-18<br>Consolidation Test, see Figure C-6 | TxUU                   | 13,000                       | 2,560                    | 41.0<br>45.4 | 79<br>75                    |                       |
| 125  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 126  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 127  | PT           |        |           | 85 psi                   | CH        | medium stiff   | TV                     | 1,000                        |                          |              |                             |                       |
| 128  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 129  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 130  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 131  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 132  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 133  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 134  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 135  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 136  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 137  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 138  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 139  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 140  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 141  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 142  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 143  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 144  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 145  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 146  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 147  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 148  | PT           |        |           | 85 psi                   | CH        |  |                        |                              |                          |              |                             |                       |
| 149  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
| 150  |              |        |           |                          |           |  |                        |                              |                          |              |                             |                       |
|  |              |        |           |                          |           |  | LANGAN                 |                              |                          |              |                             |                       |
|  |              |        |           |                          |           |  | Project No.: 750604203 |                              | Figure: A-2e             |              |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17 GPJ TR.GDT 10/16/18



# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |                |                          | Log of Boring BSWL-14<br>PAGE 6 OF 9 |   |                           |                              |                          |         |                             |                       |
|--|--------------|--------|----------------|--------------------------|--------------------------------------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |                |                          | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6"      | SPT N-Value <sup>1</sup> |                                      |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151  | PT           |        |                | 175 psi                  | CH                                   | CLAY (CH) (continued)   | TV                        |                              | 1,000                    |         |                             |                       |
| 152  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 153  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 154  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 155  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 156  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 157  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 158  |              |        |                |                          |                                      | dark gray, trace coarse sand in cuttings  |                           |                              |                          |         |                             |                       |
| 159  |              |        |                |                          |                                      | SAND with CLAY (SP-SC)<br>olive to dark gray, very dense, wet, fine-grained, organics |                           |                              |                          |         |                             |                       |
| 160  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 161  | PT           |        |                | 125 psi                  | SP-SC                                |   |                           |                              |                          |         |                             |                       |
| 162  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 163  | SPT          |        | 16<br>27<br>27 | 64                       |                                      |   |                           |                              |                          |         |                             |                       |
| 164  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 165  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 166  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 167  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 168  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 169  |              |        |                |                          |                                      | CLAY (CL)<br>olive, medium stiff, wet   |                           |                              |                          |         |                             |                       |
| 170  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 171  | PT           |        |                | 195 psi                  | CL                                   |   | TV                        |                              | 1,200                    |         |                             |                       |
| 172  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 173  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 174  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 175  |              |        |                |                          |                                      | SAND with CLAY (SP-SC)<br>olive, dark gray, light gray sand, olive clay               |                           |                              |                          |         |                             |                       |
| 176  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 177  |              |        |                |                          | SP-SC                                |   |                           |                              |                          |         |                             |                       |
| 178  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 179  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 180  |              |        |                |                          |                                      |   |                           |                              |                          |         |                             |                       |
|  |              |        |                |                          |                                      |   | LANGAN                    |                              |                          |         |                             |                       |
|  |              |        |                |                          |                                      |   | Project No.:<br>750604203 |                              | Figure:<br>A-2f          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18




OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-14

PAGE 7 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |          |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|---|----------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181             | SPT          |    | 4        | 32                       | SP-SC     | SAND with CLAY (SP-SC) (continued)                                    |                       |                              |                          |         |                             |                       |
| 182             |              |   | 10       |                          |           |   |                       |                              |                          |         |                             |                       |
| 183             |              |   | 17       |                          |           |   |                       |                              |                          |         |                             |                       |
| 184             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 185             |              |   |          |                          | CL        | CLAY (CL)<br>olive, stiff, wet, trace organics                        |                       |                              |                          |         |                             |                       |
| 186             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 187             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 188             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 189             |              |   |          |                          | CL        |   |                       |                              |                          |         |                             |                       |
| 190             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 191             | SPT          |   | 3        | 15                       |           |   |                       |                              |                          |         |                             |                       |
| 192             |              |   | 4        |                          |           |   |                       |                              |                          |         |                             |                       |
| 193             |              |   | 9        |                          |           |   |                       |                              |                          |         |                             |                       |
| 194             |              |   |          |                          | SC        |   |                       |                              |                          |         |                             |                       |
| 195             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 196             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 197             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 198             |              |   |          |                          | CL        | CLAYEY SAND (SC)<br>olive, dense, wet, coarse sand, trace fine gravel |                       |                              |                          |         |                             |                       |
| 199             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 200             | SPT          |  | 9        | 34                       |           |   |                       |                              |                          |         |                             |                       |
| 201             |              |   | 12       |                          |           |   |                       |                              |                          |         |                             |                       |
| 202             |              |   | 17       |                          |           |   |                       |                              |                          |         |                             |                       |
| 203             |              |   |          |                          | CL        |   |                       |                              |                          |         |                             |                       |
| 204             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 205             |              |   |          |                          |           | CLAY (CL)<br>olive to olive-gray, medium stiff, wet                   |                       |                              |                          |         |                             |                       |
| 206             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 207             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 208             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 209             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 210             |              |   |          |                          |           |   |                       |                              |                          |         |                             |                       |







**LANGAN**

Project No.:  
750604203

Figure:  
A-2g

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |           |                          |                       | Log of Boring BSWL-14<br>PAGE 8 OF 9 |                        |                              |                          |         |                             |                       |
|--|--------------|---|-----------|--------------------------|-----------------------|--------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |   |           |                          | LITHOLOGY             | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|  | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |                       |                                      | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211  | PT           |    |           | 175 psi                  | CLAY (CL) (continued) | TV                                   |                        | 1,500                        |                          |         |                             |                       |
| 212  |              |    |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 213  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 214  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 215  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 216  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 217  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 218  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 219  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 220  | PT           |   |           | 145 psi                  | trace sand            | TV                                   |                        | 1,000                        |                          |         |                             |                       |
| 221  |              |  |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 222  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 223  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 224  |              |   |           |                          | CL                    |                                      |                        |                              |                          |         |                             |                       |
| 225  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 226  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 227  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 228  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 229  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 230  | PT           |  |           | 100 psi                  | trace gravel          | TV                                   |                        | 2,000                        |                          |         |                             |                       |
| 231  |              |  |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 232  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 233  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 234  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 235  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 236  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 237  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 238  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 239  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
| 240  |              |   |           |                          |                       |                                      |                        |                              |                          |         |                             |                       |
|  |              |   |           |                          |                       |                                      | LANGAN                 |                              |                          |         |                             |                       |
|  |              |   |           |                          |                       |                                      | Project No.: 750604203 |                              | Figure: A-2h             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California   |              |        |           |                          | Log of Boring BSWL-14 |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
|--|--------------|--------|-----------|--------------------------|-----------------------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|--|--|--|--|
|  |              |        |           |                          | PAGE 9 OF 9           |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| DEPTH<br>(feet)  | SAMPLES      |        |           |                          | LITHOLOGY             | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |                       |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |  |  |  |  |
| 241  | PT           |        |           | 50 psi                   | SP-SC                 | SAND with CLAY (SP-SC)<br>light brown to olive, wet, coarse sand, trace gravel   | TV                    | 700                          |                          |         |                             |                       |  |  |  |  |  |  |
| 242  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 243  | SPT          |        | 24        | 95                       | GP-GC                 | GRAVEL with CLAY and SAND (GP-GC)<br>light brown to live, very dense, wet, coarse sand, fine angular gravel  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 244  |              |        | 29        |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 245  |              |        | 50        |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 246  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 247  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 248  |              |        |           |                          |                       | SILTY CLAY (CL-ML)<br>olive gray to gray, soft, wet, trace medium sand   |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 249  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 250  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 251  | PT           |        |           | 85 psi                   | CL-ML                 |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 252  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 253  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 254  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 255  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 256  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 257  | SPT          |        | 41        | 60/2.5"                  |                       | SHAPE<br>dark gray, friable to weak, highly weathered  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 258  |              |        | 50/2.5"   |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 259  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 260  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 261  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 262  | SPT          |        | 50/2.5"   | 60/2.5"                  |                       | dark gray to black, moderately weathered   |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 263  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 264  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 265  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 266  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 267  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 268  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 269  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 270  |              |        |           |                          |                       |  |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
| Boring terminated at a depth of 260.2 feet below ground surface.<br>Boring backfilled with cement grout.<br>Groundwater encountered at 6 feet below ground surface during drilling.<br>TV = torvane. |              |        |           |                          |                       | <sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet. |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  |              |        |           |                          |                       | LANGAN   |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  |              |        |           |                          |                       | Project No.: 750604203   |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  |              |        |           |                          |                       | Figure: A-2i   |                       |                              |                          |         |                             |                       |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT: MISSION ROCK DEVELOPMENT STREETS</b><br>San Francisco, California   |                 |        |                        |           |   | <b>Log of Boring BSWL-15</b><br>PAGE 1 OF 9 |                                    |                             |            |                                   |                          |
|---|-----------------|--------|------------------------|-----------|---|---|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 |        |                        |           |   | Logged by: D. Wagstaffe/J. Dean             |                                    |                             |            |                                   |                          |
| Date started: 5/30/18   |                 |        | Date finished: 6/4/18  |           |   |   |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches  |                 |        | Hammer type: Automatic |           |   | <b>LABORATORY TEST DATA</b>                 |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST), Pitcher Borell (PT) |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |        |                        | LITHOLOGY | MATERIAL DESCRIPTION  | Type of<br>Strength<br>Test                 | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample | Blows/ 6"              |           |   |   |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: 98.5 feet <sup>2</sup>  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 1   | GRAB            | X      |                        | SP-SM     | 4 inches asphalt concrete (AC)  | FILL  |                                    |                             |            |                                   |                          |
| 2   | GRAB            | X      |                        |           | 3 inches aggregate base (AB)  |   |                                    |                             |            |                                   |                          |
| 3   | GRAB            | X      |                        |           | SAND with SILT (SP-SM)<br>brown, moist, fine- to coarse-grained, with fine subangular gravel, pockets of clay with coarse gravel at 2 feet, abundant brick debris |   |                                    |                             |            |                                   |                          |
| 4   |                 |        |                        | SP-SC     | SAND with CLAY (SP-SC)<br>gray-brown, moist, medium- to coarse-grained, (05/30/18, 8:20 a.m.)   | FILL  |                                    |                             |            |                                   |                          |
| 5   | S&H             | 13     | 23                     |           | with fine to coarse subangular to subrounded gravel, with pockets of clay   |   |                                    |                             |            |                                   |                          |
| 6   | S&H             | 18     | 15                     |           | medium dense at 5 feet, grades silty, abundant brick debris   |   |                                    |                             |            |                                   |                          |
| 7   | SPT             | 0      | 2                      | CL        | wet at 5.5 feet   |   |                                    |                             |            |                                   |                          |
| 8   | SPT             | 0      | 2                      |           | CLAY (CL)   |   |                                    |                             |            |                                   |                          |
| 9   | SPT             | 0      | 2                      |           | gray, very soft to soft, wet, trace fine- to medium-grained sand  |   |                                    |                             |            |                                   |                          |
| 10  |                 |        |                        | CH        | CLAY (CH)   | PP  |                                    |                             |            |                                   |                          |
| 11  | S&H             | 0      | 0                      |           | black, very soft, wet   |   |                                    |                             |            |                                   |                          |
| 12  | S&H             | 0      | 0                      |           |   |   |                                    |                             |            |                                   |                          |
| 13  |                 |        |                        | CH        | olive-gray  | PP  |                                    |                             |            |                                   |                          |
| 15  | S&H             | 0      | 0                      |           |   |   |                                    |                             |            |                                   |                          |
| 16  | S&H             | 0      | 0                      |           |   |   |                                    |                             |            |                                   |                          |
| 17  |                 |        |                        | CH        | trace shell fragments   | PP  |                                    |                             |            |                                   |                          |
| 20  | ST              | 60     | psi                    |           |   |   |                                    |                             |            |                                   |                          |
| 21  | ST              | 60     | psi                    |           |   |   |                                    |                             |            |                                   |                          |
| 22  |                 |        |                        | BAY MUD   |   | 500   |                                    |                             |            |                                   |                          |
| 23  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 24  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 25  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 26  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 27  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 28  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 29  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |
| 30  |                 |        |                        |           |   |   |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17 GPJ TR.GDT 10/16/18

**LANGAN**

Project No.: 750604203

Figure: A-3a

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |           |                          | Log of Boring BSWL-15<br>PAGE 2 OF 9 |   |  |                              |                          |         |                             |                       |  |
|--|--------------|--------|-----------|--------------------------|--------------------------------------|---|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)  | SAMPLES      |        |           |                          | LITHOLOGY                            | MATERIAL DESCRIPTION                                    | LABORATORY TEST DATA                           |                              |                          |         |                             |                       |  |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |                                      |   | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 31   | D&M          |        |           | 0 psi                    | CH                                   | CLAY (CH) (continued)<br>Triaxial Test, see Figure C-19 | TxUU   | 3,000                        | 630                      |         | 49.3                        | 70                    |  |
| 32   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 33   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 34   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 35   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 36   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 37   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 38   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 39   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 40   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 41   | ST           |        |           | 60 psi                   |                                      |   | trace shell fragments, trace fine-grained sand |                              |                          |         |                             |                       |  |
| 42   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 43   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 44   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 45   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 46   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 47   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 48   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 49   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 50   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 51   | D&M          |        |           | 0 psi                    |                                      |   |  |                              |                          |         |                             |                       |  |
| 52   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 53   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 54   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 55   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 56   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 57   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 58   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 59   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
| 60   |              |        |           |                          |                                      |   |  |                              |                          |         |                             |                       |  |
|  |              |        |           |                          |                                      |   | LANGAN   |                              |                          |         |                             |                       |  |
|  |              |        |           |                          |                                      |   | Project No.: 750604203                         |                              | Figure: A-3b             |         |                             |                       |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-15

PAGE 3 OF 9

| PROJECT:        |              | MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |           |             |           | Log of Boring BSWL-15   |                       |                              |                          |         |                             |                       |
|-----------------|--------------|---|-----------|-------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 |              |   |           |             |           | PAGE 3 OF 9   |                       |                              |                          |         |                             |                       |
| DEPTH<br>(feet) | SAMPLES      |   |           |             | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|                 | Sampler Type | Sample  | Blows/ 6" | SPT N-Value |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61              | ST           |   |           | 300         | CH        | CLAY (CH) (continued)   | PP                    | 500                          |                          |         |                             |                       |
| 62              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 63              | SPT          |   | 15        | 58          |           | CLAYEY SAND (SC)  |                       |                              |                          |         |                             |                       |
| 64              |              |   | 20        |             |           | olive-gray, very dense, wet, fine-grained   |                       |                              |                          |         |                             |                       |
| 65              |              |   | 28        |             | SC        |   |                       |                              |                          |         |                             |                       |
| 66              |              |   |           |             |           | with organics   |                       |                              |                          |         |                             |                       |
| 67              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 68              |              |   |           |             |           | SAND (SP)   |                       |                              |                          |         |                             |                       |
| 69              | SPT          |   | 15        | 59          |           | olive-gray, very dense, wet, fine- to medium-grained, with clay seams, trace silt |                       |                              |                          |         |                             |                       |
| 70              |              |   | 23        |             | SP        |   |                       |                              |                          |         |                             |                       |
| 71              |              |   | 26        |             |           |   |                       |                              |                          |         |                             |                       |
| 72              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 73              |              |   |           |             |           | SILTY SAND (SM)   |                       |                              |                          |         |                             |                       |
| 74              | S&H          |   | 40        | 35/ 5"      |           | olive-gray, very dense, wet, fine- to medium-grained                              |                       |                              |                          |         |                             |                       |
| 75              |              |   | 50/ 5"    |             | SM        |   |                       |                              |                          |         |                             |                       |
| 76              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 77              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 78              |              |   |           |             |           | SAND with SILT (SP-SM)  |                       |                              |                          |         |                             |                       |
| 79              | SPT          |   | 36        | 95          |           | olive-gray to yellow-brown, very dense, fine-grained                              |                       |                              |                          |         |                             |                       |
| 80              |              |   | 39        |             | SP-SM     |   |                       |                              |                          |         |                             |                       |
| 81              |              |   | 40        |             |           |   |                       |                              |                          |         |                             |                       |
| 82              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 83              |              |   |           |             |           | CLAY (CH)   |                       |                              |                          |         |                             |                       |
| 84              | S&H          |   | 0         | 7           |           | olive-gray, medium stiff, wet   |                       |                              |                          |         |                             |                       |
| 85              |              |   | 3         |             |           |   |                       |                              |                          |         |                             |                       |
| 86              |              |   | 7         |             | CH        |   |                       |                              |                          |         |                             |                       |
| 87              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 88              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 89              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
| 90              |              |   |           |             |           |   |                       |                              |                          |         |                             |                       |
|                 |              |   |           |             |           |   | LANGAN                |                              |                          |         |                             |                       |
|                 |              |   |           |             |           |   | Project No.:          |                              | Figure:                  |         |                             |                       |
|                 |              |   |           |             |           |   | 750604203             |                              | A-3c                     |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18





# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-15

PAGE 5 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |          |                          | LITHOLOGY | MATERIAL DESCRIPTION                        | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|----------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121             |              |        |          |                          |           | CLAY (CH) (continued)                       |                           |                              |                          |         |                             |                       |
| 122             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 123             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 124             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 125             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 126             | PT           |        |          | 70 psi                   |           | Triaxial Test, see Figure C-20              | TxUU                      | 12,500                       | 2,360                    |         | 41.7                        | 79                    |
| 127             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 128             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 129             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 130             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 131             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 132             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 133             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 134             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 135             |              |        |          |                          | CH        |   |                           |                              |                          |         |                             |                       |
| 136             | PT           |        |          | 70 psi                   |           |   | PP                        |                              | 1,750                    |         |                             |                       |
| 137             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 138             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 139             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 140             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 141             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 142             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 143             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 144             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 145             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 146             | PT           |        |          | 80 psi                   |           | stiff<br>Consolidation Test, see Figure C-7 | PP                        |                              | 2,250                    |         | 47.7                        | 74                    |
| 147             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 148             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 149             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
| 150             |              |        |          |                          |           |   |                           |                              |                          |         |                             |                       |
|                 |              |        |          |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |          |                          |           |   | Project No.:<br>750604203 | Figure:<br>A-3e              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-15

PAGE 6 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |          |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|----------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/6" | SPT N-value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151             |              |        |          |                          |           | CLAY (CH) (continued)   |                       |                              |                          |         |                             |                       |
| 152             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 153             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 154             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 155             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 156             | PT           |        |          | 70 psi                   |           | hard  |                       |                              |                          |         |                             |                       |
| 157             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 158             | SPT          |        | 30       | 49                       | CH        |   |                       |                              |                          |         |                             |                       |
| 159             |              |        | 22       |                          |           |   |                       |                              |                          |         |                             |                       |
| 160             |              |        | 19       |                          |           |   |                       |                              |                          |         |                             |                       |
| 161             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 162             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 163             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 164             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 165             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 166             | PT           |        |          | 70 psi                   |           |   |                       |                              |                          |         |                             |                       |
| 167             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 168             | SPT          |        | 10       | 59                       |           | SILTY SAND (SP-SM)<br>olive-gray, very dense, wet, fine-grained, trace clay |                       |                              |                          |         |                             |                       |
| 169             |              |        | 13       |                          |           |   |                       |                              |                          |         |                             |                       |
| 170             |              |        | 36       |                          |           |   |                       |                              |                          |         |                             |                       |
| 171             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 172             |              |        |          |                          | SP-SM     |   |                       |                              |                          |         |                             |                       |
| 173             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 174             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 175             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 176             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 177             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 178             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 179             |              |        |          |                          | GC        | CLAYEY GRAVEL (GC)<br>gray, very dense, wet                                 |                       |                              |                          |         |                             |                       |
| 180             |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
|                 |              |        |          |                          |           |   | <b>LANGAN</b>         |                              |                          |         |                             |                       |
|                 |              |        |          |                          |           |   | Project No.:          | Figure:                      |                          |         |                             |                       |
|                 |              |        |          |                          |           |   | 750604203             | A-3f                         |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18





OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-15

PAGE 7 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |                 |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|---|-----------------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/ 6"       | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181             | SPT          |    | 36<br>50/<br>5" | 60/<br>5"                | GC        | CLAYEY GRAVEL (GC) (continued)  | PP                    | 2,750                        |                          |         |                             |                       |
| 182             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 183             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 184             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 185             | SPT          |    | 50/<br>5"       | 60/<br>5"                |           |   |                       |                              |                          |         |                             |                       |
| 186             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 187             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 188             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 189             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 190             | SPT          |   | 7<br>16<br>15   | 30                       | SC-<br>SP | SANDY CLAY (SC-SP)<br>gray to olive-gray, very stiff, wet, trace silt |                       |                              |                          |         |                             |                       |
| 191             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 192             |              |   |                 |                          |           | CLAY (CL)<br>gray to olive-gray, very stiff, wet                      |                       |                              |                          |         |                             |                       |
| 193             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 194             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 195             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 196             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 197             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 198             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 199             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 200             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 201             | PT           |  |                 | 100<br>psi               | CL        |   |                       |                              |                          |         |                             |                       |
| 202             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 203             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 204             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 205             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 206             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 207             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 208             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 209             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 210             |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
|                 |              |   |                 |                          |           |   | <b>LANGAN</b>         |                              |                          |         |                             |                       |
|                 |              |   |                 |                          |           |   | Project No.:          |                              | Figure:                  |         |                             |                       |
|                 |              |   |                 |                          |           |   | 750604203             |                              | A-3g                     |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-15

PAGE 8 OF 9

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |           |               |           | Log of Boring BSWL-15<br>PAGE 8 OF 9  |                        |                              |                          |         |                             |                       |
|--|--------------|--------|-----------|---------------|-----------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |           |               | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value   |           |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211  | PT           |        |           | 120 psi       | CL        | CLAY (CL) (continued)<br>trace gravel   | PP                     | 3,250                        |                          |         |                             |                       |
| 212  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 213  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 214  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 215  | PB           |        |           | 150 psi       | CL        | hard  | PP                     | 3,250                        |                          |         |                             |                       |
| 216  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 217  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 218  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 219  | SPT          |        |           | 42            | CL        | SAND with CLAY (SP-SC)<br>black, wet, fine- to medium-grained, trace silt<br>CLAY (CL)<br>olive-gray to red-gray, hard, wet, trace silt |                        |                              |                          |         |                             |                       |
| 220  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 221  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 222  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 223  |              |        |           | 8<br>15<br>20 | GC        | CLAYEY GRAVEL with SAND (GC)<br>brown to yellow-brown to gray, hard, wet, fine to coarse, gravel up to 1/4 inch in diameter             |                        |                              |                          |         |                             |                       |
| 224  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 225  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 226  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 227  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 228  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 229  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 230  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 231  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 232  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 233  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 234  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 235  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 236  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 237  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 238  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 239  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
| 240  |              |        |           |               |           |   |                        |                              |                          |         |                             |                       |
|  |              |        |           |               |           |   | LANGAN                 |                              |                          |         |                             |                       |
|  |              |        |           |               |           |   | Project No.: 750604203 |                              | Figure: A-3h             |         |                             |                       |









TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California  |              |        |                |                          |           | Log of Boring BSWL-15<br>PAGE 9 OF 9  |   |                              |                          |         |                             |                       |
|---|--------------|--------|----------------|--------------------------|-----------|---|---|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)   | SAMPLES      |        |                |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"      | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test   | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   | SPT          |        | 22<br>33<br>43 | 91                       | GC        | CLAYEY GRAVEL with SAND (GC) (continued)  |   |                              |                          |         |                             |                       |
| 242   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 243   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 244   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 245   | SPT          |        | 50/<br>3"      | 100/<br>3"               | BEDROCK   | SHALE<br>black to gray, moderately weak, friable, slightly weathered, very fractured, wet |   |                              |                          |         |                             |                       |
| 246   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 247   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 248   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 249   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 250   | SPT          |        | 50/<br>4"      | 100/<br>4"               |           |   |   |                              |                          |         |                             |                       |
| 251   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 252   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 253   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 254   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 255   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 256   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 257   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 258   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 259   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 260   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 261   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 262   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 263   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 264   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 265   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 266   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 267   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 268   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 269   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| 270   |              |        |                |                          |           |   |   |                              |                          |         |                             |                       |
| <div><div>Boring terminated at a depth of 250.3 feet below ground surface.<br/>Boring backfilled with cement grout.<br/>Groundwater encountered at 5.5 feet below ground surface during drilling.<br/>PP = pocket penetrometer.</div><div><sup>1</sup> S&amp;H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br/><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.</div></div> |              |        |                |                          |           |   | <div>LANGAN</div> <div>Project No.: 750604203</div> <div>Figure: A-3i</div> |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT: MISSION ROCK DEVELOPMENT STREETS</b><br>San Francisco, California  |                 |   |                        |           |  | <b>Log of Boring BSWL-16</b><br>PAGE 1 OF 9   |                                    |                             |            |                                   |                          |
|--|-----------------|---|------------------------|-----------|--|---|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |   |                        |           |  | Logged by: A. Tran  |                                    |                             |            |                                   |                          |
| Date started: 6/11/18  |                 |   | Date finished: 6/13/18 |           |  |   |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 |   | Hammer type: Automatic |           |  | <b>LABORATORY TEST DATA</b>   |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST), Pitcher Borel (PT) |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |   |                        | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test   | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample  | Blows/ 6"              |           |  |   |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~98 feet <sup>2</sup>  |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 1  |                 |   |                        |           | 4 inches asphalt concrete (AC)   |   |                                    |                             |            |                                   |                          |
| 2  | GRAB            |    |                        | CL        | 3 inches aggregate base (AB)   |   |                                    |                             |            |                                   |                          |
| 3  |                 |   |                        |           | SANDY CLAY (CL)<br>brown, moist, fine- to medium-grained sand, with<br>brick debris  |   |                                    |                             |            |                                   |                          |
| 4  | GRAB            |    |                        | SC        | CLAYEY SAND (SC)<br>dark brown to gray, moist, fine-grained sand, trace<br>medium-grained sand, trace fine to coarse           |   |                                    |                             | 8.5        | 22.1                              |                          |
| 5  |                 |   |                        |           | subangular gravel up to 2 inches in diameter,<br>(06/11/18, 8:05 a.m.)   |   |                                    |                             |            |                                   |                          |
| 6  |                 |   |                        | SP-<br>SM | with brick debris  |   |                                    |                             |            |                                   |                          |
| 7  |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 8  | SPT             |    | 9<br>12<br>6           | CL        | SAND with SILT (SP-SM)<br>brown-gray, medium dense, moist, fine-grained,<br>trace fine subangular gravel, with brick debris    | PP  |                                    | 1,000                       |            |                                   |                          |
| 9  |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 10   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 11   | SPT             |   | 10<br>12<br>3          | SP-<br>SM | CLAY with SAND (CL)<br>dark gray, medium stiff to stiff, wet, fine- to<br>medium-grained sand, trace fine subangular<br>gravel |   |                                    |                             |            |                                   |                          |
| 12   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 13   |                 |   |                        |           | SAND with SILT (SP-SM)<br>dark gray, loose, wet, fine- to medium-grained<br>sand, trace fine subangular gravel                 |   |                                    |                             |            |                                   |                          |
| 14   |                 |   |                        | CL        | CLAY with SAND (CL)<br>dark gray, very stiff, wet, fine-grained sand, trace<br>fine to coarse subangular to angular gravel     |   |                                    |                             |            |                                   |                          |
| 15   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 16   | S&H             |  | 0<br>0<br>0            |           | CLAY (CH)<br>olive-gray, very soft, wet, trace shells  | PP  |                                    | 250                         |            |                                   |                          |
| 17   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 18   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 19   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 20   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 21   | ST              |  |                        |           |  |   |                                    |                             |            |                                   |                          |
| 22   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 23   |                 |   |                        | CH        |  |   |                                    |                             |            |                                   |                          |
| 24   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 25   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 26   | D&M             |  |                        |           |  |   |                                    |                             |            |                                   |                          |
| 27   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 28   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 29   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| 30   |                 |   |                        |           |  |   |                                    |                             |            |                                   |                          |
| BAY MUD  |                 |   |                        |           |  |  |                                    |                             |            |                                   |                          |
| <b>LANGAN</b>  |                 |   |                        |           |  | <b>LANGAN</b>   |                                    |                             |            |                                   |                          |
| Project No.: 750604203   |                 |   |                        |           |  | Figure: A-4a  |                                    |                             |            |                                   |                          |




TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-16

PAGE 2 OF 9

| DEPTH<br>(feet) | SAMPLES         |   |           |                             | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |
|-----------------|-----------------|---|-----------|-----------------------------|-----------|-----------------------|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
|                 | Sampler<br>Type | Sample  | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |           |                       | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 31              | ST              |    |           | 40<br>psi                   |           | CLAY (CH) (continued) | PP                          | 500                                |                             |            |                                   |                          |
| 32              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 33              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 34              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 35              | D&M             |  |           | 100<br>psi                  |           |                       | PP                          | 500                                |                             |            |                                   |                          |
| 36              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 37              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 38              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 39              | ST              |  |           | 50<br>psi                   |           |                       | PP                          | 150                                |                             |            |                                   |                          |
| 40              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 41              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 42              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 43              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 44              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 45              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 46              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 47              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 48              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 49              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 50              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 51              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 52              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 53              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 54              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 55              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 56              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 57              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 58              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 59              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |
| 60              |                 |   |           |                             |           |                       |                             |                                    |                             |            |                                   |                          |





LANGAN

Project No.: 750604203

Figure: A-4b

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |                |                          | Log of Boring BSWL-16<br>PAGE 3 OF 9 |  |                           |                              |                          |         |                             |                       |
|--|--------------|---|----------------|--------------------------|--------------------------------------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |   |                |                          | LITHOLOGY                            | MATERIAL DESCRIPTION   | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|  | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value <sup>1</sup> |                                      |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61   |              |   |                |                          |                                      | CLAY (CH) (continued)  |                           |                              |                          |         |                             |                       |
| 62   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 63   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 64   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 65   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 66   | D&M          |    |                | 150 psi                  |                                      | with increased fine-grained sand   | PP                        |                              | 500                      |         |                             |                       |
| 67   |              |   |                |                          | CH                                   |  |                           |                              |                          |         |                             |                       |
| 68   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 69   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 70   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 71   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 72   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 73   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 74   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 75   | SPT          |  | 6<br>8<br>19   | 32                       |                                      | SANDY CLAY (CL)<br>olive-gray to dark gray, hard, wet, fine-grained sand |                           |                              |                          |         |                             |                       |
| 76   |              |   |                |                          | CL                                   |  |                           |                              |                          |         |                             |                       |
| 77   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 78   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 79   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 80   | SPT          |  | 25<br>28<br>26 | 65                       |                                      | SAND with SILT (SP-SM)<br>dark gray, very dense, wet, fine-grained sand  |                           |                              |                          |         |                             |                       |
| 81   |              |   |                |                          | SP-SM                                |  |                           |                              |                          |         |                             |                       |
| 82   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 83   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 84   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 85   | S&H          |  | 8<br>11<br>13  | 17                       |                                      |  | PP                        |                              | 2,000                    |         |                             |                       |
| 86   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 87   |              |   |                |                          |                                      | CLAY (CH)<br>olive-gray, very stiff, wet, trace fine sand                |                           |                              |                          |         |                             |                       |
| 88   |              |   |                |                          | CH                                   |  |                           |                              |                          |         |                             |                       |
| 89   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
| 90   |              |   |                |                          |                                      |  |                           |                              |                          |         |                             |                       |
|  |              |   |                |                          |                                      |  | LANGAN                    |                              |                          |         |                             |                       |
|  |              |   |                |                          |                                      |  | Project No.:<br>750604203 |                              | Figure:<br>A-4c          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17 GPJ TR.GDT 10/16/18

BAY MUD

OLD BAY CLAY



# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-16

PAGE 4 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91              | PT           |        |           | 40                       |           | CLAY (CH) (continued)          | PP                    |                              | 1,500                    |         |                             |                       |
| 92              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 93              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 94              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 95              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 96              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 97              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 98              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 99              |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 100             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 101             | PT           |        |           | 60                       |           | Triaxial Test, see Figure C-21 | TxUU                  | 10,000                       | 1,780                    |         | 53.8                        | 68                    |
| 102             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 103             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 104             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 105             |              |        |           |                          | CH        |                                |                       |                              |                          |         |                             |                       |
| 106             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 107             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 108             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 109             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 110             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 111             | PT           |        |           | 50                       |           |                                | PP                    |                              | 1,500                    |         |                             |                       |
| 112             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 113             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 114             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 115             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 116             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 117             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 118             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 119             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |
| 120             |              |        |           |                          |           |                                |                       |                              |                          |         |                             |                       |

OLD BAY CLAY

**LANGAN**

Project No.:  
750604203

Figure:  
A-4d

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-16

PAGE 5 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|---------------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                       | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121             | PT           |        |           | 50 psi                   |           | CLAY (CH) (continued)<br>medium stiff | PP                        |                              | 1,250                    |         |                             |                       |
| 122             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 123             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 124             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 125             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 126             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 127             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 128             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 129             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 130             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 131             | PT           |        |           | 50 psi                   |           | Consolidation Test, see Figure C-8    | PP                        |                              | 1,000                    |         | 47.1                        | 75                    |
| 132             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 133             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 134             |              |        |           |                          | CH        |                                       |                           |                              |                          |         |                             |                       |
| 135             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 136             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 137             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 138             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 139             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 140             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 141             | PT           |        |           | 60 psi                   |           |                                       | PP                        |                              | 1,000                    |         |                             |                       |
| 142             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 143             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 144             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 145             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 146             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 147             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 148             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 149             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
| 150             |              |        |           |                          |           |                                       |                           |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                       | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                       | Project No.:<br>750604203 | Figure:<br>A-4e              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18













OLD BAY CLAY

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-16






PAGE 6 OF 9

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |           |             | Log of Boring BSWL-16<br>PAGE 6 OF 9 |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
|--|--------------|---|-----------|-------------|--------------------------------------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|--|--|--|--|
| DEPTH<br>(feet)  | SAMPLES      |   |           |             | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  | Sampler Type | Sample  | Blows/ 6" | SPT N-Value |                                      |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |  |  |  |  |
| 151  | PT           |    |           | 60 psi      | CH                                   | CLAY (CH) (continued)<br>very stiff<br>Triaxial Test, see Figure C-22                                 | TxUU                   | 15,000                       | 2,440                    |         | 43.8                        | 75                    |  |  |  |  |  |  |
| 152  |              |    |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 153  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 154  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 155  | S&H          |    | 6         | 43          |                                      | dark gray, hard   | PP                     |                              | 3,000                    |         |                             |                       |  |  |  |  |  |  |
| 156  |              |    | 17        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 157  |              |   | 45        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 158  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 159  |              |   |           |             | SP-SC                                | SAND with CLAY (SP-SC)<br>dark gray to black, dense, wet, trace silt increased and content            |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 160  | S&H          |   | 0         | 22          |                                      | SANDY CLAY (CL)<br>dark gray, very stiff, wet, fine-grained sand, trace silt                          |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 161  |              |  | 14        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 162  |              |   | 18        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 163  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 164  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 165  | SPT          |  | 15        | 42          | CL                                   | hard  |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 166  |              |  | 22        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 167  |              |   | 13        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 168  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 169  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 170  | SPT          |  | 5         | 42          |                                      | SAND with SILT (SP-SM)<br>dark gray to black, dense, wet, fine-grained, trace clay, trace fine gravel |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 171  |              |  | 8         |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 172  |              |   | 27        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 173  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 174  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 175  | SPT          |  | 10        | 52          | SP-SM                                | very dense  |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 176  |              |  | 18        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 177  |              |   | 26        |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 178  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 179  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
| 180  |              |   |           |             |                                      |   |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  |              |   |           |             |                                      |   | LANGAN                 |                              |                          |         |                             |                       |  |  |  |  |  |  |
|  |              |   |           |             |                                      |   | Project No.: 750604203 |                              | Figure: A-4f             |         |                             |                       |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18



OLD BAY CLAY

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |                   |              | Log of Boring BSWL-16<br>PAGE 7 OF 9 |   |  |                              |                          |         |                             |                       |
|--|--------------|---|-------------------|--------------|--------------------------------------|---|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |   |                   |              | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                       |                              |                          |         |                             |                       |
|  | Sampler Type | Sample  | Blows/ 6"         | SPT N-Value¹ |                                      |   | Type of Strength Test                      | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181  | SPT          |    | 0<br>8<br>27      | 42           | CL                                   | CLAY with SAND (CL)<br>dark gray with brown mottling, hard, wet,<br>fine-grained sand                 |  |                              |                          |         |                             |                       |
| 182  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 183  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 184  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 185  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 186  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 187  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 188  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 189  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 190  | SPT          |   | 3<br>15<br>20     | 42           |                                      |   | trace fine subangular to subrounded gravel |                              |                          |         |                             |                       |
| 191  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 192  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 193  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 194  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 195  | SPT          |  | 38<br>50/<br>5.5" | 60/<br>5.5"  | GC                                   | CLAYEY GRAVEL (GC)<br>dark gray, very dense, wet, fine to coarse<br>subangular gravel, with fine sand |  |                              |                          |         |                             |                       |
| 196  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 197  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 198  |              |   |                   |              |                                      | CLAY (CL)<br>dark gray to olive-gray, hard, wet, trace fine<br>subangular gravel                      |  |                              |                          |         |                             |                       |
| 199  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 200  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 201  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 202  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 203  |              |   |                   |              | CL                                   |   |  |                              |                          |         |                             |                       |
| 204  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 205  |              |  |                   |              |                                      | Consolidation Test, see Figure C-9  |  |                              |                          |         |                             |                       |
| 206  | PT           |  |                   | 150<br>psi   |                                      |   |  |                              |                          | 49.9    | 72                          |                       |
| 207  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 208  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 209  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
| 210  |              |   |                   |              |                                      |   |  |                              |                          |         |                             |                       |
|  |              |   |                   |              |                                      |   | <b>LANGAN</b>                              |                              |                          |         |                             |                       |
|  |              |   |                   |              |                                      |   | Project No.:<br>750604203                  |                              | Figure:<br>A-4g          |         |                             |                       |


TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |             |                          |           | Log of Boring BSWL-16<br>PAGE 8 OF 9  |   |                              |                          |         |                             |                       |
|--|--------------|---|-------------|--------------------------|-----------|---|---|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |   |             |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                                      |                              |                          |         |                             |                       |
|  | Sampler Type | Sample  | Blows/ 6"   | SPT N-value <sup>1</sup> |           |   | Type of Strength Test                                     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211  | PT           |   |             | 150 psi                  | CL        | CLAY (CL) (continued)   | PP  | >4,500                       |                          |         |                             |                       |
| 212  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 213  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 214  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 215  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 216  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 217  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 218  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 219  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 220  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 221  | SPT          |  | 26 50/ 5.5" | 60/ 5.5"                 | GC        | SANDY CLAY (CL)<br>dark gray, hard, wet, fine-grained sand, trace fine subangular gravel, trace silt          |   |                              |                          |         |                             |                       |
| 222  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 223  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 224  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 225  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 226  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 227  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 228  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 229  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 230  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 231  |              |   |             |                          |           | CLAYEY GRAVEL (GC)<br>dark gray, very dense, wet, fine subangular gravel, trace silt, trace fine-grained sand |   |                              |                          |         |                             |                       |
| 232  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 233  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 234  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 235  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 236  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 237  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 238  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 239  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
| 240  |              |   |             |                          |           |   |   |                              |                          |         |                             |                       |
|  |              |   |             |                          |           |   | <b>LANGAN</b><br>Project No.: 750604203      Figure: A-4h |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California  |              |   |           |                          |           | Log of Boring BSWL-16<br>PAGE 9 OF 9  |   |                              |                          |         |                             |                       |
|---|--------------|---|-----------|--------------------------|-----------|---|---|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)   | SAMPLES      |   |           |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test   | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   |              |   |           |                          | GC        | CLAYEY GRAVEL (GC) (continued)  |   |                              |                          |         |                             |                       |
| 242   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 243   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 244   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 245   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 246   |              |   |           |                          |           | SHALE<br>closely fractured, moderately hard, friable,<br>moderately weathered | BEDROCK   |                              |                          |         |                             |                       |
| 247   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 248   | SPT          |  | 50/<br>3" | 60/<br>3"                |           |   |   |                              |                          |         |                             |                       |
| 249   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 250   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 251   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 252   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 253   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 254   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 255   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 256   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 257   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 258   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 259   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 260   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 261   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 262   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 263   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 264   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 265   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 266   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 267   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 268   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 269   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| 270   |              |   |           |                          |           |   |   |                              |                          |         |                             |                       |
| <div>Boring terminated at a depth of 248.3 feet below ground surface.<br/>Boring backfilled with cement grout.<br/>Groundwater encountered at 6.5 feet below ground surface during drilling.<br/>PP = pocket penetrometer.</div> <div><sup>1</sup> S&amp;H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br/><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.</div> |              |   |           |                          |           |   | <div>LANGAN</div> <div>Project No.: 750604203</div> <div>Figure: A-4i</div> |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT:</b> <b>MISSION ROCK DEVELOPMENT STREETS</b><br>San Francisco, California   |                 |        |                               |                             |           | <b>Log of Boring BSWL-17</b><br>PAGE 1 OF 9   |                             |                                    |                             |                 |                                   |                          |
|--|-----------------|--------|-------------------------------|-----------------------------|-----------|---|-----------------------------|------------------------------------|-----------------------------|-----------------|-----------------------------------|--------------------------|
| <b>Boring location:</b> See Site Plan, Figure 2  |                 |        |                               |                             |           | <b>Logged by:</b> J. Dean   |                             |                                    |                             |                 |                                   |                          |
| <b>Date started:</b> 6/4/18  |                 |        | <b>Date finished:</b> 6/8/18  |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| <b>Drilling method:</b> Rotary Wash  |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| <b>Hammer weight/drop:</b> 140 lbs./30 inches  |                 |        | <b>Hammer type:</b> Automatic |                             |           | <b>LABORATORY TEST DATA</b>   |                             |                                    |                             |                 |                                   |                          |
| <b>Samplers:</b> Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST), Pitcher Barrel (PT) |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |        |                               | SPT<br>N-value <sup>1</sup> | LITHOLOGY | MATERIAL DESCRIPTION  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>%      | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample | Blows/ 6"                     |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| Ground Surface Elevation: ~98 feet <sup>2</sup>  |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 1  |                 |        |                               |                             |           | 4 inches asphalt concrete (AC)  |                             |                                    |                             |                 |                                   |                          |
| 2  |                 |        |                               |                             |           | 4 inches aggregate base (AB)  |                             |                                    |                             |                 |                                   |                          |
| 3  | S&H             |        | 4                             | 5                           | SP-SM     | SAND with SILT (SP-SM)<br>brown to dark brown, moist, fine- to<br>coarse-grained, with fine subangular gravel |                             |                                    |                             |                 |                                   |                          |
| 4  |                 |        | 4                             |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 5  |                 |        | 3                             |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 6  | S&H             |        | 21                            | 33                          | SP-SC     | SAND with SILT and CLAY (SP-SC)<br>gray-brown to brown, moist, fine- to<br>coarse-grained, brick debris       |                             |                                    |                             |                 |                                   |                          |
| 7  |                 |        | 32                            |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 8  |                 |        | 15                            |                             |           | CLAYEY SAND (SP-SC)<br>(06/04/18, 1:55 p.m.)<br>brown to gray, dense, moist, fine- to<br>coarse-grained sand  |                             |                                    |                             |                 |                                   |                          |
| 9  |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 10   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 11   | SPT             | •      | 2                             | 5                           | SP-SC     |   |                             |                                    |                             |                 |                                   |                          |
| 12   |                 |        | 2                             |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 13   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 14   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 15   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 16   | S&H             |        | 2                             | 0                           |           | CLAY (CH)<br>black, very soft, wet  |                             |                                    |                             |                 |                                   |                          |
| 17   |                 |        | 0                             | 0                           |           |   |                             |                                    |                             |                 |                                   |                          |
| 18   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 19   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 20   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 21   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 22   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 23   |                 |        |                               |                             | CH        |   |                             |                                    |                             |                 |                                   |                          |
| 24   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 25   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 26   | S&H             |        | 0                             | 0                           |           | with sandstone fragments  |                             |                                    |                             |                 |                                   |                          |
| 27   |                 |        | 0                             | 0                           |           |   |                             |                                    |                             |                 |                                   |                          |
| 28   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 29   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
| 30   |                 |        |                               |                             |           |   |                             |                                    |                             |                 |                                   |                          |
|  |                 |        |                               |                             |           |   | <b>LANGAN</b>               |                                    |                             |                 |                                   |                          |
|  |                 |        |                               |                             |           |   | Project No.:<br>750604203   |                                    |                             | Figure:<br>A-5a |                                   |                          |




TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-17

PAGE 2 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|---|-----------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31              |              |   |           |                          |           | CLAY (CH) (continued)                  |                       |                              |                          |         |                             |                       |
| 32              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 33              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 34              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 35              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 36              | D&M          |    |           | 0 psi                    |           | Triaxial Test, see Figure C-23         | TxUU                  | 3,500                        | 450                      |         | 54.3                        | 66                    |
| 37              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 38              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 39              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 40              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 41              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 42              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 43              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 44              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 45              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 46              | S&H          |  |           | 0                        | CH        |  |                       |                              |                          |         |                             |                       |
| 47              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 48              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 49              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 50              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 51              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 52              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 53              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 54              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 55              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 56              | ST           |  |           | 80 psi                   |           | soft<br>Triaxial Test, see Figure C-24 | TxUU                  | 5,500                        | 790                      |         | 50.3                        | 68                    |
| 57              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 58              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 59              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 60              |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |

BAY MUD

**LANGAN**

Project No.:  
750604203

Figure:  
A-5b

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18



# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-17

PAGE 3 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                                 | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61              |              |        |           |                          |           | CLAY (CH) (continued)                                |                       |                              |                          |         |                             |                       |
| 62              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 63              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 64              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 65              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 66              | S&H          |        | 0         | 0                        |           |  | PP                    |                              | 500                      |         |                             |                       |
| 67              |              |        | 0         |                          |           |  |                       |                              |                          |         |                             |                       |
| 68              |              |        |           |                          | CH        |  |                       |                              |                          |         |                             |                       |
| 69              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 70              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 71              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 72              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 73              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 74              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 75              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 76              | ST           |        |           | 300                      |           |  |                       |                              |                          |         |                             |                       |
| 77              |              |        |           | psi                      |           |  |                       |                              |                          |         |                             |                       |
| 78              | SPT          |        | 10        | 74                       |           | SAND (SP)<br>olive-gray, very dense, wet, trace silt |                       |                              |                          |         |                             |                       |
| 79              |              |        | 22        |                          |           |  |                       |                              |                          |         |                             |                       |
| 80              |              |        | 30        |                          |           |  |                       |                              |                          |         |                             |                       |
| 81              |              |        |           |                          | SP        |  |                       |                              |                          |         |                             |                       |
| 82              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 83              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 84              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 85              |              |        |           |                          |           | CLAY (CH)<br>olive-gray, medium stiff, wet           |                       |                              |                          |         |                             |                       |
| 86              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 87              |              |        |           |                          | CH        |  |                       |                              |                          |         |                             |                       |
| 88              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 89              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 90              |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

BAY MUD

OLD BAY CLAY

**LANGAN**

Project No.:  
750604203

Figure:  
A-5c

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-17

PAGE 4 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|-------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91              |              |        |           |                          |           | CLAY (CH) (continued)               |                        |                              |                          |         |                             |                       |
| 92              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 93              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 94              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 95              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 96              | ST           |        |           | 200                      |           |                                     | PP                     |                              | 1,000                    |         |                             |                       |
| 97              |              |        |           | psi                      |           |                                     |                        |                              |                          |         |                             |                       |
| 98              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 99              |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 100             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 101             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 102             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 103             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 104             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 105             |              |        |           |                          | CH        |                                     |                        |                              |                          |         |                             |                       |
| 106             | ST           |        |           | 150                      |           | stiff                               | PP                     |                              | 1,500                    |         |                             |                       |
| 107             |              |        |           | psi                      |           |                                     |                        |                              |                          |         |                             |                       |
| 108             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 109             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 110             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 111             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 112             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 113             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 114             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 115             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 116             | ST           |        |           | 150                      |           | Triaxial Test, see Figure C-25      | TxUU                   | 11,500                       | 1,790                    |         | 42.9                        | 77                    |
| 117             |              |        |           | psi                      |           | Consolidation Test, see Figure C-10 |                        |                              |                          |         | 45.9                        | 75                    |
| 118             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 119             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 120             |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                     | <b>LANGAN</b>          |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |                                     | Project No.: 750604203 |                              | Figure: A-5d             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-17





PAGE 5 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121             |              |        |           |                          |           | CLAY (CH) (continued)   |                           |                              |                          |         |                             |                       |
| 122             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 123             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 124             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 125             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 126             | ST           |        |           | 200 psi                  |           | trace fine subangular gravel                                  | PP                        |                              | 1,500                    |         |                             |                       |
| 127             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 128             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 129             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 130             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 131             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 132             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 133             |              |        |           |                          | CH        |   |                           |                              |                          |         |                             |                       |
| 134             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 135             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 136             | ST           |        |           | 180 psi                  |           |   | PP                        |                              | 1,250                    |         |                             |                       |
| 137             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 138             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 139             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 140             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 141             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 142             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 143             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 144             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 145             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 146             | ST           |        |           | 350 psi                  |           |   |                           |                              |                          |         |                             |                       |
| 147             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
| 148             |              |        |           |                          | SP-SC     | CLAY SAND (SP-SC)<br>olive-gray, wet, fine- to coarse-grained |                           |                              |                          |         |                             |                       |
| 149             |              |        |           |                          | CL        | CLAY (CL)<br>olive-gray, medium stiff, wet                    |                           |                              |                          |         |                             |                       |
| 150             |              |        |           |                          |           |   |                           |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |           |                          |           |   | Project No.:<br>750604203 | Figure:<br>A-5e              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

OLD BAY CLAY

Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |   |                |                          |           | Log of Boring BSWL-17<br>PAGE 6 OF 9   |                        |                              |                          |         |                             |                       |
|--|--------------|---|----------------|--------------------------|-----------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |   |                |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|  | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151  | ST           |    |                | 500<br>psi               | CL        | CLAY (CL) (continued)  |                        |                              |                          |         |                             |                       |
| 152  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 153  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 154  | SPT          |   | 17<br>33<br>30 | 76                       | SP-SM     | SILTY SAND (SP-SM)<br>olive-gray, very dense, wet, fine- to coarse-grained, trace clay |                        |                              |                          |         |                             |                       |
| 155  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 156  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 157  | SPT          |  | 8<br>10<br>20  | 36                       | SP-SM     | dense  |                        |                              |                          |         |                             |                       |
| 158  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 159  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 160  | SPT          |  | 22<br>34<br>43 | 92                       | CL        | very dense   |                        |                              |                          |         |                             |                       |
| 161  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 162  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 163  |              |   |                |                          | CL        | CLAY (CL)<br>olive to olive-gray, very stiff, wet                                      |                        |                              |                          |         |                             |                       |
| 164  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 165  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 166  |              |   |                |                          | CL        |  |                        |                              |                          |         |                             |                       |
| 167  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 168  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 169  |              |   |                |                          | CL        |  |                        |                              |                          |         |                             |                       |
| 170  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 171  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 172  |              |   |                |                          | CL        |  |                        |                              |                          |         |                             |                       |
| 173  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 174  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 175  |              |   |                |                          | CL        |  |                        |                              |                          |         |                             |                       |
| 176  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 177  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 178  |              |   |                |                          | CL        |  |                        |                              |                          |         |                             |                       |
| 179  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
| 180  |              |   |                |                          |           |  |                        |                              |                          |         |                             |                       |
|  |              |   |                |                          |           |  | <b>LANGAN</b>          |                              |                          |         |                             |                       |
|  |              |   |                |                          |           |  | Project No.: 750604203 |                              | Figure: A-5f             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

PROJECT: **MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

## Log of Boring BSWL-17

PAGE 7 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |                |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|----------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6"      | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181             | PT           |        |                | 100                      |           | CLAY (CL) (continued)   | PP                        |                              | 2,250                    |         |                             |                       |
| 182             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 183             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 184             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 185             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 186             |              |        |                |                          | CL        |   |                           |                              |                          |         |                             |                       |
| 187             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 188             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 189             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 190             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 191             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 192             |              |        |                |                          |           | CLAYEY SAND with GRAVEL (SP-SC)   |                           |                              |                          |         |                             |                       |
| 193             |              |        |                |                          |           | dense, wet, trace silt  |                           |                              |                          |         |                             |                       |
| 194             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 195             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 196             | SPT          |        | 8<br>18<br>22  | 48                       |           |   |                           |                              |                          |         |                             |                       |
| 197             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 198             |              |        |                |                          | SP-SC     |   |                           |                              |                          |         |                             |                       |
| 199             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 200             |              |        |                |                          |           | trace silt  |                           |                              |                          |         |                             |                       |
| 201             | SPT          |        | 18<br>23<br>26 | 59                       |           | olive-gray to light brown, very dense, wet, fine- to coarse-grained, subangular gravel up to 1/4 inch in diameter |                           |                              |                          |         |                             |                       |
| 202             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 203             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 204             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 205             |              |        |                |                          |           | CLAY (CL)   |                           |                              |                          |         |                             |                       |
| 206             | SPT          |        | 5<br>12<br>12  | 29                       |           | olive-gray, very stiff, wet   |                           |                              |                          |         |                             |                       |
| 207             |              |        |                |                          | CL        |   |                           |                              |                          |         |                             |                       |
| 208             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 209             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 210             |              |        |                |                          |           |   |                           |                              |                          |         |                             |                       |
|                 |              |        |                |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |                |                          |           |   | Project No.:<br>750604203 | Figure:<br>A-5g              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL-17<br>PAGE 8 OF 9  |                        |                              |                          |         |                             |                       |
|--|--------------|--------|-----------|--------------------------|-----------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211  | PT           |        |           | 90 psi                   | CL        | CLAY (CL) (continued)   | PP                     |                              | 2,000                    |         |                             |                       |
| 212  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 213  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 214  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 215  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 216  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 217  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 218  | PT           |        |           | 70 psi                   | CL-GC     | GRAVELLY CLAY (CL-GC)<br>gray-brown, dense, wet, fine to coarse-grained, subangular to subrounded gravel up to 1/4 inch in diameter | PP                     |                              | 1,750                    |         |                             |                       |
| 222  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 223  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 224  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 225  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 226  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 227  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 228  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 229  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 230  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 231  | PT           |        |           | 70 psi                   |           | stiff   |                        |                              |                          |         |                             |                       |
| 235  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 236  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 237  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 238  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 239  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
| 240  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
|  |              |        |           |                          |           |   |                        |                              |                          |         |                             |                       |
|  |              |        |           |                          |           |   | LANGAN                 |                              |                          |         |                             |                       |
|  |              |        |           |                          |           |   | Project No.: 750604203 |                              | Figure: A-5h             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

# Mayor ED 17-02 Priority permit

| PROJECT: MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |              |        |               |                          | Log of Boring BSWL-17<br>PAGE 9 OF 9 |  |                       |                              |                          |         |                             |                       |
|--|--------------|--------|---------------|--------------------------|--------------------------------------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |               |                          | LITHOLOGY                            | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6"     | SPT N-Value <sup>1</sup> |                                      |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241  |              |        |               |                          | CL-GC                                | GRAVELLY CLAY (CL-GC) (continued)  |                       |                              |                          |         |                             |                       |
| 242  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 243  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 244  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 245  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 246  | SPT          | •      | 7<br>17<br>24 | 49                       |                                      |  |                       |                              |                          |         |                             |                       |
| 247  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 248  |              |        |               |                          | GC                                   | CLAYEY GRAVEL with SAND (GC)<br>olive-gray to light brown, wet, fine- to coarse-grained, subangular to subrounded up to 1/4 inch in diameter |                       |                              |                          |         |                             |                       |
| 249  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 250  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 251  | PT           |        |               | 200 psi                  |                                      |  |                       |                              |                          |         |                             |                       |
| 252  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 253  |              |        |               |                          | BEDROCK                              | SHALE<br>intensely fractured, hard, friable, moderately weathered  |                       |                              |                          |         |                             |                       |
| 254  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 255  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 256  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 257  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 258  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 259  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 260  | SPT          |        | 50/<br>1"     | 60/<br>1"                |                                      |  |                       |                              |                          |         |                             |                       |
| 261  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 262  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 263  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 264  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 265  | SPT          |        | 50/<br>2"     | 60/<br>2"                |                                      |  |                       |                              |                          |         |                             |                       |
| 266  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 267  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 268  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 269  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |
| 270  |              |        |               |                          |                                      |  |                       |                              |                          |         |                             |                       |

Boring terminated at a depth of 265.2 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 6 feet below ground surface during drilling.  
PP = pocket penetrometer.

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

Project No.: 750604203

Figure: A-5i

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TEST GEOTECH LOG 750604203 LOT 337 BSWL-13 TO BSWL-17.GPJ TR.GDT 10/16/18

BEDROCK

# Mayor ED 17-02 Priority permit









| UNIFIED SOIL CLASSIFICATION SYSTEM                                    |   |         |  |
|---|---|---------|--|
| Major Divisions   |   | Symbols | Typical Names  |
| Coarse-Grained Soils<br>(more than half of soil > no. 200 sieve size) | Gravels<br>(More than half of coarse fraction > no. 4 sieve size) | GW      | Well-graded gravels or gravel-sand mixtures, little or no fines                      |
|   |   | GP      | Poorly-graded gravels or gravel-sand mixtures, little or no fines                    |
|   |   | GM      | Silty gravels, gravel-sand-silt mixtures   |
|   |   | GC      | Clayey gravels, gravel-sand-clay mixtures  |
|   | Sands<br>(More than half of coarse fraction < no. 4 sieve size)   | SW      | Well-graded sands or gravelly sands, little or no fines                              |
|   |   | SP      | Poorly-graded sands or gravelly sands, little or no fines                            |
|   |   | SM      | Silty sands, sand-silt mixtures  |
|   |   | SC      | Clayey sands, sand-clay mixtures   |
| Fine -Grained Soils<br>(more than half of soil < no. 200 sieve size)  | Silts and Clays<br>LL = < 50                                      | ML      | Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts      |
|   |   | CL      | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays |
|   |   | OL      | Organic silts and organic silt-clays of low plasticity                               |
|   | Silts and Clays<br>LL = > 50                                      | MH      | Inorganic silts of high plasticity   |
|   |   | CH      | Inorganic clays of high plasticity, fat clays  |
|   |   | OH      | Organic silts and clays of high plasticity   |
| Highly Organic Soils  |   | PT      | Peat and other highly organic soils  |

## SAMPLE DESIGNATIONS/SYMBOLS

| GRAIN SIZE CHART                 |                          |                           |
|----------------------------------|--------------------------|---------------------------|
| Classification                   | Range of Grain Sizes     |                           |
|                                  | U.S. Standard Sieve Size | Grain Size in Millimeters |
| Boulders                         | Above 12"                | Above 305                 |
| Cobbles                          | 12" to 3"                | 305 to 76.2               |
| Gravel<br>coarse<br>fine         | 3" to No. 4              | 76.2 to 4.76              |
|                                  | 3" to 3/4"               | 76.2 to 19.1              |
|                                  | 3/4" to No. 4            | 19.1 to 4.76              |
| Sand<br>coarse<br>medium<br>fine | No. 4 to No. 200         | 4.76 to 0.075             |
|                                  | No. 4 to No. 10          | 4.76 to 2.00              |
|                                  | No. 10 to No. 40         | 2.00 to 0.420             |
|                                  | No. 40 to No. 200        | 0.420 to 0.075            |
| Silt and Clay                    | Below No. 200            | Below 0.075               |

 Unstabilized groundwater level

 Stabilized groundwater level

-  Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered
-  Classification sample taken with Standard Penetration Test sampler
-  Undisturbed sample taken with thin-walled tube
-  Disturbed sample
-  Sampling attempted with no recovery
-  Core sample
-  Analytical laboratory sample
-  Sample taken with Direct Push or Drive sampler

## SAMPLER TYPE

|     |  |     |  |
|-----|--|-----|--|
| C   | Core barrel  | PT  | Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube  |
| CA  | California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter | S&H | Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter              |
| D&M | Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube                 | SPT | Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter |
| O   | Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube              | ST  | Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure                           |

**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

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## CLASSIFICATION CHART

Date 10/09/18 Project No. 750604203 Figure A-6



# Mayor ED 17-02 Priority permit

## I FRACTURING

| Intensity              | Size of Pieces in Feet |
|------------------------|------------------------|
| Very little fractured  | Greater than 4.0       |
| Occasionally fractured | 1.0 to 4.0             |
| Moderately fractured   | 0.5 to 1.0             |
| Closely fractured      | 0.1 to 0.5             |
| Intensely fractured    | 0.05 to 0.1            |
| Crushed                | Less than 0.05         |

## II HARDNESS

1. **Soft** - reserved for plastic material alone.
2. **Low hardness** - can be gouged deeply or carved easily with a knife blade.
3. **Moderately hard** - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away.
4. **Hard** - can be scratched with difficulty; scratch produced a little powder and is often faintly visible.
5. **Very hard** - cannot be scratched with knife blade; leaves a metallic streak.

## III STRENGTH

1. **Plastic** or very low strength.
2. **Friable** - crumbles easily by rubbing with fingers.
3. **Weak** - an unfractured specimen of such material will crumble under light hammer blows.
4. **Moderately strong** - specimen will withstand a few heavy hammer blows before breaking.
5. **Strong** - specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.
6. **Very strong** - specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

## IV WEATHERING - The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, and freezing and thawing.

- D. Deep** - moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay or silt.
- M. Moderate** - slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.
- L. Little** - no megascopic decomposition of minerals; little of no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.
- F. Fresh** - unaffected by weathering agents. No disintegration or discoloration. Fractures usually less numerous than joints.

## ADDITIONAL COMMENTS:

## V CONSOLIDATION OF SEDIMENTARY ROCKS: usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated  
P = poorly consolidated  
M = moderately consolidated  
W = well consolidated

## VI BEDDING OF SEDIMENTARY ROCKS

| Splitting Property | Thickness            | Stratification    |
|--------------------|----------------------|-------------------|
| Massive            | Greater than 4.0 ft. | very thick-bedded |
| Blocky             | 2.0 to 4.0 ft.       | thick bedded      |
| Slabby             | 0.2 to 2.0 ft.       | thin bedded       |
| Flaggy             | 0.05 to 0.2 ft.      | very thin-bedded  |
| Shaly or platy     | 0.01 to 0.05 ft.     | laminated         |
| Papery             | less than 0.01       | thinly laminated  |

MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

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## PHYSICAL PROPERTIES CRITERIA FOR ROCK DESCRIPTIONS

Date 10/10/18 Project No. 750604203 Figure A-7

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX B**

### **CONE PENETRATION TEST RESULTS FROM CURRENT INVESTIGATION**



# Mayor ED 17-02 Priority permit

GREGG DRILLING & TESTING, INC.  
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

6/24/18

Langan  
Attn: Peter Brady

Subject: CPT Site Investigation  
Giants Parking Lot  
San Francisco, California  
GREGG Project Number: 18-109MA

Dear Mr. Brady:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

|    |                                  |         |                                     |
|----|----------------------------------|---------|-------------------------------------|
| 1  | Cone Penetration Tests           | (CPTU)  | <input checked="" type="checkbox"/> |
| 2  | Pore Pressure Dissipation Tests  | (PPD)   | <input checked="" type="checkbox"/> |
| 3  | Seismic Cone Penetration Tests   | (SCPTU) | <input checked="" type="checkbox"/> |
| 4  | UVOST Laser Induced Fluorescence | (UVOST) | <input type="checkbox"/>            |
| 5  | Groundwater Sampling             | (GWS)   | <input type="checkbox"/>            |
| 6  | Soil Sampling                    | (SS)    | <input type="checkbox"/>            |
| 7  | Vapor Sampling                   | (VS)    | <input type="checkbox"/>            |
| 8  | Pressuremeter Testing            | (PMT)   | <input type="checkbox"/>            |
| 9  | Vane Shear Testing               | (VST)   | <input type="checkbox"/>            |
| 10 | Dilatometer Testing              | (DMT)   | <input type="checkbox"/>            |

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,  
GREGG Drilling & Testing, Inc.

Mary Walden  
Operations Manager



# Mayor ED 17-02 Priority permit

GREGG DRILLING & TESTING, INC.  
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

## Cone Penetration Test Sounding Summary

-Table 1-

| CPT Sounding Identification | Date      | Termination Depth (feet) | Depth of Groundwater Samples (feet) | Depth of Soil Samples (feet) | Depth of Pore Pressure Dissipation Tests (feet) |
|-----------------------------|-----------|--------------------------|-------------------------------------|------------------------------|---|
| c23a                        | 6/14/2018 | 16.08                    | -                                   | -                            | -   |
| c23b                        | 6/14/2018 | 16.08                    | -                                   | -                            | -   |
| c23c                        | 6/13/2018 | 198.98                   | -                                   | -                            | -   |
| c23d                        | 6/13/2018 | 198.98                   | -                                   | -                            | -   |
| CPT-SC1                     | 6/14/2018 | 40.03                    | -                                   | -                            | -   |
| CPT-SC2                     | 6/14/2018 | 82.84                    | -                                   | -                            | -   |
| CPT-SC3                     | 6/14/2018 | 40.03                    | -                                   | -                            | -   |
| CPT-SC4                     | 6/14/2018 | 44.95                    | -                                   | -                            | -   |
| CSWL337-19                  | 6/11/2018 | 151.74                   | -                                   | -                            | -   |
| CSWL337-27                  | 6/11/2018 | 162.73                   | -                                   | -                            | -   |
| CSWL337-29                  | 6/14/2018 | 166.83                   | -                                   | -                            | -   |
| CSWL337-32                  | 6/11/2018 | 162.07                   | -                                   | -                            | -   |
| CSWL337-33                  | 6/12/2018 | 153.71                   | -                                   | -                            | 154.0   |
| CSWL337-34                  | 6/12/2018 | 189.96                   | -                                   | -                            | -   |
| CSWL337-37                  | 6/12/2018 | 32.97                    | -                                   | -                            | -   |
| CSWL337-S35                 | 6/13/2018 | 173.72                   | -                                   | -                            | -   |
| cswl33720                   | 6/13/2018 | 173.56                   | -                                   | -                            | 68.0  |
| cswl33721                   | 6/11/2018 | 65.94                    | -                                   | -                            | -   |
| cswl33722                   | 6/12/2018 | 12.63                    | -                                   | -                            | -   |
| cswl33723                   | 6/11/2018 | 185.53                   | -                                   | -                            | -   |
| cswl33724                   | 6/14/2018 | 165.03                   | -                                   | -                            | -   |
| cswl33725                   | 6/14/2018 | 164.21                   | -                                   | -                            | -   |
| cswl33726                   | 6/12/2018 | 165.85                   | -                                   | -                            | -   |
| cswl33728                   | 6/11/2018 | 152.89                   | -                                   | -                            | -   |
| cswl33730                   | 6/12/2018 | 156.99                   | -                                   | -                            | -   |
| cswl33731                   | 6/11/2018 | 161.25                   | -                                   | -                            | -   |
| tfb1                        | 6/15/2018 | 143.7                    | -                                   | -                            | -   |
| TFB-3                       | 6/15/2018 | 200.13                   | -                                   | -                            | -   |
| TFB-4                       | 6/15/2018 | 133.2                    | -                                   | -                            | -   |
| CSWL337-36                  | 6/13/2018 | 152.4                    | -                                   | -                            | -   |



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Copies of ASTM Standards are available through [www.astm.org](http://www.astm.org)

# Mayor ED 17-02 Priority permit

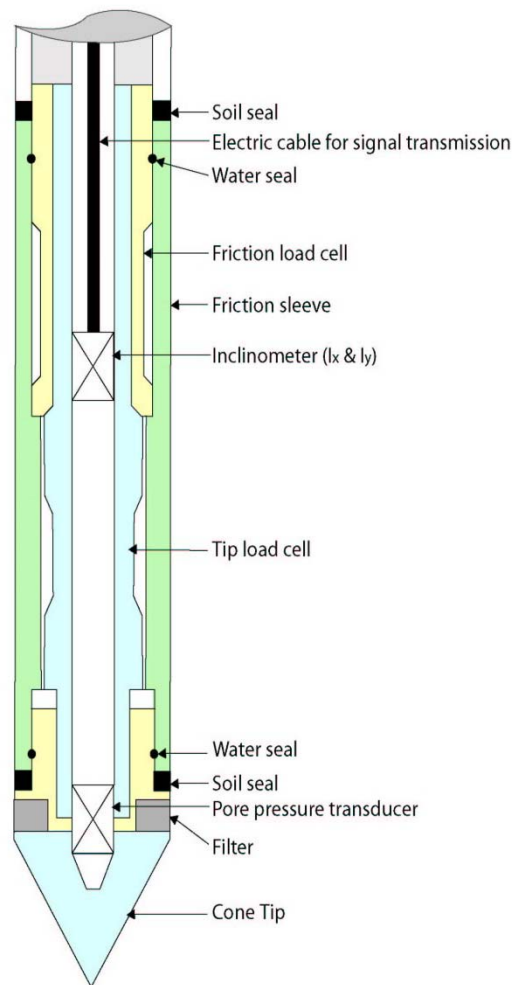
## Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*.

The cone takes measurements of tip resistance ( $q_c$ ), sleeve resistance ( $f_s$ ), and penetration pore water pressure ( $u_2$ ). Measurements are taken at either 2.5 or 5 cm intervals during penetration to provide a nearly continuous profile. CPT data reduction and basic interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored electronically for further analysis and reference. All CPT soundings are performed in accordance with revised ASTM standards (D 5778-12).

The 5mm thick porous plastic filter element is located directly behind the cone tip in the  $u_2$  location. A new saturated filter element is used on each sounding to measure both penetration pore pressures as well as measurements during a dissipation test (PPDT). Prior to each test, the filter element is fully saturated with oil under vacuum pressure to improve accuracy.

When the sounding is completed, the test hole is backfilled according to client specifications. If grouting is used, the procedure generally consists of pushing a hollow tremie pipe with a “knock out” plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.



*Figure CPT*

# Mayor ED 17-02 Priority permit

Gregg 15cm<sup>2</sup> Standard Cone Specifications

| Dimensions                      |                       |
|---------------------------------|-----------------------|
| Cone base area                  | 15 cm <sup>2</sup>    |
| Sleeve surface area             | 225 cm <sup>2</sup>   |
| Cone net area ratio             | 0.80                  |
|                                 |                       |
| Specifications                  |                       |
| <b>Cone load cell</b>           |                       |
| Full scale range                | 180 kN (20 tons)      |
| Overload capacity               | 150%                  |
| Full scale tip stress           | 120 MPa (1,200 tsf)   |
| Repeatability                   | 120 kPa (1.2 tsf)     |
|                                 |                       |
| <b>Sleeve load cell</b>         |                       |
| Full scale range                | 31 kN (3.5 tons)      |
| Overload capacity               | 150%                  |
| Full scale sleeve stress        | 1,400 kPa (15 tsf)    |
| Repeatability                   | 1.4 kPa (0.015 tsf)   |
|                                 |                       |
| <b>Pore pressure transducer</b> |                       |
| Full scale range                | 7,000 kPa (1,000 psi) |
| Overload capacity               | 150%                  |
| Repeatability                   | 7 kPa (1 psi)         |

*Note: The repeatability during field use will depend somewhat on ground conditions, abrasion, maintenance and zero load stability.*

# Mayor ED 17-02 Priority permit

## Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected are presented in graphical and electronic form in the report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings deeper than 30m, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBT<sub>n</sub>, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBT<sub>n</sub> and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson (Guide to Cone Penetration Testing, 2015). The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling & Testing Inc. does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software. Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on  $q_t$ ,  $f_s$ , and  $u_2$ . In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.

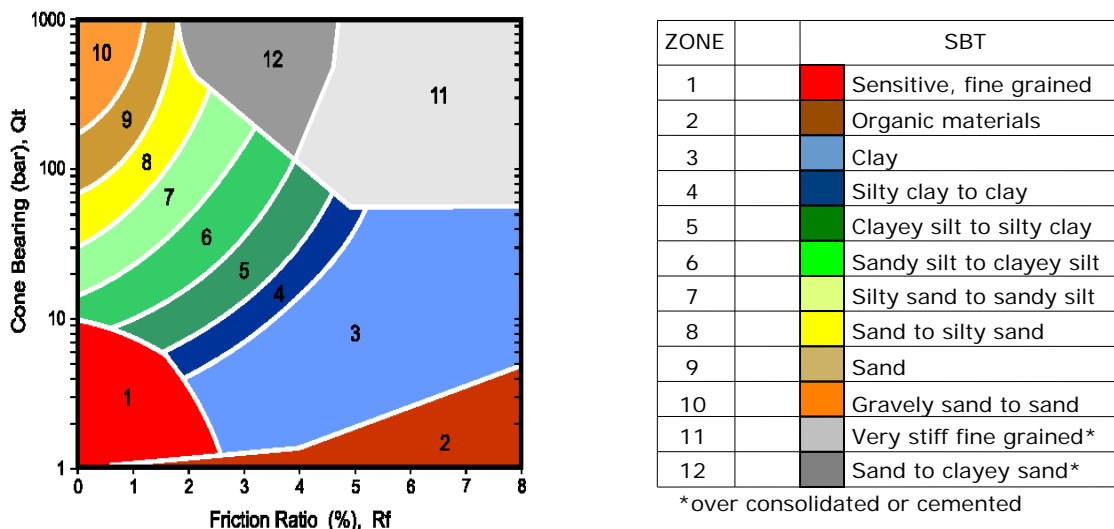


Figure SBT (After Robertson et al., 1986) – Note: Colors may vary slightly compared to plots



# Mayor ED 17-02 Priority permit

## Cone Penetration Test (CPT) Interpretation

Gregg uses a proprietary CPT interpretation and plotting software. The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

### Input:

- 1 Units for display (Imperial or metric) (atm. pressure,  $p_a = 0.96$  tsf or 0.1 MPa)
- 2 Depth interval to average results (ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
- 3 Elevation of ground surface (ft or m)
- 4 Depth to water table,  $z_w$  (ft or m) – input required
- 5 Net area ratio for cone,  $a$  (default to 0.80)
- 6 Relative Density constant,  $C_{Dr}$  (default to 350)
- 7 Young's modulus number for sands,  $\alpha$  (default to 5)
- 8 Small strain shear modulus number
  - a. for sands,  $S_G$  (default to 180 for SBT<sub>n</sub> 5, 6, 7)
  - b. for clays,  $C_G$  (default to 50 for SBT<sub>n</sub> 1, 2, 3 & 4)
- 9 Undrained shear strength cone factor for clays,  $N_{kt}$  (default to 15)
- 10 Over Consolidation ratio number,  $k_{ocr}$  (default to 0.3)
- 11 Unit weight of water, (default to  $\gamma_w = 62.4$  lb/ft<sup>3</sup> or 9.81 kN/m<sup>3</sup>)

### Column

- 1 Depth,  $z$ , (m) – CPT data is collected in meters
- 2 Depth (ft)
- 3 Cone resistance,  $q_c$  (tsf or MPa)
- 4 Sleeve resistance,  $f_s$  (tsf or MPa)
- 5 Penetration pore pressure,  $u$  (psi or MPa), measured behind the cone (i.e.  $u_2$ )
- 6 Other – any additional data
- 7 Total cone resistance,  $q_t$  (tsf or MPa)  $q_t = q_c + u(1-a)$

# Mayor ED 17-02 Priority permit

|    |   |  |
|----|---|--|
| 8  | Friction Ratio, $R_f$ (%)                                   | $R_f = (f_s/q_t) \times 100\%$                 |
| 9  | Soil Behavior Type (non-normalized), SBT                    | see note                                       |
| 10 | Unit weight, $\gamma$ (pcf or kN/m <sup>3</sup> )           | based on SBT, see note                         |
| 11 | Total overburden stress, $\sigma_v$ (tsf)                   | $\sigma_{vo} = \sigma_z$                       |
| 12 | In-situ pore pressure, $u_o$ (tsf)                          | $u_o = \gamma_w (z - z_w)$                     |
| 13 | Effective overburden stress, $\sigma'_{vo}$ (tsf)           | $\sigma'_{vo} = \sigma_{vo} - u_o$             |
| 14 | Normalized cone resistance, $Q_{tn}$                        | $Q_{tn} = (q_t - \sigma_{vo}) / \sigma'_{vo}$  |
| 15 | Normalized friction ratio, $F_r$ (%)                        | $F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$ |
| 16 | Normalized Pore Pressure ratio, $B_q$                       | $B_q = u - u_o / (q_t - \sigma_{vo})$          |
| 17 | Soil Behavior Type (normalized), $SBT_n$                    | see note                                       |
| 18 | $SBT_n$ Index, $I_c$  | see note                                       |
| 19 | Normalized Cone resistance, $Q_{tn}$ (n varies with $I_c$ ) | see note                                       |
| 20 | Estimated permeability, $k_{SBT}$ (cm/sec or ft/sec)        | see note                                       |
| 21 | Equivalent SPT $N_{60}$ , blows/ft                          | see note                                       |
| 22 | Equivalent SPT $(N_1)_{60}$ blows/ft                        | see note                                       |
| 23 | Estimated Relative Density, $D_r$ , (%)                     | see note                                       |
| 24 | Estimated Friction Angle, $\phi'$ , (degrees)               | see note                                       |
| 25 | Estimated Young's modulus, $E_s$ (tsf)                      | see note                                       |
| 26 | Estimated small strain Shear modulus, $G_o$ (tsf)           | see note                                       |
| 27 | Estimated Undrained shear strength, $s_u$ (tsf)             | see note                                       |
| 28 | Estimated Undrained strength ratio                          | $s_u/\sigma'_v$                                |
| 29 | Estimated Over Consolidation ratio, OCR                     | see note                                       |

## Notes:

- Soil Behavior Type (non-normalized), SBT (Lunne et al., 1997 and table below)
- Unit weight,  $\gamma$  either constant at 119 pcf or based on Non-normalized SBT (Lunne et al., 1997 and table below)
- Soil Behavior Type (Normalized),  $SBT_n$  Lunne et al. (1997)
- $SBT_n$  Index,  $I_c$   $I_c = ((3.47 - \log Q_{tn})^2 + (\log F_r + 1.22)^2)^{0.5}$
- Normalized Cone resistance,  $Q_{tn}$  (n varies with  $I_c$ )

$Q_{tn} = ((q_t - \sigma_{vo})/p_a) (p_a/(\sigma'_{vo}))^n$  and recalculate  $I_c$ , then iterate:

When  $I_c < 1.64$ ,  $n = 0.5$  (clean sand)  
 When  $I_c > 3.30$ ,  $n = 1.0$  (clays)  
 When  $1.64 < I_c < 3.30$ ,  $n = (I_c - 1.64)0.3 + 0.5$   
 Iterate until the change in  $n$ ,  $\Delta n < 0.01$

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- 6 Estimated permeability,  $k_{\text{SBT}}$  based on Normalized  $\text{SBT}_n$  (Lunne et al., 1997 and table below)
- 7 Equivalent SPT  $N_{60}$ , blows/ft Lunne et al. (1997)
- $$\frac{(q_t/p_a)}{N_{60}} = 8.5 \left( 1 - \frac{I_c}{4.6} \right)$$
- 8 Equivalent SPT  $(N_1)_{60}$  blows/ft  $(N_1)_{60} = N_{60} C_N$   
where  $C_N = (p_a/\sigma'_{vo})^{0.5}$
- 9 Relative Density,  $D_r$ , (%)  $D_r^2 = Q_{tn} / C_{Dr}$   
Only  $\text{SBT}_n$  5, 6, 7 & 8 Show 'N/A' in zones 1, 2, 3, 4 & 9
- 10 Friction Angle,  $\phi'$ , (degrees)  $\tan \phi' = \frac{1}{2.68} \left[ \log \left( \frac{q_c}{\sigma'_{vo}} \right) + 0.29 \right]$   
Only  $\text{SBT}_n$  5, 6, 7 & 8 Show 'N/A' in zones 1, 2, 3, 4 & 9
- 11 Young's modulus,  $E_s$   $E_s = \alpha q_t$   
Only  $\text{SBT}_n$  5, 6, 7 & 8 Show 'N/A' in zones 1, 2, 3, 4 & 9
- 12 Small strain shear modulus,  $G_o$   
a.  $G_o = S_G (q_t \sigma'_{vo} p_a)^{1/3}$  For  $\text{SBT}_n$  5, 6, 7  
b.  $G_o = C_G q_t$  For  $\text{SBT}_n$  1, 2, 3 & 4  
Show 'N/A' in zones 8 & 9
- 13 Undrained shear strength,  $s_u$   $s_u = (q_t - \sigma_{vo}) / N_{kt}$   
Only  $\text{SBT}_n$  1, 2, 3, 4 & 9 Show 'N/A' in zones 5, 6, 7 & 8
- 14 Over Consolidation ratio, OCR  $\text{OCR} = k_{ocr} Q_{t1}$   
Only  $\text{SBT}_n$  1, 2, 3, 4 & 9 Show 'N/A' in zones 5, 6, 7 & 8

The following updated and simplified SBT descriptions have been used in the software:

## SBT Zones

- 1 sensitive fine grained
- 2 organic soil
- 3 clay
- 4 clay & silty clay
- 5 clay & silty clay
- 6 sandy silt & clayey silt

## SBT<sub>n</sub> Zones

- 1 sensitive fine grained
- 2 organic soil
- 3 clay
- 4 clay & silty clay

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|    |                         |   |                         |
|----|-------------------------|---|-------------------------|
| 7  | silty sand & sandy silt | 5 | silty sand & sandy silt |
| 8  | sand & silty sand       | 6 | sand & silty sand       |
| 9  | sand                    |   |                         |
| 10 | sand                    | 7 | sand                    |
| 11 | very dense/stiff soil*  | 8 | very dense/stiff soil*  |
| 12 | very dense/stiff soil*  | 9 | very dense/stiff soil*  |

\*heavily overconsolidated and/or cemented

Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

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## Estimated Permeability (see Lunne et al., 1997)

| SBT <sub>n</sub> | Permeability (ft/sec) | (m/sec)             |
|------------------|-----------------------|---------------------|
| 1                | $3 \times 10^{-8}$    | $1 \times 10^{-8}$  |
| 2                | $3 \times 10^{-7}$    | $1 \times 10^{-7}$  |
| 3                | $1 \times 10^{-9}$    | $3 \times 10^{-10}$ |
| 4                | $3 \times 10^{-8}$    | $1 \times 10^{-8}$  |
| 5                | $3 \times 10^{-6}$    | $1 \times 10^{-6}$  |
| 6                | $3 \times 10^{-4}$    | $1 \times 10^{-4}$  |
| 7                | $3 \times 10^{-2}$    | $1 \times 10^{-2}$  |
| 8                | $3 \times 10^{-6}$    | $1 \times 10^{-6}$  |
| 9                | $1 \times 10^{-8}$    | $3 \times 10^{-9}$  |

## Estimated Unit Weight (see Lunne et al., 1997)

| SBT | Approximate Unit Weight (lb/ft <sup>3</sup> ) | (kN/m <sup>3</sup> ) |
|-----|---|----------------------|
| 1   | 111.4   | 17.5                 |
| 2   | 79.6  | 12.5                 |
| 3   | 111.4   | 17.5                 |
| 4   | 114.6   | 18.0                 |
| 5   | 114.6   | 18.0                 |
| 6   | 114.6   | 18.0                 |
| 7   | 117.8   | 18.5                 |
| 8   | 120.9   | 19.0                 |
| 9   | 124.1   | 19.5                 |
| 10  | 127.3   | 20.0                 |
| 11  | 130.5   | 20.5                 |
| 12  | 120.9   | 19.0                 |

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## Pore Pressure Dissipation Tests (PPDT)

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals can be used to measure equilibrium water pressure (at the time of the CPT). If conditions are hydrostatic, the equilibrium water pressure can be used to determine the approximate depth of the ground water table. A PPDT is conducted when penetration is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure ( $u$ ) with time is measured behind the tip of the cone and recorded.

Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation ( $c_h$ )
- In situ horizontal coefficient of permeability ( $k_h$ )

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until it reaches equilibrium, *Figure PPDT*. This time is commonly referred to as  $t_{100}$ , the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992 and Lunne et al. 1997.

A summary of the pore pressure dissipation tests are summarized in Table 1.

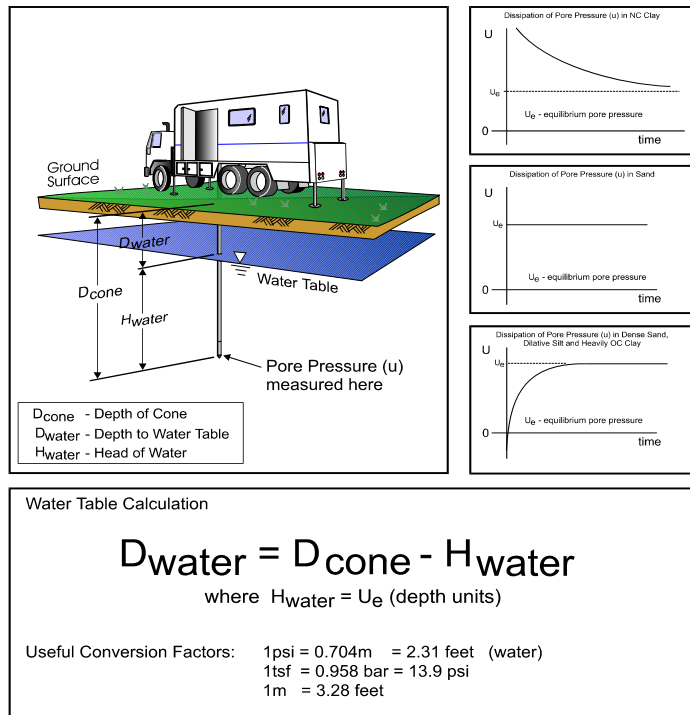


Figure PPDT

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## Seismic Cone Penetration Testing (SCPT)

Seismic Cone Penetration Testing (SCPT) can be conducted at various intervals during the Cone Penetration Test. Shear wave velocity ( $V_s$ ) can then be calculated over a specified interval with depth. A small interval for seismic testing, such as 1-1.5m (3-5ft) allows for a detailed look at the shear wave profile with depth. Conversely, a larger interval such as 3-6m (10-20ft) allows for a more average shear wave velocity to be calculated. Gregg's cones have a horizontally active geophone located 0.2m (0.66ft) behind the tip.

To conduct the seismic shear wave test, the penetration of the cone is stopped and the rods are decoupled from the rig. An automatic hammer is triggered to send a shear wave into the soil. The distance from the source to the cone is calculated knowing the total depth of the cone and the horizontal offset distance between the source and the cone. To calculate an interval velocity, a minimum of two tests must be performed at two different depths. The arrival times between the two wave traces are compared to obtain the difference in time ( $\Delta t$ ). The difference in depth is calculated ( $\Delta d$ ) and velocity can be determined using the simple equation:  $v = \Delta d / \Delta t$

Multiple wave traces can be recorded at the same depth to improve quality of the data.

A complete reference on seismic cone penetration tests is presented by Robertson et al. 1986 and Lunne et al. 1997.

A summary the shear wave velocities, arrival times and wave traces are provided with the report.

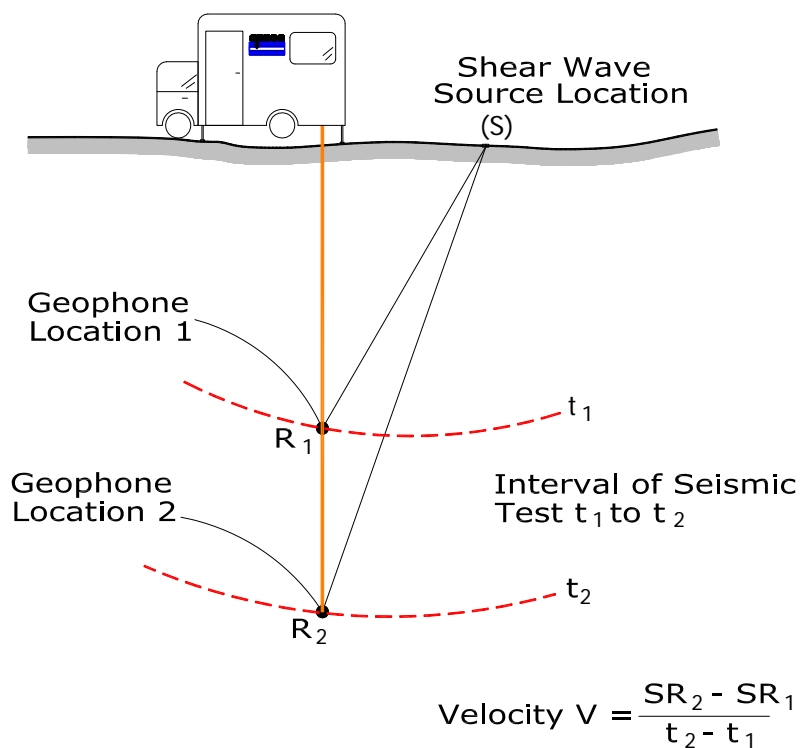
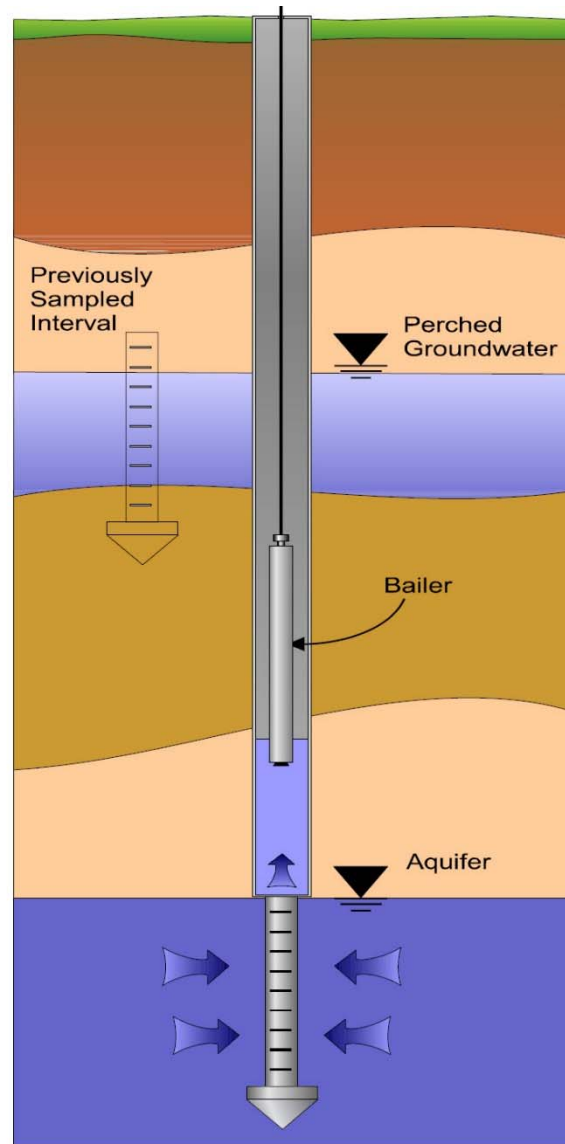


Figure SCPT

## Groundwater Sampling

Gregg Drilling & Testing, Inc. conducts groundwater sampling using a sampler as shown in *Figure GWS*. The groundwater sampler has a retrievable stainless steel or disposable PVC screen with steel drop off tip. This allows for samples to be taken at multiple depth intervals within the same sounding location. In areas of slower water recharge, provisions may be made to set temporary PVC well screens during sampling to allow the pushing equipment to advance to the next sample location while the groundwater is allowed to infiltrate.

The groundwater sampler operates by advancing 44.5mm (1¾ inch) hollow push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted; exposing the encased filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer (approximately ½ or ¾ inch) is lowered through the push rods into the screen section for sample collection. The number of downhole trips with the bailer and time necessary to complete the sample collection at each depth interval is a function of sampling protocols, volume requirements, and the yield characteristics and storage capacity of the formation. Upon completion of sample collection, the push rods and sampler, with the exception of the PVC screen and steel drop off tip are retrieved to the ground surface, decontaminated and prepared for the next sampling event.



*Figure GWS*

*For a detailed reference on direct push groundwater sampling, refer to Zemo et. al., 1992.*

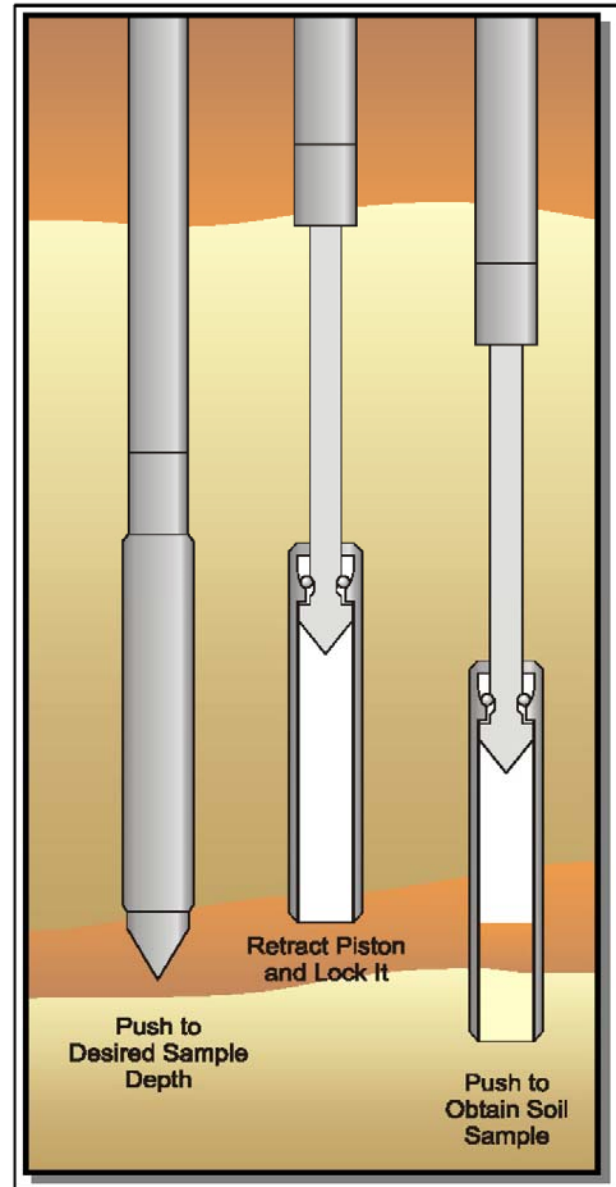


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## Soil Sampling

Gregg Drilling & Testing, Inc. uses a piston-type push-in sampler to obtain small soil samples without generating any soil cuttings, *Figure SS*. Two different types of samplers (12 and 18 inch) are used depending on the soil type and density. The soil sampler is initially pushed in a "closed" position to the desired sampling interval using the CPT pushing equipment. Keeping the sampler closed minimizes the potential of cross contamination. The inner tip of the sampler is then retracted leaving a hollow soil sampler with inner 1¼" diameter sample tubes. The hollow sampler is then pushed in a locked "open" position to collect a soil sample. The filled sampler and push rods are then retrieved to the ground surface. Because the soil enters the sampler at a constant rate, the opportunity for 100% recovery is increased. For environmental analysis, the soil sample tube ends are sealed with Teflon and plastic caps. Often, a longer "split tube" can be used for geotechnical sampling.

*For a detailed reference on direct push soil sampling, refer to Robertson et al, 1998.*



*Figure SS*



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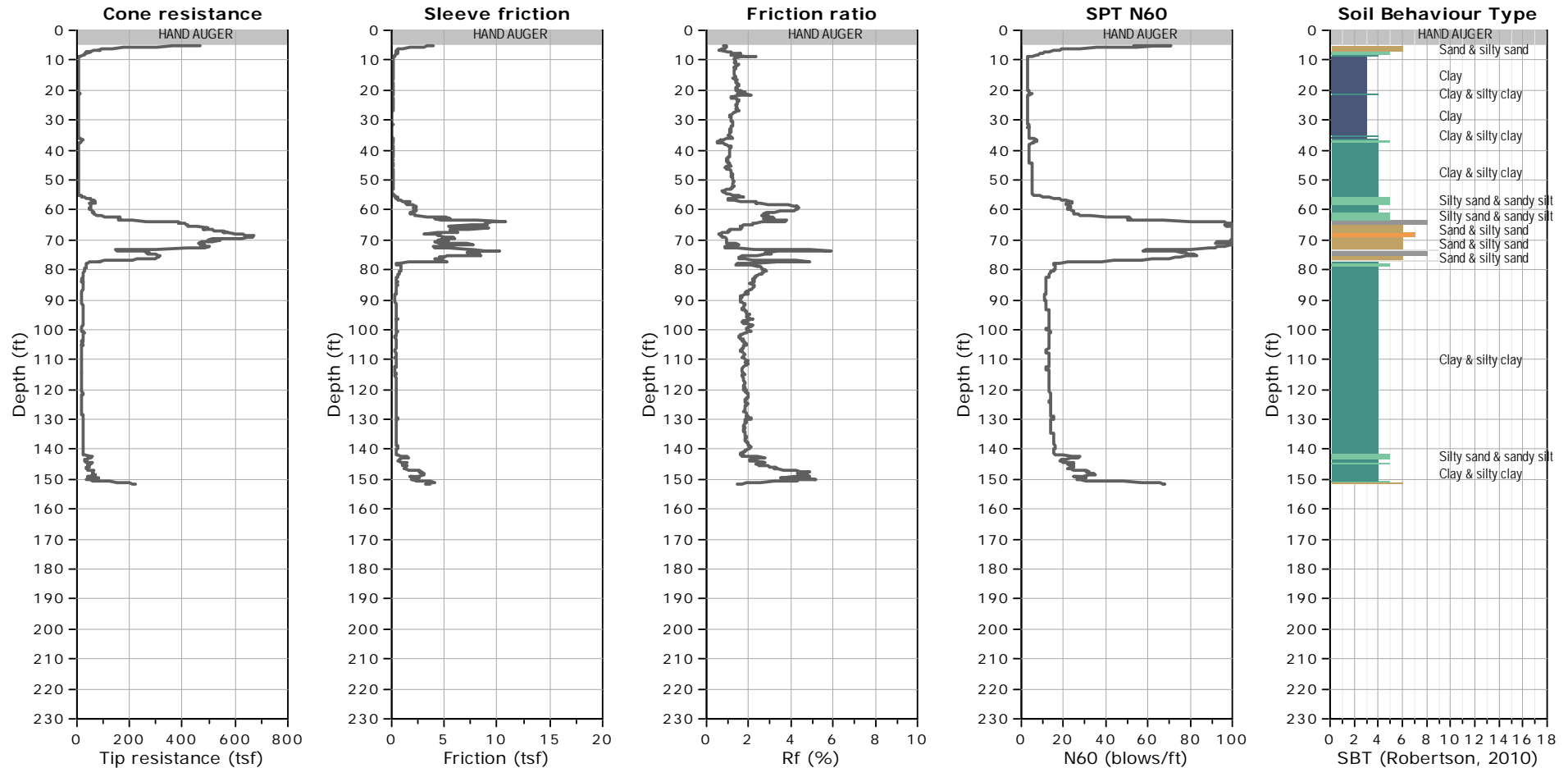
## CPT: CSWL337-19

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 151.74 ft, Date: 6/11/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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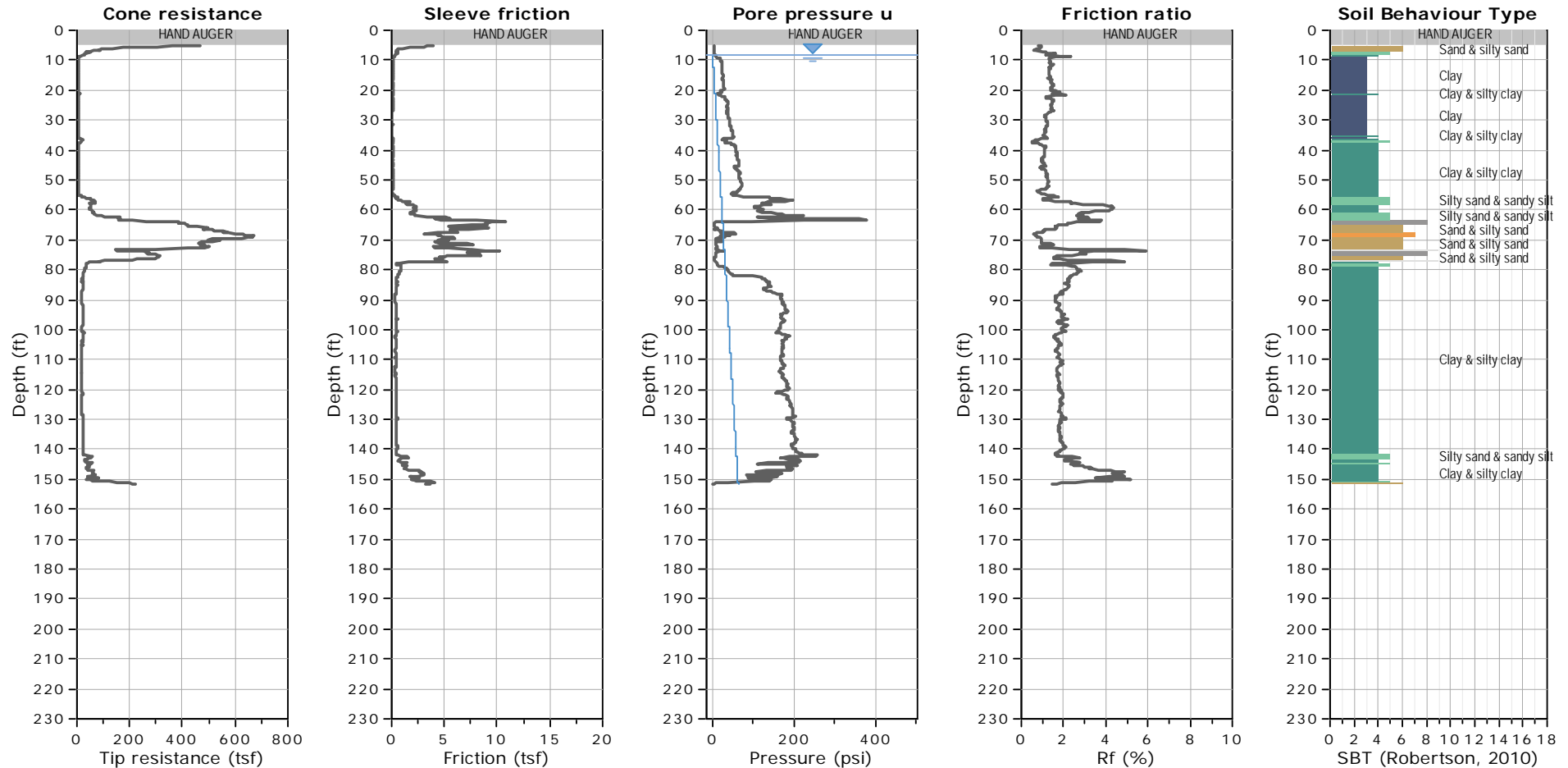
## CPT: CSWL337-19

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 151.74 ft, Date: 6/11/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY



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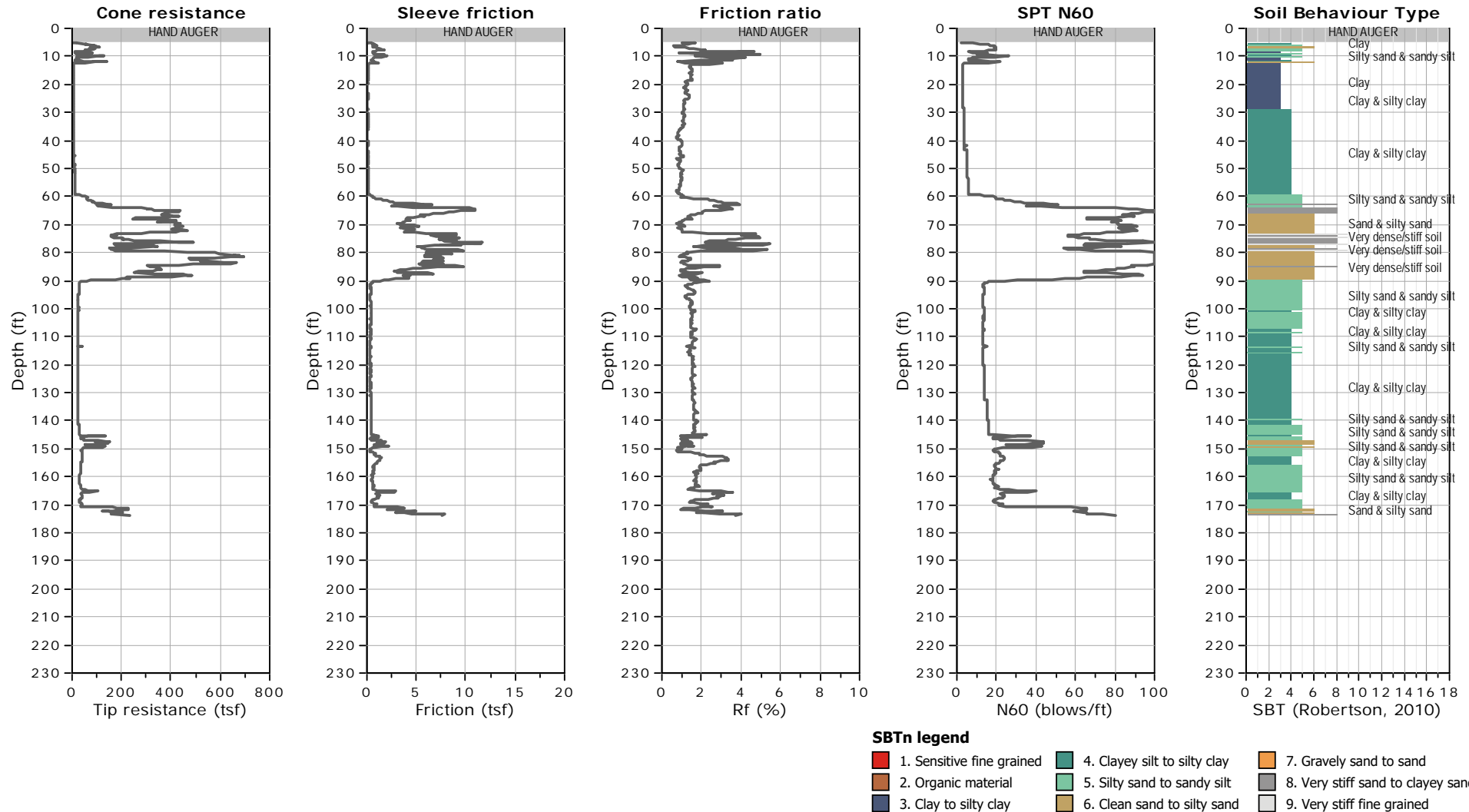
## CPT: cswl33720

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 173.56 ft, Date: 6/13/2018





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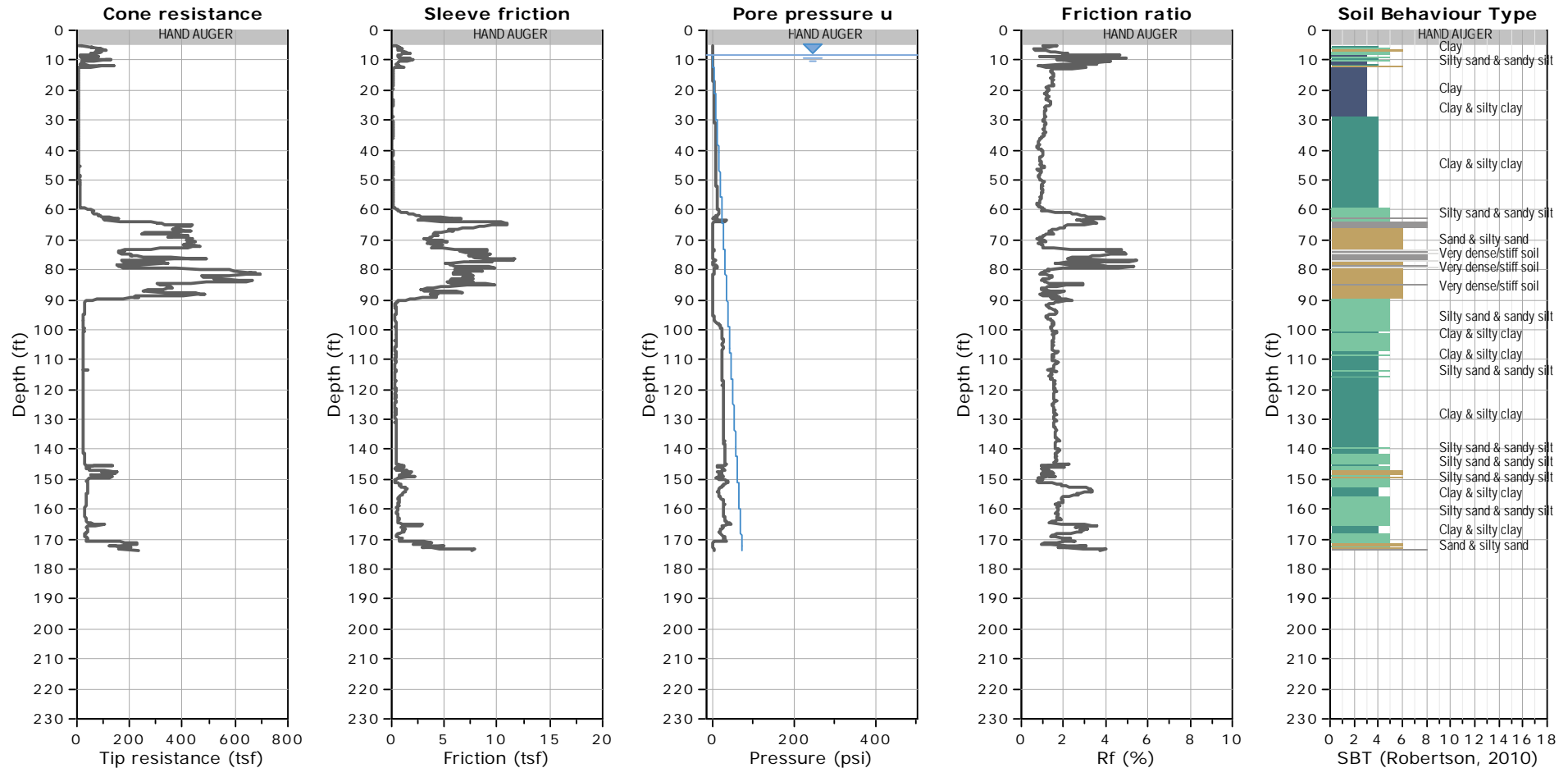
## CPT: cswl33720

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 173.56 ft, Date: 6/13/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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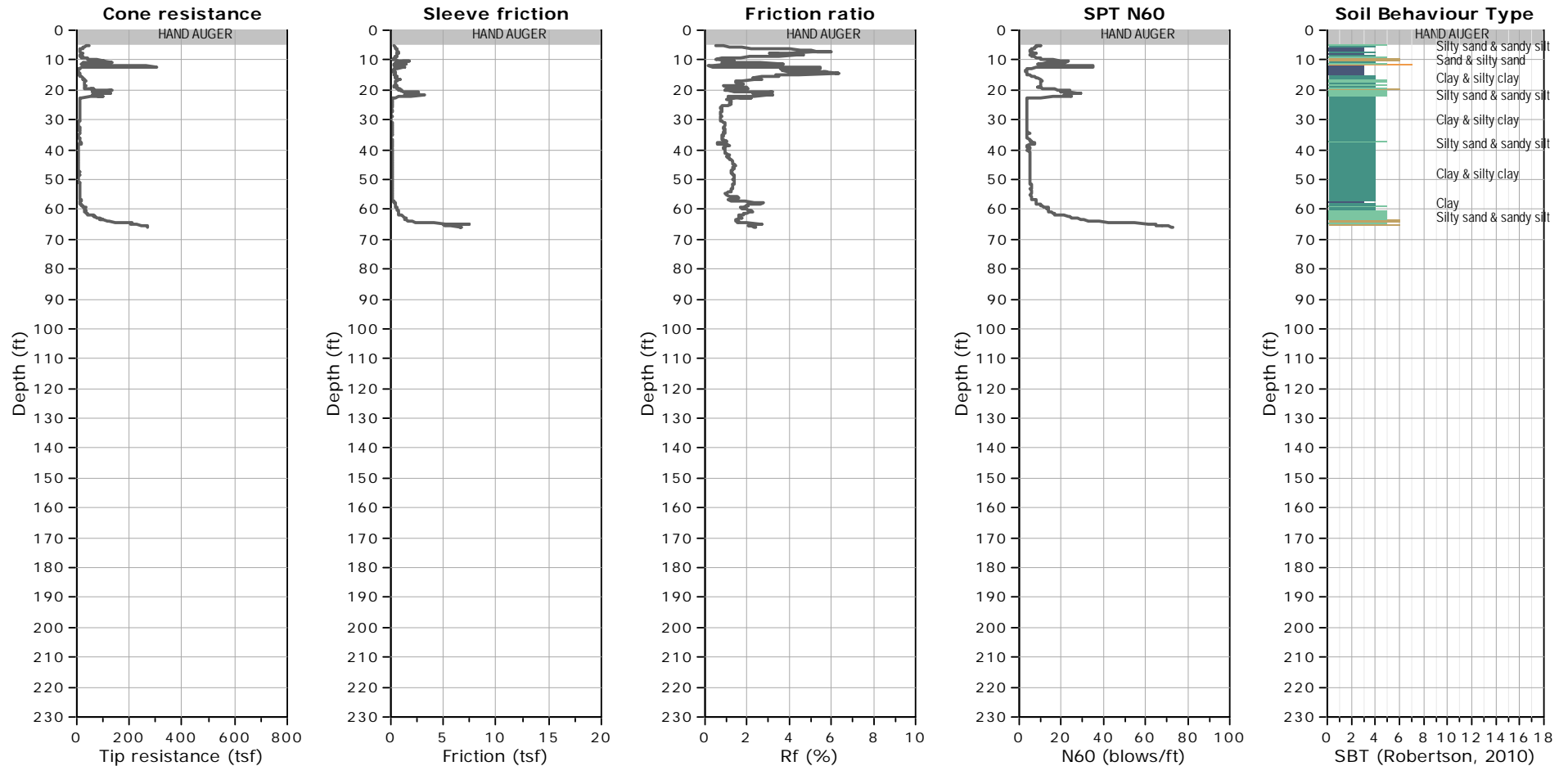
## CPT: cswl33721

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 65.94 ft, Date: 6/11/2018





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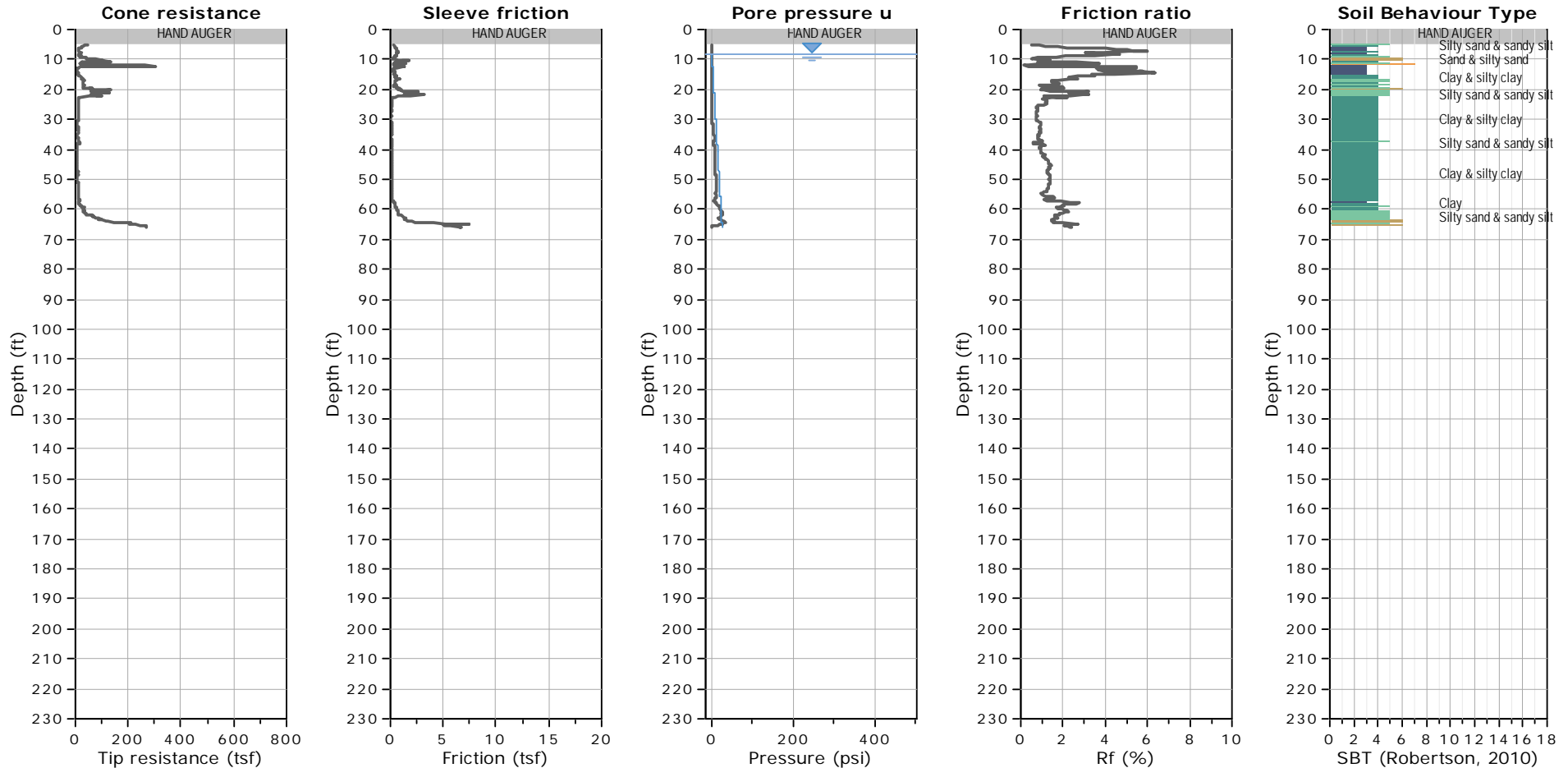
## CPT: cswl33721

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 65.94 ft, Date: 6/11/2018



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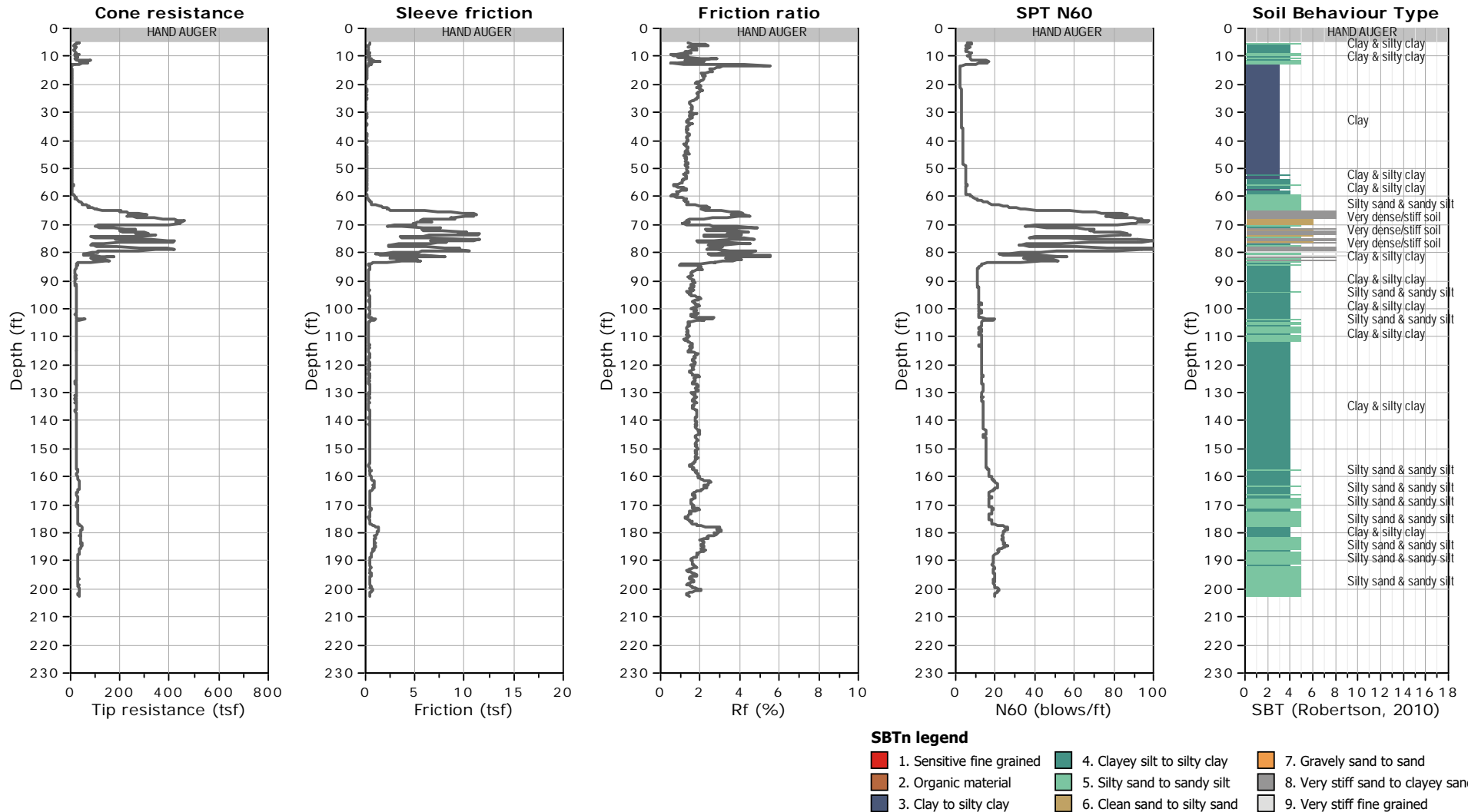
## CPT: cswl33722

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 202.41 ft, Date: 6/12/2018









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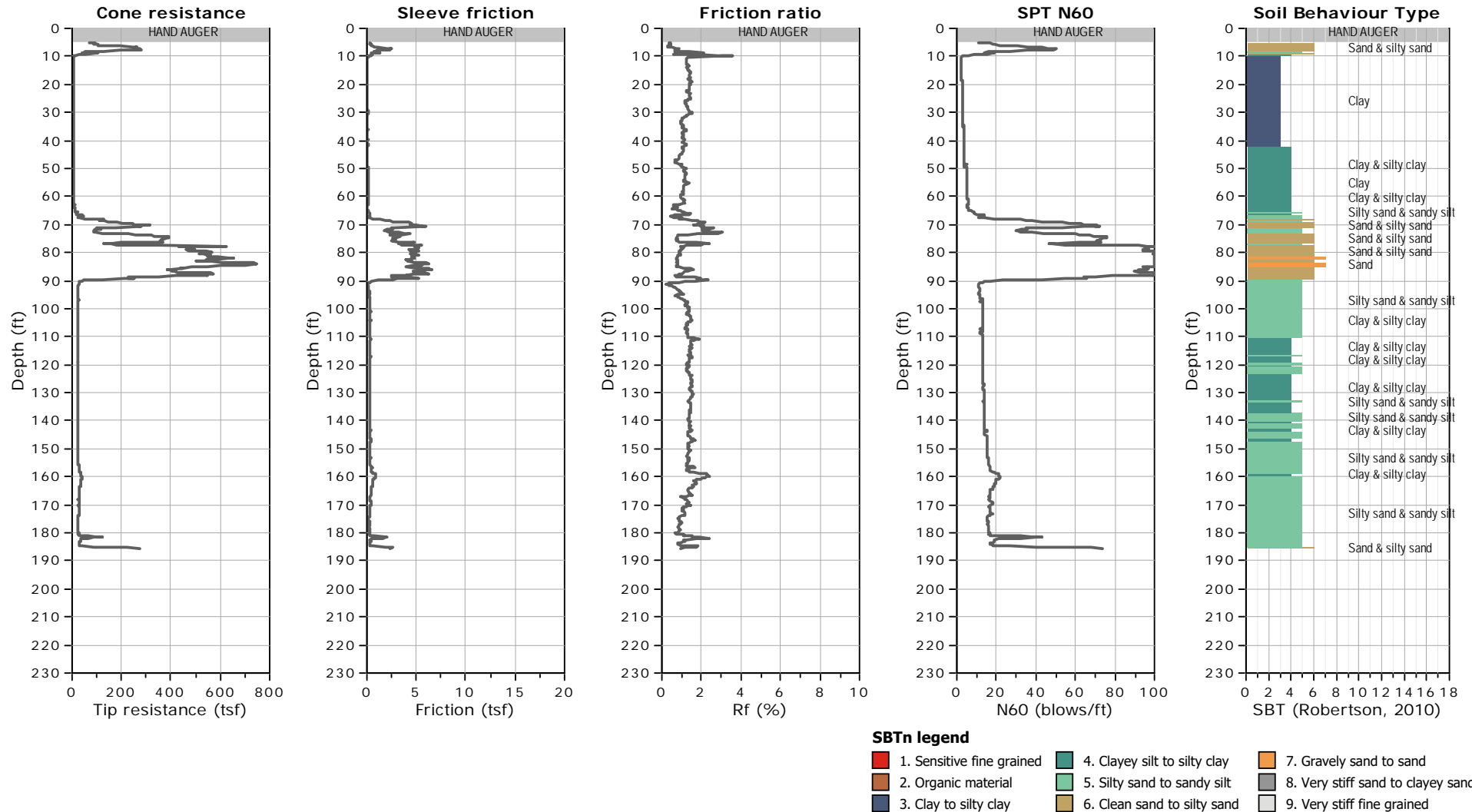
## CPT: cswl33723

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 185.53 ft, Date: 6/11/2018





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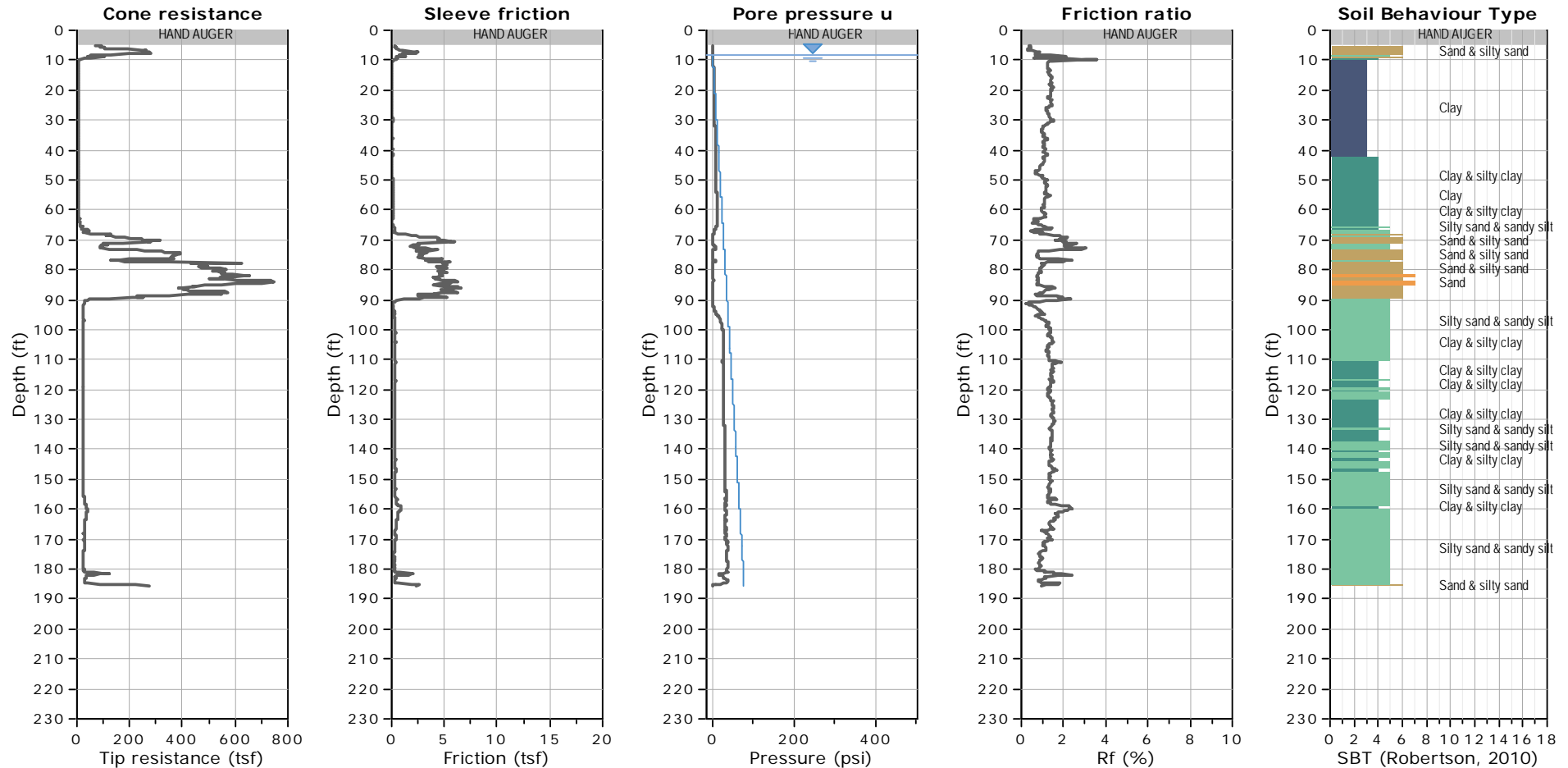
## CPT: cswl33723

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 185.53 ft, Date: 6/11/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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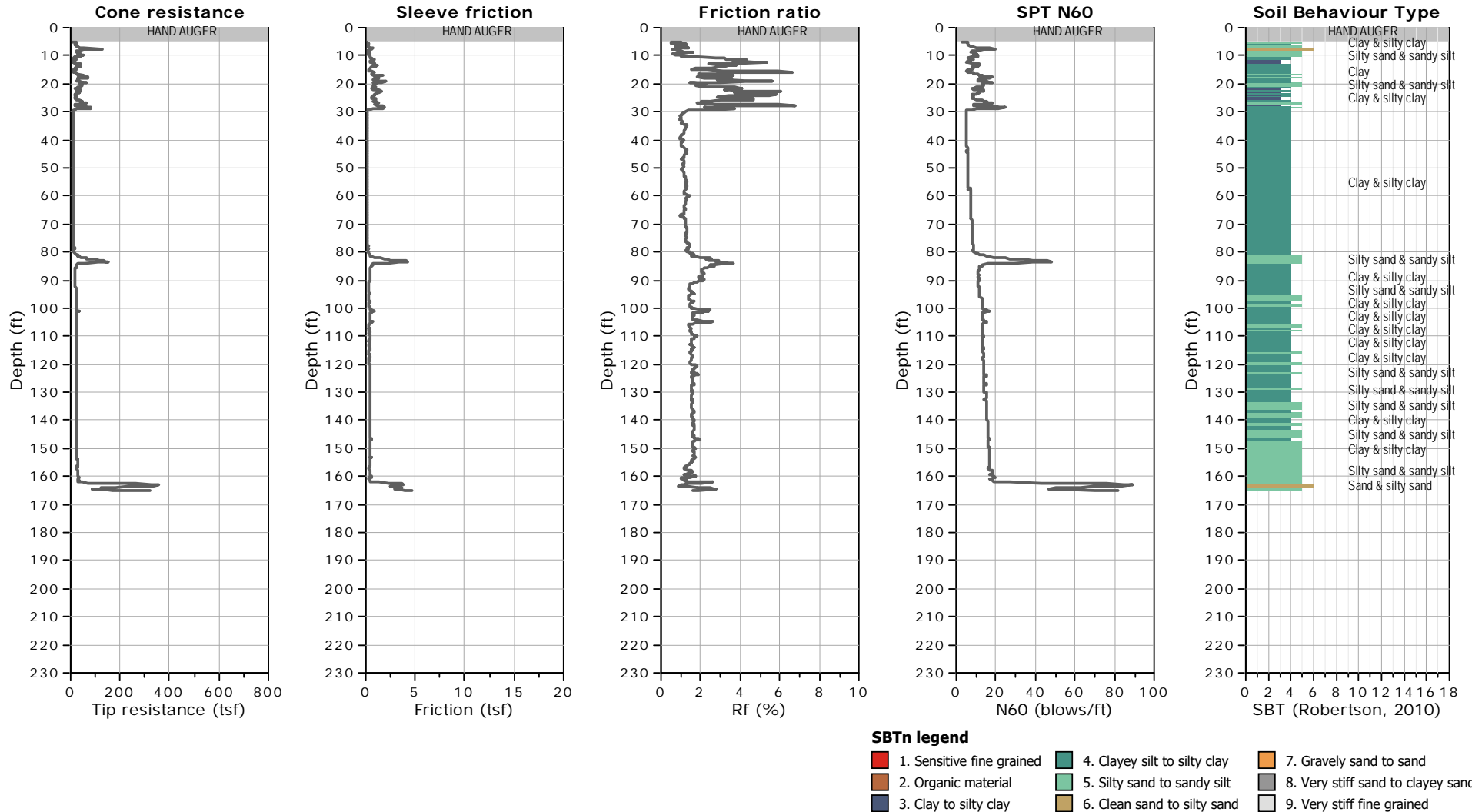
## CPT: cswl33724

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 165.03 ft, Date: 6/14/2018





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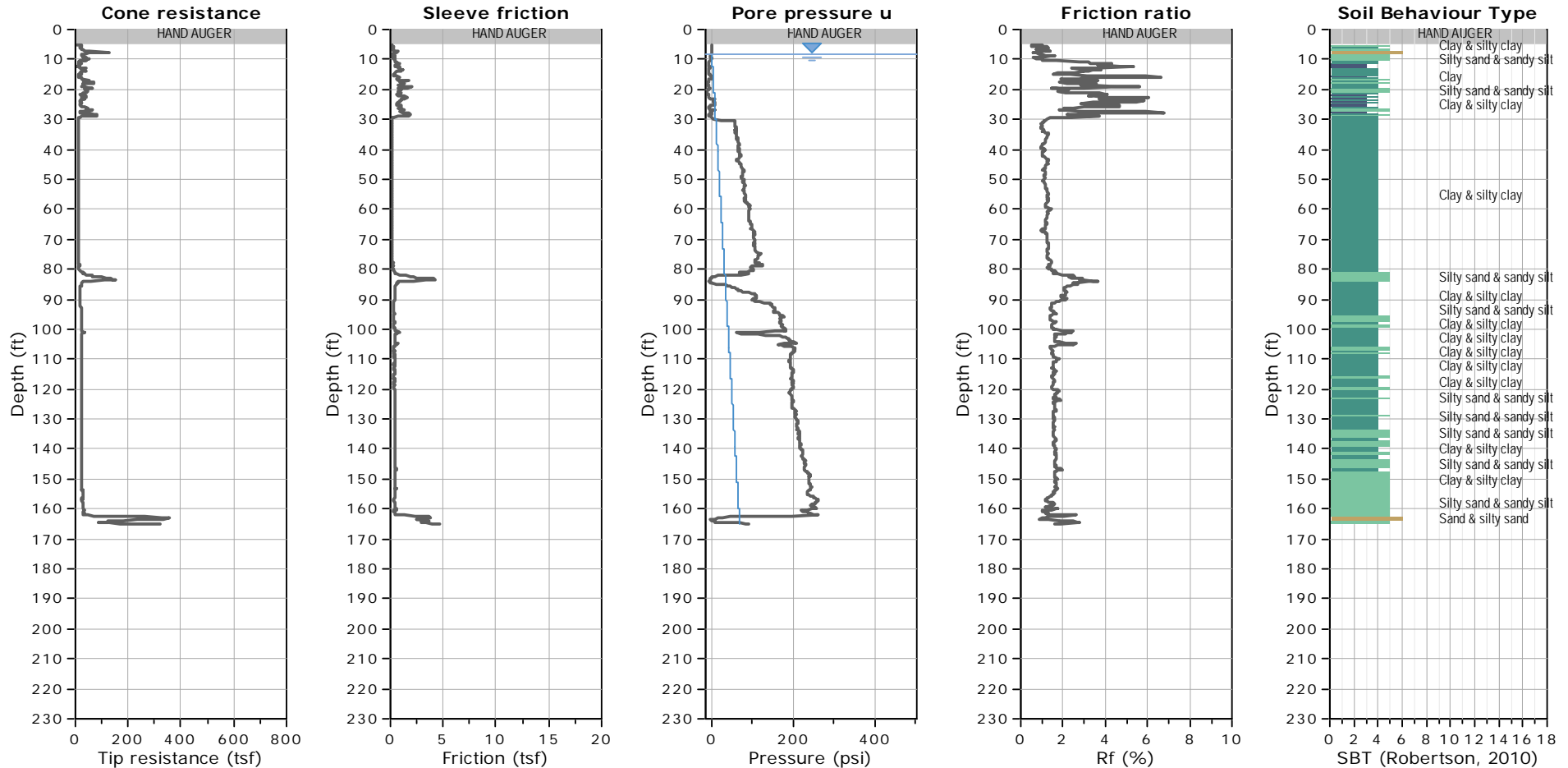
## CPT: cswl33724

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 165.03 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

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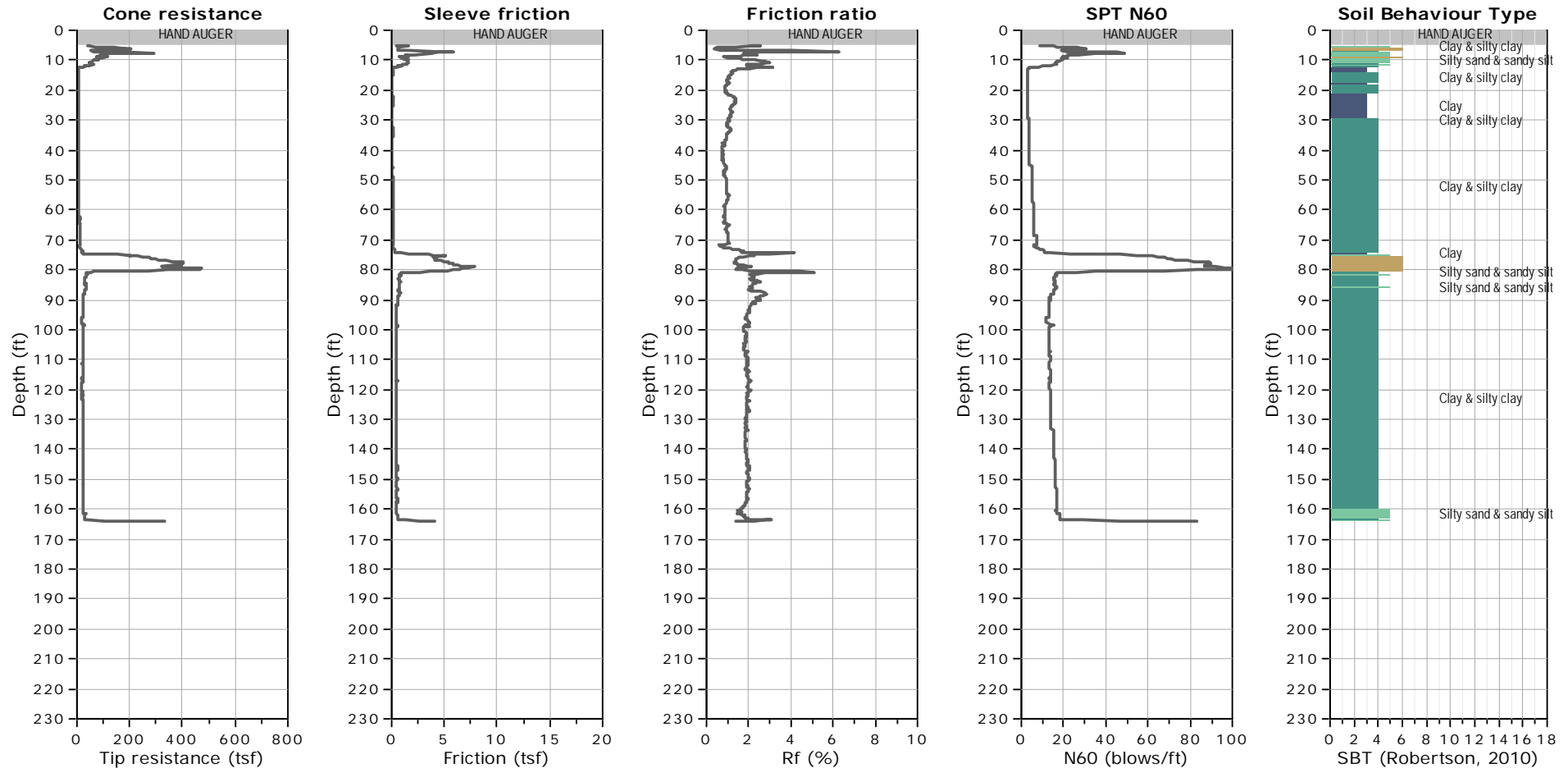
## CPT: cswl33725

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 164.21 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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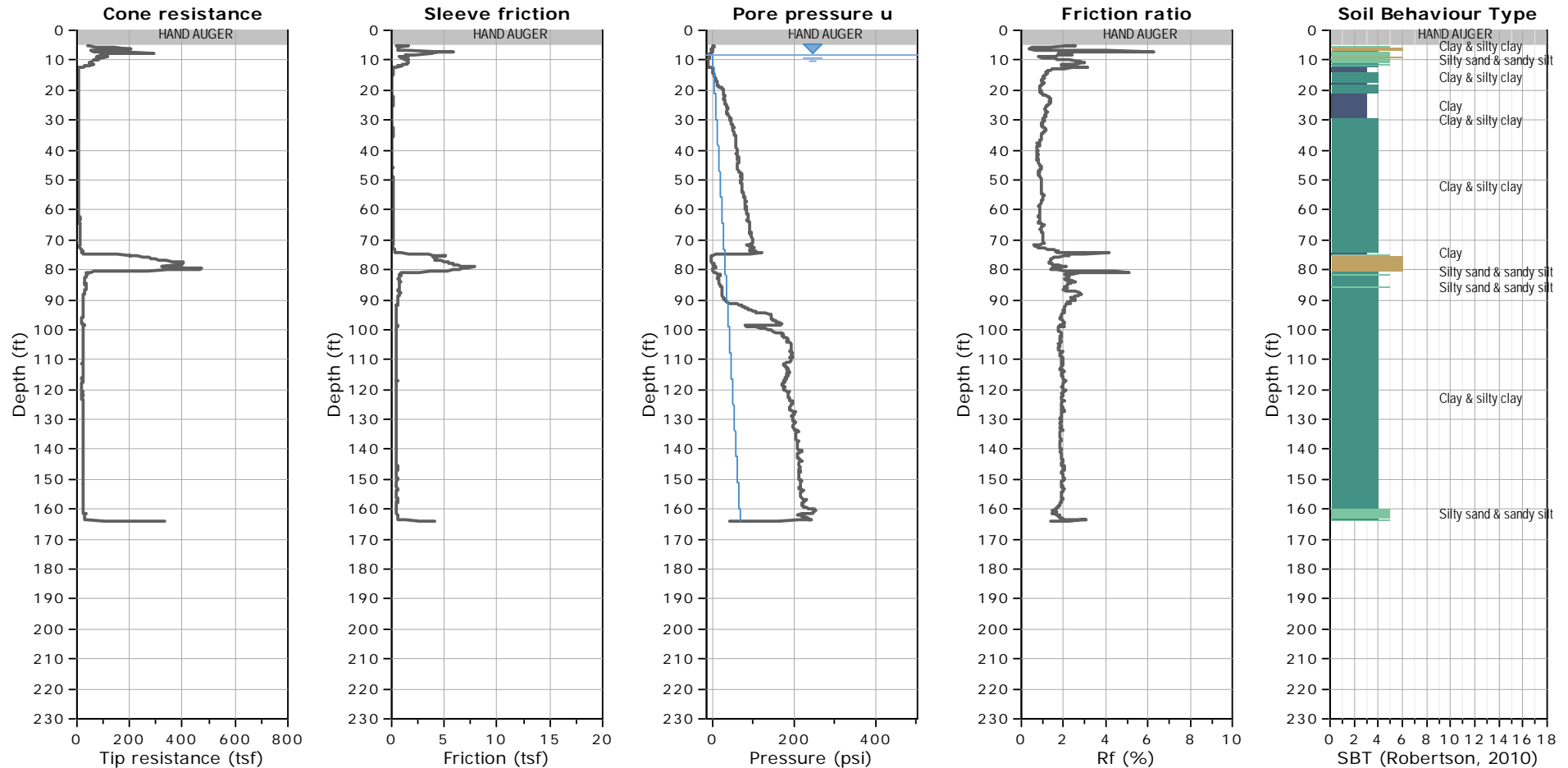
## CPT: cswl33725

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 164.21 ft, Date: 6/14/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

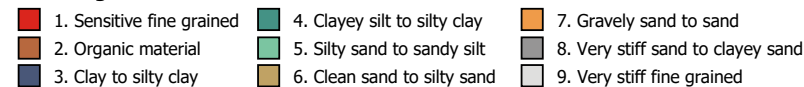
- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |







Total depth: 165.85 ft, Date: 6/12/2018



## 48



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# Mayor ED 17-02 Priority permit

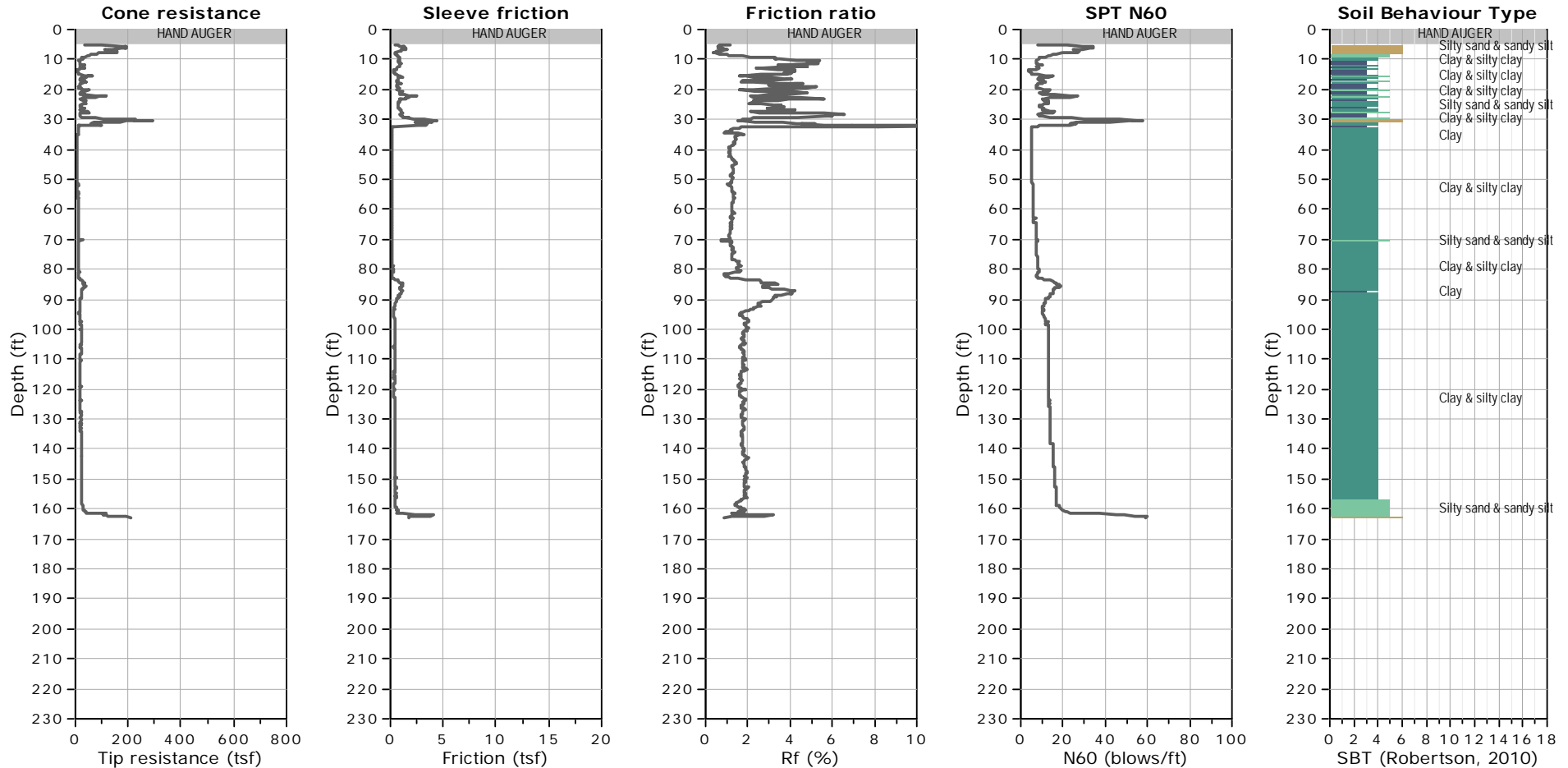
## CPT: CSWL337-27

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 162.73 ft, Date: 6/11/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

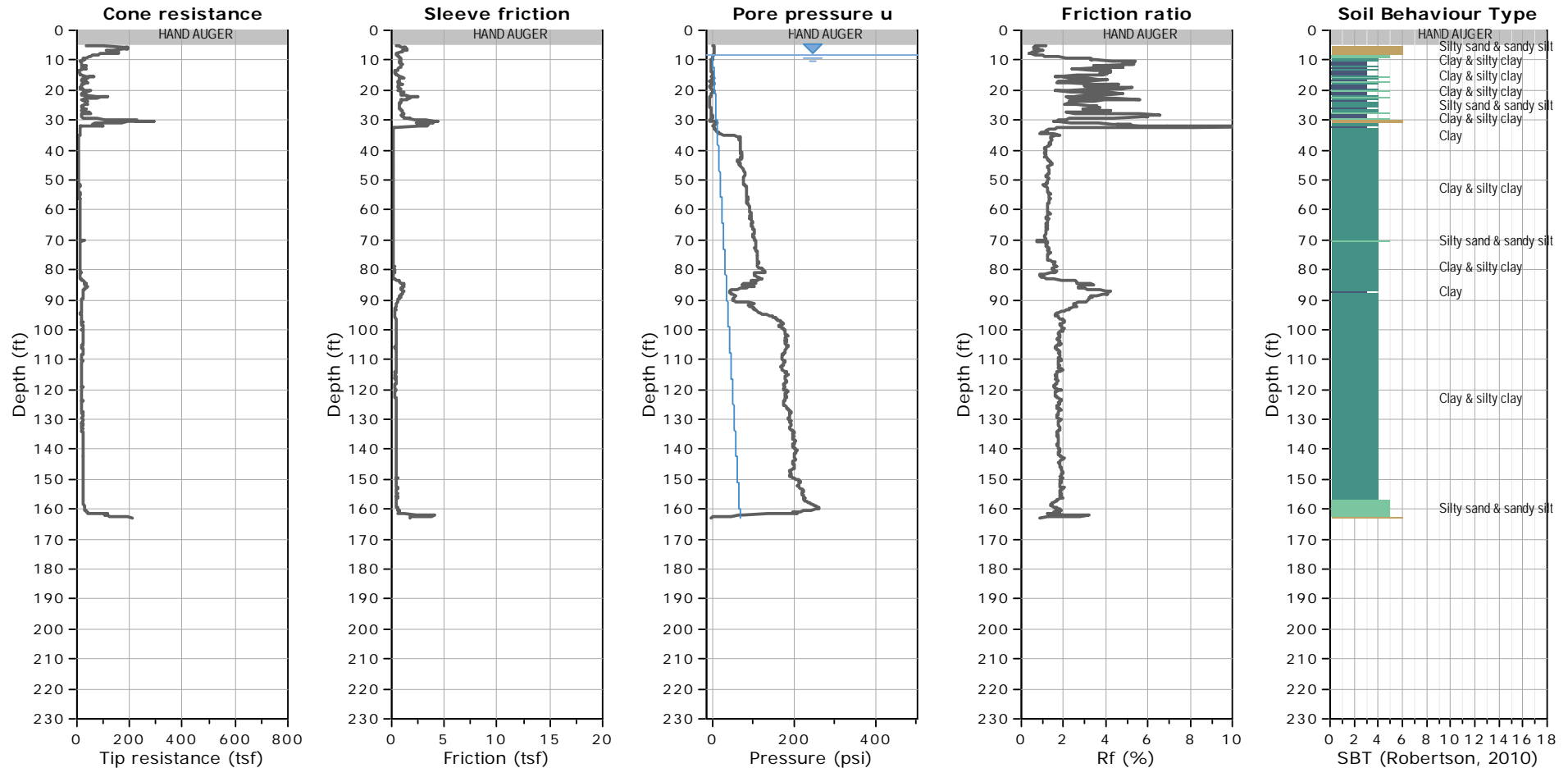
## CPT: CSWL337-27

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 162.73 ft, Date: 6/11/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

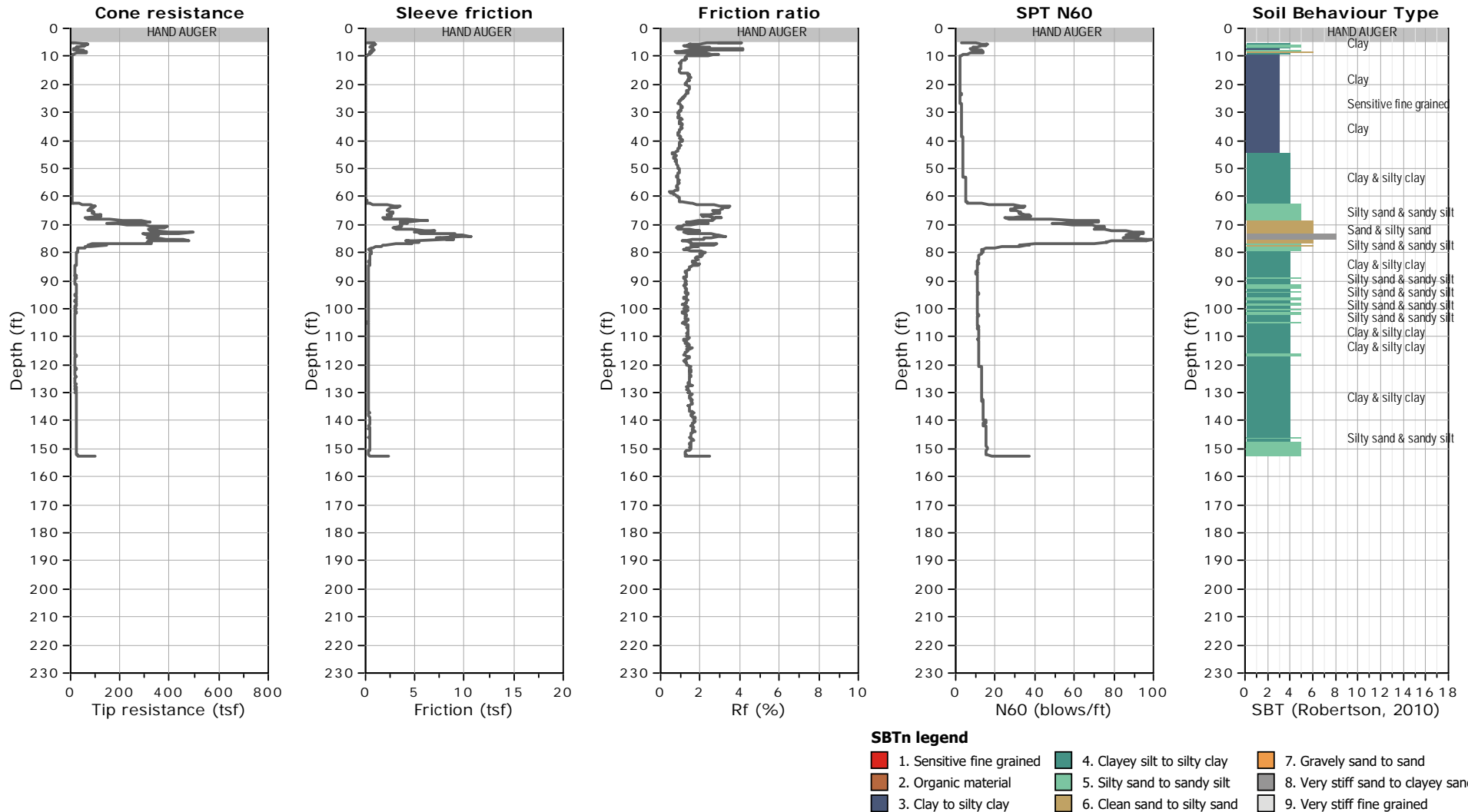
## CPT: cswl33728

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 152.89 ft, Date: 6/11/2018





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# Mayor ED 17-02 Priority permit

