INFORMATION HANDOUT

For Contract No. 06-462214
At 06-Kin-198-R15.4/R16.0

Identified by
Project ID 0614000172

MATERIALS INFORMATION

Asbestos Survey Report

Alternative-in-Line Terminal System

ASBESTOS SURVEY REPORT

Hanford – Armona Road Undercrossing
Kings County, California

PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PLANNING 06/1410
855 M STREET, SUITE 200
FRESNO, CALIFORNIA 93721

PREPARED BY:

GEOCON CONSULTANTS, INC.
3160 GOLD VALLEY DRIVE, SUITE 800
RANCHO CORDOVA, CALIFORNIA 95742

GEOCON PROJECT NO. S9800-01-35
TASK ORDER NO. 35
E-FIS 06-1400-0172-1 (EA 06-462211)
CONTRACT NO. 06A1895

NOVEMBER 2014

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. S9800-01-35
November 7, 2014

Shawn Ogletree, Task Order Manager
California Department of Transportation
Environmental Planning 06/1410
855 M St., Suite 200
Fresno, California 93721

Subject: ASBESTOS SURVEY REPORT
HANFORD-ARMONA ROAD UNDERCROSSING (45-0078)
KINGS COUNTY, CALIFORNIA
CONTRACT NO. 06A1895, E-FIS 06-1400-0172-1 (EA 06-462211)
TASK ORDER NO. 35

Dear Mr. Ogletree:

In accordance with California Department of Transportation Contract No. 06A1895 and Task Order No. 35, we have performed an asbestos survey of the Hanford-Armona Road Undercrossing (UC) on Highway 198 in Kings County, California. Our scope of services included surveying the bridge for suspect asbestos-containing materials, collecting bulk samples, and submitting the samples to a laboratory for analysis.

The accompanying report summarizes the services performed and laboratory analysis.

The contents of this report reflect the views of Geocon Consultants, Inc., who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

Please contact us if you have questions concerning the contents of this report or if we may be of further service.

Sincerely,

GEOCON CONSULTANTS, INC.

David A. Watts, CAC No. 98-2404
Senior Project Scientist

John E. Juhrend, PE, CEG
Principal/Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN JUHREND
No. 46681
CIVIL
STATE OF CALIFORNIA

(2 + 2 CDs) Addressee

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ASBESTOS SURVEY REPORT PAGE

ASBESTOS SURVEY REPORT

1.0 INTRODUCTION

This asbestos survey report was prepared by Geocon Consultants, Inc. under Caltrans Contract No. 06A1895, Task Order No. 35 (TO-35).

1.1 Project Description

The project consists of the Hanford-Armona Road Undercrossing (45-0078) at Post Mile (PM) 15.75 on Highway 198 in Kings County, California. We performed asbestos survey activities at the project location. The project location is depicted on the Vicinity Map, Figure 1, and Site Plan, Figure 2.

1.2 General Objectives

The purpose of the scope of services outlined in TO-35 was to determine the potential presence and quantity of asbestos-containing building materials at the project location prior to various improvements. The information obtained from this investigation will be used by Caltrans for waste profiling, determining California Occupational Safety and Health Administration (Cal/OSHA) applicability, and coordinating asbestos disturbance activities.

2.0 BACKGROUND

2.1 Asbestos

The Code of Federal Regulations (CFR), 40 CFR 61, Subpart M, National Emissions Standards for Hazardous Air Pollutants (NESHAP) and Federal Occupational Safety and Health Administration (FED OSHA) classify asbestos-containing material (ACM) as any material or product that contains *greater than* 1% asbestos. Nonfriable ACM is classified by NESHAP as either Category I or Category II material defined as follows:

- **Category I** – asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products.
- **Category II** – all remaining types of nonfriable asbestos-containing material not included in Category I that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Regulated asbestos-containing material (RACM), a hazardous waste when friable, is classified as any manufactured material that contains *greater than* 1% asbestos by dry weight *and* is:

- Friable (can be crumbled, pulverized, or reduced to powder by hand pressure); or
- Category I material that has become friable; or
- Category I material that has been subjected to sanding, grinding, cutting, or abrading; or

- Category II nonfriable material that has a high probability of becoming crumbled, pulverized, or reduced to a powder during demolition or renovation activities.

Activities that disturb materials containing *any* amount of asbestos are subject to certain requirements of the Cal/OSHA asbestos standard contained in Title 8 of the California Code of Regulations (CCR) §1529. Typically, removal or disturbance of more than 100 square feet of material containing more than 0.1% asbestos must be performed by a registered asbestos abatement contractor, but associated waste labeling is not required if the material contains 1% or less asbestos. When the asbestos content of a material exceeds 1%, virtually all requirements of the standard become effective.

Materials containing more than 1% asbestos are also subject to NESHAP regulations (40 CFR Part 61, Subpart M). RACM (friable ACM and nonfriable ACM that will become friable during demolition operations) must be removed from structures prior to demolition. Certain nonfriable ACM and materials containing 1% or less asbestos may remain in structures during demolition; however, there are waste handling/disposal issues and Cal/OSHA work requirements that must be addressed. Contractors are responsible for segregating and characterizing waste streams prior to disposal.

With respect to potential worker exposure, notification, and registration requirements, Cal/OSHA defines asbestos-containing construction material (ACCM) as construction material that contains more than 0.1% asbestos (Title 8, CCR 341.6).

2.2 Architectural Drawings and Previous Survey Activities

Architectural plans and previous asbestos survey reports were not available for our review.

