



Technical Memorandum

To: Chadi Chazbek, HNTB Corp.

From: Mark Trevor, P.G., SLR International Corp.

CC: Kandeep Saravanapan, Mohammad Bazargani, Denise McDonald, James Pun

Date: September 2, 2016

Subject: Additional Soil Characterization for Richmond San Rafael Bridge Bike Path Project: Sir Francis Drake Blvd EB-580 On-Ramp Area

This technical memorandum has been prepared to document additional soil characterization work performed for the I-580 Access Improvement Project. This additional investigation and memo were prepared in support of Package A of the project which includes improvements at the Sir Francis Drake Blvd – East Bound Interstate 580 on-ramp in San Rafael, Ca. A separate memo will be prepared in the future in support of Package B to document the findings from the additional characterization planned for the East Francisco Blvd area.

BACKGROUND

In 2015, Parikh Consultants Inc. retained SLR International Corporation (SLR) to conduct soil characterization activities in support of the I-580 Access Improvement Project at the Richmond San Rafael Bridge. The results were submitted in a report titled “Soil Characterization Report, Richmond-San Rafael Bridge Access Improvement Project, Second Revision” (May, 2016). An addendum to the report was subsequently prepared and dated May 19, 2016 for the purpose of documenting sampling within the Chevron Refinery property.

In 2016, SLR was retained to perform additional soil characterization work for two Marin County areas adjacent to Interstate 580 west of the Richmond-San Rafael Bridge. The areas of investigation are the left shoulder of the Sir Francis Drake (SFD) Blvd to EB580 on-ramp; and East Francisco Blvd approximately between Grange Way and the WB580 on-ramp. The scope of work was narrowed in comparison to the previous investigation based on earlier results and project requirements, as discussed below. Soil characterization for the SFD side of the project was put on an expedited schedule. Due to minimal logistics and no permitting requirements for the area, it was possible to conduct SFD sampling and analysis earlier than the East Francisco Blvd work.

EVALUATION ACTIVITIES

The scope of work was narrowed to improve efficiency and manage cost by implementing the following changes from the 2015 investigation:

- 1) Based on previous field investigations and observed land use, the presence of soil contamination other than aerially-deposited lead (ADL) is highly unlikely. Therefore, barring visual, olfactory or other evidence of soil contamination during the field

investigation (which was absent), laboratory analytical testing for this scope of work was limited to lead.

- 2) Soil characterization of the 3-foot target interval was not vertically differentiated. Shallow and deep samples from each boring were combined to represent the full vertical range of the area to be excavated. The resulting soil classification applies to the entire upper 3-feet of soil.

On August 15, 5 soil borings were advanced using a hollow-stem auger at the locations shown in the enclosed Figure. Shallow and deep soil samples were collected from each boring using a slide hammer with clean brass sleeves. The two samples per boring were combined into one pre-labeled glass jar and stored in a chilled cooler, on ice and transported under chain-of-custody protocol to Curtis & Tompkins Laboratory in Berkeley, Ca.

Laboratory analysis was conducted for:

- Total lead by EPA Method 6010B, and
- Soluble lead by WET Citrate

RESULTS AND DISCUSSION

Analytical results are presented in Table 1 (below) and laboratory analytical reports are included in Attachment A. In accordance with CalTrans ADL-Impacted Soils Management Flow Chart (Attachment B), 95% Upper Confidence Limit (UCL) analysis was calculated for each data set. The results (tabulated below) were compared to the flow chart. The 95% UCL on mean for total lead was less than 1,000 mg/kg and the 95% UCL on mean for soluble lead by WET Citrate was less than 5 mg/L.

**Table 1. Sir Francis Drake Blvd EB-580
On-Ramp Soil Results**

Sample ID	Total Lead (mg/kg)	WET-Citrate Lead (mg/L)
SSM-16-01	91	3.3
SSM-16-02	81	2.6
SSM-16-03	83	2.4
SSM-16-04	94	3.5
SSM-16-05	91	2.8
95% UCL	93.39	3.36
Direct-Exposure ESL	320	N/A

Notes:

N/A - Not applicable or not established

Direct-Exposure ESL from SF-RWQCB Environmental Screening Levels (2013)

The total lead concentrations were also compared to the California Regional Water Quality Board (RWQCB), San Francisco Bay Region Environmental Screening Levels (ESLs) Direct-exposure screening levels construction/trench workers. This screening value (320 mg/kg) is used to determine if special PPE or other handling precautions should be considered for workers handling the soil. All total lead results were significantly below the screening value (Table 1).

