INFORMATION HANDOUT

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Aerially Deposited Lead

Aerially Deposited Lead Site Investigation
Various Locations on State Route 73
Newport Beach and Irvine, California

Materials Report

Northbound (NB) SR-73 MacArthur Blvd On-Ramp Left Shoulder Widening and Widening of Portion NB SR-73 Left Shoulder between Northbound MacArthur Blvd On-Ramp and University Drive Overpass within inside Shoulder and Median, and Placing Open Graded Friction Course (OGFC) Overlay from Jamboree Overcrossing (OC) to Northbound Birch Street Off-Ramp in Cities of Irvine and Newport Beach, California

August 30, 2013
Project No. 208449020

David Yaghoubi
State of California Department of Transportation
District 12, Environmental Engineering
3334 Michelson Drive, Suite 100
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Subject: Aerially Deposited Lead Site Investigation
Various Locations on State Route 73
Newport Beach and Irvine, California
Task Order No. 12-0M1101-20
EA No. 0M1101
Contract No. 12A1340

Dear Mr. Yaghoubi:

In accordance with the State of California Department of Transportation Contract No. 12A1340, Task Order No. 12-0M1101-20, Ninyo & Moore has conducted an aerially deposited lead investigation on State Route 73 in the cities of Newport Beach and Irvine, California.

The following report documents our methodologies, findings, conclusions, and recommendations.

We appreciate the opportunity to be of service to you on this project.

Sincerely,
NINYO & MOORE

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Senior Staff Environmental Scientist

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JEV/PRM/MSC/NA/WRC/lr/sc

Distribution: (8) Addressee (5 bound copies; 1 unbound copy; 1 CD; 1 via e-mail)

AERIALLY DEPOSITED LEAD SITE INVESTIGATION
VARIOUS LOCATIONS ON STATE ROUTE 73
NEWPORT BEACH AND IRVINE, CALIFORNIA
TASK ORDER NO. 12-0M1101-20
EA NO. 0M1101, CONTRACT NO. 12A1340

PREPARED FOR:
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August 30, 2013
Project No. 208449020

AERIALLY DEPOSITED LEAD INVESTIGATION REPORT

Task Order No. 12-0M1101-20
E.A. 0M1101

This report was prepared by the staff of Ninyo & Moore Geotechnical and Environmental Sciences Consultants under the supervision of the Engineer and/or Geologist whose signature appears hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, after being prepared in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.

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EXECUTIVE SUMMARY

The State of California Department of Transportation (Caltrans) authorized Ninyo & Moore to conduct an aerially deposited lead site investigation along State Route 73 (SR-73) in the cities of Newport Beach and Irvine, California. Locations include the on-ramp at MacArthur Boulevard, to the northbound SR-73 and the west shoulder on the northbound SR-73. Work was conducted in general accordance with Caltrans Contract No. 12A1340, Task Order No. 12-0M1101-20 (TO 20), dated June 27, 2013.

It is our understanding that Caltrans is planning to widen the left shoulders along both northbound SR-73 on-ramp from MacArthur Boulevard and along the northbound SR-73 from the northbound MacArthur Boulevard on-ramp to the University Drive Undercrossing and northbound SR-73 off-ramp to Birch Street. This investigation was performed to evaluate the presence of lead in soil resulting from automobile exhaust from nearby traffic during the age of leaded fuel. Data collected during this investigation were used to develop recommendations for the potential reuse or disposal of soil excavated from the site and to inform Caltrans of potential health and safety issues concerning the presence of lead in soil for workers at the site during construction activities.

Ninyo & Moore collected 44 soil samples from 12 borings at the site (B1 through B12). None of the 44 samples contained a total lead concentration greater than 50 milligrams per kilogram so were not analyzed for soluble lead. Five samples were analyzed for pH. The pH levels ranged from 8.0 to 9.0.

Our recommendations for soil reuse on the site are based on the guidelines set forth by the Department of Toxic Substances Control (DTSC) Lead Variance issued to Caltrans on June 30, 2009 (DTSC Variance). Laboratory analytical results for lead were compared to the guidelines of the DTSC Variance for potential reuse of the soil as fill within the Caltrans right-of-way.

Our recommendations for off-site disposal were based on the comparison of lead concentrations in soil samples to the California Health and Safety Code thresholds and Title 40 Code of Federal Regulations 261.24 thresholds.

Based on the analytical results, the on-site reuse and the off-site disposal recommendations are summarized below.

Recommendations for Soil for Reuse by Caltrans

If Caltrans elects to reuse the soil on site, the following applies:

- Scenario A: The soil in the surface layer (surface to 0.5 feet below ground surface [bgs]) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).
- Scenario B: The soil in the surface and 1.5-foot layers combined (surface to 1.5 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).
- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 4-foot layer (3 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).
- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).

Recommendations for Soil to be Disposed Off Site

If Caltrans elects to dispose the soil off site, the following applies:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).
- Scenario B: The soil in the surface and 1.5-foot layer combined (surface to 1.5 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).
- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 4-foot layer (3 to 4 feet

bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

1. INTRODUCTION

The State of California Department of Transportation (Caltrans) authorized Ninyo & Moore to conduct an aerially deposited lead (ADL) site investigation along State Route 73 (SR-73). Locations include the on-ramp at MacArthur Boulevard to the northbound SR-73 off-ramp and the western shoulder along the northbound SR-73 in the cities of Newport Beach and Irvine, California. Work was conducted in general accordance with Caltrans Contract No. 12A1340, Task Order No. 12-0M1101-20 (TO 20), dated June 27, 2013.

1.1. Project Description and Objective

It is our understanding that Caltrans is planning to widen the left shoulders along both northbound SR-73 on-ramp from MacArthur Blvd and along the west shoulder on the northbound SR-73.

This report has been prepared by Ninyo & Moore to document the results of a study to evaluate the presence of ADL along the unpaved shoulder areas of the site.

1.2. Scope of Work

Ninyo & Moore performed the tasks described in the following sections.

1.2.1. Prefield Activities

Prefield activities included:

- Preparing a site-specific health and safety plan (HSP).
- Marking boring locations at the site.
- Notifying Underground Service Alert (USA) that Ninyo & Moore would be advancing soil borings in the area (USA ticket number A32170217).
- Preparing a project schedule and coordinating work with subcontractor (traffic control).

1.2.2. Soil Sampling

Soil sampling was conducted on August 7 and 8, 2013. Twelve boring locations (borings B1 through B12) were advanced for this task order as shown on Figure 2. One boring at each sampling location was advanced and sampled using a hand auger. Four

samples were attempted for collection from borings B1 through B12 at depths of surface to ½, 1½, 3, and 4 feet below ground surface (bgs). The depths reached for each boring are presented on Table 1.

1.2.3. Laboratory Analysis

Ninyo & Moore submitted the soil samples under chain-of-custody (COC) protocol to Pat-Chem Laboratories of Moorpark, California; a laboratory certified by the State of California Department of Health Services Environmental Laboratory Accreditation Program.

1.2.4. Global Positioning System Surveying

Approximate latitude and longitude (North American Datum 83) of sampling locations were recorded with a handheld global positioning system unit (GeoXT, Trimble). The latitude and longitude data for each boring are presented on Table 1.

1.2.5. Report Preparation

This report was prepared in general accordance Caltrans Contract No. 12A1340 and TO 20 dated June 27, 2013.

1.3. Previous Site Investigation

Ninyo & Moore has not performed previous investigation at this site. In addition, Caltrans has not notified Ninyo & Moore of previous investigation performed at the site.

2. BACKGROUND

Caltrans obtained a variance (V09 HQSCD006) from the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), on June 30, 2009 (DTSC Variance). The DTSC Variance allows for conditional reuse of lead-impacted soil within the Caltrans right-of-way (ROW). Background information regarding the source of ADL and the reuse or disposal of lead-impacted soil is discussed in the following sections.

2.1. Aerially Deposited Lead in Soil

Analyses for lead in soil along highways throughout the state of California have revealed that lead is commonly present along the shoulders of the highways as a result of automobile exhaust containing lead from the combustion of leaded gasoline. Elevated concentrations of lead are commonly found in the upper 2 feet of soil. Lead concentrations in soil are dependent on many variables; but in general, are a function of the age of the highway and the volvolume of traffic using the highway.

2.2. Hazardous Waste Classification Criteria

Soil that exceeds the following limitations may be classified as hazardous waste with respect to lead concentrations:

- The soil contains 1,000 milligrams per kilogram (mg/kg) or more total lead, exceeding the Total Threshold Limit Concentration (TTLC) for California hazardous waste (Title 22 California Code of Regulations [CCR], Section 66261.24);
- The soil contains 5.0 milligrams per liter (mg/l) or more citric acid-extractable lead, exceeding the Soluble Threshold Limit Concentration (STLC) for California hazardous waste (Title 22 CCR, Section 66261.24);
- The soil contains 5.0 mg/l or more leachable lead using the Toxicity Characteristic Leaching Procedure (TCLP), exceeding the maximum concentration for the toxicity characteristic of the Resource, Conservation, and Recovery Act (RCRA; Title 40 Code of Federal Regulations [CFR] 261.24); or
- The soil pH is less than or equal to 2.0 or greater than or equal to 12.5, which exceeds the limits for the corrosivity characteristic of RCRA hazardous waste (40 CFR 261.22) and California hazardous waste (Title 22 CCR, Section 66261.22).

2.3. DTSC Variance

In accordance with the DTSC Variance, soil that is subject to the guidelines presented below may be reused within the Caltrans ROW. A chart presenting the different ADL soil type classifications is included in Appendix A.

2.3.1. Reuse – Condition 1

Soil containing less than 1.5 mg/l extractable lead by the Waste Extraction Test (WET) using deionized water as the extractant (WET-DI) and less than or equal to 1,411 mg/kg

total lead (United States Environmental Protection Agency [EPA] Method 6010B) may be used as fill in the Caltrans ROW provided the soil is placed a minimum of 5 feet above the maximum level of the water table and covered with at least 1 foot of non-hazardous soil.

2.3.2. Reuse – Condition 2

Soil containing greater than or equal to 1.5 mg/l, but less than 150 mg/l, extractable lead by WET-DI method, or more than 1,411 mg/kg total lead but less than 3,397 mg/kg total lead, may be used as fill in the Caltrans ROW provided the soil is placed a minimum of 5 feet above the maximum level of the water table and protected from infiltration by a paved structure that will be maintained by Caltrans.

2.3.3. Reuse – Condition 3

Lead-contaminated soil with a pH less than 5.5 but greater than 5.0 shall only be used as fill material under the paved portion of the roadway. Lead-contaminated soil with a pH at or less than 5.0 shall be managed as a hazardous waste.

2.4. Criteria for Disposal of Soil Not Intended for Reuse On Site

If Caltrans elects to dispose soil within the Caltrans ROW that has been excavated during construction activities, the soil may be classified either as hazardous waste or non-hazardous waste. The distinction is based on the total and soluble lead concentrations compared to the TTLC and STLC criteria. As mentioned in Section 2.2, the TTLC for total lead is 1,000 mg/kg and the STLC for citric acid extractable lead is 5.0 mg/l. Waste containing lead concentrations in excess of or equal to those listed must be disposed at a Class I hazardous waste disposal facility pursuant to State of California Regulations.

3. INVESTIGATION METHODS

The investigation activities are described in the following subsections and were conducted in general accordance with the TO that was approved by Caltrans prior to beginning the field activities.

3.1. Site-Specific Health and Safety Plan (HSP)

A site-specific HSP dated August 6, 2013, was prepared by Ninyo & Moore and submitted to Caltrans for approval prior to commencing field work.