3.0 SCOPE OF SERVICES

Mr. David Watts, a California-Certified Asbestos Consultant (CAC), certification No. 98-2404 (expiration September 16, 2015), performed the asbestos survey at the project location on September 29, 2014.

Suspect ACM were grouped into homogeneous areas with representative samples randomly collected from each. In addition, each potential ACM was evaluated for friability. A total of ten bulk asbestos samples representing four suspect components were collected.

Our procedures for inspection and sampling in accordance with TO-35 are discussed below:

- Collected bulk asbestos samples after first wetting friable materials with a light mist of water. The samples were then cut from the substrate and transferred to labeled containers. Note that when multiple samples were collected, the sampling locations were distributed throughout the homogeneous area (spaces where the material was observed).

- Relinquished bulk asbestos samples under standard chain-of-custody protocol to EMSL Analytical, Inc., a California-licensed and Caltrans-approved subcontractor, for asbestos analysis in accordance with United States Environmental Protection Agency (EPA) Test Method 600/R-93/116 using polarized light microscopy (PLM). EMSL Analytical, Inc. is a laboratory accredited by the National Institute of Standards and Technology National Voluntary Laboratory Accreditation Program (NIST-NVLAP) for bulk asbestos fiber analysis. The laboratory analyses were requested on a turnaround period of five days.

Sample group identification numbers, material descriptions, approximate quantities, friability assessments, and photo references are summarized on Table 1. Approximate sample locations are presented on Figure 2. Materials represented by the samples collected are shown in the attached photographs.

4.0 INVESTIGATIVE RESULTS

Chrysotile asbestos at a concentration of 2.5% was detected in samples representing nonfriable drainpipe encased within the bridge abutments. We were not able to quantify the material. The asbestos content was determined using PLM point count analysis (1,000 points).

Chrysotile asbestos at a concentration of 80% was detected in samples representing approximately 6 square feet of nonfriable asbestos sheet packing used as shims on the bridge barrier rail systems.

No asbestos was detected in samples of the remaining suspect materials collected during our survey. A summary of the analytical laboratory test results for asbestos is presented on Table 1. Reproductions of the laboratory report and chain-of-custody documentation are presented in Appendix A.

5.0 RECOMMENDATIONS

Based on our findings, we recommend the following:

NESHAP regulations require that asbestos-containing drainpipe (a Category II nonfriable/nonhazardous material) be removed and disposed of prior to demolition or other activities that would disturb the material. We recommend that the removal of the material be performed by a licensed contractor who is registered with Cal/OSHA for asbestos-related work. Contractors are responsible for informing the landfill of the contractor's intent to dispose of asbestos waste. Some landfills may require additional waste characterization. Contractors are responsible for segregating and characterizing waste streams prior to disposal.

NESHAP regulations do not require that asbestos-containing sheet packing (a Category I nonfriable/nonhazardous material) identified during our survey be removed prior to demolition/renovation or be treated as hazardous waste. The sheet packing may also be reused or stored. However, activities causing *disturbance* of the sheet packing (i.e., cutting, abrading, sanding, grinding, etc.) would require compliance with the Cal/OSHA asbestos standard (Title 8, CCR §1529).

We also recommend the notification of contractors (that will be conducting demolition, renovation, or related activities) of the presence of asbestos in their work areas (i.e., provide the contractor[s] with a copy of this report and a list of asbestos removed by contractor[s] during subsequent abatement activities). Personnel not trained for asbestos work should be instructed not to disturb asbestos.

Written notification to the San Joaquin Valley Unified Air Pollution Control District is required ten working days prior to commencement of *any* demolition activity (whether asbestos is present or not).

6.0 REPORT LIMITATIONS

This asbestos survey was conducted in conformance with generally accepted standards of practice for identifying and evaluating asbestos-containing building materials in structures. The survey addressed only the structure identified in Section 1.1. Due to the nature of structure surveys, some asbestos-containing building materials at the project location may not have been identified. Spaces, such as cavities, crawlspaces, voids, and pipe chases, may have been concealed to our investigator. Previous building renovation work may have concealed or covered spaces or materials, or may have partially demolished materials and left debris in inaccessible areas. Additionally, renovation activities may have partially replaced asbestos with indistinguishable non-asbestos. Asbestos may exist in areas not accessible or sampled in conjunction with this TO.