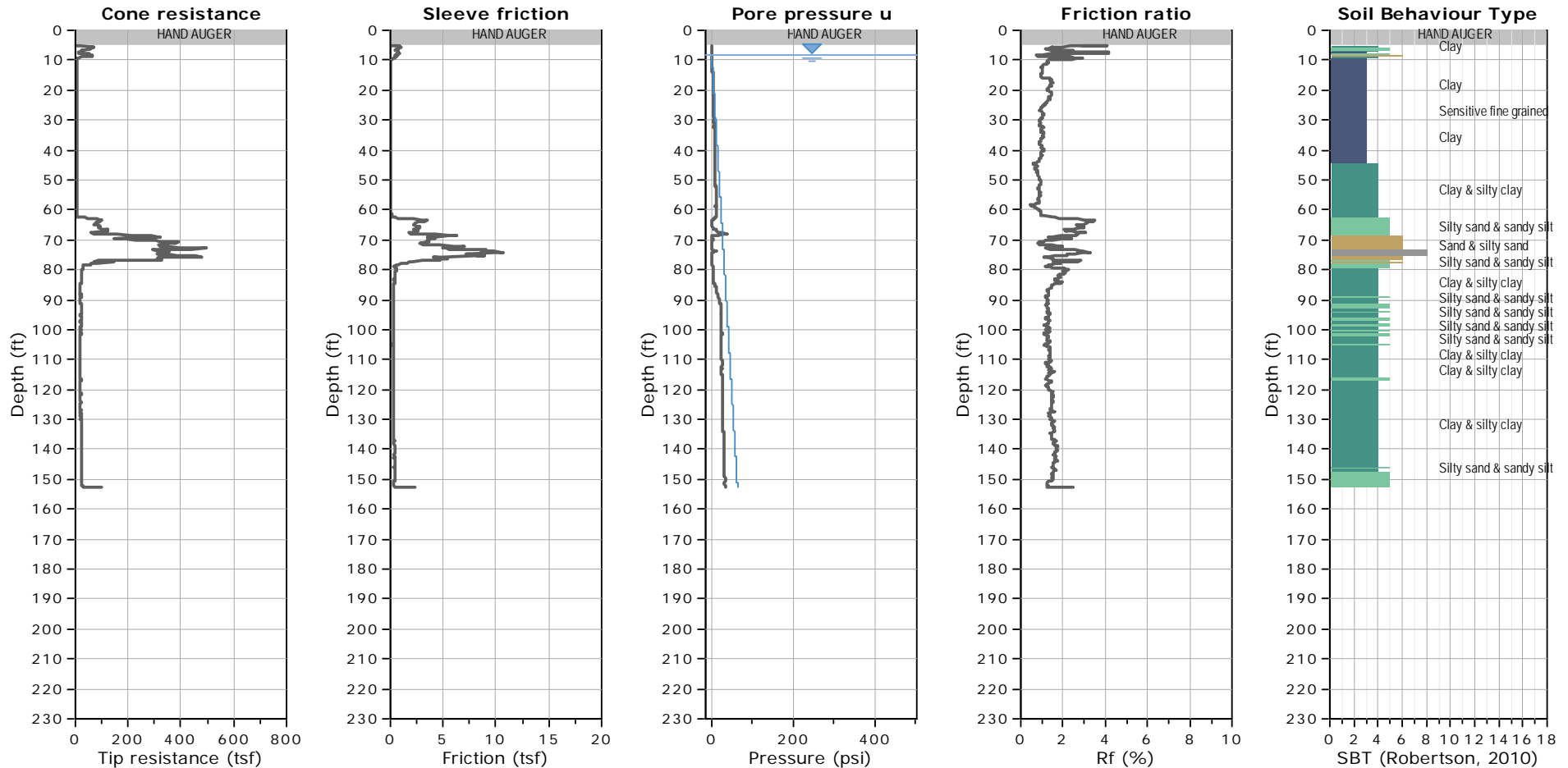
## CPT: cswl33728

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 152.89 ft, Date: 6/11/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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# Mayor ED 17-02 Priority permit

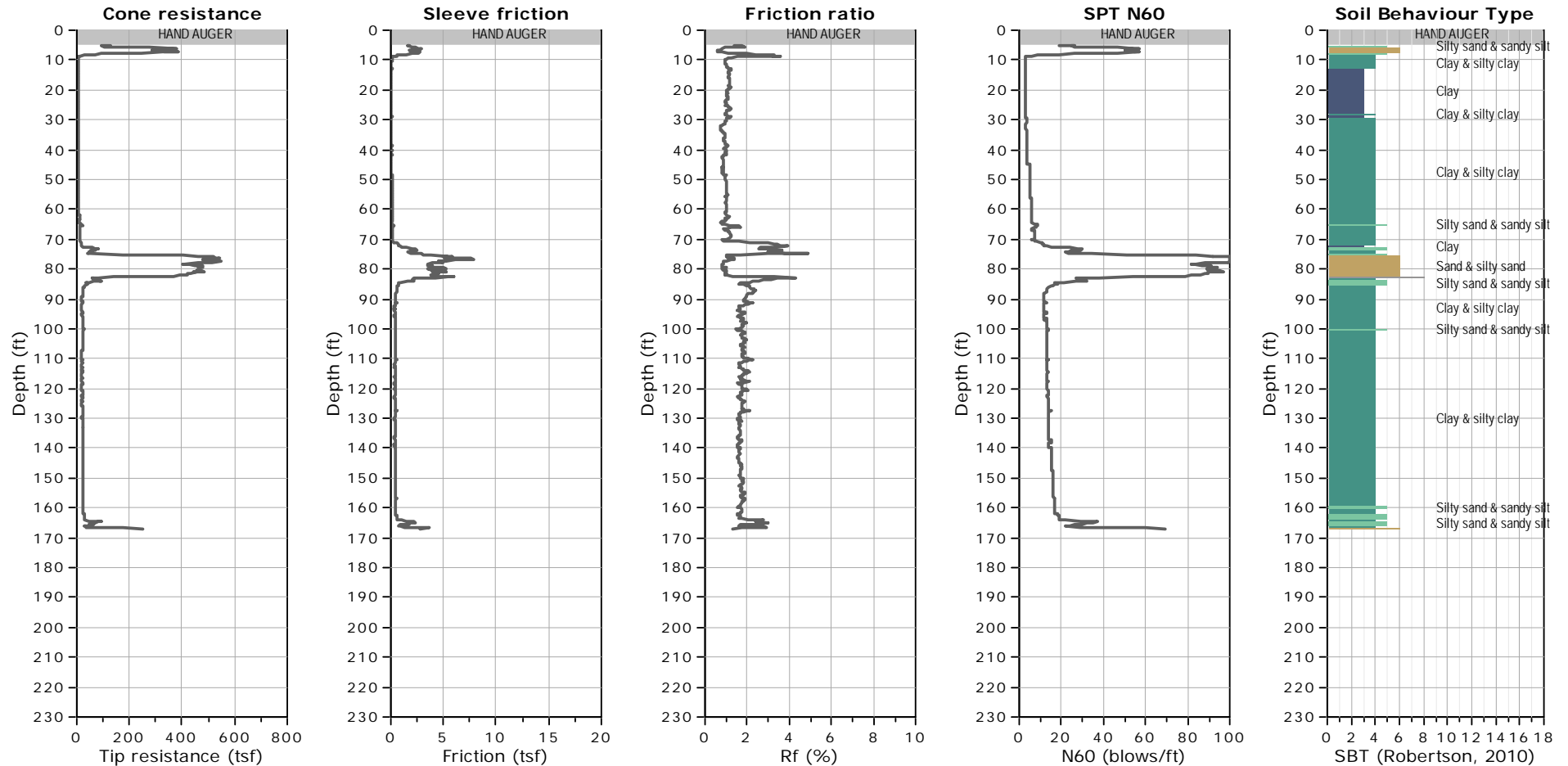
## CPT: CSWL337-29

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 166.83 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

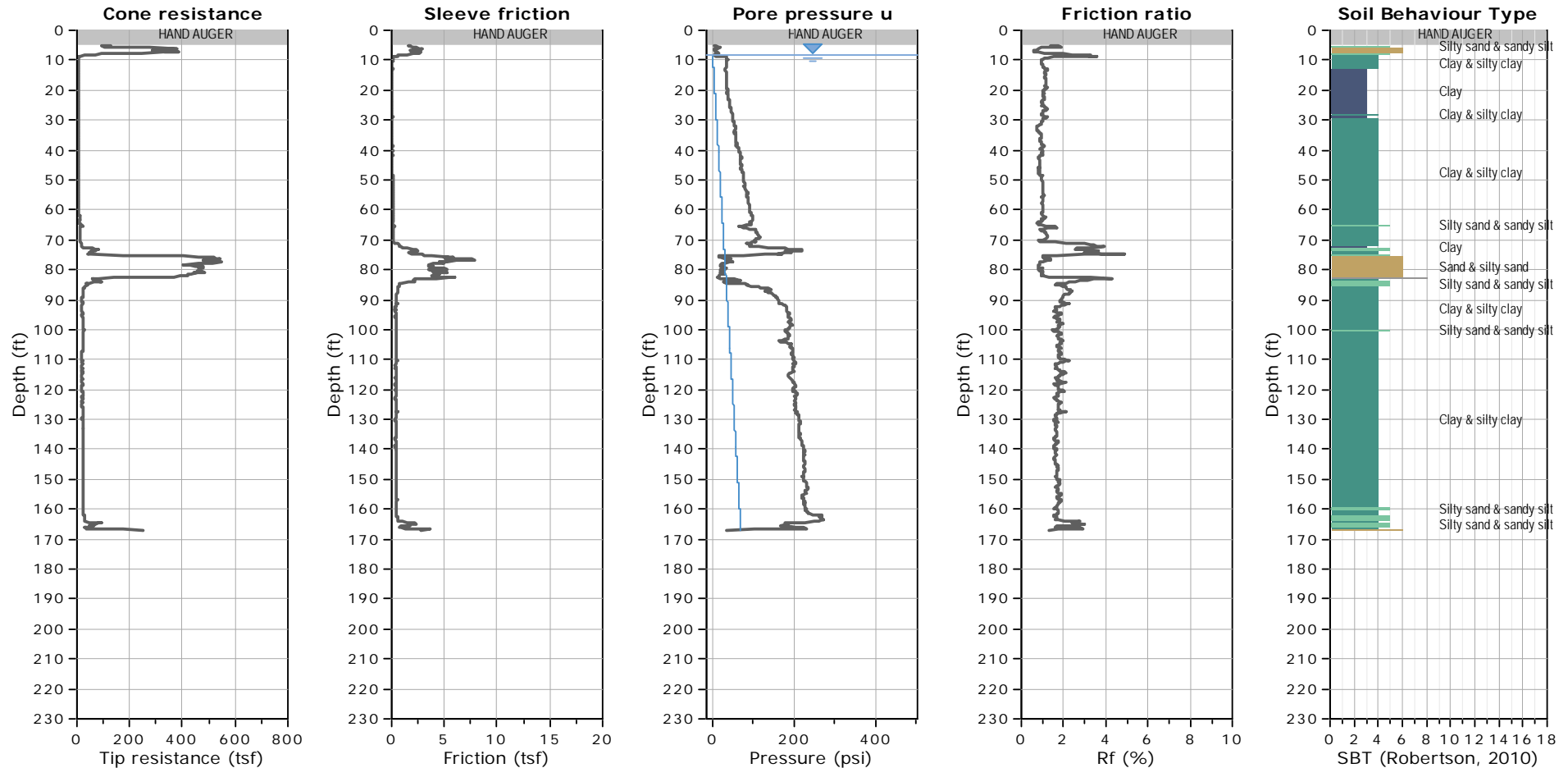
## CPT: CSWL337-29

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 166.83 ft, Date: 6/14/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |





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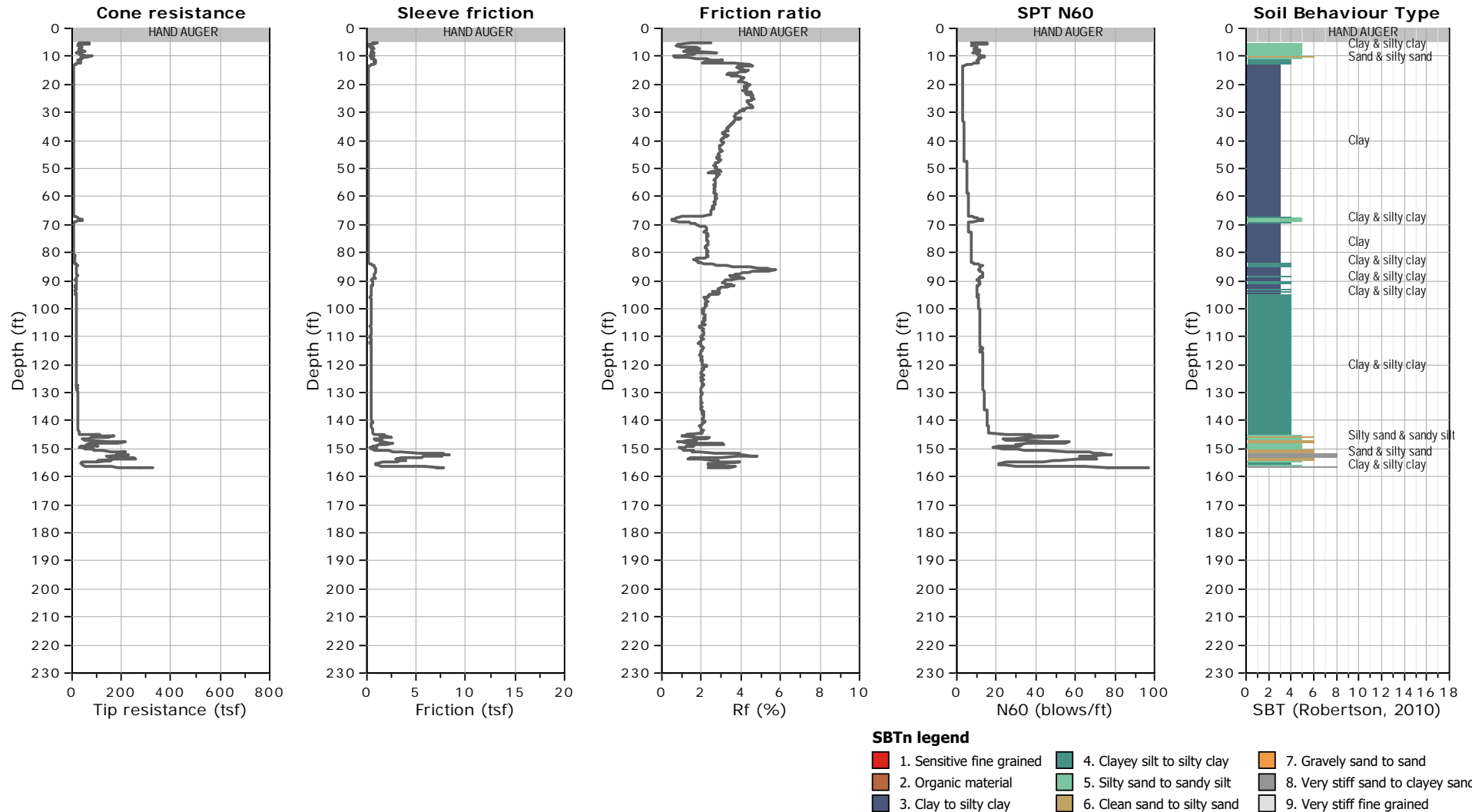
## CPT: cswl33730

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 156.99 ft, Date: 6/12/2018





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# Mayor ED 17-02 Priority permit

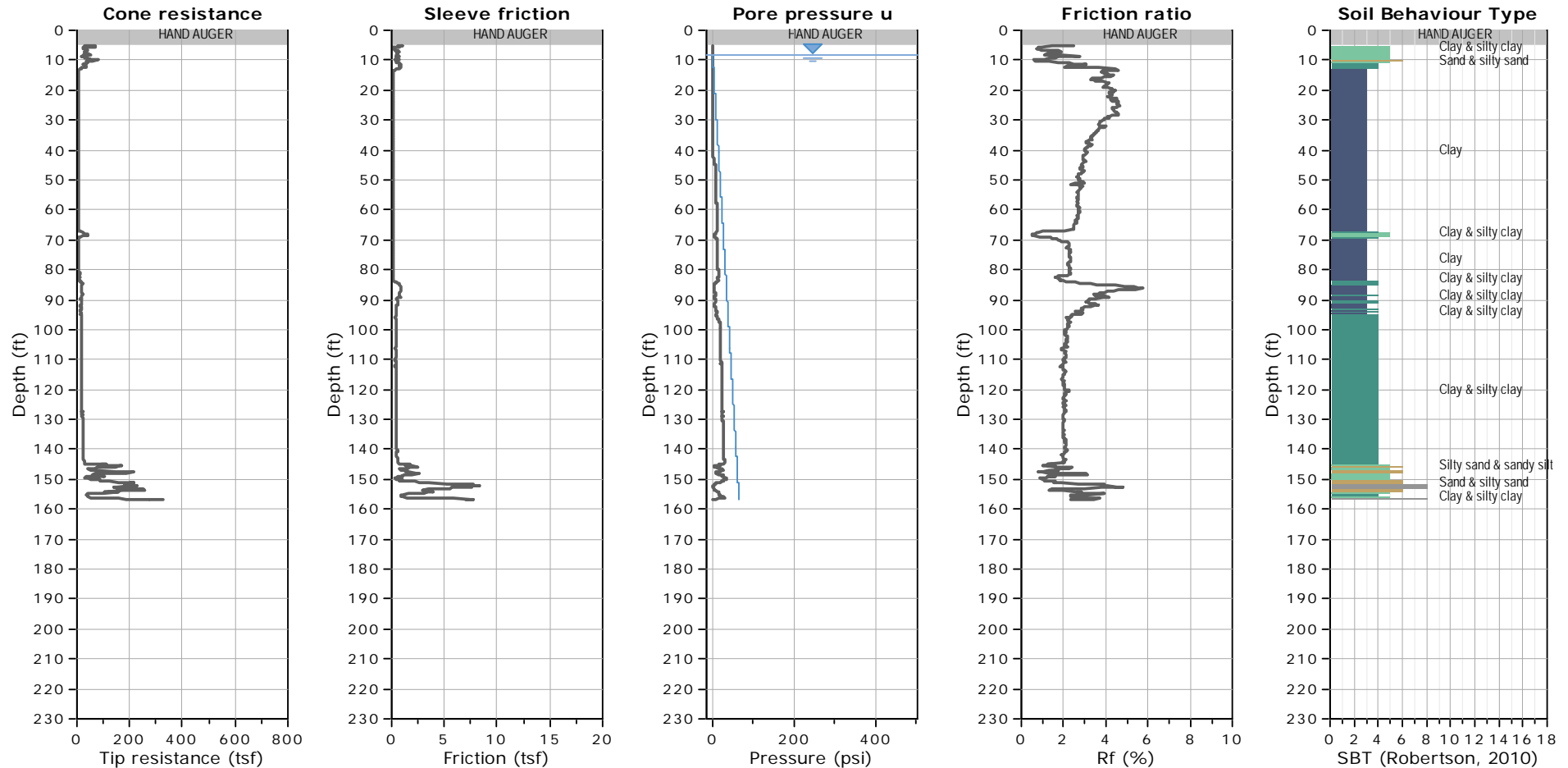
## CPT: cswl33730

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 156.99 ft, Date: 6/12/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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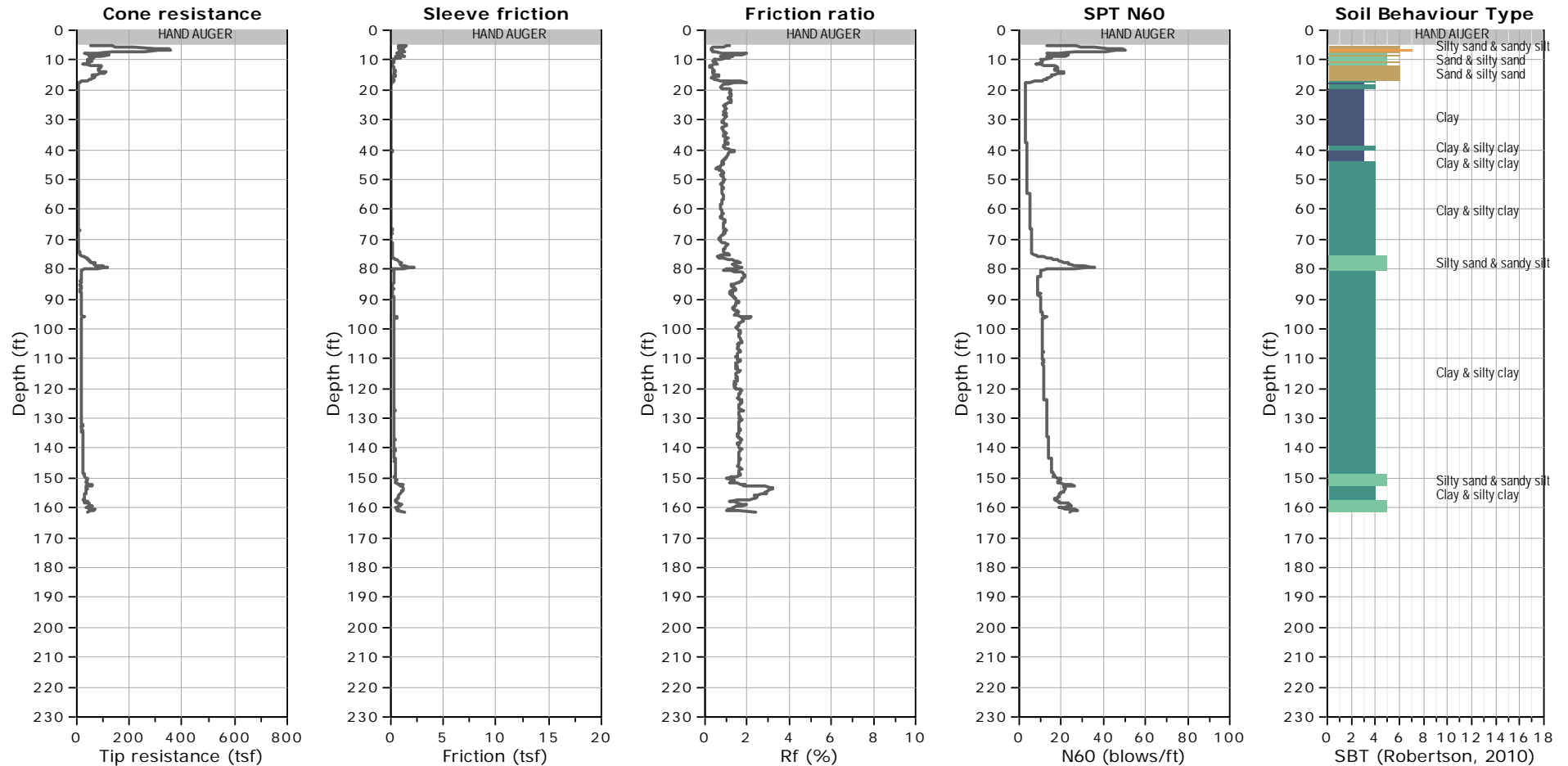
## CPT: cswl33731

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 161.25 ft, Date: 6/11/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

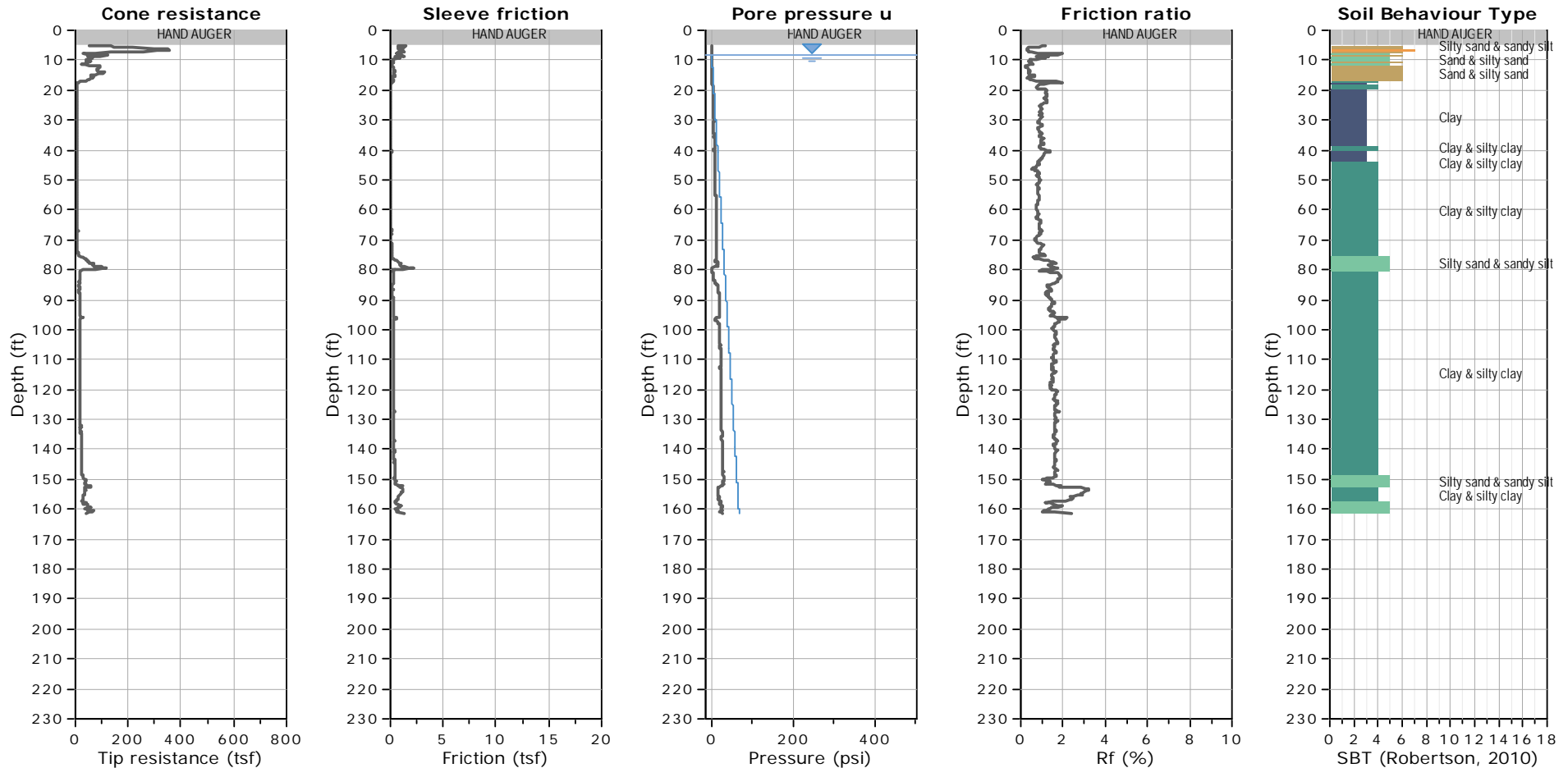
## CPT: cswl33731

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 161.25 ft, Date: 6/11/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

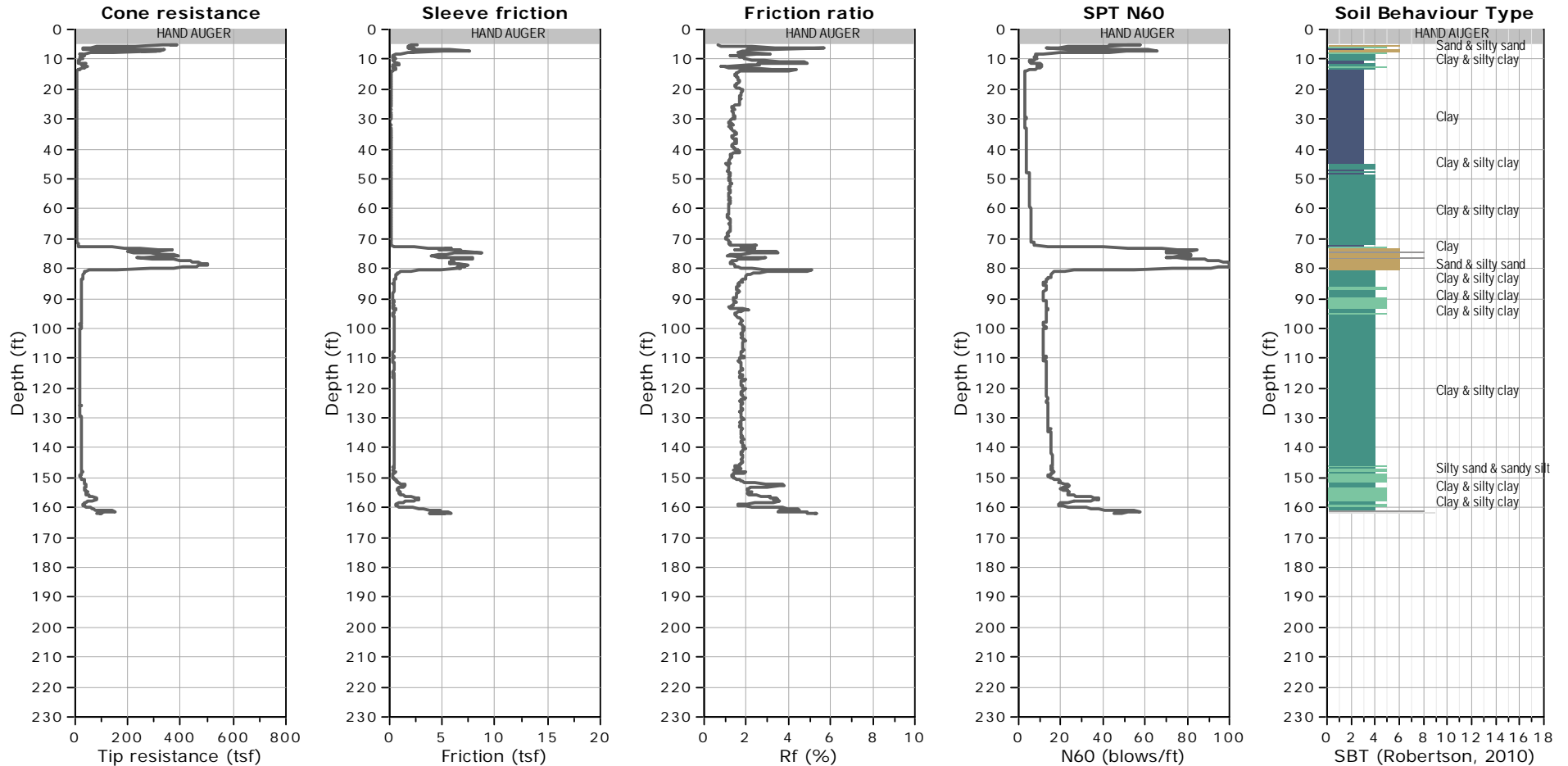
## CPT: CSWL337-32

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 162.07 ft, Date: 6/11/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

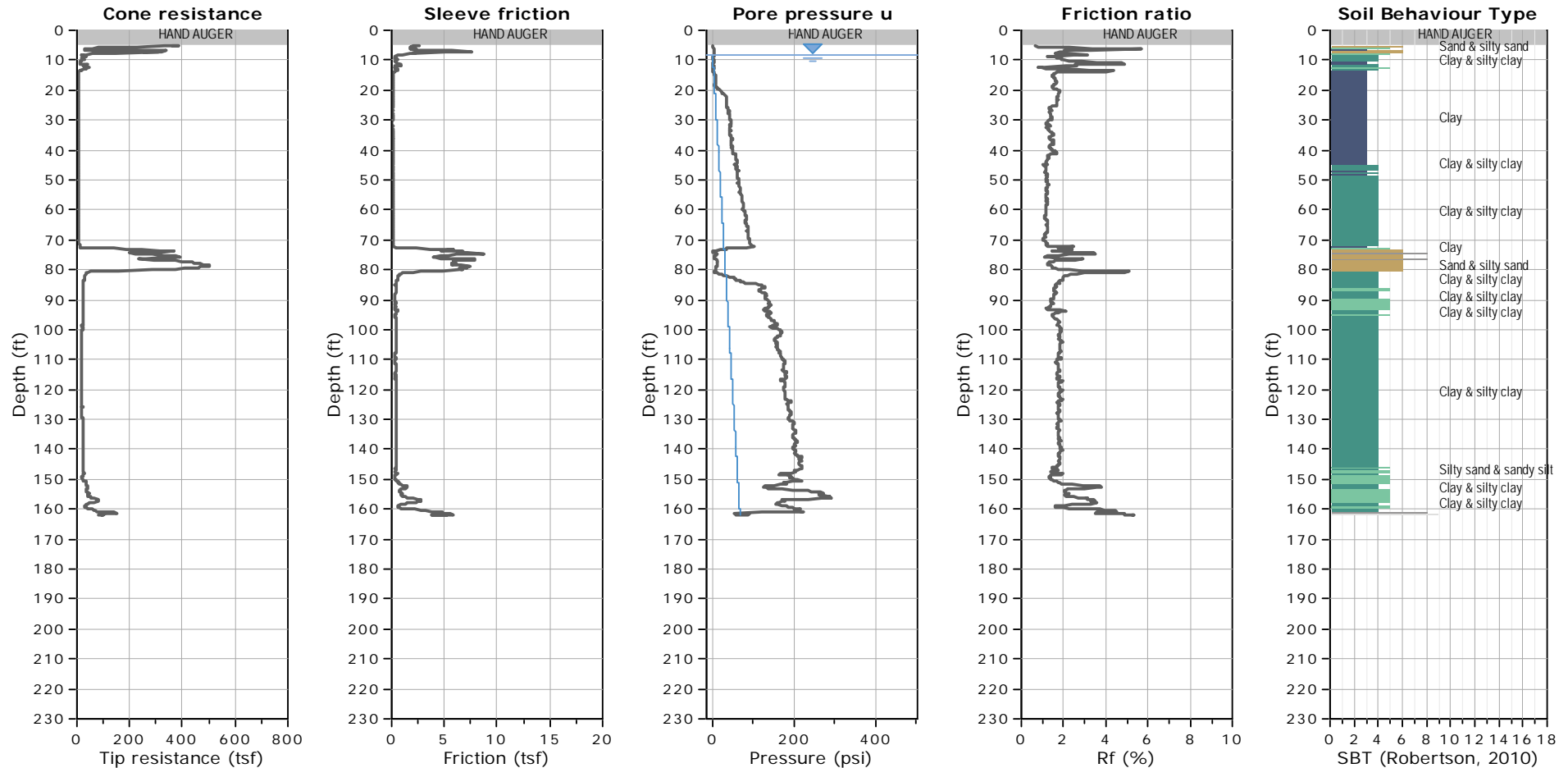
## CPT: CSWL337-32

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 162.07 ft, Date: 6/11/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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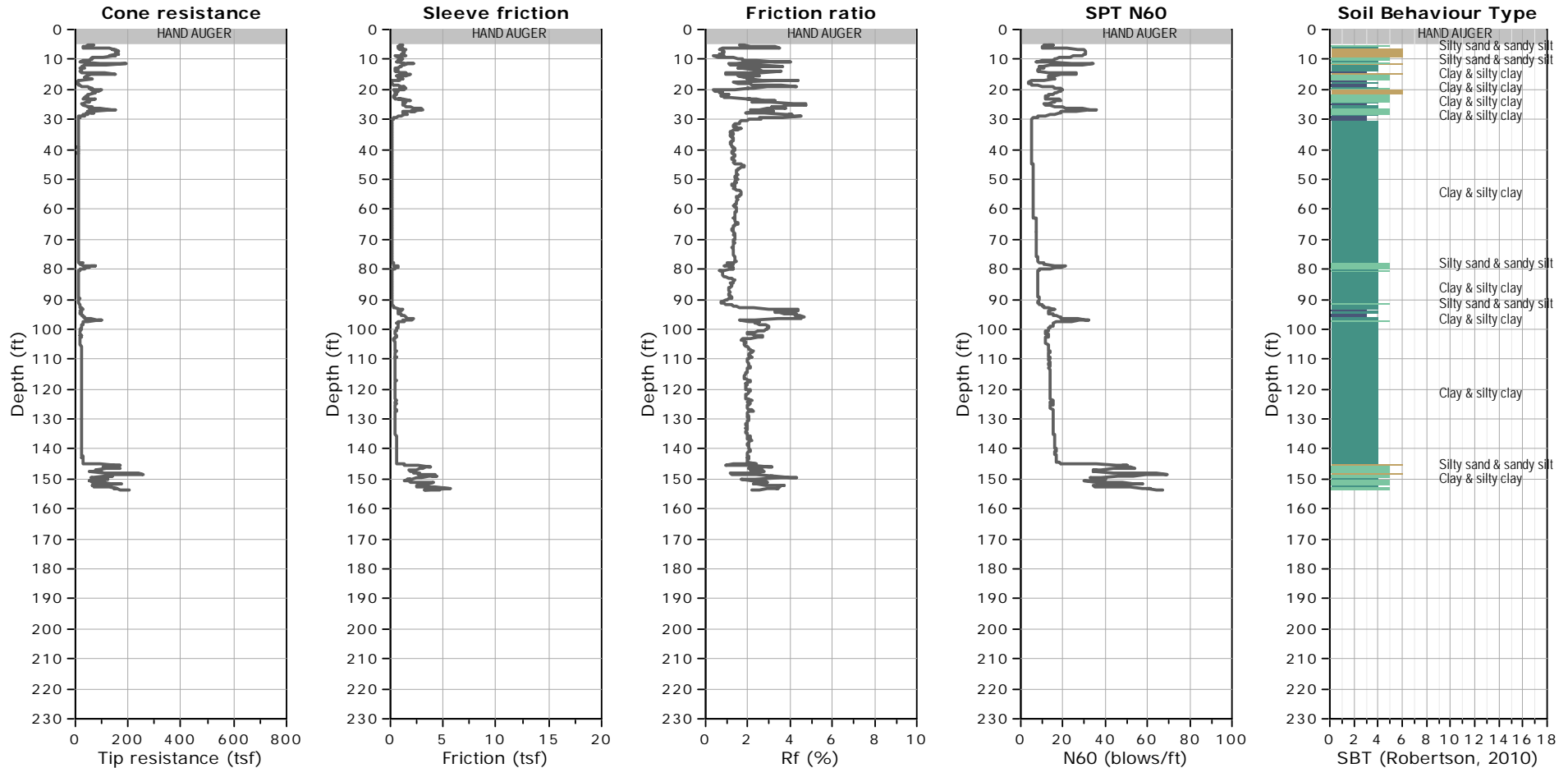
## CPT: CSWL337-33

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 153.71 ft, Date: 6/12/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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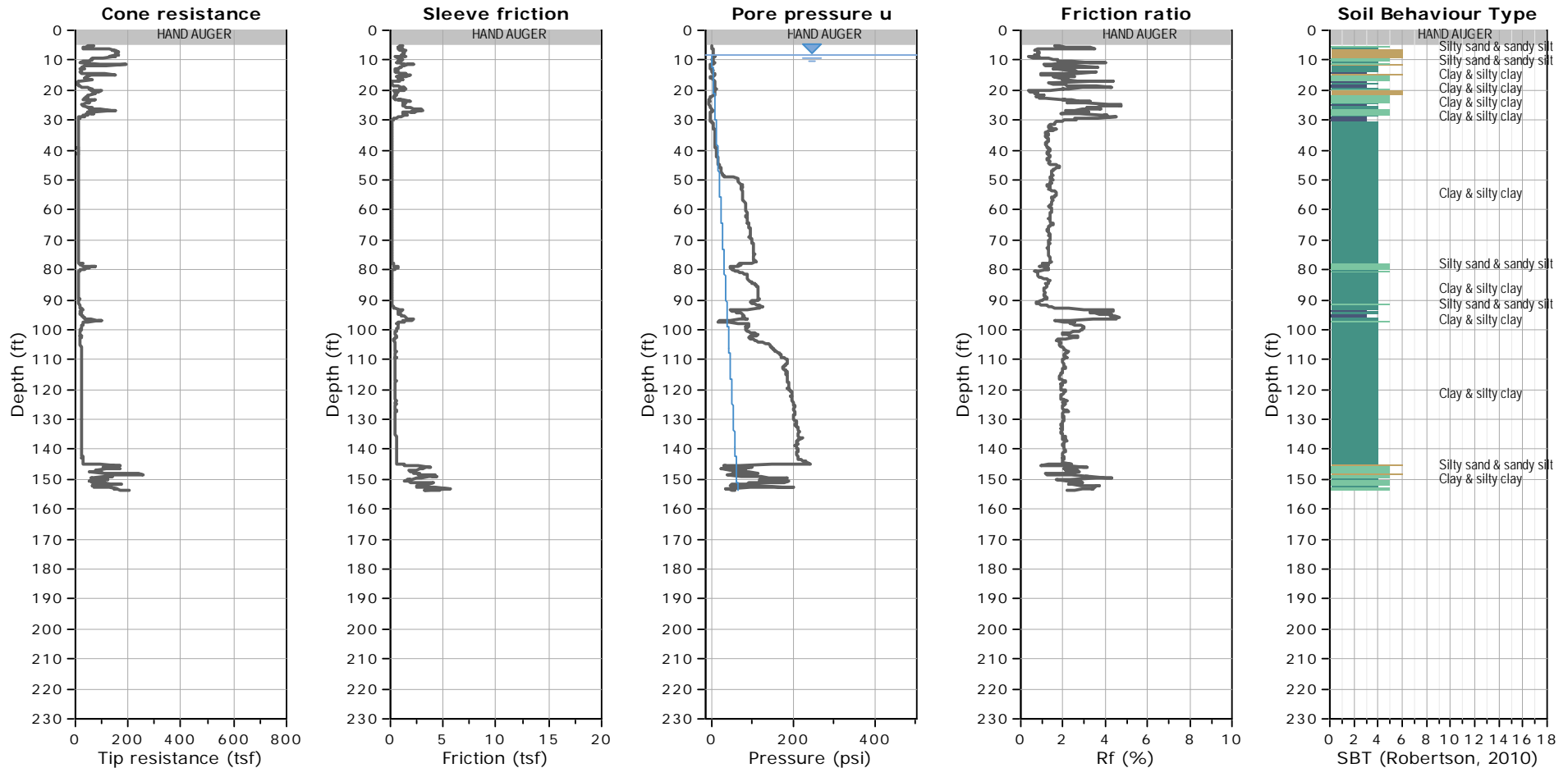
## CPT: CSWL337-33

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 153.71 ft, Date: 6/12/2018



**WATER TABLE FOR ESTIMATING PURPOSES ONLY**





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# Mayor ED 17-02 Priority permit

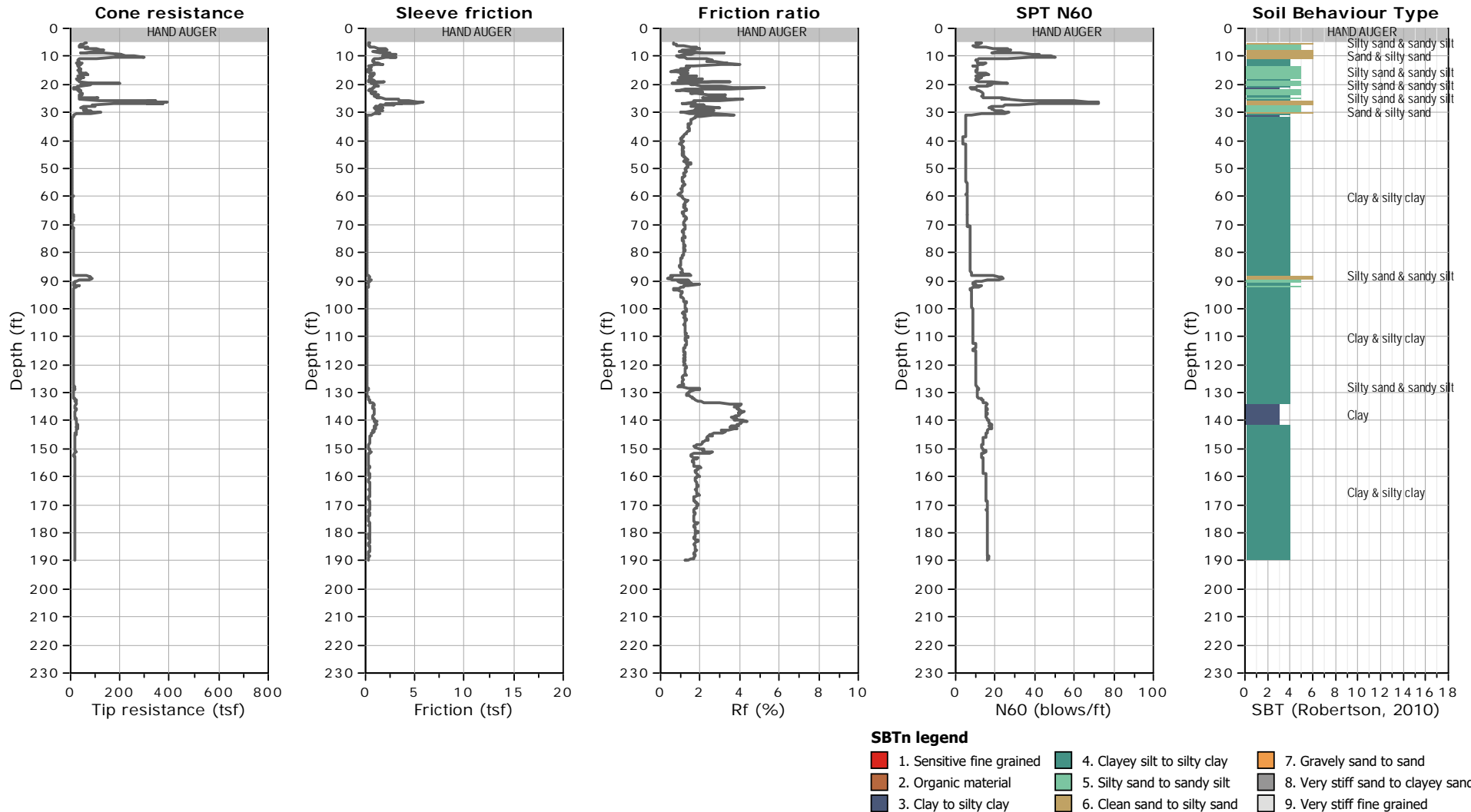
## CPT: CSWL337-34

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 189.96 ft, Date: 6/12/2018





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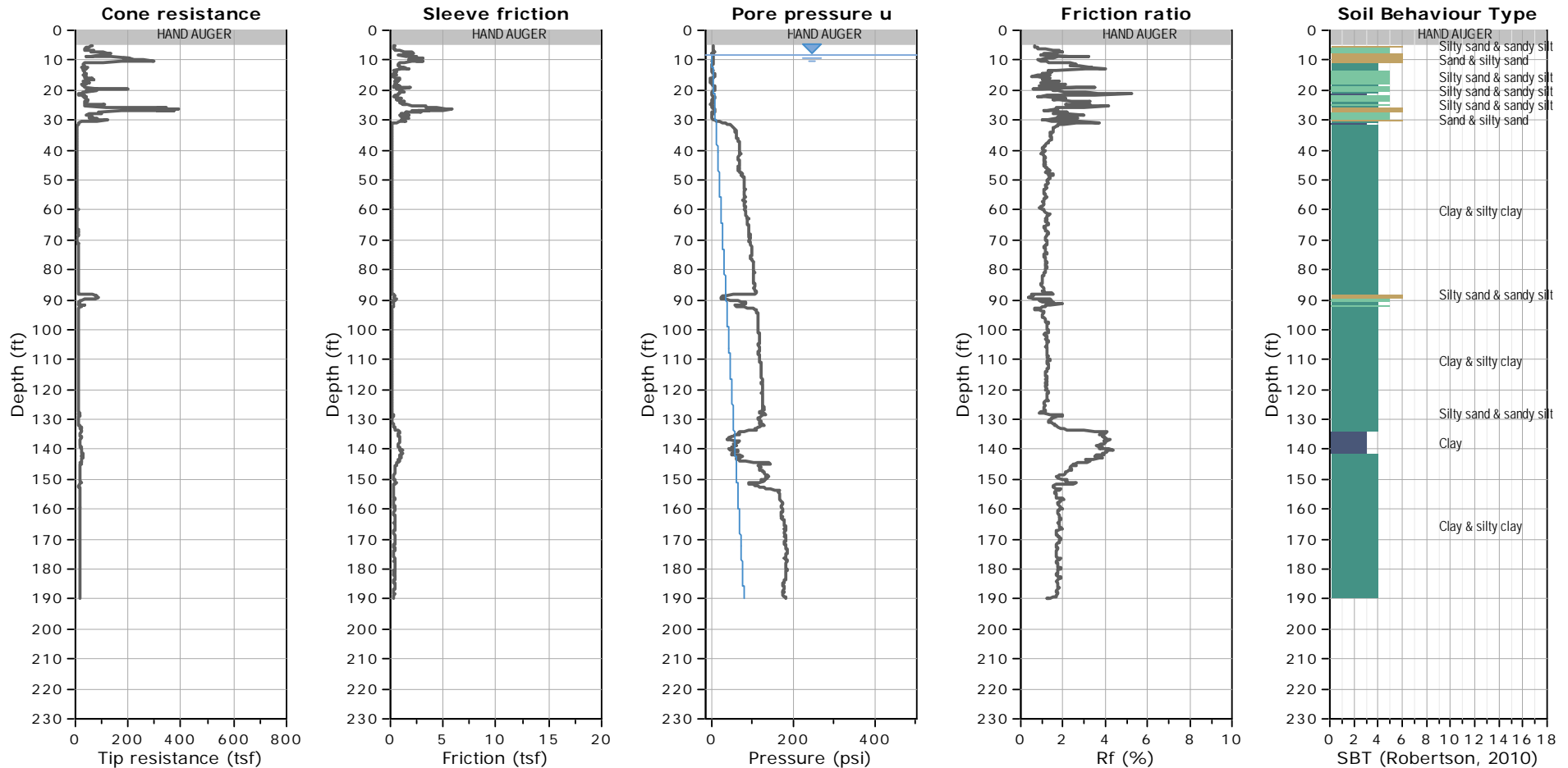
CPT: CSWL337-34

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 189.96 ft, Date: 6/12/2018



## WATER TABLE FOR ESTIMATING PURPOSES ONLY



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# Mayor ED 17-02 Priority permit

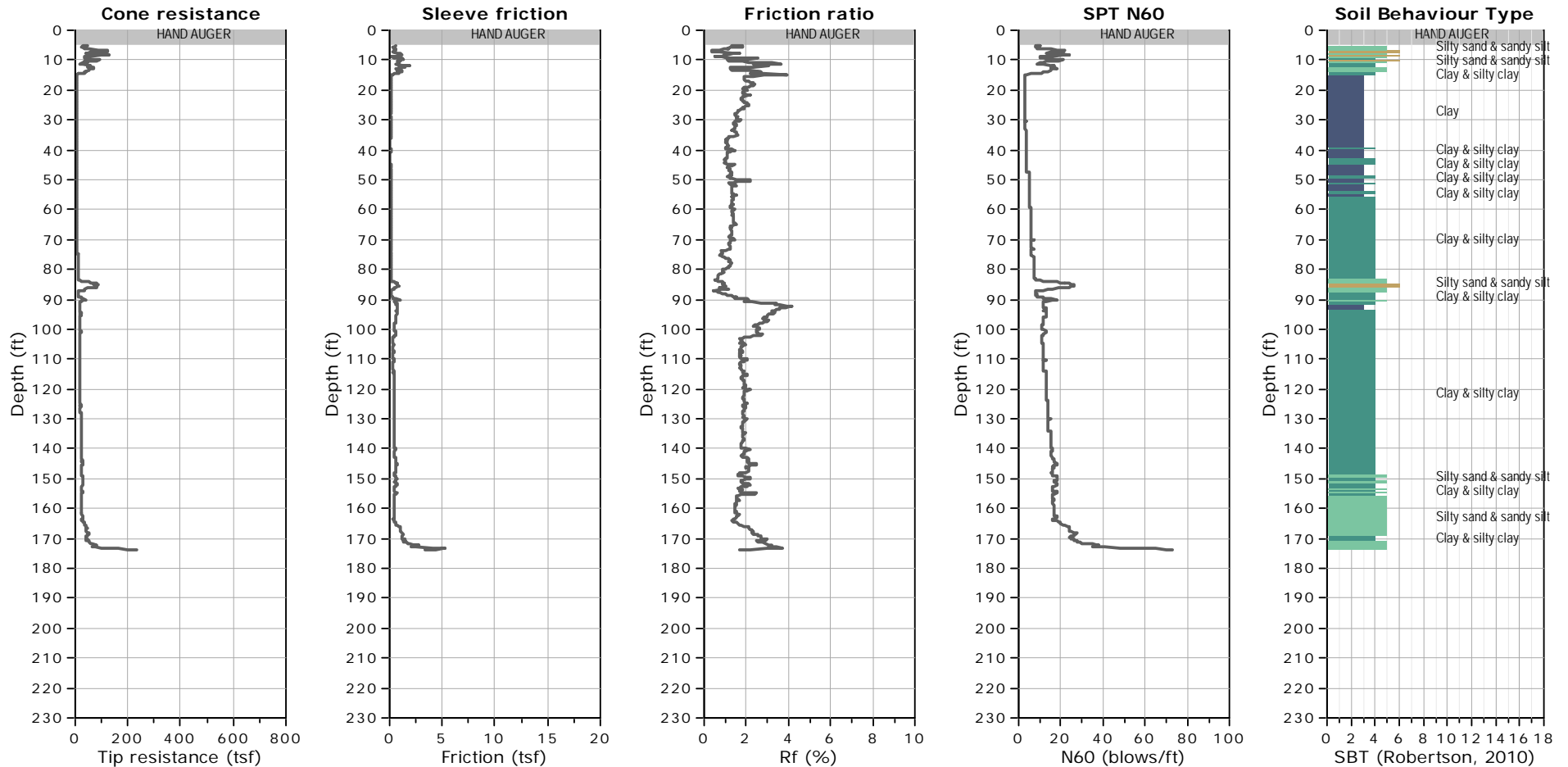
## CPT: CSWL337-S35

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 173.72 ft, Date: 6/13/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

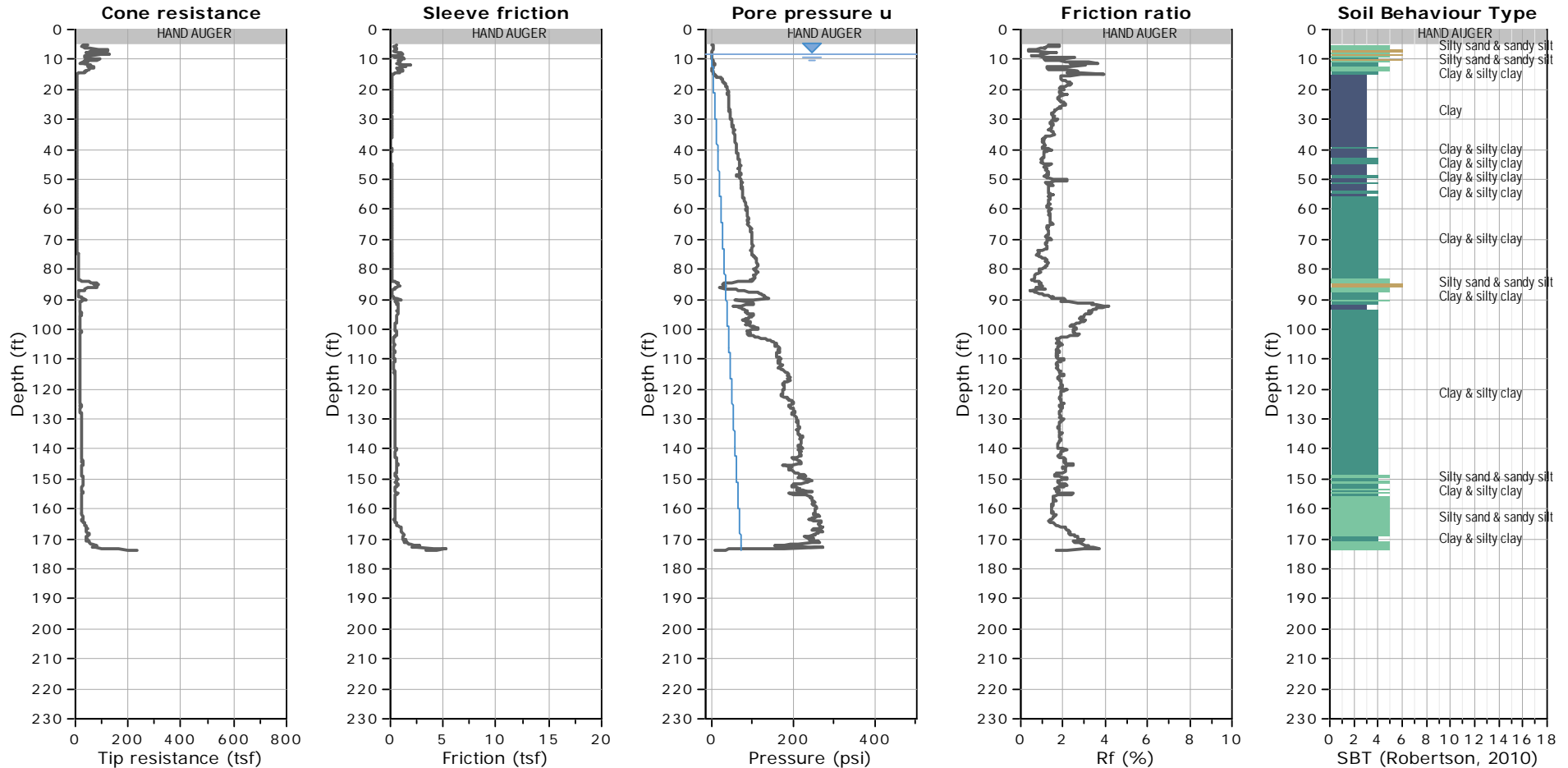
## CPT: CSWL337-S35

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 173.72 ft, Date: 6/13/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

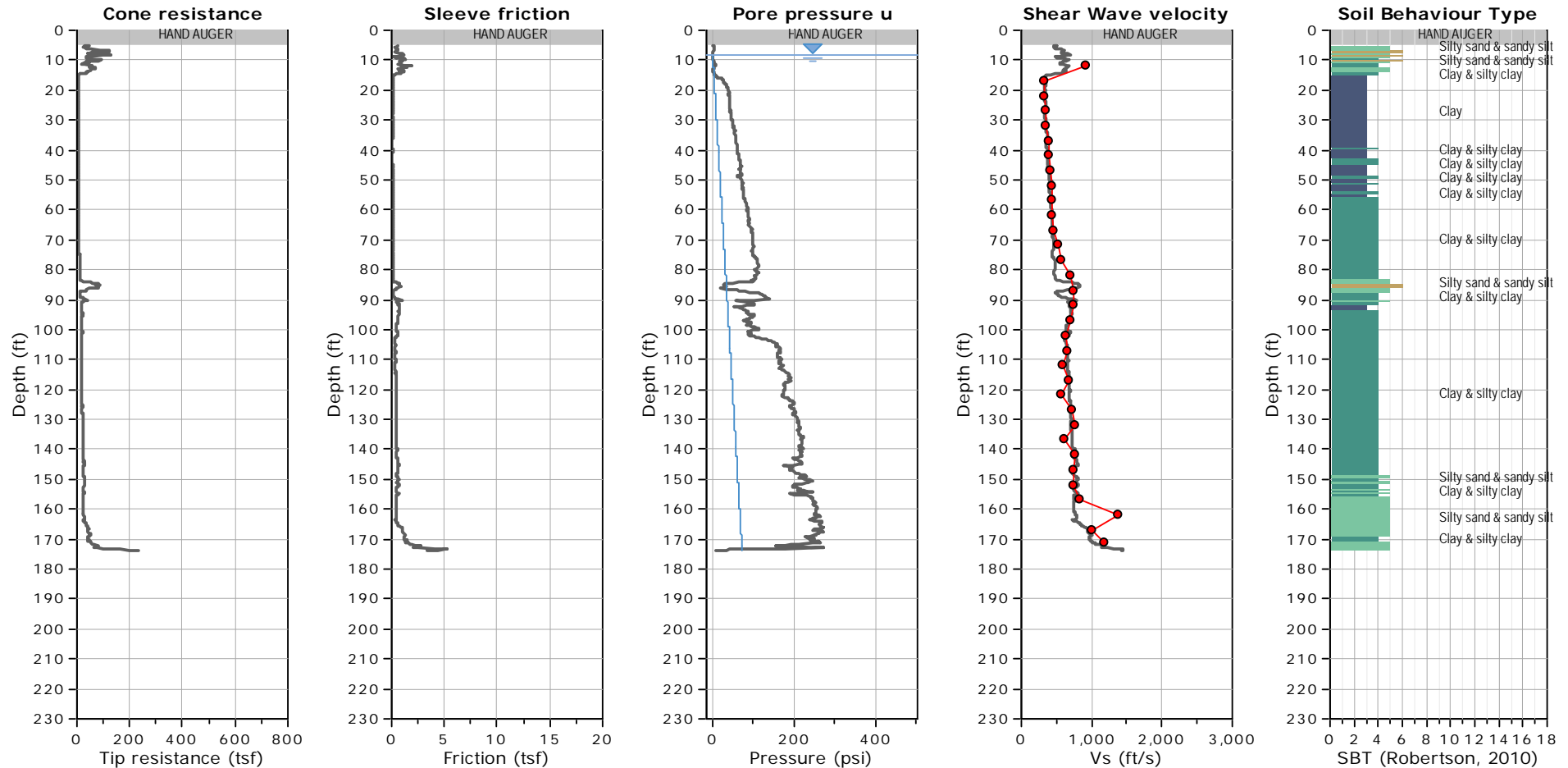
## CPT: CSWL337-S35

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 173.72 ft, Date: 6/13/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

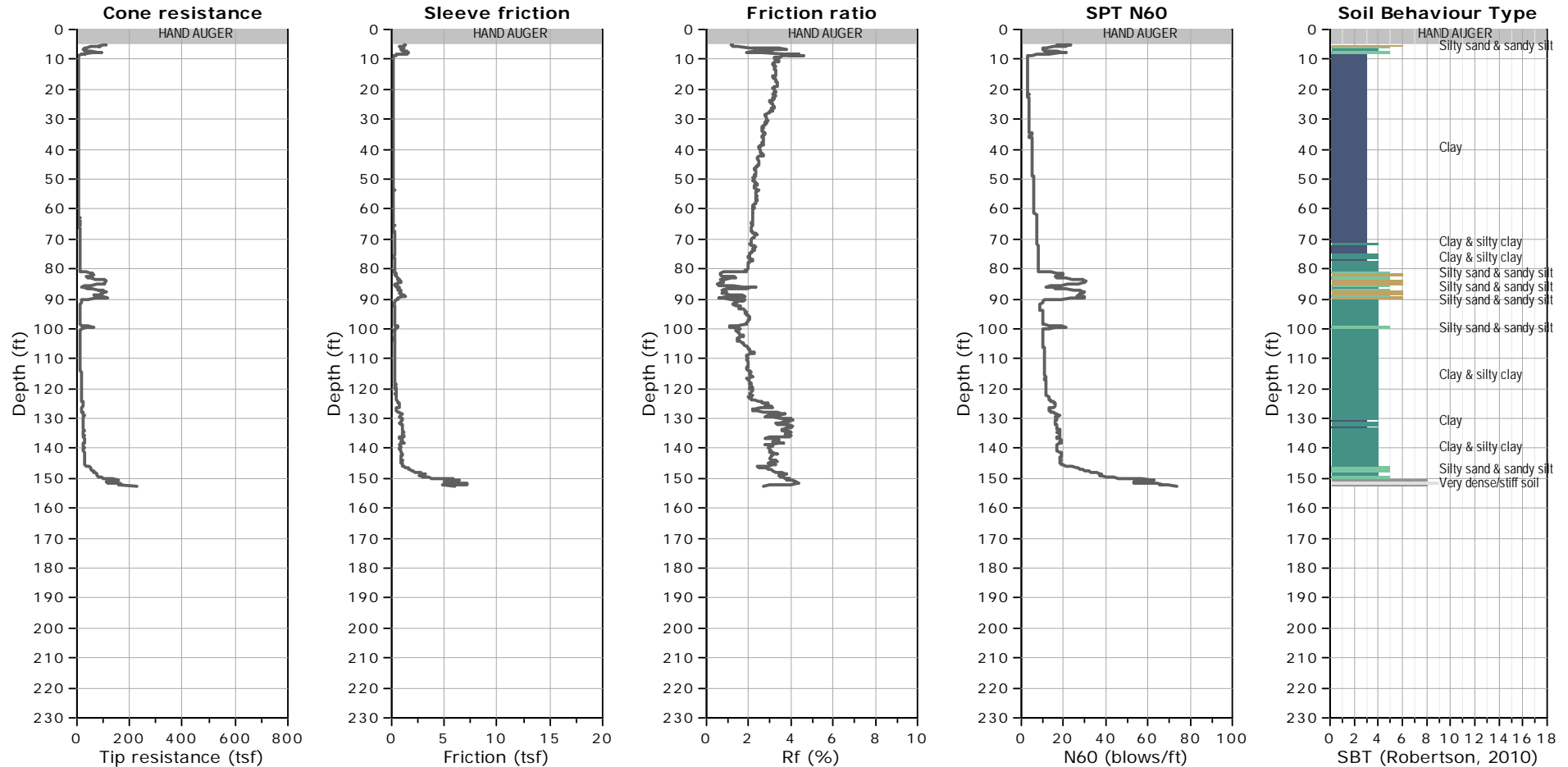
## CPT: CSWL337-36

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 152.40 ft, Date: 6/13/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

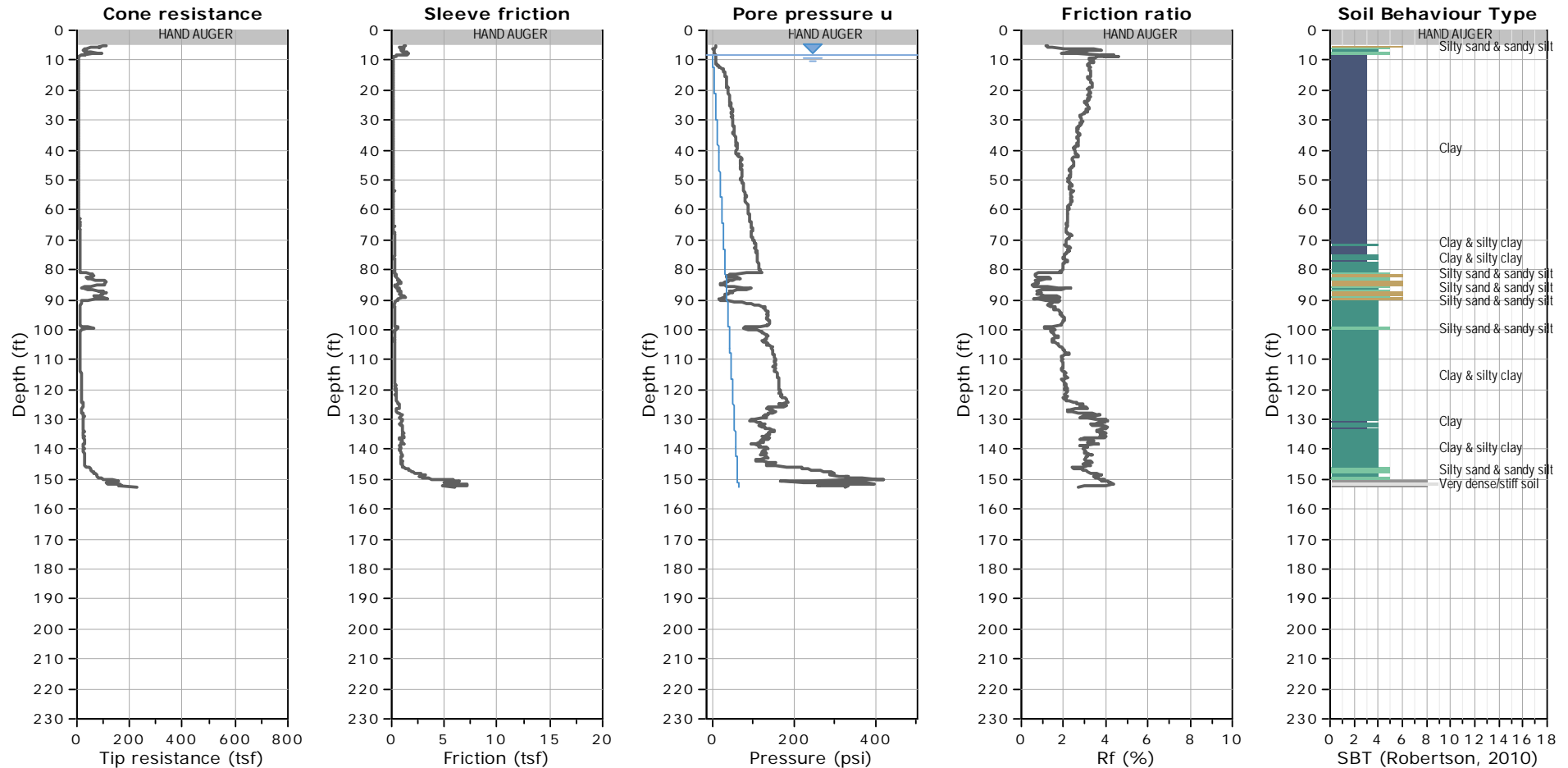
## CPT: CSWL337-36

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 152.40 ft, Date: 6/13/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

### WATER TABLE FOR ESTIMATING PURPOSES ONLY



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# Mayor ED 17-02 Priority permit

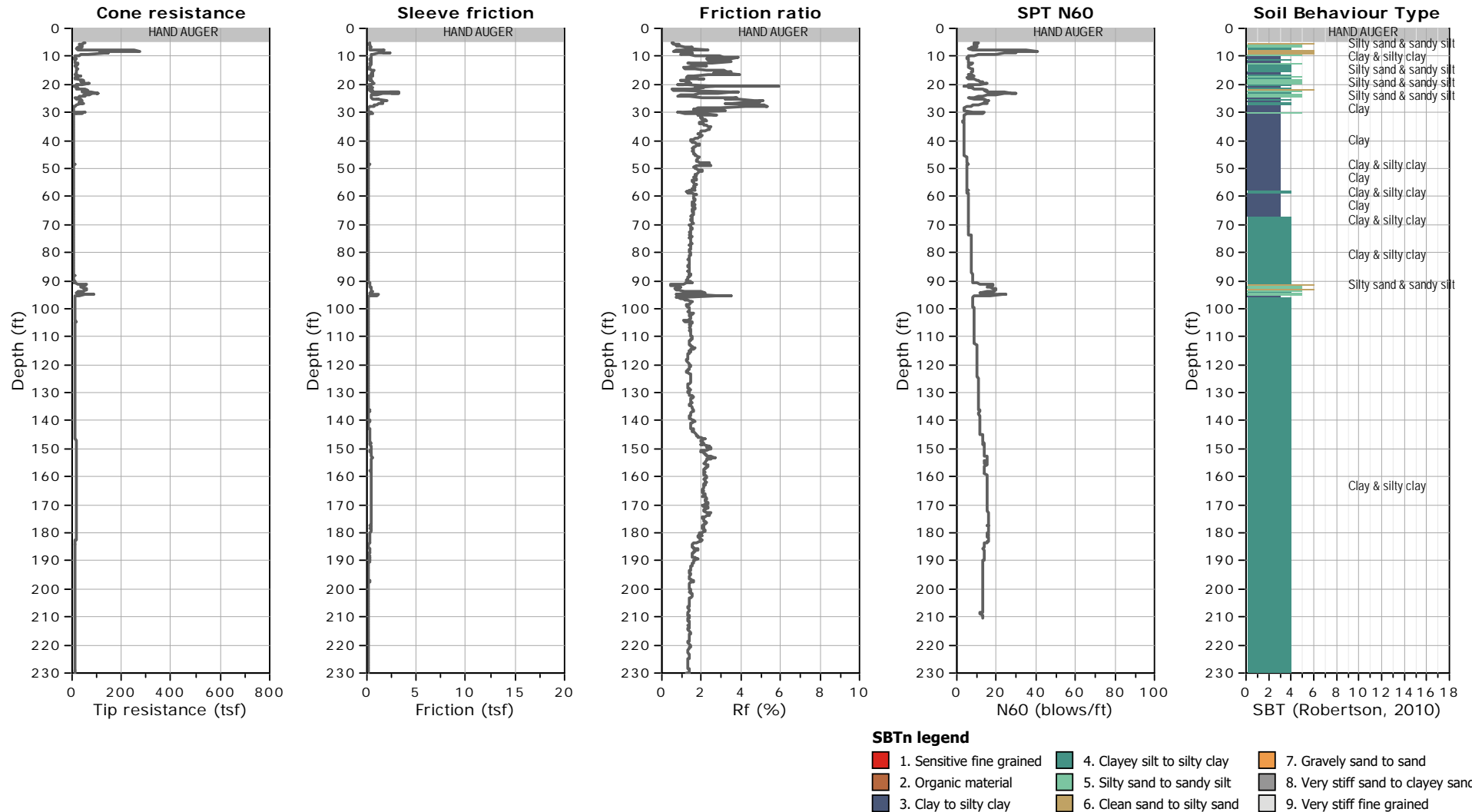
## CPT: CSWL337-37

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 230.18 ft, Date: 6/12/2018







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# Mayor ED 17-02 Priority permit

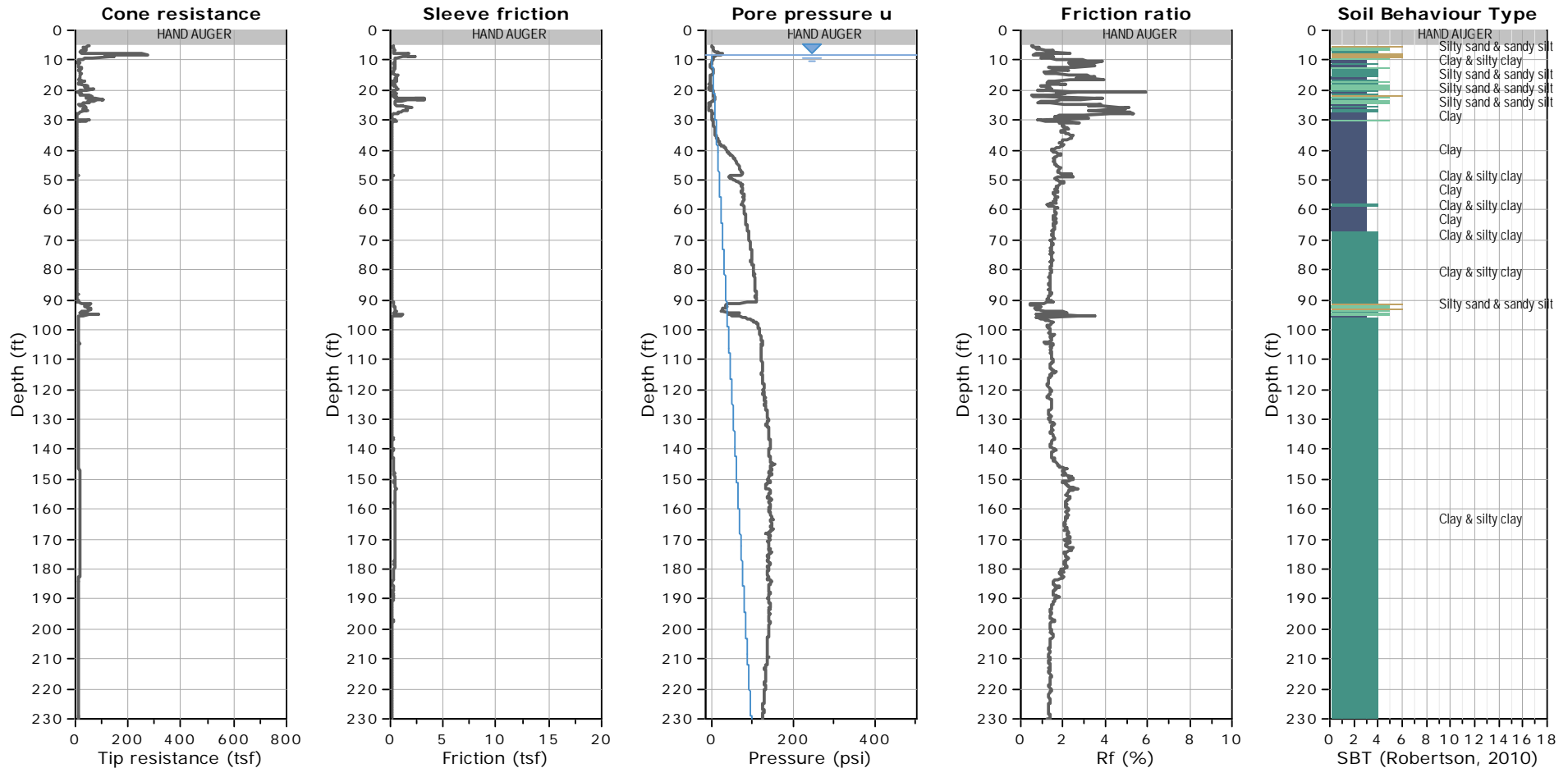
## CPT: CSWL337-37

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 230.18 ft, Date: 6/12/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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# Mayor ED 17-02 Priority permit

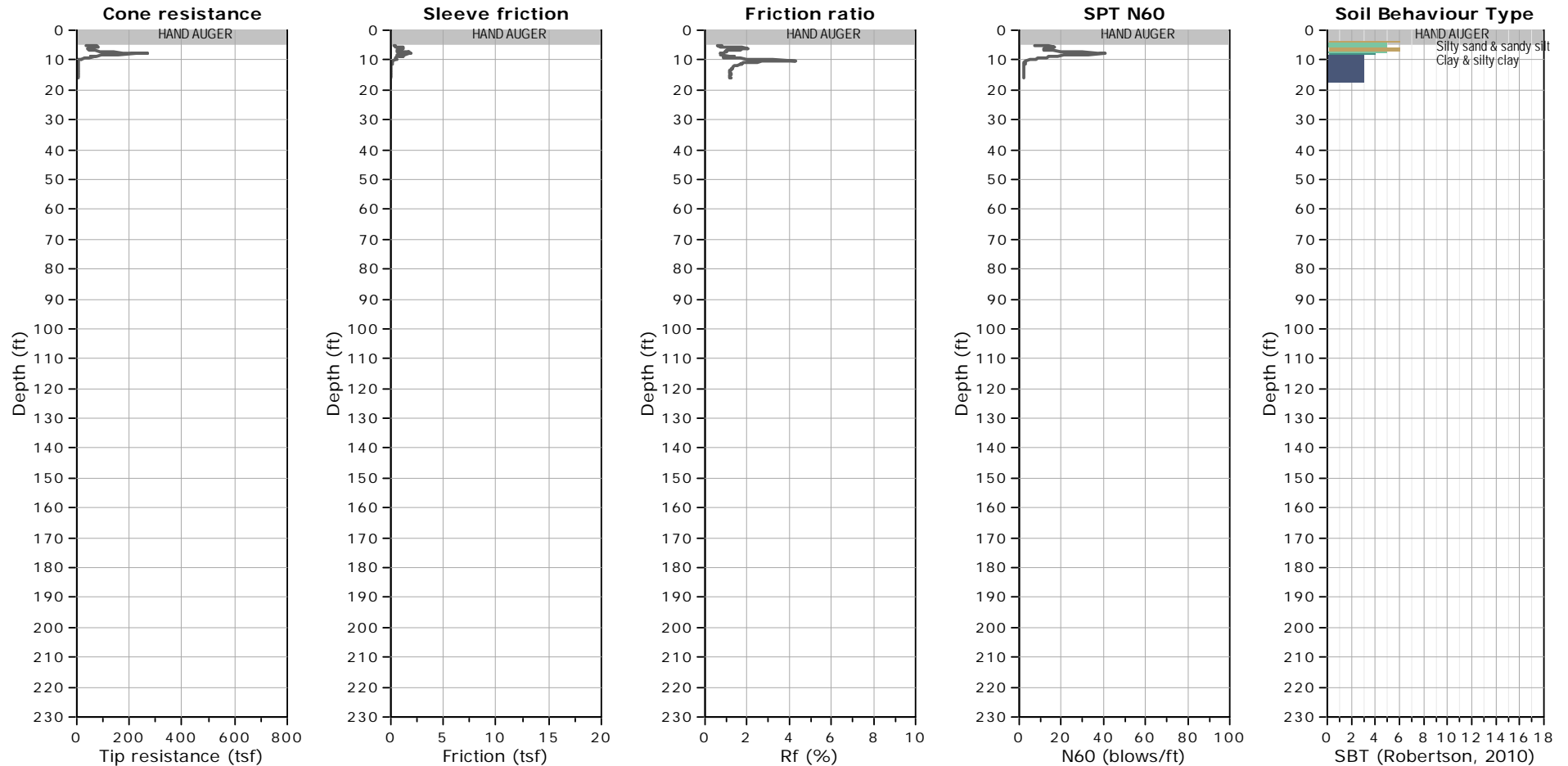
CPT: c23a

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 16.08 ft, Date: 6/14/2018



#### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

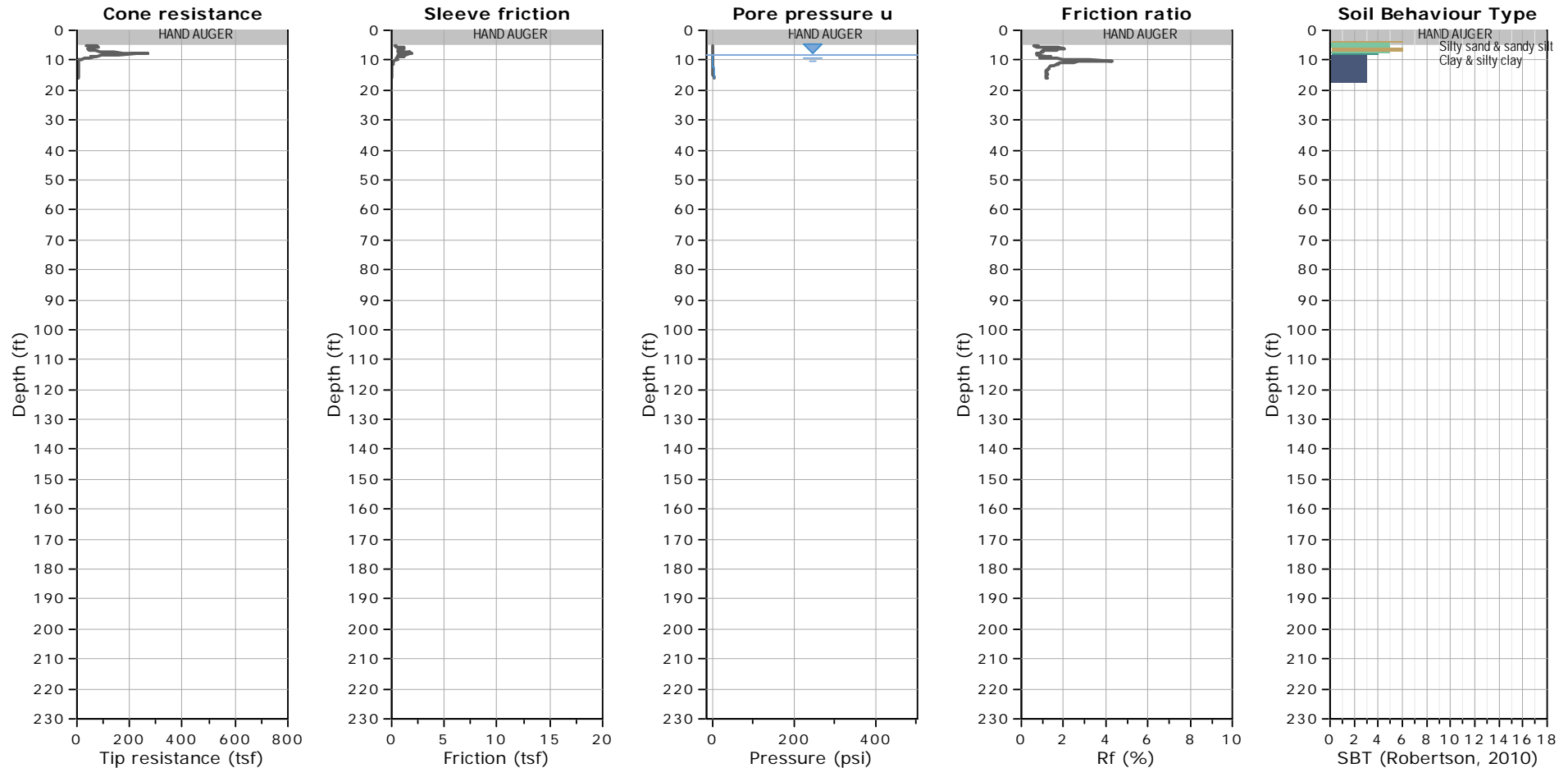
CPT: c23a

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 16.08 ft, Date: 6/14/2018



## WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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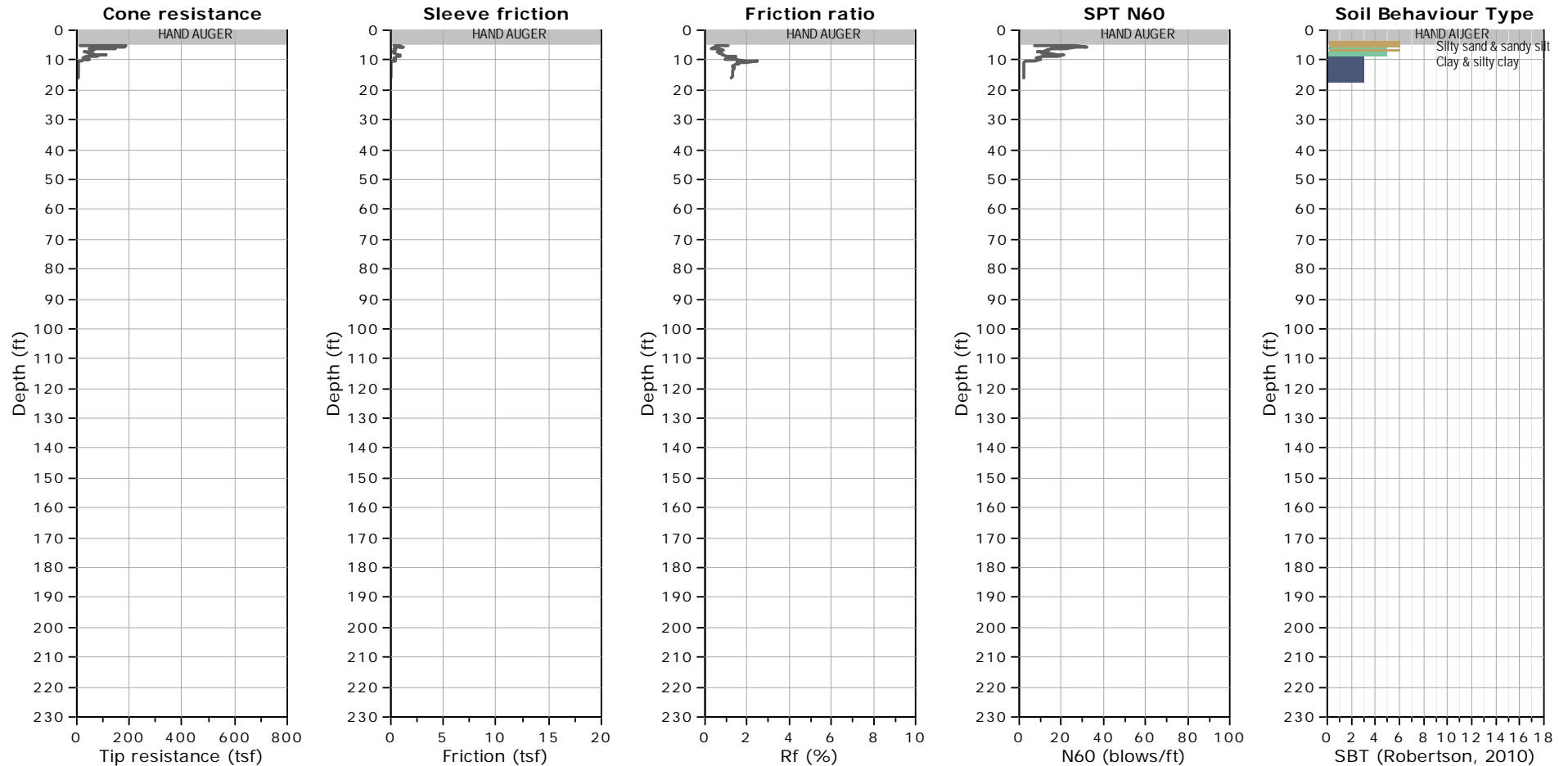
CPT: c23b

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 16.08 ft, Date: 6/14/2018





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# Mayor ED 17-02 Priority permit

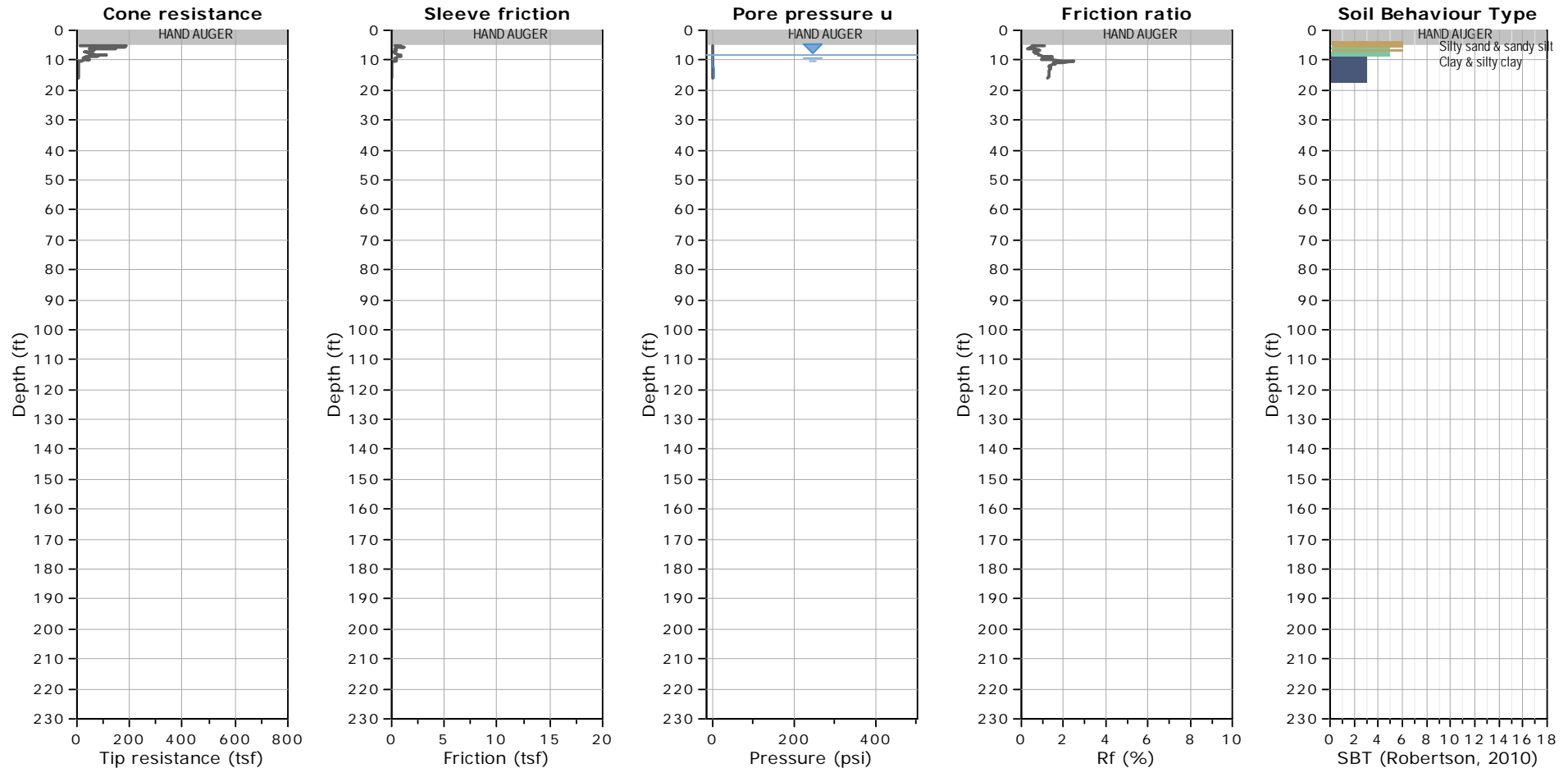
CPT: c23b

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 16.08 ft, Date: 6/14/2018



## WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravelly sand to sand          |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

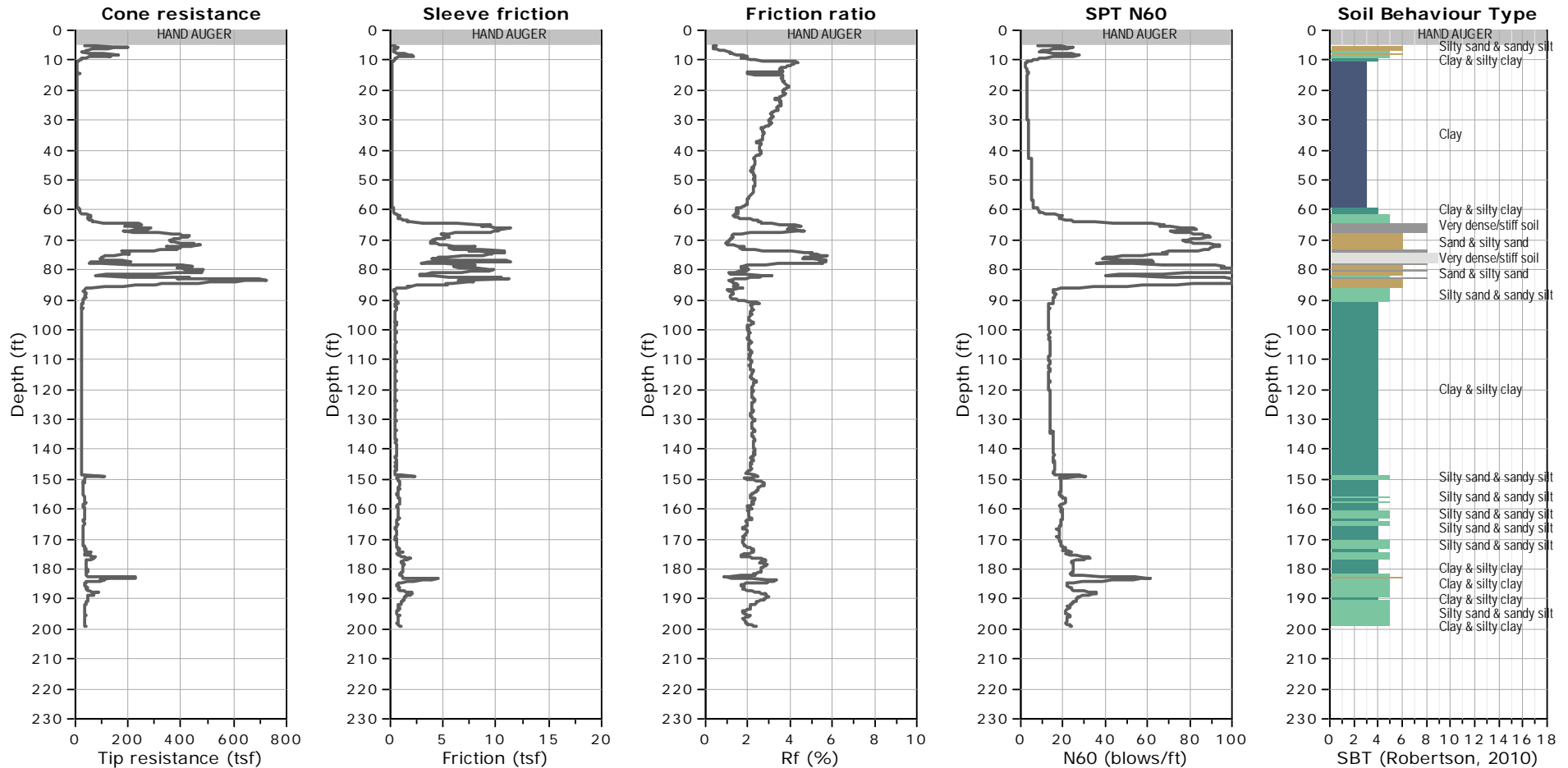
CPT: c23c

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 198.98 ft, Date: 6/13/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

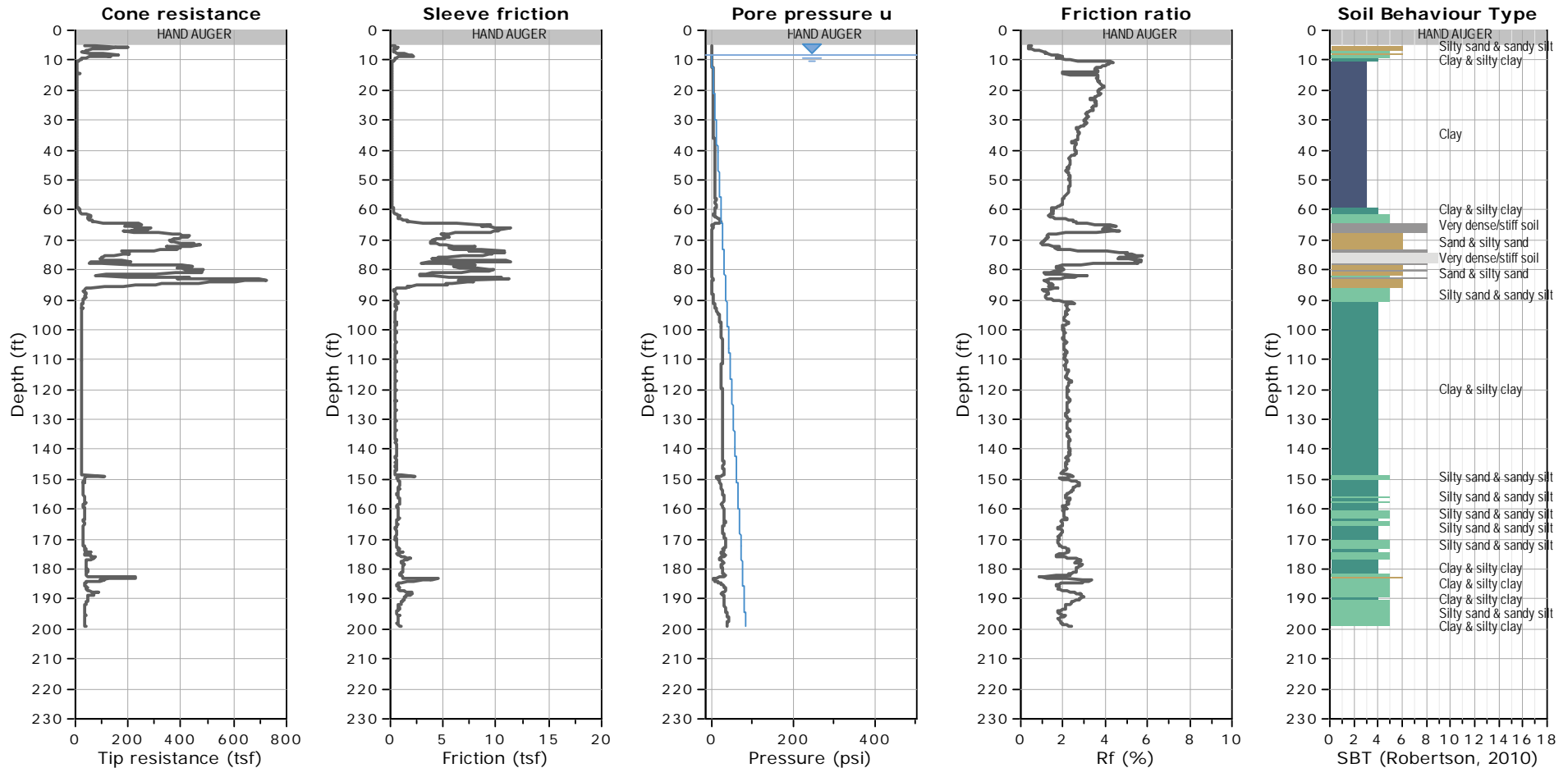
CPT: c23c

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 198.98 ft, Date: 6/13/2018



**WATER TABLE FOR ESTIMATING PURPOSES ONLY**

## SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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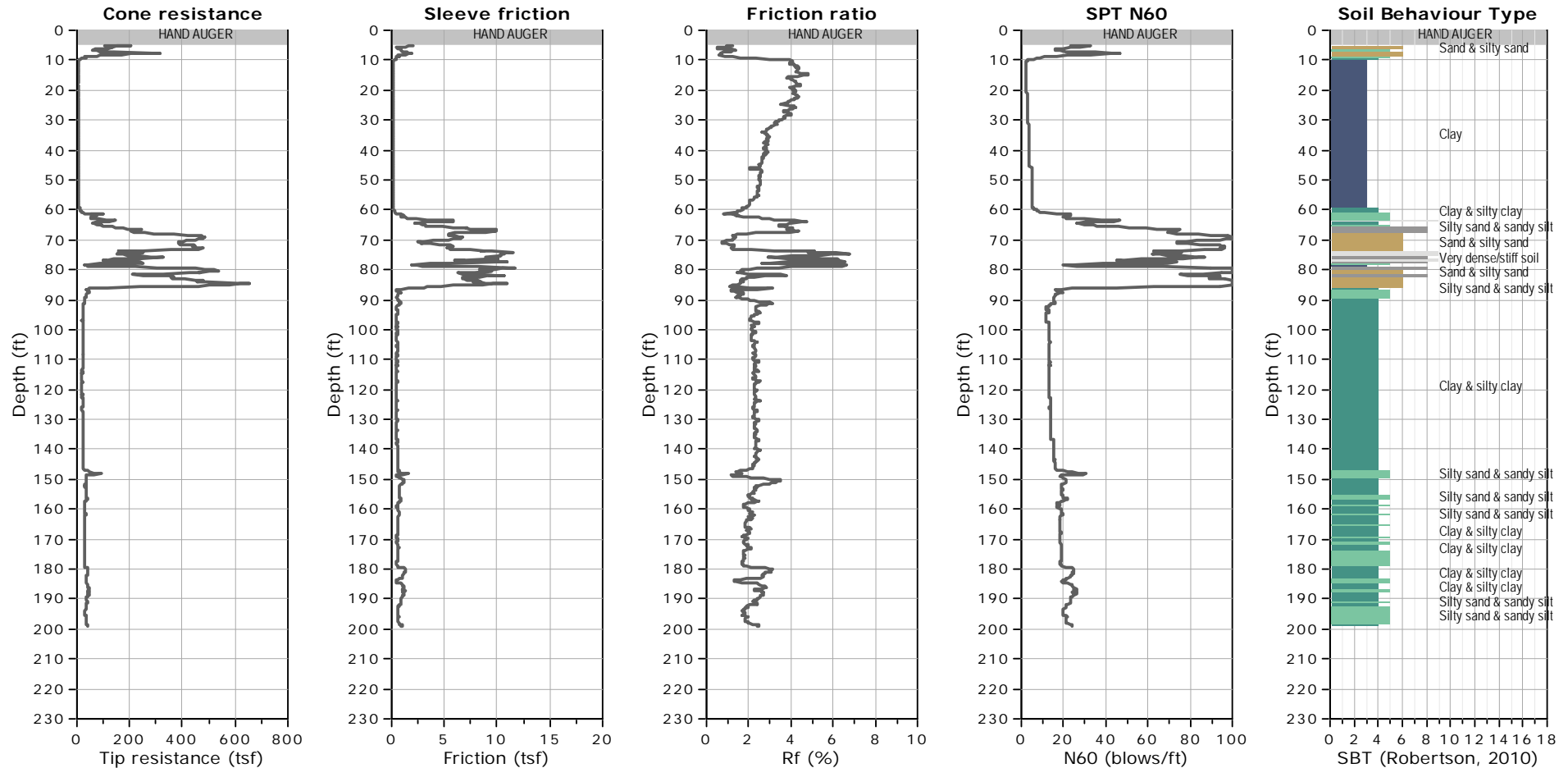
## CPT: c23d

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 198.98 ft, Date: 6/13/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |





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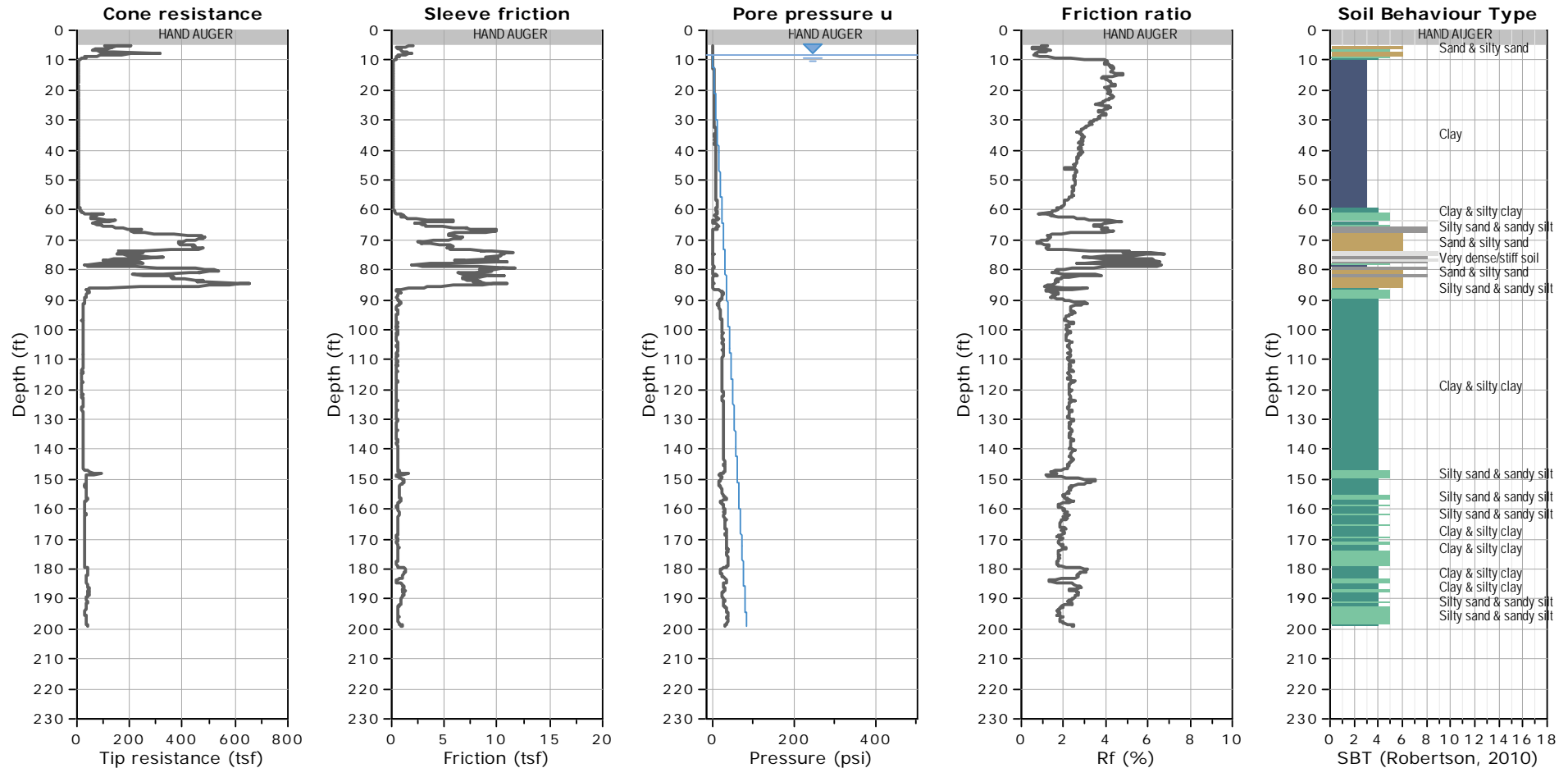
CPT: c23d

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 198.98 ft, Date: 6/13/2018



## WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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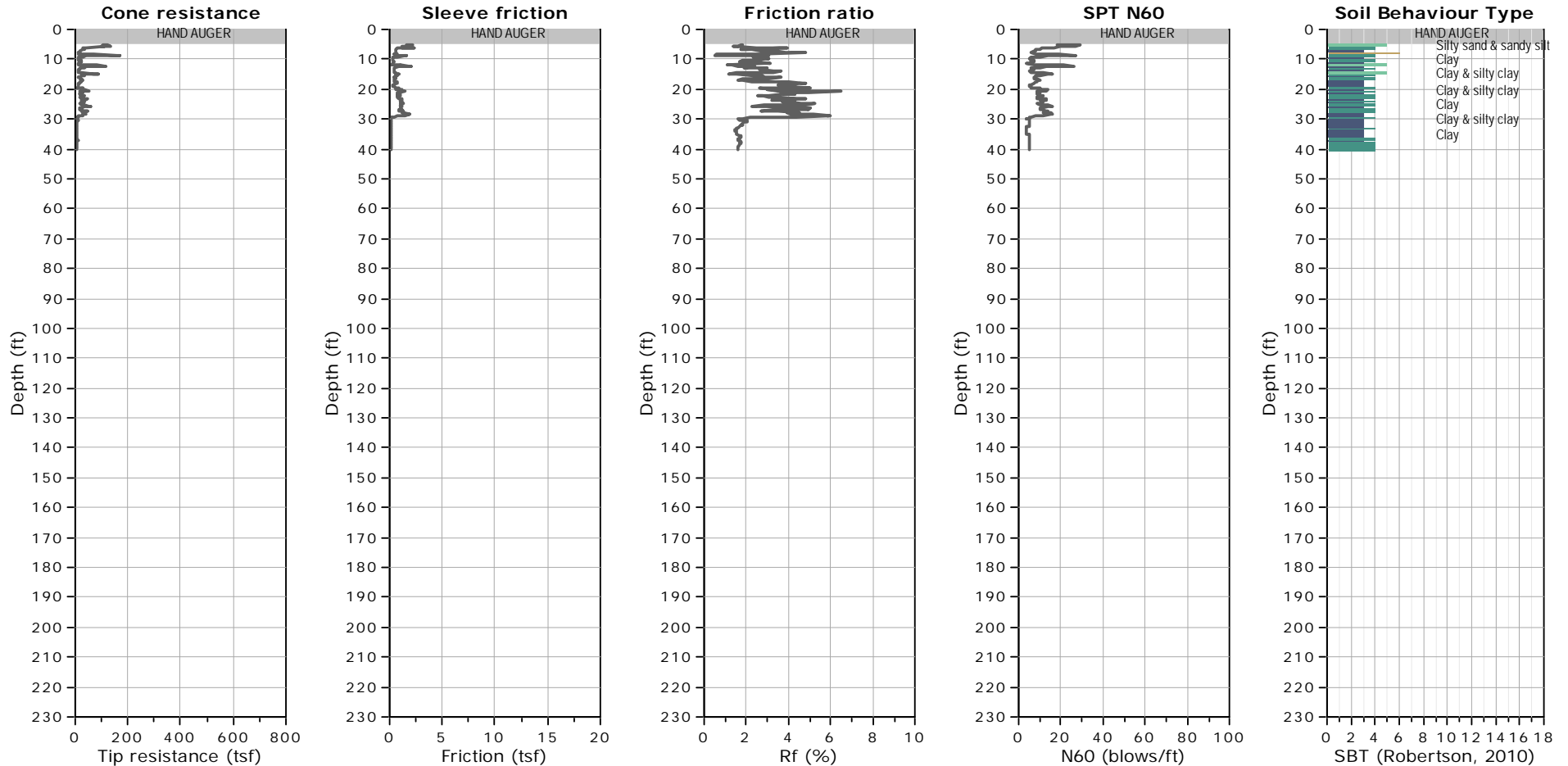
## CPT: CPT-SC1

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 40.03 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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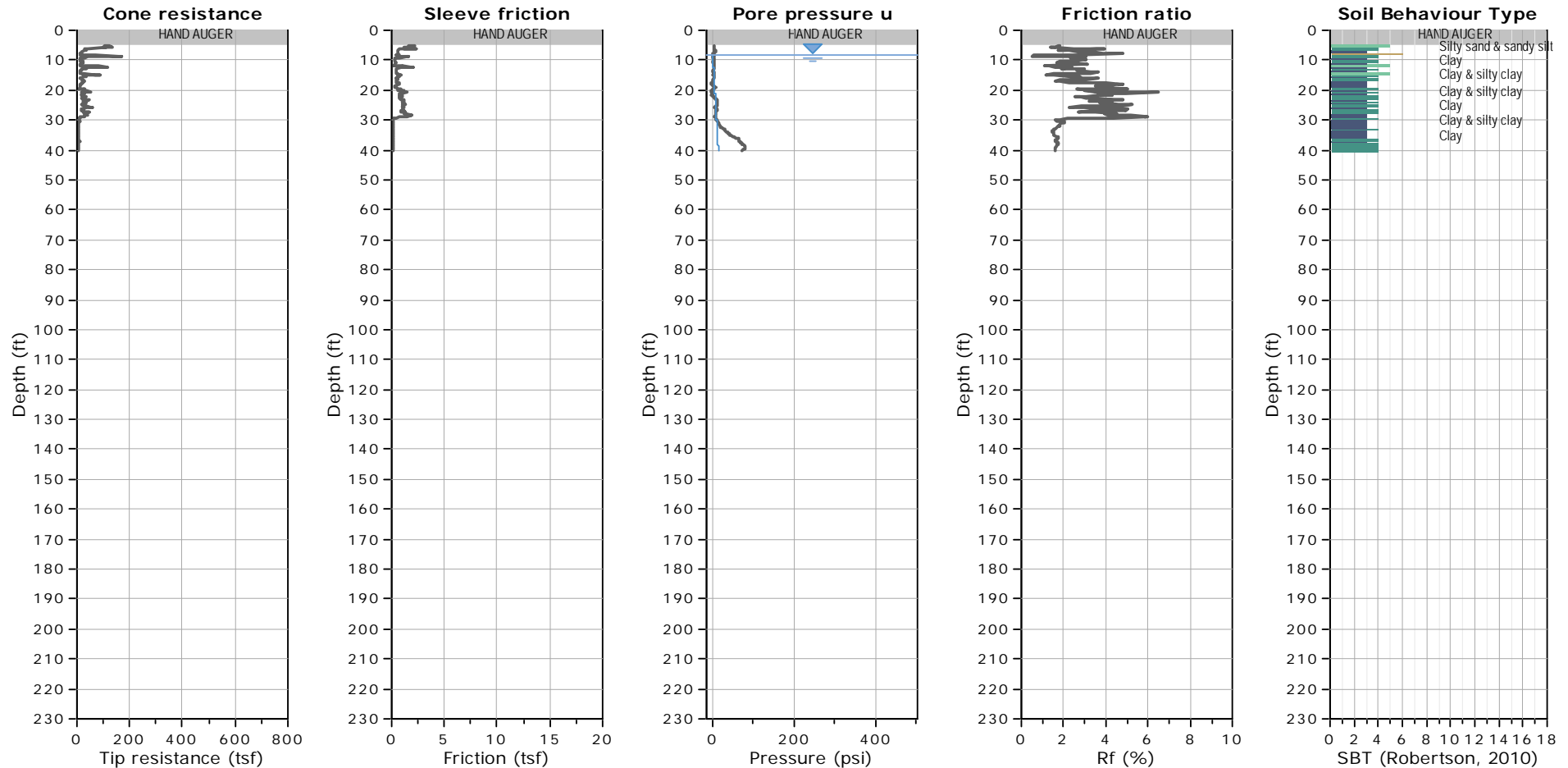
## CPT: CPT-SC1

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 40.03 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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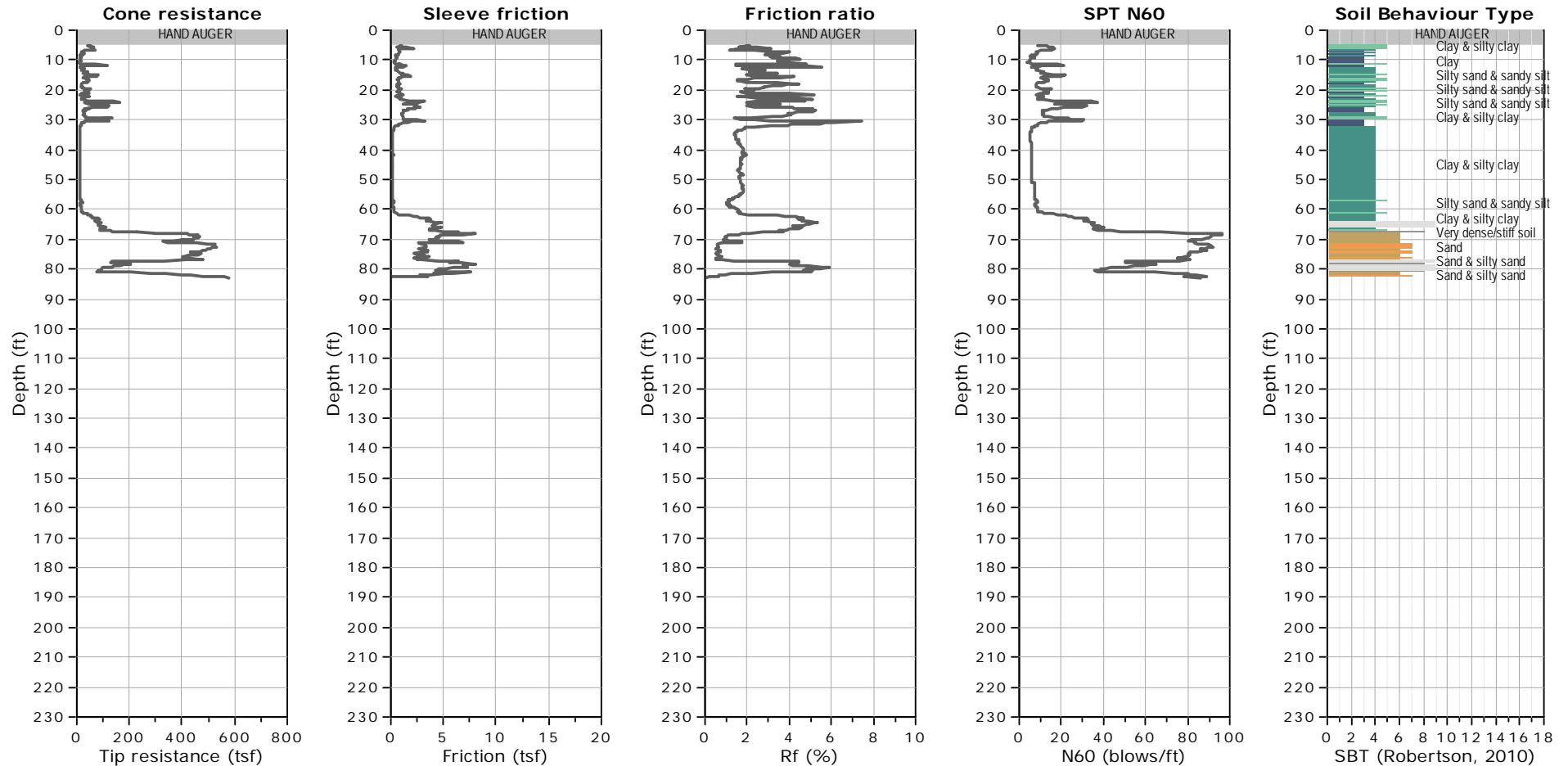
## CPT: CPT-SC2

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 82.84 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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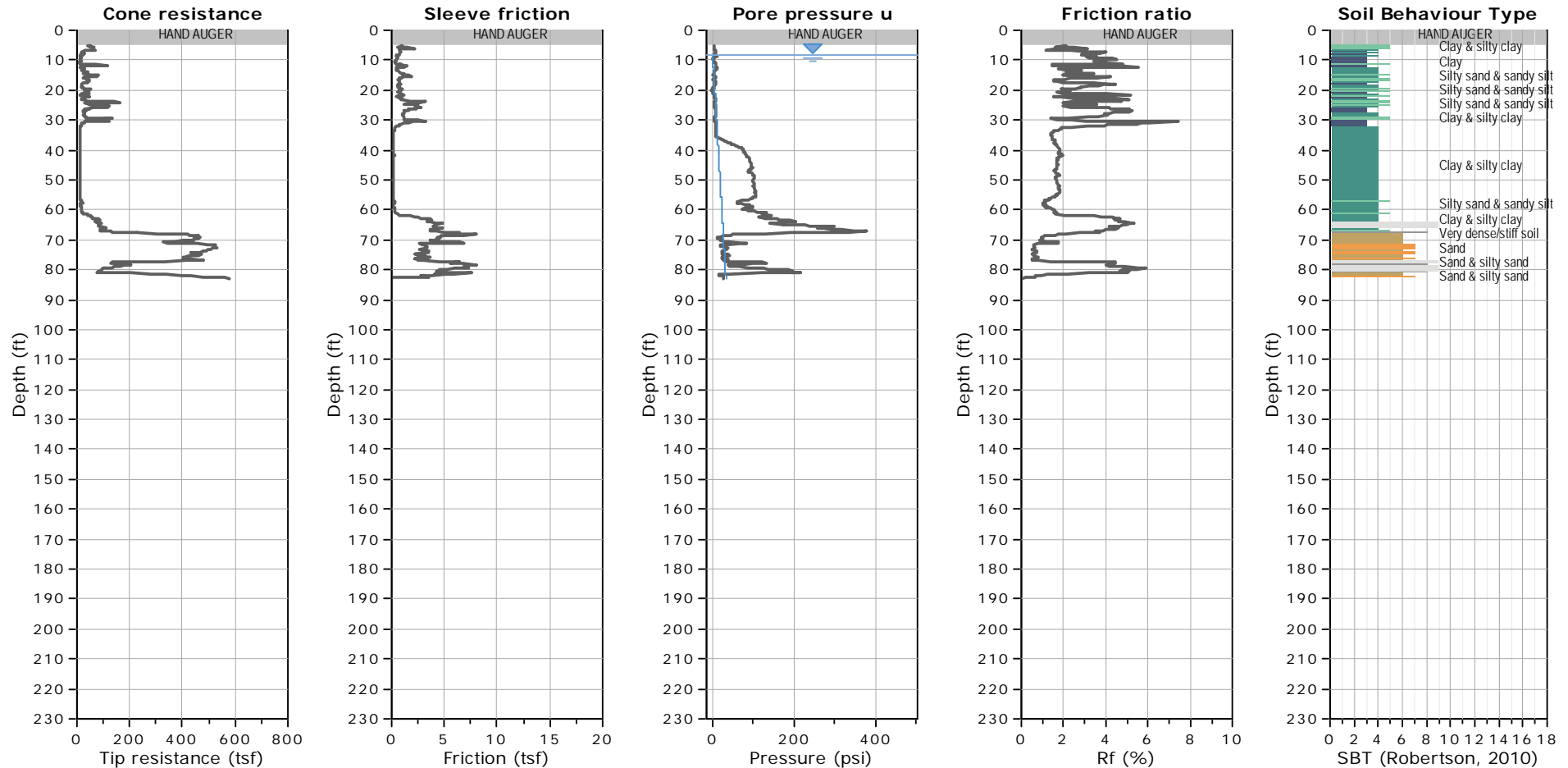
## CPT: CPT-SC2

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 82.84 ft, Date: 6/14/2018



**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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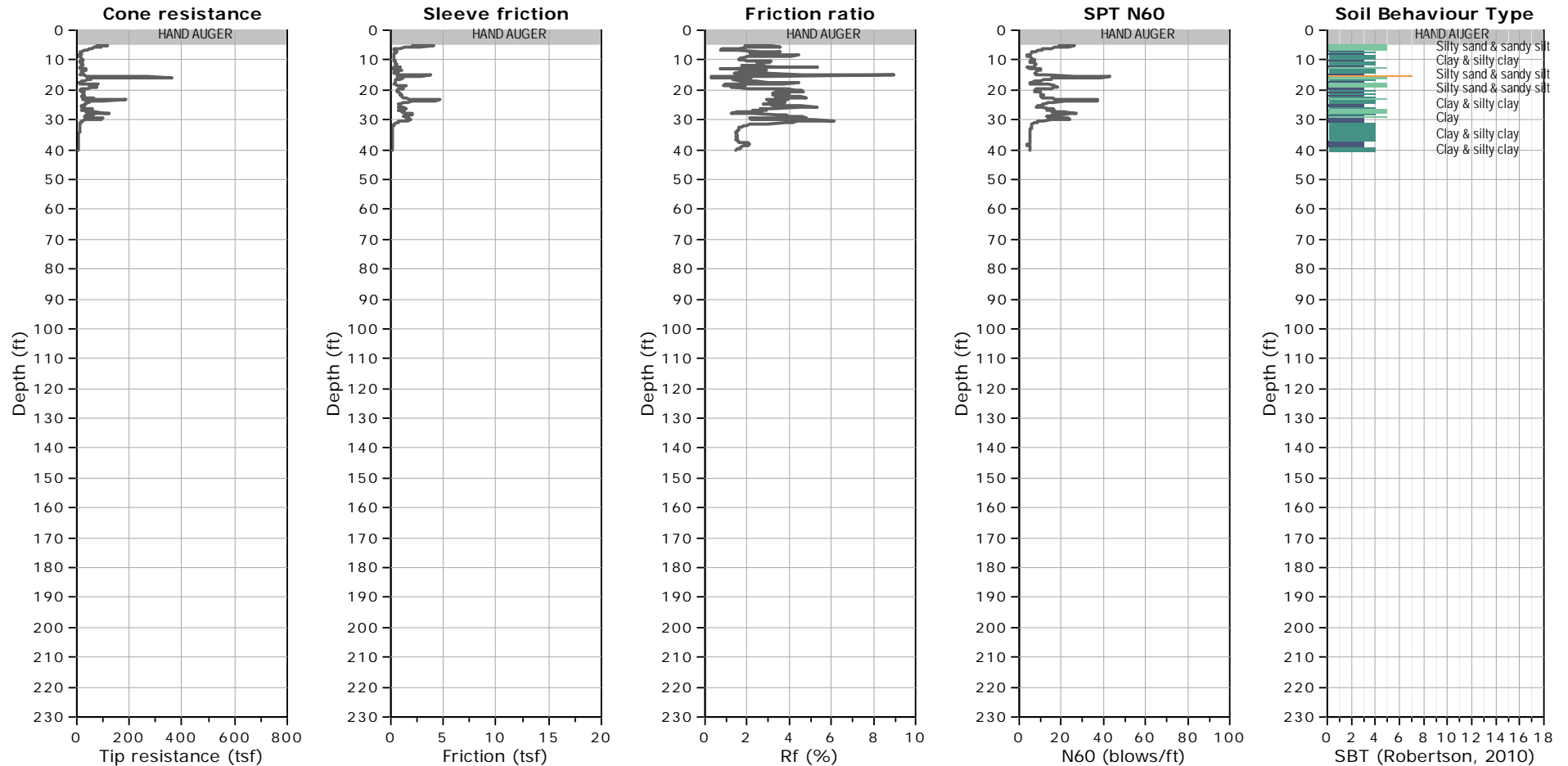
## CPT: CPT-SC3

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 40.03 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

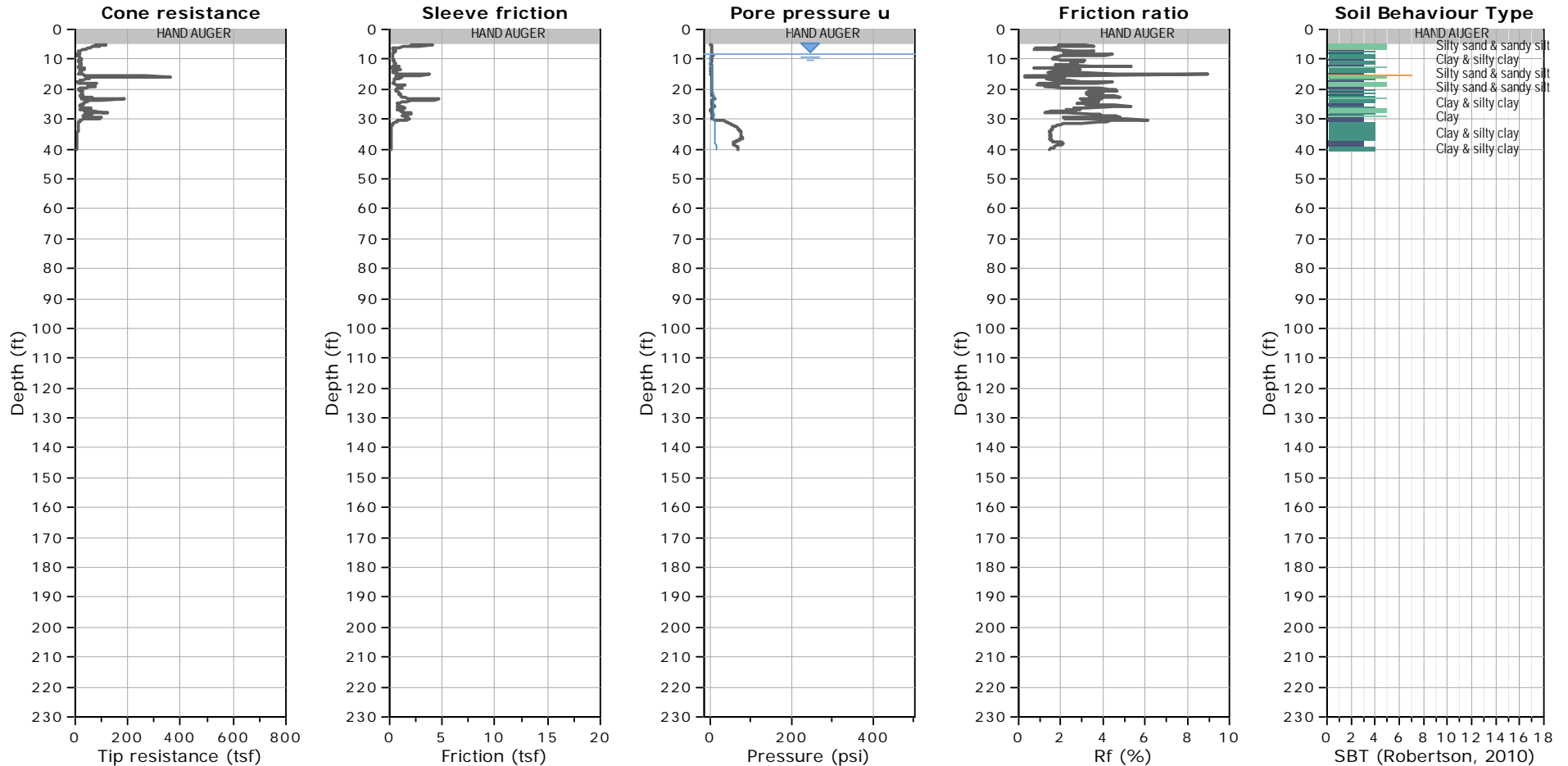
## CPT: CPT-SC3

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 40.03 ft, Date: 6/14/2018



**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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# Mayor ED 17-02 Priority permit

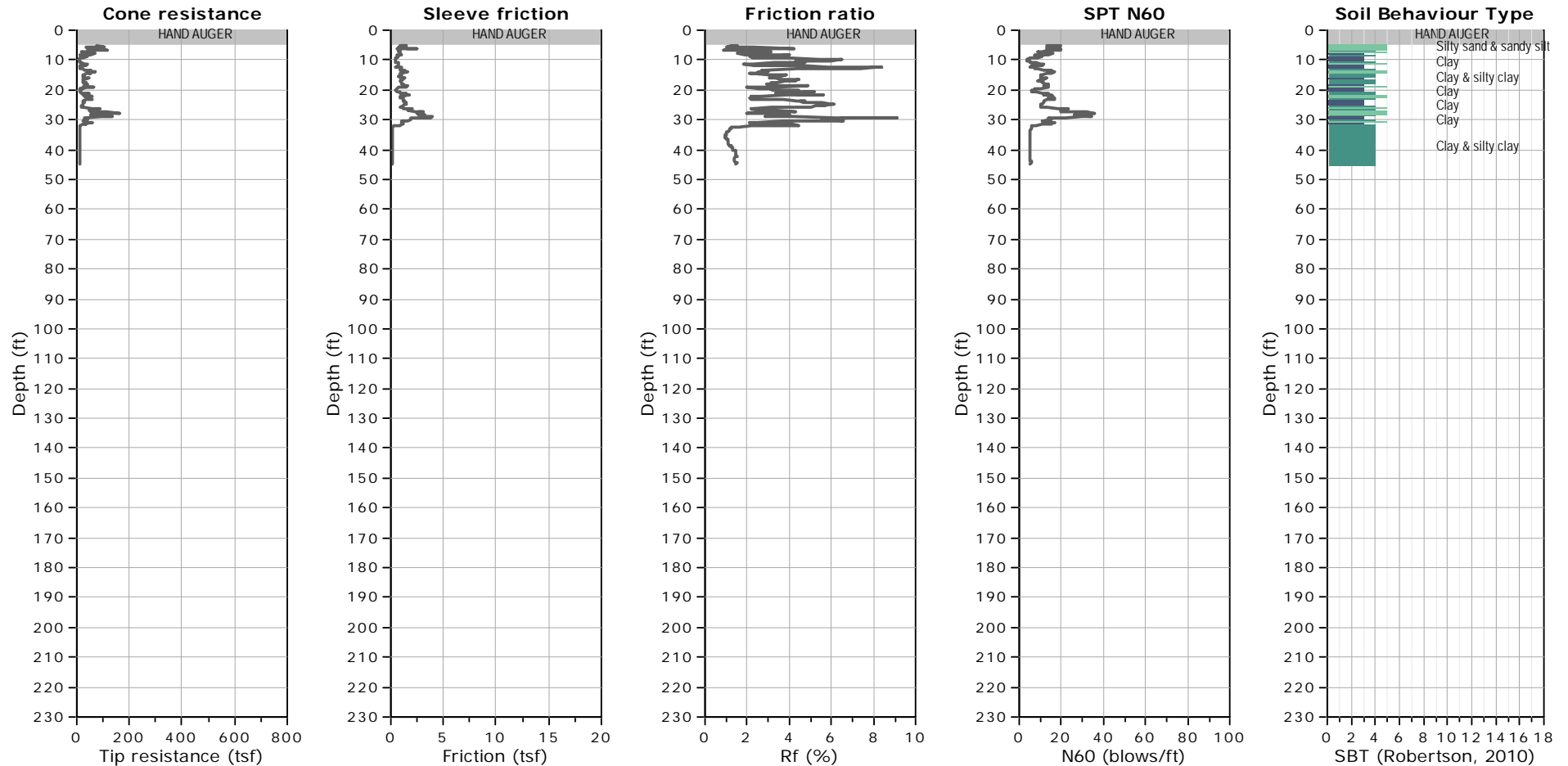
## CPT: CPT-SC4

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 44.95 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |





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# Mayor ED 17-02 Priority permit

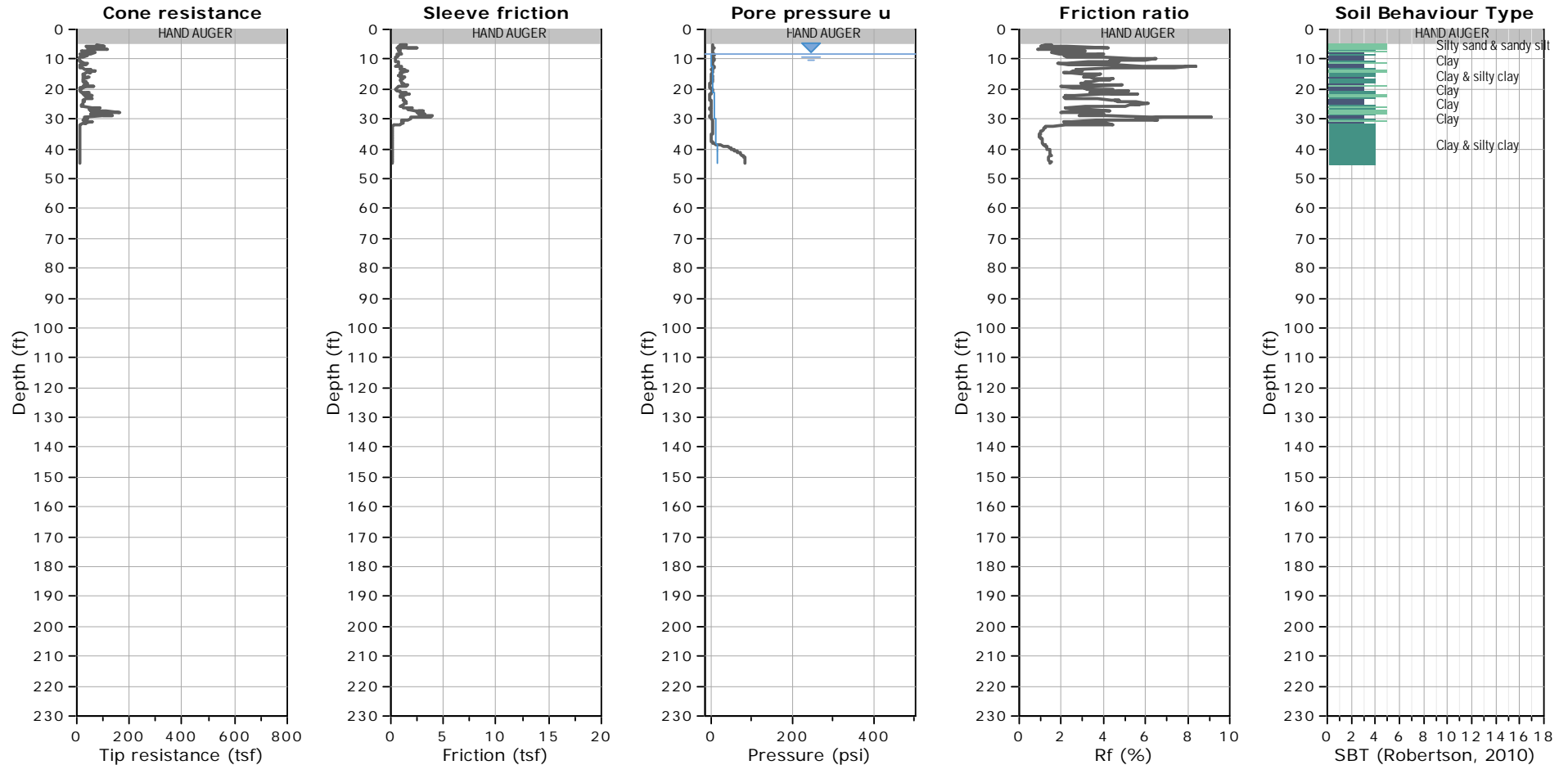
## CPT: CPT-SC4

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 44.95 ft, Date: 6/14/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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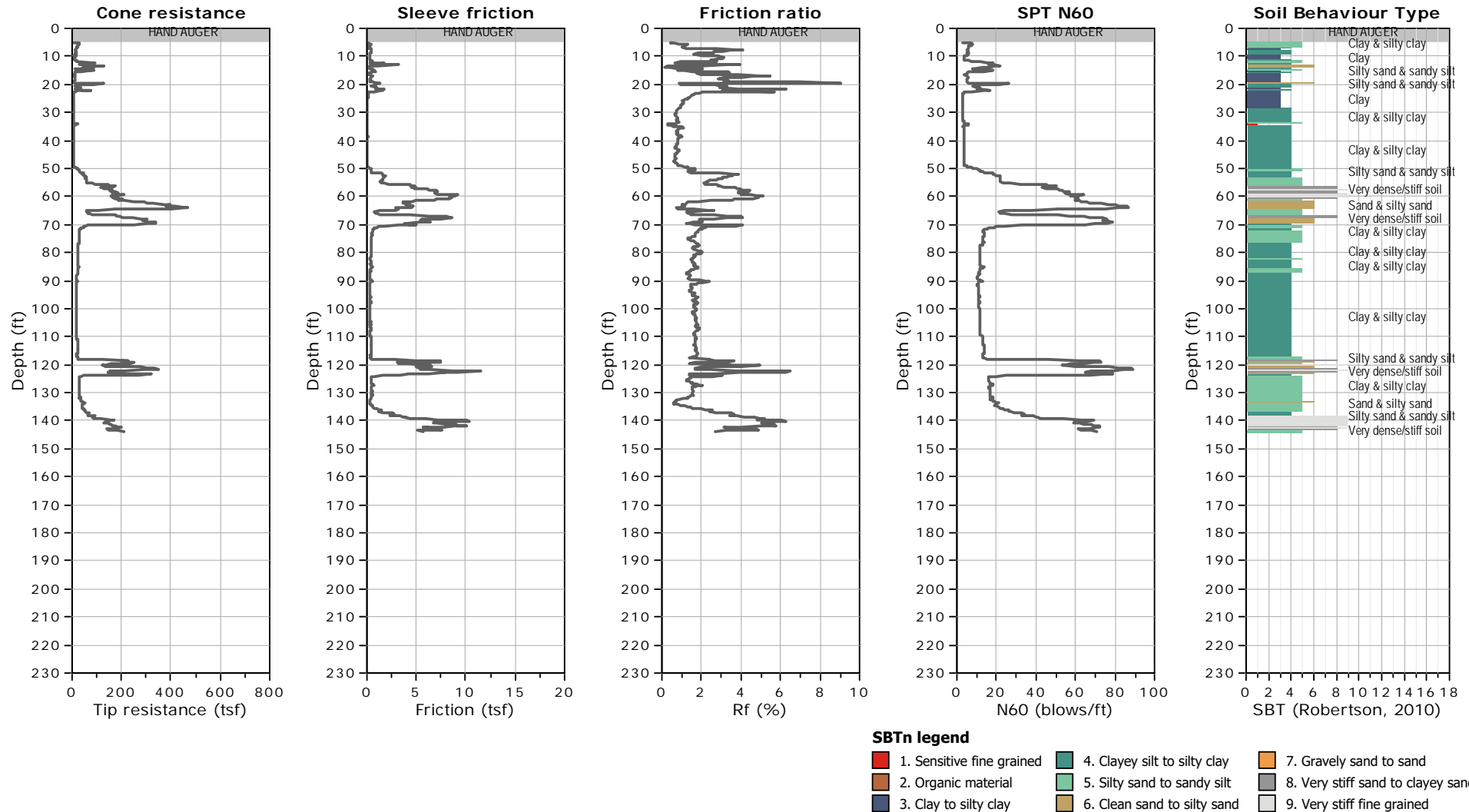
CPT: tfb1

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 143.70 ft, Date: 6/15/2018





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# Mayor ED 17-02 Priority permit

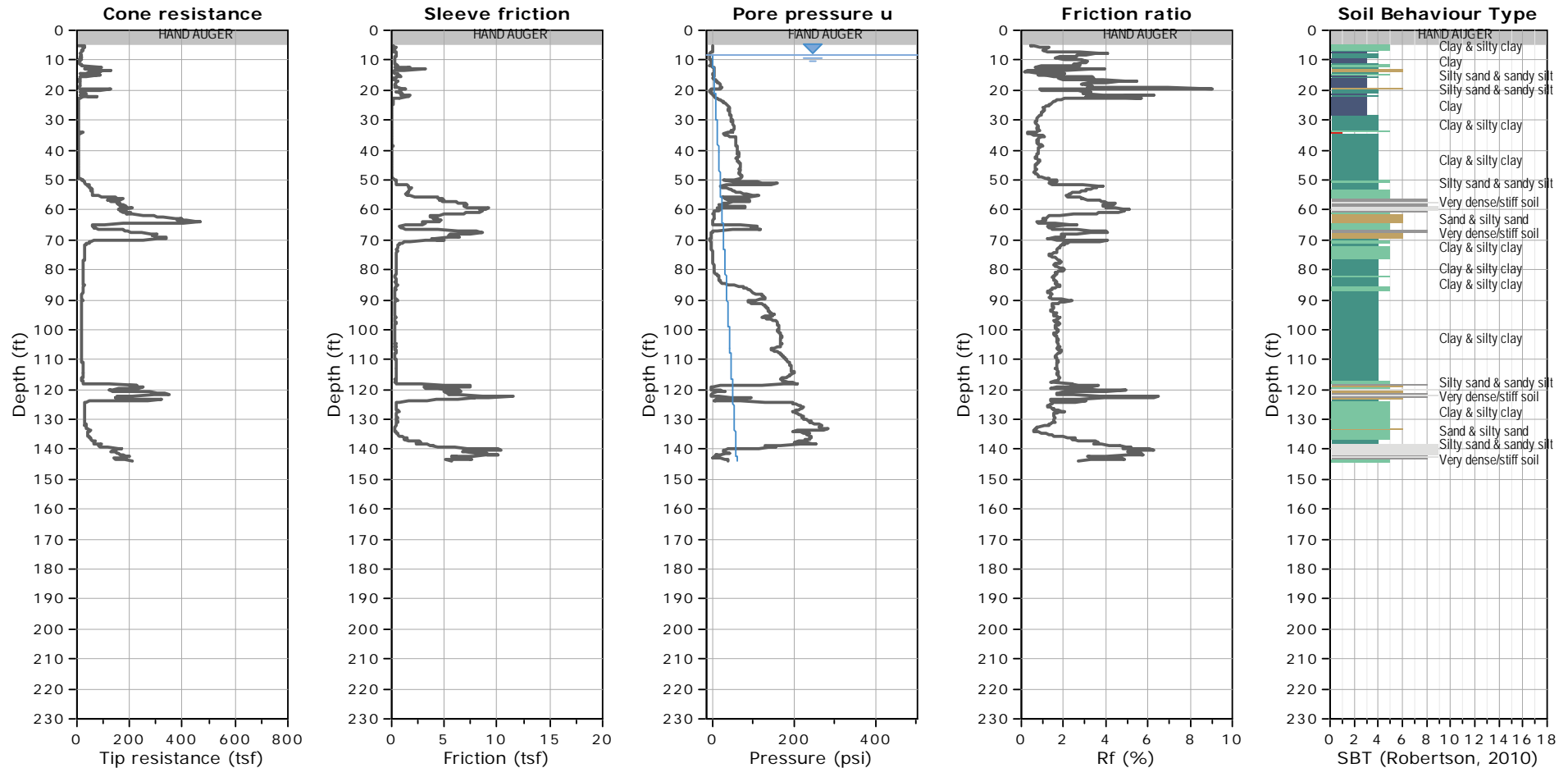
CPT: tfb1

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 143.70 ft, Date: 6/15/2018



## WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



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# Mayor ED 17-02 Priority permit

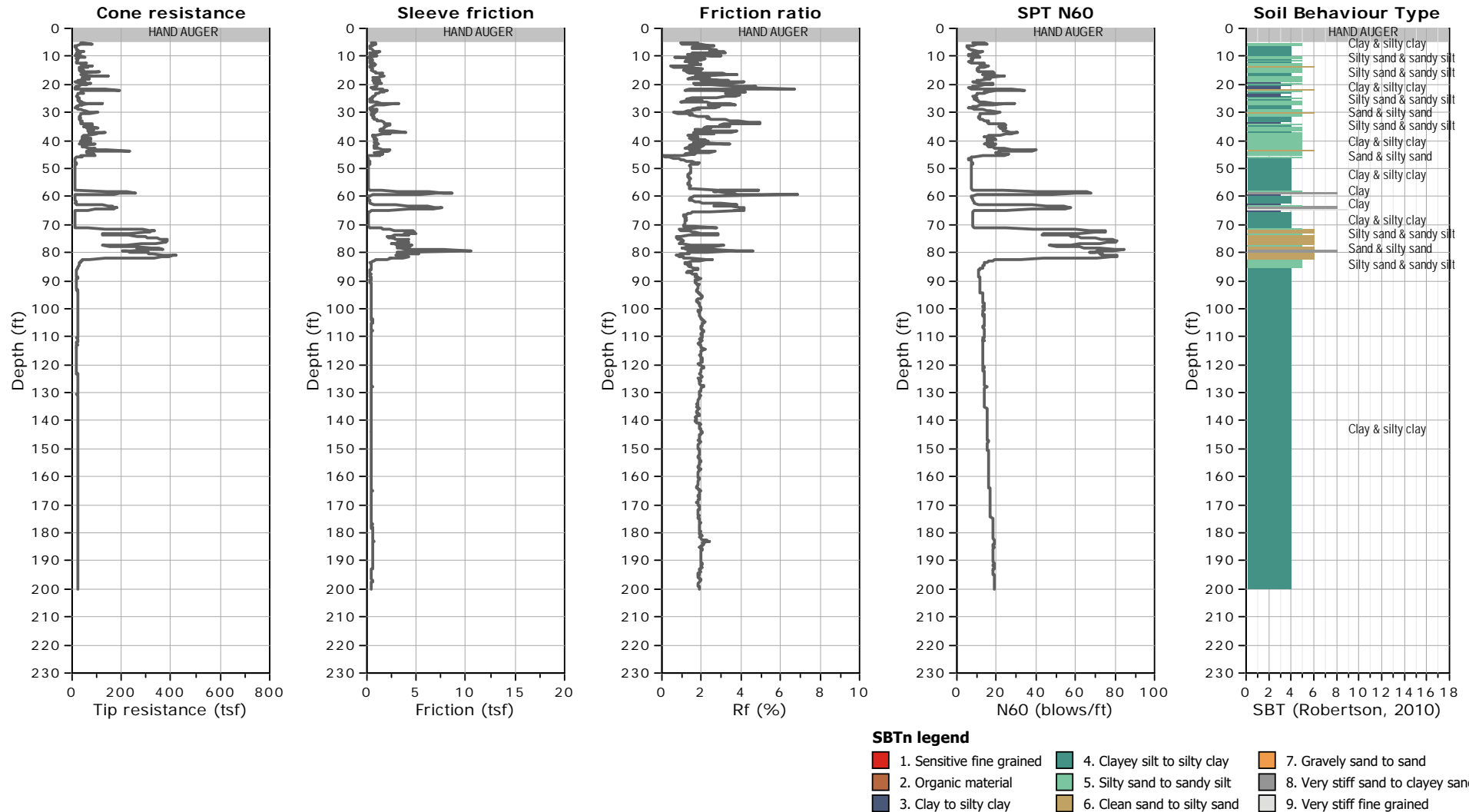
## CPT: TFB-3

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 200.13 ft, Date: 6/15/2018





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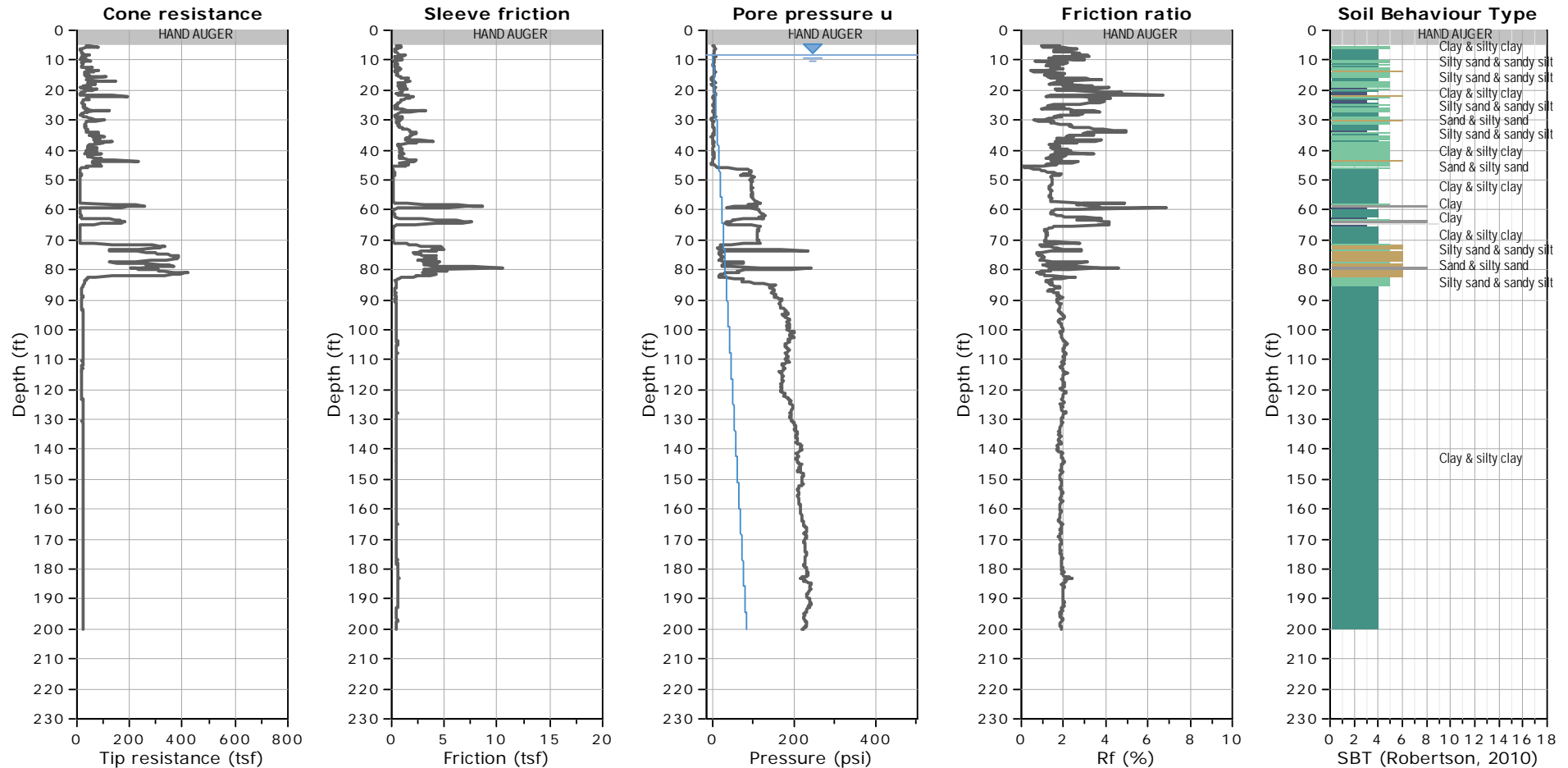
# Mayor ED 17-02 Priority permit CPT: TFB-3

