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JANUARY 20, 2015

GEOTECHNICAL DESIGN REPORT

OVERHEAD SIGN STRUCTURES
I 680 EXPRESS LANES PROJECT

ALAMEDA COUNTY AND CONTRA COSTA COUNTY, CALIFORNIA

Prepared for
Bay Area Infrastructure Financing Authority
Joseph P. Bort Metro Center
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Project No: 28645477

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January 20, 2015
Project 28645477

Project ID: 0414000489
EA 04-3G9501

Mr. Chris Lillie
Bay Area Infrastructure Financing Authority
Joseph P. Bort Metro Center
101 – 8th Street
Oakland, CA 94607-4700

Subject: **Geotechnical Design Report**
Median Overhead Sign Structures
I-680 Express Lanes Project
Pleasanton, Dublin, San Ramon, Danville, Alamo and Walnut Creek, California

Dear Mr. Lillie:

URS has completed a geotechnical investigation for design of median overhead sign structures as part of the Interstate 680 Express Lanes Project in Pleasanton, Dublin, San Ramon, Danville, Alamo and Walnut Creek, California. The Geotechnical Design Report was prepared in accordance with current Caltrans Guidelines (April 2013).

This report presents our engineering opinions and recommendations regarding the geotechnical factors influencing the design and construction of the proposed median overhead sign structures. The opinions and recommendations have been based upon the results of our field investigation, laboratory testing, engineering judgment and local experience. Mr. Madhu Thummaluru, Geotechnical Engineer, coordinated the subsurface investigation and assisted in preparation of this report. Mr. David Simpson, Certified Engineering Geologist, prepared the site geology and geologic hazards portion of this report. Ms. Anne-Marie Moore, Geotechnical Engineer, provided peer review.

If any questions should arise, or if we can be of further service, please contact the undersigned at (408) 297-9585.

Sincerely,

Stephen Huang, G.E. 2150
Geotechnical Task Leader

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1.1 DESCRIPTION OF PROJECT

To enhance mobility and afford greater user flexibility to those using the I-680 corridor, the Bay Area Infrastructure Finance Authority (BAIFA) is proposing to maximize corridor capacity by converting High Occupancy Vehicle (HOV) lanes into HOV/Express Lanes. The project spans from Alcosta Boulevard to Livorna Road in the northbound (NB) direction and from Rudgear Road to Alcosta Boulevard in the southbound direction. The project is located within the cities of Walnut Creek, Danville and San Ramon in Contra Costa County, and within the city of Dublin in Alameda County. The project would construct approximately 2 miles of express lanes in each direction on the I-680 corridor through conversion of existing High Occupancy Vehicle (HOV) lanes into express lanes.

Civil infrastructure construction will include installation of sign gantries for dynamic messaging and overhead toll gantries/readers, barriers for protecting the toll equipment, close circuit television (CCTV) camera poles, road lighting and conduit for providing connections to power and communication sources.

A total of 31 overhead sign structures are also planned in the northbound and southbound medians as part of this project. The overhead static sign (OSS) structure and the variable toll message sign (VTMS) structure cast-in-drilled hole (CIDH) foundations will be designed in accordance with the 2010 Caltrans Standard Plans, Sheet S-8. The proposed signs are to be located at stations shown in the following table. Figures 2A through 2X present the approximate locations of the proposed sign structures.

Table 1-1 Locations of Median Overhead Sign Structures

Sign Number	Sign Type	Post Type	Station	ID
1	OSS	VII	483+80	OS1-1
2	VTMS	IX	499+50	OS2-1
3	OSS	VII	514+80	OS3-1
4	OSS	VII	540+54	OS5-1
5	OSS	V	593+61	OS9-1
6	VTMS	IX	605+15	OS9-2
7	OSS	VII	625+87	OS11-1
8	OSS	VII	659+05	OS13-1
9	VTMS	IX	692+02	OS16-1
10	VTMS	IX	693+51	OS16-2
11	OSS	VIII	736+26	OS19-1 OS19-2
12	VTMS	IX	759+50	OS20-1
13	VTMS	IX	786+80	OS23-1
14	VTMS	IX	812+02	OS24-1 OS24-2
15	VTMS	IX	850+12	OS27-1
16	OSS	VII	851+44	OS27-2
17	VTMS	IX	900+76	OS30-1
18	VTMS	IX	950+94	OS34-1 OS34-2

Table 1-1 Locations of Median Overhead Sign Structures (continued)

Sign Number	Sign Type	Post Type	Station	ID
19	VTMS	IX	965+30	OS35-1
20	VTMS	IX	998+52	OS36-1
21	OSS	VIII	1013+24	OS37-1 OS37-2
22	VTMS	IX	1059+40	OS40-1 OS40-2
23	OSS	VII	1103+80	OS43-1
24	VTMS	IX	1114+31	OS44-1
25	VTMS	IX	1135+70	OS45-1
26	OSS	VIII	1161+45	OS47-1 OS47-2
27	OSS	V	1173+70	OS48-1
28	VTMS	IX	1211+03	OS50-1
29	OSS	VI	1241+30	OS52-1
30	VTMS	VI	1287+92	OS55-1
31	OSS	II	1301+63	OS56-1

1.2 CALTRANS REVIEW COMMENTS

No comments have been reveiced to date regarding geotechnical aspects of the project. Appendix A is reserved for responses to future comments.

2.1 PURPOSE AND SCOPE OF WORK

The purpose of this Geotechnical Design Report (GDR) is to study the subsurface soil and groundwater conditions at the proposed overhead sign locations, and to provide recommendations for foundation design as well as other geotechnical aspects of the project.

Specifically, URS' scope of services included the following tasks:

- Reviewed existing available as-built exploration data from previous studies by others;
- Conducted a geotechnical field investigation consisting of 33 exploratory borings in 2014;
- Characterized the geotechnical and geologic conditions;
- Evaluated potential geologic hazards;
- Performed engineering analyses based on exploratory data;
- Analyzed soil samples to evaluate corrosion potential for buried concrete structures;
- Provided opinions and recommendations regarding suitability of the standard CIDH pile design for the on-site soil and groundwater conditions, and
- Prepared this GDR in accordance with Caltrans Guidelines for Preparation of Geotechnical Design Reports (2013).

The tasks URS performed are discussed in the subsequent sections and appendices of this report. This report pertains to design and construction of median overhead sign structures only. Recommendations for civil infrastructure, underground utilities, pavements, and gantry and overhead lighting foundations are beyond the scope of this report.

A concurrent soil and groundwater quality assessment was performed; the results are presented in a companion report.

2.2 PREVIOUS INVESTIGATIONS

Numerous exploratory borings and Cone Penetration Tests (CPTs) were completed previously within the project limits by Caltrans and other consultants; however, most of the existing data was determined to be either too far from the proposed sign structures, or incomplete with regard to qualitative and/or quantitative information for use in design of the proposed overhead sign structures.

2.3 FIELD EXPLORATION AND LABORATORY TESTING

URS advanced 34 borings in 2014 in the highway median to investigate the subsurface conditions at proposed overhead sign locations along the project alignment. The approximate locations of the closest borings to the proposed sign structures are presented on Figures 2A through 2X. All of the borings were drilled with a truck-mounted rig using hollow-stem drilling methods.

Prior to drilling, all boring locations were cleared for the presence of underground utilities by reviewing as-built utility plans, contacting Underground Services Alert (USA), and by using a private utility locator.

A representative of URS observed the drilling operations and soil sampling. Visual classifications of the soils encountered were made from cuttings and soil samples. The soil

samples collected from the borings were sealed and labeled immediately to preserve their natural moisture content. At completion of the exploration, samples were delivered to the laboratory for further examination and testing. The borings were then backfilled with a mixture of cement and bentonite in accordance with the requirements of the Zone 7 Water Agency and Contra Costa County Environmental Health Department.

The Unified Soil Classification System and guidelines summarizing soil consistency and relative density are presented on the LOTB legend (Sheets A10F and A10G of the 2010 Standard Plans). The logging method is consistent with guidelines presented in Caltrans Soil & Rock Logging, Classification, and Presentation Manual, 2010 Edition. Comprehensive descriptions of the soils encountered at each boring, together with field and laboratory test data and symbols, are presented on the LOTBs in Appendix B. Detailed results of the laboratory tests are presented on Table B-1 in Appendix B.

2.4 SITE CONDITIONS

2.4.1 Surface Conditions

Structural pavement was encountered at the surface in each boring by URS with the approximate measured component thicknesses as shown in Table 2-1.

Table 2-1 Pavement Section Measurements (URS Borings 2014)

Boring	Station	Structural Pavement Component Thickness (inches)		
		Asphalt Concrete	Lean Concrete Base	Aggregate Base/Cement Treated Base
A-14-001	485+60	14	-	6
A-14-002	499+50	16	-	8
A-14-003	514+80	12	-	6
A-14-004	540+50	14	-	8
A-14-005	593+60	13	-	7
A-14-006	606+10	14	-	8
A-14-007	625+20	14	-	4
A-14-008	659+05	14	-	6
A-14-009	692+75	14	-	6
A-14-010	735+90	12	-	6
A-14-011	759+80	15	-	7
A-14-012A	785+75	14	-	10
A-14-013	811+80	15	-	9
A-14-014	850+40	18	-	6
A-14-015	900+62	15	-	9
A-14-016	950+70	14	-	10
A-14-017	966+25	16	-	8
A-14-018	998+50	16	-	8
A-14-019	1013+00	18	-	12
A-14-020	1059+15	12	3	9

Table 2-1 Pavement Section Measurements (URS Borings 2014) (continued)

Boring	Station	Structural Pavement Component Thickness (inches)		
		Asphalt Concrete	Lean Concrete Base	Aggregate Base/Cement Treated Base
A-14-021	1103+15	16	-	8
A-14-022	1114+30	12	-	12
A-14-023	1133+40	15	-	9
A-14-024	1161+00	18	-	10
A-14-025	1173+70	18	-	8
A-14-027	1211+03	12	-	8
A-14-028	1241+30	12	-	4
A-14-030	1287+90	14	-	8
A-14-031	1301+35	12	-	12
A-14-032	1135+70	14	-	10

2.4.2 Subsurface Soil Conditions

Beneath the pavement sections, the borings encountered embankment fills underlain by native alluvial soils and formational materials. The fills, where encountered, typically consisted of stiff to hard lean and sandy lean clays and medium dense to very dense sands and gravels. The native alluvial soils typically consisted of medium to hard lean clays, sandy lean clays and silts with interbedded medium dense to very dense poorly graded silty and clayey sands. The underlying formational materials, where encountered below the alluvium, generally consisted of highly weathered siltstone and claystone. Detailed descriptions of the soils encountered in the borings are presented in Table 2-2 for each overhead sign structure location.

Table 2-2 Summary of Soil Conditions

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS1-1	483+80	A-14-001	485+60 5 ft right	Below the pavement section described in Table 2-1, the boring encountered medium dense silty sand to a depth of about 2.5 feet, underlain by stiff to very stiff lean clay with gravel to depth of 30 feet below the existing ground surface (bgs), the terminal depth of the boring. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.
OS2-1	499+50	A-14-002	499+50 5 ft right	Below the pavement section described in Table 2-1, the boring encountered very stiff to hard lean and sandy lean clay to depth of 30 feet bgs, the terminal depth of the boring. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.

Table 2-2 Summary of Soil Conditions (continued)

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS3-1	514+80	A-14-003	514+80 5 ft right	Below the pavement section described in Table 2-1, the boring encountered medium dense sandy silt to a depth of approximately 5 feet bgs, underlain by very stiff to hard sandy lean clay to depth of 30 feet bgs, the terminal depth of the boring. Based on available topographic data, the upper 15 to 20 feet of the soil profile is likely embankment fill.
OS5-1	540+54	A-14-004	540+50 5 ft right	Below the pavement section described in Table 2-1, the boring encountered dense to very dense poorly-graded gravel with sand to a depth of about 6 feet, underlain by stiff to hard lean clay to a depth of 30 feet, the terminal depth of the boring.
OS9-1	593+61	A-14-005	593+60 5 ft right	Below the pavement section described in Table 2-1, the boring encountered very stiff silt to a depth of about 5 feet, underlain by hard lean clay to a depth of about 13 feet, underlain by sedimentary claystone/siltstone bedrock to a depth of 30 feet, the terminal depth of the boring.
OS9-2	605+15	A-14-006	606+10 5 ft left	Below the pavement section described in Table 2-1, the boring encountered very stiff lean clay to a depth of about 6 feet underlain by dense clayey sand to a depth of about 7 feet. Stiff to very stiff lean clay was encountered below the clayey sand to a depth of about 17 feet, underlain by dense silty, clayey sand with gravel to a depth of about 20 feet. Very stiff lean clay was encountered below the sand to a depth of 30 feet, the terminal depth of the boring.
OS11-1	624+87	A-14-007	625+20 5 ft left	Below the pavement section described in Table 2-1, the boring encountered stiff to hard lean clay to a depth of about 22 feet, underlain by medium dense to dense silty sand with gravel to a depth of about 28.5 feet and very stiff lean clay to a depth of 30 feet, the terminal depth of the boring. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.
OS13-1	659+05	A-14-008	659+05 5ft right	Below the pavement section described in Table 2-1, the boring encountered stiff to hard lean clay to a depth of 30 feet, the terminal depth of the boring. Based on available topographic data, the upper 8 to 15 feet of the soil profile is likely embankment fill.