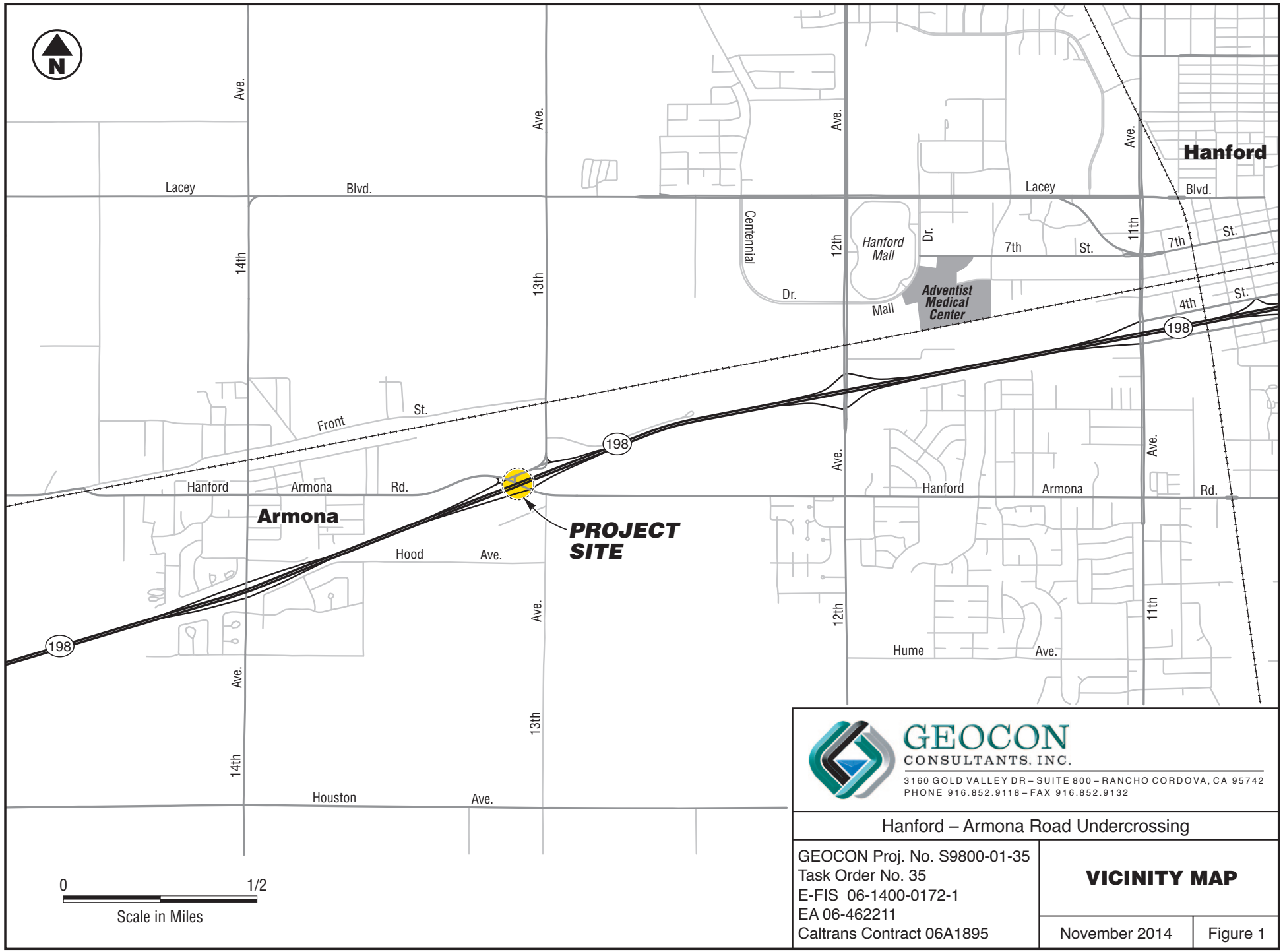
During renovation or demolition operations, suspect materials may be uncovered which are different from those accessible for sampling during this assessment. Personnel in charge of renovation/demolition should be alerted to note materials uncovered during such activities that differ substantially from those included in this or previous assessment reports. If additional suspect materials are found, they should be treated as hazardous until/unless sampling and analysis indicate otherwise.

This report has been prepared exclusively for Caltrans. The information contained herein is only valid as of the date of the report and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation.

Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.



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PHONE 916.852.9118 – FAX 916.852.9132

Hanford – Armona Road Undercrossing

GEOCON Proj. No. S9800-01-35
Task Order No. 35
E-FIS 06-1400-0172-1
EA 06-462211
Caltrans Contract 06A1895

VICINITY MAP

November 2014 | Figure 1

LEGEND:

- Approximate Asbestos Sample Location

N

0 50

Scale in Feet

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Hanford – Armona Road Undercrossing

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SITE PLAN

November 2014 | Figure 2

Photo 1 – Hanford-Armona Road UC (45-0078) at PM 15.75 on Highway 198 in Kings County, California

Photo 2 – Bridge deck and barriers

Photo 3 – East abutment (drainpipe is asbestos-containing)

GEOCON
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PHOTOGRAPHS 1, 2, & 3		
Hanford-Armona Road Undercrossing Kings County, California		
S9800-01-35		November 2014

Photo 4 – Asbestos sheet packing on barrier rail systems

Photo 5 – Bridge columns

Photo 6 – Polyurethane joint fill material (non-suspect)

TABLE 1
SUMMARY OF ANALYTICAL LABORATORY TEST RESULTS - ASBESTOS
HANFORD-ARMONA ROAD UNDERCROSSING (45-0078)
CALTRANS CONTRACT 06A1895, TASK ORDER NO. 35, E-FIS 06-1400-0172-1 (EA 06-462211)
KINGS COUNTY, CALIFORNIA

Polarized Light Microscopy (PLM) - EPA Test Method 600/R-93/116

Sample Group No.	Material Description	Approximate Quantity	Friable	Site Photos	Asbestos Content
1	Concrete	NA	NA	1 through 6	ND
2	Asphalt	NA	NA	2	ND
3	**Drainpipe (abutments)**	**Unable to quantify**	**No**	**3**	**2.5%***
4	**Sheet packing (barrier rail shims)**	**6 square feet**	**No**	**4**	**80%**

Notes:

NA = Not applicable (no asbestos detected)

ND = Not detected

* Material analyzed using PLM Point Counting (1,000 points)

APPENDIX A

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.EMSL.com sanleandrolab@emsl.com

EMSL Order:	091415155
CustomerID:	GECN21
CustomerPO:	S9800-01-35
ProjectID:	06A1895