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 200.13 ft, Date: 6/15/2018



### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

**WATER TABLE FOR ESTIMATING PURPOSES ONLY**



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# Mayor ED 17-02 Priority permit

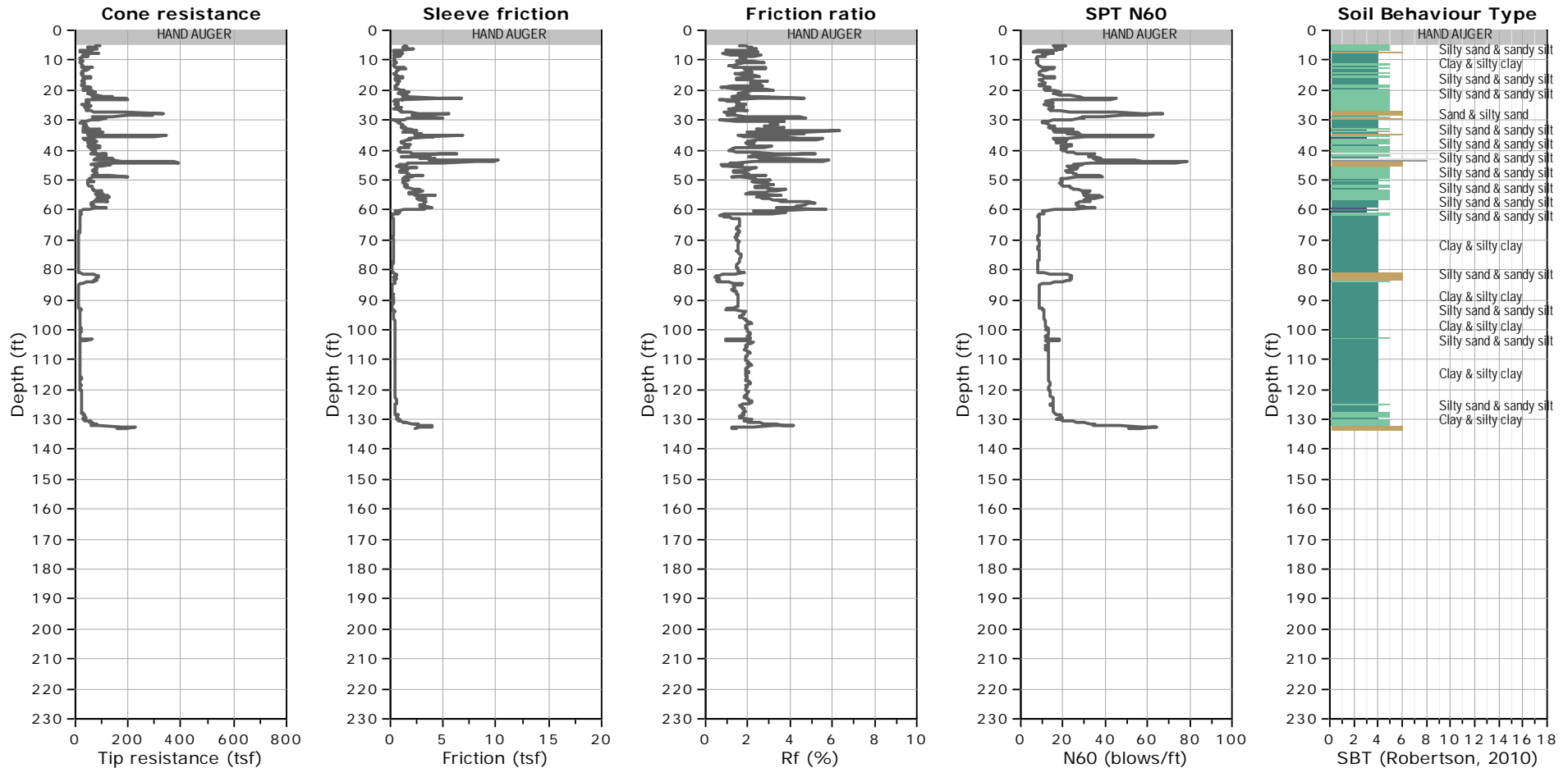
## CPT: TFB-4

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 133.20 ft, Date: 6/15/2018





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# Mayor ED 17-02 Priority permit

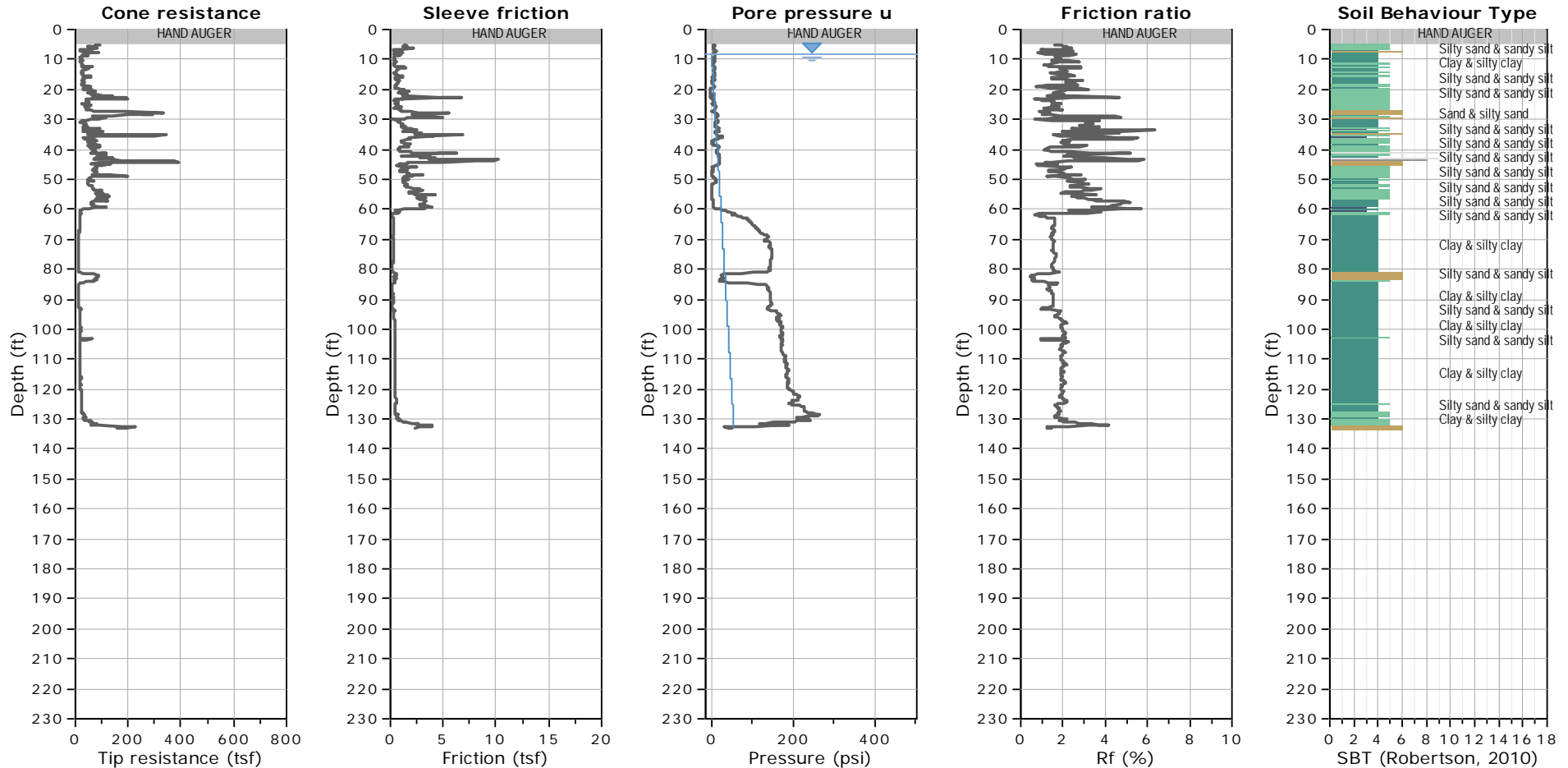
## CPT: TFB-4

CLIENT: LANGAN

SITE: MISSION ROCK DEVELOPMENT - SAN FRANCISCO, CA

Field Rep: PETER BRADY

Total depth: 133.20 ft, Date: 6/15/2018



### WATER TABLE FOR ESTIMATING PURPOSES ONLY

### SBTn legend

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

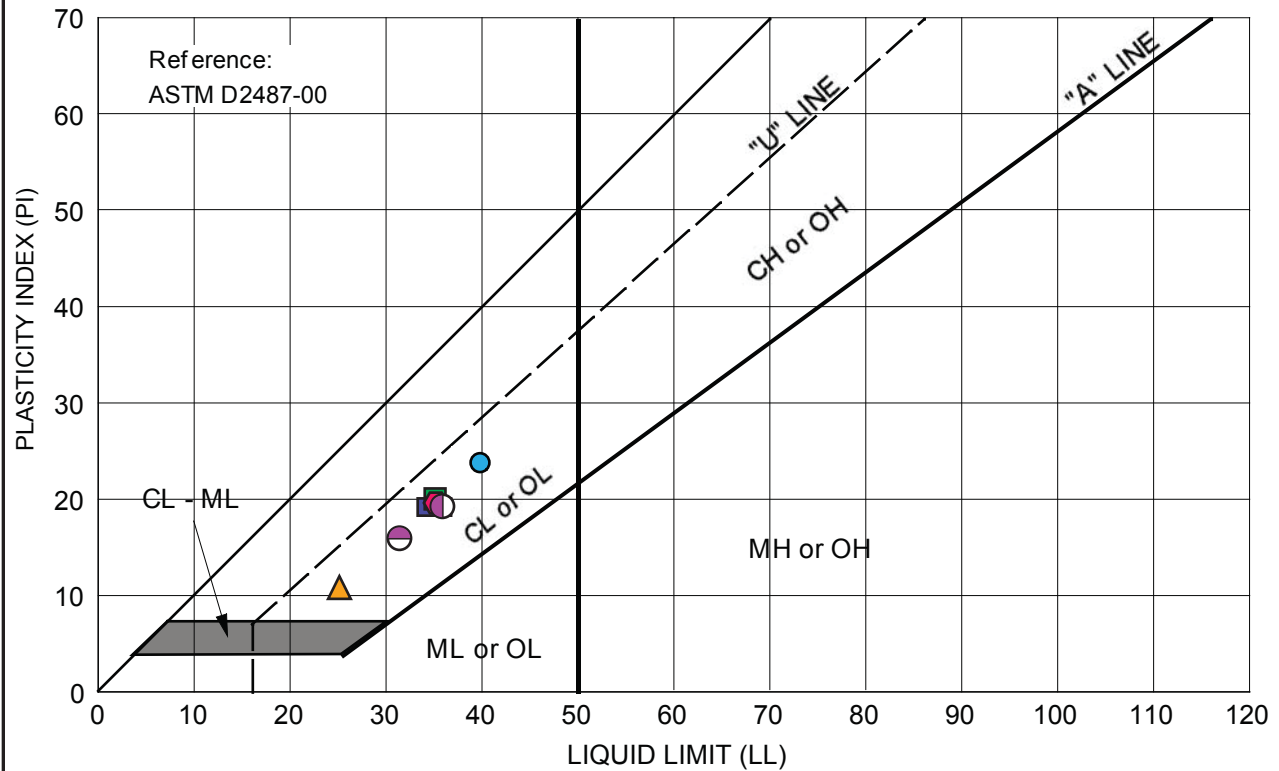
# ***Mayor ED 17-02 Priority permit***

## **APPENDIX C**

### **LABORATORY TEST RESULTS FROM CURRENT INVESTIGATION**



# Mayor ED 17-02 Priority permit



NP = Non Plastic

| Symbol | Source                              | Description and Classification               | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|-------------------------------------|--|------------------|------------------|----------------------|----------------------|
| ●      | BCPT-19 at 7.5 feet                 | CLAYEY GRAVEL with SAND (SC), dark blue-gray | 15.9             | 40               | 24                   | 36.7                 |
| ▲      | BCPT-21 at 11 feet                  | CLAYEY SAND with GRAVEL (SC), blue-gray      | 13.2             | 25               | 11                   | 14.7                 |
| ■      | BCPT-21 at 20 feet                  | CLAYEY GRAVEL with SAND (GC), dark blue-gray | 12.9             | 35               | 19                   | 17.2                 |
| ◆      | BCPT-22 at 11 feet                  | CLAYEY GRAVEL with SAND (GC), blue-gray      | 19.0             | 35               | 19                   | 13.7                 |
| ●      | BCPT-23 at 9.5 feet (top of sample) | SAND with CLAY and GRAVEL (SP-SC), brown     | 10.9             | 31               | 16                   | 8.2                  |
| ●      | BCPT-26 at 7 feet                   | SANDY CLAY with GAVEL (CL), gray-brown       | 22.4             | 36               | 19                   | 51.5                 |
| ■      | BCPT-27 at 9.5 feet                 | CLAYEY GRAVEL with SAND (GC), blue-gray      | 14.4             | 35               | 19                   | 24.1                 |

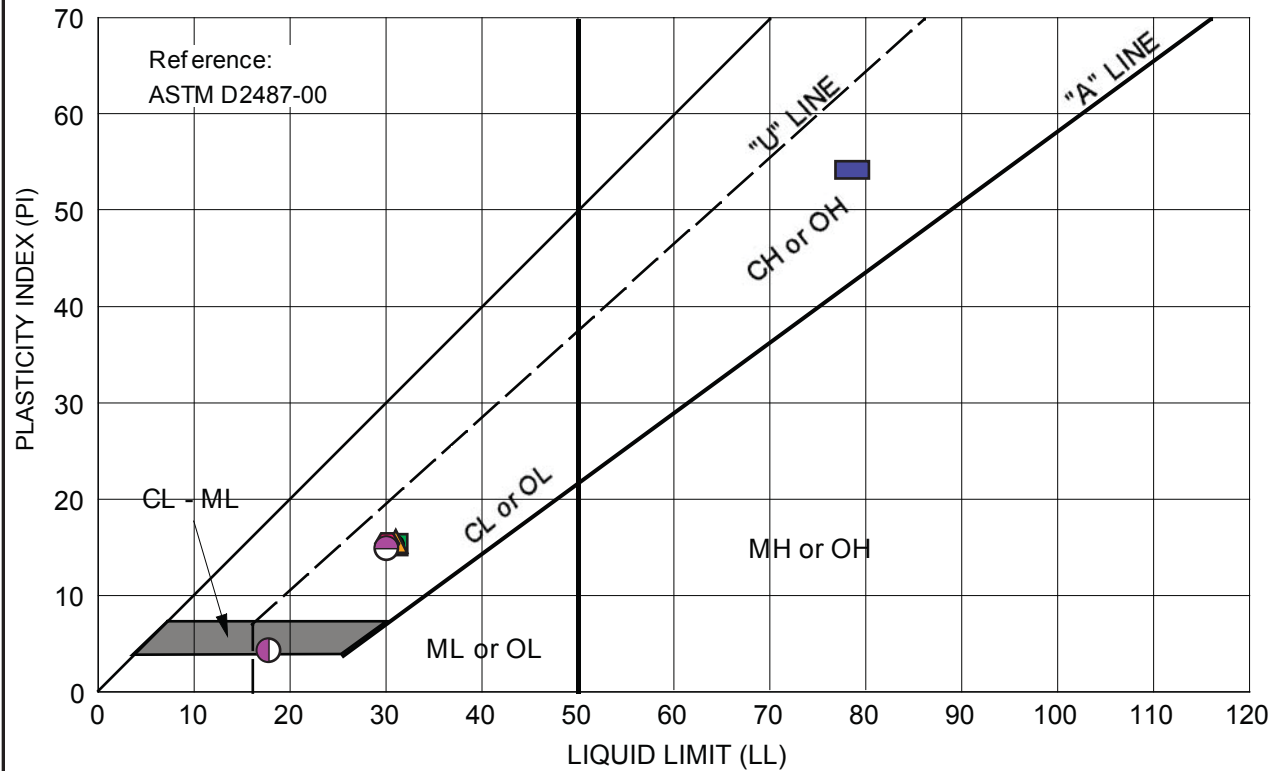
MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

**LANGAN**

## PLASTICITY CHART

Date 09/19/18 Project No. 750604203 Figure C-1

# Mayor ED 17-02 Priority permit



NP = Non Plastic

| Symbol | Source             | Description and Classification           | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|--------------------|--|------------------|------------------|----------------------|----------------------|
|        | BCPT-27 at 16 feet | CLAYEY SAND with GRAVEL (SC), gray-brown | 17.6             | 31               | 16                   | 27.1                 |
|        | BCPT-28 at 8 feet  | CLAYEY SAND (SC), gray-brown             | 13.4             | 31               | 16                   | 19.4                 |
|        | BCPT-32 at 10 feet | CLAYEY GRAVEL with SAND (GC), blue-gray  | 13.1             | 31               | 16                   | 12.1                 |
|        | BCPT-32 at 13 feet | CLAYEY GRAVEL with SAND (GC), blue-gray  | 12.1             | 30               | 16                   | 23.2                 |
|        | BCPT-33 at 17 feet | CLAYEY SAND with GRAVEL (SC), blue-gray  | 20.5             | 30               | 16                   | 25.1                 |
|        | BCPT-34 at 6 feet  | SILTY SAND (SM), gray-brown              | 10.6             | 17               | 6                    | 29.1                 |
|        | BCPT-34 at 16 feet | CLAYEY GRAVEL with SAND (GC), blue-gray  | 21.9             | 78               | 54                   | 16.3                 |

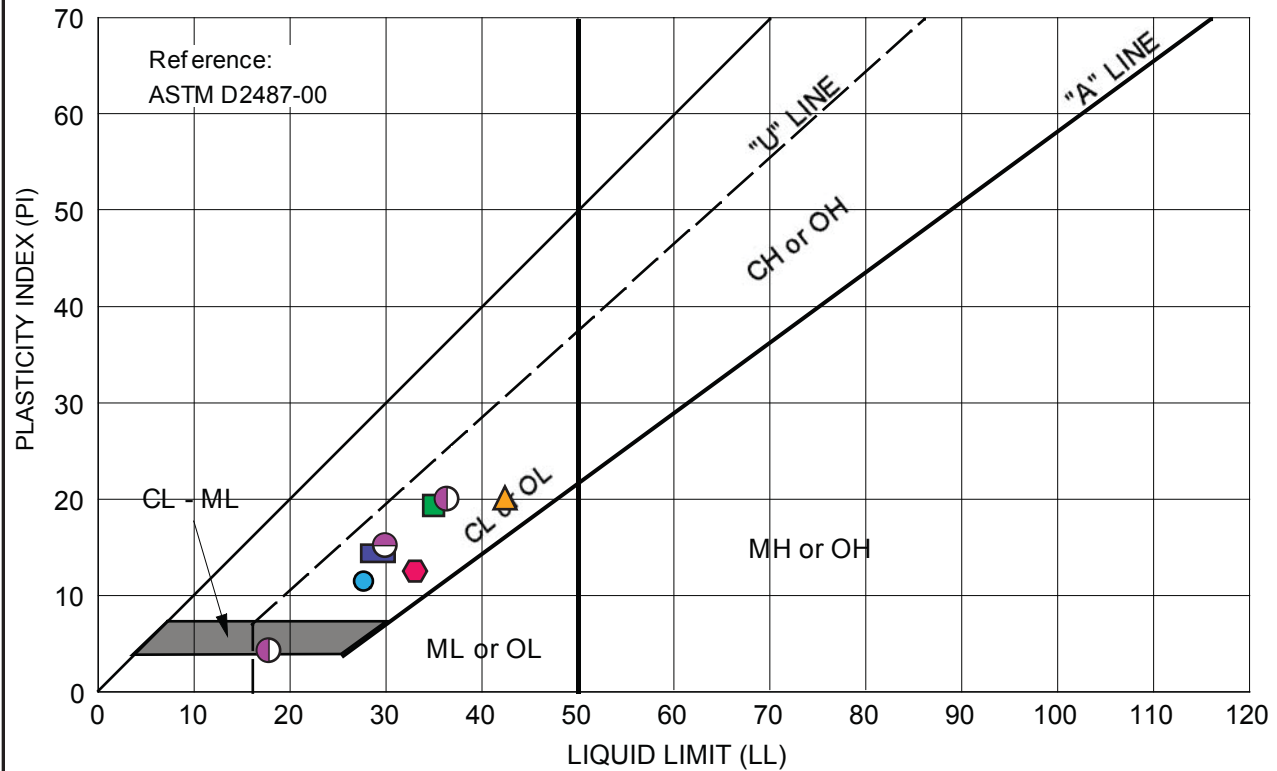
**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

**LANGAN**

## PLASTICITY CHART

Date 09/19/18 Project No. 750604203 Figure C-2

# Mayor ED 17-02 Priority permit



NP = Non Plastic

| Symbol | Source             | Description and Classification               | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|--------------------|--|------------------|------------------|----------------------|----------------------|
|        | BSC-2 at 8.5 feet  | CLAYEY SAND with GRAVEL (SC), dark red-brown | 10.0             | 28               | 11                   | 16.6                 |
|        | BSC-2 at 15 feet   | CLAYEY GRAVEL with SAND (GC), blue-gray      | 17.0             | 43               | 20                   | 18.4                 |
|        | BSC-2 at 20 feet   | CLAYEY GRAVEL with SAND (GC), blue-gray      | 14.1             | 35               | 19                   | 20.7                 |
|        | BSC-3 at 7 feet    | CLAYEY SAND with GRAVEL (SC), dark blue-gray | 14.2             | 32               | 12                   | 19.3                 |
|        | BSC-3 at 27 feet   | CLAYEY GRAVEL with SAND (GC), dark blue-gray | 10.4             | 30               | 15                   | 16.0                 |
|        | BSC-23 at 9.5 feet | CLAYEY GRAVEL with SAND (GC), dark blue-gray | 17.9             | 36               | 20                   | 23.6                 |
|        | BSWL-14 at 10 feet | CLAYEY GRAVEL with SAND (GC), dark blue-gray | 12.8             | 25               | 14                   | 15.2                 |

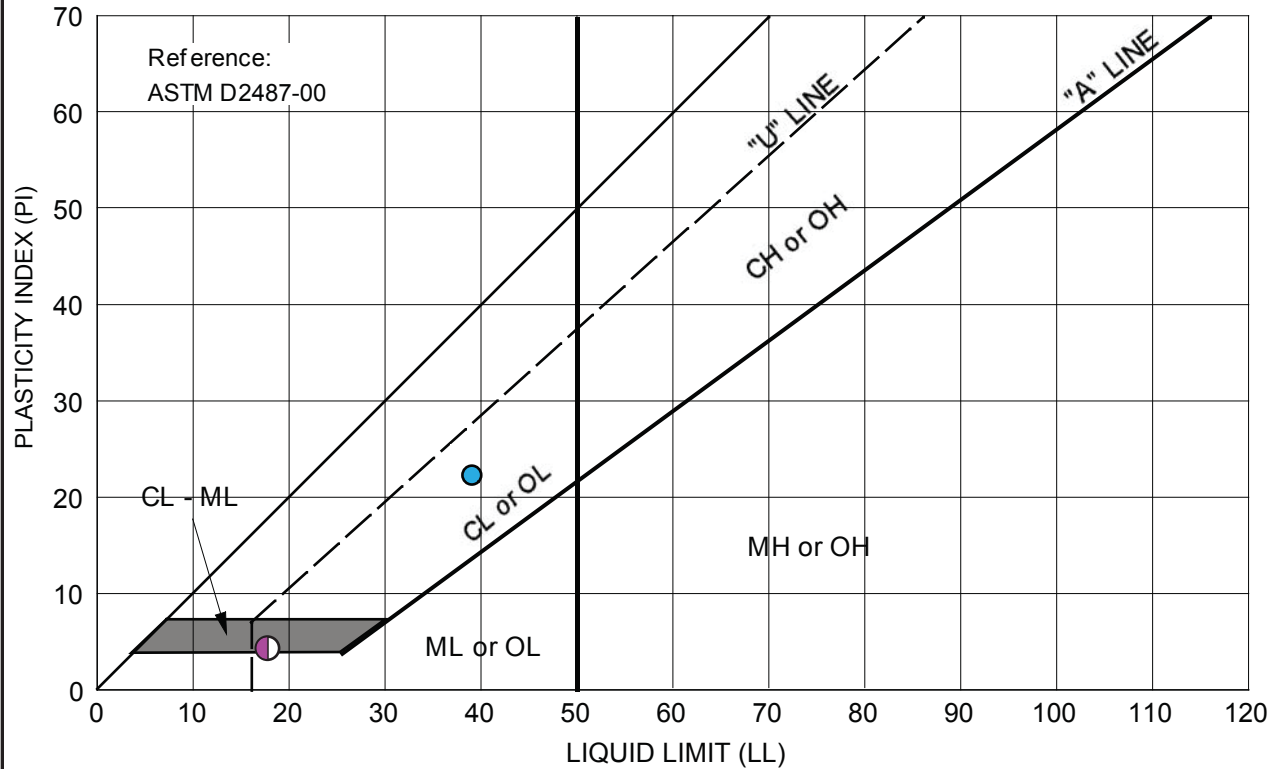
MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

**LANGAN**

## PLASTICITY CHART

Date 09/19/18 Project No. 750604203 Figure C-3

# Mayor ED 17-02 Priority permit



NP = Non Plastic

| Symbol | Source             | Description and Classification                      | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|--------------------|---|------------------|------------------|----------------------|----------------------|
| ●      | BSWL-14 at 22 feet | SANDY CLAY (CL), mottled gray-brown/olive dark gray | 22.1             | 39               | 22                   | 50.9                 |

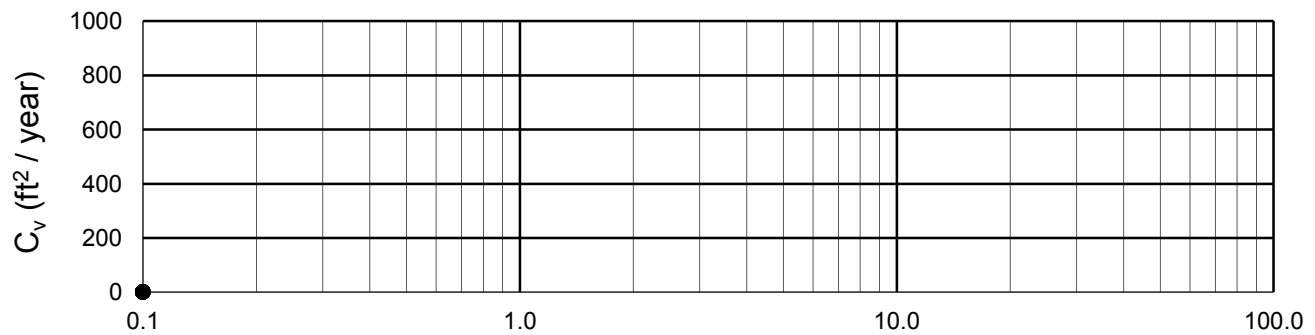
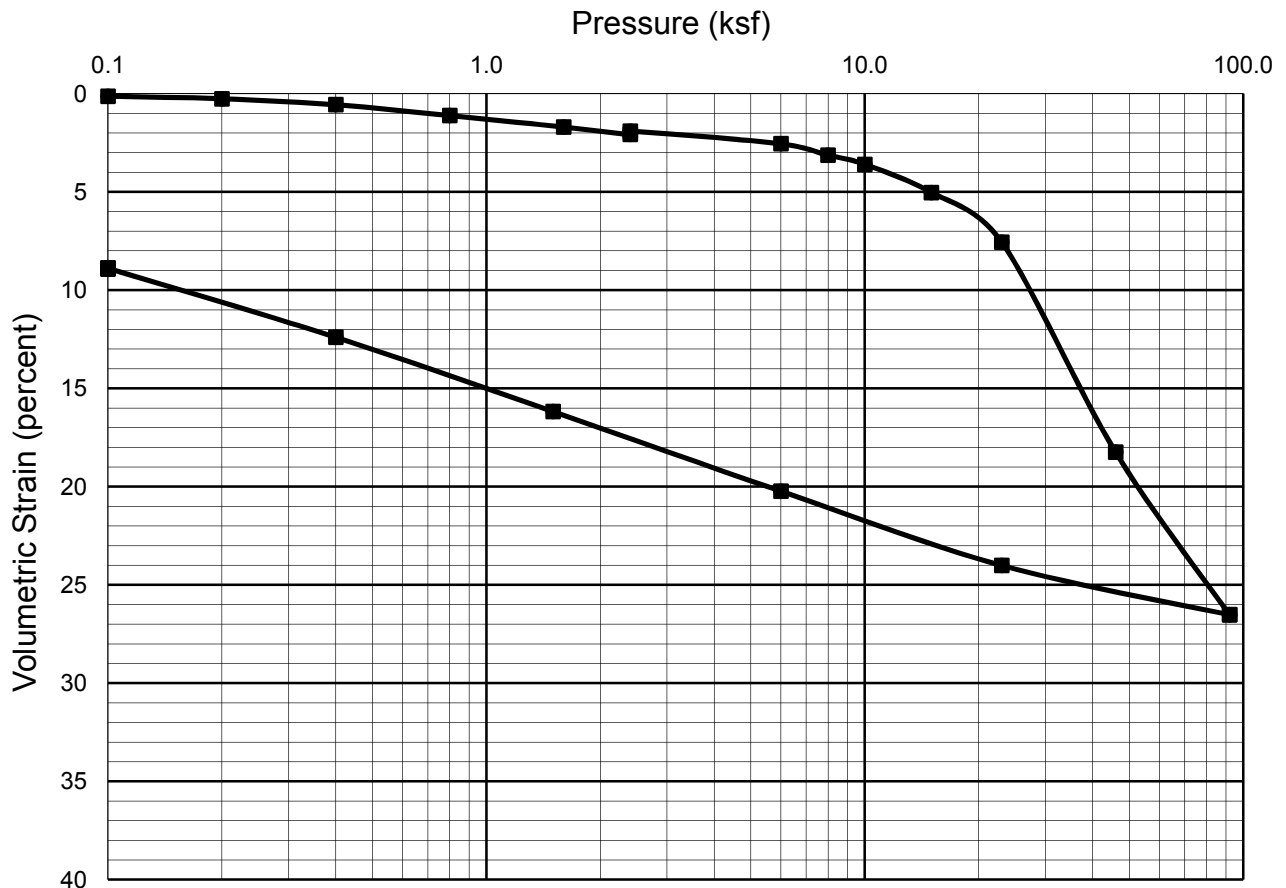
MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

**LANGAN**

**PLASTICITY CHART**

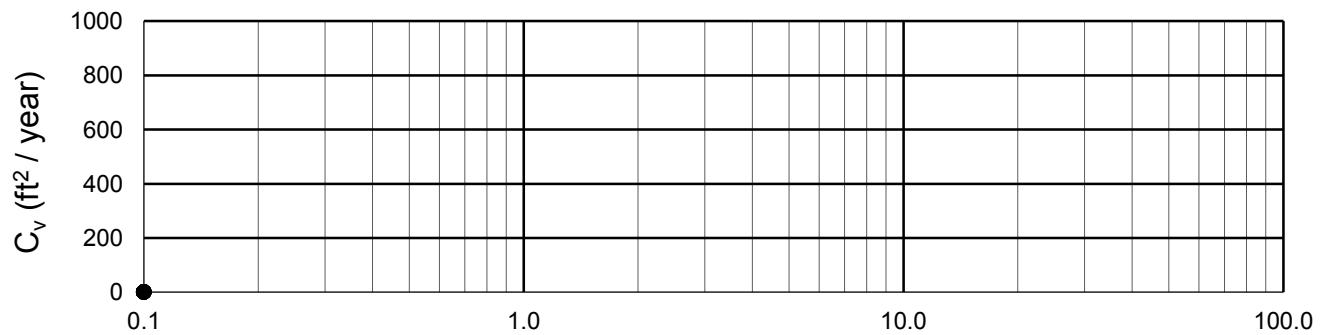
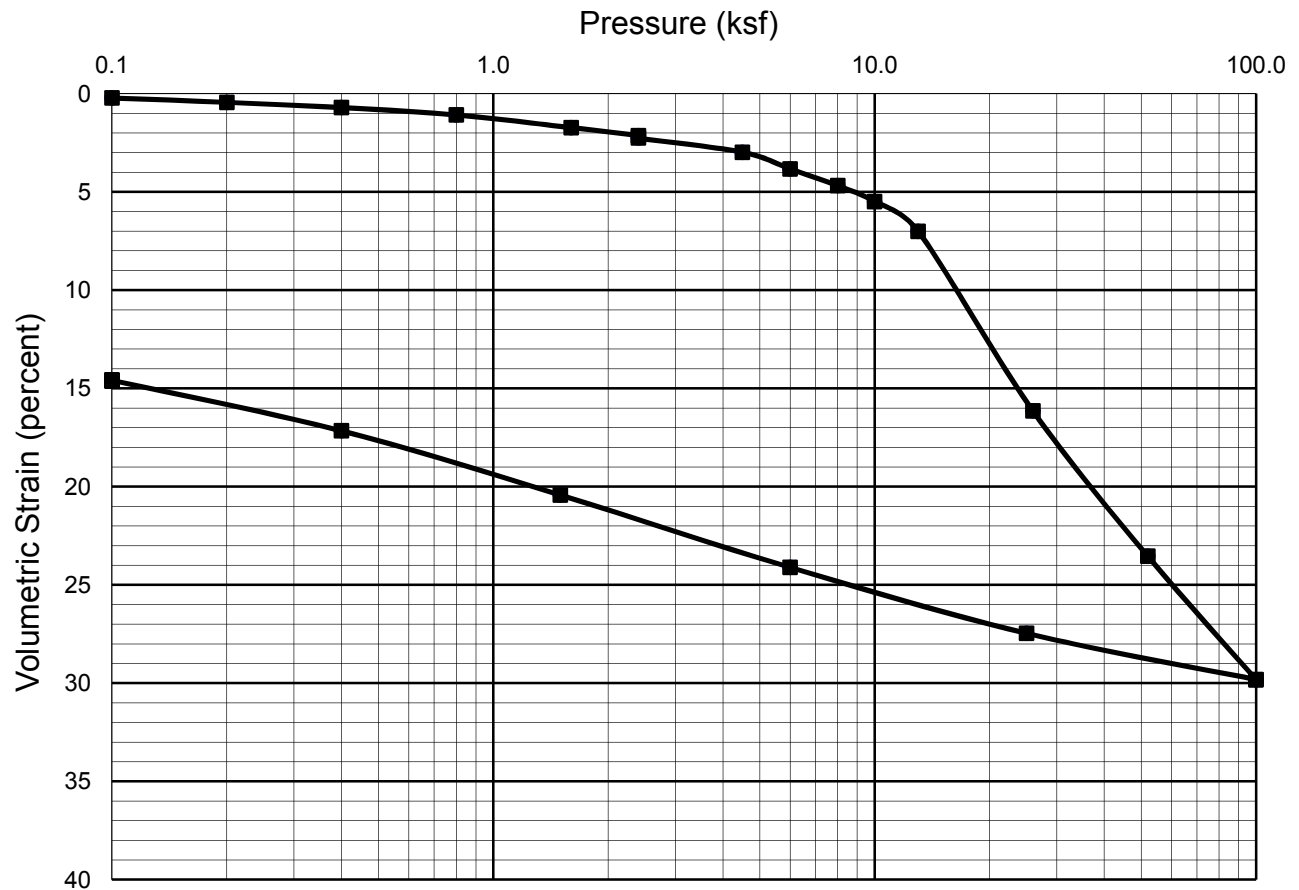
Date 09/19/18 Project No. 750604203 Figure C-4

# Mayor ED 17-02 Priority permit



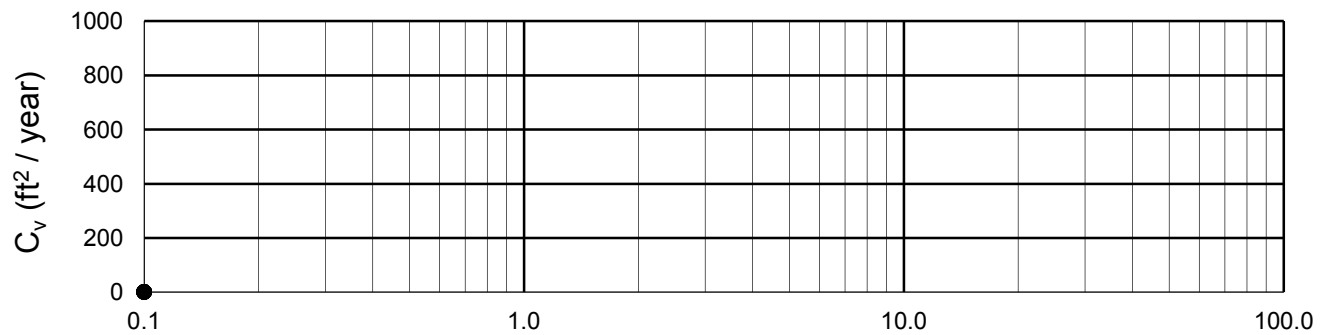
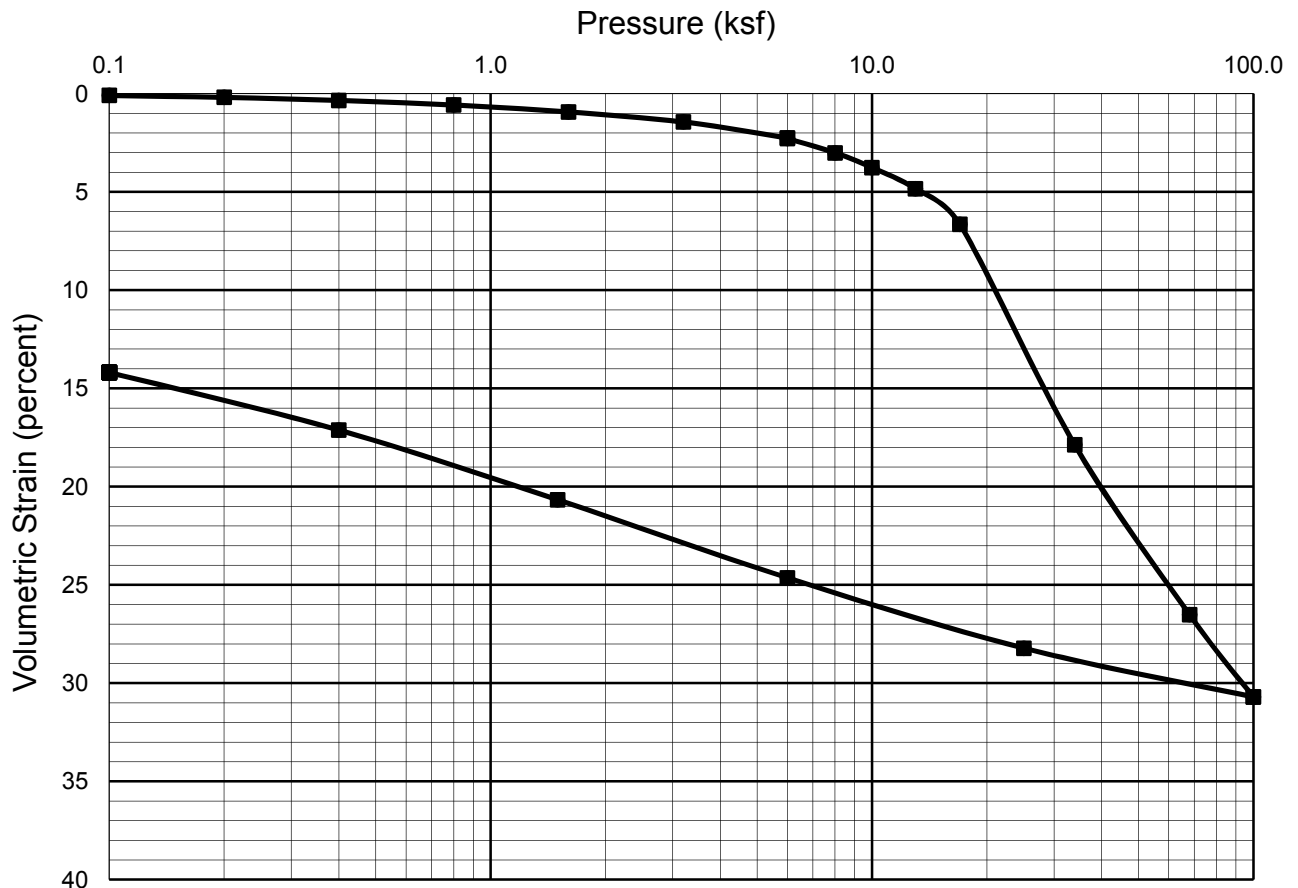
|   |      |             |             |                           |                |                        |     |                |      |           |
|---|------|-------------|-------------|---------------------------|----------------|------------------------|-----|----------------|------|-----------|
| Sampler Type: Pitcher Tube                                    |      |             |             | Condition                 |                | Before Test            |     | After Test     |      |           |
| Diameter (in)   | 2.42 | Height (in) | 1.00        | Water Content             | w <sub>o</sub> | 43.5                   | %   | w <sub>f</sub> | 37.1 | %         |
| Overburden Pressure, p <sub>o</sub>                           |      | 10,660      | psf         | Void Ratio                | e <sub>o</sub> | 1.19                   |     | e <sub>f</sub> | 1.00 |           |
| Preconsol. Pressure, p <sub>c</sub>                           |      | 21,000      | psf         | Saturation                | S <sub>o</sub> | 98                     | %   | S <sub>f</sub> | 100  | %         |
| Compression Ratio, C <sub>ec</sub>                            |      | 0.37        |             | Dry Density               | γ <sub>d</sub> | 77                     | pcf | γ <sub>d</sub> | 84   | pcf       |
| LL  |      | --          | PL          | --                        | PI             | --                     |     | G <sub>s</sub> | 2.70 | (assumed) |
| Classification CLAY (CH), olive to olive-gray                 |      |             |             | Source                    |                | BSWL337-13 at 190 feet |     |                |      |           |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |             |             | CONSOLIDATION TEST REPORT |                |                        |     |                |      |           |
| LANGAN  |      |             |             |                           |                |                        |     |                |      |           |
| Date  |      | 07/24/18    | Project No. |                           | 750604203      | Figure C-5             |     |                |      |           |

# Mayor ED 17-02 Priority permit



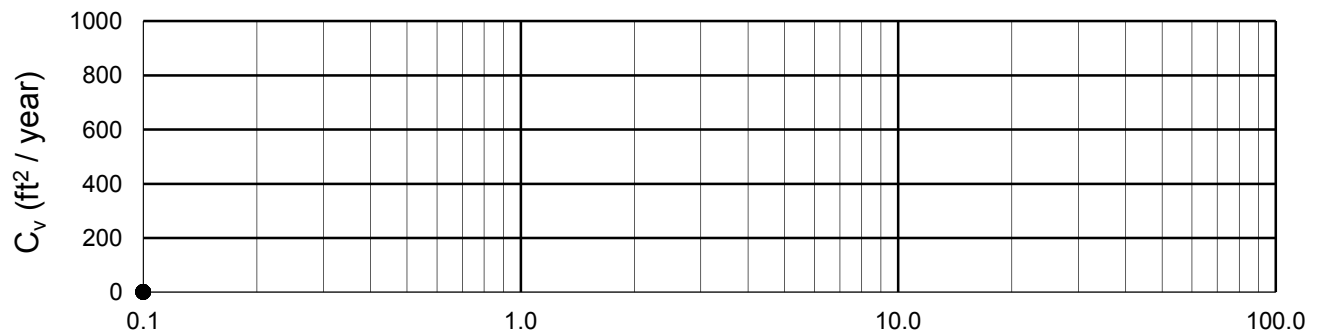
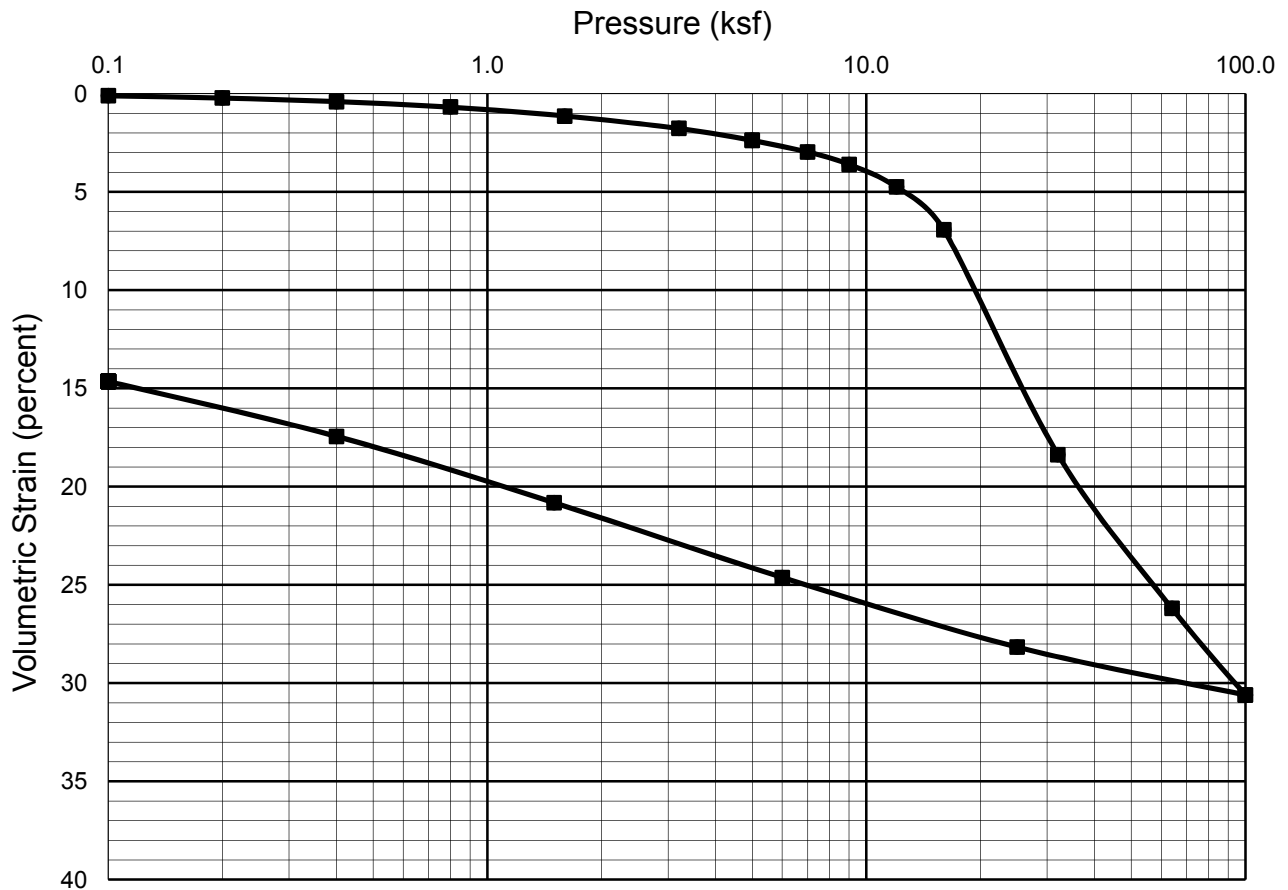
|   |      |             |             |                           |                |                        |        |                |      |     |   |
|---|------|-------------|-------------|---------------------------|----------------|------------------------|--------|----------------|------|-----|---|
| Sampler Type: Pitcher Tube                                    |      |             |             | Condition                 |                | Before Test            |        | After Test     |      |     |   |
| Diameter (in)   | 2.42 | Height (in) | 1.00        | Water Content             | w <sub>o</sub> | 45.4                   | %      | w <sub>f</sub> | 34.4 | %   |   |
| Overburden Pressure, p <sub>o</sub>                           |      | 6,500       | psf         | Void Ratio                | e <sub>o</sub> | 1.26                   |        | e <sub>f</sub> | 0.93 |     |   |
| Preconsol. Pressure, p <sub>c</sub>                           |      | 12,000      | psf         | Saturation                | S <sub>o</sub> | 98                     | %      | S <sub>f</sub> | 100  |     | % |
| Compression Ratio, C <sub>ec</sub>                            |      | 0.31        |             | Dry Density               | γ <sub>d</sub> | 75                     | pcf    | γ <sub>d</sub> | 87   | pcf |   |
| LL  | --   | PL          | --          | PI                        | --             | G <sub>s</sub>         | 2.70   | (assumed)      |      |     |   |
| Classification CLAY (CH), olive                               |      |             |             | Source                    |                | BSWL337-14 at 130 feet |        |                |      |     |   |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |             |             | CONSOLIDATION TEST REPORT |                |                        |        |                |      |     |   |
| LANGAN  |      |             |             |                           |                |                        |        |                |      |     |   |
| Date  |      | 07/24/18    | Project No. |                           | 750604203      |                        | Figure |                | C-6  |     |   |

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|   |      |             |      |               |                               |             |     |                |                |      |           |
|---|------|-------------|------|---------------|-------------------------------|-------------|-----|----------------|----------------|------|-----------|
| Sampler Type: Pitcher Tube                                    |      |             |      | Condition     |                               | Before Test |     | After Test     |                |      |           |
| Diameter (in)   | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>                | 47.7        | %   | w <sub>f</sub> | 35.9           | %    |           |
| Overburden Pressure, p <sub>o</sub>                           |      | 7,955       | psf  | Void Ratio    | e <sub>o</sub>                | 1.28        |     | e <sub>f</sub> | 0.96           |      |           |
| Preconsol. Pressure, p <sub>c</sub>                           |      | 14,100      | psf  | Saturation    | S <sub>o</sub>                | 101         | %   | S <sub>f</sub> | 101            |      | %         |
| Compression Ratio, C <sub>ec</sub>                            |      | 0.40        |      | Dry Density   | γ <sub>d</sub>                | 74          | pcf | γ <sub>d</sub> | 86             |      | pcf       |
| LL  |      | --          | PL   |               | --                            | PI          |     | --             | G <sub>s</sub> | 2.70 | (assumed) |
| Classification CLAY (CH), olive-gray                          |      |             |      |               | Source BSWL337-15 at 145 feet |             |     |                |                |      |           |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT     |             |     |                |                |      |           |
| LANGAN  |      |             |      |               |                               |             |     |                |                |      |           |
| Date  |      | 07/25/18    |      | Project No.   |                               | 750604203   |     | Figure C-7     |                |      |           |

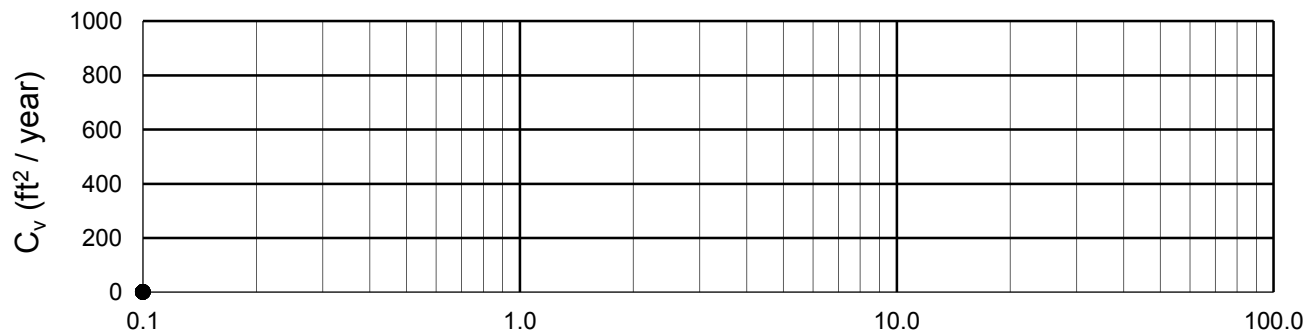
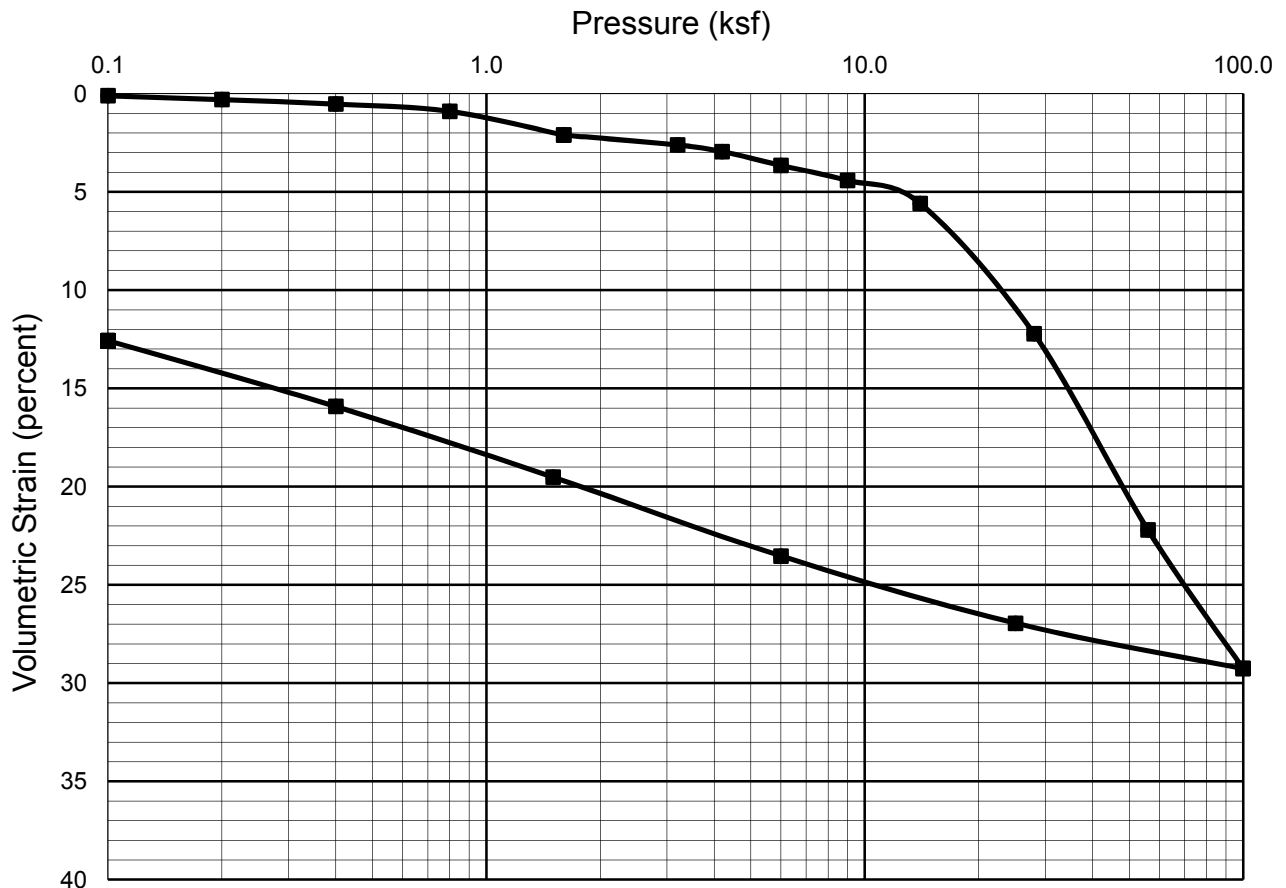
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|   |  |          |             |             |      |                               |  |                |            |    |                |                               |
|---|--|----------|-------------|-------------|------|-------------------------------|--|----------------|------------|----|----------------|-------------------------------|
| Sampler Type: Pitcher Tube                                    |  |          |             | Condition   |      | Before Test                   |  |                | After Test |    |                |                               |
| Diameter (in)   |  | 2.42     | Height (in) |             | 1.00 | Water Content                 |  | w <sub>o</sub> | 47.1 %     |    | w <sub>f</sub> | 34.8 %                        |
| Overburden Pressure, p <sub>o</sub>                           |  |          | 7,700       |             | psf  | Void Ratio                    |  | e <sub>o</sub> | 1.26       |    | e <sub>f</sub> | 0.93                          |
| Preconsol. Pressure, p <sub>c</sub>                           |  |          | 14,000      |             | psf  | Saturation                    |  | S <sub>o</sub> | 101 %      |    | S <sub>f</sub> | 101 %                         |
| Compression Ratio, C <sub>ec</sub>                            |  |          | 0.36        |             |      | Dry Density                   |  | γ <sub>d</sub> | 75 pcf     |    | γ <sub>d</sub> | 87 pcf                        |
| LL  |  | --       |             | PL          |      | --                            |  | PI             |            | -- |                | G <sub>s</sub> 2.70 (assumed) |
| Classification CLAY (CH), olive-gray                          |  |          |             |             |      | Source BSWL337-16 at 130 feet |  |                |            |    |                |                               |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |  |          |             |             |      | CONSOLIDATION TEST REPORT     |  |                |            |    |                |                               |
| LANGAN  |  |          |             |             |      |                               |  |                |            |    |                |                               |
| Date  |  | 07/26/18 |             | Project No. |      | 750604203                     |  |                | Figure C-8 |    |                |                               |

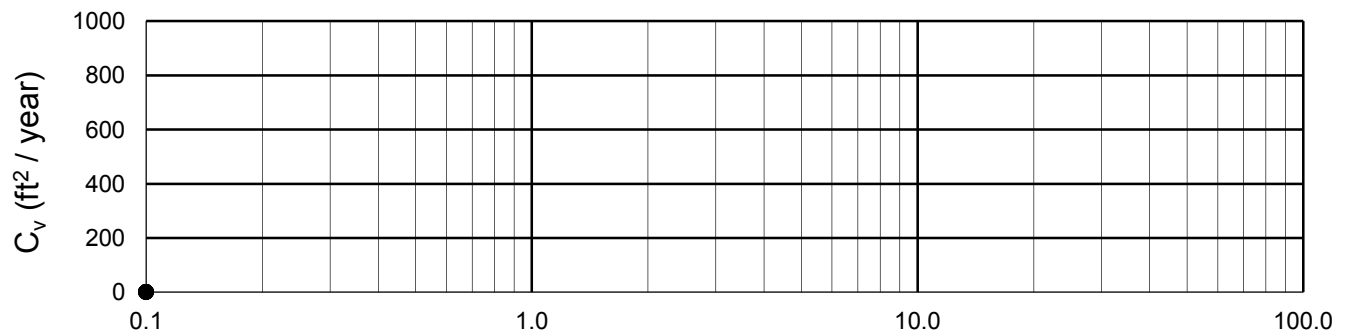
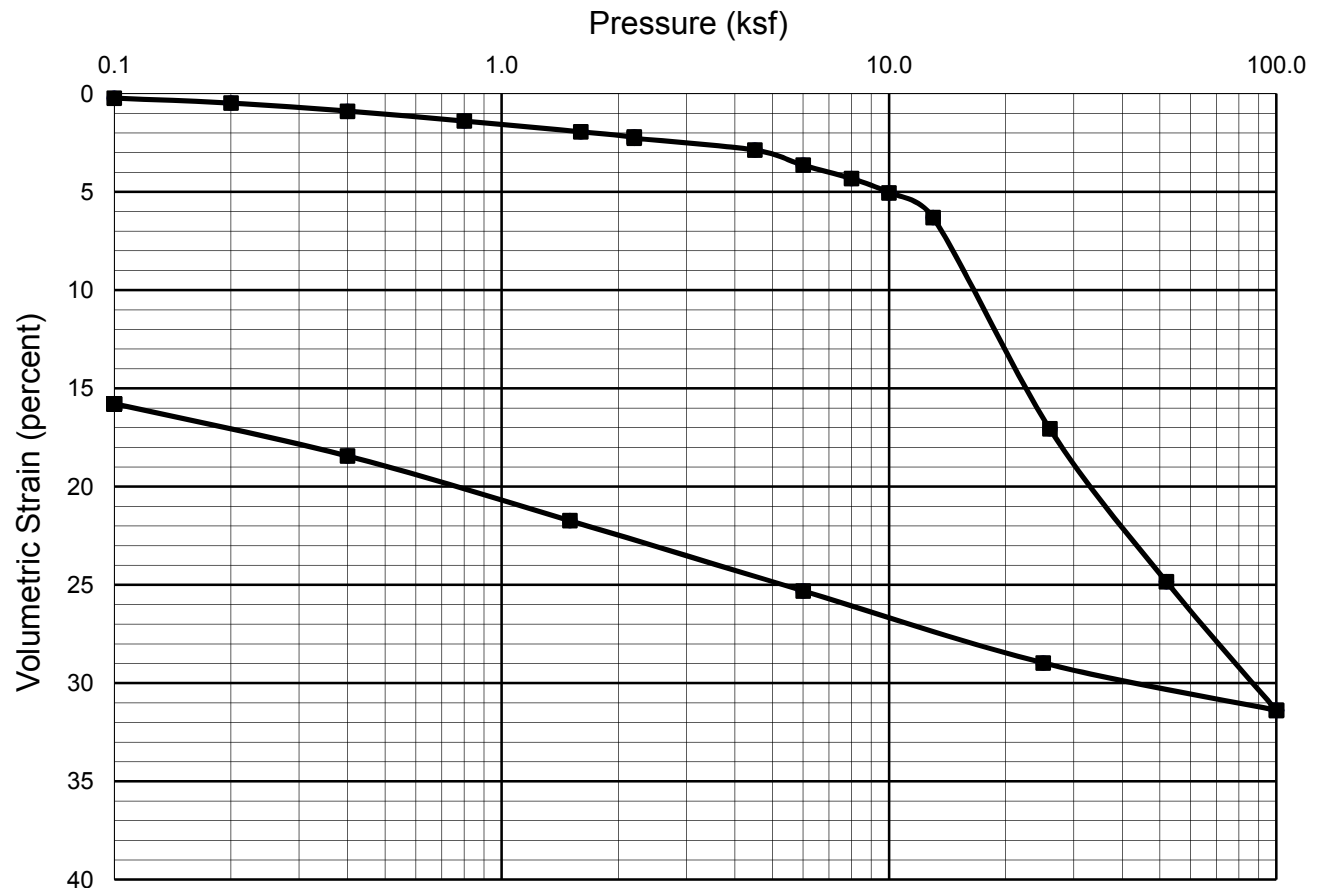


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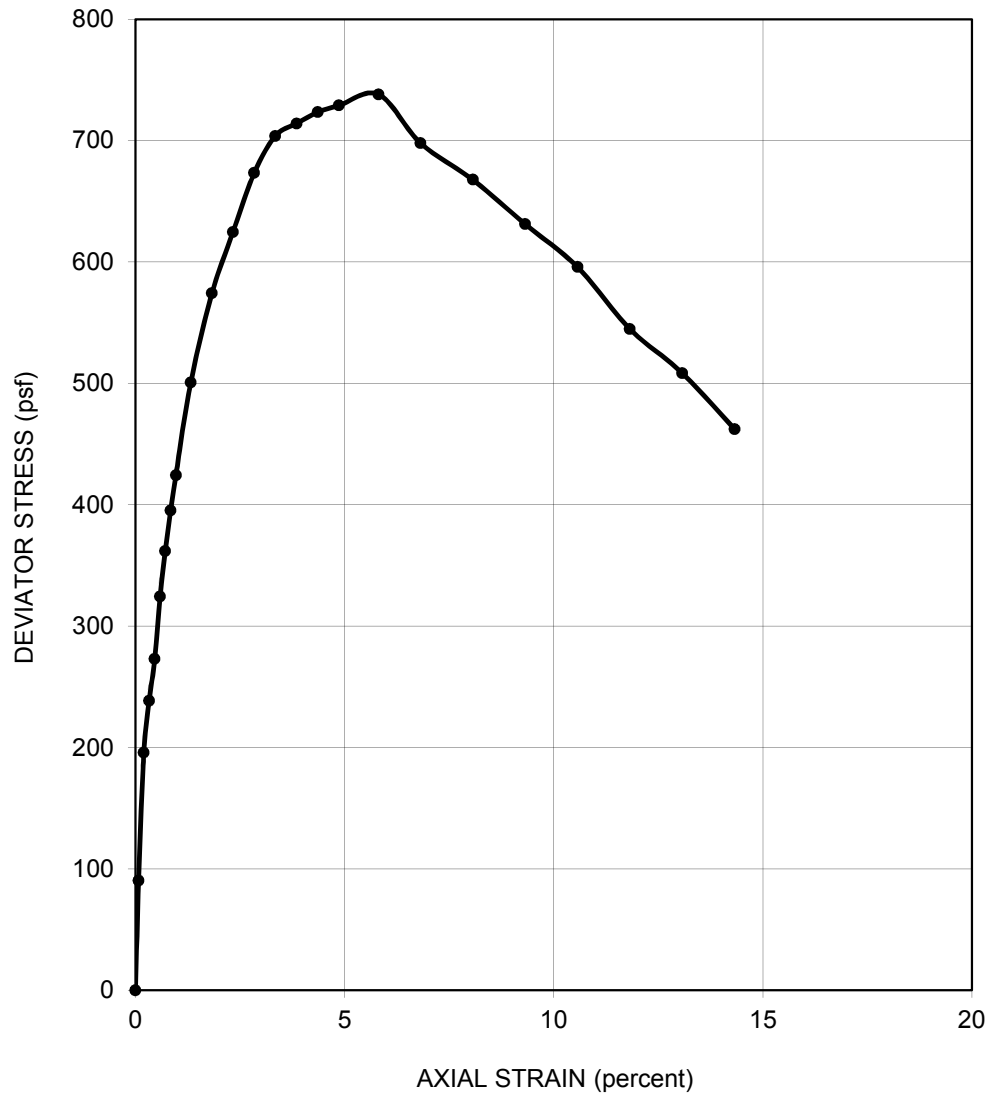


|   |  |          |             |             |             |                           |                |                        |                |   |                |           |     |
|---|--|----------|-------------|-------------|-------------|---------------------------|----------------|------------------------|----------------|---|----------------|-----------|-----|
| Sampler Type: Pitcher Tube                                    |  |          |             | Condition   |             | Before Test               |                |                        | After Test     |   |                |           |     |
| Diameter (in)   |  | 2.42     | Height (in) |             | 1.00        | Water Content             |                | w <sub>o</sub>         | 49.9           | % | w <sub>f</sub> | 39.3      | %   |
| Overburden Pressure, p <sub>o</sub>                           |  |          | 10,150      | psf         | Void Ratio  |                           | e <sub>o</sub> | 1.35                   |                |   | e <sub>f</sub> | 1.06      |     |
| Preconsol. Pressure, p <sub>c</sub>                           |  |          | 18,400      | psf         | Saturation  |                           | S <sub>o</sub> | 100                    | %              |   | S <sub>f</sub> | 100       | %   |
| Compression Ratio, C <sub>ec</sub>                            |  |          | 0.35        |             | Dry Density |                           | γ <sub>d</sub> | 72                     | pcf            |   | γ <sub>d</sub> | 82        | pcf |
| LL  |  | --       | PL          |             | --          | PI                        |                | --                     | G <sub>s</sub> |   | 2.70           | (assumed) |     |
| Classification CLAY (CL), dark gray olive-gray                |  |          |             |             |             | Source                    |                | BSWL337-16 at 205 feet |                |   |                |           |     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |  |          |             |             |             | CONSOLIDATION TEST REPORT |                |                        |                |   |                |           |     |
| LANGAN  |  |          |             |             |             |                           |                |                        |                |   |                |           |     |
| Date  |  | 07/26/18 |             | Project No. |             | 750604203                 |                | Figure C-9             |                |   |                |           |     |

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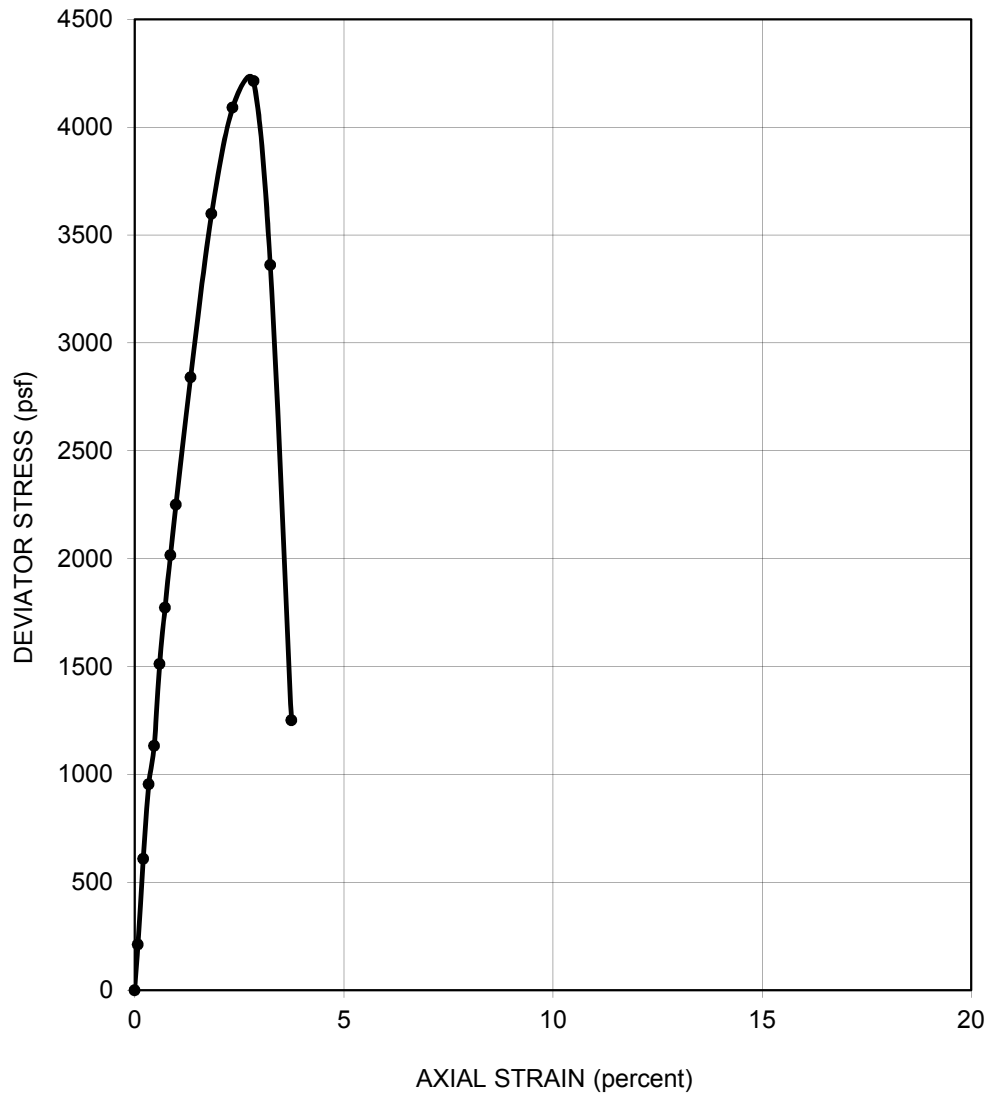


|   |            |             |      |                                  |              |             |                |
|---|------------|-------------|------|----------------------------------|--------------|-------------|----------------|
| Sampler Type: Pitcher Tube                                    |            | Condition   |      | Before Test                      |              | After Test  |                |
| Diameter (in)   | 2.42       | Height (in) | 1.00 | Water Content                    | $w_o$ 45.9 % | $w_f$       | 32.8 %         |
| Overburden Pressure, $p_o$                                    | 5,800 psf  | Void Ratio  |      | $e_o$                            | 1.24         | $e_f$       | 0.88           |
| Preconsol. Pressure, $p_c$                                    | 12,500 psf | Saturation  |      | $S_o$                            | 100 %        | $S_f$       | 100 %          |
| Compression Ratio, $C_{ec}$                                   | 0.32       | Dry Density |      | $\gamma_d$                       | 75 pcf       | $\gamma_d$  | 90 pcf         |
| LL  | --         | PL          | --   | PI                               | --           | $G_s$       | 2.70 (assumed) |
| Classification CLAY (CH), olive-gray                          |            |             |      | Source BSWL337-17 at 115 feet    |              |             |                |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |            |             |      | <b>CONSOLIDATION TEST REPORT</b> |              |             |                |
| <b>LANGAN</b>   |            |             |      | Date                             | 07/24/18     | Project No. | 750604203      |
|   |            |             |      | Figure                           |              | C-10        |                |



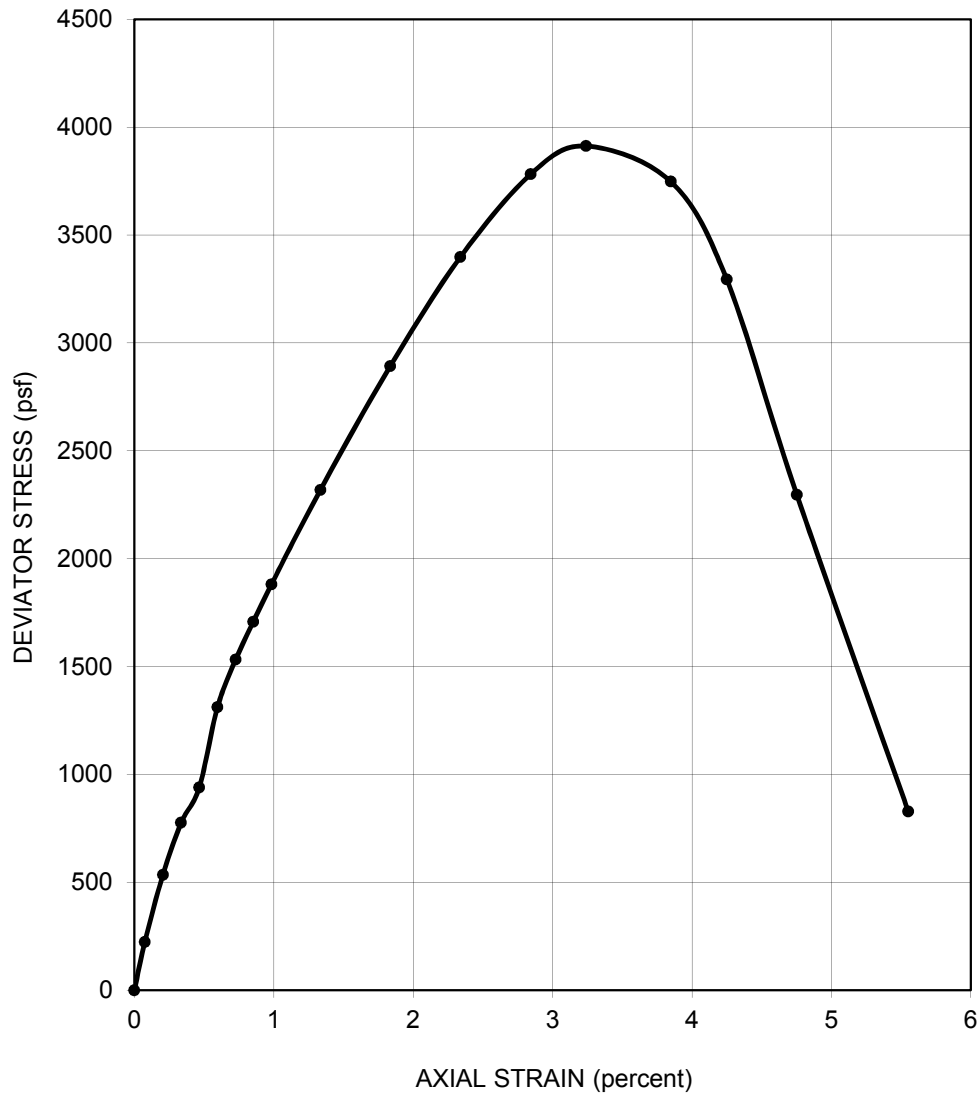
|   |                   |   |                                   |
|---|-------------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood                                |                   | SHEAR STRENGTH 370 psf                                |                                   |
| DIAMETER (in.) 2.43   | HEIGHT (in.) 5.75 | STRAIN AT FAILURE 5.8 %                               |                                   |
| MOISTURE CONTENT 60.1 %                                       |                   | CONFINING PRESSURE 2,500 psf                          |                                   |
| DRY DENSITY 61 pcf  |                   | STRAIN RATE 0.75 % / min                              |                                   |
| DESCRIPTION CLAY (CH), dark gray                              |                   |   | SOURCE BSWL337-13 at 25 feet      |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                   | Date 09/19/18   | Project No. 750604203 Figure C-11 |

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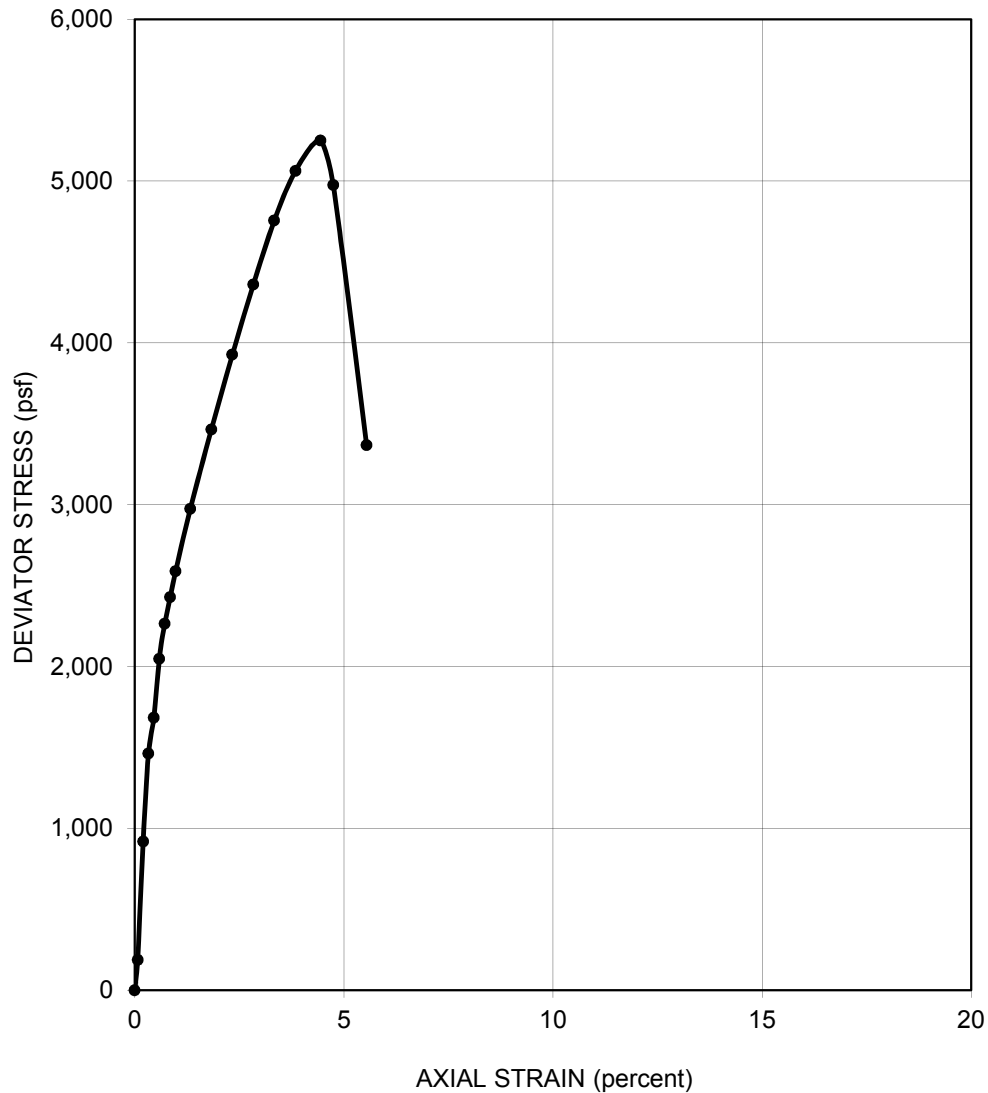
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood                                |                  | SHEAR STRENGTH 2,110 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 2.8 %                               |                                   |
| MOISTURE CONTENT 49.5 %                                       |                  | CONFINING PRESSURE 11,000 psf                         |                                   |
| DRY DENSITY 70 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), dark gray                              |                  |   | SOURCE BSWL337-13 at 110 feet     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-12 |

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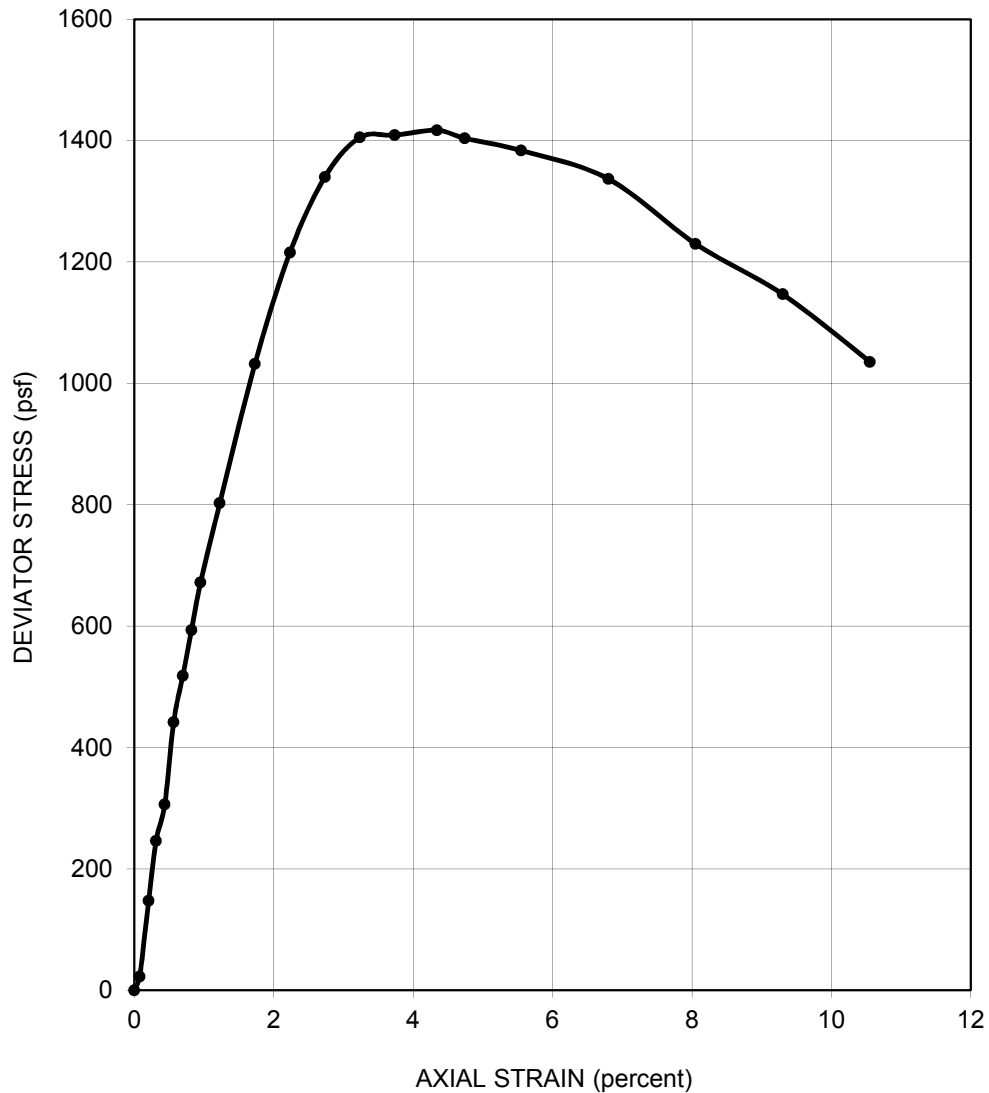
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Pitcher Barell                                   |                  | SHEAR STRENGTH 1,960 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 3.2 %                               |                                   |
| MOISTURE CONTENT 52.2 %                                       |                  | CONFINING PRESSURE 12,000 psf                         |                                   |
| DRY DENSITY 68 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive-gray                             |                  |   | SOURCE BSWL337-13 at 120 feet     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-13 |

# Mayor ED 17-02 Priority permit



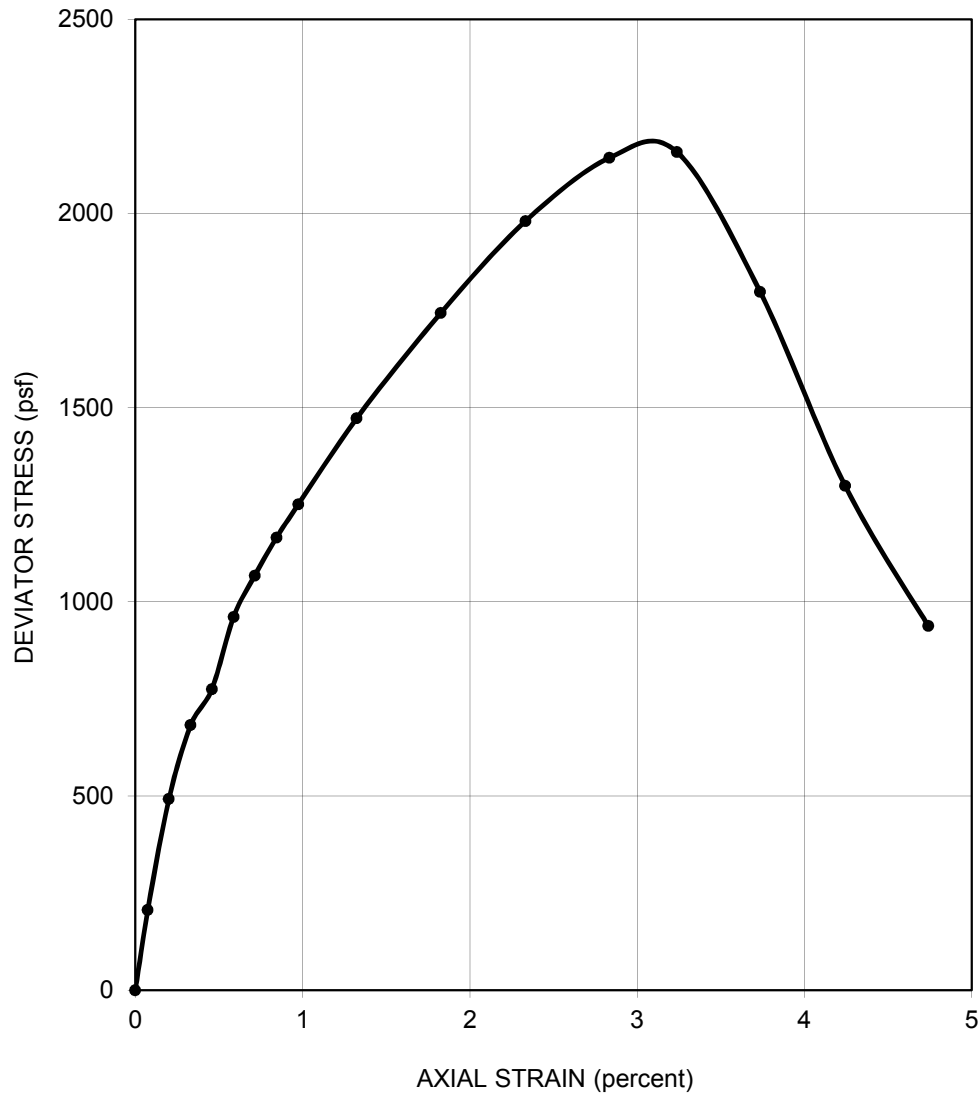
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Pitcher Tube                                     |                  | SHEAR STRENGTH 2,620 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 4.4 %                               |                                   |
| MOISTURE CONTENT 49.4 %                                       |                  | CONFINING PRESSURE 17,000 psf                         |                                   |
| DRY DENSITY 69 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive                                  |                  |   | SOURCE BSWL337-13 at 170          |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-14 |

# Mayor ED 17-02 Priority permit



|   |      |                |   |                    |                                   |
|---|------|----------------|---|--------------------|-----------------------------------|
| SAMPLER TYPE Shelby Tube                                      |      | SHEAR STRENGTH |   | 710                | psf                               |
| DIAMETER (in.)  | 2.86 | HEIGHT (in.)   | 6.1   | STRAIN AT FAILURE  | 4.3 %                             |
| MOISTURE CONTENT  |      | 53.7           | %   | CONFINING PRESSURE | 5,000 psf                         |
| DRY DENSITY   |      | 67             | pcf   | STRAIN RATE        | 0.50 % / min                      |
| DESCRIPTION CLAY (CH), olive to dark gray                     |      |                |   | SOURCE             | BSWL337-14 at 50 feet             |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |                                   |
| <b>LANGAN</b>   |      |                | Date  | 09/19/18           | Project No. 750604203 Figure C-15 |

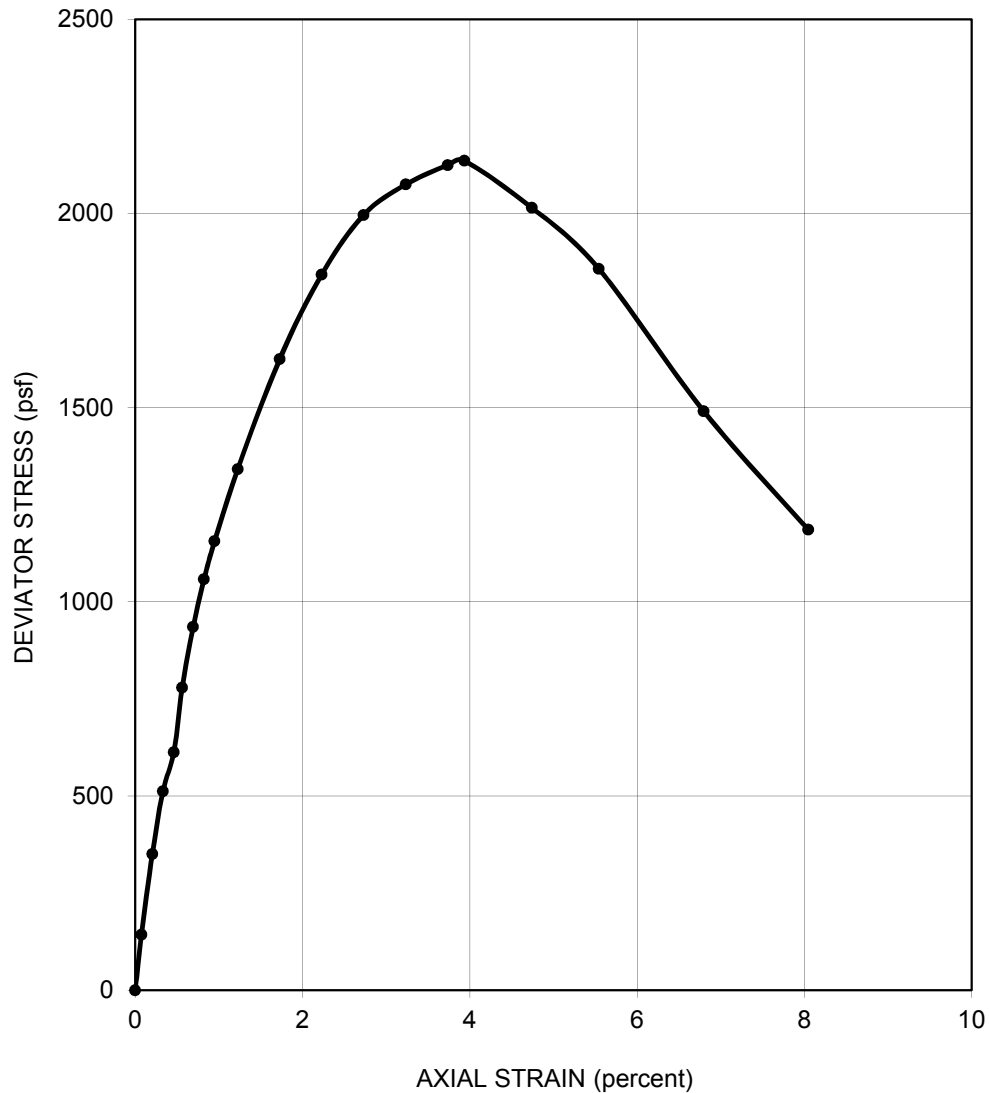
# Mayor ED 17-02 Priority permit



|   |                |   |                                   |
|---|----------------|---|-----------------------------------|
| SAMPLER TYPE Shelby Tube                                      |                | SHEAR STRENGTH 1,080 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6 | STRAIN AT FAILURE 3.2 %                               |                                   |
| MOISTURE CONTENT 29.3 %                                       |                | CONFINING PRESSURE 8,000 psf                          |                                   |
| DRY DENSITY 92 pcf  |                | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive to dark gray                     |                |   | SOURC BSWL337-14 at 80 feet       |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                | Date 09/19/18   | Project No. 750604203 Figure C-16 |

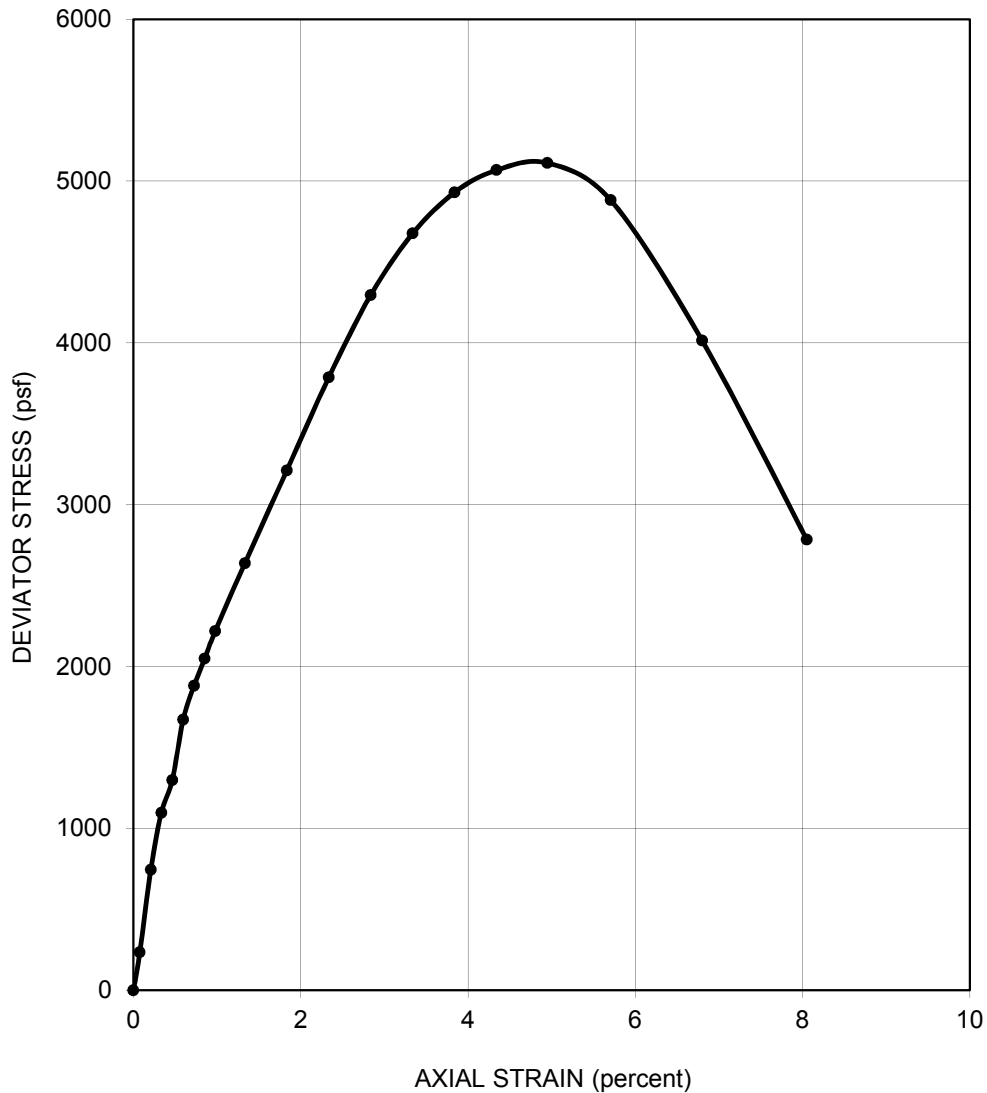


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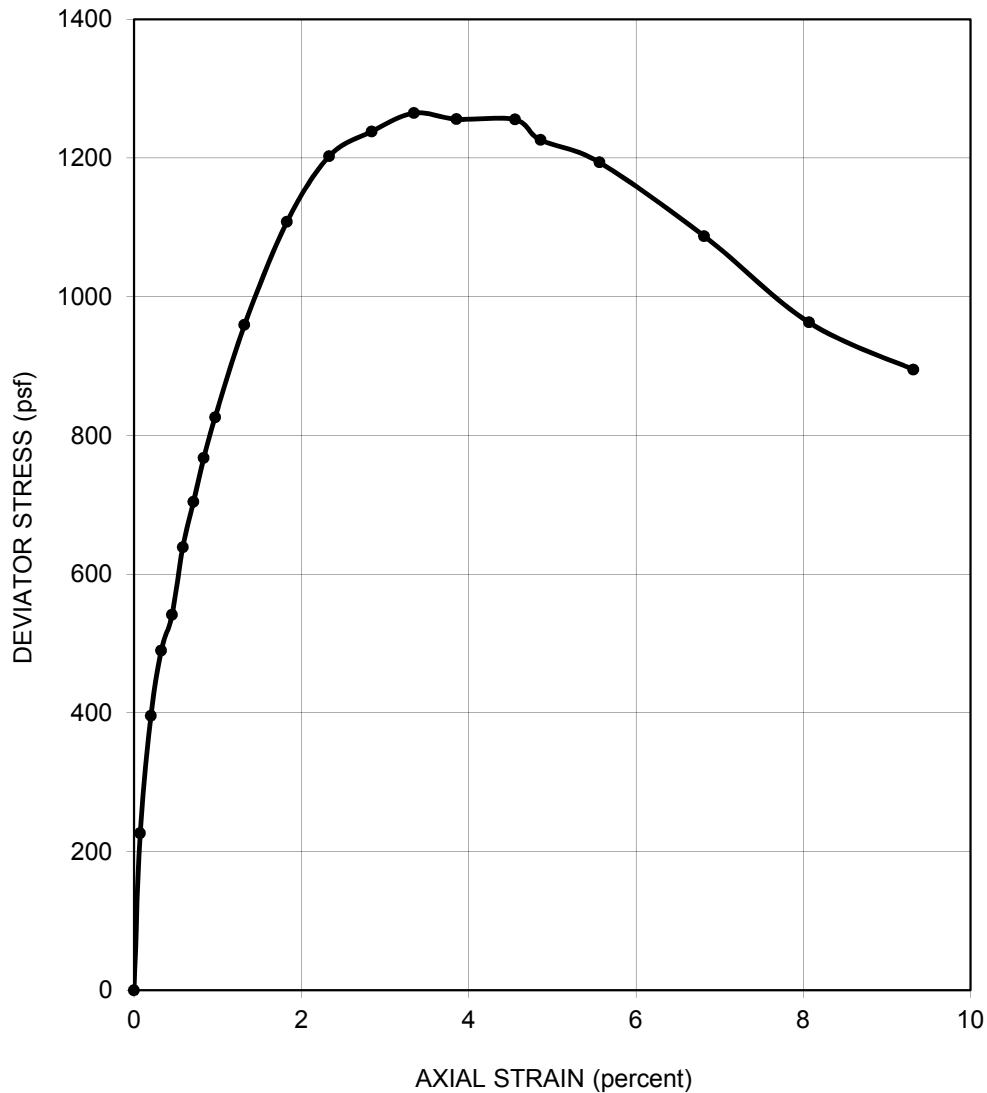
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Shelby Tube                                      |                  | SHEAR STRENGTH 1,070 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 3.9 %                               |                                   |
| MOISTURE CONTENT 44.2 %                                       |                  | CONFINING PRESSURE 9,000 psf                          |                                   |
| DRY DENSITY 75 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive                                  |                  |   | SOURCE BSWL337-14 at 90 feet      |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-17 |

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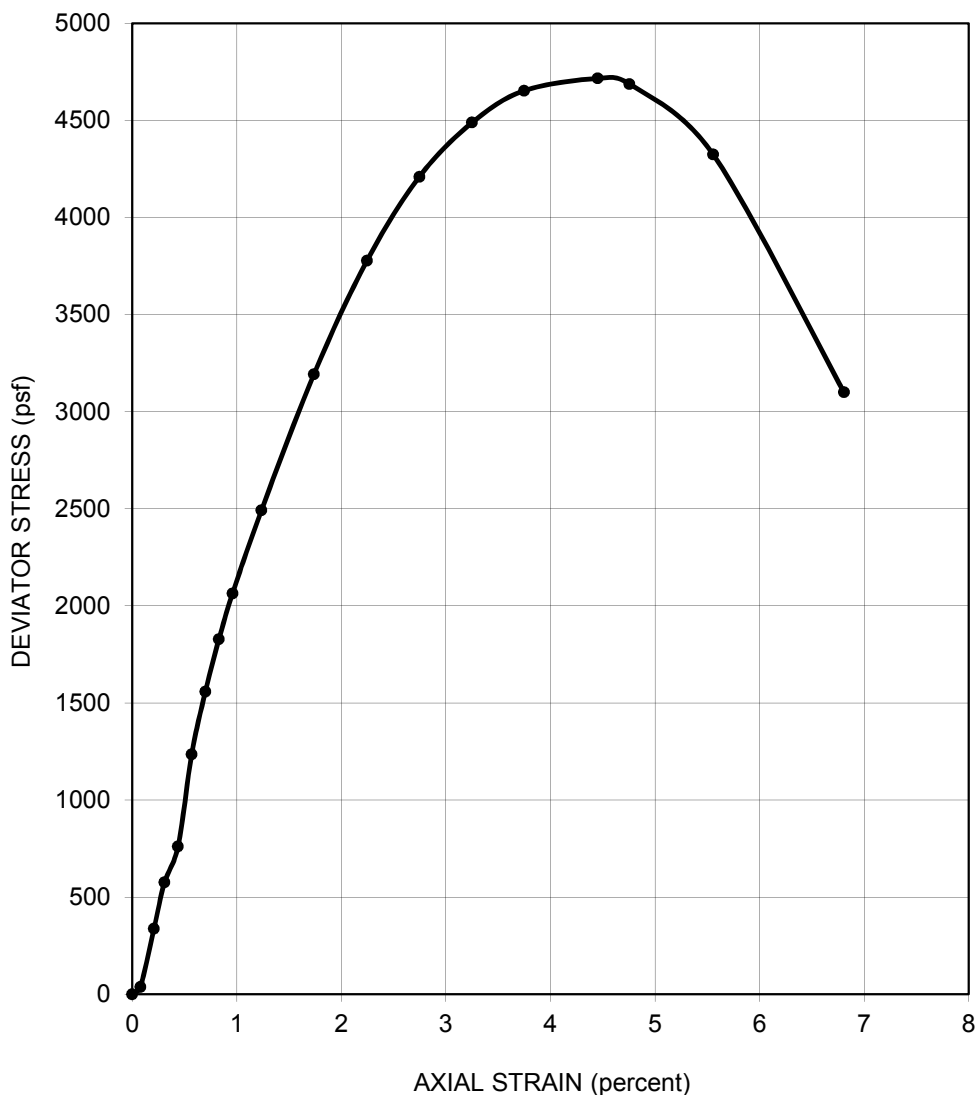
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Pitcher Borell                                   |                  | SHEAR STRENGTH 2,560 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 4.9 %                               |                                   |
| MOISTURE CONTENT 41.0 %                                       |                  | CONFINING PRESSURE 13,000 psf                         |                                   |
| DRY DENSITY 79 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive                                  |                  |   | SOURCE BSWL337-14 at 130 feet     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-18 |

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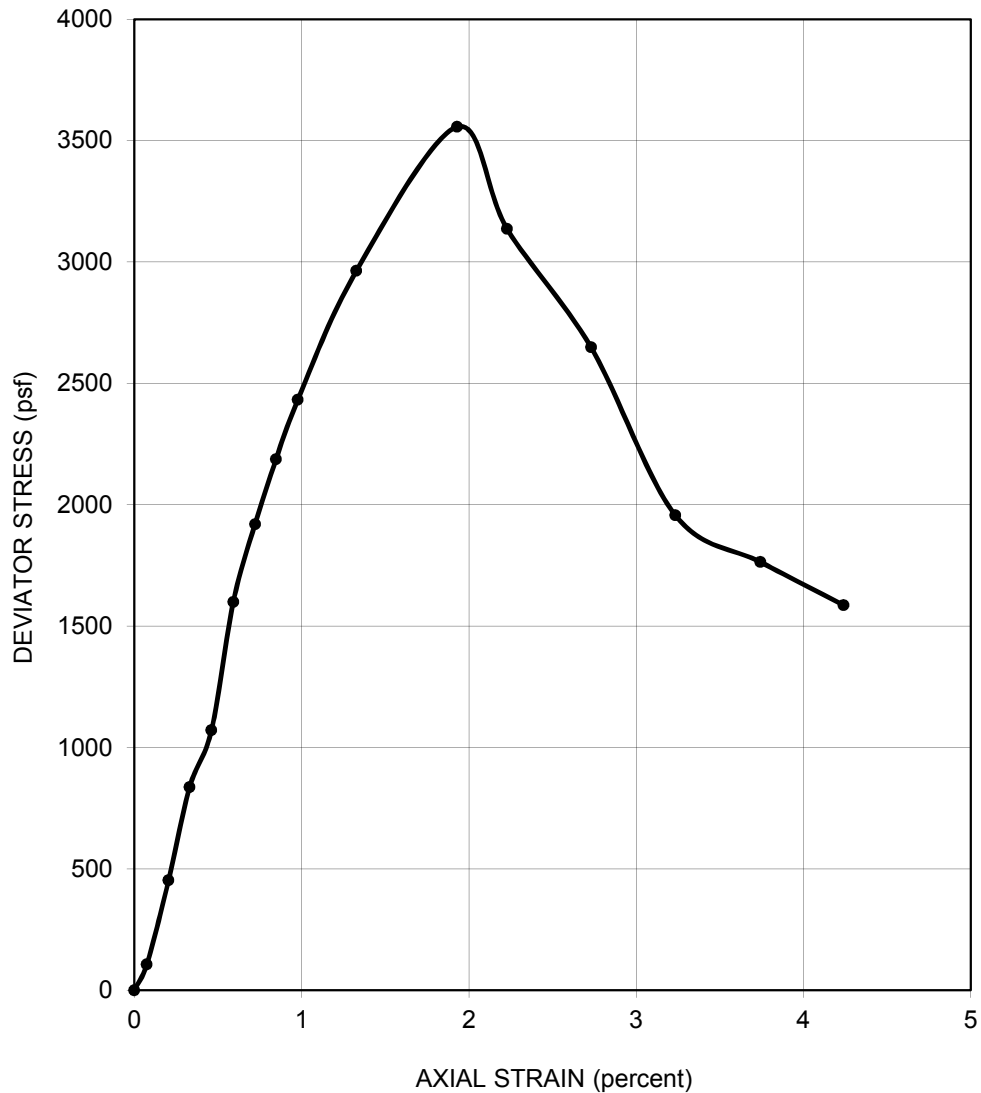
|   |                   |   |                                   |
|---|-------------------|---|-----------------------------------|
| SAMPLER TYPE Dames & Moore                                    |                   | SHEAR STRENGTH 630 psf                                |                                   |
| DIAMETER (in.) 2.43   | HEIGHT (in.) 5.75 | STRAIN AT FAILURE 3.3 %                               |                                   |
| MOISTURE CONTENT 49.3 %                                       |                   | CONFINING PRESSURE 3,000 psf                          |                                   |
| DRY DENSITY 70 pcf  |                   | STRAIN RATE 0.75 % / min                              |                                   |
| DESCRIPTION CLAY (CH), black                                  |                   |   | SOURCE BSWL337-15 at 30 feet      |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                   | Date 09/19/18   | Project No. 750604203 Figure C-19 |

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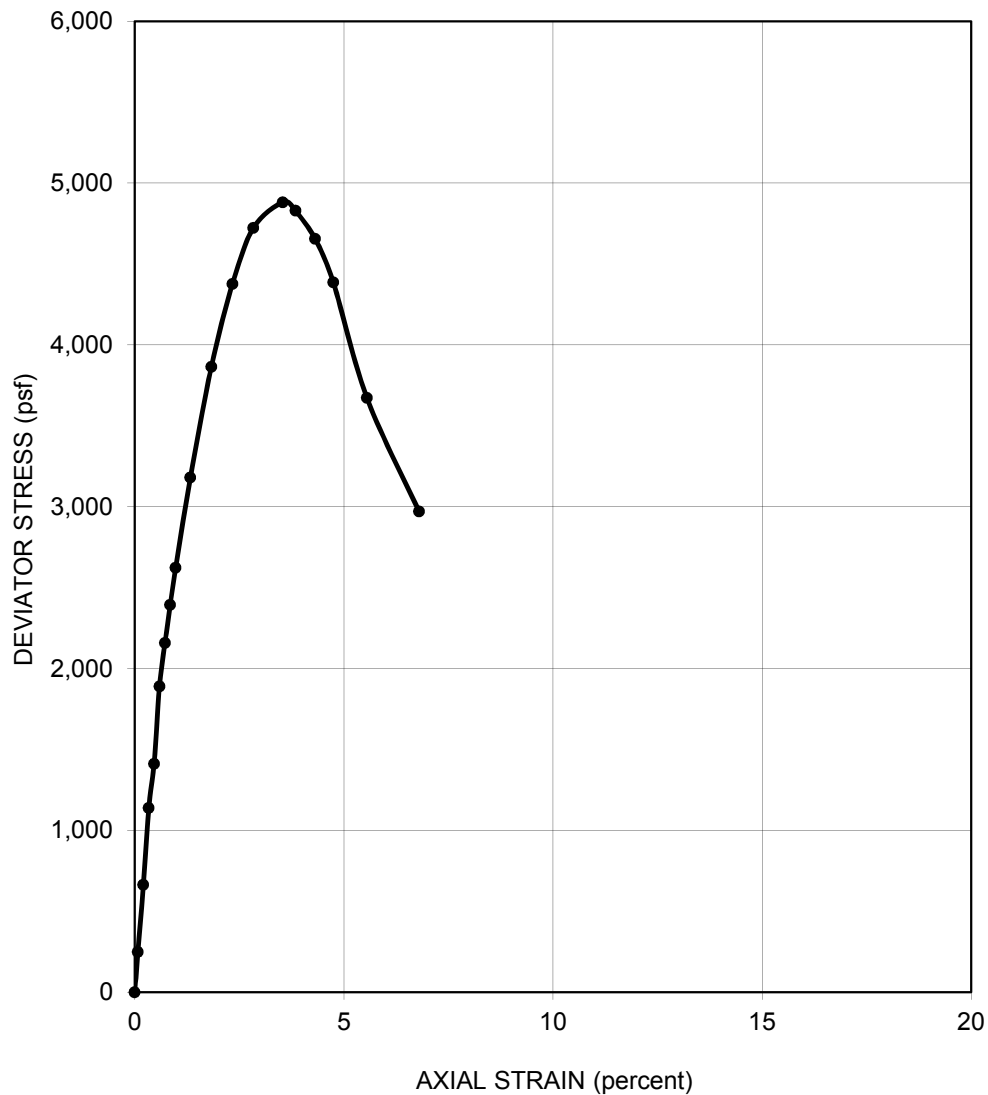
|   |      |                |   |                       |                        |
|---|------|----------------|---|-----------------------|------------------------|
| SAMPLER TYPE Pitcher Borell                                   |      | SHEAR STRENGTH |   | 2,360                 | psf                    |
| DIAMETER (in.)  | 2.86 | HEIGHT (in.)   | 6.1   | STRAIN AT FAILURE     | 4.5 %                  |
| MOISTURE CONTENT  |      | 41.7 %         | CONFINING PRESSURE                                    |                       | 12,500 psf             |
| DRY DENSITY   |      | 79 pcf         | STRAIN RATE   |                       | 0.50 % / min           |
| DESCRIPTION CLAY (CH), olive-gray                             |      |                |   | SOURCE                | BSWL337-15 at 125 feet |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                       |                        |
| <b>LANGAN</b>   |      |                | Date 09/19/18   | Project No. 750604203 | Figure C-20            |

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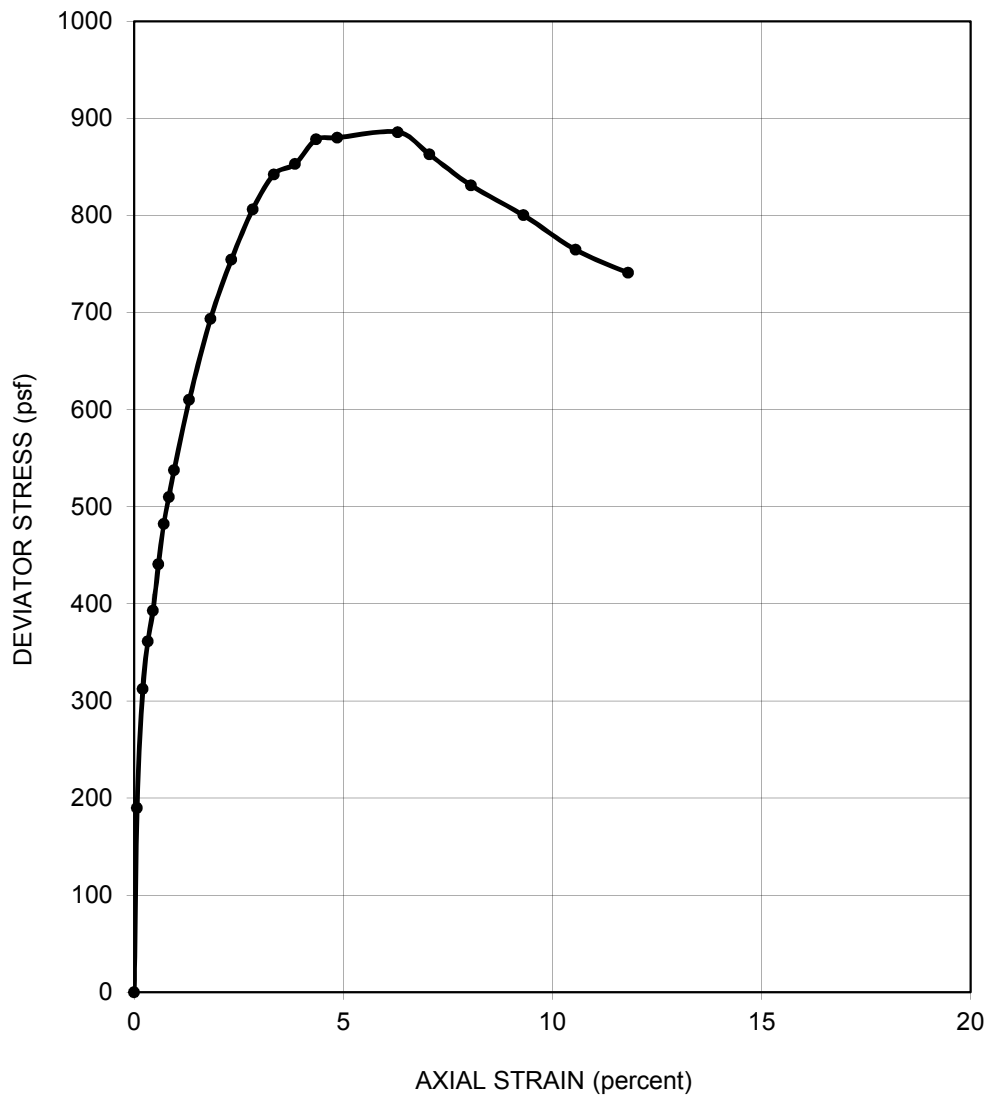
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Pitcher Barell                                   |                  | SHEAR STRENGTH 1,780 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 1.9 %                               |                                   |
| MOISTURE CONTENT 53.8 %                                       |                  | CONFINING PRESSURE 10,000 psf                         |                                   |
| DRY DENSITY 68 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive-gray                             |                  |   | SOURCE BSWL337-16 at 100 feet     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-21 |

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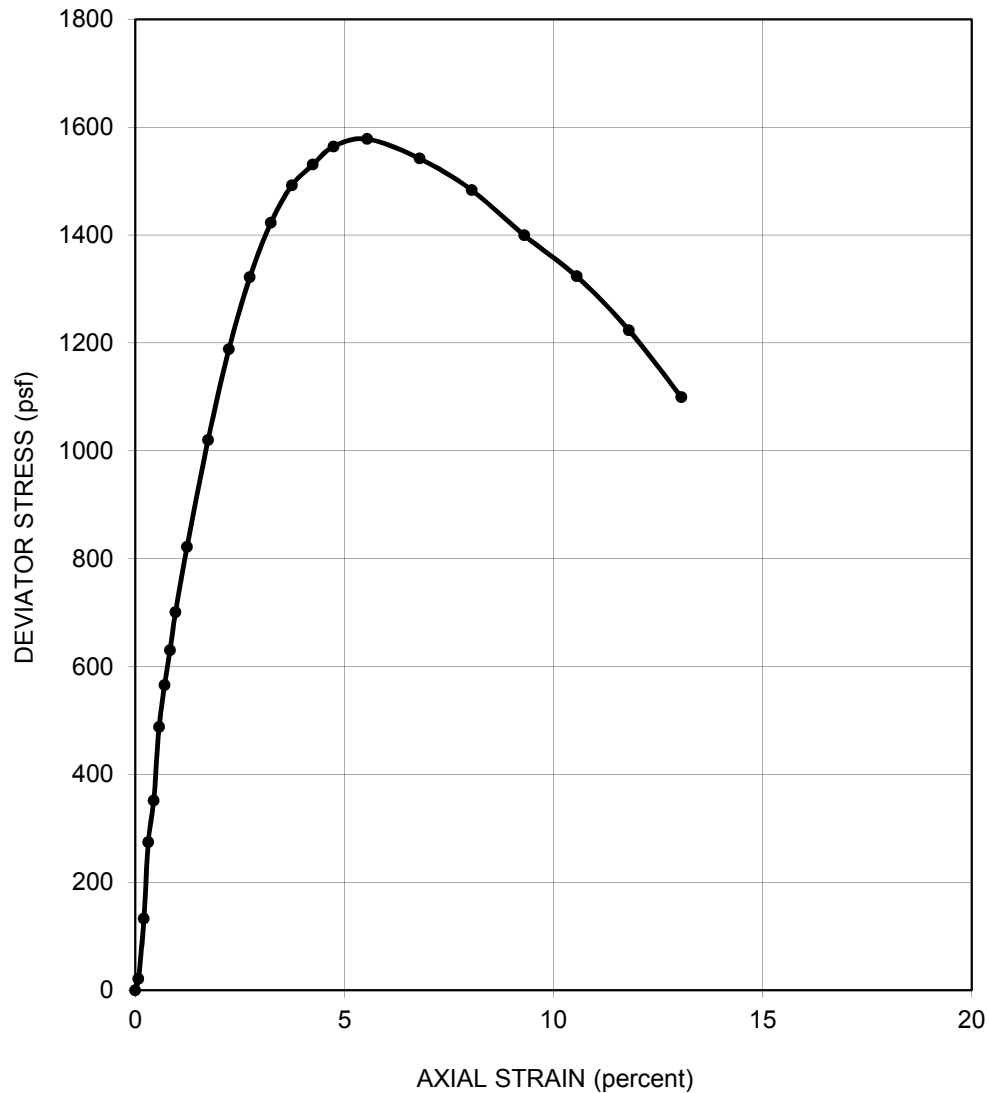
|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Pitcher Tube                                     |                  | SHEAR STRENGTH 2,440 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 3.5 %                               |                                   |
| MOISTURE CONTENT 43.8 %                                       |                  | CONFINING PRESSURE 15,000 psf                         |                                   |
| DRY DENSITY 75 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive-gray                             |                  |   | SOURCE BSWL337-16 at 150          |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-22 |

# Mayor ED 17-02 Priority permit



|   |      |                |   |                    |                                   |
|---|------|----------------|---|--------------------|-----------------------------------|
| SAMPLER TYPE Dames & Moore                                    |      | SHEAR STRENGTH |   | 440                | psf                               |
| DIAMETER (in.)  | 2.43 | HEIGHT (in.)   | 5.75  | STRAIN AT FAILURE  | 6.3 %                             |
| MOISTURE CONTENT  |      | 54.3           | %   | CONFINING PRESSURE | 3,500 psf                         |
| DRY DENSITY   |      | 66             | pcf   | STRAIN RATE        | 0.75 % / min                      |
| DESCRIPTION CLAY (CH), black                                  |      |                |   | SOURCE             | BSWL337-17 at 35 feet             |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |                                   |
| <b>LANGAN</b>   |      |                | Date  | 09/19/18           | Project No. 750604203 Figure C-23 |

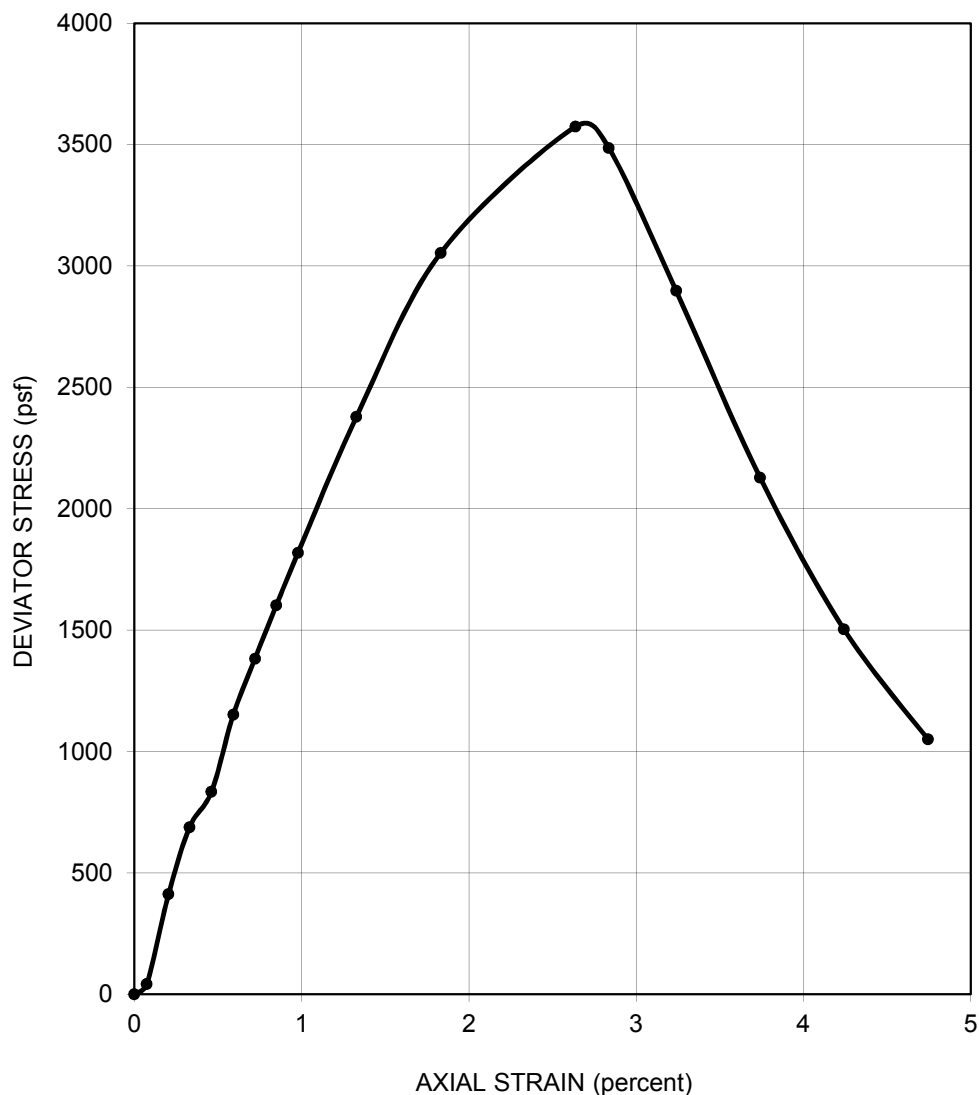
# Mayor ED 17-02 Priority permit



|   |      |              |                |   |                    |        |                       |         |
|---|------|--------------|----------------|---|--------------------|--------|-----------------------|---------|
| SAMPLER TYPE   Shelby Tube                                    |      |              | SHEAR STRENGTH |   | 790                | psf    |                       |         |
| DIAMETER (in.)  | 2.86 | HEIGHT (in.) | 6.1            | STRAIN AT FAILURE                                     |                    | 5.5    | %                     |         |
| MOISTURE CONTENT  |      |              | 50.3           | %   | CONFINING PRESSURE |        | 5,500                 | psf     |
| DRY DENSITY   |      |              | 68             | pcf   | STRAIN RATE        |        | 0.50                  | % / min |
| DESCRIPTION   CLAY (CH), black                                |      |              |                |   | SOURCE             |        | BSWL337-17 at 55 feet |         |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |      |              |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |        |                       |         |
| LANGAN  |      |              |                |   |                    |        |                       |         |
| Date  |      | 09/19/18     | Project No.    |   | 750604203          | Figure |                       | C-24    |



# Mayor ED 17-02 Priority permit



|   |                  |   |                                   |
|---|------------------|---|-----------------------------------|
| SAMPLER TYPE Shelby Tube                                      |                  | SHEAR STRENGTH 1,790 psf                              |                                   |
| DIAMETER (in.) 2.86   | HEIGHT (in.) 6.1 | STRAIN AT FAILURE 2.6 %                               |                                   |
| MOISTURE CONTENT 42.9 %                                       |                  | CONFINING PRESSURE 11,500 psf                         |                                   |
| DRY DENSITY 77 pcf  |                  | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CH), olive-gray                             |                  |   | SOURCE BSWL337-17 at 115 feet     |
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                  | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                  | Date 09/19/18   | Project No. 750604203 Figure C-25 |

# Mayor ED 17-02 Priority permit

## CRS Consolidation Testing of soils for the Mission Rock Project

Dr. Michael Riemer

A total of four constant rate of strain (CRS) consolidation tests were performed on specimens prepared from four Pitcher Tube samples retrieved from the Mission Rock project site, ranging in depth from 105 feet to 135 feet. The samples were selected and relevant field effective stresses were estimated by Peter Brady of Langan, and are summarized in Table 1. All of the tubes were identified as “Old Bay Clay.” One consolidation specimen was retrieved from each of the sample tubes provided, typically within the bottom 10” or so of material in the tube, to be sure to stay clear of soil disturbed at the base of the borehole prior to sampling. Untested portions of the sample tubes were resealed and returned to Langan for other testing purposes.

### Consolidation Specimen Preparation

Retrieving a minimally disturbed specimen from the bottom portion of the sample tube requires cutting the tubes to access this material. The cut was made using a pipe-cutter with the tube clamped in a vertical orientation. Steel ring stiffeners are rigidly bolted above and below the area of the cut, and the pressure exerted by the cutting wheel is kept low to minimize “ovaling” of the tube during the cutting process (Figure 1). Once the tube is cut through, a thin wire saw is passed through soil within the tube to cleanly shear the soil within. The cut ends of the tube will typically have a significant burr after cutting, which significantly reduces the diameter of the opening and must be removed with a machinist’s deburring tool prior to extruding the sample. Once the tube is cut and deburred, a small portion of soil at the end should be extruded and either discarded or used for index testing. The top edge of the sample can then be sliced level and flat using a sharp blade, and the tube end as a guide.

For this project, the consolidation oedometer ring used is a composite of stainless steel and teflon (to reduce sidewall friction), and has a very thick (over 1”) sidewall, which makes the ring very rigid to resist possible lateral expansion – which can lead to compliance and overestimation of the compression and recompression properties at large load levels. The inside diameter of the ring is 6.09 cm – significantly smaller than the inner diameter of the sampling tube. Thus the soil sample was trimmed down in diameter to fit the oedometer ring. To do this, approximately 4 to 5 cm of soil were extruded and removed from the tube without lateral constraint (other than its capillarity) (Figure 2). The soil sample was then placed on a conventional soil trimming lathe (Figure 3) whose vertical guides were adjusted so that trimming with a wire saw or blade produced the desired diameter. Trimmings of the soil from around the specimen were collected and used to measure a moisture content, which therefore should reasonably reflect the material at

# Mayor ED 17-02 Priority permit

that position in the soil column. Once fully trimmed down to the proper diameter, the soil is placed on a glass plate, and the consolidation ring is lowered over the specimen (Figure 4).

It is important that the specimen not be loose or show a gap between the ring and soil, but instead that the ring require a slight downward force when being slipped onto the soil sample. After sliding on the ring, the extra soil extending beyond the top and bottom faces is trimmed away with a wire saw and rigid blade. The moist mass (and thus moist density, using the ring volume) can then be determined prior to placing the ring in the consolidometer and performing the test.

Once trimmed and measured, the ring was placed in the CRS consolidation cell, over the porous stone in the base, and clamped down against the base to effectively seal it from the rest of the chamber. A top porous stone sized to fit within the ring was then centered on the soil specimen, and the chamber and piston were then fitted into place. The whole chamber was then centered within the constant rate loading frame, the bottom drain line was connected to the back pressure system and pressure transducer, and the LVDT was clamped to the thick loading piston and placed into its initial position.

Undisturbed specimens of plastic soils from these depths should retain substantial capillary stresses following quality sampling, and therefore should show a good “memory” of their maximum past pressure if disturbance is minimized. Careful specimen selection, trimming and handling are important for that, as is preventing premature access of water to specimen which might result in swell and loss of those capillary stresses. For this reason, the undisturbed specimens were first loaded to a seating load of between 8 and 10 kg (or about 500 to 700 psf of vertical stress), in order to ensure that the loading elements were in good contact, at which point “initial” LVDT readings were obtained. The specimens were then slowly loaded without access to water to a “soaking stress” of between 1 to 2 atm of vertical stress (depending on the depth of the sample). Deformations during this phase were recorded and included as volume change and vertical strain in the subsequent data interpretation. With the vertical position of the piston locked at a constant height, water was then introduced into the CRS chamber to submerge the specimen, and water from the back pressure reservoir was connected to the base drainage line, so that the subsequent consolidation testing could proceed. [The specimen response to the introduction of water is a good indicator of the sample quality: if the soil has experienced significant disturbance and loss of capillarity, it will likely lose a portion of the vertical effective stress applied at constant height, whereas high quality samples with little disturbance try to swell on the introduction of water, and the vertical stress will increase as the height is held constant.] Chamber/back pressures of between 0.7 and 1.0 atm were then slowly applied to the water to promote saturation of the porous stones and the rest of the system prior to consolidation testing.

# Mayor ED 17-02 Priority permit

## CRS Consolidation Loading

As described in ASTM D4186, Constant Rate of Strain consolidation consists of applying load through a slow but continuous deformation of the soil, and measuring both the vertical load at the top of the specimen and the excess pore pressure at the bottom, undrained surface of the specimen. From these, histories of the vertical effective stress, vertical (and volumetric) strains, void ratio and density, coefficient of consolidation ( $C_v$ ), hydraulic conductivity ( $k$ ) and other quantities can be calculated, and plots of these quantities as functions of the vertical effective stress are commonly produced. These smooth and continuous curves are in contrast to the relatively few individual points that are produced for such relationships from incremental consolidation tests.

In this project, loading was applied using a standard Wykeham-Farrance loading frame, which mechanically controls the rate of deformation based on the gears selected by the user. Ideally the rate at which the test is performed is fast enough for the reliable measurement of pore pressures at the base of the specimen, but slow enough to keep those pore pressures relatively small compared to the vertical stress applied to the top of the specimen ( $u_b < 10\%$  of  $\sigma'_v$  is good, with 15% being the maximum permitted in the standard). Optimal rates will obviously depend on the coefficient of consolidation, so for unfamiliar soils, some trial and error is involved at the early stages of testing to identify appropriate rates. For the Old Bay Clay specimens from this portion of San Francisco, prior testing had suggested that a deformation rate of 0.0039 mm/min worked very well, and so the first two tests were performed at this rate. While CRS1 indeed responded as expected, with low and clearly measurable pore pressures, CRS2 generated substantially larger pore pressure at this rate (between 15% and 20% of the vertical stress in some regions) – and in response, the remaining two tests (CRS3 and CRS4) were run at a somewhat slower rate (0.003 mm/min), and showed much smaller pore pressures again.

For this project there was a specific focus on the values of the stiffness in unloading and reloading, both prior to reaching the maximum past pressure, and after that stress had been exceeded, so two full cycles of unload-reload response were included in these tests. During unloading, the direction of deformation of the system is reversed, while the rate of deformation can either be maintained or reduced to keep the pore pressures at the base at appropriate levels.

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## Results of Consolidation Testing

As each of the tests was completed, preliminary plots of vertical strain, void ratio, Work performed, coefficient of consolidation ( $C_v$ ) and interpreted vertical hydraulic conductivity as functions of the vertical effective stress were produced and transmitted to Langan. Final versions of these plots are included as an Appendix to this report, and the final Excel files containing the processed data are also being made available to Langan for their review.

Table 1 also includes a summary of the results from the individual tests, including the interpreted maximum past pressure, and values of the Recompression Ratio, CER (% strain/log cycle of stress) both prior to reaching maximum past pressure, and after. The disturbance ratio ( $\Delta e / e_o$ ) is also included in the Table, which is calculated as the change in void ratio required to return to the estimated vertical effective stress in the field, normalized by the initial void ratio, and expressed as a percentage. As shown in Table 1, 3 of the 4 specimens show values of between 3% and 5%, with CRS2 being the notable exception from this range having a value of 6.6%. Lunne (1997) suggests that values of this ratio around 4 to 5% indicate a sample quality of “good to fair” for overconsolidation ratios of around 2, such as observed for the samples in this study. The larger value indicates a specimen of “fair” quality, in part because the overconsolidation ratio for this more disturbed specimen was the lowest, with an OCR of 1.6. So overall the sample quality was quite good, particularly considering the depths from which the samples were retrieved.

Figure 5 shows a comparison of the consolidation curves obtained from all four specimens, plotting the measured vertical strains as functions of the applied effective vertical stresses. All four are relatively similar in terms of their recompression slopes, degree of curvature near the maximum past pressures, and the large-strain compression slopes in these laboratory curves. (Remember that without correcting these lab curves into “field” curves, using the traditional methods for consolidation interpretation, one can’t simply take the slopes from these continuous lines as the virgin “compression index”  $C_c$  or equivalent...)

The two biggest differences would appear to be the stiffer, less disturbed and less compressible response of CRS1 (appearing above the other curves in the plot, consistent with it showing the largest maximum past pressure); and the presence of some degree of sensitivity from test CRS4, which shows stiff initial response and low disturbance, but then drops more steeply and less linearly on the log (stress) scale, suggesting a more structured and sensitive soil than the others.

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Table 1: Consolidation Sample Information and Results

| Test | Boring | Material | Depth | w (%) | e <sub>o</sub> | γ <sub>m</sub> | Disturb. Ratio | Field σ' <sub>v</sub> | Pp    | OCR | CER                   |      |
|------|--------|----------|-------|-------|----------------|----------------|----------------|-----------------------|-------|-----|-----------------------|------|
|      |        |          | (ft)  |       |                | (g/cc)         | (%)            | (ksf)                 | (ksf) |     | (% strain/log cycle ) |      |
| CRS1 | B-17   | OBC      | 137   | 44.3  | 1.23           | 1.78           | 3.4            | 6.34                  | 14.3  | 2.3 | 1.25                  | 2.15 |
| CRS2 | B-13   | OBC      | 152   | 50.6  | 1.37           | 1.72           | 6.6            | 7.52                  | 12.3  | 1.6 | 1.2                   | 1.8  |
| CRS3 | B-14   | OBC      | 122   | 50.7  | 1.37           | 1.72           | 5              | 5.83                  | 11.3  | 1.9 | 2                     | 1.9  |
| CRS4 | B-15   | OBC      | 107   | 60.3  | 1.62           | 1.66           | 3.6            | 5.31                  | 12.6  | 2.4 | 1.5                   | 2.8  |

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Figure 1: Cutting the sample tube using the pipe cutter and rigid stiffener rings (5M project)



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Figure 2: Extruding soil to slice and trim to prepare the consolidation specimen (5M project).





Figure 3: Portion of tube sample on the soil lathe, ready for trimming to proper diameter.

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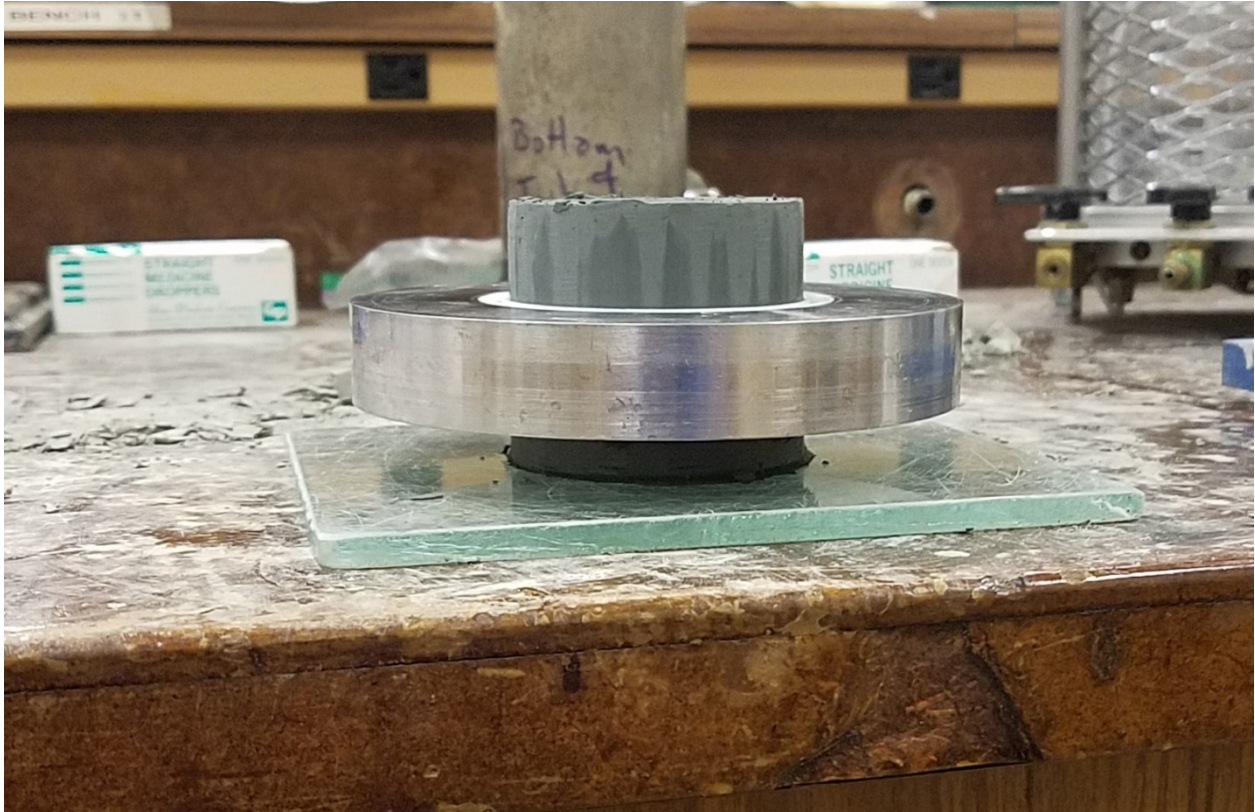


Figure 4: Oedometer ring placed over trimmed specimen (note ring suspended above plate).



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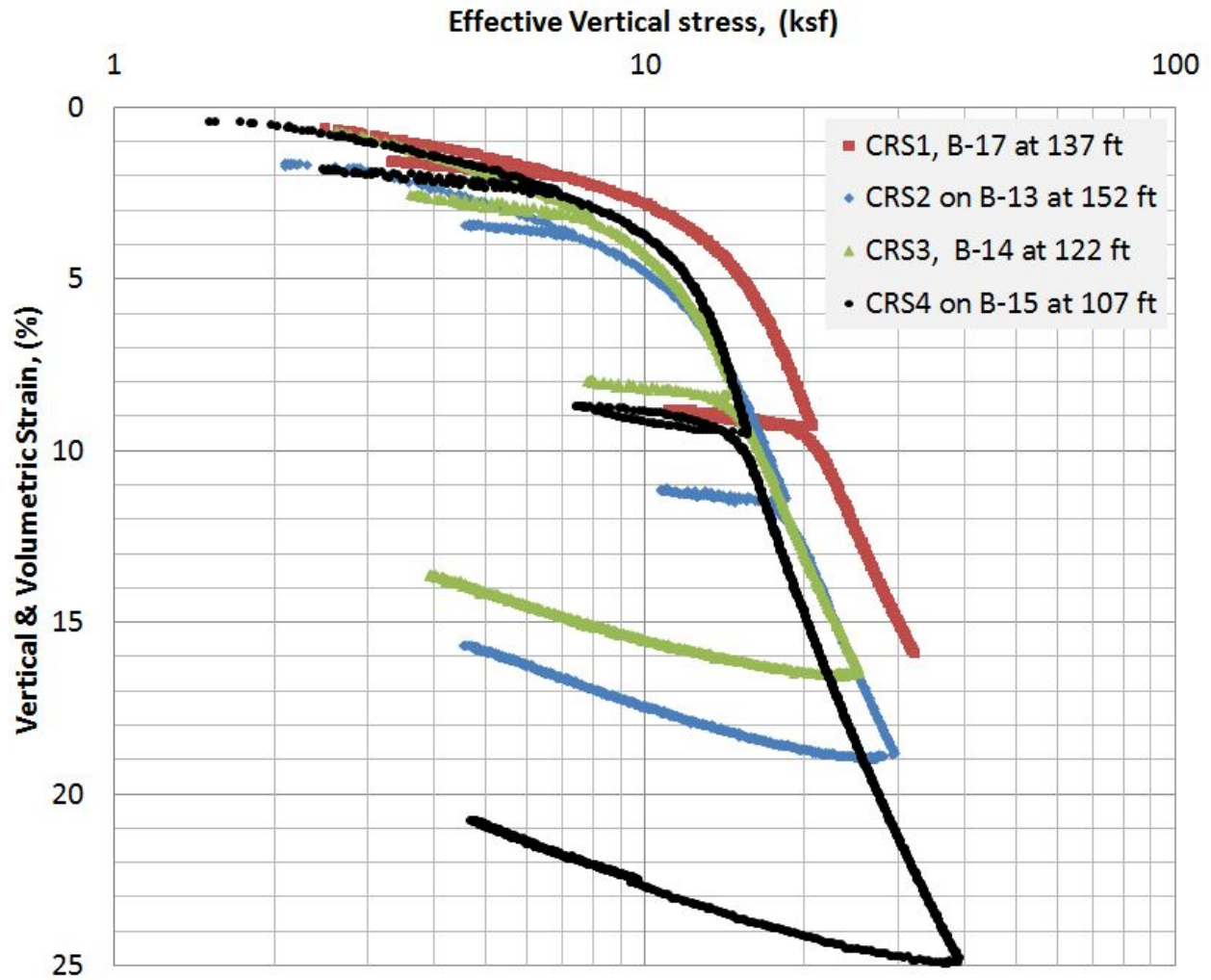


Figure 5: Comparison of consolidation curves from all four tests.