Table 2-2 Summary of Soil Conditions (continued)

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS16-1 OS16-2	692+02 693+51	A-14-009	692+75 5 ft left	Below the pavement section described in Table 2-1, the boring encountered stiff to very stiff lean clay with sand to a depth of 30 feet, the terminal depth of the boring. Based on available topographic data, the upper 8 to 15 feet of the soil profile is likely embankment fill.
OS19-1 OS19-2	736+26	A-14-010	735+90 5 ft left	Below the pavement section described in Table 2-1, the boring encountered stiff to very stiff lean clay with a clayey sand interbed to a depth of about 16 feet, underlain by very dense sandy silt and sedimentary siltstone bedrock to a depth of 30 feet, the terminal depth of the boring.
OS20-1	759+50	A-14-011	759+80 5 ft left	Below the pavement section described in Table 2-1, the boring encountered very stiff to hard sandy lean clay to a depth of about 12 feet, underlain by medium dense silty sand with gravel to a depth of about 14 feet. Very stiff to hard sandy silt, lean clay with sand, and sandy lean clay were encountered below a depth of 14 feet and extended to a depth of 30 feet, the terminal depth of the boring.
OS23-1	786+80	A-14-012A	785+75 5 ft left	Below the pavement section described in Table 2-1, medium to very stiff lean clay was encountered to depth of 30 feet bgs, the terminal depth of the boring.
OS24-1 OS24-2	812+02	A-14-013	811+80 5 ft left	Below the pavement section described in Table 2-1, the boring encountered stiff to very stiff lean to fat clay to depth of about 13 feet, underlain by medium dense silty sand and sandy silt to a depth of about 28 feet. Lean clay with silt and sand was encountered below the sand to the terminal boring depth of 30 feet.
OS27-1 OS27-2	850+12 851+44	A-14-014	850+40 5 ft left	Below the pavement section described in Table 2-1, the boring encountered very stiff lean clay to depth of about 8 feet underlain by hard sandy silt (siltstone) to a depth of 30 feet, the terminal depth of the boring.
OS30-1	900+76	A-14-015	900+60 10 ft left	Below the pavement section described in Table 2-1, the boring encountered very stiff to hard lean clay to depth of about 18 feet underlain by stiff to very stiff sandy silt to a depth of 28 feet and very dense silty sand to a depth of 30 feet, the terminal depth of the boring.

Table 2-2 Summary of Soil Conditions (continued)

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS34-1 OS34-2	950+94	A-14-016	950+705 ft right	Below the pavement section described in Table 2-1, the boring encountered stiff to hard sandy silt to a depth of about 19 feet underlain by stiff to hard sandy lean clay to a depth of 30 feet, the terminal depth of the boring.
OS35-1	965+30	A-14-017	966+25 5 ft right	Below the pavement section described in Table 2-1, the boring encountered silty sand to a depth of about 4 feet underlain by hard sandy lean clay and sandy silt to a depth of about 18 feet. Stiff sandy lean clay, lean clay and sandy silt were encountered below a depth of about 18 feet, extending to the bottom of the boring at 30 feet. Based on available topographic data, the upper 15 to 20 feet of the soil profile is likely embankment fill.
OS36-1	998+52	A-14-018	998+50 5 ft right	Below the pavement section described in Table 2-1, the boring encountered sandy lean clay to a depth of 8 feet underlain by silty sand to a depth of about 11 feet. Hard lean clay, sandy lean clay and silty sand with gravel were encountered below a depth of about 11 feet, extending to the bottom of the boring at 30 feet.
OS37-1 OS37-2	1013+24	A-14-019	1013+005 ft right	Below the pavement section described in Table 2-1, the boring encountered hard silt (siltstone) to a depth of about 13 feet, underlain by very dense silty sand to a depth of about 18 feet. Siltstone was encountered below the silty sand to the terminal depth of the boring at 30 feet bgs.
OS40-1 OS40-2	1059+40	A-14-020	1059+155 ft right	Below the pavement section described in Table 2-1, the boring encountered clayey sand to a depth of about 3 feet bgs, underlain by hard lean clay to a depth of about 5 feet bgs and medium dense clayey sand to a depth of about 7 feet bgs. Stiff sandy silt was encountered below the clayey sand to a depth of about 13 feet bgs, underlain by hard sandy lean clay and sandy silt to the terminal depth of the boring at 30 feet bgs. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.
OS43-1	1103+80	A-14-021	1103+15 5 ft right	Below the pavement section described in Table 2-1, the boring encountered stiff to very stiff lean clay to a depth of about 9 feet bgs, underlain by hard silt and clay to the terminal depth of the boring at 30 feet bgs.

Table 2-2 Summary of Soil Conditions (continued)

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS44-1	1114+31	A-14-022	1114+30 5 ft right	Below the pavement section described in Table 2-1, the boring encountered hard sandy lean clay and sandy silt to a depth of about 8 feet bgs underlain by very dense silty sand and poorly graded sand with gravel to a depth of 30 feet bgs, the terminal depth of the boring.
OS45-1	1135+70	A-14-032	1135+70 5 ft right	Below the pavement section described in Table 2-1, the boring encountered very stiff lean clay to a depth of 5 feet underlain by stiff to very stiff sandy lean clay with occasional sitly sand lenses to a depth of 30 feet bgs, the terminal depth of the boring. Based on available topographic data, the upper 15 to 20 feet of the soil profile is likely embankment fill.
OS47-1 OS47-2	1161+45	A-14-024	1161+00 5 ft right	Below the pavement section described in Table 2-1, the boring encountered very stiff to hard lean clay to a depth of about 9 feet bgs underlain by medium dense silty sand to a depth of about 19 feet bgs. Very stiff to hard lean clay was encountered below the silty sand to a depth of 30 feet bgs, the terminal depth of the boring.
OS48-1	1173+70	A-14-025	1173+70 5 ft right	Below the pavement section described in Table 2-1, the boring encountered very dense and interbedded silty sand, sandy silt and poorly-graded sand with silt to a depth of about 23 feet bgs, underlain by hard sandy silty and very dense silty sand to a depth of 30 feet bgs, the terminal depth of the boring.
OS50-1	1211+03	A-14-027	1211+05 5 ft right	Below the pavement section described in Table 2-1, the boring encountered hard sandy lean clay to a depth of about 4 feet bgs underlain by very dense silty sand with gravel to a depth of about 6 feet bgs. Siltstone bedrock was encountered below the silty sand to a depth of 30 feet, the terminal depth of the boring.

Table 2-2 Summary of Soil Conditions (continued)

Sign Structure(s)	Sign Station(s)	Relevant Boring		Subsurface Conditions
		Boring ID	Station and Approx. Offset	
OS52-1	1241+30	A-14-028	1241+30 5 ft right	Below the pavement section described in Table 2-1, the boring encountered dense silty sand to a depth of about 5 feet bgs underlain by very stiff lean clay to a depth of about 14 feet bgs. The lean clay was underlain by medium dense silty sand to a depth of about 15 feet bgs, underlain by very stiff sandy lean clay and sandy silt to a depth of about 28 feet bgs. Very dense silty sand was encountered below a depth of 28 feet to the terminal depth of the boring at 30 feet bgs. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.
OS55-1	1287+92	A-14-030	1287+90 5 ft right	Below the pavement section described in Table 2-1, the boring encountered stiff to hard lean clay to a depth of about 9 feet bgs, underlain by medium dense to dense sandy silt and silty sand to a depth of about 19 feet bgs. Hard lean clay was encountered below the silty sand to a depth of about 23 feet bgs, undelrian by medium dense clayey and poorly-graded sand to a depth of about 30 feet bgs. Stiff to very stiff lean clay was encounetered below the sand to a depth of 40 feet, the terminal depth of the boring. Based on available topographic data, the upper 20 to 25 feet of the soil profile is likely embankment fill.
OS56-1	1301+63	A-14-031	1301+35 5 ft right	Below the pavement section described in Table 2-1, the boring encountered medium dense clayey sand interbedded with hard sandy lean clay to a depth of about 10 feet bgs, underlain by stiff to hard lean clay, sandy lean clay and sandy silt (siltstone) to a depth of about 26 feet bgs. Medium dense to very dense silty sand and poorly-graded sand were encountered below the sandy silt to the terminal depth of the boring at 40 feet bgs. Based on available topographic data, the upper 15 to 20 feet of the soil profile is likely embankment fill.

Table 2-3 presents the measured groundwater depths encountered in borings by URS; elevations are approximate and based on NAVD88.

Table 2-3 Groundwater Measurements at Time of Drilling

Sign Structure(s)	Boring ID	Approximate Ground Surface Elevation (ft)	Groundwater Table Elevation (ft)		Date Measured
			Depth below Ground surface (ft)	Elevation (ft)	
OS1-1	A-14-001	359.0	Dry to 30 feet	Not applicable	5/27/2014
OS2-1	A-14-002	355.5	Dry to 30 feet	Not applicable	5/27/2014
OS3-1	A-14-003	360.0	Dry to 30 feet	Not applicable	5/28/2014
OS5-1	A-14-004	367.0	18.2 (initial)	348.8	5/25/2014
OS9-1	A-14-005	415.0	Dry to 30 feet	Not applicable	5/16/2014
OS9-2	A-14-006	428.0	Dry to 30 feet	Not applicable	5/15/2014
OS11-1	A-14-007	449.5	Dry to 30 feet	Not applicable	5/15/2014
OS13-1	A-14-008	432.0	23.3 (end of drilling)	408.7	5/28/2014
OS16-1, OS16-2	A-14-009	448.0	Dry to 30 feet	Not applicable	5/14/2014
OS19-1, OS19-2	A-14-010	472.0	Dry to 30 feet	Not applicable	5/28/2014
OS20-1	A-14-011	490.0	Dry to 30 feet	Not applicable	5/14/2014
OS23-1	A-14-12A	484.0	9.8 (initial) 24.0 (end of drilling)	474.2 460.0	5/13/2014
OS24-1, OS24-2	A-14-013	477.5	24.0 (initial) 16.5 (end of drilling	453.5 461.0	5/13/2014
OS27-1, OS27-2	A-14-014	456.0	Dry to 30 feet	Not applicable	5/13/2014
OS30-1	A-14-015	421.0	Dry to 30 feet	Not applicable	5/12/2014
OS34-1, OS34-2	A-14-016	396.0	Dry to 30 feet	Not applicable	5/19/2014
OS35-1	A-14-017	390.5	Dry to 30 feet	Not applicable	5/20/2014
OS36-1	A-14-018	400.5	Dry to 30 feet	Not applicable	5/20/2014
OS37-1, OS37-2	A-14-019	396.5	Dry to 30 feet	Not applicable	5/20/2014
OS40-1, OS40-2	A-14-020	352.5	Dry to 30 feet	Not applicable	5/21/2014
OS43-1	A-14-021	321.0	Dry to 30 feet	Not applicable	5/21/2014
OS44-1	A-14-022	302.0	Dry to 30 feet	Not applicable	5/21/2014
OS45-1	A-14-032	292.0	Dry to 30 feet	Not applicable	12/23/2014
OS47-1, OS47-2	A-14-024	282.5	Dry to 30 feet	Not applicable	5/22/2014
OS48-1	A-14-025	277.0	Dry to 30 feet	Not applicable	5/22/2014
OS50-1	A-14-027	261.5	Dry to 30 feet	Not applicable	5/29/2014
OS52-1	A-14-028	217.0	Dry to 30 feet	Not applicable	5/29/2014
OS55-1	A-14-030	175.5	Dry to 40 feet	Not applicable	5/30/2014
OS56-1	A-14-031	178.5	34 (initial)	144.5	5/29/2014

The groundwater levels shown in the preceding table were measured in borings by URS at the time of drilling and may not represent stabilized groundwater levels.

A public records review of groundwater data for the San Ramon groundwater basin (Geotracker, 2014), indicates that depth to first groundwater along the project alignment could be as shallow as 5 to 10 feet bgs where Interstate 680 is at grade (not on a raised embankment) and/or located in close proximity to creeks or streams.

Please note that fluctuations in the groundwater level can occur due to variations in rainfall, infiltration rate or other factors not in evidence at the time measurements were made.

3.1 REGIONAL AND LOCAL GEOLOGY

The section of I-680 between I-580 on the south (Sta. 485+50) and Olympic Boulevard on the north (Sta. 1310+50) is located within the San Ramon Valley. Las Trampas Ridge flanks the west side of the valley and Sherburne Hills and other low hills and ridges in the foothills of Mt. Diablo flank the east side of the valley. The valley is flat to gently northwest sloping. This region is within the Coast Ranges geomorphic province of California. Northwest-southeast-trending valleys and ridges characterize the regional morphology of the Coast Ranges province. These topographic features are controlled by folds and faults resulting from the collision of the Farallon tectonic plate and North American plate, compressional folding and faulting, and subsequent predominately strike-slip movement along the San Andreas Fault System that separates the North American plate and the Pacific plates.

Figure 3 shows the regional geologic map of the project area that was compiled from two US Geological Survey maps of Alameda and Contra Costa Counties (Graymer, et al. 1994; Helley and Graymer, 1997). This map shows that over 90 percent of the alignment is underlain by undivided Quaternary alluvial deposits, Qu, that have been laid down in the San Ramon Valley. These young sedimentary deposits include deposits associated with active stream channels, stream terraces, and flood plain deposits and are composed of unconsolidated clay to gravel size particles.