CONCLUSION AND RECOMENDATIONS

The 95% UCL on mean for total lead and WET-Citrate lead are 93.4 mg/kg and 3.4 mg/L, respectively. Therefore, in accordance with the CalTrans ADL-Impacted Soils Management Flow Chart, the soil is non-hazardous and can be released to the contractor for re-use. No DTSC variance is needed.

A comparison of total lead levels with the RWQCB ESL indicates the soil does not require special handling precautions to protect worker safety.

FIGURE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	CC/Mrn	580	5.0/7.8, 0.0/3.3		

REGISTERED CIVIL ENGINEER	DATE
ANTHONY E. SILVA	
No. C75053	
Exp 12/31/15	
CIVIL	

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

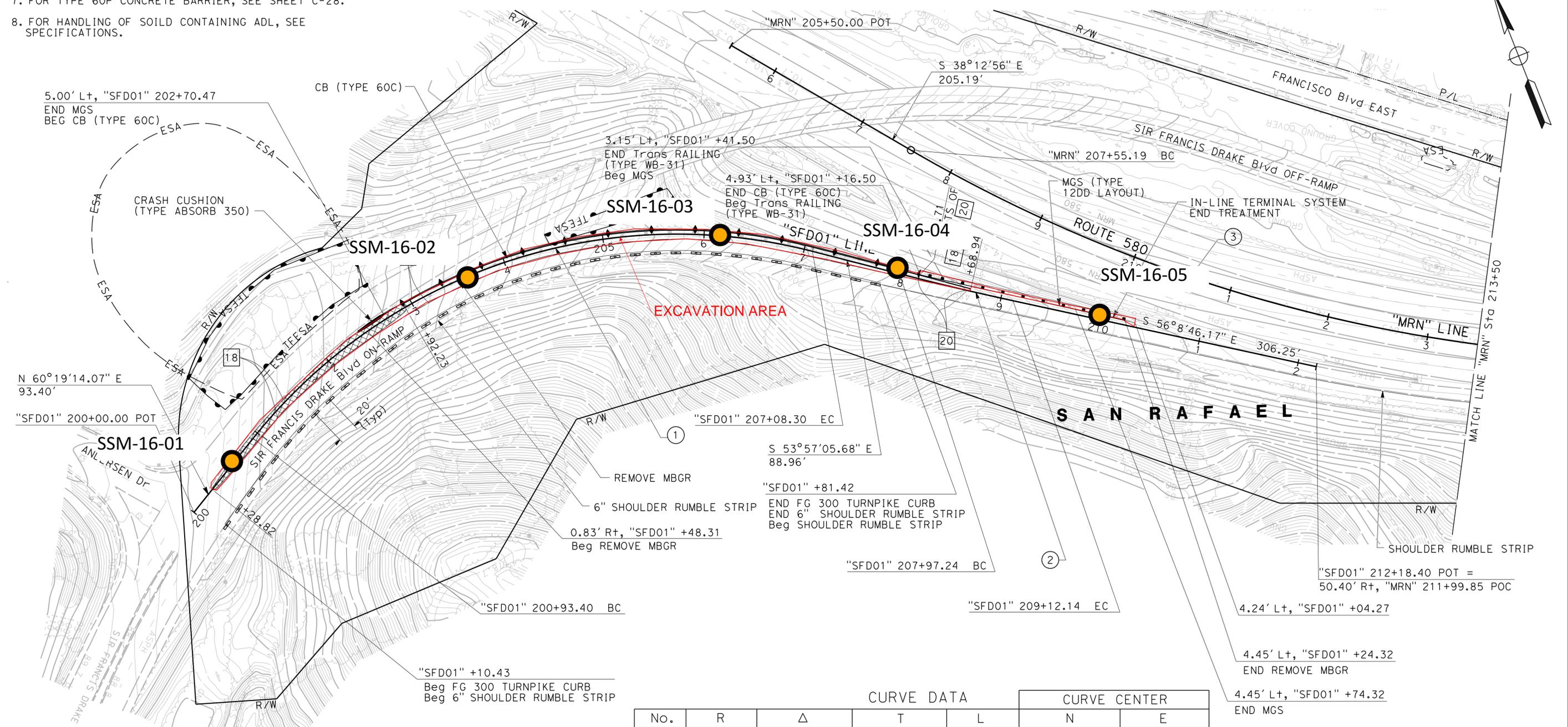
HNTB CORPORATION 1111 BROADWAY 9TH FLOOR OAKLAND, CA 94607	BAY AREA TOLL AUTHORITY 375 BEALE STREET SUITE 800 SAN FRANCISCO, CA 94105
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NOTES:

- FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
- FOR RETAINING WALL No. 1 THROUGH No. 7 DETAILS, SEE RETAINING WALL PLANS.
- FOR HORIZONTAL DATUM INFORMATION, SEE SHEET PC-1.
- PROTECT EXISTING IRRIGATION SYSTEMS; REPAIR IF DAMAGED, SEE SHEET IR-1.
- FOR SAFETY EDGE LIMITS, SEE TYPICAL SECTIONS.
- FOR 6" SHOULDER RUMBLE STRIP, SEE SHEET C-37.
- FOR TYPE 60P CONCRETE BARRIER, SEE SHEET C-28.
- FOR HANDLING OF SOILD CONTAINING ADL, SEE SPECIFICATIONS.

LEGEND AND ABBREVIATIONS:

	COLD PLANE & OVERLAY		HMA OVERLAY (CROSS-SLOPE CORRECTION) OR (ADA COMPLIANCE)		LIMITS OF ESA		AERIALY DEPOSITED LEAD
	REMOVE SIDEWALK/RAISED ISLAND		TEXTURED PAVING		TEMPORARY FENCE (TYPE ESA)		VEGETATION CONTROL
	REMOVE BASE AND SURFACING		POLYESTER OVERLAY (SEE BRIDGE PLANS)		CURVE DATA NUMBER		
	SOILS CONTAINING ADL		1' CLASS 2 AB		PAVEMENT STRUCTURAL SECTION NUMBER (SEE SHEET X-1)		
	REMOVE Conc ISLAND		IRRIGATION CONDUIT		FG 300 TURNPIKE GRADE CURB SYSTEM		
					PEDESTRIAN BARRICADE (TYPE 1)		



APPROXIMATE SOIL SAMPLE LOCATIONS - ●

LAYOUT
SCALE: 1" = 50'
L-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	DESIGNED BY	REVISOR
James Pun	QIANWEN DENG	DATE
CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	DATE
James Pun	ANTHONY SILVA	
CALCULATED/DESIGNED BY	DATE	
QIANWEN DENG		

ATTACHMENT A
LABORATORY ANALYTICAL RESULTS



Curtis & Tompkins, Ltd.

Analytical Laboratories, Since 1878



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 279747
ANALYTICAL REPORT**

SLR International
110 11th Street
Oakland, CA 94607

Project : STANDARD
Location : RSR Bridge Project
Level : II

<u>Sample ID</u>	<u>Lab ID</u>
SSM-16-01	279747-001
SSM-16-02	279747-002
SSM-16-03	279747-003
SSM-16-04	279747-004
SSM-16-05	279747-005

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____

Mikelle Chong
Project Manager
mikelle.chong@ctberk.com

Date: 08/18/2016

CASE NARRATIVE

Laboratory number: 279747
Client: SLR International
Location: RSR Bridge Project
Request Date: 08/15/16
Samples Received: 08/15/16

This data package contains sample and QC results for five soil samples, requested for the above referenced project on 08/15/16. The samples were received intact.

Metals (EPA 6010B):

No analytical problems were encountered.

