APPENDIX

G Slurry Displacement Piles

Table of Contents

Submit to: Office of Geotechnical Support
Foundation Testing Branch
Attn: Thomas Song
Fax #: (916) 227-1083
Phone #: (916) 227-1000
Email: FTB.test.requests@dot.ca.gov

CIDH Pile Acceptance Test Request Form
Gamma Gamma Logging (GGL)

Project Name :	Structure Rep :
Dist/Co/Rte/PM :	Office Phone# :
EA/EFIS# & Activity Code :	Fax# :
	Cell Phone# :
Bridge/Structure No :	Field Inspector :
Date of Request :	Cell Phone# :

Support Location (Abut/Bent #)	Pile Numbers	Pile Diameter	Pile Length	Date Ready for Testing	Status
					☐ Estimated Date ☐ Actual Date
					☐ Estimated Date ☐ Actual Date
					☐ Estimated Date ☐ Actual Date
					☐ Estimated Date ☐ Actual Date
					☐ Estimated Date ☐ Actual Date

1. Please submit test request to FTB by 11:00AM each Friday for testing to be scheduled for the following week.
2. Please update all Estimated Dates as dates can be confirmed or as piles become ready for testing.
3. Inspection tubes must be verified as capable of passing the specified dummy probe freely prior to a pile being ready for testing.

For FTB Office Use Only

FTB Tracking	FTB Rep	Date Tested	Date of Report	Deadline
Comments:				

For individuals with sensory disabilities, this document can be made available in Braille, large print, audiocassette or computer disk upon request. To obtain one fo these alternate formats, please call (916) 227-8185 or TTY 711 or write tot eh EEO Officer, Division of Engineering Services, P.O. Box 168041, Mail Stop 9 Room 509, Sacramento, CA 95816-8041.

Figure G-1. FTB CIDH Pile Acceptance Test Request Form

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help save water!

To: ALLEN KING
Structure Representative
SR 4 Crosstown Viaduct

Date: April 27, 2015

File: 10-SJ-4-T14.83
10-0S1104 (1000000229)
SR4 Crosstown Viaduct
Bridge No. 29-0350

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES - MS 5

Subject: Gamma-Gamma Logging Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct

Introduction

This memorandum presents Gamma-Gamma Logging (GGL) test results for Pile 1(referred to as Pile 7-1) at Bent 7 of the SR4 Crosstown Viaduct. The subject pile is a Cast-In-Drilled-Hole (CIDH) concrete pile with a diameter of 108 inches. The pile contains ten (10) inspection pipes on the interior of the reinforcing steel cage. The centerline location of the pile with number designation was provided by Structure Construction and is shown on the *Foundation Plan No. 2* sheet included in Appendix A. The reported elevations for top of concrete, bottom of inspection pipe, and pile tip were provided by OSC and are included in Appendix B. Pile information is summarized in Table I.

Table I. Summary of Pile Information: Pile 7-1 at Bent 7

	Pile 7-1
Specified Pile Cut-Off Elev. (ft) (1)	0.00
Construction Joint Elev. (ft) (1)	-15.00
Specified Pile Tip Elev. (ft) (1)	-150.00
Reported Bottom of Permanent Steel Casing Elev. (1)	-20.00
Reported Top of Concrete Elev. (ft) (2)	-15.00
Reported Bottom of Inspection Pipe Elev. (ft) (2)	-147.80
Reported CIDH Pile Tip Elev. (ft) (2)	-151.50
Approx. CIDH Pile Length (3)	136.50
Approx. GGL-Tested Length (ft) (4)	132.11
Approx. Length of Untested Concrete at Bottom of Pile (ft) (3)	4.39

(1) Based on information provided in the Contract Plans.
(2) Based on information provided in the Contractor's Drilled Shaft Record II.
(3) Calculated from information provided.
(4) GGL data not collected over the bottom 1 foot of inspection pipe – See Background of this report.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

GGL at Pile 7-1 was conducted by Technician Rocco Cosato of the Foundation Testing Branch (FTB) on April 23, 2015 within each accessible inspection pipe. Testing utilized a Mt. Sopris Model HLP-2375 Gamma-Gamma Probe with a 100-millicurie Cesium 137 source. The inspection pipes for the subject pile are numbered in a clockwise direction with Pipe 1 marked with orange paint in the field.

Background

GGL is generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. Substantial drops in bulk density readings from GGL are indicative of the presence of anomalies in the material surrounding the inspection pipe. For the Mt. Sopris Model HLP-2375 Gamma-Gamma Probe used by this Office, the range of detection is approximately 3 inches into the concrete surrounding the inspection pipe.

Limitations of the GGL equipment preclude the accurate measurement of concrete density across the top one foot of the pile. Data collected in the top one foot of pile concrete is influenced by the detector exiting the concrete, and calibration of measured gamma count rate to density is not applicable in this region. The trend of measured densities immediately below the top one foot of pile concrete may assist the Engineer in evaluation of the top of pile concrete. Limitations of the GGL equipment also prevent evaluation of the concrete surrounding the bottom approximate one foot of an inspection pipe. The total length of untested concrete at the bottom of a given pile is equal to the length of pile below the bottom of the inspection pipe plus one foot.

Discussion

A GGL graph depicting the variation from mean bulk density versus depth for Pile 7-1 at Bent 7 is presented in Appendix C. The mean and standard deviation criteria set was derived from GGL readings of the tested lengths of the inspection pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable. The reported locations of inspection pipe couplers were considered in the analysis. For each inspection pipe, separate mean densities were calculated for the known differences in the steel reinforcement schedule. Testing was performed in the completely submerged condition using a submerged probe calibration. GGL results are presented in Table II.

Table II: Summary of GGL Test Results: Pile 7-1 at Bent 7

Pile (Section)	Approx. Depth[1] (ft)	Approx. Elevation[2] (ft)	GGL Pipe(s)	Data Description
1 (A-A)	51.4' to 52.3'	-66.4' to -67.3'	6	GGL detected an anomaly at one inspection pipe. Depth of anomaly is near the reported location of a PVC coupler. However, the anomalies magnitude of deviation from mean density is not consistent with a PVC coupler. May affect up to 10% of the pile cross-section at this depth range.

(1) Depth 0.0 feet is equal to the Reported Top of Concrete / Construction Joint Elevation of -15.0'.
(2) Calculated based on elevation information provided by OSC.

Recommendations

This Office recommends rejection of Pile 7-1 at Bent 7 based on the GGL test results. Please see the Pile Design Data Form (PDDF) in Appendix D and refer to Caltrans BRIDGE CONSTRUCTION MEMO 130-10.0 (June 30, 2014) for guidance in addressing rejected CIDH piles. This Office will conduct Cross-Hole Sonic Logging at Pile 7-1 to further evaluate the size of reported anomalies if requested by the OSC.

This Office also recommends that OSC inspect the top of pile concrete prior to completing pile construction above the reported construction joint elevation. Further, this Office recommends that pile designer's review the condition of over 4 feet of untested concrete at the bottom of the pile.

This Office also recommends OSC review the Contractor's plan for placing inspection pipes considering the bottom of inspection pipe elevation, as reported, indicates inspection pipes do not extend to the bottom of the reinforcing steel cage as required by the specifications.

MR. ALLEN KING
APRIL 27, 2015
PAGE 4

GGL TEST RESULTS: PILE 7-1
SR4 Crosstown Viaduct (BR. 29-0350)
10-0S1104 (1000000229)
10-SJ-4-T14.83

If you have any questions or comments regarding this report, please contact Jason Wahleithner at (916) 227-1059.

REGISTERED PROFESSIONAL ENGINEER
JASON DWIGHT WAHLEITHNER
No. C63572
Exp. 9/30/16
CIVIL
STATE OF CALIFORNIA

JASON D. WAHLEITHNER, P.E.
Transportation Engineer, Civil
Foundation Testing Branch
Office of Geotechnical Support

BEN BARNES, P.E.
Senior Transportation Engineer (Acting)
Foundation Testing Branch
Office of Geotechnical Support

C: J. Abercrombie – OSC (Email)
N. Terzis – OSC (Email)
Q. Huang –OGDN (Email)
K. Harirsaz–R&M Engineers (Email)
C. Pazzi – OSC (Email)
B. Alsamman – OSC (Email)
R. Erfanian – OSFP (Email)
M. Mifkovic –METS (Email)
C. Henderson–Kleinfelder (Email)
GEODOG

