**Union Pacific Railroad**
**Environmental Management Group**
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July 25, 2014

Ms. Karel Detterman
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Submittal of the Surface Improvement Work Plan, 744 and 758 High Street, Oakland, California, Fuel Leak Case No. RO1135 and GeoTracker Global ID T0600101305

Dear Ms. Detterman:

On behalf of Union Pacific Railroad (UPRR), enclosed is the Surface Improvement Work Plan, which describes the plan to conduct surface improvements at the 744 and 758 High Street site in Oakland, California.

I declare, under penalty of perjury, that the information and recommendations contained in the attached document is true and correct to the best of my knowledge.

If you have any questions or comments after reviewing this material, please feel free to contact me by email at JEDIEL@up.com or by phone at (916) 789-5184.

Sincerely,

James E. Diel
Manager of Site Remediation
Union Pacific Railroad Company

C: David Hodson/CH2M HILL

CH2M HILL
155 Grand Avenue
Suite 800
Oakland, CA
94612
Tel 510.251.2888
Fax 510.622.9000

July 25, 2014

Ms. Karel Detterman
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Subject: Surface Improvement Work Plan, 744 and 758 High Street, Oakland, California
Fuel Leak Case No. RO1135 and GeoTracker Global ID T0600101305

Dear Ms. Detterman:

On behalf of Union Pacific Railroad Company (UPRR), CH2M HILL has prepared this work plan to describe the plan for proposed surface improvements for the former UPRR property located within the property currently located at 750 High Street, Oakland, California (the site). A site location map is presented on Figure 1 (figures are enclosed with this letter report).

The *Site Conceptual Model Update and Soil and Groundwater Investigation Report* (Site Investigation Report) (CH2M HILL, 2013a) presented the recommendation to pave the unpaved area south of the building supply warehouse to limit potential worker exposure to chemicals of potential concern in shallow soil. As presented in this work plan, soil-cement surface treatment is recommended as an alternative to paving the unpaved area with asphalt concrete. Soil-cement surface treatment is the preferred solution for the unpaved area, because it limits disturbance of the existing soil/aggregate within the unpaved area, and after constructed, it creates an even ground surface with the surrounding area. Constructing asphalt paving on the unpaved area would require an uneven transition from the existing asphalt to the new asphalt. This uneven transition may create unwanted challenges for continued utilization of the area as a portion of an existing lumber yard.

Site background information is presented in the Site Investigation Report (CH2M HILL, 2013a).

## Scope of Work

This work plan proposes soil-cement surface treatment of the approximate 0.35-acre unpaved area within the southern portion of the site (Figure 2). Soil-cement surface treatment, also referred to as cement-stabilized base or cement-treated aggregate base, is a highly compacted mixture of soil/aggregate, cement, and water. Soil-cement surface treatment will be constructed at the site by mixing cement and water with existing soil/aggregate to create strong, impermeable, and solid surface to replace the unpaved area of the site. The purpose of the soil-cement surface treatment is to limit potential worker exposure to chemicals of potential concern in shallow soil and create a surface that allows for existing lumber-yard-related operations to continue at the site.

## Geotechnical Sampling and Evaluation

To evaluate the technical effectiveness of soil-cement surface treatment at the site, a four-point composite soil sample was collected from the top 8 inches of the unpaved area and submitted for geotechnical analysis. Specifically, the soil sample was analyzed for the following laboratory test:

- Particle size analysis (ASTM D422)
- Liquid and plastic limits (Atterberg Limits) analysis (ASTM D4318)
- Proctor compaction analysis (ASTM D1557 Method C)

- Corrosivity analysis for sulfate (ASTM D4327)
- Unconfined compressive strength (ASTM D1633 Method B)

The soil sample was classified as dark brown, low plastic, poorly graded sand with silt and gravel (SP-SM) that contained hot-mix asphalt grindings. The particle size test results were used to determine which methods of the proctor compaction and the unconfined compressive strength tests should be run. Because the sample contains relatively uniform disturbed aggregates and soils from 2-inch to passing No.200 sieve, Method C of ASTM D1557 and Method B of ASTM D1633 were conducted for the proctor compaction and the unconfined compressive strength tests, respectively. The soil sample had a sulfate content of 426 milligrams per kilogram, which indicate that Type II cement can be used during soil-cement surface treatment. The proctor compaction test results indicate that when the soil is mixed with 6 percent cement, it will have an optimum moisture content of 6.4 percent and a maximum dry density of 134.8 pounds per cubic foot. The 7-day unconfined compressive strength of 495 pounds per square inch (psi) was achieved for the soil mixed with 6 percent cement and 8 percent water. This unconfined compressive strength is above the minimum recommended unconfined compressive strength (300 psi) (Gaspard, 2000) for soil-cement surface treatment.