3.2. Traffic Control

Shoulder closures were set up and maintained by California Barricade (sub-contractor) for the duration of the field work.

3.3. Utility Clearance

The boring locations were described to USA during the notification at least 2 working days prior to conducting the soil sampling. USA marked the member utilities known to be in the vicinity of the boring locations.

3.4. Hand-Auger Sampling

The field work was conducted on August 7 and 8, 2013. The boring locations were approved by the Caltrans TO Manager and are shown on the attached Figure 2. Four samples were attempted for collection from borings B1 and B12 at depths of surface to ½, 1½, 3, and 4 feet bgs. The depths reached for each boring are presented on Table 1.

Borings B1 through B12 were advanced by hand-auger. Hand augering activities and sample collection was performed by Ninyo & Moore personnel.

Samples were placed into new, 4-ounce, glass jars; capped with Teflon-coated plastic lids; labeled; placed in a resealable plastic bag; and stored in a cooler. The sampling equipment was decontaminated between each boring. Soil samples were transferred under COC protocol to Pat-Chem Laboratories within 24 hours of collection. In accordance with the TO, soil sample homogenization was performed in the laboratory.

3.5. INVESTIGATION-DERIVED WASTES

Soil cuttings generated by hand-auger drilling were returned to their corresponding boreholes after collection of soil samples. Decontamination water was transported to Ninyo & Moore's Irvine office and placed in a drum pending chemical characterization. Based on the

analytical result of the decontamination water sample, the decontamination water was subsequently disposed in the sanitary sewer.

3.6. Laboratory Analyses

Once the samples were received by Pat-Chem Laboratories the samples were separately homogenized and analyzed for the following.

- Forty-four soil samples were analyzed for total lead using EPA Method 6010B.
- Five soil samples were analyzed for pH using EPA Method 9045.
- One decontamination water sample was analyzed for total lead using EPA Method 6010B.

4. ANALYTICAL RESULTS

The results of this investigation are described in the following subsections. The analytical results of lead and pH are summarized in Table 1 and Figures 3 and 4. Laboratory reports and COC records are included in Appendix B.

4.1. Total Lead

Forty-four soil samples were analyzed for total lead. The maximum total lead concentration was 4.3 mg/kg. The minimum total lead concentration was less than the laboratory practical quantitation limit (PQL) of 1.0 mg/kg.

The decontamination water sample contained total lead concentration was less than the PQL of 0.02 mg/l.

4.2. Soluble Lead – Citric Acid

None of the samples were analyzed for soluble lead using the WET-citric.

4.3. Soluble Lead – Deionized Water

None of the samples were analyzed for soluble lead using the WET-DI.

4.4. Soluble Lead – TCLP

None of the samples were analyzed for soluble lead by the TCLP.

4.5. pH

Five of the samples collected were analyzed for pH. The maximum pH level was 9.0 and the minimum pH level was 8.0.

5. STATISTICAL EVALUATION

Based on the data reported for the site, none of the samples contained concentrations that would drive the soil to be classified as hazardous. Therefore, statistical analyses were not performed.

The following depth combinations are used to define layers:

- **Scenario A** – surface soil (0 to ½ foot) and underlying subsurface soil (½ foot to 4 feet)
- **Scenario B** – the upper 1½ feet (0 to 1½ feet) and the underlying subsurface soil (1½ to 4 feet)
- **Scenario C** – the upper 3 feet (0 to 3 feet) and the underlying subsurface soil (3 to 4 feet)
- **Scenario D** – the entire 4-foot soil column

6. CONCLUSIONS

The analyses of the data indicate that the surface layers tend to have the highest concentrations of total lead, followed by the 1 ½ -, 3-, and 4-foot layers. Assuming the soil has not been disturbed since construction of the route, concentrations of total lead would be expected to decrease with depth.

7. RECOMMENDATIONS

Based on the findings of this study, recommendations are summarized on block diagrams in Appendix C and discussed below:

7.1. Recommendations for Soil for Reuse by Caltrans

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).

- Scenario B: The soil in the surface and 1.5-foot layers combined (surface to 1.5 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X). The remaining soil from the 4-foot layer (3 to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is suitable for on-site reuse by Caltrans with no restrictions based on total lead concentrations (Soil Type X).

7.2. Recommendations for Soil to be Disposed Off Site

If Caltrans elects to dispose the soil off site, the following restrictions apply:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

- Scenario B: The soil in the surface and 1.5-foot layer combined (surface to 1.5 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X). The remaining soil from the 4-foot layer (3 to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is classified as non-hazardous and recommendation for offsite disposal shall be in accordance with SSP 7-1.02K(6)(j)(iii) (Soil Type X).

7.3. Health Effects of Lead

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft, gray metal. The permissible exposure limit for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average. The immediately dangerous to life and health exposure limit is 100 mg/m^3 as established by the National Institute of Occupational Safety and Health. Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead HSP should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 CFR 1910.120 and 8 CCR 1532.1. The plan developed by the CIH should include a hazard analysis, dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

8. LIMITATIONS

The services outlined in this report have been conducted in a manner generally consistent with current regulatory guidelines. No warrant, expressed or implied, is made regarding the professional opinions presented in this report. Ninyo & Moore's opinions are based on an analysis of observed conditions and on information obtained from third parties. It is likely that variations in soil conditions may exist.

The samples collected and chemically analyzed and the observations made are believed to be representative of the general area evaluated; however, conditions can vary significantly between sampling locations. The interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and measure the

concentration of selected chemical or physical constituents in samples collected from the site. The analyses have been conducted by an independent laboratory certified by the State of California to conduct such analyses. Ninyo & Moore has no involvement in, or control over, such anal-analyses and has no means of confirming the accuracy of laboratory results. Ninyo & Moore, therefore, disclaims any responsibility for inaccuracy in such laboratory results.

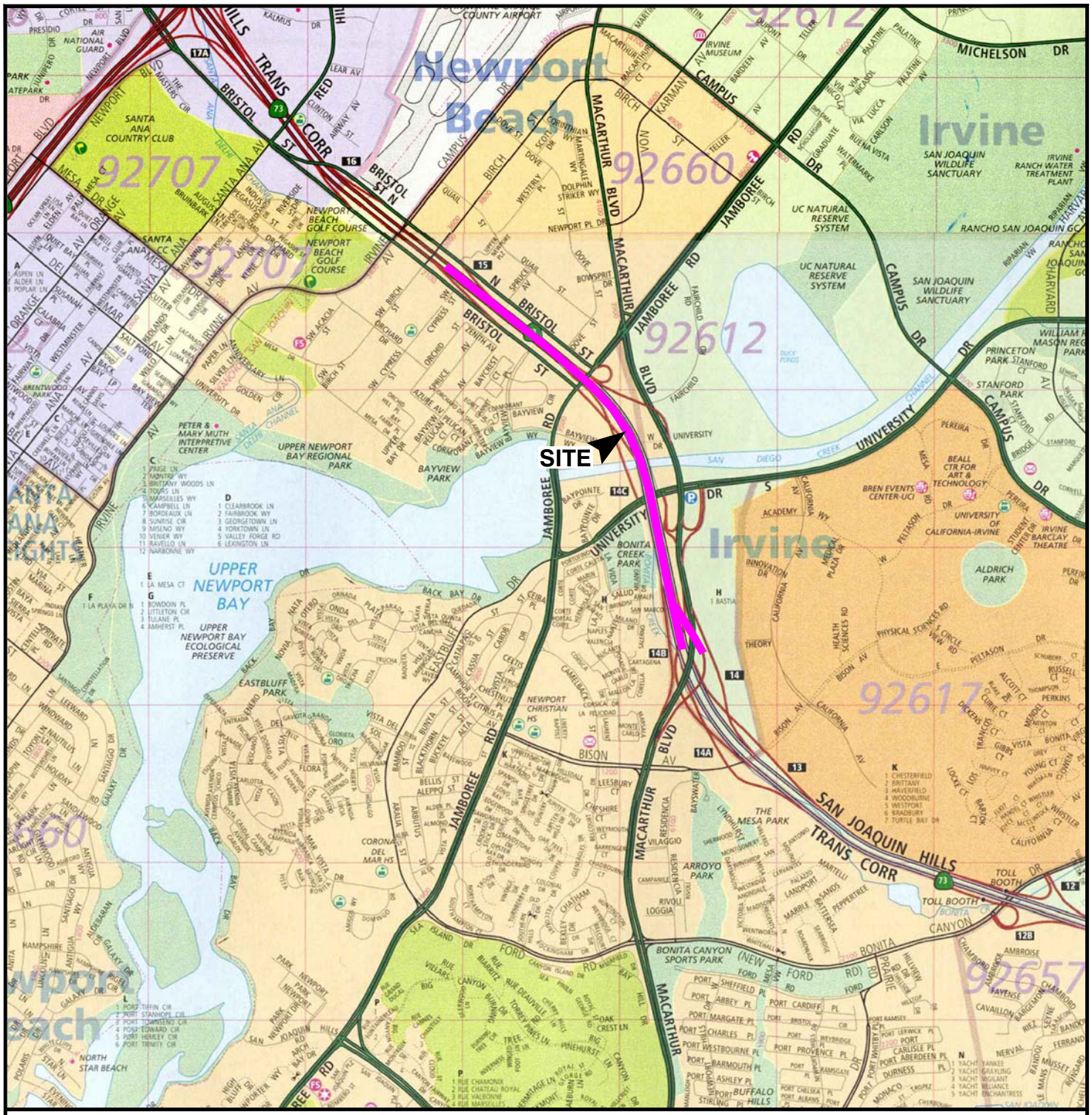
This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader wants any additional information, or has questions regarding content, interpretations presented, or completeness of this document. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

For individuals with sensory disabilities, this document is available in alternate formats upon request. For any questions regarding this document, please call or write David Yaghoubi, Environmental Engineering, 3334 Michelson Drive, Suite 100, Irvine, California 92612-8894. Phone Number (949) 756-7828.