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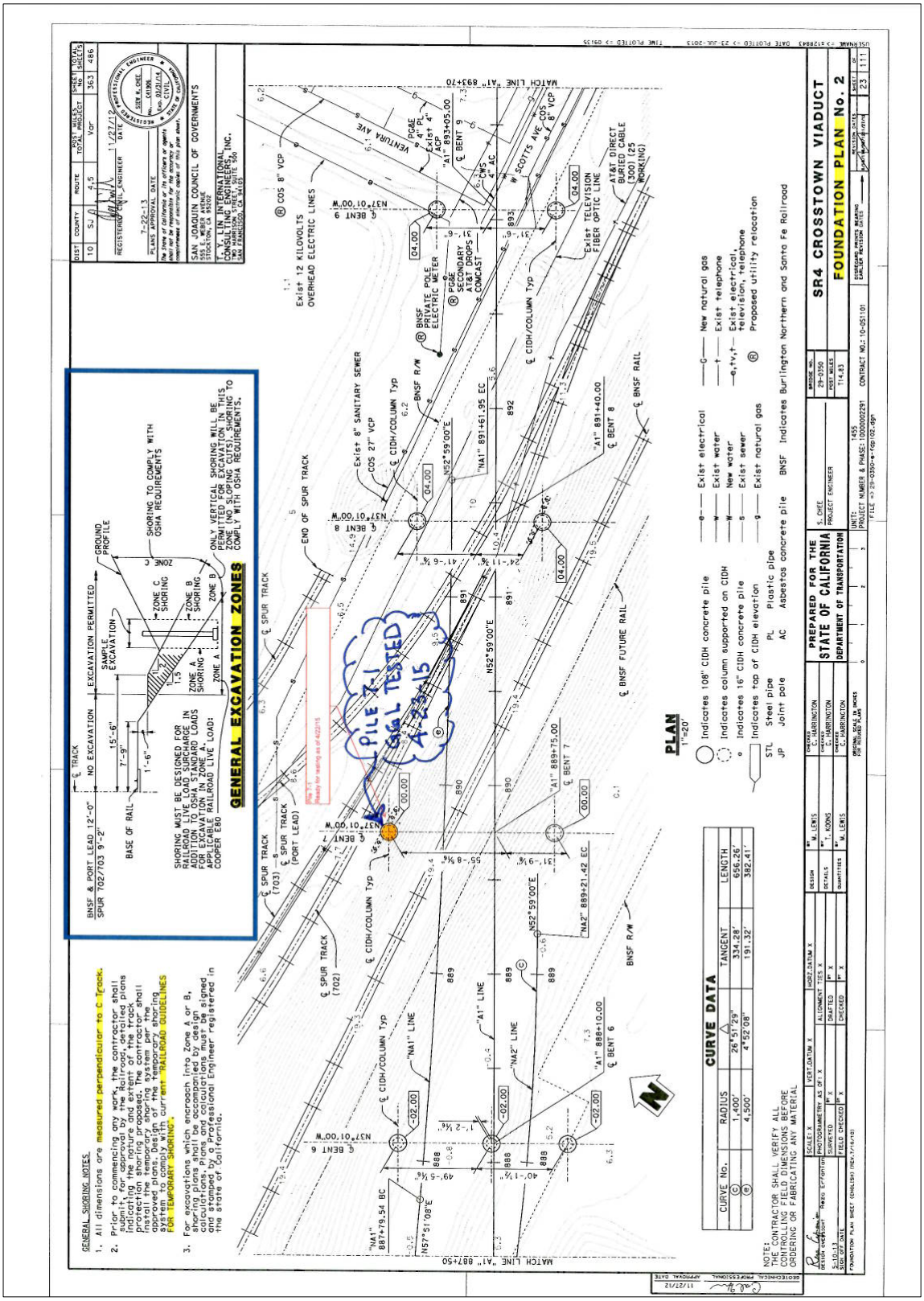
Foundation Testing Branch

APPENDIX A

Pile Location

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7


GENERAL EXCAVATION ZONES
PLAN
1"=20'
CURVE DATA
PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SR4 CROSSTOWN VIADUCT
FOUNDATION PLAN No. 2
Indicates 108" CIDH concrete pile
Indicates column supported on CIDH
Indicates 16" CIDH concrete pile
Indicates top of CIDH elevation
Steel pipe
Joint pole
Plastic pipe
Asbestos concrete pile
Exist electrical
Exist water
New water
Exist sewer
Exist natural gas
New natural gas
Exist telephone
Exist electrical, television, telephone
Proposed utility relocation
Indicates Burlington Northern and Santa Fe Railroad
BNSF Indicates
PILE 7-1 CSL TESTED 4-23-15
GENERAL SHORING NOTES:
1. All dimensions are measured perpendicular to ℄ Track.
2. Prior to commencing any work, the contractor shall submit, for approval by the Railroad, detailed plans indicating the method and sequence of excavation protection shoring proposed. The contractor shall install the temporary shoring system per the approved plans. Design of the temporary shoring system shall comply with current RAILROAD GUIDELINES FOR TEMPORARY SHORING.
3. For excavations which encroach into Zone A or B, shoring plans shall be accompanied by design calculations. Plans and calculations must be signed and stamped by a Professional Engineer registered in the state of California.
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

Foundation Testing Branch

APPENDIX B

Pile Information

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7

MALCOLM DRILLING CO., INC

DRILLED SHAFT RECORD II
INSPECTION TUBE LOG

BENT NO. : Bent 7-1 SHAFT NO. :

RECORDING DATE: 24-Mar-15

PROJECT / CONTRACT	SHAFT DIAMETER:	SHAFT TYPE :	GROUND ELEVATION:
SR4 Crosstown Viaduct	9.0 FT	CIDH	11.9 FT MSL

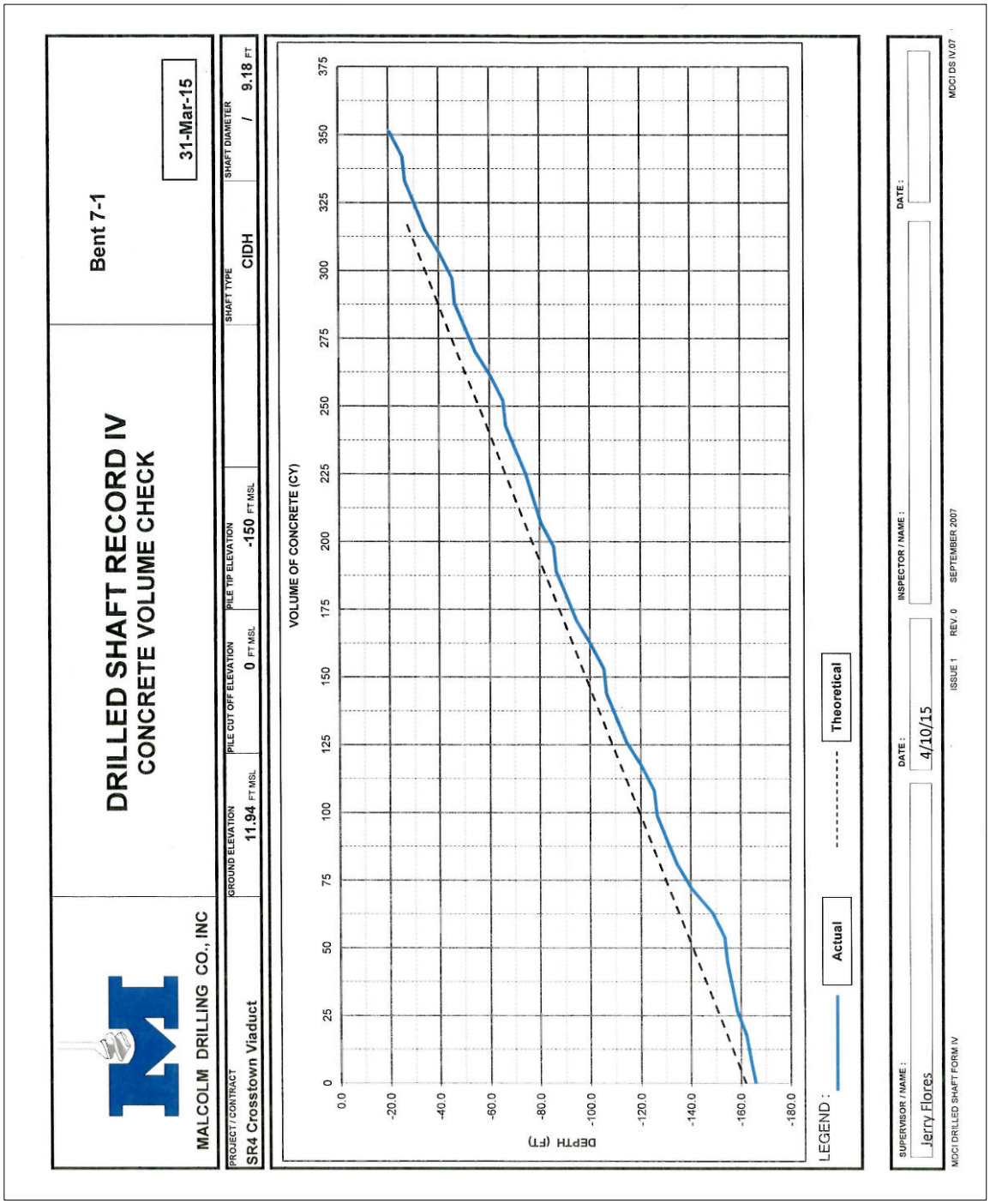
DEPTH FROM TOP OF REBAR CAGE		INSPECTION TUBE NUMBER												NOTES
[FT]	[EL]	1	2	3	4	5	6	7	8	9	...	11	12	
-1.4	3.2	X	X	X	X	X	X	X	X	X	X			PVC Coupler
8.63	-6.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
28.63	-26.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
48.63	-46.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
68.63	-66.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
88.63	-86.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
108.63	-106.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
128.63	-126.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
148.63	-146.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
149.13	-147.34	X	X	X	X	X	X	X	X	X	X			PVC Coupler
149.63	-147.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler

COMMENT:

SHAFT TIP ELEVATION :	-151.5 FT	TOP OF INSPECTION TUBE ELEVATION :	FT
TOP OF CONCRETE ELEVATION	-15 FT	TIP OF INSPECTION TUBE ELEVATION :	-147.8 FT

SUPERVISOR / NAME :	DATE :	INSPECTOR / NAME :	DATE :
Jerry Flores	4/7/15		

MDCI DRILLED SHAFT FORM II ISSUE 1 REV 0 SEPTEMBER 2007 MDCI DS II 07


MALCOLM DRILLING CO., INC
DRILLED SHAFT RECORD IV
CONCRETE VOLUME CHECK
Bent 7-1
31-Mar-15
PROJECT / CONTRACT
SR4 Crosstown Viaduct
GROUND ELEVATION
11.94 FT MSL
PILE CUT OFF ELEVATION
0 FT MSL
PILE TIP ELEVATION
-150 FT MSL
SHAFT TYPE
CIDH
SHAFT DIAMETER
/ 9.18 FT
VOLUME OF CONCRETE (CY)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
DEPTH (FT)
0.0
-20.0
-40.0
-60.0
-80.0
-100.0
-120.0
-140.0
-160.0
-180.0
LEGEND :
Actual
Theoretical
SUPERVISOR / NAME :
Jerry Flores
DATE :
4/10/15
INSPECTOR / NAME :
DATE :
MDCI DRILLED SHAFT FORM IV
ISSUE 1
REV 0
SEPTEMBER 2007
MDCI DS IV.07

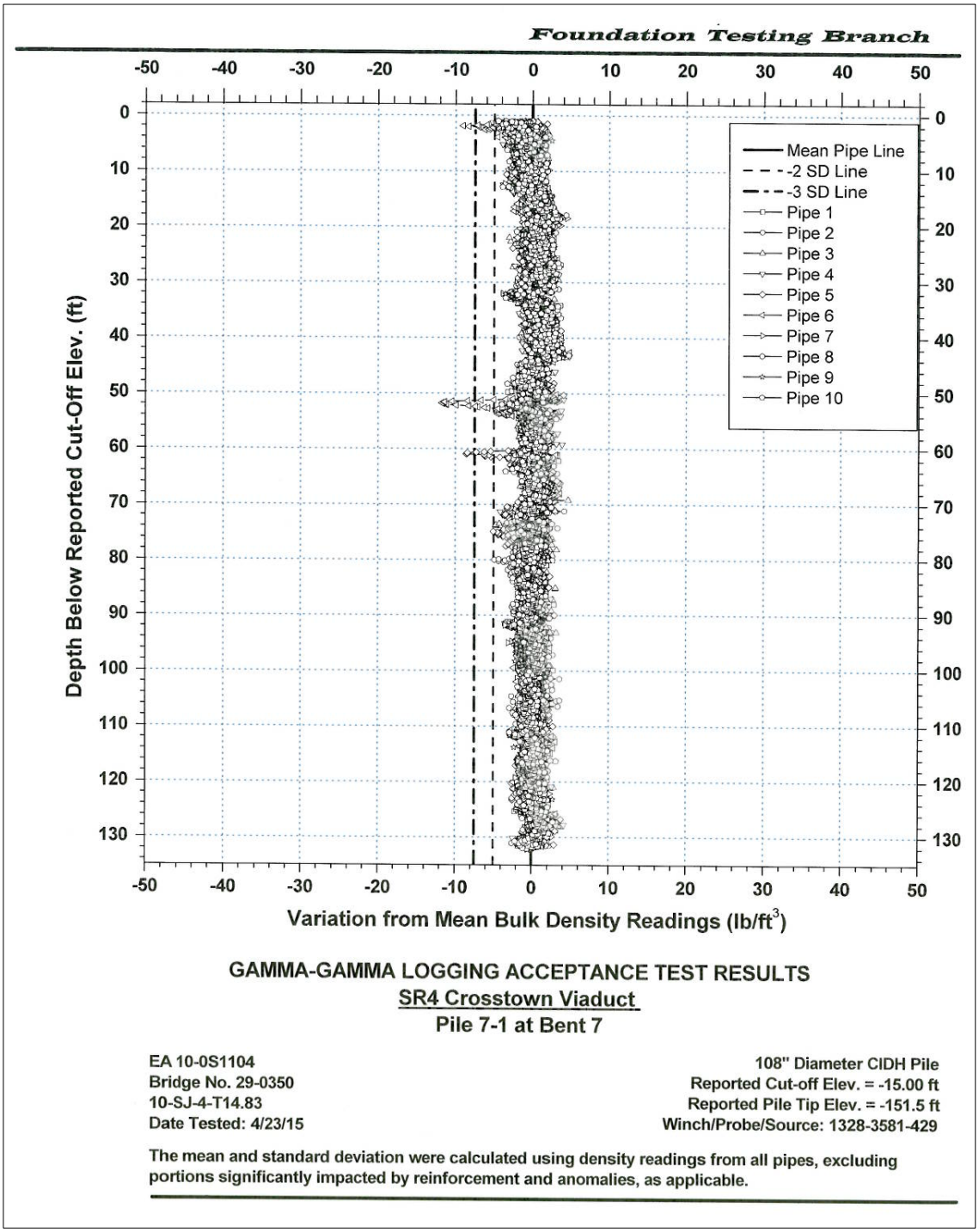
Foundation Testing Branch

APPENDIX C

Gamma-Gamma Logging Acceptance Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7


Foundation Testing Branch
Depth Below Reported Cut-Off Elev. (ft)
Variation from Mean Bulk Density Readings (lb/ft3)
Mean Pipe Line
-2 SD Line
-3 SD Line
Pipe 1
Pipe 2
Pipe 3
Pipe 4
Pipe 5
Pipe 6
Pipe 7
Pipe 8
Pipe 9
Pipe 10
GAMMA-GAMMA LOGGING ACCEPTANCE TEST RESULTS
SR4 Crosstown Viaduct
Pile 7-1 at Bent 7
EA 10-0S1104
Bridge No. 29-0350
10-SJ-4-T14.83
Date Tested: 4/23/15
108" Diameter CIDH Pile
Reported Cut-off Elev. = -15.00 ft
Reported Pile Tip Elev. = -151.5 ft
Winch/Probe/Source: 1328-3581-429
The mean and standard deviation were calculated using density readings from all pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable.

Foundation Testing Branch

APPENDIX D

Pile Design Data Form (PDDF)

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7

Appendix D - Pile Design Data Form (GGL)

1 Foundation Testing

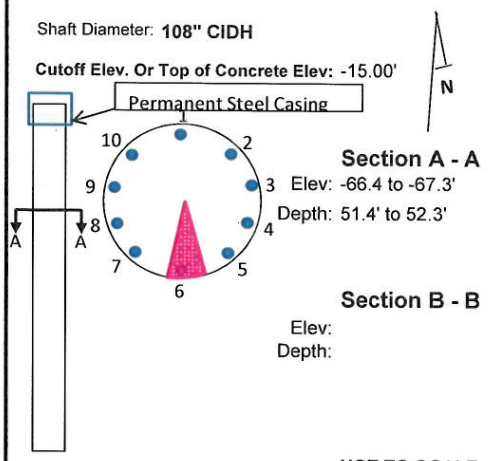
Name: Jason Wahleithner
Phone: (916) 227-1059
Date: 4/27/2015

Anomaly Overview

Testing Performed X GGL CSL

Shaft Diameter: **108" CIDH**

Cutoff Elev. Or Top of Concrete Elev: -15.00'



Section A - A
Elev: -66.4 to -67.3'
Depth: 51.4' to 52.3'

Section B - B
Elev:
Depth:

NOT TO SCALE

Reported Tip Elev.: -151.50'

Anomaly Description

Section A - A: GGL detected an anomaly at one (1) inspection pipe (IP 6) . May affect up to 10% of the pile cross-section at this depth range.

Section B - B:

2 Geotechnical

Name:
Phone:
Date:

Required Nominal Resistance of Pile (per contract plans):

Compression:_____kip Tension: _____kips

Groundwater Elevation: _____

"As-Designed" nominal resistance over entire pile surface from the top to bottom elev. of anomaly / capacity loss within anomaly length (kips):

Section A-A: Compression____/____Tension____/____

Soil and/or Rock Type: _____

Section is geotechnically ☐ Acceptable ☐ Unacceptable

Section B-B: Compression_____Tension_____

Soil and/or Rock Type: _____

Section is geotechnically ☐ Acceptable ☐ Unacceptable

Comments: _____

3 Structural

Name:
Phone:
Date:

As-Designed Capacity of Shaft

Section A-A: Shear: _____ Moment: _____
Section B-B: Shear: _____ Moment: _____

Maximum Demand of Shaft at Section A-A:

Shear: _____ Moment: _____
Shaft is structurally: ☐ Acceptable ☐ Unacceptable

Maximum Demand of Shaft at Section B-B:

Shear: _____ Moment: _____
Shaft is structurally: ☐ Acceptable ☐ Unacceptable

Comment _____

4 Corrosion

Name:

Consideration is ☐ Required ☐ Not Required

For anomalies between the top of pile and 3 feet below the lowest estimated groundwater level at the site, corrosion results listed in the Geotechnical report are used to assess the need for repair. For situations where results are not available, soil samples may be obtained adjacent to the anomaly and tested in accordance with California Test (CT) 643 (Parts 2, 3 and 4) and if necessary, CT 417 and CT 422 to determine soil corrosivity. For anomalies outside these limits, and where no stray current source can be identified, or for non-corrosive soil conditions, no consideration of corrosion potential is required.