Attn: **Dave Watts**
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	10/03/14 9:00 AM
Analysis Date:	10/10/2014
Collected:	9/29/2014

Project: **S9800-01-35 KINGS**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1A-Concrete *091415155-0001*		Gray Non-Fibrous Homogeneous		20% Quartz 20% Mica 40% Ca Carbonate 20% Non-fibrous (other)	**None Detected**
1B-Concrete *091415155-0002*		Gray Non-Fibrous Homogeneous		20% Quartz 20% Mica 40% Ca Carbonate 20% Non-fibrous (other)	**None Detected**
1C-Concrete *091415155-0003*		Gray Non-Fibrous Homogeneous		30% Quartz 40% Ca Carbonate 30% Non-fibrous (other)	**None Detected**
1D-Concrete *091415155-0004*		Gray Non-Fibrous Homogeneous		20% Quartz 20% Mica 40% Ca Carbonate 20% Non-fibrous (other)	**None Detected**
2A-Asphalt *091415155-0005*		Black Non-Fibrous Homogeneous		40% Quartz 30% Matrix 30% Non-fibrous (other)	**None Detected**
2B-Asphalt *091415155-0006*		Black Non-Fibrous Homogeneous		30% Quartz 40% Matrix 30% Non-fibrous (other)	**None Detected**

Analyst(s)

Amanda Sherman (10)

Derrick Tanner, Laboratory Manager
or other approved signatory

Report Amended: 10/10/2014 11:42:48 Replaces the Inital Report 10/10/2014 11:20:46. Reason Code: Data Entry-Change to Sample ID

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
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Fax:	(925) 371-5915
Received:	10/03/14 9:00 AM
Analysis Date:	10/10/2014
Collected:	9/29/2014

Project: **S9800-01-35 KINGS**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos			Asbestos	
Sample	**Description**	**Appearance**	**%**	**Fibrous**	**% Non-Fibrous**	**%**	**Type**
3A-Drain Pipe *091415155-0007*		Black Fibrous Homogeneous	15%	Cellulose	50% Matrix 35% Non-fibrous (other)		**None Detected**
3B-Drain Pipe *091415155-0008*		Black Fibrous Homogeneous	10%	Cellulose	60% Matrix 30% Non-fibrous (other)	**<1%**	**Chrysotile**
4A-Sheet Packing *091415155-0009*		Tan/Black Fibrous Homogeneous			20% Non-fibrous (other)	**80%**	**Chrysotile**
4B-Sheet Packing *091415155-0010*		Tan/Black Fibrous Homogeneous			20% Non-fibrous (other)	**80%**	**Chrysotile**

Analyst(s)

Amanda Sherman (10)

Derrick Tanner, Laboratory Manager
or other approved signatory

Report Amended: 10/10/2014 11:42:48 Replaces the Inital Report 10/10/2014 11:20:46. Reason Code: Data Entry-Change to Sample ID

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Attn: **Dave Watts**
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	10/03/14 9:00 AM
Analysis Date:	10/15/2014
Collected:	9/29/2014

Project: **S9800-01-35 KINGS**

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 1000 Point Count

SAMPLE ID	DESCRIPTIO	APPEARANCE	(%) Matrix Organic	Acid	NON- ASBESTOS % Fibrous	NON- ASBESTOS % NON-FIBROUS	ASBESTOS % TYPES
3B-Drain Pipe *091415155-0008*		Black Fibrous Homogeneous	94.7	0.5		2.3 Non-fibrous (other)	2.5 Chrysotile

Analyst(s)
Matthew Batongbacal (1)

Derrick Tanner, Laboratory Manager
or other approved signatory

Some samples may contain asbestos fibers present in dimensions below PLM resolution limits.The limit of detection as stated in the method is 0.1%. EMSL Analytyical Inc suggests that samples reported as <0.1% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval EMSL Analytical Inc. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical Inc. bears no esponsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. EMSL Analytical Inc liability is limited to the cost of sample analysis. The test results contained within this report meet the requirements of NELAC unless otherwise noted. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Initial report from 10/15/2014 11:32:50

OrderID: 091415155

Asbestos Chain of Custody

EMSL Order Number (*Lab Use Only*):

№091415155

EMSL ANALYTICAL, INC.
2235 POLVOROSA DR #230
SAN LEANDRO, CA 94577
PHONE: (510) 895-3675
FAX. (510) 895-3680

Company: GEOCON	**EMSL-Bill to:** ☒ Same ☐ Different If Bill to is Different note instructions in Comments** *Third Party Billing requires written authorization from third party*
Street: 6671 BRISA ST.	
City: LIVERMORE **State/Province:** CA	**Zip/Postal Code:** 94550 **Country:** USA
Report To (Name): D. WATTS	**Telephone #:** 925-371-5900
Email Address: WATTS@GEOCONINC.COM	**Fax #:** 925-371-5915 **Purchase Order:**
Project Name/Number: 39800-01-35 KINGS	**Please Provide Results:** ☐ Fax ☒ Email
U.S. State Samples Taken: CA	**CT Samples:** ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

**For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide*

PCM - Air ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☒ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT (AHERA only)**
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ TEM Qual. via Filtration Technique
- ☐ TEM Qual. via Drop-Mount Technique

Other:
- ☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group** **Filter Pore Size (Air Samples):** ☐ 0.8µm ☐ 0.45µm

Samplers Name: D. WATTS **Samplers Signature:** [signature]

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
1A-D	CONCRETE	NA	9/29/14
2A/B	ASPHALT		
3A/B	DRAIN PIPE		
4A/B	SHEET PACKING		