In the northern half of the project alignment, portions of I-680 cross the westernmost toe of the foothills along the east side of the San Ramon Valley. From several hundred yards north of Stone Valley Road northward to about ¾ mile north of Livorna Road most of the alignment is constructed on Pliocene age (2.6 to 5.3 million years) Green Valley and Tassajara Formations, Tgvt, non-marine sandstone, siltstone, and conglomerate. Between Crow Canyon Road and Sycamore Valley Road, the project alignment crosses the toe of a low hill on the west side of San Ramon Valley that is underlain by Miocene age (5.3 to 23 million years) Briones Formation, Tbr, composed of marine sandstone, siltstone and conglomerate, locally with abundant shell fossils. Farther south near Alcosta Boulevard a cut was made into an east-facing hillslope for the construction of I-680. This hill is underlain by Green Valley and Tassajara Formations.

Table 3-1 lists the mapped geologic unit(s) at each overhead sign location.

Table 3-1 Mapped Geologic Units at Overhead Sign Locations

Sign ID	Sign Type	Station	Geologic Unit
OS1-1	Overhead Static Sign	483+80	Qu
OS2-1	Variable Toll Message Sign	499+50	Qu
OS3-1	Overhead Static Sign	514+80	Qu
OS5-1	Overhead Static Sign	540+54	Qu
OS9-1	Overhead Static Sign	593+61	Tgvt
OS9-2	Variable Toll Message Sign	605+15	Tgvt
OS11-1	Overhead Static Sign	625+87	Qu
OS13-1	Overhead Static Sign	659+05	Qu
OS16-1	Variable Toll Message Sign	692+02	Qu
OS16-2	Variable Toll Message Sign	693+51	Qu
OS19-1, OS19-2	Overhead Static Sign	736+26	Qu

Table 3-1 Mapped Geologic Units at Overhead Sign Locations (continued)

Sign ID	Sign Type	Station	Geologic Unit
OS20-1	Variable Toll Message Sign	759+50	Qu
OS23-1	Variable Toll Message Sign	786+80	Qu
OS24-1, OS24-2	Variable Toll Message Sign	812+02	Qu
OS27-1	Variable Toll Message Sign	850+12	Tbr
OS27-2	Overhead Static Sign	851+44	Tbr
OS30-1	Variable Toll Message Sign	900+76	Qu
OS34-1, OS34-2	Overhead Static Sign	950+94	Qu
OS35-1	Variable Toll Message Sign	965+30	Qu
OS36-1	Variable Toll Message Sign	998+52	Qu
OS37-1, OS37-2	Overhead Static Sign	1013+24	Tgvt
OS40-1, OS40-2	Variable Toll Message Sign	1059+40	Tgvt
OS43-1	Overhead Static Sign	1103+80	Tgvt
OS44-1	Variable Toll Message Sign	1114+31	Tgvt
OS45-1	Variable Toll Message Sign	1135+70	Tgvt
OS47-1, OS47-2	Overhead Static Sign	1161+45	Tgvt
OS48-1	Overhead Static Sign	1173+70	Tgvt
OS50-1	Variable Toll Message Sign	1211+03	Qu
OS52-1	Overhead Static Sign	1241+30	Qu
OS55-1	Variable Toll Message Sign	1287+92	Qu
OS56-1	Overhead Static Sign	1301+36	Qu

3.2 REGIONAL TECTONIC SETTING AND SEISMICITY

The project is located in the seismically active San Francisco Bay area and can be expected to experience strong ground shaking during its lifetime. This portion of the I-680 corridor is subparallel to the nearby active northern segment of the Calaveras fault that lies between 1,000 and 5,000 feet to the west. Figure 4 is a map of major active faults in the Bay Area. Other faults that can be expected to generate large earthquakes affecting the site include the Concord-Green Valley, Greenville, Hayward, and San Andreas faults. The California Geological Survey has produced maps showing Alquist-Priolo (A-P) Earthquake Fault Zones along faults with known Holocene activity that pose a potential surface faulting hazard. The east edge of the A-P zone along the Calaveras fault is very close to this portion of I-680.

3.3 PROJECT SITE SEISMICITY

The project alignment is located in close proximity to known active and potentially active geologic faults as shown on Figure 4. The closest active fault to this section of I-680 is the Calaveras fault.

Based on the Caltrans ARS online tool (v.2.3.06), URS estimates the peak ground acceleration, PGA, at about 0.83g at the southern project limit and about 0.78g at the northern project limit for earthquakes generated on nearby faults. URS considered a shear wave velocity of 300 meters per second to be representative for the generally stiff and dense soils along the project alignment.

3.4 POTENTIAL GEOLOGIC HAZARDS

3.4.1 Fault Rupture

The major active faults in the area are the East Bay faults associated with the San Andreas Fault System: Hayward and Calaveras. Historically, ground surface ruptures closely follow the trace of geologically young faults. The project alignment is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo (AP) Earthquake Fault Zoning Act of 1972 and no known active or potentially active faults cross the alignment. However, the eastern edge of the AP zone along the northern segment of the Calaveras fault touches the west side of I-680 about 1 mile north of Alcosta Boulevard. We conclude the risk of fault offset along the project alignment from a known active fault is very low.

3.4.2 Ground Shaking

During a major earthquake on a segment of one of the nearby faults, strong to very strong shaking is expected to occur at the project site. The intensity of the earthquake ground motion at the site will depend upon the characteristics of the generating fault, distance to the earthquake epicenter, magnitude and duration of the earthquake, and specific site geologic conditions. Strong shaking during an earthquake can cause damage to structures not designed to withstand the shaking. Shaking can also result in ground failure such as that associated with soil liquefaction, lateral spreading, and landsliding.

3.4.3 Liquefaction and Lateral Spreading

Liquefaction is a phenomenon whereby soil deposits temporarily lose shear strength and collapse. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the soil deposits. The soil type most susceptible to liquefaction is loose, cohesionless, granular soil below the water table and within about 50 feet of the ground surface. Liquefaction can result in a loss of foundation support and settlement of overlying structures, ground subsidence and translation due to lateral spreading, lurch cracking, and differential settlement of affected deposits. Lateral spreading occurs when a soil layer liquefies at depth and causes horizontal movement or displacement of the overlying mass on sloping ground or towards a free face such as a stream bank or excavation.

The alluvial deposits underlying the southern portion of the project alignment within Alameda County have been mapped by California Geologic Survey (CGS) on the Dublin 7.5 minute quadrangle as susceptible to liquefaction (CGS, 2003). The same is also likely true of the alluvial deposits beneath the majority of the alignment to the north within Contra Costa County, although this area has not been mapped by CGS. Lateral spreading may also be a significant hazard along the project alignment where there are nearby incised stream channels.

The soils encountered in the current and previous subsurface explorations are generally stiff to hard clays or, if sandy, are mostly medium dense to very dense silty and clayey sand. Groundwater was generally encountered within the upper 10 to 30 feet of ground surface in five of the 2014 borings. Based on the generally cohesive nature of the soils encountered in borings, the relative density of the interbedded granular soils and the depth to groundwater, we conclude that the susceptibility to liquefaction at the sign structure sites is moderate, primarily within the

granular interbedded soils. Site specific liquefaction evaluation and estimates of post-liquefaction settlement are presented in Section 4.1.2 of this report.

3.4.4 Seismic Induced Settlement

Seismic induced settlement of unsaturated or dry sands occurs when loose sands above the water table increase in density as a result of earthquake shaking. The soil densification can result in differential settlement because of variations in soil composition, thickness and initial density. The granular soils encountered in the borings completed at and near the sign structure locations are generally medium dense to dense and are mostly interbedded within the cohesive clayey soils. Therefore, we judge the potential for seismic compression to be low.

3.4.5 Landsliding

Landslides are downslope movements of rock and/or soil under the effects of gravity. They often occur following the initiation of a destabilizing event such as ground saturation following heavy rains, earthquake shaking, erosion of the toe or downslope portion of the slide mass, or loading of the head or upslope portion of the slide mass. The CGS Seismic Hazard Zones Map of the Dublin quadrangle (CGS, 2003) indicates the site is not within an area susceptible to seismically induced landsliding. Our reconnaissance of the project alignment indicates that the natural slopes are not steep. We did not observe evidence of past landsliding near I-680. The potential for landsliding on the natural slopes at this site is considered to be low.

3.4.6 Scour

None of the proposed overhead signs are located in a streambed or waterway; scour is therefore not a potential concern.

4.1 NEW OVERHEAD SIGNS

4.1.1 General

Thirty-one new overhead sign structures are planned in the median of I-680 between Stations 483+80 and 1301+63. These signs structures will be Single Post Types II, V, VI, VII and IX, Round Pedestal, and will be supported on CIDH pile foundations ranging from 14¾ to 25 feet deep as shown on Sheet S-8 of the 2010 Caltrans Standard Plans. CIDH pile diameters will be 54 inches for Type II and V foundations and 60 inches for Type VI, VII and IX foundations.

Although soil strength criteria for use with standard foundation design is not shown on the Standard Plans, we understand through a recent discussion with Mr. Stanley Johnson of Caltrans that the Standard CIDH pile design is based on Brom's method using a total unit weight of 120 pounds per cubic foot and effective friction angle of 30 degrees for the supporting soils.

4.1.2 Liquefaction

Medium dense sands and sandy silts were encountered below the anticipated high groundwater table in Borings A-14-011, A-14-013 and A-14-031 as shown on the LOTBs presented in Appendix B. These strata typically range from about 4 to 6 feet thick and could potentially liquefy following a large seismic event. In our opinion, the engineering consequences of liquefaction in those layers would be limited to temporary loss of strength, and estimate that post-liquefaction settlement could be on the order of about 1 to 1½ inches based on a PGA of 0.78g to 0.83g generated by a Maximum Magnitude, M_{max}, 6.8 event. The liquefiable layers encountered in these three borings are generally capped by at least 15 feet of stiff to hard clay such that surface manifestation of soil liquefaction is not anticipated.

4.1.3 Foundation Recommendations

The native alluvial soils and underlying formational materials encountered in borings by URS and others are generally stiff to very stiff and medium dense to dense. In addition, the approach fills encountered in several of the recent borings as well as in Borings P-70 (1989) and P-5 (1990) by others are generally stiff and dense. Substantiated with laboratory tests completed to date, the soil conditions encountered at the proposed sign structures are consistent with the Standard Plan pile design assumptions. Therefore, we expect that the proposed standard overhead sign structures can be supported on CIDH piles as shown on Sheet S8 of the 2010 Caltrans Standard Plans.

Sign structures OS2-1, OS9-2, OS16-1, OS16-2, OS20-1, OS23-1, OS27-1, OS30-1, OS34-1, OS35-1, OS36-1, OS44-1, OS45-1, OS50-1 and OS55-1 are classified as non-standard with applied loads provided by the Structural Engineer. The computer program LPILE was used to evaluate the capacity of the Caltrans Standard CIDH pile to resist the applied lateral loads and top of pile moments provided by the Structural Engineer for the proposed overhead sign structures. The analysis resulted in top of pile deflection of less than ¼ inch and maximum bending moment of about 687 kip-feet in the CIDH pile shaft. Table 4-1 presents the results of

LPILE analyses and corresponding minimum foundation depths based on lateral load responses of the piles. LPILE analyses results are presented in Appendix C.

Table 4-1 Summary of LPILE Analyses

Sign Structure	Shear		Bending Moment		Minimum Foundation Depth[1]
	Maximum Shear (kips)	Depth Below Top of Pedestal (feet)	Maximum Bending Moment (kip-ft)	Depth Below Top of Pedestal (feet)	(feet)
OS2-1	54	12.5	638	3	25
OS9-2	57	13	639	3	25
OS16-1	62	14	658	5	25
OS16-2	62	14	658	5	25
OS20-1	61	9	631	2.5	25
OS23-1	48	14	641	3.5	25
OS27-1	66	13	650	4	25
OS30-1	50	13	641	3.5	25
OS34-1	47	20	687	6.5	30
OS35-1	46	20	685	6	30
OS36-1	64	9	630	2	25
OS44-1	48	9	642	3.5	30
OS45-1	56	16.5	650	4	25
OS50-1	44	8	629	2	25
OS55-1	31	17	523	6	30

1 Foundation depth as defined in Standard Plan Sheet S8.

4.1.4 Construction Considerations

The subsurface conditions encountered in borings consist primarily of stiff clay with occasional discontinuous sand strata and interbeds. Groundwater was encountered between depths of about 10 and 35 feet in five of the borings drilled for this study and was not encountered to the terminal boring depths of 30 to 50 feet in the remaining borings by URS and others. In cohesive soils, as were generally encountered, a fairly long time would be required for the groundwater to seep into the borehole and attain an equilibrium position with the long-term hydrostatic groundwater table. Thus, the immediate readings obtained from borings may or may not be representative of the actual groundwater table level. Furthermore, seasonal fluctuations in groundwater levels should be anticipated throughout the year.

Poorly-graded and silty sands, and sandy silts were encountered in many of the borings drilled for the overhead sign structures. Sloughing or caving of these soils could occur during CIDH pile construction. As such, the Contractor should be prepared to use some method of hole stabilization, such as temporary casing or slurry. If casing is used, it should be withdrawn from the hole slowly as the concrete is being placed; a minimum head of concrete of 3 feet should be maintained in the casing at all times. Temporary casing should have a diameter at least 8 inches larger than the specified diameter of the CIDH pile.

Corrosivity testing was completed as part of this investigation to assess the corrosion potential of the soils with regards to construction materials. The corrosion tests were performed by Cerco Analytical in accordance with Caltrans test methods. Caltrans considers a site corrosive to foundation elements if minimum resistivity if less than or equal to 1,000 ohm-cm (as an indicator only), and one or more of the following conditions exist for the representative soil samples taken from the site:

- Chloride concentration is greater than or equal to 500 parts per million (ppm),
- Sulfate concentration s greater than or equal to 2,000 ppm,
- pH is 5.5 or less.