Corrosion Potential at Section A-A: _____
Corrosion Potential at Section B-B: _____

5 Construction Considering parts 2-4 of this form,

Structure Rep.:
Phone: Date:

Sec. A-A is: ☐ Acceptable with Administrative Deduction ☐ Unacceptable; Mitigation is Required
Sec. B-B is: ☐ Acceptable with Administrative Deduction ☐ Unacceptable; Mitigation is Required

Bridge:	SR4 Crosstown Viaduct	Bridge No.:	29-0350	Bent:	7
Dist-Co.-Rte:	10-SJ-4-T14.83	EA:	10-0S1104	Pile:	7-1
Structure Rep.:	Allen King	Phone:	(209) 470-8819	Fax:	n/a

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help save water!

To: ALLEN KING
Structure Representative
SR 4 Crosstown Viaduct

Date: April 30, 2015

File: 10-SJ-4-T14.83
10-0S1104 (1000000229)
SR4 Crosstown Viaduct
Bridge No. 29-0350

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES - MS 5

Subject: Combined Gamma-Gamma Logging (GGL) and Cross-Hole Sonic Logging (CSL) Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct

Introduction

This memorandum presents the combined GGL and CSL test results for Pile 1(referred to as Pile 7-1) at Bent 7 of the SR4 Crosstown Viaduct. The subject pile is a Cast-In-Drilled-Hole (CIDH) concrete pile with a diameter of 108 inches. The pile contains ten (10) inspection pipes on the interior of the reinforcing steel cage. The centerline location of the pile with number designation was provided by Structure Construction and is shown on the *Foundation Plan No. 2* sheet included in Appendix A. The reported elevations for top of concrete, bottom of inspection pipe, and pile tip were provided by OSC and are included in Appendix B. Pile information is summarized in Table I.

Table I. Summary of Pile Information: Pile 7-1 at Bent 7

	Pile 7-1
Specified Pile Cut-Off Elev. (ft) (1)	0.00
Construction Joint Elev. (ft) (1)	-15.00
Specified Pile Tip Elev. (ft) (1)	-150.00
Reported Bottom of Permanent Steel Casing Elev. (1)	-20.00
Reported Top of Concrete Elev. (ft) (2)	-15.00
Reported Bottom of Inspection Pipe Elev. (ft) (2)	-147.80
Reported CIDH Pile Tip Elev. (ft) (2)	-151.50
Approx. CIDH Pile Length (3)	136.50
Approx. GGL Tested Length (ft) (4) / CSL Tested Length (ft)	132.11 / 133.0
Approx. Length of Untested Concrete at Bottom of Pile (ft) (3)	4.39

(1) Based on information provided in the Contract Plans.
(2) Based on information provided in the Contractor's Drilled Shaft Record II.
(3) Calculated from information provided.
(4) GGL data not collected over the bottom 1 foot of inspection pipe – See Background of this report.

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Based on GGL test results as presented in "Gamma-Gamma Logging Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct" dated April 27, 2015, CSL testing was conducted at Pile 1 to further define the estimated size of a reported anomaly. Engineers Jeremy Peterson-Self and Jason Wahleithner of the Foundation Testing Branch (FTB) performed the CSL testing on April 28, 2015. CSL Testing utilized the Cross-Hole Analyzer (Pile Dynamics, Inc.) Model: CHAMP in order to further evaluate the pile concrete. The inspection pipes for the subject pile are numbered with Pipe 1 marked with orange paint in the field.

Background

GGL and CSL are generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. As each test examines different parts of the shaft cross-section, they can be used in combination to complement one another.

GGL is generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. Substantial drops in bulk density readings from GGL are indicative of the presence of anomalies in the material surrounding the inspection pipe. For the Mt. Sopris Model HLP-2375 Gamma-Gamma Probe used by this Office, the range of detection is approximately 3 inches into the concrete surrounding the inspection pipe.

Limitations of the GGL equipment preclude the accurate measurement of concrete density across the top one foot of the pile. Data collected in the top one foot of pile concrete is influenced by the detector exiting the concrete, and calibration of measured gamma count rate to density is not applicable in this region. The trend of measured densities immediately below the top one foot of pile concrete may assist the Engineer in evaluation of the top of pile concrete. Limitations of the GGL equipment also prevent evaluation of the concrete surrounding the bottom approximate one foot of an inspection pipe. The total length of untested concrete at the bottom of a given pile is equal to the length of pile below the bottom of the inspection pipe plus one foot.

For CSL, high frequency compression waves propagating through the concrete material between the signal probe and receiver probe placed in pipe pairs is examined to evaluate concrete integrity between pipes. The propagation time of these sonic waves is a function of concrete density and wave travel path. A significant increase in wave arrival time, or reduction in apparent sonic wave velocity, is representative of the presence of anomalies in the material between the inspection pipes.

CSL is utilized as an indicator of concrete integrity between the signal probe and receiver probe pair. CSL cannot confirm concrete integrity around the inspection pipe perimeter, as verified by GGL, and this uncertainty is one limitation of CSL testing when attempting to verify concrete homogeneity around the perimeter of an inspection pipe.

Discussion

The previously reported GGL graph depicting the variation from mean bulk density versus depth for Pile 7-1 at Bent 7 is presented in Appendix C. The mean and standard deviation criteria set was derived from GGL readings of the tested lengths of the inspection pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable. The reported locations of inspection pipe couplers were considered in the analysis. For each inspection pipe, separate mean densities were calculated for the known differences in the steel reinforcement schedule. Testing was performed in the completely submerged condition using a submerged probe calibration.

Plots presenting the CSL compression wave arrival times and signal energy as a function of depth for the subject piles are presented in Appendix D. The general criteria for analyzing CSL results are also included in Appendix E. A summary of the combined GGL and CSL analyses are presented in Table II and shown in a section view included in Appendix D.

Table II: Summary of GGL Test Results: Pile 7-1 at Bent 7

Pile (Section)	Approx. Depth[1] (ft)	Approx. Elevation[2] (ft)	GGL Pipe(s)	CSL Pipe Pair(s)	Data Description
1 (A-A)	51.4' to 52.3'	-66.4' to -67.3'	6	--	GGL detected an anomaly at one inspection pipe. Depth of anomaly is near the reported location of a PVC coupler. However, the anomaly's magnitude of deviation from mean density is not consistent with a PVC coupler. No anomalies detected by CSL at the same depth range (Pipe Pair Combinations 5-6, 6-7, and 5-7) May affect up to 2% of the pile cross-section at this depth range.

(1) Depth 0.0 feet is equal to the Reported Top of Concrete / Construction Joint Elevation of -15.0'.
(2) Calculated based on elevation information provided by OSC.

CSL was conducted for three profiles (Inspection Pipes 5-6, 6-7, 5-7) representing an inside boundary of the anomaly reported in the GGL report. The anomaly was not found in any of the three profiles indicating the actual location is likely contained to the pile perimeter adjacent to Inspection Pipe 6.

Recommendations

This Office recommends continued rejection of Pile 7-1 at Bent 7 based on the combined GGL and CSL test results. Please see the revised Pile Design Data Form (PDDF) in Appendix F and refer to Caltrans BRIDGE CONSTRUCTION MEMO 130-10.0 (June 30, 2014) for guidance in addressing rejected CIDH piles.

This Office also continues to recommend that OSC inspect the top of pile concrete prior to completing pile construction above the reported construction joint elevation. Further, this Office continues to recommend that pile designer's review the condition of over 4 feet of untested concrete at the bottom of the pile.

This Office also recommends OSC review the Contractor's plan for placing inspection pipes considering the bottom of inspection pipe elevation, as reported, indicates inspection pipes do not extend to the bottom of the reinforcing steel cage as required by the specifications.

If you have any questions or comments regarding this report, please contact Jason Wahleithner at (916) 227-1059.