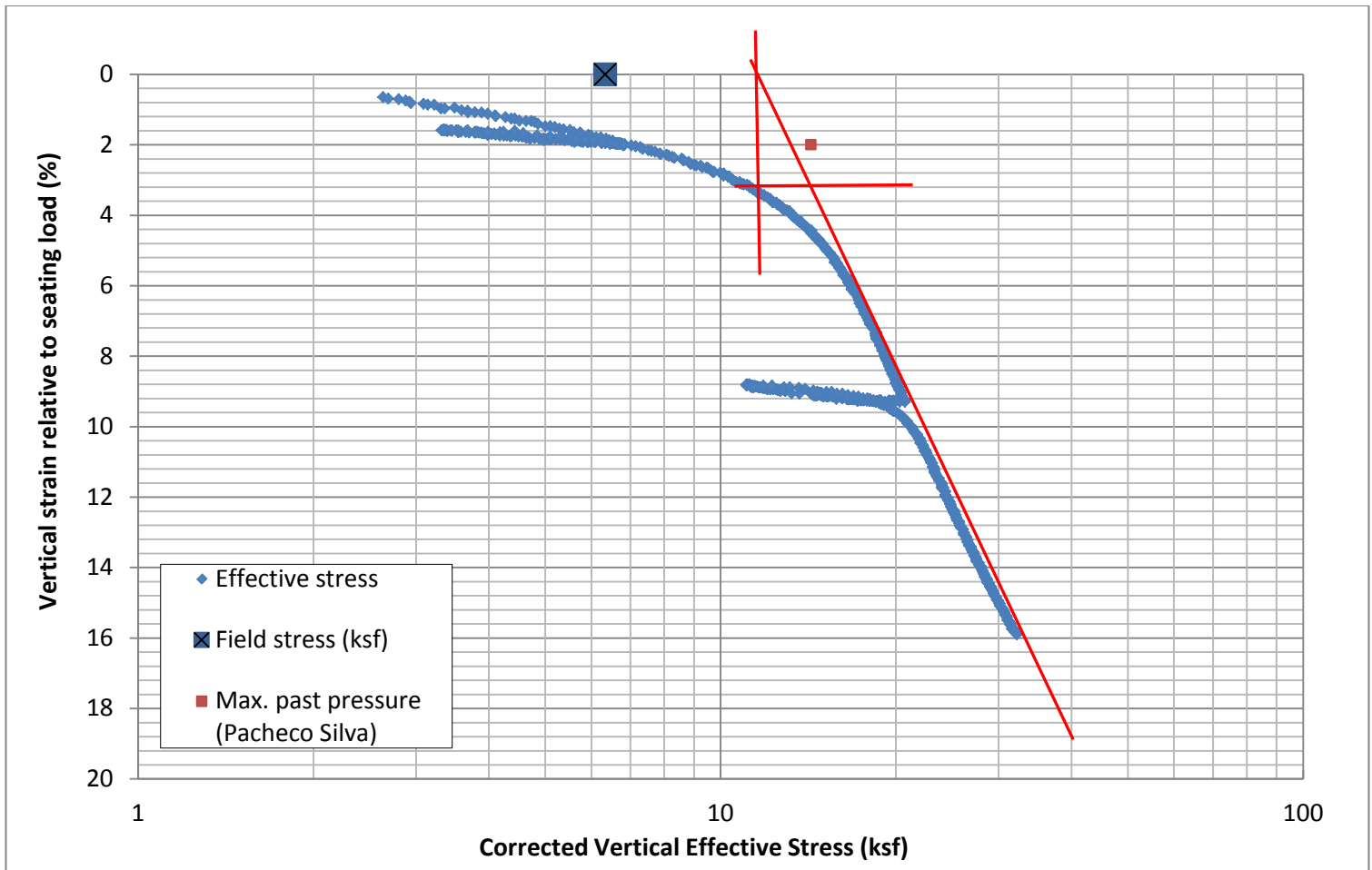
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## **Appendix:**

### **Results of Individual Consolidation Tests**

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Constant Rate of Strain Consolidation Test  
ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 137   | 44.3 |                  |    |    |               |             |      |

| Initial Specimen Properties                |       |
|--|-------|
| Height (mm)                                | 20.25 |
| Diameter (mm)                              | 60.9  |
| Volume (cm <sup>3</sup> )                  | 58.99 |
| Moist mass (g)                             | 104.7 |
| Moist density, $\rho$ (g/cm <sup>3</sup> ) | 1.775 |
| Total unit weight (pcf)                    | 110.8 |
| Gs (assumed)                               | 2.70  |
| Void Ratio e                               | 1.226 |
| Saturation                                 | 102.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 6.34  |
| Maximum past (Pacheco Silva)       | 14.3  |
| Maximum past (Work method)         | 14.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| $\Delta e / e_o$ (%)         | 3.4  |
| Sample quality (Lunne, 1997) | Good |

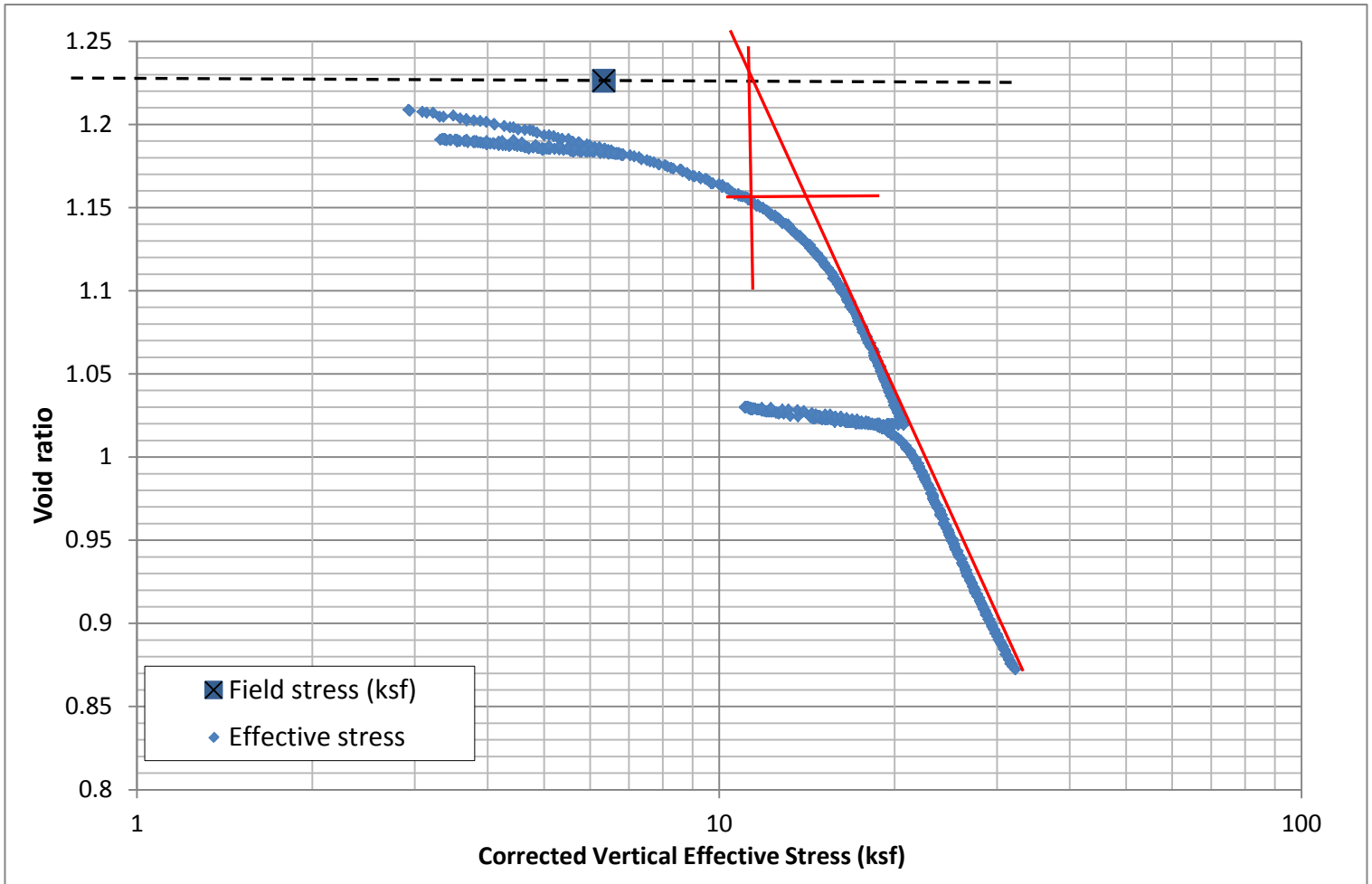
|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

|   |                      |
|---|----------------------|
| Project: Mission Rock                           | Test: B-17 at 137 ft |
| Location:                                       |                      |
| Project Number:                                 |                      |
| Axial strain v. log (vertical effective stress) | Figure: 1.1          |

# Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test  
ASTM D4186



Specimen

| Depth | W.C. | Atterberg Limits |    |    | Fines content | Description  | USCS |
|-------|------|------------------|----|----|---------------|--------------|------|
| (ft)  | (%)  | LL               | PL | PI | (%)           |              |      |
| 137   | 44.3 |                  |    |    |               | Old Bay Clay |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 104.7 |
| Moist density, $\rho$ (g/cm3) | 1.775 |
| Total unit weight (pcf)       | 110.8 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.226 |
| Saturation                    | 102.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 6.34  |
| Maximum past (Pacheco Silva)       | 14.3  |
| Maximum past (Work method)         | 14.3  |

| Disturbance                  |      |
|------------------------------|------|
| $\Delta e / e_o$ (%)         | 3.4  |
| Sample quality (Lunne, 1997) | Good |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Project: Mission Rock

Test: B-17 at 137 ft

Location:

Project Number:

Void ratio v. log (vertical effective stress)

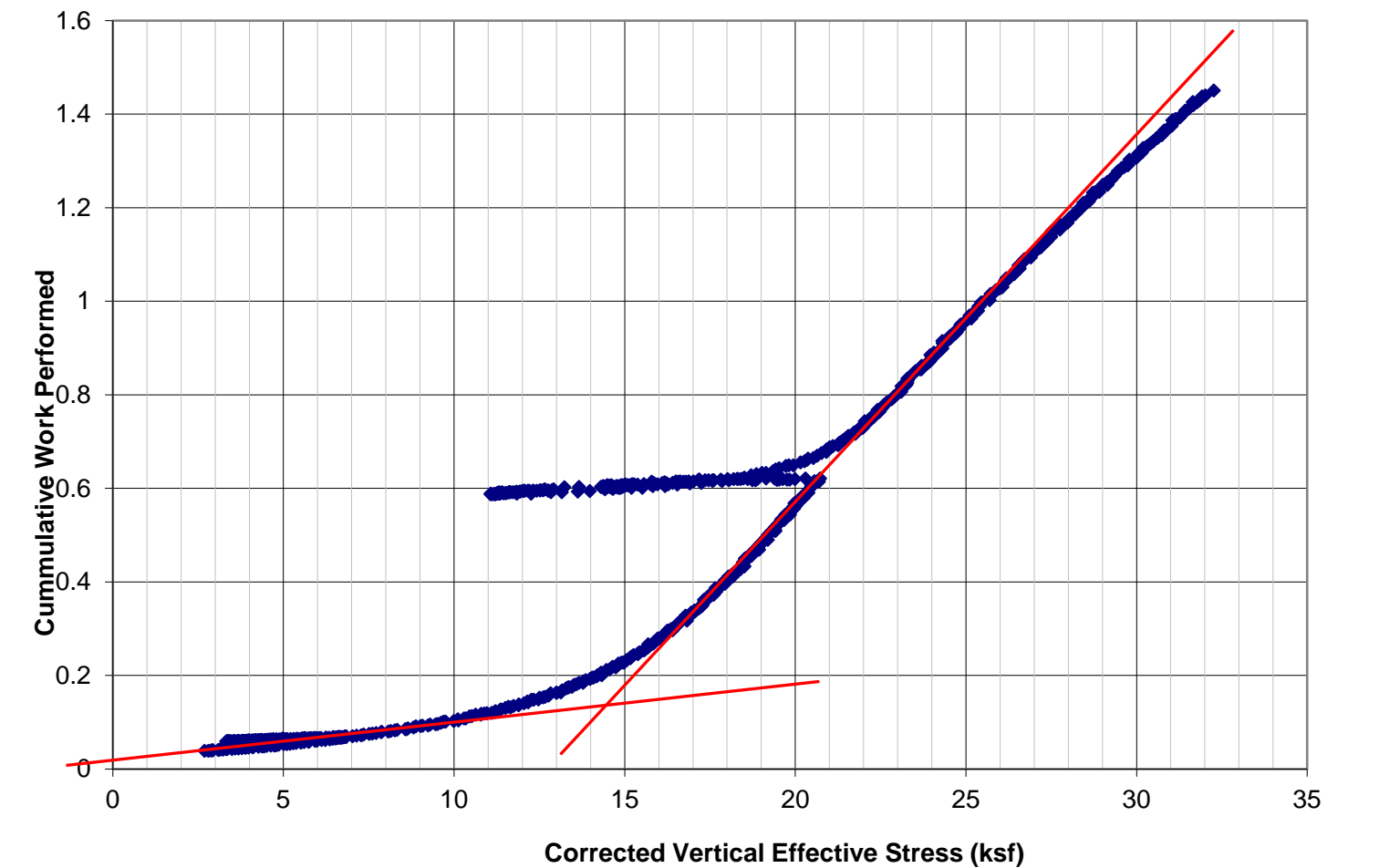
Figure: 1.2

Performed by: M. Riemer  
at UCB Geotech labs

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Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 137   | 44.3 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 104.7 |
| Moist density, ρ (g/cm3)    | 1.775 |
| Total unit weight (pcf)     | 110.8 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.226 |
| Saturation                  | 102.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 6.34  |
| Maximum past (Pacheco Silva)       | 14.3  |
| Maximum past (Work method)         | 14.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.4  |
| Sample quality (Lunne, 1997) | Good |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-17 at 137 ft

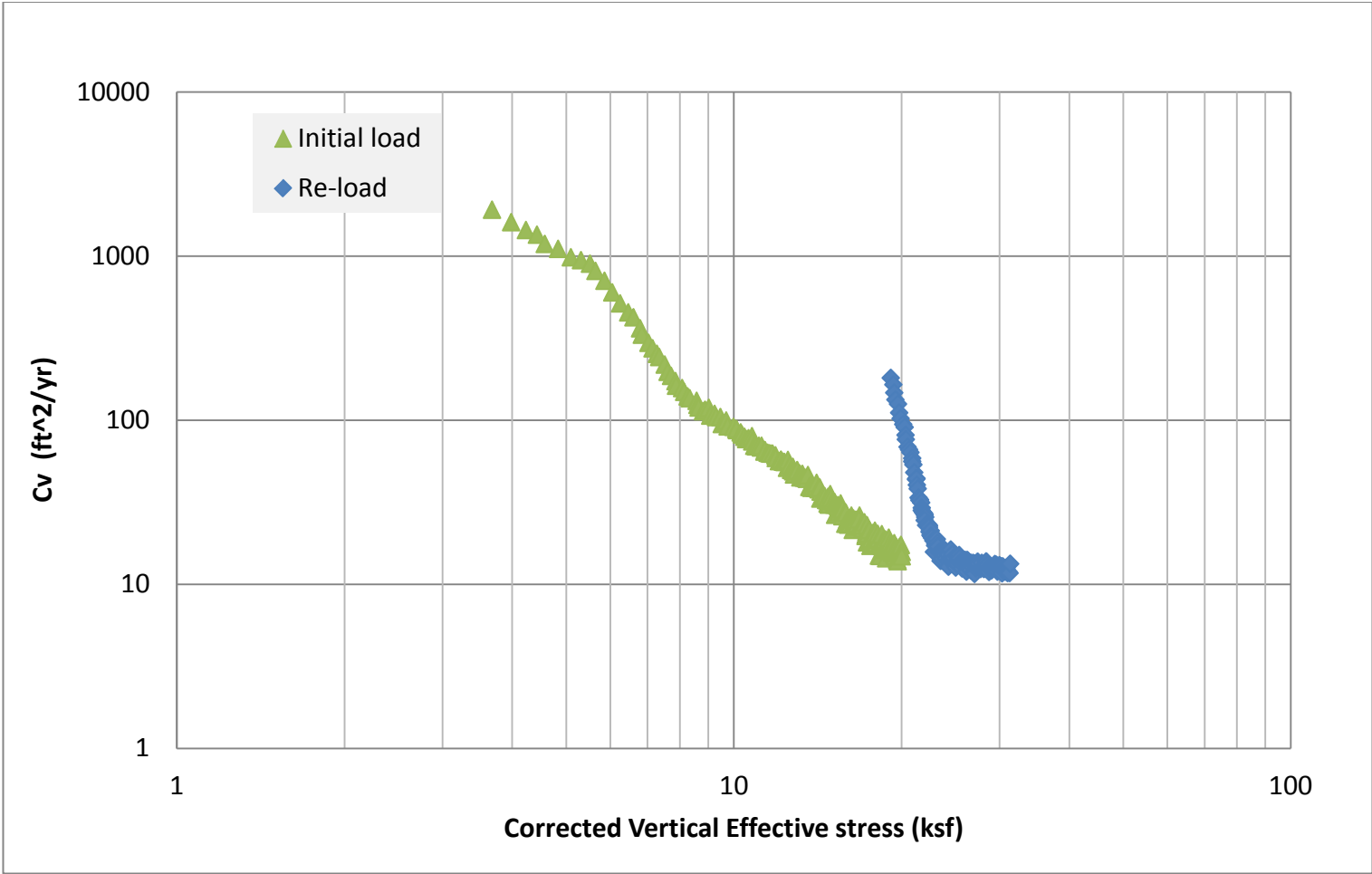
Cumulative work v. vertical effective stress  
(Becker Method)

Figure: 1.3

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 137   | 44.3 |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 104.7 |
| Moist density, ρ (g/cm3)    | 1.775 |
| Total unit weight (pcf)     | 110.8 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.226 |
| Saturation                  | 102.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 6.34  |
| Maximum past (Pacheco Silva)       | 14.3  |
| Maximum past (Work method)         | 14.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.4  |
| Sample quality (Lunne, 1997) | Good |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

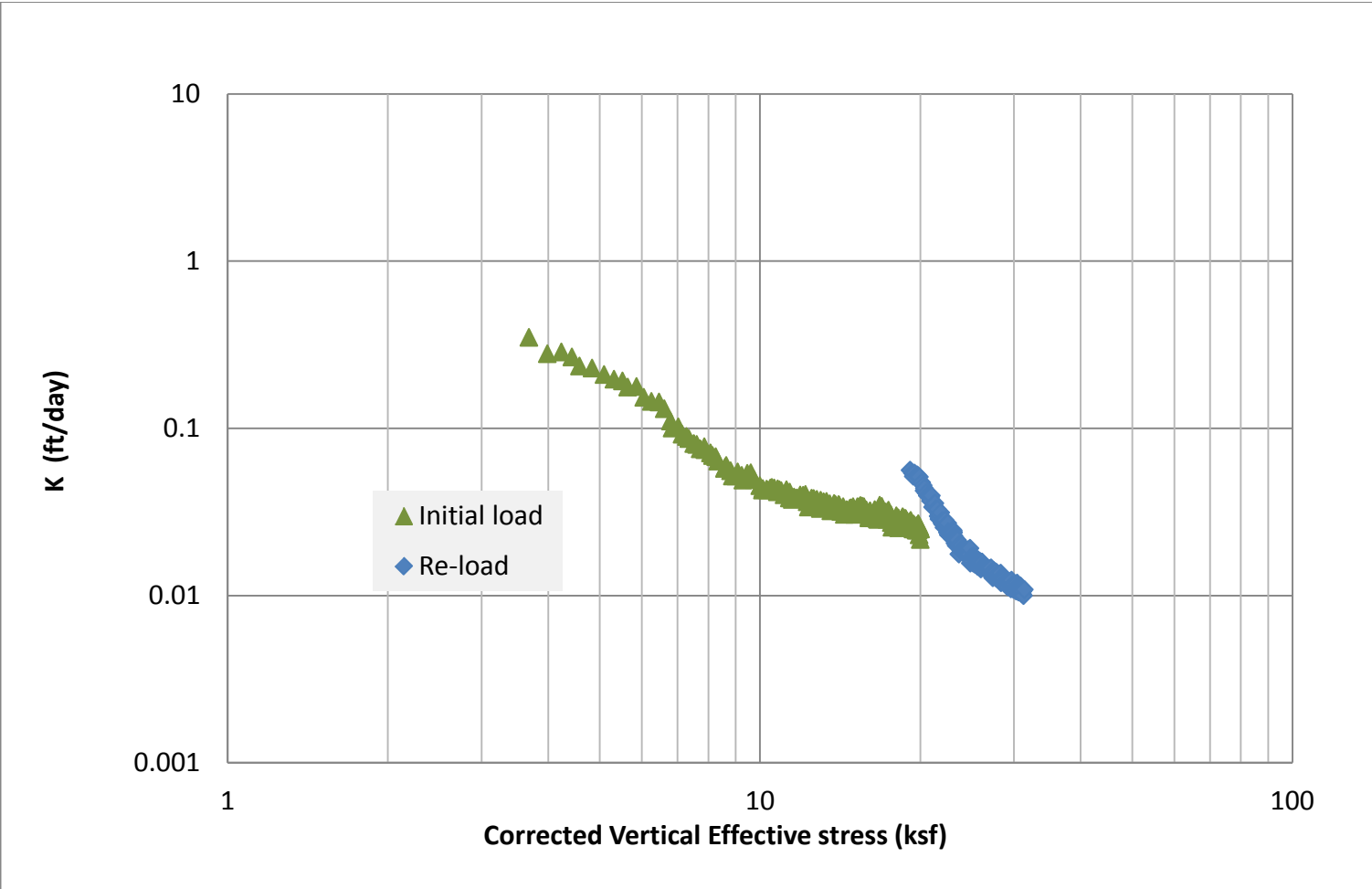
|  |                      |
|--|----------------------|
| Project: Mission Rock                    | Test: B-17 at 137 ft |
| Location:                                |                      |
| Project Number:                          |                      |
| Coeff.of Consol v. log(effective stress) | Figure: 1.4          |



Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 137   | 44.3 |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 104.7 |
| Moist density, ρ (g/cm3)    | 1.775 |
| Total unit weight (pcf)     | 110.8 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.226 |
| Saturation                  | 102.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 6.34  |
| Maximum past (Pacheco Silva)       | 14.3  |
| Maximum past (Work method)         | 14.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.4  |
| Sample quality (Lunne, 1997) | Good |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-17 at 137 ft

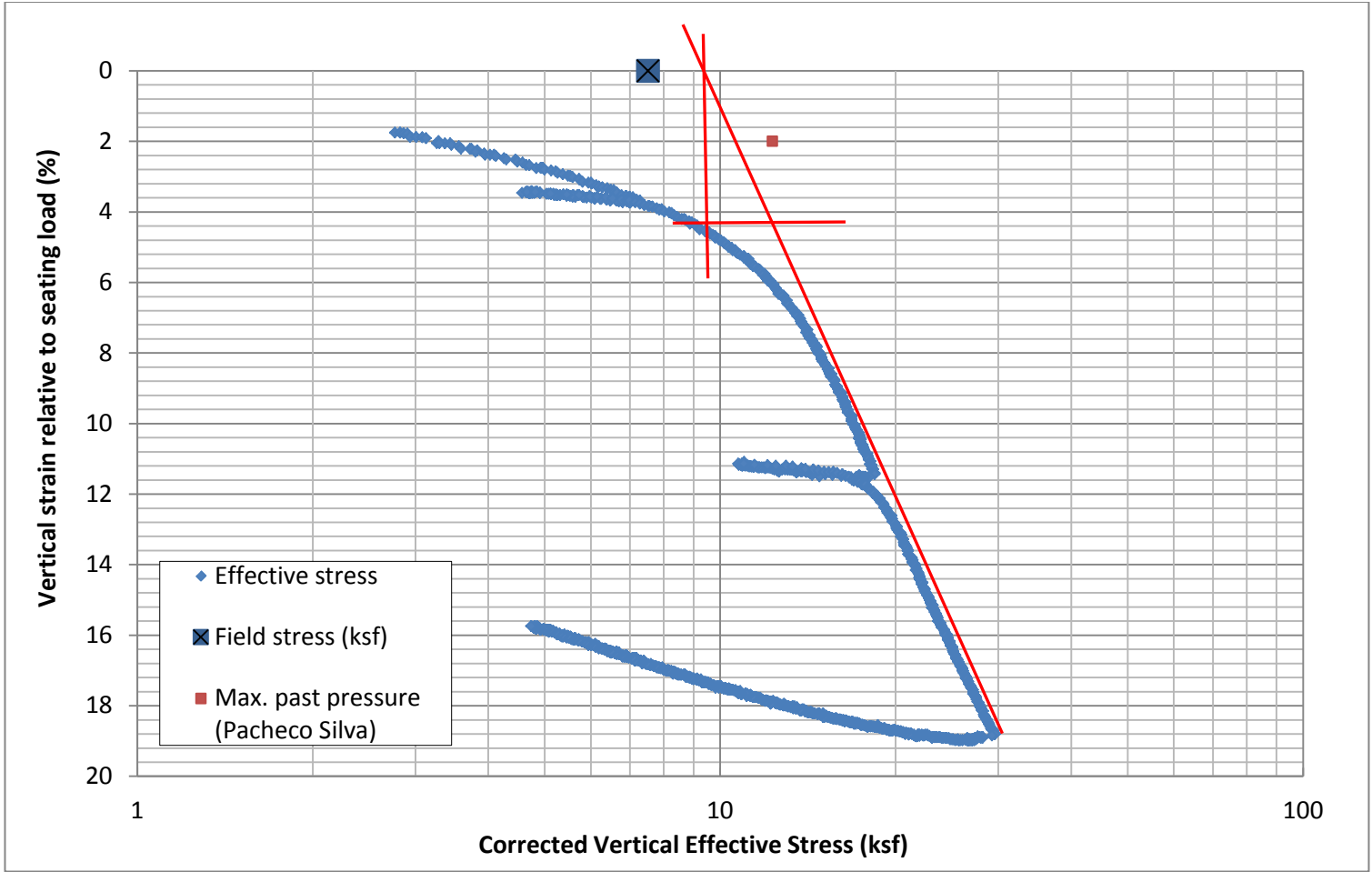
Hydraulic conductivity v. log(effective stress)

Figure: 1.5

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 152   | 50.6 |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.372 |
| Saturation                  | 101.3 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 7.52  |
| Maximum past (Pacheco Silva)       | 12.3  |
| Maximum past (Work method)         | 12.5  |

|                              |              |
|------------------------------|--------------|
| Disturbance                  |              |
| Δe / eo (%)                  | 6.6          |
| Sample quality (Lunne, 1997) | Good to Fair |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

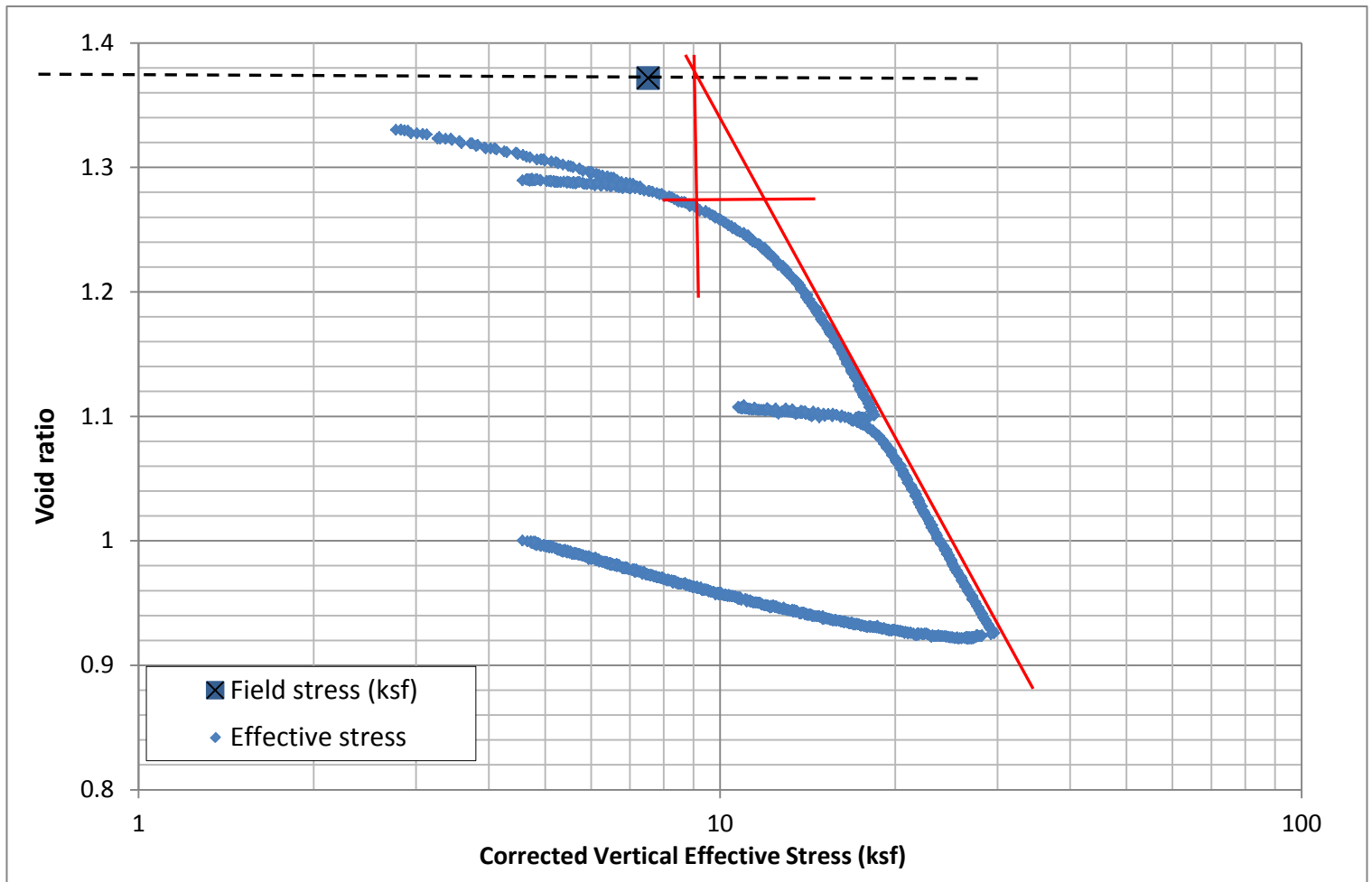
Test: B-13 at 152 ft

Figure: 2.1

Axial strain v. log (vertical effective stress)

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Constant Rate of Strain Consolidation Test  
ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 152   | 50.6 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 101.7 |
| Moist density, $\rho$ (g/cm3) | 1.724 |
| Total unit weight (pcf)       | 107.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.372 |
| Saturation                    | 101.3 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 7.52  |
| Maximum past (Pacheco Silva)       | 12.3  |
| Maximum past (Work method)         | 12.5  |

|                              |              |
|------------------------------|--------------|
| Disturbance                  |              |
| $\Delta e / e_o$ (%)         | 6.6          |
| Sample quality (Lunne, 1997) | Good to Fair |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

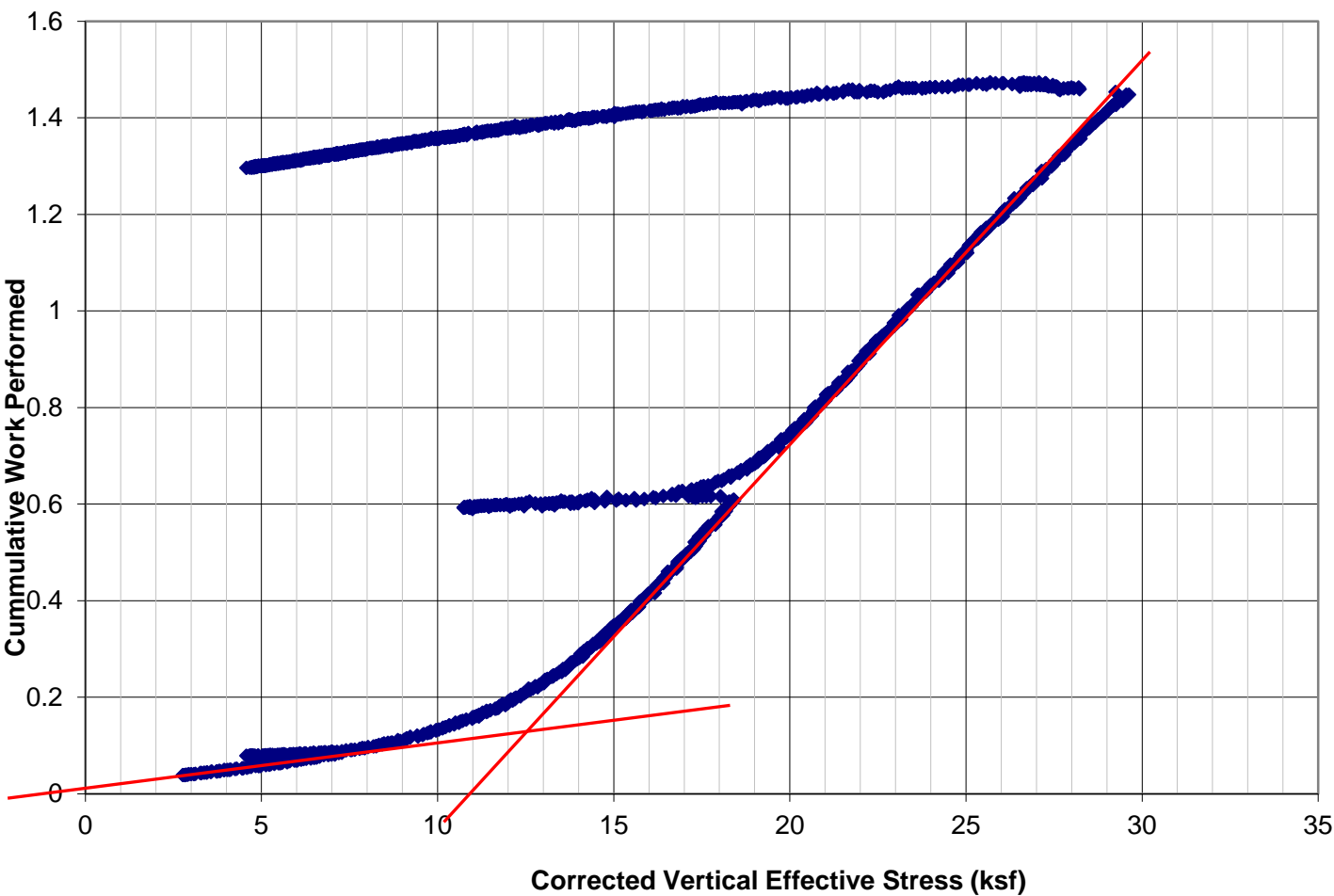
Performed by: M. Riemer  
at UCB Geotech labs

|   |                      |
|---|----------------------|
| Project: Mission Rock                         | Test: B-13 at 152 ft |
| Location:                                     |                      |
| Project Number:                               |                      |
| Void ratio v. log (vertical effective stress) | Figure: 2.2          |

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |              |      |
|----------|-------|------|------------------|----|----|---------------|--------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description  | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |              |      |
|          | 152   | 50.6 |                  |    |    |               |              |      |
|          |       |      |                  |    |    |               | Old Bay Clay |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.372 |
| Saturation                  | 101.3 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 7.52  |
| Maximum past (Pacheco Silva)       | 12.3  |
| Maximum past (Work method)         | 12.5  |

|                              |              |
|------------------------------|--------------|
| Disturbance                  |              |
| Δe / eo (%)                  | 6.6          |
| Sample quality (Lunne, 1997) | Good to Fair |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-13 at 152 ft

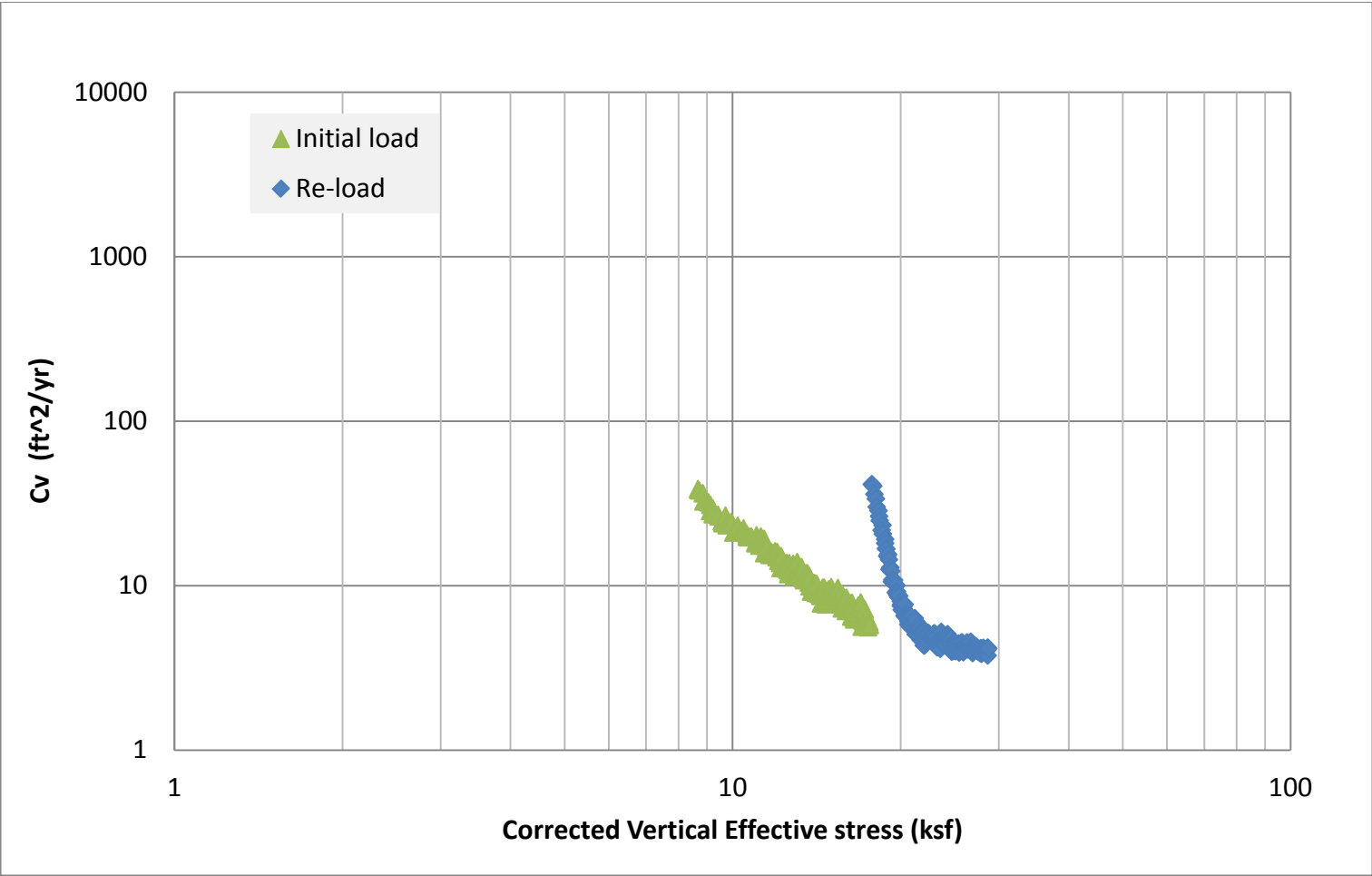
Cumulative work v. vertical effective stress  
(Becker Method)

Figure: 2.3

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 152   | 50.6 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.372 |
| Saturation                  | 101.3 |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 7.52  |
| Maximum past (Pacheco Silva)       | 12.3  |
| Maximum past (Work method)         | 12.5  |

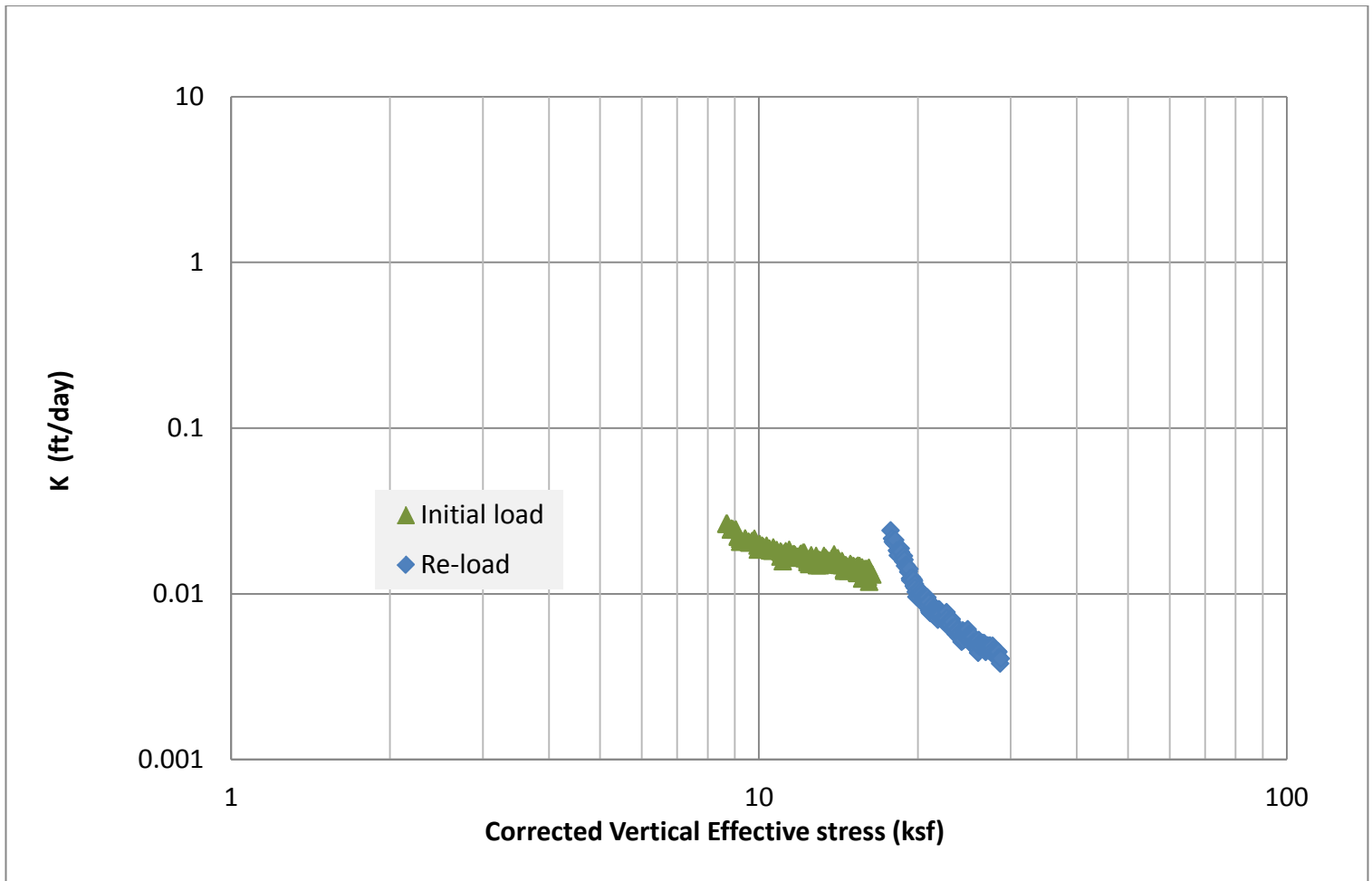
|                              |              |
|------------------------------|--------------|
| Disturbance                  |              |
| Δe / eo (%)                  | 6.6          |
| Sample quality (Lunne, 1997) | Good to Fair |

|  |                      |
|--|----------------------|
| Project: Mission Rock                    | Test: B-13 at 152 ft |
| Location:                                |                      |
| Project Number:                          |                      |
| Coeff.of Consol v. log(effective stress) | Figure: 2.4          |

Performed by: M. Riemer  
at UCB Geotech labs

# Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test  
ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 152   | 50.6 |                  |    |    |               |             |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 101.7 |
| Moist density, $\rho$ (g/cm3) | 1.724 |
| Total unit weight (pcf)       | 107.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.372 |
| Saturation                    | 101.3 |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0039 |
|-----------------------|--------|

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 7.52  |
| Maximum past (Pacheco Silva)       | 12.3  |
| Maximum past (Work method)         | 12.5  |

|                              |              |
|------------------------------|--------------|
| Disturbance                  |              |
| $\Delta e / e_o$ (%)         | 6.6          |
| Sample quality (Lunne, 1997) | Good to Fair |

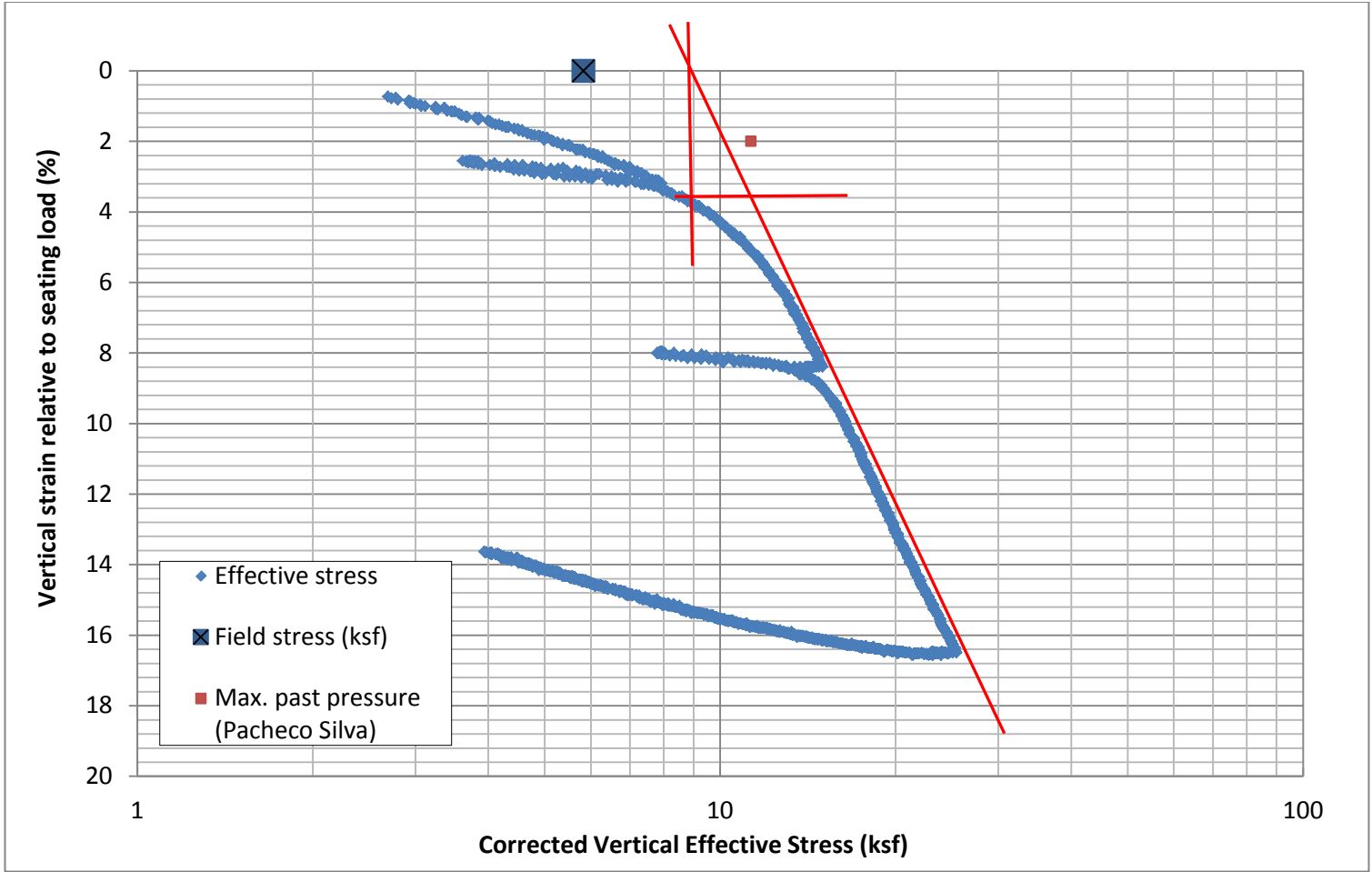
|   |                      |
|---|----------------------|
| Project: Mission Rock                           | Test: B-13 at 152 ft |
| Location:                                       |                      |
| Project Number:                                 |                      |
| Hydraulic conductivity v. log(effective stress) | Figure: 2.5          |

Performed by: M. Riemer  
at UCB Geotech labs

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Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 122   | 50.7 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.368 |
| Saturation                  | 101.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.83  |
| Maximum past (Pacheco Silva)       | 11.3  |
| Maximum past (Work method)         | 11.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 5.0  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-14 at 122 ft

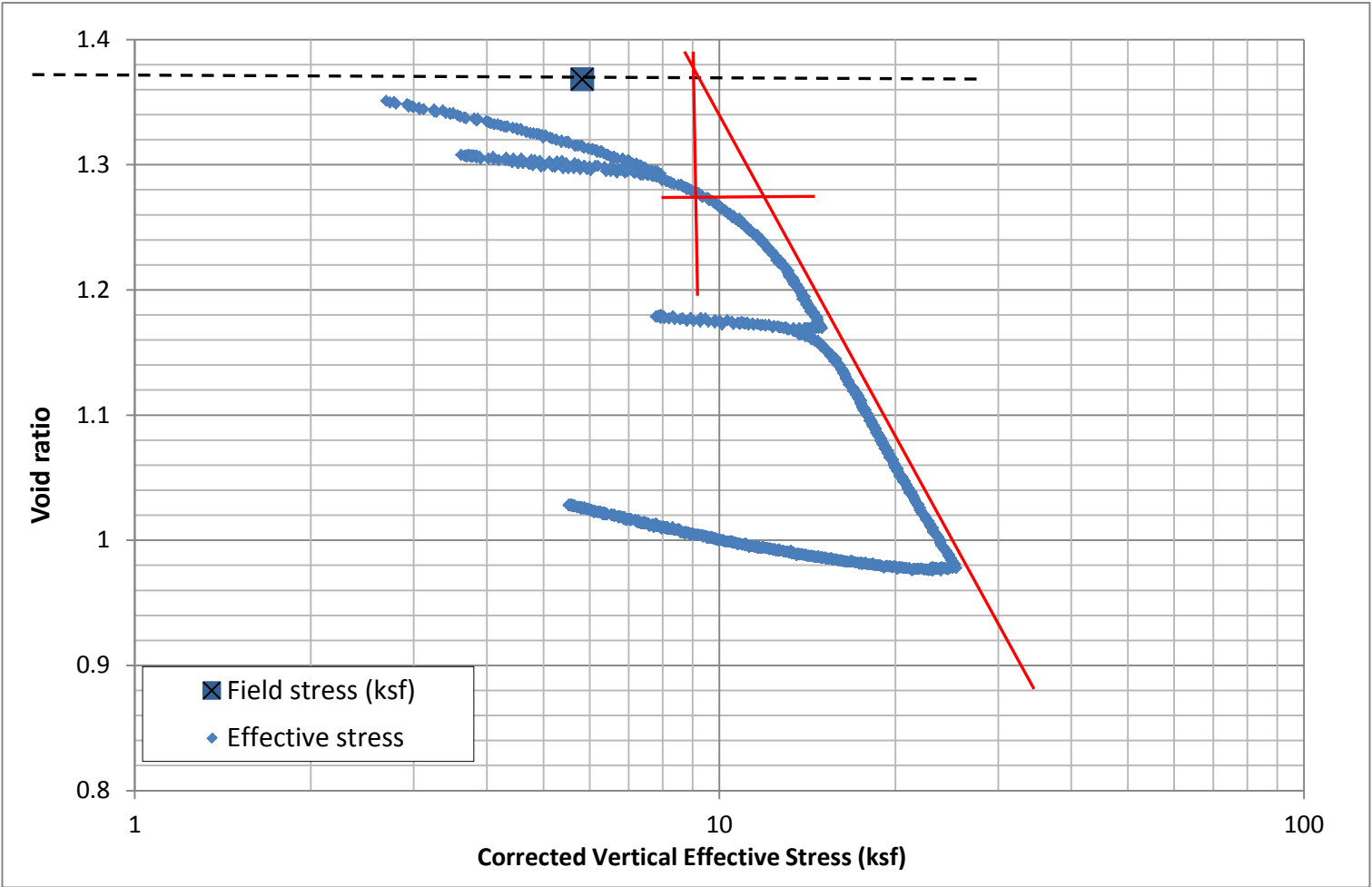
Axial strain v. log (vertical effective stress)

Figure: 3.1

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 122   | 50.7 |                  |    |    |               |             |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 101.7 |
| Moist density, $\rho$ (g/cm3) | 1.724 |
| Total unit weight (pcf)       | 107.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.368 |
| Saturation                    | 101.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.83  |
| Maximum past (Pacheco Silva)       | 11.3  |
| Maximum past (Work method)         | 11.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| $\Delta e / e_o$ (%)         | 5.0  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

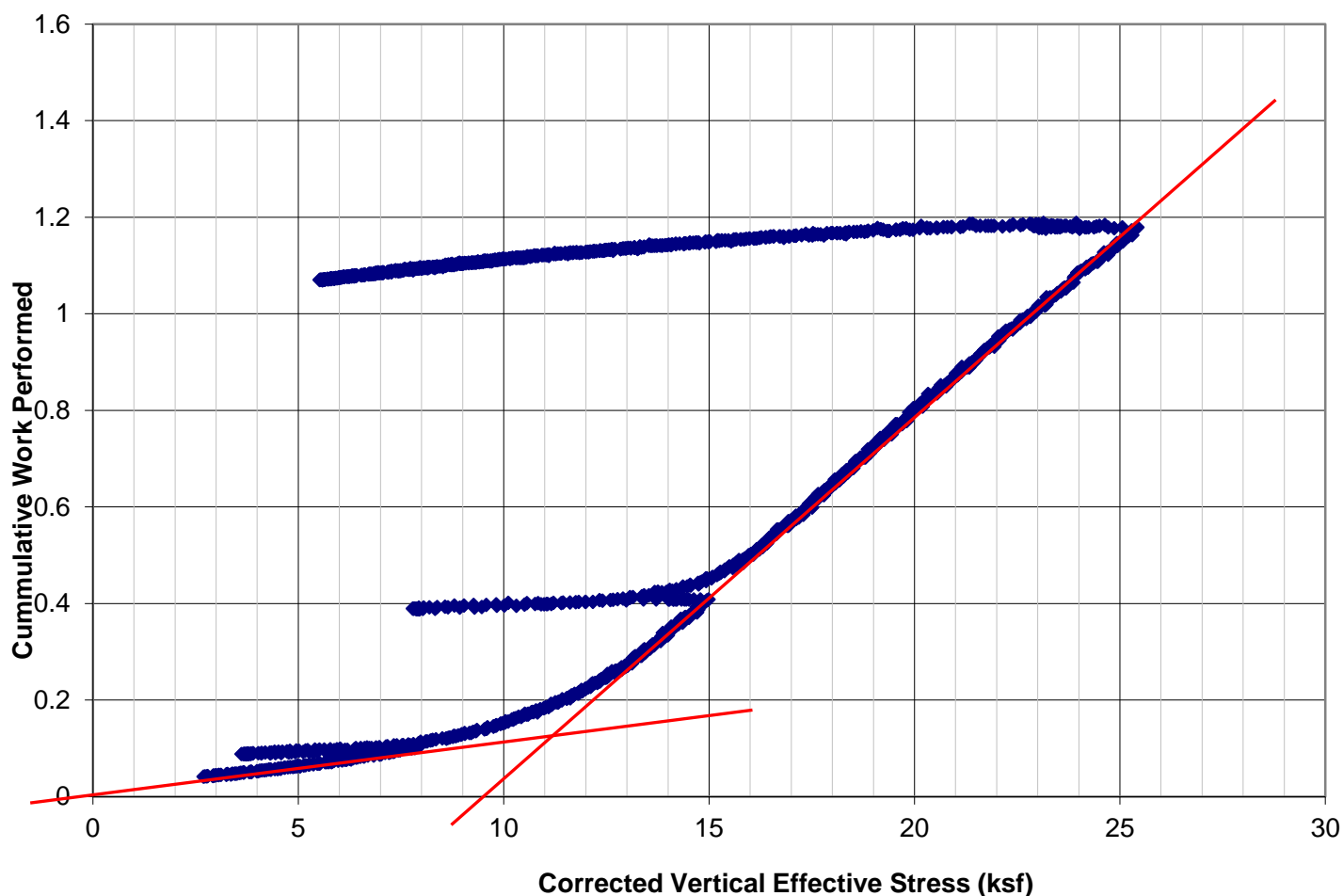
Performed by: M. Riemer  
at UCB Geotech labs

|   |                      |
|---|----------------------|
| Project: Mission Rock                         | Test: B-14 at 122 ft |
| Location:                                     |                      |
| Project Number:                               |                      |
| Void ratio v. log (vertical effective stress) | Figure: 3.2          |



# Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test  
ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 122   | 50.7 |                  |    |    |               |             |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 101.7 |
| Moist density, $\rho$ (g/cm3) | 1.724 |
| Total unit weight (pcf)       | 107.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.368 |
| Saturation                    | 101.1 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.83  |
| Maximum past (Pacheco Silva)       | 11.3  |
| Maximum past (Work method)         | 11.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| $\Delta e / e_o$ (%)         | 5.0  |
| Sample quality (Lunne, 1997) | Good |

|                       |        |
|-----------------------|--------|
| Deform. rate (mm/min) | 0.0033 |
|-----------------------|--------|

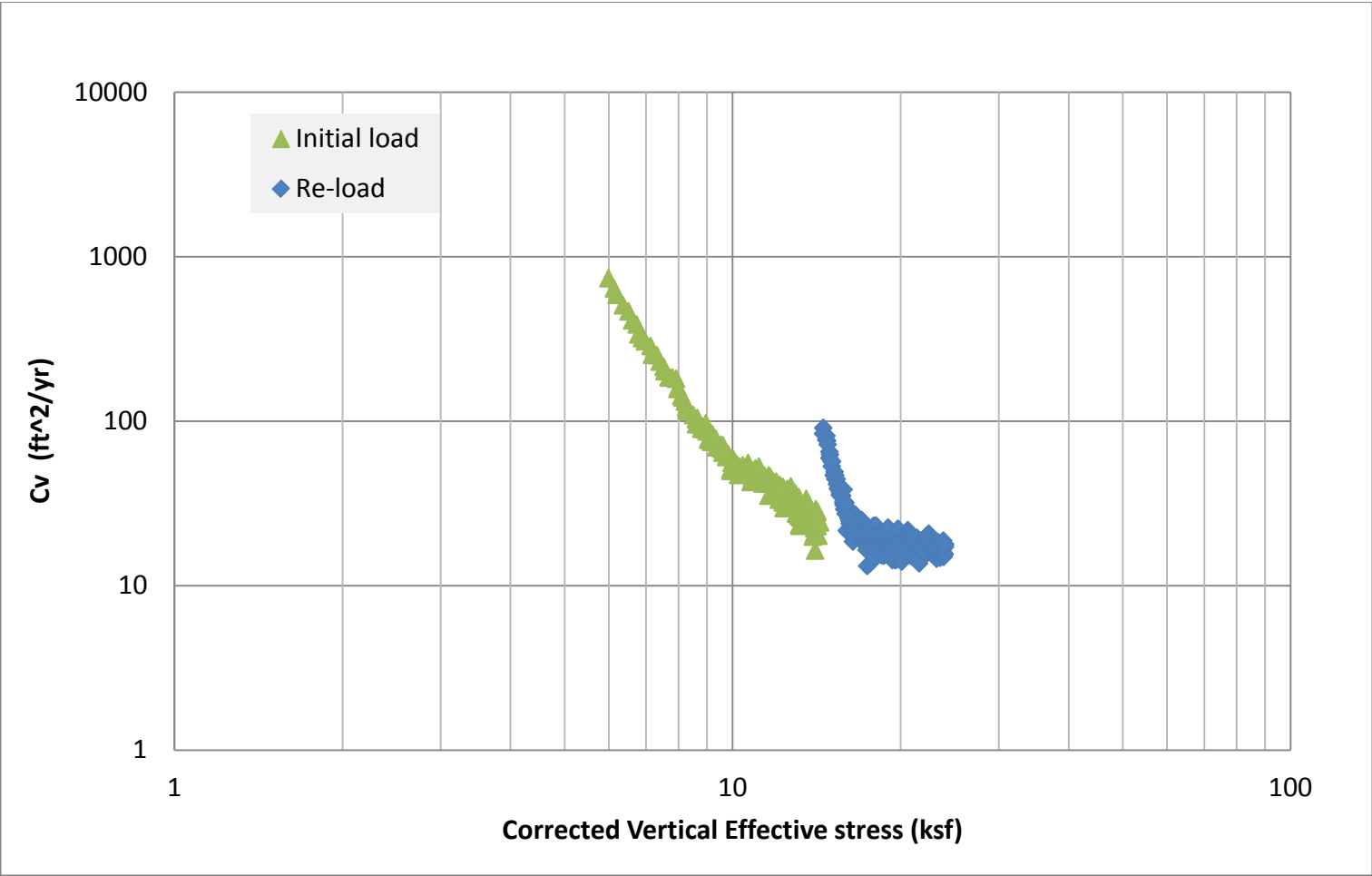
Performed by: M. Riemer  
at UCB Geotech labs

|   |                      |
|---|----------------------|
| Project: Mission Rock   | Test: B-14 at 122 ft |
| Location:   |                      |
| Project Number:   |                      |
| Cumulative work v. vertical effective stress<br>(Becker Method) | Figure: 3.3          |

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |              |      |                  |    |    |               |             |      |
|----------|--------------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth        | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)         | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 122          | 50.7 |                  |    |    |               |             |      |
|          | Old Bay Clay |      |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.368 |
| Saturation                  | 101.1 |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.83  |
| Maximum past (Pacheco Silva)       | 11.3  |
| Maximum past (Work method)         | 11.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 5.0  |
| Sample quality (Lunne, 1997) | Good |

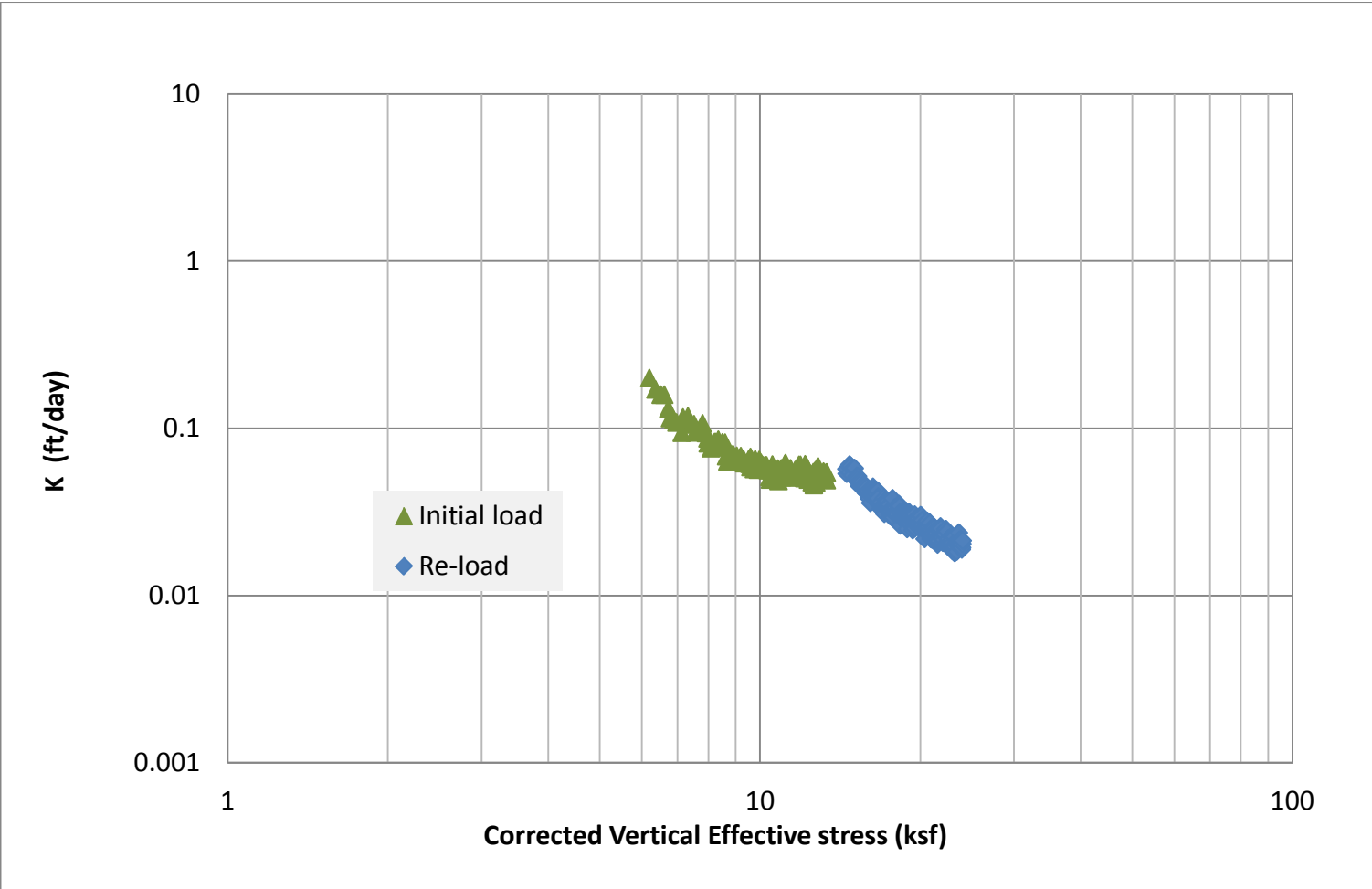
|  |                      |
|--|----------------------|
| Project: Mission Rock                    | Test: B-14 at 122 ft |
| Location:                                |                      |
| Project Number:                          |                      |
| Coeff.of Consol v. log(effective stress) | Figure: 3.4          |

Performed by: M. Riemer  
at UCB Geotech labs

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 122   | 50.7 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 101.7 |
| Moist density, ρ (g/cm3)    | 1.724 |
| Total unit weight (pcf)     | 107.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.368 |
| Saturation                  | 101.1 |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.83  |
| Maximum past (Pacheco Silva)       | 11.3  |
| Maximum past (Work method)         | 11.3  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 5.0  |
| Sample quality (Lunne, 1997) | Good |

Project: Mission Rock

Test: B-14 at 122 ft

Location:

Project Number:

Hydraulic conductivity v. log(effective stress)

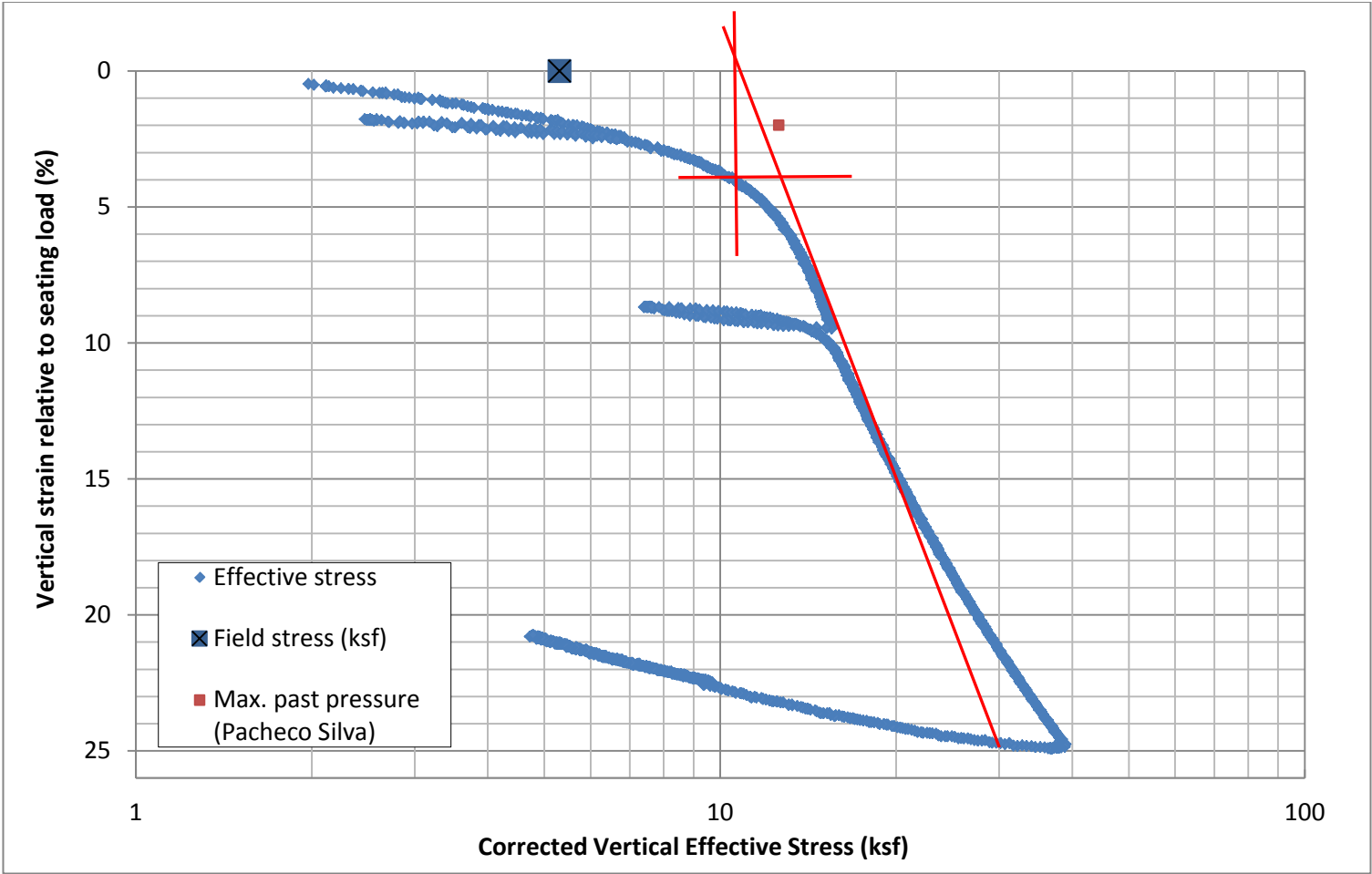
Figure: 3.5

Performed by: M. Riemer  
at UCB Geotech labs

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 107   | 60.3 |                  |    |    |               |             |      |

Old Bay Clay

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 97.9  |
| Moist density, ρ (g/cm3)    | 1.660 |
| Total unit weight (pcf)     | 103.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.619 |
| Saturation                  | 101.7 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.31  |
| Maximum past (Pacheco Silva)       | 12.6  |
| Maximum past (Work method)         | 12.4  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.6  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

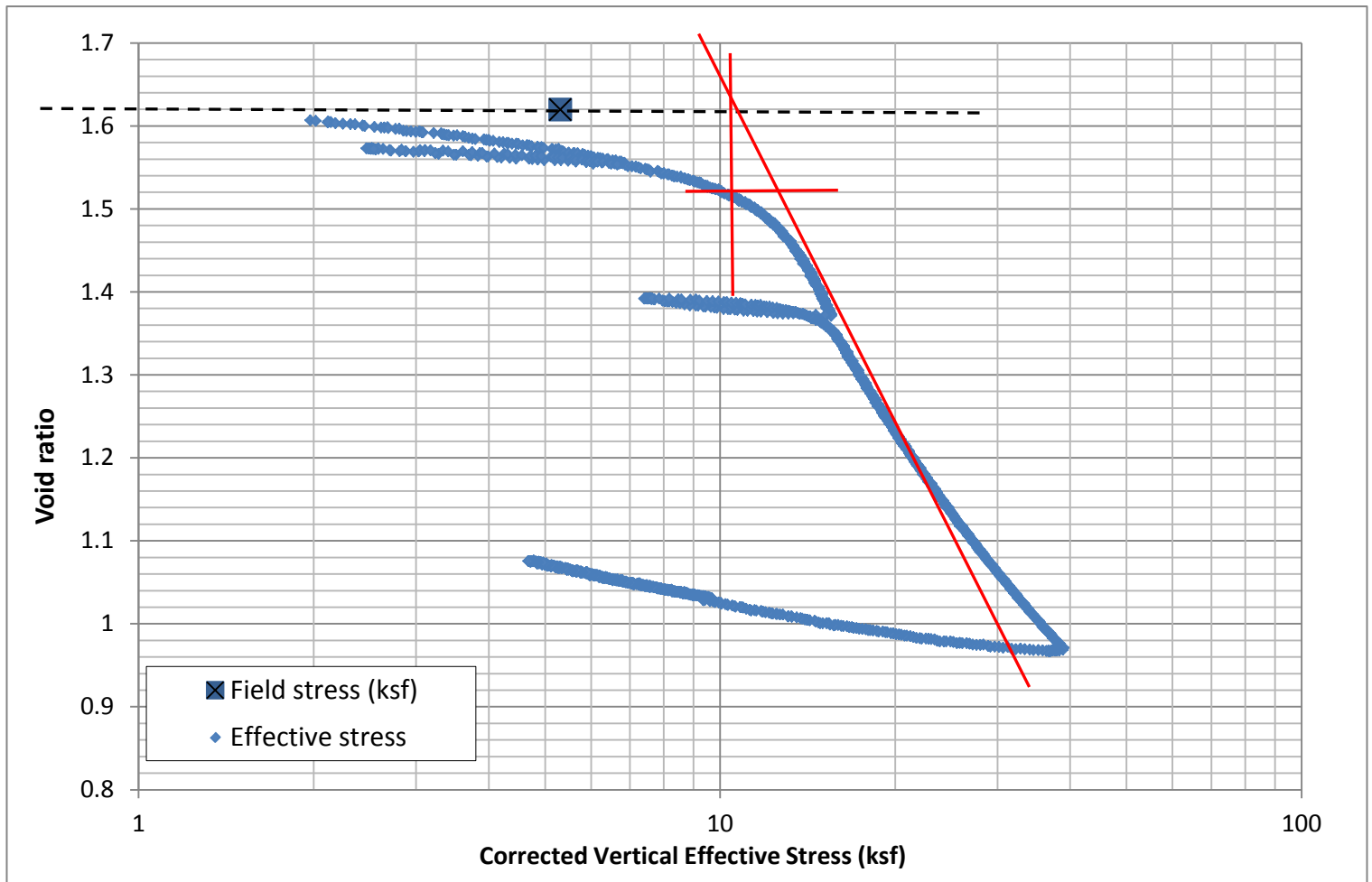
Test: B-15 at 107 ft

Axial strain v. log (vertical effective stress)

Figure: 4.1

# Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test  
ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 107   | 60.3 |                  |    |    |               |             |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 97.9  |
| Moist density, $\rho$ (g/cm3) | 1.660 |
| Total unit weight (pcf)       | 103.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.619 |
| Saturation                    | 101.7 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.31  |
| Maximum past (Pacheco Silva)       | 12.6  |
| Maximum past (Work method)         | 12.4  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| $\Delta e / e_o$ (%)         | 3.6  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

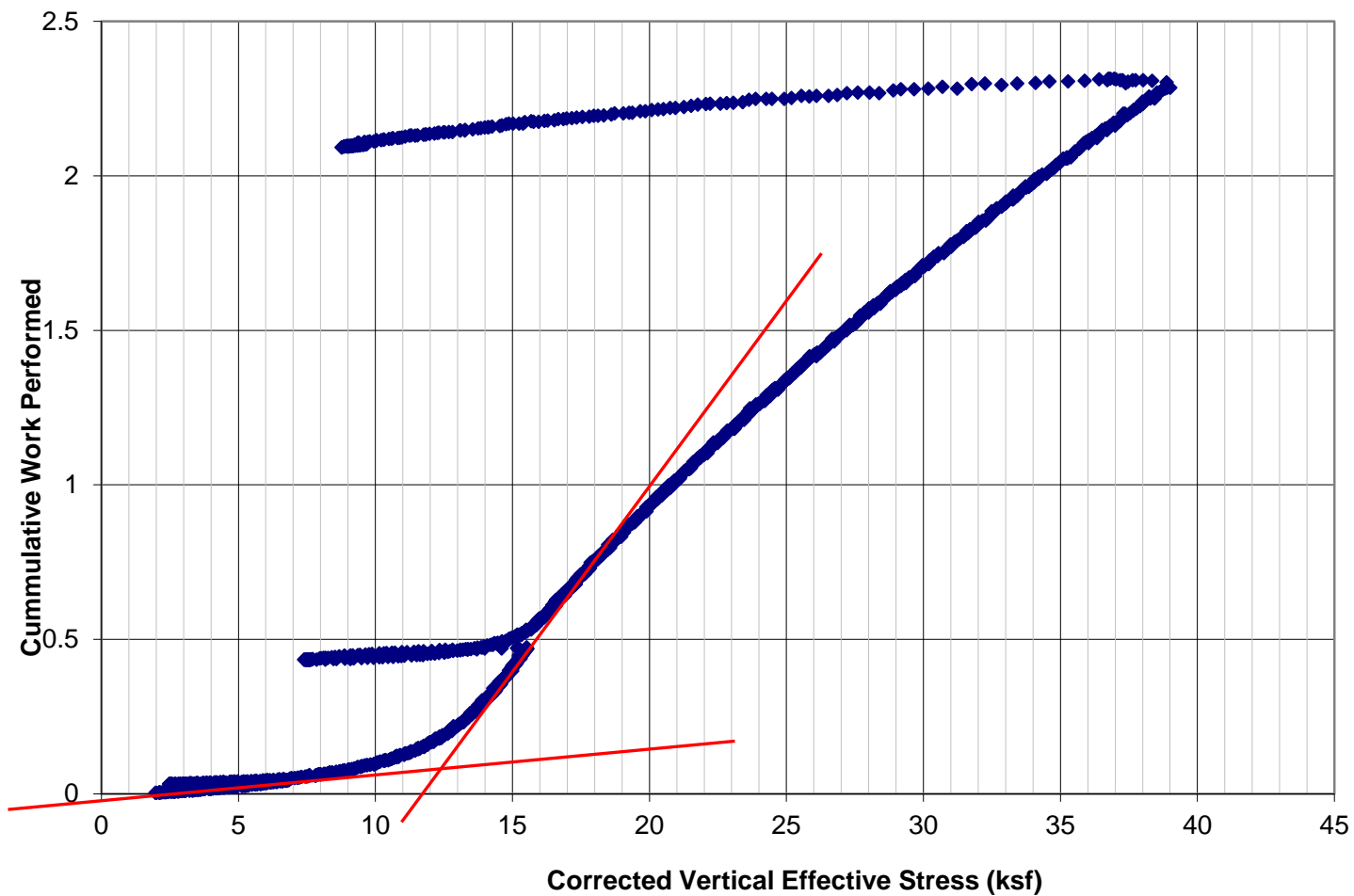
|   |                      |
|---|----------------------|
| Project: Mission Rock                         | Test: B-15 at 107 ft |
| Location:                                     |                      |
| Project Number:                               |                      |
| Void ratio v. log (vertical effective stress) | Figure: 4.2          |

Performed by: M. Riemer  
at UCB Geotech labs

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



|          |       |      |                  |    |    |               |             |      |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 107   | 60.3 |                  |    |    |               |             |      |

| Initial Specimen Properties   |       |
|-------------------------------|-------|
| Height (mm)                   | 20.25 |
| Diameter (mm)                 | 60.9  |
| Volume (cm3)                  | 58.99 |
| Moist mass (g)                | 97.9  |
| Moist density, $\rho$ (g/cm3) | 1.660 |
| Total unit weight (pcf)       | 103.6 |
| Gs (assumed)                  | 2.70  |
| Void Ratio e                  | 1.619 |
| Saturation                    | 101.7 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.31  |
| Maximum past (Pacheco Silva)       | 12.6  |
| Maximum past (Work method)         | 12.4  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| $\Delta e / e_o$ (%)         | 3.6  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-15 at 107 ft

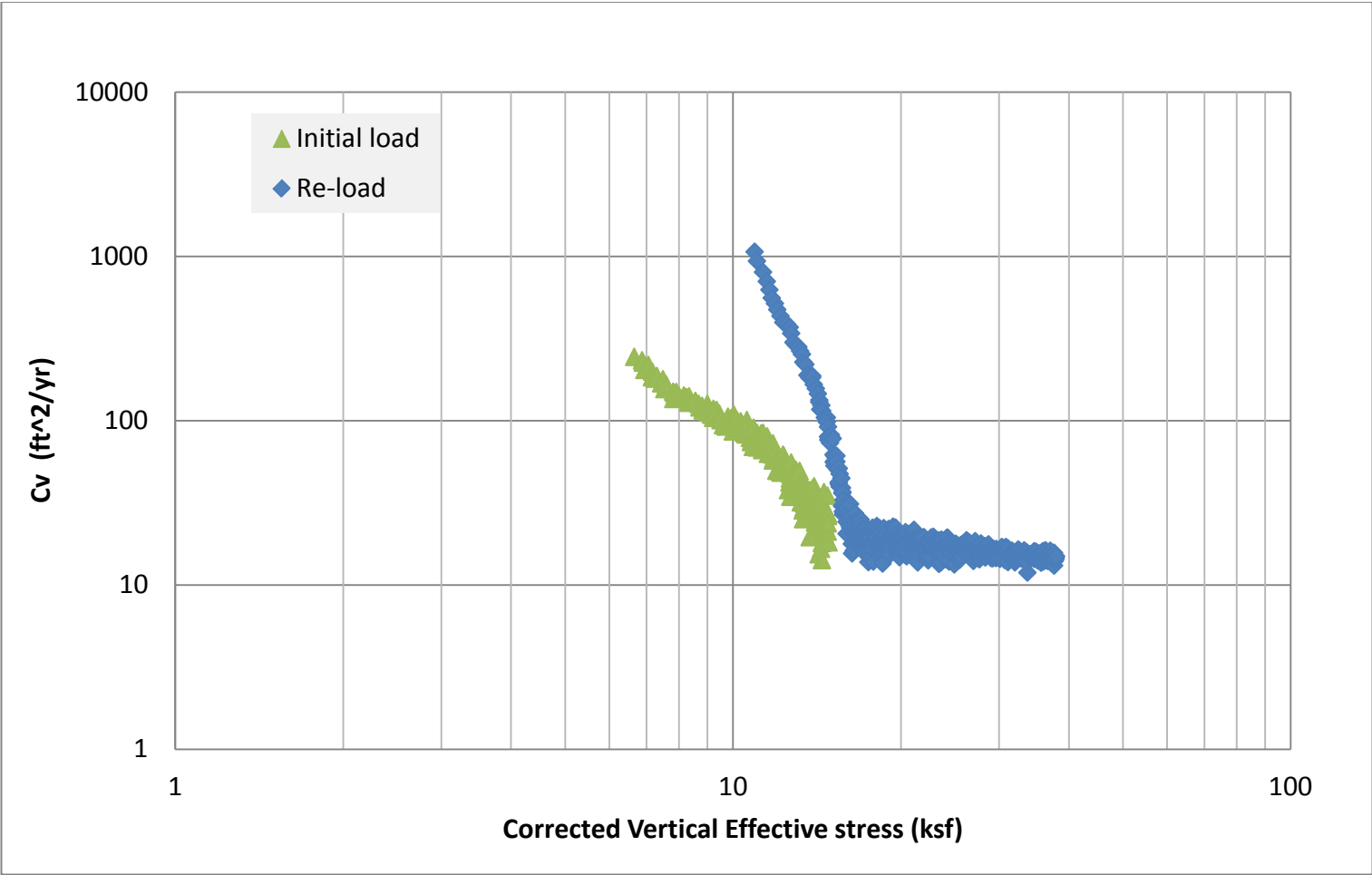
Cumulative work v. vertical effective stress  
(Becker Method)

Figure: 4.3

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 107   | 60.3 |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 97.9  |
| Moist density, ρ (g/cm3)    | 1.660 |
| Total unit weight (pcf)     | 103.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.619 |
| Saturation                  | 101.7 |

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.31  |
| Maximum past (Pacheco Silva)       | 12.6  |
| Maximum past (Work method)         | 12.4  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.6  |
| Sample quality (Lunne, 1997) | Good |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

Performed by: M. Riemer  
at UCB Geotech labs

Project: Mission Rock

Location:

Project Number:

Test: B-15 at 107 ft

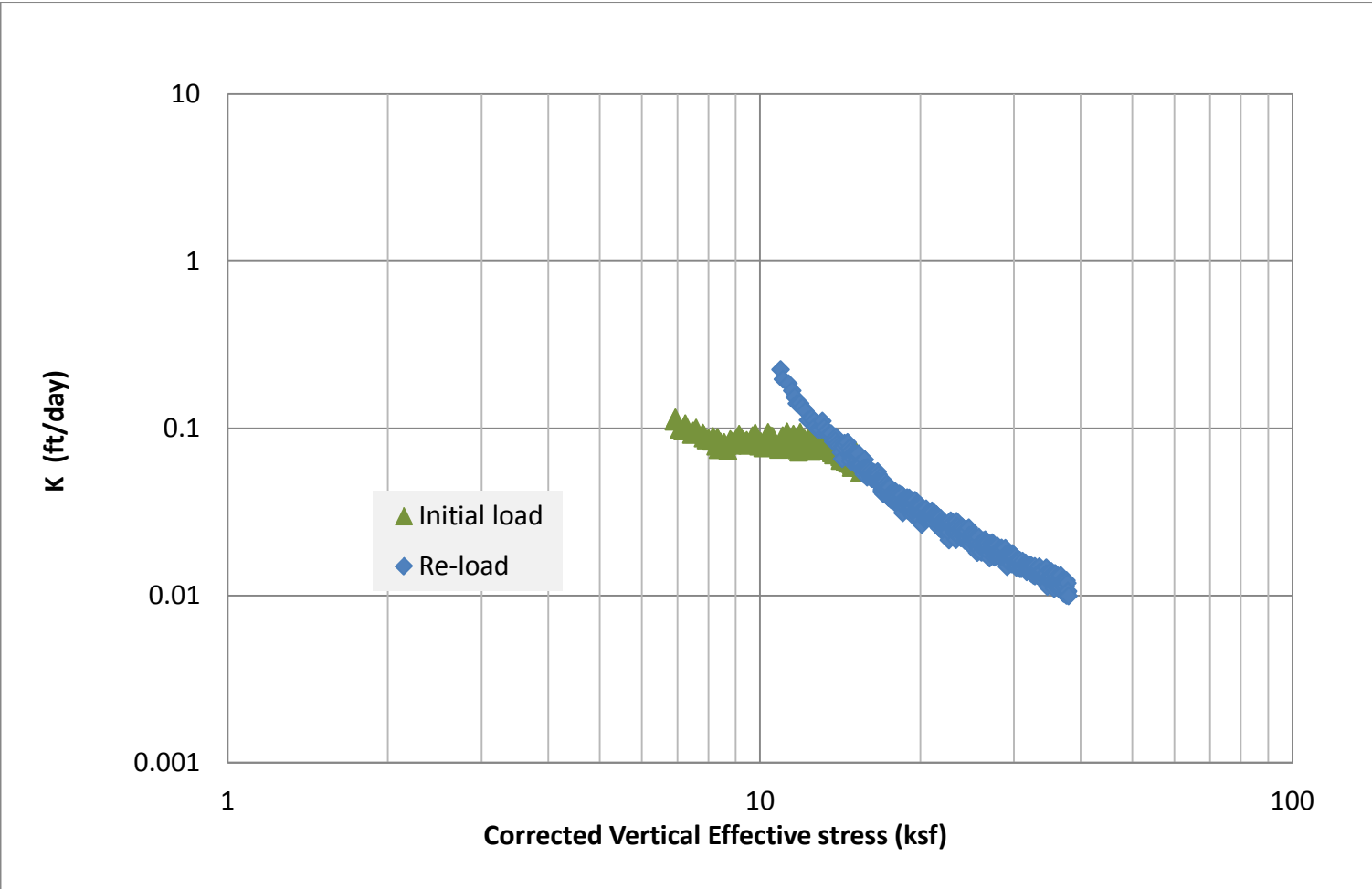
Coeff.of Consol v. log(effective stress)

Figure: 4.4

Mayor ED 17-02 Priority permit

Constant Rate of Strain Consolidation Test

ASTM D4186



| Specimen | Depth | W.C. | Atterberg Limits |    |    | Fines content | Description | USCS |
|----------|-------|------|------------------|----|----|---------------|-------------|------|
|          | (ft)  | (%)  | LL               | PL | PI | (%)           |             |      |
|          | 107   | 60.3 |                  |    |    |               |             |      |

| Initial Specimen Properties |       |
|-----------------------------|-------|
| Height (mm)                 | 20.25 |
| Diameter (mm)               | 60.9  |
| Volume (cm3)                | 58.99 |
| Moist mass (g)              | 97.9  |
| Moist density, ρ (g/cm3)    | 1.660 |
| Total unit weight (pcf)     | 103.6 |
| Gs (assumed)                | 2.70  |
| Void Ratio e                | 1.619 |
| Saturation                  | 101.7 |

|                       |       |
|-----------------------|-------|
| Deform. rate (mm/min) | 0.003 |
|-----------------------|-------|

| Stresses                           | (ksf) |
|------------------------------------|-------|
| Estimated vertical field effective | 5.31  |
| Maximum past (Pacheco Silva)       | 12.6  |
| Maximum past (Work method)         | 12.4  |

|                              |      |
|------------------------------|------|
| Disturbance                  |      |
| Δe / eo (%)                  | 3.6  |
| Sample quality (Lunne, 1997) | Good |

Project: Mission Rock

Location:

Project Number:

Test: B-15 at 107 ft

Hydraulic conductivity v. log(effective stress)

Figure: 4.5

Performed by: M. Riemer  
at UCB Geotech labs



# ***Mayor ED 17-02 Priority permit***

## **APPENDIX D**

### **SOIL CORROSIVITY EVALUATION AND RECOMMENDATIONS**

# Mayor ED 17-02 Priority permit



*Protecting the infrastructure  
through innovative  
Corrosion Engineering Solutions*

September 12, 2018

Langan  
555 Montgomery St # 1300  
San Francisco, CA 94111

Attention: **Mr. Peter Brady, P.E.**  
**Project Manager**

Subject: **Soil Corrosivity Evaluation & Recommendations for Corrosion Control  
Underground Piping Systems, Concrete Foundations and Piles  
Mission Rock Development  
San Francisco, CA**

Dear Mr. Brady,

Pursuant to your request, **JDH Corrosion Consultants, Inc.** has conducted a site corrosivity evaluation for the above referenced project site and we have provided herein recommendations for long-term corrosion control for the proposed materials of construction for the underground utilities, concrete foundations and piles at this site.

## Purpose

The purpose for this evaluation is to determine the corrosion potential, resulting from the soils at the subject site and to provide recommendations for long-term corrosion control for the pipelines, steel or concrete piles, concrete foundations and buried metallic utilities.

## Background

The proposed will be a mixed-use development comprising of both residential and commercial buildings as well as several acres of open space. The structures will be supported on steel piles and there will be buried utilities associated with the development.

# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

## Soil Testing and Analysis

### Soil Testing Results

Four (4) soil samples were collected from the project site by Langan field personnel and they were transported to a state certified testing laboratory, **CERCO Analytical, Inc.** (certificate no. 2153) located in Concord, CA for chemical analysis. Each sample was analyzed for pH, chlorides, resistivity (@ 100% saturation), sulfates, sulfides and Redox potential using ASTM test methods as detailed in the table below. The preparation of the soil samples for chemical analysis was in accordance with the applicable specifications.

#### Soil Analysis Test Methods

| Chemical Analysis             | ASTM Method |
|-------------------------------|-------------|
| Chlorides                     | D4327       |
| pH                            | D4972       |
| Resistivity (100% Saturation) | G57         |
| Sulfate                       | D4327       |
| Redox Potential               | D1498       |
| Sulfide                       | D4658M      |

The results of the chemical analysis are provided in the CERCO Analytical, Inc. reports dated July 20, 2018. The results are summarized as follows:

#### CERCO Analytical, Inc. Soil Laboratory Analysis

| Chemical Analysis             | Range of Results   | Corrosion Classification*                   |
|-------------------------------|--------------------|---|
| Chlorides                     | 54 – 2,600 (mg/kg) | Non-corrosive to Severely Corrosive *       |
| pH                            | 7.93 – 9.34        | Non corrosive*                              |
| Sulfide                       | None Detected      | Non-corrosive**                             |
| Resistivity(@100% saturation) | 94 – 2,200 ohms-cm | Severely Corrosive to Moderately Corrosive* |
| Sulfate                       | N.D.– 150 (mg/kg)  | Non-corrosive**                             |
| Redox Potential               | -66.8 - +170 mV    | Severely Corrosive to Corrosive*            |

\* With respect to bare steel or ductile iron.

\*\* With respect to mortar coated steel

# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

## Chemical Testing Analysis

The chemical analysis provided by **CERCO Analytical, Inc.** indicates that based on this soil data, the soils are generally classified as “severely corrosive to moderately corrosive” based on the resistivity measurements. The chloride levels indicate “non-corrosive to severely corrosive” conditions to steel and ductile iron. The sulfate levels indicate “non-corrosive” conditions for concrete structures placed in the soils with regard to sulfate attack. The pH of the soils ranges from slightly acidic to alkaline which classifies them as “non-corrosive” to buried steel and concrete structures.

## In-Situ Soil Resistivity Measurements

The in-situ resistivity of the soil was measured at five (5) locations at the project site by **JDH Corrosion Consultants, Inc.** field personnel. Resistance measurements were conducted with probe spacing of 2.5, 5, 7.5, 10, and 15-feet at each location. For analysis purposes we have calculated the resistivity of soil layers 0-2.5', 2.5-5', 5-7.5', 7.5-10', and 10-15' using the Barnes Method as follows:

$$\rho_{b-a} = KR (b-a)$$

Where;

|              |   |  |
|--------------|---|--|
| $\rho_{b-a}$ | = | soil resistivity of layer depth b-a (ohm-cm) |
| a            | = | soil depth to top layer (ft)                 |
| b            | = | soil depth to bottom layer (ft)              |
| $R_a$        | = | soil resistance read at depth a (ohms)       |
| $R_b$        | = | soil resistance read at depth b (ohms)       |
| $R_{b-a}$    | = | resistance of soil layer from a to b (ft)    |
| K            | = | layer constant = $60.96\pi(b-a)$ (cm)        |

$$\text{and } \frac{1}{R_{b-a}} = \frac{1}{R_a} - \frac{1}{R_b}$$

The visual diagrams below describe the Wenner 4-pin testing configuration.

## Site Corrosivity Evaluation Mission Rock Development, San Francisco, CA

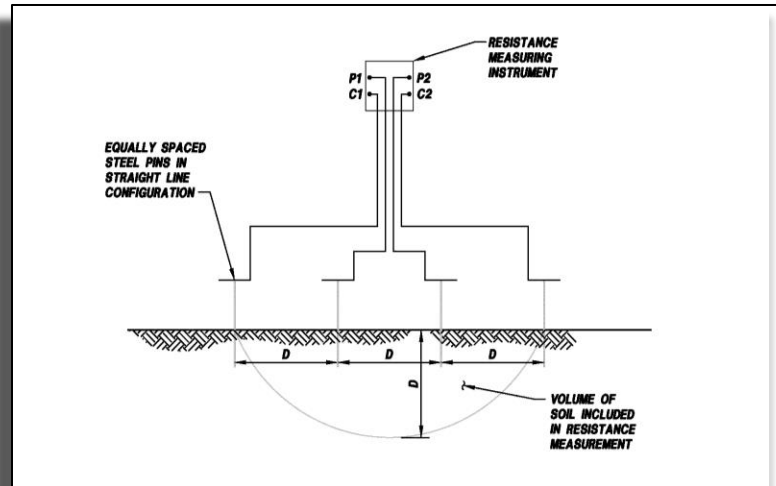


Fig 1: Wenner 4-Pin Resistivity Schematic No.1

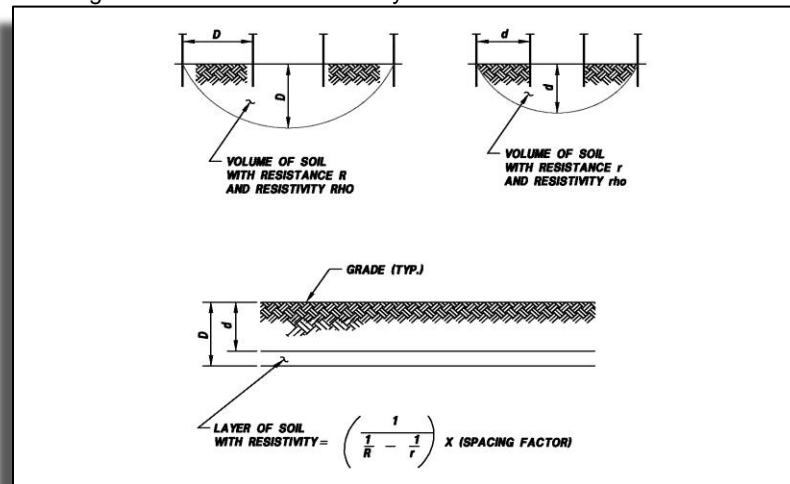


Fig 2: Illustration of Barnes Layer Calculations

### In-Situ Soil Resistivity Analysis

Corrosion of a metal is an electro-chemical process and is accompanied by the flow of electric current. Resistivity is a measure of the ability of a soil to conduct an electric current and is, therefore, an important parameter in consideration of corrosion data. Soil resistivity is primarily dependent upon the chemical content and moisture content of the soil mass.

The greater the amount of chemical constituents present in the soil, the lower the resistivity will be. As moisture content increases, resistivity decreases until maximum solubility of dissolved chemicals is attained. Beyond this point, an increase in moisture content results in dilution of the chemical concentration and resistivity increases. The corrosion rate of steel in soil normally increases as resistivity decreases. Therefore, in any particular group of soils, maximum corrosion will generally occur in the lowest resistivity areas. The following classification of soil corrosivity, developed by William J. Ellis<sup>1</sup>, is used for the analysis of the soil data for the project site.

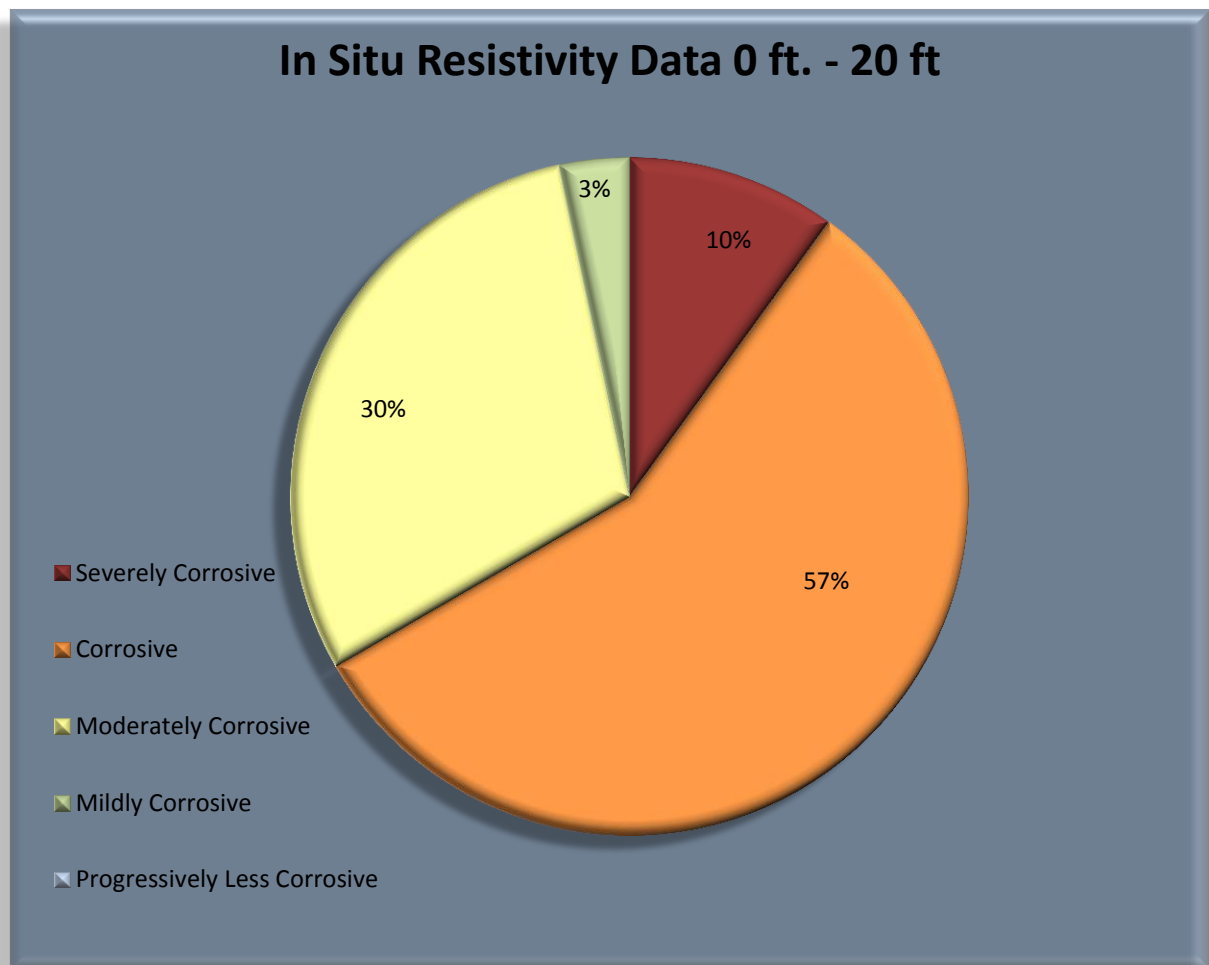
# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

| <u>Resistivity (Ohm-cm)</u> | <u>Corrosivity Classification</u> |
|-----------------------------|-----------------------------------|
| 0 – 500                     | Very Corrosive                    |
| 501 – 2,000                 | Corrosive                         |
| 2,001 – 8,000               | Moderately Corrosive              |
| 8,001 – 32,000              | Mildly Corrosive                  |
| > 32,000                    | Progressively Less Corrosive      |

The above classifications are appropriate for the project site and the results are presented in the graphs below. In general, the soils are classified as “severely corrosive to moderately corrosive” with respect to corrosion of buried steel structures throughout the top 0 to 20 feet of the site.

The chart of the in-situ soil resistivity data for the soil layers 0 to 20 feet indicate that 10% of the soils are classified as “severely corrosive”, 57% of the soils are “corrosive”, 30% of the soils are classified as “moderately corrosive” and 3% of the soils are classified as “mildly corrosive”.



# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

## Discussion

### Sub-grade Reinforced Concrete Walls and Floors

#### **Reinforced Concrete In Contact With Fill Soils**

The presence of water-soluble sulfate ions in the soils tested in the fill zone of the soil at the site was at a relatively low level. As such, Type II cement can be utilized for the concrete foundations that do not extend beyond the fill soil zone. It is recommended that the water/cement ratio should not exceed 0.55 in order to achieve a dense concrete, with a minimum depth of cover of 3" over the reinforcing bars, especially in the areas where the foundation is more than a few feet deep.

#### **Reinforced Concrete In Contact With Bay Mud**

The presence of water-soluble sulfate ions in the soils tested in the fill zone of the soil at the site was at a relatively low level. As such, Type II cement can be utilized for the concrete foundations. However the soils are corrosive and the chloride levels are severely high. In order to slow the ingress of aggressive ions, it is recommended that the water/cement ratio should not exceed 0.40 in order to achieve a dense concrete, with a minimum depth of cover of 3" over the reinforcing bars, especially in the areas where the foundation is more than a few feet deep.

### Piles

#### **Pre-stressed Pre-cast Reinforced Concrete Piles**

The pre-stressed, pre-cast concrete piles will pass through the aggressive Bay Mud. It is therefore recommended that Type II cement should be utilized. The water/cement ratio should not exceed 0.35 in order to achieve a dense concrete, with a minimum depth of cover of 2" over the pre-stressing wires. Also, a mineral admixture shall be added to the concrete mix.

#### **Bare Steel Piles**

Due to the corrosive soils being encountered, the piles are expected to experience significant corrosion, especially in the top 30 feet. It is therefore recommended to use a corrosion allowance on all exposed surfaces of the piles. In addition the use of coatings and cathodic protection may be required, depending upon the specific design of the structure.

### Underground Metallic Pipelines

The fill soils at the project site are considered to be "corrosive" to ductile/cast iron, steel and dielectric coated steel. Therefore, we recommend the use of coatings, and/or polyethylene encasement, supplemented with cathodic protection for direct buried metallic pressure piping such as domestic and fire water pipelines. All underground pipelines should also be

# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

electrically isolated from above grade structures, reinforced concrete structures and copper lines in order to minimize potential galvanic corrosion problems.

## Recommendations

### Sub-grade Reinforced Concrete Walls and Floors

#### **Fill Soils**

For application in reinforced concrete slab foundations, we recommend using a Type II modified cement mix with a maximum water-to-cement ratio of 0.55 and a minimum depth of cover for the reinforcing steel of 3-inches.

#### **Bay Mud**

For application in reinforced concrete slab foundations, we recommend using a Type II modified cement mix with a maximum water-to-cement ratio of 0.40 and a minimum depth of cover for the reinforcing steel of 3-inches. Also, a mineral admixture shall be added to the concrete mix. The amount of mineral admixture shall be 25% of the total amount of the cementitious material used in the concrete mix and shall be comprised of 80% by mass mineral admixture conforming to ASTM Designation: C618 type F or N and 20% by mass mineral admixture meeting ASTM Designation: C 1240.

Also, a calcium nitrite corrosion inhibitor shall be added to the concrete mix. The amount of inhibitor added to the concrete mix will be determined by whether a vapor guard is installed between the soil and concrete. 4 gallons per cubic yard of calcium nitrite inhibitor shall be added to the concrete mix, if the vapor guard is **not** installed. If the vapor guard is installed, 2 gallons per cubic yard shall be added.

### Piles

#### **Pre-stressed Pre-cast Reinforced Concrete Piles**

It is recommended that Type II cement should be utilized. The water/cement ratio should not exceed 0.35 in order to achieve a dense concrete, with a minimum depth of cover of 2" over the pre-stressing wires. Also, a mineral admixture shall be added to the concrete mix. The amount of mineral admixture shall be 25% of the total amount of the cementitious material used in the concrete mix and shall be comprised of 80% by mass mineral admixture conforming to ASTM Designation: C618 type F or N and 20% by mass mineral admixture meeting ASTM Designation: C 1240.

#### **Bare Steel Piles**

It is recommended to use a corrosion allowance on all exposed surfaces of the piles for the top 30 feet of the piles at a minimum. The exact length of the pile requiring the corrosion allowance will vary depending upon the design of the structure and the specific soils



# Mayor ED 17-02 Priority permit

## Site Corrosivity Evaluation Mission Rock Development, San Francisco, CA

conditions for the subject piles. The amount of corrosion allowance (i.e. thickness) to be added to the piles is dependent upon the type of pile being used and the desired design life for the subject piles as provided in the following table:

**Total Added Thickness for Corrosion Allowance**

| Pile Type      | 50-yr Design Life | 75-yr Design Life  | 100-yr Design Life |
|----------------|-------------------|--------------------|--------------------|
| Pipe Type Pile | (1/16") .0625-in. | (3/32") .09375-in. | (1/8") .125-in.    |
| H-piles        | (1/8") .125-in.   | (3/16") .1875-in.  | (1/4") .25-in.     |

A dielectric barrier such as a 10-mil thick polyethylene sheet should also be installed between the pile cap or reinforced concrete foundation and the soil underneath to minimize the effects of the galvanic cell between steel in soil and steel in concrete. In addition the possible use of coatings and cathodic protection should be considered, depending upon the specific design of the steel supports.

### **Ductile Iron Pipe (Pressure Piping such as Domestic Water and Fire)**

1. Direct buried ductile iron pipe should be encased in 8-mil polyethylene as specified in AWWA specification C-105. Epoxy coatings are also an acceptable alternative type of coating system for the pipe and/or fittings such as valves.
2. All rubber gasket joints, fusion-bonded epoxy coated flanges and flexible couplings on ductile iron pipelines should be bonded with insulated copper cable to insure electrical continuity of the pipeline and fittings.
3. Insulating flanges and/or couplings should be installed to electrically isolate the buried portion of pipeline from other metallic pipelines, reinforced concrete structures and above grade buildings or structures.
4. Test stations shall be installed on all ductile iron pipelines at a spacing of 800 to 1,000 feet. Bonding and test stations shall comply with NACE Standards.
5. A sacrificial type of cathodic protection utilizing **high-potential magnesium** anodes should be installed to protect the entire length of buried metallic pipeline. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the pipeline.
6. As an alternate, non-metallic piping may be used in lieu of ductile iron piping as allowed by State and local codes. Non-metallic piping does not require the implementation of any special type of corrosion prevention measures. However, all metallic valves, fittings and appurtenances on non-metallic piping will require protection as specified below.

### **Ductile Iron Fittings & Metallic Valves (On Plastic Pressure Piping)**

1. All direct buried ductile iron fittings installed on non-metallic piping shall be provided with a bituminous coating from the factory and encased in an 8-mil polyethylene bag in the field in accordance with AWWA Specification C-105. All bolts, restraining rods, etc. shall be coated with bitumastic prior to encasement in the polyethylene bag.

# Mayor ED 17-02 Priority permit

## Site Corrosivity Evaluation

Mission Rock Development, San Francisco, CA

2. All metallic valves shall be coated from the factory (i.e. using powdered epoxy or equivalent type of coating system) and all bolts shall be coated with bitumastic in the field and the entire valve shall be encased in an 8-mil polyethylene bag in accordance with AWWA Specification C-105.
3. A sacrificial type of cathodic protection utilizing **high-potential magnesium** anodes should be installed to protect the valves and fittings. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the pipeline.

### **Cast Iron (Gravity Sewer and Storm Drain Lines)**

1. Sewer and storm drain lines that will be routed underneath a concrete foundation should be encased in 8-mil polyethylene as specified in AWWA specification C-105. Any lines outside the footprint of the building do not require any special corrosion control measures.

### **Steel Pipelines (Natural Gas Pipelines & Risers)**

1. A fusion-bonded epoxy coating system or a suitable tape coating should be applied to all buried steel pipelines in accordance with ANSI/AWWA C214-95, "AWWA Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines." Also, a tape coating per AWWA Standard C209-95 is recommended for special sections, connections and fittings.
2. Insulating flanges and/or couplings should be installed to electrically isolate the buried portions of steel pipelines from other metallic pipelines, reinforced concrete structures and above grade structures.
3. All rubber gasket joints, fusion epoxy coated flanges and flexible couplings should be bonded with insulated copper cable to insure electrical continuity of the pipeline and fittings.
4. A sacrificial type of cathodic protection using **high-potential magnesium** anodes should be installed to protect the buried portions of steel pipelines used for the natural gas piping systems. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the subject pipeline.
5. As an alternate, non-metallic piping may be used in lieu of steel piping as allowed by State and local codes. Non-metallic piping does not require the implementation of any special type of corrosion prevention measures.

### **Copper Water Pipelines (Service Lines)**

1. All copper water laterals shall be provided with a polyethylene sleeve to effectively isolate the copper piping from the earth.
2. All copper water laterals shall be electrically isolated from metallic water mains via the use of insulating type corporation stops installed at the water main.

# Mayor ED 17-02 Priority permit

Site Corrosivity Evaluation  
Mission Rock Development, San Francisco, CA

## LIMITATIONS

*The conclusions and recommendations contained in this report reflect the opinion of the author of this report and are based on the information and assumptions referenced herein. All services provided herein were performed by persons who are experienced and skilled in providing these types of services and in accordance with the standards of workmanship in this profession. No other warranties or guarantees either expressed or implied are provided.*

We thank you for the opportunity to be of assistance on this important project. If you have any questions concerning this report or the recommendations provided herein, please feel free to contact us at (925) 927-6630.

Respectfully submitted,

*Brendon Hurley*

Brendon Hurley  
JDH Corrosion Consultants, Inc.  
Field Technician

*Mohammed Ali*

Mohammed Ali, P.E.  
JDH Corrosion Consultants, Inc.  
Principal



CC: File 18153

## REFERENCES

1. Ellis, William J., Corrosion of Concrete Pipelines, Western States Corrosion Seminar, 1978
2. AWWA Manual of Water Supply Practices - M27, First Edition, External Corrosion - Introduction to Chemistry and Control (Denver, CO: 1987)
3. National Association of Corrosion Engineers, Standard Recommended Practice, SP 01-69-13, Control of External Corrosion on underground or Submerged Pipeline

Date of Report: 20-Jul-2018

Authorization: Chain of Custody

Date of Report: 20-Jul-2018

## Page No. 1

|                  |             |             |             |             |             |                              |             |
|------------------|-------------|-------------|-------------|-------------|-------------|------------------------------|-------------|
| Method:          | ASTM D1498  | ASTM D4972  | ASTM D1125M | ASTM G57    | ASTM D4658M | ASTM D4327                   | ASTM D4327  |
| Reporting Limit: | -           | -           | 10          | -           | 50          | 15                           | 15          |
| Date Analyzed:   | 12-Jul-2018 | 12-Jul-2018 | -           | 12-Jul-2018 | 10-Jul-2018 | 12-Jul-2018 &<br>17-Jul-2018 | 12-Jul-2018 |

(1) Detection limit is elevated to 75 mg/kg due to dilution

Laboratory Director

**Quality Control Summary -** All laboratory quality control parameters were found to be within established limits

# Mayor ED 17-02 Priority permit

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| Location: |  | San Francisco, CA             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Date:     |  | 6/21/2018                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subject:  |  | In-Situ Soil Resistivity Data |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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## In-Situ Test Locations



# ***Mayor ED 17-02 Priority permit***

## **APPENDIX E VANE SHEAR TEST RESULTS**

# Mayor ED 17-02 Priority permit



GREGG DRILLING & TESTING, INC.  
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

June 25, 2018

LANGAN  
Attn: Peter Brady  
Langan

Subject: Field Vane Shear Testing - Site Investigation  
3<sup>rd</sup> St & Channel St.  
San Francisco, CA  
GREGG Project Number: 750604203

Dear Peter:

The following report presents the results of GREGG Drilling & Testing's Field Vane Shear Test investigation for the above referenced site. The following testing services were performed:

|    |                                    |         |                                     |
|----|------------------------------------|---------|-------------------------------------|
| 1  | Cone Penetration Tests             | (CPTU)  | <input type="checkbox"/>            |
| 2  | Pore Pressure Dissipation Tests    | (PPD)   | <input type="checkbox"/>            |
| 3  | Seismic Cone Penetration Tests     | (SCPTU) | <input type="checkbox"/>            |
| 4  | Resistivity Cone Penetration Tests | (RCPTU) | <input type="checkbox"/>            |
| 5  | UVOST Laser Induced Fluorescence   | (UVOST) | <input type="checkbox"/>            |
| 6  | Groundwater Sampling               | (GWS)   | <input type="checkbox"/>            |
| 7  | Soil Sampling                      | (SS)    | <input type="checkbox"/>            |
| 8  | Vapor Sampling                     | (VS)    | <input type="checkbox"/>            |
| 9  | Vane Shear Testing                 | (VST)   | <input checked="" type="checkbox"/> |
| 10 | SPT Energy Calibration             | (SPTE)  | <input type="checkbox"/>            |

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,  
GREGG Drilling & Testing, Inc.

Peter Robertson



# Mayor ED 17-02 Priority permit



GREGG DRILLING & TESTING, INC.  
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

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## Field Vane Shear Test Summary

-Table 1-

| FVST Identification | Date                           | Test Depths (Feet)   | Comments  |
|---------------------|--------------------------------|--|---|
| BSWL-14-VS          | 06/11/2018<br>to<br>06/13/2018 | 33.5, 43.5, 46.5, 51.5, (51.5R), 66.5, 81.5, (81.5R),<br>96.5, 111.5 | Vane head slipped and test<br>ended for tests at 43.5ft and<br>46.5ft |

# Mayor ED 17-02 Priority permit



GREGG DRILLING & TESTING, INC.  
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

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## Bibliography

Greig, J.W., R.G. Campanella and P.K. Robertson, "Comparison of Field Vane Results With Other In-Situ Test Results", International Symposium on Laboratory and Field Vane Shear Strength Testing, ASTM, Tampa FL, Proceedings, 1987

Mayne, P.W., "NHI (2002) Manual on Subsurface Investigations: Geotechnical Site Characterization", available through [www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html](http://www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html), Section 5.3, pp.107=112.

Richards, Adrian F. (Editor), "Vane Shear Testing in Soils", The International Symposium on Laboratory and Field Vane Shear Strength Testing, January 1987.

Chandler, R.J., "The In-Situ Measurement of the Undrained Shear Strength of Clays Using the Field Vane," Vane Shear Testing in Soils: Field and Laboratory Studies, ASTM STP 1014, A.F. Richards, Ed., American Society for Testing and Materials, Philadelphia, 1988, pp. 13-44.

Copies of ASTM Standards are available through [www.astm.org](http://www.astm.org)

# Mayor ED 17-02 Priority permit

**CLIENT**

Langan

**SITE**

3rd St and Channel St, San Francisco

**LOCATION**

BSWL-14 VS

**VANE TYPE**

Geonor H-10

**VANE DIAMETER, d (mm)**

55

**VANE LENGTH, l (mm)**

110



| DEPTH<br>(m) | DEPTH<br>(ft) | PEAK<br>LOAD READING<br>(N) | SHEAR<br>STRENGTH<br>(kPa) | SHEAR<br>STRENGTH<br>(psf) | REMOLDED                    |                            |                            | SENSITIVITY |
|--------------|---------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-------------|
|              |               |                             |                            |                            | PEAK<br>LOAD READING<br>(N) | SHEAR<br>STRENGTH<br>(kPa) | SHEAR<br>STRENGTH<br>(psf) |             |
| 10.21        | 33.50         | 164.62                      | 47.25                      | 986.96                     |                             |                            |                            |             |
| 13.26        | 43.50         | 59.07                       | 16.95                      | 354.13                     |                             |                            |                            |             |
| 14.18        | 46.50         | 128.34                      | 36.83                      | 769.43                     |                             |                            |                            |             |
| 15.70        | 51.50         | 105.25                      | 30.21                      | 630.99                     | 39.28                       | 11.28                      | 235.60                     | 2.68        |
| 20.27        | 66.50         | 240.48                      | 69.02                      | 1441.81                    |                             |                            |                            |             |
| 24.85        | 81.50         | 329.54                      | 94.58                      | 1975.76                    | 49.17                       | 14.11                      | 294.80                     | 6.70        |
| 29.42        | 96.50         | 299.86                      | 86.06                      | 1797.77                    |                             |                            |                            |             |
| 33.99        | 111.50        | 344.39                      | 98.84                      | 2064.75                    |                             |                            |                            |             |

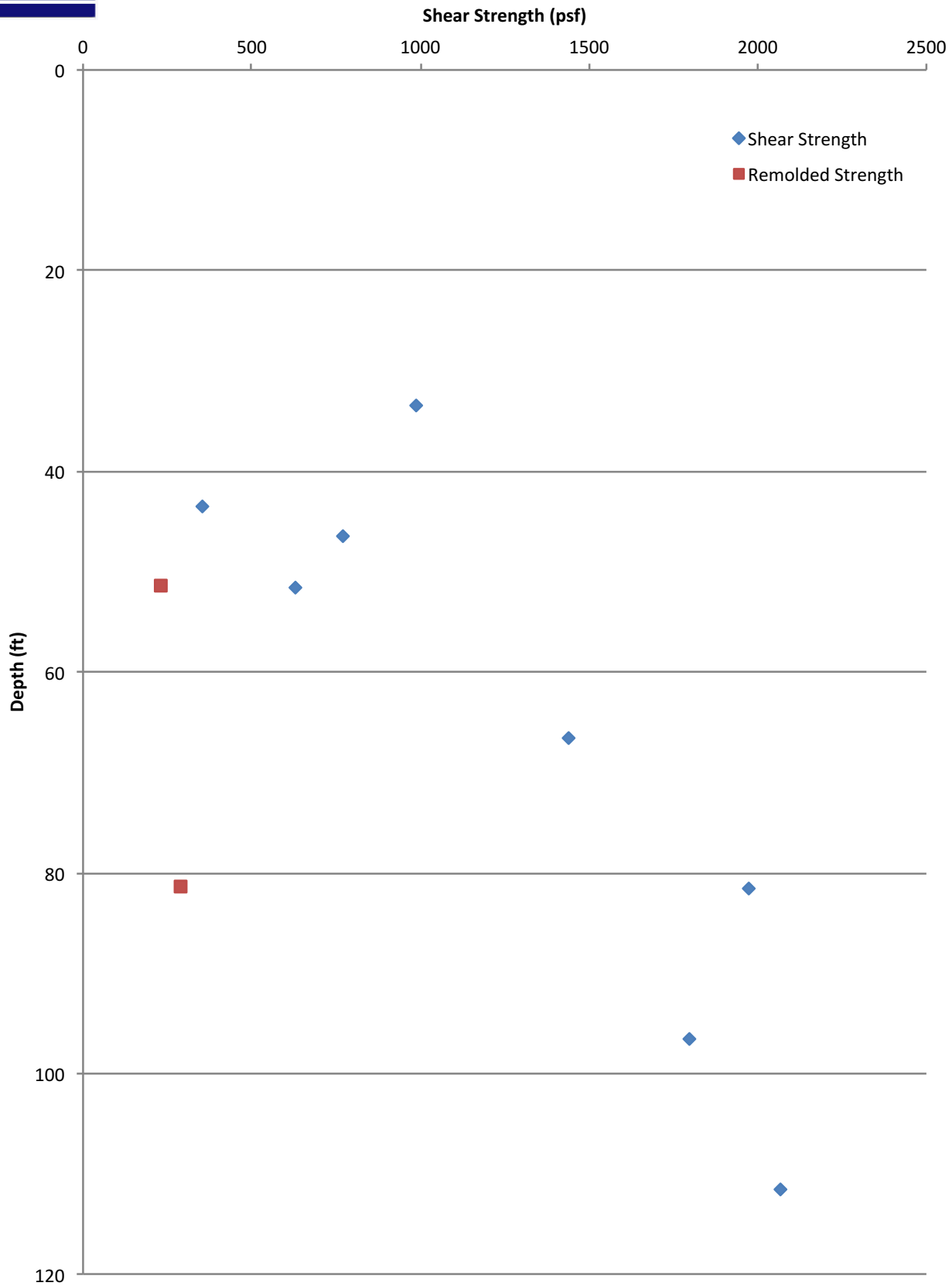
Note: Tests at 43.5 and 46.5 - Vane head slipped, tested ended before soil failed



# Mayor ED 17-02 Priority permit



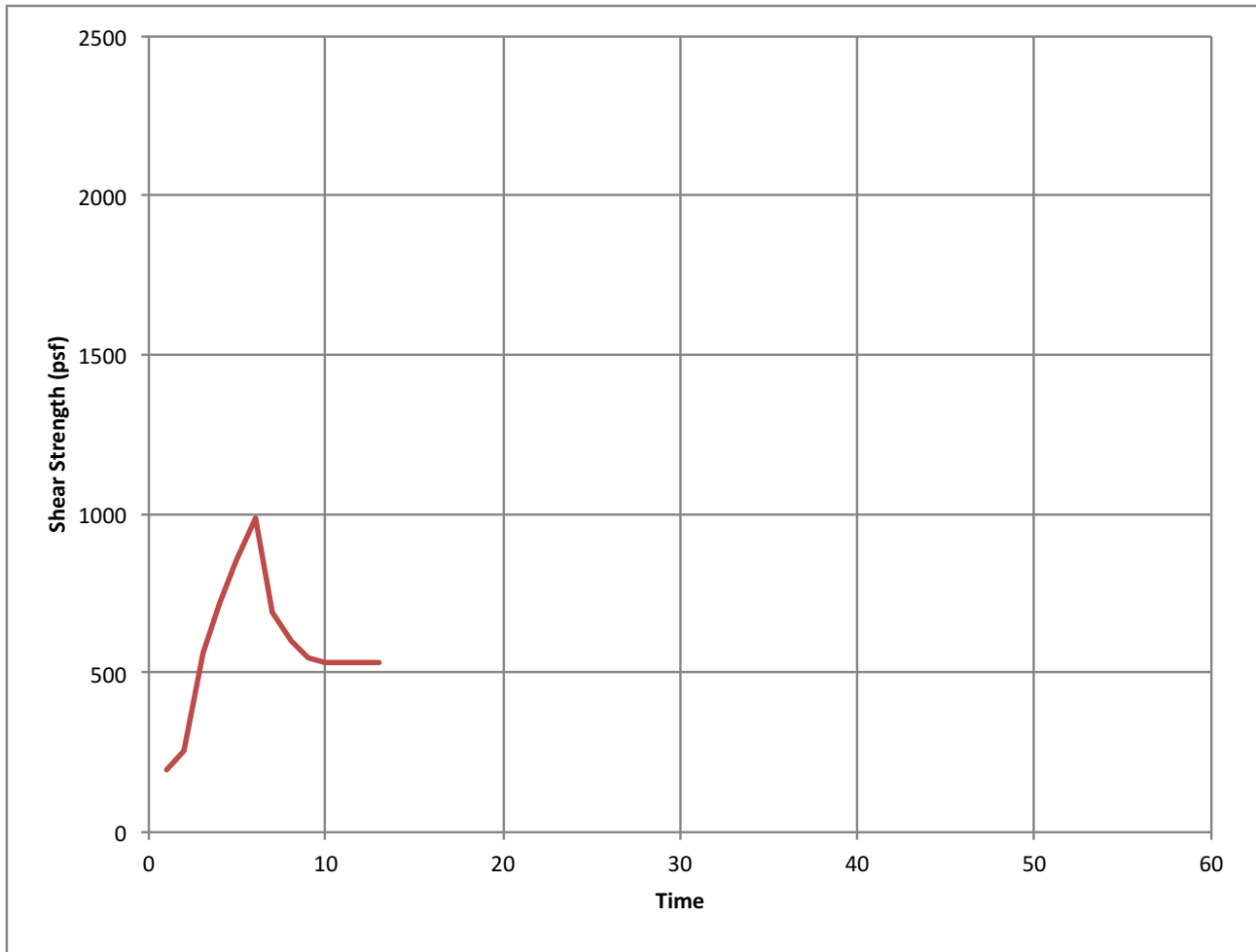
## BSWL-14-VS FVST



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 33.5

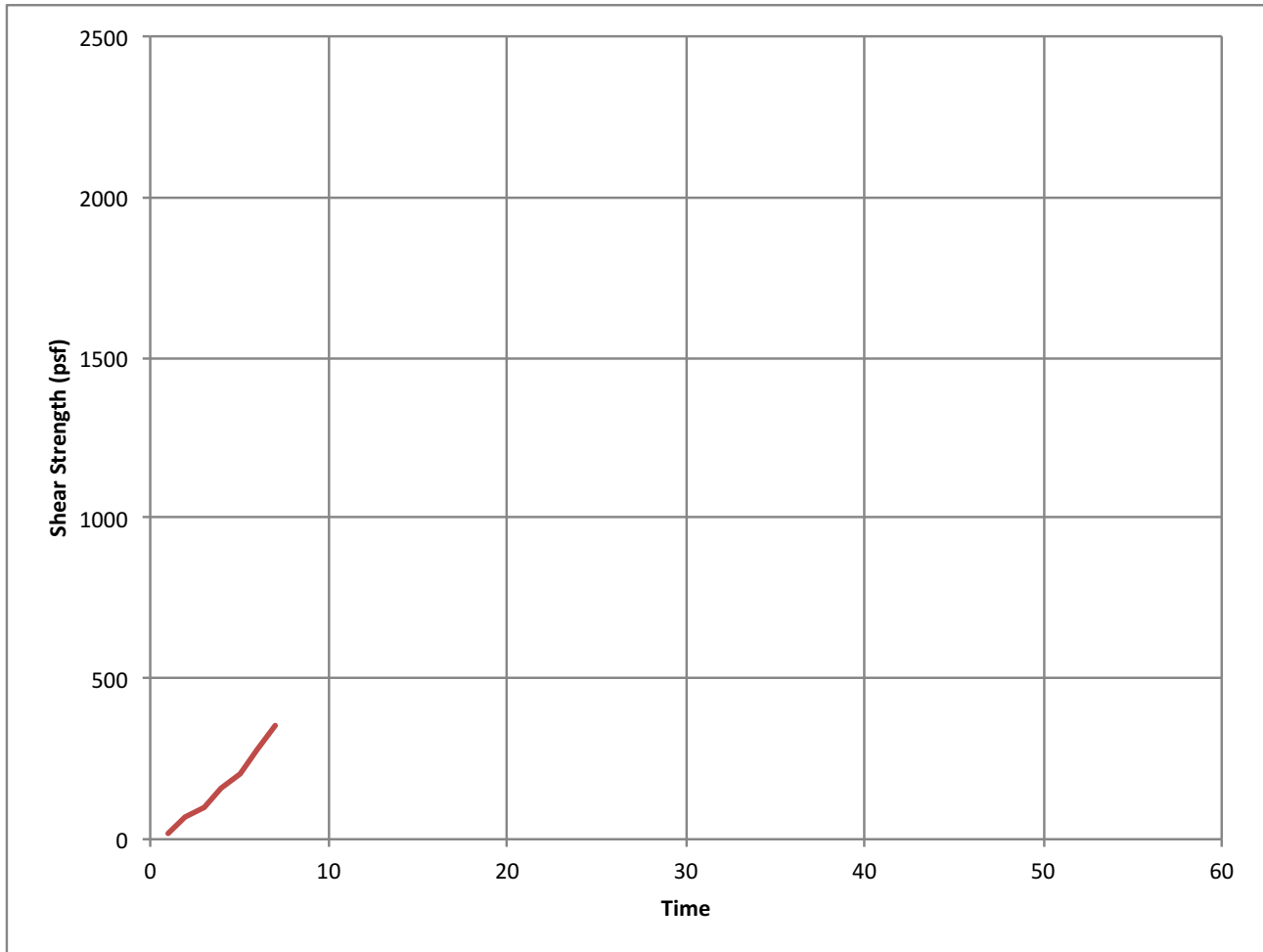
**Max Shear** 47.25 kPa  
**Strength:** 986.96 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 43.5

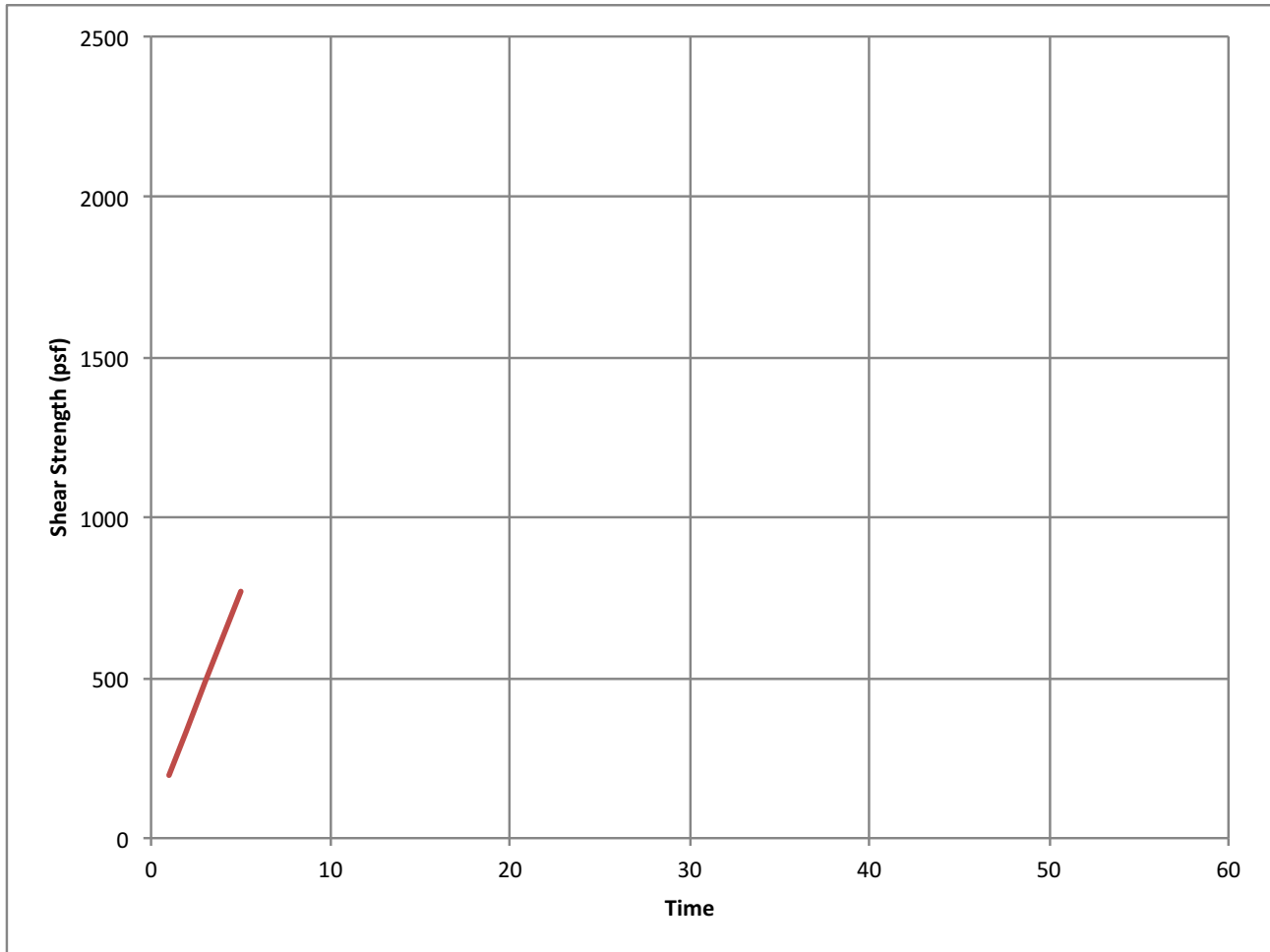
**Max Shear** 16.95 kPa  
**Strength:** 354.13 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 46.5

**Max Shear** 36.83 kPa  
**Strength:** 769.43 psf

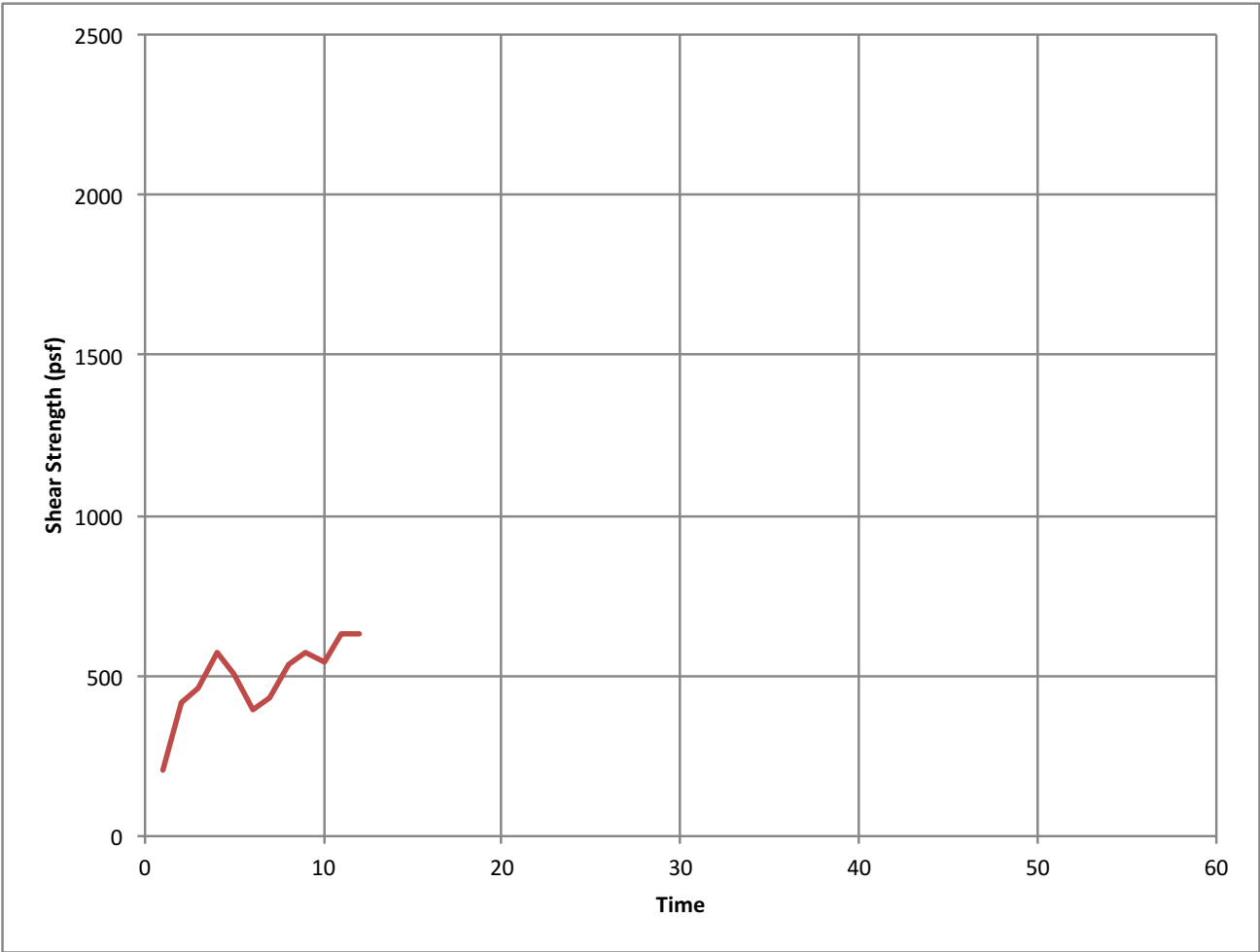




# Mayor ED 17-02 Priority permit

Location: BSWL-14 VS  
Depth: 51.5

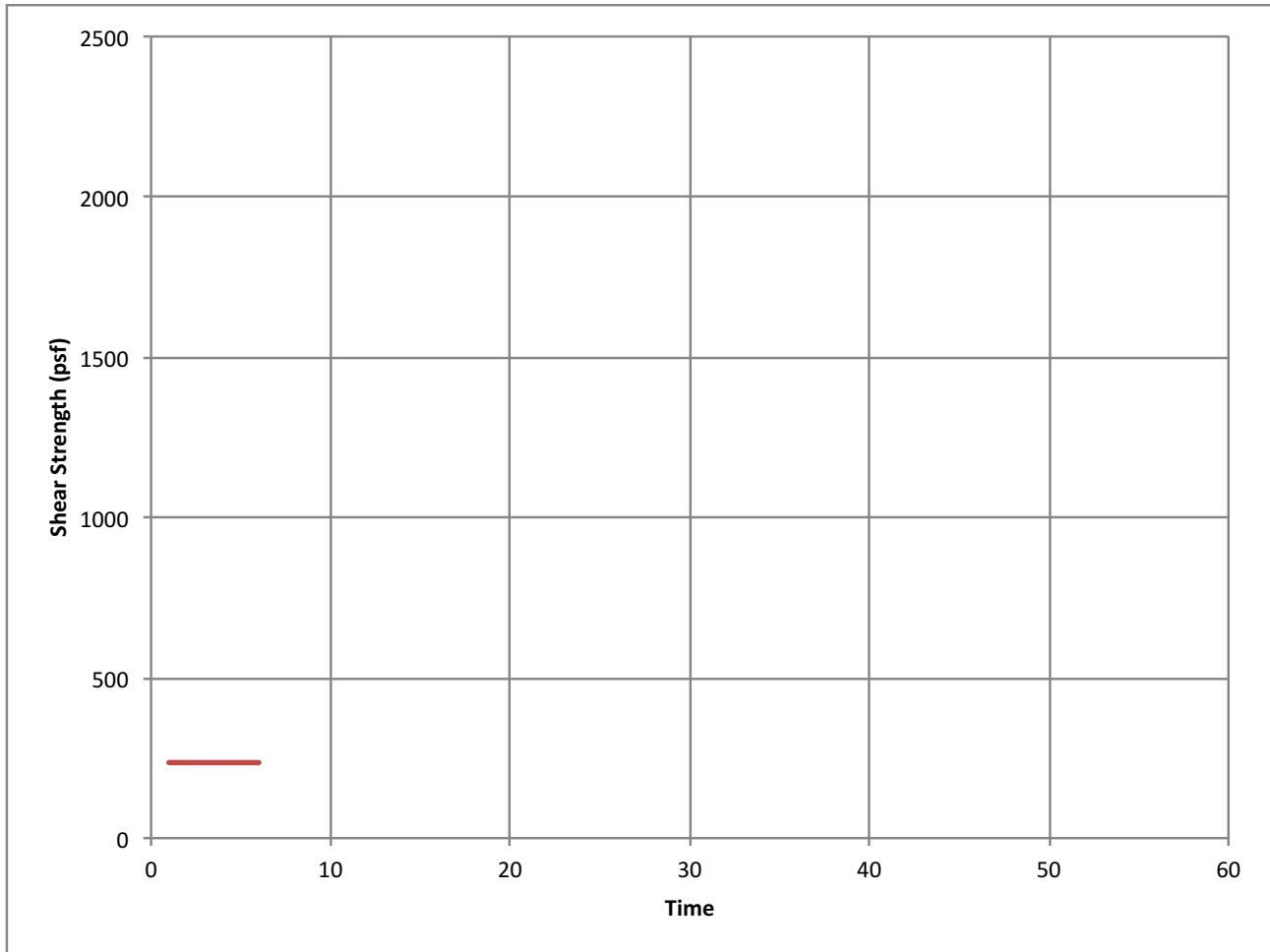
Max Shear                    30.21 kPa  
Strength:                    630.99 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 51.5R

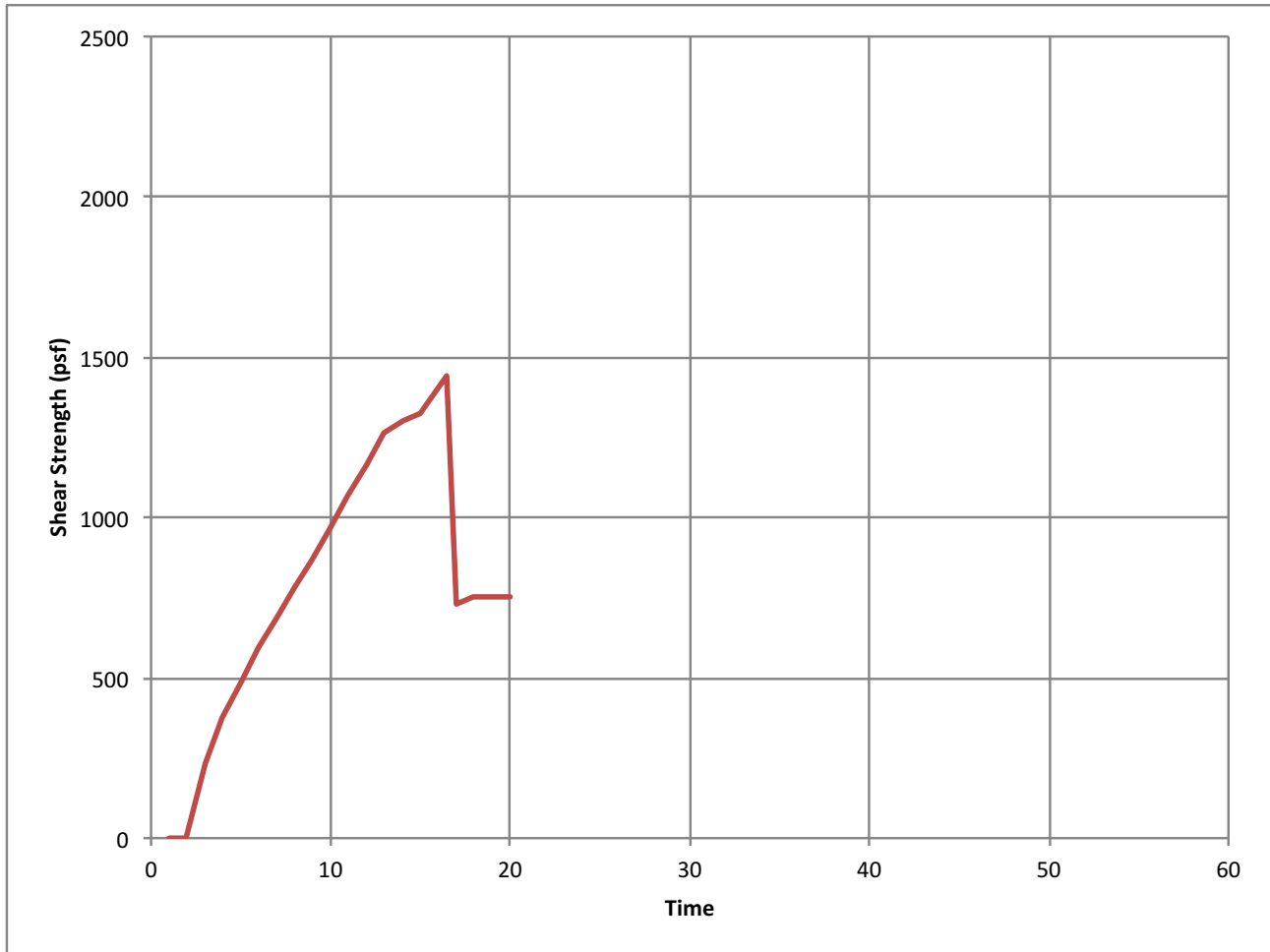
**Max Shear** 11.28 kPa  
**Strength:** 235.60 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 66.5

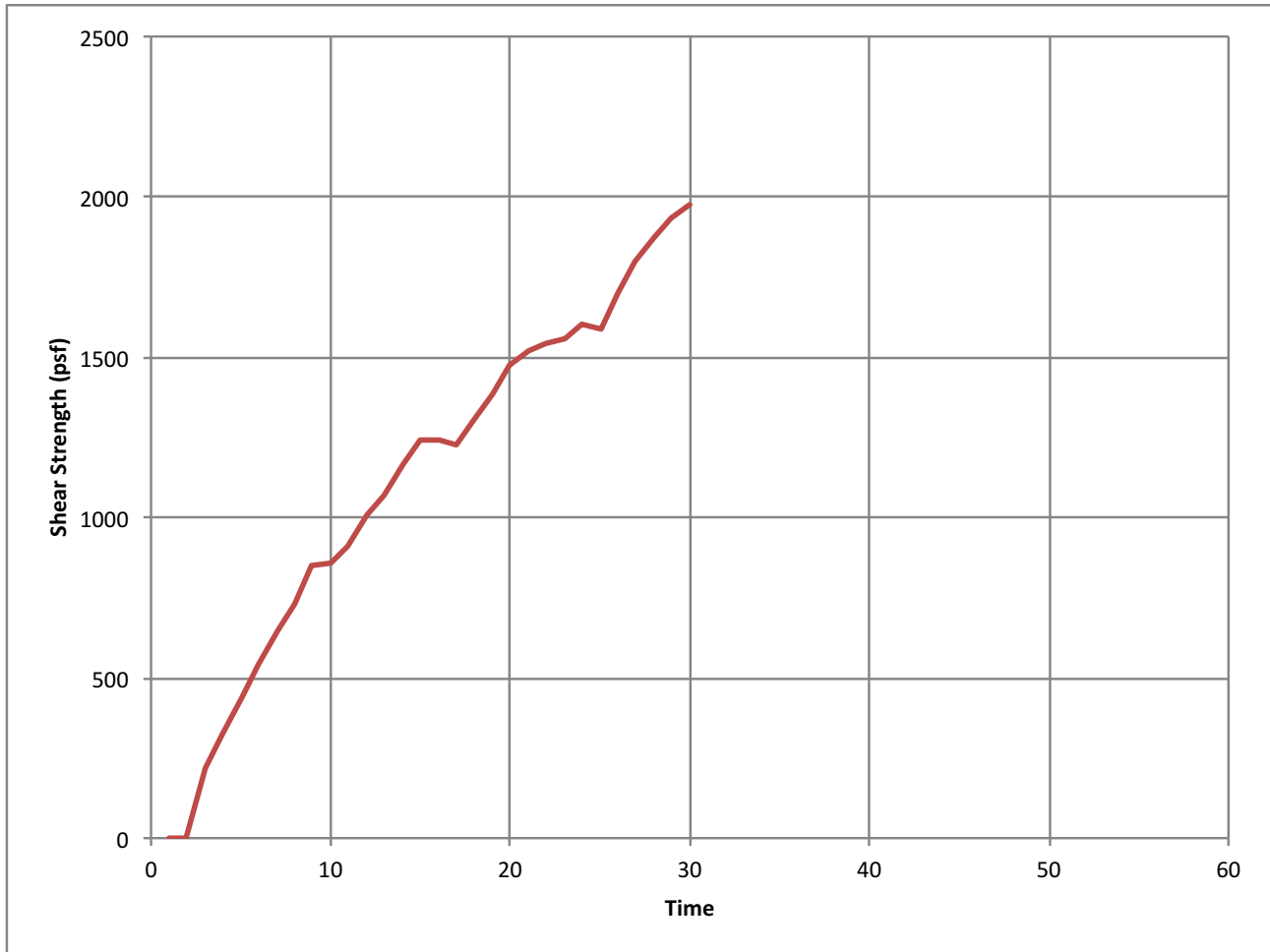
**Max Shear** 69.02 kPa  
**Strength:** 1441.81 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 81.5

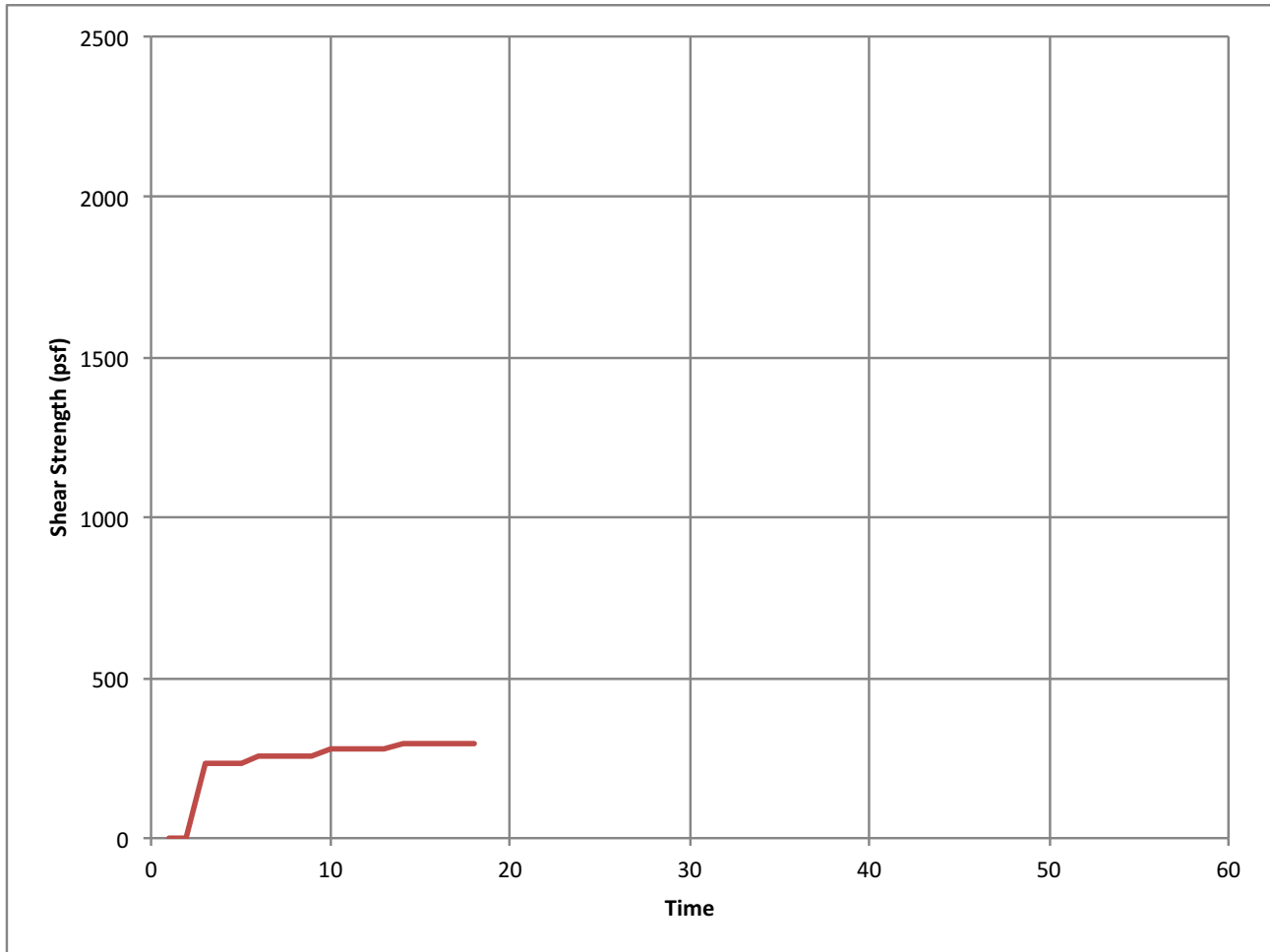
**Max Shear** 94.58 kPa  
**Strength:** 1975.76 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 81.5 Remolded

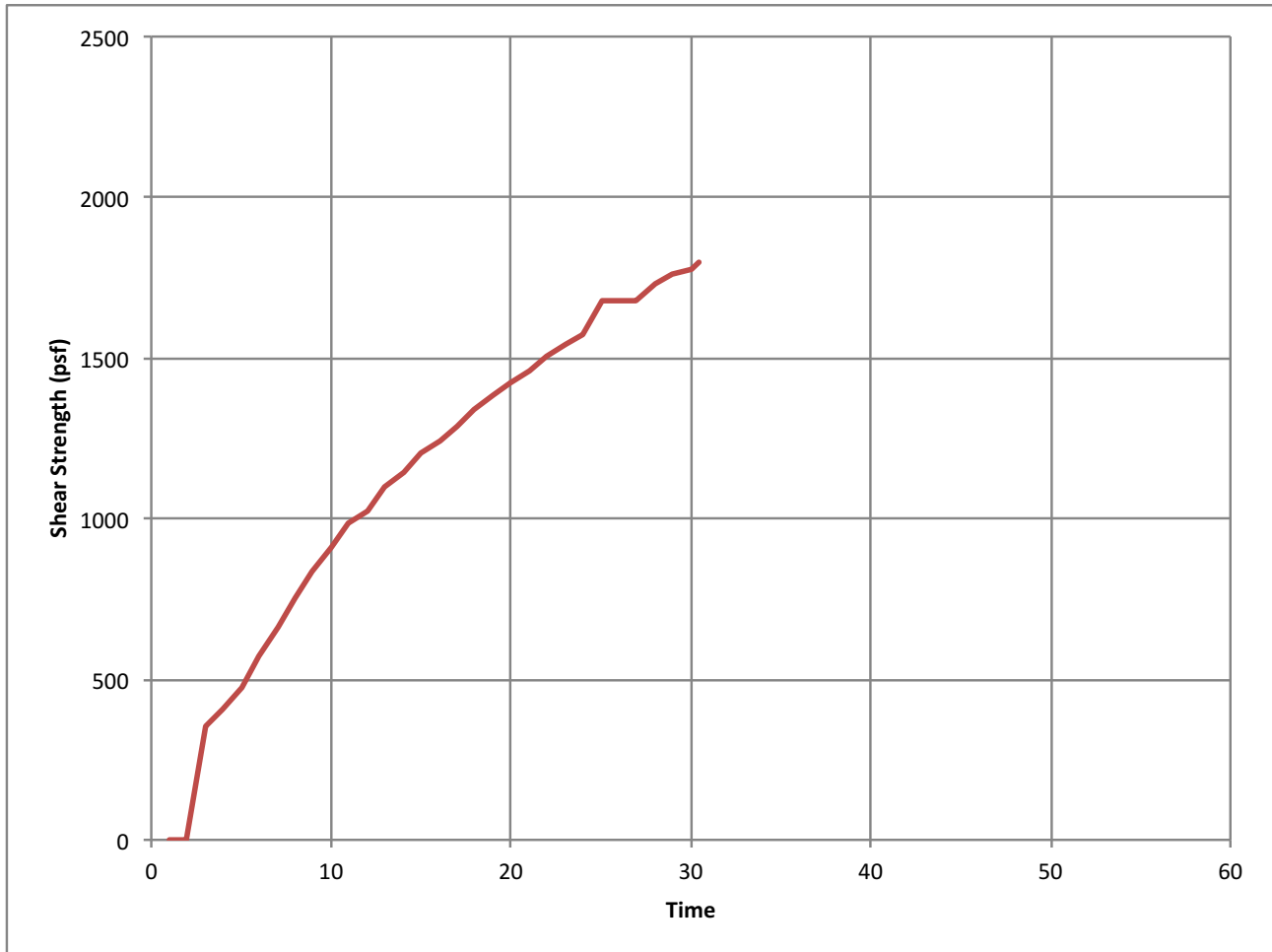
**Max Shear** 14.11 kPa  
**Strength:** 294.80 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 96.5

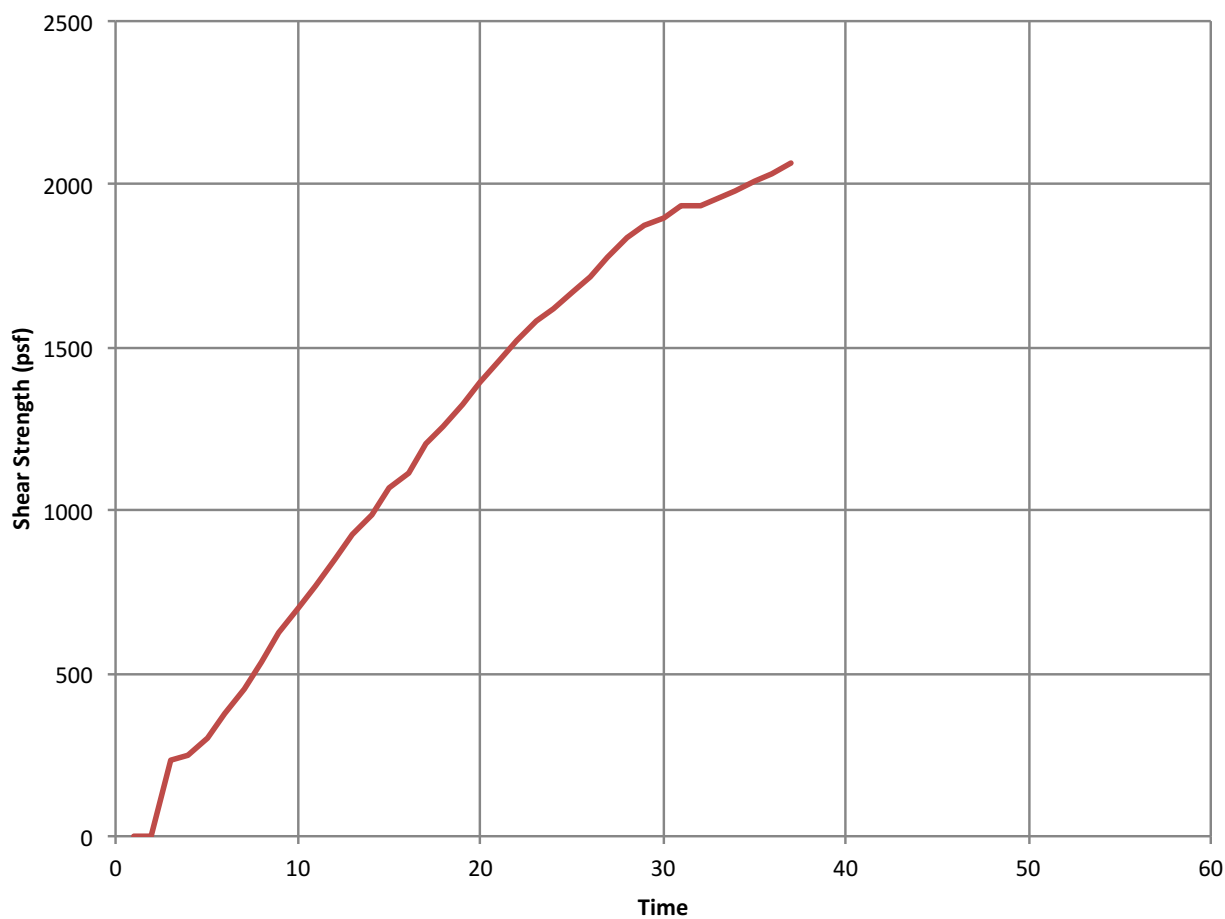
**Max Shear** 86.06 kPa  
**Strength:** 1797.77 psf



# Mayor ED 17-02 Priority permit

**Location:** BSWL-14 VS  
**Depth:** 111.5

**Max Shear** 98.84 kPa  
**Strength:** 2064.75 psf







# ***Mayor ED 17-02 Priority permit***

## **APPENDIX F**

### **BORINGS, CONE PENETRATION TEST, LABORATORY TEST RESULTS FROM PREVIOUS INVESTIGATIONS**



# Mayor ED 17-02 Priority permit

| <b>PROJECT:</b><br><b>SEAWALL LOG 337</b><br>San Francisco, California                                    |                 | <b>Log of Boring BSWL337-1</b><br>PAGE 1 OF 9                                       |             |           |  |  |                                    |                             |            |                                   |                          |
|---|-----------------|---|-------------|-----------|--|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 | Logged by: C. Divis   |             |           |  |  |                                    |                             |            |                                   |                          |
| Date started: 7/18/11      Date finished: 7/20/11   |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches      Hammer type: Automatic  |                 | <b>LABORATORY TEST DATA</b>   |             |           |  |  |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST), Dames & Moore (D&M) |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |   |             | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample  | Blows/ 6"   |           |  |  |                                    |                             |            |                                   |                          |
|   |                 |   |             |           | Ground Surface Elevation: 99 feet <sup>2</sup>   |  |                                    |                             |            |                                   |                          |
| 1   |                 |   |             |           | 3-inch Asphalt Concrete (AC)   |  |                                    |                             |            |                                   |                          |
| 2   |                 |   |             |           | 33-inch Aggregate Base (AB)  |  |                                    |                             |            |                                   |                          |
| 3   |                 |   |             |           | 4-inch Asphalt Concrete (AC)   |  |                                    |                             |            |                                   |                          |
| 4   |                 |   |             |           | CLAY with SAND (CL)  |  |                                    |                             |            |                                   |                          |
| 5   |                 |   |             |           | dark gray, stiff, moist, trace fine gravel   |  |                                    |                             |            |                                   |                          |
| 6   | SPT             |    | 4<br>3<br>5 | 10        | CL   |  |                                    |                             |            |                                   |                          |
| 7   |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 8   |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 9   |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 10  |                 |   |             |           | CLAY with GRAVEL (CL)  |  |                                    |                             |            |                                   |                          |
| 11  | S&H             |   | 4<br>5<br>6 | 8         | CL   | FILL   |                                    |                             |            | 14.9                              | 114                      |
| 12  |                 |   |             |           | dark gray, medium stiff to stiff, wet, with deeply weathered angular and subangular serpentinite fragments |  |                                    |                             |            |                                   |                          |
| 13  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 14  |                 |   |             |           | SAND (SP)  |  |                                    |                             |            |                                   |                          |
| 15  |                 |   |             |           | black, loose wet, trace fines  |  |                                    |                             |            |                                   |                          |
| 16  | S&H             |  | 5<br>7<br>6 | 9         | SP   |  |                                    |                             | 3.8        | 21.5                              |                          |
| 17  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 18  |                 |   |             |           | CLAY (CH)  |  |                                    |                             |            |                                   |                          |
| 19  |                 |   |             |           | gray, very soft, wet, with shell fragments   |  |                                    |                             |            |                                   |                          |
| 20  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 21  | S&H             |  | 0<br>0<br>0 | 0         |  |  |                                    |                             |            |                                   |                          |
| 22  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 23  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 24  |                 |   |             |           | CH   |  |                                    |                             |            |                                   |                          |
| 25  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 26  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 27  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 28  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 29  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
| 30  |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
|   |                 |   |             |           |  | TV   | 700                                |                             |            |                                   |                          |
|   |                 |   |             |           |  |  |                                    |                             |            |                                   |                          |
|   |                 |   |             |           |  | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |   |             |           |  | Project No.: 750604201                         |                                    | Figure: F-1a                |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |              | Log of Boring BSWL337-1<br>PAGE 2 OF 9 |                                    |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------|--|------------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |              | LITHOLOGY                              | MATERIAL DESCRIPTION               | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value¹ |  |                                    | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  | ST           |        |           | 50 psi       | CH                                     | CLAY (CH) (continued)              | TV                    | 600 - 800                    |                          | 55.4    | 68                          |                       |
| 32  |              |        |           |              |  | medium stiff<br>Consolidation Test |                       |                              |                          |         |                             |                       |
| 33  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 34  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 35  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 36  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 37  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 38  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 39  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 40  | ST           |        |           | 50 psi       |  |                                    |                       | TV                           | 600                      |         |                             |                       |
| 41  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 42  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 43  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 44  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 45  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 46  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 47  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 48  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 49  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 50  | ST           |        |           | 50 psi       |  |                                    | TV                    | 600                          |                          | 61.5    | 63                          |                       |
| 51  |              |        |           |              | Consolidation Test                     |                                    |                       |                              |                          |         |                             |                       |
| 52  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 53  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 54  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 55  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 56  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 57  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 58  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 59  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |
| 60  |              |        |           |              |  |                                    |                       |                              |                          |         |                             |                       |

EST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

Treadwell&Rollo

A LANGAN COMPANY

Project No.: 750604201

Figure: F-1b

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |                                   |           |                          | Log of Boring BSWL337-1<br>PAGE 3 OF 9 |                       |                                     |                              |                          |         |                             |                       |
|---|--------------|-----------------------------------|-----------|--------------------------|--|-----------------------|-------------------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |                                   |           |                          | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample                            | Blows/ 6" | SPT N-Value <sup>1</sup> |  |                       | Type of Strength Test               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | D&M          | <div><div></div><div></div></div> |           | 50 psi                   | CH                                     | CLAY (CH) (continued) | TV                                  |                              | 800                      |         |                             |                       |
| 62  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 63  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 64  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 65  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 66  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 67  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 68  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 69  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 70  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 71  | D&M          | <div><div></div><div></div></div> |           | 100 psi                  |  | Consolidation Test    | TV                                  |                              | 700                      |         | 61.0                        | 63                    |
| 72  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 73  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 74  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 75  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 76  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 77  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 78  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 79  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 80  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 81  | D&M          | <div><div></div><div></div></div> |           | 50 psi                   |  | TV                    |                                     | 800                          |                          | 50.6    | 82                          |                       |
| 82  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 83  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 84  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 85  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 86  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 87  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 88  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
| 89  |              |                                   |           |                          | CL                                     | CLAY (CL)             |                                     |                              |                          |         |                             |                       |
| 90  |              |                                   |           |                          |  |                       |                                     |                              |                          |         |                             |                       |
|   |              |                                   |           |                          |  |                       | Treadwell&Rollo<br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |                                   |           |                          |  |                       | Project No.: 750604201              |                              | Figure: F-1c             |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

BAY MUD

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |               |                          |           | Log of Boring BSWL337-1<br>PAGE 4 OF 9  |  |                              |                          |         |                             |                       |  |
|---|--------------|--------|---------------|--------------------------|-----------|---|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |        |               |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                           |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample | Blows/ 6"     | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 91  | SPT          |        | 2<br>6<br>13  | 23                       | CL        | CLAY (CL) (continued)<br>green-gray, very stiff, wet,<br>with interbedded CLAYEY SAND (SC) lenses |  |                              |                          |         |                             |                       |  |
| 92  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 93  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 94  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 95  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 96  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 97  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 98  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 99  |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 100   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 101   | S&H          |        | 8<br>13<br>18 | 20                       |           | light olive-gray  |  |                              |                          |         |                             |                       |  |
| 102   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 103   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 104   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 105   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 106   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 107   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 108   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 109   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 110   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 111   | S&H          |        | 8<br>13<br>17 | 21                       |           | gray, with trace organics   |  |                              |                          |         |                             |                       |  |
| 112   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 113   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 114   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 115   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 116   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 117   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 118   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 119   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
| 120   |              |        |               |                          |           |   |  |                              |                          |         |                             |                       |  |
|   |              |        |               |                          |           |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                              |                          |         |                             |                       |  |
|   |              |        |               |                          |           |   | Project No.:<br>750604201                      |                              | Figure:<br>F-1d          |         |                             |                       |  |





TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          | Log of Boring BSWL337-1<br>PAGE 5 OF 9 |  |                                     |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|--|--|-------------------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY                              | MATERIAL DESCRIPTION   | LABORATORY TEST DATA                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |  |  | Type of Strength Test               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | S&H          |        | 28        | 15                       | CL                                     | CLAY (CL) (continued)<br>gray to olive-gray, stiff to very stiff, with interbedded sand lenses |                                     |                              |                          |         |                             |                       |
| 122   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 123   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 124   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 125   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 126   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 127   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 128   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 129   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 130   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 131   | S&H          |        | 08        | 15                       |  | dark gray  | TxUU                                | 7,800                        | 1,540                    |         | 37.3                        | 83                    |
| 132   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 133   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 134   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 135   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 136   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 137   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 138   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 139   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 140   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 141   | S&H          |        | 38        | 19                       |  | very stiff, with trace organics  |                                     |                              |                          |         |                             |                       |
| 142   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 143   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 144   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 145   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 146   |              |        |           |                          | CL                                     | SANDY CLAY (CL)<br>gray with black mottling, very stiff, wet, with trace organic               |                                     |                              |                          |         |                             |                       |
| 147   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 148   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 149   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
| 150   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
|   |              |        |           |                          |  |  |                                     |                              |                          |         |                             |                       |
|   |              |        |           |                          |  |  | Treadwell&Rollo<br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |        |           |                          |  |  | Project No.: 750604201              |                              | Figure: F-1e             |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18




# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                |              | Log of Boring BSWL337-1<br>PAGE 6 OF 9 |  |                                     |                              |                          |         |                             |                       |
|---|--------------|---|----------------|--------------|--|--|-------------------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |              | LITHOLOGY                              | MATERIAL DESCRIPTION   | LABORATORY TEST DATA                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value¹ |  |  | Type of Strength Test               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   | S&H          |    | 5<br>11<br>18  | 20           | CL                                     | SANDY CLAY (CL) (continued)                                  |                                     |                              |                          |         |                             |                       |
| 152   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 153   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 154   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 155   |              |   |                |              | SP                                     | SAND (SP)<br>mottled gray and green, dense, wet, trace fines |                                     |                              |                          |         |                             |                       |
| 156   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 157   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 158   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 159   |              |   |                |              | CL                                     | SANDY CLAY (CL)<br>gray-green, hard, wet                     |                                     |                              |                          |         |                             |                       |
| 160   | SPT          |   | 34<br>17<br>24 | 49           |  |  |                                     |                              |                          |         |                             |                       |
| 161   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 162   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 163   |              |   |                |              | CL                                     | very stiff, trace fine gravel                                |                                     |                              |                          |         |                             |                       |
| 164   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 165   | SPT          |  | 7<br>8<br>13   | 25           |  |  |                                     |                              |                          |         |                             |                       |
| 166   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 167   |              |   |                |              | SP                                     |  |                                     |                              |                          |         |                             |                       |
| 168   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 169   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 170   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 171   |              |   |                |              | CL                                     | SAND (SP) seam   |                                     |                              |                          |         |                             |                       |
| 172   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 173   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 174   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 175   | SPT          |  | 5<br>4<br>9    | 16           | CL                                     | CLAY (CL)<br>gray-green, very stiff, wet                     |                                     |                              |                          |         |                             |                       |
| 176   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 177   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 178   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 179   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
| 180   |              |   |                |              |  |  |                                     |                              |                          |         |                             |                       |
|   |              |   |                |              |  |  | Treadwell&Rollo<br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |   |                |              |  |  | Project No.:<br>750604201           |                              | Figure:<br>F-1f          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18




TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                   |                          |           | Log of Boring BSWL337-1<br>PAGE 7 OF 9   |  |                              |                          |         |                             |                       |
|---|--------------|---|-------------------|--------------------------|-----------|--|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                   |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"         | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181   | S&H          |    | 22<br>35<br>50/5" | 60/<br>11"               | CL        | CLAY (CL) (continued)  |  |                              |                          |         |                             |                       |
| 182   |              |   |                   |                          | CL        | SANDY CLAY (CL)<br>gray-green, hard, wet, with some deeply weathered serpentinite  |  |                              |                          |         |                             |                       |
| 183   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 184   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 185   |              |   |                   |                          | SPT       |  |  |                              |                          |         |                             |                       |
| 186   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 187   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 188   | CL           | CLAY (CL)<br>gray-green, hard, wet, with trace sand and gravel                      |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 189   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 190   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 191   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 192   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 193   | SPT          |  | 10<br>14<br>16    | 36                       | CL        |  |  |                              |                          |         |                             |                       |
| 194   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 195   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 196   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 197   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 198   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 199   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 200   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 201   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 202   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 203   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 204   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 205   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 206   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 207   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 208   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 209   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
| 210   |              |   |                   |                          |           |  |  |                              |                          |         |                             |                       |
|   |              |   |                   |                          |           |  | <div>Treadwell&amp;Rollo</div> <div>A LANGAN COMPANY</div> <div>Project No.: 750604201</div> <div>Figure: F-1g</div> |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18





Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                   |                          | Log of Boring BSWL337-1<br>PAGE 8 OF 9 |   |  |                              |                          |         |                             |                       |  |
|---|--------------|---|-------------------|--------------------------|--|---|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                   |                          | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                           |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6"         | SPT N-Value <sup>1</sup> |  |   | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 211   | SPT          |    | 2<br>8<br>13      | 25                       | CL                                     | CLAY (CL) (continued)<br>very stiff   |  |                              |                          |         |                             |                       |  |
| 212   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 213   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 214   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 215   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 216   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 217   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 218   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 219   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 220   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 221   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 222   |              |   |                   |                          | SC                                     | CLAYEY SAND (SC)<br>mottled brown and dark green-gray, very dense,<br>wet, with trace fine gravel                           |  |                              |                          |         |                             |                       |  |
| 223   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 224   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 225   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 226   | SPT          |  | 17<br>38<br>50/5" | 106/<br>11"              |  |   |  |                              |                          |         |                             |                       |  |
| 227   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 228   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 229   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 230   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 231   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 232   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 233   |              |   |                   |                          | CL                                     | SANDY CLAY with GRAVEL (CL)<br>green-gray, hard, wet, poorly sorted, fine- to<br>coarse sand with gravel to 1 inch diameter |  |                              |                          |         |                             |                       |  |
| 234   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 235   | SPT          |  | 30<br>50/6"       | 96                       |  |   |  |                              |                          |         |                             |                       |  |
| 236   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 237   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 238   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 239   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
| 240   |              |   |                   |                          |  |   |  |                              |                          |         |                             |                       |  |
|   |              |   |                   |                          |  |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                              |                          |         |                             |                       |  |
|   |              |   |                   |                          |  |   | Project No.:<br>750604201                      |                              | Figure:<br>F-1h          |         |                             |                       |  |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18



# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                   |                          | Log of Boring BSWL337-1<br>PAGE 9 OF 9 |   |                       |                              |                          |         |                             |                       |
|---|--------------|---|-------------------|--------------------------|--|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                   |                          | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"         | SPT N-Value <sup>1</sup> |  |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   | SPT          |    | 6<br>21<br>43     | 77                       | CL                                     | CLAY (CL)<br>gray, hard, wet, trace fine sand   |                       |                              |                          |         |                             |                       |
| 242   |              |   |                   |                          | SC                                     | CLAYEY SAND with GRAVEL (SC)<br>mottled brown, gray, and red, very dense, wet   |                       |                              |                          |         |                             |                       |
| 243   |              |   |                   |                          |  | CLAY with GRAVEL (CL)<br>gray, hard, wet  |                       |                              |                          |         |                             |                       |
| 244   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 245   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 246   |              |   |                   |                          | CL                                     |   |                       |                              |                          |         |                             |                       |
| 247   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 248   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 249   |              |   |                   |                          |  | SHALE [BEDROCK]<br>dark green-gray and black, low hardness,<br>sheared, crushed, weak, slightly plastic, deeply<br>weathered, wet |                       |                              |                          |         |                             |                       |
| 250   | SPT          |   | 25<br>31<br>50/4" | 97/<br>10"               |  |   |                       |                              |                          |         |                             |                       |
| 251   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 252   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 253   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 254   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 255   | SPT          |  | 50/<br>1.5"       | 60/<br>1.5"              |  |   |                       |                              |                          |         |                             |                       |
| 256   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 257   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 258   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 259   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 260   | SPT          |  | 50/1"             | 60/1"                    |  |   |                       |                              |                          |         |                             |                       |
| 261   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 262   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 263   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 264   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 265   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 266   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 267   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 268   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 269   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |
| 270   |              |   |                   |                          |  |   |                       |                              |                          |         |                             |                       |

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Boring terminated at a depth of 260.1 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater not measured during drilling.