COOLER RECEIPT CHECKLIST



Login # 279747 Date Received 8/15/16 Number of coolers 1
 Client SLR Project RSR Bridge
 Date Opened 8/15 By (print) SL (sign) [Signature]
 Date Logged in J By (print) DN (sign) [Signature]
 Date Labelled J By (print) J (sign) [Signature]

1. Did cooler come with a shipping slip (airbill, etc) _____ YES NO
 Shipping info _____

2A. Were custody seals present? YES (circle) on cooler on samples NO
 How many _____ Name _____ Date _____

2B. Were custody seals intact upon arrival? _____ YES NO N/A

3. Were custody papers dry and intact when received? _____ YES NO

4. Were custody papers filled out properly (ink, signed, etc)? _____ YES NO

5. Is the project identifiable from custody papers? (If so fill out top of form) _____ YES NO

6. Indicate the packing in cooler: (if other, describe) _____
 Bubble Wrap Foam blocks Bags None
 Cloth material Cardboard Styrofoam Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C
 Type of ice used: Wet Blue/Gel None Temp(°C) 2.6

Temperature blank(s) included? Thermometer# _____ IR Gun# B

Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? _____ YES NO
 If YES, what time were they transferred to freezer? _____

9. Did all bottles arrive unbroken/unopened? _____ YES NO

10. Are there any missing / extra samples? _____ YES NO

11. Are samples in the appropriate containers for indicated tests? _____ YES NO

12. Are sample labels present, in good condition and complete? _____ YES NO

13. Do the sample labels agree with custody papers? _____ YES NO

14. Was sufficient amount of sample sent for tests requested? _____ YES NO

15. Are the samples appropriately preserved? _____ YES NO N/A

16. Did you check preservatives for all bottles for each sample? _____ YES NO N/A

17. Did you document your preservative check? (pH strip lot# _____) YES NO N/A

18. Did you change the hold time in LIMS for unpreserved VOAs? _____ YES NO N/A

19. Did you change the hold time in LIMS for preserved terracores? _____ YES NO N/A

20. Are bubbles > 6mm absent in VOA samples? _____ YES NO N/A

21. Was the client contacted concerning this sample delivery? _____ YES NO
 If YES, Who was called? _____ By _____ Date: _____

COMMENTS _____

Detections Summary for 279747

Results for any subcontracted analyses are not included in this summary.

Client : SLR International
 Project : STANDARD
 Location : RSR Bridge Project

Client Sample ID : SSM-16-01 Laboratory Sample ID : 279747-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	91		0.24	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

Client Sample ID : SSM-16-02 Laboratory Sample ID : 279747-002

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	81		0.27	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

Client Sample ID : SSM-16-03 Laboratory Sample ID : 279747-003

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	83		0.25	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

Client Sample ID : SSM-16-04 Laboratory Sample ID : 279747-004

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	94		0.26	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

Client Sample ID : SSM-16-05 Laboratory Sample ID : 279747-005

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	91		0.24	mg/Kg	As Recd	1.000	EPA 6010B	EPA 3050B

Lead			
Lab #:	279747	Location:	RSR Bridge Project
Client:	SLR International	Prep:	EPA 3050B
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Batch#:	238170
Matrix:	Soil	Sampled:	08/15/16
Units:	mg/Kg	Received:	08/15/16
Basis:	as received	Prepared:	08/17/16
Diln Fac:	1.000	Analyzed:	08/18/16

Field ID	Type	Lab ID	Result	RL
SSM-16-01	SAMPLE	279747-001	91	0.24
SSM-16-02	SAMPLE	279747-002	81	0.27
SSM-16-03	SAMPLE	279747-003	83	0.25
SSM-16-04	SAMPLE	279747-004	94	0.26
SSM-16-05	SAMPLE	279747-005	91	0.24
	BLANK	QC847810	ND	0.28

ND= Not Detected
 RL= Reporting Limit

Batch QC Report

Lead			
Lab #:	279747	Location:	RSR Bridge Project
Client:	SLR International	Prep:	EPA 3050B
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Batch#:	238170
Field ID:	ZZZZZZZZZZ	Sampled:	08/11/16
MSS Lab ID:	279752-001	Received:	08/15/16
Matrix:	Soil	Prepared:	08/17/16
Units:	mg/Kg	Analyzed:	08/18/16
Basis:	as received		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Diln	Fac
BS	QC847811		47.62	48.86	103	80-120				1.000
BSD	QC847812		53.19	55.46	104	80-120	2	20		1.000
MS	QC847813	3.603	49.50	34.70	63	53-125				100.0
MSD	QC847814		55.56	56.52	95	53-125	38	42		100.0