April 30, 2015

REGISTERED PROFESSIONAL ENGINEER
JASON DWIGHT WAHLEITHNER
No. C63572
Exp. 9/30/16
CIVIL
STATE OF CALIFORNIA

JASON D. WAHLEITHNER, P.E.
Transportation Engineer, Civil
Foundation Testing Branch
Office of Geotechnical Support

BEN BARNES, P.E.
Senior Transportation Engineer (Acting)
Foundation Testing Branch
Office of Geotechnical Support

C: J. Abercrombie – OSC (Email)
N. Terzis – OSC (Email)
Q. Huang –OGDN (Email)
K. Harirsaz–R&M Engineers (Email)
C. Pazzi – OSC (Email)
B. Alsamman – OSC (Email)
R. Erfanian – OSFP (Email)
M. Mifkovic –METS (Email)
C. Henderson–Kleinfelder (Email)
GEODOG

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

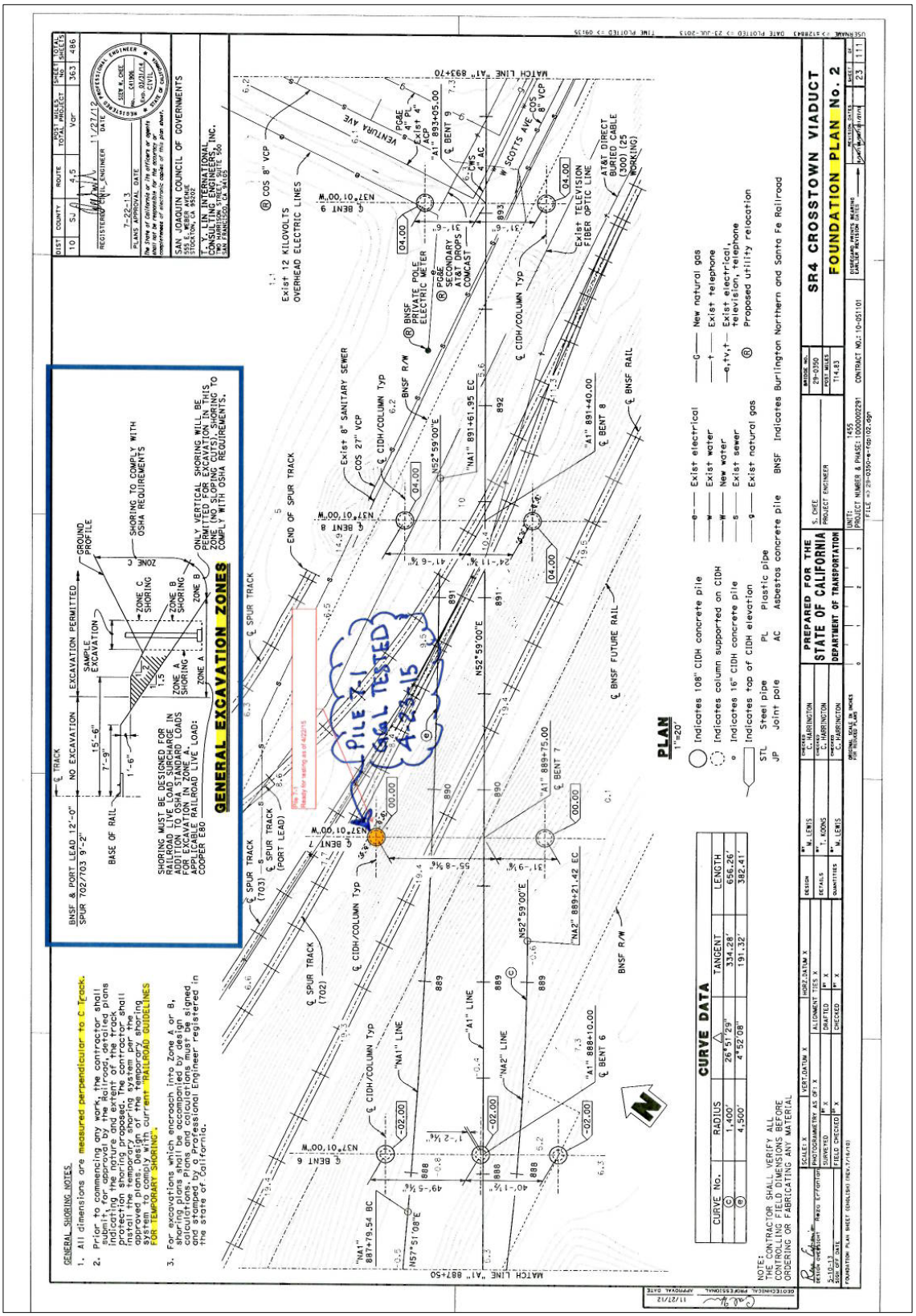
Foundation Testing Branch

APPENDIX A

Pile Location

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7


GENERAL EXCAVATION ZONES
GENERAL SHORING NOTES:
1. All dimensions are measured perpendicular to C Track.
2. Prior to commencing any work, the contractor shall submit to the resident engineer working drawings indicating the nature and extent of the track protection shoring proposed. The contractor shall install the temporary shoring system per the approved plans. Design of the shoring system to comply with current "RAILROAD GUIDELINES FOR TEMPORARY SHORING".
3. For excavations which encroach into Zone A or B, shoring plans shall be accompanied by design calculations. Plans and calculations must be signed and stamped by a professional Engineer registered in the state of California.
SHORING MUST BE DESIGNED FOR RAILROAD LIVE LOAD SURCHARGE IN ADDITION TO OSHA STANDARD LOADS FOR EXCAVATION IN ZONE A. RAILROAD LIVE LOAD: COOPER E80
ONLY VERTICAL SHORING WILL BE PERMITTED FOR EXCAVATION IN THIS ZONE (NO SLOPING CUTS). SHORING TO COMPLY WITH OSHA REQUIREMENTS.
SHORING TO COMPLY WITH OSHA REQUIREMENTS
BNSF & PORT LEAD 12'-0"
SPUR 702/703 9'-2"
NO EXCAVATION
EXCAVATION PERMITTED
SAMPLE EXCAVATION
GROUND PROFILE
BASE OF RAIL
ZONE C SHORING
ZONE B SHORING
ZONE A SHORING
ZONE C
ZONE B
ZONE A
PLAN
CURVE DATA
CURVE No. RADIUS TANGENT LENGTH
© 1,400' 26°51'29" 334.28' 656.26'
® 4,500' 4°52'08" 191.32' 382.41'
NOTE: THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL
Indicates 108" CIDH concrete pile
Indicates column supported on CIDH
Indicates 16" CIDH concrete pile
Indicates top of CIDH elevation
STL Steel pipe
JP Joint pole
PL Plastic pipe
AC Asbestos concrete pile
BNSF Indicates Burlington Northern and Santa Fe Railroad
Exist electrical
Exist water
New water
Exist sewer
Exist natural gas
New natural gas
Exist telephone
Exist electrical, television, telephone
Proposed utility relocation
PILE T-1 FINAL TESTED 4-22-15
Ready for reading as of 4/22/15
Exist 12 KILOVOLTS OVERHEAD ELECTRIC LINES
Exist 8" SANITARY SEWER
Exist TELEVISION FIBER OPTIC LINE
AT&T DIRECT BURIED CABLE (NOT IN WORKING)
BNSF PRIVATE POLE ELECTRIC METER
PG&E SECONDARY AT&T DROPS COMCAST
PG&E 4" GAS
Exist 4" ACP
CWS 4" AC
VENTURA AVE
W SCOTTS AVE
END OF SPUR TRACK
BNSF FUTURE RAIL
BNSF R/W
MATCH LINE "A1" 887+50
MATCH LINE "A1" 893+70
SR4 CROSSTOWN VIADUCT
FOUNDATION PLAN No. 2
PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SAN JOAQUIN COUNCIL OF GOVERNMENTS
T.Y. LIN INTERNATIONAL CONSULTING ENGINEERS, INC.
FOUNDATION PLAN SHEET SIGNALING INDEX STAGED

Foundation Testing Branch

APPENDIX B

Pile Information

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7

MALCOLM DRILLING CO., INC

DRILLED SHAFT RECORD II
INSPECTION TUBE LOG

BENT NO. : Bent 7-1 SHAFT NO. :