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City datum plus 100 feet.

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Project No.:  
750604201

Figure:  
F-1i

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT:  |                 | SEAWALL LOG 337<br>San Francisco, California |                | Log of Boring BSWL337-2<br>PAGE 1 OF 9 |   |                             |                                    |                             |            |                                   |                          |
|---|-----------------|--|----------------|--|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 |  |                | Logged by: S. Magallon                 |   |                             |                                    |                             |            |                                   |                          |
| Date started: 7/21/11   |                 | Date finished: 7/21/11                       |                |  |   |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches  |                 | Hammer type: Automatic                       |                | LABORATORY TEST DATA                   |   |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST), Dames & Moore (D&M) |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |  |                | LITHOLOGY                              | MATERIAL DESCRIPTION                            | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample                                       | Blows/ 6"      |  |   |                             |                                    |                             |            |                                   |                          |
|   |                 |  |                |  | Ground Surface Elevation: 100 feet <sup>2</sup> |                             |                                    |                             |            |                                   |                          |
| 1   |                 |  |                |  | 2-inch Asphalt Concrete (AC)                    |                             |                                    |                             |            |                                   |                          |
| 2   |                 |  |                |  | 12-inch Aggregate Base (AB)                     |                             |                                    |                             |            |                                   |                          |
| 3   |                 |  |                |  | CLAYEY SAND (SC)                                |                             |                                    |                             |            |                                   |                          |
| 4   |                 |  |                |  | mottled brown and gray, medium dense, moist     |                             |                                    |                             |            |                                   |                          |
| 5   |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 6   | S&H             |  | 7<br>12<br>20  | 22                                     | SC  |                             |                                    |                             |            | 13.3                              | 125                      |
| 7   |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 8   |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 9   |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 10  |                 |  |                |  | GRAVEL with SILT (GP-GM)                        |                             |                                    |                             |            |                                   |                          |
| 11  | SPT             |  | 13<br>12<br>11 | 28                                     | GP-GM   |                             |                                    |                             | 9.4        | 13.5                              |                          |
| 12  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 13  |                 |  |                |  | CLAY (CH)                                       |                             |                                    |                             |            |                                   |                          |
| 14  |                 |  |                |  | dark gray, very soft, wet, trace shells         |                             |                                    |                             |            |                                   |                          |
| 15  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 16  | S&H             |  | 0              | 0                                      |   |                             |                                    |                             |            |                                   |                          |
| 17  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 18  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 19  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 20  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 21  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 22  |                 |  |                |  | CH  |                             |                                    |                             |            |                                   |                          |
| 23  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 24  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 25  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 26  | D&M             |  | 0              | 0                                      |   |                             |                                    |                             |            |                                   |                          |
| 27  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 28  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 29  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |
| 30  |                 |  |                |  |   |                             |                                    |                             |            |                                   |                          |

FILL

BAY MUD

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

**Treadwell&Rollo**  
A LANGAN COMPANY

Project No.:  
750604201







Figure:  
F-2a

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL337-2<br>PAGE 2 OF 9 |  |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|-----------|--|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                           |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  |              |        |           |                          |           | CLAY (CH) (continued)                  |  |                              |                          |         |                             |                       |
| 32  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 33  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 34  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 35  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 36  | D&M          |        |           | 100 psi                  |           | trace organics and shells              |  |                              |                          |         |                             |                       |
| 37  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 38  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 39  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 40  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 41  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 42  |              |        |           |                          | CH        |  |  |                              |                          |         |                             |                       |
| 43  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 44  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 45  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 46  | D&M          |        |           | 100 psi                  |           | Consolidation Test                     |  |                              |                          |         | 55.8                        | 67                    |
| 47  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 48  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 49  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 50  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 51  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 52  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 53  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 54  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 55  |              |        |           |                          |           | CLAYEY SAND (SC)<br>gray, loose, wet   |  |                              |                          |         |                             |                       |
| 56  | D&M          |        |           | 50 psi                   |           |  |  |                              |                          |         |                             |                       |
| 57  |              |        |           |                          | SC        |  |  |                              |                          |         |                             |                       |
| 58  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 59  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
| 60  |              |        |           |                          |           |  |  |                              |                          |         |                             |                       |
|   |              |        |           |                          |           |  | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |        |           |                          |           |  | Project No.:<br>750604201                      |                              | Figure:<br>F-2b          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |                         |                             | Log of Boring BSWL337-2<br>PAGE 3 OF 9 |  |   |                                    |                             |            |                                   |                          |
|---|-----------------|---|-------------------------|-----------------------------|--|--|---|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                         |                             | LITHOLOGY                              | MATERIAL DESCRIPTION                                 | LABORATORY TEST DATA  |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6"               | SPT<br>N-Value <sup>1</sup> |  |  | Type of<br>Strength<br>Test                                   | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 61  |                 |   |                         |                             | SC                                     | CLAYEY SAND (SC) (continued)                         |   |                                    |                             |            |                                   |                          |
| 62  |                 |   |                         |                             |  | CLAYEY SAND (SP-SC)<br>yellow-brown, very dense, wet |   |                                    |                             |            |                                   |                          |
| 63  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 64  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 65  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 66  | SPT             |    | 20<br>23<br>30          | 64                          |  |  |   |                                    | 22.9                        | 24.2       |                                   |                          |
| 67  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 68  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 69  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 70  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 71  | SPT             |   | 21<br>43<br>50/6"       | 112                         |  | trace fine gravel                                    |   |                                    |                             |            |                                   |                          |
| 72  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 73  |                 |   |                         |                             | 62                                     |  |   |                                    |                             |            |                                   |                          |
| 74  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 75  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 76  | SPT             |  | 8<br>13<br>20           | 40                          |  | dense<br>LL = 28, PI = 8                             |   |                                    |                             | 26.8       | 18.6                              |                          |
| 77  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 78  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 79  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 80  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 81  | SPT             |  | 13<br>48<br>50/<br>4.5" | 118/<br>10.5"               |  | very dense   |   |                                    |                             | 18.2       | 21.4                              |                          |
| 82  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 83  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 84  |                 |   |                         |                             |  | SILTY SAND (SM)<br>green-gray, very dense, wet       |   |                                    |                             |            |                                   |                          |
| 85  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 86  | SPT             |  | 16<br>40<br>37          | 92                          |  |  |   |                                    |                             | 15.9       | 23.2                              |                          |
| 87  |                 |   |                         |                             | SM                                     |  |   |                                    |                             |            |                                   |                          |
| 88  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 89  |                 |   |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
| 90  | S&H             |  |                         |                             |  |  |   |                                    |                             |            |                                   |                          |
|   |                 |   |                         |                             |  |  | <b>Treadwell&amp;Rollo</b><br><small>A LANGAN COMPANY</small> |                                    |                             |            |                                   |                          |
|   |                 |   |                         |                             |  |  | Project No.:<br>750604201                                     |                                    | Figure:<br>F-2c             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |        |           |                             |           | Log of Boring BSWL337-2<br>PAGE 4 OF 9            |                                     |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|-----------|---|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY | MATERIAL DESCRIPTION                              | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |           |   | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 91  | S&H             |        | 3         | 15                          | CL        | CLAY (CL)<br>green-gray, stiff to very stiff, wet |                                     |                                    |                             |            |                                   |                          |
| 92  |                 |        | 9         | 12                          |           |   |                                     |                                    |                             |            |                                   |                          |
| 93  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 94  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 95  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 96  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 97  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 98  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 99  |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 100   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 101   | S&H             |        | 3         | 13                          |           | stiff, trace organics, trace fine-grained sand    |                                     |                                    |                             |            |                                   |                          |
| 102   |                 |        | 8         | 10                          |           |   |                                     |                                    |                             |            |                                   |                          |
| 103   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 104   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 105   |                 |        |           |                             | CL        |   |                                     |                                    |                             |            |                                   |                          |
| 106   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 107   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 108   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 109   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 110   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 111   | S&H             |        | 2         | 11                          |           | olive-gray  |                                     |                                    |                             |            | 58.0                              | 67                       |
| 112   |                 |        | 4         |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 113   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 114   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 115   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 116   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 117   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 118   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 119   |                 |        |           |                             |           |   |                                     |                                    |                             |            |                                   |                          |
| 120   | S&H             |        |           | 15                          |           |   |                                     |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |           |   | Treadwell&Rollo<br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |           |   | Project No.:<br>750604201           |                                    | Figure:<br>F-2d             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          |                   | Log of Boring BSWL337-2<br>PAGE 5 OF 9 |                                     |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|-------------------|--|-------------------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY         | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |                   |  | Type of Strength Test               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | S&H          |        | 19        | 15                       | CL                | CLAY (CL) (continued)                  |                                     |                              |                          |         |                             |                       |
| 122   |              |        | 12        |                          |                   | stiff to very stiff                    |                                     |                              |                          |         |                             |                       |
| 123   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 124   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 125   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 126   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 127   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 128   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 129   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 130   | S&H          |        | 27        | 15                       |                   | grades sandier                         |                                     |                              |                          |         |                             |                       |
| 131   |              |        | 14        |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 132   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 133   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 134   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 135   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 136   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 137   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 138   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 139   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 140   | S&H          |        | 39        | 15                       | grades less sandy |  |                                     |                              |                          |         |                             |                       |
| 141   |              |        | 13        |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 142   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 143   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 144   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 145   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 146   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 147   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 148   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 149   |              |        |           |                          |                   |  |                                     |                              |                          |         |                             |                       |
| 150   | S&H          |        |           | 11                       |                   |  |                                     |                              |                          |         |                             |                       |
|   |              |        |           |                          |                   |  | Treadwell&Rollo<br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |        |           |                          |                   |  | Project No.: 750604201              |                              | Figure: F-2e             |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18






TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |        |           |                             | Log of Boring BSWL337-2<br>PAGE 6 OF 9 |   |                                     |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|--|---|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY                              | MATERIAL DESCRIPTION                              | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |  |   | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 151   | S&H             |        | 2         | 11                          | CL                                     | CLAY (CL) (continued)                             |                                     |                                    |                             |            |                                   |                          |
| 152   |                 |        | 6         |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 153   |                 |        | 9         |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 154   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 155   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 156   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 157   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 158   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 159   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 160   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 161   | S&H             |        | 3         | 15                          | SC                                     | trace organics                                    |                                     |                                    |                             |            |                                   |                          |
| 162   |                 |        | 8         |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 163   |                 |        | 13        |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 164   |                 |        |           |                             |  | CLAYEY SAND (SC)<br>green-gray, medium dense, wet |                                     |                                    |                             |            |                                   |                          |
| 165   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 166   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 167   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 168   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 169   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 170   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 171   | S&H             |        | 8         | 22                          |  |   |                                     |                                    |                             |            |                                   |                          |
| 172   |                 |        | 14        |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 173   |                 |        | 17        |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 174   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 175   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 176   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 177   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 178   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 179   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 180   | SPT             |        |           | 83                          | SC                                     |   |                                     |                                    | 24.9                        | 23.2       |                                   |                          |
|   |                 |        |           |                             |  |   | Treadwell&Rollo<br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |  |   | Project No.:<br>750604201           |                                    | Figure:<br>F-2f             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                |              | Log of Boring BSWL337-2<br>PAGE 7 OF 9 |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
|---|--------------|---|----------------|--------------|--|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|---|--|-----------------|--|--|------|------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |              | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |   |  |                 |  |  |      |      |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value¹ |  |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft   |  |                 |  |  |      |      |
| 181   | SPT          |    | 10<br>36<br>33 | 83           | SC                                     | CLAYEY SAND (SC)<br>CLAYEY SAND (SC) (continued)<br>gray, very dense, wet |                       |                              |                          | 24.9    | 23.2                        |   |  |                 |  |  |      |      |
| 182   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 183   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 184   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 185   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 186   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 187   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 188   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 189   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 190   | SPT          |    | 28<br>41<br>39 | 96           |  |   |                       |                              |                          |         |                             |   |  |                 |  |  | 19.0 | 19.5 |
| 191   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 192   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 193   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 194   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 195   | S&H          |  | 2<br>7<br>17   | 17           | CL                                     | CLAY (CL)<br>gray, very stiff, wet  |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 196   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 197   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 198   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 199   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 200   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 201   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 202   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 203   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 204   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 205   | S&H          |  | 14<br>37<br>43 | 56           | SC                                     | CLAYEY SAND (SC)<br>green-gray, very dense, wet                           |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 206   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 207   |              |   |                |              | CL                                     | SANDY CLAY (CL)<br>gray, very stiff, wet                                  |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 208   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 209   |              |   |                |              |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
| 210   | SPT          |  |                | 16           |  |   |                       |                              |                          |         |                             |   |  |                 |  |  |      |      |
|   |              |   |                |              |  |   |                       |                              |                          |         |                             | <b>Treadwell&amp;Rollo</b><br><small>A LANGAN COMPANY</small> |  |                 |  |  |      |      |
|   |              |   |                |              |  |   |                       |                              |                          |         |                             | Project No.:<br>750604201                                     |  | Figure:<br>F-2g |  |  |      |      |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18



# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |        |           |                             | Log of Boring BSWL337-2<br>PAGE 8 OF 9 |   |                                     |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|--|---|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY                              | MATERIAL DESCRIPTION                                      | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |  |   | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 211   | SPT             | •      | 1         | 16                          | CL                                     | SANDY CLAY (CL) (continued)<br><br>grades less sandy      |                                     |                                    |                             |            |                                   |                          |
| 212   |                 |        | 5         |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 213   |                 |        | 8         |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 214   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 215   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 216   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 217   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 218   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 219   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 220   | S&H             |        | 3         | 25                          |  | CLAY (CL)<br>green-gray, very stiff, wet, trace fine sand |                                     |                                    |                             |            |                                   |                          |
| 221   |                 |        | 13        |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 222   |                 |        | 23        |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 223   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 224   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 225   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 226   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 227   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 228   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 229   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 230   |                 |        |           |                             | CL                                     |   |                                     |                                    |                             |            |                                   |                          |
| 231   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 232   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 233   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 234   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 235   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 236   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 237   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 238   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 239   |                 |        |           |                             |  |   |                                     |                                    |                             |            |                                   |                          |
| 240   | SPT             |        |           | 29                          |  |   |                                     |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |  |   | Treadwell&Rollo<br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |  |   | Project No.:<br>750604201           |                                    | Figure:<br>F-2h             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOG 337**  
San Francisco, California

**Log of Boring BSWL337-2**

PAGE 9 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|-----------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241             | SPT          |        | 0         | 29                       | CL        | CLAY (CL)  |                       |                              |                          |         |                             |                       |
| 242             |              |        | 5         |                          |           | yellow-brown, very stiff, wet, trace fine gravel   |                       |                              |                          |         |                             |                       |
| 243             |              |        | 19        |                          |           |  |                       |                              |                          |         |                             |                       |
| 244             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 245             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 246             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 247             |              |        |           |                          |           | grades gravelly  |                       |                              |                          |         |                             |                       |
| 248             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 249             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 250             |              |        |           |                          | CL        |  |                       |                              |                          |         |                             |                       |
| 251             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 252             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 253             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 254             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 255             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 256             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 257             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 258             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 259             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 260             | SPT          |        | 50/ 4.5"  | 60/ 4.5"                 |           | SHALE [BEDROCK]  |                       |                              |                          |         |                             |                       |
| 261             |              |        |           |                          |           | olive gray to black, mottled with dark yellowish brown, deeply weathered, weak, low hardness, crushed, wet |                       |                              |                          |         |                             |                       |
| 262             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 263             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 264             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 265             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 266             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 267             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 268             | SPT          |        | 50/ 0.5"  | 60/ 0.5"                 |           |  |                       |                              |                          |         |                             |                       |
| 269             |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 270             |              |        |           |                          |           | dark-gray to black   |                       |                              |                          |         |                             |                       |

Boring terminated at a depth of 270 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at a depth of 8 feet during drilling.

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City datum plus 100 feet.






**Treadwell&Rollo**  
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Project No.:  
750604201

Figure:  
F-2i

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT:</b><br><div style="text-align: center;"> <b>SEAWALL LOG 337</b><br/> San Francisco, California </div> |                 | <b>Log of Boring BSWL337-3</b><br><div style="text-align: right;">PAGE 1 OF 9</div> |                            |           |  |                             |                                    |                             |            |                                   |                          |
|---|-----------------|---|----------------------------|-----------|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| <b>Boring location:</b> See Site Plan, Figure 2   |                 |   | <b>Logged by:</b> C. Divis |           |  |                             |                                    |                             |            |                                   |                          |
| <b>Date started:</b> 7/21/11 <b>Date finished:</b> 7/25/11  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| <b>Drilling method:</b> Rotary Wash   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| <b>Hammer weight/drop:</b> 140 lbs./30 inches <b>Hammer type:</b> Automatic                                       |                 | <b>LABORATORY TEST DATA</b>   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| <b>Samplers:</b> Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST), Dames & Moore (D&M)  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |   |                            | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample  | Blows/ 6"                  |           |  |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: 100 feet <sup>2</sup>   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 1   |                 |   |                            |           | 4-inch Asphalt Concrete (AC)<br>20-inch Aggregate Base (AB)  |                             |                                    |                             |            |                                   |                          |
| 2   |                 |   |                            |           | 3-inch Asphalt Concrete (AC)   |                             |                                    |                             |            |                                   |                          |
| 3   |                 |   |                            |           | GRAVEL with CLAY and SAND (GP-GC)<br>gray, dense, dry to moist, with trace brick<br>fragments, trace fines |                             |                                    |                             |            |                                   |                          |
| 4   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 5   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 6   | SPT             |    | 16<br>17<br>13             | 36        | GP-GC  |                             |                                    |                             | 7.5        | 3.6                               |                          |
| 7   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 8   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 9   |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 10  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 11  | SPT             |   | 3<br>1<br>2                | 4         | SANDY CLAY with GRAVEL (CL)<br>gray and brown, soft, wet   |                             |                                    |                             |            |                                   |                          |
| 12  |                 |   |                            |           | CL   |                             |                                    |                             |            |                                   |                          |
| 13  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 14  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 15  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 16  | S&H             |  | 4<br>6<br>10               | 11        | CLAYEY GRAVEL with SAND (GC)<br>gray, medium dense, wet, angular to subangular<br>gravel                   |                             |                                    |                             | 13.8       | 10.6                              | 117                      |
| 17  |                 |   |                            |           | GC   |                             |                                    |                             |            |                                   |                          |
| 18  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 19  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 20  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 21  | S&H             |  | 0<br>1<br>0                | 1         | CLAY (CH)<br>gray, very soft, wet, with rubble and serpentinite<br>pieces                                  |                             |                                    |                             |            | 40.2                              |                          |
| 22  |                 |   |                            |           | CH   |                             |                                    |                             |            |                                   |                          |
| 23  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 24  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 25  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 26  | S&H             |  | 3<br>8<br>6                | 10        | CLAY with GRAVEL (CH)<br>gray, medium stiff, wet   |                             |                                    |                             |            |                                   |                          |
| 27  |                 |   |                            |           | CH   |                             |                                    |                             |            |                                   |                          |
| 28  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 29  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |
| 30  |                 |   |                            |           |  |                             |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

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Project No.:  
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Figure:  
F-3a

# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOG 337**  
San Francisco, California

**Log of Boring BSWL337-3**

PAGE 2 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |          |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|--------|----------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/6" | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31              | SPT          |        | 10       | 16                       | GC        | CLAYEY GRAVEL (GC)<br>gray-brown, medium dense, wet, trace sand | FILL                  |                              |                          | 14.8    | 22.5                        |                       |
| 32              |              |        | 6        |                          | CH        | CLAY with GRAVEL (CH)<br>brown/gray, stiff, wet, trace sand     |                       |                              |                          |         |                             |                       |
| 33              |              |        | 7        |                          |           |   |                       |                              |                          |         |                             |                       |
| 34              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 35              | S&H          |        | 1        | 1                        | CH        | CLAY (CH)<br>dark gray, very soft, wet                          | TV                    | 700                          |                          |         |                             |                       |
| 36              |              |        | 1        |                          |           |   |                       |                              |                          |         |                             |                       |
| 37              |              |        | 1        |                          |           |   |                       |                              |                          |         |                             |                       |
| 38              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 39              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 40              |              |        |          |                          |           | medium stiff, wet   |                       |                              |                          |         |                             |                       |
| 41              | ST           |        |          | 50-75 psi                | CH        |   | BAY MUD               |                              |                          |         |                             |                       |
| 42              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 43              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 44              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 45              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 46              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 47              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 48              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 49              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 50              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 51              | ST           |        |          | 50 psi                   | CH        | soft to medium stiff, trace organics                            | TV                    | 500                          |                          |         |                             |                       |
| 52              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 53              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 54              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 55              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 56              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 57              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 58              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 59              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |
| 60              |              |        |          |                          |           |   |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

**Treadwell&Rollo**  
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Project No.:  
750604201

Figure:  
F-3b

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |             |           |              | Log of Boring BSWL337-3<br>PAGE 3 OF 9 |  |                       |                              |                          |         |                             |                       |
|---|--------------|-------------|-----------|--------------|--|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |             |           |              | LITHOLOGY                              | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample      | Blows/ 6" | SPT N-Value¹ |  |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | D&M          | <div></div> |           | 100 psi      | CH                                     | CLAY (CH) (continued)<br>medium stiff                                  | TV                    |                              | 920                      |         |                             |                       |
| 62  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 63  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 64  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 65  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 66  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 67  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 68  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 69  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 70  |              | <div></div> |           | 50 psi       |  |  |                       | TV                           |                          | 720     |                             |                       |
| 71  | D&M          | <div></div> |           |              |  |  |                       |                              |                          |         |                             |                       |
| 72  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 73  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 74  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 75  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 76  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 77  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 78  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 79  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 80  |              | <div></div> |           | 50 psi       |  |  |                       |                              |                          |         |                             |                       |
| 81  | D&M          | <div></div> |           |              |  |  |                       |                              |                          |         |                             |                       |
| 82  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 83  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 84  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 85  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 86  |              |             |           |              |  | grades sandier and darker gray   |                       |                              |                          |         |                             |                       |
| 87  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 88  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |
| 89  |              |             |           |              | CL                                     | CLAY with SAND (CL)<br>light green-gray, stiff, wet, trace fine gravel |                       |                              |                          |         |                             |                       |
| 90  |              |             |           |              |  |  |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

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Project No.: 750604201

Figure: F-3c

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

**Treadwell&Rollo**  
A LANGAN COMPANY

Project No.:  
750604201

Figure:  
F-3c

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL337-3<br>PAGE 4 OF 9 |   |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|-----------|--|---|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test                               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91  | S&H          |        | 8         | 17                       | CL        | CLAY with SAND (CL) (continued)        |   |                              |                          |         |                             |                       |
| 92  |              |        | 10        |                          |           |  |   |                              |                          |         |                             |                       |
| 93  |              |        | 14        |                          |           |  |   |                              |                          |         |                             |                       |
| 94  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 95  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 96  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 97  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 98  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 99  |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 100   | S&H          |        | 1         | 6                        |           | CL                                     | CLAY (CL)<br>gray-green, medium stiff to stiff, wet | TxUU                         | 6,000                    | 1,410   |                             | 53.4                  |
| 101   |              |        | 3         |                          |           |  |   |                              |                          |         |                             |                       |
| 102   |              |        | 6         |                          |           |  |   |                              |                          |         |                             |                       |
| 103   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 104   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 105   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 106   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 107   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 108   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 109   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 110   | S&H          |        | 0         | 6                        | CL        | trace organics                         |   |                              |                          |         |                             |                       |
| 111   |              |        | 1         |                          |           |  |   |                              |                          |         |                             |                       |
| 112   |              |        | 8         |                          |           |  |   |                              |                          |         |                             |                       |
| 113   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 114   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 115   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 116   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 117   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 118   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 119   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |
| 120   |              |        |           |                          |           |  |   |                              |                          |         |                             |                       |

TEST LOG SHEET LOG 750604201 FOR 255019 9 INCH 103/10

Treadwell&Rollo

A LANGAN COMPANY

Project No.:

750604201

Figure:

F-3d






TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |        |              |                | Log of Boring BSWL337-3<br>PAGE 5 OF 9 |                                |                                     |                                    |                             |            |                                   |                          |
|---|-----------------|--------|--------------|----------------|--|--------------------------------|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |              |                | LITHOLOGY                              | MATERIAL DESCRIPTION           | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6"    | SPT<br>N-Value |  |                                | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 121   | S&H             |        | 2<br>5<br>10 | 11             | CL                                     | CLAY (CL) (continued)<br>stiff |                                     |                                    |                             |            |                                   |                          |
| 122   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 123   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 124   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 125   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 126   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 127   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 128   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 129   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 130   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 131   | S&H             |        | 2<br>7<br>12 | 13             |  |                                |                                     |                                    |                             |            |                                   |                          |
| 132   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 133   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 134   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 135   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 136   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 137   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 138   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 139   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 140   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 141   | S&H             |        | 2<br>8<br>12 | 14             |  |                                |                                     |                                    |                             |            |                                   |                          |
| 142   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 143   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 144   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 145   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 146   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 147   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 148   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 149   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
| 150   |                 |        |              |                |  |                                |                                     |                                    |                             |            |                                   |                          |
|   |                 |        |              |                |  |                                | Treadwell&Rollo<br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |        |              |                |  |                                | Project No.:<br>750604201           |                                    | Figure:<br>F-3e             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                |                          | Log of Boring BSWL337-3<br>PAGE 6 OF 9 |   |  |                              |                          |         |                             |                       |
|---|--------------|---|----------------|--------------------------|--|---|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |                          | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                           |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value <sup>1</sup> |  |   | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   | S&H          |    | 5<br>8<br>13   | 15                       | CL                                     | CLAY (CL) (continued)<br>stiff to very stiff                          |  |                              |                          |         |                             |                       |
| 152   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 153   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 154   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 155   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 156   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 157   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 158   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 159   |              |   |                |                          |  | SAND (SP)<br>olive-gray, dense, wet, trace fines                      |  |                              |                          |         |                             |                       |
| 160   | S&H          |   | 10<br>13<br>30 | 32                       | SP                                     |   |  |                              |                          |         |                             |                       |
| 161   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 162   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 163   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 164   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 165   | SPT          |  | 16<br>30<br>41 | 85                       |  | very dense  |  |                              |                          |         |                             |                       |
| 166   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 167   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 168   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 169   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 170   | SPT          |  | 39<br>47<br>50 | 116                      |  |   |  |                              |                          |         |                             |                       |
| 171   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 172   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 173   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 174   |              |   |                |                          |  | clay lense at 174 feet  |  |                              |                          |         |                             |                       |
| 175   | SPT          |  | 16<br>24<br>30 | 65                       | SC                                     | CLAYEY SAND (SC)<br>olive-gray, very dense, wet                       |  |                              |                          | 26.7    | 23.4                        |                       |
| 176   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 177   |              |   |                |                          |  | CLAY with SAND (CL)<br>gray-brown, very stiff to hard, wet, fine sand |  |                              |                          |         |                             |                       |
| 178   |              |   |                |                          | CL                                     |   |  |                              |                          |         |                             |                       |
| 179   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
| 180   |              |   |                |                          |  |   |  |                              |                          |         |                             |                       |
|   |              |   |                |                          |  |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |   |                |                          |  |   | Project No.:<br>750604201                      |                              | Figure:<br>F-3f          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18



# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |                |             | Log of Boring BSWL337-3<br>PAGE 7 OF 9 |  |  |                              |   |         |                             |                       |  |  |
|---|--------------|--------|----------------|-------------|--|--|--|------------------------------|---|---------|-----------------------------|-----------------------|--|--|
| DEPTH<br>(feet)                                       | SAMPLES      |        |                |             | LITHOLOGY                              | MATERIAL DESCRIPTION   | LABORATORY TEST DATA                           |                              |   |         |                             |                       |  |  |
|   | Sampler Type | Sample | Blows/ 6"      | SPT N-Value |  |  | Type of Strength Test                          | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft  | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |
| 181   | SPT          |        | 29<br>41<br>48 | 107         | CL                                     | CLAY with SAND (CL) (continued)                                  |  |                              |   |         |                             |                       |  |  |
| 182   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 183   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 184   |              |        |                |             |  |  |  |                              | CLAYEY SAND with GRAVEL (SC)<br>olive-gray, very dense, with organics |         |                             |                       |  |  |
| 185   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 186   |              |        |                |             | SC                                     |  |  |                              |   |         |                             |                       |  |  |
| 187   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 188   |              |        |                |             |  | CLAY (CL)<br>olive-gray, hard, wet                               |  |                              |   |         |                             |                       |  |  |
| 189   |              |        |                |             | CL                                     |  |  |                              |   |         |                             |                       |  |  |
| 190   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 191   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 192   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 193   |              |        |                |             |  | CLAYEY SAND (SC)<br>green, very dense, wet, trace gravel         |  |                              |   |         |                             |                       |  |  |
| 194   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 195   | SPT          |        | 16<br>27<br>31 | 70          |  |  |  |                              |   |         |                             |                       |  |  |
| 196   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 197   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 198   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 199   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 200   | SPT          |        | 7<br>10<br>11  | 25          |  | CLAY (CL)<br>mottled olive and gray, very stiff, wet, trace sand |  |                              |   |         |                             |                       |  |  |
| 201   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 202   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 203   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 204   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 205   |              |        |                |             | CL                                     |  |  |                              |   |         |                             |                       |  |  |
| 206   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 207   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 208   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 209   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
| 210   |              |        |                |             |  |  |  |                              |   |         |                             |                       |  |  |
|   |              |        |                |             |  |  | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                              |   |         |                             |                       |  |  |
|   |              |        |                |             |  |  | Project No.:<br>750604201                      |                              | Figure:<br>F-3g   |         |                             |                       |  |  |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18




# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |              |           | Log of Boring BSWL337-3<br>PAGE 8 OF 9 |                                     |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------|-----------|--|-------------------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |              | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value¹ |           |  | Type of Strength Test               | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   |              |        |           |              |           | CLAY (CL) (continued)                  |                                     |                              |                          |         |                             |                       |
| 212   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 213   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 214   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 215   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 216   | S&H          |        | 7         | 28           |           | with trace organics                    |                                     |                              |                          |         |                             |                       |
| 217   |              |        | 16        |              |           |  |                                     |                              |                          |         |                             |                       |
| 218   |              |        | 24        |              |           |  |                                     |                              |                          |         |                             |                       |
| 219   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 220   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 221   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 222   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 223   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 224   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 225   |              |        |           |              | CL        |  |                                     |                              |                          |         |                             |                       |
| 226   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 227   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 228   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 229   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 230   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 231   | S&H          |        | 10        | 33           |           | hard, with light brown mottling        |                                     |                              |                          |         |                             |                       |
| 232   |              |        | 21        |              |           |  |                                     |                              |                          |         |                             |                       |
| 233   |              |        | 26        |              |           |  |                                     |                              |                          |         |                             |                       |
| 234   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 235   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 236   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 237   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 238   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 239   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
| 240   |              |        |           |              |           |  |                                     |                              |                          |         |                             |                       |
|   |              |        |           |              |           |  | Treadwell&Rollo<br>A LANGAN COMPANY |                              |                          |         |                             |                       |
|   |              |        |           |              |           |  | Project No.: 750604201              |                              | Figure: F-3h             |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                |                          |           | Log of Boring BSWL337-3<br>PAGE 9 OF 9   |                       |                              |                          |         |                             |                       |  |
|---|--------------|---|----------------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 241   | SPT          |  | 23<br>26<br>38 | 77                       | CL        | CLAY with SAND and GRAVEL (CL)<br>olive-gray, hard, wet  |                       |                              |                          |         |                             |                       |  |
| 242   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 243   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 244   |              |   |                |                          |           | CLAYSTONE [BEDROCK]<br>dark gray mottled with dark yellowish brown, thinly laminated, low hardness, sheared, weak, slightly plastic, polished surface, wet, moderately weathered | FRANCISCAN FORMATION  |                              |                          |         |                             |                       |  |
| 245   | SPT          |  | 52/1"          | 62/1"                    |           |  |                       |                              |                          |         |                             |                       |  |
| 246   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 247   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 248   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 249   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 250   | SPT          |  | 54/2"          | 65/2"                    |           |  |                       |                              |                          |         |                             |                       |  |
| 251   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 252   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 253   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 254   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 255   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 256   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 257   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 258   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 259   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 260   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 261   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 262   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 263   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 264   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 265   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 266   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 267   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 268   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 269   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |
| 270   |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |  |

Boring terminated at a depth of 250 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater not measured during drilling.





<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City datum plus 100 feet.

**Treadwell&Rollo**  
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Project No.: 750604201      Figure: F-3i

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| <b>PROJECT:</b><br><b>SEAWALL LOG 337</b><br>San Francisco, California                                    |                 | <b>Log of Boring BSWL337-4</b><br>PAGE 1 OF 8                                       |             |           |  |                             |                                    |                             |            |                                   |                          |
|---|-----------------|---|-------------|-----------|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 | Logged by: C. Divis   |             |           |  |                             |                                    |                             |            |                                   |                          |
| Date started: 7/25/11      Date finished: 7/27/11   |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches      Hammer type: Automatic  |                 | <b>LABORATORY TEST DATA</b>   |             |           |  |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST), Dames & Moore (D&M) |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |   |             | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample  | Blows/ 6"   |           |  |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: 99 feet <sup>2</sup>  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 1   |                 |   |             |           | 3-inch Asphalt Concrete (AC)   |                             |                                    |                             |            |                                   |                          |
| 2   |                 |   |             |           | 12-inch Aggregate Base (AB)  |                             |                                    |                             |            |                                   |                          |
| 3   |                 |   |             |           | CLAYEY SAND (SC)<br>orange, moist  |                             |                                    |                             |            |                                   |                          |
| 4   |                 |   |             |           | SC   |                             |                                    |                             |            |                                   |                          |
| 5   |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 6   | S&H             |    | 4<br>6<br>6 | 8         | SAND with SILT and GRAVEL (SP-SM)<br>brown, loose, moist, trace fines        |                             |                                    |                             | 9.1        | 10.8                              |                          |
| 7   |                 |   |             |           | SP-SM  |                             |                                    |                             |            |                                   |                          |
| 8   |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 9   |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 10  |                 |   |             |           | CLAY (CL)<br>gray-brown, soft, wet, with sand and gravel<br>LL = 33, PI = 15 |                             |                                    |                             |            |                                   |                          |
| 11  | SPT             |   | 1<br>1<br>2 | 4         | CL   |                             |                                    |                             |            |                                   |                          |
| 12  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 13  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 14  |                 |   |             |           | CLAY (CH)<br>dark gray, very soft, wet, trace organics and shells            |                             |                                    |                             |            |                                   |                          |
| 15  | SPT             |  | 1<br>0<br>1 | 1         | CH   |                             |                                    |                             |            |                                   |                          |
| 16  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 17  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 18  |                 |   |             |           | shells at 18 to 19 feet  |                             |                                    |                             |            |                                   |                          |
| 19  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 20  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 21  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 22  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 23  |                 |   |             |           | CLAY with GRAVEL and SAND (CH)<br>gray, very stiff, wet, trace shells        |                             |                                    |                             |            |                                   |                          |
| 24  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 25  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 26  |                 |   |             |           | CH   |                             |                                    |                             |            |                                   |                          |
| 27  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 28  | SPT             |  | 3<br>6<br>9 | 18        |  |                             |                                    |                             |            |                                   |                          |
| 29  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |
| 30  |                 |   |             |           |  |                             |                                    |                             |            |                                   |                          |



TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

**Treadwell&Rollo**  
 A LANGAN COMPANY

Project No.: 750604201      Figure:

F-4a

# Mayor ED 17-02 Priority permit



| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |             |                          |           | Log of Boring BSWL337-4<br>PAGE 2 OF 8                                 |                       |                              |                          |         |                             |                       |
|---|--------------|---|-------------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  | SPT          |    | 1<br>5<br>6 | 13                       | CH        | CLAY with GRAVEL and SAND (CH) (continued)<br>grades gray-brown, stiff |                       |                              |                          |         |                             |                       |
| 32  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 33  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 34  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 35  |              |   |             |                          | CH        | CLAY (CH)<br>gray, soft, wet   | TV                    | 700                          |                          |         |                             |                       |
| 36  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 37  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 38  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 39  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 40  |              |   |             |                          |           | shells in cuttings   |                       |                              |                          |         |                             |                       |
| 41  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 42  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 43  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 44  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 45  |              |   |             |                          | CH        | medium stiff   |                       |                              |                          |         |                             |                       |
| 46  | D&M          |  |             | 100<br>psi               |           |  |                       |                              |                          |         |                             |                       |
| 47  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 48  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 49  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 50  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 51  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 52  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 53  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 54  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 55  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 56  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 57  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 58  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 59  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |
| 60  |              |   |             |                          |           |  |                       |                              |                          |         |                             |                       |

FILL  
 BAY MUD

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18



**Treadwell&Rollo**  
 A LANGAN COMPANY  
 Project No.: 750604201      Figure: F-4b

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |           |                             | Log of Boring BSWL337-4<br>PAGE 3 OF 8 |                                  |  |                                    |                             |            |                                   |                          |
|---|-----------------|---|-----------|-----------------------------|--|----------------------------------|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |           |                             | LITHOLOGY                              | MATERIAL DESCRIPTION             | LABORATORY TEST DATA                           |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |  |                                  | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 61  |                 |   |           |                             |  | CLAY (CH) (continued)            |  |                                    |                             |            |                                   |                          |
| 62  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 63  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 64  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 65  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 66  | D&M             |    |           | 175<br>psi                  | CH                                     |                                  | TV   |                                    | 900                         |            |                                   |                          |
| 67  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 68  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 69  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 70  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 71  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 72  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 73  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 74  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 75  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 76  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 77  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 78  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 79  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 80  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 81  | D&M             |  |           | 175<br>psi                  | CH                                     | gray, medium stiff to stiff, wet | TV   |                                    | 1,000                       |            |                                   |                          |
| 82  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 83  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 84  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 85  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 86  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
| 87  |                 |   |           |                             |  | CLAYEY SAND (SC) lense           |  |                                    |                             |            |                                   |                          |
| 88  |                 |   |           |                             | SC                                     |                                  |  |                                    |                             |            |                                   |                          |
| 89  |                 |   |           |                             | CH                                     |                                  |  |                                    |                             |            |                                   |                          |
| 90  |                 |   |           |                             |  |                                  |  |                                    |                             |            |                                   |                          |
|   |                 |   |           |                             |  |                                  | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |   |           |                             |  |                                  | Project No.:<br>750604201                      |                                    | Figure:<br>F-4c             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |                |                             | Log of Boring BSWL337-4<br>PAGE 4 OF 8 |   |  |                                    |                             |                 |                                   |                          |  |  |  |
|---|-----------------|---|----------------|-----------------------------|--|---|--|------------------------------------|-----------------------------|-----------------|-----------------------------------|--------------------------|--|--|--|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                |                             | LITHOLOGY                              | MATERIAL DESCRIPTION                        | LABORATORY TEST DATA                           |                                    |                             |                 |                                   |                          |  |  |  |
|   | Sampler<br>Type | Sample  | Blows/ 6"      | SPT<br>N-Value <sup>1</sup> |  |   | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>%      | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |  |  |  |
| 91  | S&H             |    | 11<br>17<br>23 | 28                          | CH                                     | CLAY (CH)                                   | BAY MUD  |                                    |                             |                 |                                   |                          |  |  |  |
| 92  |                 |   |                |                             |  | CLAY (CH) (continued)                       |  |                                    |                             |                 |                                   |                          |  |  |  |
| 93  |                 |   |                |                             |  | gray, wet                                   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 94  |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 95  |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 96  |                 |   |                |                             | CL                                     | CLAY (CL)                                   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 97  |                 |   |                |                             |  | gray, green, very stiff, wet                |  |                                    |                             |                 |                                   |                          |  |  |  |
| 98  |                 |   |                |                             |  | trace organics                              |  |                                    |                             |                 |                                   |                          |  |  |  |
| 99  |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 100   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 101   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 102   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 103   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 104   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 105   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 106   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 107   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 108   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 109   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 110   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 111   |                 |   |                |                             | CL                                     | SANDY CLAY (CL)                             |  |                                    |                             |                 |                                   |                          |  |  |  |
| 112   |                 |   |                |                             |  | gray, wet                                   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 113   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 114   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 115   | SPT             |  | 0<br>1<br>8    | 11                          | CL                                     | CLAY (CL)                                   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 116   |                 |   |                |                             |  | olive-gray, stiff, wet, with trace organics |  |                                    |                             |                 |                                   |                          |  |  |  |
| 117   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 118   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 119   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
| 120   |                 |   |                |                             |  |   |  |                                    |                             |                 |                                   |                          |  |  |  |
|   |                 |   |                |                             |  |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |                 |                                   |                          |  |  |  |
|   |                 |   |                |                             |  |   | Project No.:<br>750604201                      |                                    |                             | Figure:<br>F-4d |                                   |                          |  |  |  |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18




Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |             |              |                             |           | Log of Boring BSWL337-4<br>PAGE 5 OF 8 |  |                                    |                             |            |                                   |                          |
|---|-----------------|-------------|--------------|-----------------------------|-----------|--|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |             |              |                             | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                                       |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample      | Blows/ 6"    | SPT<br>N-Value <sup>1</sup> |           |  | Type of<br>Strength<br>Test                                | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 121   | S&H             | <div></div> | 4<br>8<br>13 | 15                          | CL        | CLAY (CL) (continued)                  |  |                                    |                             |            |                                   |                          |
| 122   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 123   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 124   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 125   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 126   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 127   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 128   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 129   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 130   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 131   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 132   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 133   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 134   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 135   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 136   |                 |             |              |                             |           | stiff to very stiff                    |  |                                    |                             | 45.0       | 77                                |                          |
| 137   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 138   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 139   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 140   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 141   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 142   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 143   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 144   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 145   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 146   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 147   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 148   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 149   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
| 150   |                 |             |              |                             |           |  |  |                                    |                             |            |                                   |                          |
|   |                 |             |              |                             |           |  | <div>Treadwell&amp;Rollo</div> <div>A LANGAN COMPANY</div> |                                    |                             |            |                                   |                          |
|   |                 |             |              |                             |           |  | Project No.:<br>750604201                                  |                                    | Figure:<br>F-4e             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18



Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |                |                             |   | Log of Boring BSWL337-4<br>PAGE 6 OF 8  |                             |                                    |   |            |                                   |                          |
|---|-----------------|---|----------------|-----------------------------|---|---|-----------------------------|------------------------------------|---|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                |                             | LITHOLOGY                                       | MATERIAL DESCRIPTION  | LABORATORY TEST DATA        |                                    |   |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6"      | SPT<br>N-Value <sup>1</sup> |   |   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft                                   | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 151   | S&H             |    | 8<br>17<br>21  | 27                          | CL  | CLAY (CL) (continued)   | TxUU                        | 9,300                              | 3,210   |            | 21.3                              | 105                      |
| 152   |                 |   |                |                             |   | very stiff, with trace organics and sand  |                             |                                    |   |            |                                   |                          |
| 153   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 154   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 155   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 156   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 157   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 158   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 159   | SC              |  | 19<br>30<br>28 | 70                          | CLAYEY SAND (SC)<br>olive-gray, very dense, wet |   |                             |                                    |   |            |                                   |                          |
| 160   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 161   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 162   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 163   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 164   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 165   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 166   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 167   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 168   |                 |   |                |                             | CL  |  | 7<br>14<br>21               | 25                                 | CLAY (CL)<br>olive-gray with orange mottling, very stiff, wet |            |                                   |                          |
| 169   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 170   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 171   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 172   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 173   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 174   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 175   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 176   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 177   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 178   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 179   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |
| 180   |                 |   |                |                             |   |   |                             |                                    |   |            |                                   |                          |

Treadwell&Rollo



A Langan Company

Project No.: 750604201

Figure: F-4f





TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |                |                             |           | Log of Boring BSWL337-4<br>PAGE 7 OF 8 |  |                                    |                             |            |                                   |                          |
|---|-----------------|---|----------------|-----------------------------|-----------|--|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                |                             | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA                           |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6"      | SPT<br>N-Value <sup>1</sup> |           |  | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 181   |                 |   |                |                             |           | CLAY (CL) (continued)<br>with gravel   |  |                                    |                             |            |                                   |                          |
| 182   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 183   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 184   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 185   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 186   | SPT             |    | 0<br>2<br>12   | 17                          |           | with organics                          |  |                                    |                             |            |                                   |                          |
| 187   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 188   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 189   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 190   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 191   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 192   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 193   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 194   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 195   |                 |   |                |                             | CL        |  |  |                                    |                             |            |                                   |                          |
| 196   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 197   |                 |   |                |                             |           | hard, with gravel and organics         |  |                                    |                             |            |                                   |                          |
| 198   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 199   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 200   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 201   | S&H             |  | 12<br>26<br>30 | 39                          |           |  |  |                                    |                             |            |                                   |                          |
| 202   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 203   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 204   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 205   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 206   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 207   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 208   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 209   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
| 210   |                 |   |                |                             |           |  |  |                                    |                             |            |                                   |                          |
|   |                 |   |                |                             |           |  | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |   |                |                             |           |  | Project No.:<br>750604201                      |                                    | Figure:<br>F-4g             |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18







# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California   |              |   |                 |                          |           | Log of Boring BSWL337-4<br>PAGE 8 OF 8  |                       |                              |                          |         |                             |                       |
|---|--------------|---|-----------------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)   | SAMPLES      |   |                 |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"       | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   |              |   |                 |                          |           | CLAY (CL) (continued)   |                       |                              |                          |         |                             |                       |
| 212   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 213   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 214   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 215   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 216   | SPT          |    | 0<br>2<br>12    | 17                       | CL        | very stiff  |                       |                              |                          |         |                             |                       |
| 217   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 218   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 219   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 220   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 221   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 222   |              |   |                 |                          |           | CLAY (CH)   |                       |                              |                          |         |                             |                       |
| 223   |              |   |                 |                          |           | olive-gray, very stiff to hard, wet, with gravel and organics   |                       |                              |                          |         |                             |                       |
| 224   |              |   |                 |                          | CH        |   |                       |                              |                          |         |                             |                       |
| 225   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 226   | SPT          |  | 6<br>15<br>29   | 53                       |           |   |                       |                              |                          |         |                             |                       |
| 227   |              |   |                 |                          |           | SHALE [BEDROCK]   |                       |                              |                          |         |                             |                       |
| 228   |              |   |                 |                          |           | olive-gray to black, deeply weathered, intensely fractured to crushed, low hardness, weak, friable, moist to wet  |                       |                              |                          |         |                             |                       |
| 229   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 230   | SPT          |  | 50/3" 60/3"     |                          |           |   |                       |                              |                          |         |                             |                       |
| 231   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 232   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 233   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 234   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 235   | SPT          |  | 50/1.5" 60/1.5" |                          |           |   |                       |                              |                          |         |                             |                       |
| 236   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 237   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 238   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 239   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 240   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| Boring terminated at a depth of 235 feet below ground surface.<br>Boring backfilled with cement grout.<br>Groundwater not measured during drilling. |              |   |                 |                          |           | <sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br><sup>2</sup> Elevations based on San Francisco City datum plus 100 feet. |                       |                              |                          |         |                             |                       |
|   |              |   |                 |                          |           | Treadwell&Rollo<br>A LANGAN COMPANY   |                       |                              |                          |         |                             |                       |
|   |              |   |                 |                          |           | Project No.: 750604201  |                       |                              | Figure: F-4h             |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

FRANCISCAN FORMATION

# Mayor ED 17-02 Priority permit

| PROJECT:  |                 | <b>SEAWALL LOG 337</b><br>San Francisco, California                                 |             |                             | <b>Log of Boring BSWL337-5</b><br>PAGE 1 OF 8 |   |  |                                    |                             |              |                                   |                          |
|---|-----------------|---|-------------|-----------------------------|---|---|--|------------------------------------|-----------------------------|--------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2  |                 |   |             |                             | Logged by: S. Magallon                        |   |  |                                    |                             |              |                                   |                          |
| Date started: 7/18/11   |                 | Date finished: 7/20/11  |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| Drilling method: Rotary Wash  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches  |                 | Hammer type: Automatic  |             |                             | LABORATORY TEST DATA                          |   |  |                                    |                             |              |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST), Dames & Moore (D&M) |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| DEPTH<br>(feet)   | SAMPLES         |   |             | SPT<br>N-value <sup>1</sup> | LITHOLOGY                                     | MATERIAL DESCRIPTION                                  | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>%   | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|   | Sampler<br>Type | Sample  | Blows/ 6"   |                             |   |   |  |                                    |                             |              |                                   |                          |
| Ground Surface Elevation: 98.5 feet <sup>2</sup>  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 1   |                 |   |             |                             |   | 1.5-inch Asphalt Concrete (AC)                        |  |                                    |                             |              |                                   |                          |
| 2   |                 |   |             |                             |   | 4-inch Aggregate Base (AB)                            |  |                                    |                             |              |                                   |                          |
| 3   |                 |   |             |                             |   | SANDY CLAY (CL)                                       |  |                                    |                             |              |                                   |                          |
| 4   |                 |   |             |                             |   | gray, soft, moist, trace fine gravel                  |  |                                    |                             |              |                                   |                          |
| 5   |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 6   | SPT             |    | 3<br>2<br>1 | 4                           |   |   |  |                                    |                             |              |                                   |                          |
| 7   |                 |   |             |                             |   | ▽   |  |                                    |                             |              |                                   |                          |
| 8   |                 |   |             |                             |   | trace brick and glass                                 |  |                                    |                             |              |                                   |                          |
| 9   |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 10  |                 |   |             |                             |   | CL  |  |                                    |                             |              |                                   |                          |
| 11  | SPT             |   | 4<br>2<br>4 | 7                           |   | medium stiff  |  |                                    |                             |              |                                   |                          |
| 12  |                 |   |             |                             |   | green-gray with mottling, yellow-brown, wet, with     |  |                                    |                             |              |                                   |                          |
| 13  |                 |   |             |                             |   | deeply weathered, friable, angular and subangular     |  |                                    |                             |              |                                   |                          |
| 14  |                 |   |             |                             |   | serpentinite fragments, with trace fine to coarse     |  |                                    |                             |              |                                   |                          |
| 15  |                 |   |             |                             |   | gravel  |  |                                    |                             |              |                                   |                          |
| 16  |                 |   |             |                             |   | grades more gravelly                                  |  |                                    |                             |              |                                   |                          |
| 17  | SPT             |  | 4<br>4<br>3 | 8                           |   | stiff to very stiff                                   |  |                                    |                             |              |                                   |                          |
| 18  | S&H             |  | 6<br>6<br>8 | 10                          |   |   |  |                                    |                             |              |                                   |                          |
| 19  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 20  |                 |   |             |                             |   | CLAYEY GRAVEL (GC)                                    |  |                                    |                             |              |                                   |                          |
| 21  | SPT             |  | 9<br>9<br>5 | 17                          |   | gray, medium dense, wet, trace sand                   |  |                                    |                             |              |                                   |                          |
| 22  |                 |   |             |                             |   | LL = 28, PI = 10                                      |  |                                    |                             |              |                                   |                          |
| 23  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 24  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 25  |                 |   |             |                             |   | CLAY (CH)   |  |                                    |                             |              |                                   |                          |
| 26  | SPT             |  | 8<br>9<br>8 | 20                          |   | olive-gray to dark gray, very stiff, wet, trace silt, |  |                                    |                             |              |                                   |                          |
| 27  |                 |   |             |                             |   | trace fine gravel                                     |  |                                    |                             |              |                                   |                          |
| 28  |                 |   |             |                             |   |   |  |                                    |                             |              |                                   |                          |
| 29  |                 |   |             |                             |   | CLAY with SAND (CH)                                   |  |                                    |                             |              |                                   |                          |
| 30  |                 |   |             |                             |   | gray mottled with green, very stiff, wet, trace fine  |  |                                    |                             |              |                                   |                          |
|   |                 |   |             |                             |   | to coarse subangular gravel, with deeply              |  |                                    |                             |              |                                   |                          |
|   |                 |   |             |                             |   | weathered, friable serpentinite                       |  |                                    |                             |              |                                   |                          |
|   |                 |   |             |                             |   |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |              |                                   |                          |
|   |                 |   |             |                             |   |   | Project No.: 750604201                         |                                    |                             | Figure: F-5a |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18





# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOG 337**  
San Francisco, California

**Log of Boring BSWL337-5**

PAGE 2 OF 8

| DEPTH<br>(feet) | SAMPLES      |   |                |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|-----------------|--------------|---|----------------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample  | Blows/6"       | SPT N-value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31              | S&H          |    | 6<br>11<br>16  | 19                       | CH        | CLAY with SAND (CH) (continued)  |                       |                              |                          |         | 13.9                        | 122                   |
| 32              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 33              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 34              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 35              |              |    | 10<br>12<br>12 | 17                       | CH        |  |                       |                              |                          |         |                             |                       |
| 36              | S&H          |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 37              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 38              |              |   |                |                          |           | CLAY (CH)<br>gray, soft to medium stiff, wet, trace organics and shell fragments |                       |                              |                          |         |                             |                       |
| 39              |              |   |                |                          | CH        |  |                       |                              |                          |         |                             |                       |
| 40              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 41              | S&H          |   | 0<br>3<br>4    | 5                        |           | medium stiff   |                       |                              |                          |         |                             |                       |
| 42              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 43              |              |   |                |                          | CH        |  |                       |                              |                          |         |                             |                       |
| 44              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 45              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 46              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 47              |              |   |                |                          | CH        |  |                       |                              |                          |         |                             |                       |
| 48              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 49              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 50              |              |  |                | 175-<br>200<br>psi       |           |  |                       |                              |                          |         |                             |                       |
| 51              | ST           |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 52              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 53              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 54              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 55              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 56              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 57              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 58              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 59              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |
| 60              |              |   |                |                          |           |  |                       |                              |                          |         |                             |                       |

FILL

BAY MUD

**Treadwell&Rollo**  
A LANGAN COMPANY

Project No.:  
750604201

Figure:  
F-5b

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          | Log of Boring BSWL337-5<br>PAGE 3 OF 8 |   |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|--|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY                              | MATERIAL DESCRIPTION                          | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |  |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | S&H          |        | 0         |                          | CH                                     | CLAY (CH) (continued)                         |                       |                              |                          |         |                             |                       |
| 62  |              |        | 0         |                          |  |   |                       |                              |                          |         |                             |                       |
| 63  |              |        | 4         |                          |  |   |                       |                              |                          |         |                             |                       |
| 64  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 65  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 66  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 67  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 68  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 69  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 70  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 71  | ST           |        |           | 175-200-225 psi          |  |   |                       |                              |                          |         |                             |                       |
| 72  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 73  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 74  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 75  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 76  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 77  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 78  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 79  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 80  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 81  | S&H          |        | 3         | 9                        | SC                                     | CLAYEY SAND (SC)<br>dark-gray, loose, wet     |                       |                              |                          |         |                             |                       |
| 82  |              |        | 6         |                          |  |   |                       |                              |                          |         |                             |                       |
| 83  |              |        | 7         |                          |  |   |                       |                              |                          |         |                             |                       |
| 84  |              |        |           |                          |  | CLAY (CL)<br>gray, medium stiff to stiff, wet |                       |                              |                          |         |                             |                       |
| 85  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 86  |              |        |           |                          | CL                                     |   |                       |                              |                          |         |                             |                       |
| 87  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 88  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 89  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 90  |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |

TEST LOG FILE: LOG\_750604201 FOR 25501 9 INCH 103710

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A LANEAN COMPANY

Project No.: 750604201

Figure: F-5c

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

BAY MUD

**Treadwell&Rollo**  
A LANGAN COMPANY

Project No.:  
750604201

Figure:  
F-5c

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |        |              |                             | Log of Boring BSWL337-5<br>PAGE 4 OF 8 |   |                                     |                                    |                             |            |                                   |                          |  |
|---|-----------------|--------|--------------|-----------------------------|--|---|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES         |        |              |                             | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |  |
|   | Sampler<br>Type | Sample | Blows/ 6"    | SPT<br>N-Value <sup>1</sup> |  |   | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |  |
| 91  | D&M             |        |              | 175<br>psi                  | CL                                     | CLAY (CL) (continued)   |                                     |                                    |                             |            |                                   |                          |  |
| 92  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 93  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 94  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 95  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 96  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 97  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 98  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 99  |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 100   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 101   | S&H             |        | 3<br>7<br>11 | 13                          | CL                                     | CLAY (CL)<br>light olive-gray with mottled yellow-brown, stiff, wet | PP                                  |                                    | 4,000                       |            |                                   |                          |  |
| 102   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 103   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 104   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 105   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 106   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 107   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 108   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 109   |                 |        |              |                             |  |   | gray                                |                                    |                             |            |                                   |                          |  |
| 110   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 111   | S&H             |        | 3<br>8<br>10 | 13                          |  |   |                                     | PP                                 |                             | 3,000      |                                   |                          |  |
| 112   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 113   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 114   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 115   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 116   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 117   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 118   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 119   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
| 120   |                 |        |              |                             |  |   |                                     |                                    |                             |            |                                   |                          |  |
|   |                 |        |              |                             |  |   | Treadwell&Rollo<br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |  |
|   |                 |        |              |                             |  |   | Project No.:<br>750604201           |                                    | Figure:<br>F-5d             |            |                                   |                          |  |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18






# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL337-5<br>PAGE 5 OF 8 |   |                              |                          |                 |                             |                       |
|---|--------------|--------|-----------|--------------------------|-----------|--|---|------------------------------|--------------------------|-----------------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA  |                              |                          |                 |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test   | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines %         | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | S&H          |        | 4         | 17                       | CL        | CLAY (CL) (continued)<br>very stiff    | TxUU  | 7,200                        | 1,550                    |                 | 36.3                        | 83                    |
| 122   |              |        | 11        |                          |           |  |   |                              |                          |                 |                             |                       |
| 123   |              |        | 13        |                          |           |  |   |                              |                          |                 |                             |                       |
| 124   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 125   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 126   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 127   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 128   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 129   |              |        |           |                          |           |  | grades green-gray, stiff to very stiff                          |                              |                          |                 |                             |                       |
| 130   |              |        | 5         |                          |           |  |   |                              |                          |                 |                             |                       |
| 131   | S&H          |        | 9         | 15                       | CL        |  |   |                              |                          |                 |                             |                       |
| 132   |              |        | 13        |                          |           |  |   |                              |                          |                 |                             |                       |
| 133   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 134   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 135   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 136   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 137   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 138   |              |        |           |                          |           |  | CLAY with SAND (CL)<br>gray, very stiff, wet, fine grained sand |                              |                          |                 |                             |                       |
| 139   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 140   |              |        | 9         |                          |           |  |   |                              |                          |                 |                             |                       |
| 141   | S&H          |        | 16        | 25                       | CL        |  |   |                              |                          |                 |                             |                       |
| 142   |              |        | 19        |                          |           |  |   |                              |                          |                 |                             |                       |
| 143   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 144   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 145   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 146   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 147   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
| 148   |              |        |           |                          |           |  | SAND (SP)<br>olive-brown, very dense, wet, trace fines          |                              |                          |                 |                             |                       |
| 149   |              |        |           |                          |           | SP                                     |   |                              |                          |                 |                             |                       |
| 150   |              |        |           |                          |           |  |   |                              |                          |                 |                             |                       |
|   |              |        |           |                          |           |  | Treadwell&Rollo<br>A LANGAN COMPANY                             |                              |                          |                 |                             |                       |
|   |              |        |           |                          |           |  | Project No.:<br>750604201                                       |                              |                          | Figure:<br>F-5e |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18






# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |                 |   |                         |                             | Log of Boring BSWL337-5<br>PAGE 6 OF 8 |   |  |                                    |                             |            |                                   |                          |
|---|-----------------|---|-------------------------|-----------------------------|--|---|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                         |                             | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA                           |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6"               | SPT<br>N-Value <sup>1</sup> |  |   | Type of<br>Strength<br>Test                    | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 151   | S&H             |    | 28<br>50/5"             | 35/5"                       | SP                                     | SAND (SP) (continued)   |  |                                    |                             | 4.2        | 20.8                              |                          |
| 152   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 153   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 154   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 155   | SPT             |    | 37<br>26<br>29          | 66                          |  | olive-gray  |  |                                    |                             |            |                                   |                          |
| 156   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 157   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 158   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 159   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 160   | SPT             |   | 19<br>38<br>50/<br>4.5" | 106/<br>10.5"               |  | blue-gray   |  |                                    |                             |            |                                   |                          |
| 161   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 162   |                 |   |                         |                             |  | CLAYEY SAND (SC)<br>olive-gray to gray, dense, wet, fine-grained sand |  |                                    |                             |            |                                   |                          |
| 163   |                 |   |                         |                             | SC                                     |   |  |                                    |                             |            |                                   |                          |
| 164   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 165   | SPT             |  | 22<br>28<br>29          | 68                          |  | CLAYEY SAND (SC)<br>olive-gray, very dense, wet                       |  |                                    |                             |            |                                   |                          |
| 166   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 167   |                 |   |                         |                             |  | SC  |  |                                    |                             |            |                                   |                          |
| 168   |                 |   |                         |                             |  | CLAY (CL)<br>light olive-gray with mottling yellow-brown, stiff, wet  |  |                                    |                             |            |                                   |                          |
| 169   | SPT             |  | 0<br>2<br>6             | 10                          |  |   |  |                                    |                             |            |                                   |                          |
| 170   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 171   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 172   |                 |   |                         |                             | CL                                     |   |  |                                    |                             |            |                                   |                          |
| 173   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 174   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 175   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 176   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 177   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 178   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 179   |                 |   |                         |                             |  |   |  |                                    |                             |            |                                   |                          |
| 180   |                 |   |                         |                             | CL                                     |   |  |                                    |                             |            |                                   |                          |
|   |                 |   |                         |                             |  |   | <b>Treadwell&amp;Rollo</b><br>A LANGAN COMPANY |                                    |                             |            |                                   |                          |
|   |                 |   |                         |                             |  |   | Project No.: 750604201                         |                                    | Figure: F-5f                |            |                                   |                          |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California |              |   |                |           | Log of Boring BSWL337-5<br>PAGE 7 OF 8 |  |                       |                              |                          |         |                             |                       |
|---|--------------|---|----------------|-----------|--|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                | LITHOLOGY | MATERIAL DESCRIPTION                   | LABORATORY TEST DATA   |                       |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      |           |  | SPT N-Value <sup>1</sup>   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181   | S&H          |    | 22<br>42<br>40 | 57        | CL                                     | GRAVELLY CLAY with SAND (CL)<br>GRAVELLY CLAY with SAND (CL) (continued)<br>gray to olive with mottled yellow-brown, hard, wet,<br>fine subrounded and subangular gravel |                       |                              |                          |         | 12.4                        | 126                   |
| 182   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 183   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 184   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 185   | SPT          |   | 10<br>16<br>23 | 47        | CL                                     | CLAY with SAND (CL)<br>yellow-brown with variegated red, olive, gray, hard,<br>wet, trace fine subangular gravel   |                       |                              |                          |         |                             |                       |
| 186   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 187   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 188   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 189   | SPT          |  | 0<br>5<br>10   | 18        | CL                                     | CLAY (CL)<br>green-gray to olive-gray, very stiff, wet, trace<br>fine-grained sand   |                       |                              |                          |         |                             |                       |
| 190   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 191   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 192   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 193   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 194   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 195   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 196   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 197   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 198   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 199   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 200   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 201   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 202   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 203   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 204   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 205   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 206   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 207   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 208   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |
| 209   |              |   |                |           | SC                                     | SAND with CLAY (SC)<br>green-gray to light-gray, dense to very dense, wet  |                       |                              |                          |         |                             |                       |
| 210   |              |   |                |           |  |  |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

**Treadwell&Rollo**  
A LANGAN COMPANY

Project No.:  
750604201









Figure:  
F-5g

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOG 337<br>San Francisco, California   |              |        |           |                          | Log of Boring BSWL337-5<br>PAGE 8 OF 8 |   |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|--|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)   | SAMPLES      |        |           |                          | LITHOLOGY                              | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |  |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   | SPT          |        | 50/ 3.5"  | 60 3.5"                  | SC                                     | SAND with CLAY (SC) (continued)   |                       |                              |                          |         |                             |                       |
| 212   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 213   |              |        |           |                          |  | grades gravelly   |                       |                              |                          |         |                             |                       |
| 214   |              |        |           |                          |  | SANDSTONE [BEDROCK]   |                       |                              |                          |         |                             |                       |
| 215   | SPT          |        | 50/ 0.5"  | 115/1"                   |  | mottled yellow-brown to gray-brown, well sorted, fine- to medium-grained, subrounded, medium hard, moderate strength, well-cemented, highly fractured with rounded to subrounded fractures, moderately weathered  |                       |                              |                          |         |                             |                       |
| 216   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 217   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 218   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 219   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 220   | SPT          |        | 50/4"     | 60/4"                    |  | olive-brown   |                       |                              |                          |         |                             |                       |
| 221   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 222   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 223   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 224   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 225   | SPT          |        | 50/ 1"    | 120/ 1.5"                |  | olive-gray  |                       |                              |                          |         |                             |                       |
| 226   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 227   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 228   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 229   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 230   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 231   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 232   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 233   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 234   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 235   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 236   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 237   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 238   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 239   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| 240   |              |        |           |                          |  |   |                       |                              |                          |         |                             |                       |
| Boring terminated at a depth of 225 feet below ground surface.<br>Boring backfilled with cement grout.<br>Groundwater encountered at a depth of 7 feet during drilling. |              |        |           |                          |  | <sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br><sup>2</sup> Elevations based on San Francisco City datum plus 100 feet. |                       |                              |                          |         |                             |                       |
|   |              |        |           |                          |  | Treadwell&Rollo<br>A LANGAN COMPANY   |                       |                              |                          |         |                             |                       |
|   |              |        |           |                          |  | Project No.:<br>750604201   |                       |                              | Figure:<br>F-5h          |         |                             |                       |

TEST GEOTECH LOG 750604201 FOR 203.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | <b>SEAWALL LOT 337</b><br>San Francisco, California                                 |                       |           | <b>Log of Boring BSWL-6</b><br>PAGE 1 OF 8  |                             |                                    |                             |            |                                   |                          |
|--|-----------------|---|-----------------------|-----------|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |   |                       |           | Logged by: S. Magallon  |                             |                                    |                             |            |                                   |                          |
| Date started: 3/1/16   |                 | Date finished: 3/3/16   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic  |                       |           | LABORATORY TEST DATA  |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Herwood (S&H). Standard Penetration Test (SPT), Dames & Moore (DM) |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |   |                       | LITHOLOGY | MATERIAL DESCRIPTION  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample  | Blows/ 6"             |           |   |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~100 feet <sup>2</sup>                                       |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 1  |                 |   |                       |           | 3 inches asphalt concrete (AC)  |                             |                                    |                             |            |                                   |                          |
| 2  |                 |   |                       |           | 9 inches aggregate base (AB)  |                             |                                    |                             |            |                                   |                          |
| 3  | GRAB            |    |                       | SM        | SILTY SAND (SM)<br>brown, moist, fine- to medium-grained sand, with fine subangular gravel  |                             |                                    |                             |            |                                   |                          |
| 4  |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 5  |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 6  | SPT             |    | 6<br>7<br>3           | SP        | SAND (SP)<br>light brown to yellow-brown, medium dense, moist, medium- to coarse-grained, trace fine subrounded gravel  |                             |                                    |                             |            | 4.4                               |                          |
| 7  |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 8  |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 9  | GRAB            |    |                       | CL        | SANDY CLAY (CL)<br>olive-gray to green-gray, moist, medium-grained sand, trace fine subangular gravel<br>(03/01/16, 1:00 p.m.)  |                             |                                    |                             |            |                                   |                          |
| 10   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 11   | S&H             |    | 4<br>2<br>2           | CL        | CLAY (CL)<br>dark gray to black, soft, moist to wet<br>(03/01/16, 12:15 p.m.)   |                             |                                    |                             |            |                                   |                          |
| 12   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 13   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 14   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 15   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 16   | S&H             |  | 6<br>8<br>14          | GC        | CLAYEY GRAVEL with SAND (GC)<br>green to green-gray, medium dense, wet, medium- to coarse-grained sand, fine to coarse subangular gravel from 1/4 inch to 1 inch in diameter, gravel consists of serpentine<br>LL = 35, PI = 11, see Figure B-1 |                             |                                    |                             | 15.5       | 18.2                              | 108                      |
| 17   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 18   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 19   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 20   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 21   | SPT             |  | 0<br>0<br>0<br>0<br>0 |           | CLAY (CH)<br>dark gray with olive-gray mottling, very soft, wet, trace shells   |                             |                                    |                             |            |                                   |                          |
| 22   | S&H             |  | 0<br>0<br>0<br>0<br>0 |           |   |                             |                                    |                             |            |                                   |                          |
| 23   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 24   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 25   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 26   | ST              |  |                       | CH        |   |                             |                                    |                             |            |                                   |                          |
| 27   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 28   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 29   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
| 30   |                 |   |                       |           |   |                             |                                    |                             |            |                                   |                          |
|  |                 |   |                       |           |   | LANGAN                      |                                    |                             |            |                                   |                          |
|  |                 |   |                       |           |   | Project No.: 750604203      |                                    | Figure: F-6a                |            |                                   |                          |







TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |        |           |                             | Log of Boring BSWL-6<br>PAGE 2 OF 8 |   |                             |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|-------------------------------------|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY                           | MATERIAL DESCRIPTION  | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |                                     |   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 31  | S&H             |        | 0         | 0                           | CH                                  | CLAY (CH) (continued)   |                             |                                    |                             |            |                                   |                          |
| 32  |                 |        | 0         | 0                           |                                     |   |                             |                                    |                             |            |                                   |                          |
| 33  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 34  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 35  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 36  | ST              |        |           | 75                          |                                     | abundant shells, trace fine-grained sand<br>Consolidation Test, see Figure B-17 |                             |                                    |                             |            | 48.4                              | 73                       |
| 37  |                 |        |           | psi                         |                                     |   |                             |                                    |                             |            |                                   |                          |
| 38  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 39  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 40  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 41  | S&H             |        | 0         | 0                           | CH                                  |   |                             |                                    |                             |            |                                   |                          |
| 42  |                 |        | 0         | 0                           |                                     |   |                             |                                    |                             |            |                                   |                          |
| 43  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 44  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 45  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 46  | D&M             |        |           | 75                          |                                     | Triaxial Test, see Figure B-3   | TxUU                        | 4,500                              | 1,030                       |            | 61.0                              | 62                       |
| 47  |                 |        |           | psi                         |                                     |   |                             |                                    |                             |            |                                   |                          |
| 48  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 49  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 50  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 51  | S&H             |        | 0         | 0                           | CH                                  |   |                             |                                    |                             |            |                                   |                          |
| 52  |                 |        | 0         | 0                           |                                     |   |                             |                                    |                             |            |                                   |                          |
| 53  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 54  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 55  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 56  | D&M             |        |           | 100                         |                                     |   |                             |                                    |                             |            |                                   |                          |
| 57  |                 |        |           | psi                         |                                     |   |                             |                                    |                             |            |                                   |                          |
| 58  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 59  |                 |        |           |                             |                                     |   |                             |                                    |                             |            |                                   |                          |
| 60  |                 |        |           |                             |                                     | SC  |                             |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |                                     |   | LANGAN                      |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |                                     |   | Project No.: 750604203      |                                    | Figure: F-6b                |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                 |              | Log of Boring BSWL-6 |  |                           |                              |                          |         |                             |                       |
|---|--------------|---|-----------------|--------------|----------------------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |                 |              | PAGE 3 OF 8          |  |                           |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |                 |              | LITHOLOGY            | MATERIAL DESCRIPTION   | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"       | SPT N-Value¹ |                      |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | SPT          |    | 8<br>11<br>18   | 35           | SC                   | CLAYEY SAND (SC)<br>olive-gray with olive and yellow-brown mottling,<br>dense, wet |                           |                              | 25.1                     | 17.3    |                             |                       |
| 62  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 63  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 64  |              |   |                 |              |                      | yellow-brown, very dense   |                           |                              |                          |         |                             |                       |
| 65  | SPT          |    | 27<br>50/<br>6" | 60/<br>6"    |                      |  |                           |                              |                          |         |                             |                       |
| 66  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 67  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 68  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 69  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 70  | SPT          |   | 19<br>28<br>37  | 78           |                      |  |                           |                              |                          | 27.4    | 18.8                        |                       |
| 71  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 72  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 73  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 74  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 75  | SPT          |  | 22<br>36<br>39  | 90           | CH                   |  | PP                        | 4,000                        |                          |         |                             |                       |
| 76  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 77  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 78  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 79  |              |   |                 |              |                      | CLAY (CH)<br>olive-gray, stiff to very stiff, wet                                  |                           |                              |                          |         |                             |                       |
| 80  | S&H          |  | 5<br>11<br>11   | 15           |                      |  |                           |                              |                          |         |                             |                       |
| 81  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 82  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 83  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 84  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 85  | D&M          |  | 125<br>psi      |              |                      | Triaxial Test, see Figure B-4  | TxUU                      | 8,500                        | 2,350                    |         | 50.9                        | 71                    |
| 86  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 87  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 88  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 89  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
| 90  |              |   |                 |              |                      |  |                           |                              |                          |         |                             |                       |
|   |              |   |                 |              |                      |  | LANGAN                    |                              |                          |         |                             |                       |
|   |              |   |                 |              |                      |  | Project No.:<br>750604203 |                              | Figure:<br>F-6c          |         |                             |                       |



TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |             |              |           | Log of Boring BSWL-6<br>PAGE 4 OF 8   |                        |                              |                          |         |                             |                       |
|---|--------------|--------|-------------|--------------|-----------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |             |              | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"   | SPT N-Value¹ |           |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91  | S&H          |        | 0<br>2<br>4 | 4            | CH        | CLAY (CL) (continued)<br>soft to medium stiff<br>LL = 67, PI = 36, see Figure B-1 | PP                     |                              | 2,500                    |         |                             |                       |
| 92  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 93  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 94  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 95  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 96  | S&H          |        | 0<br>0<br>3 | 2            |           | very soft to soft   | PP                     |                              | 1,500                    |         |                             |                       |
| 97  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 98  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 99  |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 100   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 101   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 102   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 103   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 104   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 105   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 106   | S&H          |        | 0<br>1<br>3 | 3            |           |   | PP                     |                              | 500                      |         |                             |                       |
| 107   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 108   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 109   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 110   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 111   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 112   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 113   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 114   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 115   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 116   | S&H          |        | 0<br>2<br>5 | 5            |           | medium stiff  | PP                     |                              | 1,000                    |         |                             |                       |
| 117   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 118   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 119   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
| 120   |              |        |             |              |           |   |                        |                              |                          |         |                             |                       |
|   |              |        |             |              |           |   | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |             |              |           |   | Project No.: 750604203 |                              | Figure: F-6d             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18




Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |                          |           | Log of Boring BSWL-6<br>PAGE 5 OF 8 |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
|---|--------------|---|-----------|--------------------------|-----------|-------------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|------------------------|--|--------------|--|--|--|--|--|--|--|--|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA  |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |                        |  |              |  |  |  |  |  |  |  |  |  |
| 121   | D&M          |    |           | 200 psi                  | CH        | CLAY (CL) (continued)               | PP                    |                              | 3,000                    |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 122   |              |   |           |                          |           | stiff                               |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 123   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 124   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 125   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 126   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 127   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 128   | D&M          |  |           | 325 psi                  | CH        | Triaxial Test, see Figure B-5       | TxUU                  | 14,500                       | 2,200                    |         | 43.8                        | 76                    |                        |  |              |  |  |  |  |  |  |  |  |  |
| 129   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 130   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 131   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 132   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 133   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 134   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 135   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 136   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 137   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 138   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 139   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 140   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 141   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 142   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 143   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 144   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 145   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 146   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 147   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 148   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 149   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
| 150   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       |                        |  |              |  |  |  |  |  |  |  |  |  |
|   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       | LANGAN                 |  |              |  |  |  |  |  |  |  |  |  |
|   |              |   |           |                          |           |                                     |                       |                              |                          |         |                             |                       | Project No.: 750604203 |  | Figure: F-6e |  |  |  |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18



# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                |              |           | Log of Boring BSWL-6<br>PAGE 6 OF 8   |                           |                              |                          |         |                             |                       |
|---|--------------|---|----------------|--------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |              | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value¹ |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   |              |   |                |              |           | CLAY (CL) (continued)   |                           |                              |                          |         |                             |                       |
| 152   |              |   |                |              | CH        |   |                           |                              |                          |         |                             |                       |
| 153   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 154   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 155   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 156   | SPT          |    | 3<br>6<br>11   | 20           |           | SANDY CLAY (CL)<br>olive-gray to green-gray, very stiff, wet, trace fine sand and subangular gravel |                           |                              |                          |         |                             |                       |
| 157   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 158   |              |   |                |              | CL        |   |                           |                              |                          |         |                             |                       |
| 159   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 160   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 161   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 162   |              |   |                |              |           | SAND with SILT (SP-SM)<br>olive-gray to gray, very dense, wet, very fine- to fine-grained sand      |                           |                              |                          |         |                             |                       |
| 163   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 164   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 165   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 166   | SPT          |  | 31<br>28<br>21 | 59           | SP-SM     |   |                           |                              | 11.5                     | 21.2    |                             |                       |
| 167   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 168   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 169   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 170   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 171   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 172   |              |   |                |              |           | CLAY (CL)<br>green-gray to gray, hard, wet, trace sand  |                           |                              |                          |         |                             |                       |
| 173   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 174   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 175   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 176   | S&H          |  | 12<br>20<br>24 | 31           | CL        |   | PP                        | 4,000                        |                          |         |                             |                       |
| 177   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 178   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 179   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
| 180   |              |   |                |              |           |   |                           |                              |                          |         |                             |                       |
|   |              |   |                |              |           |   | LANGAN                    |                              |                          |         |                             |                       |
|   |              |   |                |              |           |   | Project No.:<br>750604203 |                              | Figure:<br>F-6f          |         |                             |                       |



TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |        |           |                             | Log of Boring BSWL-6<br>PAGE 7 OF 8 |  |                             |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|-------------------------------------|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY                           | MATERIAL DESCRIPTION   | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |                                     |  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 181   |                 |        |           |                             | CL                                  | CLAY (CL) (continued)  |                             |                                    |                             |            |                                   |                          |
| 182   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 183   |                 |        |           |                             | CL                                  | CLAY with SAND (CL)<br>olive-gray with yellow-brown mottling, hard, wet,<br>trace fine and subangular gravel   |                             |                                    |                             |            |                                   |                          |
| 184   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 185   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 186   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 187   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 188   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 189   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 190   | S&H             |        | 15        | 44                          |                                     |  |                             |                                    |                             |            |                                   |                          |
| 191   |                 |        | 30        |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 192   |                 |        | 33        |                             |                                     |  |                             | PP                                 | 6,000                       |            |                                   |                          |
| 193   |                 |        |           |                             | CL                                  |  |                             |                                    |                             |            |                                   |                          |
| 194   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 195   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 196   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 197   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 198   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 199   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 200   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 201   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 202   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 203   |                 |        |           |                             | CL                                  |  |                             |                                    |                             |            |                                   |                          |
| 204   |                 |        |           |                             |                                     | SANDY CLAY (CL)<br>yellow to yellow-brown with olive mottling and<br>white calcareous material, hard, wet, fine to<br>medium sand, trace fine sand subangular gravel |                             |                                    |                             |            |                                   |                          |
| 205   | SPT             |        | 18        | 79                          |                                     |  |                             |                                    |                             |            |                                   |                          |
| 206   |                 |        | 29        |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 207   |                 |        | 37        |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 208   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 209   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 210   |                 |        |           |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |                                     |  | LANGAN                      |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |                                     |  | Project No.:<br>750604203   |                                    | Figure:<br>F-6g             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |  |   |           |                             |           | Log of Boring BSWL-6<br>PAGE 8 OF 8 |                             |                                    |                             |            |                                   |                          |
|---|--|---|-----------|-----------------------------|-----------|-------------------------------------|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES  |   |           |                             | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type  | Sample  | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |           |                                     | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 211   | S&H  |    | 50/<br>4" | 35/<br>4"                   | CL        | SANDY CLAY (CL) (continued)         |                             |                                    |                             |            |                                   |                          |
| 212   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 213   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 214   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 215   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 216   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 217   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 218   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 219   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 220   |  |   |           |                             |           | SHALE                               |                             |                                    |                             |            |                                   |                          |
| 221   | dark gray to black with white calcareous material,<br>low hardness, weak to friable, deeply to<br>moderately weathered |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 222   | SPT  |  | 50/<br>6" | 60/<br>6"                   |           | BEDROCK                             |                             |                                    |                             |            |                                   |                          |
| 223   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 224   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 225   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 226   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 227   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 228   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 229   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 230   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 231   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 232   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 233   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 234   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 235   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 236   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 237   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 238   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 239   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |
| 240   |  |   |           |                             |           |                                     |                             |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

Boring terminated at a depth of 231 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 12 feet below ground surface during drilling.

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

LANGAN

Project No.: 750604203

Figure: F-6h

# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | <b>SEAWALL LOT 337</b><br>San Francisco, California |           |                             | <b>Log of Boring BSWL-7</b><br>PAGE 1 OF 9 |   |                             |                                    |                             |            |                                   |                          |
|--|-----------------|---|-----------|-----------------------------|--|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |   |           |                             | Logged by: B. Murphy                       |   |                             |                                    |                             |            |                                   |                          |
| Date started: 2/24/16  |                 | Date finished: 2/29/16                              |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic                              |           |                             | LABORATORY TEST DATA                       |   |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST) |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |   |           | SPT<br>N-value <sup>1</sup> | LITHOLOGY                                  | MATERIAL DESCRIPTION  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample  | Blows/ 6" |                             |  |   |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: 99 feet <sup>2</sup>   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 1  |                 |   |           |                             |  | 3 inches asphalt concrete (AC)  |                             |                                    |                             |            |                                   |                          |
| 2  | GRAB            |   |           |                             | SM   | 6 inches aggregate base (AB)  |                             |                                    |                             |            |                                   |                          |
| 3  |                 |   |           |                             |  | SILTY SAND (SM)<br>brown, moist, with gravel, brick debris  |                             |                                    |                             |            |                                   |                          |
| 4  |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 5  |                 |   |           |                             | SC   | CLAYEY SAND with GRAVEL (SC)<br>brown, loose, moist   |                             |                                    |                             |            |                                   |                          |
| 6  | S&H             |   | 4         | 9                           |  | (02/24/16, 11:45 a.m.)  |                             |                                    |                             |            |                                   |                          |
| 7  |                 |   | 7         |                             | CL   | SANDY CLAY with GRAVEL (CL)<br>olive-gray, medium stiff, moist  |                             |                                    |                             |            |                                   |                          |
| 8  |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 9  |                 |   |           |                             |  | GRAVEL with CLAY and SAND (GP-GC)<br>olive-dark green and gray, medium dense, wet,<br>subangular gravel | FILL                        |                                    |                             |            |                                   |                          |
| 10   | S&H             |   | 1         | 8                           | GP-GC                                      | LL = 31, PI = 9, see Figure B-1   |                             |                                    |                             | 11.1       | 19.8                              | 107                      |
| 11   |                 |   | 5         |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 12   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 13   |                 |   |           |                             |  | CLAYEY GRAVEL with SAND (GC)<br>olive-gray, medium dense, wet, subangular gravel                        |                             |                                    |                             |            |                                   |                          |
| 14   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 15   |                 |   |           |                             |  | LL = 28, PI = 13, see Figure B-1  |                             |                                    |                             |            |                                   |                          |
| 16   | S&H             |   | 6         | 10                          | GC   |   |                             |                                    | 19.0                        | 12.3       | 125                               |                          |
| 17   |                 |   | 6         |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 18   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 19   |                 |   |           |                             |  | CLAY (CH)<br>dark gray, soft, wet, fine gravel and coarse sand  |                             |                                    |                             |            |                                   |                          |
| 20   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 21   | D&M             |   |           | 55<br>psi                   |  | olive   | TV                          |                                    | 700                         |            |                                   |                          |
| 22   |                 |   |           |                             | CH   |   |                             |                                    |                             |            |                                   |                          |
| 23   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 24   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 25   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 26   | S&H             |   | 0         | 0                           |  |   | TV                          |                                    | 800                         |            |                                   |                          |
| 27   |                 |   | 0         |                             | CH   |   |                             |                                    |                             |            |                                   |                          |
| 28   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 29   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |
| 30   |                 |   |           |                             |  |   |                             |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

**LANGAN**

 Project No.:  
750604203

 Figure:  
F-7a

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |        |             |                             | Log of Boring BSWL-7<br>PAGE 2 OF 9 |                               |                                     |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-------------|-----------------------------|-------------------------------------|-------------------------------|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |             |                             | LITHOLOGY                           | MATERIAL DESCRIPTION          | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6"   | SPT<br>N-Value <sup>1</sup> |                                     |                               | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 31  | D&M             |        |             | 55<br>psi                   | CH                                  | CLAY (CH) (continued)         | TV                                  |                                    | 700                         |            |                                   |                          |
| 32  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 33  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 34  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 35  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 36  | S&H             |        | 0<br>0<br>0 | 0                           |                                     |                               | LL = 53, PI = 26, see Figure B-1    | TV                                 |                             | 700        |                                   |                          |
| 37  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 38  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 39  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 40  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 41  | D&M             |        |             | 65<br>psi                   |                                     |                               | Consolidation Test, see Figure B-18 | TV                                 |                             | 400        | 74.0                              | 56                       |
| 42  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 43  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 44  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 45  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 46  | S&H             |        | 0<br>0<br>0 | 0                           |                                     |                               |                                     | TV                                 |                             | 600        |                                   |                          |
| 47  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 48  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 49  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 50  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 51  | D&M             |        |             | 90<br>psi                   |                                     | Triaxial Test, see Figure B-6 | TxUU                                | 5,000                              | 1,060                       | 55.0       | 66                                |                          |
| 52  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 53  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 54  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 55  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 56  | S&H             |        | 0<br>0<br>0 | 0                           |                                     |                               | TV                                  |                                    | 600                         |            |                                   |                          |
| 57  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 58  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 59  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
| 60  |                 |        |             |                             |                                     |                               |                                     |                                    |                             |            |                                   |                          |
|   |                 |        |             |                             |                                     |                               | LANGAN                              |                                    |                             |            |                                   |                          |
|   |                 |        |             |                             |                                     |                               | Project No.:<br>750604203           |                                    | Figure:<br>F-7b             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18








# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOT 337**  
San Francisco, California






## Log of Boring BSWL-7

PAGE 3 OF 9

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |             |           | Log of Boring BSWL-7<br>PAGE 3 OF 9                          |                        |                              |                          |         |                             |                       |
|---|--------------|---|-----------|-------------|-----------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |             | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value |           |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | D&M          |    |           | 100         | CH        | CLAY (CH) (continued)<br>Consolidation Test, see Figure B-19 | TV                     |                              | 800                      |         | 55.6                        | 66                    |
| 62  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 63  |              |   |           |             |           | SILTY CLAY with SAND (CL-ML)<br>olive, very stiff, wet       | TV                     |                              | 1,000                    |         |                             |                       |
| 64  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 65  | S&H          |    | 4         | 32          | CL-ML     |  |                        |                              |                          |         |                             |                       |
| 66  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 67  |              |   |           |             |           | SAND with SILT (SP-SM)<br>olive, very dense, wet             |                        |                              |                          |         |                             |                       |
| 68  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 69  | SPT          |   | 15        | 77          | SP-SM     |  |                        |                              |                          | 11.1    | 23.2                        |                       |
| 70  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 71  |              |   |           |             |           | SILTY SAND (SM)<br>gray, dense to very dense, wet            |                        |                              |                          |         |                             |                       |
| 72  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 73  | SPT          |  | 13        | 50          |           |  |                        |                              |                          |         |                             |                       |
| 74  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 75  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 76  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 77  | SPT          |  | 13        | 40          | SM        | dense  |                        |                              |                          |         |                             |                       |
| 78  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 79  |              |   |           |             |           | CLAY (CL)<br>olive, medium stiff, wet                        |                        |                              |                          |         |                             |                       |
| 80  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 81  | SPT          |  | 0         | 5           |           |  |                        |                              |                          |         |                             |                       |
| 82  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 83  |              |   |           |             | CL        |  |                        |                              |                          |         |                             |                       |
| 84  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 85  | SPT          |  | 0         |             |           |  |                        |                              |                          |         |                             |                       |
| 86  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 87  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 88  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 89  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
| 90  |              |   |           |             |           |  |                        |                              |                          |         |                             |                       |
|   |              |   |           |             |           |  | <b>LANGAN</b>          |                              |                          |         |                             |                       |
|   |              |   |           |             |           |  | Project No.: 750604203 |                              | Figure: F-7c             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |              | Log of Boring BSWL-7 |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
|---|--------------|---|-----------|--------------|----------------------|-----------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|-------------------------------|------|--------------|-------|------|----|--|--|
|   |              |   |           |              | PAGE 4 OF 9          |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |              | LITHOLOGY            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value¹ |                      |                       | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |                               |      |              |       |      |    |  |  |
| 91  | D&M          |    |           | 50 psi       | CL                   | CLAY (CH) (continued) | TV                    |                              | 900                      |         |                             |                       |                               |      |              |       |      |    |  |  |
| 92  |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 93  |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 94  |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 95  | S&H          |    | 0         | 5            |                      |                       | TV                    |                              | 1,600                    |         |                             |                       |                               |      |              |       |      |    |  |  |
| 96  |              |   | 2         |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 97  |              |   | 5         |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 98  |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 99  |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 100   | D&M          |   |           | 180 psi      |                      | trace organics        |                       | TV                           |                          | 1,200   |                             |                       |                               |      |              |       |      |    |  |  |
| 101   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 102   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 103   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 104   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 105   | S&H          |  | 0         | 8            |                      |                       |                       |                              |                          |         |                             |                       | Triaxial Test, see Figure B-7 | TxUU | 11,000       | 2,500 | 54.5 | 68 |  |  |
| 106   |              |   | 5         |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 107   |              |   | 6         |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 108   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 109   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 110   | D&M          |  |           | 210 psi      |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 111   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 112   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 113   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 114   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 115   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 116   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 117   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 118   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 119   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
| 120   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       |                               |      |              |       |      |    |  |  |
|   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       | LANGAN                        |      |              |       |      |    |  |  |
|   |              |   |           |              |                      |                       |                       |                              |                          |         |                             |                       | Project No.: 750604203        |      | Figure: F-7d |       |      |    |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18






Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |             |             |                          |           | Log of Boring BSWL-7<br>PAGE 5 OF 9 |                        |                              |                          |         |                             |                       |
|---|--------------|-------------|-------------|--------------------------|-----------|-------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |             |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample      | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | S&H          | <div></div> | 0<br>1<br>4 | 4                        | CL        | CLAY (CL) (continued)               | TV                     |                              | 1,800                    |         |                             |                       |
| 122   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 123   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 124   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 125   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 126   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 127   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 128   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 129   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 130   |              | <div></div> | 0<br>4<br>8 | 8                        |           | medium stiff to stiff               |                        |                              |                          |         |                             |                       |
| 131   | S&H          |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 132   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 133   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 134   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 135   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 136   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 137   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 138   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 139   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 140   |              | <div></div> |             | 250<br>psi               |           | Consolidation Test, see Figure B-20 |                        |                              |                          |         | 48.2                        | 72                    |
| 141   | D&M          |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 142   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 143   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 144   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 145   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 146   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 147   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 148   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 149   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
| 150   |              |             |             |                          |           |                                     |                        |                              |                          |         |                             |                       |
|   |              |             |             |                          |           |                                     | LANGAN                 |                              |                          |         |                             |                       |
|   |              |             |             |                          |           |                                     | Project No.: 750604203 |                              | Figure: F-7e             |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18





# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                         |                          | Log of Boring BSWL-7 |  |                           |                              |                          |         |                             |                       |
|---|--------------|---|-------------------------|--------------------------|----------------------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |                         |                          | PAGE 6 OF 9          |  |                           |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |                         |                          | LITHOLOGY            | MATERIAL DESCRIPTION                                   | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"               | SPT N-Value <sup>1</sup> |                      |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   | S&H          |    | 0<br>5<br>12            | 12                       | CL                   | CLAY (CL) (continued)<br>stiff                         | TV                        | 1,200                        |                          |         |                             |                       |
| 152   |              |    |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 153   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 154   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 155   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 156   |              |   |                         |                          | SP-SC                | SAND with CLAY (SP-SC)<br>olive, very dense, wet       |                           |                              |                          |         |                             |                       |
| 157   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 158   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 159   |              |   |                         |                          | CL                   | CLAY (CL)<br>olive, stiff, wet                         |                           |                              |                          |         |                             |                       |
| 160   | SPT          |   | 26<br>27<br>26          | 64                       |                      |  |                           |                              |                          |         |                             |                       |
| 161   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 162   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 163   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 164   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 165   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 166   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 167   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 168   |              |   |                         |                          | CL                   | hard   |                           |                              |                          |         |                             |                       |
| 169   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 170   | SPT          |  | 16<br>25<br>50/<br>5.5" | 90/<br>11.5"             |                      |  |                           |                              |                          |         |                             |                       |
| 171   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 172   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 173   |              |   |                         |                          | CL-ML                | SILTY CLAY (CL-ML)<br>olive, soft to medium stiff, wet |                           |                              |                          |         |                             |                       |
| 174   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 175   | SPT          |  | 0<br>0<br>3             | 4                        |                      |  |                           |                              |                          |         |                             |                       |
| 176   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 177   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 178   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 179   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
| 180   |              |   |                         |                          |                      |  |                           |                              |                          |         |                             |                       |
|   |              |   |                         |                          |                      |  | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|   |              |   |                         |                          |                      |  | Project No.:<br>750604203 |                              | Figure:<br>F-7f          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |               |             |           | Log of Boring BSWL-7<br>PAGE 7 OF 9      |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
|---|--------------|---|---------------|-------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|---------------------------|--|-----------------|--|--|--|--|--|--|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |               |             | LITHOLOGY | MATERIAL DESCRIPTION                     | LABORATORY TEST DATA  |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
|   | Sampler Type | Sample  | Blows/ 6"     | SPT N-Value |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |                           |  |                 |  |  |  |  |  |  |  |
| 181   | D&M          |    |               | 350 psi     | CL-ML     | SILTY CLAY (CL-ML) (continued)           | TV                    |                              | 2,500                    |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 182   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 183   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 184   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 185   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 186   | S&H          |  | 1<br>17<br>20 | 26          | CL        | CLAY (CL)<br>olive-gray, very stiff, wet | TV                    |                              | 3,500                    |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 187   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 188   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 189   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 190   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 191   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 192   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 193   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 194   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 195   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 196   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 197   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 198   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 199   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 200   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 201   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 202   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 203   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 204   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 205   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 206   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 207   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 208   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 209   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
| 210   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       |                           |  |                 |  |  |  |  |  |  |  |
|   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       | LANGAN                    |  |                 |  |  |  |  |  |  |  |
|   |              |   |               |             |           |  |                       |                              |                          |         |                             |                       | Project No.:<br>750604203 |  | Figure:<br>F-7g |  |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18




# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOT 337**  
San Francisco, California

**Log of Boring BSWL-7**

PAGE 8 OF 9

| PROJECT:        |              |   |                       |             | SEAWALL LOT 337<br>San Francisco, California |  | Log of Boring BSWL-7  |                              |                          |         |                             |                       |
|-----------------|--------------|---|-----------------------|-------------|--|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 |              |   |                       |             |  |  | PAGE 8 OF 9           |                              |                          |         |                             |                       |
| DEPTH<br>(feet) | SAMPLES      |   |                       |             | LITHOLOGY                                    | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|                 | Sampler Type | Sample  | Blows/ 6"             | SPT N-Value |  |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211             | S&H          |    | 18<br>42<br>50/<br>3" | 64/<br>9"   | GP-GM  | CLAY (CL) (continued)  |                       |                              |                          |         |                             |                       |
| 212             |              |   |                       |             |  | GRAVEL with SILT and SAND (GP-GM)<br>olive-green and yellow-brown, very dense, wet |                       |                              |                          |         |                             |                       |
| 213             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 214             | SPT          |    | 0<br>2<br>12          | 17          | CL   | CLAY (CL)<br>olive, very stiff, wet  |                       |                              |                          |         |                             |                       |
| 215             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 216             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 217             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 218             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 219             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 220             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 221             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 222             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 223             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 224             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 225             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 226             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 227             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 228             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 229             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 230             | S&H          |  | 20<br>36<br>50        | 60          | GC   | CLAYEY GRAVEL (GC)<br>gray-olive and red-brown, very dense, wet                    |                       |                              |                          |         |                             |                       |
| 231             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 232             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 233             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 234             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 235             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 236             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 237             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 238             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 239             |              |   |                       |             |  |  |                       |                              |                          |         |                             |                       |
| 240             |              |   |                       |             |  |  | <b>LANGAN</b>         |                              |                          |         |                             |                       |
|                 |              |   |                       |             |  |  | Project No.:          |                              | Figure:                  |         |                             |                       |
|                 |              |   |                       |             |  |  | 750604203             |                              | F-7h                     |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL-7<br>PAGE 9 OF 9                                    |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   | SPT          |        | 50/ 1/2"  | 60/ 1/2"                 |           | SHALE<br>green to black, weak, friable, very fractured to crushed, wet |                       |                              |                          |         |                             |                       |
| 242   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 243   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 244   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 245   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 246   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 247   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 248   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 249   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 250   | SPT          |        | 50/ 5"    | 60/ 5"                   |           |  |                       |                              |                          |         |                             |                       |
| 251   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 252   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 253   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 254   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 255   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 256   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 257   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 258   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 259   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 260   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 261   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 262   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 263   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 264   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 265   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 266   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 267   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 268   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 269   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 270   |              |        |           |                          |           |  |                       |                              |                          |         |                             |                       |

Boring terminated at a depth of 249.3 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 6 feet below ground surface during drilling.  
TV = torvane

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

LANGAN

Project No.: 750604203

Figure: F-7i

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit







TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |        |               |                             | Log of Boring BSWL-8<br>PAGE 2 OF 9 |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
|---|-----------------|--------|---------------|-----------------------------|-------------------------------------|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|---------|----|--|--|------|----|
| DEPTH<br>(feet)                                       | SAMPLES         |        |               |                             | LITHOLOGY                           | MATERIAL DESCRIPTION  | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
|   | Sampler<br>Type | Sample | Blows/ 6"     | SPT<br>N-Value <sup>1</sup> |                                     |   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |         |    |  |  |      |    |
| 31  | SPT             |        | 4             | 18                          | GP                                  | CLAYEY GRAVEL with SAND (GP) (continued)  | FILL                        |                                    |                             |            | 8.9                               | 10.1                     |         |    |  |  |      |    |
| 32  |                 |        |               |                             | GP-GC                               | GRAVEL with CLAY and SAND (GP-GC)<br>yellow-brown to olive-brown, medium dense, wet,<br>fine to coarse angular to subangular gravel,<br>medium-grained sand |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 33  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          | 11      | 31 |  |  |      |    |
| 34  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 35  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 36  | SPT             |        | 11            | 31                          |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 37  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 38  | S&H             |        | 0             | 0                           | CH                                  | CLAY (CH)<br>olive-gray to gray, very soft, wet, trace shells   |                             |                                    |                             |            |                                   |                          | BAY MUD |    |  |  |      |    |
| 39  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 40  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 41  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 42  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 43  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 44  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 45  | ST              |        | 75-100<br>psi |                             |                                     | Consolidation Test, see Figure B-21   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 46  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 47  |                 |        |               |                             |                                     |   |                             |                                    |                             |            | 55.4                              | 68                       |         |    |  |  |      |    |
| 48  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 49  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 50  | S&H             |        | 0             | 0                           | CH                                  |   | BAY MUD                     |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 51  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 52  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 53  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 54  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 55  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 56  | ST              |        | 85-180<br>psi |                             |                                     | Consolidation Test, see Figure B-22   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 57  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 58  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  | 55.6 | 67 |
| 59  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
| 60  |                 |        |               |                             |                                     |   |                             |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
|   |                 |        |               |                             |                                     |   | <b>LANGAN</b>               |                                    |                             |            |                                   |                          |         |    |  |  |      |    |
|   |                 |        |               |                             |                                     |   | Project No.:<br>750604203   |                                    | Figure:<br>F-8b             |            |                                   |                          |         |    |  |  |      |    |







TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12 GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                |                          | Log of Boring BSWL-8 |   |                        |                              |                          |         |                             |                       |  |
|---|--------------|---|----------------|--------------------------|----------------------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
|   |              |   |                |                          | PAGE 3 OF 9          |   |                        |                              |                          |         |                             |                       |  |
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |                          | LITHOLOGY            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value <sup>1</sup> |                      |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 61  | S&H          |    | 0<br>0<br>0    | 0                        | CH                   | CLAY (CH) (continue)  |                        |                              |                          |         |                             |                       |  |
| 62  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 63  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 64  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 65  |              |    |                | 50-130 psi               |                      |   |                        |                              |                          |         |                             |                       |  |
| 66  | ST           |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 67  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 68  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 69  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 70  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 71  | S&H          |   | 0<br>0<br>0    | 0                        |                      |   |                        |                              |                          |         |                             |                       |  |
| 72  |              |   |                |                          | SC                   | CLAYEY SAND (SC)<br>olive-gray to gray, very dense, wet, fine- to medium-grained sand |                        |                              |                          |         |                             |                       |  |
| 73  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 74  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 75  |              |  |                | 50-300 psi               |                      |   |                        |                              |                          |         |                             |                       |  |
| 76  | ST           |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 77  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 78  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 79  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 80  |              |  | 30<br>37<br>33 | 84                       |                      |   |                        |                              |                          |         |                             |                       |  |
| 81  | SPT          |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 82  |              |   |                |                          | CL                   | CLAY (CL)<br>olive-gray with yellow-brown mottling, stiff, wet                        |                        |                              |                          |         |                             |                       |  |
| 83  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 84  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 85  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 86  | S&H          |  | 4<br>6<br>9    | 11                       |                      |   |                        |                              |                          |         |                             |                       |  |
| 87  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 88  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 89  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
| 90  |              |   |                |                          |                      |   |                        |                              |                          |         |                             |                       |  |
|   |              |   |                |                          |                      |   | LANGAN                 |                              |                          |         |                             |                       |  |
|   |              |   |                |                          |                      |   | Project No.: 750604203 |                              | Figure: F-8c             |         |                             |                       |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18




# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |   |             |                             |           | Log of Boring BSWL-8                                      |                                     |                                    |                             |            |                                   |                          |    |
|---|-----------------|---|-------------|-----------------------------|-----------|---|-------------------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|----|
|   |                 |   |             |                             |           | PAGE 4 OF 9   |                                     |                                    |                             |            |                                   |                          |    |
| DEPTH<br>(feet)                                       | SAMPLES         |   |             |                             | LITHOLOGY | MATERIAL DESCRIPTION                                      | LABORATORY TEST DATA                |                                    |                             |            |                                   |                          |    |
|   | Sampler<br>Type | Sample  | Blows/ 6"   | SPT<br>N-Value <sup>1</sup> |           |   | Type of<br>Strength<br>Test         | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |    |
| 91  | S&H             |    | 0<br>0<br>8 | 6                           | CL        | CLAY (CL) (continued)<br>olive-gray to gray, medium stiff | PP                                  |                                    | 1,500                       |            |                                   |                          |    |
| 92  |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 93  |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 94  |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 95  |                 |    |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 96  | ST              |   |             | 75-<br>220<br>psi           |           |   | Consolidation Test, see Figure B-23 | PP                                 |                             | 2,500      |                                   | 65.2                     | 61 |
| 97  |                 |    |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 98  |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 99  |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 100   |                 |   | 0<br>3<br>5 | 6                           |           |   |                                     | PP                                 |                             | 2,500      |                                   |                          |    |
| 101   | S&H             |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 102   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 103   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 104   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 105   |                 |  | 0<br>0<br>0 | 0                           |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 106   | S&H             |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 107   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 108   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 109   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 110   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 111   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 112   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 113   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 114   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 115   |                 |  | 0<br>4<br>8 | 8                           |           |   |                                     | PP                                 |                             | 2,500      |                                   |                          |    |
| 116   | S&H             |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 117   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 118   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 119   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
| 120   |                 |   |             |                             |           |   |                                     |                                    |                             |            |                                   |                          |    |
|   |                 |   |             |                             |           |   | LANGAN                              |                                    |                             |            |                                   |                          |    |
|   |                 |   |             |                             |           |   | Project No.:<br>750604203           |                                    | Figure:<br>F-8d             |            |                                   |                          |    |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18







# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |               |                          |           | Log of Boring BSWL-8<br>PAGE 5 OF 9 |                           |                              |                          |         |                             |                       |
|---|--------------|---|---------------|--------------------------|-----------|-------------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |               |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"     | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   |              |   |               |                          |           | CLAY (CL) (continued)               |                           |                              |                          |         |                             |                       |
| 122   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 123   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 124   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 125   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 126   | D&M          |    |               | 200 psi                  |           | Triaxial Test, see Figure B-8       | TxUU                      | 12,500                       | 2,780                    |         | 45.8                        | 75                    |
| 127   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 128   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 129   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 130   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 131   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 132   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 133   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 134   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 135   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 136   | S&H          |  | 0<br>5<br>11  | 11                       | CL        | stiff                               | PP                        |                              | 1,500                    |         |                             |                       |
| 137   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 138   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 139   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 140   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 141   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 142   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 143   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 144   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 145   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 146   | S&H          |  | 0<br>11<br>13 | 17                       |           | very stiff                          | PP                        |                              | 2,000                    |         |                             |                       |
| 147   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 148   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 149   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 150   |              |   |               |                          |           |                                     |                           |                              |                          |         |                             |                       |
|   |              |   |               |                          |           |                                     | LANGAN                    |                              |                          |         |                             |                       |
|   |              |   |               |                          |           |                                     | Project No.:<br>750604203 |                              | Figure:<br>F-8e          |         |                             |                       |




TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |               |              |           | Log of Boring BSWL-8   |                        |                              |                          |         |                             |                       |
|---|--------------|---|---------------|--------------|-----------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |               |              |           | PAGE 6 OF 9  |                        |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |               |              | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"     | SPT N-Value¹ |           |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   |              |   |               |              |           | CLAY (CL) (continued)  |                        |                              |                          |         |                             |                       |
| 152   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 153   |              |   |               |              | CL        |  |                        |                              |                          |         |                             |                       |
| 154   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 155   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 156   | D&M          |    |               | 300 psi      |           |  |                        |                              |                          |         |                             |                       |
| 157   | SPT          |    | 4<br>8<br>18  | 31           | SM        | SILTY SAND (SM)<br>dark olive-gray, dense, wet, very fine- to fine-grained, trace organics |                        |                              |                          |         |                             |                       |
| 158   |              |   |               |              |           | CLAY (CL)<br>dark gray to dark brown, hard, wet, with organics                             |                        |                              |                          |         |                             |                       |
| 159   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 160   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 161   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 162   |              |   |               |              | CL        |  |                        |                              |                          |         |                             |                       |
| 163   |              |   |               |              |           | sandy lens 6 to 12 inches thick  |                        |                              |                          |         |                             |                       |
| 164   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 165   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 166   | S&H          |  | 0<br>17<br>34 | 36           |           | olive-gray, trace fine-grained sand  |                        |                              |                          |         |                             |                       |
| 167   |              |   |               |              |           | SAND with SILT (SP-SM)<br>olive-gray, dense, wet, very fine- to fine-grained               |                        |                              |                          |         |                             |                       |
| 168   |              |   |               |              | SP-SM     |  |                        |                              |                          |         |                             |                       |
| 169   |              |   |               |              |           | CLAY (CL)<br>dark gray to dark brown, hard, wet, with organics                             |                        |                              |                          |         |                             |                       |
| 170   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 171   |              |   |               |              | CL        |  |                        |                              |                          |         |                             |                       |
| 172   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 173   | GRAB         |  |               |              | SP/GP     | SAND and GRAVEL (SP/GP)<br>coarse-grained sand to fine gravel                              |                        |                              |                          |         |                             |                       |
| 174   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 175   |              |   |               |              |           | CLAY (CL)<br>dark gray to dark brown, hard, wet, with organics                             |                        |                              |                          |         |                             |                       |
| 176   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 177   |              |   |               |              | CL        |  |                        |                              |                          |         |                             |                       |
| 178   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 179   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
| 180   |              |   |               |              |           |  |                        |                              |                          |         |                             |                       |
|   |              |   |               |              |           |  | LANGAN                 |                              |                          |         |                             |                       |
|   |              |   |               |              |           |  | Project No.: 750604203 |                              | Figure: F-8f             |         |                             |                       |



TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                                       |        | Log of Boring BSWL-8<br>PAGE 7 OF 9 |   |                       |                              |                          |         |                             |                       |
|---|--------------|---|---------------------------------------|--------|-------------------------------------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                                       |        | LITHOLOGY                           | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"<br>SPT N-Value <sup>1</sup> |        |                                     |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181   | SPT          |    | 21                                    | 97/10" | SP                                  | SAND (SP)<br>olive-gray to gray, very dense, wet, very fine- to fine-grained, trace silt and organics   |                       |                              |                          |         |                             |                       |
| 182   |              |   | 31                                    |        |                                     |   |                       |                              |                          |         |                             |                       |
| 183   |              |   | 50/4"                                 |        | CL                                  | CLAY (CL)<br>dark gray to dark brown, hard, wet, with organics  |                       |                              |                          |         |                             |                       |
| 184   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 185   |              |   |                                       |        | SP                                  | SAND (SP)<br>olive-gray to gray, very dense, wet, fine-grained, with fine subangular gravel, trace silt |                       |                              |                          |         |                             |                       |
| 186   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 187   | SPT          |    | 37                                    | 67     | SP                                  | CLAY (CL)<br>dark gray to dark brown, hard, wet, with organics  |                       |                              |                          |         |                             |                       |
| 188   |              |   | 31                                    |        |                                     |   |                       |                              |                          |         |                             |                       |
| 189   |              |   | 25                                    |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 190   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 191   |              |   |                                       |        | SP                                  | SAND (SP)<br>olive-gray to gray, very dense, wet, fine-grained, with fine subangular gravel, trace silt |                       |                              |                          |         |                             |                       |
| 192   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 193   |              |   |                                       |        | CL                                  | CLAY (CL)<br>olive-gray with yellow-brown mottling, very stiff, wet, trace very fine-grained sand       |                       |                              |                          |         |                             |                       |
| 194   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 195   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 196   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 197   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 198   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 199   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 200   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 201   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 202   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 203   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 204   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 205   | S&H          |  | 1                                     | 18     | CL                                  |   | PP                    | 4,000                        |                          |         |                             |                       |
| 206   |              |   | 9                                     |        |                                     |   |                       |                              |                          |         |                             |                       |
| 207   |              |   | 16                                    |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 208   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
| 209   |              |   |                                       |        | CL                                  |   |                       |                              |                          |         |                             |                       |
| 210   |              |   |                                       |        |                                     |   |                       |                              |                          |         |                             |                       |
|   |              |   |                                       |        |                                     |   | <b>LANGAN</b>         |                              |                          |         |                             |                       |
| Project No.: 750604203                                |              |   |                                       |        |                                     |   | Figure: F-8g          |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                |                          |           | Log of Boring BSWL-8<br>PAGE 8 OF 9                                 |                           |                              |                          |         |                             |                       |
|---|--------------|---|----------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   |              |   |                |                          |           | CLAY (CL) (continued)   |                           |                              |                          |         |                             |                       |
| 212   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 213   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 214   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 215   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 216   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 217   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 218   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 219   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 220   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 221   | S&H          |   | 8<br>20<br>28  | 34                       |           | green-gray, hard  | PP                        |                              | 9,000                    |         |                             |                       |
| 222   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 223   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 224   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 225   |              |   |                |                          | CL        |   |                           |                              |                          |         |                             |                       |
| 226   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 227   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 228   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 229   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 230   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 231   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 232   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 233   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 234   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 235   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 236   | S&H          |  | 10<br>20<br>27 | 33                       |           | olive-gray with yellow-brown mottling, trace very fine-grained sand |                           |                              |                          |         |                             |                       |
| 237   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 238   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 239   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
| 240   |              |   |                |                          |           |   |                           |                              |                          |         |                             |                       |
|   |              |   |                |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|   |              |   |                |                          |           |   | Project No.:<br>750604203 |                              | Figure:<br>F-8h          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California   |              |        |             |                          | Log of Boring BSWL-8 |  |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-------------|--------------------------|----------------------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |        |             |                          | PAGE 9 OF 9          |  |                       |                              |                          |         |                             |                       |
| DEPTH<br>(feet)   | SAMPLES      |        |             |                          | LITHOLOGY            | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"   | SPT N-Value <sup>1</sup> |                      |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   |              |        |             |                          | CL                   | CLAY (CL) (continued)  |                       |                              |                          |         |                             |                       |
| 242   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 243   |              |        |             |                          |                      | SERPENTINITE/MELANGE<br>dark gray with white calcareous material, low hardness, friable to weak, deeply to moderately weathered  |                       |                              |                          |         |                             |                       |
| 244   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 245   | SPT          |        | 50/<br>1.5" | 60/<br>1.5"              |                      |  |                       |                              |                          |         |                             |                       |
| 246   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 247   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 248   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 249   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 250   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 251   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 252   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 253   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 254   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 255   | SPT          |        | 50/<br>1"   | 60/<br>1"                |                      |  |                       |                              |                          |         |                             |                       |
| 256   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 257   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 258   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 259   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 260   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 261   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 262   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 263   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 264   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 265   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 266   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 267   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 268   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 269   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| 270   |              |        |             |                          |                      |  |                       |                              |                          |         |                             |                       |
| Boring terminated at a depth of 255.1 feet below ground surface.<br>Boring backfilled with cement grout.<br>Groundwater encountered at 6.5 feet below ground surface during drilling.<br>PP = pocket penetrometer |              |        |             |                          |                      | <sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet. |                       |                              |                          |         |                             |                       |
|   |              |        |             |                          |                      | <b>LANGAN</b>  |                       |                              |                          |         |                             |                       |
|   |              |        |             |                          |                      | Project No.:<br>750604203  |                       |                              | Figure:<br>F-8i          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | SEAWALL LOT 337<br>San Francisco, California |           | Log of Boring BSWL-9   |   | PAGE 1 OF 9   |                                    |                             |            |                                   |                          |
|--|-----------------|--|-----------|------------------------|---|---|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |  |           | Logged by: S. Magallon |   |   |                                    |                             |            |                                   |                          |
| Date started: 2/16/16  |                 | Date finished: 2/19/16                       |           |                        |   |   |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic                       |           | LABORATORY TEST DATA   |   |   |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM) |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |  |           | LITHOLOGY              | MATERIAL DESCRIPTION                            | Type of<br>Strength<br>Test   | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample                                       | Blows/ 6" |                        |   |   |                                    |                             |            |                                   |                          |
|  |                 |  |           |                        | Ground Surface Elevation: ~99 feet <sup>2</sup> |   |                                    |                             |            |                                   |                          |
| 1  |                 |  |           |                        | 8 inches asphalt concrete (AC)                  |   |                                    |                             |            |                                   |                          |
| 2  |                 |  |           |                        | 16 inches aggregate base (AB)                   |   |                                    |                             |            |                                   |                          |
| 3  | GRAB            |  |           |                        | CL  | SANDY CLAY (CL)<br>brown to red-brown, moist, medium- to coarse-grained sand, trace fine subangular gravel  |                                    |                             |            |                                   |                          |
| 4  |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 5  | S&H             |  | 11        | 18                     | SP  | SAND with GRAVEL (SP)<br>brown, medium dense, moist, trace clay, coarse angular to subangular gravel  |                                    |                             |            |                                   |                          |
| 6  |                 |  | 11        |                        |   |   |                                    |                             |            |                                   |                          |
| 7  |                 |  | 15        |                        |   |   |                                    |                             |            |                                   |                          |
| 8  |                 |  |           | 8                      | GC  | (02/16/16, 6:15 a.m.)<br>CLAYEY GRAVELLY SAND (GC)<br>gray to olive-gray, loose, wet, medium-grained, gravel consists of angular to subangular serpentinite fragments<br>LL = 27, PI = 14, see Figure B-1 |                                    |                             | 28.4       | 12.7                              | 123                      |
| 9  | S&H             |  | 4         |                        |   |   |                                    |                             |            |                                   |                          |
| 10   |                 |  | 6         |                        |   |   |                                    |                             |            |                                   |                          |
| 11   |                 |  | 5         |                        |   |   |                                    |                             |            |                                   |                          |
| 12   |                 |  |           | 35/ 3"                 | GC  | very dense<br>trace cobbles, light organic odor   |                                    |                             |            |                                   |                          |
| 13   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 14   | S&H             |  | 28        |                        |   |   |                                    |                             |            |                                   |                          |
| 15   |                 |  | 50/ 3"    |                        |   |   |                                    |                             |            |                                   |                          |
| 16   |                 |  |           | 19                     |   | medium dense  |                                    |                             | 15.4       | 9.0                               |                          |
| 17   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 18   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 19   | SPT             |  | 6         |                        |   |   |                                    |                             |            |                                   |                          |
| 20   |                 |  | 8         |                        |   |   |                                    |                             |            |                                   |                          |
| 21   |                 |  | 8         |                        |   |   |                                    |                             |            |                                   |                          |
| 22   |                 |  |           | 400 psi                | CH  | CLAY (CH)<br>gray to olive-gray, very soft to soft, wet, light organic odor, trace shells   |                                    |                             |            |                                   |                          |
| 23   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 24   | D&M             |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 25   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 26   |                 |  |           | 100 psi                |   |   |                                    |                             |            |                                   |                          |
| 27   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 28   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 29   | S&H             |  |           |                        |   |   |                                    |                             |            |                                   |                          |
| 30   |                 |  |           |                        |   |   |                                    |                             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

FILL

BAY MUD

**LANGAN**

Project No.: 750604203
Figure: F-9a

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |             |                          |           | Log of Boring BSWL-9<br>PAGE 2 OF 9 |                       |                              |                          |         |                             |                       |
|---|--------------|--------|-------------|--------------------------|-----------|-------------------------------------|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"   | SPT N-value <sup>1</sup> |           |                                     | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  |              |        |             |                          |           | CLAY (CH) (continued)               |                       |                              |                          |         |                             |                       |
| 32  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 33  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 34  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 35  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 36  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 37  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 38  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 39  | ST           |        |             | 100                      |           | Triaxial Test, see Figure B-9       | TxUU                  | 3,850                        | 690                      |         | 61.5                        | 63                    |
| 40  |              |        |             | psi                      |           |                                     |                       |                              |                          |         |                             |                       |
| 41  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 42  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 43  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 44  |              |        |             |                          | CH        |                                     |                       |                              |                          |         |                             |                       |
| 45  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 46  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 47  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 48  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 49  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 50  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 51  | S&H          |        | 0<br>4<br>2 | 4                        |           |                                     |                       |                              |                          |         |                             |                       |
| 52  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 53  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 54  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 55  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 56  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 57  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 58  |              |        |             |                          |           |                                     |                       |                              |                          |         |                             |                       |
| 59  | S&H          |        | 0<br>0<br>3 | 2                        |           |                                     |                       |                              |                          |         |                             |                       |
| 60  |              |        |             |                          | SM        |                                     |                       |                              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

BAY MUD

**LANGAN**

Project No.: 750604203

Figure: F-9b

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |                |                          | Log of Boring BSWL-9 |   |                           |                              |                          |         |                             |                       |
|---|--------------|--------|----------------|--------------------------|----------------------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |        |                |                          | PAGE 3 OF 9          |   |                           |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |        |                |                          | LITHOLOGY            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"      | SPT N-Value <sup>1</sup> |                      |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | SPT          |        | 0<br>4<br>1    | 6                        | SM                   | SILTY SAND (SM)<br>olive-gray, loose, wet, trace clay                                     |                           |                              |                          | 24.4    | 23.0                        |                       |
| 62  |              |        |                |                          | CH                   | CLAY (CH)<br>gray to olive-gray, very soft to soft, wet, light organic odor, trace shells |                           |                              |                          |         |                             |                       |
| 63  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 64  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 65  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 66  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 67  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 68  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 69  | S&H          |        | 0<br>21<br>46  | 47                       |                      |   |                           |                              |                          |         |                             |                       |
| 70  |              |        |                |                          | SC                   | CLAYEY SAND (SC)<br>gray to olive-gray, very dense, wet, medium-grained sand              |                           |                              |                          |         |                             |                       |
| 71  | SPT          |        | 20<br>40<br>50 | 108/<br>11"              |                      |   |                           |                              |                          |         |                             |                       |
| 72  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 73  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 74  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 75  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 76  | SPT          |        | 13<br>20<br>30 | 60                       |                      | very fine- to fine-grained  |                           |                              |                          | 24.0    | 24.1                        |                       |
| 77  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 78  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 79  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 80  |              |        |                |                          | CL                   | CLAY (CL)<br>green-gray, very stiff, wet, occasional organics                             |                           |                              |                          |         |                             |                       |
| 81  | SPT          |        | 16<br>37<br>39 | 91                       |                      |   |                           |                              |                          |         |                             |                       |
| 82  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 83  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 84  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 85  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 86  | SPT          |        | 2<br>6<br>7    | 16                       |                      |   |                           |                              |                          |         |                             |                       |
| 87  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 88  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 89  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
| 90  |              |        |                |                          |                      |   |                           |                              |                          |         |                             |                       |
|   |              |        |                |                          |                      |   | LANGAN                    |                              |                          |         |                             |                       |
|   |              |        |                |                          |                      |   | Project No.:<br>750604203 |                              | Figure:<br>F-9c          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18





# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |           |              |           | Log of Boring BSWL-9  |   |                              |                          |         |                             |                       |    |
|---|--------------|--------|-----------|--------------|-----------|---|---|------------------------------|--------------------------|---------|-----------------------------|-----------------------|----|
|   |              |        |           |              |           | PAGE 4 OF 9   |   |                              |                          |         |                             |                       |    |
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |              | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |    |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value¹ |           |   | Type of Strength Test   | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |    |
| 91  | S&H          |        | 2         | 8            | CL        | CLAY (CL) (continued)<br>medium stiff to stiff  | PP  |                              | 2,500                    |         |                             |                       |    |
| 92  |              |        | 5         |              |           |   |   |                              |                          |         |                             |                       |    |
| 93  |              |        | 6         |              |           |   |   |                              |                          |         |                             |                       |    |
| 94  |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 95  |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 96  | D&M          |        |           | 400 psi      |           |   | green-gray to olive-gray, stiff<br>Triaxial Test, see Figure B-10 | TxUU                         | 9,500                    | 2,740   |                             | 51.5                  | 69 |
| 97  |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 98  |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 99  |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 100   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 101   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 102   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 103   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 104   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 105   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 106   | S&H          |        | 0         | 7            |           | medium stiff to stiff   | PP  |                              | 2,000                    |         |                             |                       |    |
| 107   |              |        | 4         |              |           |   |   |                              |                          |         |                             |                       |    |
| 108   |              |        | 6         |              |           |   |   |                              |                          |         |                             |                       |    |
| 109   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 110   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 111   |              |        |           |              |           | SANDY CLAY (CL)<br>olive-gray to gray, very stiff, wet, fine- to<br>medium-grained sand |   |                              |                          |         |                             |                       |    |
| 112   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 113   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 114   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 115   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
| 116   | S&H          |        | 0         | 1            | CL        | gray to olive-gray, medium stiff  | PP  |                              | 1,500                    |         |                             |                       |    |
| 117   |              |        | 0         |              |           |   |   |                              |                          |         |                             |                       |    |
| 118   |              |        | 0         |              |           |   |   |                              |                          |         |                             |                       |    |
| 119   |              |        | 1         |              |           |   |   |                              |                          |         |                             |                       |    |
| 120   |              |        |           |              |           |   |   |                              |                          |         |                             |                       |    |
|   |              |        |           |              |           |   | LANGAN  |                              |                          |         |                             |                       |    |
|   |              |        |           |              |           |   | Project No.:  |                              | Figure:                  |         |                             |                       |    |
|   |              |        |           |              |           |   | 750604203   |                              | F-9d                     |         |                             |                       |    |







TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |                          |           | Log of Boring BSWL-9<br>PAGE 5 OF 9 |                           |                              |                          |         |                             |                       |
|---|--------------|---|-------------|--------------------------|-----------|-------------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | S&H          |    | 0<br>7<br>2 | 6                        | CL        | SANDY CLAY (CL) (continued)         |                           |                              |                          |         |                             |                       |
| 122   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 123   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 124   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 125   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 126   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 127   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 128   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 129   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 130   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 131   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 132   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 133   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 134   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 135   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 136   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 137   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 138   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 139   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 140   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 141   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 142   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 143   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 144   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 145   | S&H          |  | 0<br>3<br>9 | 8                        | stiff     | PP                                  | 2,500                     |                              |                          |         |                             |                       |
| 146   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 147   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 148   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 149   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
| 150   |              |   |             |                          |           |                                     |                           |                              |                          |         |                             |                       |
|   |              |   |             |                          |           |                                     | LANGAN                    |                              |                          |         |                             |                       |
|   |              |   |             |                          |           |                                     | Project No.:<br>750604203 |                              | Figure:<br>F-9e          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |   |                |                             | Log of Boring BSWL-9<br>PAGE 6 OF 9 |  |                             |                                    |                             |            |                                   |                          |
|---|-----------------|---|----------------|-----------------------------|-------------------------------------|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |   |                |                             | LITHOLOGY                           | MATERIAL DESCRIPTION   | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample  | Blows/ 6"      | SPT<br>N-Value <sup>1</sup> |                                     |  | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 151   |                 |   |                |                             |                                     | SANDY CLAY (CL) (continued)  |                             |                                    |                             |            |                                   |                          |
| 152   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 153   |                 |   |                |                             | CL                                  |  |                             |                                    |                             |            |                                   |                          |
| 154   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 155   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 156   | D&M             |    |                | 350<br>psi                  |                                     | with very fine-grained sand<br>Triaxial Test, see Figure B-11  | TxUU                        | 15,500                             | 4,460                       |            | 31.7                              | 87                       |
| 157   |                 |   |                |                             |                                     | SANDY CLAY (CL)<br>olive-gray to gray, stiff, wet, very fine-grained sand                            |                             |                                    |                             |            |                                   |                          |
| 158   |                 |   |                |                             | CL                                  |  |                             |                                    |                             |            |                                   |                          |
| 159   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 160   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 161   | SPT             |   | 0<br>0<br>8    | 10                          |                                     |  |                             |                                    |                             |            |                                   |                          |
| 162   |                 |   |                |                             | SP-<br>SC                           | SAND with CLAY (SP-SC)<br>olive-gray to gray, loose to medium dense, wet,<br>trace silt and rootlets |                             |                                    |                             |            |                                   |                          |
| 163   | SPT             |  | 2<br>17<br>31  | 58                          |                                     | SILTY SAND (SM)<br>olive-gray to gray, very dense, wet, trace silt, fine-<br>to medium-grained       |                             |                                    |                             |            |                                   |                          |
| 164   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 165   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 166   | SPT             |  | 9<br>21<br>27  | 58                          |                                     |  |                             |                                    |                             | 21.2       | 22.9                              |                          |
| 167   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 168   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 169   |                 |   |                |                             |                                     | wood debris in cuttings  |                             |                                    |                             |            |                                   |                          |
| 170   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 171   | SPT             |  | 20<br>38<br>34 | 86                          | SM                                  |  |                             |                                    |                             |            |                                   |                          |
| 172   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 173   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 174   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 175   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 176   | SPT             |  | 16<br>26<br>26 | 62                          |                                     |  |                             |                                    |                             |            |                                   |                          |
| 177   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 178   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 179   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
| 180   |                 |   |                |                             |                                     |  |                             |                                    |                             |            |                                   |                          |
|   |                 |   |                |                             |                                     |  | <b>LANGAN</b>               |                                    |                             |            |                                   |                          |
|   |                 |   |                |                             |                                     |  | Project No.:<br>750604203   |                                    | Figure:<br>F-9f             |            |                                   |                          |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOT 337**  
San Francisco, California



## Log of Boring BSWL-9


PAGE 7 OF 9

| DEPTH<br>(feet) | SAMPLES      |        |                    |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|-----------------|--------------|--------|--------------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|                 | Sampler Type | Sample | Blows/ 6"          | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181             | SPT          |        | 14<br>43<br>50/ 4" | 112/ 10"                 | SM        | SAND (SP) (continued)   |                           |                              |                          |         |                             |                       |
| 182             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 183             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 184             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 185             |              |        | 23<br>35<br>25     | 72                       | SP        | SAND with GRAVEL (SP)<br>olive-gray to gray, very dense, wet, red and green fine to coarse angular gravel |                           |                              |                          |         |                             |                       |
| 186             | SPT          |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 187             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 188             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 189             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 190             |              |        | 3<br>7<br>12       | 23                       |           |   |                           |                              |                          |         |                             |                       |
| 191             | SPT          |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 192             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 193             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 194             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 195             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 196             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 197             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 198             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 199             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 200             |              |        | 15<br>31<br>50/ 5" | 57/ 11"                  |           |   |                           |                              |                          |         |                             |                       |
| 201             | S&H          |        |                    |                          |           | green-gray to blue-green, hard, with fine-grained sand, trace fine subangular gravel                      |                           |                              |                          |         |                             |                       |
| 202             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 203             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 204             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 205             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 206             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 207             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 208             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 209             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
| 210             |              |        |                    |                          |           |   |                           |                              |                          |         |                             |                       |
|                 |              |        |                    |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|                 |              |        |                    |                          |           |   | Project No.:<br>750604203 | Figure:<br>F-9g              |                          |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |               |                          |           | Log of Boring BSWL-9<br>PAGE 8 OF 9                         |                       |                              |                          |         |                             |                       |
|---|--------------|---|---------------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |               |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"     | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   |              |   |               |                          |           | SAND with GRAVEL (SP) (continued)                           |                       |                              |                          |         |                             |                       |
| 212   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 213   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 214   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 215   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 216   | S&H          |    | 7<br>18<br>20 | 27                       |           | very stiff  |                       |                              |                          |         |                             |                       |
| 217   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 218   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 219   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 220   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 221   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 222   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 223   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 224   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 225   |              |   |               |                          | SP        |   |                       |                              |                          |         |                             |                       |
| 226   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 227   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 228   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 229   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 230   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 231   | S&H          |  | 0<br>0<br>26  | 24                       |           | yellow-brown, very stiff, wet, trace fine subangular gravel |                       |                              |                          |         |                             |                       |
| 232   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 233   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 234   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 235   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 236   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 237   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 238   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 239   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |
| 240   |              |   |               |                          |           |   |                       |                              |                          |         |                             |                       |





Project No.:  
750604203

Figure:  
F-9h

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |                          | Log of Boring BSWL-9<br>PAGE 9 OF 9 |                                   |  |                              |                          |         |                             |                       |
|---|--------------|---|-----------|--------------------------|-------------------------------------|-----------------------------------|--|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |                          | LITHOLOGY                           | MATERIAL DESCRIPTION              | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |                                     |                                   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   |              |   |           |                          | SP                                  | SAND with GRAVEL (SP) (continued) |  |                              |                          |         |                             |                       |
| 242   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 243   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 244   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 245   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 246   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 247   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 248   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 249   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 250   | SPT          |    | 50/ 3'    | 60/ 3"                   |                                     |                                   | SHALE<br>dark gray to black, moderately hard, friable to weak, moderately to little weathering |                              |                          |         |                             |                       |
| 251   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 252   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 253   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 254   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 255   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 256   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 257   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 258   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 259   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 260   | SPT          |  | 50/ 4"    | 60/ 4"                   |                                     | with white calcareous material    |  |                              |                          |         |                             |                       |
| 261   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 262   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 263   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 264   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 265   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 266   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 267   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 268   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 269   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |
| 270   |              |   |           |                          |                                     |                                   |  |                              |                          |         |                             |                       |

Boring terminated at a depth of 260.3 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 8 feet below ground surface during drilling.  
PP = pocket penetrometer

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

LANGAN

Project No.: 750604203

Figure: F-9i

Boring terminated at a depth of 260.3 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 8 feet below ground surface during drilling.  
PP = pocket penetrometer

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

**LANGAN**

Project No.:  
750604203

Figure:  
F-9i

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | <b>SEAWALL LOT 337</b><br>San Francisco, California |           |                             | <b>Log of Boring BSWL-10</b><br>PAGE 1 OF 9 |  |                             |                                    |                             |            |                                   |                          |
|--|-----------------|---|-----------|-----------------------------|---|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |   |           |                             | Logged by: C. Divis                         |  |                             |                                    |                             |            |                                   |                          |
| Date started: 2/19/16  |                 | Date finished: 2/24/16                              |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic                              |           |                             | LABORATORY TEST DATA                        |  |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Herwood (S&H). Standard Penetration Test (SPT), Dames & Moore (DM) |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |   |           | SPT<br>N-value <sup>1</sup> | LITHOLOGY                                   | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample  | Blows/ 6" |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~100 feet <sup>2</sup>                                       |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 1  |                 |   |           |                             |   | 5 inches asphalt concrete (AC)   |                             |                                    |                             |            |                                   |                          |
| 2  |                 |   |           |                             |   | 3 inches aggregate base (AB)   |                             |                                    |                             |            |                                   |                          |
| 3  | GRAB            |   |           |                             | SC  | CLAYEY SAND with GRAVEL (SC)<br>brown, moist, with debris  |                             |                                    |                             |            |                                   |                          |
| 4  |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 5  |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 6  | S&H             |   | 8         | 15                          |   | CLAYEY SAND (SC)<br>brown, medium dense, moist, with brick debris<br>(02/29/16, 9:30 a.m.)<br>LL = 33, PI = 18, see Figure B-2 |                             |                                    |                             | 36.6       | 11.6                              |                          |
| 7  |                 |   | 10        |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 8  |                 |   | 11        |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 9  |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 10   |                 |   |           |                             | SC  |  |                             |                                    |                             |            |                                   |                          |
| 11   | SPT             |   | 1         | 29                          |   | trace rock fragments in shoe   |                             |                                    |                             |            |                                   |                          |
| 12   |                 |   | 3         |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 13   |                 |   | 21        |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 14   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 15   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 16   | SPT             |   | 0         | 0                           |   | CLAY (CH)<br>grades black to dark gray, very soft, wet   |                             |                                    |                             |            |                                   |                          |
| 17   |                 |   | 0         |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 18   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 19   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 20   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 21   | D&M             |   |           | 60                          |   | trace shells   |                             |                                    |                             |            |                                   |                          |
| 22   |                 |   |           | psi                         | CH  |  |                             |                                    |                             |            |                                   |                          |
| 23   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 24   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 25   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 26   | S&H             |   | 0         | 0                           |   |  |                             |                                    |                             |            |                                   |                          |
| 27   |                 |   | 0         |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 28   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 29   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 30   |                 |   |           |                             |   |  |                             |                                    |                             |            |                                   |                          |

FILL

BAY MUD

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

LANGAN

Project No.:  
750604203

Figure:  
F-10a

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |             |                          | Log of Boring BSWL-10 |  |                        |                              |                          |         |                             |                       |
|---|--------------|--------|-------------|--------------------------|-----------------------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |        |             |                          | PAGE 2 OF 9           |  |                        |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |        |             |                          | LITHOLOGY             | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"   | SPT N-Value <sup>1</sup> |                       |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  | D&M          |        |             | 70 psi                   | CH                    | CLAY (CH) (continued)<br>Consolidation Test, see Figure B-24 |                        |                              |                          |         | 55.9                        | 66                    |
| 32  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 33  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 34  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 35  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 36  | S&H          |        | 0<br>0<br>0 | 0                        |                       |  |                        |                              |                          |         |                             |                       |
| 37  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 38  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 39  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 40  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 41  | D&M          |        |             | -- psi                   | CH                    | Triaxial Test, see Figure B-12                               | TxUU                   | 4,000                        | 860                      |         | 67.4                        | 58                    |
| 42  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 43  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 44  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 45  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 46  | S&H          |        | 0<br>0<br>1 | 1                        |                       |  |                        |                              |                          |         |                             |                       |
| 47  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 48  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 49  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 50  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 51  | D&M          |        |             | 100 psi                  | CH                    | Consolidation Test, see Figure B-25                          |                        |                              |                          |         | 56.9                        | 66                    |
| 52  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 53  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 54  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 55  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 56  | S&H          |        | 0<br>0<br>3 | 2                        |                       |  |                        |                              |                          |         |                             |                       |
| 57  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 58  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 59  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
| 60  |              |        |             |                          |                       |  |                        |                              |                          |         |                             |                       |
|   |              |        |             |                          |                       |  | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |             |                          |                       |  | Project No.: 750604203 |                              | Figure: F-10b            |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18






# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |                |                          | Log of Boring BSWL-10<br>PAGE 3 OF 9 |   |                        |                              |                          |         |                             |                       |
|---|--------------|--------|----------------|--------------------------|--------------------------------------|---|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |                |                          | LITHOLOGY                            | MATERIAL DESCRIPTION                                      | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"      | SPT N-Value <sup>1</sup> |                                      |   | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  | D&M          |        |                | 125                      | CH                                   | CLAY (CH) (continued)<br>olive-gray, soft to medium stiff |                        |                              |                          |         |                             |                       |
| 62  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 63  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 64  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 65  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 66  | S&H          |        | 1<br>1<br>3    | 3                        |                                      |   |                        |                              |                          |         |                             |                       |
| 67  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 68  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 69  |              |        |                |                          |                                      | CLAYEY SAND (SC)<br>olive, very dense, wet                |                        |                              |                          |         |                             |                       |
| 70  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 71  | D&M          |        |                | 600                      |                                      |   |                        |                              |                          |         |                             |                       |
| 72  | SPT          |        | 13<br>26<br>37 | 76                       |                                      |   |                        |                              |                          |         |                             |                       |
| 73  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 74  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 75  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 76  | SPT          |        | 16<br>29<br>36 | 78                       |                                      |   |                        |                              |                          |         |                             |                       |
| 77  |              |        |                |                          | SC                                   |   |                        |                              |                          |         |                             |                       |
| 78  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 79  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 80  |              |        |                |                          |                                      | dense   |                        |                              |                          |         |                             |                       |
| 81  | SPT          |        | 11<br>12<br>16 | 34                       |                                      |   |                        |                              |                          |         |                             |                       |
| 82  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 83  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 84  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 85  |              |        |                |                          |                                      | CLAY (CH)<br>olive, stiff, wet, with trace organics       |                        |                              |                          |         |                             |                       |
| 86  | S&H          |        | 3<br>5<br>10   | 11                       |                                      |   |                        |                              |                          |         |                             |                       |
| 87  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 88  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
| 89  |              |        |                |                          | CH                                   |   |                        |                              |                          |         |                             |                       |
| 90  |              |        |                |                          |                                      |   |                        |                              |                          |         |                             |                       |
|   |              |        |                |                          |                                      |   | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |                |                          |                                      |   | Project No.: 750604203 |                              | Figure: F-10c            |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18





BAY MUD

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |              |           | Log of Boring BSWL-10<br>PAGE 4 OF 9 |                        |                              |                          |         |                             |                       |  |
|---|--------------|---|-----------|--------------|-----------|--------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |              | LITHOLOGY | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA   |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value¹ |           |                                      | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 91  |              |   |           |              |           | CLAY (CH) (continued)                |                        |                              |                          |         |                             |                       |  |
| 92  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 93  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 94  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 95  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 96  | D&M          |    |           | 210 psi      |           |                                      | TV                     |                              | 1,200                    |         |                             |                       |  |
| 97  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 98  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 99  |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 100   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 101   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 102   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 103   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 104   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 105   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 106   | S&H          |  | 0 3 5     | 6            | CH        |                                      | TV                     |                              | 1,200                    |         |                             |                       |  |
| 107   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 108   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 109   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 110   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 111   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 112   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 113   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 114   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 115   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 116   | S&H          |  | 0 1 3     | 3            |           |                                      | TV                     |                              | 1,300                    |         |                             |                       |  |
| 117   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 118   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 119   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
| 120   |              |   |           |              |           |                                      |                        |                              |                          |         |                             |                       |  |
|   |              |   |           |              |           |                                      | LANGAN                 |                              |                          |         |                             |                       |  |
|   |              |   |           |              |           |                                      | Project No.: 750604203 |                              | Figure: F-10d            |         |                             |                       |  |







TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |              |           | Log of Boring BSWL-10               |                        |                              |                          |         |                             |                       |
|---|--------------|---|-------------|--------------|-----------|-------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |             |              |           | PAGE 5 OF 9                         |                        |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |              | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value¹ |           |                                     | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   |              |   |             |              |           | CLAY (CH) (continued)               |                        |                              |                          |         |                             |                       |
| 122   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 123   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 124   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 125   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 126   | D&M          |    |             | 240 psi      |           | Consolidation Test, see Figure B-26 | TV                     |                              | 1,300                    |         | 48.7                        | 73                    |
| 127   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 128   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 129   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 130   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 131   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 132   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 133   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 134   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 135   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 136   | S&H          |  | 0<br>3<br>5 | 6            | CH        |                                     |                        |                              |                          |         |                             |                       |
| 137   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 138   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 139   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 140   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 141   | S&H          |  | 0<br>3<br>6 | 7            |           |                                     | TV                     |                              | 1,200                    |         |                             |                       |
| 142   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 143   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 144   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 145   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 146   | S&H          |  | 0<br>4<br>7 | 7            |           |                                     | TV                     |                              | 1,400                    |         |                             |                       |
| 147   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 148   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 149   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
| 150   |              |   |             |              |           |                                     |                        |                              |                          |         |                             |                       |
|   |              |   |             |              |           |                                     | LANGAN                 |                              |                          |         |                             |                       |
|   |              |   |             |              |           |                                     | Project No.: 750604203 |                              | Figure: F-10e            |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                 |                          | Log of Boring BSWL-10<br>PAGE 6 OF 9 |   |                           |                              |                          |         |                             |                       |  |
|---|--------------|---|-----------------|--------------------------|--------------------------------------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                 |                          | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6"       | SPT N-Value <sup>1</sup> |                                      |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 151   |              |   |                 |                          | CH                                   | CLAY (CH) (continued)   |                           |                              |                          |         |                             |                       |  |
| 152   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 153   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 154   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 155   |              |    |                 |                          |                                      | CLAYEY SAND (SC)<br>olive, dense, wet   |                           |                              |                          |         |                             |                       |  |
| 156   | D&M          |   |                 | 300 psi                  |                                      |   |                           |                              |                          |         |                             |                       |  |
| 157   | SPT          |    | 6<br>9<br>12    | 37                       |                                      |   |                           |                              |                          |         |                             |                       |  |
| 158   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 159   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 160   |              |   | 14<br>19<br>19  | 46                       |                                      |   |                           |                              |                          |         |                             |                       |  |
| 161   | SPT          |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 162   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 163   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 164   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 165   |              |  | 14<br>10<br>14  | 29                       | SC                                   | medium dense<br>LL = 23, PI = 9, see Figure B-2                               |                           |                              | 37.8                     | 22.7    |                             |                       |  |
| 166   | SPT          |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 167   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 168   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 169   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 170   |              |  | 0<br>10<br>22   | 38                       |                                      | dense   |                           |                              |                          |         |                             |                       |  |
| 171   | SPT          |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 172   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 173   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 174   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 175   |              |  | 26<br>50/<br>6" | 91/<br>6"                | GP                                   | very dense<br>GRAVEL (GP)<br>black, brown, olive,very dense, wet, fine gravel |                           |                              |                          |         |                             |                       |  |
| 176   | SPT          |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 177   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 178   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 179   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
| 180   |              |   |                 |                          |                                      |   |                           |                              |                          |         |                             |                       |  |
|   |              |   |                 |                          |                                      |   | LANGAN                    |                              |                          |         |                             |                       |  |
|   |              |   |                 |                          |                                      |   | Project No.:<br>750604203 |                              | Figure:<br>F-10f         |         |                             |                       |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18






# Mayor ED 17-02 Priority permit

PROJECT:

**SEAWALL LOT 337**  
San Francisco, California



## Log of Boring BSWL-10

PAGE 7 OF 9

| DEPTH<br>(feet) | SAMPLES      |   |                       |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |  |  |
|-----------------|--------------|---|-----------------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|
|                 | Sampler Type | Sample  | Blows/ 6"             | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |
| 181             | SPT          |    | 11<br>18<br>27        | 54                       | SP        | SAND (SP)<br>olive-gray, very dense, wet                                    | TV                        |                              | 1,300                    |         |                             |                       |  |  |
| 182             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 183             |              |   |                       |                          | CH        | CLAY with GRAVEL (CH)<br>olive-gray, very stiff, wet, trace shell fragments |                           |                              |                          |         |                             |                       |  |  |
| 184             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 185             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 186             | SPT          |    | 0<br>3<br>14          | 20                       |           |   |                           |                              |                          |         |                             |                       |  |  |
| 187             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 188             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 189             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 190             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 191             |              |   |                       |                          | SP-SC     | SAND with SILTY CLAY (SP-SC)<br>olive-gray, very dense, wet                 |                           |                              |                          |         |                             |                       |  |  |
| 192             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 193             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 194             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 195             |              |   |                       |                          | GP-GC     |   |                           |                              |                          |         |                             |                       |  |  |
| 196             | S&H          |  | 10<br>32<br>50/<br>5" | 57/<br>11"               |           | GRAVEL with CLAY and SAND (GP-GC)<br>olive-gray, very dense, wet            |                           |                              |                          |         |                             |                       |  |  |
| 197             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 198             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 199             |              |   |                       |                          | CH        | CLAY with GRAVEL (CH)<br>olive, hard, wet                                   |                           |                              |                          |         |                             |                       |  |  |
| 200             | SPT          |  | 15<br>21<br>24        | 54                       |           |   |                           |                              |                          |         |                             |                       |  |  |
| 201             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 202             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 203             |              |   |                       |                          | CH        | CLAY (CH)<br>olive, very stiff, wet   |                           |                              |                          |         |                             |                       |  |  |
| 204             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 205             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 206             | S&H          |  | 3<br>14<br>21         | 25                       |           |   |                           |                              |                          |         |                             |                       |  |  |
| 207             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 208             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 209             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
| 210             |              |   |                       |                          |           |   |                           |                              |                          |         |                             |                       |  |  |
|                 |              |   |                       |                          |           |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |  |  |
|                 |              |   |                       |                          |           |   | Project No.:<br>750604203 |                              | Figure:<br>F-10g         |         |                             |                       |  |  |



TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                        |   |                |                             |           | Log of Boring BSWL-10                             |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
|---|------------------------|---|----------------|-----------------------------|-----------|---|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|--|--|----|--|--|--|
|   |                        |   |                |                             |           | PAGE 8 OF 9                                       |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| DEPTH<br>(feet)                                       | SAMPLES                |   |                |                             | LITHOLOGY | MATERIAL DESCRIPTION                              | LABORATORY TEST DATA        |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
|   | Sampler<br>Type        | Sample  | Blows/ 6"      | SPT<br>N-Value <sup>1</sup> |           |   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |  |  |    |  |  |  |
| 211   | S&H                    |   | 0<br>5<br>24   | 20                          | CH        | CLAY (CH) (continued)                             | TV                          | 1,800                              |                             |            |                                   |                          |  |  |    |  |  |  |
| 212   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 213   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 214   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 215   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 216   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 217   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 218   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 219   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 220   |                        |   |                |                             |           | CLAY with SAND and GRAVEL (CH)                    |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 221   | olive, very stiff, wet |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 222   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 223   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 224   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 225   |                        |   |                |                             | CH        |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 226   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 227   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 228   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 229   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 230   | SPT                    |  | 11<br>12<br>15 | 19                          | CH        | CLAY (CH)   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 231   |                        |   |                |                             |           | olive with yellow-brown mottling, very stiff, wet |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 232   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 233   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 234   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 235   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  | CH |  |  |  |
| 236   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 237   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 238   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 239   |                        |   |                |                             |           |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
| 240   |                        |   |                |                             | CH        |   |                             |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
|   |                        |   |                |                             |           |   | <b>LANGAN</b>               |                                    |                             |            |                                   |                          |  |  |    |  |  |  |
|   |                        |   |                |                             |           |   | Project No.:<br>750604203   |                                    | Figure:<br>F-10h            |            |                                   |                          |  |  |    |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |                          |           | Log of Boring BSWL-10<br>PAGE 9 OF 9   |                       |                              |                          |         |                             |                       |
|---|--------------|---|-----------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   | SPT          |    | 19        | 66                       | CH        | GRAVELLY CLAY (CH)   |                       |                              |                          |         |                             |                       |
|   |              |   |           |                          |           | olive clay with brown, dark brown, red and black and white gravel, wet, hard   |                       |                              |                          |         |                             |                       |
| 242   |              |   |           |                          |           | GRAVELLY CLAY (CH) (continued)   |                       |                              |                          |         |                             |                       |
| 243   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 244   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 245   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 246   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 247   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 248   |              |   |           |                          |           | SERPENTINITE   |                       |                              |                          |         |                             |                       |
| 249   |              |   |           |                          |           | dark green-gray, low hardness, friable to weak, deeply to moderately weathered |                       |                              |                          |         |                             |                       |
| 250   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 251   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 252   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 253   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 254   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 255   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 256   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 257   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 258   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 259   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 260   | SPT          |  | 50/       | 60/                      |           |  |                       |                              |                          |         |                             |                       |
|   |              |   | 2.5"      |                          |           | 2.5"   |                       |                              |                          |         |                             |                       |
| 261   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 262   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 263   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 264   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 265   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 266   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 267   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 268   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 269   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |
| 270   |              |   |           |                          |           |  |                       |                              |                          |         |                             |                       |

Boring terminated at a depth of 260.2 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 6 feet below ground surface during drilling.  
TV = torvane.