Corrosivity test results from the current investigation are presented in Appendix B. Minimum resistivity tests returned values less than or equal to 1,000 ohm-cm for seven of the 12 samples. Based on measured chloride and sulfate concentrations, the site is considered to be non-corrosive to buried concrete structures in accordance with the Caltrans Corrosion Guidelines. In addition, test results presented in the 2013 Geotechnical Design and Materials Report by others for the portion of I-680 between approximately Station 800+00 to 925+00 indicate that the soils are not corrosive to buried concrete structures.

The opinions, conclusions and recommendations contained in this Geotechnical Design Report are based upon the information obtained from explorations made at widely separated locations, geologic reconnaissance, review of available geologic and topographic information and historic data, and upon local experience and engineering judgment.

The recommendations presented in this report are based on the assumption the soil and geologic conditions do not deviate substantially from those encountered in the exploratory borings. If any variations are encountered during construction, URS should be consulted so that supplementary recommendations can be made.

If the planned construction is changed from that presently conceived, URS should be retained to review the changes and make modifications to the original recommendations presented in this report in order to meet the project needs.

Geotechnical issues may arise during construction that are not apparent at this time. We should be retained during construction to review the soil conditions encountered and the construction procedures. All testing should be done under the direct observation of a representative of our firm.

The elevations shown on LOTBs are based on interpolation from spot and contour elevations shown on available topographic maps and as-built plans.

The recommendations presented in this Geotechnical Design Report were developed with the standard of care commonly used as state of the practice in the profession. No other warranties are included, either express or implied, as to the professional advice presented in this report.

California Geologic Survey, 1982, Alquist Priolo Special Studies Zones map of the Dublin quadrangle, scale 1: 24,000, January 1.

California Geologic Survey, 2008, Seismic Hazard Zones map of the Dublin quadrangle, scale 1: 24,000, August 27.

Geotracker Database, http://geotracker.waterboard.ca.gov/ accessed July 8, 2014.

Graymer, R.W., Jones, D.L., and Brabb, E.E., 1994, Preliminary geologic map emphasizing bedrock formations in Contra Costa County, California: A digital database, U.S. Geological Survey Open-file Report 94-622.

Graymer, R.W., Jones, D.L., and Brabb, E.E., 1996, Preliminary geologic map emphasizing bedrock formations in Alameda County, California: a digital database: US Geological Survey Open-File Report 96-252.

Helley, E.J. and Graymer, R.W., 1997, Quaternary geology of Alameda County and parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin counties, California: a digital database: U.S. Geological Survey Open-File Report 97-97.

INDEX OF PLANS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

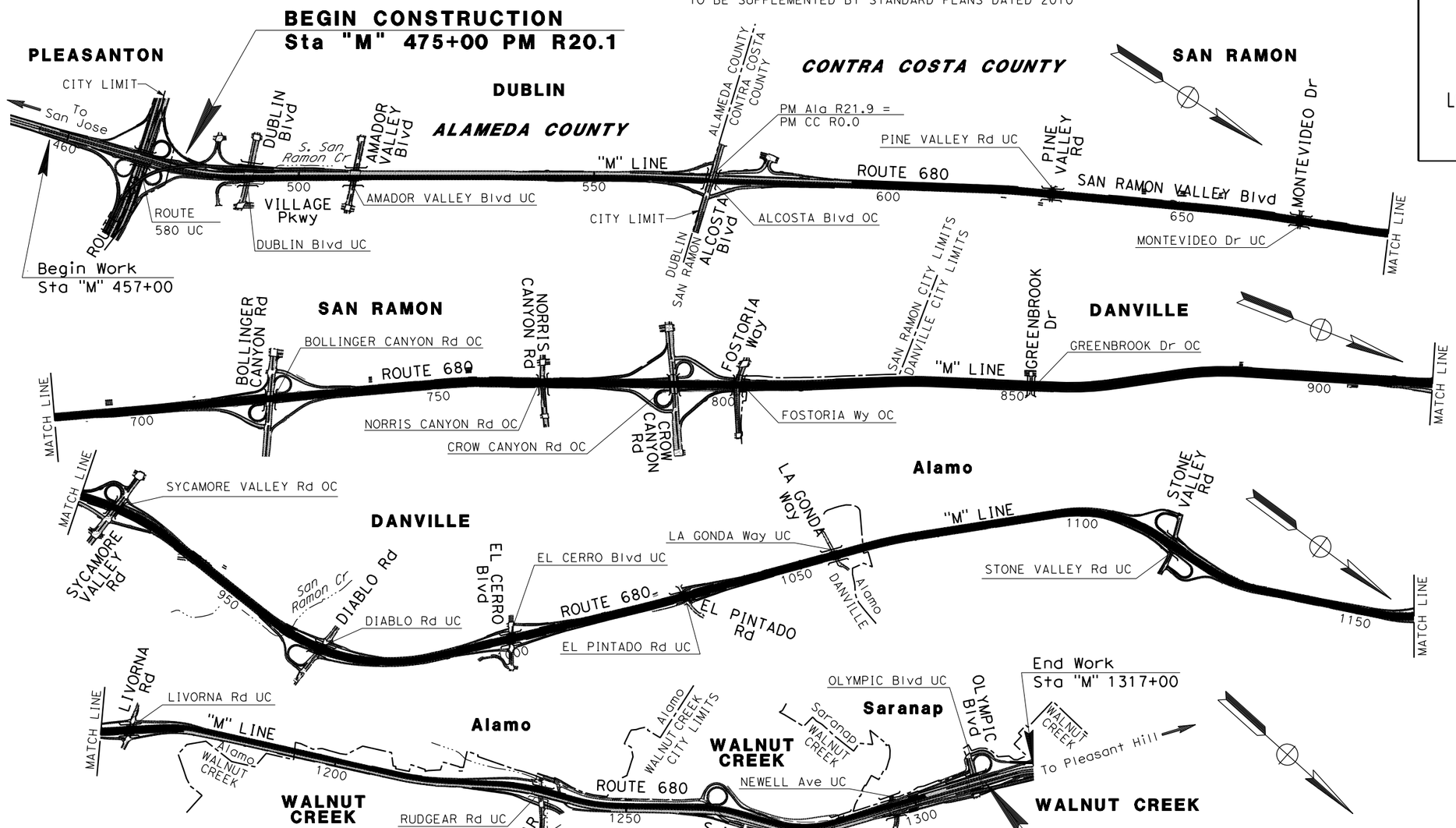
PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

IN ALAMEDA AND CONTRA COSTA COUNTIES
IN DUBLIN, SAN RAMON, DANVILLE
AND WALNUT CREEK
FROM 0.12 MILE SOUTH OF DUBLIN BOULEVARD UNDERCROSSING
TO 0.5 MILE NORTH OF OLYMPIC BOULEVARD UNDERCROSSING

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala,CC	680	R20.1/R21.9, R0.0/14.0		

LOCATION MAP



FINAL SUBMITTAL
JANUARY 20, 2015

PROJECT LOCATION MAP
FIGURE 1

PROJECT ENGINEER DATE
REGISTERED ELECTRICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
RAMSEY J. HISSEN
No. C39608
Exp. 12/31/15
ELECTRICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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URS CORPORATION
100 W SAN FERNANDO St, SUITE 200
SAN JOSE, CA 95113

Bay Area Infrastructure Financing Authority
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

CONTRACT No.	04-3G9504
PROJECT ID	0414000489

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

APPROVED AS TO IMPACT ON STATE FACILITIES AND CONFORMANCE WITH APPLICABLE STATE STANDARDS AND PRACTICES AND THAT TECHNICAL OVERSIGHT WAS PERFORMED.

CONSULTANT DESIGN MANAGER: RAMSEY HISSEN | CALTRANS DESIGN OVERSIGHT APPROVAL | REGISTRATION No. | LICENSE Exp DATE | DATE SIGNED

LAST REVISION 00-00-00 | DATE PLOTTED => 1/15/2015 | TIME PLOTTED => 5:46:00 PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Ramsey J. Hissen No. 39608 Exp. 12-31-16 CIVIL STATE OF CALIFORNIA

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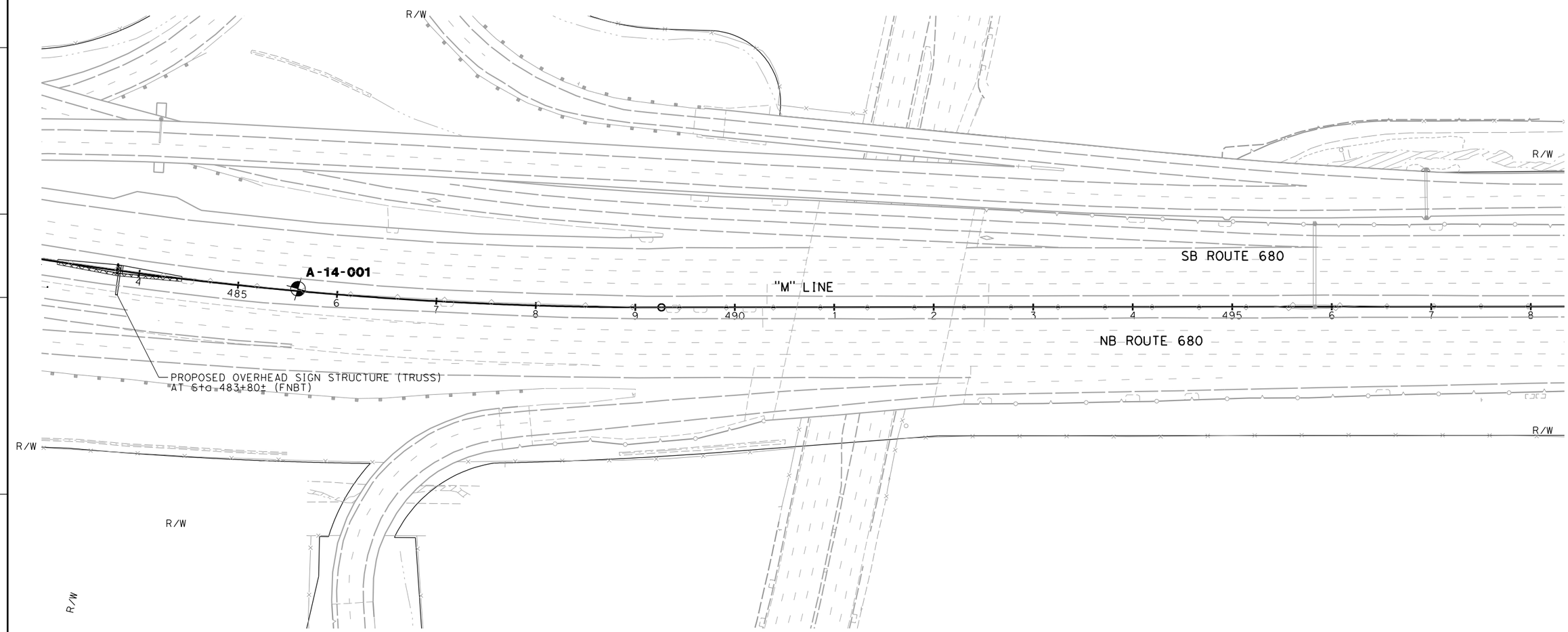
OAKLAND, CA 94607



LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2A

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: RAMSEY HISSEN

CALCULATED-DESIGNED BY: -

CHECKED BY: -

REVISED BY: .

DATE REVISED: .

LAST REVISION 03-11-13

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TIME PLOTTED => $TIME

BORDER LAST REVISED 7/2/2010

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DGN FILE => $REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT -

PROJECT NUMBER & PHASE -

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

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PLANS APPROVAL DATE

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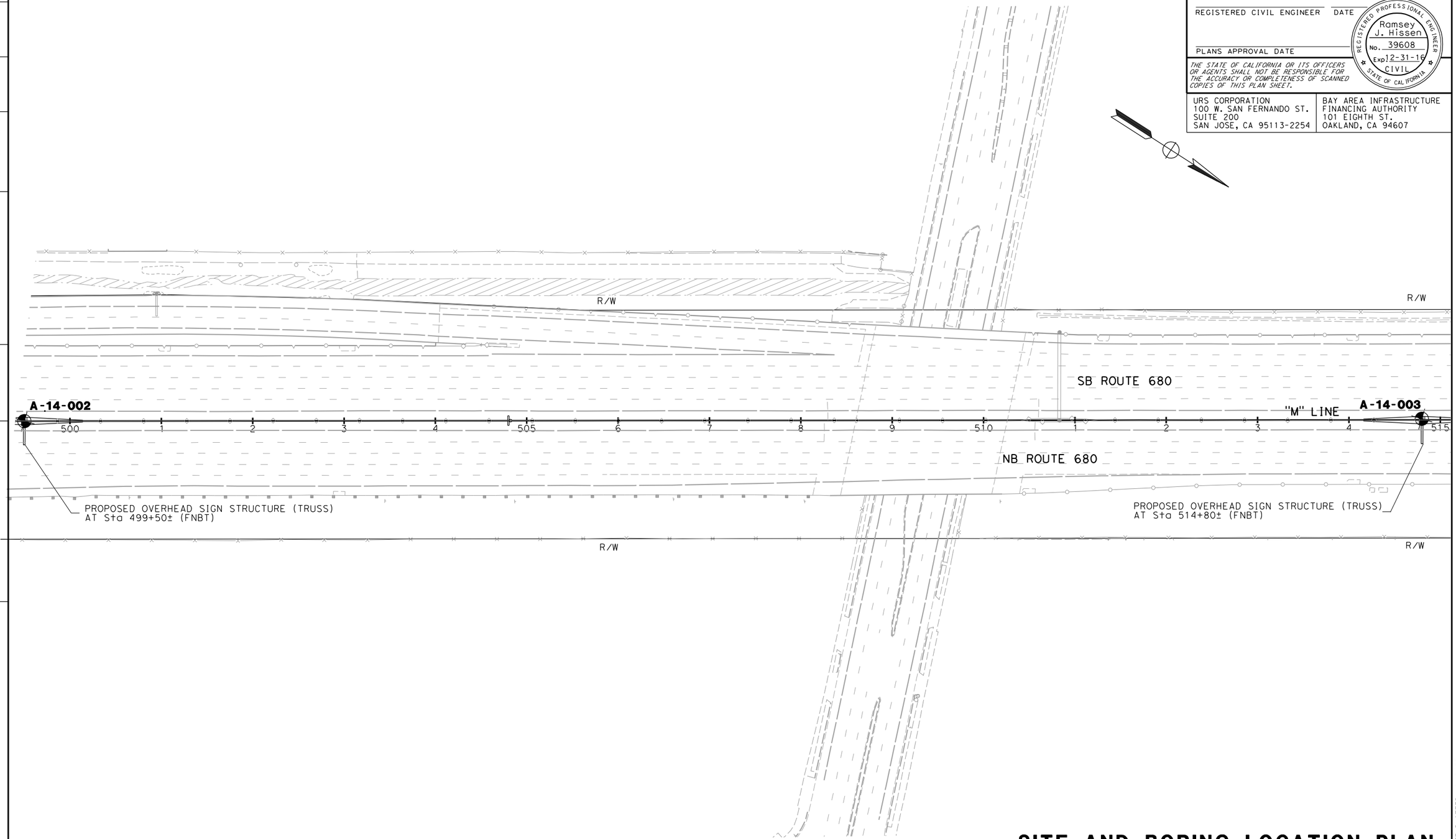