RECORDING DATE: 24-Mar-15

PROJECT / CONTRACT	SHAFT DIAMETER:	SHAFT TYPE :	GROUND ELEVATION:
SR4 Crosstown Viaduct	9.0 FT	CIDH	11.9 FT MSL

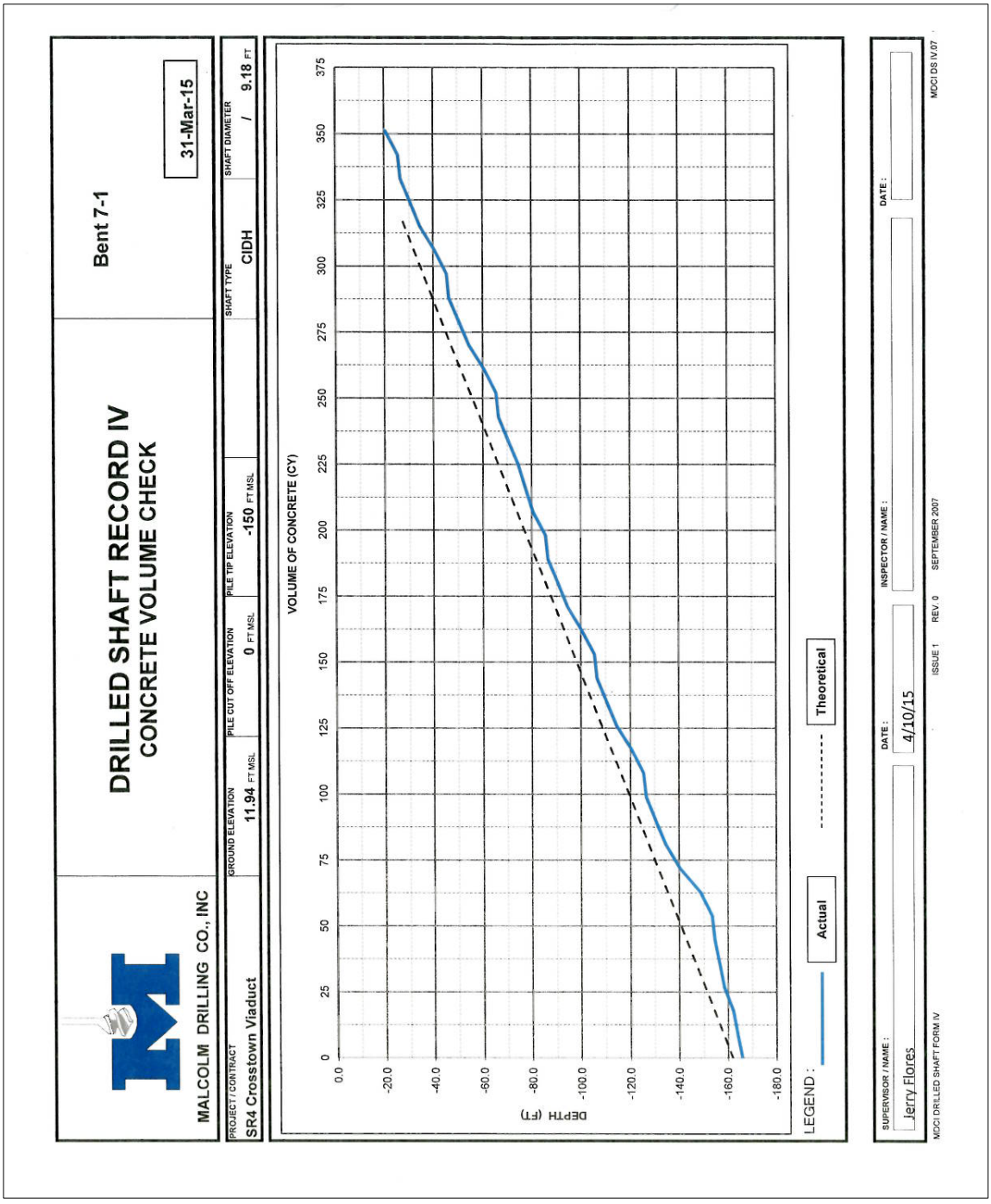
DEPTH FROM TOP OF REBAR CAGE		INSPECTION TUBE NUMBER												NOTES
(FT)	(EL)	1	2	3	4	5	6	7	8	9	...	11	12	
-1.4	3.2	X	X	X	X	X	X	X	X	X	X			PVC Coupler
8.63	-6.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
28.63	-26.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
48.63	-46.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
68.63	-66.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
88.63	-86.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
108.63	-106.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
128.63	-126.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
148.63	-146.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler
149.13	-147.34	X	X	X	X	X	X	X	X	X	X			PVC Coupler
149.63	-147.84	X	X	X	X	X	X	X	X	X	X			PVC Coupler

COMMENT:

SHAFT TIP ELEVATION :	-151.5 FT	TOP OF INSPECTION TUBE ELEVATION :	FT
TOP OF CONCRETE ELEVATION	-15 FT	TIP OF INSPECTION TUBE ELEVATION :	-147.8 FT

SUPERVISOR / NAME :	DATE :	INSPECTOR / NAME :	DATE :
Jerry Flores	4/7/15		

MDCI DRILLED SHAFT FORM II ISSUE 1 REV 0 SEPTEMBER 2007 MDCI DS II 07


MALCOLM DRILLING CO., INC
DRILLED SHAFT RECORD IV
CONCRETE VOLUME CHECK
Bent 7-1
31-Mar-15
PROJECT / CONTRACT
SR4 Crosstown Viaduct
GROUND ELEVATION
11.94 FT MSL
PILE CUT OFF ELEVATION
0 FT MSL
PILE TIP ELEVATION
-150 FT MSL
SHAFT TYPE
CIDH
SHAFT DIAMETER
/ 9.18 FT
VOLUME OF CONCRETE (CY)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
DEPTH (FT)
0.0
-20.0
-40.0
-60.0
-80.0
-100.0
-120.0
-140.0
-160.0
-180.0
LEGEND :
Actual
Theoretical
SUPERVISOR / NAME :
Jerry Flores
DATE :
4/10/15
INSPECTOR / NAME :
DATE :
MDCI DRILLED SHAFT FORM IV
ISSUE 1
REV. 0
SEPTEMBER 2007
MDCI DS IV.07

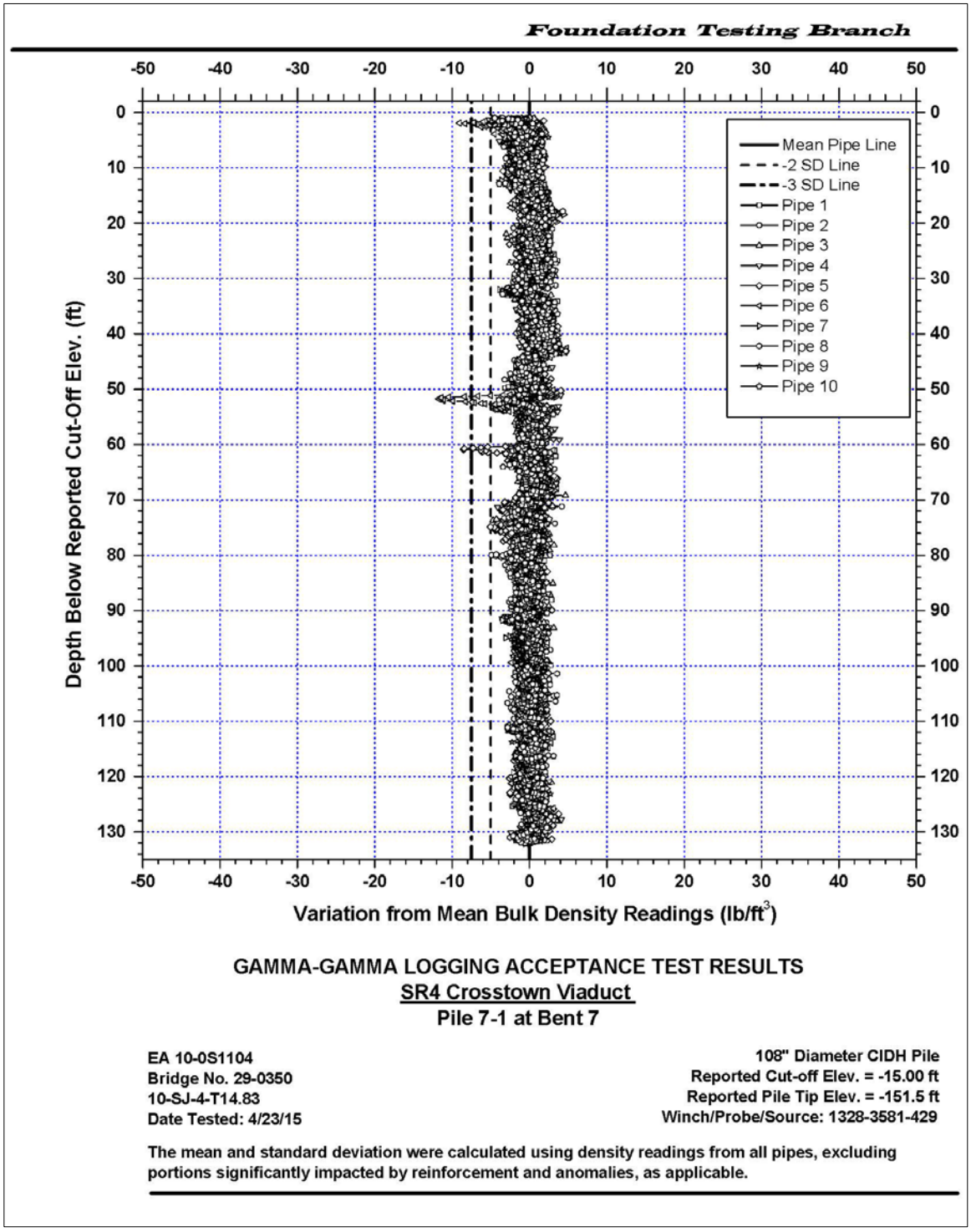
Foundation Testing Branch

APPENDIX C

Gamma-Gamma Logging Acceptance Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7


Foundation Testing Branch
Depth Below Reported Cut-Off Elev. (ft)
Variation from Mean Bulk Density Readings (lb/ft3)
Mean Pipe Line
-2 SD Line
-3 SD Line
Pipe 1
Pipe 2
Pipe 3
Pipe 4
Pipe 5
Pipe 6
Pipe 7
Pipe 8
Pipe 9
Pipe 10
GAMMA-GAMMA LOGGING ACCEPTANCE TEST RESULTS
SR4 Crosstown Viaduct
Pile 7-1 at Bent 7
EA 10-0S1104
Bridge No. 29-0350
10-SJ-4-T14.83
Date Tested: 4/23/15
108" Diameter CIDH Pile
Reported Cut-off Elev. = -15.00 ft
Reported Pile Tip Elev. = -151.5 ft
Winch/Probe/Source: 1328-3581-429
The mean and standard deviation were calculated using density readings from all pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable.