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.








LANGAN

Project No.: 750604203

Figure: F-10i

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | <b>SEAWALL LOT 337</b><br>San Francisco, California                                 |           |           | <b>Log of Boring BSWL-11</b><br>PAGE 1 OF 9  |                             |                                    |                             |            |                                   |                          |   |
|--|-----------------|---|-----------|-----------|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|---|
| Boring location: See Site Plan, Figure 2   |                 |   |           |           | Logged by: S. Magallon   |                             |                                    |                             |            |                                   |                          |   |
| Date started: 2/22/16  |                 | Date finished: 2/24/16  |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| Drilling method: Rotary Wash   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic  |           |           | LABORATORY TEST DATA   |                             |                                    |                             |            |                                   |                          |   |
| Samplers: Sprague & Herwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM) |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| DEPTH<br>(feet)  | SAMPLES         |   |           | LITHOLOGY | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |   |
|  | Sampler<br>Type | Sample  | Blows/ 6" |           |  |                             |                                    |                             |            |                                   |                          |   |
| Ground Surface Elevation: ~99 feet <sup>2</sup>  |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 1  |                 |   |           |           | 4 inches asphalt concrete (AC)   |                             |                                    |                             |            |                                   |                          |   |
| 2  |                 |   |           |           | 8 inches aggregate base (AB)   |                             |                                    |                             |            |                                   |                          |   |
| 3  | GRAB            |    |           |           | SAND with CLAY (SP-SC)<br>brown to olive-brown, moist, fine- to medium-grained sand, trace fine subangular gravel, trace brick debris  |                             |                                    |                             |            |                                   |                          |   |
| 4  |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 5  | S&H             |    | 12        | 16        | SP-SC  |                             |                                    |                             |            |                                   |                          |   |
| 6  |                 |   | 12        |           |  |                             |                                    |                             |            |                                   |                          | medium dense, moist   |
| 7  |                 |   | 11        |           |  |                             |                                    |                             |            |                                   |                          | ▽ (02/22/16, 7:30 a.m.)   |
| 8  |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 9  |                 |   |           |           | CLAYEY GRAVEL with SAND (GC)<br>dark gray, loose, wet, trace coarse subangular gravel  |                             |                                    |                             | 17.4       | 12.9                              |                          |   |
| 10   | SPT             |    | 2         | 6         | GC   |                             |                                    |                             |            |                                   |                          |   |
| 11   |                 |   | 2         |           |  |                             |                                    |                             |            |                                   |                          | SANDY CLAY (CL)<br>olive-gray to gray, medium stiff, wet, fine to coarse-grained sand |
| 12   |                 |   |           |           | CL   |                             |                                    |                             |            |                                   |                          |   |
| 13   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 14   |                 |   |           |           | CLAYEY GRAVEL with SAND (GC)<br>olive-gray to gray with yellow-brown mottling, loose, wet, trace fine to coarse subangular gravel consisting of shale and serpentinite fragments<br>LL = 27, PI = 12, see Figure B-2 | FILL                        |                                    |                             | 20.8       | 13.5                              | 117                      |   |
| 15   | S&H             |  | 4         | 6         | GC   |                             |                                    |                             |            |                                   |                          |   |
| 16   |                 |   | 6         |           |  |                             |                                    |                             |            |                                   |                          |   |
| 17   | SPT             |  | 0         | 4         | GC   |                             |                                    |                             |            |                                   |                          |   |
| 18   |                 |   | 2         |           |  |                             |                                    |                             |            |                                   |                          |   |
| 19   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 20   |                 |   |           |           | CLAYEY SAND with GRAVEL (SC)<br>olive-gray to gray, medium dense, wet, fine to coarse subangular gravel consisting of shale fragments  |                             |                                    |                             |            |                                   |                          |   |
| 21   | S&H             |  | 6         | 28        | SC   |                             |                                    |                             |            |                                   |                          |   |
| 22   |                 |   | 20        |           |  |                             |                                    |                             |            |                                   |                          |   |
| 23   |                 |   | 20        |           |  |                             |                                    |                             |            |                                   |                          |   |
| 24   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 25   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 26   | S&H             |  | 8         | 34        | SC   |                             |                                    |                             |            |                                   |                          |   |
| 27   |                 |   | 32        |           |  |                             |                                    |                             | dense      |                                   |                          |   |
| 28   |                 |   | 16        |           |  |                             |                                    |                             |            |                                   |                          |   |
| 29   |                 |   |           |           |  |                             |                                    |                             |            |                                   |                          |   |
| 30   |                 |   |           |           | GC   |                             |                                    |                             |            |                                   |                          |   |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

**LANGAN**

 Project No.:  
750604203

 Figure:  
F-11a



# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |           |              | Log of Boring BSWL-11 |  |                        |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------|-----------------------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |        |           |              | PAGE 2 OF 9           |  |                        |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |              | LITHOLOGY             | MATERIAL DESCRIPTION   | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value¹ |                       |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  | S&H          |        | 7         | 12           | GC                    | CLAYEY GRAVEL with SAND (GC)<br>olive-gray, medium dense, wet, subangular gravel<br>LL = 30, PI = 16, see Figure B-2         |                        |                              |                          | 25.3    | 11.4                        | 125                   |
| 32  |              |        | 10        |              |                       |  |                        |                              |                          |         |                             |                       |
| 33  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 34  | SPT          |        | 4         | 4            | CL                    | SANDY CLAY with GRAVEL (CL)<br>olive-gray to gray, soft to medium stiff, wet,<br>coarse-grained sand, fine subangular gravel | FILL                   |                              |                          |         |                             |                       |
| 35  |              |        | 3         |              |                       |  |                        |                              |                          |         |                             |                       |
| 36  |              |        | 2         |              |                       |  |                        |                              |                          |         |                             |                       |
| 37  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 38  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 39  |              |        |           |              |                       | CLAY (CH)<br>olive-gray, very soft, wet  |                        |                              |                          |         |                             |                       |
| 40  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 41  | D&M          |        |           | 200 psi      |                       | gray to olive gray, very soft to soft, occasional shells   |                        |                              |                          |         |                             |                       |
| 42  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 43  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 44  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 45  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 46  | S&H          |        | 0         | 0            | CH                    |  | PP                     | 500                          |                          |         |                             |                       |
| 47  |              |        | 0         |              |                       |  |                        |                              |                          |         |                             |                       |
| 48  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 49  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 50  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 51  | S&H          |        | 0         | 0            |                       | LL = 58, PI = 31, see Figure B-2   |                        |                              |                          |         |                             |                       |
| 52  |              |        | 0         |              |                       |  |                        |                              |                          |         |                             |                       |
| 53  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 54  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 55  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 56  | D&M          |        |           | 75 psi       |                       | Triaxial Test, see Figure B-13   | TxUU                   | 5,500                        | 1,260                    |         | 50.7                        | 70                    |
| 57  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 58  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 59  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
| 60  |              |        |           |              |                       |  |                        |                              |                          |         |                             |                       |
|   |              |        |           |              |                       |  | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |           |              |                       |  | Project No.: 750604203 |                              | Figure: F-11b            |         |                             |                       |





TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |           |                          |           | Log of Boring BSWL-11               |                        |                              |                          |         |                             |                       |  |  |  |  |  |
|---|--------------|--------|-----------|--------------------------|-----------|-------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|--|--|--|
|   |              |        |           |                          |           | PAGE 3 OF 9                         |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY | MATERIAL DESCRIPTION                | LABORATORY TEST DATA   |                              |                          |         |                             |                       |  |  |  |  |  |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |           |                                     | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |  |  |  |
| 61  | S&H          |        | 0         | 0                        | CH        | CLAY (CH) (continued)               | PP                     | 500                          | 52.2                     | 69      | BAY MUD                     |                       |  |  |  |  |  |
| 62  |              |        |           |                          |           | Consolidation Test, see Figure B-27 |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 63  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 64  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 65  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 66  | D&M          |        |           | 200 psi                  |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 67  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 68  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 69  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 70  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 71  | S&H          |        | 0         | 0                        |           | Consolidation Test, see Figure B-28 | PP                     | 500                          | 48.7                     | 71      |                             |                       |  |  |  |  |  |
| 72  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 73  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 74  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 75  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 76  | D&M          |        |           | 200 psi                  |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 77  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 78  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 79  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 80  |              |        |           |                          |           | Consolidation Test, see Figure B-29 | PP                     | 1,000                        | 44.7                     | 75      |                             |                       |  |  |  |  |  |
| 81  | S&H          |        | 0         | 0                        |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 82  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 83  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 84  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 85  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 86  | D&M          |        |           | 150 psi                  |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 87  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 88  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 89  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
| 90  |              |        |           |                          |           |                                     |                        |                              |                          |         |                             |                       |  |  |  |  |  |
|   |              |        |           |                          |           |                                     | LANGAN                 |                              |                          |         |                             |                       |  |  |  |  |  |
|   |              |        |           |                          |           |                                     | Project No.: 750604203 |                              | Figure: F-11c            |         |                             |                       |  |  |  |  |  |




TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |                          | Log of Boring BSWL-11<br>PAGE 4 OF 9 |   |                           |                              |                          |         |                             |                       |
|---|--------------|---|-------------|--------------------------|--------------------------------------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |                          | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value <sup>1</sup> |                                      |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 91  | S&H          |    | 0<br>0<br>0 | 0                        | CH                                   | CLAY (CH) (continued)   | BAY MUD                   |                              |                          |         |                             |                       |
| 92  |              |   |             |                          |                                      | SANDY CLAY (CL)<br>very fine-grained sand   |                           |                              |                          |         |                             |                       |
| 93  |              |   |             |                          |                                      | CLAY (CH)<br>gray to olive gray, very soft to soft, trace<br>fine-grained sand, occasional shells |                           |                              |                          |         |                             |                       |
| 94  |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 95  |              |    | 4<br>7<br>5 | 14                       | CL                                   | CLAY (CL)<br>green-gray, stiff, wet   |                           |                              |                          |         |                             |                       |
| 96  | SPT          |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 97  |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 98  |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 99  |              |   |             |                          | CL                                   | green-gray with olive and gray mottling, very soft  |                           |                              |                          |         |                             |                       |
| 100   |              |   | 0<br>0<br>2 | 1                        |                                      |   |                           |                              |                          |         |                             |                       |
| 101   | S&H          |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 102   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 103   |              |   |             |                          | CL                                   |   |                           |                              |                          |         |                             |                       |
| 104   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 105   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 106   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 107   |              |   |             |                          | CL                                   | green-gray to olive-gray, stiff<br>Consolidation Test, see Figure B-30                            |                           |                              |                          |         | 59.9                        | 64                    |
| 108   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 109   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 110   |              |  |             | 375<br>psi               |                                      |   |                           |                              |                          |         |                             |                       |
| 111   | D&M          |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 112   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 113   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 114   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 115   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 116   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 117   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 118   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 119   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
| 120   |              |   |             |                          |                                      |   |                           |                              |                          |         |                             |                       |
|   |              |   |             |                          |                                      |   | <b>LANGAN</b>             |                              |                          |         |                             |                       |
|   |              |   |             |                          |                                      |   | Project No.:<br>750604203 |                              | Figure:<br>F-11d         |         |                             |                       |


TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |              | Log of Boring BSWL-11 |                                     |                           |                              |                          |         |                             |                       |  |  |
|---|--------------|---|-------------|--------------|-----------------------|-------------------------------------|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|
|   |              |   |             |              | PAGE 5 OF 9           |                                     |                           |                              |                          |         |                             |                       |  |  |
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |              | LITHOLOGY             | MATERIAL DESCRIPTION                | LABORATORY TEST DATA      |                              |                          |         |                             |                       |  |  |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value¹ |                       |                                     | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |
| 121   | S&H          |    | 0<br>0<br>0 | 0            | CL                    | CLAY (CL) (continued)<br>olive-gray |                           |                              |                          |         |                             |                       |  |  |
| 122   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 123   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 124   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 125   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 126   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 127   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 128   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 129   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 130   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 131   | S&H          |   | 0<br>0<br>0 | 0            |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 132   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 133   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 134   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 135   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 136   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 137   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 138   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 139   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 140   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 141   | D&M          |  |             | 400 psi      |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 142   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 143   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 144   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 145   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 146   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 147   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 148   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 149   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
| 150   |              |   |             |              |                       |                                     |                           |                              |                          |         |                             |                       |  |  |
|   |              |   |             |              |                       |                                     | LANGAN                    |                              |                          |         |                             |                       |  |  |
|   |              |   |             |              |                       |                                     | Project No.:<br>750604203 |                              | Figure:<br>F-11e         |         |                             |                       |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

|   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
|---|--------------|--|-------------|--------------------------|-----------|--------------------------------------|------------------------|------------------------------|--------------------------|-------------------------------|-----------------------------|-----------------------|--|--|--|
| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |  |             |                          |           | Log of Boring BSWL-11<br>PAGE 6 OF 9 |                        |                              |                          |                               |                             |                       |  |  |  |
| DEPTH<br>(feet)                                       | SAMPLES      |  |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA   |                              |                          |                               |                             |                       |  |  |  |
|   | Sampler Type | Sample   | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |                                      | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines %                       | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |  |
| 151   | S&H          |  | 0<br>1<br>5 | 4                        | CL        | CLAY (CL) (continued)                |                        |                              |                          |                               |                             |                       |  |  |  |
| 152   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 153   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 154   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 155   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 156   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 157   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 158   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 159   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 160   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 161   |              |  |             |                          |           |                                      |                        |                              |                          | sandy<br>soft to medium stiff |                             |                       |  |  |  |
| 162   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 163   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 164   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 165   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 166   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 167   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 168   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 169   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 170   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 171   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 172   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 173   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 174   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 175   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 176   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 177   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 178   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 179   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
| 180   |              |  |             |                          |           |                                      |                        |                              |                          |                               |                             |                       |  |  |  |
|   |              |  |             |                          |           |                                      | <b>LANGAN</b>          |                              |                          |                               |                             |                       |  |  |  |
|   |              |  |             |                          |           |                                      | Project No.: 750604203 |                              | Figure: F-11f            |                               |                             |                       |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |                 |        |           |                             |           | Log of Boring BSWL-11<br>PAGE 7 OF 9 |  |                                    |                             |            |                                   |                          |
|---|-----------------|--------|-----------|-----------------------------|-----------|--------------------------------------|--|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| DEPTH<br>(feet)                                       | SAMPLES         |        |           |                             | LITHOLOGY | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA                                     |                                    |                             |            |                                   |                          |
|   | Sampler<br>Type | Sample | Blows/ 6" | SPT<br>N-Value <sup>1</sup> |           |                                      | Type of<br>Strength<br>Test                              | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
| 181   | S&H             |        | 0         | 5                           | CL        | CLAY (CL) (continued)                |  |                                    |                             |            |                                   |                          |
| 182   |                 |        | 0         |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 183   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 184   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 185   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 186   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 187   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 188   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 189   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 190   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 191   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 192   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 193   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 194   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 195   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 196   | S&H             |        | 0         | 11                          |           |                                      | green-gray mottling, stiff, trace very fine-grained sand |                                    |                             |            |                                   |                          |
| 197   |                 |        | 2         |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 198   |                 |        | 13        |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 199   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 200   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 201   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 202   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 203   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 204   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 205   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 206   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 207   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 208   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 209   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
| 210   |                 |        |           |                             |           |                                      |  |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |           |                                      | LANGAN   |                                    |                             |            |                                   |                          |
|   |                 |        |           |                             |           |                                      | Project No.: 750604203                                   |                                    | Figure: F-11g               |            |                                   |                          |



TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |              |              |           | Log of Boring BSWL-11<br>PAGE 8 OF 9                               |                           |                              |                          |         |                             |                       |
|---|--------------|--------|--------------|--------------|-----------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |              |              | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"    | SPT N-Value¹ |           |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 211   | S&H          |        | 0<br>5<br>10 | 11           | CL        | CLAY (CL) (continued)<br>stiff                                     | PP                        |                              | 4,000                    |         |                             |                       |
| 212   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 213   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 214   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 215   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 216   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 217   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 218   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 219   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 220   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 221   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 222   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 223   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 224   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 225   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 226   | S&H          |        | 0<br>0<br>0  | 0            |           | very soft  | PP                        |                              | 3,000                    |         |                             |                       |
| 227   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 228   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 229   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 230   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 231   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 232   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 233   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 234   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 235   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 236   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 237   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 238   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
| 239   |              |        |              |              |           | SHALE and MELANGE<br>gray to dark gray with white mottling, low to |                           |                              |                          |         |                             |                       |
| 240   |              |        |              |              |           |  |                           |                              |                          |         |                             |                       |
|   |              |        |              |              |           |  | LANGAN                    |                              |                          |         |                             |                       |
|   |              |        |              |              |           |  | Project No.:<br>750604203 |                              | Figure:<br>F-11h         |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                 |                          |           | Log of Boring BSWL-11   |                       |                              |                          |         |                             |                       |
|---|--------------|---|-----------------|--------------------------|-----------|---|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |                 |                          |           | PAGE 9 OF 9   |                       |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |                 |                          | LITHOLOGY | MATERIAL DESCRIPTION  | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"       | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241   | SPT          |  | 34<br>50/<br>4" | 60/<br>4"                |           | SHALE and MELANGE (continued)<br>moderately hard, friable to weak, deeply to moderately weathered |                       |                              |                          |         |                             |                       |
| 242   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 243   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 244   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 245   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 246   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 247   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 248   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 249   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 250   | SPT          |  | 50/<br>2"       | 60/<br>2"                |           |   |                       |                              |                          |         |                             |                       |
| 251   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 252   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 253   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 254   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 255   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 256   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 257   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 258   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 259   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 260   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 261   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 262   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 263   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 264   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 265   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 266   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 267   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 268   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 269   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |
| 270   |              |   |                 |                          |           |   |                       |                              |                          |         |                             |                       |

Boring terminated at a depth of 250.2 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 7 feet below ground surface during drilling.  
PP = pocket penetrometer

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

LANGAN

Project No.: 750604203

Figure: F-11i

Boring terminated at a depth of 250.2 feet below ground surface.  
Boring backfilled with cement grout.  
Groundwater encountered at 7 feet below ground surface during drilling.  
PP = pocket penetrometer

<sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.  
<sup>2</sup> Elevations based on San Francisco City Datum + 100 feet.

**LANGAN**







Project No.:  
750604203

Figure:  
F-11i

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18



# Mayor ED 17-02 Priority permit

| PROJECT:   |                 | <b>SEAWALL LOT 337</b><br>San Francisco, California                                 |             |                             | <b>Log of Boring BSWL-12</b><br>PAGE 1 OF 9 |  |                             |                                    |                             |            |                                   |                          |
|--|-----------------|---|-------------|-----------------------------|---|--|-----------------------------|------------------------------------|-----------------------------|------------|-----------------------------------|--------------------------|
| Boring location: See Site Plan, Figure 2   |                 |   |             |                             | Logged by: B. Murphy                        |  |                             |                                    |                             |            |                                   |                          |
| Date started: 2/16/16  |                 | Date finished: 2/18/16  |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Drilling method: Rotary Wash   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Hammer weight/drop: 140 lbs./30 inches   |                 | Hammer type: Automatic  |             |                             | LABORATORY TEST DATA                        |  |                             |                                    |                             |            |                                   |                          |
| Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Dames & Moore (DM), Shelby Tube (ST) |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| DEPTH<br>(feet)  | SAMPLES         |   |             | SPT<br>N-value <sup>1</sup> | LITHOLOGY                                   | MATERIAL DESCRIPTION   | Type of<br>Strength<br>Test | Confining<br>Pressure<br>Lbs/Sq Ft | Shear Strength<br>Lbs/Sq Ft | Fines<br>% | Natural<br>Moisture<br>Content, % | Dry Density<br>Lbs/Cu Ft |
|  | Sampler<br>Type | Sample  | Blows/ 6"   |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Ground Surface Elevation: ~100 feet <sup>2</sup>   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 1  |                 |   |             |                             |   | 7 inches asphalt concrete (AC)   |                             |                                    |                             |            |                                   |                          |
| 2  |                 |   |             |                             |   | 4 inches aggregate base (AB)   |                             |                                    |                             |            |                                   |                          |
| 3  | GRAB            |    |             |                             | SC  | CLAYEY SAND with GRAVEL (SC)<br>black, moist   |                             |                                    |                             |            |                                   |                          |
| 4  |                 |   |             |                             |   | 21 inches asphalt concrete (AC)  |                             |                                    |                             |            |                                   |                          |
| 5  |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 6  | SPT             |    | 3<br>7<br>4 | 8                           | GC  | CLAYEY GRAVEL (GC)<br>brown-gray, loose to medium stiff, moist   |                             |                                    |                             |            |                                   |                          |
| 7  |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 8  |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 9  |                 |   |             |                             |   | ▽ (02/16/16, 8:45 a.m.)  |                             |                                    |                             |            |                                   |                          |
| 10   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 11   | SPT             |   | 3<br>1<br>1 | 2                           |   | GRAVEL with CLAY, SILT, and SAND<br>(GP-GC/GM)<br>gray, very loose, wet, trace sand, angular to<br>subangular gravel, fine-grained sand<br>LL = 32, PI = 8, see Figure B-2 |                             |                                    |                             | 11.7       | 18.7                              |                          |
| 12   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 13   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 14   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 15   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 16   | SPT             |  | 4<br>5<br>4 | 11                          | GP-<br>GC/<br>GM                            |  |                             |                                    |                             |            |                                   |                          |
| 17   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 18   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 19   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 20   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 21   | SPT             |  | 4<br>3<br>3 | 7                           | GP  | GRAVEL with SAND (GP)<br>blue-gray to black, loose, wet, some silt   |                             |                                    |                             | 3.1        | 12.9                              |                          |
| 22   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 23   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 24   |                 |   |             |                             |   | CLAY (CH)<br>gray, very soft, wet, with shell fragments  |                             |                                    |                             |            |                                   |                          |
| 25   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 26   | D&M             |  |             | 70<br>psi                   | CH  |  |                             |                                    |                             |            |                                   |                          |
| 27   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 28   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 29   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| 30   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| BAY MUDD   |                 |   |             |                             |   |  | FILL                        |                                    |                             |            |                                   |                          |
| LANGAN   |                 |   |             |                             |   |  |                             |                                    |                             |            |                                   |                          |
| Project No.: 750604203   |                 |   |             |                             |   |  | Figure: F-12a               |                                    |                             |            |                                   |                          |




TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |             |                          |           | Log of Boring BSWL-12<br>PAGE 2 OF 9 |                        |                              |                          |         |                             |                       |
|---|--------------|--------|-------------|--------------------------|-----------|--------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |                                      | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 31  |              |        |             |                          |           | CLAY (CH) (continued)                |                        |                              |                          |         |                             |                       |
| 32  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 33  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 34  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 35  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 36  | D&M          |        |             | 110 psi                  |           |                                      |                        |                              |                          |         |                             |                       |
| 37  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 38  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 39  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 40  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 41  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 42  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 43  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 44  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 45  |              |        |             |                          | CH        |                                      |                        |                              |                          |         |                             |                       |
| 46  | D&M          |        |             | 130 psi                  |           |                                      |                        |                              |                          |         |                             |                       |
| 47  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 48  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 49  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 50  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 51  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 52  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 53  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 54  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 55  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 56  | S&H          |        | 0<br>0<br>0 | 0                        |           |                                      | TV                     |                              | 240                      |         |                             |                       |
| 57  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 58  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 59  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
| 60  |              |        |             |                          |           |                                      |                        |                              |                          |         |                             |                       |
|   |              |        |             |                          |           |                                      | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |             |                          |           |                                      | Project No.: 750604203 |                              | Figure: F-12b            |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL- 6 TO BSWL-12.GPJ TR.GDT 10/5/18




# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |                |             | Log of Boring BSWL-12<br>PAGE 3 OF 9 |  |                           |                              |                          |         |                             |                       |
|---|--------------|---|----------------|-------------|--------------------------------------|--|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |   |                |             | LITHOLOGY                            | MATERIAL DESCRIPTION                                       | LABORATORY TEST DATA      |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"      | SPT N-Value |                                      |  | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 61  |              |   |                |             |                                      | CLAY (CH) (continued)                                      |                           |                              |                          |         |                             |                       |
| 62  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 63  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 64  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 65  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 66  | D&M          |    |                | 140 psi     |                                      | Triaxial Test, see Figure B-14                             | TxUU                      | 6,500                        | 1,030                    |         | 55.6                        | 65                    |
| 67  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 68  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 69  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 70  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 71  |              |   |                |             | CH                                   |  |                           |                              |                          |         |                             |                       |
| 72  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 73  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 74  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 75  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 76  | S&H          |  | 0<br>0<br>2    | 1           |                                      |  | TV                        |                              | 600                      |         |                             |                       |
| 77  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 78  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 79  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 80  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 81  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 82  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 83  |              |   |                |             |                                      | CLAYEY SAND (SC)<br>olive-gray, dense, wet                 |                           |                              |                          |         |                             |                       |
| 84  |              |   |                |             | SC                                   |  |                           |                              |                          |         |                             |                       |
| 85  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 86  | SPT          |  | 17<br>17<br>12 | 35          |                                      | SANDY CLAY (CL)<br>olive and yellow-brown, very stiff, wet |                           |                              |                          |         |                             |                       |
| 87  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 88  |              |   |                |             | CL                                   |  |                           |                              |                          |         |                             |                       |
| 89  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
| 90  |              |   |                |             |                                      |  |                           |                              |                          |         |                             |                       |
|   |              |   |                |             |                                      |  | LANGAN                    |                              |                          |         |                             |                       |
|   |              |   |                |             |                                      |  | Project No.:<br>750604203 |                              | Figure:<br>F-12c         |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12 GPJ TR GDT 10/5/18

BAY MUD




# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |                          |           | Log of Boring BSWL-12<br>PAGE 4 OF 9                    |                           |                              |                          |         |                             |                       |  |
|---|--------------|---|-------------|--------------------------|-----------|---|---------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |                          | LITHOLOGY | MATERIAL DESCRIPTION                                    | LABORATORY TEST DATA      |                              |                          |         |                             |                       |  |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |   | Type of Strength Test     | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |
| 91  |              |   |             |                          | CL        | SANDY CLAY (CL) (continued)                             |                           |                              |                          |         |                             |                       |  |
| 92  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 93  |              |   |             |                          | CH        | CLAY (CH)<br>yellow-brown and olive, stiff, wet         |                           |                              |                          |         |                             |                       |  |
| 94  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 95  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 96  | SPT          |    | 0<br>2<br>3 | 6                        |           |   |                           |                              |                          |         |                             |                       |  |
| 97  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 98  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 99  |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 100   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 101   | D&M          |   |             | 200 psi                  |           | olive, trace organics<br>Triaxial Test, see Figure B-15 | TxUU                      | 10,000                       | 2,070                    |         | 60.9                        | 62                    |  |
| 102   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 103   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 104   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 105   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 106   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 107   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 108   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 109   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 110   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 111   | S&H          |  | 0<br>2<br>6 | 6                        |           | LL = 64, PI = 36, see Figure B-2                        |                           |                              |                          | 91.2    | 52.4                        | 74                    |  |
| 112   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 113   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 114   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 115   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 116   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 117   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 118   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 119   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
| 120   |              |   |             |                          |           |   |                           |                              |                          |         |                             |                       |  |
|   |              |   |             |                          |           |   | LANGAN                    |                              |                          |         |                             |                       |  |
|   |              |   |             |                          |           |   | Project No.:<br>750604203 |                              | Figure:<br>F-12d         |         |                             |                       |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18








TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |             |                          |           | Log of Boring BSWL-12          |                        |                              |                          |               |                             |                       |
|---|--------------|---|-------------|--------------------------|-----------|--------------------------------|------------------------|------------------------------|--------------------------|---------------|-----------------------------|-----------------------|
|   |              |   |             |                          |           | PAGE 5 OF 9                    |                        |                              |                          |               |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |             |                          | LITHOLOGY | MATERIAL DESCRIPTION           | LABORATORY TEST DATA   |                              |                          |               |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6"   | SPT N-Value <sup>1</sup> |           |                                | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines %       | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 121   | D&M          |    |             | 250 psi                  | CH        | CLAY (CH) (continued)          | TV                     |                              | 1,200                    |               |                             |                       |
| 122   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 123   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 124   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 125   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 126   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 127   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 128   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 129   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 130   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 131   | S&H          |   | 1<br>3<br>9 | 8                        |           |                                | TV                     |                              | 1,600                    |               |                             |                       |
| 132   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 133   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 134   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 135   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 136   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 137   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 138   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 139   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 140   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 141   | D&M          |  |             | 290 psi                  |           | Triaxial Test, see Figure B-16 | TxUU                   | 14,000                       | 2,840                    |               | 32.0                        | 89                    |
| 142   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 143   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 144   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 145   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 146   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 147   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 148   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 149   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
| 150   |              |   |             |                          |           |                                |                        |                              |                          |               |                             |                       |
|   |              |   |             |                          |           |                                | LANGAN                 |                              |                          |               |                             |                       |
|   |              |   |             |                          |           |                                | Project No.: 750604203 |                              |                          | Figure: F-12e |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |           |                          | Log of Boring BSWL-12 |  |                        |                              |                          |         |                             |                       |
|---|--------------|---|-----------|--------------------------|-----------------------|--|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
|   |              |   |           |                          | PAGE 6 OF 9           |  |                        |                              |                          |         |                             |                       |
| DEPTH<br>(feet)                                       | SAMPLES      |   |           |                          | LITHOLOGY             | MATERIAL DESCRIPTION                             | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample  | Blows/ 6" | SPT N-Value <sup>1</sup> |                       |  | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 151   | S&H          |    | 0         | 8                        | CH                    | CLAY (CH) (continued)                            | TV                     |                              | 1,200                    |         |                             |                       |
| 152   |              |   | 3         |                          |                       |  |                        |                              |                          |         |                             |                       |
| 153   |              |   | 9         |                          |                       |  |                        |                              |                          |         |                             |                       |
| 154   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 155   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 156   |              |   |           |                          | SP-SC                 | SAND with CLAY (SP-SC)<br>olive, very dense, wet |                        |                              |                          |         |                             |                       |
| 157   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 158   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 159   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 160   | S&H          |    | 15        | 35/4"                    |                       |  |                        |                              |                          |         |                             |                       |
| 161   | SPT          |   | 50/4"     | 60/5.5"                  |                       |  |                        |                              |                          |         |                             |                       |
| 162   |              |  | 40        |                          |                       |  |                        |                              |                          |         |                             |                       |
| 163   |              |   | 50/5.5"   |                          | CH                    | CLAY (CH)<br>olive-gray, hard, wet               |                        |                              |                          |         |                             |                       |
| 164   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 165   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 166   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 167   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 168   |              |   |           |                          | CH                    |  |                        |                              |                          |         |                             |                       |
| 169   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 170   | SPT          |  | 11        | 39                       |                       |  |                        |                              |                          |         |                             |                       |
| 171   |              |  | 15        |                          |                       |  |                        |                              |                          |         |                             |                       |
| 172   |              |   | 18        |                          |                       |  |                        |                              |                          |         |                             |                       |
| 173   |              |   |           |                          | CH                    |  |                        |                              |                          |         |                             |                       |
| 174   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 175   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 176   | S&H          |  | 13        | 26                       |                       |  |                        |                              |                          |         |                             |                       |
| 177   |              |   | 18        |                          |                       |  |                        |                              |                          |         |                             |                       |
| 178   |              |   | 17        |                          |                       | very stiff                                       |                        |                              |                          |         |                             |                       |
| 179   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
| 180   |              |   |           |                          |                       |  |                        |                              |                          |         |                             |                       |
|   |              |   |           |                          |                       |  | <b>LANGAN</b>          |                              |                          |         |                             |                       |
|   |              |   |           |                          |                       |  | Project No.: 750604203 |                              | Figure: F-12f            |         |                             |                       |



TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |        |           |                          | Log of Boring BSWL-12<br>PAGE 7 OF 9 |                       |                        |                              |                          |         |                             |                       |
|---|--------------|--------|-----------|--------------------------|--------------------------------------|-----------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)                                       | SAMPLES      |        |           |                          | LITHOLOGY                            | MATERIAL DESCRIPTION  | LABORATORY TEST DATA   |                              |                          |         |                             |                       |
|   | Sampler Type | Sample | Blows/ 6" | SPT N-Value <sup>1</sup> |                                      |                       | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 181   | S&H          |        | 0         | 16                       | CH                                   | CLAY (CH) (continued) | TV                     |                              | 1,960                    |         |                             |                       |
| 182   |              |        | 8         |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 183   |              |        | 15        |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 184   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 185   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 186   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 187   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 188   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 189   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 190   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 191   | S&H          |        | 6         | 59                       |                                      |                       |                        |                              |                          |         |                             |                       |
| 192   |              |        | 22        |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 193   |              |        | 37        |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 194   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 195   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 196   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 197   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 198   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 199   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 200   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 201   | S&H          |        | 18        | 40                       |                                      |                       |                        |                              |                          |         |                             |                       |
| 202   |              |        | 28        |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 203   |              |        | 29        |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 204   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 205   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 206   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 207   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 208   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 209   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
| 210   |              |        |           |                          |                                      |                       |                        |                              |                          |         |                             |                       |
|   |              |        |           |                          |                                      |                       | LANGAN                 |                              |                          |         |                             |                       |
|   |              |        |           |                          |                                      |                       | Project No.: 750604203 |                              | Figure: F-12g            |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California |              |   |               |                          |           | Log of Boring BSWL-12<br>PAGE 8 OF 9 |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
|---|--------------|---|---------------|--------------------------|-----------|--------------------------------------|------------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|--|--|--|--|--|--|--|--|
| DEPTH<br>(feet)                                       | SAMPLES      |   |               |                          | LITHOLOGY | MATERIAL DESCRIPTION                 | LABORATORY TEST DATA   |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
|   | Sampler Type | Sample  | Blows/ 6"     | SPT N-Value <sup>1</sup> |           |                                      | Type of Strength Test  | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |  |  |  |  |  |  |  |  |
| 211   | S&H          |    | 9<br>28<br>39 | 47                       | CH        | CLAY (CH) (continued)                | TV                     |                              | 3,060                    |         |                             |                       |  |  |  |  |  |  |  |  |
| 212   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 213   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 214   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 215   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 216   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 217   | S&H          |  | 2<br>12<br>22 | 24                       |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 218   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 219   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 220   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 221   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 222   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 223   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 224   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 225   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 226   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 227   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 228   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 229   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 230   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 231   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 232   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 233   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 234   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 235   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 236   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 237   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 238   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 239   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
| 240   |              |   |               |                          |           |                                      |                        |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
|   |              |   |               |                          |           |                                      | <b>LANGAN</b>          |                              |                          |         |                             |                       |  |  |  |  |  |  |  |  |
|   |              |   |               |                          |           |                                      | Project No.: 750604203 |                              | Figure: F-12h            |         |                             |                       |  |  |  |  |  |  |  |  |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18



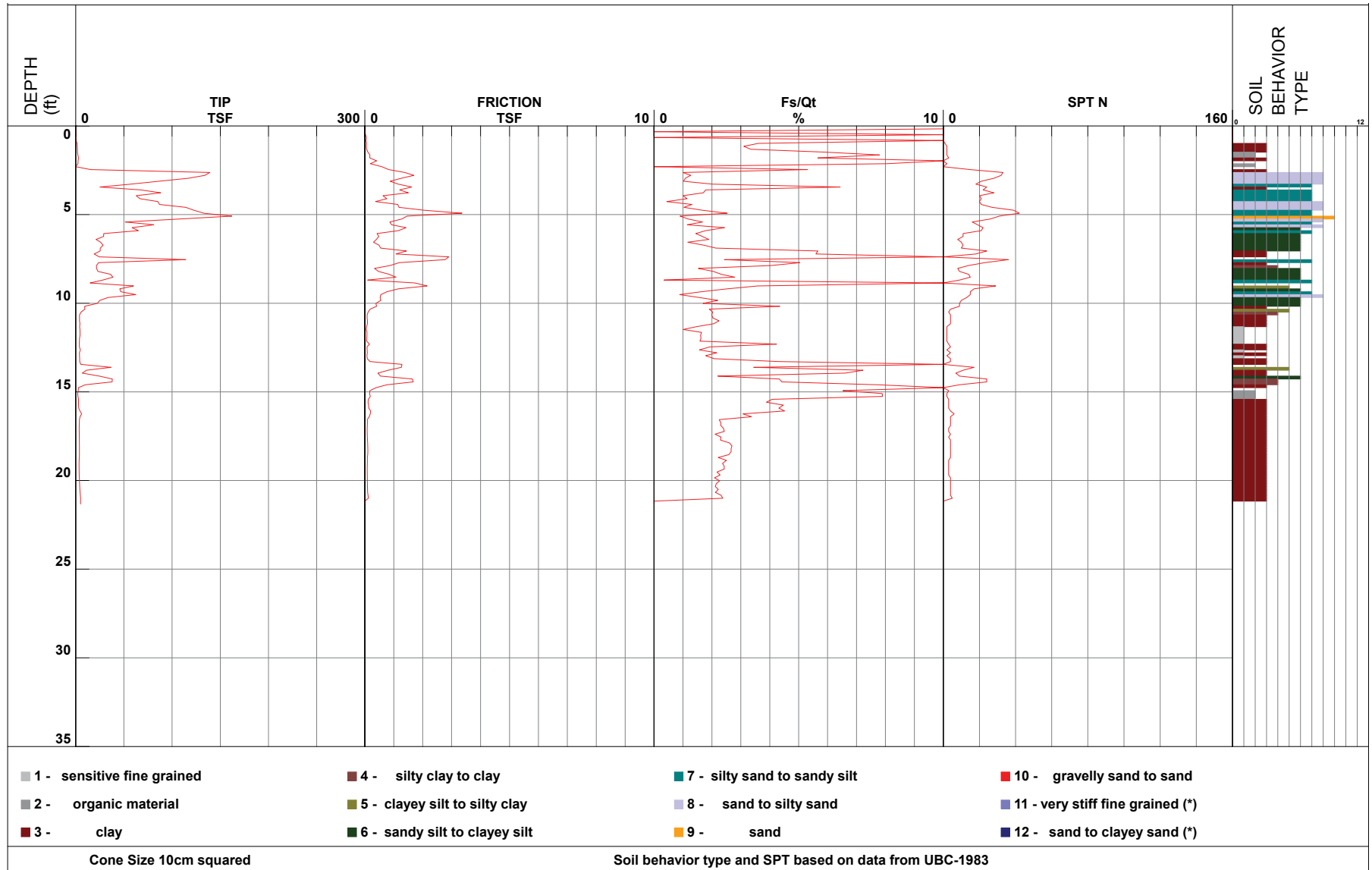
# Mayor ED 17-02 Priority permit

| PROJECT: SEAWALL LOT 337<br>San Francisco, California  |              |        |               |                          |           | Log of Boring BSWL-12<br>PAGE 9 OF 9   |                       |                              |                          |         |                             |                       |
|--|--------------|--------|---------------|--------------------------|-----------|--|-----------------------|------------------------------|--------------------------|---------|-----------------------------|-----------------------|
| DEPTH<br>(feet)  | SAMPLES      |        |               |                          | LITHOLOGY | MATERIAL DESCRIPTION   | LABORATORY TEST DATA  |                              |                          |         |                             |                       |
|  | Sampler Type | Sample | Blows/ 6"     | SPT N-Value <sup>1</sup> |           |  | Type of Strength Test | Confining Pressure Lbs/Sq Ft | Shear Strength Lbs/Sq Ft | Fines % | Natural Moisture Content, % | Dry Density Lbs/Cu Ft |
| 241  |              |        |               |                          |           | CLAY with GRAVEL (CH) (continued)  |                       |                              |                          |         |                             |                       |
| 242  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 243  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 244  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 245  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 246  | S&H          |        | 5<br>15<br>30 | 32                       | CH        |  | TV                    | 3,260                        |                          |         |                             |                       |
| 247  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 248  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 249  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 250  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 251  | SPT          |        | 50/<br>2.5"   | 60/<br>2.5"              | GC        | CLAYEY GRAVEL (GC)<br>olive, dark green, brown and black gravel in olive clay  |                       |                              |                          |         |                             |                       |
| 252  |              |        |               |                          |           | SHALE<br>dark green-gray and black, crushed, weak, wet   |                       |                              |                          |         |                             |                       |
| 253  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 254  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 255  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 256  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 257  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 258  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 259  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 260  | SPT          |        | 50/<br>1"     | 60/<br>1"                |           |  |                       |                              |                          |         |                             |                       |
| 261  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 262  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 263  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 264  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 265  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 266  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 267  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 268  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 269  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| 270  |              |        |               |                          |           |  |                       |                              |                          |         |                             |                       |
| Boring terminated at a depth of 260.1 feet below ground surface.<br>Boring backfilled with cement grout.<br>Groundwater encountered at 9 feet below ground surface during drilling.<br>TV = torvane. |              |        |               |                          |           | <sup>1</sup> S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.<br><sup>2</sup> Elevations based on San Francisco City Datum + 100 feet. |                       |                              |                          |         |                             |                       |
|  |              |        |               |                          |           | LANGAN   |                       |                              |                          |         |                             |                       |
|  |              |        |               |                          |           | Project No.:<br>750604203  |                       |                              | Figure:<br>F-12i         |         |                             |                       |

TEST GEOTECH LOG 750604203 LOT 337 BSWL-6 TO BSWL-12.GPJ TR.GDT 10/5/18

FRANCISCAN FORMATION

# Mayor ED 17-02 Priority permit



Terminated at 21.3 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 99.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

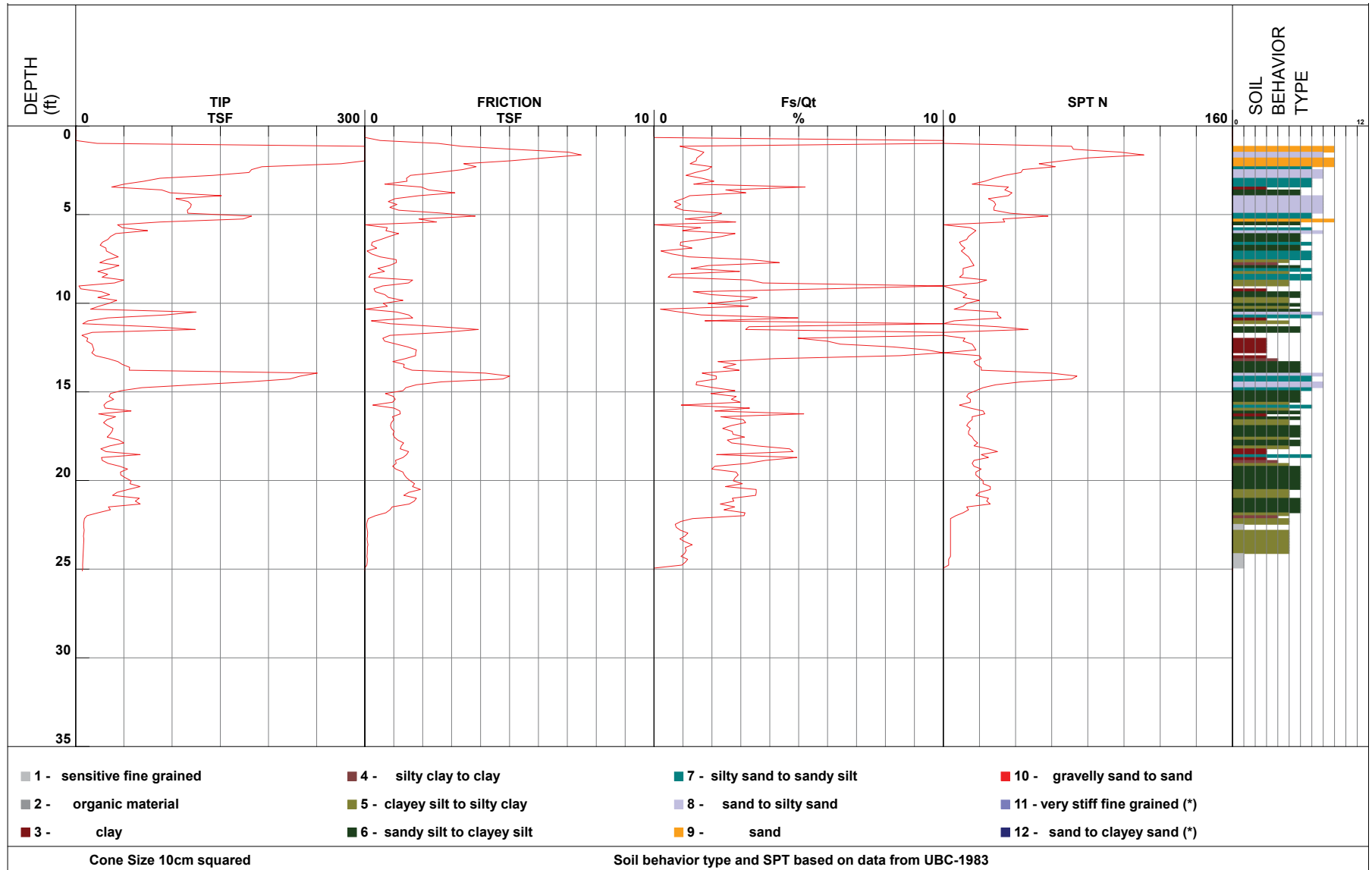
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-2

Date 10/31/13 | Project No. 750604203 | Figure F-13

# Mayor ED 17-02 Priority permit



Terminated at 25.1 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

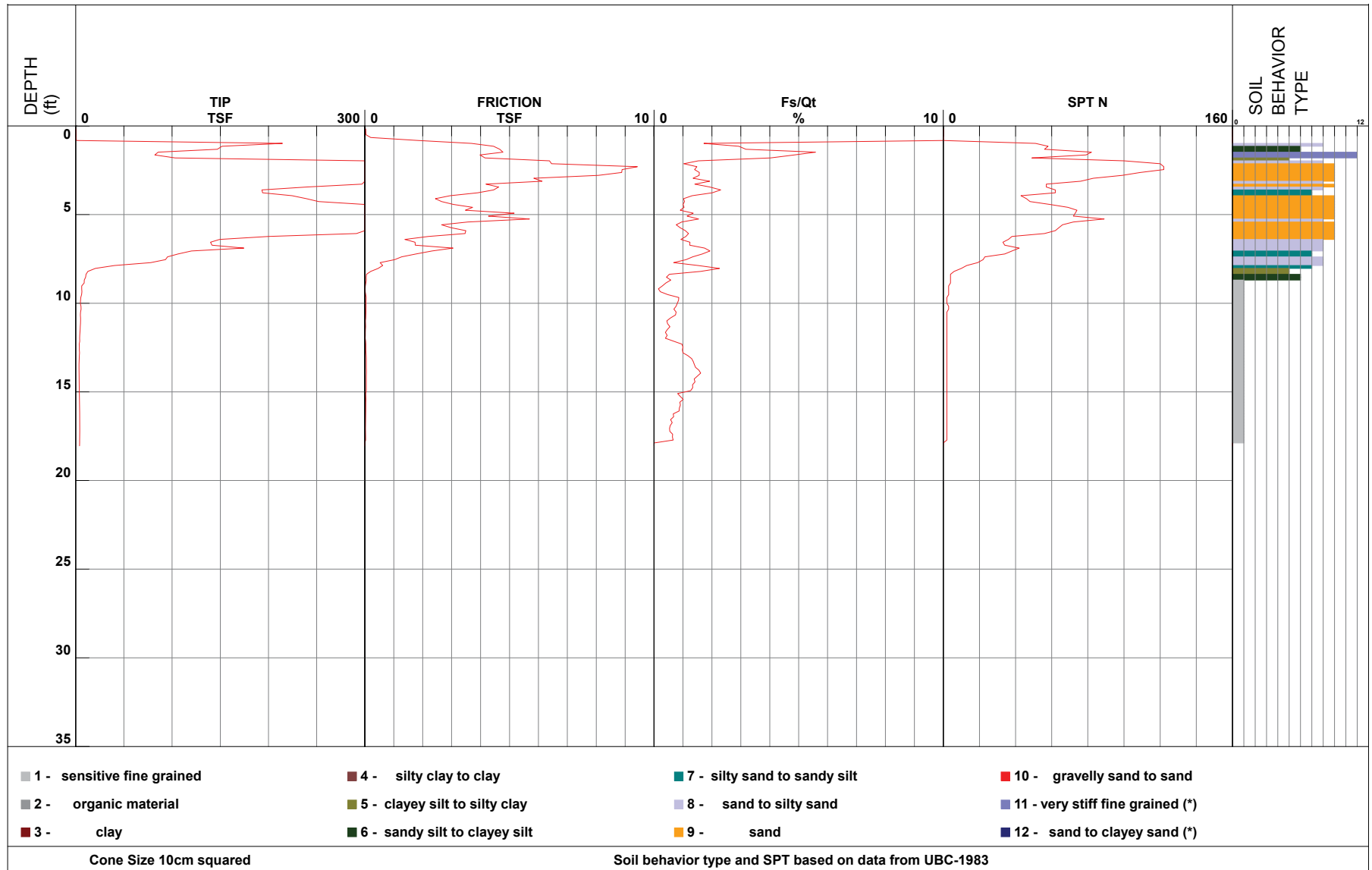
**MISSION ROCK DEVELOPMENT**  
**SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-3

Date 10/31/13 | Project No. 750604203 | Figure F-14

# Mayor ED 17-02 Priority permit



Terminated at 18 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

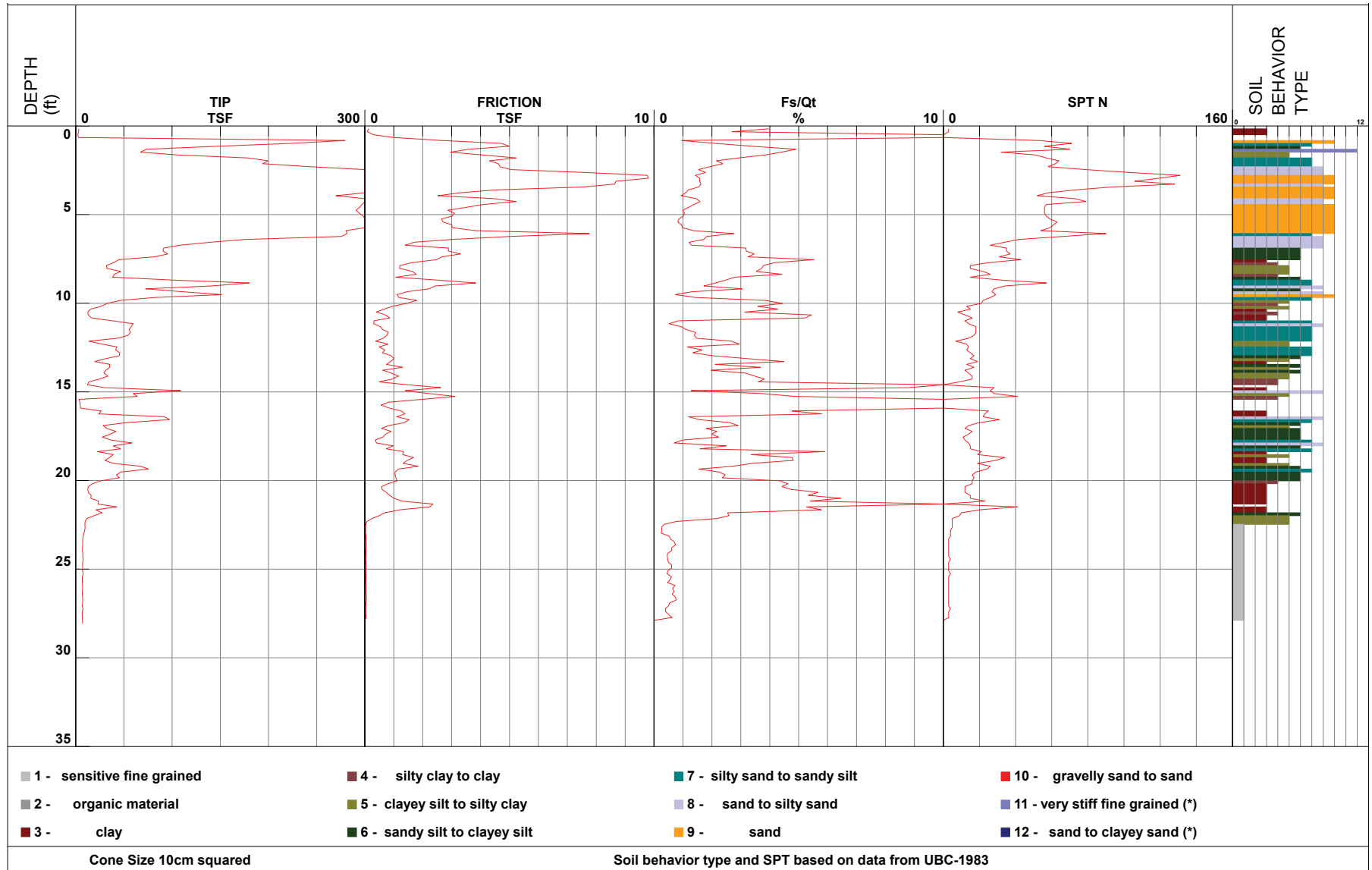
MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-4

Date 10/31/13 | Project No. 750604203 | Figure F-15

# Mayor ED 17-02 Priority permit



Terminated at 28 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

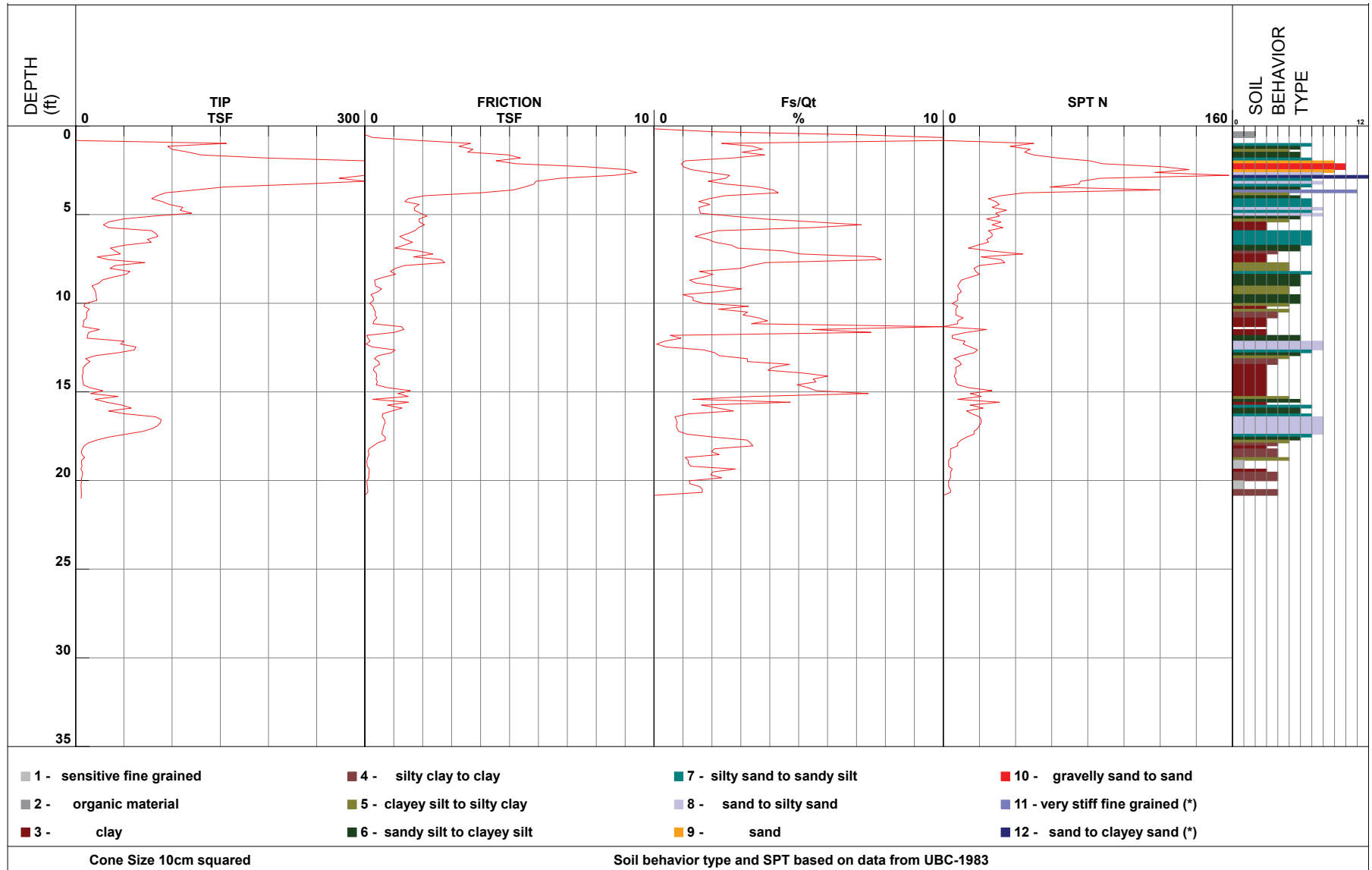
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-5

Date 10/31/13 | Project No. 750604203 | Figure F-16

# Mayor ED 17-02 Priority permit



Terminated at 21 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 99 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

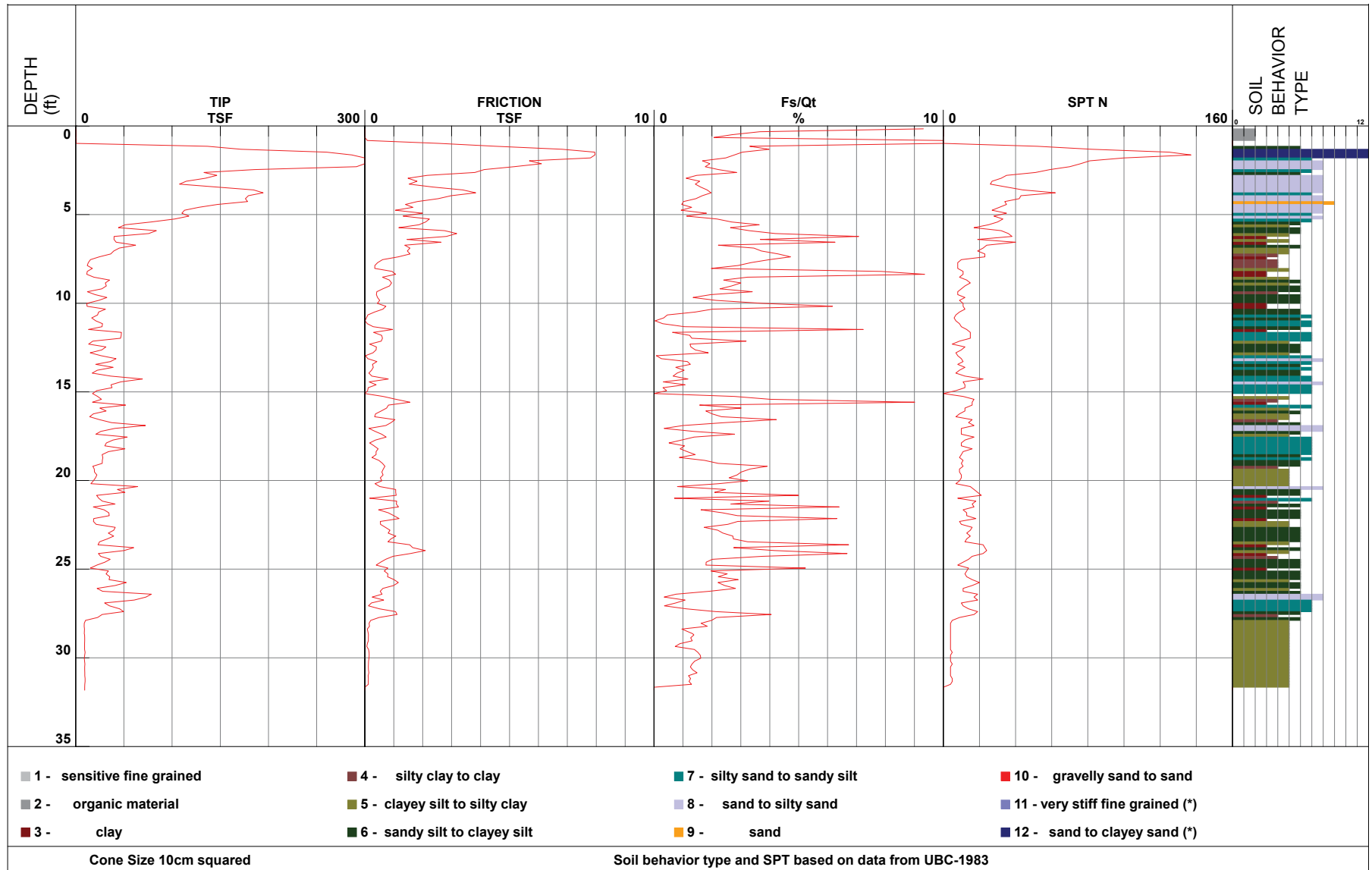
MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-6

Date 10/31/13 | Project No. 750604203 | Figure F-17

# Mayor ED 17-02 Priority permit



Terminated at 31.8 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 100 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

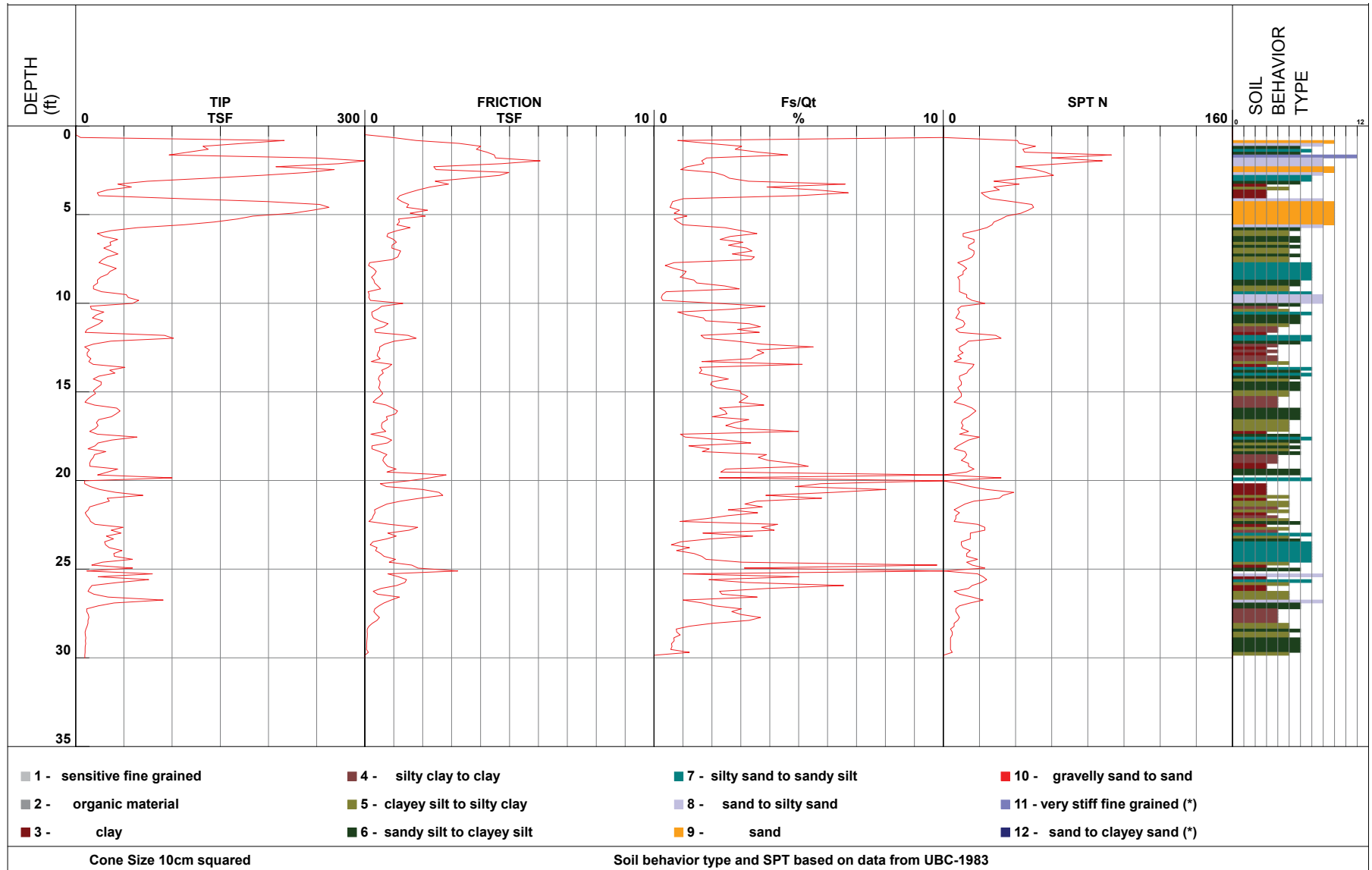
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-7

Date 10/31/13 | Project No. 750604203 | Figure F-18

# Mayor ED 17-02 Priority permit



Terminated at 30 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 100.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

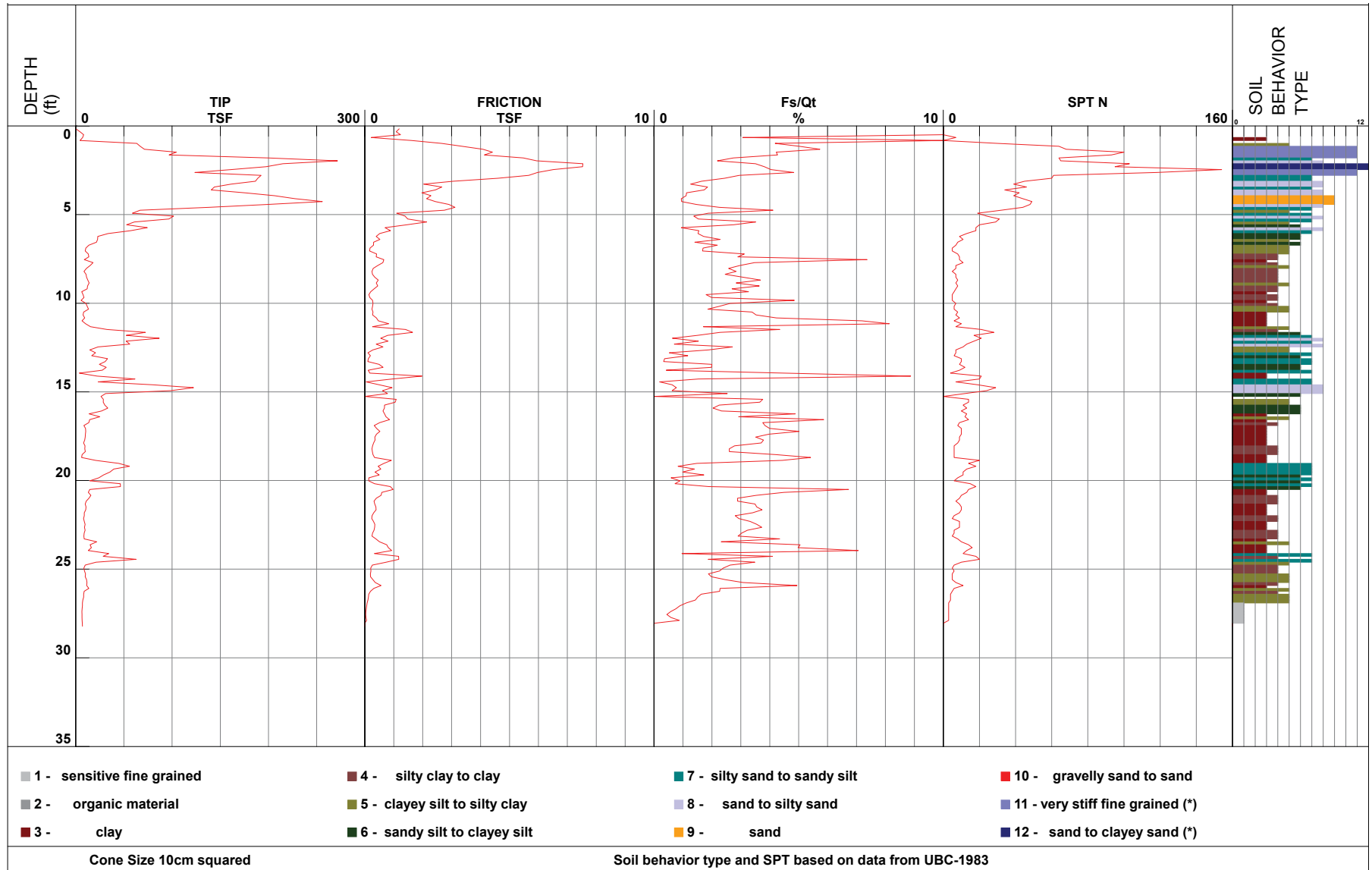
**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-8

Date 10/31/13 | Project No. 750604203 | Figure F-19



# Mayor ED 17-02 Priority permit



Terminated at 28.2 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 99.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

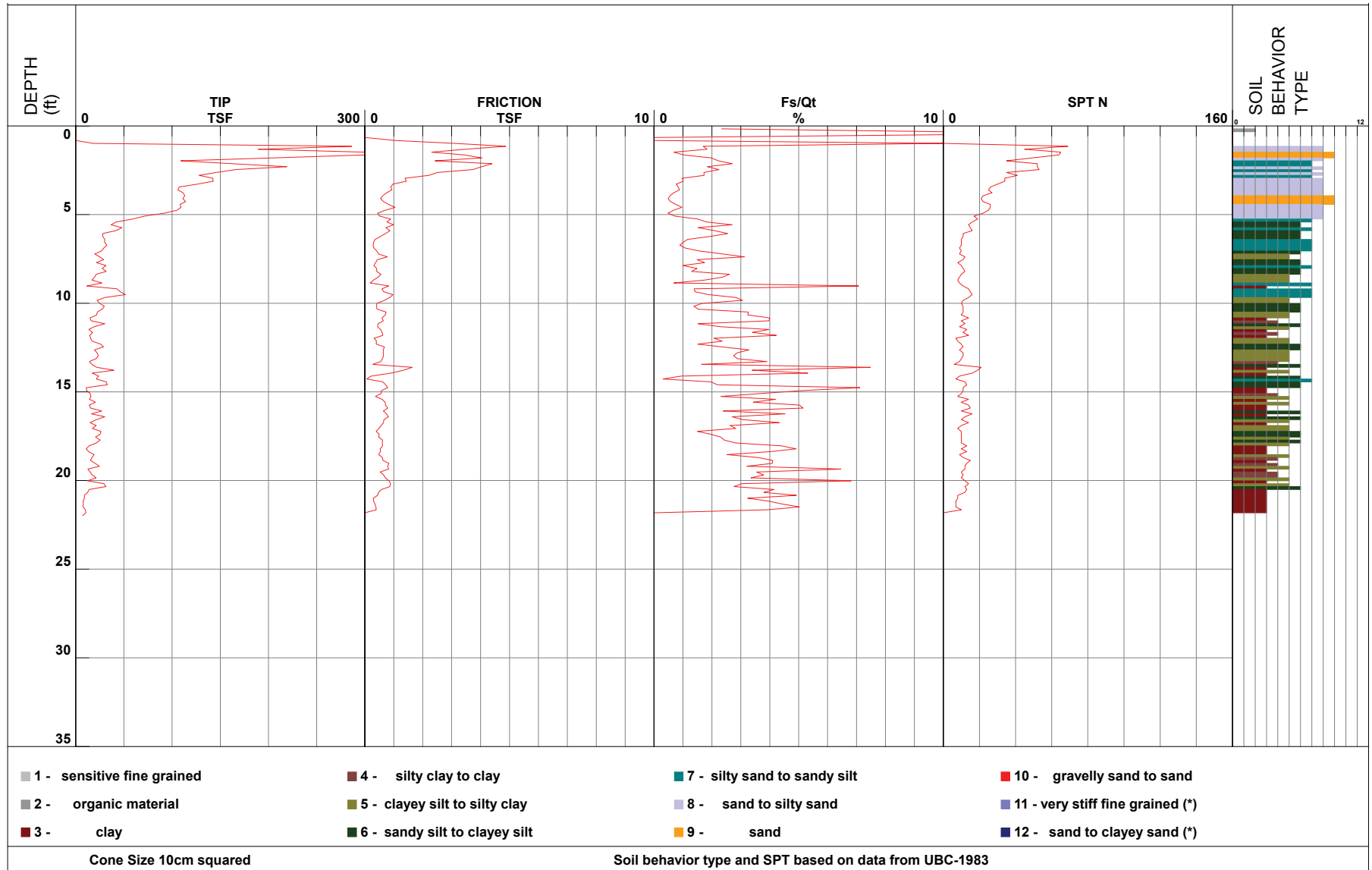
MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-9

Date 10/31/13 | Project No. 750604203 | Figure F-20

# Mayor ED 17-02 Priority permit



Terminated at 21.9 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 99 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

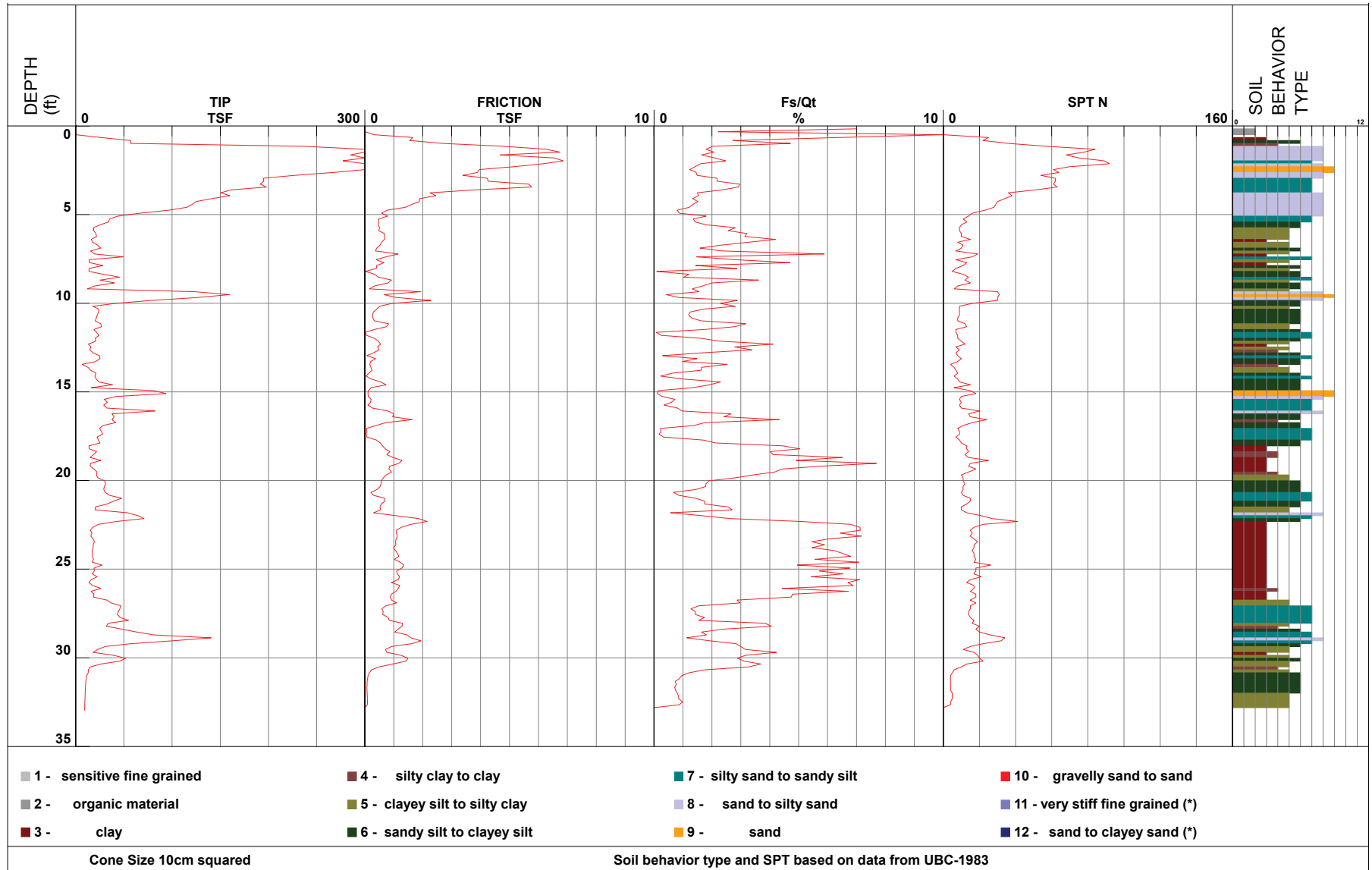
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-10

Date 10/31/13 | Project No. 750604203 | Figure F-21

# Mayor ED 17-02 Priority permit



Terminated at 32.9 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 99 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

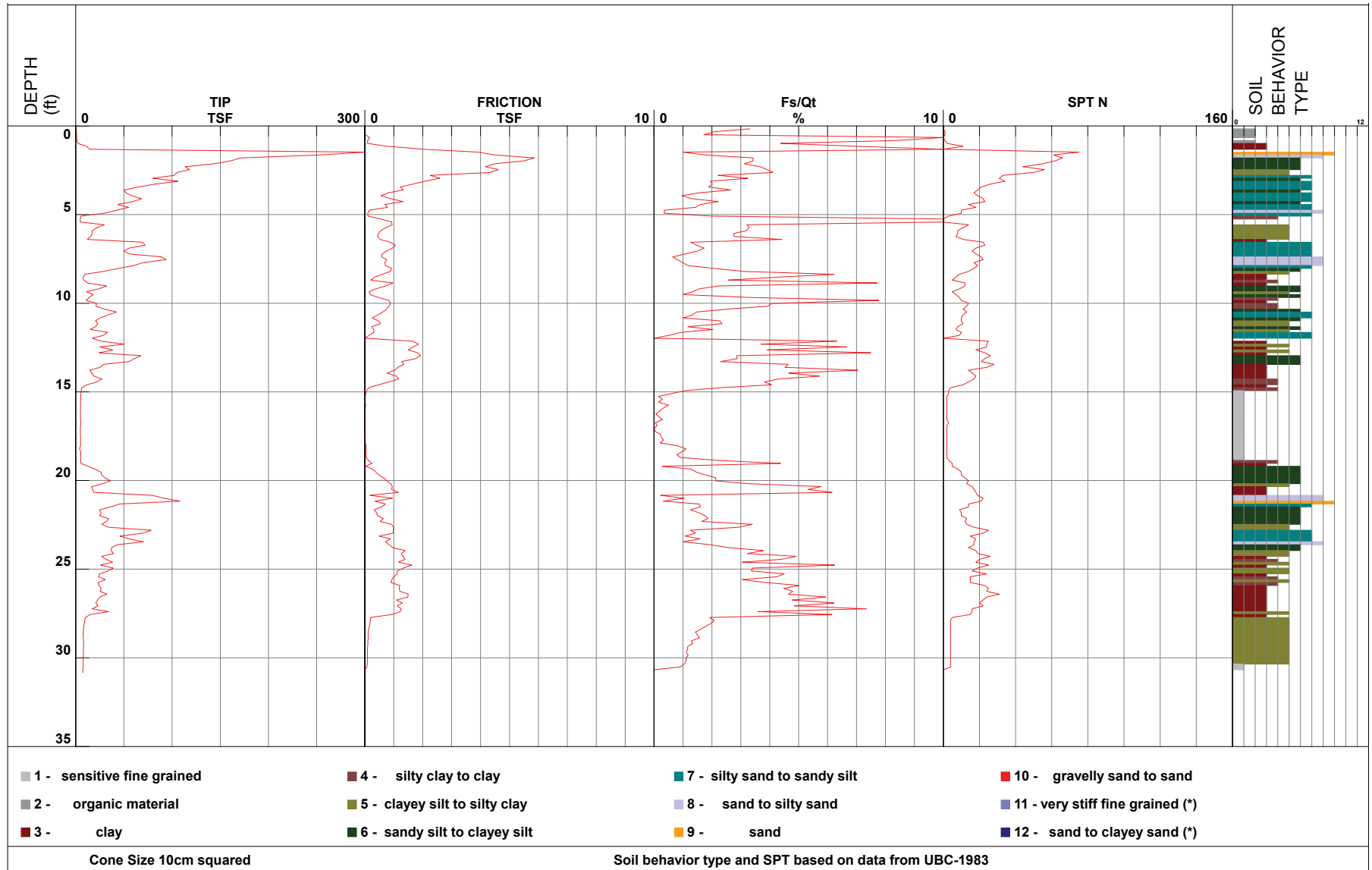
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-11

Date 10/31/13 | Project No. 750604203 | Figure F-22

# Mayor ED 17-02 Priority permit



Terminated at 30.8 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 99 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

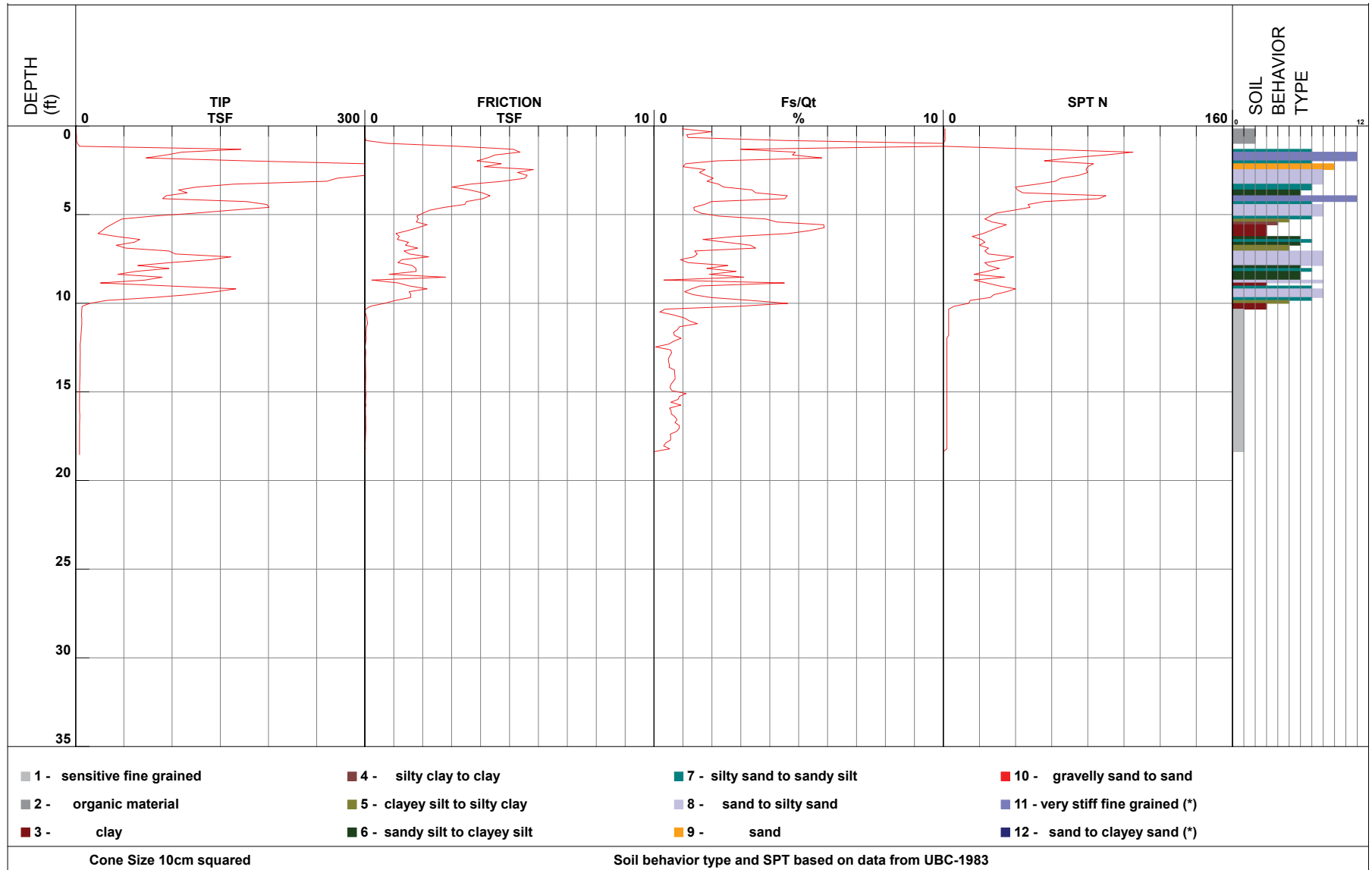
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-12

Date 10/31/13 | Project No. 750604203 | Figure F-23

# Mayor ED 17-02 Priority permit



Terminated at 18.5 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 100 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

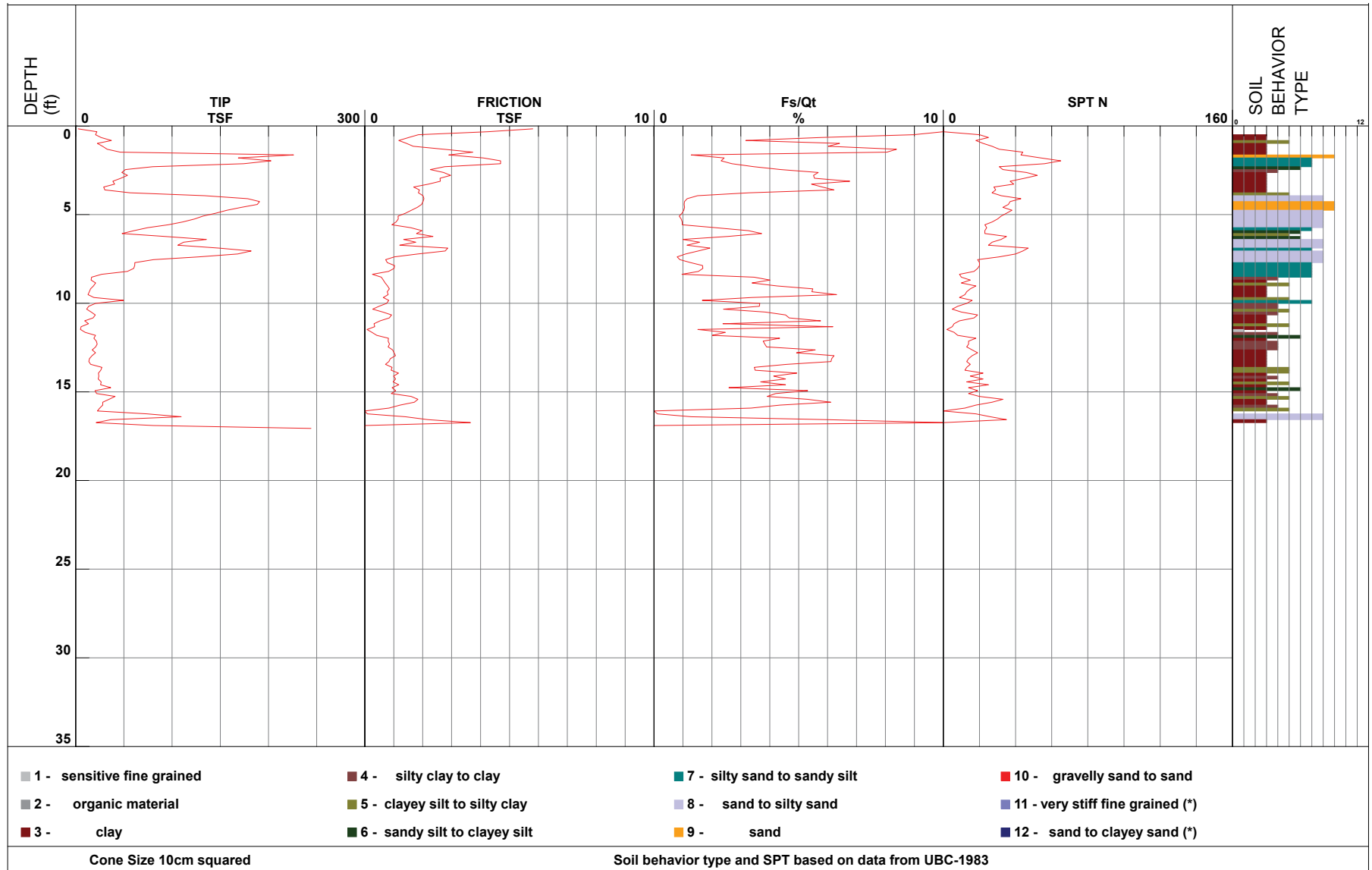
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-13

Date 10/31/13 | Project No. 750604203 | Figure F-24

# Mayor ED 17-02 Priority permit



Terminated at 17 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 100.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

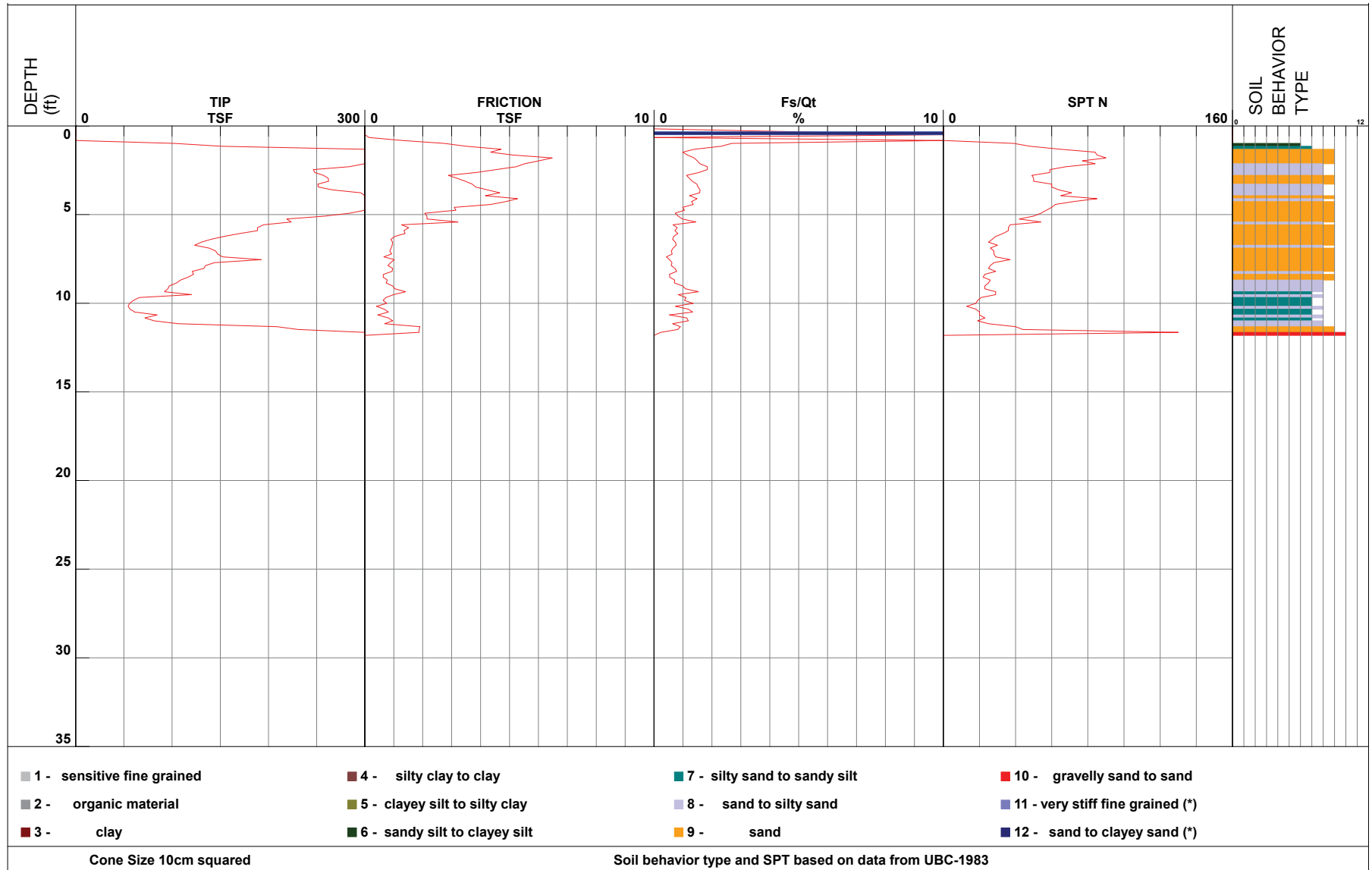
**MISSION ROCK DEVELOPMENT**  
**SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-14

Date 10/31/13 | Project No. 750604203 | Figure F-25

# Mayor ED 17-02 Priority permit



Terminated at 11.9 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 100 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

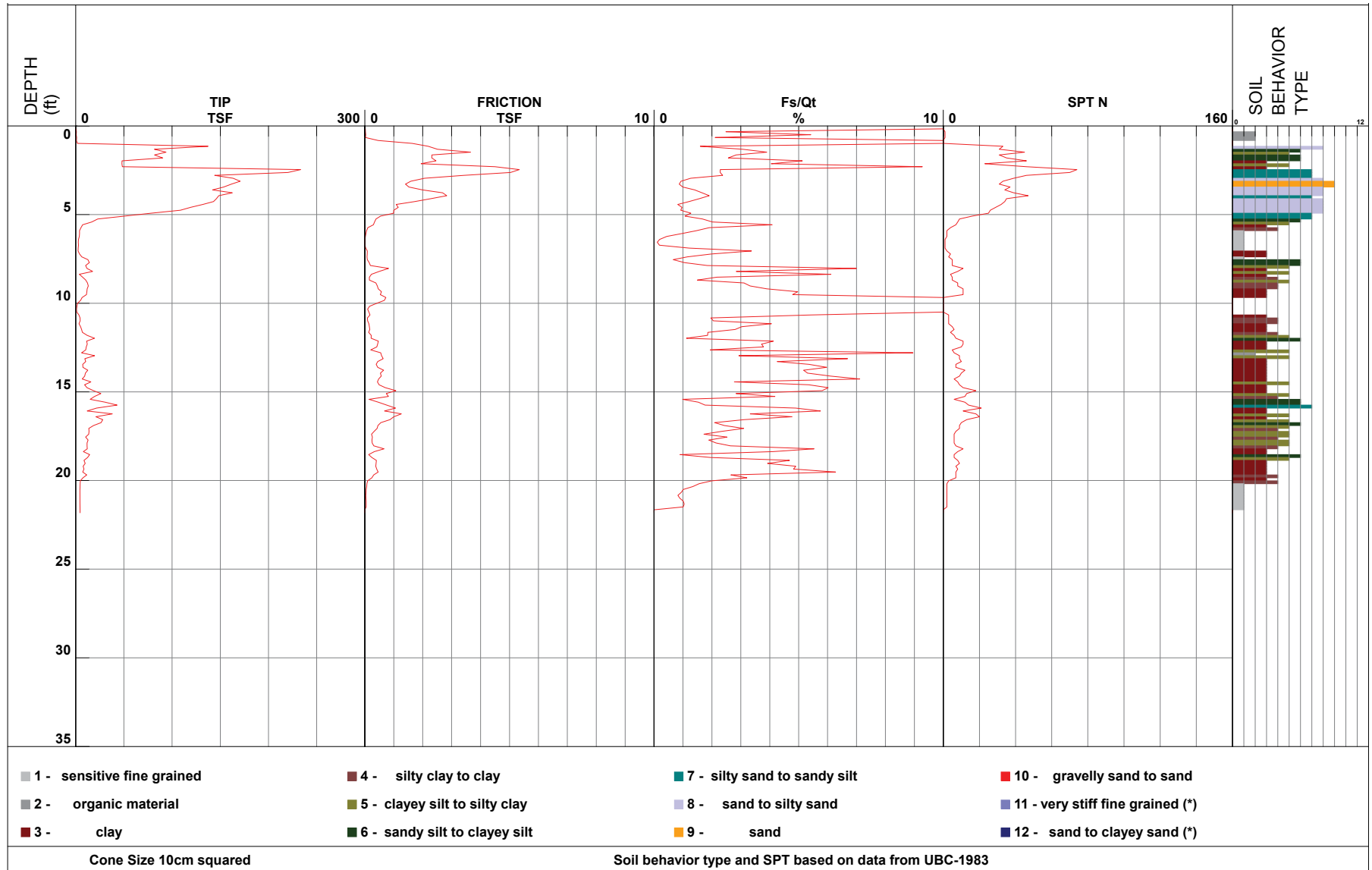
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-15

Date 10/31/13 | Project No. 750604203 | Figure F-26

# Mayor ED 17-02 Priority permit



Terminated at 21.8 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California**

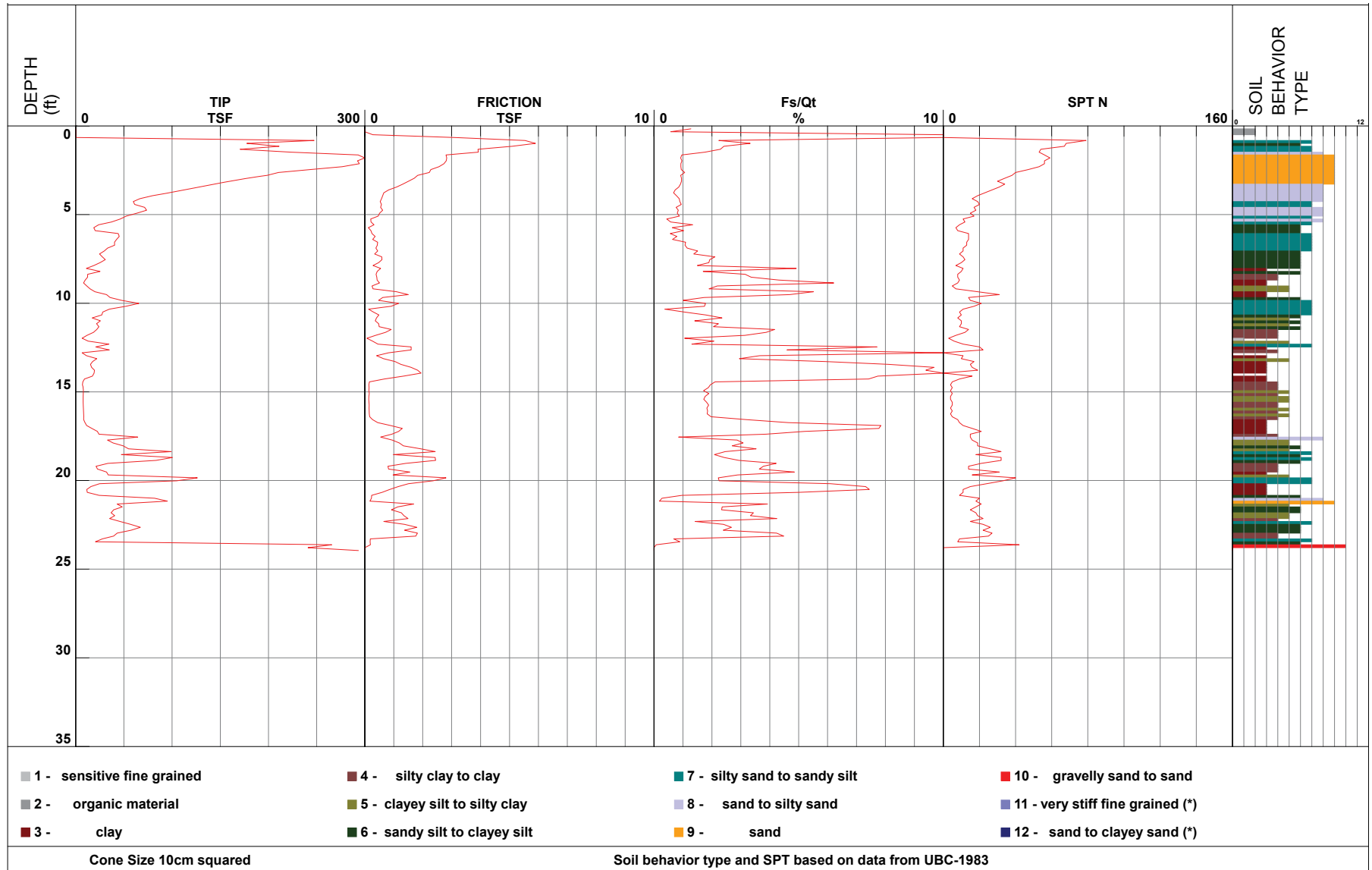
**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-16a

Date 10/31/13 | Project No. 750604203 | Figure F-27



# Mayor ED 17-02 Priority permit



Terminated at 23.9 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

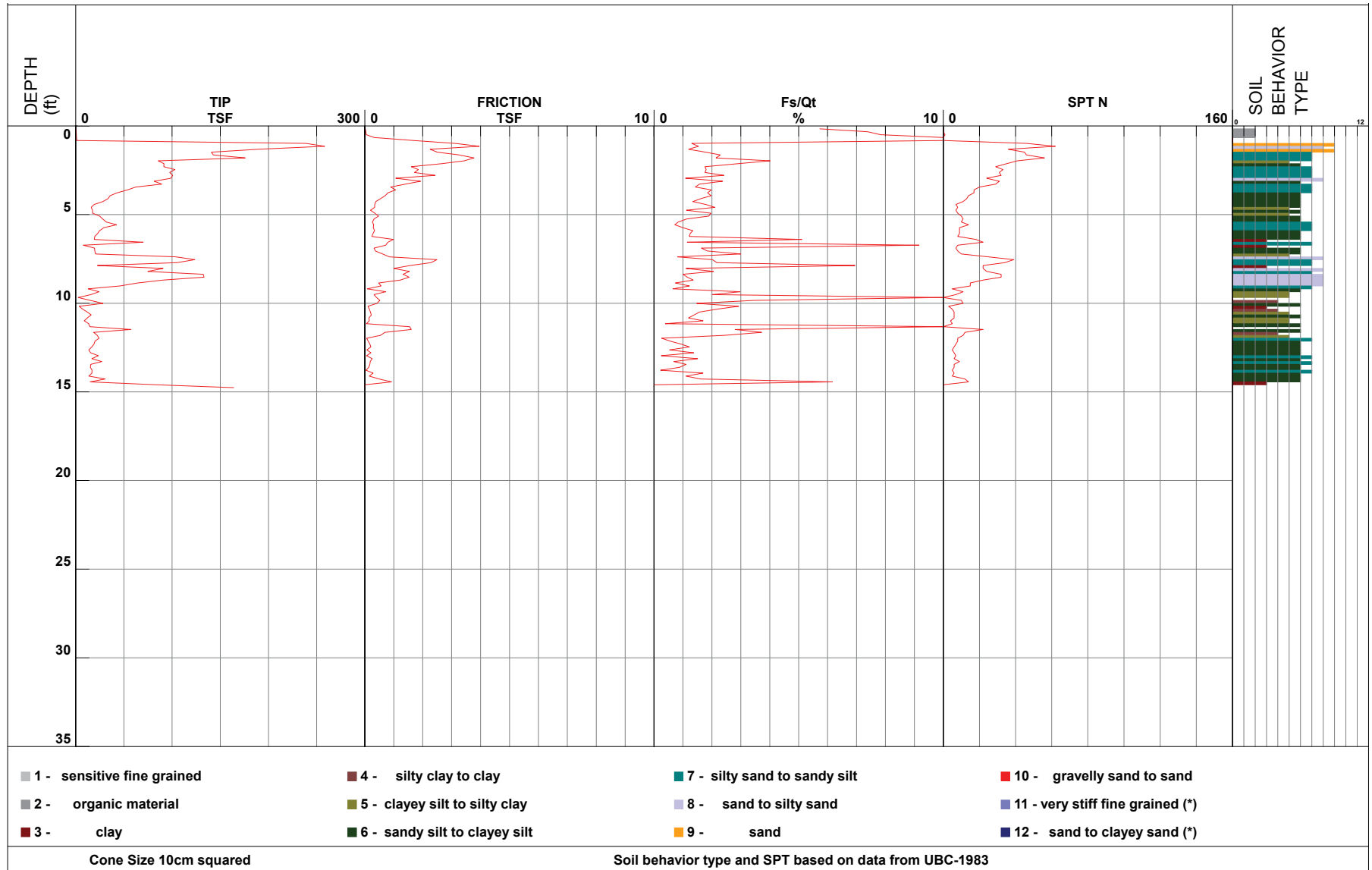
MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-17

Date 10/31/13 | Project No. 750604203 | Figure F-28

# Mayor ED 17-02 Priority permit



Terminated at 14.7 feet  
 Date performed: 10/23/2013  
 Ground surface elevation: 98.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

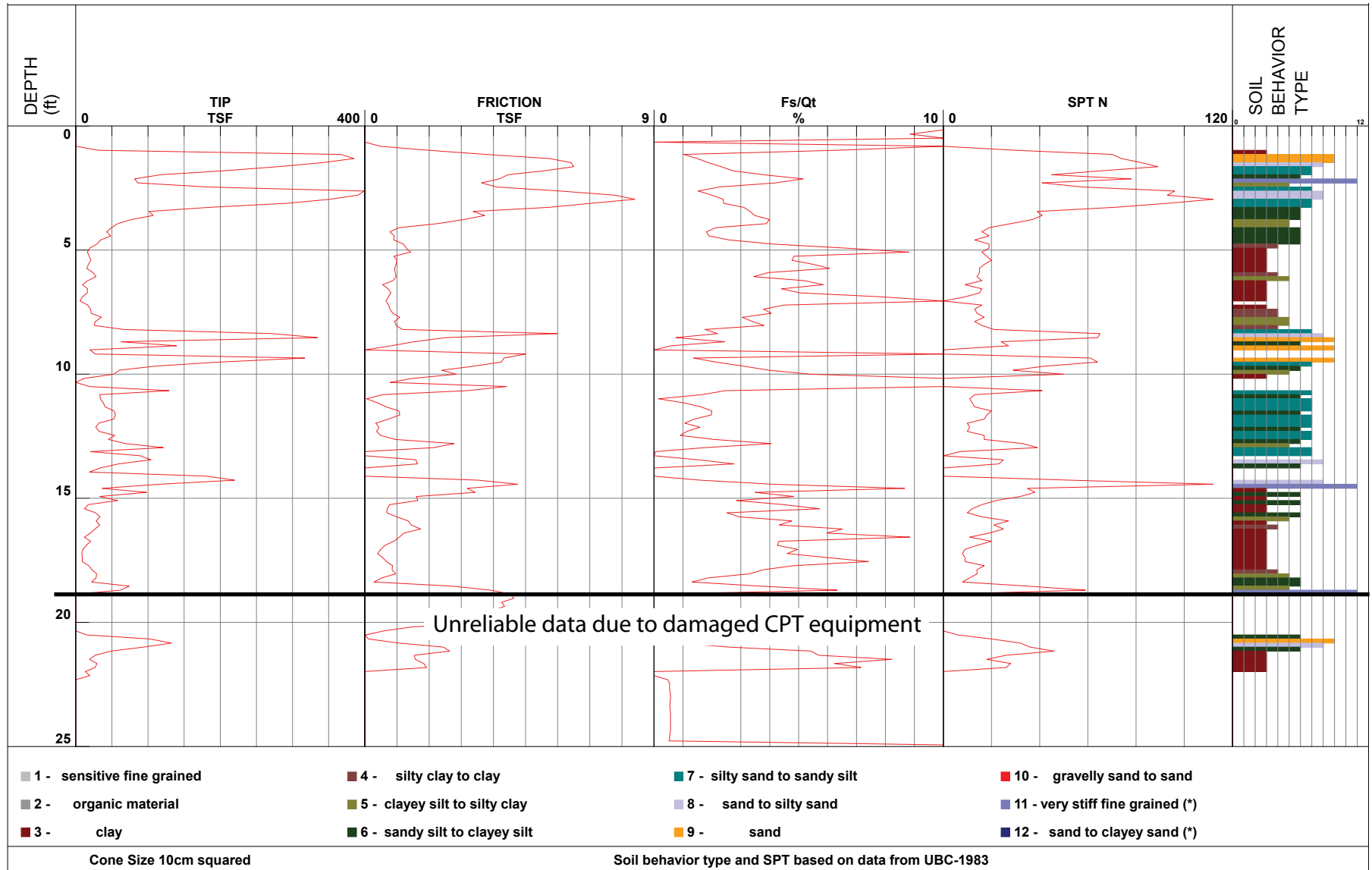
**MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48**  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CSWL337-18

Date 10/31/13 | Project No. 750604203 | Figure F-29

# Mayor ED 17-02 Priority permit



Terminated at 25.1 feet  
 Date performed: 10/24/2013  
 Ground surface elevation: 99.5 feet  
 Performed by Middle Earth Geo Testing, Inc.  
 (San Francisco City Datum + 100 feet)

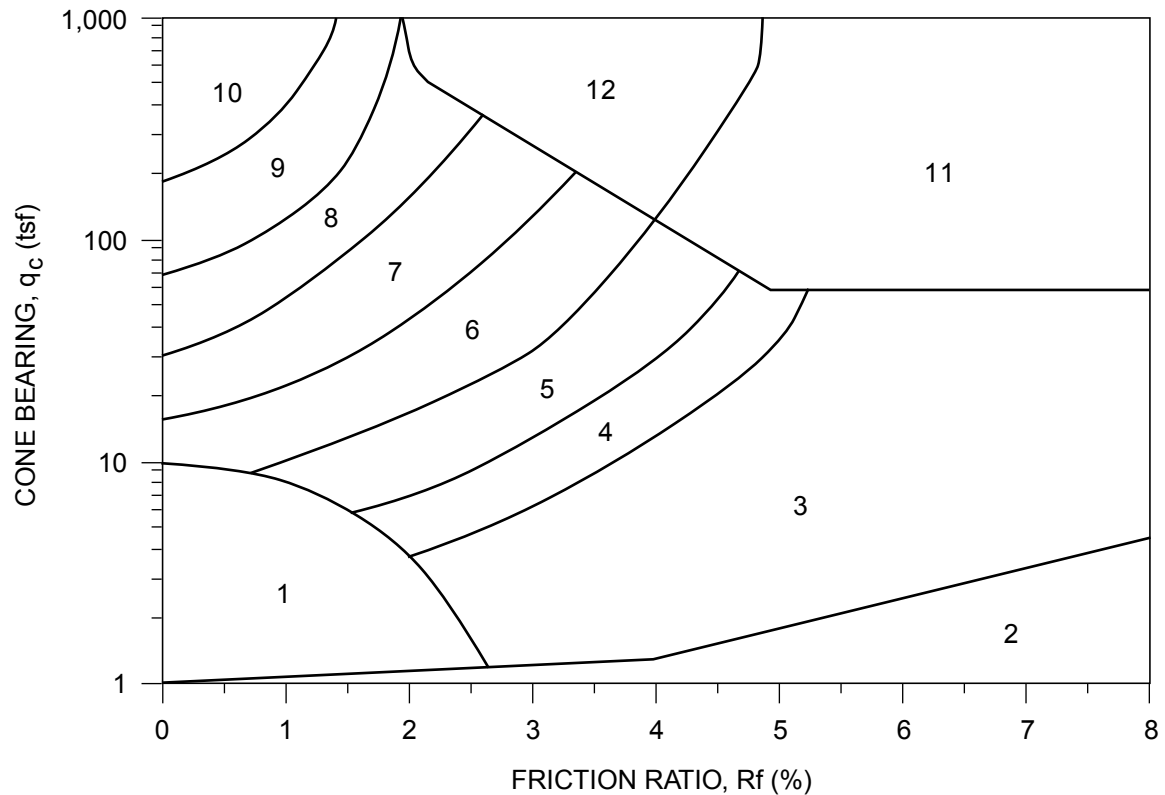
MISSION ROCK DEVELOPMENT  
 SEAWALL LOT 337 AND PIER 48  
 San Francisco, California

**Treadwell & Rollo**  
 A LANGAN COMPANY

## CONE PENETRATION TEST RESULTS CP48-1

Date 10/31/13 | Project No. 750604203 | Figure F-30

# Mayor ED 17-02 Priority permit



| ZONE | $q_c/N^1$ | $S_u$ Factor $(Nk)^2$        | SOIL BEHAVIOR TYPE <sup>1</sup> |
|------|-----------|------------------------------|---------------------------------|
| 1    | 2         | 15 (10 for $q_c \leq 9$ tsf) | Sensitive Fine-Grained          |
| 2    | 1         | 15 (10 for $q_c \leq 9$ tsf) | Organic Material                |
| 3    | 1         | 15 (10 for $q_c \leq 9$ tsf) | CLAY                            |
| 4    | 1.5       | 15                           | SILTY CLAY to CLAY              |
| 5    | 2         | 15                           | CLAYEY SILT to SILTY CLAY       |
| 6    | 2.5       | 15                           | 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         | 15                           | Very Stiff Fine-Grained (*)     |
| 12   | 2         | ---                          | SAND to CLAYEY SAND (*)         |

(\*) Overconsolidated or Cemented

$q_c$  = Tip Bearing

$f_s$  = Sleeve Friction

$R_f = f_s/q_c \times 100$  = Friction Ratio

Note: Testing performed in accordance with ASTM D3441.

References: 1. Robertson, 1986, Olsen, 1988.

2. Bonaparte & Mitchell, 1979 (young Bay Mud  $q_c \leq 9$ ).

Estimated from local experience (fine-grained soils  $q_c > 9$ ).

**MISSION ROCK DEVELOPMENT**  
**SEAWALL 337 LOT AND PIER 48**  
 San Francisco, California

**Treadwell&Rollo**  
 A LANGAN COMPANY

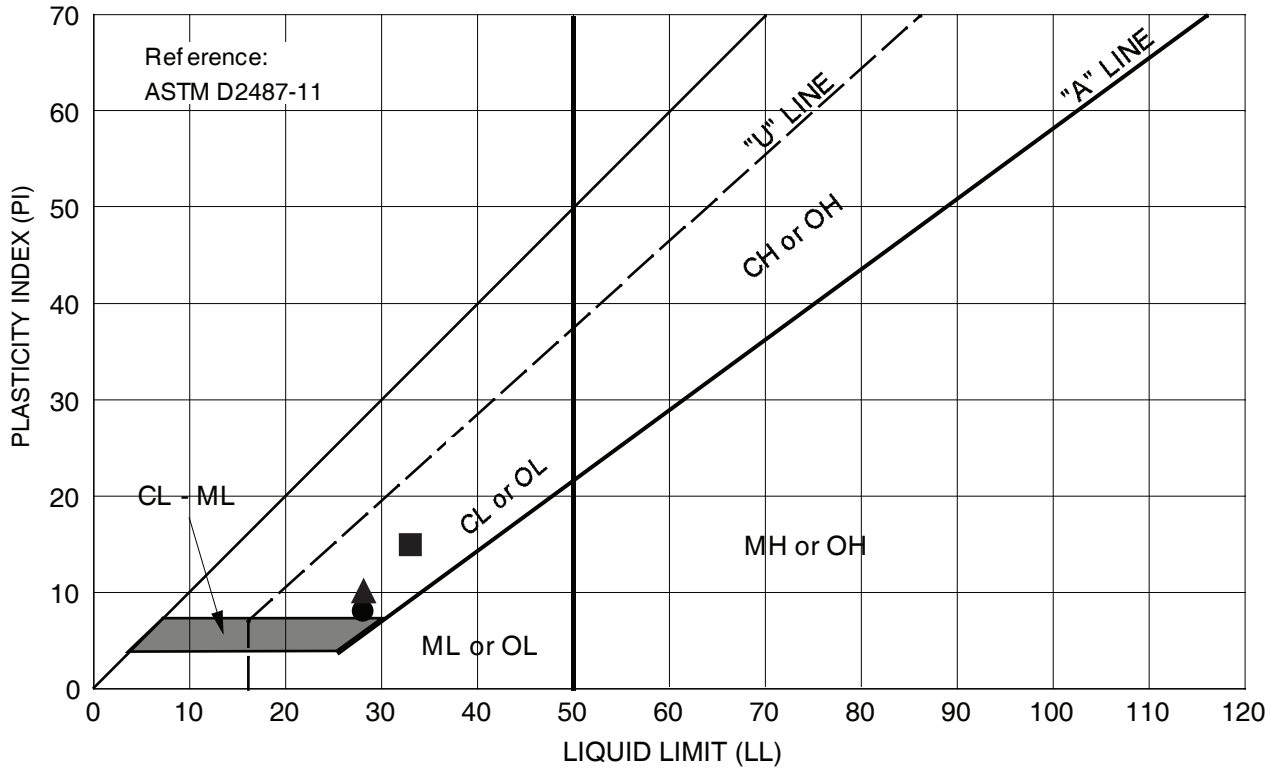
## CLASSIFICATION CHART FOR CONE PENETRATION TESTS

Date 11/25/13

Project No. 750604203

Figure F-31

# Mayor ED 17-02 Priority permit



| Symbol | Source         | Description and Classification                  | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|----------------|---|------------------|------------------|----------------------|----------------------|
| ●      | B-2 at 75 feet | SANDY CLAY (CL), olive-gray                     | 22.9             | 28               | 8                    | --                   |
| ■      | B-4 at 10 feet | SANDY SILT (ML), mottled oliva and yellow-brown | --               | 33               | 15                   | --                   |
| ▲      | B-5 at 20 feet | SANDY SILT (ML), mottled oliva and yellow-brown |                  | 28               | 10                   |                      |

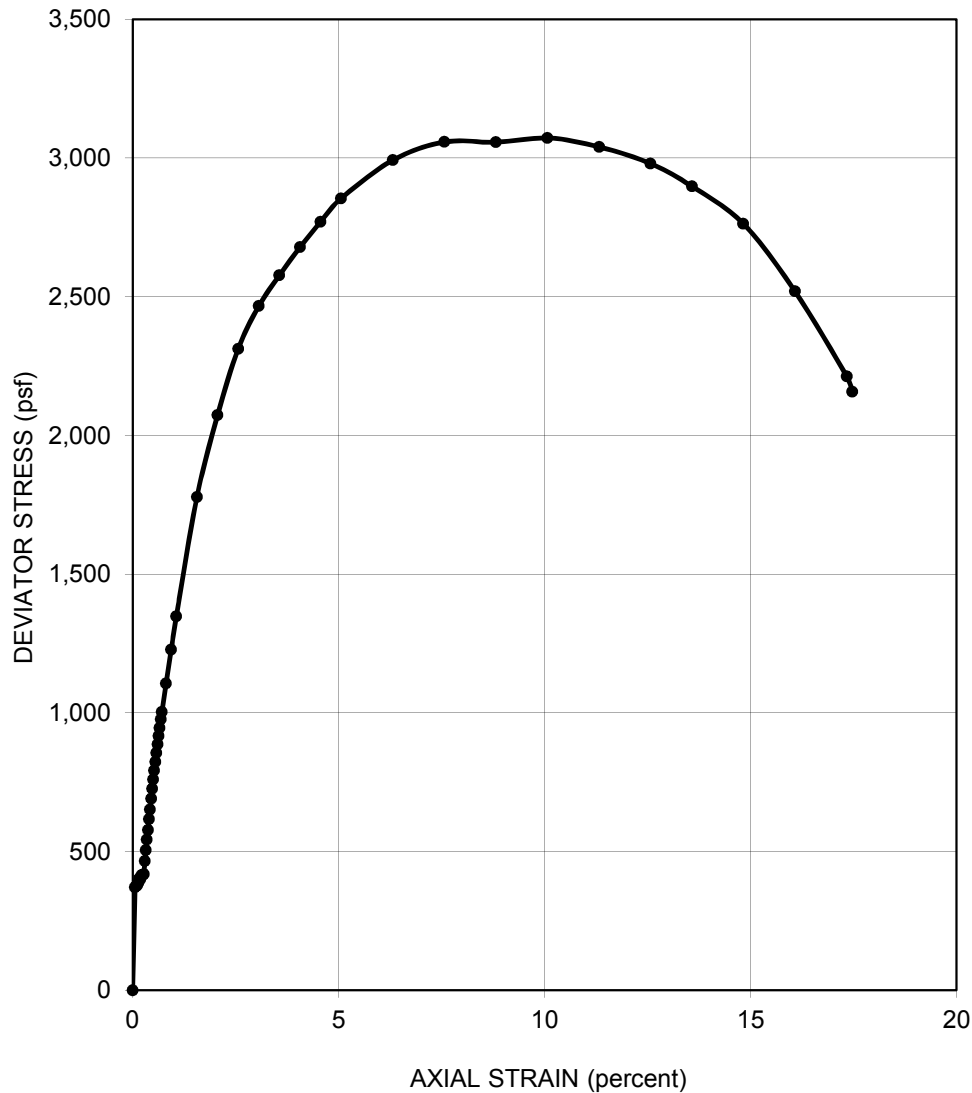
MISSION ROCK DEVELOPMENT AT  
SEAWALL LOT 337  
San Francisco, California

**LANGAN**

## PLASTICITY CHART

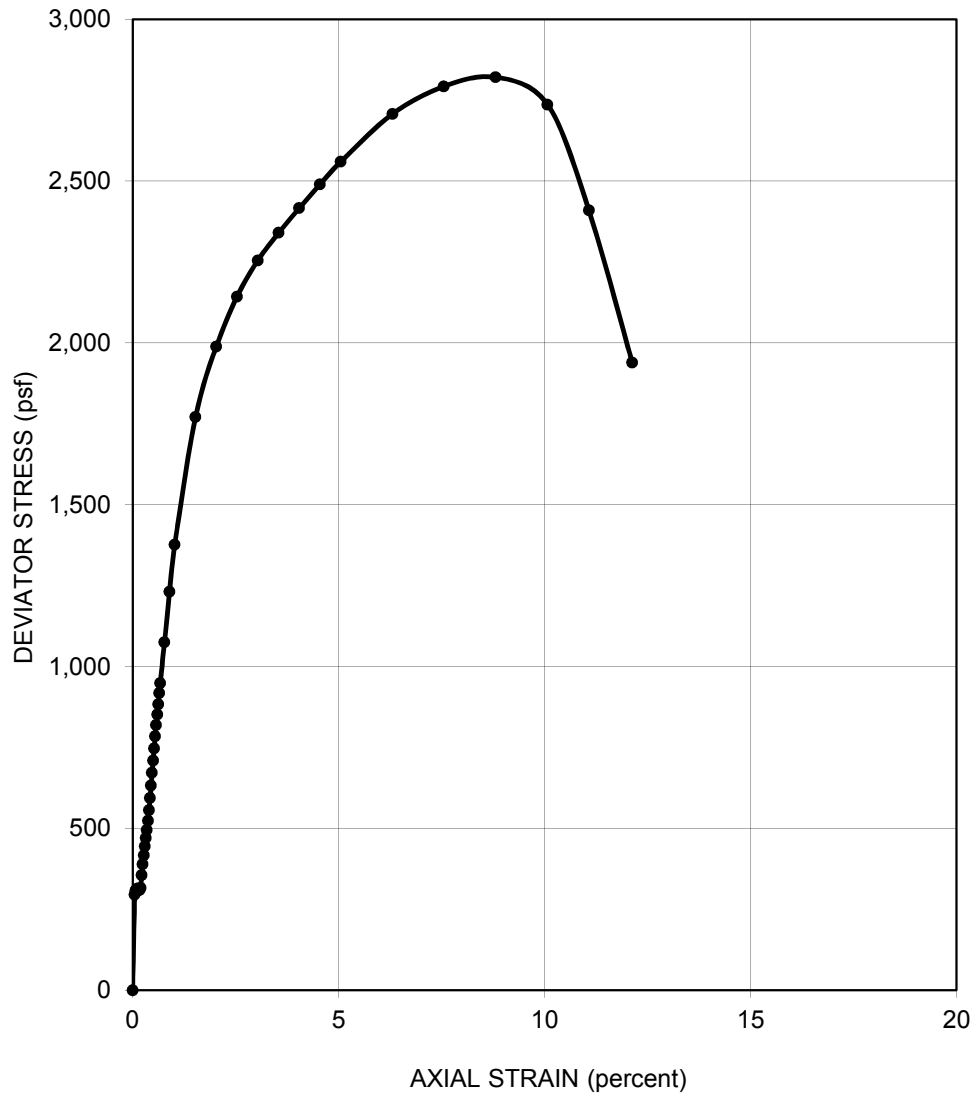
Date 10/03/18 Project No. 750604201 Figure F-32

# Mayor ED 17-02 Priority permit



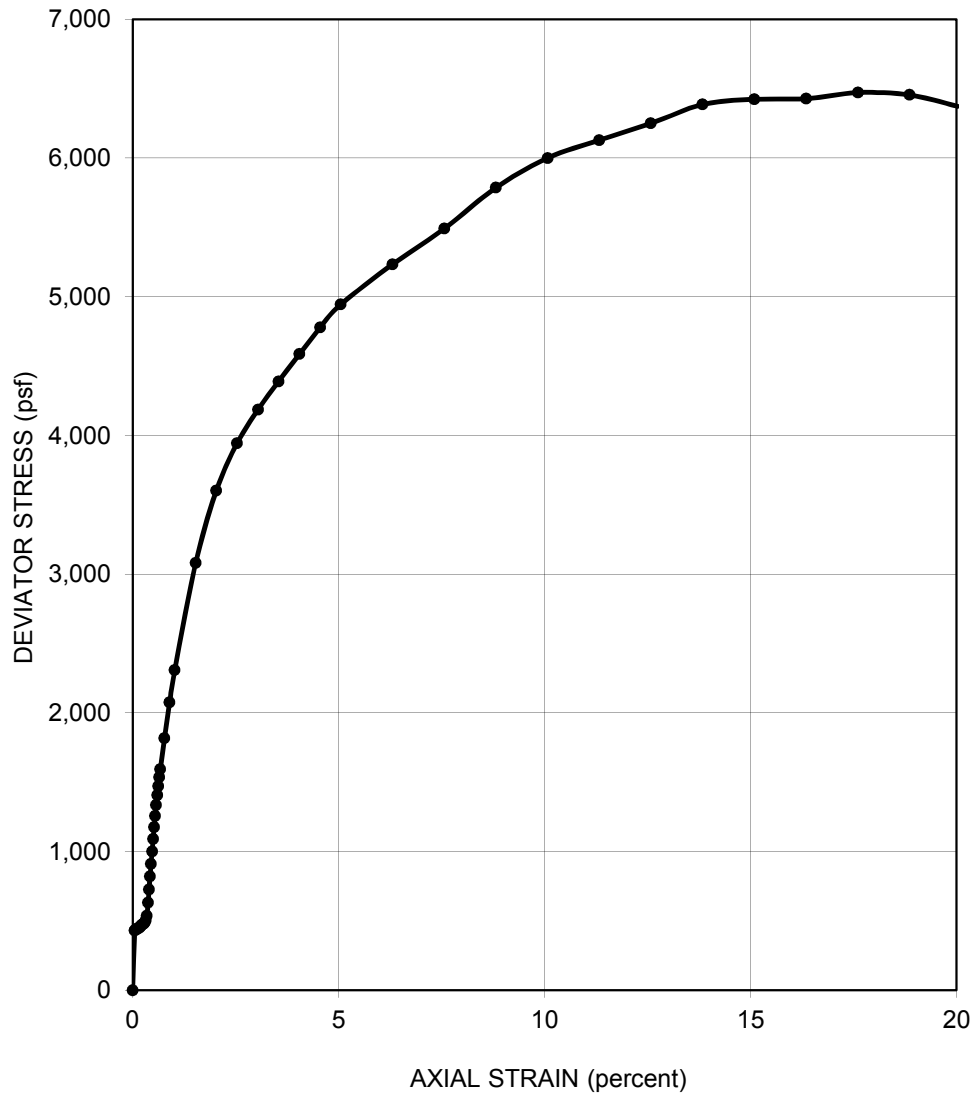
|   |                   |   |                                   |
|---|-------------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood  |                   | SHEAR STRENGTH 1,540 psf                              |                                   |
| DIAMETER (in.) 2.423  | HEIGHT (in.) 5.04 | STRAIN AT FAILURE 10.1 %                              |                                   |
| MOISTURE CONTENT 37.3 %   |                   | CONFINING PRESSURE 7,800 psf                          |                                   |
| DRY DENSITY 83 pcf  |                   | STRAIN RATE 0.50 % / min                              |                                   |
| DESCRIPTION CLAY (CL), dark gray  |                   |   | SOURCE B-1 at 131 feet            |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                   | Date 10/03/18   | Project No. 750604201 Figure F-33 |

# Mayor ED 17-02 Priority permit



|   |                |   |                                   |
|---|----------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood  |                | SHEAR STRENGTH 1,410 psf                              |                                   |
| DIAMETER (in.) 2.410  | HEIGHT (in.) 6 | STRAIN AT FAILURE 8.8 %                               |                                   |
| MOISTURE CONTENT 53.4 %   |                | CONFINING PRESSURE 6,000 psf                          |                                   |
| DRY DENSITY 68 pcf  |                | STRAIN RATE 0.75 % / min                              |                                   |
| DESCRIPTION CLAY (CL), green-gray   |                |   | SOURCE B-3 at 101 feet            |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                | Date 10/03/18   | Project No. 750604201 Figure F-34 |

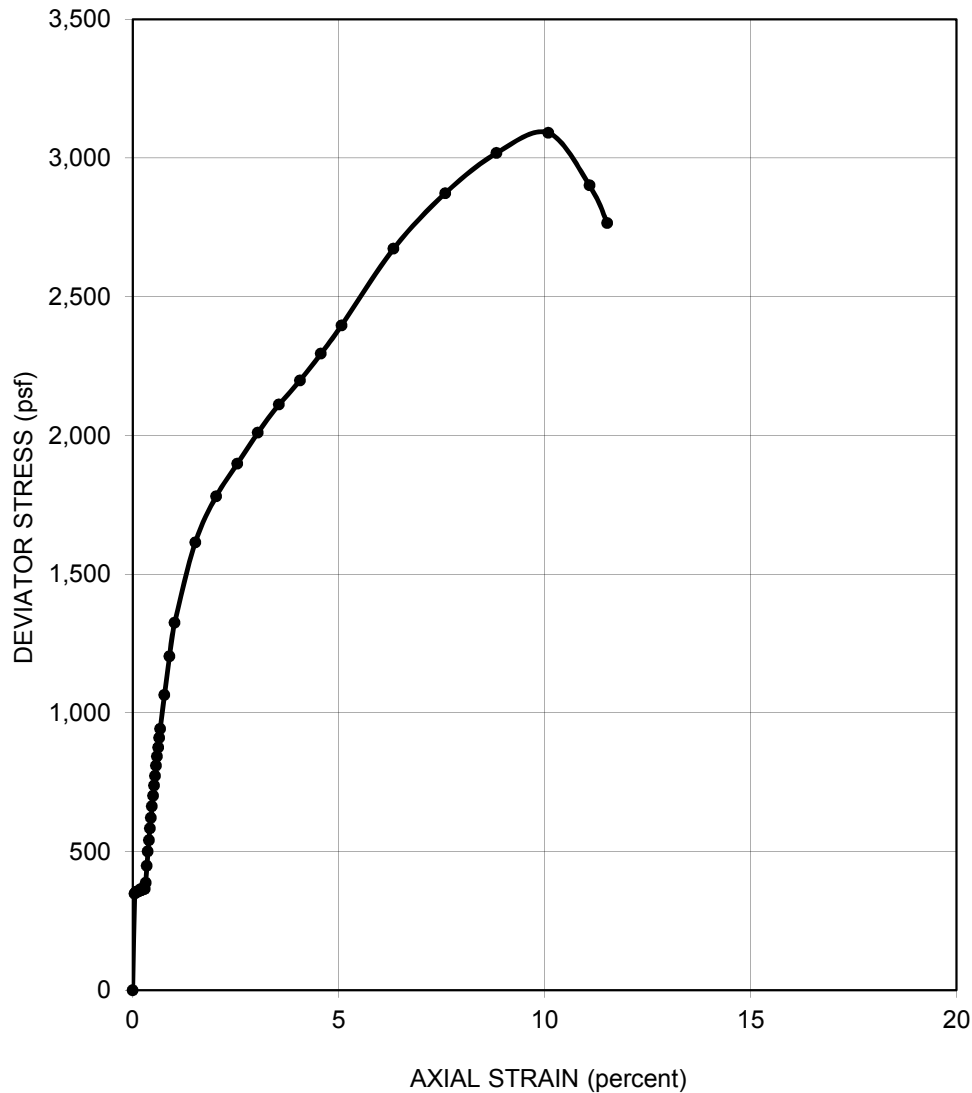
# Mayor ED 17-02 Priority permit



|   |                   |   |                                   |
|---|-------------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood  |                   | SHEAR STRENGTH 3,210 psf                              |                                   |
| DIAMETER (in.) 2.400  | HEIGHT (in.) 5.86 | STRAIN AT FAILURE 15.1 %                              |                                   |
| MOISTURE CONTENT 21.3 %   |                   | CONFINING PRESSURE 9,300 psf                          |                                   |
| DRY DENSITY 105 pcf   |                   | STRAIN RATE 0.75 % / min                              |                                   |
| DESCRIPTION CLAY (CL), olive-gray   |                   |   | SOURCE B-4 at 156 feet            |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                   | Date 10/03/18   | Project No. 750604201 Figure F-35 |

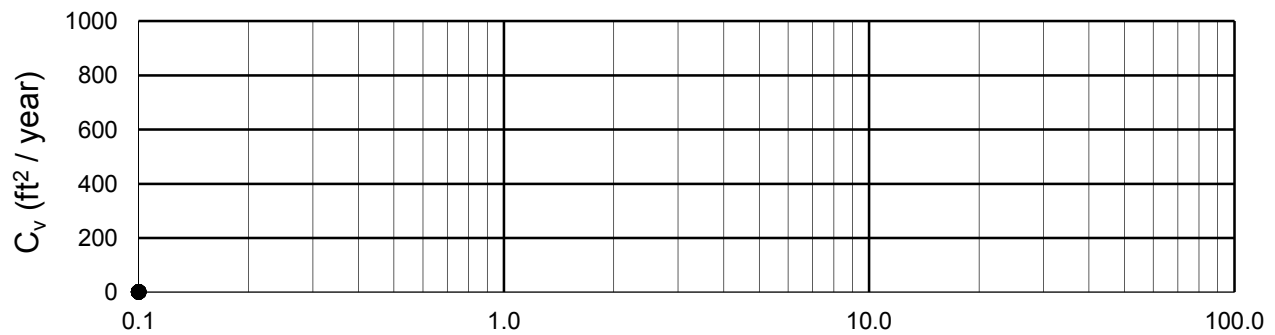
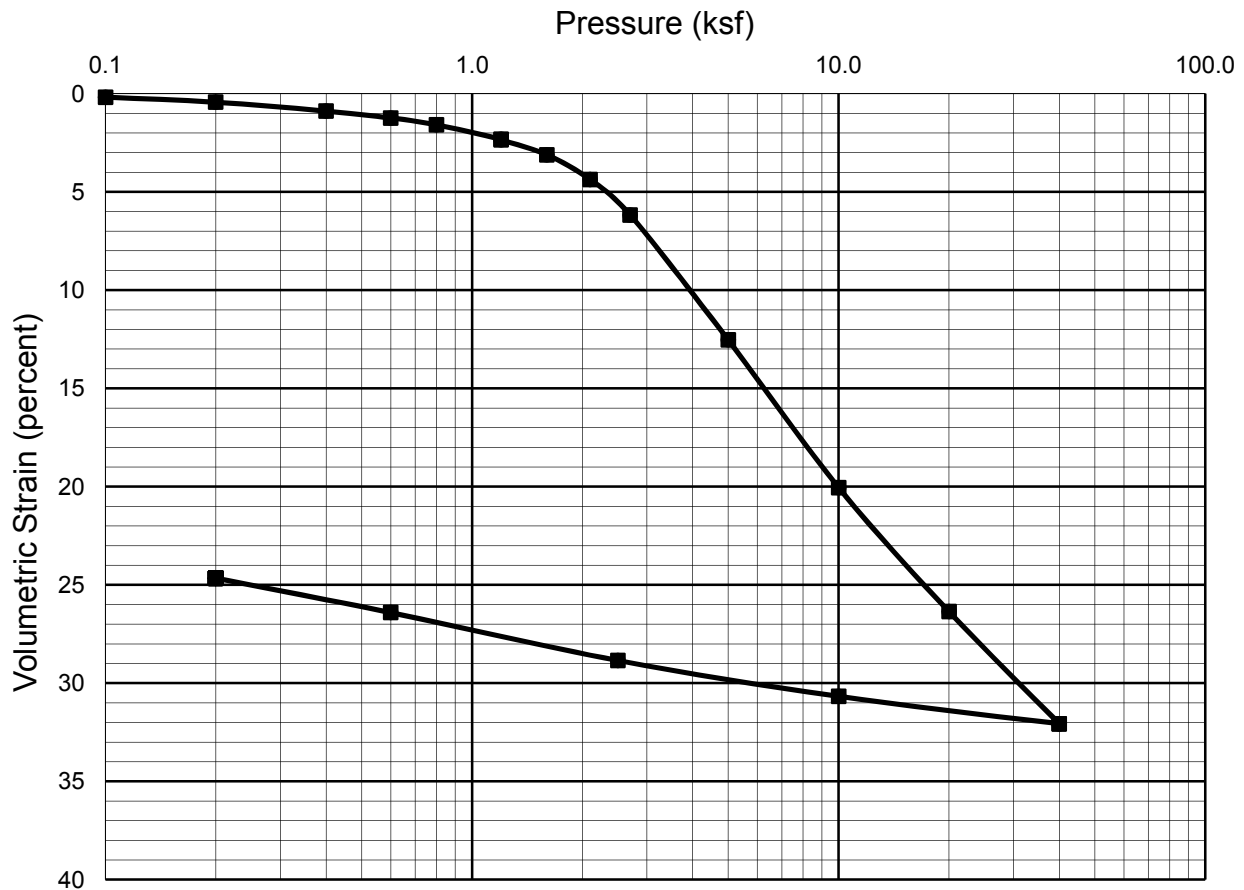


# Mayor ED 17-02 Priority permit



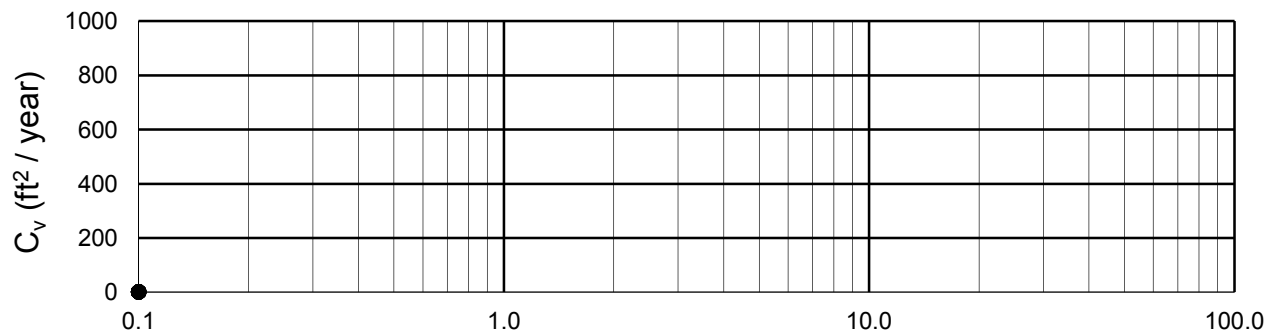
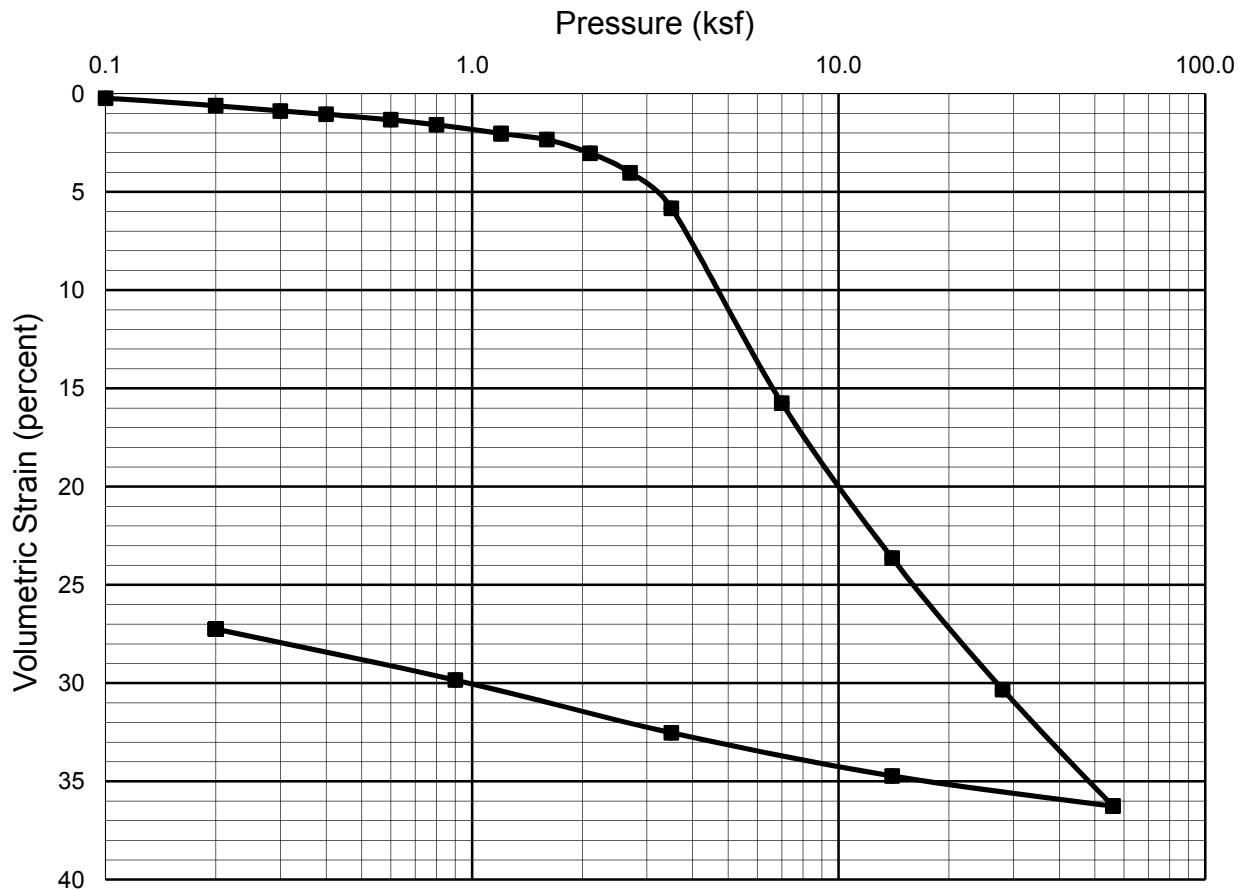
|   |                   |   |                                   |
|---|-------------------|---|-----------------------------------|
| SAMPLER TYPE Sprague & Henwood  |                   | SHEAR STRENGTH 1,550 psf                              |                                   |
| DIAMETER (in.) 2.400  | HEIGHT (in.) 5.99 | STRAIN AT FAILURE 10.1 %                              |                                   |
| MOISTURE CONTENT 36.3 %   |                   | CONFINING PRESSURE 7,200 psf                          |                                   |
| DRY DENSITY 83 pcf  |                   | STRAIN RATE 0.75 % / min                              |                                   |
| DESCRIPTION CLAY (CL), light olive-gray with mottled yellow-brown           |                   |   | SOURCE B-5 at 121 feet            |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                   |
| <b>LANGAN</b>   |                   | Date 10/03/18   | Project No. 750604201 Figure F-36 |

# Mayor ED 17-02 Priority permit



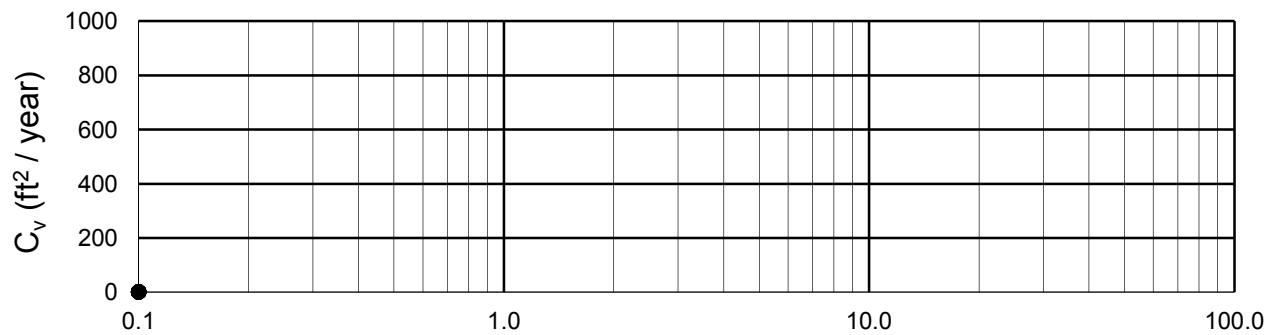
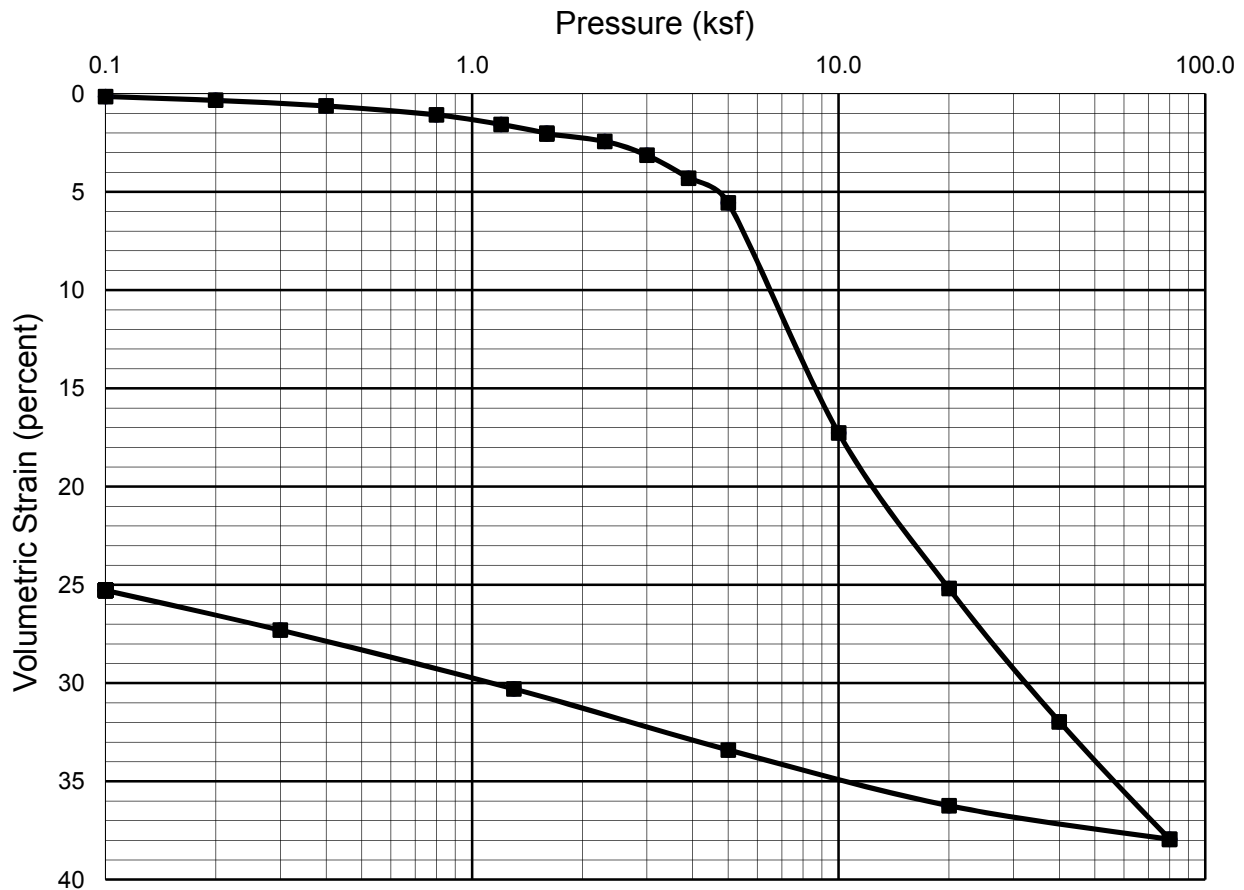
|   |  |      |             |           |             |                           |                |                |            |                |                |      |      |  |
|---|--|------|-------------|-----------|-------------|---------------------------|----------------|----------------|------------|----------------|----------------|------|------|--|
| Sampler Type: Shelby Tube   |  |      |             | Condition |             | Before Test               |                |                | After Test |                |                |      |      |  |
| Diameter (in)   |  | 2.42 | Height (in) |           | 1.00        | Water Content             |                | w <sub>o</sub> | 55.4       | %              | w <sub>f</sub> | 34.2 | %    |  |
| Overburden Pressure, p <sub>o</sub>   |  |      | 1,950       | psf       | Void Ratio  |                           | e <sub>o</sub> | 1.49           |            |                | e <sub>f</sub> | 0.88 |      |  |
| Preconsol. Pressure, p <sub>c</sub>   |  |      | 2,400       | psf       | Saturation  |                           | S <sub>o</sub> | 100            | %          |                | S <sub>f</sub> | 105  | %    |  |
| Compression Ratio, C <sub>ec</sub>  |  |      | 0.25        |           | Dry Density |                           | γ <sub>d</sub> | 68             | pcf        |                | γ <sub>d</sub> | 90   | pcf  |  |
| LL  |  | PL   |             |           | PI          |                           |                | G <sub>s</sub> | 2.70       | (assumed)      |                |      |      |  |
| Classification CLAY (CH), gray  |  |      |             |           |             |                           |                | Source         |            | B-1 at 30 feet |                |      |      |  |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |  |      |             |           |             | CONSOLIDATION TEST REPORT |                |                |            |                |                |      |      |  |
| LANGAN  |  |      |             |           |             |                           |                |                |            |                |                |      |      |  |
| Date  |  |      | 10/03/18    |           | Project No. |                           |                | 750604201      |            | Figure         |                |      | F-37 |  |