TABLE 1 – SOIL ANALYTICAL RESULTS – AERIALLY DEPOSITED LEAD, pH, AND GPS COORDINATES

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH	Latitude	Longitude
B1-0.5	0.5	8/8/2013	3.3	--	--	--	--	33.642558000	-117.858775000
B1-1.5	1.5	8/8/2013	1.7	--	--	--	--		
B1-3.0	3.0	8/8/2013	2.6	--	--	--	--		
B1-4.0	4.0	8/8/2013	1.1	--	--	--	--		
B2-0.5	0.5	8/8/2013	ND<1.0	--	--	--	--	33.643331043	-117.859025407
B2-1.5	1.5	8/8/2013	ND<1.0	--	--	--			
B2-3.0	3.0	8/8/2013	ND<1.0	--	--	--	9.0		
B2-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--		
B3-0.5	0.5	8/8/2013	ND<1.0	--	--	--	8.6	33.643682722	-117.859469758
B3-1.5	1.5	8/8/2013	ND<1.0	--	--	--	--		
B3-3.0	3.0	8/8/2013	ND<1.0	--	--	--	--		
B3-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--		
B4-0.5	0.5	8/8/2013	ND<1.0	--	--	--	--	33.644219982	-117.859808289
B4-1.5	1.5	8/8/2013	ND<1.0	--	--	--	--		
B4-3.0	3.0	8/8/2013	ND<1.0	--	--	--	--		
B4-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--		
B5-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--	33.643119000	-117.859851000
B5-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B5-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--		
B5-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--		
B6-0.5	0.5	8/7/2013	1.8	--	--	--	--	33.643709753	-117.860017946
B6-1.5	1.5	8/7/2013	4.3	--	--	--	--		
B7-0.5	0.5	8/7/2013	2.8	--	--	--	8.0	33.644578285	-117.860220975
B7-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B7-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--		
B7-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--		
B8-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--	33.645431644	-117.860417727
B8-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B8-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--		
B8-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--		
B9-0.5	0.5	8/7/2013	3.1	--	--	--	--	33.646290534	-117.860618177
B9-1.5	1.5	8/7/2013	2.9	--	--	--	--		
B9-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--		
B9-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--		
B10-0.5	0.5	8/7/2013	ND<1.0	--	--	--	9.0	33.647151002	-117.860796075
B10-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B10-3.0	3.0	8/7/2013	1.2	--	--	--	--		
B10-4.0	4.0	8/7/2013	4.1	--	--	--	--		
B11-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--	33.647999000	-117.860973000
B11-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B12-0.5	0.5	8/7/2013	1.6	--	--	--	--	33.648862452	-117.861181342
B12-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--		
B12-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--		
B12-4.0	4.0	8/7/2013	ND<1.0	--	--	--	8.8		
Maximum			4.3	--	--	--	9.0		
Average			2.5	--	--	--	8.7		
Minimum			ND<1.0	--	--	--	8.0		
Regulatory Limits			1,411(1)	5(2)	1.5(3)	5(4)	5(5)		
Decontamination Water (mg/l)									
W-1	--	8/8/2013	ND<0.02	--	--	--	--		

Notes:
1 − Limit specified in addendum to Variance issued by the Department of Toxic Substance Control to Caltrans
2 − Soluble Threshold Limit Concentration for California Hazardous Waste (California Code of Regulations [CCR] Title 22, Section 66261.24)
3 − Limit Specified by DTSC Variance
4 − Maximum concentration for the TCLP of Resource Conservation and Recovery Act (RCRA) hazardous waste (40 Code of Federal Regulations, Section 261.24)
5 − Minimum value specified by DTSC Variance
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
ND − not detected above reporting limits presented in Appendix B
TCLP – soluble lead by the Toxicity Characteristic Leaching Procedure
TTLC – total lead for comparison to the Total Threshold Limit Concentration
WET – Waste Extraction Test
WET-citric – soluble lead by WET using citric acid for comparison to the Soluble Threshold Limit Concentration
WET-DI – soluble lead by WET using deionized water for comparison to the DTSC Variance
-- – not analyzed



REFERENCE: 52ND EDITION, THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY.

N

SCALE IN FEET

0 2,400 4,800

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Rand McNally, R.L.07-S-129

Ninyo & Moore	SITE LOCATION	FIGURE
PROJECT NO. 208449020 / DATE 8/13	STATE ROUTE 73 IMPROVEMENTS NEWPORT BEACH AND IRVINE, CALIFORNIA	1

208449020_SL.dwg 16:44:28 08/28/2013 GK

REFERENCE: GOOGLE EARTH AERIAL PHOTO, 2013.

LEGEND	
B12	BORING

N

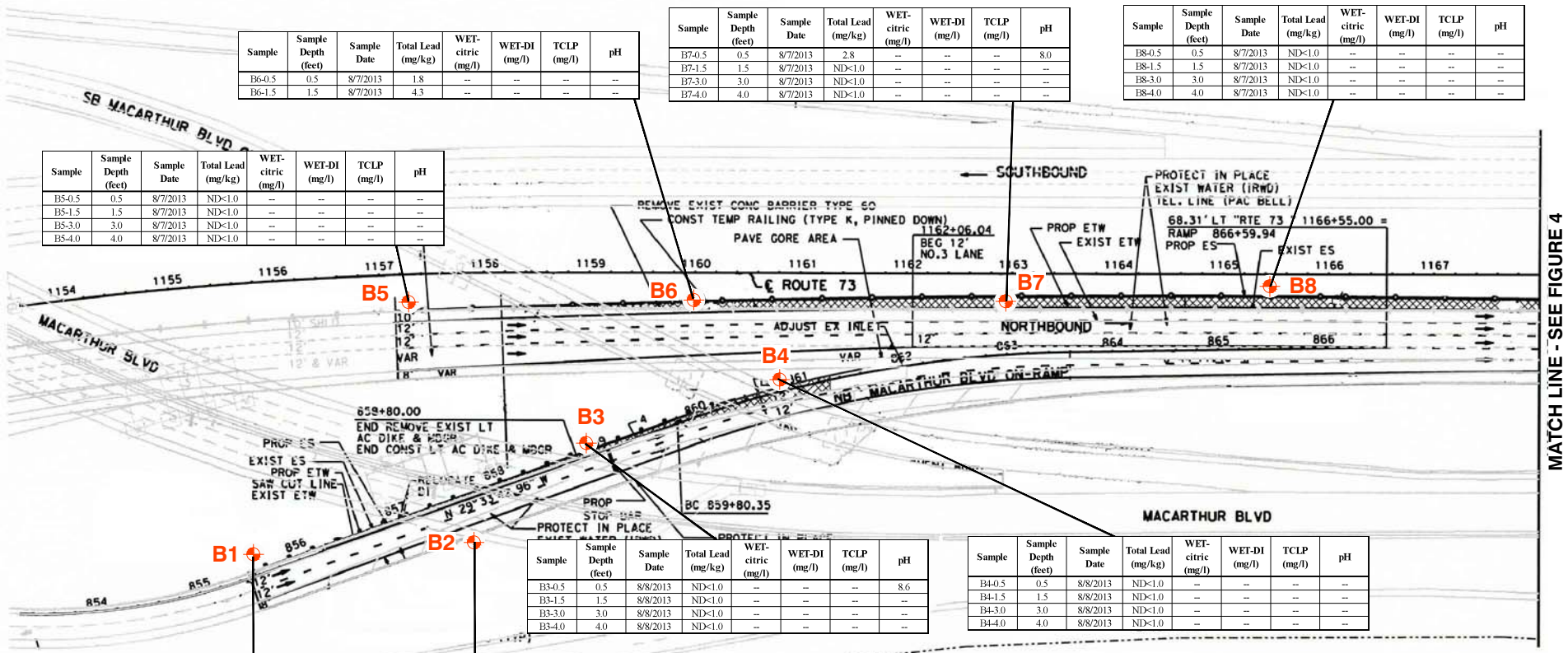
SCALE IN FEET

0 300 600

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore		BORING LOCATIONS	FIGURE
PROJECT NO.	DATE	STATE ROUTE 73 IMPROVEMENTS NEWPORT BEACH AND IRVINE, CALIFORNIA	2
208449020	8/13		

208449020_BL.dwg 10:37:26 08/26/2013 GK



Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B6-0.5	0.5	8/7/2013	1.8	--	--	--	--
B6-1.5	1.5	8/7/2013	4.3	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B7-0.5	0.5	8/7/2013	2.8	--	--	--	8.0
B7-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--
B7-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--
B7-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B8-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--
B8-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--
B8-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--
B8-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B5-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--
B5-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--
B5-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--
B5-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B3-0.5	0.5	8/8/2013	ND<1.0	--	--	--	8.6
B3-1.5	1.5	8/8/2013	ND<1.0	--	--	--	--
B3-3.0	3.0	8/8/2013	ND<1.0	--	--	--	--
B3-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B4-0.5	0.5	8/8/2013	ND<1.0	--	--	--	--
B4-1.5	1.5	8/8/2013	ND<1.0	--	--	--	--
B4-3.0	3.0	8/8/2013	ND<1.0	--	--	--	--
B4-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B1-0.5	0.5	8/8/2013	3.3	--	--	--	--
B1-1.5	1.5	8/8/2013	1.7	--	--	--	--
B1-3.0	3.0	8/8/2013	2.6	--	--	--	--
B1-4.0	4.0	8/8/2013	1.1	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B2-0.5	0.5	8/8/2013	ND<1.0	--	--	--	--
B2-1.5	1.5	8/8/2013	ND<1.0	--	--	--	
B2-3.0	3.0	8/8/2013	ND<1.0	--	--	--	9.0
B2-4.0	4.0	8/8/2013	ND<1.0	--	--	--	--

LEGEND

B8	BORING
mg/kg	MILLIGRAMS PER KILOGRAM
mg/l	MILLIGRAMS PER LITER
WET	WASTE EXTRACTION TEST
WET- citric	SOLUBLE LEAD BY WET USING CITRIC ACID FOR COMPARISON TO THE SOLUBLE THRESHOLD LIMIT CONCENTRATIO
WET- DI	SOLUBLE LEAD BY WET USING DEIONIZED WATER FOR COMPARISON TO THE SOLUBLE THRESHOLD LIMIT CONCENTRATION
TCLP	SOLUBLE LEAD BY THE TOCICITY CHARACTERISTIC LEACHING PROCEDURE

REFERENCE: CALTRANS

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449020	8/13

BORING DATA

STATE ROUTE 73 IMPROVEMENTS
NEWPORT BEACH AND IRVINE, CALIFORNIA

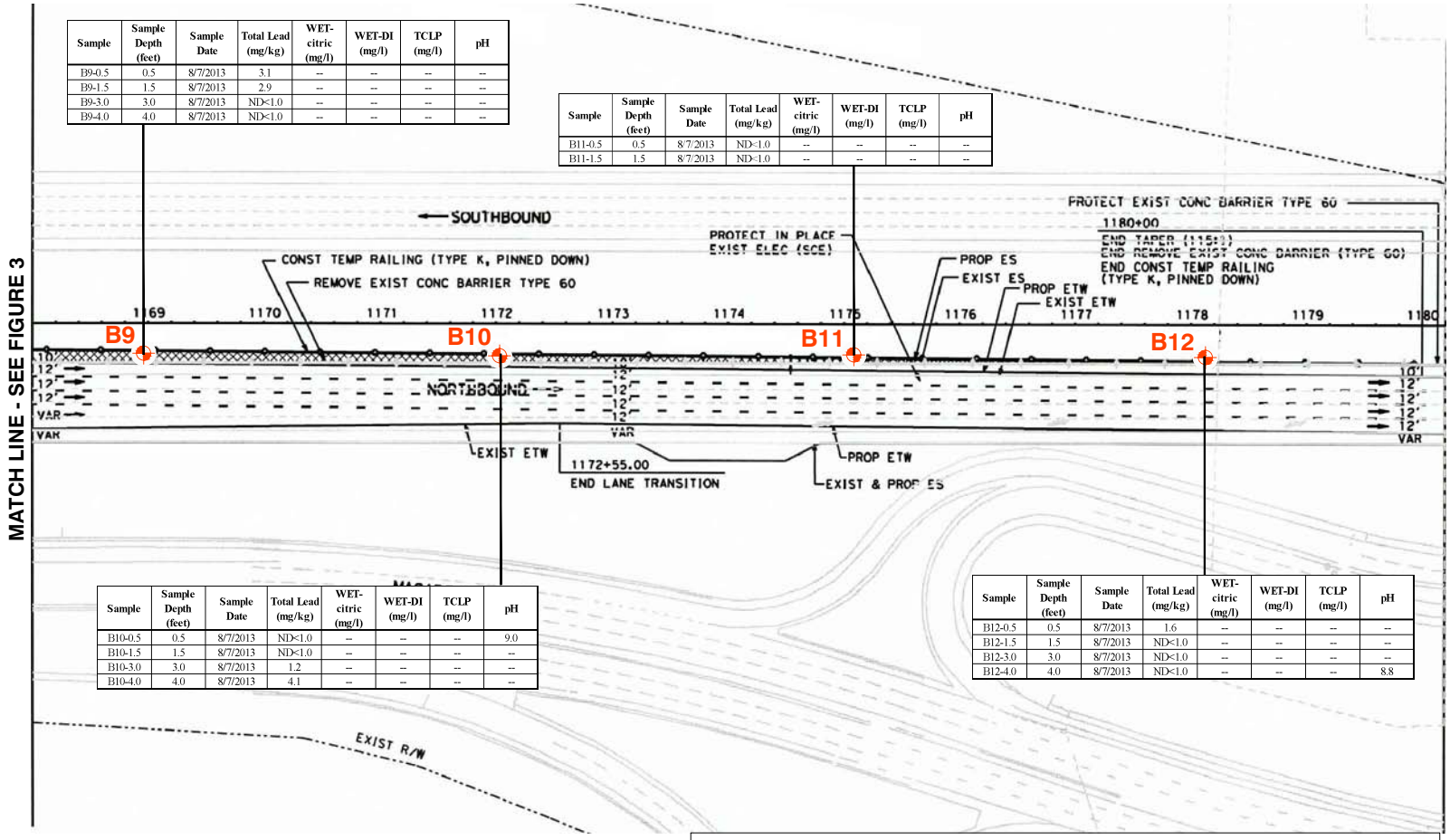
FIGURE

3

208449020_BD1.dwg 10:45:20 08/20/2013 GK

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B9-0.5	0.5	8/7/2013	3.1	--	--	--	--
B9-1.5	1.5	8/7/2013	2.9	--	--	--	--
B9-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--
B9-4.0	4.0	8/7/2013	ND<1.0	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B11-0.5	0.5	8/7/2013	ND<1.0	--	--	--	--
B11-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--



Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B10-0.5	0.5	8/7/2013	ND<1.0	--	--	--	9.0
B10-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--
B10-3.0	3.0	8/7/2013	1.2	--	--	--	--
B10-4.0	4.0	8/7/2013	4.1	--	--	--	--

Sample	Sample Depth (feet)	Sample Date	Total Lead (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B12-0.5	0.5	8/7/2013	1.6	--	--	--	--
B12-1.5	1.5	8/7/2013	ND<1.0	--	--	--	--
B12-3.0	3.0	8/7/2013	ND<1.0	--	--	--	--
B12-4.0	4.0	8/7/2013	ND<1.0	--	--	--	8.8

REFERENCE: CALTRANS.

LEGEND

B12	BORING
mg/kg	MILLIGRAMS PER KILOGRAM
mg/l	MILLIGRAMS PER LITER
WET	WASTE EXTRACTION TEST
WET- citric	SOLUBLE LEAD BY WET USING CITRIC ACID FOR COMPARISON TO THE SOLUBLE THRESHOLD LIMIT CONCENTRATIO
WET- DI	SOLUBLE LEAD BY WET USING DEIONIZED WATER FOR COMPARISON TO THE SOLUBLE THRESHOLD LIMIT CONCENTRATION
TCLP	SOLUBLE LEAD BY THE TOCICITY CHARACTERISTIC LEACHING PROCEDURE

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449020	8/13

BORING DATA

STATE ROUTE 73 IMPROVEMENTS
NEWPORT BEACH AND IRVINE, CALIFORNIA

FIGURE

4

208449020_BD2.dwg 10:45:20 08/20/2013 GK

APPENDIX A

AERIALLY DEPOSITED LEAD SOIL MANAGEMENT CHART

AERIALLY DEPOSITED LEAD SOIL MANAGEMENT			
SOLUBLE LEAD (mg/l)	TOTAL LEAD (mg/kg)	SOIL TYPE	HANDLING
CALIFORNIA TESTING			
STLC <5.0	TTLC <1000	X	**Non-hazardous Waste**. Notify and require Lead Compliance Plan for worker safety.
	1000 – 1411 and DI WET < 1.5 mg/l	Y1	**Hazardous Waste. Variance applies** – cover with minimum 1 foot of clean soil.*
	1411 – 3397 and DI WET < 150 mg/l	Y2	**Hazardous Waste. Variance applies** – cover with pavement structure. *
	1000 – 3397 but Surplus	Z2	**Hazardous Waste** - Surplus. Dispose at Class 1 disposal site.
	> 3397 or 1000 – 3397 & DI WET > 150 mg/l	Z2	**Hazardous Waste** – not reusable under Variance. Dispose at Class 1 disposal site.
STLC >5.0	TTLC < 1411 and DI WET < 1.5 mg/l	Y1	**Hazardous Waste. Variance applies** – cover with minimum of 1 foot of clean soil.*
	1411 – 3397 and DI WET < 150 mg/l	Y2	**Hazardous Waste. Variance applies** – cover with pavement structure.*
	< 3397 and DI WET < 150 mg/l but Surplus	Z2	**Hazardous Waste** - Surplus. Dispose at Class 1 disposal site.
	> 3397 or DI WET > 150 mg/l	Z2	**Hazardous Waste** – not reusable under Variance. Dispose at Class 1 disposal site.
FEDERAL TESTING			
TCLP > 5.0 mg/l	N/A	Z3	**RCRA Hazardous Waste** Dispose at Class 1 disposal site as a RCRA waste regardless of TTLC and STLC results.

*Note: For hazardous waste levels of lead - if pH is less than 5.5 soil must be placed under a pavement structure. If pH is less than 5.0 variance can not be used and the soil must be disposed as Z-2 material.

APPENDIX B

LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

PAT-CHEM LABORATORIES

11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 12-Aug-13 16:59
Subject: Lead Soil Samples

Project/P.O.#: [none]

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B1-0.5 (Sample I.D.# : 1308098-01) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)		3.3 mg/kg	
B1-1.5 (Sample I.D.# : 1308098-02) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)		1.7 mg/kg	
B1-3.0 (Sample I.D.# : 1308098-03) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)		2.6 mg/kg	
B1-4.0 (Sample I.D.# : 1308098-04) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)		1.1 mg/kg	
B3-0.5 (Sample I.D.# : 1308098-05) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AH30904	0.1	09-Aug-13 (SJ)		8.6 pH Units	
B3-1.5 (Sample I.D.# : 1308098-06) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B3-3.0 (Sample I.D.# : 1308098-07) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B3-4.0 (Sample I.D.# : 1308098-08) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B4-0.5 (Sample I.D.# : 1308098-09) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B4-1.5 (Sample I.D.# : 1308098-10) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B4-3.0 (Sample I.D.# : 1308098-11) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B4-4.0 (Sample I.D.# : 1308098-12) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B2-0.5 (Sample I.D.# : 1308098-13) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
B2-1.5 (Sample I.D.# : 1308098-14) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	

Respectfully Submitted,

Pat Brueckner 8/12/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 12-Aug-13 16:59
Subject: Lead Soil Samples

Project/P.O.#: [none]

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B2-3.0 (Sample I.D.# : 1308098-15) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AH30904	0.1	09-Aug-13 (SJ)		9.0 pH Units	
B2-1.0 (Sample I.D.# : 1308098-16) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30901	1.0	09-Aug-13 (AF)	<	1.0 mg/kg	
W-1 (Sample I.D.# : 1308098-17) Collected: 08-Aug-13 By N&M							
Lead	EPA 6010B	AH30902	0.02	09-Aug-13 (AF)	<	0.02 mg/l	

Respectfully Submitted,

Pat Brueckner 8/12/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 12-Aug-13 16:59
Subject: Lead Soil Samples

Project/P.O.#: [none]

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30901 - EPA 3050B										
Blank (AH30901-BLK1)				Prepared & Analyzed: 09-Aug-13						
Lead	ND	1.0	mg/kg							
LCS (AH30901-BS1)				Prepared & Analyzed: 09-Aug-13						
Lead	27.3	1.0	mg/kg	25.0		109	80-120			
LCS Dup (AH30901-BSD1)				Prepared & Analyzed: 09-Aug-13						
Lead	27.2	1.0	mg/kg	25.0		109	80-120	0.356	20	
Duplicate (AH30901-DUP1)		**Source: 1308098-01**		Prepared & Analyzed: 09-Aug-13						
Lead	3.42	1.0	mg/kg		3.30			3.58	20	
Matrix Spike (AH30901-MS1)		**Source: 1308098-01**		Prepared & Analyzed: 09-Aug-13						
Lead	127	1.0	mg/kg	125	3.30	98.9	75-125			
Matrix Spike Dup (AH30901-MSD1)		**Source: 1308098-01**		Prepared & Analyzed: 09-Aug-13						
Lead	130	1.0	mg/kg	125	3.30	102	75-125	2.72	20	
Batch AH30902 - EPA 200 Series										
Blank (AH30902-BLK1)				Prepared & Analyzed: 09-Aug-13						
Lead	ND	0.02	mg/l							
LCS (AH30902-BS1)				Prepared & Analyzed: 09-Aug-13						
Lead	0.510	0.02	mg/l	0.500		102	80-120			
LCS Dup (AH30902-BSD1)				Prepared & Analyzed: 09-Aug-13						
Lead	0.511	0.02	mg/l	0.500		102	80-120	0.0875	20	

Respectfully Submitted,

Pat Brueckner 8/12/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 12-Aug-13 16:59
Subject: Lead Soil Samples

Project/P.O.#: [none]

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30902 - EPA 200 Series										
Duplicate (AH30902-DUP1)		**Source: 1308090-01**		Prepared & Analyzed: 09-Aug-13						
Lead	ND	0.02	mg/l		ND				20	
Matrix Spike (AH30902-MS1)		**Source: 1308090-01**		Prepared & Analyzed: 09-Aug-13						
Lead	0.973	0.02	mg/l	1.00	ND	97.3	80-120			
Matrix Spike Dup (AH30902-MSD1)		**Source: 1308090-01**		Prepared & Analyzed: 09-Aug-13						
Lead	1.00	0.02	mg/l	1.00	ND	100	80-120	2.92	20	

Respectfully Submitted,

Pat Brueckner 8/12/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 12-Aug-13 16:59
Subject: Lead Soil Samples

Project/P.O.#: [none]

General Inorganic Nonmetallic Chemistry by Standard Methods/EPA Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30904 - General Preparation										
Duplicate (AH30904-DUP1)		**Source: 1308098-05**		Prepared & Analyzed: 09-Aug-13						
pH	8.53	0.1	pH Units		8.56			0.351	15	

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis

Respectfully Submitted,

Pat Brueckner 8/12/2013
Laboratory Director

1308098

LABORATORY:	SITE:	CONSULTANT:
Pat Chem Laboratories 11990 Discovery Court Moorpark, CA 93021 (805) 532-0012 / fax (805) 532-0016	Various Locations, SR-73 Newport Beach, California EA 0M1101 Project Number 208449020	Ninyo & Moore 475 Goddard, Suite 200 Irvine, CA 92618 (949) 753-7070/fax (949) 753-7071

Special Instructions:

Homogonize the samples

If total lead is <1,000 mg/kg, but >/= 50 mg/kg, run STLC WET test (citric acid extraction EPA Method 7000 series)

If STLC WET >/= 5 mg/l, run STLC-DI (DI extraction EPA Method 7000 series)

If total lead is >/=1,000 mg/kg or STLC WET >/=5 mg/l, run TCLP (EPA Method 7000 series for leachable lead)

Samplers Name: Jesus Villanueva

Relinquished by (name/date and time):	Received by (name/date and time):
8/8/13 1508	8/8/13 1508
8/8/13 1825	
	8/8/13 1825