Client Sample # (s): - **Total # of Samples:** 10

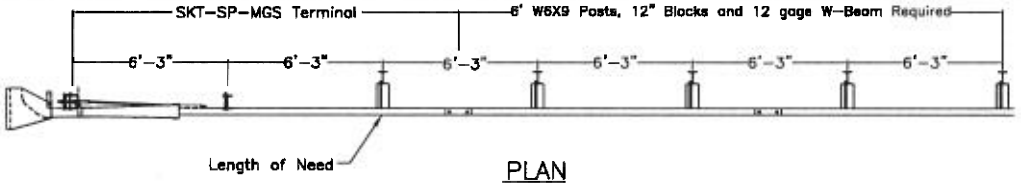
Relinquished (Client): [signature] Fed Ex **Date:** 9/30/14 **Time:** 1800

Received (Lab): 9/30/14 **Date:** **Time:** 1800

Comments/Special Instructions:

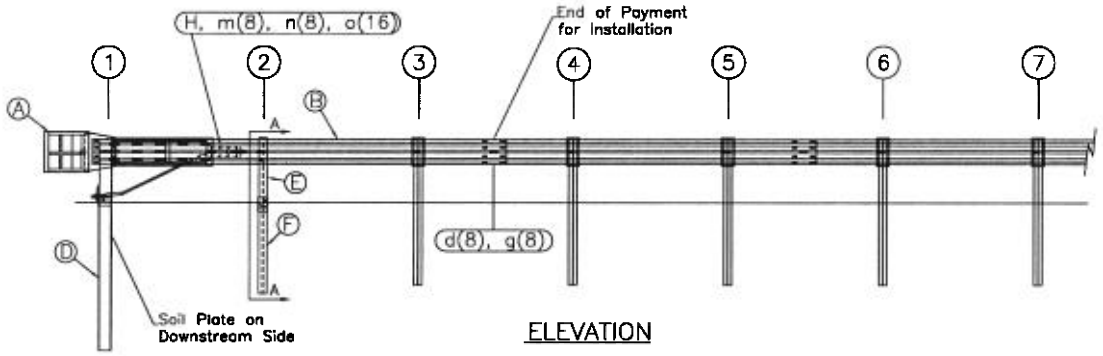
CALTRANS CONTRACT 06A1895

[signature] 10/02/14 9am FedEx

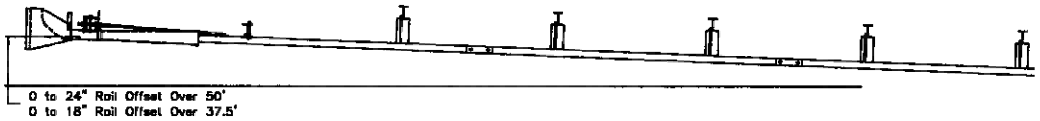


PLAN

TRAFFIC



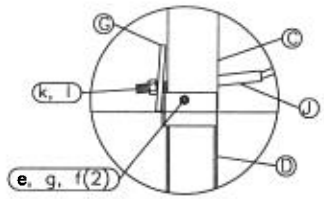
ELEVATION



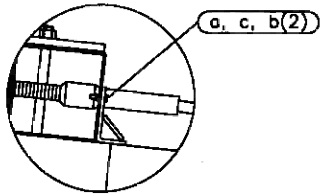
OPTIONAL FLARED INSTALLATION
25:1 maximum flare rate

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X¼" Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP38
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
		HARDWARE (ALL DIMENSIONS IN INCHES)	
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

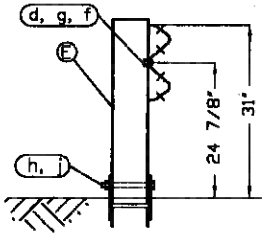
GENERAL NOTES:
1. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
2. The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
3. The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
4. When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
5. A site evaluation should be considered if there is less than 25' between the outlet side of the terminal and any adjacent driving lane.
6. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.