Foundation Testing Branch

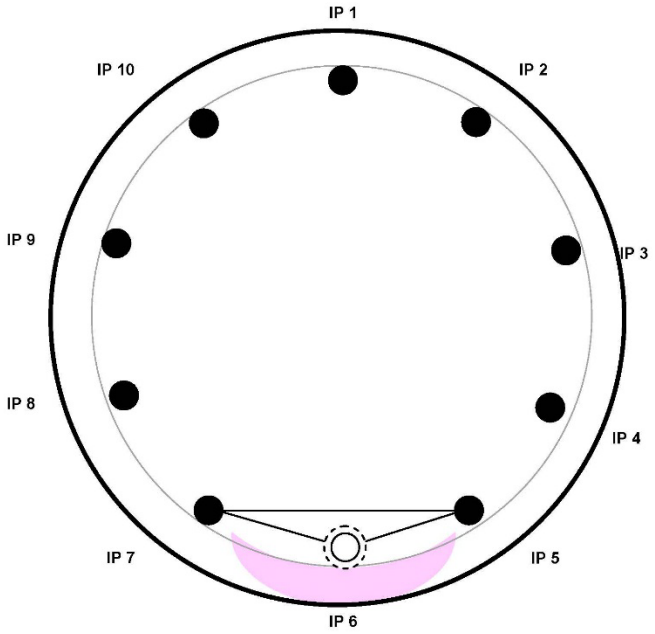
APPENDIX D

Cross-Hole Sonic Logging Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7

Foundation Testing Branch



NOT TO SCALE

LEGEND

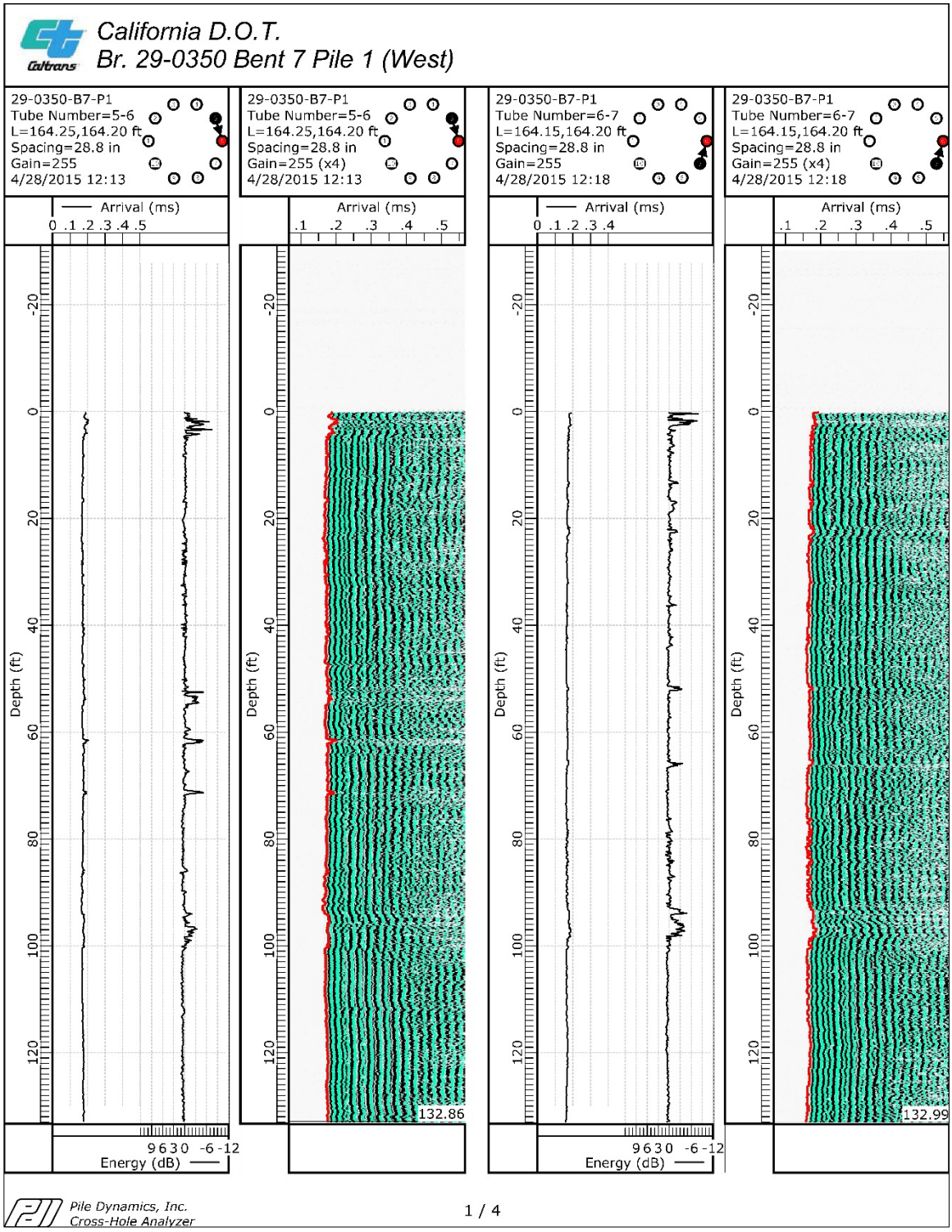
- - - - -	Anomalies Detected/Inconclusive by Crosshole Sonic Logging
———	No Anomalies Detected by Crosshole Sonic Logging (CSL)
◯	Anomalies Detected by Gamma-Gamma Logging (GGL)
●	No Anomalies Detected by GGL
▣	Inspection Pipe(s) Not Tested by GGL
⬡	Inspection Pipe(s) Not Tested by GGL and CSL

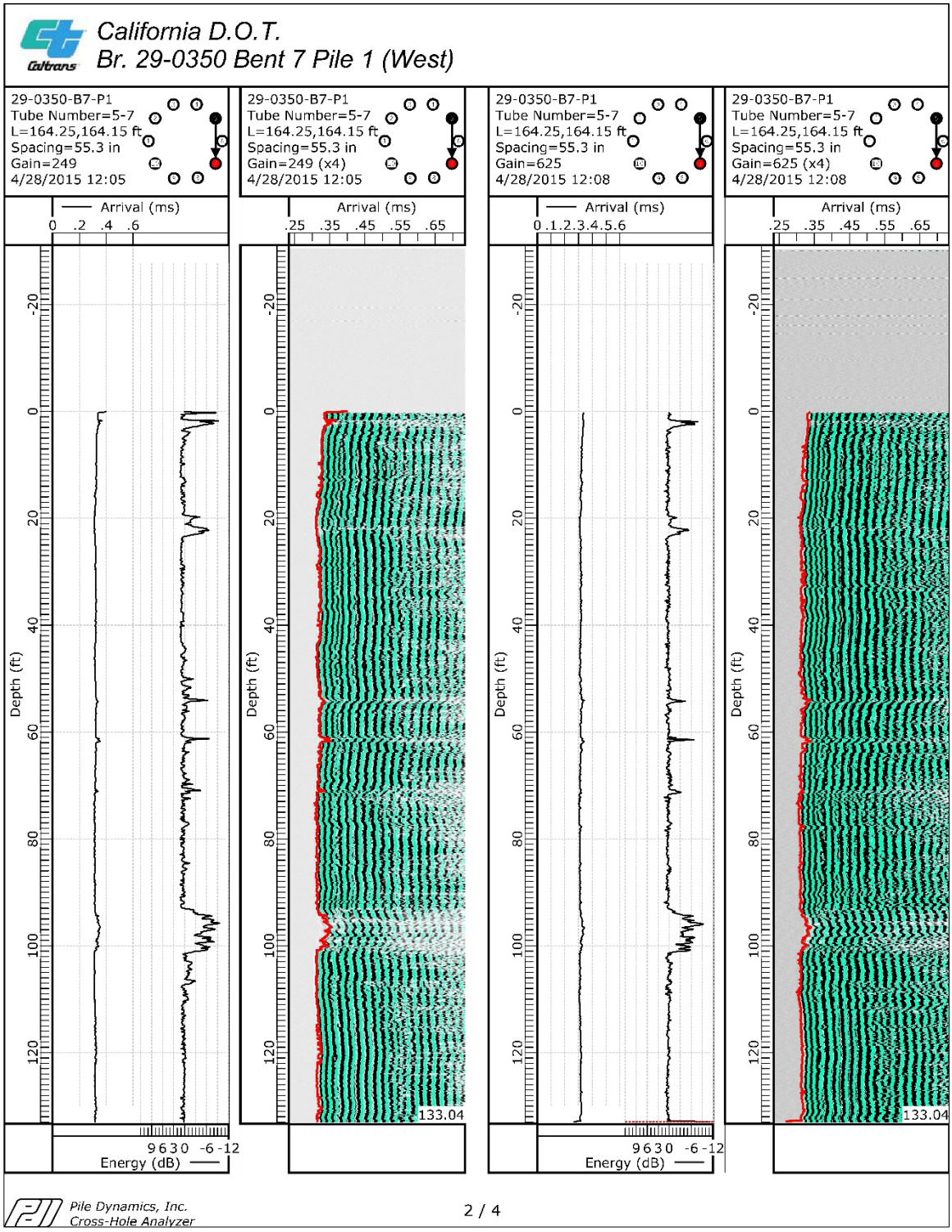
Crosshole Sonic Logging Test Results

SR4 Crosstown Viaduct – Pile 1 at Bent 7: Section (A-A)
Approximate Depth Range: 51.4 feet to 52.3 feet