Lab No.	Sample I. D.	Date	Time	Total Lead EPA Method 6010	pH EPA Method 9045	Sample Type	Turn-Around Time	Container Type	HOLD
	B1-0.5	8/8/13	0920	X		Soil	Normal	Glass Jar	
	B1-1.5		0928	X		Soil	Normal	Glass Jar	
	B1-3.0		0933	X		Soil	Normal	Glass Jar	
	B1-4.0		0936	X		Soil	Normal	Glass Jar	
	B3-0.5		0950	X	X	Soil	Normal	Glass Jar	
	B3-1.5		0955	X		Soil	Normal	Glass Jar	
	B3-3.0		1001	X		Soil	Normal	Glass Jar	
	B3-4.0		1004	X		Soil	Normal	Glass Jar	
	B4-0.5		1020	X		Soil	Normal	Glass Jar	
	B4-1.5		1027	X		Soil	Normal	Glass Jar	
	B4-3.0		1031	X		Soil	Normal	Glass Jar	
	B4-4.0		1035	X		Soil	Normal	Glass Jar	
	B2-0.5		1058	X		Soil	Normal	Glass Jar	
	B2-1.5		1103	X		Soil	Normal	Glass Jar	
	B2-3.0		1108	X	X	Soil	Normal	Glass Jar	
	B2-4.0		1112	X		Soil	Normal	Glass Jar	
X	W-1		1120	X	water	~~Soil~~	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
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						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
	W-1	8/8/13	1120	X		water	Normal	Plastic	

Page 1 of 1

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B12-0.5 (Sample I.D.# : 1308084-01) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		1.6 mg/kg	
B12-1.5 (Sample I.D.# : 1308084-02) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B12-3.0 (Sample I.D.# : 1308084-03) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B12-4.0 (Sample I.D.# : 1308084-04) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AH30811	0.1	08-Aug-13 (CS)		8.8 pH Units	
B11-0.5 (Sample I.D.# : 1308084-05) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B11-1.5 (Sample I.D.# : 1308084-06) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B10-0.5 (Sample I.D.# : 1308084-07) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AH30811	0.1	08-Aug-13 (CS)		9.0 pH Units	
B10-1.5 (Sample I.D.# : 1308084-08) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B10-3.0 (Sample I.D.# : 1308084-09) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		1.2 mg/kg	
B10-4.0 (Sample I.D.# : 1308084-10) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		4.1 mg/kg	
B9-0.5 (Sample I.D.# : 1308084-11) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		3.1 mg/kg	
B9-1.5 (Sample I.D.# : 1308084-12) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		2.9 mg/kg	
B9-3.0 (Sample I.D.# : 1308084-13) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B9-4.0 (Sample I.D.# : 1308084-14) Collected: 07-Aug-13 By N&M							

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B9-4.0 (Sample I.D.# : 1308084-14) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B8-0.5 (Sample I.D.# : 1308084-15) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B8-1.5 (Sample I.D.# : 1308084-16) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B8-3.0 (Sample I.D.# : 1308084-17) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B8-4.0 (Sample I.D.# : 1308084-18) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B7-0.5 (Sample I.D.# : 1308084-19) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		2.8 mg/kg	
pH	EPA 9045B	AH30811	0.1	08-Aug-13 (CS)		8.0 pH Units	
B7-1.5 (Sample I.D.# : 1308084-20) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B7-3.0 (Sample I.D.# : 1308084-21) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B7-4.0 (Sample I.D.# : 1308084-22) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B6-0.5 (Sample I.D.# : 1308084-23) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		1.8 mg/kg	
B6-1.5 (Sample I.D.# : 1308084-24) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)		4.3 mg/kg	
B5-0.5 (Sample I.D.# : 1308084-25) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B5-1.5 (Sample I.D.# : 1308084-26) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	
B5-3.0 (Sample I.D.# : 1308084-27) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B5-4.0 (Sample I.D.# : 1308084-28) Collected: 07-Aug-13 By N&M							
Lead	EPA 6010B	AH30810	1.0	08-Aug-13 (AF)	<	1.0 mg/kg	

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

PAT-CHEM LABORATORIES
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Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30810 - EPA 3050B										
Blank (AH30810-BLK1)				Prepared & Analyzed: 08-Aug-13						
Lead	ND	1.0	mg/kg							
Blank (AH30810-BLK2)				Prepared & Analyzed: 08-Aug-13						
Lead	ND	1.0	mg/kg							
LCS (AH30810-BS1)				Prepared & Analyzed: 08-Aug-13						
Lead	27.3	1.0	mg/kg	25.0		109	80-120			
LCS (AH30810-BS2)				Prepared & Analyzed: 08-Aug-13						
Lead	26.6	1.0	mg/kg	25.0		106	80-120			
LCS Dup (AH30810-BSD1)				Prepared & Analyzed: 08-Aug-13						
Lead	26.8	1.0	mg/kg	25.0		107	80-120	1.82	20	
LCS Dup (AH30810-BSD2)				Prepared & Analyzed: 08-Aug-13						
Lead	26.7	1.0	mg/kg	25.0		107	80-120	0.464	20	
Duplicate (AH30810-DUP1)		**Source: 1308084-01**		Prepared & Analyzed: 08-Aug-13						
Lead	1.48	1.0	mg/kg		1.56			5.59	20	
Duplicate (AH30810-DUP2)		**Source: 1308084-21**		Prepared & Analyzed: 08-Aug-13						
Lead	ND	1.0	mg/kg		ND				20	
Matrix Spike (AH30810-MS1)		**Source: 1308084-01**		Prepared & Analyzed: 08-Aug-13						
Lead	113	1.0	mg/kg	125	1.56	88.9	75-125			
Matrix Spike (AH30810-MS2)		**Source: 1308084-21**		Prepared & Analyzed: 08-Aug-13						
Lead	98.2	1.0	mg/kg	125	ND	78.6	75-125			

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30810 - EPA 3050B										
Matrix Spike Dup (AH30810-MSD1)		**Source: 1308084-01**		Prepared & Analyzed: 08-Aug-13						
Lead	102	1.0	mg/kg	125	1.56	80.0	75-125	10.3	20	
Matrix Spike Dup (AH30810-MSD2)		**Source: 1308084-21**		Prepared & Analyzed: 08-Aug-13						
Lead	95.8	1.0	mg/kg	125	ND	76.6	75-125	2.51	20	

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

PAT-CHEM LABORATORIES
11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 09-Aug-13 16:41
Subject: Soil Samples

Project/P.O.#: 208449020, EA 0M1101

General Inorganic Nonmetallic Chemistry by Standard Methods/EPA Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AH30811 - General Preparation										
Duplicate (AH30811-DUP1)		**Source: 1308084-04**		Prepared & Analyzed: 08-Aug-13						
pH	8.73	0.1	pH Units		8.78			0.571	15	

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis

Respectfully Submitted,

Pat Brueckner 8/9/2013
Laboratory Director

1308084

LABORATORY:	SITE: Various Locations, SR-73	CONSULTANT:
Pat Chem Laboratories 11990 Discovery Court Moorpark, CA 93021 (805) 532-0012 / fax (805) 532-0016	Newport Beach, California EA 0M1101 Project Number 208449020	Ninyo & Moore 475 Goddard, Suite 200 Irvine, CA 92618 (949) 753-7070/fax (949) 753-7071

Special Instructions:

Homogonize the samples

If total lead is <1,000 mg/kg, but >/= 50 mg/kg, run STLC WET test (citric acid extraction EPA Method 7000 series)

If STLC WET >/= 5 mg/l, run STLC-DI (DI extraction EPA Method 7000 series)

If total lead is >/=1,000 mg/kg or STLC WET >/=5 mg/l, run TCLP (EPA Method 7000 series for leachable lead)

Samplers Name:

Relinquished by (name/date and time):	Received by (name/date and time):
Jesus Villanueva 8/7/13 1600	Kalina Cole 8.7.13 1600
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time): Kcole 8/7/13 715	Received by (name/date and time): 8/7/13 718

Lab No.	Sample I. D.	Date	Time	Total Lead EPA Method 6010	pH EPA Method 9045	Sample Type	Turn-Around Time	Container Type	HOLD
1	B12-0.5	8/7/13	0933	X		Soil	Normal	Glass Jar	
2	B12-1.5		0945	X		Soil	Normal	Glass Jar	
3	B12-3.0		0950	X		Soil	Normal	Glass Jar	
4	B12-4.0		1000	X	X	Soil	Normal	Glass Jar	
5	B11-0.5		1017	X		Soil	Normal	Glass Jar	
6	B11-1.5		1022	X		Soil	Normal	Glass Jar	
	~~B11-3.0~~					Soil	Normal	Glass Jar	
	~~B11-4.0~~					Soil	Normal	Glass Jar	
7	B10-0.5		1106	X	X	Soil	Normal	Glass Jar	
8	B10-1.5		1111	X		Soil	Normal	Glass Jar	
9	B10-3.0		1117	X		Soil	Normal	Glass Jar	
10	B10-4.0		1125	X		Soil	Normal	Glass Jar	
11	B9-0.5		1137	X		Soil	Normal	Glass Jar	
12	B9-1.5		1142	X		Soil	Normal	Glass Jar	
13	B9-3.0		1145	X		Soil	Normal	Glass Jar	
14	B9-4.0		1148	X		Soil	Normal	Glass Jar	
15	B8-0.5		1218	X		Soil	Normal	Glass Jar	
16	B8-1.5		1223	X		Soil	Normal	Glass Jar	
17	B8-3.0		1230	X		Soil	Normal	Glass Jar	
18	B8-4.0		1234	X		Soil	Normal	Glass Jar	
19	B7-0.5		1257	X	X	Soil	Normal	Glass Jar	
20	B7-0 1.5		1302	X		Soil	Normal	Glass Jar	
21	B7-3.0		1306	X		Soil	Normal	Glass Jar	
22	B7-4.0		1310	X		Soil	Normal	Glass Jar	
23	B6-0.5		1329	X		Soil	Normal	Glass Jar	
24	B6-1.5		1335	X		Soil	Normal	Glass Jar	
	~~B6-3.0~~					Soil	Normal	Glass Jar	
	~~B6-4.0~~					Soil	Normal	Glass Jar	
25	B5-0.5		1402	X		Soil	Normal	Glass Jar	
26	B5-1.5		1415	X		Soil	Normal	Glass Jar	
27	B5-3.0		1423	X		Soil	Normal	Glass Jar	
28	B5-4.0		1430	X		Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
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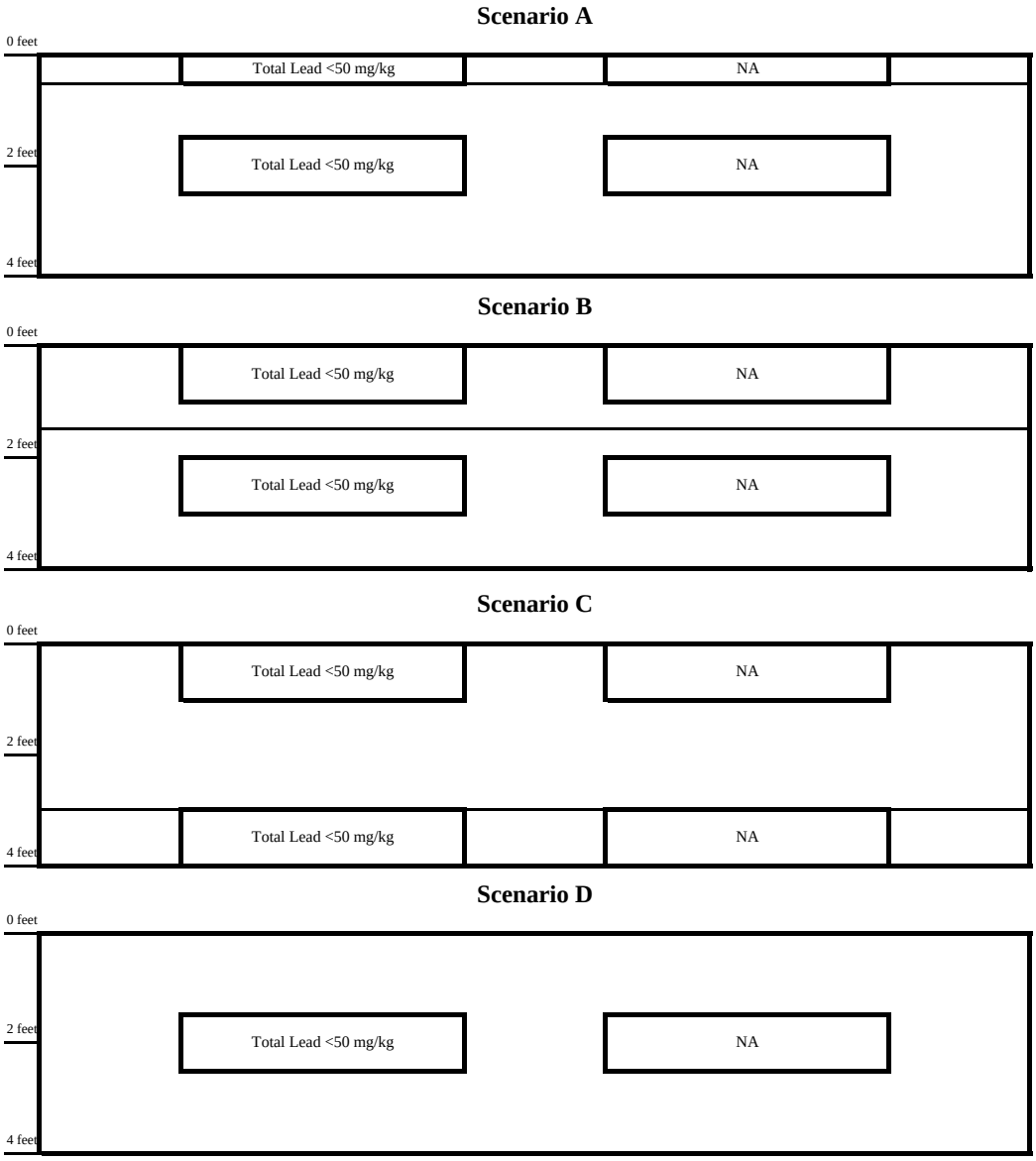
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						water	Normal	Plastic	