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2B

REVISED BY	DATE REVISED
-	-

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: RAMSEY HISSEN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Ramsey J. Hissen No. 39608 Exp. 12-31-16 CIVIL STATE OF CALIFORNIA

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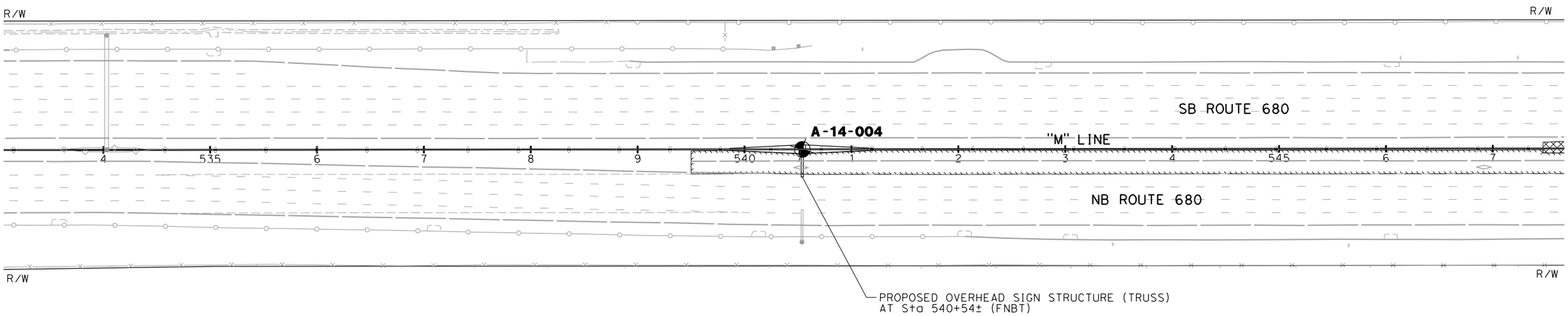

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2C

REVISED BY	DATE REVISED	CALCULATED-DESIGNED BY	CHECKED BY
.	.	-	-

CONSULTANT FUNCTIONAL SUPERVISOR: RAMSEY HISSEN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 03-11-13 DATE PLOTTED => $DATE TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Ramsey J. Hissen No. 39608 Exp 12-31-16 CIVIL STATE OF CALIFORNIA

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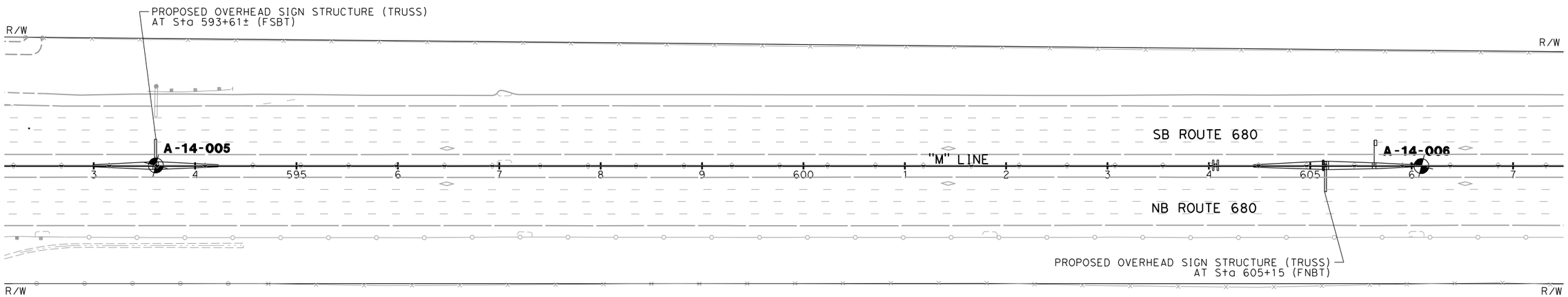

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2D

REVISED BY	CALCULATED-DESIGNED BY	CONSULTANT FUNCTIONAL SUPERVISOR	STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DATE REVISED	CHECKED BY	RAMSEY HISSEN	Caltrans

LAST REVISION 03-11-13 | DATE PLOTTED => $DATE TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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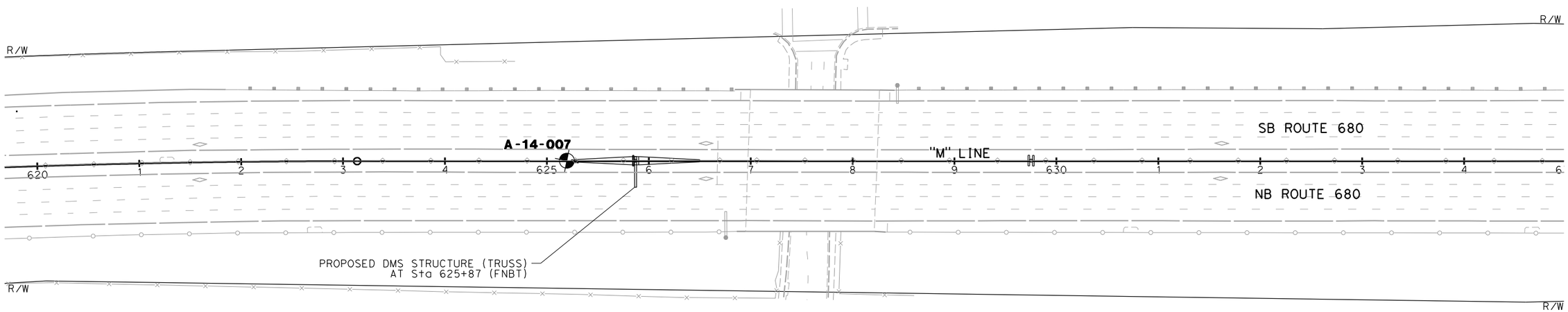

LEGEND:

·A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2E

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 7/2/2010

USERNAME => $USER
DGN FILE => $REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT -

PROJECT NUMBER & PHASE -

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

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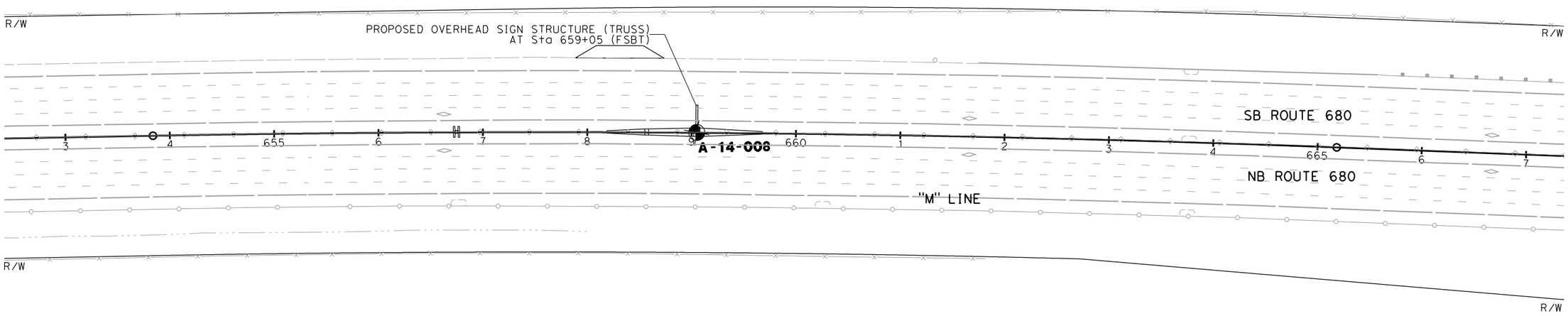

LEGEND:

. A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2F

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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LAST REVISION 03-11-13

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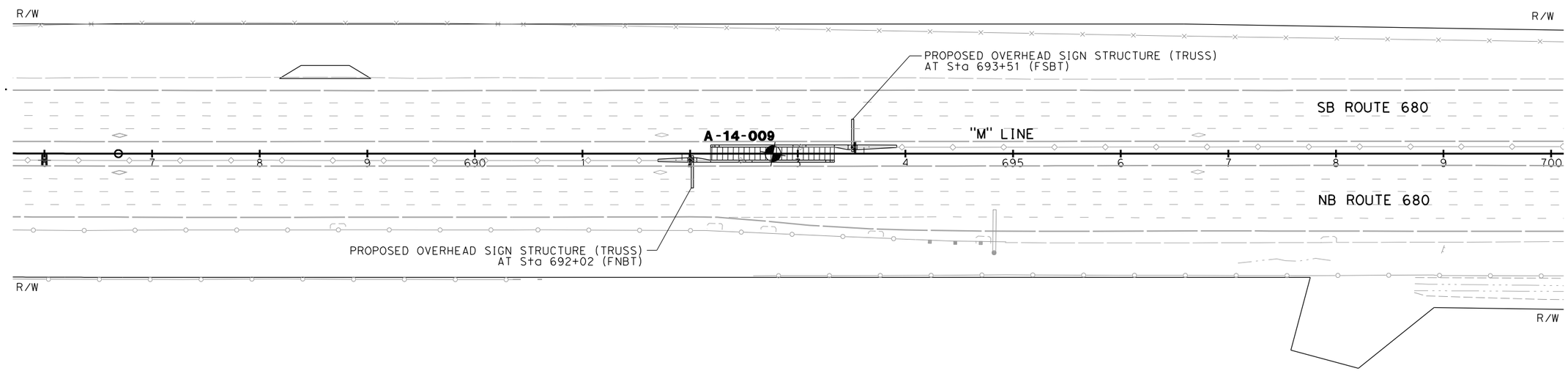

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2G

REVISED BY	DATE REVISED	CALCULATED-DESIGNED BY	CHECKED BY	CONSULTANT FUNCTIONAL SUPERVISOR	STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
-	-	-	-	RAMSEY HISSEN	Caltrans

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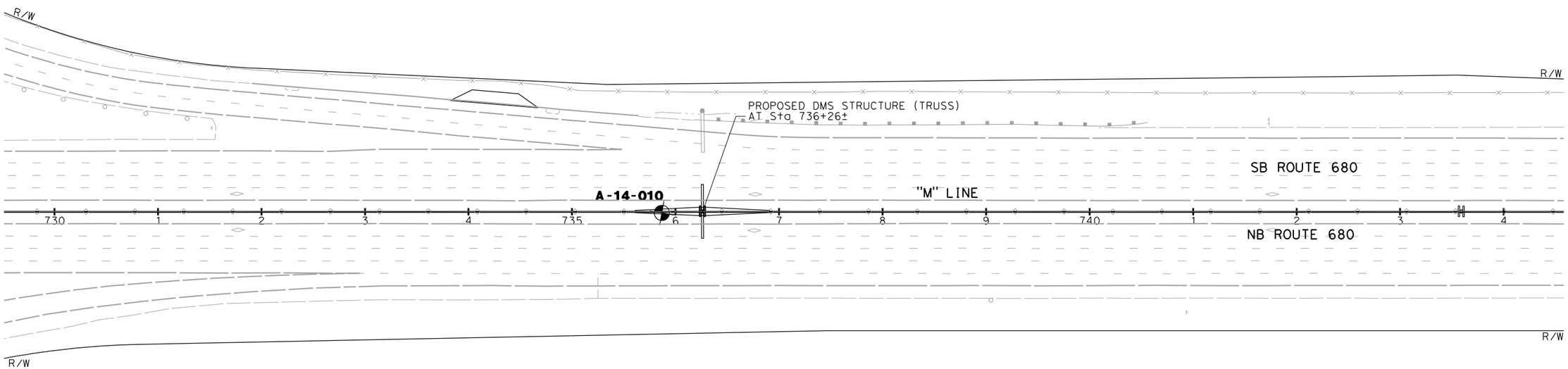