Bridge Number: 29-0350
10-SJ-4-T14.83
Dated Tested: 4/30/2015

EA. 10-0S1104
9 ft. Diam. CIDH Pile
Reported Top of Conc. Elev.: -15.00 ft
Reported Tip Elev.: -151.50 ft


California D.O.T.
Br. 29-0350 Bent 7 Pile 1 (West)
29-0350-B7-P1
Tube Number=5-6
L=164.25,164.20 ft
Spacing=28.8 in
Gain=255
4/28/2015 12:13
29-0350-B7-P1
Tube Number=5-6
L=164.25,164.20 ft
Spacing=28.8 in
Gain=255 (x4)
4/28/2015 12:13
29-0350-B7-P1
Tube Number=6-7
L=164.15,164.20 ft
Spacing=28.8 in
Gain=255
4/28/2015 12:18
29-0350-B7-P1
Tube Number=6-7
L=164.15,164.20 ft
Spacing=28.8 in
Gain=255 (x4)
4/28/2015 12:18
Arrival (ms)
Depth (ft)
Energy (dB)
132.86
132.99
Pile Dynamics, Inc.
Cross-Hole Analyzer
1 / 4


California D.O.T.
Br. 29-0350 Bent 7 Pile 1 (West)
29-0350-B7-P1
Tube Number=5-7
L=164.25,164.15 ft
Spacing=55.3 in
Gain=249
4/28/2015 12:05
29-0350-B7-P1
Tube Number=5-7
L=164.25,164.15 ft
Spacing=55.3 in
Gain=249 (x4)
4/28/2015 12:05
29-0350-B7-P1
Tube Number=5-7
L=164.25,164.15 ft
Spacing=55.3 in
Gain=625
4/28/2015 12:08
29-0350-B7-P1
Tube Number=5-7
L=164.25,164.15 ft
Spacing=55.3 in
Gain=625 (x4)
4/28/2015 12:08
Arrival (ms)
Depth (ft)
133.04
Energy (dB)
Pile Dynamics, Inc.
Cross-Hole Analyzer
2 / 4

California D.O.T.
Br. 29-0350 Bent 7 Pile 1 (West)

Pile	Profile	Start feet	To feet	Peak feet	Energy Decrease	FAT Delay
29-0350-B7-P1	5-7	132.93	132.93	132.93	11.4dB	

Pile Dynamics, Inc.
Cross-Hole Analyzer

3 / 4

California D.O.T.
Br. 29-0350 Bent 7 Pile 1 (West)

Pile	Prof	Distance in	Avg AT ms	Avg WS ft/sec	Standard Dev.	Discrete Coeff.	Max PSD
29-0350-B7-P1	5-6	28.8	0.169	14242	134	0.031	
29-0350-B7-P1	6-7	28.8	0.163	14721	142	0.032	
29-0350-B7-P1	5-7	55.3	0.315	14614	115	0.026	
29-0350-B7-P1	5-7	55.3	0.311	14811	97	0.021	

Pile Dynamics, Inc.
Cross-Hole Analyzer

4 / 4

Foundation Testing Branch

APPENDIX E

Cross-Hole Sonic Logging Rating Criteria

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7

Foundation Testing Branch

CROSSHOLE SONIC LOGGING RATING CRITERIA

RATING	INCREASE IN ARRIVAL TIME	DESCRIPTION
ACCEPTABLE	0 – 10%	No signal distortion and an increase in signal arrival time of 10% or less are indicative of acceptable quality concrete.
MINOR ANOMALIES	10 – 20%	Minor signal distortion and lower signal amplitude with an increase in signal arrival time between 10% and 20% are indicative of minor contamination or intrusion and/or questionable quality concrete.
SIGNIFICANT ANOMALIES	More than 20%	Severe signal distortion and much lower signal amplitude with an increase in signal arrival time of 20% or more are indicative of water slurry contamination or soil intrusion and/or poor quality concrete.
NO SIGNAL		No signal was received. It is highly probable that a soil intrusion or other severe defect has absorbed the signal. It may also be due to debonding between the inspection tubes and concrete, especially in the portions of the piles above the water table.
WATER		A measured signal velocity of nominally V = 4,800 to 5,000 ft/sec is indicative of a water intrusion or a water-filled gravel intrusion with few or no fines present.

Foundation Testing Branch

APPENDIX F

Revised Pile Design Data Forms (PDDF's)

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7

Appendix D - Pile Design Data Form (GGL)

1 Foundation Testing

Name: Jason Wahleithner
Phone: (916) 227-1059
Date: 4/29/2015

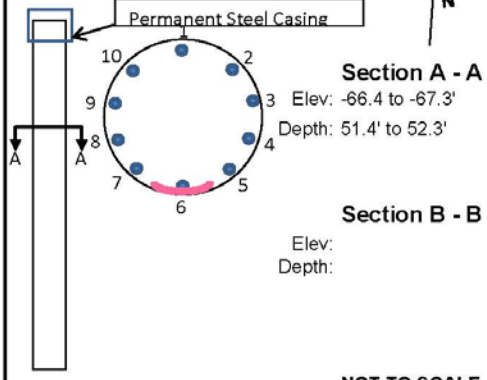
Anomaly Overview

Testing Performed X GGL X CSL

Shaft Diameter: **108" CIDH**

Cutoff Elev. Or Top of Concrete Elev: -15.00'

Permanent Steel Casing



Section A - A
Elev: -66.4 to -67.3'
Depth: 51.4' to 52.3'

Section B - B
Elev:
Depth:

NOT TO SCALE

Reported Tip Elev.: -151.50'

Anomaly Description

Section A - A: GGL detected an anomaly at one (1) inspection pipe (IP 6) . No anomalies detected by CSL. May affect up to 2% of the pile cross-section at this depth range.

Section B - B:

2 Geotechnical

Name:
Phone:
Date:

Required Nominal Resistance of Pile (per contract plans):

Compression:_____kip Tension: _____kips

Groundwater Elevation: _____

"As-Designed" nominal resistance over entire pile surface from the top to bottom elev. of anomaly / capacity loss within anomaly length (kips):

Section A-A: Compression____/_____Tension____/____

Soil and/or Rock Type: _____

Section is geotechnically ☐ Acceptable ☐ Unacceptable

Section B-B: Compression_____Tension_____

Soil and/or Rock Type: _____

Section is geotechnically ☐ Acceptable ☐ Unacceptable

Comments: _____

3 Structural

Name:
Phone:
Date:

As-Designed Capacity of Shaft

Section A-A: Shear: _____ Moment: _____

Section B-B: Shear: _____ Moment: _____

Maximum Demand of Shaft at Section A-A:

Shear: _____ Moment: _____

Shaft is structurally: ☐ Acceptable ☐ Unacceptable

Maximum Demand of Shaft at Section B-B:

Shear: _____ Moment: _____

Shaft is structurally: ☐ Acceptable ☐ Unacceptable

Comment _____

4 Corrosion

Name:

Consideration is ☐ Required ☐ Not Required

For anomalies between the top of pile and 3 feet below the groundwater level at the site, corrosion results listed in the Geotechnical report are used to assess the need for repair. For situations where results are not available, soil samples may be obtained adjacent to the anomaly and tested in accordance with California Test (CT) 643 (Parts 2, 3 and 4) and if necessary, CT 417 and CT 422 to determine soil corrosivity. For anomalies outside these limits, and where no stray current source can be identified, or for non-corrosive soil conditions, no consideration of corrosion potential is required.

Corrosion Potential at Section A-A: _____

Corrosion Potential at Section B-B: _____

5 Construction Considering parts 2-4 of this form,

Structure Rep.:
Phone: Date:

Sec. A-A is: ☐ Acceptable with Administrative Deduction ☐ Unacceptable; Mitigation is Required

Sec. B-B is: ☐ Acceptable with Administrative Deduction ☐ Unacceptable; Mitigation is Required

Bridge:	SR4 Crosstown Viaduct	Bridge No.:	29-0350	Bent:	7
Dist-Co.-Rte:	10-SJ-4-T14.83	EA:	10-0S1104	Pile:	7-1
Structure Rep.:	Allen King	Phone:	(209) 470-8819	Fax:	n/a