Geotechnical reports are included as Attachment 1.

## Field Preparations

The following activities will be completed before fieldwork begins at the site:

- Update the site-specific health and safety plan
- Obtain entry approval from the property owner
- Contact UPRR's fiber optic hotline and complete UPRR fiber optic notifications
- Notify Alameda County Health Care Services Agency Environmental Health Services (ACEH) of the field investigation schedule

## Soil-cement Surface Treatment

The results of the geotechnical sampling and analysis were used to design the approach for the soil-cement surface treatment. Based on the geotechnical analysis results, the optimum cement and water ratios to achieve the unconfined compressive strength higher than the target value of 300 psi were determined to be 6 percent and 8 percent, respectively. Six percent cement equates to 28.7 tons of Type II Portland cement (approximately 6 percent). Eight percent water equates to 6,081 gallons of water (approximately 8 percent). Cement and water will be manually spread across the surface of the treatment area. The cement and water will be thoroughly mixed in situ with the top 8 inches of surface material to create a homogenous layer. Following mixing, the treatment area will be spread out with the mixture uniformly and compacted with a roller to a minimum of 95 percent of the maximum dry density, as determined from the proctor compaction test results. The addition of the cement will raise the grade of the surface treatment area approximately 0.5 inch. The interface between the existing asphalt and surface treatment area will be graded to create a smooth transition between the two areas. A minimum of four compaction tests will be conducted throughout the area to verify the level of the compaction achieved.

After the compaction levels have been achieved and the finished surface level has been verified, the completed cement-treated surface will be covered with an asphaltic emulsion curing seal to have a consistent appearance with the surrounding asphalt. The asphaltic emulsion curing seal will be applied on the same day as completion of final compaction and as soon after final compaction is practicable. The

surface will be kept moist until the curing seal is applied. Traffic and equipment will not be allowed on the cement-treated surface for 72 hours after application of the curing seal.

## Schedule and Reporting

The proposed work will be conducted within 4 weeks of receiving acceptance of this work plan. Work may be conducted on weekdays, weekends, or nights to limit any inconvenience to lumber-related operations at the site. Following completion of the proposed work, ACEH will be informed that the paving has been completed.

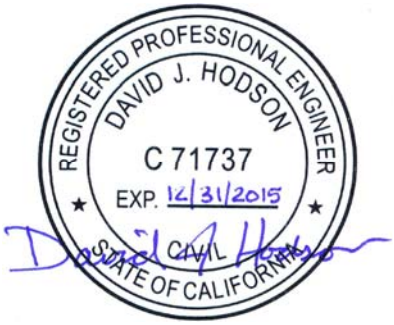
## Works Cited

CH2M HILL. 2013a. *Site Conceptual Model Update and Soil and Groundwater Investigation Report, 744 and 758 High Street, Oakland, California.* November 8.

Gaspard, Kevin J. 2000. Evaluation of Cement Treated Base Courses. Technical Assistance Report Number 00-1TA. December.

Please contact me at (510) 316-2323 if you have any questions.