Post #1 Connection Detail



Impact Head Connection Detail



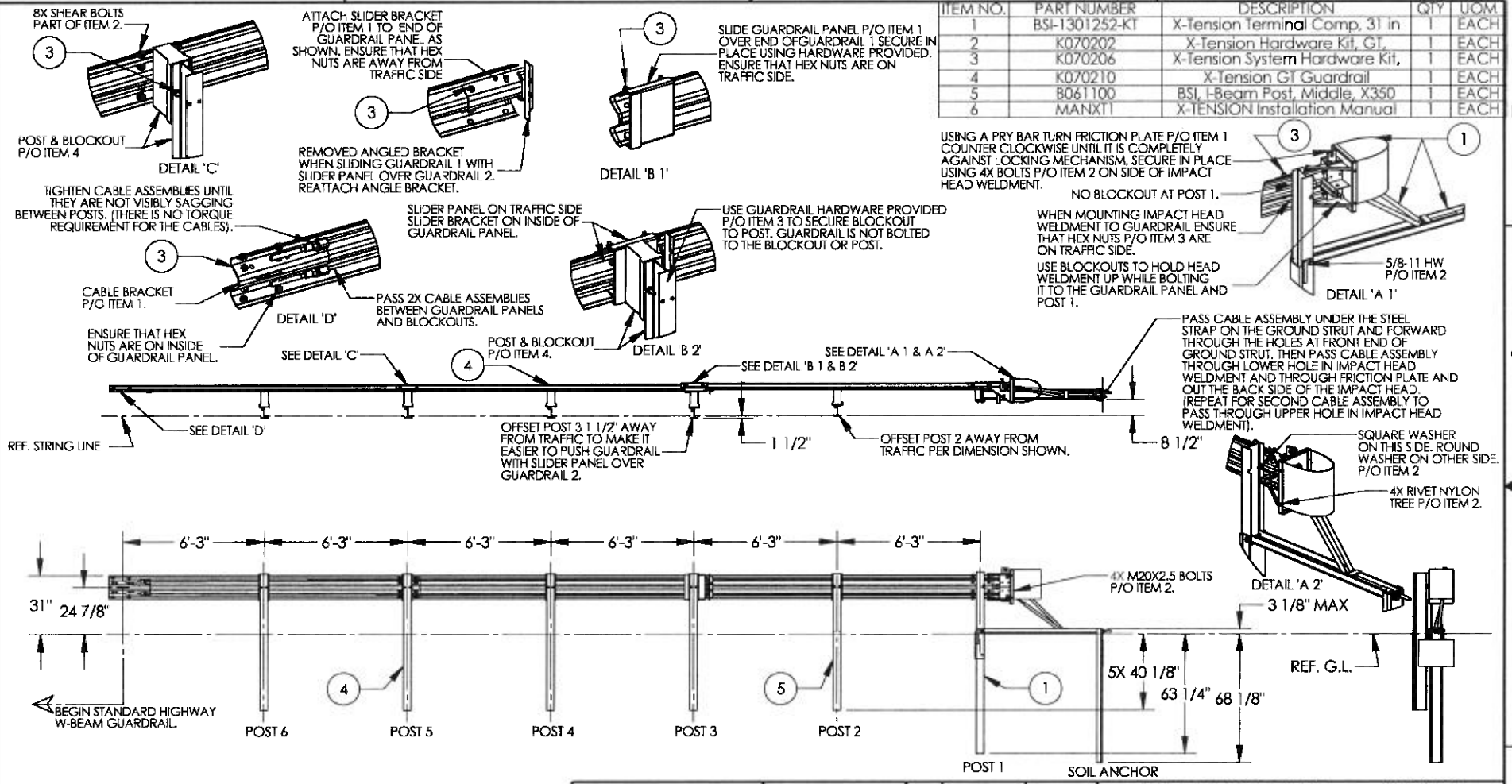
SECTION A-A
Post #2

R-SI Road Systems, Inc.
Big Spring, TX
Phone: 432-263-3435
or Phone: 330-346-0721

SKT-SP-MGS Terminal
Midwest Guardrail System
31" Top of Rail

Sheet: 1
Date: 02/24/10
By: JRR
Drawing Name: SKT-SP-S-MGS
Scale: None
Rev: 0

ITEM NO.	PART NUMBER	DESCRIPTION	QTY	UOM
1	BSI-1301252-KT	X-Tension Terminal Comp, 31 in	1	EACH
2	K070202	X-Tension Hardware Kit, GT,	1	EACH
3	K070206	X-Tension System Hardware Kit,	1	EACH
4	K070210	X-Tension GT Guardrail	1	EACH
5	B061100	BSI, I-Beam Post, Middle, X350	1	EACH
6	MANXTI	X-TENSION Installation Manual	1	EACH



NOTES: UNLESS OTHERWISE SPECIFIED.

1. SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.

APPROVALS

DRAWN BY:	NMV
DRAWN DATE:	2/08/13
APPRD BY:	JMT
APPRD DATE:	2/08/13

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE
FRACTIONS ±1/16 DECIMAL .XX = ±.03 .XXX = ±.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
B	2067	05/02/13
A	2022	2/08/13