LEGEND:

.A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2H

REVISED BY	DATE REVISED
-	-

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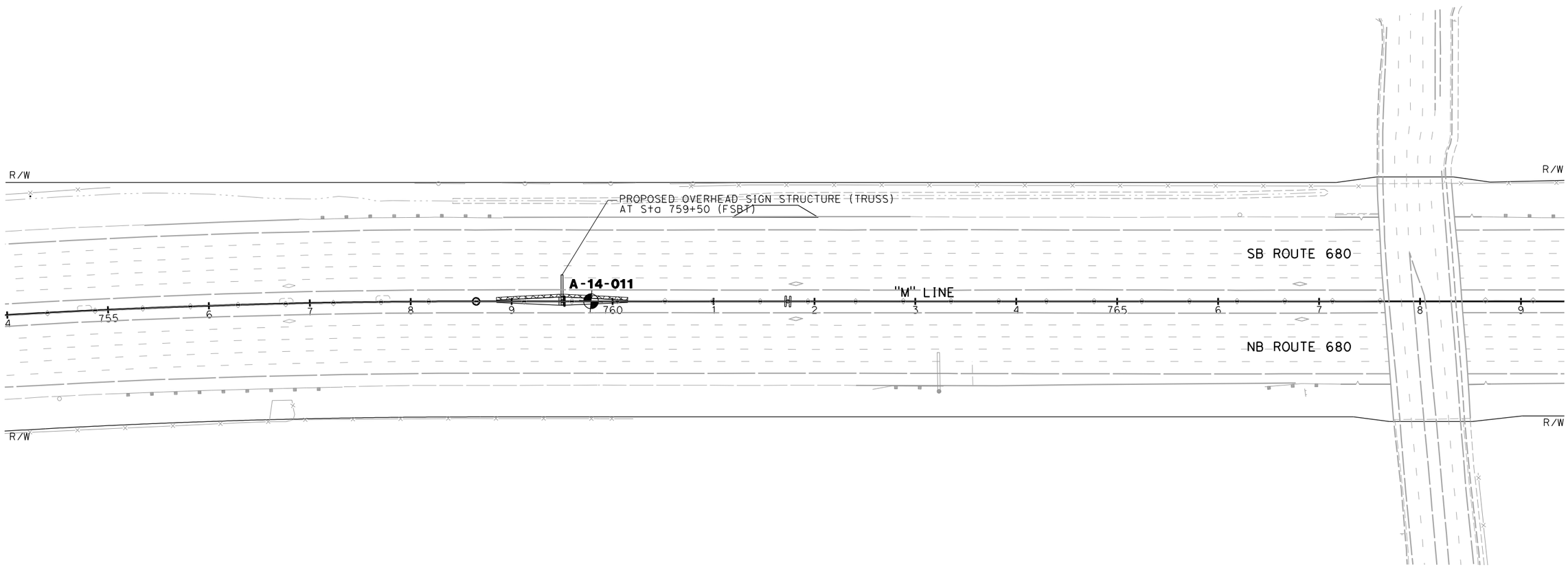

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2I

REVISED BY	DATE REVISED
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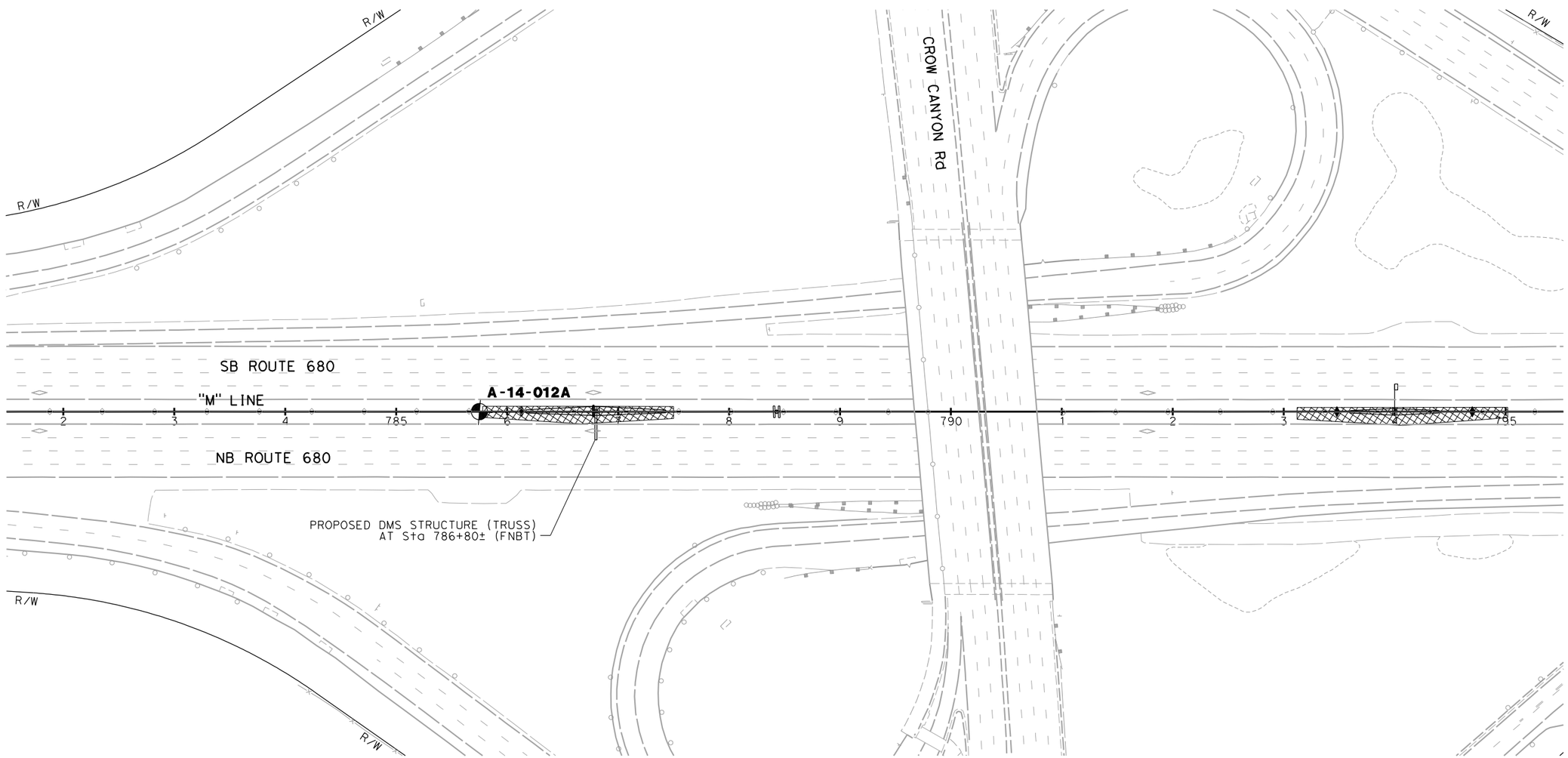

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2J

REVISED BY	DATE REVISED
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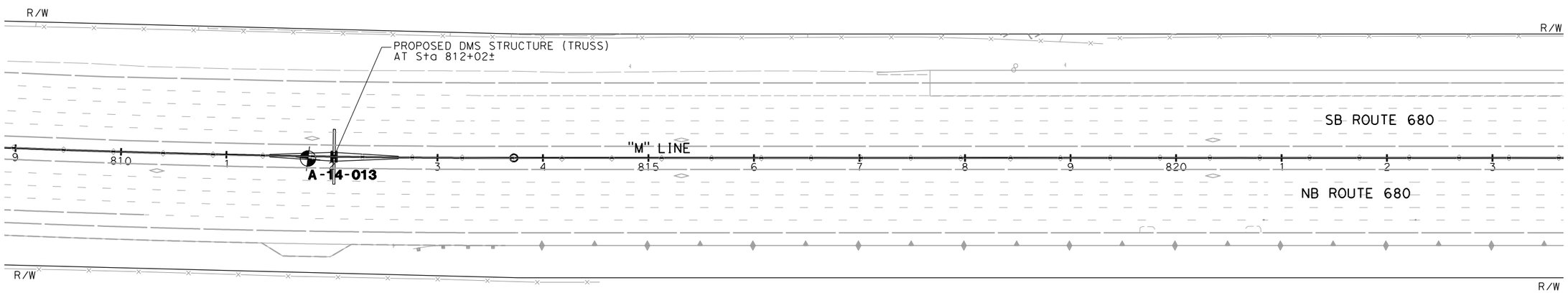

LEGEND:

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SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2K

REVISED BY	DATE REVISED
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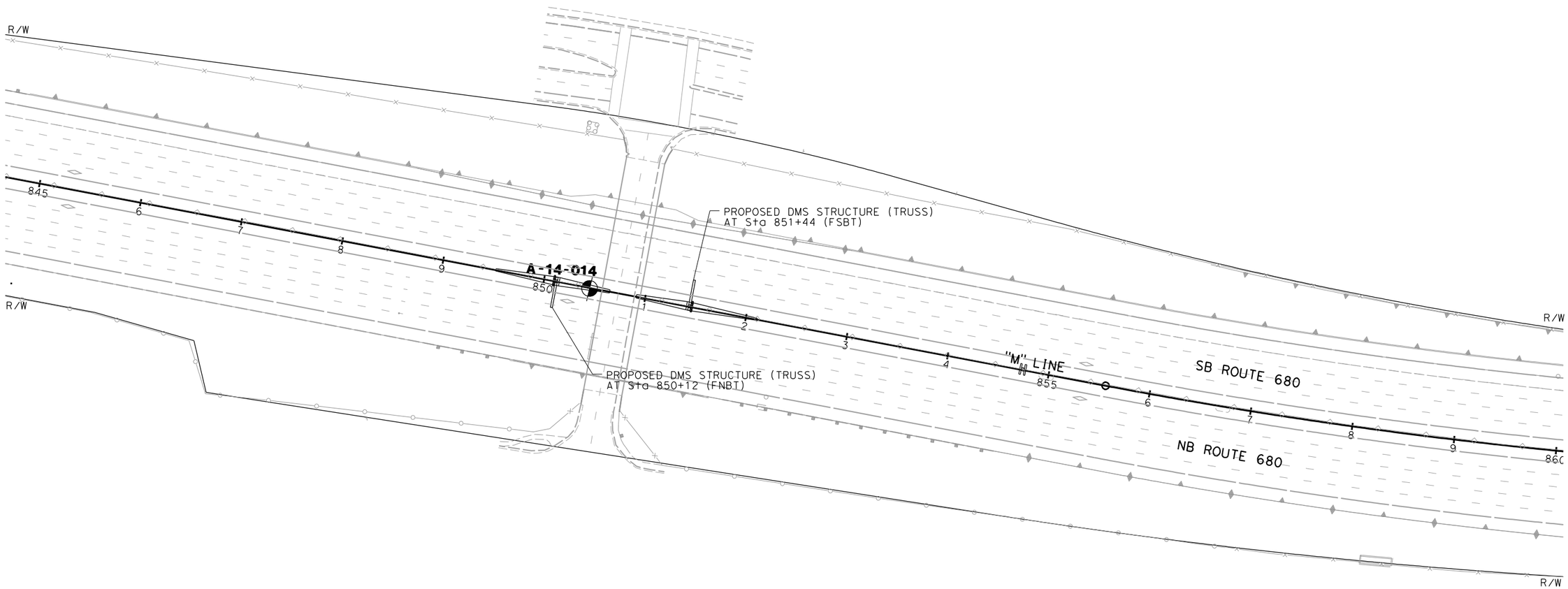

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2L

REVISED BY	DATE REVISED
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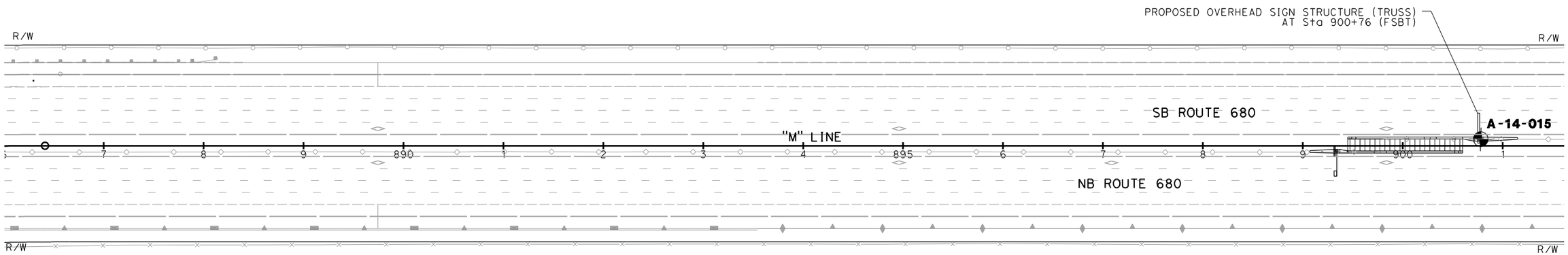

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2M

REVISED BY	CALCULATED-DESIGNED BY	CONSULTANT FUNCTIONAL SUPERVISOR	STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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LAST REVISION 03-11-13 DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BORDER LAST REVISED 7/2/2010 | USERNAME => $USER DGN FILE => $REQUEST | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT - | PROJECT NUMBER & PHASE -