APPENDIX C

BLOCK DIAGRAMS

FIGURE C1 – BLOCK DIAGRAM FOR POTENTIAL CALTRANS RIGHT-OF-WAY RE-USE



– Non-hazardous soil with respect to total and soluble lead

– Reuse Condition 1 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil]

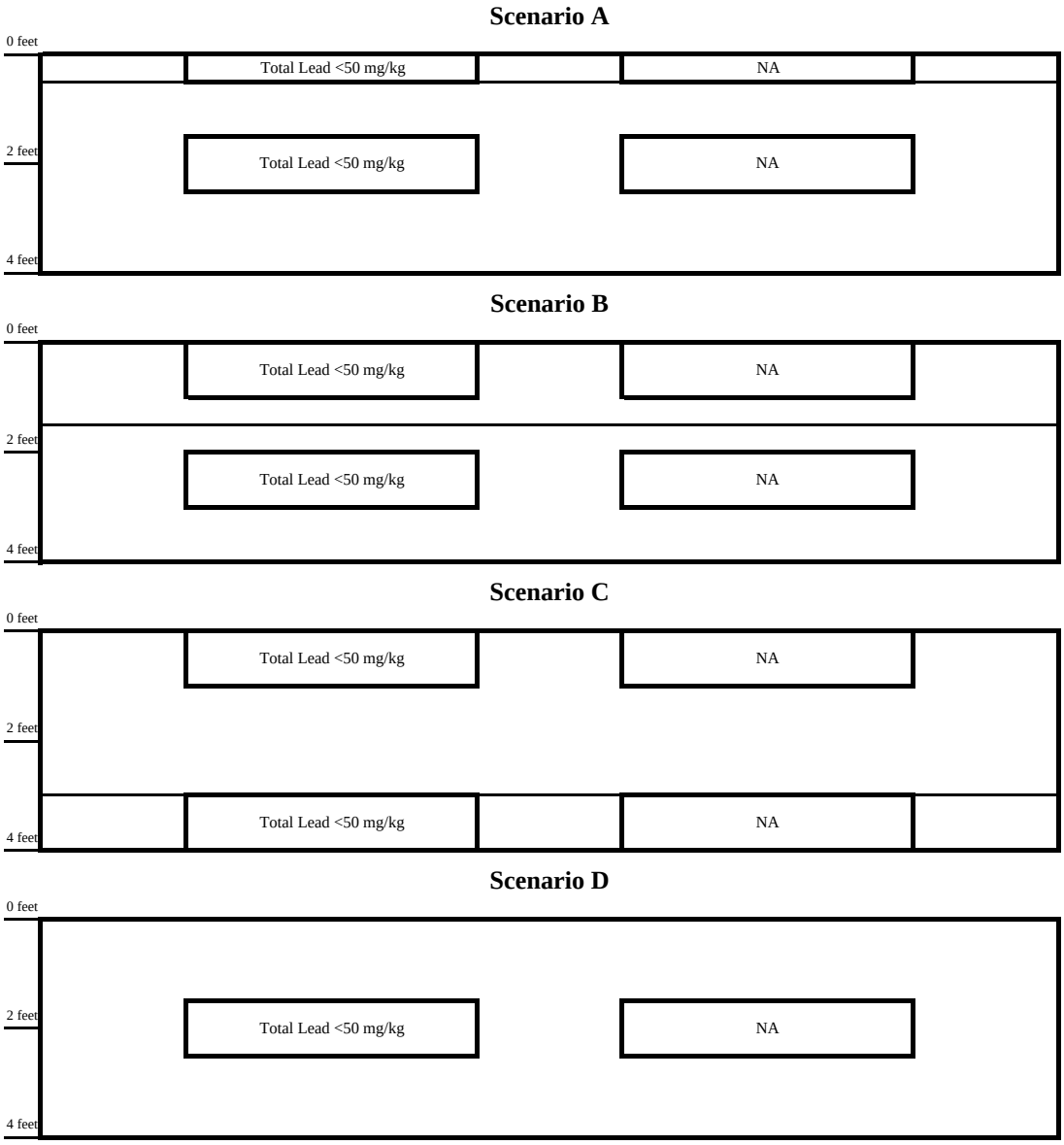
– Reuse Condition 2 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water tabl elevation and protect from infiltration with a pavement structure which will be maintained by Caltran

– Hazardous. Class 1 disposal site, all other Title 22 CCR requirements apply

– Hazardous. Class 1 disposal site RCRA based on the layer having a TCLP value ≥ 5 mg/l

UCL – upper confidence limit
WET-DI – soluble lead using the Waste Extraction Test with deionized water
WET-citric acid – soluble lead using the Waste Extraction Test with citric acid
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
CCR – California Code of Regulations
RCRA – Resource, Conservation, and Recovery Act
NA – not applicable

FIGURE C2 – BLOCK DIAGRAM FOR POTENTIAL CALTRANS OFF SITE DISPOSAL



— Non-hazardous soil with respect to total and soluble lead

— Reuse Condition 1 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil]

— Reuse Condition 2 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by Caltrans]

— Hazardous. Class 1 disposal site, all other Title 22 CCR requirements apply

— Hazardous. Class 1 disposal site RCRA based on the layer having a TCLP value≥ 5 mg/l

UCL — upper confidence limit
WET-DI — soluble lead using the Waste Extraction Test with deionized water
WET-citric acid — soluble lead using the Waste Extraction Test with citric acid
TCLP — Toxicity Characteristic Leaching Procedure
mg/kg — milligrams per kilogram
mg/l — milligrams per liter
CCR — California Code of Regulations
RCRA — Resource, Conservation, and Recovery Act
NA — not applicable

State of California
DEPARTEMNT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought!
Help Save Water!

To: MATHEW CUGINI
Branch Chief,
Design C

Date: June 6, 2014

File: 12-Ora -73/ PM 23.9-25.2
E.A: 0M1101
ID: 1200020297
Materials Letter Report

From: KAMBIZ ZANJANI
Materials and Research Branch

Subject: **FINAL: Materials Letter Report: Northbound (NB) SR-73 MacArthur Blvd On-Ramp Left Shoulder Widening and Widening of Portion NB SR-73 Left Shoulder between Northbound MacArthur Blvd On-Ramp and University Drive Overpass within inside Shoulder and Median, and Placing Open Graded Friction Course (OGFC) Overlay from Jamboree Over Crossing (OC) to Northbound Birth Street Off-Ramp in Cites of Irvine and Newport Beach, California.**

According to your request, attached please find a final copy of subject Materials Letter Report for the records. The SSPs are being prepared and will be forwarded to your office soon.

If you have any questions or need more information, please contact Kambiz (Ken) Zanjani at x-7806 or Behdad Baseghi at x-2485. Thank you for your assistance.

Prepared by:

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Division of Project Delivery

Concurred by:

Behdad Baseghi,
Chief, Materials & Research Branch
Division of Project Delivery

State of California
DEPARTEMNT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious Drought!
Help Save Water!

To: MATHEW CUGINI
Branch Chief,
Design C

Date: June 26, 2014

File: 12-Ora -73/PM 23.9 – 25.2
EA: 0M1101
Job: 1200020297
Materials Letter Report

From: KAMBIZ ZANJANI
Materials and Research Branch

Subject: **Materials Letter Report: Northbound (NB) SR-73 MacArthur Blvd On-Ramp Left Shoulder Widening and Widening of Portion NB SR-73 Left Shoulder between Northbound MacArthur Blvd On-Ramp and University Drive Overpass within inside Shoulder and Median, and Placing Open Graded Friction Course (OGFC) Overlay from Jamboree Over Crossing (OC) to Northbound Birth Street Off - Ramp in Cites of Irvine and Newport Beach, California.**

In accordance with your June 19, 2013 request, Materials and Research (M&R) Branch has reviewed the Project Plans submitted for the above-referenced project. The Project Study Report –Project Report (PSR-PR) Safety dated September 2012 was also submitted for our review earlier. As part of this Materials Letter Report (MLR) we, M&R Branch have conducted field investigation, sampling and laboratory testing in order to provide you with pavement structural sections recommendations for the proposed widening.

1. Purpose and Scope of Study

The purpose of this MLR is to provide pavement and materials related recommendations and assist the Design Branch in preparing Project Plans, Specifications, and Estimates (PS&E). This MLR presents the findings, conclusions and recommendations for subject area in accordance with Topic 114 of Highway Design Manual (2012). The scope of work provided for this project included the following tasks:

- Field exploration consisting of exploratory borings (shallow drilling) and sampling;
- Laboratory testing of bulk soil sample;
- Engineering analysis to develop design and construction recommendations; and
- Preparation of this report: Presenting our findings, conclusions and recommendations.

2. Existing Facility

The project is located on northbound (NB) Route 73 between NB on-ramp from MacArthur Blvd (PM 23.866) and Route 73 NB off-ramp to Birch St. – north of Jamboree Rd Over-Crossing (OC) PM 25.208. The northbound MacArthur Blvd is a two lane on-ramp which transitions to one lane upstream of the nose area on a horizontal curve with downhill vertical grade. This lane continues for approximately 1700 feet before it merges with the freeway main line. The existing mainline NB SR-73 between NB MacArthur Blvd on-ramp and University Drive is a four-lane freeway with concrete barrier along inside shoulder and open space unpaved median between northbound and southbound.