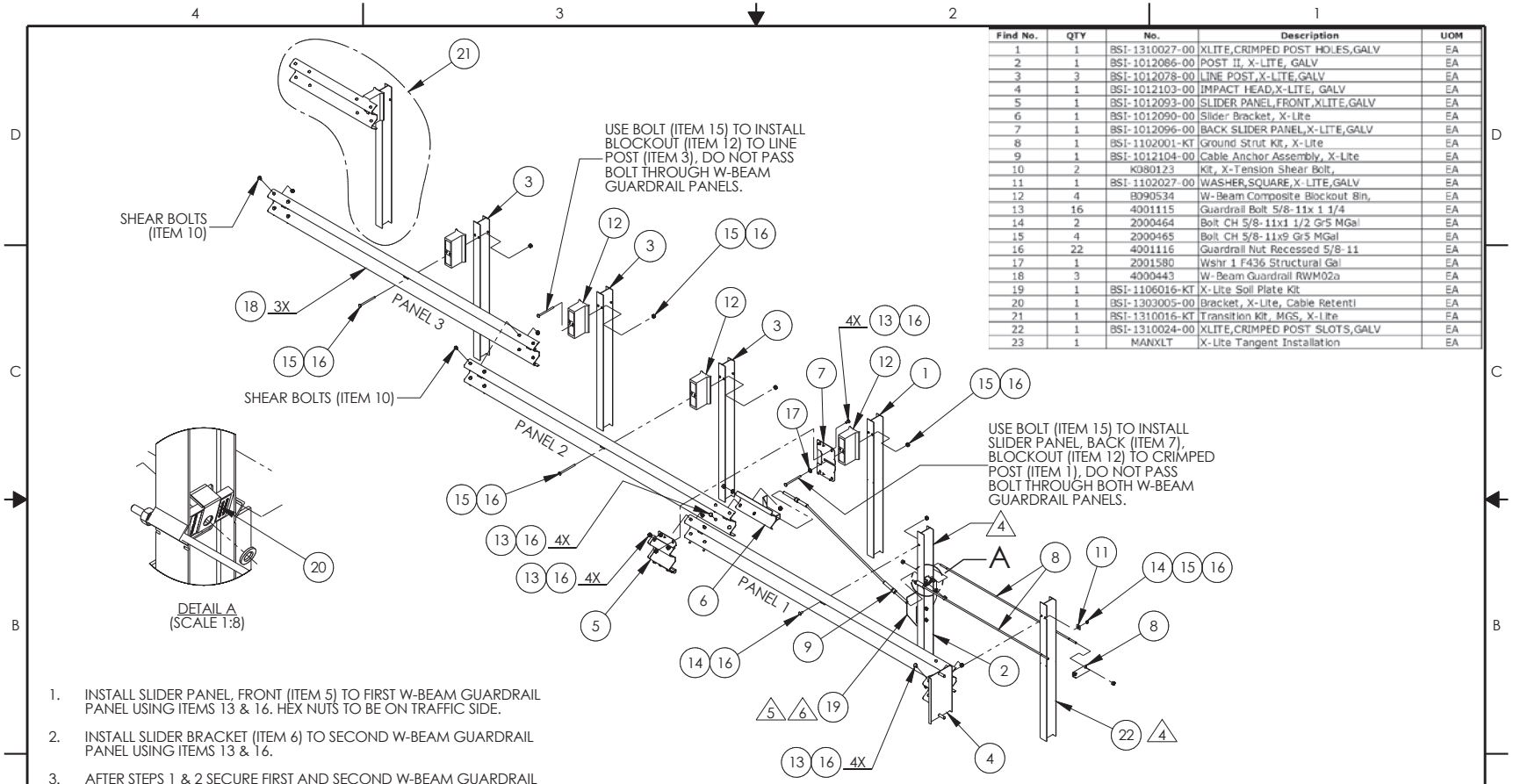
LINDSAY TRANSPORTATION SOLUTIONS
BARRIER SYSTEMS INC.
3333 Vaca Valley Parkway Ste 800
Vacaville, CA 95688
Tel: 888-800-3491
www.barriersystemsinc.com

TITLE: **X-TENSION GUARDRAIL TERMINAL SYSTEM STEEL POST WITH COMPOSITE BLOCKOUT 31" RAIL HEIGHT**

SIZE B | DWG NO. XTGTSS5 | REV. B
SCALE 1:50 | SHEET 1 OF 1

Doc. B100108

Last Saved by: Jeff.Thompson; Friday, May 03, 2013 1:23:29 PM



Find No.	QTY	No.	Description	UOM
1	1	BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	EA
2	1	BSI-1012086-00	POST II, X-LITE, GALV	EA
3	3	BSI-1012078-00	LINE POST,X-LITE,GALV	EA
4	1	BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	EA
5	1	BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	EA
6	1	BSI-1012090-00	Slider Bracket, X-Lite	EA
7	1	BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	EA
8	1	BSI-1102001-KT	Ground Strut Kit, X-Lite	EA
9	1	BSI-1012104-00	Cable Anchor Assembly, X-Lite	EA
10	2	K080123	Kit, X-Tension Shear Bolt,	EA
11	1	BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	EA
12	4	B090534	W-Beam Composite Blockout 8in,	EA
13	16	4001115	Guardrail Bolt 5/8-11x 1 1/4	EA
14	2	2000464	Bolt CH 5/8-11x1 1/2 Gr5 MGal	EA
15	4	2000465	Bolt CH 5/8-11x9 Gr5 MGal	EA
16	22	4001116	Guardrail Nut Recessed 5/8-11	EA
17	1	2001580	Wshr 1 F436 Structural Gal	EA
18	3	4000443	W-Beam Guardrail RWM02a	EA
19	1	BSI-1106016-KT	X-Lite Soil Plate Kit	EA
20	1	BSI-1303005-00	Bracket, X-Lite, Cable Retenti	EA
21	1	BSI-1310016-KT	Transition Kit, MGS, X-Lite	EA
22	1	BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	EA
23	1	MANXLT	X-Lite Tangent Installation	EA

1. INSTALL SLIDER PANEL, FRONT (ITEM 5) TO FIRST W-BEAM GUARDRAIL PANEL USING ITEMS 13 & 16. HEX NUTS TO BE ON TRAFFIC SIDE.
2. INSTALL SLIDER BRACKET (ITEM 6) TO SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 13 & 16.
3. AFTER STEPS 1 & 2 SECURE FIRST AND SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 7, 13 & 16. HEX NUTS TO BE ON TRAFFIC SIDE.
4. SLOT ON POSTS 1 AND 2 TO FACE GUARDRAIL PANEL.
5. IF ROCK OR STIFF SOIL IS ENCOUNTERED, THE POST AND SOIL PLATE MAY BE INSTALLED BY AUGERING AND BACKFILLING THE HOLE. EXTRA CARE MUST BE TAKEN TO PREVENT SETTLEMENT OR LATERAL DISPLACEMENT OF THE POST. BACKFILL MATERIAL SHALL BE COMPACTED TO OPTIMUM COMPACTION.
6. IF ROCK IS ENCOUNTERED, THE SOIL PLATE MAY BE MODIFIED IF APPROVED BY THE PROJECT ENGINEER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE:
FRACTIONS ±1/16 DECIMAL .XX = ±.03 .XXX = ±.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994