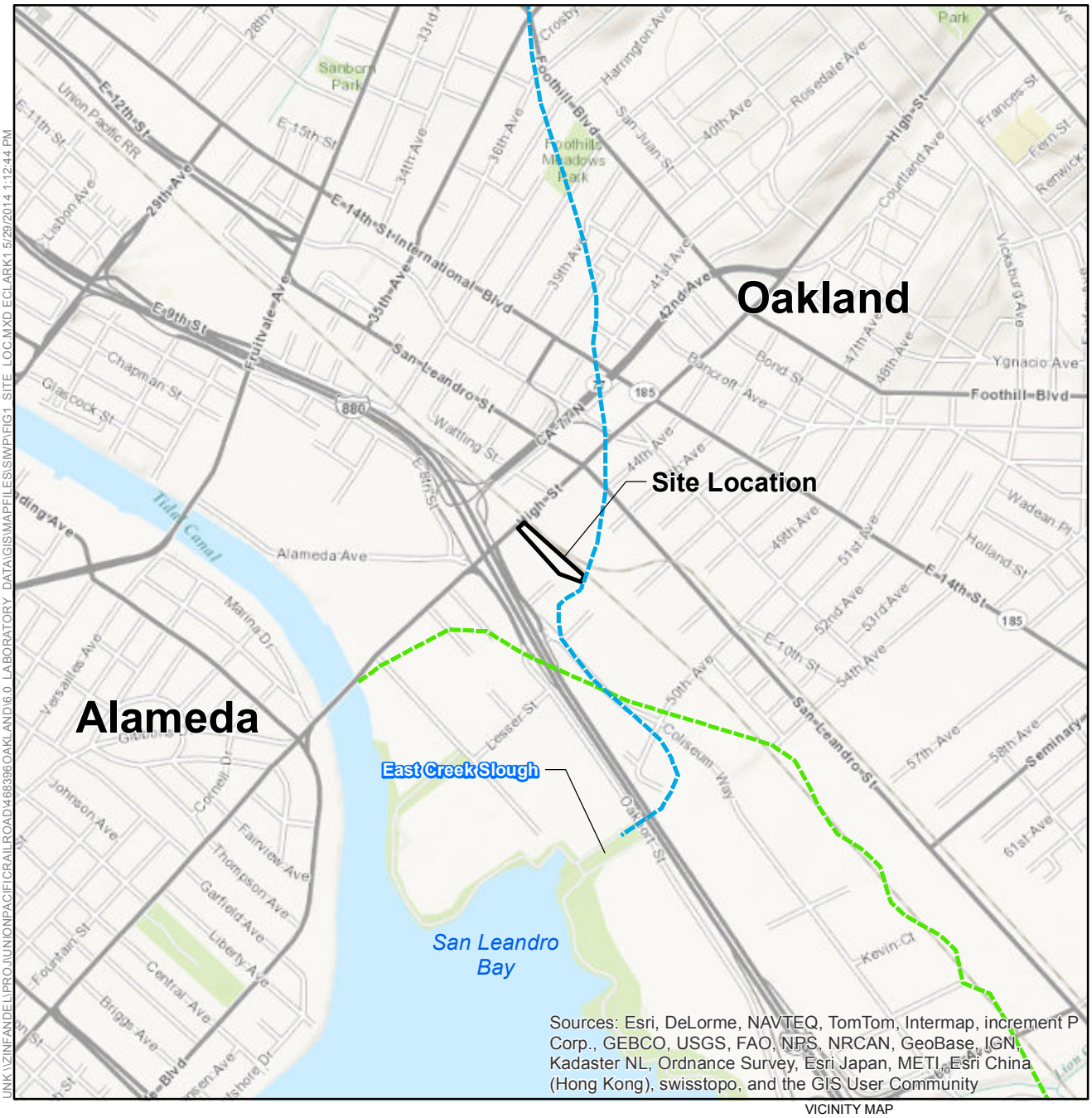
Sincerely,
CH2M HILL




David Hodson, P.E.
Project Manager

Enclosures:

| | |
|---|---|
| Figure 1 | Site Location Map |
| Figure 2 | Surface Improvement Map |
| Attachment 1 | Geotechnical Reports |




VICINITY MAP


LEGEND

- Site Location
- Approximate Location of Peralta Creek
- Approximate Boundary of 1850 Tidal Marshes

Note:
Creek and historical shoreline features from Sowers and Richard (2009)

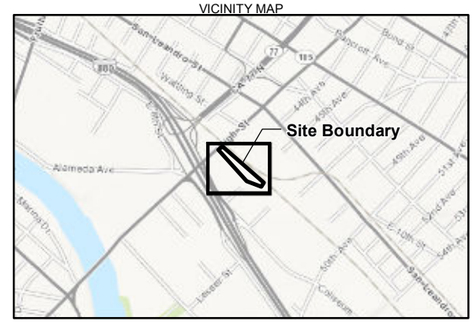
Reference:
Sowers, J.M., and C.M. Richard. 2009. Creek & Watershed Map of Oakland & Berkeley (Fourth Edition). Oakland Museum of California, Oakland, CA.
http://www.museumca.org/creeks/images/TitleBlockOak.gif.
Accessed on March 10, 2013.