# Mayor ED 17-02 Priority permit



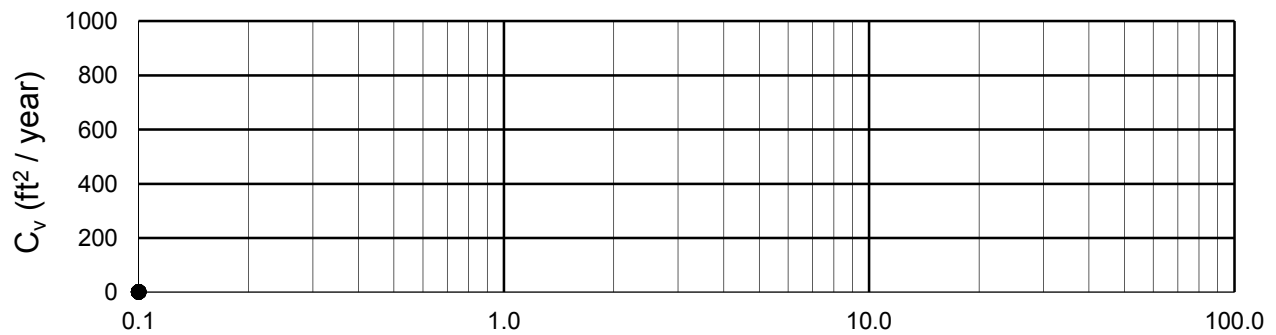
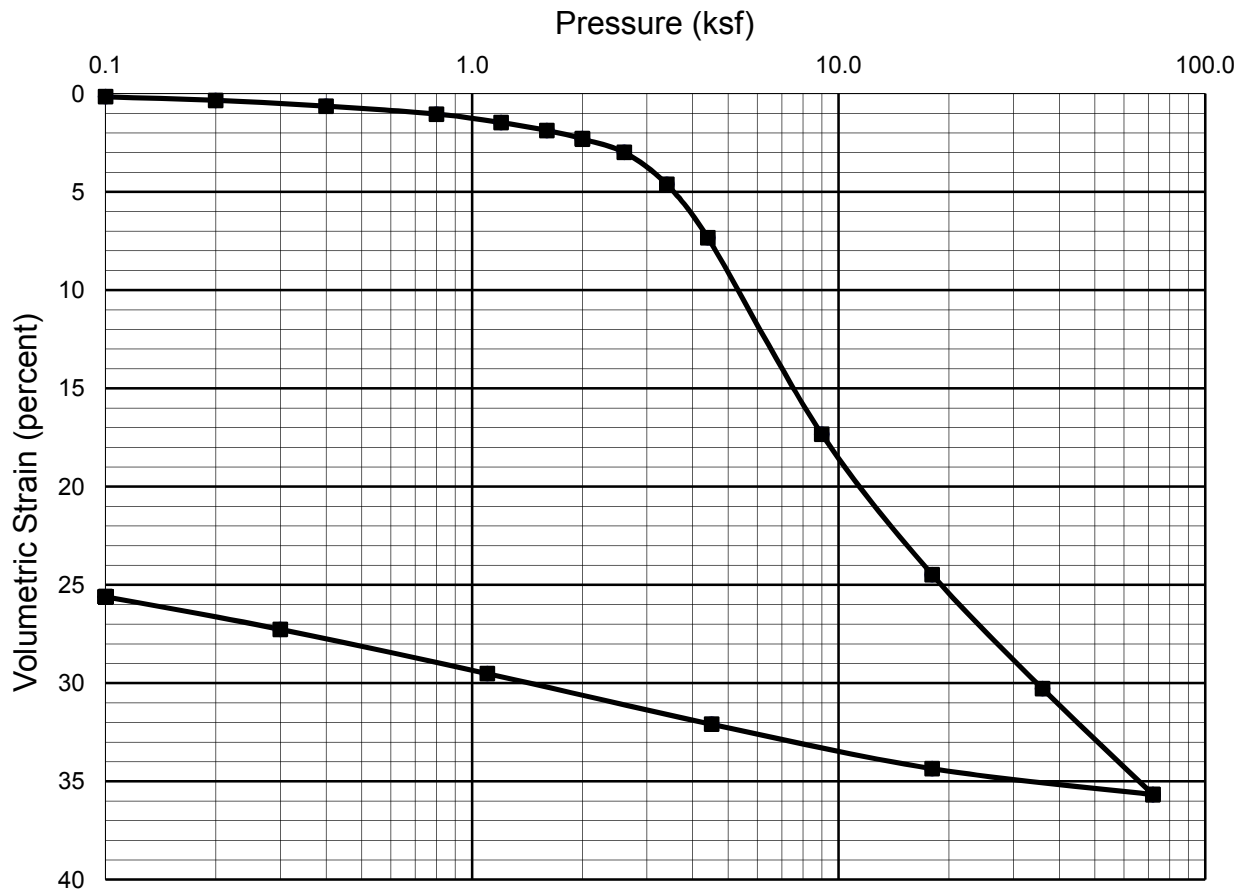
|   |      |             |      |               |                           |                 |          |                |                |                |        |     |      |
|---|------|-------------|------|---------------|---------------------------|-----------------|----------|----------------|----------------|----------------|--------|-----|------|
| Sampler Type: Shelby Tube   |      |             |      | Condition     |                           | Before Test     |          | After Test     |                |                |        |     |      |
| Diameter (in)   | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 61.5            | %        | w <sub>f</sub> | 37.7           | %              |        |     |      |
| Overburden Pressure, p <sub>o</sub>   |      | 2,700       | psf  | Void Ratio    | e <sub>o</sub>            | 1.68            |          | e <sub>f</sub> | 0.95           |                |        |     |      |
| Preconsol. Pressure, p <sub>c</sub>   |      | 3,200       | psf  | Saturation    | S <sub>o</sub>            | 99              |          | %              | S <sub>f</sub> | 107            | %      |     |      |
| Compression Ratio, C <sub>ec</sub>  |      | 0.28        |      | Dry Density   | γ <sub>d</sub>            | 63              |          | pcf            | γ <sub>d</sub> | 86             |        | pcf |      |
| LL  |      | PL          |      | PI            |                           | G <sub>s</sub>  |          | 2.70           | (assumed)      |                |        |     |      |
| Classification  |      |             |      |               |                           | CLAY (CH), gray |          | Source         |                | B-1 at 50 feet |        |     |      |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |                 |          |                |                |                |        |     |      |
| LANGAN  |      |             |      |               |                           |                 |          |                |                |                |        |     |      |
|   |      |             |      |               | Date                      |                 | 10/03/18 | Project No.    |                | 750604201      | Figure |     | F-38 |

# Mayor ED 17-02 Priority permit



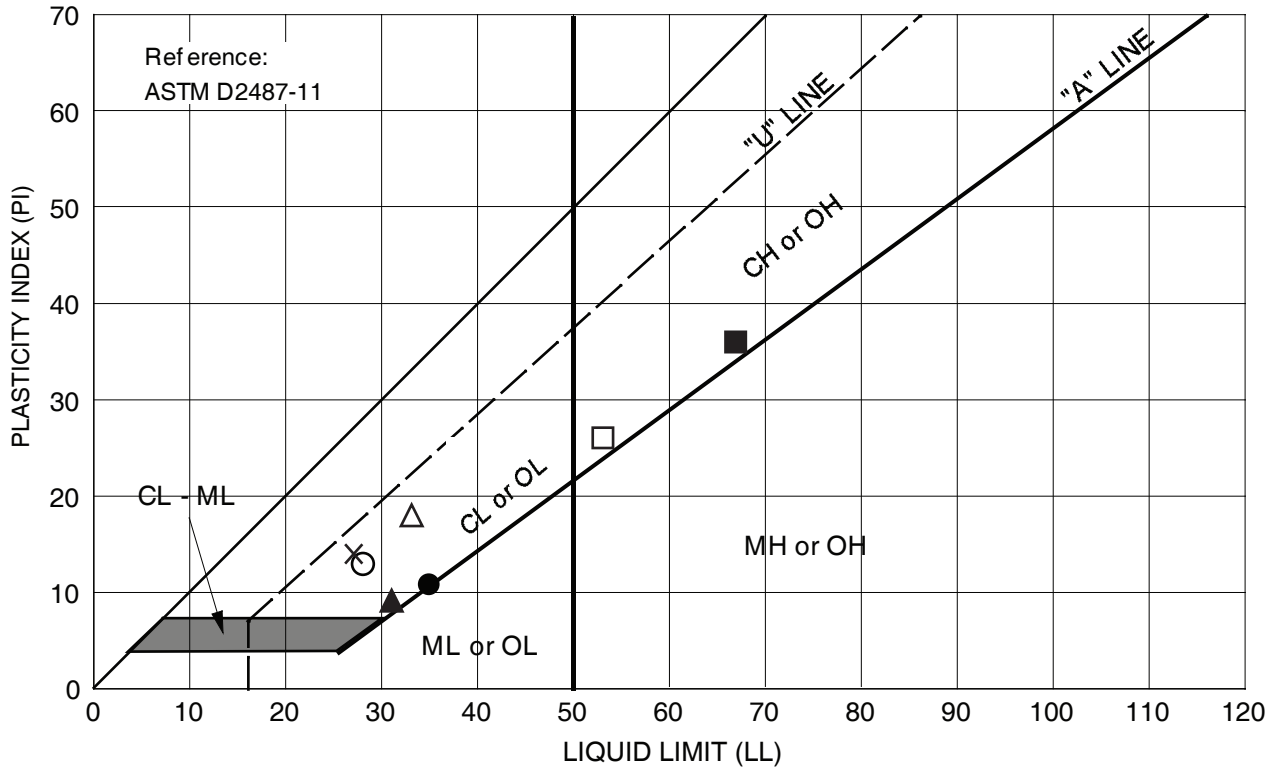
|   |      |             |      |               |                           |      |                       |                |           |      |
|---|------|-------------|------|---------------|---------------------------|------|-----------------------|----------------|-----------|------|
| Sampler Type: Dames & Moore   |      |             |      | Condition     | Before Test               |      |                       | After Test     |           |      |
| Diameter (in)   | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 61.0 | %                     | w <sub>f</sub> | 36.3      | %    |
| Overburden Pressure, p <sub>o</sub>   |      | 3,450       | psf  | Void Ratio    | e <sub>o</sub>            | 1.69 |                       | e <sub>f</sub> | 0.96      |      |
| Preconsol. Pressure, p <sub>c</sub>   |      | 4,500       | psf  | Saturation    | S <sub>o</sub>            | 97   | %                     | S <sub>f</sub> | 102       | %    |
| Compression Ratio, C <sub>ec</sub>  |      | 0.30        |      | Dry Density   | γ <sub>d</sub>            | 63   | pcf                   | γ <sub>d</sub> | 86        | pcf  |
| LL  |      | PL          |      | PI            |                           |      | G <sub>s</sub>        | 2.70           | (assumed) |      |
| Classification CLAY (CH), gray  |      |             |      |               |                           |      | Source B-1 at 70 feet |                |           |      |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |      |                       |                |           |      |
| LANGAN  |      |             |      |               |                           |      |                       |                |           |      |
|   |      |             | Date | 10/03/18      | Project No.               |      |                       | 750604201      | Figure    | F-39 |

# Mayor ED 17-02 Priority permit



|   |      |                      |      |                           |  |                |      |        |                |                |     |
|---|------|----------------------|------|---------------------------|--|----------------|------|--------|----------------|----------------|-----|
| Sampler Type: Dames & Moore   |      |                      |      | Condition                 |  | Before Test    |      |        | After Test     |                |     |
| Diameter (in)   | 2.42 | Height (in)          | 1.00 | Water Content             |  | w <sub>o</sub> | 55.8 | %      | w <sub>f</sub> | 32.1           | %   |
| Overburden Pressure, p <sub>o</sub>   |      | 2,400                | psf  | Void Ratio                |  | e <sub>o</sub> | 1.51 |        | e <sub>f</sub> | 0.84           |     |
| Preconsol. Pressure, p <sub>c</sub>   |      | 3,600                | psf  | Saturation                |  | S <sub>o</sub> | 100  | %      | S <sub>f</sub> | 103            | %   |
| Compression Ratio, C <sub>ec</sub>  |      | 0.27                 |      | Dry Density               |  | γ <sub>d</sub> | 67   | pcf    | γ <sub>d</sub> | 92             | pcf |
| LL  |      | PL                   |      | PI                        |  | G <sub>s</sub> |      | 2.70   | (assumed)      |                |     |
| Classification  |      | CLAY (CH), dark gray |      |                           |  |                |      | Source |                | B-2 at 45 feet |     |
| MISSION ROCK DEVELOPMENT AT<br>SEAWALL LOT 337<br>San Francisco, California |      |                      |      | CONSOLIDATION TEST REPORT |  |                |      |        |                |                |     |
| LANGAN  |      |                      |      |                           |  |                |      |        |                |                |     |
| Date  |      | 10/03/18             |      | Project No.               |  | 750604201      |      | Figure |                | F-40           |     |

# Mayor ED 17-02 Priority permit



| Symbol | Source                 | Description and Classification                               | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|------------------------|--|------------------|------------------|----------------------|----------------------|
| ●      | BSWL337-6 at 16 feet   | CLAYEY GRAVEL with SAND (GC), green to green-gray            | 18.2             | 35               | 11                   | 15.5                 |
| ■      | BSWL337-6 at 91 feet   | CLAY (CH), olive-gray  | --               | 67               | 36                   | --                   |
| ▲      | BSWL337-7 at 10.5 feet | GRAVEL with CLAY and SAND (GP-GC), olive-dark green and gray | 19.8             | 31               | 9                    | 11.1                 |
| ○      | BSWL337-7 at 15 feet   | CLAYEY GRAVEL with SAND (GC), olive-gray                     | 12.3             | 28               | 13                   | 19.0                 |
| □      | BSWL337-7 at 36 feet   | CLAY (CH), dark gray   | --               | 53               | 26                   | --                   |
| △      | BSWL337-8 at 10 feet   | SILTY SAND (SM), gray-brown                                  | 14.4             | 33               | 17                   | 28.4                 |
| ×      | BSWL337-9 at 10 feet   | CLAYEY GRAVELLY SAND (GC), gray to olive-gray                | 12.7             | 27               | 14                   | 28.4                 |

**MISSION ROCK SQUARE GARAGE  
SEAWALL LOT 337  
San Francisco, California**

## PLASTICITY CHART

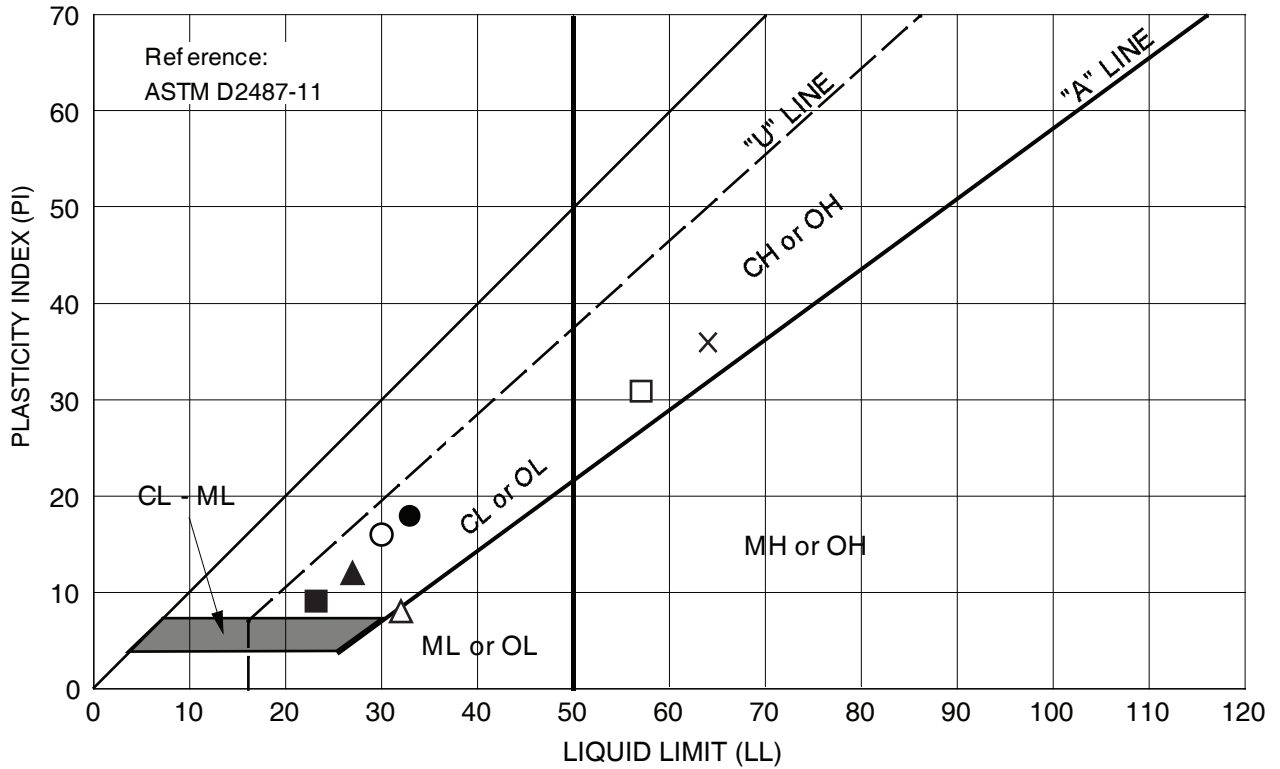
**LANGAN TREADWELL ROLLO**

Date 06/01/16

Project No. 750604205

Figure F-41

# Mayor ED 17-02 Priority permit



| Symbol | Source                   | Description and Classification  | Natural M.C. (%) | Liquid Limit (%) | Plasticity Index (%) | % Passing #200 Sieve |
|--------|--------------------------|---|------------------|------------------|----------------------|----------------------|
| ●      | BSWL337-10 at 5 feet     | CLAYEY SAND (SC), brown   | 11.6             | 33               | 18                   | 36.6                 |
| ■      | BSWL337-10 at 165 feet   | CLAYEY SAND (SC), olive   | 22.7             | 23               | 9                    | 37.8                 |
| ▲      | BSWL337-11 at 16 feet    | CLAYEY GRAVEL with SAND (GC), olive-gray to gray with yellow-brown mottling | 13.5             | 27               | 12                   | 20.8                 |
| ○      | BSWL337-11 at 31 feet    | CLAYEY GRAVEL with SAND (GC), olive-gray                                    | 11.4             | 30               | 16                   | 25.3                 |
| □      | BSWL337-11 at 51 feet    | CLAY (CH), gray to olive-gray   | --               | 58               | 31                   | --                   |
| △      | BSWL337-12 at 10 feet    | GRAVEL with CLAY, SILT, and SAND (GP-GC/GM), gray                           | 18.7             | 32               | 8                    | 11.7                 |
| ×      | BSWL337-12 at 110.5 feet | CLAY (CH), olive  | 52.4             | 64               | 36                   | 91.2                 |

**MISSION ROCK SQUARE GARAGE  
SEAWALL LOT 337  
San Francisco, California**

## PLASTICITY CHART

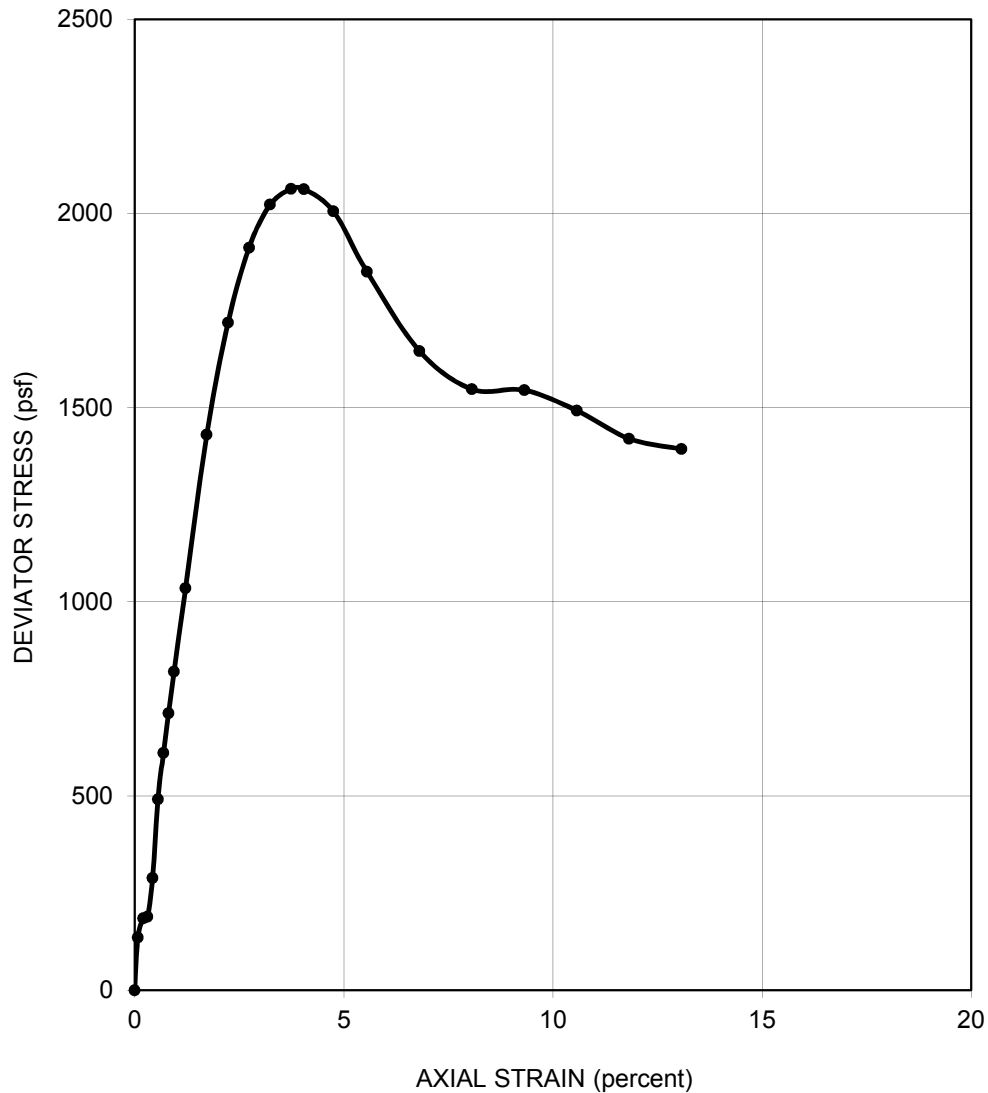
**LANGAN TREADWELL ROLLO**

Date 06/01/16

Project No. 750604205

Figure F-42

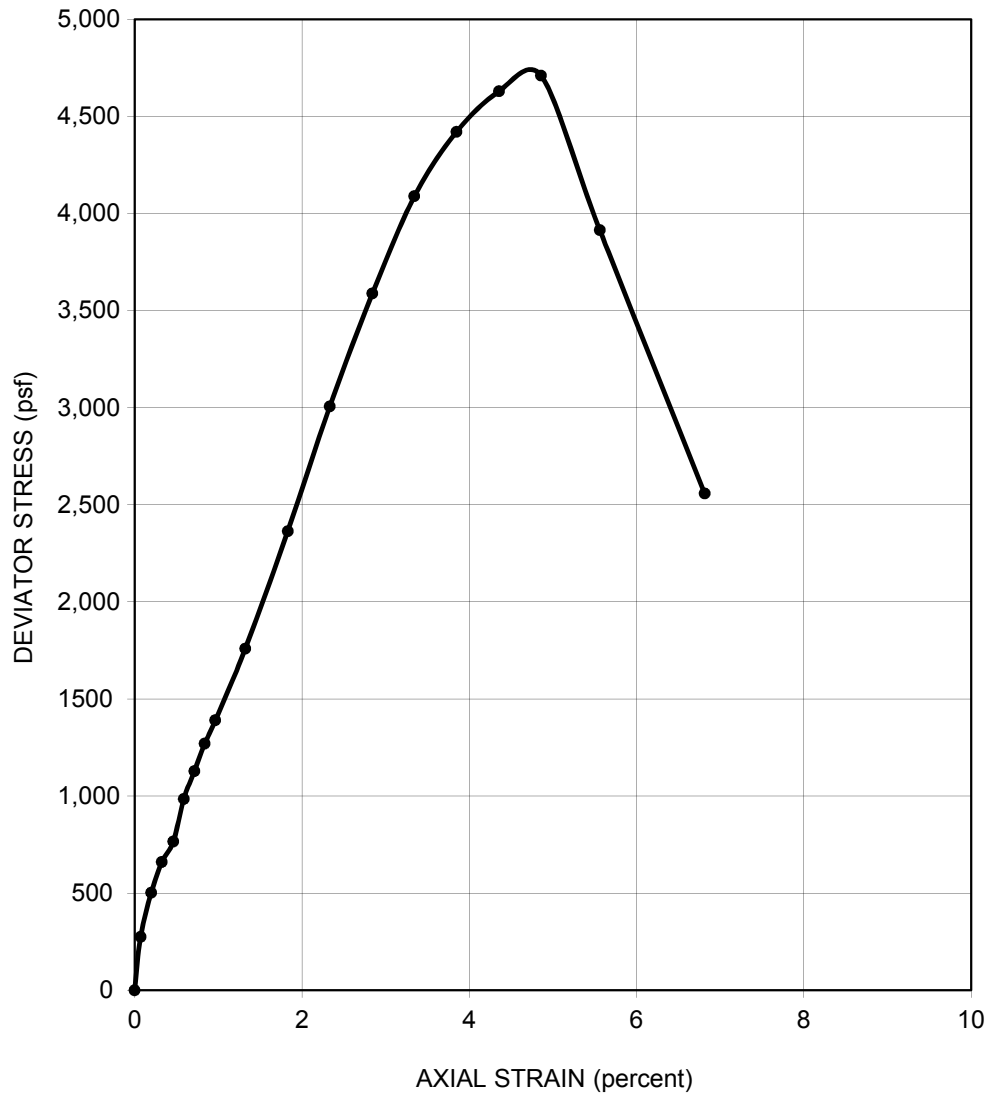
# Mayor ED 17-02 Priority permit



|  |   |              |   |                   |                       |
|--|---|--------------|---|-------------------|-----------------------|
| SAMPLER TYPE   | Dames & Moore                                 |              | SHEAR STRENGTH  | 1,030             | psf                   |
| DIAMETER (in.)   | 2.43  | HEIGHT (in.) | 5.73  | STRAIN AT FAILURE | 3.7 %                 |
| MOISTURE CONTENT   | 61.0  | %            | CONFINING PRESSURE                                    | 4,500             | psf                   |
| DRY DENSITY  | 62  | pcf          | STRAIN RATE   | 0.75              | % / min               |
| DESCRIPTION  | CLAY (CH), dark gray with olive-gray mottling |              |   | SOURCE            | BSWL337-6 at 45 feet  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |   |              | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                   |                       |
| <b>LANGAN TREADWELL ROLLO</b>  |   |              | Date  | 06/02/16          | Project No. 750604205 |
|  |   |              |   |                   | Figure F-43           |

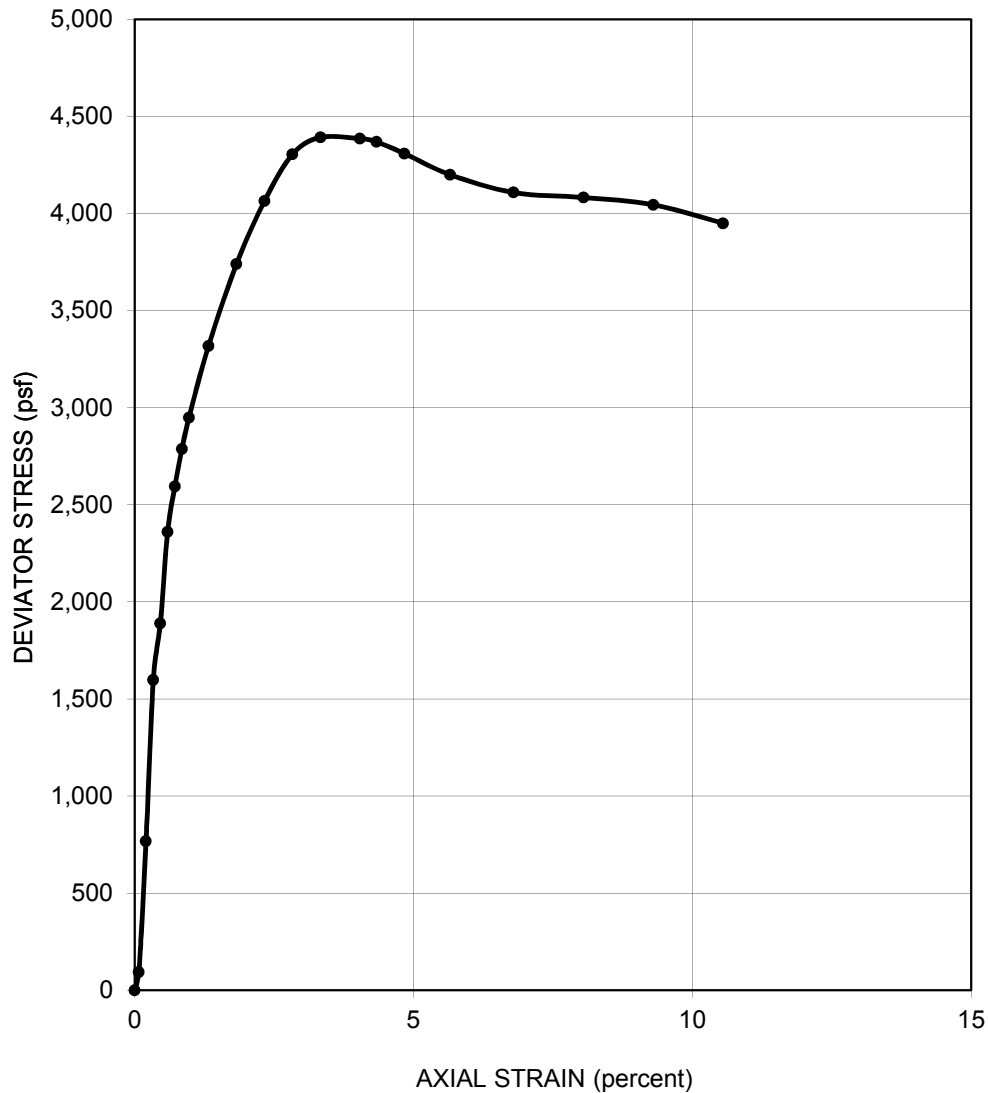


# Mayor ED 17-02 Priority permit



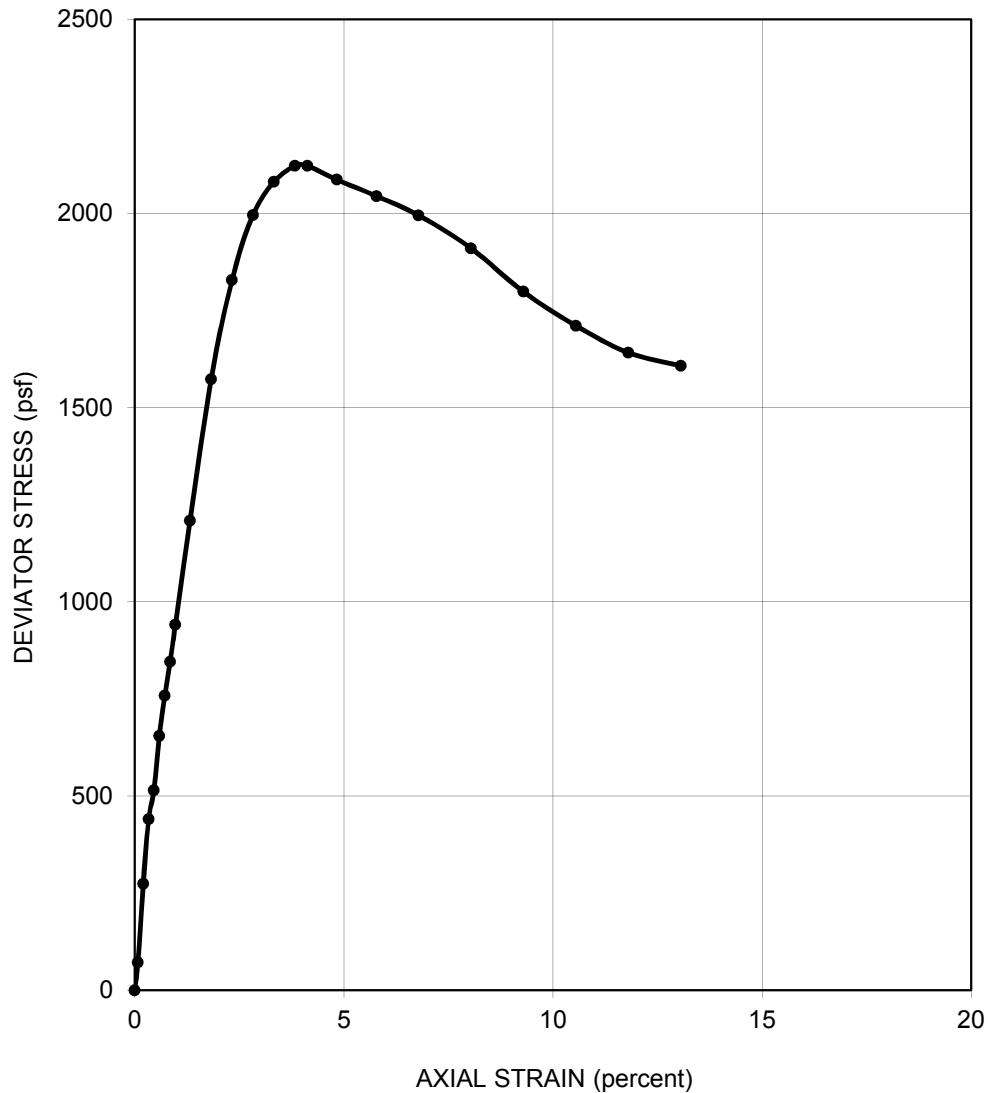
|  |                       |              |   |                    |                             |           |        |      |
|--|-----------------------|--------------|---|--------------------|-----------------------------|-----------|--------|------|
| SAMPLER TYPE   | Dames & Moore         |              |   | SHEAR STRENGTH     | 2,350                       | psf       |        |      |
| DIAMETER (in.)   | 2.43                  | HEIGHT (in.) | 5.7   | STRAIN AT FAILURE  | 4.9                         | %         |        |      |
| MOISTURE CONTENT   | 50.9                  | %            |   | CONFINING PRESSURE | 8,500                       | psf       |        |      |
| DRY DENSITY  | 71                    | pcf          |   | STRAIN RATE        | 0.75                        | % / min   |        |      |
| DESCRIPTION  | CLAY (CH), olive-gray |              |   |                    | SOURCE BSWL337-6 at 85 feet |           |        |      |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                       |              | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |                             |           |        |      |
| LANGAN TREADWELL ROLLO   |                       |              |   |                    |                             |           |        |      |
|  |                       |              | Date  | 06/02/16           | Project No.                 | 750604205 | Figure | F-44 |

# Mayor ED 17-02 Priority permit



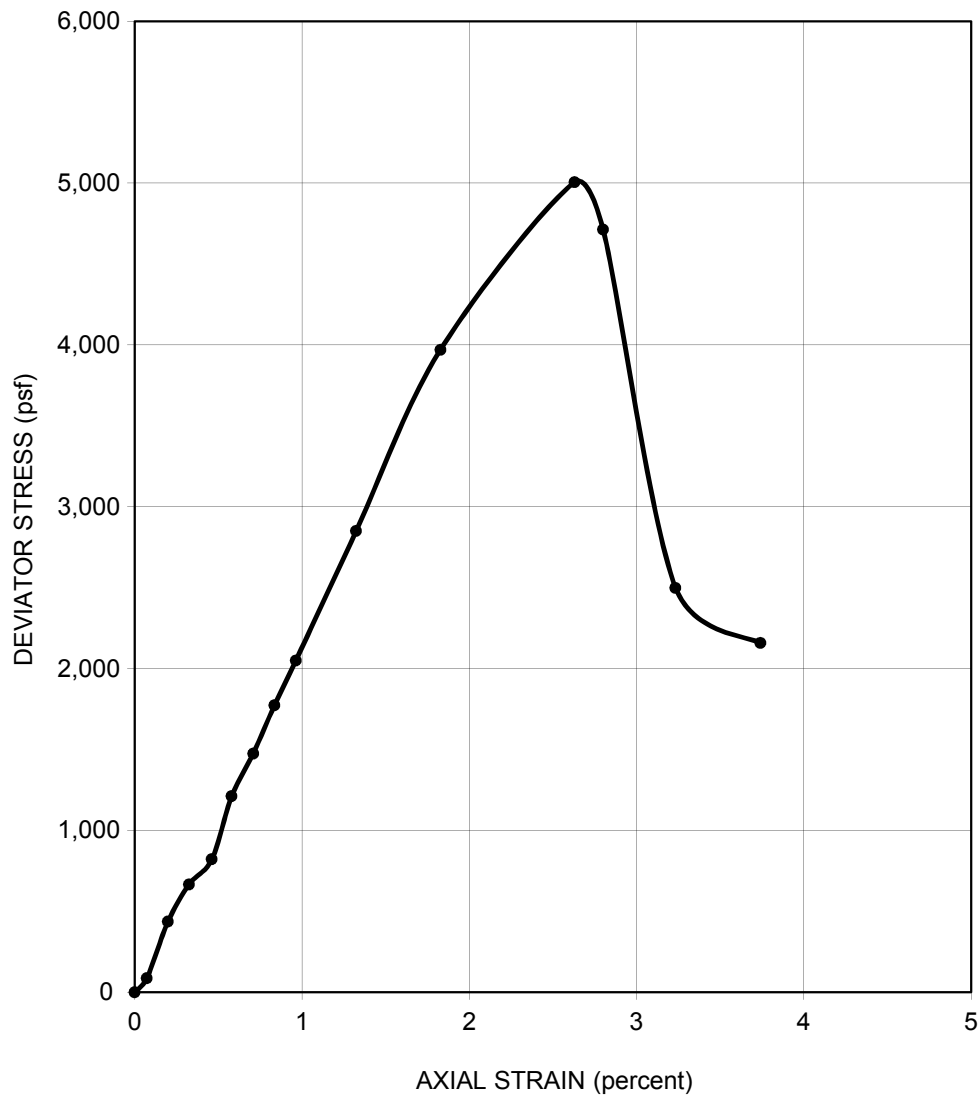
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|--|-----------------------|--------------|---|--------------------|------------------------------|---------|
| SAMPLER TYPE   | Dames & Moore         |              |   | SHEAR STRENGTH     | 2,200                        | psf     |
| DIAMETER (in.)   | 2.43                  | HEIGHT (in.) | 5.71  | STRAIN AT FAILURE  | 3.3                          | %       |
| MOISTURE CONTENT   | 43.8                  | %            |   | CONFINING PRESSURE | 14,500                       | psf     |
| DRY DENSITY  | 76                    | pcf          |   | STRAIN RATE        | 0.50                         | % / min |
| DESCRIPTION  | CLAY (CH), olive-gray |              |   |                    | SOURCE BSWL337-6 at 145 feet |         |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                       |              | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                    |                              |         |
| LANGAN TREADWELL ROLLO   |                       |              |   |                    |                              |         |
| Date 06/02/16  |                       |              | Project No. 750604205                                 |                    | Figure F-45                  |         |

# Mayor ED 17-02 Priority permit



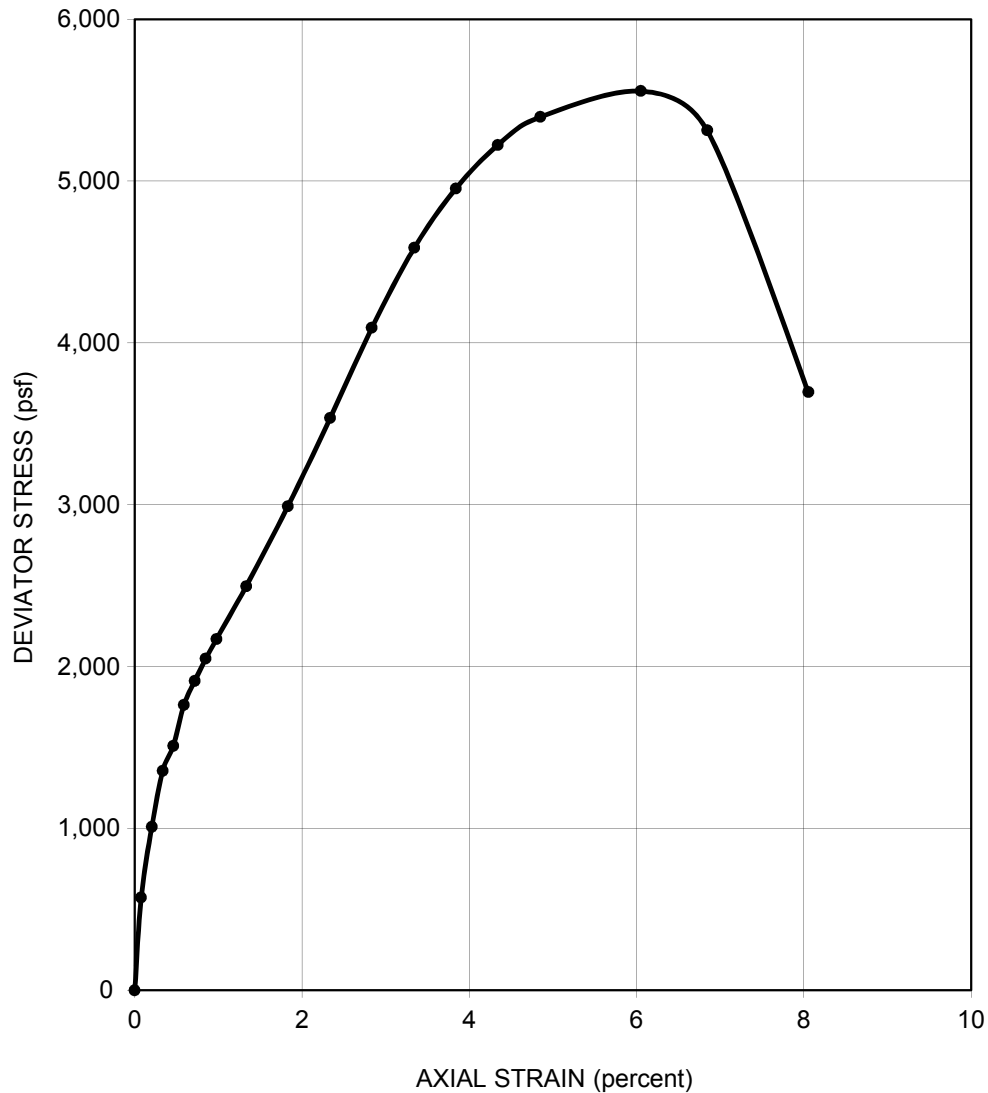
|  |                      |              |      |   |                    |           |                      |      |
|--|----------------------|--------------|------|---|--------------------|-----------|----------------------|------|
| SAMPLER TYPE   | Dames & Moore        |              |      | SHEAR STRENGTH  | 1,060              | psf       |                      |      |
| DIAMETER (in.)   | 2.41                 | HEIGHT (in.) | 5.73 | STRAIN AT FAILURE                                     | 3.8                | %         |                      |      |
| MOISTURE CONTENT   | 55.0                 |              |      | %   | CONFINING PRESSURE | 5,000     | psf                  |      |
| DRY DENSITY  | 66                   |              |      | pcf   | STRAIN RATE        | 0.50      | % / min              |      |
| DESCRIPTION  | CLAY (CH), dark gray |              |      |   | SOURCE             |           | BSWL337-7 at 50 feet |      |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                      |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |           |                      |      |
| LANGAN TREADWELL ROLLO   |                      |              |      |   |                    |           |                      |      |
| Date   |                      | 06/02/16     |      | Project No.   |                    | 750604205 | Figure               | F-46 |

# Mayor ED 17-02 Priority permit



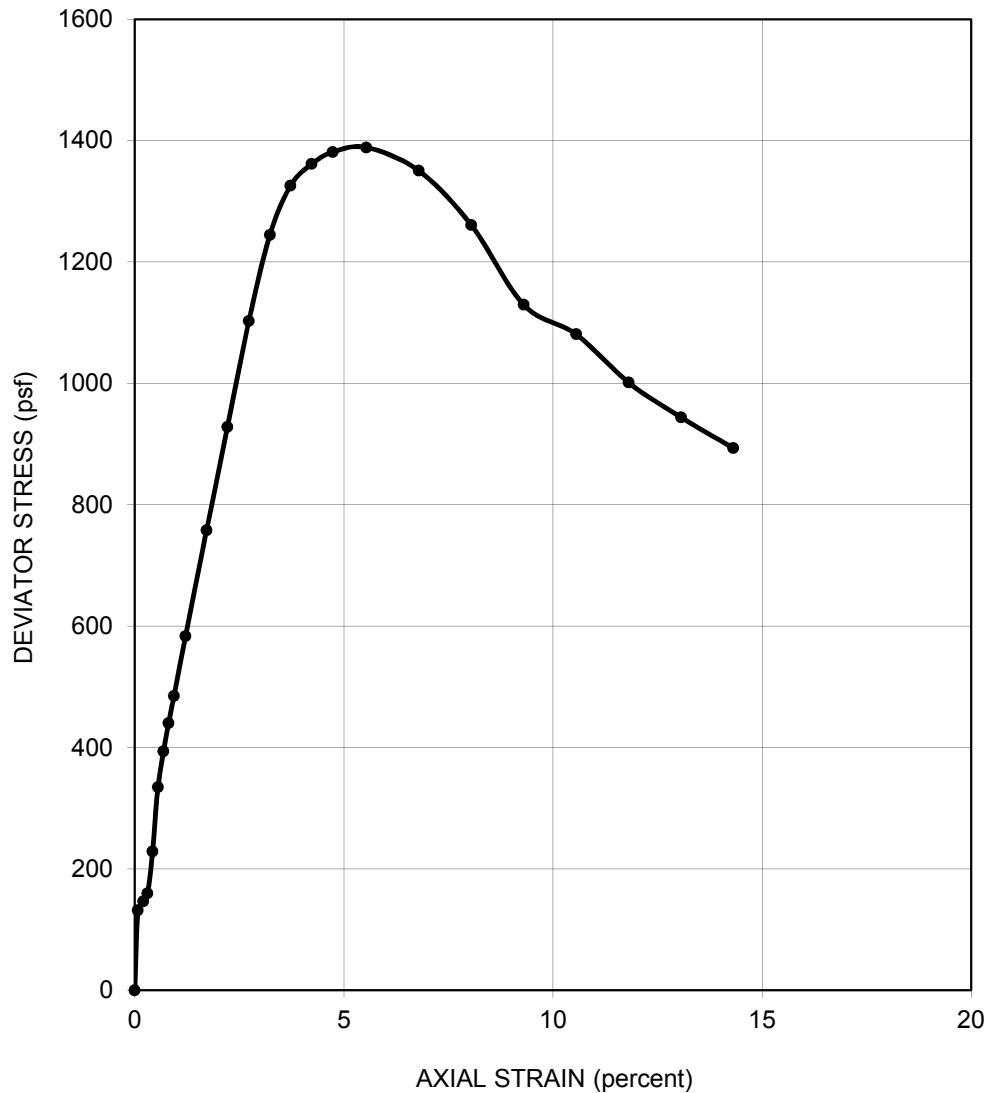
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|--|-----------------------|--------------|------|---|------------------------------|-------------|
| SAMPLER TYPE   | Dames & Moore         |              |      | SHEAR STRENGTH  | 2,500                        | psf         |
| DIAMETER (in.)   | 2.42                  | HEIGHT (in.) | 5.73 | STRAIN AT FAILURE                                     | 2.6                          | %           |
| MOISTURE CONTENT   | 54.5 %                |              |      | CONFINING PRESSURE                                    | 11,000                       | psf         |
| DRY DENSITY  | 68 pcf                |              |      | STRAIN RATE   | 0.75                         | % / min     |
| DESCRIPTION  | CLAY (CH), olive-gray |              |      |   | SOURCE BSWL337-1 at 110 feet |             |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                       |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                              |             |
| LANGAN TREADWELL ROLLO   |                       |              |      |   |                              |             |
|  |                       |              |      | Date 06/02/16   | Project No. 750604205        | Figure F-47 |

# Mayor ED 17-02 Priority permit



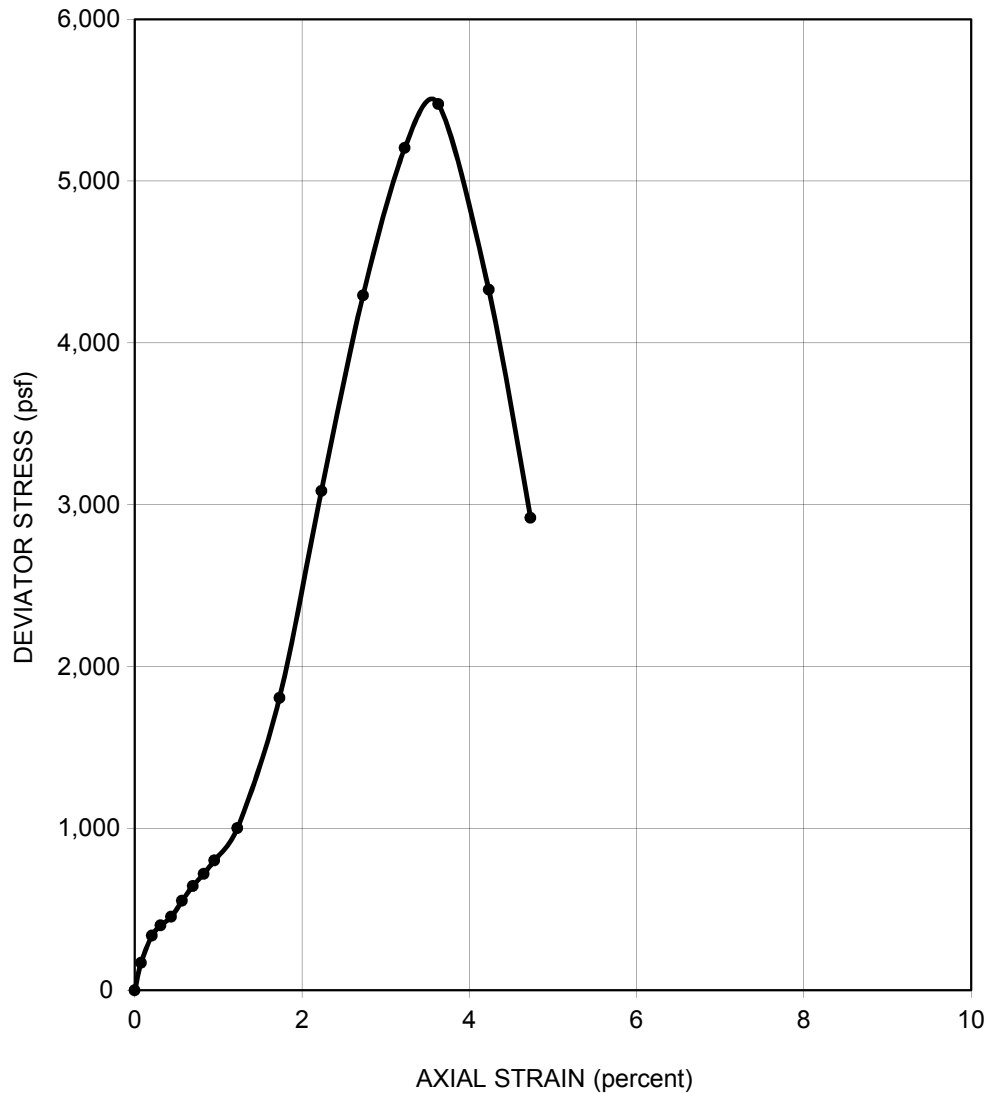
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|--|-------------------------------|--------------|---|--------------------|------------------------------|-----------|--------|------|
| SAMPLER TYPE   | Dames & Moore                 |              |   | SHEAR STRENGTH     | 2,780                        | psf       |        |      |
| DIAMETER (in.)   | 2.43                          | HEIGHT (in.) | 5.73  | STRAIN AT FAILURE  | 6.1                          | %         |        |      |
| MOISTURE CONTENT   | 45.8                          | %            |   | CONFINING PRESSURE | 12,500                       | psf       |        |      |
| DRY DENSITY  | 75                            | pcf          |   | STRAIN RATE        | 0.50                         | % / min   |        |      |
| DESCRIPTION  | CLAY (CL), olive-gray to gray |              |   |                    | SOURCE BSWL337-8 at 125 feet |           |        |      |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                               |              | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |                              |           |        |      |
| LANGAN TREADWELL ROLLO   |                               |              |   |                    |                              |           |        |      |
|  |                               |              | Date  | 06/02/16           | Project No.                  | 750604205 | Figure | F-48 |

# Mayor ED 17-02 Priority permit



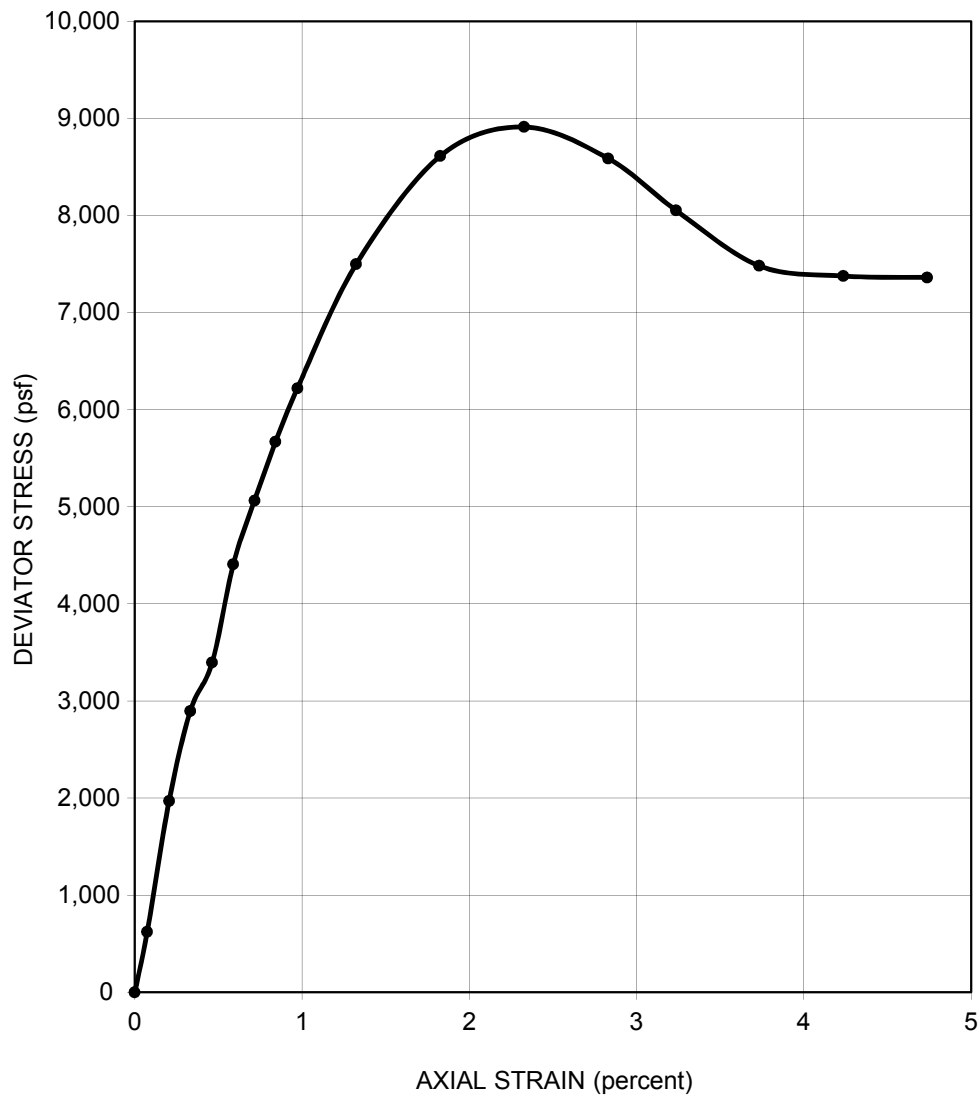
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|--|--|-------------------------------|-------------|--------------|----------------|---|-----|--------------------|-------------------------------|-----|--|--------|--|---------|--|
| SAMPLER TYPE   |  |                               | Shelby Tube |              | SHEAR STRENGTH |   | 690 |                    | psf                           |     |  |        |  |         |  |
| DIAMETER (in.)   |  | 2.86                          |             | HEIGHT (in.) |                | 6.1   |     | STRAIN AT FAILURE  |                               | 5.5 |  | %      |  |         |  |
| MOISTURE CONTENT   |  |                               |             | 61.5         |                | %   |     | CONFINING PRESSURE |                               |     |  | 3,850  |  | psf     |  |
| DRY DENSITY  |  |                               |             | 63           |                | pcf   |     | STRAIN RATE        |                               |     |  | 0.75   |  | % / min |  |
| DESCRIPTION  |  | CLAY (CH), gray to olive-gray |             |              |                |   |     |                    | SOURCE BSWL337-9 at 38.5 feet |     |  |        |  |         |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |  |                               |             |              |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |     |                    |                               |     |  |        |  |         |  |
| LANGAN TREADWELL ROLLO   |  |                               |             |              |                |   |     |                    |                               |     |  |        |  |         |  |
| Date   |  |                               | 06/02/16    |              |                | Project No.   |     |                    | 750604205                     |     |  | Figure |  | F-49    |  |

# Mayor ED 17-02 Priority permit



|  |      |              |                |   |                                     |              |
|--|------|--------------|----------------|---|-------------------------------------|--------------|
| SAMPLER TYPE   |      |              | SHEAR STRENGTH |   | 2,740                               | psf          |
| DIAMETER (in.)   | 2.42 | HEIGHT (in.) | 5.73           | STRAIN AT FAILURE                                     |                                     | 3.6 %        |
| MOISTURE CONTENT   |      |              | 51.5 %         | CONFINING PRESSURE                                    |                                     | 9,500 psf    |
| DRY DENSITY  |      |              | 69 pcf         | STRAIN RATE   |                                     | 0.50 % / min |
| DESCRIPTION  |      |              |                |   | CLAY (CL), green-gray to olive gray |              |
|  |      |              |                |   | SOURCE BSWL337-9 at 95 feet         |              |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |              |                | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                                     |              |
| LANGAN TREADWELL ROLLO   |      |              |                |   |                                     |              |
| Date   |      | 06/02/16     |                | Project No.   |                                     | 750604205    |
| Figure   |      | F-50         |                |   |                                     |              |

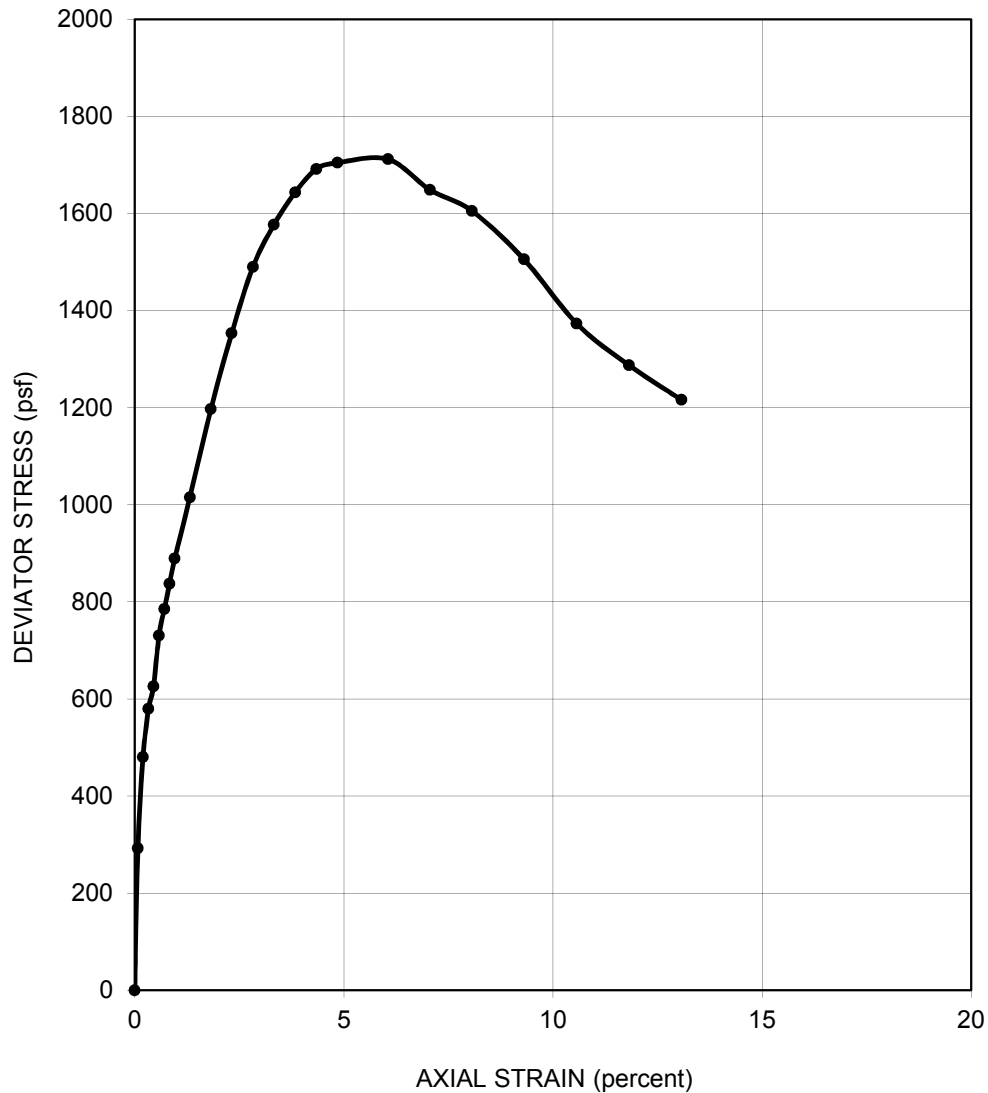
# Mayor ED 17-02 Priority permit



|  |                                     |              |      |   |                              |           |
|--|-------------------------------------|--------------|------|---|------------------------------|-----------|
| SAMPLER TYPE   | Dames & Moore                       |              |      | SHEAR STRENGTH  | 4,460                        | psf       |
| DIAMETER (in.)   | 2.43                                | HEIGHT (in.) | 5.54 | STRAIN AT FAILURE                                     | 2.3                          | %         |
| MOISTURE CONTENT   | 31.7 %                              |              |      | CONFINING PRESSURE                                    | 15,500                       | psf       |
| DRY DENSITY  | 87 pcf                              |              |      | STRAIN RATE   | 0.50                         | % / min   |
| DESCRIPTION  | SANDY CLAY (CL), gray to olive-gray |              |      |   | SOURCE BSWL337-9 at 155 feet |           |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                                     |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                              |           |
| LANGAN TREADWELL ROLLO   |                                     |              |      |   |                              |           |
| Date   |                                     | 06/02/16     |      | Project No.   |                              | 750604205 |
| Figure   |                                     | F-51         |      |   |                              |           |

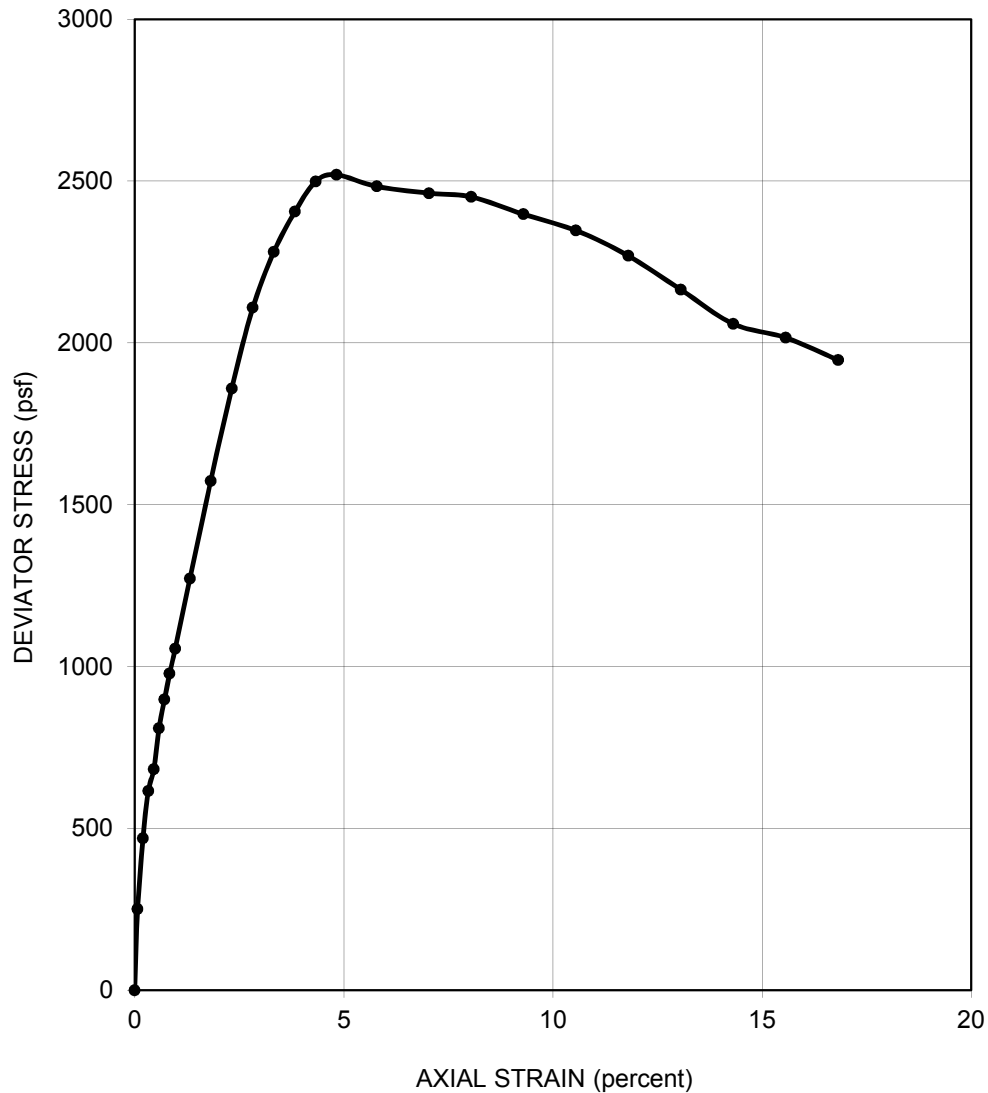


# Mayor ED 17-02 Priority permit



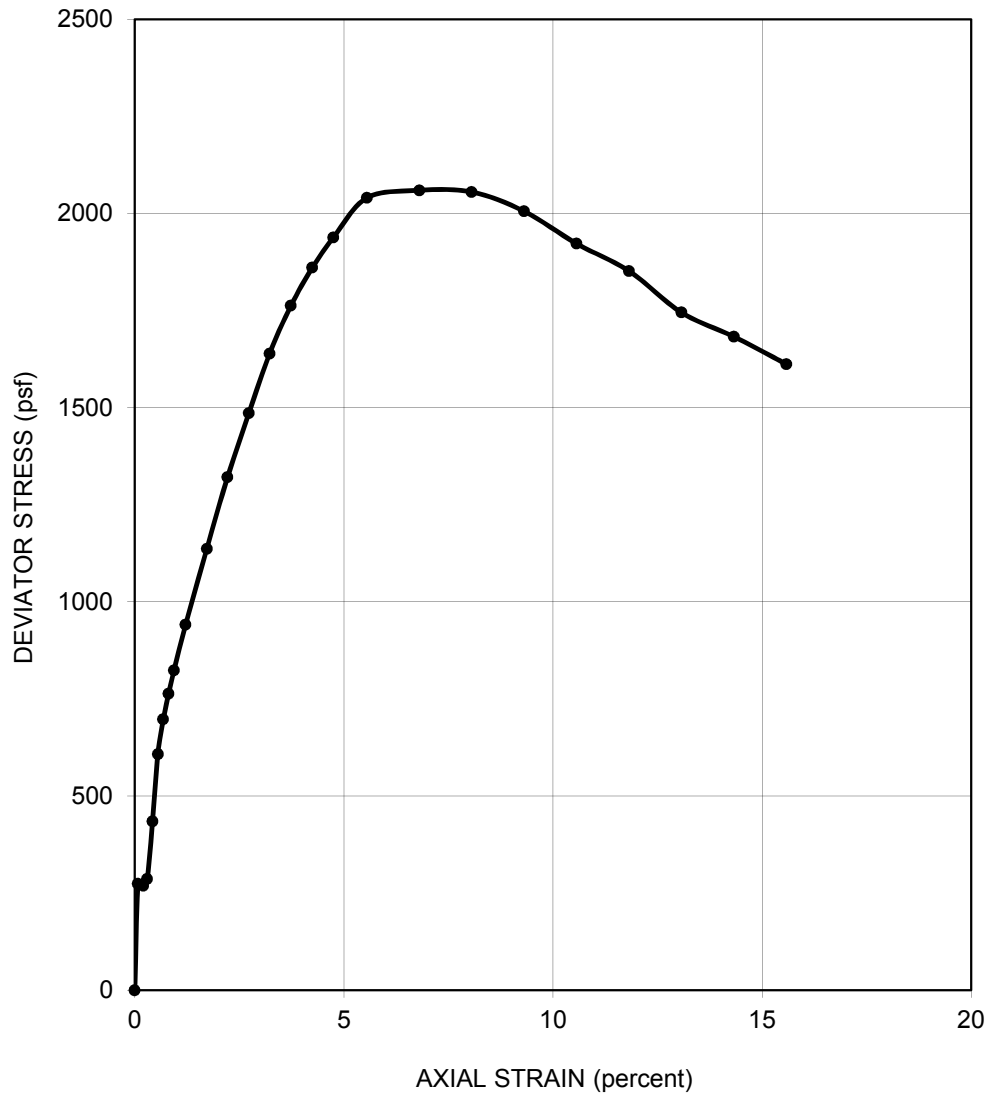
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|--|--------------------------------------|--------------|------|---|------------------------------|-------------|
| SAMPLER TYPE   | Dames & Moore                        |              |      | SHEAR STRENGTH  | 860                          | psf         |
| DIAMETER (in.)   | 2.41                                 | HEIGHT (in.) | 5.74 | STRAIN AT FAILURE                                     | 6.1                          | %           |
| MOISTURE CONTENT   | 67.4                                 | %            |      | CONFINING PRESSURE                                    | 4,000                        | psf         |
| DRY DENSITY  | 58                                   | pcf          |      | STRAIN RATE   | 0.75                         | % / min     |
| DESCRIPTION  | CLAY (CH), grades black to dark gray |              |      |   | SOURCE BSWL337-10 at 40 feet |             |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                                      |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                              |             |
| LANGAN TREADWELL ROLLO   |                                      |              |      |   |                              |             |
|  |                                      |              |      | Date 06/02/16   | Project No. 750604205        | Figure F-52 |

# Mayor ED 17-02 Priority permit



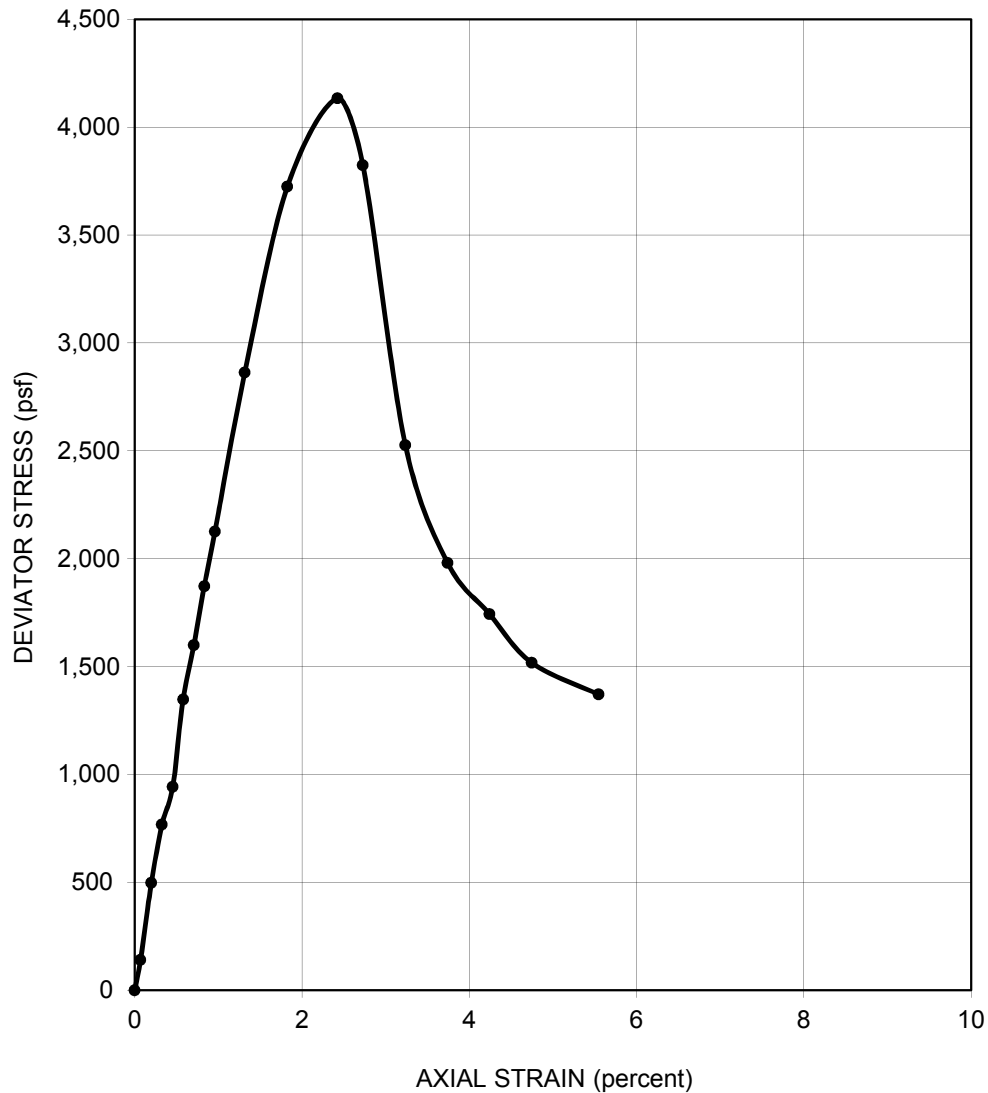
|  |                   |   |                              |
|--|-------------------|---|------------------------------|
| SAMPLER TYPE Dames & Moore   |                   | SHEAR STRENGTH 1,260 psf                              |                              |
| DIAMETER (in.) 2.40  | HEIGHT (in.) 5.68 | STRAIN AT FAILURE 4.8 %                               |                              |
| MOISTURE CONTENT 50.7 %  |                   | CONFINING PRESSURE 5,500 psf                          |                              |
| DRY DENSITY 70 pcf   |                   | STRAIN RATE 0.75 % / min                              |                              |
| DESCRIPTION CLAY (CH), gray to olive-gray                                  |                   |   | SOURCE BSWL337-11 at 55 feet |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                   | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                              |
| <b>LANGAN TREADWELL ROLLO</b>  |                   | Date 06/02/16   | Project No. 750604205        |
|  |                   | Figure F-53   |                              |

# Mayor ED 17-02 Priority permit



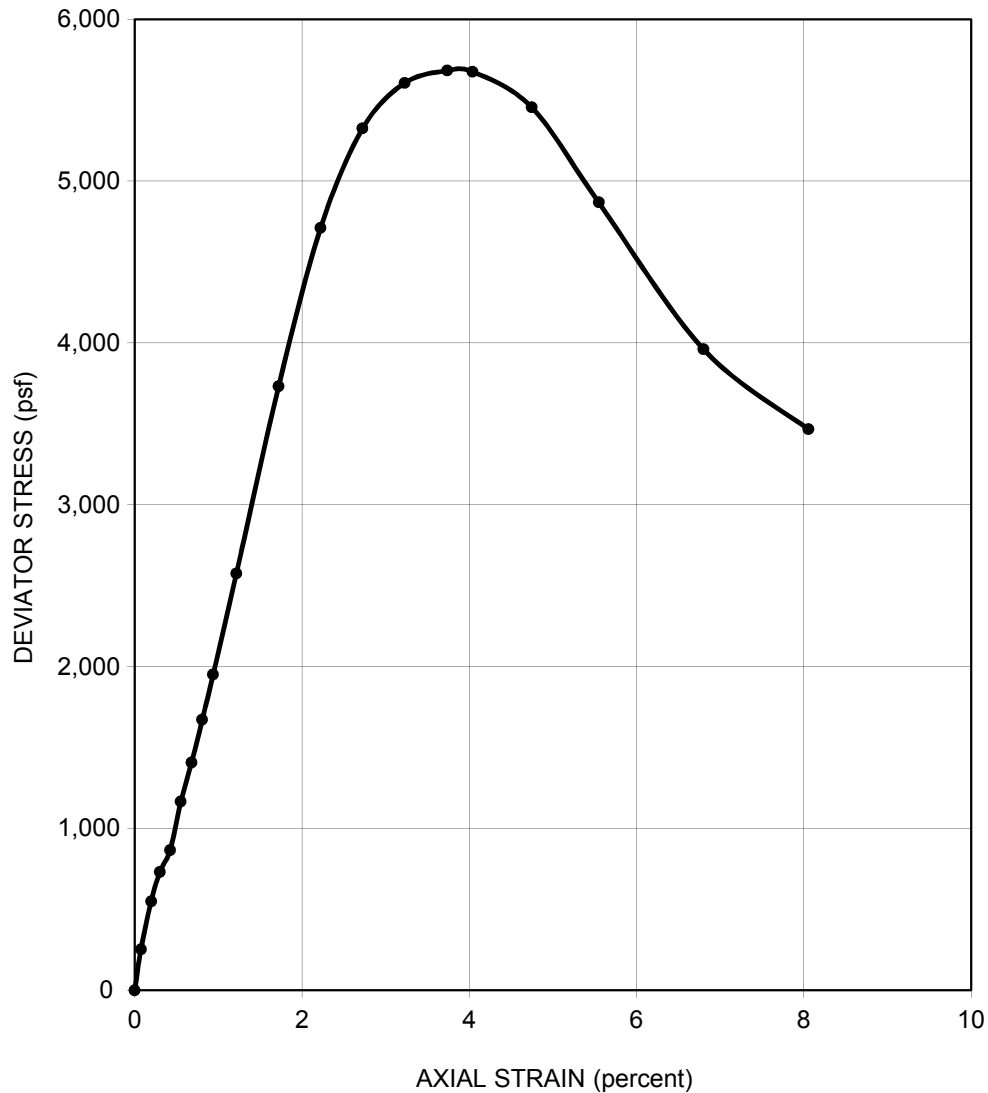
|  |                 |              |      |   |                              |             |
|--|-----------------|--------------|------|---|------------------------------|-------------|
| SAMPLER TYPE   | Dames & Moore   |              |      | SHEAR STRENGTH  | 1,030                        | psf         |
| DIAMETER (in.)   | 2.41            | HEIGHT (in.) | 5.57 | STRAIN AT FAILURE                                     | 6.8                          | %           |
| MOISTURE CONTENT   | 55.6            | %            |      | CONFINING PRESSURE                                    | 6,500                        | psf         |
| DRY DENSITY  | 65              | pcf          |      | STRAIN RATE   | 0.75                         | % / min     |
| DESCRIPTION  | CLAY (CH), gray |              |      |   | SOURCE BSWL337-12 at 65 feet |             |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                 |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                              |             |
| LANGAN TREADWELL ROLLO   |                 |              |      |   |                              |             |
|  |                 |              |      | Date 06/02/16   | Project No. 750604205        | Figure F-54 |

# Mayor ED 17-02 Priority permit



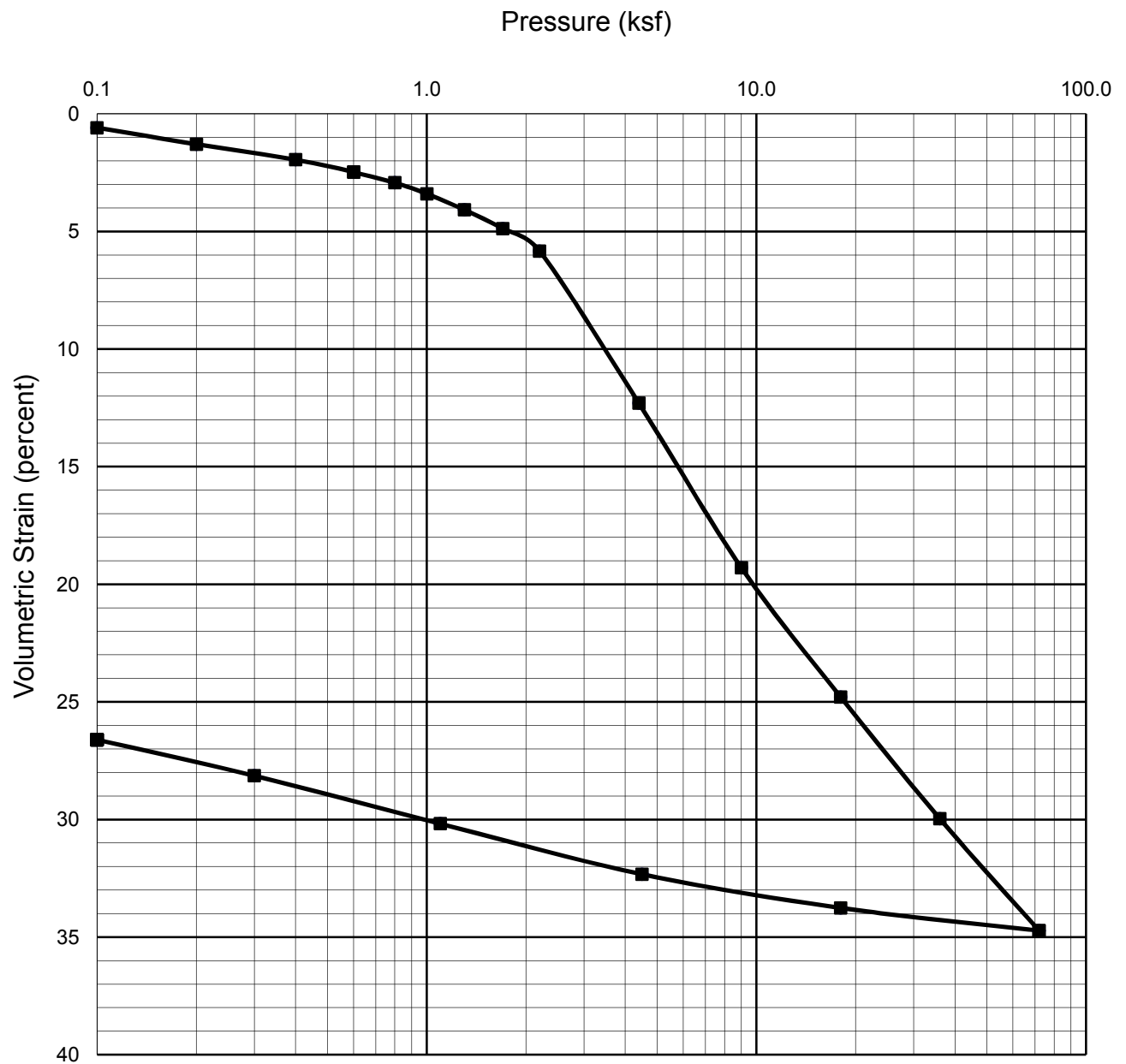
|  |                  |              |      |   |                               |             |
|--|------------------|--------------|------|---|-------------------------------|-------------|
| SAMPLER TYPE   | Dames & Moore    |              |      | SHEAR STRENGTH  | 2,070                         | psf         |
| DIAMETER (in.)   | 2.43             | HEIGHT (in.) | 5.56 | STRAIN AT FAILURE                                     | 2.4                           | %           |
| MOISTURE CONTENT   | 60.9             | %            |      | CONFINING PRESSURE                                    | 10,000                        | psf         |
| DRY DENSITY  | 62               | pcf          |      | STRAIN RATE   | 0.75                          | % / min     |
| DESCRIPTION  | CLAY (CH), olive |              |      |   | SOURCE BSWL337-12 at 100 feet |             |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                  |              |      | UNCONSOLIDATED-UNDRAINED<br>TRIAXIAL COMPRESSION TEST |                               |             |
| LANGAN TREADWELL ROLLO   |                  |              |      |   |                               |             |
|  |                  |              |      | Date 06/02/16   | Project No. 750604205         | Figure F-55 |

# Mayor ED 17-02 Priority permit



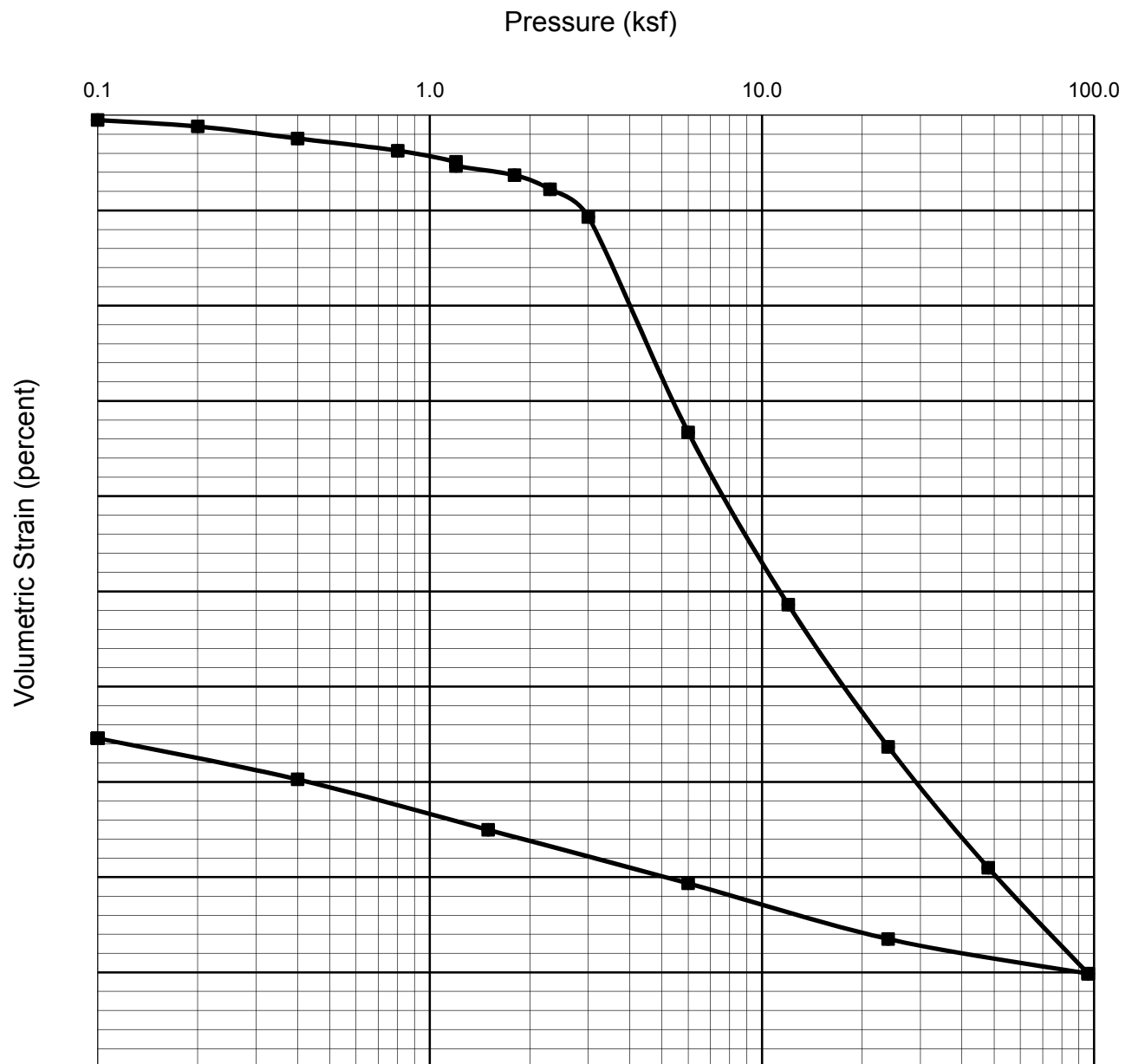
|  |                  |              |   |                    |                               |           |        |      |
|--|------------------|--------------|---|--------------------|-------------------------------|-----------|--------|------|
| SAMPLER TYPE   | Dames & Moore    |              |   | SHEAR STRENGTH     | 2,840                         | psf       |        |      |
| DIAMETER (in.)   | 2.43             | HEIGHT (in.) | 5.54  | STRAIN AT FAILURE  | 3.7                           | %         |        |      |
| MOISTURE CONTENT   | 32.0             | %            |   | CONFINING PRESSURE | 14,000                        | psf       |        |      |
| DRY DENSITY  | 89               | pcf          |   | STRAIN RATE        | 0.75                          | % / min   |        |      |
| DESCRIPTION  | CLAY (CH), olive |              |   |                    | SOURCE BSWL337-12 at 140 feet |           |        |      |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |                  |              | UNCONSOLIDATED-UNDRAINED<br>TRIAxIAL COMPRESSION TEST |                    |                               |           |        |      |
| LANGAN TREADWELL ROLLO   |                  |              |   |                    |                               |           |        |      |
|  |                  |              | Date  | 06/02/16           | Project No.                   | 750604205 | Figure | F-56 |

# Mayor ED 17-02 Priority permit



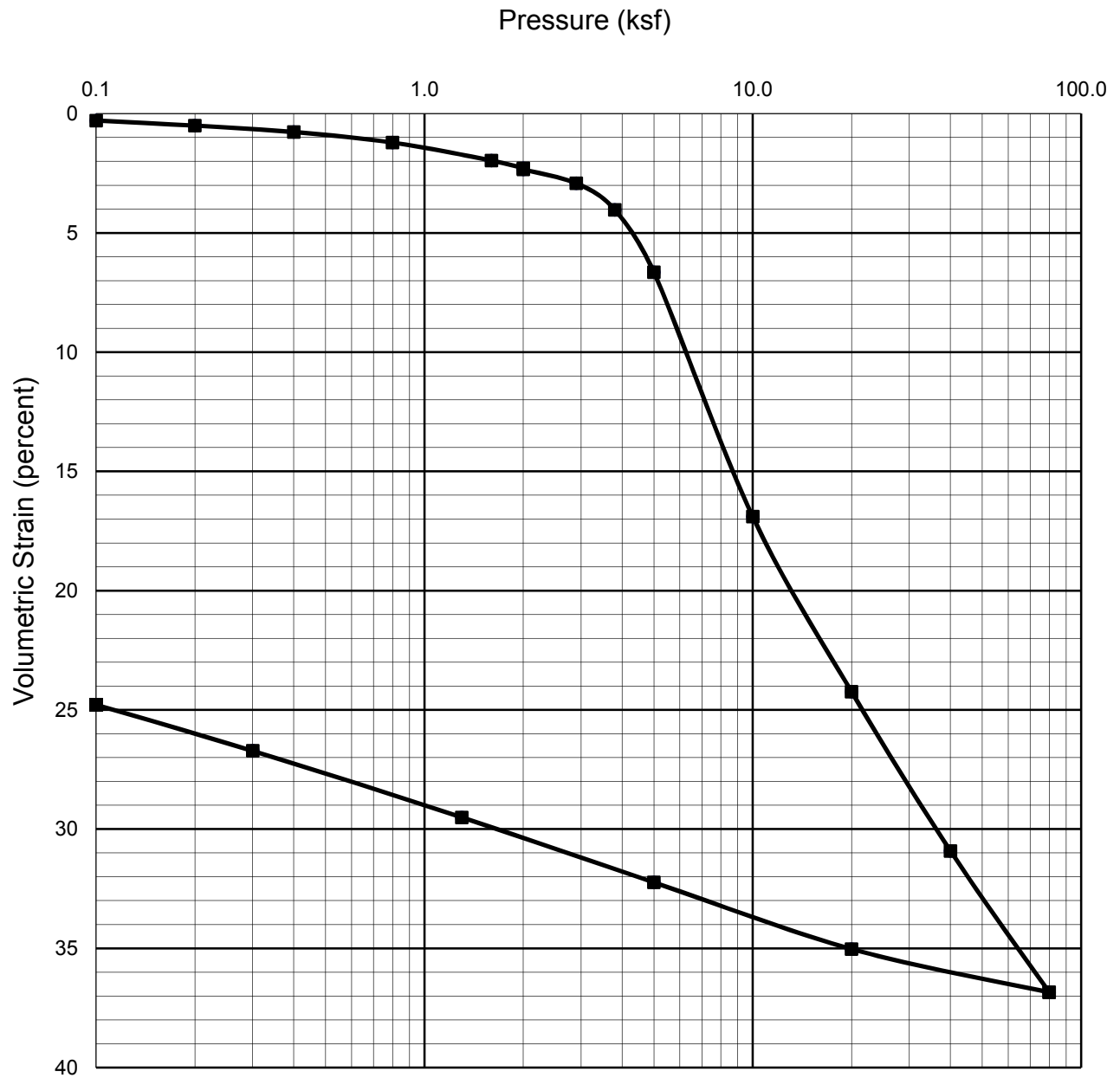
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|-------------------------------------|--|------|-------------|-----------|-------------|---------------------------|----|----------------|--------------------------------------|-----|----------------|--------|-----------|----------------------|
| Sampler Type: Shelby Tube           |  |      |             | Condition | Before Test |                           |    | After Test     |                                      |     |                |        |           |                      |
| Diameter (in)                       |  | 2.42 | Height (in) |           | 1.00        | Water Content             |    | w <sub>o</sub> | 48.4                                 | %   | w <sub>f</sub> | 26.0   | %         |                      |
| Overburden Pressure, p <sub>o</sub> |  |      |             | 2,400     | psf         | Void Ratio                |    | e <sub>o</sub> | 1.32                                 |     | e <sub>f</sub> | 0.70   |           |                      |
| Preconsol. Pressure, p <sub>c</sub> |  |      |             | 2,200     | psf         | Saturation                |    | S <sub>o</sub> | 99                                   | %   | S <sub>f</sub> | 100    | %         |                      |
| Compression Ratio, C <sub>ec</sub>  |  |      |             | 0.21      |             | Dry Density               |    | γ <sub>d</sub> | 73                                   | pcf | γ <sub>d</sub> | 99     | pcf       |                      |
| LL                                  |  | --   | PL          |           |             | --                        | PI |                |                                      | --  | G <sub>s</sub> | 2.70   | (assumed) |                      |
| Classification                      |  |      |             |           |             |                           |    |                | CLAY (CH), dark gray with olive-gray |     |                | Source |           | BSWL337-6 at 35 feet |
| SEAWALL LOT 337                     |  |      |             |           |             | CONSOLIDATION TEST REPORT |    |                |                                      |     |                |        |           |                      |
| San Francisco, California           |  |      |             |           |             |                           |    |                |                                      |     |                |        |           |                      |
| LANGAN TREADWELL ROLLO              |  |      |             |           |             | Date                      |    | 06/02/16       | Project No.                          |     | 750604205      | Figure |           | F-57                 |

# Mayor ED 17-02 Priority permit



|  |      |             |      |               |                           |             |                      |                |      |      |     |
|--|------|-------------|------|---------------|---------------------------|-------------|----------------------|----------------|------|------|-----|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |                      | After Test     |      |      |     |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 74.0        | %                    | w <sub>f</sub> | 38.2 | %    |     |
| Overburden Pressure, p <sub>o</sub>  |      | 2,550       | psf  | Void Ratio    | e <sub>o</sub>            | 2.02        |                      | e <sub>f</sub> | 1.03 |      |     |
| Preconsol. Pressure, p <sub>c</sub>  |      | 3,000       | psf  | Saturation    | S <sub>o</sub>            | 99          | %                    | S <sub>f</sub> | 100  |      | %   |
| Compression Ratio, C <sub>ec</sub>   |      | 0.36        |      | Dry Density   | γ <sub>d</sub>            | 56          | pcf                  | γ <sub>d</sub> | 83   |      | pcf |
| LL   |      | --          |      | PL            |                           | --          |                      | PI             |      | --   |     |
| G <sub>s</sub>   |      | 2.70        |      | (assumed)     |                           |             |                      |                |      |      |     |
| Classification   |      |             |      |               |                           |             | CLAY (CH), dark gray |                |      |      |     |
| Source   |      |             |      |               |                           |             | BSWL337-7 at 40 feet |                |      |      |     |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |                      |                |      |      |     |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |                      |                |      |      |     |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |                      | Figure         |      | F-58 |     |

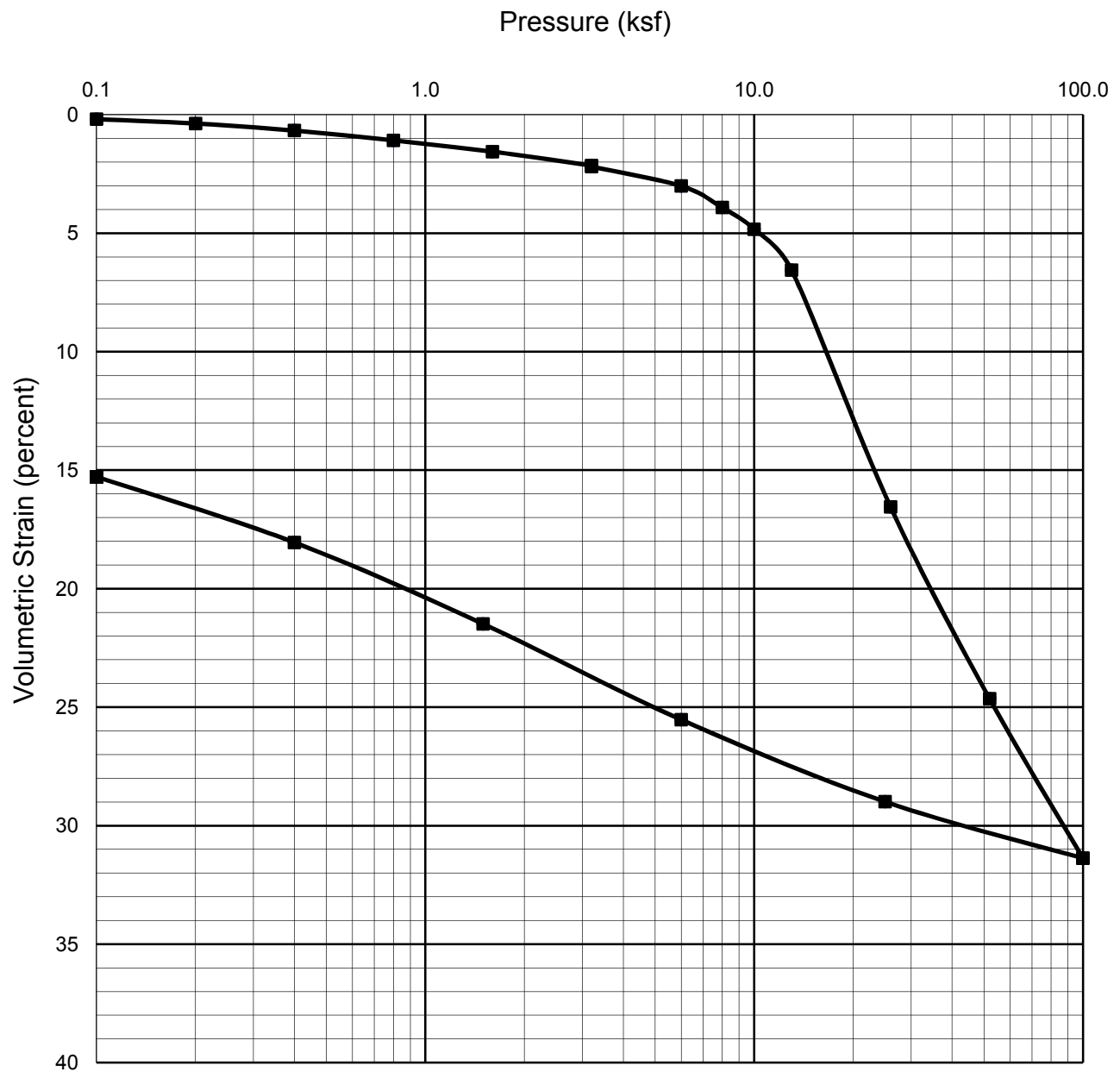
# Mayor ED 17-02 Priority permit



|  |      |             |      |               |                           |             |                      |                |                |                |        |                      |
|--|------|-------------|------|---------------|---------------------------|-------------|----------------------|----------------|----------------|----------------|--------|----------------------|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |                      | After Test     |                |                |        |                      |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 55.6        | %                    | w <sub>f</sub> | 33.7           | %              |        |                      |
| Overburden Pressure, p <sub>o</sub>  |      | 3,300       | psf  | Void Ratio    | e <sub>o</sub>            | 1.54        |                      | e <sub>f</sub> | 0.91           |                |        |                      |
| Preconsol. Pressure, p <sub>c</sub>  |      | 4,000       | psf  | Saturation    | S <sub>o</sub>            | 98          | %                    | S <sub>f</sub> | 100            | %              |        |                      |
| Compression Ratio, C <sub>ec</sub>   |      | 0.27        |      | Dry Density   | γ <sub>d</sub>            | 66          | pcf                  | γ <sub>d</sub> | 88             | pcf            |        |                      |
| LL   |      | --          | PL   |               | --                        | PI          |                      | --             | G <sub>s</sub> | 2.70 (assumed) |        |                      |
| Classification   |      |             |      |               |                           |             | CLAY (CH), dark gray |                |                |                | Source | BSWL337-7 at 60 feet |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |                      |                |                |                |        |                      |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |                      |                |                |                |        |                      |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |                      | Figure         |                | F-59           |        |                      |

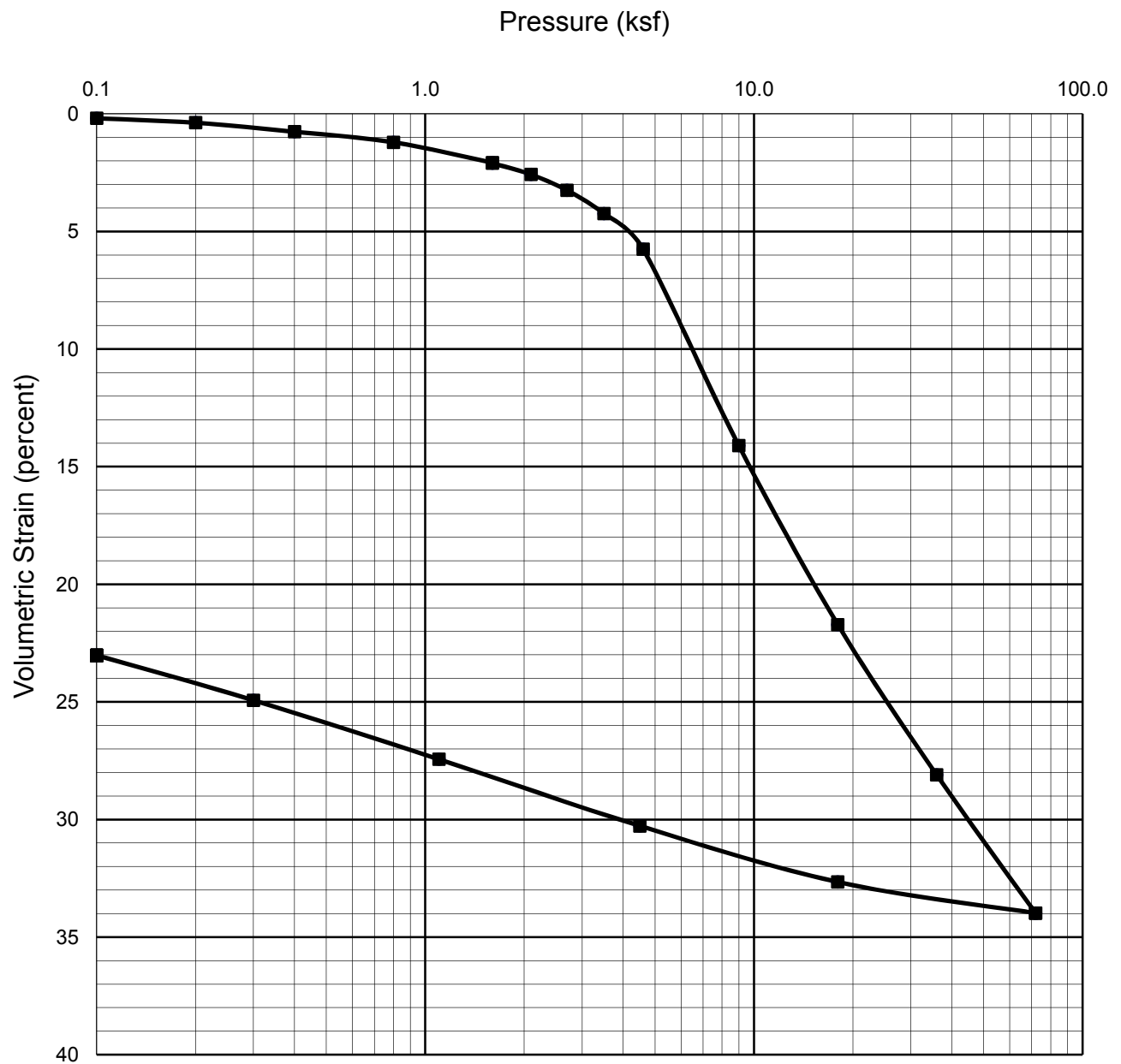


# Mayor ED 17-02 Priority permit



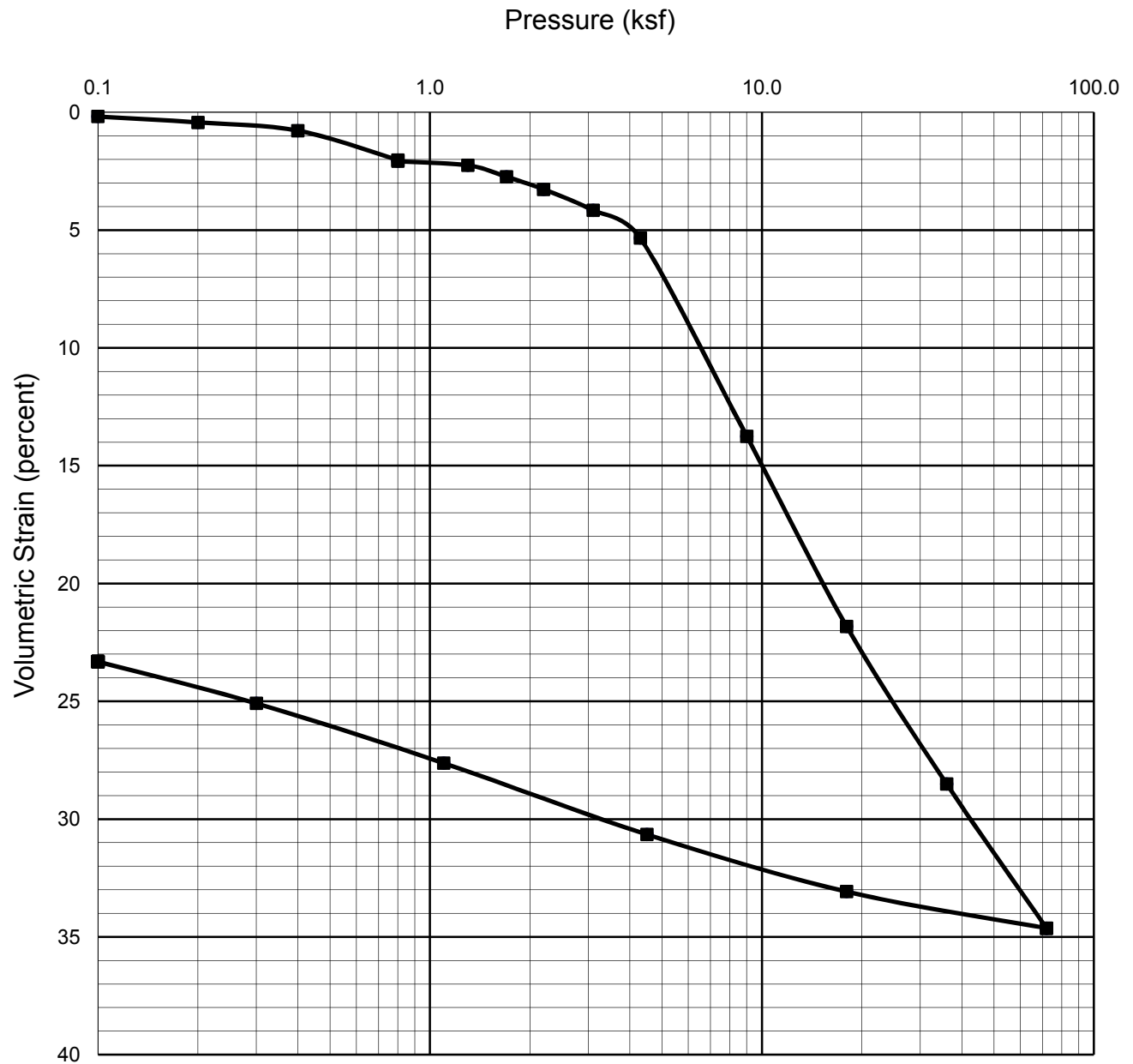
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|--|------|-------------|------|---------------|---------------------------|-------------|------------------|----------------|----------------|----------------|--------|-----------------------|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |                  | After Test     |                |                |        |                       |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 48.2        | %                | w <sub>f</sub> | 36.3           | %              |        |                       |
| Overburden Pressure, p <sub>o</sub>  |      | 7,300       | psf  | Void Ratio    | e <sub>o</sub>            | 1.34        |                  | e <sub>f</sub> | 0.98           |                |        |                       |
| Preconsol. Pressure, p <sub>c</sub>  |      | 13,000      | psf  | Saturation    | S <sub>o</sub>            | 97          | %                | S <sub>f</sub> | 100            | %              |        |                       |
| Compression Ratio, C <sub>ec</sub>   |      | 0.3         |      | Dry Density   | γ <sub>d</sub>            | 72          | pcf              | γ <sub>d</sub> | 85             | pcf            |        |                       |
| LL   |      | --          | PL   |               | --                        | PI          |                  | --             | G <sub>s</sub> | 2.70 (assumed) |        |                       |
| Classification   |      |             |      |               |                           |             | CLAY (CH), olive |                |                |                | Source | BSWL337-7 at 140 feet |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |                  |                |                |                |        |                       |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |                  |                |                |                |        |                       |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |                  | Figure         |                | F-60           |        |                       |

# Mayor ED 17-02 Priority permit



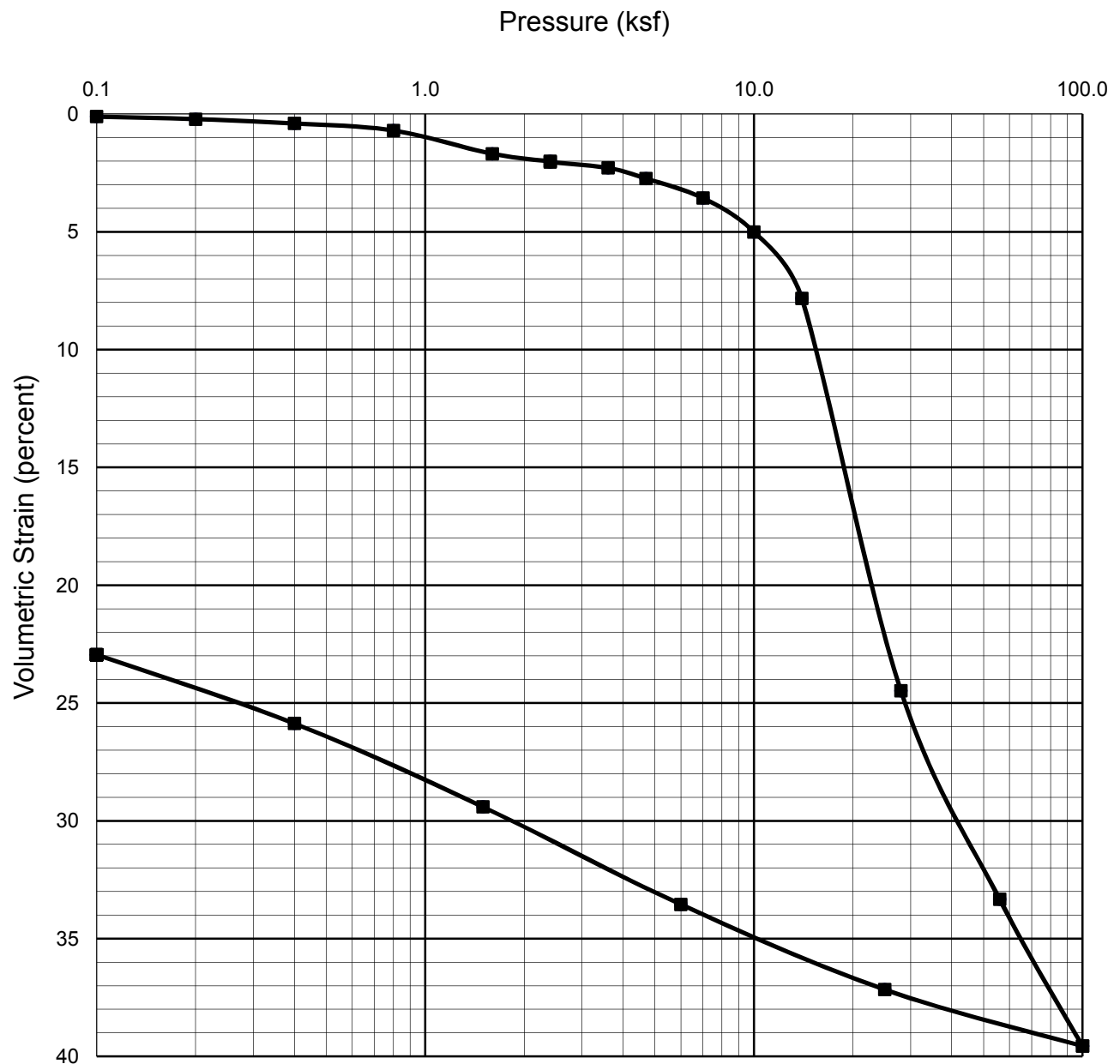
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|--|------|-------------|------|---------------|---------------------------|-------------|---|-------------------------------|----------------|------|---|-----------|--|----------------------|--|
| Sampler Type: Shelby Tube  |      |             |      | Condition     |                           | Before Test |   | After Test                    |                |      |   |           |  |                      |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 55.4        | % | w <sub>f</sub>                | 34.2           | %    |   |           |  |                      |  |
| Overburden Pressure, p <sub>o</sub>  |      | 3,450       | psf  | Void Ratio    | e <sub>o</sub>            | 1.50        |   | e <sub>f</sub>                | 0.92           |      |   |           |  |                      |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 4,500       | psf  | Saturation    | S <sub>o</sub>            | 100         |   | %                             | S <sub>f</sub> | 100  | % |           |  |                      |  |
| Compression Ratio, C <sub>cc</sub>   |      | 0.28        |      | Dry Density   | γ <sub>d</sub>            | 68          |   | pcf                           | γ <sub>d</sub> | 88   |   | pcf       |  |                      |  |
| LL   |      | --          | PL   |               | --                        | PI          |   | --                            | G <sub>s</sub> | 2.70 |   | (assumed) |  |                      |  |
| Classification   |      |             |      |               |                           |             |   | CLAY (CH), olive-gray to gray |                |      |   | Source    |  | BSWL337-8 at 45 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |   |                               |                |      |   |           |  |                      |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |   |                               |                |      |   |           |  |                      |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |   | Figure                        |                | F-61 |   |           |  |                      |  |

# Mayor ED 17-02 Priority permit



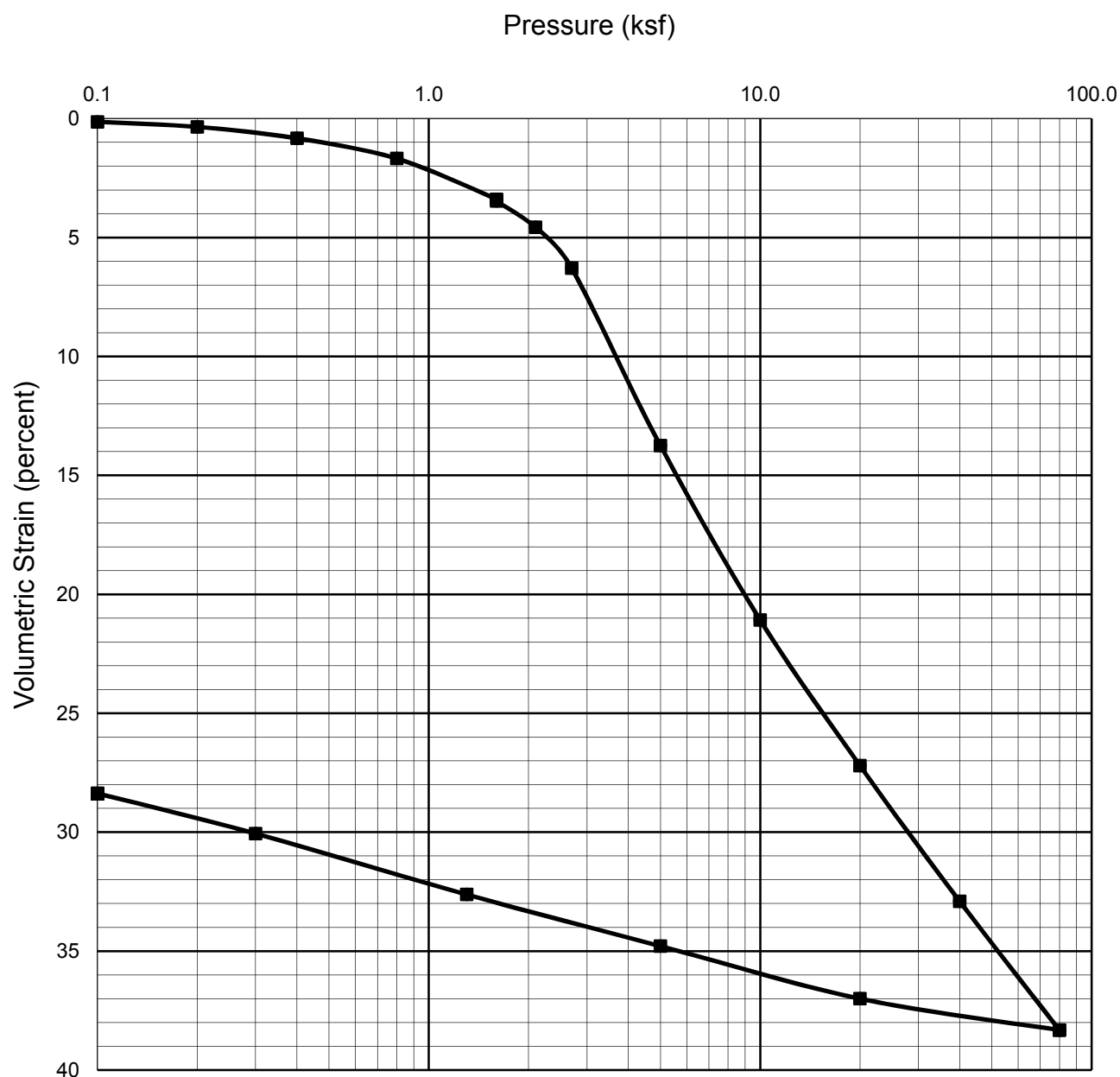
|  |      |             |      |               |                           |             |   |                               |                |     |   |                |      |                      |  |
|--|------|-------------|------|---------------|---------------------------|-------------|---|-------------------------------|----------------|-----|---|----------------|------|----------------------|--|
| Sampler Type: Shelby Tube  |      |             |      | Condition     |                           | Before Test |   | After Test                    |                |     |   |                |      |                      |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 55.6        | % | w <sub>f</sub>                | 34.0           | %   |   |                |      |                      |  |
| Overburden Pressure, p <sub>o</sub>  |      | 3,900       | psf  | Void Ratio    | e <sub>o</sub>            | 1.50        |   | e <sub>f</sub>                | 0.92           |     |   |                |      |                      |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 4,500       | psf  | Saturation    | S <sub>o</sub>            | 100         |   | %                             | S <sub>f</sub> | 100 | % |                |      |                      |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.28        |      | Dry Density   | γ <sub>d</sub>            | 67          |   | pcf                           | γ <sub>d</sub> | 88  |   | pcf            |      |                      |  |
| LL   |      | --          |      | PL            |                           | --          |   | PI                            |                | --  |   | G <sub>s</sub> | 2.70 | (assumed)            |  |
| Classification   |      |             |      |               |                           |             |   | CLAY (CH), olive-gray to gray |                |     |   | Source         |      | BSWL337-8 at 55 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |   |                               |                |     |   |                |      |                      |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |   |                               |                |     |   |                |      |                      |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |   | Figure F-62                   |                |     |   |                |      |                      |  |

# Mayor ED 17-02 Priority permit



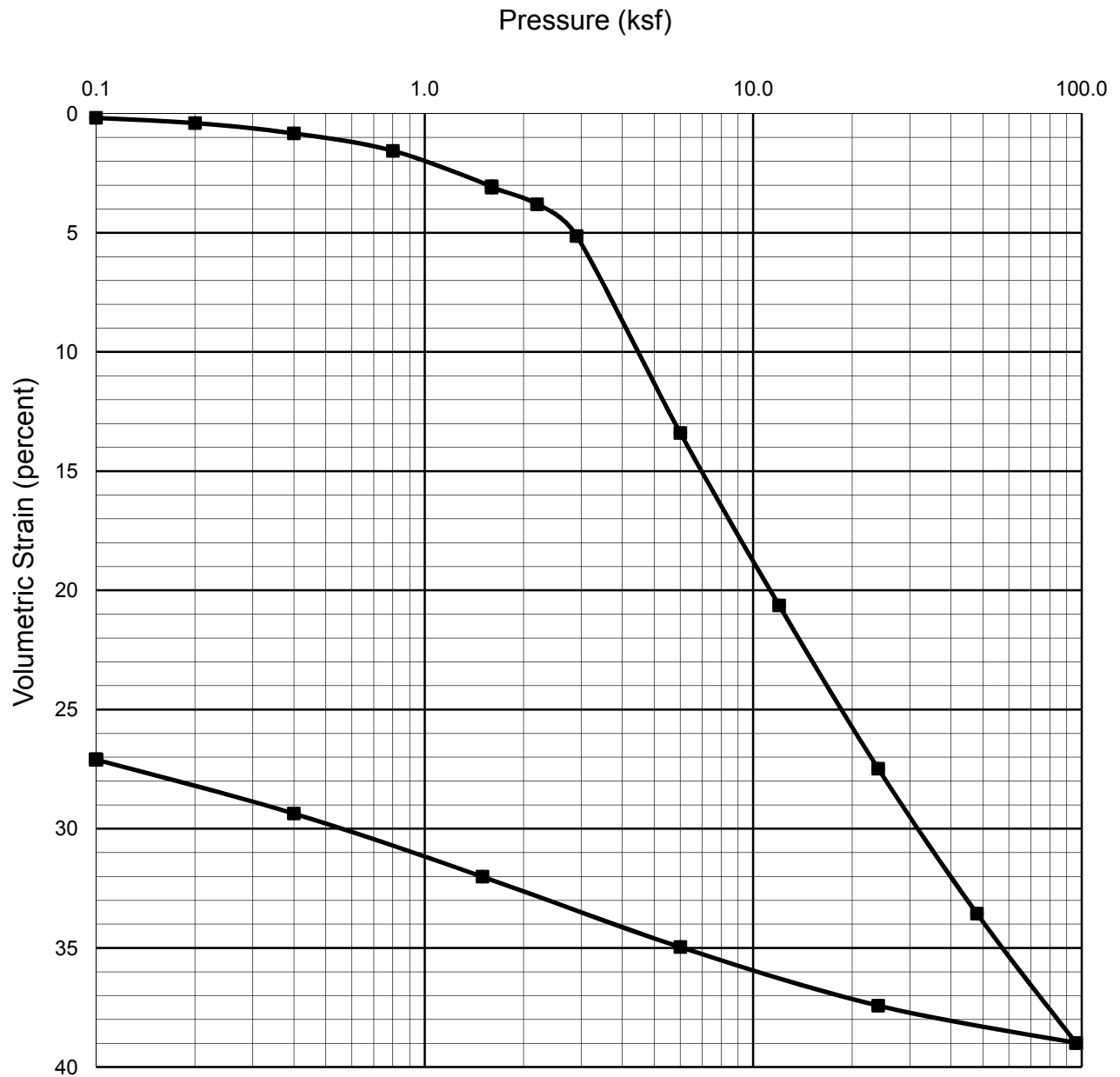
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|--|------|-------------|------|---------------|---------------------------|-------------|---|-------------------------------|----------------|------|-----------|--------|----------------------|--|
| Sampler Type: Shelby Tube  |      |             |      | Condition     |                           | Before Test |   | After Test                    |                |      |           |        |                      |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 65.2        | % | w <sub>f</sub>                | 41.6           | %    |           |        |                      |  |
| Overburden Pressure, p <sub>o</sub>  |      | 5,700       | psf  | Void Ratio    | e <sub>o</sub>            | 1.75        |   | e <sub>f</sub>                | 1.12           |      |           |        |                      |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 14,500      | psf  | Saturation    | S <sub>o</sub>            | 101         |   | %                             | S <sub>f</sub> | 100  | %         |        |                      |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.40        |      | Dry Density   | γ <sub>d</sub>            | 61          |   | pcf                           | γ <sub>d</sub> | 80   |           | pcf    |                      |  |
| LL   |      | --          | PL   |               | --                        | PI          |   | --                            | G <sub>s</sub> | 2.70 | (assumed) |        |                      |  |
| Classification   |      |             |      |               |                           |             |   | CLAY (CL), olive-gray to gray |                |      |           | Source | BSWL337-8 at 95 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |   |                               |                |      |           |        |                      |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |   |                               |                |      |           |        |                      |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |   | Figure                        |                | F-63 |           |        |                      |  |

# Mayor ED 17-02 Priority permit



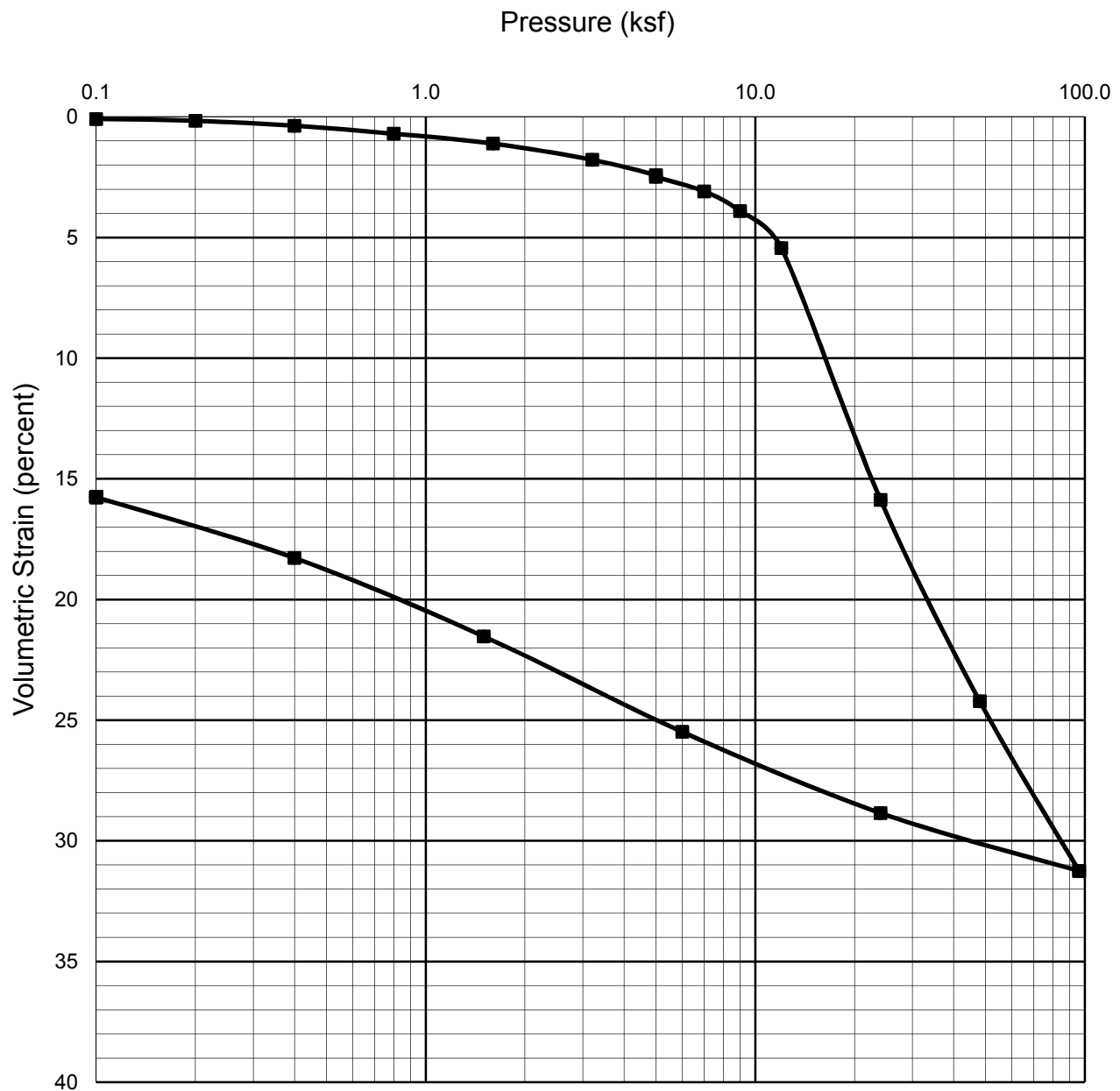
|  |      |             |      |                           |                |                       |                              |                |             |     |  |
|--|------|-------------|------|---------------------------|----------------|-----------------------|------------------------------|----------------|-------------|-----|--|
| Sampler Type: Dames & Moore  |      |             |      | Condition                 |                | Before Test           |                              |                | After Test  |     |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content             | w <sub>o</sub> | 55.9                  | %                            | w <sub>f</sub> | 30.5        | %   |  |
| Overburden Pressure, p <sub>o</sub>  |      | 1,950       | psf  | Void Ratio                | e <sub>o</sub> | 1.55                  |                              | e <sub>f</sub> | 0.83        |     |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 2,500       | psf  | Saturation                | S <sub>o</sub> | 97                    | %                            | S <sub>f</sub> | 100         | %   |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.25        |      | Dry Density               | γ <sub>d</sub> | 66                    | pcf                          | γ <sub>d</sub> | 92          | pcf |  |
| LL --  |      | PL --       |      | PI --                     |                |                       | G <sub>s</sub>               | 2.70           | (assumed)   |     |  |
| Classification CLAY (CH), grades black to dark gray                        |      |             |      |                           |                |                       | Source BSWL337-10 at 30 feet |                |             |     |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      | CONSOLIDATION TEST REPORT |                |                       |                              |                |             |     |  |
|  |      |             |      |                           |                |                       |                              |                |             |     |  |
| LANGAN TREADWELL ROLLO   |      |             |      | Date 06/02/16             |                | Project No. 750604205 |                              |                | Figure F-64 |     |  |

# Mayor ED 17-02 Priority permit



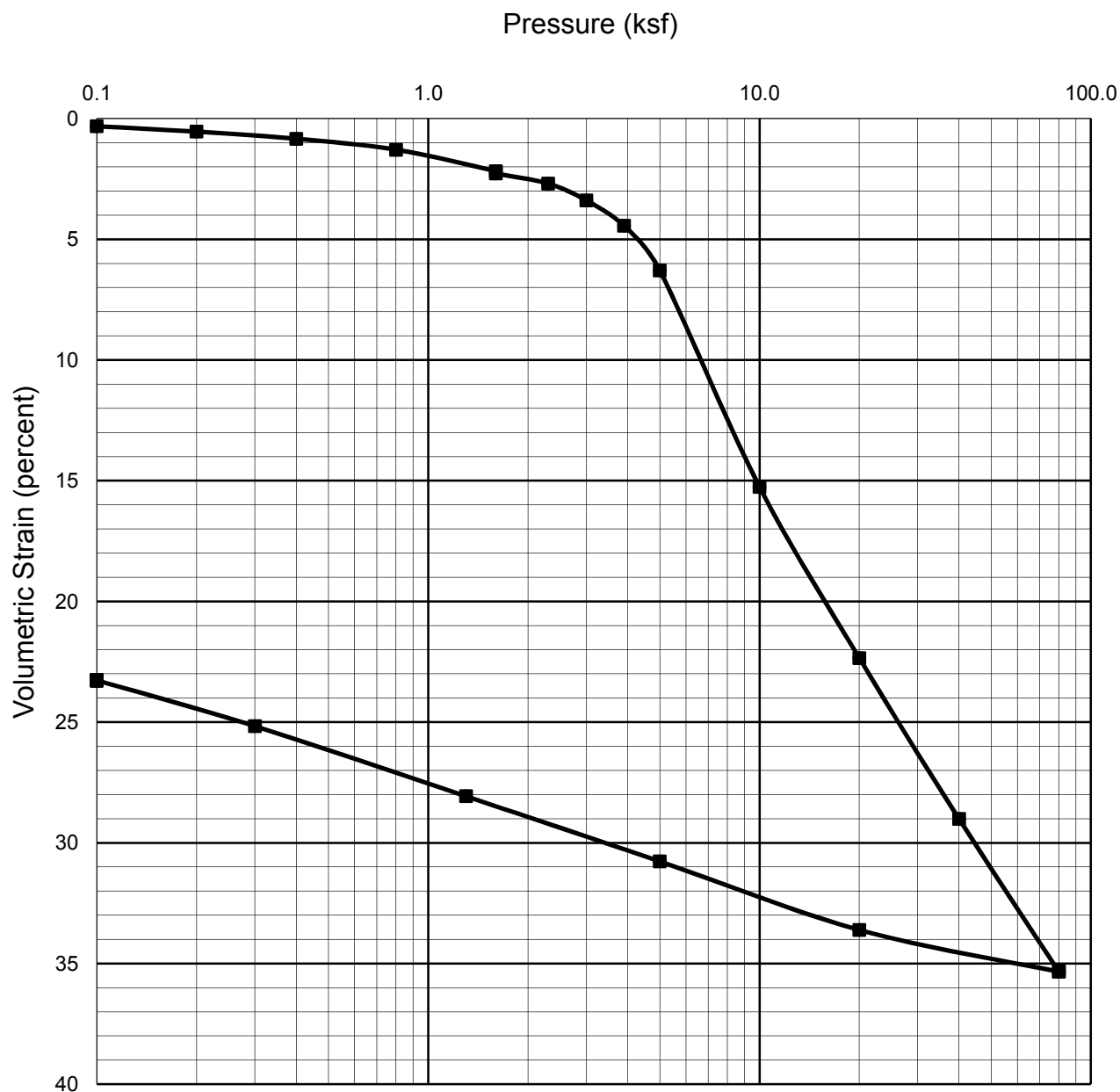
|  |  |      |             |           |      |               |                           |                |                                      |     |                               |        |     |        |  |                       |  |
|--|--|------|-------------|-----------|------|---------------|---------------------------|----------------|--------------------------------------|-----|-------------------------------|--------|-----|--------|--|-----------------------|--|
| Sampler Type: Dames & Moore  |  |      |             | Condition |      | Before Test   |                           |                | After Test                           |     |                               |        |     |        |  |                       |  |
| Diameter (in)  |  | 2.42 | Height (in) |           | 1.00 | Water Content |                           | w <sub>o</sub> | 56.9                                 | %   | w <sub>f</sub>                | 32.4   | %   |        |  |                       |  |
| Overburden Pressure, p <sub>o</sub>  |  |      |             | 2,700     | psf  | Void Ratio    |                           | e <sub>o</sub> | 1.57                                 |     | e <sub>f</sub>                | 0.87   |     |        |  |                       |  |
| Preconsol. Pressure, p <sub>c</sub>  |  |      |             | 2,800     | psf  | Saturation    |                           | S <sub>o</sub> | 98                                   | %   | S <sub>f</sub>                | 100    | %   |        |  |                       |  |
| Compression Ratio, C <sub>ec</sub>   |  |      |             | 0.25      |      | Dry Density   |                           | γ <sub>d</sub> | 66                                   | pcf | γ <sub>d</sub>                | 90     | pcf |        |  |                       |  |
| LL   |  | --   | PL          |           |      | --            | PI                        |                |                                      | --  | G <sub>s</sub> 2.70 (assumed) |        |     |        |  |                       |  |
| Classification   |  |      |             |           |      |               |                           |                | CLAY (CH), grades black to dark gray |     |                               |        |     | Source |  | BSWL337-10 at 50 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |  |      |             |           |      |               | CONSOLIDATION TEST REPORT |                |                                      |     |                               |        |     |        |  |                       |  |
| LANGAN TREADWELL ROLLO   |  |      |             |           |      |               |                           |                |                                      |     |                               |        |     |        |  |                       |  |
| Date   |  |      | 06/02/16    |           |      | Project No.   |                           |                | 750604205                            |     |                               | Figure |     | F-65   |  |                       |  |

# Mayor ED 17-02 Priority permit



|  |      |             |      |               |                           |             |   |                |                  |      |   |                |      |           |  |                        |  |
|--|------|-------------|------|---------------|---------------------------|-------------|---|----------------|------------------|------|---|----------------|------|-----------|--|------------------------|--|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |   | After Test     |                  |      |   |                |      |           |  |                        |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 48.7        | % | w <sub>f</sub> | 35.8             | %    |   |                |      |           |  |                        |  |
| Overburden Pressure, p <sub>o</sub>  |      | 6,500       | psf  | Void Ratio    | e <sub>o</sub>            | 1.31        |   | e <sub>f</sub> | 0.95             |      |   |                |      |           |  |                        |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 12,500      | psf  | Saturation    | S <sub>o</sub>            | 100         |   | %              | S <sub>f</sub>   | 102  | % |                |      |           |  |                        |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.29        |      | Dry Density   | γ <sub>d</sub>            | 73          |   | pcf            | γ <sub>d</sub>   | 86   |   | pcf            |      |           |  |                        |  |
| LL   |      | --          |      | PL            |                           | --          |   | PI             |                  | --   |   | G <sub>s</sub> | 2.70 | (assumed) |  |                        |  |
| Classification   |      |             |      |               |                           |             |   |                | CLAY (CH), olive |      |   |                |      | Source    |  | BSWL337-10 at 125 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |   |                |                  |      |   |                |      |           |  |                        |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |   |                |                  |      |   |                |      |           |  |                        |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |   | Figure         |                  | F-66 |   |                |      |           |  |                        |  |

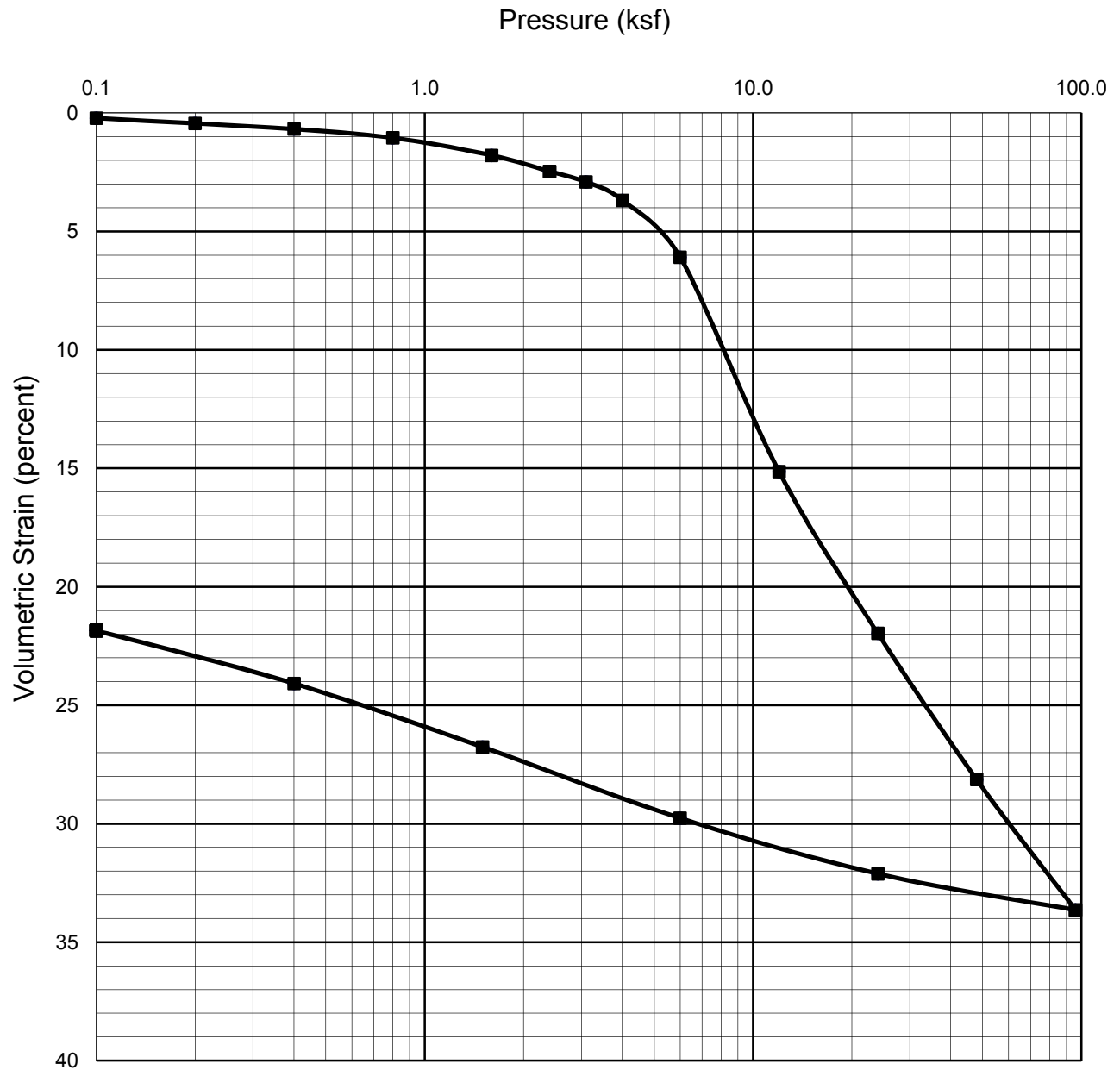
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|  |      |             |      |                           |                |           |                              |                |           |   |
|--|------|-------------|------|---------------------------|----------------|-----------|------------------------------|----------------|-----------|---|
| Sampler Type: Dames & Moore  |      |             |      | Condition                 | Before Test    |           |                              | After Test     |           |   |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content             | w <sub>o</sub> | 52.2      | %                            | w <sub>f</sub> | 32.2      | % |
| Overburden Pressure, p <sub>o</sub>  |      | 4,350       | psf  | Void Ratio                | e <sub>o</sub> | 1.44      |                              | e <sub>f</sub> | 0.87      |   |
| Preconsol. Pressure, p <sub>c</sub>  |      | 4,400       | psf  | Saturation                | S <sub>o</sub> | 98        | %                            | S <sub>f</sub> | 100 %     |   |
| Compression Ratio, C <sub>ec</sub>   |      | 0.27        |      | Dry Density               | γ <sub>d</sub> | 69        | pcf                          | γ <sub>d</sub> | 90 pcf    |   |
| LL --  |      | PL --       |      | PI --                     |                |           | G <sub>s</sub>               | 2.70           | (assumed) |   |
| Classification CLAY (CH), gray to olive-gray                               |      |             |      |                           |                |           | Source BSWL337-11 at 65 feet |                |           |   |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      | CONSOLIDATION TEST REPORT |                |           |                              |                |           |   |
| LANGAN TREADWELL ROLLO   |      |             |      |                           |                |           |                              |                |           |   |
| Date   |      | 06/02/16    |      | Project No.               |                | 750604205 |                              | Figure F-67    |           |   |

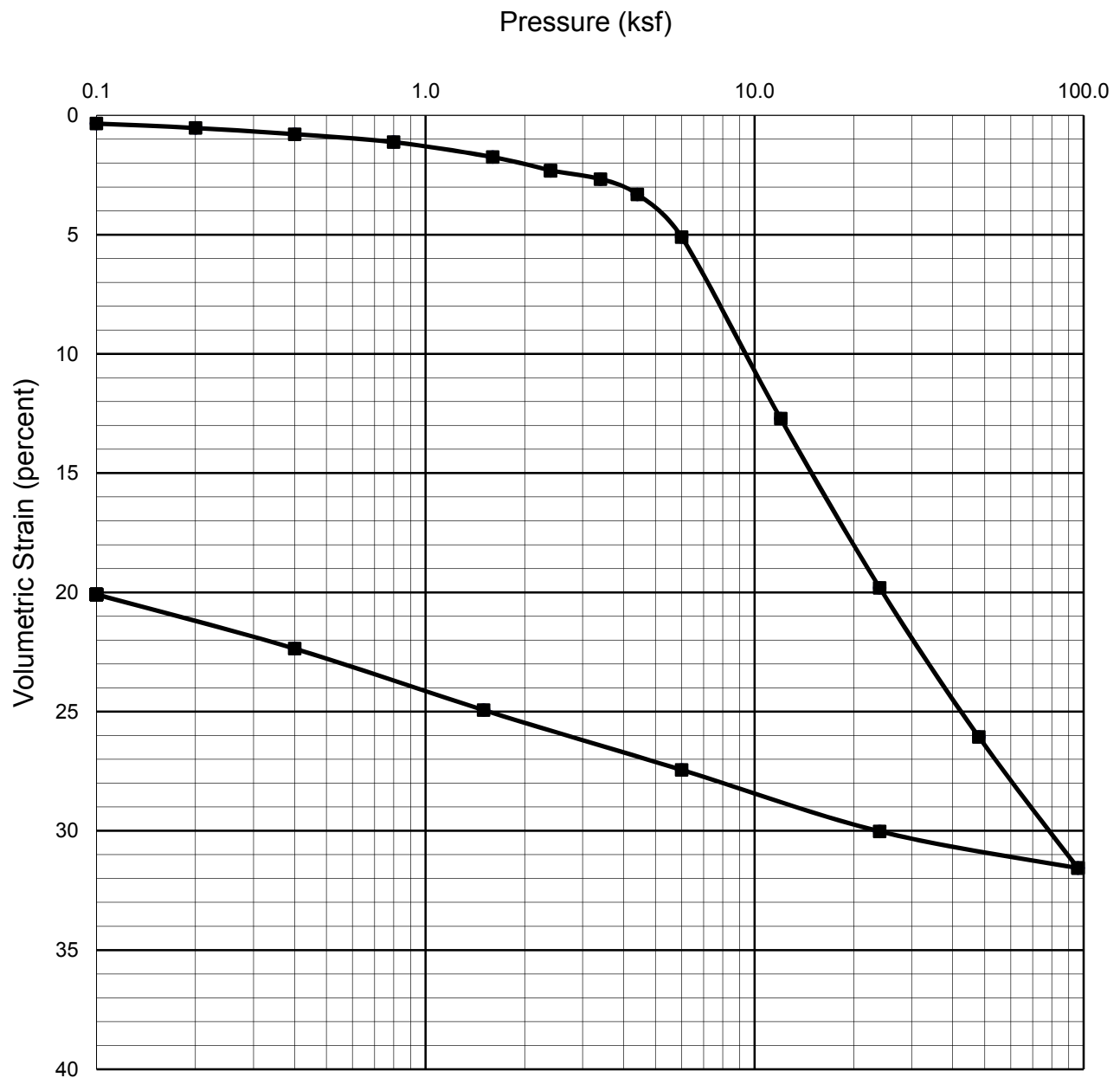


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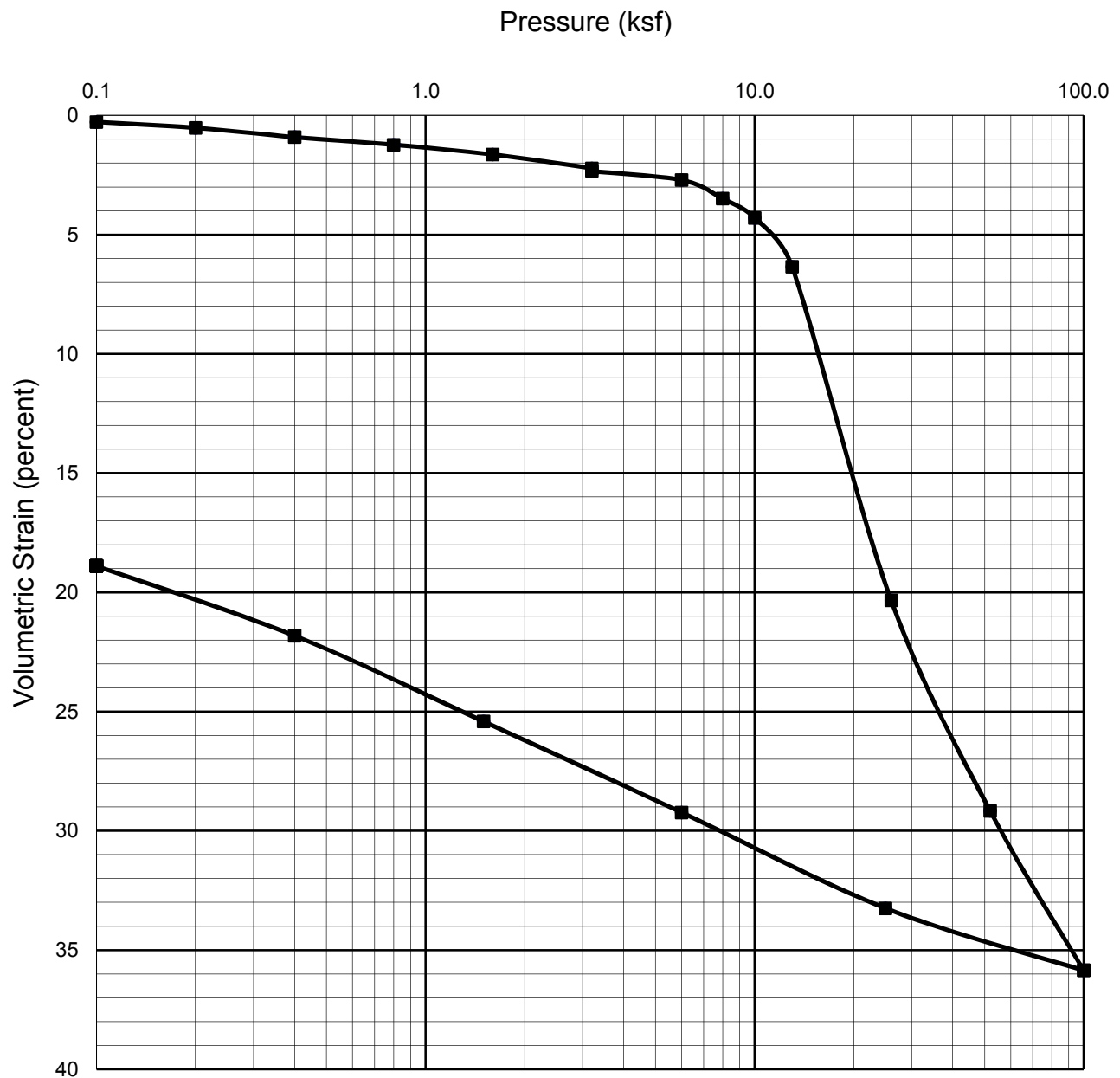
|  |      |             |      |               |                           |             |   |                               |                |      |           |        |                       |  |
|--|------|-------------|------|---------------|---------------------------|-------------|---|-------------------------------|----------------|------|-----------|--------|-----------------------|--|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |   | After Test                    |                |      |           |        |                       |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 48.7        | % | w <sub>f</sub>                | 31.9           | %    |           |        |                       |  |
| Overburden Pressure, p <sub>o</sub>  |      | 4,800       | psf  | Void Ratio    | e <sub>o</sub>            | 1.38        |   | e <sub>f</sub>                | 0.86           |      |           |        |                       |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 5,500       | psf  | Saturation    | S <sub>o</sub>            | 95          |   | %                             | S <sub>f</sub> | 100  | %         |        |                       |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.27        |      | Dry Density   | γ <sub>d</sub>            | 71          |   | pcf                           | γ <sub>d</sub> | 91   |           | pcf    |                       |  |
| LL   |      | --          | PL   |               | --                        | PI          |   | --                            | G <sub>s</sub> | 2.70 | (assumed) |        |                       |  |
| Classification   |      |             |      |               |                           |             |   | CLAY (CH), gray to olive-gray |                |      |           | Source | BSWL337-11 at 75 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |   |                               |                |      |           |        |                       |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |   |                               |                |      |           |        |                       |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |   | Figure                        |                | F-68 |           |        |                       |  |

# Mayor ED 17-02 Priority permit



|  |      |             |      |               |                           |             |                               |                |                |                |        |                       |  |
|--|------|-------------|------|---------------|---------------------------|-------------|-------------------------------|----------------|----------------|----------------|--------|-----------------------|--|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |                               | After Test     |                |                |        |                       |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 44.7        | %                             | w <sub>f</sub> | 29.3           | %              |        |                       |  |
| Overburden Pressure, p <sub>o</sub>  |      | 5,200       | psf  | Void Ratio    | e <sub>o</sub>            | 1.24        |                               | e <sub>f</sub> | 0.79           |                |        |                       |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 5,500       | psf  | Saturation    | S <sub>o</sub>            | 97          | %                             | S <sub>f</sub> | 100            | %              |        |                       |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.24        |      | Dry Density   | γ <sub>d</sub>            | 75          | pcf                           | γ <sub>d</sub> | 94             | pcf            |        |                       |  |
| LL   |      | --          | PL   |               | --                        | PI          |                               | --             | G <sub>s</sub> | 2.70 (assumed) |        |                       |  |
| Classification   |      |             |      |               |                           |             | CLAY (CH), gray to olive-gray |                |                |                | Source | BSWL337-11 at 85 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |                               |                |                |                |        |                       |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |                               |                |                |                |        |                       |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |                               | Figure         |                | F-69           |        |                       |  |

# Mayor ED 17-02 Priority permit



|  |      |             |      |               |                           |             |     |                                     |                |      |           |        |                        |  |
|--|------|-------------|------|---------------|---------------------------|-------------|-----|-------------------------------------|----------------|------|-----------|--------|------------------------|--|
| Sampler Type: Dames & Moore  |      |             |      | Condition     |                           | Before Test |     | After Test                          |                |      |           |        |                        |  |
| Diameter (in)  | 2.42 | Height (in) | 1.00 | Water Content | w <sub>o</sub>            | 59.9        | %   | w <sub>f</sub>                      | 42.4           | %    |           |        |                        |  |
| Overburden Pressure, p <sub>o</sub>  |      | 6,350       | psf  | Void Ratio    | e <sub>o</sub>            | 1.64        |     | e <sub>f</sub>                      | 1.14           |      |           |        |                        |  |
| Preconsol. Pressure, p <sub>c</sub>  |      | 13,000      | psf  | Saturation    | S <sub>o</sub>            | 99          | %   | S <sub>f</sub>                      | 100            |      | %         |        |                        |  |
| Compression Ratio, C <sub>ec</sub>   |      | 0.38        |      | Dry Density   | γ <sub>d</sub>            | 64          | pcf | γ <sub>d</sub>                      | 79             |      | pcf       |        |                        |  |
| LL   |      | --          | PL   |               | --                        | PI          |     | --                                  | G <sub>s</sub> | 2.70 | (assumed) |        |                        |  |
| Classification   |      |             |      |               |                           |             |     | CLAY (CH), green-gray to olive-gray |                |      |           | Source | BSWL337-11 at 110 feet |  |
| MISSION ROCK SQUARE GARAGE<br>SEAWALL LOT 337<br>San Francisco, California |      |             |      |               | CONSOLIDATION TEST REPORT |             |     |                                     |                |      |           |        |                        |  |
| LANGAN TREADWELL ROLLO   |      |             |      |               |                           |             |     |                                     |                |      |           |        |                        |  |
| Date   |      | 06/02/16    |      | Project No.   |                           | 750604205   |     | Figure                              |                | F-70 |           |        |                        |  |

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX G**

### **STRUCTURED STREETS ON PILES**

# Mayor ED 17-02 Priority permit

## PRELIMINARY RECOMMENDATIONS FOR PILE-SUPPORTED (STRUCTURAL) STREETS

The fill and Bay Mud below it, in their present conditions, are not capable of providing adequate support for the streets and the underlying utilities. Furthermore, using soil fill to raise grades will create a new cycle of consolidation settlement of the Bay Mud beneath the site, causing up to several feet of settlement. This settlement would create differential settlement between pile-supported buildings, which will experience little to no long-term settlement, and surrounding streets, sidewalks, and other improvements; it will affect utility connections and building entrances. The settlement would also cause an additional load (downdrag) on the order of 200 to 225 kips to act on piles, as the fill and Bay Mud move downward relative to the pile, thus reducing the available pile capacity for support of the streets. On the basis of the results of our studies and our experience in Mission Bay, we conclude a deep foundation consisting of 14-inch driven steel H-piles or drilled shafts can be used to support the proposed structured streets. The foundations should extend below the fill and Bay Mud and gain support primarily from friction in the soil below the Bay Mud and/or end bearing in very dense sand or bedrock.