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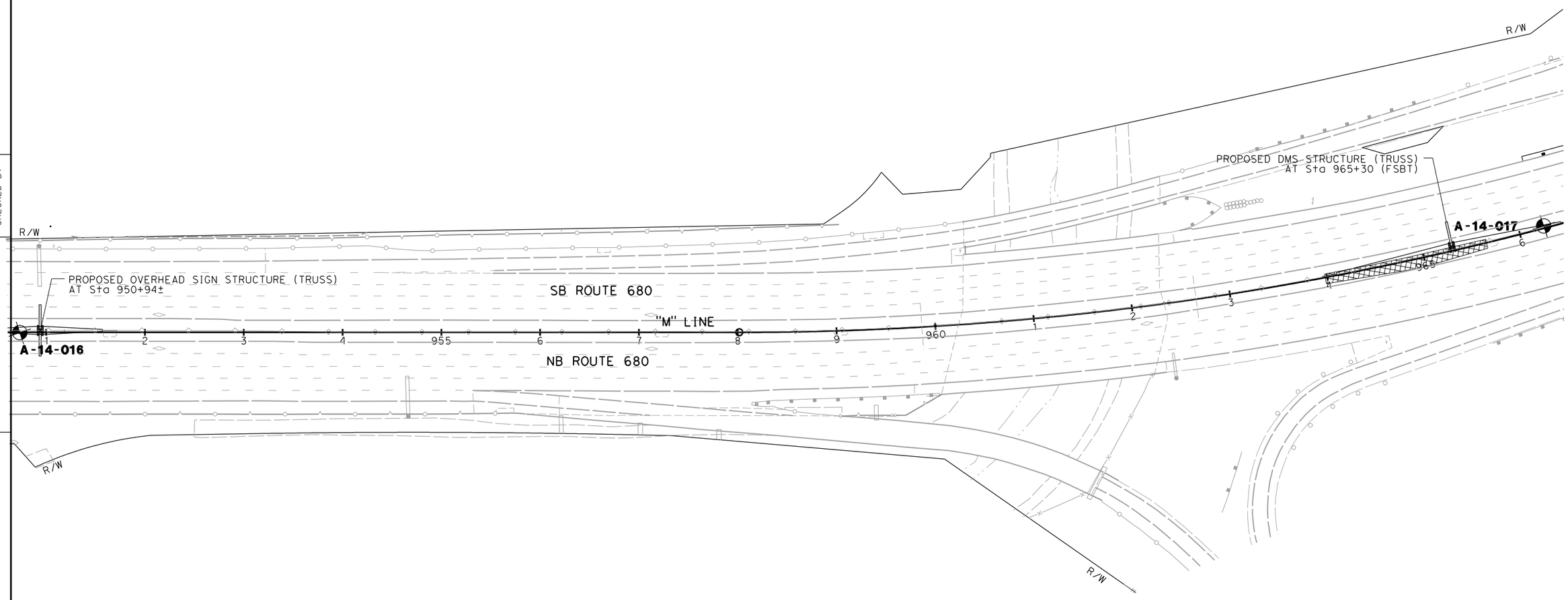

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2N

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BORDER LAST REVISED 7/2/2010 | USERNAME => $USER | DGN FILE => $REQUEST | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT - | PROJECT NUMBER & PHASE -

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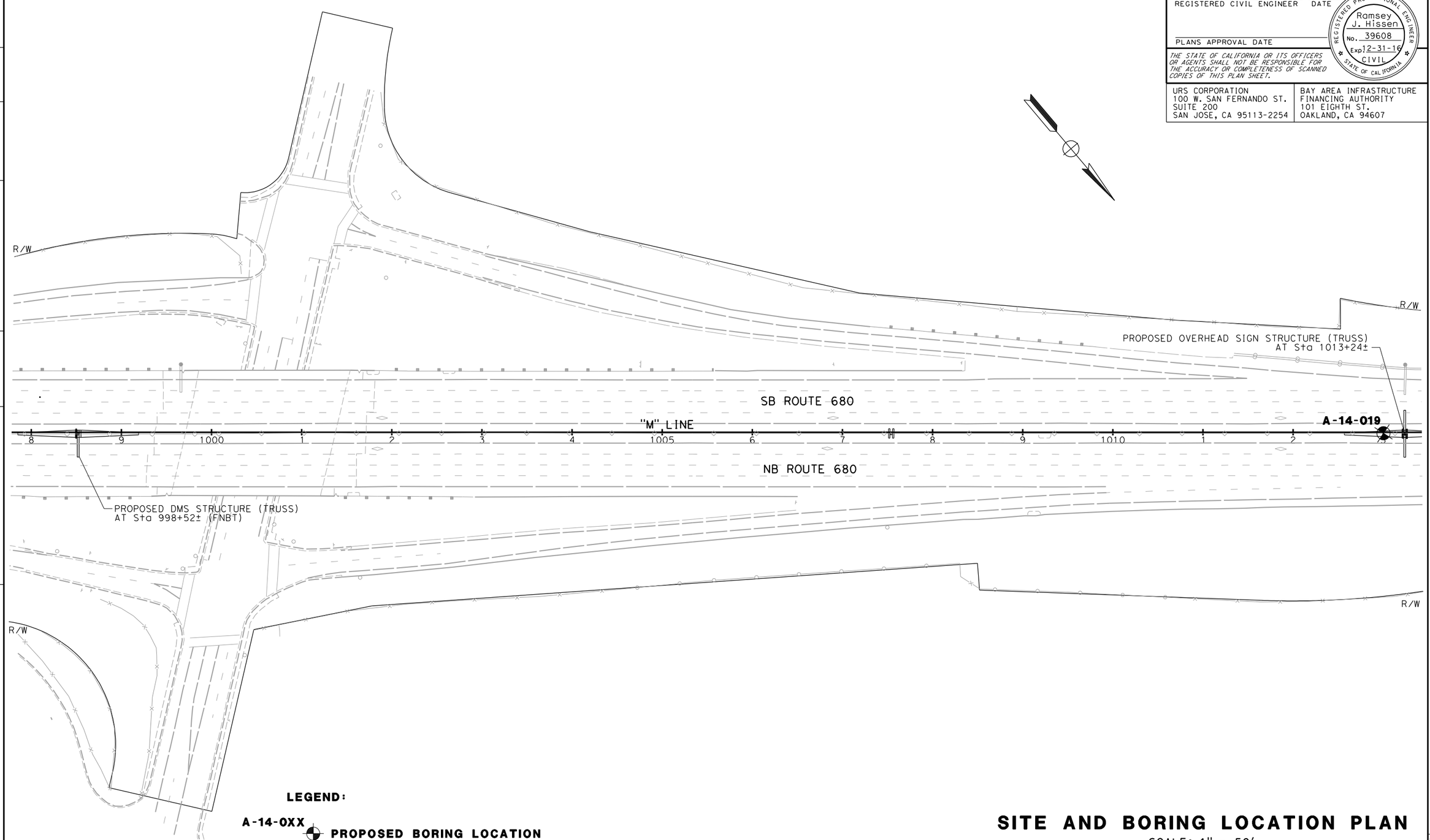

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 20

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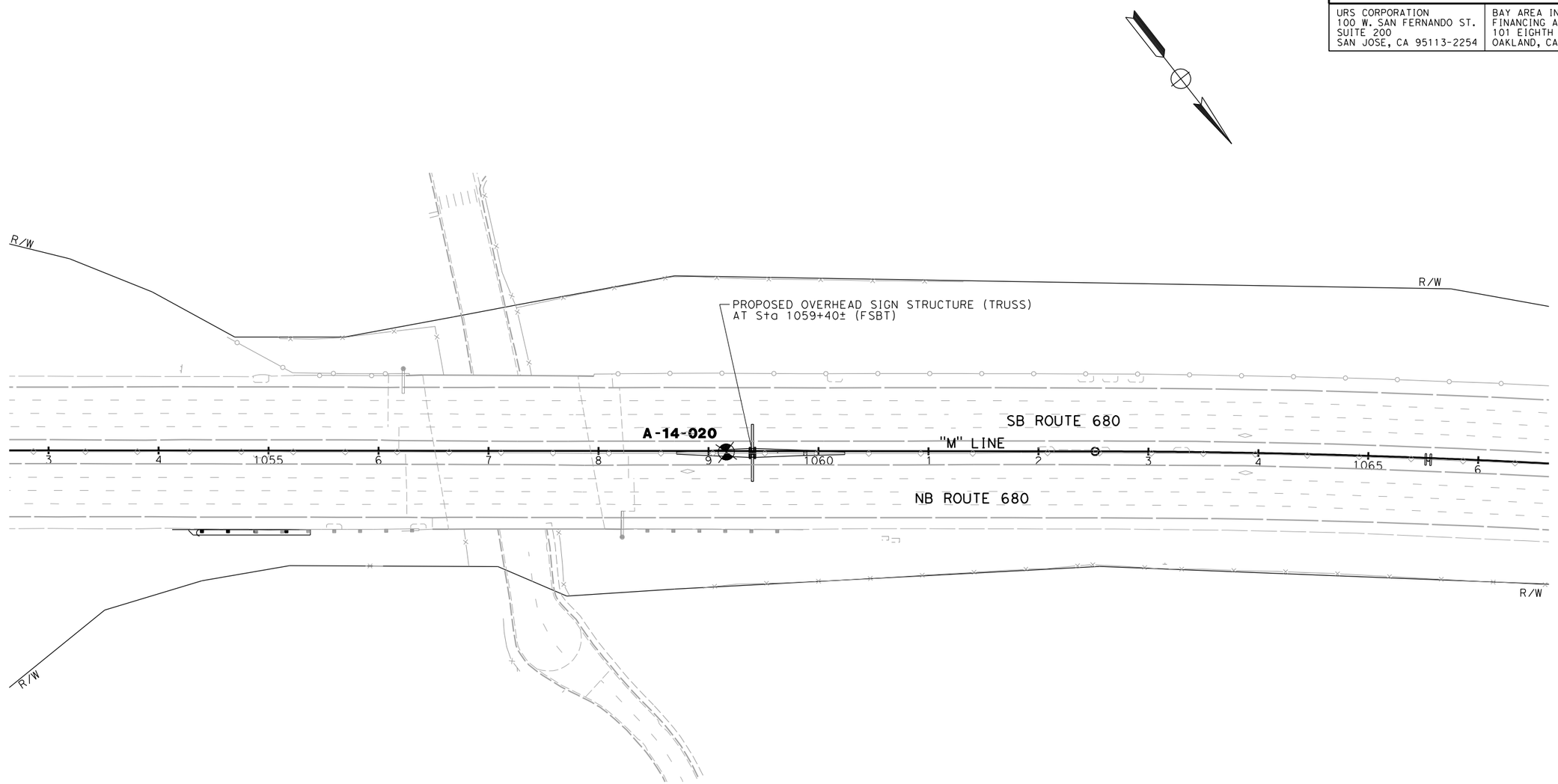

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2P

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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CALCULATED-DESIGNED BY: -

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DATE REVISED: .

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DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 7/2/2010

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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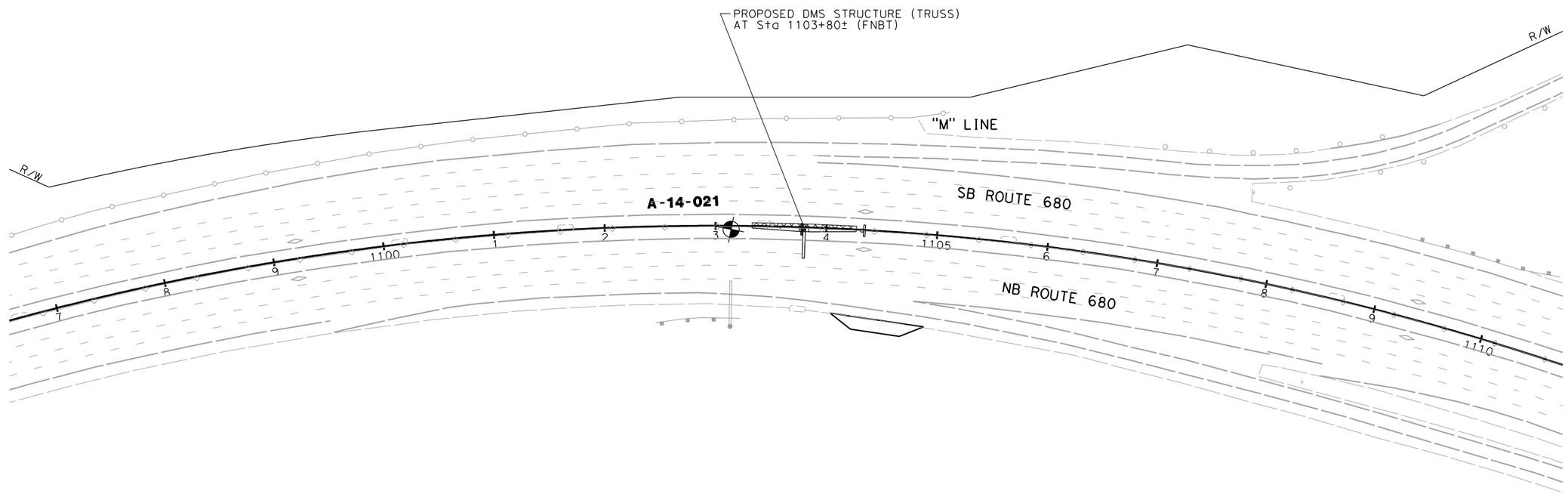