0 750 1,500
Feet

N

**FIGURE 1**
**Site Location Map**
*Surface Improvement Work Plan,*
*744 and 758 High Street, Oakland, California*


VICINITY MAP




LEGEND

- Active Rail Line
- Site Boundary
- Unpaved Area (0.35 acres)

0 35 70
Feet

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**FIGURE 2**
**Surface Improvement Map**
*Surface Improvement Work Plan,*
*744 and 758 High Street, Oakland, California*

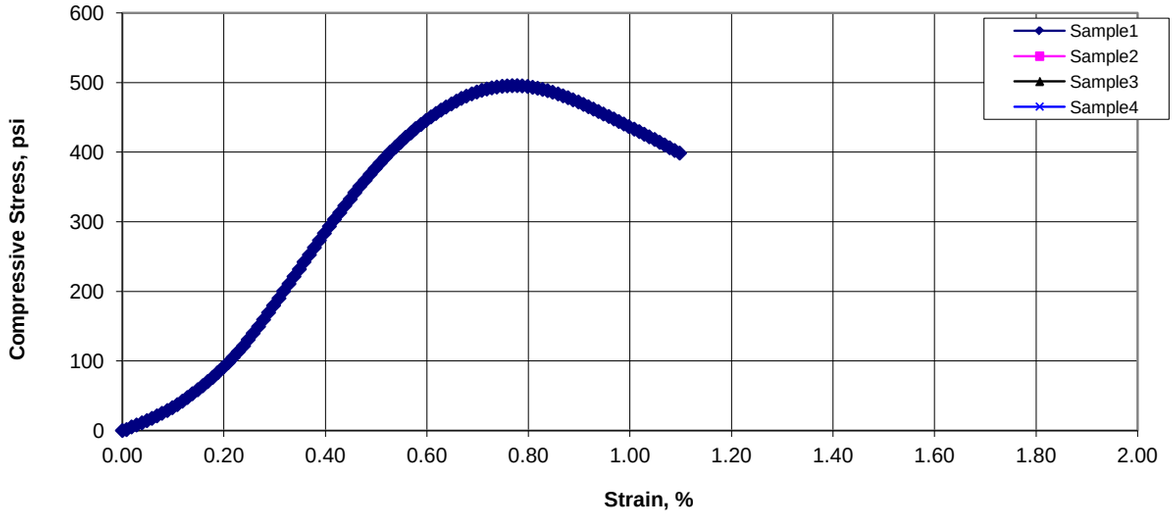


CH2MHILL

# Unconfined Compressive Strength of Molded Soil-Cement Cylinders (ASTM D1633 method B)

| | | | | | |
|---|---|---|---|---|---|
| **CTL No.:** | 095-029 | **Project Number:** | 468396.10.06.03 | | |
| **Client:** | CH2M Hill | **Date:** | 5/21/2014 | **By:** | MD/RU |
| **Project Name:** | 750 High Street | | | | |

## Compressive Stress vs. Strain




| **Sample No.:** | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **Boring:** | TP-1 | | | |
| **Sample:** | | | | |
| **Depth, ft.:** | 0-0.7 | | | |
| **Visual Description:** | Dark Brown Poorly Graded SAND w/ Silt & Gravel (Recycled Material-AC Grindings) | | | |
| **Source of Cement Used:** | Basalite | | | |
| **Type of Cement Used:** | Type II-V | | | |
| **Designed Moisture Content, %:** | 8.4 | | | |
| **Designed Dry Density, pcf:** | 128.1 | | | |
| **Designed Cement Content, %:** | 6.0 | | | |
| **Diameter, in:** | 5.99 | | | |
| **Height, in:** | 12.19 | | | |
| **Cross Sectional Area, $in^2$:** | 28.19 | | | |
| **Height to Diameter Ratio:** | 2.0 | | | |
| **As Remolded Moisture Content, %:** | 10.1 | | | |
| **As Remolded Dry Density, pcf:** | 125.9 | | | |
| **At Test Moisture Content, %:** | 8.0 | | | |
| **At Test Dry Density, pcf:** | 128.3 | | | |
| **At Test Degree Of Saturation, %:** | 68.8% | | | |
| **Age of Specimen, Days:** | 7 | | | |
| **Curing Temperature, °F:** | 69.0 | | | |
| **Curing Humidity, %:** | 96 | | | |
| **Max Load, lb:** | 13970 | | | |
| **Compressive Strength, psi:** | 495 | | | |
| **Remarks:** | Water exuded out of the sample during remolding resulting in an at test moisture content lower than targeted. | | | |

Additional water was added to the sample equal to 30% of the weight of cement to ensure hydration. The as remolded moisture content and dry density reported assume that no hydration has occured. The samples were not soaked prior to testing.