Driven steel H-piles can be cut off or lengthened as needed during driving to accommodate variations in length due to sloping bedrock and early refusal in dense sand layers above bedrock. However, driving steel piles will generate noise and vibrations. Drilled shafts can be drilled through the soil layers, including very dense sand layers, and obtain significant bedrock embedment, as needed for capacity. They can also be designed to accommodate the variation in pile length. Drilled shafts create minimum noise and vibrations but produce drilling spoils during installation. An extensive indicator and test pile program will be needed for either foundation type, including indicator piles and load tests, to provide information regarding the variability and capacity of the bearing layers.

Because of the structured streets, no new fill will be placed to raise site grades; therefore, we expect no downdrag loads will be induced on new piles supporting the structured streets. However, where the streets surrounding the site have been raised as part of the Mission Bay project improvements, such as along the southern portion of Third Street and along Mission Rock Street, settlement will occur below the structures streets within a zone of influence, causing downdrag load on these street piles.

Because the fill is corrosive and the Bay Mud is severely corrosive, piles will require protection from corrosion. A corrosion engineering specialist should be engaged to provide recommendations once a foundation type has been determined.

### **Axial Capacity 14-Inch Driven Steel H-Piles**

#### End Bearing Piles

Piles should be driven to refusal in the dense sand below the Bay Mud or in bedrock. Driven piles can typically encounter refusal in very dense, relatively clean sand layers (typically less than 10 percent fines, passing the No. 200 sieve) that are at least 10 feet thick. If significant fines are present, the pile will generally continue driving through the layer. Within Mission Bay and elsewhere along the San Francisco waterfront, we have found that where sand layers are very dense and sufficiently thick, piles may encounter refusal in this layer and develop a

# Mayor ED 17-02 Priority permit

significant amount of end bearing. When a pile refuses in the sand, we evaluate the individual pile capacity and estimate settlement on a case-by-case basis and coordinate with the structural engineer.

Some borings encountered a relatively dense sand below the Bay Mud and below the Old Bay Clay; a continuous sand layer does not appear to be present across the site. Piles driven to refusal in bedrock will likely be 210 to 270 feet long, likely extending up to approximately 10 feet into rock. Preliminary capacity for bearing piles bearing in dense sand or bedrock for driven 14-inch steel H-piles with no downdrag in Table G-1.

**TABLE G-1**  
**Preliminary Estimated Single Pile Axial Capacity**  
**End-Bearing Driven 14-Inch Steel H-Piles (No Downdrag)**

| <b>Estimated Pile Tip Elevation (feet, SFCD + 100 feet)</b> | <b>Anticipated End-Bearing Condition</b>        | <b><math>Q_{ultimate}</math> Axial Capacity (kips)</b> | <b><math>Q_{allowable}</math> Dead plus Live (kips)</b> | <b><math>Q_{allowable}</math> Total Design Load (kips)</b> | <b>Comment</b>   |
|---|---|--|---|--|--|
| -150  | Bedrock   | 960  | 480   | 640  | This is an average estimated pile tip with refusal approximately 10 feet into bedrock  |
| 30  | Dense Sand below Bay Mud and above Old Bay Clay | 500  | 175   | 230  | This layer was not encountered in all borings; however, where encountered, it was present at approximately Elevation 30 feet |
| -60   | Dense Sand below Old Bay Clay                   | 860  | 430   | 570  |  |

Notes:

- 1) Capacities of piles presented in Table G-1 represent the capacity of the soil and bedrock only; the structural capacity of the pile should be checked and should govern if less.
- 2) For the bedrock and deeper sand (tip at Elevation -60 feet) end-bearing piles,  $Q_{allowable}$  includes a factor of safety of 2.0 for dead plus live loads (these capacities are based on nearby pile load tests).
- 3)  $Q_{allowable}$  for the shallower sand end-bearing piles (tip Elevation 30 feet), dead plus live loads represents a factor of safety of 2.0 for friction and end-bearing.
- 4)  $Q_{allowable}$  for total design loads (including earthquake loads) represents a 1/3 increase on  $Q_{allowable}$  for dead plus live loads.

# Mayor ED 17-02 Priority permit

Although the piles will be driven to refusal, foundation settlement will still occur. Considering the anticipated pile lengths, piles could elastically compress up to about 2 inches. Differential settlement should be no more than about 3/4 inch between any adjacent columns. These elastic compression and settlement values are typical for piles in the Mission Bay and other areas around the San Francisco Bay margins, have been tolerable for design, and have yielded acceptable foundation and building performance.

## Friction-Only Piles Bearing in Clay

We developed preliminary friction-only capacity for piles extending below the Bay Mud and gaining friction in the sand and clay below the Bay Mud; these capacities are presented on Figure G-1. The capacities shown on Figure G-1 consider:

- capacity starts at the bottom of the Bay Mud (see Figure G-2 of this report for estimated contours of the bottom of Bay Mud elevations)
- piles do not gain capacity in the fill and Bay Mud; downdrag should be accounted for within the zone of influence adjacent to existing streets where settlement is ongoing
- capacities include a factor of safety of 2.0 for dead plus live loads
- capacities can be increased by 1/3 for temporary total design loads including wind and/or seismic.

## **Axial Capacity Drilled Shafts**

Drilled shafts range in diameter; however 3- to 6-foot-diameter piers are typical and appropriate for this site. Drilled shafts will primarily gain capacity from a combination of skin friction from the soil beneath the Bay Mud and in end bearing in bedrock. The attached Figure G-3 presents preliminary allowable capacity of 3- and 4-foot diameter shafts considering bottom of Bay Mud at Elevation 20 feet and 10 feet embedment into bedrock, with top of bedrock at Elevation -150 feet; Table G-2 presents the preliminary ultimate skin friction and end bearing unit values for various layers, based on load testing in the vicinity of the site, to evaluate shaft capacities for different diameter shafts and for different Bay Mud and bedrock depths. Final design axial capacities should be verified by a test program.

# Mayor ED 17-02 Priority permit

**TABLE G-2**

**Preliminary Ultimate Unit Skin Friction and End Bearing Values (No Downdrag)  
Drilled Shafts**

| <b>Soil Layer/Depth</b>   | <b>Ultimate Skin Friction<br/>(ksf)</b> | <b>Ultimate End Bearing<br/>(ksf)</b> |
|---|---|---------------------------------------|
| Medium Stiff to Stiff Clay<br>0 to 70 feet below Bottom of<br>Bay Mud   | 1.0                                     | N/A                                   |
| Stiff to Hard Clay and Dense to<br>Very Dense Sand<br>From 70 feet below Bottom of<br>Bay Mud to Top of Bedrock | 2.0                                     | N/A                                   |
| Franciscan Bedrock  | 7.5                                     | 60                                    |

Notes:

- 1) Capacities of piles presented in Table G-2 represent the ultimate geotechnical capacity of the soil and bedrock only; the structural capacity of the pile should be checked and should govern if less.
- 2) ksf = kips per square foot.
- 3) Ultimate values do not include a factor of safety. A factor of safety of 2.0 should be applied to these values to determine allowable capacities for dead plus live loads and 1.5 for temporary total design loads including wind and/or seismic. See Figure G-3 for allowable capacity estimates.
- 4) Values provided are preliminary for cost estimating purposes only.
- 5) Use contours on Figure G-2 of this report to determine bottom of Bay Mud and top of bedrock elevations.

## **Lateral Load Resistance**

Piles and piers should develop lateral resistance from the passive pressure acting on the upper portion of the piles and their structural rigidity. The allowable lateral capacity of the piles depends on:

- the pile stiffness
- the strength of the surrounding soil
- axial load on the pile
- the allowable deflection at the pile top and the ground surface
- the allowable moment capacity of the pile.



# Mayor ED 17-02 Priority permit

The lateral capacity of piles is significantly influenced by the potential for liquefaction in the fill, as well as the depth to groundwater and the presence of weak Bay Mud below the fill. We performed lateral pile analysis using the LPILE Version 2018 program for the following pile types:

- HP14x73 Steel Pile (strong and weak axis)
  - Elastic Modulus ( $E$ ) =  $29 \times 10^6$  psi
  - Moment of Inertia ( $I$ ) =  $729 \text{ in}^4$  (strong direction)
  - $I = 261 \text{ in}^4$  (weak direction)
- 3- and 4-foot diameter drilled shafts
  - $E = 4.03 \times 10^6$  psi (concrete compressive strength = 5,000 psi)
  - $I = 57,714 \text{ in}^4$  (3-foot-diameter, considering cracked section  $I_{\text{cracked}} = 0.7I_{\text{full}}$ )
  - $I = 182,403 \text{ in}^4$  (4-foot-diameter, considering cracked section  $I_{\text{cracked}} = 0.7I_{\text{full}}$ )

The lateral capacity of each of these pile types was evaluated considering:

- the top of the pile at Elevation 95 feet<sup>1</sup> and at Elevation 87 feet, which are the highest and lowest estimated bottom of the structured street slab/top of pile elevations, respectively
- free head pile top condition
- 1/2 inch and 3/4 inch of pile head deflection
- improved fill (no liquefaction) condition.

The results of our LPILE analyses are presented in Tables G-3 and G-4, which are attached to this memorandum and report lateral load capacities, maximum moment induced in the pile, and the depth to maximum moment for each of the combinations of pile types and conditions described above. The capacities presented in Tables G-3 and G-4 for the steel piles consider steel piles that have already corroded 1/16 inch on all sides (i.e. the actual steel piles that will be installed should be sized 1/16 inch larger on all sides to account for corrosion). This corrosion allowance was done for the 50-year design life and was performed before the team decided the piles would have a 75-year design life. The analysis would need to be updated for the 75-year design life.

Additionally, the lateral capacities presented in Tables G-3 and G-4 are for single piles only.

To account for group effects, the lateral load capacity of a single pile should be multiplied by the appropriate reduction factors shown on Table G-5. The reduction factors are based on a pile spacing of three pile diameters, center to center.

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<sup>1</sup> Elevations are based on San Francisco City datum plus 100 feet (Mission Bay datum).

# Mayor ED 17-02 Priority permit

**TABLE G-5**  
**Lateral Group Reduction Factors**

| <b>Number of Piles<br/>within Pile Cap</b> | <b>Lateral Group<br/>Reduction Factor</b> |
|--|---|
| 2 – 5                                      | 0.8                                       |
| ≥ 6  | 0.7                                       |

The moment profile for a single pile with an unfactored load should be used to check the design of individual piles in a group. Once the pile spacing is determined, we should be consulted to provide appropriate lateral reduction factors.

Additional lateral load resistance can be developed by passive resistance acting against the faces of the pile caps, mat slabs, and grade beams. Within improved fill at the site, equivalent fluid weights of 300 pounds per cubic foot (pcf) and 150 pcf may be used to compute passive resistance above and below the groundwater table, respectively. For this exercise, we recommend design groundwater at Elevation 95 feet. The upper twelve inches below final soil subgrade should be ignored in computing passive resistance for both improved and unimproved fill conditions if not confined by a slab or pavement.

If increased lateral resistance is needed, pile caps and grade beams could be deepened and/or additional "short piles" or intermediate grade beams could be added for lateral resistance. Downdrag loads, where present, will act on short piles or grade beams.

## **Preliminary Recommended Response Spectra**

We have performed preliminary recommended response spectra for different dampening ratios per the AASHTO guidelines. The different preliminary spectra are provided in the attached Figures G-4 through G-6 and Tables G-6 through G-10.

## **Construction Considerations and Indicator and Load Testing Program for Driven Steel H-Piles**

We recommend an indicator pile program be performed to provide data for choosing production pile lengths. Indicator piles should be installed near boring locations, where possible, and may be installed at production pile locations that are selected by us and approved by the structural engineer. They should be installed with the same equipment that will be used to install the production piles.

We recommend indicator piles be driven within the new street alignments at a minimum of one indicator per every 100 lineal feet to provide data regarding pile lengths necessary to achieve refusal penetration in sand or bedrock. It is difficult to predict where piles will encounter refusal in dense sand or how far the piles will extend into the dense sand or bedrock before encountering refusal. During indicator pile driving, we recommend that most of the piles be driven to high blow counts in an attempt to penetrate any dense sand layer(s) and achieve maximum penetration in bedrock. Some indicator piles can be stopped in the very dense sand. We will use this data to further define the presence and thickness of the dense sand layer and

# Mayor ED 17-02 Priority permit

the variation in depth and hardness of bedrock, and evaluate the capacities of each. We recommend most of the indicator pile lengths be chosen to extend at least 15 feet into bedrock based on the bedrock elevation contours on the attached site plan; variations in depth to and hardness of bedrock will cause variations in actual pile lengths. The contractor should be prepared to cut off and weld on additional length to accommodate the variations. The length of indicators to stop in the sand can be chosen after further exploration is performed to define the very dense sand. Cutoff lengths as much as 130 feet should be anticipated during the indicator program.

Determination of driving equipment and pile section for this project should take into account the “matching” of the pile hammer with the pile size and length. Special consideration should be given to selecting a hammer that can deliver enough energy to the tip of the piles to drive them efficiently without damaging them. The hammer selected should be appropriate to supply sufficient energy to the pile tip to penetrate very stiff to hard clay and dense to very dense sand layers encountered below the Bay Mud and to penetrate into Franciscan bedrock. In addition the hammer needs to be adequate to develop the ultimate capacity of the piles. We recommend a WEAP analysis be performed to help determine the most appropriate hammer and pile size, and we should be provided with the opportunity to review the results.

Because of the potential for rubble and rock in the fill, pile locations should be predrilled or the first pile section should be vibrated in. Vibrating a pile through the fill has generally been successful for maintaining horizontal and vertical tolerances. Piles should only be vibrated to the bottom of the Bay Mud; below the Bay Mud, the piles should be driven with an impact hammer. The effects of vibration on adjacent improvements may need to be monitored during vibration and driving. The predrill auger should have a diameter no greater than the minimum pile width to avoid reductions in lateral pile capacities. To reduce the amount of spoils, the predrilling should not extend more than a few feet into the Bay Mud. The cost of disposing of the fill and Bay Mud removed from the predrill holes should be considered when determining the foundation costs. Where obstructions are encountered that cannot be predrilled or vibrated through, obstruction should be removed or piles relocated. Excavation with a backhoe or excavator may also be required to remove larger obstructions encountered in the fill.

We recommend all of the indicator piles be dynamically tested with a pile driving analyzer (PDA). The PDA uses accelerometers to measure the propagation of compression waves through the pile during driving. When used in conjunction with the Case Pile Wave Analysis Program (CAPWAP), the PDA data can be used to:

- verify the hammer selected is appropriate to drive the piles to the desired tip elevation without damaging the pile
- estimate the ultimate capacity of the piles

All indicator piles should be restruck at least four days after the initial drive. A hammer capable of developing sufficient energy to mobilize the tip of the pile and/or develop the pile capacity should be used. CAPWAP analysis should be performed on a representable blow near the end of initial drive and during the beginning of restrike.

# Mayor ED 17-02 Priority permit

After the completion of the indicator program, we will develop estimated tip elevations and driving criteria for production installation. Where piles will be driven to refusal, actual pile tip elevations will vary from predicted tip elevations and the contractor should be prepared for 100 percent pile cutoff.

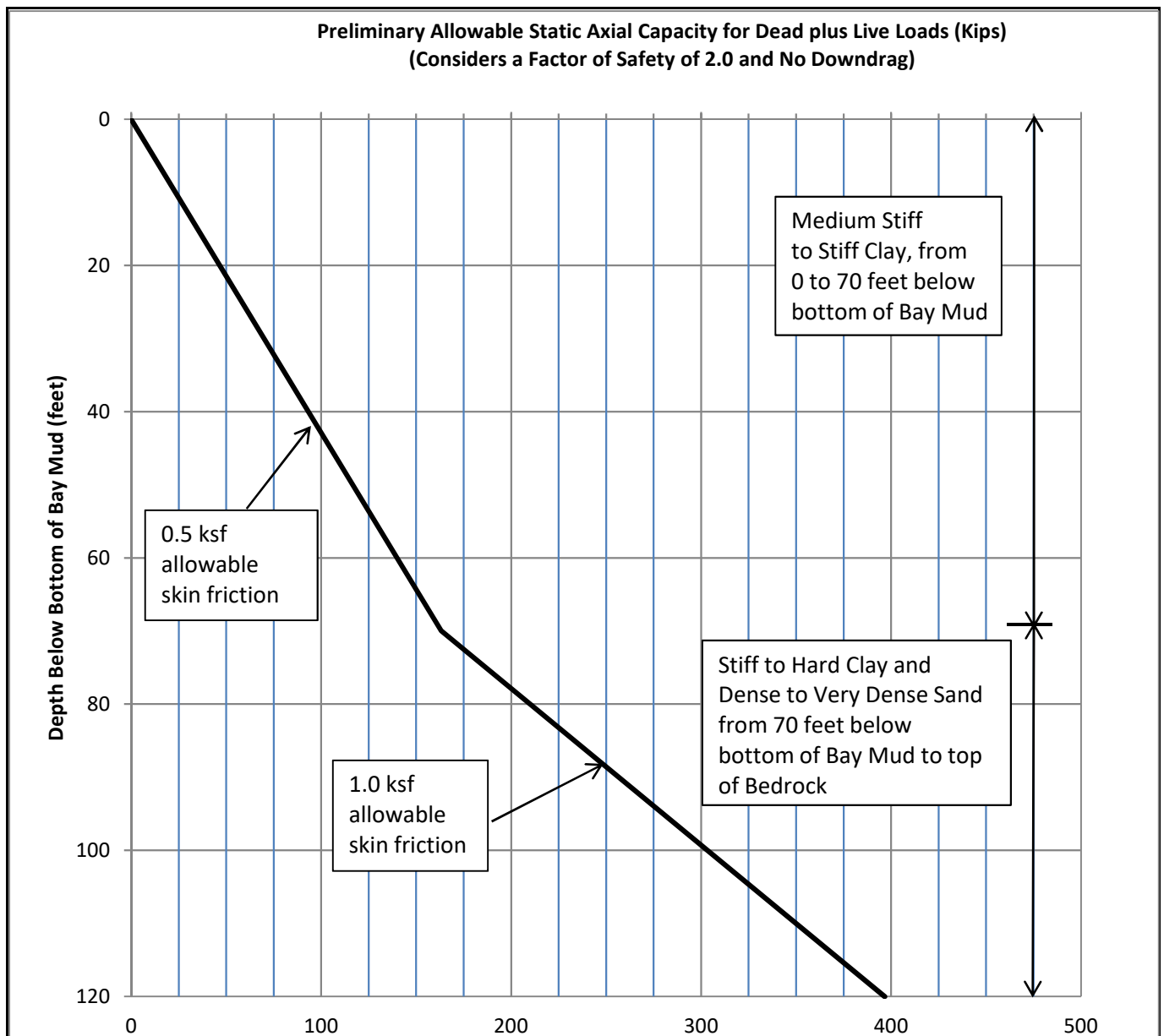
Pile driving will cause vibrations on adjacent sites. These vibrations can cause settlement of the fill materials surrounding the site or could adversely affect nearby improvements, particularly freshly place concrete. We recommend that the conditions of buildings and improvements within 150 feet of the site be photographed and surveyed to document existing conditions prior to the start of construction and that they be monitored periodically during construction.

## **Construction Considerations and Indicator and Load Testing Program for Drilled Shafts**

We recommend that before the production installation of any of the drilled shafts that the pile lengths are selected, indicator piles be installed to: 1) evaluate predrilling requirements, if any, and 2) estimate production pile lengths. We recommend a minimum of one indicator per every 100 lineal feet. We expect the indicator piles can be used as production piles if installed in the proper location and are not damaged during installation or testing. If indicator piles are to be abandoned following the indicator program, then the indicator piles should be located at least seven pile diameters (center-to-center) from production pile locations. Indicator piles should be installed with the same equipment and using the same procedure, including predrilling depth and predrill auger diameter, that will be used for production piles.

We recommend load tests of the drilled shafts be performed to confirm the axial compression and tension pile capacities. We recommend a minimum of two compression and one uplift load tests be performed for each proposed production pile installation methodology (i.e. rig type, predrilling depth and diameter, pile length, etc.). The test pile locations should be selected by us in conjunction with the structural engineer. The compression load tests should be performed in accordance with the current ASTM D1143, Standard Test Method for Piles Under Static Axial Compressive Load, and the tension tests should be performed in accordance with the current ASTM D3689. Equipment used for the test (load frame, jacks, and reaction piles) should be capable of applying at least 2 times the allowable dead plus live design load, plus the contribution in friction from fill and Bay Mud, and at least 1.5 times the total load, plus the contribution in friction from fill and Bay Mud. The load tests should be interpreted using accepted criteria per the 2016 SFBC to determine the ultimate capacities of the piles.

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- Notes for Figure:
1. Where refusal in dense sand or bedrock is encountered, the pile capacities in Table G-1 will apply.
  2. Profile based on an average bottom of Bay Mud elevation at 20 feet and an average top of bedrock elevation at -150 feet.

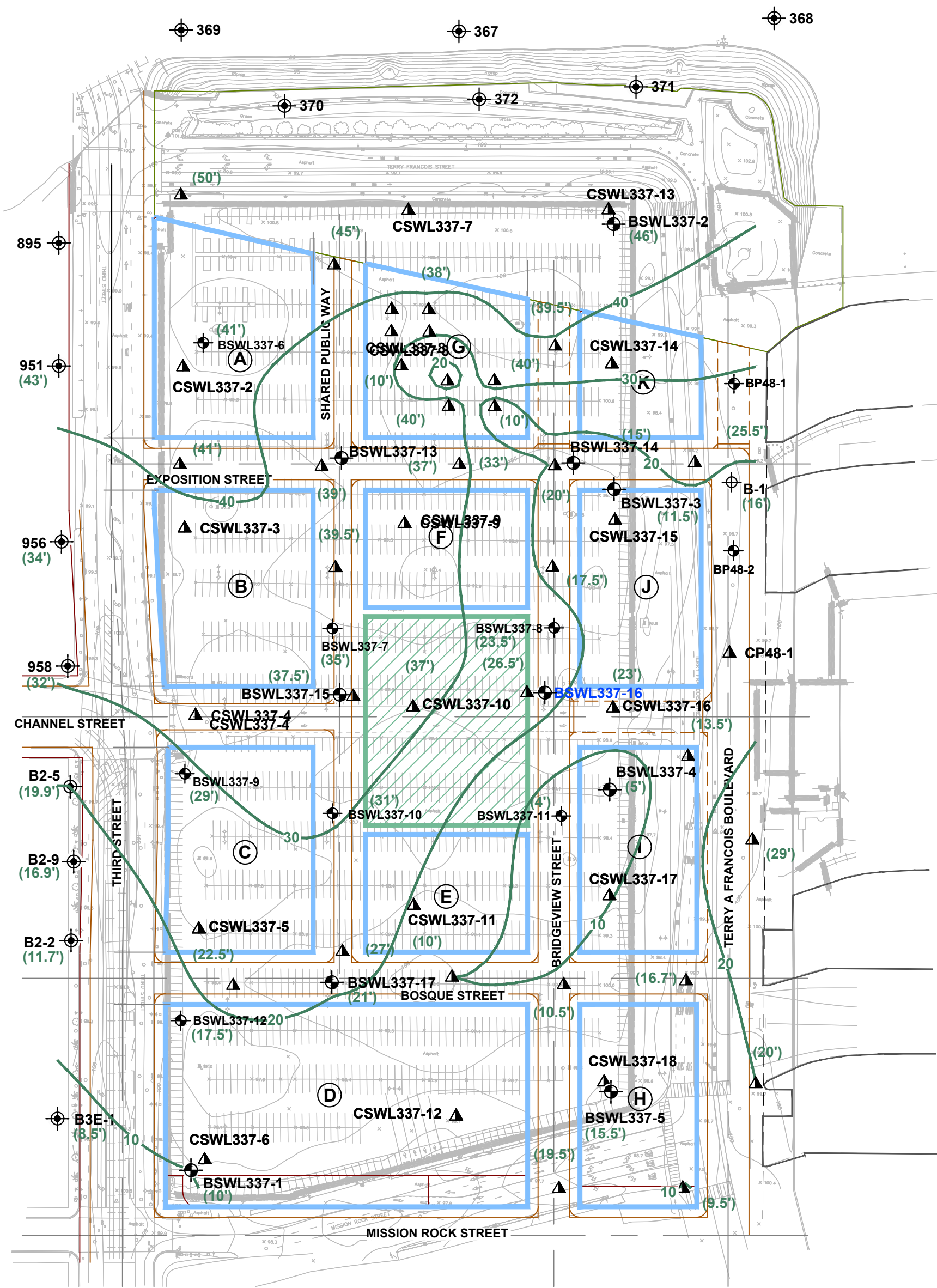
**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

**LANGAN**

**ALLOWABLE FRICTION CAPACITY  
DRIVEN 14-INCH STEEL H-PILES**

|      |          |                       |            |
|------|----------|-----------------------|------------|
| Date | 04/30/18 | Project No. 750604203 | Figure G-1 |
|------|----------|-----------------------|------------|

Mayor ED 17-02 Priority permit



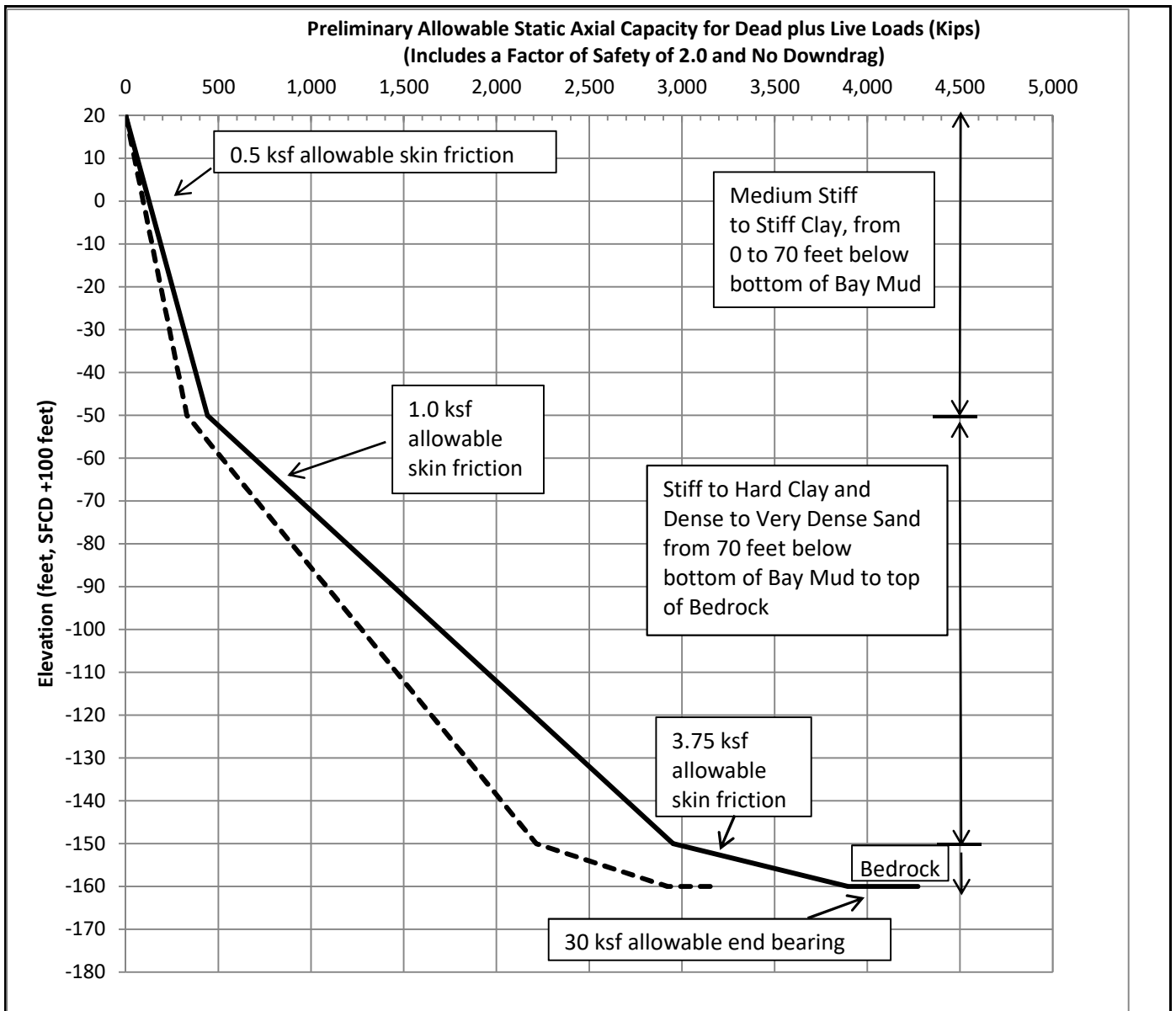
EXPLANATION

- BSWL337-1 Approximate location of boring
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Bottom of bay mud contour (feet, SFCD + 100 feet)
- Elevation of bottom of bay mud (feet, SFCD + 100 feet)

0 120 Feet  
Approximate scale

|   |                       |            |
|---|-----------------------|------------|
| MISSION ROCK DEVELOPMENT STREETS<br>San Francisco, California |                       |            |
| APPROXIMATE ELEVATION OF<br>BOTTOM OF BAY MUD                 |                       |            |
| Date 06/20/18   | Project No. 750604203 | Figure G-2 |
| LANGAN  |                       |            |

# Mayor ED 17-02 Priority permit



Notes for Figure:

1. Allowable capacities based on 10 feet of embedment into rock for drilled shafts.
2. Profile based on an average bottom of Bay Mud elevation at 20 feet and an average top of bedrock elevation at -150 feet.

Legend:

----- 3-foot-diameter drilled shaft

————— 4-foot-diameter drilled shaft

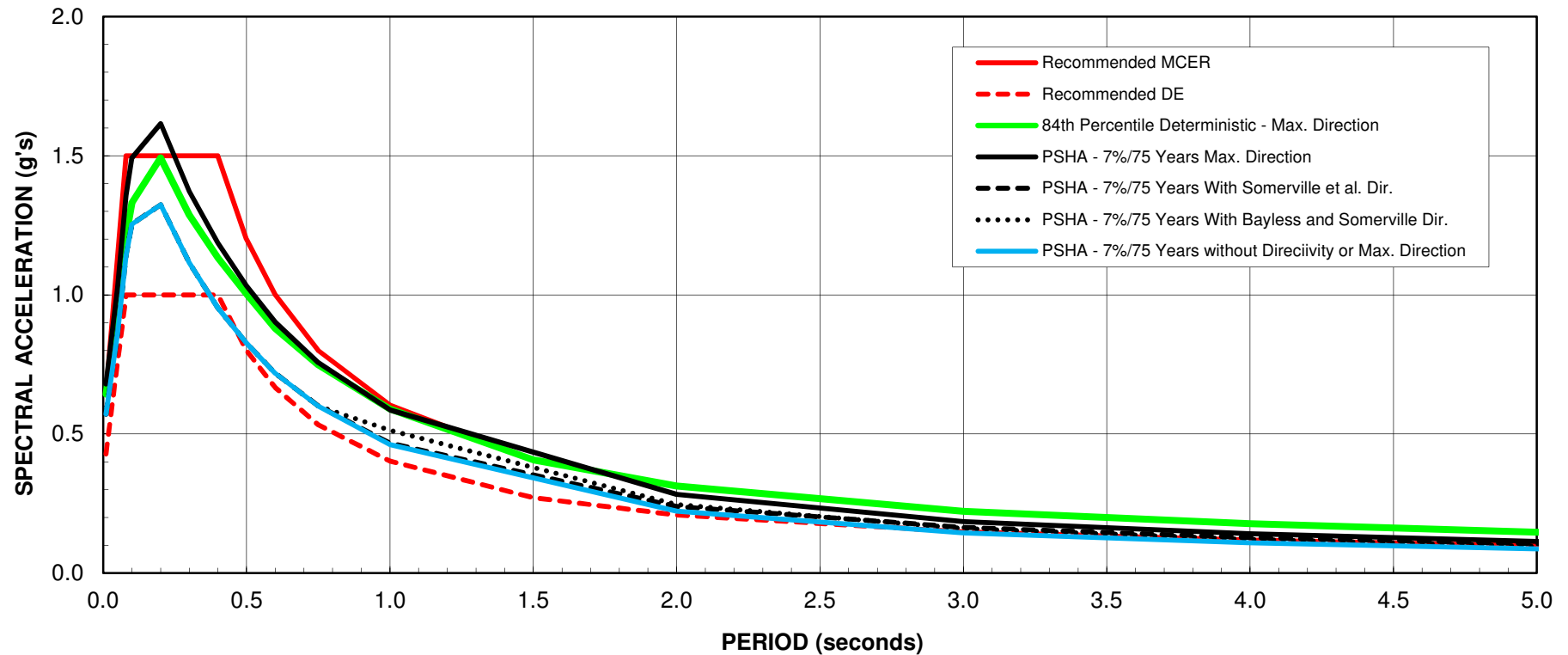
**MISSION ROCK DEVELOPMENT STREETS**  
San Francisco, California

**LANGAN**

## ALLOWABLE CAPACITY FOR DRILLED SHAFTS

|      |          |                       |            |
|------|----------|-----------------------|------------|
| Date | 03/22/18 | Project No. 750604203 | Figure G-3 |
|------|----------|-----------------------|------------|

# Mayor ED 17-02 Priority permit



Damping Ratio = 5%

Notes:

1. Deterministic spectrum is for  $M_w = 8.0$ , Dist. 12.9 km
2. Estimated Average.  $V_{s30} = 760$  m/s

DRAFT

MISSION ROCK DEVELOPMENT,  
SEAWALL LOT 337  
San Francisco, California

COMPARISON OF DETERMINISTIC, PROBABILISTIC  
AND CODE SPECTRA FOR ROCK

Date 07/12/18

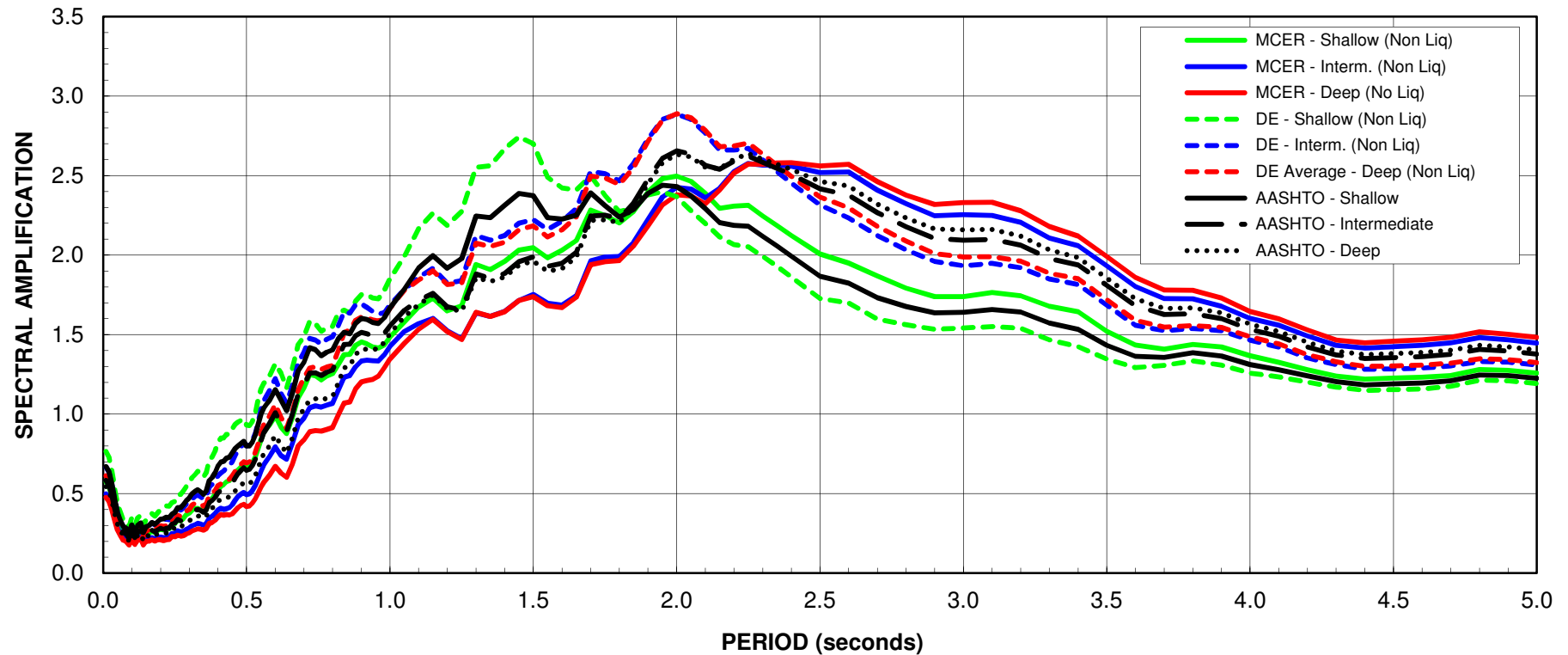
Project No. 750604203

Figure G-4

**LANGAN**



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Damping Ratio = 5%

DRAFT

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SEAWALL LOT 337  
San Francisco, California

## COMPARISON OF AMPLIFICATION FACTORS

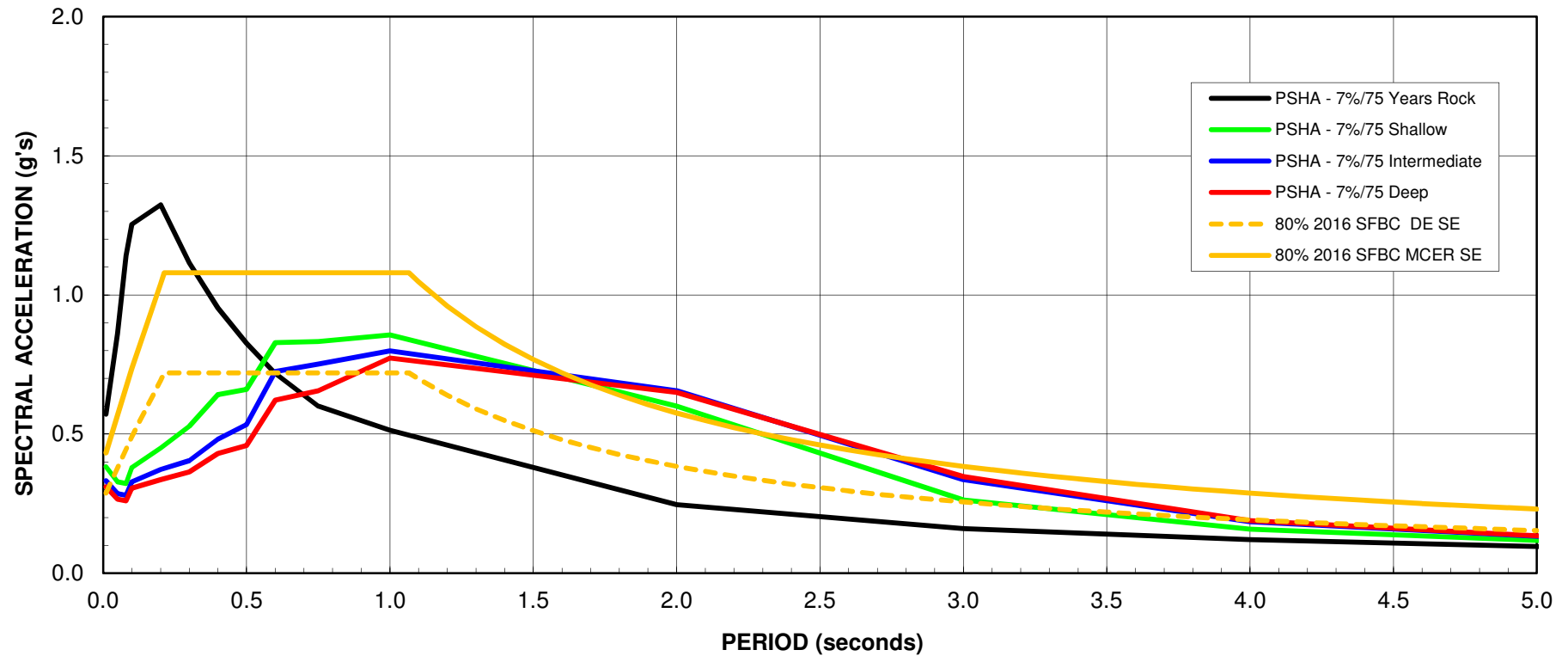
Date 07/17/18

Project No. 750604203

Figure G-5

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Damping Ratio = 5%

DRAFT

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SEAWALL LOT 337  
San Francisco, California

## COMPARISON OF SPECTRA

Date 07/17/18

Project No. 750604203

Figure G-6

**LANGAN**

# Mayor ED 17-02 Priority permit

**Table G-3: Lateral Pile Analysis Results**  
**Improved Fill - Top of Pile at Elevation 95 Feet<sup>1</sup>**

| Pile Type       | Axis   | Pile Head Condition | Assumed E (psi)        | Assumed I (in <sup>4</sup> ) | Pile Head Deflection (inch) | Maximum Moment (kip-inches) | Shear (kips) | Depth to Maximum Moment (feet) |
|-----------------|--------|---------------------|------------------------|------------------------------|-----------------------------|-----------------------------|--------------|--------------------------------|
| HP14x73 Steel   | Strong | Free                | 29 x 10 <sup>6</sup>   | 729                          | 1/2                         | 996                         | 16.2         | 7.1                            |
|                 |        | Free                | 29 x 10 <sup>6</sup>   | 729                          | 3/4                         | 1392                        | 21.1         | 7.1                            |
| HP14x73 Steel   | Weak   | Free                | 29 x 10 <sup>6</sup>   | 261                          | 1/2                         | 546                         | 9.2          | 6.1                            |
|                 |        | Free                | 29 x 10 <sup>6</sup>   | 261                          | 3/4                         | 769                         | 11.6         | 6.1                            |
| 3-foot-diameter | N/A    | Free                | 4.03 x 10 <sup>6</sup> | 57,714                       | 1/2                         | 4522                        | 51.9         | 9.2                            |
| Drilled Shaft   |        | Free                | 4.03 x 10 <sup>6</sup> | 57,714                       | 3/4                         | 5874                        | 61.9         | 9.2                            |
| 4-foot-diameter | N/A    | Free                | 4.03 x 10 <sup>6</sup> | 182,403                      | 1/2                         | 8032                        | 88.0         | 12.2                           |
| Drilled Shaft   |        | Free                | 4.03 x 10 <sup>6</sup> | 182,403                      | 3/4                         | 10424                       | 104.9        | 13.3                           |

**Notes:**

1. Elevation based on San Francisco City Datum + 100 feet.
2. For preliminary estimating HP14x73 piles should be sized up to account for 1/16-inch of corrosion on all sides. This is for a 50-yr design life. The analysis would need to be redone for a 75-yr design life.
3. These capacities are for a single pile. To account for group effects, the lateral load capacity of the pile group should be multiplied by the factor presented in Table G-5 of our memorandum; moment profile used to check individual piles in a group should be for the unfactored load.
4. Assumes the fill is improved down to Bay Mud

Mission Rock Development Streets  
San Francisco, CA  
Langan  
Project Number: 750604208  
22 March 2018

**Table G-4: Lateral Pile Analysis Results**  
**Improved Fill - Top of Pile at Elevation 87 Feet<sup>1</sup>**

| Pile Type       | Axis   | Pile Head Condition | Assumed E (psi)        | Assumed I (in <sup>4</sup> ) | Pile Head Deflection (inch) | Axial Load (kips) | Maximum Moment (kip-inches) | Shear (kips) | Depth to Maximum Moment (feet) |
|-----------------|--------|---------------------|------------------------|------------------------------|-----------------------------|-------------------|-----------------------------|--------------|--------------------------------|
| HP14x73 Steel   | Strong | Free                | 29 x 10 <sup>6</sup>   | 729                          | 1/2                         | 640               | 678                         | 7.7          | 9.5                            |
|                 |        | Free                | 29 x 10 <sup>6</sup>   | 729                          | 3/4                         | 640               | 921                         | 9.3          | 9.5                            |
| HP14x73 Steel   | Weak   | Free                | 29 x 10 <sup>6</sup>   | 261                          | 1/2                         | 640               | 388                         | 4.6          | 7.4                            |
|                 |        | Free                | 29 x 10 <sup>6</sup>   | 261                          | 3/4                         | 640               | 532                         | 5.3          | 7.4                            |
| 3-foot-diameter | N/A    | Free                | 4.03 x 10 <sup>6</sup> | 57,714                       | 1/2                         | 4,250             | 3180                        | 20.2         | 13.8                           |
| Drilled Shaft   |        | Free                | 4.03 x 10 <sup>6</sup> | 57,714                       | 3/4                         | 4,250             | 4304                        | 24.0         | 14.8                           |
| 4-foot-diameter | N/A    | Free                | 4.03 x 10 <sup>6</sup> | 182,403                      | 1/2                         | 5,720             | 6232                        | 37.9         | 17.0                           |
| Drilled Shaft   |        | Free                | 4.03 x 10 <sup>6</sup> | 182,403                      | 3/4                         | 5,720             | 8403                        | 46.1         | 18.0                           |

**Notes:**

1. Elevation based on San Francisco City Datum + 100 feet.
2. For preliminary estimating HP14x73 piles should be sized up to account for 1/16-inch of corrosion on all sides. This is for a 50-yr design life. The analysis would need to be redone for a 75-yr design life.
3. These capacities are for a single pile. To account for group effects, the lateral load capacity of the pile group should be multiplied by the factor presented in Table G-5 of our memorandum; moment profile used to check individual piles in a group should be for the unfactored load.
4. Assumes the fill is improved down to Bay Mud

# Mayor ED 17-02 Priority permit

Project Name: MISSION ROCK DEVELOPMENT, SEAWALL LOT 337  
City State: San Francisco, California  
Project No.: 750604203

TABLE G-6  
PRELIMINARY 5 PERCENT DAMPING  
RECOMMENDED SPECTRA

| MISSION ROCK DEVELOPMENT<br>SEAWALL LOT 337<br>RECOMMENDED SPECTRA PER AASHTO $S_a$ (g)   |                                      |   |                                   |
|---|--------------------------------------|---|-----------------------------------|
| Period (seconds)  | Shallow Profile<br>5 Percent Damping | Intermediate Profile<br>5 Percent Damping | Deep Profile<br>5 Percent Damping |
| 0.01  | 0.382                                | 0.333                                     | 0.311                             |
| 0.08  | 0.328                                | 0.286                                     | 0.266                             |
| 0.10  | 0.323                                | 0.280                                     | 0.260                             |
| 0.20  | 0.380                                | 0.329                                     | 0.305                             |
| 0.30  | 0.450                                | 0.373                                     | 0.336                             |
| 0.40  | 0.528                                | 0.405                                     | 0.364                             |
| 0.50  | 0.642                                | 0.481                                     | 0.431                             |
| 0.60  | 0.661                                | 0.534                                     | 0.459                             |
| 0.75  | 0.829                                | 0.725                                     | 0.622                             |
| 1.00  | 0.833                                | 0.751                                     | 0.656                             |
| 1.50  | 0.856                                | 0.799                                     | 0.774                             |
| 2.00  | 0.600                                | 0.655                                     | 0.650                             |
| 3.00  | 0.264                                | 0.336                                     | 0.347                             |
| 4.00  | 0.158                                | 0.185                                     | 0.189                             |
| 5.00  | 0.118                                | 0.133                                     | 0.135                             |
| Note: The spectra are for 7% Probability of Exceedance in 75 years with inclusion of average directivity factors using Bayless and Somerville (2013). |                                      |   |                                   |

# Mayor ED 17-02 Priority permit

Project Name: MISSION ROCK DEVELOPMENT, SEAWALL LOT 337  
City State: San Francisco, California  
Project No. 750604203

TABLE G-7  
PRELIMINARY 7 PERCENT DAMPING  
RECOMMENDED SPECTRA

| MISSION ROCK DEVELOPMENT<br>SEAWALL LOT 337<br>RECOMMENDED SPECTRA PER AASHTO $S_a$ (g)   |                                      |   |                                   |
|---|--------------------------------------|---|-----------------------------------|
| Period (seconds)  | Shallow Profile<br>7 Percent Damping | Intermediate Profile<br>7 Percent Damping | Deep Profile<br>7 Percent Damping |
| 0.01  | 0.382                                | 0.333                                     | 0.311                             |
| 0.08  | 0.312                                | 0.271                                     | 0.253                             |
| 0.10  | 0.303                                | 0.263                                     | 0.245                             |
| 0.20  | 0.342                                | 0.296                                     | 0.275                             |
| 0.30  | 0.400                                | 0.332                                     | 0.299                             |
| 0.40  | 0.470                                | 0.360                                     | 0.324                             |
| 0.50  | 0.565                                | 0.424                                     | 0.379                             |
| 0.60  | 0.581                                | 0.470                                     | 0.404                             |
| 0.75  | 0.729                                | 0.638                                     | 0.548                             |
| 1.00  | 0.733                                | 0.661                                     | 0.577                             |
| 1.50  | 0.754                                | 0.703                                     | 0.681                             |
| 2.00  | 0.528                                | 0.577                                     | 0.572                             |
| 3.00  | 0.235                                | 0.299                                     | 0.309                             |
| 4.00  | 0.141                                | 0.164                                     | 0.168                             |
| 5.00  | 0.105                                | 0.118                                     | 0.120                             |
| Note: The spectra are for 7% Probability of Exceedance in 75 years with inclusion of average directivity factors using Bayless and Somerville (2013). |                                      |   |                                   |

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Project Name: MISSION ROCK DEVELOPMENT, SEAWALL LOT 337  
City State San Francisco, California  
Project No. 750604203

TABLE G-8  
PRELIMINARY 10 PERCENT DAMPING  
RECOMMENDED SPECTRA

| MISSION ROCK DEVELOPMENT<br>SEAWALL LOT 337<br>RECOMMENDED SPECTRA PER AASHTO S <sub>a</sub> (g)  |                                       |  |                                    |
|---|---------------------------------------|--|------------------------------------|
| Period (seconds)  | Shallow Profile<br>10 Percent Damping | Intermediate Profile<br>10 Percent Damping | Deep Profile<br>10 Percent Damping |
| 0.01  | 0.382                                 | 0.333                                      | 0.311                              |
| 0.08  | 0.296                                 | 0.257                                      | 0.240                              |
| 0.10  | 0.281                                 | 0.243                                      | 0.226                              |
| 0.20  | 0.300                                 | 0.260                                      | 0.241                              |
| 0.30  | 0.351                                 | 0.291                                      | 0.262                              |
| 0.40  | 0.406                                 | 0.312                                      | 0.281                              |
| 0.50  | 0.494                                 | 0.371                                      | 0.332                              |
| 0.60  | 0.509                                 | 0.411                                      | 0.353                              |
| 0.75  | 0.630                                 | 0.551                                      | 0.473                              |
| 1.00  | 0.633                                 | 0.571                                      | 0.499                              |
| 1.50  | 0.651                                 | 0.607                                      | 0.588                              |
| 2.00  | 0.456                                 | 0.498                                      | 0.494                              |
| 3.00  | 0.203                                 | 0.259                                      | 0.267                              |
| 4.00  | 0.122                                 | 0.142                                      | 0.145                              |
| 5.00  | 0.091                                 | 0.102                                      | 0.104                              |
| Note: The spectra are for 7% Probability of Exceedance in 75 years with inclusion of average directivity factors using Bayless and Somerville (2013). |                                       |  |                                    |

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Project Name: MISSION ROCK DEVELOPMENT, SEAWALL LOT 337  
City State: San Francisco, California  
Project No. 750604203

TABLE G-9  
PRELIMINARY 15 PERCENT DAMPING  
RECOMMENDED SPECTRA

| MISSION ROCK DEVELOPMENT<br>SEAWALL LOT 337<br>RECOMMENDED SPECTRA PER AASHTO S <sub>a</sub> (g)  |                                       |  |                                    |
|---|---------------------------------------|--|------------------------------------|
| Period (seconds)  | Shallow Profile<br>15 Percent Damping | Intermediate Profile<br>15 Percent Damping | Deep Profile<br>15 Percent Damping |
| 0.01  | 0.382                                 | 0.333                                      | 0.311                              |
| 0.08  | 0.282                                 | 0.246                                      | 0.229                              |
| 0.10  | 0.239                                 | 0.207                                      | 0.193                              |
| 0.20  | 0.262                                 | 0.227                                      | 0.211                              |
| 0.30  | 0.297                                 | 0.246                                      | 0.222                              |
| 0.40  | 0.343                                 | 0.263                                      | 0.237                              |
| 0.50  | 0.411                                 | 0.308                                      | 0.276                              |
| 0.60  | 0.423                                 | 0.342                                      | 0.294                              |
| 0.75  | 0.522                                 | 0.457                                      | 0.392                              |
| 1.00  | 0.525                                 | 0.473                                      | 0.413                              |
| 1.50  | 0.539                                 | 0.504                                      | 0.487                              |
| 2.00  | 0.378                                 | 0.413                                      | 0.409                              |
| 3.00  | 0.171                                 | 0.219                                      | 0.226                              |
| 4.00  | 0.103                                 | 0.120                                      | 0.123                              |
| 5.00  | 0.077                                 | 0.086                                      | 0.088                              |
| Note: The spectra are for 7% Probability of Exceedance in 75 years with inclusion of average directivity factors using Bayless and Somerville (2013). |                                       |  |                                    |



# Mayor ED 17-02 Priority permit

Project Name: MISSION ROCK DEVELOPMENT, SEAWALL LOT 337  
City State: San Francisco, California  
Project No. 750604203

TABLE G-10  
PRELIMINARY 20 PERCENT DAMPING  
RECOMMENDED SPECTRA

| MISSION ROCK DEVELOPMENT<br>SEAWALL LOT 337<br>RECOMMENDED SPECTRA PER AASHTO $S_a$ (g)   |                                       |  |                                    |
|---|---------------------------------------|--|------------------------------------|
| Period (seconds)  | Shallow Profile<br>20 Percent Damping | Intermediate Profile<br>20 Percent Damping | Deep Profile<br>20 Percent Damping |
| 0.01  | 0.382                                 | 0.333                                      | 0.311                              |
| 0.08  | 0.273                                 | 0.237                                      | 0.221                              |
| 0.10  | 0.248                                 | 0.215                                      | 0.200                              |
| 0.20  | 0.236                                 | 0.204                                      | 0.189                              |
| 0.30  | 0.265                                 | 0.220                                      | 0.198                              |
| 0.40  | 0.301                                 | 0.231                                      | 0.208                              |
| 0.50  | 0.366                                 | 0.274                                      | 0.245                              |
| 0.60  | 0.377                                 | 0.304                                      | 0.261                              |
| 0.75  | 0.456                                 | 0.399                                      | 0.342                              |
| 1.00  | 0.458                                 | 0.413                                      | 0.361                              |
| 1.50  | 0.471                                 | 0.440                                      | 0.425                              |
| 2.00  | 0.330                                 | 0.361                                      | 0.357                              |
| 3.00  | 0.148                                 | 0.188                                      | 0.194                              |
| 4.00  | 0.090                                 | 0.105                                      | 0.108                              |
| 5.00  | 0.066                                 | 0.074                                      | 0.076                              |
| Note: The spectra are for 7% Probability of Exceedance in 75 years with inclusion of average directivity factors using Bayless and Somerville (2013). |                                       |  |                                    |

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX H**

### **STRUCTURED STREETS ON DEEP SOIL MIXED ELEMENTS**

# Mayor ED 17-02 Priority permit

## Deep Soil Mixing

Deep soil mixing (DSM) is used to treat soil in-situ with cement grout using mixing shafts consisting of auger cutting heads, discontinuous flight augers, or blades/paddles to create below-ground deep soil-cement mixed elements. DSM may be installed in a variety of patterns including cellular blocks, grids, or individual columns/panels. DSM columns or panels typically have a minimum diameter or width, respectively, of three feet. The installation of DSM systems typically does not create soil spoils; however, it does transport cementitious grout spoils and some soil-cement-mixed spoils to the ground surface. If DSM was used for ground improvement to mitigate liquefaction and lateral spreading, a cellular block of continuous DSM walls composed of overlapping DSM columns or panels would be needed. Unlike stone columns, DSM does not densify the surrounding potentially liquefiable soil, instead the closed cellular blocks act as a confined shear box, which provides additional shear stiffness and strength to the improved zone of soil to withstand liquefaction.

If DSM is used as a ground improvement technique to mitigate liquefaction and lateral spreading, the streets could be supported the DSM grid extending to bearing soil. Structured streets with a mat slab bearing on improved ground by DSM will transfer loads through the fill and Bay Mud to the dense sand layer or deep clay layers at the site.

A qualified, design-build, specialty contractor, who has previously successfully performed ground improvement in similar subsurface soil conditions, should design and perform the ground improvement. We recommend the contractor be presented with our recommendations and the results of our site exploration. We should also review the design calculations, proposed plans and other submittals.

The contractor should design the ground improvement system, including the type of improvement used and the size and spacing of the elements, to adequately improve the liquefaction and lateral spread potential soil within the fill and provide adequate vertical support of the structured street and fill loads. However, the DSM elements should be installed in a closed grid pattern. Further, the minimum replacement ratio for DSM should be 30 percent, and the grid should have a maximum spacing such that no untreated zone is greater than about 15 feet on center each way. The design-build contractor should perform soil structure interaction analysis to demonstrate that liquefaction and lateral spreading has been mitigated.

The DSM elements should be designed with sufficient strength and bearing to provide a bearing capacity factor of safety of at least 2.0 under dead plus live loads and 1.5 for total

# Mayor ED 17-02 Priority permit

design loads, including seismic. The actual calculated bearing pressures from the project structural engineer should be used for this calculation. The recommended minimum unconfined compressive strength of the DSM elements will depend on the ground improvement area replacement ratio and the actual bearing pressures of the overlying foundations.

During preliminary evaluations of this system, we considered 3-foot-wide overlapping panels/columns in a closed grid pattern at 15 feet on-center embedded 12 feet into dense sand or stiff clay below the Bay Mud. The elevation of the bottom of the Bay Mud is presented on Figure H-1 of this report. Other assumptions in our analysis include:

- 250 psi DSM minimum compressive strength in upper portion of DSM (in fill)
- 150 psi DSM strength in lower portion of DSM (in Bay Mud and sand and clay below)
- 12-inch-thick bottom concrete mat slab
- 12-inch-thick structured street walls
- 12-inch-thick pavement section over whole right-of-way
- Average thickness of fill within structured street box of 11 feet.

Based on our analysis, we estimate long-term settlement of the streets could be about 1-1/2 inches due consolidation settlement from load transfer in the Old Bay Clay. These settlement estimates do not incorporate additional settlement that may occur within the improved ground zone; the specialty ground improvement contractor should evaluate the potential for settlement in this layer. If the proposed streets increase in height and/or weight, significantly more settlement could occur. Detailed settlement estimates should be performed following final design of a DSM system. The DSM should be designed by the contractor to limit settlement after placement of the mat and the fill to 1-1/2 inches. The soil-structure interaction analysis should show that settlement has been limited accordingly.

We recommend at least two test sections be improved prior to production installation of DSM elements. We should choose the locations of the test sections and review the ground improvement contractor's submittals for the proposed test sections.

DSM does not densify the soil within the cellular blocks, but rather improves the whole cellular block, such that CPTs or SPTs are not a recommended quality control (QC) measure. For QC of a DSM-improved zone, we recommend monitoring the grout pumping and mixing/penetration rate and obtaining wet grab samples of the in situ soil-cement mixed material for laboratory testing. At least two wet grab samples should be taken with a "bailer type" sampler every

# Mayor ED 17-02 Priority permit

work shift. Grab sample locations should alternate between 1/3 and 2/3 of the element depth; we may occasionally request samples at other depths to evaluate soil variations. Once collected, the wet samples should be immediately provided to the materials testing engineer, who should prepare cylinders without additional mixing. A 3/4-inch screen may be used to remove oversized material from the test samples. Light tamping of samples to facilitate consolidation and remove air bubbles is permitted. At least 90 percent of all strength tests performed on the ground improvement elements should meet or exceed the design minimum compressive strength.

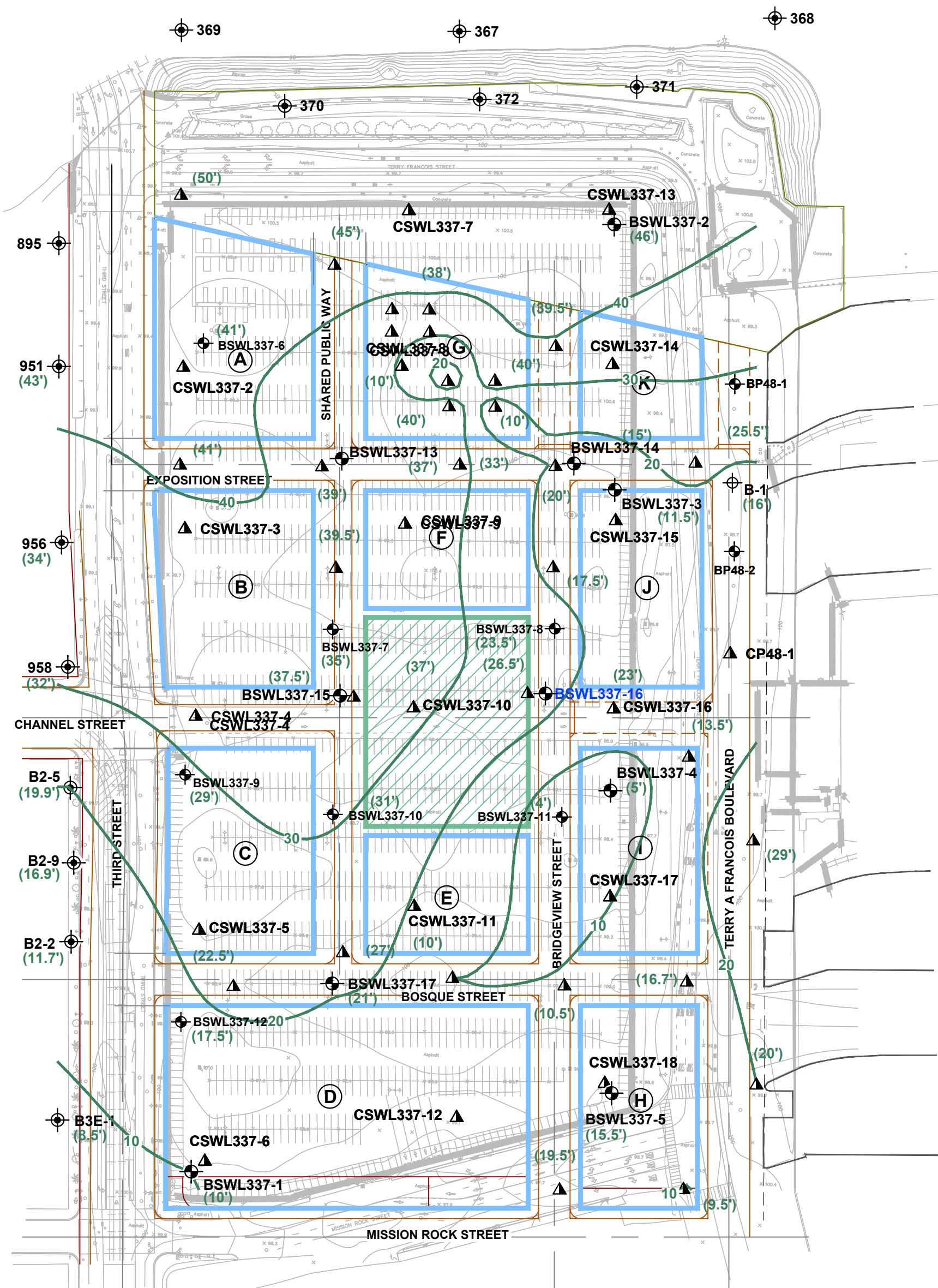
In addition, the QC plan for DSM should include triple-barrel HQ-sized (or larger) coring through at least two of the DSM test panel/column elements to show that the equipment is appropriately mixing and improving the ground. In addition, three percent of the production elements should be cored during the project. Coring should be performed at least seven days after the DSM elements are installed; the center of the core should be about 12 inches from the outer edge of the DSM element. Cores should be checked for recovery, rock quality designation, and percent treatment. For acceptance, the cores should show thorough soil mixing and have a recovery greater than about 90 percent for the entire cored element. At least one sample should be tested for strength from every three feet of core, with a minimum of 5 tests per element.

Resistance to lateral loads can be mobilized by utilizing the shear resistance of the DSM elements provided they are embedded a minimum of six inches into the concrete mat slab. The maximum shear resistance is equivalent to 40 percent of the DSM compressive strength.

The mat foundation should be designed to span between ground improvement columns/elements. If a load transfer platform (LTP), which typically consists of open-graded angular crushed rock is used to help initially distribute load to the ground improvement elements and provide a stable subgrade on which to pour the mat, settlement will occur between the DSM cells and could cause downdrag on the DSM elements. If used, the LTP should be designed by the design-build contractor and settlement and downdrag should be considered in the design. .

We should perform observation during installation of the DSM elements, including during the test program. We should check the subgrade prior to placing the LTP or reinforcing steel. If constructability is an issue, a working platform should be provided that is adequate to support equipment. The design of the working platform should be provided by the general contractor or the ground improvement contractor.

Mayor ED 17-02 Priority permit



EXPLANATION

- BSWL337-1 Approximate location of boring
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Boring drilled for investigations in Langan database
- Development parcel
- Mission Rock Square
- Bottom of bay mud contour (feet, SFCD + 100 feet)
- Elevation of bottom of bay mud (feet, SFCD + 100 feet)

0 120 Feet  
Approximate scale

MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

APPROXIMATE ELEVATION OF  
BOTTOM OF BAY MUD

Date 06/20/18 Project No. 750604203 Figure H-1

LANGAN

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX I**

### **SURCHARGE AND WICK DRAINS BENEATH STREETS**

# Mayor ED 17-02 Priority permit

## **SURCHARGE AND WICK DRAINS**

The goal of a surcharge and wick drain program is to presettle the site and reduce post-construction settlement. Surcharge loads will cause the Bay Mud underlying the site to consolidate to a load in excess of the planned load, thus reducing future settlement. Wick drains will accelerate consolidation of the compressible Bay Mud by providing a shorter drainage path and significantly reducing the time needed for consolidation. Once the desired degree of consolidation is achieved, the temporary surcharge can be removed and the planned improvements can be constructed. A portion of the surcharge will be left in place to bring the streets to final construction grades.

The amount of consolidation settlement that will occur during a surcharge and wick drain program will depend on the thickness of the Bay Mud, the height and extent of the surcharge fill, the spacing of the wick drains, and the length of time the surcharge is applied.

For this surcharge exercise, the roadway pavement section should be left out and not be pre-built. Our preliminary analysis indicates the full 5-1/2-foot-thick section will cause up to about 20 inches of settlement. Allowing for up to about 1-1/2 inches of settlement to occur during the life of the project after completion of surcharging, we conclude that the site needs to be pre-settled by about 18-1/2 inches. Considering that the desired top of compacted street fill is roughly 4-1/2 feet above existing site grades and the site needs to be pre-settled by about 18-1/2 inches, we suggest building the properly compacted/engineered fill street section to 6 feet tall (above existing site grades). A horizontal drainage layer should be placed atop the compacted soil, with the temporary surcharge layer on top. The temporary surcharge can be "loosely" placed (i.e. no need for engineered fill as it is temporary) with a minimum unit weight of 120 pounds per cubic foot, however, some compaction/track rolling will be necessary to build safe side slopes at an inclination of 1.5:1 (horizontal:vertical) and to support construction equipment. The drainage layer could consist of strip drains or 12 inches of open-graded drain rock gravel with perforated PVC pipes placed within the gravel blanket. The drain rock, if used, should be overlain by filter fabric to prevent clogging. Vertical wick drains should be installed from the top of the engineered fill section to the bottom of the Bay Mud in a 4-foot, on-center, triangular pattern. The top of the wick drains should connect into the horizontal drainage layer.

We have evaluated two temporary surcharge heights, i.e. the thickness of fill that will be removed: these are 4 feet and 9 feet (with a total section thickness of properly compacted street fill + surcharge on the order of 10 or 15 feet). Figure I-1 presents the estimated settlement versus time chart for the 4-foot and 9-foot surcharge (10 and 15 feet of total thickness) respectively. Based on these results, we estimate it will take approximately 15 or 9 months to reach the necessary surcharge settlement using a 10-foot or 15-foot total section, respectively, such that about 1-1/2 inches of settlement remains during the life of the project. After reaching the target settlement, the temporary surcharge and the drainage layers can be removed, and the remaining soils regraded for the streets. The surcharge height should be limited such that the loading does not overstress the soil layers below and cause a bearing capacity failure.

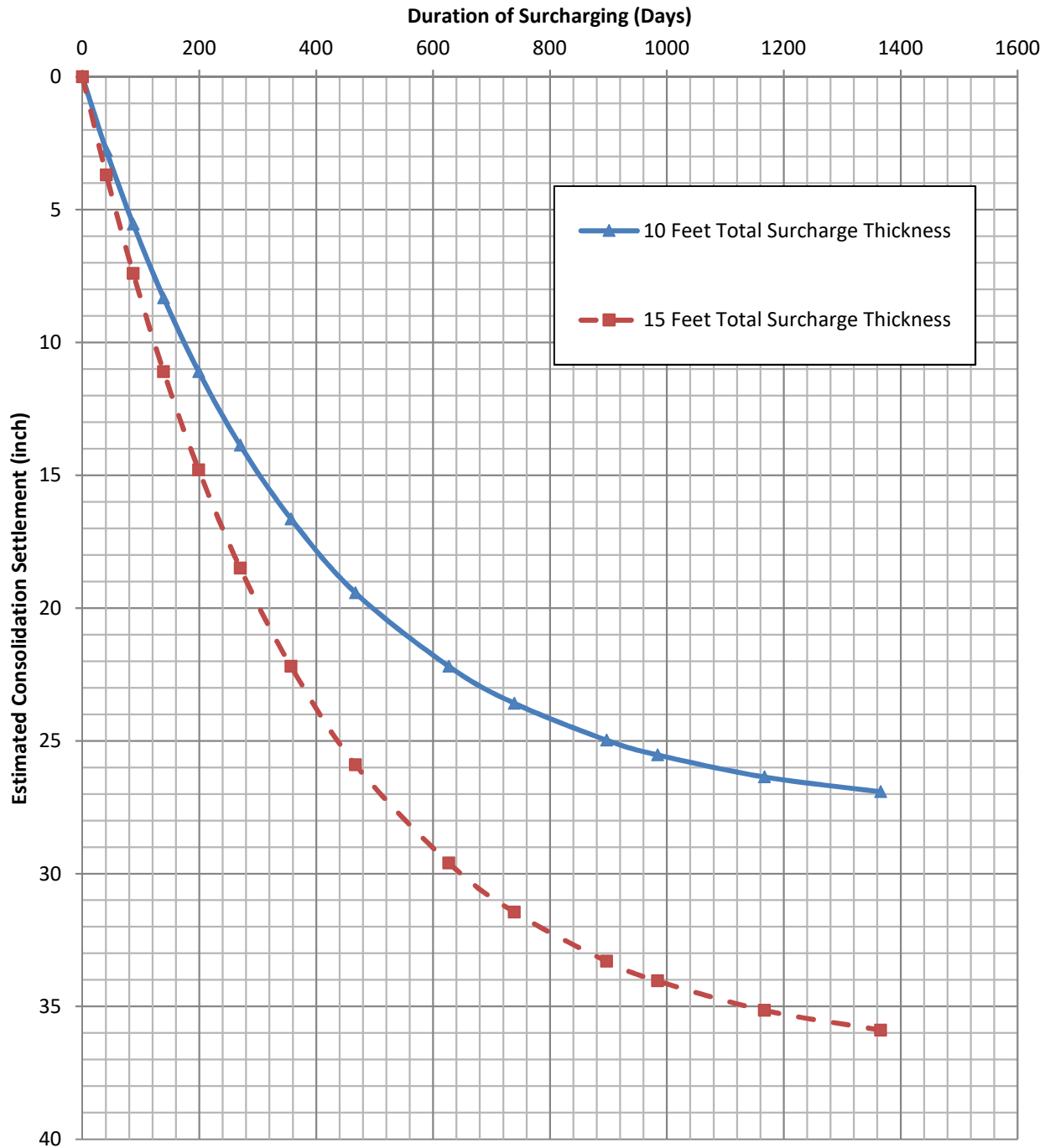


# Mayor ED 17-02 Priority permit

To reduce the potential for additional settlement of the existing surrounding streets (3<sup>rd</sup> Street, Mission Rock Street, and Terry Francois Blvd) and improvements, the wick drains and surcharge (at its full height) should be set back at least 50 feet from the existing street right-of-way. Further setbacks may be required depending on the sensitivity and tolerance of the surrounding improvements to settlement.

The portion of the new street that cannot be surcharged may be raised by using compensating lightweight fill, or structurally supporting that section of the street to prevent additional settlement. Care will need to be taken at the interface of sections improved by different methodologies to mitigate the potential for differential settlement between the two sections.

# Mayor ED 17-02 Priority permit



Notes for Figure: 1. Total surcharge thickness is the total thickness of the properly compacted street fill plus the temporary surcharge thickness.

MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

**LANGAN**

## ESTIMATED SURCHARGE SETTLEMENT VERSUS TIME

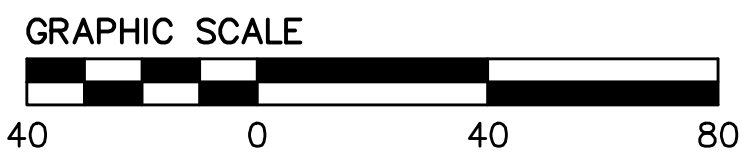
|      |          |                       |            |
|------|----------|-----------------------|------------|
| Date | 08/31/18 | Project No. 750604203 | Figure I-1 |
|------|----------|-----------------------|------------|

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX J**

### **TYPICAL COMPENSATING LIGHTWEIGHT FILL SECTIONS AND CALCULATIONS**

DRAWING NAME: \\BK4-sf\vol14\2008\080006\Mission Rock\ENG\Exhibits\Street Sections\CI.0 SITE PLAN.dwg  
PLOT DATE: 10-18-18 PLOTTED BY: volk



| Revisions | No. | Date | MM/DD/YY |
|-----------|-----|------|----------|
|           |     |      |          |
|           |     |      |          |
|           |     |      |          |
|           |     |      |          |

Drawing Number: C1.0

CITY OF SAN FRANCISCO

MISSION ROCK REDEVELOPMENT PROJECT  
BASIS OF DESIGN  
SITE PLAN

CALIFORNIA

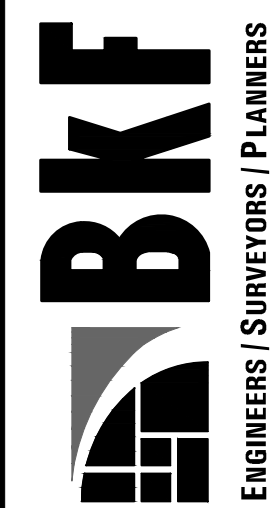
**BKF**  
ENGINEERS / SURVEYORS / PLANNERS

150 CALIFORNIA ST. STE. 600  
SAN FRANCISCO, CA 94111  
415/930-7900 (FAX)  
415/930-7949 (FAX)



NOT FOR CONSTRUCTION





CALIFORNIA

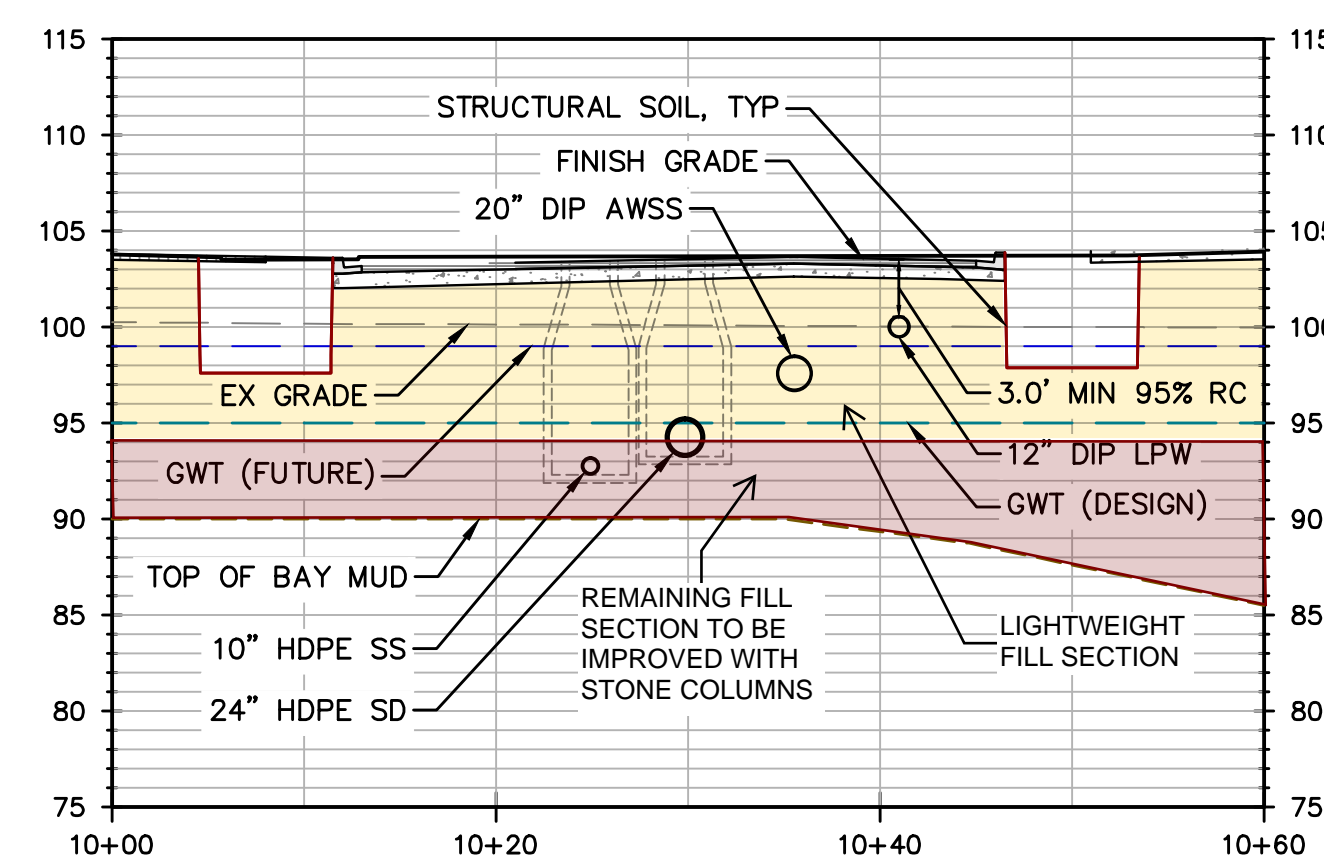
MISSION ROCK REDEVELOPMENT PROJECT  
BASIS OF DESIGN  
STREET SECTIONS  
COUNTY OF SAN FRANCISCO

CITY OF SAN FRANCISCO

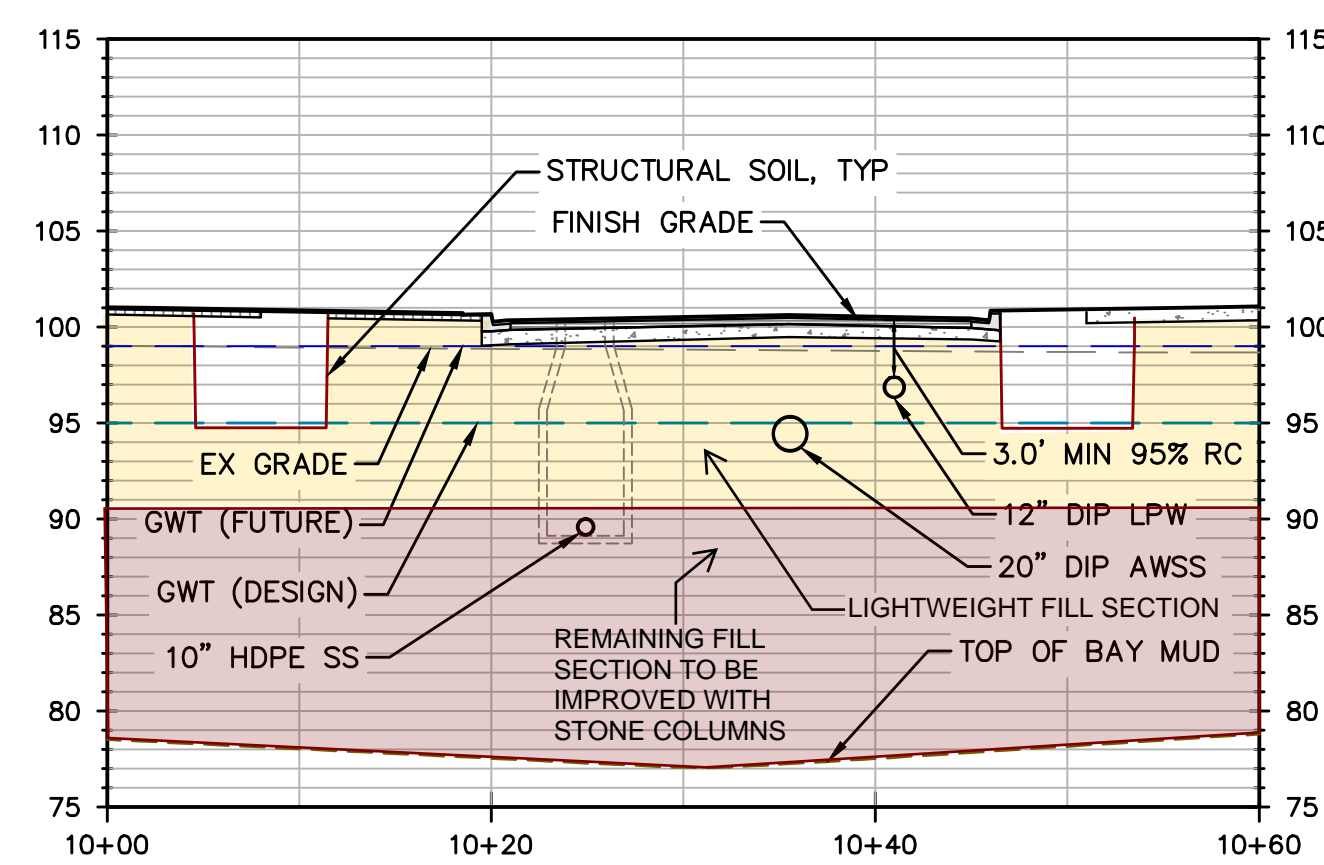
| Revisions        |  |
|------------------|--|
| No.              |  |
| Date: MM/DD/YY   |  |
| Scale: AS SHOWN  |  |
| Design: JD       |  |
| Drawn: LB        |  |
| Approved: JD     |  |
| Job No: 20080006 |  |
| Drawing Number:  |  |

C1.1

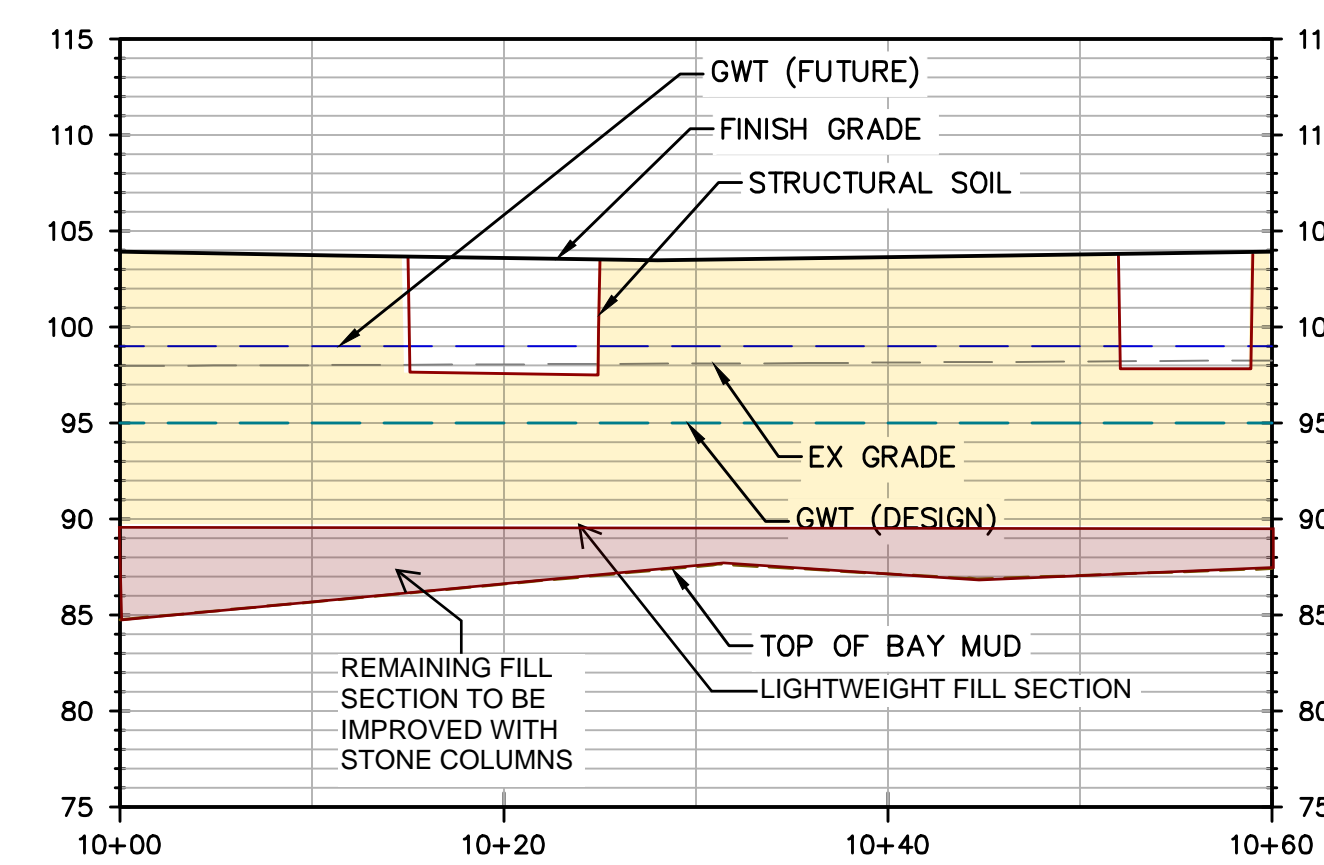
NOT FOR CONSTRUCTION



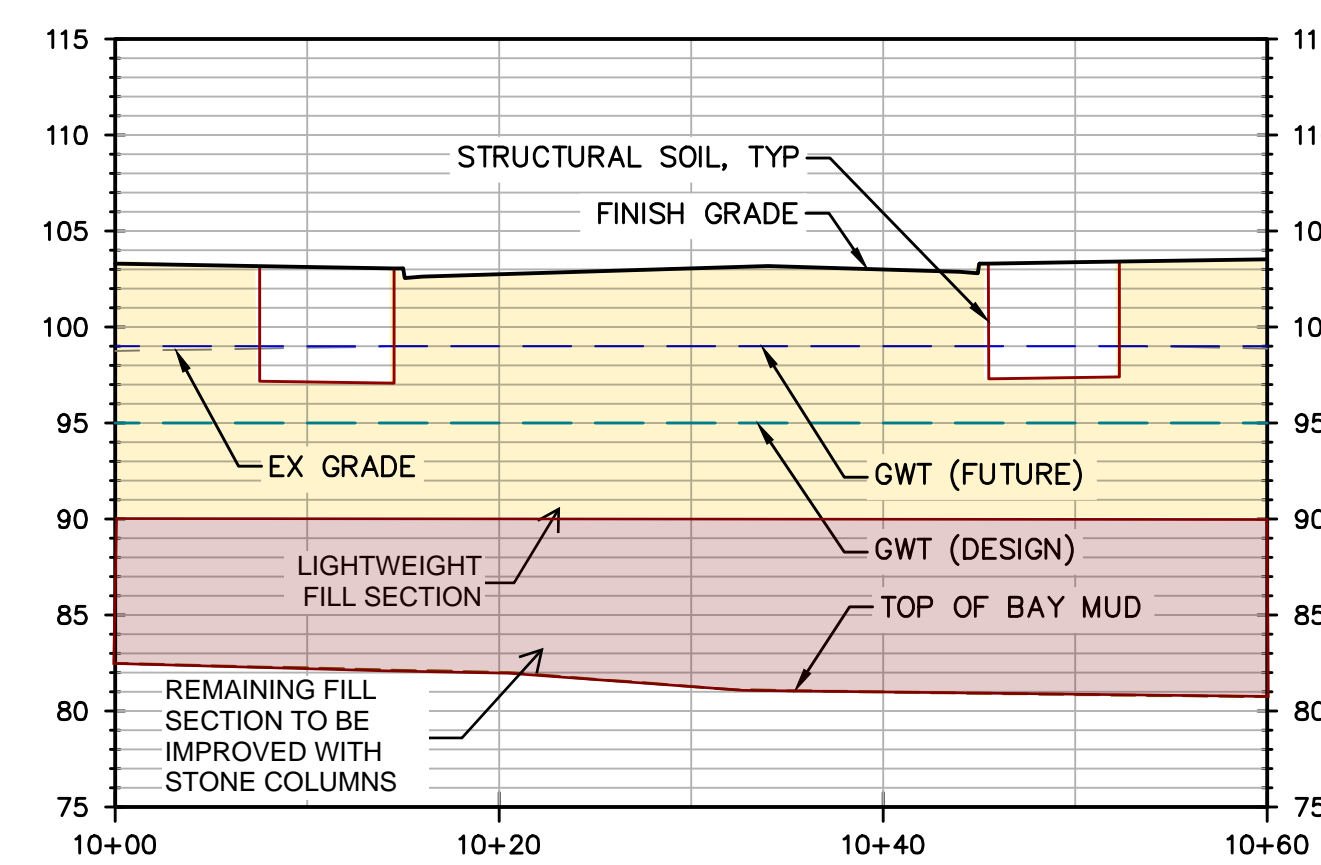
T1 EXPOSITION STREET SECTION  
1" = 10'



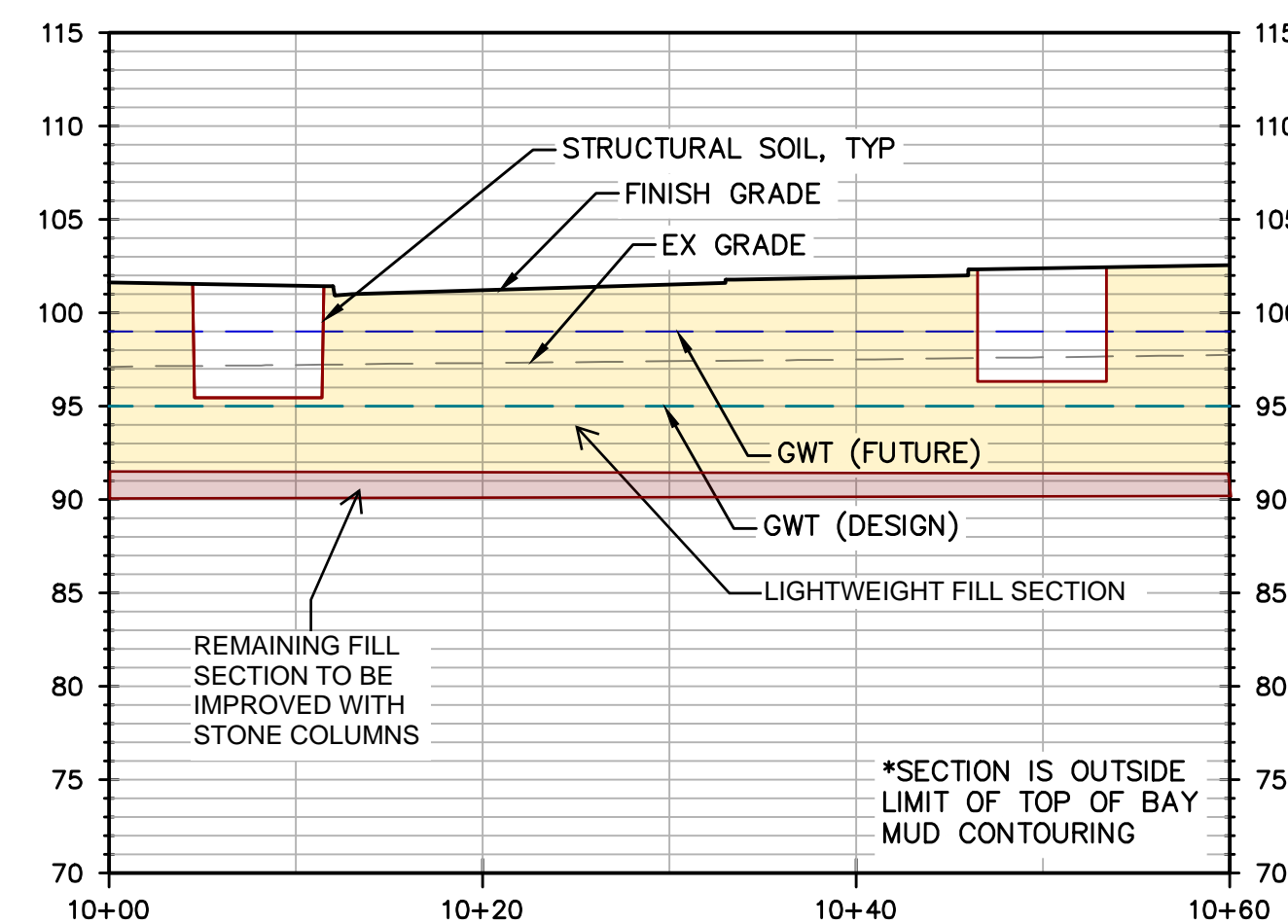
T2 EXPOSITION STREET SECTION  
1" = 10'



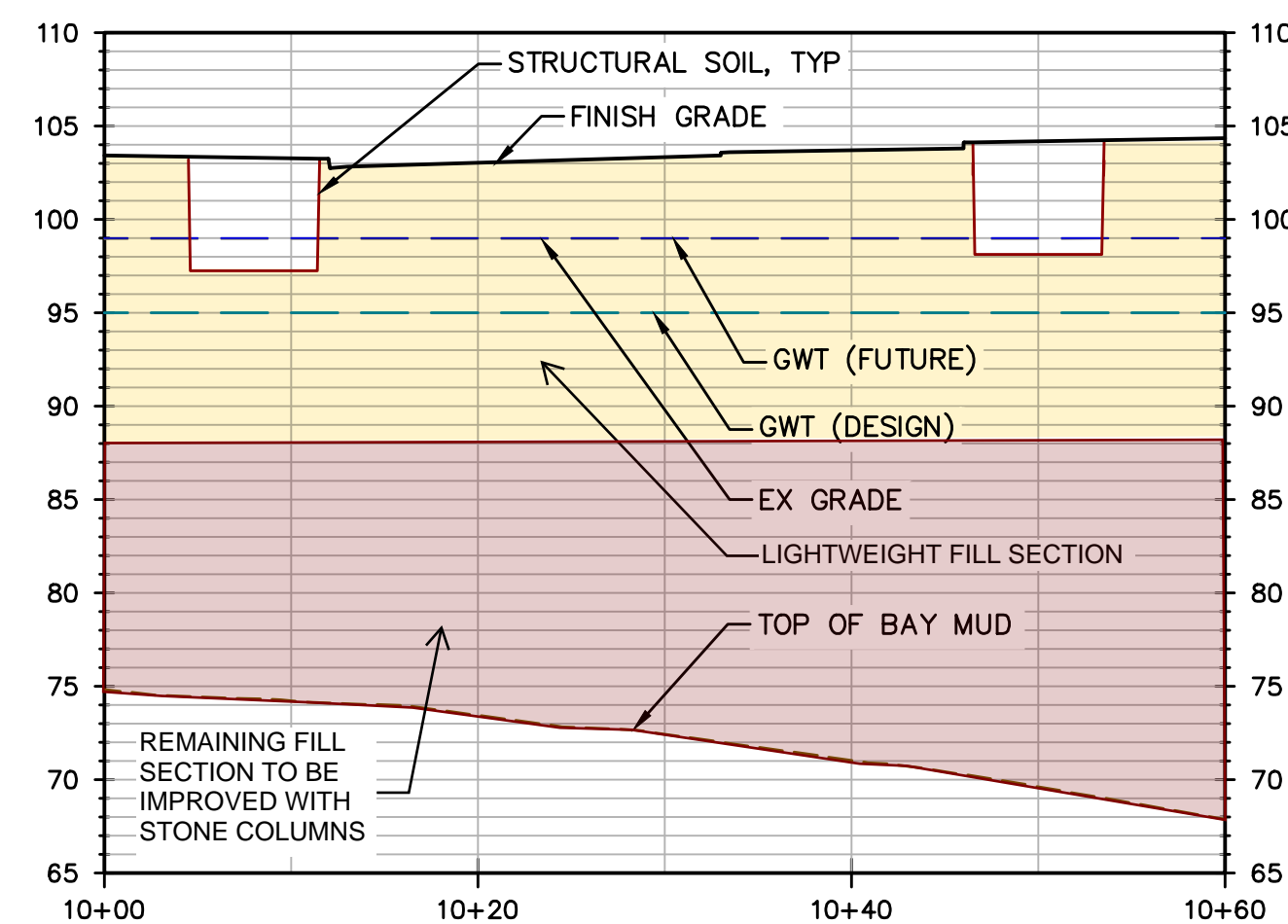
T3 SHARED PUBLIC WAY SECTION  
1" = 10'



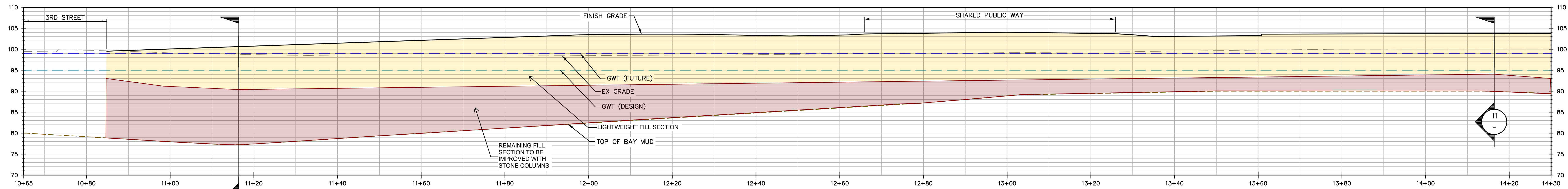
T4 LONG BRIDGE STREET SECTION  
1" = 10'



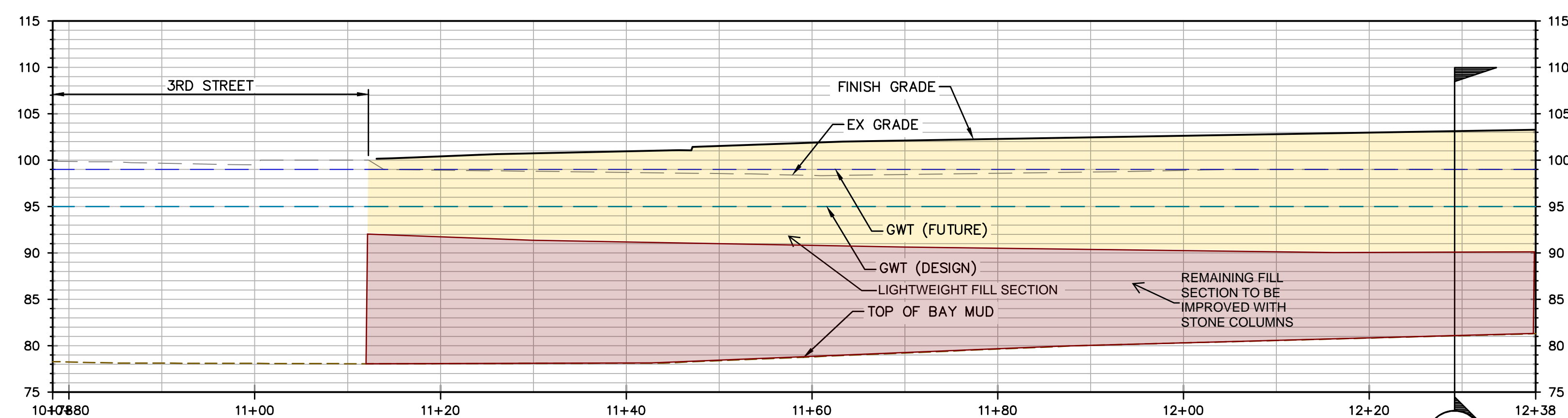
T5 BRIDGEVIEW STREET SECTION  
1" = 10'



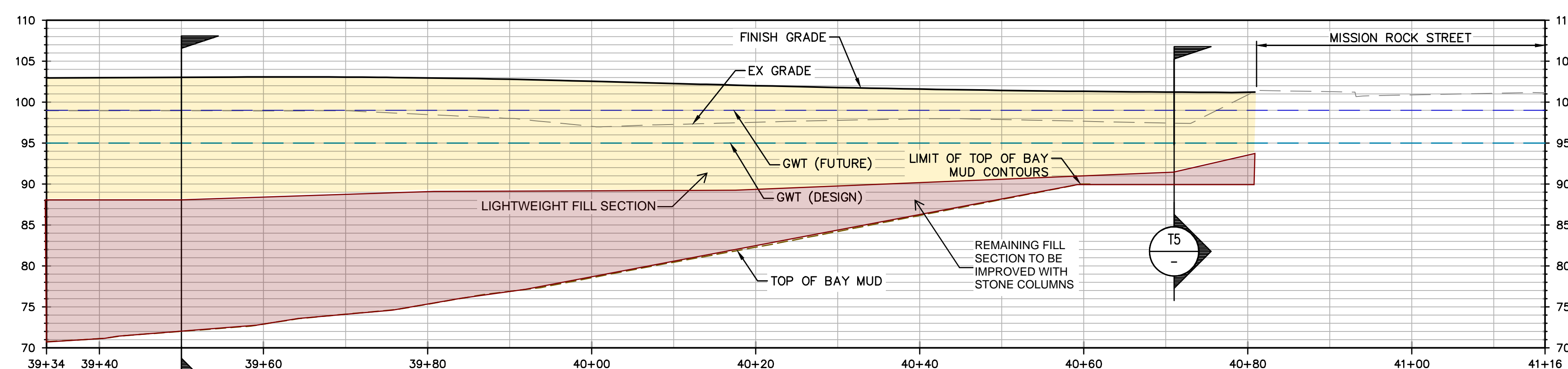
T6 BRIDGEVIEW STREET SECTION  
1" = 10'



L1 EXPOSITION STREET PROFILE  
1" = 10'



L2 LONG BRIDGE STREET PROFILE  
1" = 10'



L3 BRIDGEVIEW STREET PROFILE  
1" = 10'

Stone Column Notes:

3-foot-diameter stone columns

Spaced in a triangular pattern 6- to 8-feet on-center depending on the results of a test program as described in the Final Geotechnical Report

Stone columns will be installed from the bottom of the lightweight fill section and be embedded into the underlying Bay Mud

Preliminary-For Discussion/Illustrative  
Purposes Only

NOT FOR CONSTRUCTION

Revised 6/12/2019  
Based on open cell LCC placed below  
Elevation 99.5 feet and closed cell above  
Mission Rock Development  
750604203

| LEGEND |                            |
|--------|----------------------------|
| ---    | EXISTING GRADE             |
| ---    | FINISH GRADE               |
| ---    | GROUNDWATER TABLE (FUTURE) |
| ---    | GROUNDWATER TABLE (DESIGN) |
| ---    | TOP OF BAY MUD             |
| ---    | STRUCTURAL SOIL            |
| ---    | LIGHTWEIGHT FILL SECTION   |

Mayor ED 17-02 Priority permit

|  |   |                           |                         |                               |
|--|---|---------------------------|-------------------------|-------------------------------|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation = | <b>T3 Shared Public Way</b><br><div><div>98</div>ft MBD<div>Fill Thickness ft. = 11</div></div> <div><div>87</div>ft MBD<div>Grades raised = 6.0</div></div> <div><div>94</div>ft MBD</div> |                           |                         |                               |
| <b>Element</b>   | <b>Effective Unit Wt (pcf)</b>  | <b>Bottom Elev. (MBD)</b> | <b>Thickness (feet)</b> | <b>Effective Weight (lbs)</b> |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b>   |   |                           |                         |                               |
| approximate new grade  |   | 104.0                     |                         |                               |
| composite unit weight upper 6 feet of new section  | 79  | 98.0                      | 6.0                     | 474.0                         |
| lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet   | 27  | 94.0                      | 4.0                     | 108.0                         |
| effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet  | 16  | 89.5                      | 4.5                     | 72.0                          |
| remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]   | 72  | 87.0                      | 2.5                     | 180.0                         |
| Total  |   |                           |                         | 834.0                         |
| <b>Existing Fill Section</b>   |   |                           |                         |                               |
| existing grade   |   | 98.0                      |                         |                               |
| fill above El. 94 feet   | 125   | 94.0                      | 4.0                     | 500.0                         |
| effective fill weight (125 pcf - 63 pcf) below El. 94 feet   | 62  | 87.0                      | 7.0                     | 434.0                         |
| Total  |   | 89.5                      | 11.0                    | 934.0                         |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

Check Load Compensation

|                                  |          |
|----------------------------------|----------|
| Weight of Existing Section (lbs) | 934.0    |
| Weight of New Section (lbs)      | 834.0    |
| % Old/New: Goal is > 110%        | 112.0% ✓ |

Check Crushing

|  |          |
|--|----------|
| Maximum load on 1 square foot column (lbs) | 834.0    |
| Compressive Strength (psi)                 | 40.0     |
| Compressive Strength (psf)                 | 5,760.0  |
| Compressive Strength/Actual Load           | 690.6% ✓ |

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section

|   |       |
|---|-------|
| Elevation of future mid-range water table (MBD)             | 97.0  |
| Elevation of future high-range water table (MBD)            | 99.5  |
| Elevation bottom of light wt fill (MBD)                     | 89.5  |
| Groundwater pressure head mid-range (ft)                    | 7.5   |
| Groundwater pressure head high-range (ft)                   | 10.0  |
| Unit weight of water (pcf)                                  | 63.0  |
| Hydrostatic uplift for mid-range Elevation 97 feet (lbs)    | 472.5 |
| Hydrostatic uplift for high-range Elevation 99.5 feet (lbs) | 630.0 |

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)

|   |     |
|---|-----|
| New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift)    | 1.6 |
| New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift) | 1.2 |

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative.  
However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
1. Calculation estimates the weight of the new section compared to the total fill section
  2. MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  3. Calculations are for 1 square foot section of new ROW
  4. Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-5

Mayor ED 17-02 Priority permit

|  |   |                                      |                                   |  |
|--|---|--------------------------------------|-----------------------------------|--|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation =   | <b>T2 Exposition Street</b><br><div><div>99</div>ft MBD<div>Fill Thickness ft. = 21</div></div> <div><div>78</div>ft MBD<div>Grades raised = 2.0</div></div> <div><div>94</div>ft MBD</div> |                                      |                                   |  |
| <b>Element</b>   | <b>Effective Unit Wt (pcf)</b>  | <b>Bottom Elev. (MBD)</b>            | <b>Thickness (feet)</b>           | <b>Effective Weight (lbs)</b>                                |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b><br>approximate new grade<br>composite unit weight upper 6 feet of new section<br>lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet<br>effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet<br>remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]<br>Total | <br><br>79<br>27<br>16<br>72  | <br><br>95.0<br>94.0<br>90.5<br>78.0 | <br><br>6.0<br>1.0<br>3.5<br>12.5 | <br><br>474.0<br>27.0<br>56.0<br>900.0<br><div>1,457.0</div> |
| <b>Existing Fill Section</b><br>existing grade<br>fill above El. 94 feet<br>effective fill weight (125 pcf - 63 pcf) below El. 94 feet<br>Total  | <br><br>125<br>62   | <br><br>99.0<br>94.0<br>78.0<br>90.5 | <br><br>5.0<br>16.0<br>21.0       | <br><br>625.0<br>992.0<br><div>1,617.0</div>                 |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

|  |  |
|--|--|
| <b>Check Load Compensation</b><br>Weight of Existing Section (lbs)<br>Weight of New Section (lbs)<br>% Old/New: Goal is > 110% | <br><br>1,617.0<br>1,457.0<br>111.0% ✓ |
|--|--|

|   |  |
|---|--|
| <b>Check Crushing</b><br>Maximum load on 1 square foot column (lbs)<br>Compressive Strength (psi)<br>Compressive Strength (psf)<br>Compressive Strength/Actual Load | <br><br>1,457.0<br>40.0<br>5,760.0<br>395.3% ✓ |
|---|--|

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

|   |  |
|---|--|
| <b>Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section</b><br>Elevation of future mid-range water table (MBD)<br>Elevation of future high-range water table (MBD)<br>Elevation bottom of light wt fill (MBD)<br>Groundwater pressure head mid-range (ft)<br>Groundwater pressure head high-range (ft)<br>Unit weight of water (pcf)<br>Hydrostatic uplift for mid-range Elevation 97 feet (lbs)<br>Hydrostatic uplift for high-range Elevation 99.5 feet (lbs) | <br><br>97.0<br>99.5<br>90.5<br>6.5<br>9.0<br>63.0<br>409.5<br>567.0 |
|---|--|

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

|  |                        |
|--|------------------------|
| <b>Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)</b><br>New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift)<br>New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift) | <br><br>1.5<br><br>1.1 |
|--|------------------------|

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative. However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
- Calculation estimates the weight of the new section compared to the total fill section
  - MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  - Calculations are for 1 square foot section of new ROW
  - Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-4



Mayor ED 17-02 Priority permit

|  |   |                           |                         |                               |
|--|---|---------------------------|-------------------------|-------------------------------|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation = | <b>T3 Shared Public Way</b><br><div><div>98</div>ft MBD<div>Fill Thickness ft. = 11</div></div> <div><div>87</div>ft MBD<div>Grades raised = 6.0</div></div> <div><div>94</div>ft MBD</div> |                           |                         |                               |
| <b>Element</b>   | <b>Effective Unit Wt (pcf)</b>  | <b>Bottom Elev. (MBD)</b> | <b>Thickness (feet)</b> | <b>Effective Weight (lbs)</b> |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b>   |   |                           |                         |                               |
| approximate new grade  |   | 104.0                     |                         |                               |
| composite unit weight upper 6 feet of new section  | 79  | 98.0                      | 6.0                     | 474.0                         |
| lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet   | 27  | 94.0                      | 4.0                     | 108.0                         |
| effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet  | 16  | 89.5                      | 4.5                     | 72.0                          |
| remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]   | 72  | 87.0                      | 2.5                     | 180.0                         |
| Total  |   |                           |                         | 834.0                         |
| <b>Existing Fill Section</b>   |   |                           |                         |                               |
| existing grade   |   | 98.0                      |                         |                               |
| fill above El. 94 feet   | 125   | 94.0                      | 4.0                     | 500.0                         |
| effective fill weight (125 pcf - 63 pcf) below El. 94 feet   | 62  | 87.0                      | 7.0                     | 434.0                         |
| Total  |   | 89.5                      | 11.0                    | 934.0                         |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

|                                  |          |
|----------------------------------|----------|
| <b>Check Load Compensation</b>   |          |
| Weight of Existing Section (lbs) | 934.0    |
| Weight of New Section (lbs)      | 834.0    |
| % Old/New: Goal is > 110%        | 112.0% ✓ |

|  |          |
|--|----------|
| <b>Check Crushing</b>                      |          |
| Maximum load on 1 square foot column (lbs) | 834.0    |
| Compressive Strength (psi)                 | 40.0     |
| Compressive Strength (psf)                 | 5,760.0  |
| Compressive Strength/Actual Load           | 690.6% ✓ |

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

|   |       |
|---|-------|
| <b>Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section</b> |       |
| Elevation of future mid-range water table (MBD)                             | 97.0  |
| Elevation of future high-range water table (MBD)                            | 99.5  |
| Elevation bottom of light wt fill (MBD)                                     | 89.5  |
| Groundwater pressure head mid-range (ft)                                    | 7.5   |
| Groundwater pressure head high-range (ft)                                   | 10.0  |
| Unit weight of water (pcf)  | 63.0  |
| Hydrostatic uplift for mid-range Elevation 97 feet (lbs)                    | 472.5 |
| Hydrostatic uplift for high-range Elevation 99.5 feet (lbs)                 | 630.0 |

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

|   |     |
|---|-----|
| <b>Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)</b>     |     |
| New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift)    | 1.6 |
| New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift) | 1.2 |

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative. However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
1. Calculation estimates the weight of the new section compared to the total fill section
  2. MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  3. Calculations are for 1 square foot section of new ROW
  4. Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-5



Mayor ED 17-02 Priority permit

|  |  |  |   |   |
|--|--|--|---|---|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation =   | <b>T4 Long Bridge Street</b><br><div><div>99</div>ft MBD<div>Fill Thickness ft. = 18</div></div> <div><div>81</div>ft MBD<div>Grades raised = 5.0</div></div> <div><div>94</div>ft MBD</div> |  |   |   |
| <b>Element</b>   | <b>Effective Unit Wt (pcf)</b>   | <b>Bottom Elev. (MBD)</b>  | <b>Thickness (feet)</b>                                     | <b>Effective Weight (lbs)</b>   |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b><br>approximate new grade<br>composite unit weight upper 6 feet of new section<br>lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet<br>effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet<br>remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]<br>Total | <div>79</div> <div>27</div> <div>16</div> <div>72</div>  | <div>104.0</div> <div>98.0</div> <div>94.0</div> <div>90.0</div> <div>81.0</div> | <div>6.0</div> <div>4.0</div> <div>4.0</div> <div>9.0</div> | <div>474.0</div> <div>108.0</div> <div>64.0</div> <div>648.0</div> <div>1,294.0</div> |
| <b>Existing Fill Section</b><br>existing grade<br>fill above El. 94 feet<br>effective fill weight (125 pcf - 63 pcf) below El. 94 feet<br>Total  | <div>125</div> <div>62</div>   | <div>99.0</div> <div>94.0</div> <div>81.0</div> <div>90.0</div>                  | <div>5.0</div> <div>13.0</div> <div>18.0</div>              | <div>625.0</div> <div>806.0</div> <div>1,431.0</div>                                  |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

|  |   |
|--|---|
| <b>Check Load Compensation</b><br>Weight of Existing Section (lbs)<br>Weight of New Section (lbs)<br>% Old/New: Goal is > 110% | <div>1,431.0</div> <div>1,294.0</div> <div>110.6% ✓</div> |
|--|---|

|   |   |
|---|---|
| <b>Check Crushing</b><br>Maximum load on 1 square foot column (lbs)<br>Compressive Strength (psi)<br>Compressive Strength (psf)<br>Compressive Strength/Actual Load | <div>1,294.0</div> <div>40.0</div> <div>5,760.0</div> <div>445.1% ✓</div> |
|---|---|

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

|   |   |
|---|---|
| <b>Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section</b><br>Elevation of future mid-range water table (MBD)<br>Elevation of future high-range water table (MBD)<br>Elevation bottom of light wt fill (MBD)<br>Groundwater pressure head mid-range (ft)<br>Groundwater pressure head high-range (ft)<br>Unit weight of water (pcf)<br>Hydrostatic uplift for mid-range Elevation 97 feet (lbs)<br>Hydrostatic uplift for high-range Elevation 99.5 feet (lbs) | <div>97.0</div> <div>99.5</div> <div>90.0</div> <div>7.0</div> <div>9.5</div> <div>63.0</div> <div>441.0</div> <div>598.5</div> |
|---|---|

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

|   |                |
|---|----------------|
| <b>Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)</b><br>New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift) | <div>1.7</div> |
| New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift)   | <div>1.2</div> |

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative. However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
1. Calculation estimates the weight of the new section compared to the total fill section
  2. MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  3. Calculations are for 1 square foot section of new ROW
  4. Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-6

Mayor ED 17-02 Priority permit

|  |   |                                      |                                  |  |
|--|---|--------------------------------------|----------------------------------|--|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation =   | <b>T5 Bridgeview Street</b><br><div><div>98 ft MBD</div><div>90 ft MBD</div><div>94 ft MBD</div></div> <div><div>Fill Thickness ft. = 8</div><div>Grades raised = 4.0</div></div> |                                      |                                  |  |
| <b>Element</b>   | <b>Effective Unit Wt (pcf)</b>  | <b>Bottom Elev. (MBD)</b>            | <b>Thickness (feet)</b>          | <b>Effective Weight (lbs)</b>                              |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b><br>approximate new grade<br>composite unit weight upper 6 feet of new section<br>lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet<br>effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet<br>remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]<br>Total | <br><br>79<br>27<br>16<br>72  | <br><br>96.0<br>94.0<br>91.5<br>90.0 | <br><br>6.0<br>2.0<br>2.5<br>1.5 | <br><br>474.0<br>54.0<br>40.0<br>108.0<br><div>676.0</div> |
| <b>Existing Fill Section</b><br>existing grade<br>fill above El. 94 feet<br>effective fill weight (125 pcf - 63 pcf) below El. 94 feet<br>Total  | <br><br>125<br>62   | <br><br>98.0<br>94.0<br>90.0<br>91.5 | <br><br>4.0<br>4.0<br>8.0        | <br><br>500.0<br>248.0<br>748.0                            |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

|  |                                    |
|--|------------------------------------|
| <b>Check Load Compensation</b><br>Weight of Existing Section (lbs)<br>Weight of New Section (lbs)<br>% Old/New: Goal is > 110% | <br><br>748.0<br>676.0<br>110.7% ✓ |
|--|------------------------------------|

|   |  |
|---|--|
| <b>Check Crushing</b><br>Maximum load on 1 square foot column (lbs)<br>Compressive Strength (psi)<br>Compressive Strength (psf)<br>Compressive Strength/Actual Load | <br><br>676.0<br>40.0<br>5,760.0<br>852.1% ✓ |
|---|--|

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

|   |  |
|---|--|
| <b>Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section</b><br>Elevation of future mid-range water table (MBD)<br>Elevation of future high-range water table (MBD)<br>Elevation bottom of light wt fill (MBD)<br>Groundwater pressure head mid-range (ft)<br>Groundwater pressure head high-range (ft)<br>Unit weight of water (pcf)<br>Hydrostatic uplift for mid-range Elevation 97 feet (lbs)<br>Hydrostatic uplift for high-range Elevation 99.5 feet (lbs) | <br><br>97.0<br>99.5<br>91.5<br>5.5<br>8.0<br>63.0<br>346.5<br>504.0 |
|---|--|

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

|  |                        |
|--|------------------------|
| <b>Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)</b><br>New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift)<br>New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift) | <br><br>1.8<br><br>1.2 |
|--|------------------------|

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative.  
However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
1. Calculation estimates the weight of the new section compared to the total fill section
  2. MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  3. Calculations are for 1 square foot section of new ROW
  4. Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-7

Mayor ED 17-02 Priority permit

|  |  |                    |                  |                        |
|--|--|--------------------|------------------|------------------------|
| <b>MISSION ROCK COMPENSATING FILL SECTION:</b><br>Original Ground Surface ft =<br>Bottom of existing fill =<br>Observed high groundwater elevation =   | <b>T6 Bridgeview Street</b><br><div><div>99</div>ft MBD<div>72</div>ft MBD<div>94</div>ft MBD</div> <div>Fill Thickness ft. = 27<br/>Grades raised = 4.0</div> |                    |                  |                        |
| Element  | Effective Unit Wt (pcf)  | Bottom Elev. (MBD) | Thickness (feet) | Effective Weight (lbs) |
| <b>New Section Lightweight Fill at 33 pcf above El. 99.5 and 27 pcf below El. 99.5</b><br>approximate new grade<br>composite unit weight upper 6 feet of new section<br>lightweight fill @ 27 pcf above El. 94 feet to El. 99.5 feet<br>effective lightweight fill weight (79 pcf - 63 pcf) below El. 94 feet<br>remaining fill effective weight with additional weight due to stone columns [(125 pcf +10 pcf) - 63 pcf]<br>Total |  | 103.0              |                  |                        |
|  | 79   | 97.0               | 6.0              | 474.0                  |
|  | 27   | 94.0               | 3.0              | 81.0                   |
|  | 16   | 88.0               | 6.0              | 96.0                   |
|  | 72   | 72.0               | 16.0             | 1,152.0                |
|  |  |                    |                  | 1,803.0                |
| <b>Existing Fill Section</b><br>existing grade<br>fill above El. 94 feet<br>effective fill weight (125 pcf - 63 pcf) below El. 94 feet<br>Total  |  | 99.0               |                  |                        |
|  | 125  | 94.0               | 5.0              | 625.0                  |
|  | 62   | 72.0               | 22.0             | 1,364.0                |
|  |  | 88.0               | 27.0             | 1,989.0                |

<<<---- 33 pcf for closed cell LCC to be used above the future high water table and 27 pcf for open cell LCC below the future high water table  
<<<---- new composite section calculated on page J-9  
<<<---- observed high groundwater level (El. 94 feet)  
  
<<<---- stone columns will increase the weight of the remaining fill section  
remaining fill depth is averaged over the entire ROW

|                                  |          |
|----------------------------------|----------|
| <b>Check Load Compensation</b>   |          |
| Weight of Existing Section (lbs) | 1,989.0  |
| Weight of New Section (lbs)      | 1,803.0  |
| % Old/New: Goal is > 110%        | 110.3% ✓ |

|  |          |
|--|----------|
| <b>Check Crushing</b>                      |          |
| Maximum load on 1 square foot column (lbs) | 1,803.0  |
| Compressive Strength (psi)                 | 40.0     |
| Compressive Strength (psf)                 | 5,760.0  |
| Compressive Strength/Actual Load           | 319.5% ✓ |

<<<---- assumes everything below Elevation 99.5 feet has a saturated unit weight of 84 pcf  
<<<---- minimum compressive strength for Class III closed cell LCC

|   |       |
|---|-------|
| <b>Hydrostatic Uplift at the Bottom of the New Lightweight Fill Section</b> |       |
| Elevation of future mid-range water table (MBD)                             | 97.0  |
| Elevation of future high-range water table (MBD)                            | 99.5  |
| Elevation bottom of light wt fill (MBD)                                     | 88.0  |
| Groundwater pressure head mid-range (ft)                                    | 9.0   |
| Groundwater pressure head high-range (ft)                                   | 11.5  |
| Unit weight of water (pcf)  | 63.0  |
| Hydrostatic uplift for mid-range Elevation 97 feet (lbs)                    | 567.0 |
| Hydrostatic uplift for high-range Elevation 99.5 feet (lbs)                 | 724.5 |

<<<---- 2100 estimates of sea level rise per FEMA guidelines is 36 inches (El. 94 + 3 feet)  
<<<---- 2100 estimates of sea level rise per FEMA guidelines is 66 inches (El. 94 + 5.5 feet)

|   |     |
|---|-----|
| <b>Factor of Safety (FOS) Against Uplift (Assumes worst case if all closed cell LCC was used)</b>     |     |
| New section with water at mid-range Elevation 97 feet<br>(new section weight / hydrostatic uplift)    | 1.4 |
| New section with water at high-range Elevation 99.5 feet<br>(new section weight / hydrostatic uplift) | 1.1 |

<<<---- FOS against uplift assumes lightweight fill below water is all 33 pcf and that the hydrostatic pressure acts at the bottom of the section  
<<<----Since open cell LCC is proposed below Elevation 99.5 feet, no hydrostatic pressure should develop below or within the LCC section so FOS noted here is conservative. However, if all closed cell LCC was used, there would still be an adequate FOS

- Notes:
1. Calculation estimates the weight of the new section compared to the total fill section
  2. MBD = Mission Bay Datum, which is old San Francisco Datum +100'
  3. Calculations are for 1 square foot section of new ROW
  4. Factor of Safety against uplift assumes that the hydrostatic pressure acts act the bottom of the section

\*Not for construction; sections will be finalized once grades are finalized

Mission Rock Development Streets  
Compensating Fill Section Calculations  
Revised 30 May 2019  
750604203



Figure J-8

# Mayor ED 17-02 Priority permit

## New Composite Fill Average Unit Weight Calculation

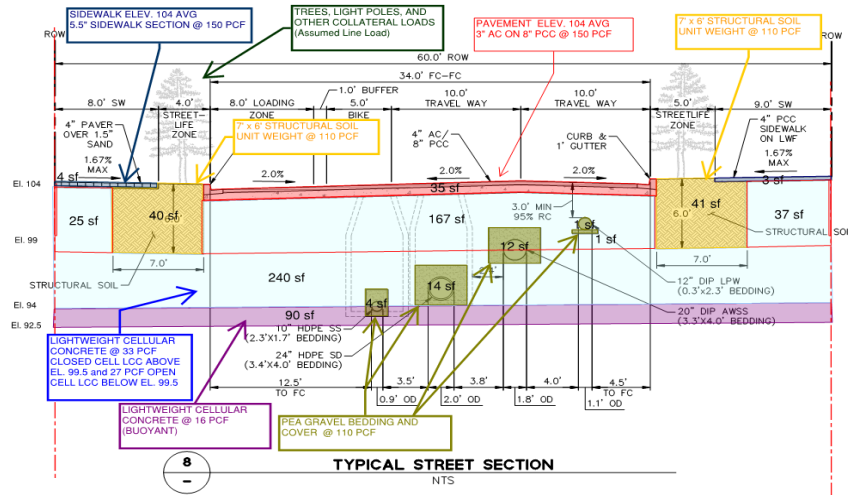
|  | Area<br>(sf) | Total Unit<br>Weight<br>(psf/ft) | Total<br>Weight<br>(plf) |
|--|--------------|----------------------------------|--------------------------|
| Structural Soil)   | 81           | 110                              | 8910                     |
| Trees, light poles, and other collateral weight            | 14           | 86                               | 1204                     |
| Utilities, bedding, and shading (See calc. above for area) | 32           | -                                | 3486                     |
| Sidewalk and Pavers  | 7            | 150                              | 1050                     |
| 4" AB under Sidewalk, Pavers, Streets                      | 16           | 130                              | 2080                     |
| Street Pavement Section                                    | 35           | 150                              | 5250                     |
| Remainder of 60 foot ROW is lightweight fill               | 181          | 32                               | 5792                     |
| Total  | 352          | -                                | 27772                    |
| <b>Average unit weight (total weight/total area)</b>       |              | <b>79</b>                        |                          |

--average line load placed on top of Structural Soil area  
 --assumed to be within the upper 6 feet for ease in calculation

area of LCC subtracted by the area of utilities, bedding, and shading  
 -- total unit weight based on 1.5 feet of 27 pcf and 4.5 feet of 33 pcf LCC  
 (25+167+37)-total of utility, bedding, and shading area

### Notes:

1. Typical Street Section prepared by BKF Engineers
2. Calculation averages the unit weight of the upper 5 feet of the lightweight fill section below the new pavement section and assumes the structural soil, utility bedding, utility shading, utilities, and lightweight fill are in that 5 foot section
3. Area of utilities and utility bedding and shading taken from a typical street section prepared by BKF Engineers
4. Assumes the entire unit weight of the utilities, bedding, and shading is 110 pcf
5. Unit weight of saturated structural soil assumed to be 110 pcf



|           | Bedding and cushion |            |                    | Unit wt = 110                    |                   | PCF                                 |                      |   |                    |
|-----------|---------------------|------------|--------------------|----------------------------------|-------------------|-------------------------------------|----------------------|---|--------------------|
|           | Width (ft)          | Depth (ft) | Pipe diameter (ft) | Area of bedding and shading (sf) | Area of pipe (sf) | Weight of bedding and shading (plf) | Weight of pipe (plf) | Weight of fluid in pipe assuming full (plf) | Total weight (plf) |
| 10" SS*   | 1.7                 | 2.3        | 0.9                | 3.3                              | 0.6               | 360                                 | 65                   | 48  | 473                |
| 24" SD*   | 4.0                 | 3.4        | 2.0                | 10.5                             | 3.1               | 1,151                               | 253                  | 236   | 1,404              |
| 20" AWSS* | 4.0                 | 3.3        | 1.8                | 10.7                             | 2.5               | 1,172                               | 265                  | 191   | 1,437              |
| 12" LPW   | 2.3                 | 0.3        | 1.0                | 0.7                              | 0.8               | 76                                  | 96                   | 59  | 172                |
| Total     |                     |            |                    | 25.1                             | 7.1               |                                     |                      |   | 3,486              |

\*Assumed unit weight of bedding and shading = 110 pcf

\*Assumed unit weight of fluid in pipe = 75 pcf

Total Area (sf) = 32  
 Total Weight (plf) = 3,486

Composite Fill Average Unit Weight Calculation  
 Mission Rock Development Streets  
 750604203  
 1 February 2019

**LANGAN**

Figure J-9

# ***Mayor ED 17-02 Priority permit***

## **APPENDIX K**

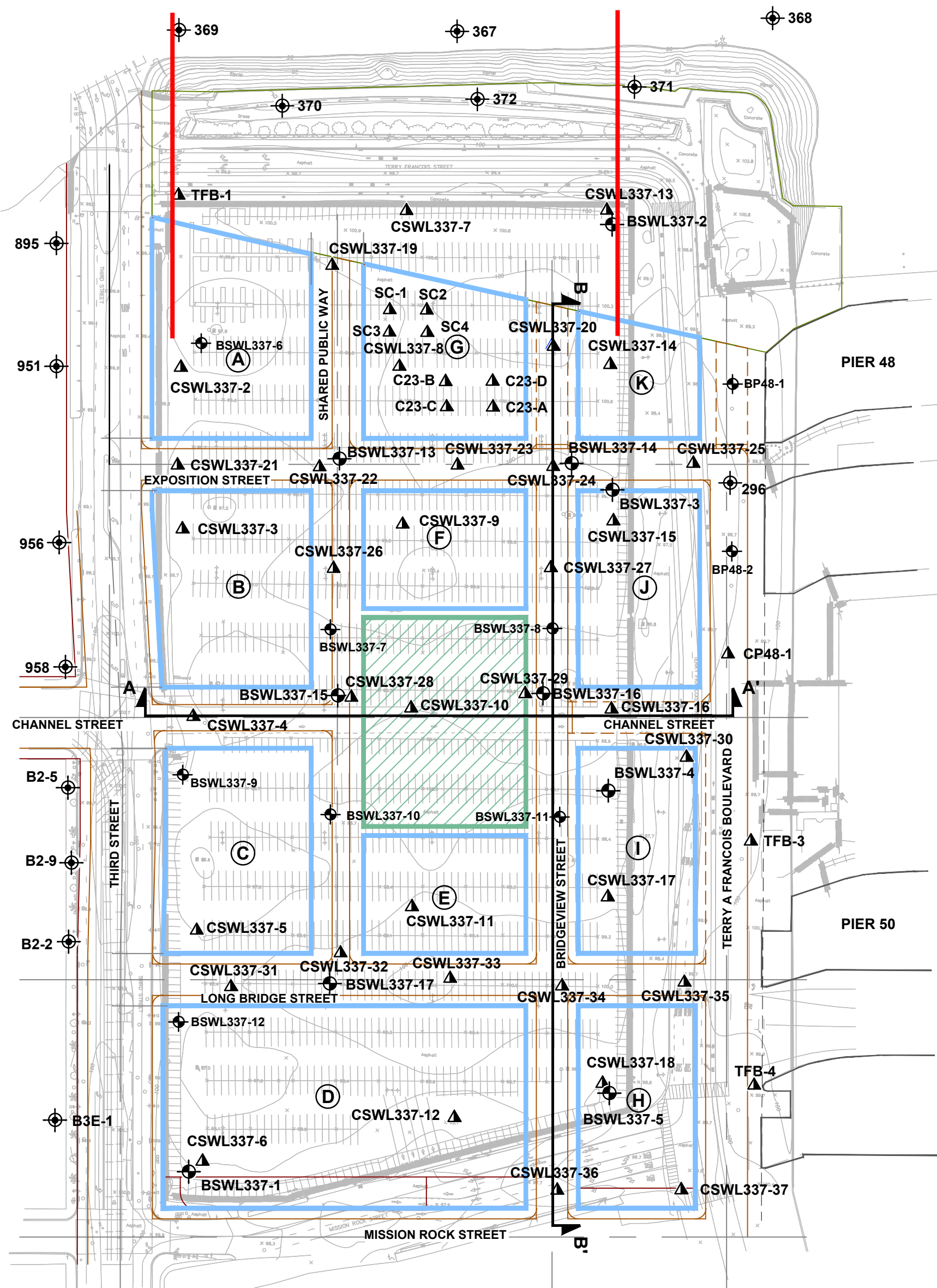
### **CHINA BASIN PARK SLOPE STABILITY ANALYSIS**



Mayor ED 17-02 Priority permit

PROFILE 1

PROFILE 2



EXPLANATION

- BSWL337-1 Boring drilled for investigations in Langan database
- CSWL337-02 Approximate location of cone penetration test (CPT)
- Development parcel
- Mission Rock Square
- Idealized subsurface profile location

0 120 Feet  
Approximate scale

MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California

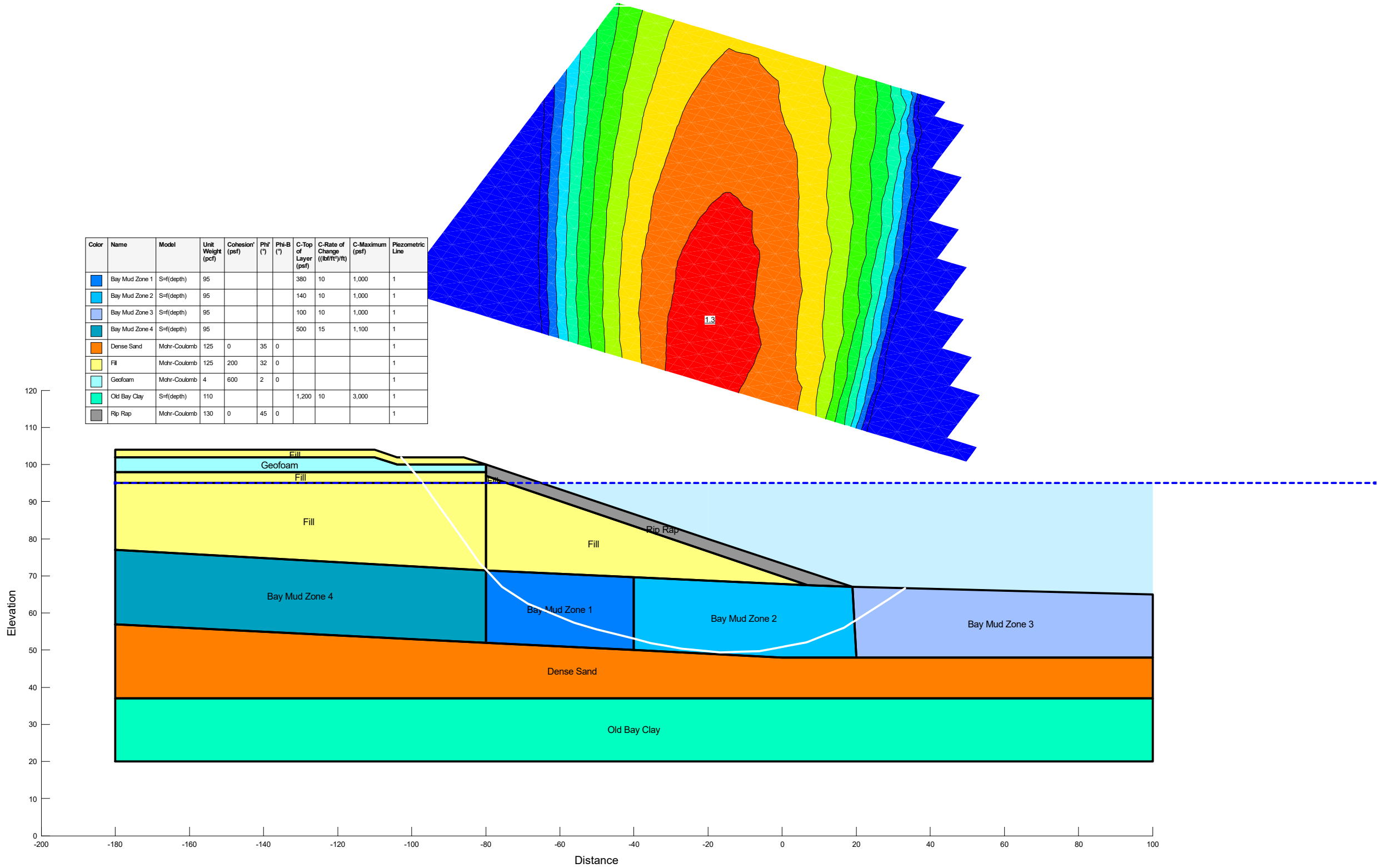
SITE PLAN

Date 07/09/18 Project No. 750604203 Figure K-1

LANGAN

References: Base map from a drawing titled "Seawall Lot 337, Working Exhibit", by BKF Engineers, dated 07/19/2011 and "SWL 337/Parcel Plan", by Perkins + Will, undated.

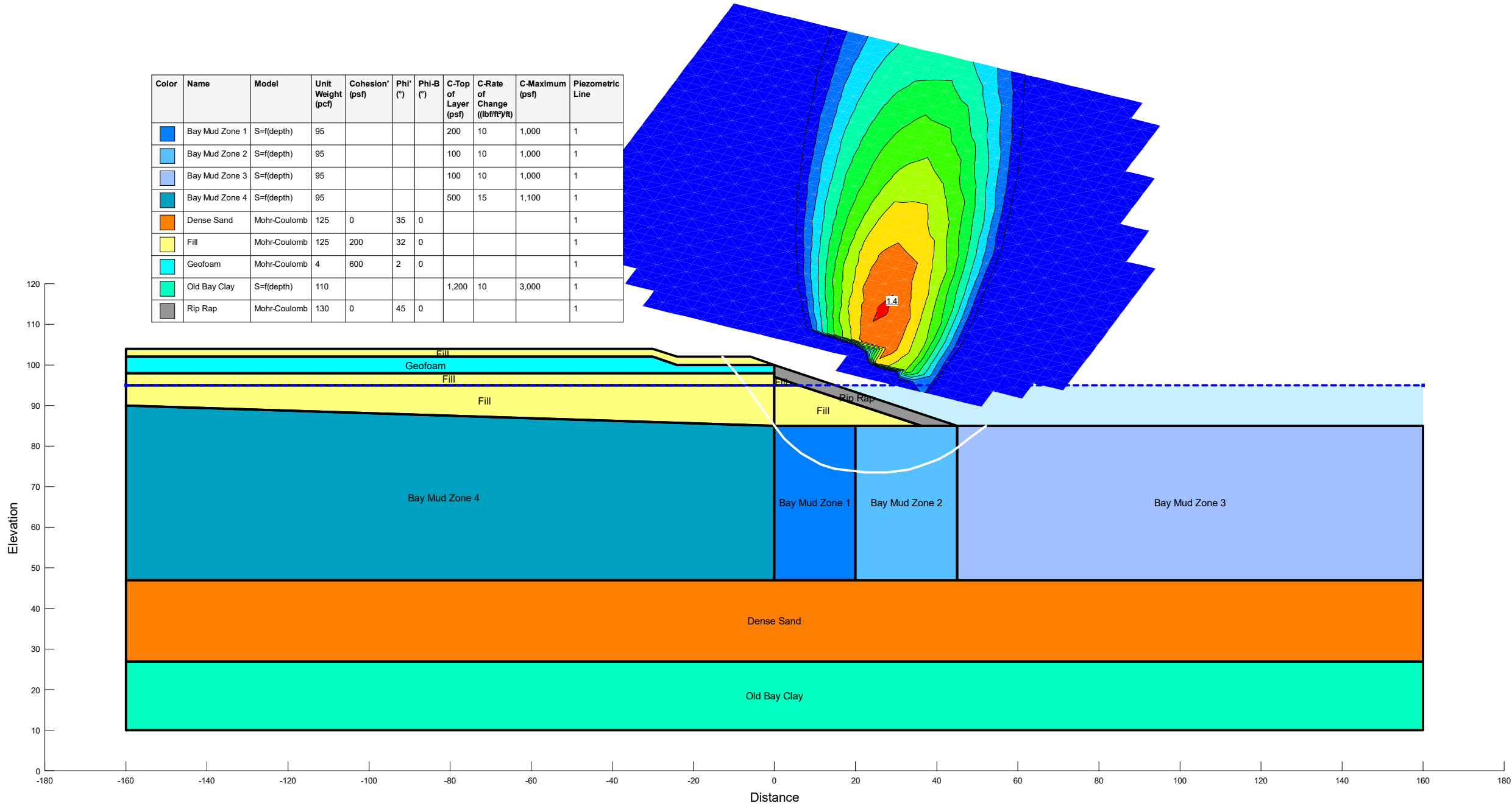
PROFILE 1  
STATIC PROPOSED CONDITION



MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California  
Langan  
750604203

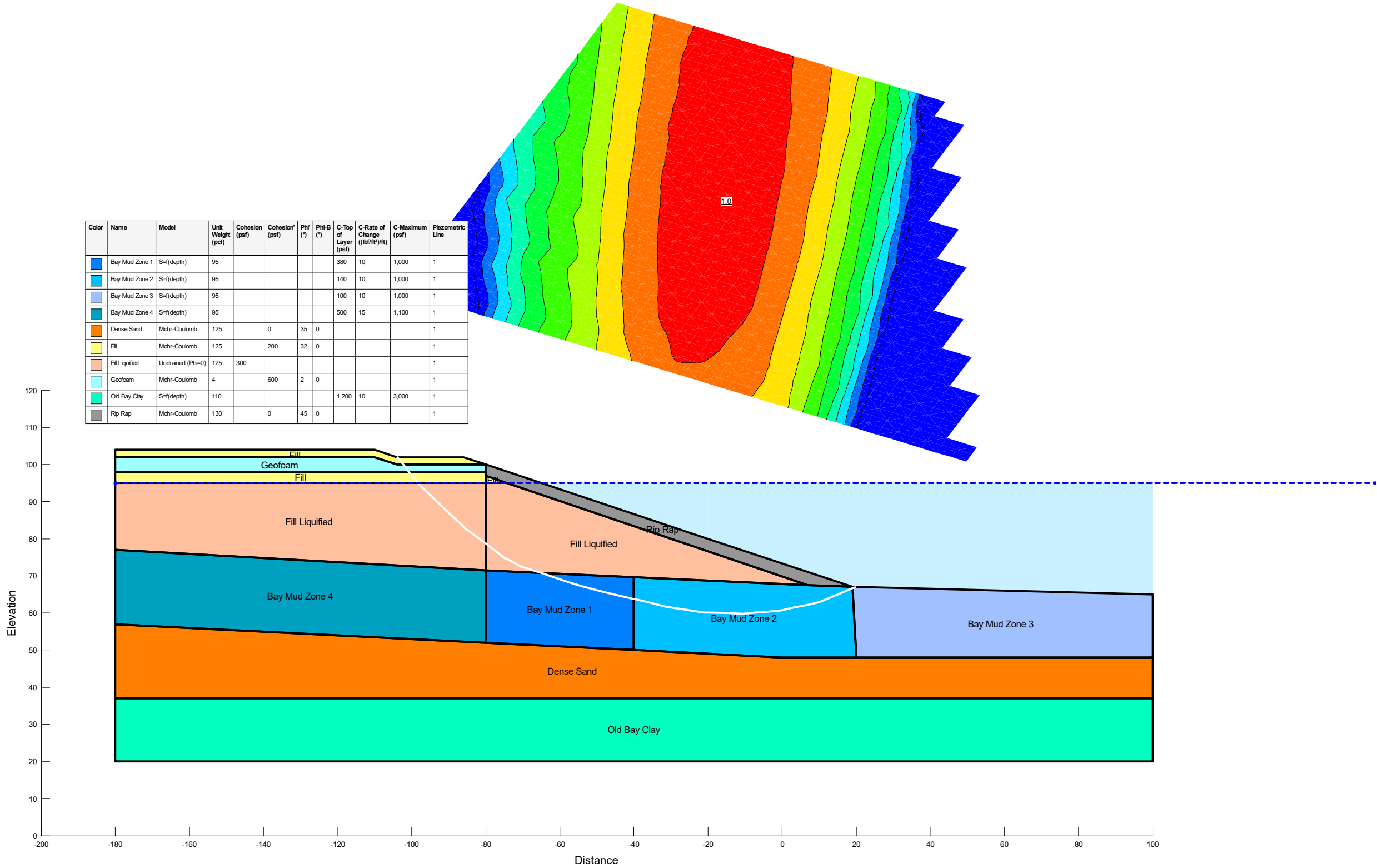
Figure K-2

PROFILE 2  
STATIC PROPOSED CONDITION





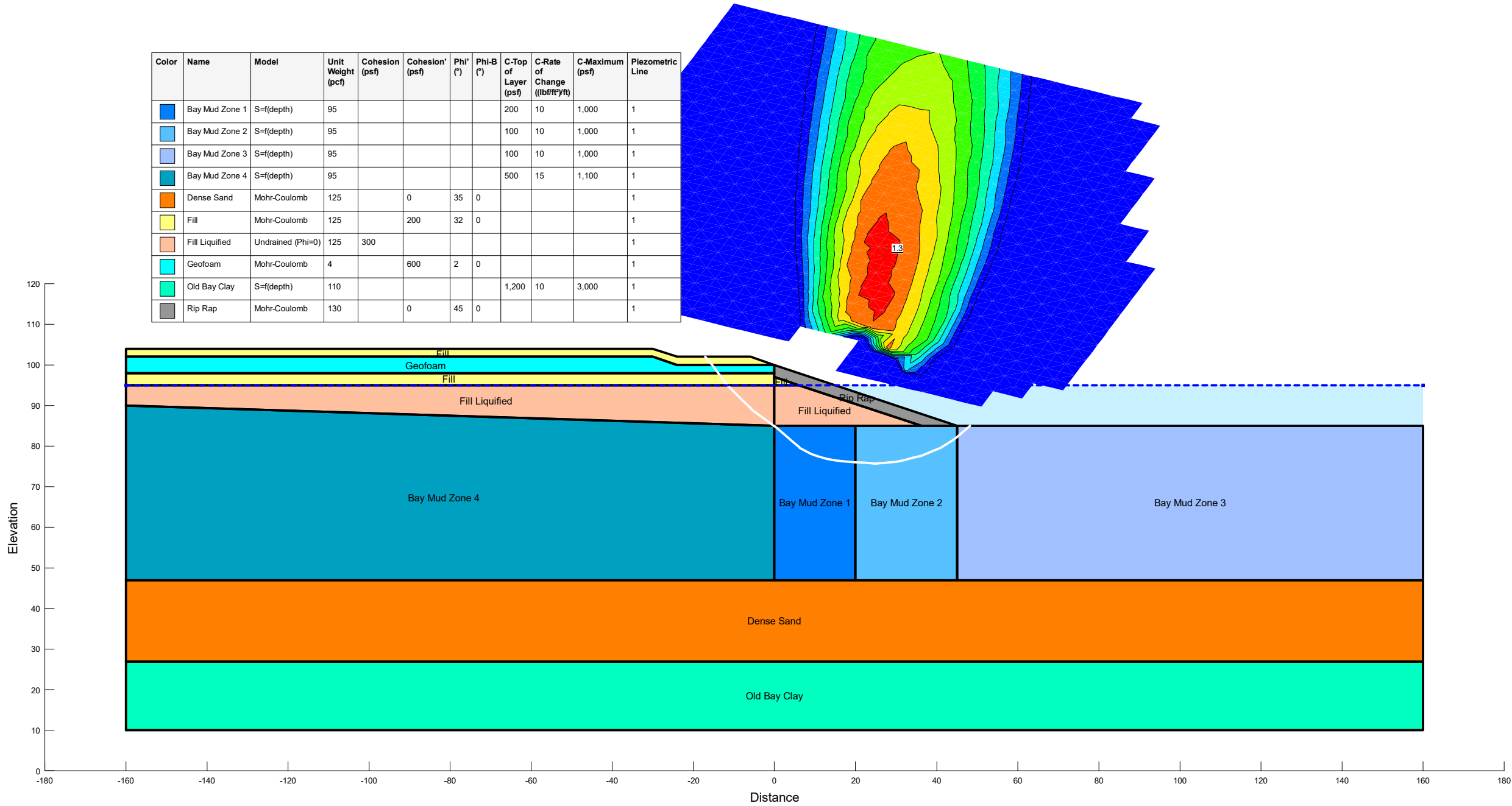
PROFILE 1  
STATIC POST LIQUEFACTION CONDITION



MISSION ROCK DEVELOPMENT STREETS  
San Francisco, California  
Langan  
750604203

Figure K-4

PROFILE 2  
STATIC POST LIQUEFACTION CONDITION



# ***Mayor ED 17-02 Priority permit***

## **APPENDIX L**

### **EXAMPLE LIGHTWEIGHT FILL SPECIFICATION**

# Mayor ED 17-02 Priority permit

## Sample Cellular Concrete Specification from Caltrans

Add to section 19:

### 19-10 CELLULAR CONCRETE LIGHTWEIGHT EMBANKMENT MATERIAL

#### 19-10.01 GENERAL

##### 19-10.01A Summary

Section 19–10 includes specifications for placing cellular concrete lightweight embankment material to the lines, grades and dimensions shown.

Cellular concrete is designated as Class I through Class VI as shown in the following table:

| Cellular Concrete Class | Max Density<br>pcf | Minimum Compressive<br>Strength<br>psi |
|-------------------------|--------------------|--|
|                         |                    |  |
| I                       | 24                 | 10                                     |
| II                      | 30                 | 40                                     |
| III                     | 36                 | 80                                     |
| IV                      | 42                 | 120                                    |
| V                       | 50                 | 160                                    |
| VI                      | 80                 | 300                                    |

##### 19-10.01B Submittals

##### 19-10.01B(1) Mix Design

Submit a mix design that will produce a cast density at point of placement and a minimum compressive strength for the class described. Include laboratory data using the mix design verifying mass and strength requirements

##### 19-10.01B(2) Work Plan

Submit the work plan before placement of embankment material.

The plan includes:

1. Proposed construction sequence and schedule
2. Type of equipment and tools to be used.
3. Material list of items and manufacturer's specifications

#### 19-10.02 MATERIALS

##### 19-10.02A General

Not Used

##### 19-10.02B Admixtures

Admixtures for accelerating the set time may be used under the manufacturer's recommendations. A foaming agent must be used and testing in accordance with ASTM C 796.

##### 19-10.02C Water

Mixing water shall be potable and free of deleterious amounts of acids, alkali, salts, oils, and organic materials which would adversely affect the setting or strength of the cellular concrete.

##### 19-10.02D Portland cement

Portland cement must comply with ASTM C 150, Types II, or VI. Pozzolans and other cementitious materials may be used when approved by the manufacturer of the foaming agent. Fly ash and natural pozzolans must comply with ASTM C 618. Ground granulated blast furnace slag must comply with ASTM C 989, grade 100 or 120.

##### 19-10.02E Prime Coat

Prime coat must comply with section 93 or 94.

# Mayor ED 17-02 Priority permit

## **19-10.03 CONSTRUCTION**

Subgrade to receive embankment material must be free of all loose and extraneous material. Subgrade must be uniformly moist, and any excess water standing on the surface must be removed before placing embankment material.

A minimum 12 hour curing period between lifts is required. If ambient temperatures are anticipated to be below 40 degrees F within 24 hours after placement, the mixing water must be heated when approved by the manufacturer of the foaming agent or placement must be prohibited. Placement must not be allowed on frozen ground.

Cellular concrete must be job site batched, mixed with the foaming agent and placed with specialized equipment certified by the manufacturer of the cellular concrete lightweight material. Cement and water may be premixed and delivered to the job site and foaming agent added on site.

At the point of placement, the density must comply with the specified cast density. A single cast density test must represent the lesser of 300 cy or 1 day's production.

The compressive strength must be tested under ASTM C 485 except as follows:

1. Unless otherwise approved, the specimens must be 3 x 6 inch cylinders. During molding, place the concrete in 2 equal layers and raise and drop the cylinders 1 inch, 3 times on a hard surface or lightly tap the side or bottom of the cylinder to close any accidental entrained air. No rodding is allowed.
2. Specimens must be covered and protected immediately after casting to prevent damage and loss of moisture. Specimens must be moist cured in the molds for 7 days and air dry a minimum of 24 hours and maximum of 72 hours before the 28 day compressive strength test. Specimens must not be oven dried.

Lift thickness must not exceed 3 feet. After curing for 12 hours, any crumbling area on the surface must be removed and scarified before the next layer is placed. Surface stepping to achieve grade and super elevation must not be less than 6 inches in thickness. Grades of up to 5 percent may be made by adding a thickening agent to the mix in conformance with the manufacturer's recommendation.

## **19-10.04 PAYMENT**

Not Used

# ***Mayor ED 17-02 Priority permit***

## **DISTRIBUTION**

Electronic copy

Mr. Steve Minden  
Mission Rock Partners, LLC  
c/o Tishman Speyer  
One Bush Street, Suite 450  
San Francisco, California 94104