RPD= Relative Percent Difference



Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878





Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 280007
ANALYTICAL REPORT**

SLR International
110 11th Street
Oakland, CA 94607

Project : STANDARD
Location : RSR Bridge Project
Level : II

<u>Sample ID</u>	<u>Lab ID</u>
SSM-16-01	280007-001
SSM-16-02	280007-002
SSM-16-03	280007-003
SSM-16-04	280007-004
SSM-16-05	280007-005

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Signature: _____

Mikelle Chong
Project Manager
mikelle.chong@ctberk.com

Date: 08/29/2016

CA ELAP# 2896, NELAP# 4044-001

CASE NARRATIVE

Laboratory number: 280007
Client: SLR International
Location: RSR Bridge Project
Request Date: 08/22/16
Samples Received: 08/15/16

This data package contains sample and QC results for five soil samples, requested for the above referenced project on 08/22/16. The samples were received cold and intact.

Metals (EPA 6010B) TCLP Leachate:

No analytical problems were encountered.

Metals (EPA 6010B) WET Leachate:

No analytical problems were encountered.

COOLER RECEIPT CHECKLIST



Curtis & Tompkins, Ltd.

Alias 280 007

Login # 274747 Date Received 8/15/16 Number of coolers 1
Client SLR Project RSR Bridge

Date Opened 8/15 By (print) SL (sign) [Signature]
Date Logged in [Signature] By (print) [Signature] (sign) [Signature]
Date Labelled [Signature] By (print) [Signature] (sign) [Signature]

1. Did cooler come with a shipping slip (airbill, etc) YES NO
Shipping info

2A. Were custody seals present? ... YES (circle) on cooler on samples NO
How many Name Date

2B. Were custody seals intact upon arrival? YES NO N/A

3. Were custody papers dry and intact when received? YES NO

4. Were custody papers filled out properly (ink, signed, etc)? YES NO

5. Is the project identifiable from custody papers? (If so fill out top of form) YES NO

6. Indicate the packing in cooler: (if other, describe)
Bubble Wrap Foam blocks Bags None
Cloth material Cardboard Styrofoam Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C
Type of ice used: Wet Blue/Gel None Temp(°C) 2.6

Temperature blank(s) included? Thermometer# IR Gun# B

Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES NO
If YES, what time were they transferred to freezer?

9. Did all bottles arrive unbroken/unopened? YES NO

10. Are there any missing / extra samples? YES NO

11. Are samples in the appropriate containers for indicated tests? YES NO

12. Are sample labels present, in good condition and complete? YES NO

13. Do the sample labels agree with custody papers? YES NO

14. Was sufficient amount of sample sent for tests requested? YES NO

15. Are the samples appropriately preserved? YES NO N/A

16. Did you check preservatives for all bottles for each sample? YES NO N/A

17. Did you document your preservative check? (pH strip lot#) YES NO N/A

18. Did you change the hold time in LIMS for unpreserved VOAs? YES NO N/A

19. Did you change the hold time in LIMS for preserved terracores? YES NO N/A

20. Are bubbles > 6mm absent in VOA samples? YES NO N/A

21. Was the client contacted concerning this sample delivery? YES NO
If YES, Who was called? By Date:

COMMENTS

Detections Summary for 280007

Results for any subcontracted analyses are not included in this summary.

Client : SLR International
 Project : STANDARD
 Location : RSR Bridge Project

Client Sample ID : SSM-16-01 Laboratory Sample ID : 280007-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	3.3		0.25	mg/L	STLC	10.00	EPA 6010B	WET

Client Sample ID : SSM-16-02 Laboratory Sample ID : 280007-002

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	2.6		0.25	mg/L	STLC	10.00	EPA 6010B	WET

Client Sample ID : SSM-16-03 Laboratory Sample ID : 280007-003

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	2.4		0.25	mg/L	STLC	10.00	EPA 6010B	WET