APPROVALS

DRAWN BY:	JMT
DRAWN DATE:	10/09/2013
APPR'D BY:	GAD
APPR'D DATE:	10/09/13

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

REV	ECN#	DATE
B	2220	01/23/14
A	2165	11/13/13
0	2151	10/09/13

BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY
3333 Vaca Valley Parkway Ste 800
Vacaville, CA 95688
Tel: 888-800-3691
www.barriersystemsinc.com

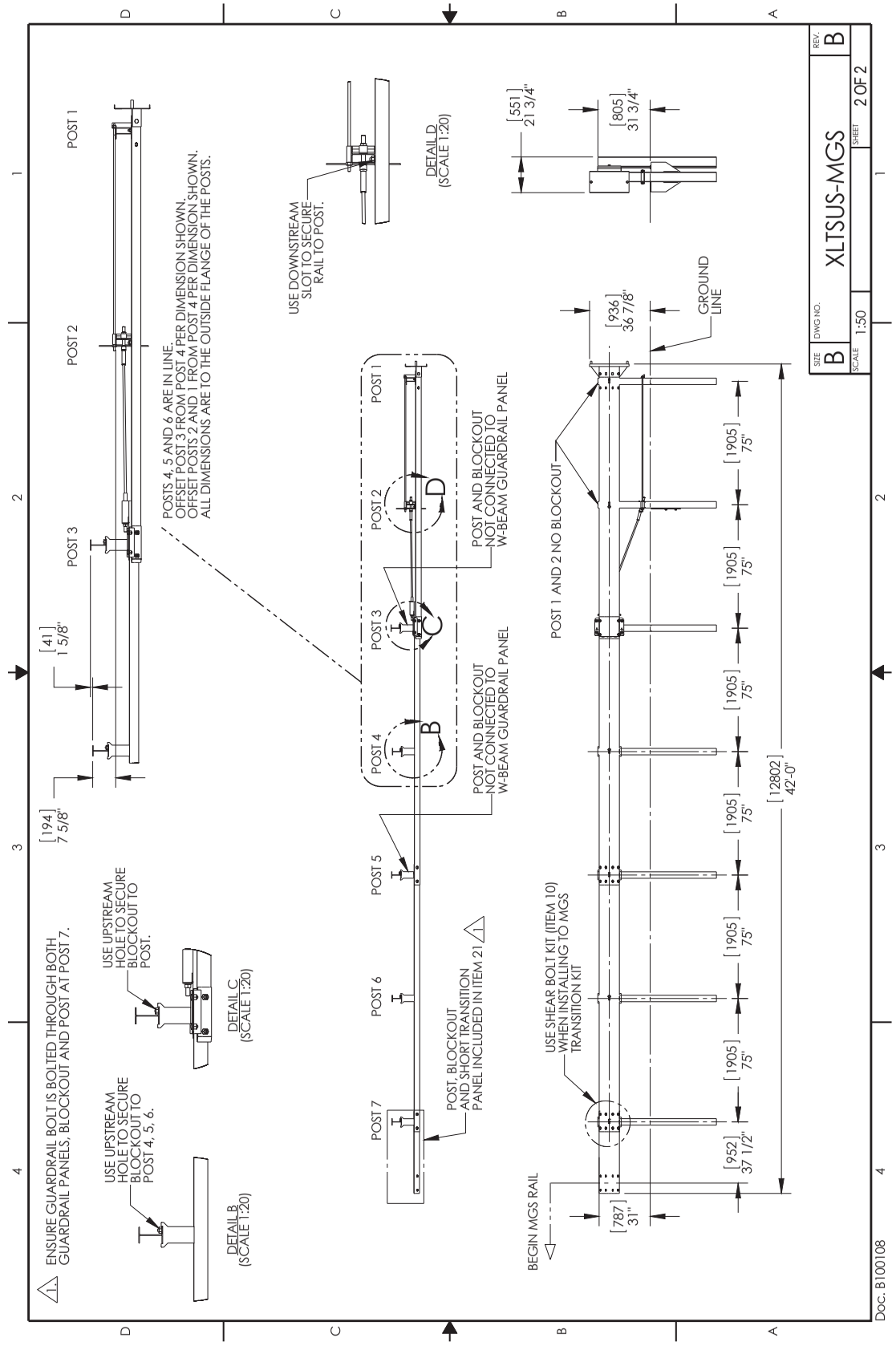
TITLE: **X-LITE SYSTEM ASSEMBLY, TANGENT, TRANSITION TO MGS**

SIZE: B | DWG NO.: XLTSUS-MGS | REV.: B

SCALE: 1:40 | SHEET: 1 OF 2

Doc. B100108

Appendix A - System Configuration, 37’ 6” MGS



Appendix A -Bill of Materials - X-Lite Tangent, MGS 37’ 6”

Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	1.00	1.00
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST,X-LITE,GALV	3.00	-
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	2.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	4.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2000464	Bolt CH 5/8-11x1 1/2 Gr5 MGal	2.00	-
2000465	Bolt CH 5/8-11x9 Gr5 MGal	4.00	-
4001116	Guardrail Nut Recessed 5/8-11	26.00	-
2001580	Wshr 1" F436 Structural	1.00	-
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2 Gr5 MGal	2.00	2.00
2001636	Wshr 5/8 F436 Struct MGal	4.00	4.00
2000312	Nut HX 5/8-11 Gr5 Mgal	2.00	1.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00
BSI-1310016-KT	Transition Kit, MGS, X-Lite	1.00	1.00