3. Proposed Project Improvement

This project proposes widening of existing Route 73 NB on-ramp from MacArthur Blvd, from one lane to two lanes and also adding a lane within freeway mainline at existing inside shoulder and unpaved medina from Sta. 1157+15 to Sta. 1180+00. It is recommended to upgrade the existing geometry of MacArthur Blvd on-ramp and widening a portion of it by removing the lane drop area and extend and widen existing two lanes approximately 512 ft to proposed gore point from Sta. 861+48.00 to Sta. 866+59.94. In general the existing alignment of the on-ramp will be shifted to the left side approximately 0.2 ft to 17 ft from the existing pavement, from Sta. 855+49.75 to Sta. 866+59.94. The new pavement will be constructed from the existing left edge of shoulder (ES) to the proposed left ES. The gore area will be paved with the same pavement section as well. Existing guard rail (MBGR) and AC dike will be removed and positioned at the proposed left ES. It is also proposed to widen a portion of actual freeway (Route 73 NB) starting at vicinity of MacArthur Blvd, from Sta. 1157+15 to Sta. 1180+00. To accommodate this, the existing alignment of the mainline will be shifted to the left side towards median area approximately 2.4 ft to 13.0 ft from the existing pavement. The new pavement will be constructed from existing left ES to the proposed left ES. The existing acceleration lane no. 4 will be also extended 210 ft from Sta. 1182+70 to Sta. 1185+00. Two additional inlets shall be constructed along the NB loop on-ramp from Jamboree Rd. at Sta. 1204+20 and 1204+60 and connected to existing inlet at Sta. 1204+40. It is also proposed to place 0.1 ft (1.2 inches) Open Graded Friction Course (OGFC) between north of San Diego Creek Bridge and Route 73-NB off-ramp to Birch St. (between Sta. 1191+91 and 1227+46) and construction of additional drainage inlets on Route 73 NB loop on-ramp from Jamboree Rd.

4. Terrain and Surface Drainage

The project site is located within the limits of Caltrans right-of-way in Cities of Irvine and Newport Beach NB MacArthur Blvd on-ramp is mostly downhill that turns flat at freeway level. Any possible surface water within the ramp shall drain per design along super-elevation from left to right and toward inlets at low point. Within mainline, the roadway cross slope is also supposed to shift flow based on super-elevation to side shoulders. There is an existing sag area approximately at Sta. 1207+00 and the super-elevation transition of the Rout 73 NB around Sta. 1208+70 which both may contribute to hydroplaning. It is proposed to study and adjust the freeway cross-slop, add drainage inlets at the vertical sag, resurface with OGFC, and restripe.

5. Summary of Field Investigation

Our field investigation was conducted on July 10, 2013 and consisted of total seven coring and borings, MB-1 through MB-7. We cored AC at three locations and drilled soils to a depth of 6ft at other four locations. Testing was conducted by Southern Regional Lab (SRL) crew. A truck mount auger provided by D-11was used for testing. The purpose of coring AC was to measure the thickness of various pavement sections within existing paved shoulders. We also collected subsurface soils samples within unpaved shoulder and median areas for laboratory testing and evaluation. All bulk samples were shipped to SRL for testing. Table 1 presents summary of testing locations, AC coring data and soil testing results.

6. Subsurface and Groundwater Conditions

Borings MB-1 through 3 are located within MacArthur Blvd NB on-ramp left shoulder and MB-4 through 7 are located along inside shoulder of NB SR-73 and median. We did not encounter any groundwater during our shallow drilling (6 to 7 ft deep) and have no information regarding the groundwater elevations in this area. For groundwater issues please consult with Office of Geotechnical Design-South 1. However it is required that groundwater levels to be kept a minimum of 5 ft below the pavement structural section

7. Cut and Fill Construction

Construction of the proposed widening requires no major cut-fill operation within project limits. The import fill material that is going to be placed within 4 ft of finished grade shall have an R-value of greater that 40 and an Expansion Index of less than 50 or PI less than 12. Materials shall be non-corrosive to metals and concrete especially if any underground utilities or structures are planned to be constructed within project limits.

8. Seismic Considerations

Office of Geotechnical Design-South shall provide recommendations for seismic design including liquefaction/seismic settlement and lateral spreading as applicable.

9. Earthwork Factors

All earthwork shall conform to requirements of Section 19 Standard Specifications (2010), and project Standard Special Provisions. Imported borrow could be the major source of materials needed for widening of the road. Source of imported borrow is unknown at this time. Therefore, earthwork factors cannot yet be determined. If the contractor is planning to use import borrow to replace the in-situ soils, they should provide pertinent information such as Classification, R-value, Gradation, SE, Compaction Curves, expansive, and corrosive properties to the District Materials Branch prior to their acceptance for use. ***This information needs to be verified on the jobsite.***

10. Construction Observation and Testing

It is recommended that inspection and testing be performed during the following stages of construction:

- Grading operations, including excavation and placement of compacted fill;
- Partial removal of existing pavement structural sections;
- Preparation of pavement subgrade;
- Placement of aggregate base;
- Placement of Pavement sections;
- Excavations for utility trenches (if any); and
- When any unusual conditions are encountered.

For all flexible pavements, it is imperative that special attention be given to mix design and compaction requirements. A copy of the approved mix design (field samplings/ laboratory test results) for Hot Mix Asphalt (HMA) and summary of all field compaction records (HMA, Aggregate Base (AB), Aggregate Subbase (AS), and subgrade shall be provided to our office at the conclusion of the construction activities and during the project closeout. ***We also request a copy of all field temperature measurements for AC (hauled and placed) and ambient to be submitted to our office at project closeout***

11. Corrosion Testing

Caltrans Corrosion Guidelines (November 2012), defines a corrosive environment as one where the soil has electrical resistivity of less than 1000 Ω-cm, sulfate content of greater than 2,000 ppm, chloride content of greater than 500 ppm, or pH of less than 5.5. All bulk sample obtained from job site were sent to SRL for pH and resistivity testing (chemical testing are done in Headquarters). Table 3 presents summary of corrosion potential test results.

12. Site Corrosion Recommendations

Based on results of corrosion tests, the minimum resistivity of three of samples, MB-2, 3, and 7 are less that 1000 Ω-cm with pH greater than 5.5. Further chemical testing (Sulfate and Chloride content) were done for all 4 samples (including MB-5 with minimum resistivity of 2300 Ohm-cm) and they all came below limits (see Table 3). In general existing soil can be none to slightly corrosive to concrete or steel elements. For design purposes, it is recommended that Type IP (MS) Modified or Type II modified cement be used for concrete in contact with on-site soils. Various reinforced concrete pipes (RCP, RCB, CIPCP) design shall be suitable under the site soil corrosion level. Based on Figure 855.3A of Highway Design Manual (HDM Aug 2011) the minimum thickness of the steel pipe for a design life of 50 years shall be 0.109 inch (Gage No.12) galvanized steel pipe (CSP, SSRP, SSPP). Aluminum pipes (CAP, ASRP, SAPP) and Corrugated Aluminized Steel Pipe (CASP) cannot be used. Approved plastic pipe, for 50-yr service life can be used with abrasion resistance.

13. Traffic Index

In accordance with Topic 613.5 -2, Table 613.5A of Highway Design Manual (Nov 2012) a TI value for ramp with "Heavy Truck Traffic" (20-year design life) is 12. A TI value of 12 is also being applied for the mainline as per Traffic Studies June 17, 2013 memorandum. Proposed shoulder will be designed with same TI value as the roadway pavement section.

14. Laboratory Testing

The following laboratory tests were performed on all four samples collected from the borings:

- Sieve Analysis (CTM 202)
- Mechanical Analysis (CTM 203)
- Atterberg Limits (CTM 204)
- R-Value (CTM 301)
- Expansion Index (UBC 29.2)
- Resistivity and pH (CTM 643)

Tests were conducted in general accordance with California Test Methods (CTM) and Uniform Building Code (UBC). Tables 1 and 2 at the end of report present test locations and summary of laboratory test results for all samples.

15. Subsurface Conditions

The subsurface conditions within the proposed ramp and mainline lane widening were classified based on site exploration and laboratory testing. The material within upper 5 ft of finished grade consists of Silty Sand with trace Clay (SM) within on-ramp area and Sandy Silt (ML) within freeway median area. Overall the Plasticity Index (PI) was in range of 1 to 8 and maximum Expansion Index (EI) of 23. Please see section 21 (Recommended Materials Specifications) on page 8 of this report (Comment 2) for in-situ soils requirements.

16. Surface Drainage

Results of core samples indicate presence of a permeable layer (Asphalt Treated Permeable Base – ATPB 0.25 ft thick) within both on-ramp and freeway's inside shoulder structural section profiles. Due to super-elevation configuration (from left to right) within current lane widening construction limits (on-ramp and roadway) it is our recommendation to eliminate permeable layer ATPB as part of proposed structural sections. As the edge drain system is not being maintained properly and the permeable layer does not serve any useful purpose in general but to weaken the proposed structural section, we are of the opinion that it should not be incorporated in the design. Any remaining existing lane also needs to be replaced with a stronger section without the permeable layer in the future. Furthermore as the HMA section is relatively impermeable, any moisture penetrating below surface is very minimal. Also considering the ramp's downhill grade any surface drainage shall be able to pick up run-off from the surface on the pavement (no standing water). Please see section 21 (Recommended Materials Specifications) Comments 9 and 10 for proper saw cutting and tack coat application on any exposed vertical AC sections.

17. Freeway Sag

The PR-PSR talks about an existing NB freeway sag at approximately Sta. 1207+00. Transition of roadway super-elevation also occurs at approximately St. 1208+70. The report also indicates the existing inlets along the left edge shoulder may not be adequate to intercept the surface water. It has been recommended in PR-PSR to add additional inlets and replace existing barrier with temporary Type K Pinned Down railing to help with surface drainage. Temporary railing with scuppers should allow surface water to drain in non-concentrated condition. The existing earth ditch in the median is also supposed to collect any excess water or surface runoffs. The Maintenance Engineering Brach (Majid Movahed) in email to Design Branch (Mathew Cugini) dated August 27, 2013 recommended to conduct topographic survey between Sta. 1207+00 to 1210+00 in super-elevation transition area to get an accurate count of cross section/slope. On November 5, 2013 we visited the site and also observed the freeway sag within roadway (northbound SR-73 north of Jamboree over crossing). The pavement condition visually does not seem to be seriously deteriorated. However, to further evaluate the pavement condition we recommend conducting a deflection testing and AC coring.

18. Findings, Conclusions and Recommendations

The existing pavement structural sections based on core results are as follow (See also Table 2):

- ***Left Shoulder MacArthur Blvd On-Ramp (existing)***

0.1ft OGFC / 0.35ft HMA / 0.25ft ATPB / AB

- ***Inside Shoulder NB SR-73 (existing)***

0.1ft OGFC / 0.55ft HMA / 0.25ft ATPB / AB

Based on TI value of 12 and R-values of 8 for on-ramp and 40 for roadway widening respectively, we recommend Type A Hot Mix Asphalt Concrete (HMA) over Class 2 Aggregate Base (AB) and Aggregate Subbase (AS) for both sections. A final layer of 0.1 ft Open Graded Friction Course (OGFC) will be placed to match the existing condition. We also recommend that same structural section as the ramp is used for the shoulder area (Section 613.5-2, HDM September 2006). Our recommendations:

- ***Ramp and Shoulder Widening**** ***(TI_{20}=12, R=8)***

0.1ft OGFC / 0.6ft HMA-Type A / 0.8ft AB Class 2 / 1.5ft AS Class 2

- ***Roadway Widening **** ***(TI_{20}=12, design R=40)***

0.1ft OGFC / 0.7ft HMA-Type A / 0.6ft AB Class 2 / 0.35ft AS Class 2

Legends: OGFC: Open Grade Friction Course, HMA: Hot Mix Asphalt Concrete Type A, AB: Aggregate Base – Class 2, AS: Aggregate Subbase – Class 2 ***Note:** The *ATPB* (Asphalt Treated Permeable Base) layer is not included as part of proposed structural section (See Section 16 of this report for additional information)

The existing AC pavement section shall be removed properly by sawcutting to full depth to provide a neat and straight pavement break. The join between the existing pavement and the new pavement shall be sealed. It is critical that to avoid a cold joint along the saw cutting line where a new pavement will be placed against exiting roadway. To reduce potential risks (water and drainage percolating down to foundation) it is recommended to cold plain 0.2ft within the existing pavement in area two foot wide. It is therefore important that the final lift (0.2ft) is placed at milled and widened areas at the same time (See also Comment 14, Section 21 of this report).