# Corrosivity Tests Summary

**CTL #** 095-029 **Date:** 5/2/2014 **Tested By:** PJ **Checked:** PJ
**Client:** CH2M Hill **Project:** 750 High Street **Proj. No:** 468396.10.06.03
**Remarks:**

| Sample Location or ID | | | Resistivity @ 15.5 °C (Ohm-cm) | | | Chloride | Sulfate | | pH | ORP (Redox) | | Sulfide | Moisture | Soil Visual Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | As Rec. | Min | Sat. | mg/kg | mg/kg | % | | | | Qualitative | At Test | |
| | | | | | | Dry Wt. | Dry Wt. | Dry Wt. | | $E_H$ (mv) | At Test | by Lead | % | |
| Boring | Sample, No. | Depth, ft. | ASTM G57 | Cal 643 | ASTM G57 | ASTM D4327 | ASTM D4327 | ASTM D4327 | ASTM G51 | ASTM G200 | Temp °C | Acetate Paper | ASTM D2216 | |
| TP-1 | - | 0-0.7 | - | - | - | - | 426 | 0.0426 | - | - | - | - | 1.0 | Dark Bown Poorly Graded SAND w/ Silt & Gravel (Recycled Material-AC Grindings) |
| | | | | | | | | | | | | | | |
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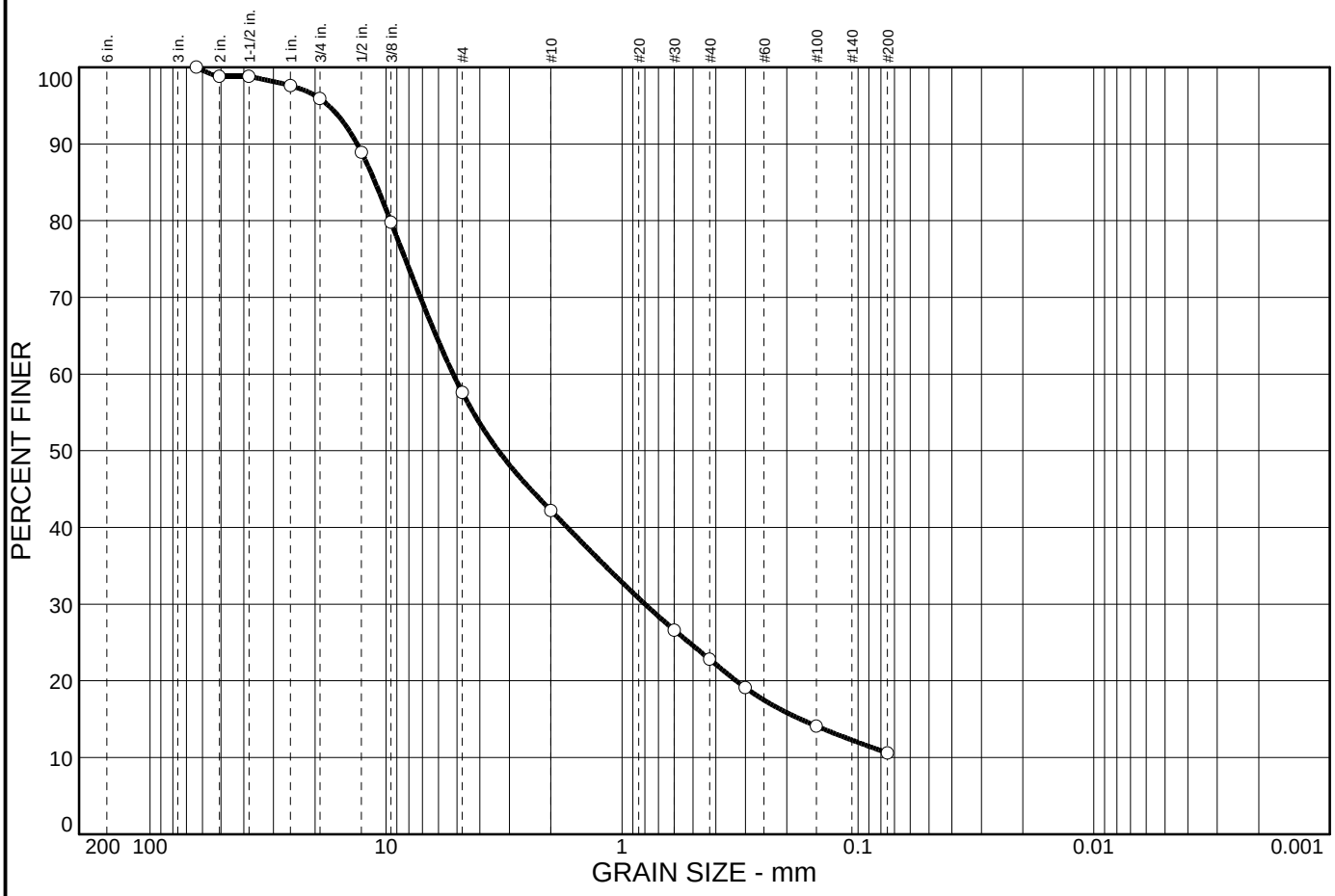
# Particle Size Distribution Report




| | % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | | 42.4 | 47.0 | 10.6 | | SP-SM | | 20 | 22 |
| | | | | | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | | |
|---|---|---|---|
| 2.5 | 100.0 | | |
| 2 | 98.8 | | |
| 1.5" | 98.8 | | |
| 1" | 97.6 | | |
| 3/4" | 95.9 | | |
| 1/2" | 88.9 | | |
| 3/8" | 79.8 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 5.19 | | |
| $D_{30}$ | 0.799 | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | | |
|---|---|---|---|
| #4 | 57.6 | | |
| #10 | 42.2 | | |
| #30 | 26.6 | | |
| #40 | 22.8 | | |
| #50 | 19.1 | | |
| #100 | 14.1 | | |
| #200 | 10.6 | | |

SOIL DESCRIPTION

○ Dark Brown Poorly Graded SAND w/ Silt & Gravel (Recycled Material-AC Grindings)

REMARKS:

○

○ Source: TP-1 Elev./Depth: 0-0.7'

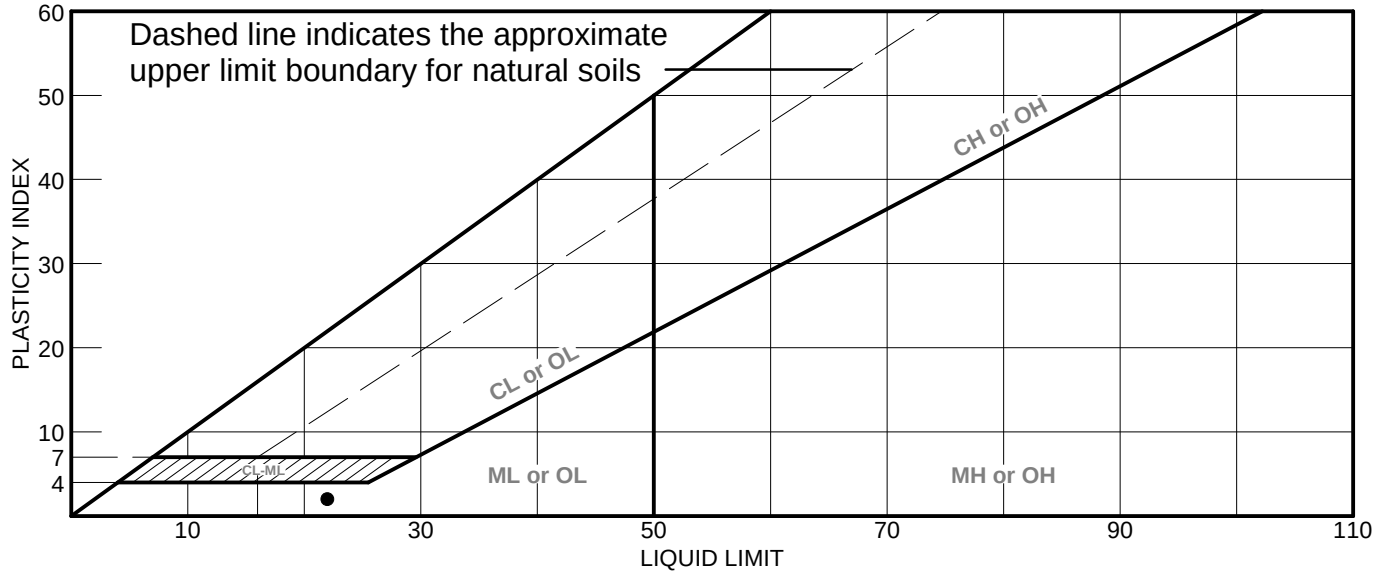
**COOPER TESTING LABORATORY**

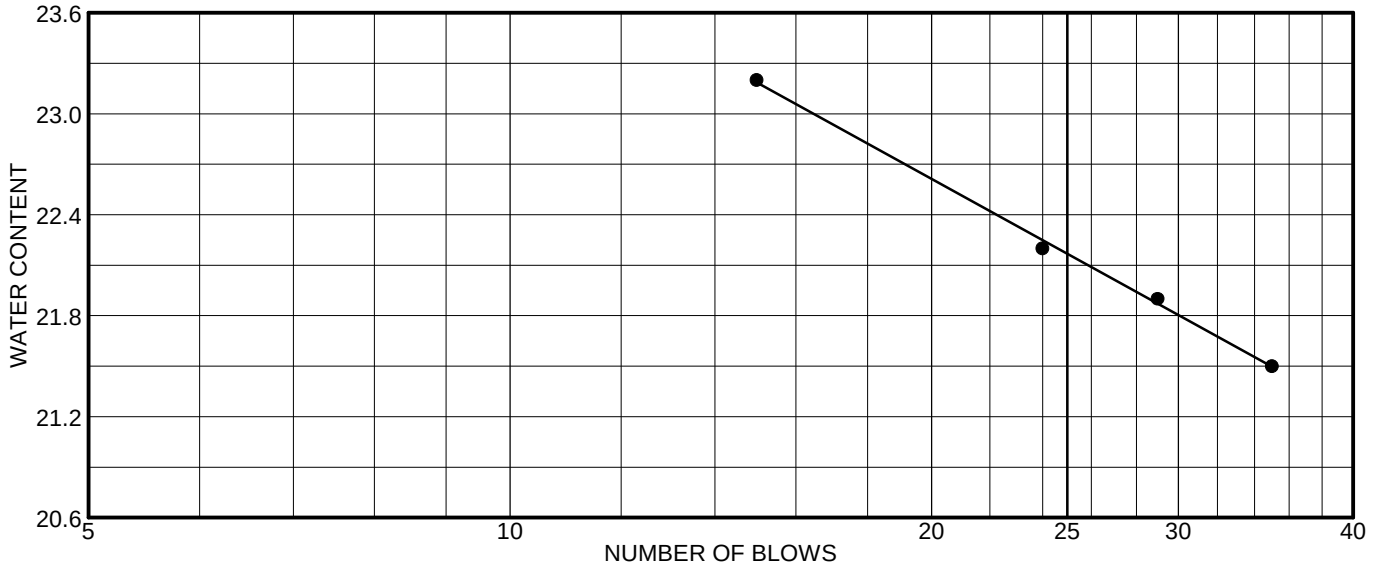
Client: CH2M Hill

Project: 750 High Street - 468396.10.06.03

Project No.: 095-029 Figure

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Dark Brown Poorly Graded SAND w/ Silt & Gravel (Recycled Material-AC Grindings) | 22 | 20 | 2 | 22.8 | 10.6 | SP-SM |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Project No.** 095-029 **Client:** CH2M Hill

**Project:** 750 High Street - 468396.10.06.03

● **Source:** TP-1 **Elev./Depth:** 0-0.7'