Client Sample ID : SSM-16-04 Laboratory Sample ID : 280007-004

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	0.051		0.050	mg/L	TCLP	10.00	EPA 6010B	EPA 3010A
Lead	3.5		0.25	mg/L	STLC	10.00	EPA 6010B	WET

Client Sample ID : SSM-16-05 Laboratory Sample ID : 280007-005

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Lead	2.8		0.25	mg/L	STLC	10.00	EPA 6010B	WET

Lead			
Lab #:	280007	Location:	RSR Bridge Project
Client:	SLR International	Prep:	EPA 3010A
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Batch#:	238370
Matrix:	TCLP Leachate	Sampled:	08/15/16
Units:	mg/L	Received:	08/15/16
Diln Fac:	10.00	Analyzed:	08/29/16

Field ID	Type	Lab ID	Result	RL	Prepared
SSM-16-01	SAMPLE	280007-001	ND	0.050	08/24/16
SSM-16-02	SAMPLE	280007-002	ND	0.050	08/24/16
SSM-16-03	SAMPLE	280007-003	ND	0.050	08/24/16
SSM-16-04	SAMPLE	280007-004	0.051	0.050	08/24/16
SSM-16-05	SAMPLE	280007-005	ND	0.050	08/24/16
	BLANK	QC848641	ND	0.050	08/23/16
	BLANK	QC848642	ND	0.050	08/23/16

ND= Not Detected
 RL= Reporting Limit

Batch QC Report

Lead			
Lab #:	280007	Location:	RSR Bridge Project
Client:	SLR International	Prep:	EPA 3010A
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Batch#:	238370
Field ID:	ZZZZZZZZZZ	Sampled:	07/27/16
MSS Lab ID:	279934-001	Received:	07/27/16
Matrix:	TCLP Leachate	Prepared:	08/23/16
Units:	mg/L	Analyzed:	08/29/16

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Diln	Fac
BS	QC848643		0.1000	0.09978	100	80-120				1.000
BSD	QC848644		0.1000	0.1001	100	80-120	0	20		1.000
MS	QC848645	0.8215	0.1000	0.8852	64 NM	67-120				10.00
MSD	QC848646		0.1000	0.9250	103 NM	67-120	4	23		10.00

NM= Not Meaningful: Sample concentration > 4X spike concentration
 RPD= Relative Percent Difference

Lead			
Lab #:	280007	Location:	RSR Bridge Project
Client:	SLR International	Prep:	WET
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Sampled:	08/15/16
Matrix:	WET Leachate	Received:	08/15/16
Units:	mg/L	Prepared:	08/25/16
Diln Fac:	10.00	Analyzed:	08/29/16
Batch#:	238419		

Field ID	Type	Lab ID	Result	RL
SSM-16-01	SAMPLE	280007-001	3.3	0.25
SSM-16-02	SAMPLE	280007-002	2.6	0.25
SSM-16-03	SAMPLE	280007-003	2.4	0.25
SSM-16-04	SAMPLE	280007-004	3.5	0.25
SSM-16-05	SAMPLE	280007-005	2.8	0.25
	BLANK	QC848831	ND	0.25

ND= Not Detected
 RL= Reporting Limit

Batch QC Report

Lead			
Lab #:	280007	Location:	RSR Bridge Project
Client:	SLR International	Prep:	WET
Project#:	STANDARD	Analysis:	EPA 6010B
Analyte:	Lead	Batch#:	238419
Field ID:	ZZZZZZZZZZ	Sampled:	08/19/16
MSS Lab ID:	279993-002	Received:	08/19/16
Matrix:	WET Leachate	Prepared:	08/25/16
Units:	mg/L	Analyzed:	08/29/16

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Diln	Fac
LCS	QC848832		0.1000	0.1004	100	80-120				1.000
MS	QC848833	0.2979	0.5000	0.7434	89	67-120				10.00
MSD	QC848834		0.5000	0.7341	87	67-120	1	23		10.00

RPD= Relative Percent Difference

ATTACHMENT B

ADL-IMPACTED SOILS MANAGEMENT FLOW CHART

Figure 1: ADL-Impacted Soils Management Flow Chart

Note: For soil that will NOT be relinquished to the Contractor, the 90%UCL should be used for waste characterization.