- ***Open Graded Friction Course (OGFC)***

This being a safety project it has been proposed to reduce wet pavement related accidents by resurfacing the roadway with OGFC in area between San Diego Creek and NB off-ramp to Birch St. PM 24.466 / 25.208(north of the Jamboree Rd. overcrossing). T he southern segment of SR-73 between PM 22.4 / 24.3 OFGC overlay was completed in 2007 (contract 12-0G0704). In general the productive life of OGFC overlays are 4 to 6 years based on traffic loading, the condition of existing pavement that received the overlay and the climate (environmental conditions) in which overly was placed. In surface preparation prior to placing OGFC overlay following steps shall be followed:

1) Thermoplastic markings shall be removed according to Caltrans guidelines,
2) The open graded overlay shall be only placed on structurally sound pavements because they offer no structural improvements.
3) All crack and joint sealing shall be preformed prior to placing the OGFC. Allow for adequate cure time for crack and sealants. In areas with severe distress such as rutting greater than 0.5 inch the localized distressed areas shall be identified and repaired. The crakes wider than 0.2 inch shall be sealed before overlay. In areas with rutting greater than 1-inch, they shall require a digout operation. The digouts can be 3 to 6 ft wide by 3 to 6 ft long within wheel path / localized distressed areas.
4) Based on our field visit the right shoulder (outside shoulder) before Birch St. off-ramp shows uneven surface due to possible traffic load, oxidations, and previous repair works (trench backfilling). It is our recommendation to conduct a deflection study test within Birch St on-ramp itself and the SR-73 outside shoulder to determine pavement condition and provide proper rehabilitation strategies. We may have to mill off the existing structural section to a depth of 0.2 ft, repair any localized distressed areas, seal crakes where appropriate and place 0.2ft HMA Type A before placing proposed OGFC overlay.
5) The exiting tapered joints within the freeway (where the existing OGFC had been placed in past) shall be properly saw cut to create a straight edge and tack coat applied prior to placing the new OGFC overlay.
6) Follow tack coat practice (as per Caltrans Paint (Tack) Coat Guidelines) in waterproofing the underlying pavement.
7) Anticipated Ambient Temperature: OGFC shall not be placed below 10 C (See SSPs).

19. Materials Available

Imported borrow will be required for replacement of unsuitable soils within the project limits. Materials are available from several commercial suppliers throughout Orange, Los Angeles, Riverside and San Bernardino Counties. Furthermore, the Web-Site of Department of Conservation on the Internet contains a current listing of mining operations eligible to sell materials to the State of California. The page can be accessed at: http://www.consrv.ca.gov/omr/index.htm

20. Limitations

This report is intended for the use of Caltrans for the proposed widening in Cities of Irvine and Newport Beach, California. This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated in Table 1. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. District Materials and Research (M&R) Branch should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report. The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of the District M&R Branch.

21. Recommended Materials Specifications

The following requirements shall be included in the project specifications:

1) If the Contractor is planning to use import borrow to replace the in-situ soils, they should provide pertinent information such as Classification, R-value, Gradation, SE, Compaction Curves, expansive, and corrosive properties to the District Materials Branch prior to their acceptance for use. This information **needs to be verified on the jobsite.**
2) Following exposing subgrade and prior to placement of pavement section on native soils, the native soils within upper 4 ft to the finished grade shall have a minimum R-value of 8, be non-corrosive to metal and concrete, have an expansive index of less than 51 or plasticity index of less than 12. If the existing native soils (within upper 4.0 ft to the finished grade) is determined to be not meeting the above requirements, the existing native soils shall be over-excavated and replaced with imported borrow to meet the imported fill recommendations herein. Borrow materials shall conform to Section 19-7 Caltrans Standard Spec (2010).

3) For pavement section on imported fill areas (if any), the engineering fill within the upper 4 ft to the finished grade shall have an R-value of at least 40, be non-corrosive to metal and concrete and have an expansive index (EI) of less than 51 or plasticity index (PI) of less than 12. Non-corrosive requirements shall be based on Caltrans Corrosion Guidelines (Nov 2012).
4) For metal pipes and concrete structures, site specific corrosion tests of the soils surrounding the pipe or structure be performed to verify the corrosivity of the soils along the pipe alignment or the structure
5) Prior to the placement of pavement sections, the subgrade soils shall be compacted in accordance with Section 19-5.03 Caltrans Standard Specification (2010).
6) Hot Mix Asphalt concrete (HMA) shall be Type A, Aggregate Base (AB), and Aggregate Subbase (AS) shall be Class 2. Extreme care must be taken to ensure moisture sensitive aggregates are not used for HMA mix design.
7) Compatible structural section as the roadway shall be used for the shoulder area in order to compensate for truck off-tracking on the shoulder area and where the width is less than 5 ft (See Section 613.5-2 HDM Nov 2012).
8) It is imperative that special attention is given to the mix design, compaction and temperature requirements for flexible pavement as stated in Caltrans Standard Specifications and Project Standard Special Provisions (SSPs).
9) The existing AC pavement section shall be removed properly by sawcutting to full depth to provide a neat and straight pavement break. The join between the existing pavement and the new pavement shall be sealed.
10) The tack coat application shall follow Sections 39-1.09C Caltrans Standard Specifications (2010). Tack Coat shall be also applied to all vertical faces of existing pavement, curbs, gutters and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced and to other surfaces designated in the Special Provisions.
11) Specifications are required for asphalt pavement treatment by applying Tack Coat on AB prior to the placement of HMA.
12) Special attention is required to be given to the following sections of 2010 Standard Specifications:

Section 19: Earthwork;
Section 25: Aggregate Subbases;
Section 39: Asphalt Concrete;
Section 61: Culvert and Drainage Pipe Joints;
Section 63: Cast-In-Place Concrete Pipe;
Section 64: Plastic Pipe;
Section 65: Reinforced Concrete Pipe;
Section 66: Corrugated Metal Pipe;
Section 68: Subsurface Drains;
Section 92: Asphalts;
Section 93: Liquid Asphalts;
Section 94: Asphaltic Emulsion.

13) All Standard Special Provisions (SSPs) to be included in the project shall be submitted to the Materials and Research Branch for review and approval.

14) It is critical that to avoid a cold joint along the saw cutting line where a new pavement will be placed against exiting roadway. To reduce potential risks (water and drainage percolating down to foundation) it is recommended to cold plain 0.2ft within the existing pavement for two foot wide. It is therefore important that the final lift (0.2ft) is placed at milled and widened areas at the same time.

If you have any questions, please call Ken Zanjani at x-7806 or Behdad Baseghi at x-2485.

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REGISTERED PROFESSIONAL ENGINEER
KAMBIZ N. ZANJANI
No. C64311
Exp. 6/30/15
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Attachments: Table 1: Summary of Testing Locations,
Table 2: Summary of Laboratory Test Results,
Table 3: Corrosivity Test Results,

Cc: Frank Lin, Office Chief, Design
Steven Le, Transportation Engineer, Design C

Table 1: Summary of Testing Locations

Route Direction	Bore Hole No.	Location	Station No.	Position	Distance off of Shoulder	Location
Northbound SR-73	MB-1	On-Ramp MacArthur Blvd	860+25	Left side Shoulder	—	125 ft south of ramp traffic signal
NB SR-73	MB-2	(Same)	860+25	Left side Shoulder Open area	10ft west of ETW	(Same)
NB SR-73	MB-3	(Same)	857+50	Open area	10ft west of ETW	375 ft south of ramp traffic signal
NB SR-73	MB-4	Main Line	1166+25	Inside Shoulder	—	Across from end of Gore area
NB SR-73	MB-5	Main Line	1166+25	Median	17-20 ft west of ETW	(same)
NB SR-73	MB-6	Main Line	1170+50	Inside Shoulder	—	425 ft North of MB-6
NB SR-73	MB-7	Main Line	1170+50	Median	17- 20 ft West of ETW	(same)

Table 2: Summary of Field and Lab Testing

Sample No.	Location SR-73	Sample Depth (ft)	Soils Type (USCS) (1)	Plasticity Index (2)			Percent Fine (Passing #200) (3)	Expansion Index (EI) (4)	Sand Equivalent (5)	R-Value (6)
				L.L.	P.L.	P.I.				
MB-1	Left Shoulder MacArthur Blvd NB On-ramp	Pavement Core Result: 0.1ft OGFC / 0.35ft HMA /0.25ft ATPB/ AB (see footnote)								
MB-2	Left Shoulder MacArthur Blvd NB On-ramp	1 - 5	SM	25	20	5	35	23	7	26
MB-3	Left Shoulder MacArthur Blvd NB On-ramp	1 - 5	SC	25	17	8	45	12	9	8
MB-4	Mainline Freeway Inside Shoulder	Pavement Core Result: 0.1ft OGFC / 0.55ft HMA / 0.25ft ATPB/ AB								
MB-5	Mainline Median (Unpaved area)	1 - 5	ML	26	25	1	81	1	6	68
MB-6	Mainline Inside Shoulder	Pavement Core Result: 0.1 ft OGFC / 0.55ft HMA / 0.25ft ATPB/ AB								
MB-7	Median (Unpaved area)	1 - 5	ML	22	20	2	53	3	9	68

NOTE: ***OGFC***: *Open Graded Friction Coarse,*
HMA: *Hot Mix Asphalt,*
ATPB: *Asphalt Treated Permeable Base,*
AB: *Aggregate Base*

(1) Classification is based on ASTM D2487 and ASTM 2488 test Methods, USCS: Unified Soil Classification System
(2) Caltrans Test Method (CTM) – 204, LL: Liquid Limit, PL: Plasticity Limit, PI: Plasticity Index
(3) CTM – 202
(4) UBC – 29 Designations: 0-20 Very Low, 21-50 Low, 51-90 Medium, 91-130 High, and >131 Very High
(5) CTM 217 Sand Equivalent
(6) CTM – 301
NB: Northbound

Table 3: Summary of Corrosion Potential Test Results

Sample Number	Sample Depth (ft)	Soil pH (1)	Minimum Resistivity (ohm-cm) (2)	Sulfate Content (ppm) (3)	Chloride Content (ppm) (4)
MB-2	1 – 5	8.08	657	303	679
MB-3	1 – 5	7.98	884	290	216
MB-5	1 – 5	8.85	2300	125	60
MB-7	1 – 5	8.06	794	599	182

Note: Normally Samples with Resistivity > 1000 ohm – cm are not tested for Sulfate and Chloride contents according to Caltrans Guidelines (2010).

(1) California Test Method (CTM) – 532
(2) CTM – 532,
(3) CTM – 417
(4) CTM – 422