**Remarks:**

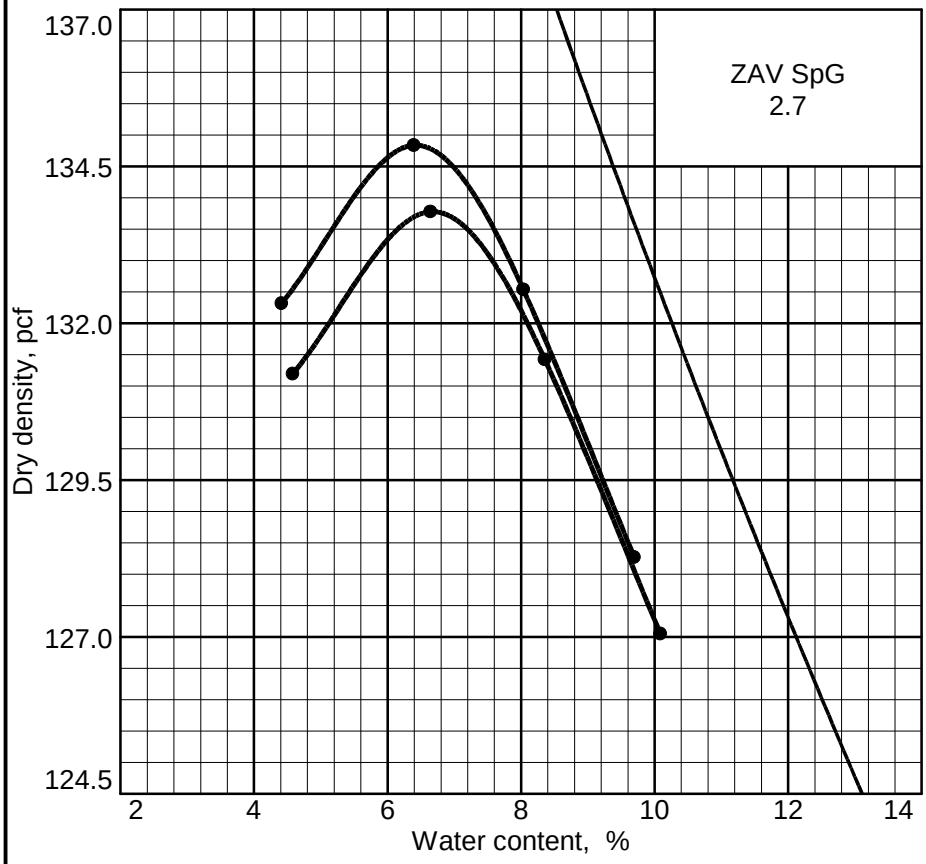
●

LIQUID AND PLASTIC LIMITS TEST REPORT

**COOPER TESTING LABORATORY**

**Figure**

# COMPACTION TEST REPORT




**Curve No.**

**Test Specification:**
ASTM D 1557-00 Method C Modified
Oversize correction applied to each point

**Hammer Wt.:** 10 lb.
**Hammer Drop:** 18 in.
**Number of Layers:** five
**Blows per Layer:** 56
**Mold Size:** .075 cu.ft.

**Test Performed on Material Passing** 3/4 in. **Sieve**

**Soil Data**

**NM** _____ **Sp.G.** 2.7
**LL** 22 **PI** 2
**%>3/4 in.** 4.1 **%<#200** 10.6
**USCS** SP-SM **AASHTO** _____

**TESTING DATA**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **WM + WS** | 16.75 | 16.73 | 16.34 | 16.54 | | |
| **WM** | 6.05 | 6.05 | 6.05 | 6.05 | | |
| **WW + T #1** | 1240.90 | 1133.10 | 1089.70 | 1329.20 | | |
| **WD + T #1** | 1184.00 | 1068.60 | 1055.00 | 1237.90 | | |
| **TARE #1** | 327.50 | 296.40 | 297.00 | 332.60 | | |
| **WW + T #2** | | | | | | |
| **WD + T #2** | | | | | | |
| **TARE #2** | | | | | | |
| **MOISTURE** | 6.4 | 8.0 | 4.4 | 9.7 | | |
| **DRY DENSITY** | 134.8 | 132.5 | 132.3 | 128.3 | | |

| ROCK CORRECTED TEST RESULTS | UNCORRECTED | Material Description |
|---|---|---|
| Maximum dry density = 134.8 pcf | 133.8 pcf | Dark Brown Poorly Graded SAND w/ Silt & Gravel (Recycled Material-AC Grindings)(treated w/ 6% Cement) |
| Optimum moisture = 6.4 % | 6.7 % | |

**Project No.** 095-029 **Client:** CH2M Hill
**Project:** 750 High Street - 468396.10.06.03

● **Source:** TP-1 **Elev./Depth:** 0-0.7'

**Remarks:**

COMPACTION TEST REPORT

**COOPER TESTING LABORATORY**

**Figure**