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2Q

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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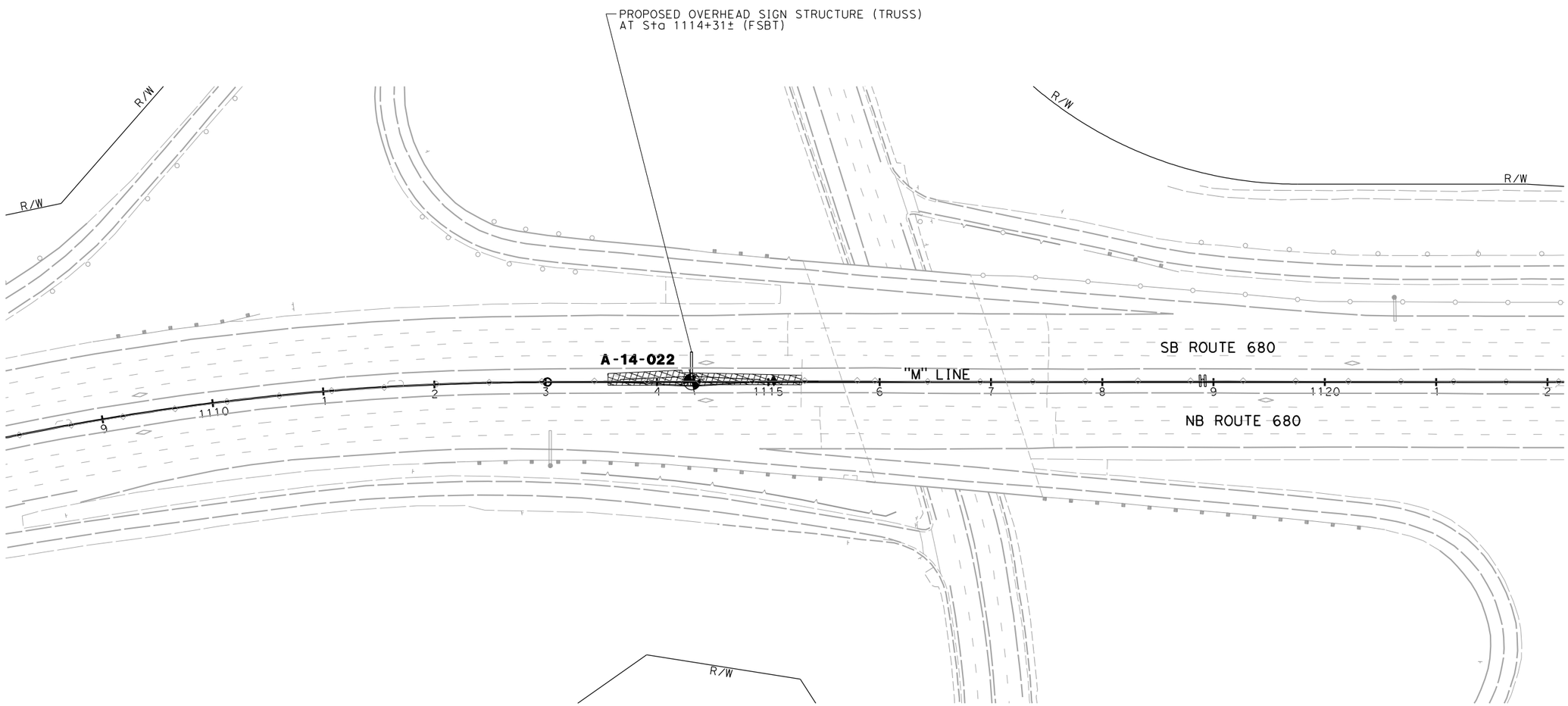

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2R

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CONSULTANT FUNCTIONAL SUPERVISOR: RAMSEY HISSEN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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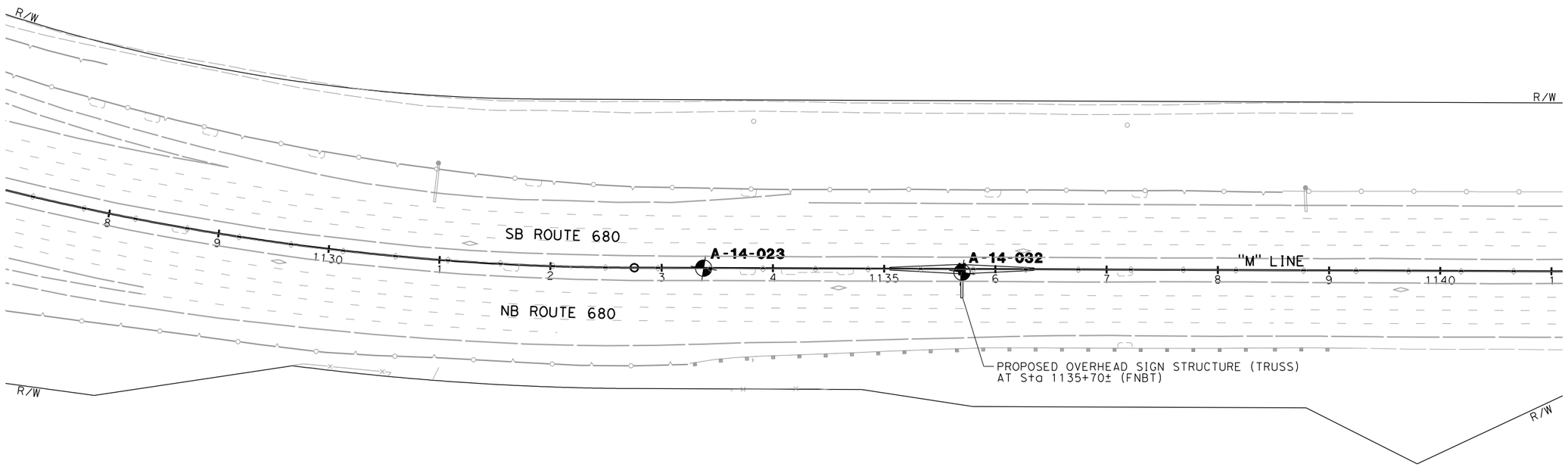

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2S

REVISED BY	DATE REVISED
.	.
.	.

CALCULATED-DESIGNED BY -
CHECKED BY -

CONSULTANT FUNCTIONAL SUPERVISOR
RAMSEY HISSEN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 03-11-13
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Ramsey J. Hissen No. 39608 Exp 12-31-16 CIVIL STATE OF CALIFORNIA

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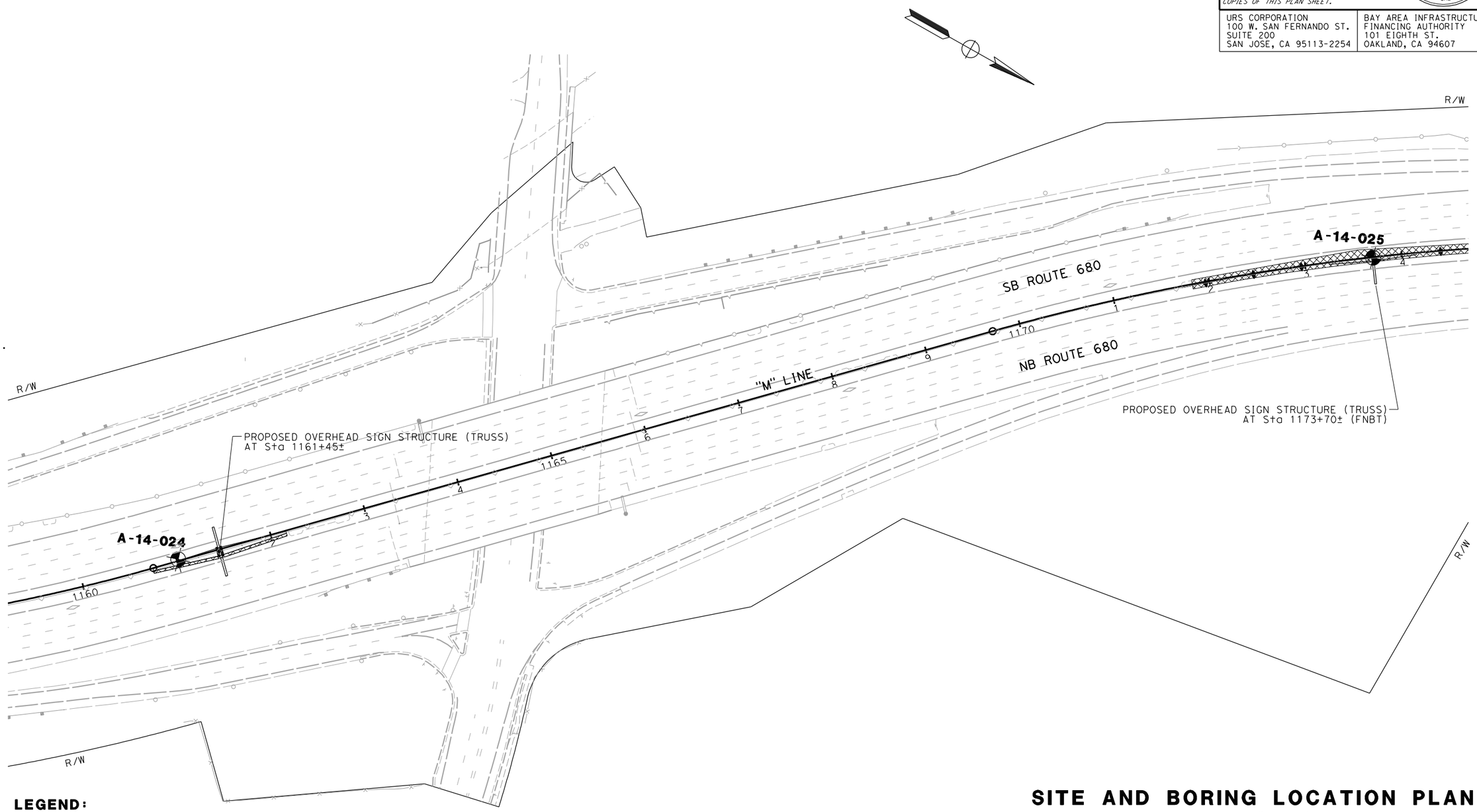
OAKLAND, CA 94607



LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2T

REVISED BY	DATE REVISED
-	-

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TIME PLOTTED => $TIME

BORDER LAST REVISED 7/2/2010
USERNAME => $USER
DGN FILE => $REQUEST
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT -
PROJECT NUMBER & PHASE -

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

REGISTERED CIVIL ENGINEER DATE

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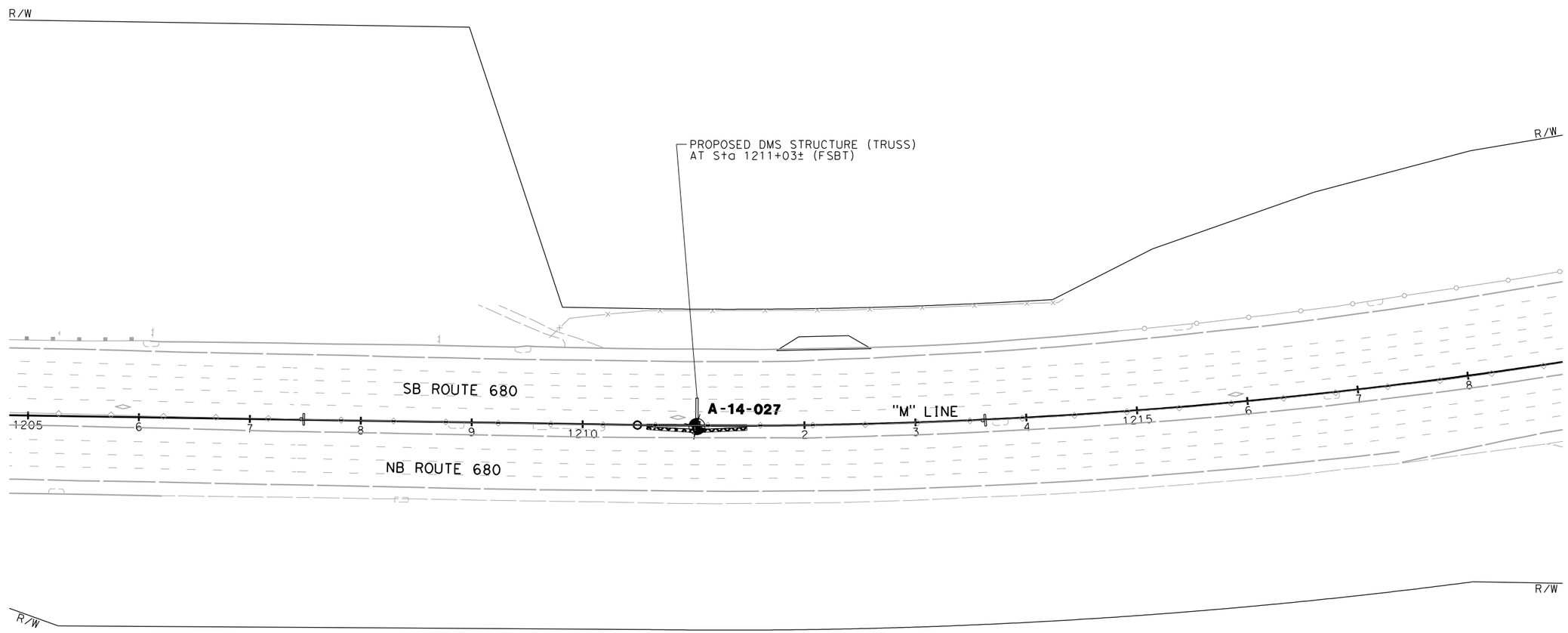
OAKLAND, CA 94607



LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2U

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: RAMSEY HISSEN

CALCULATED-DESIGNED BY: -

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REVISED BY: .

DATE REVISED: .

LAST REVISION 03-11-13

DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
4	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

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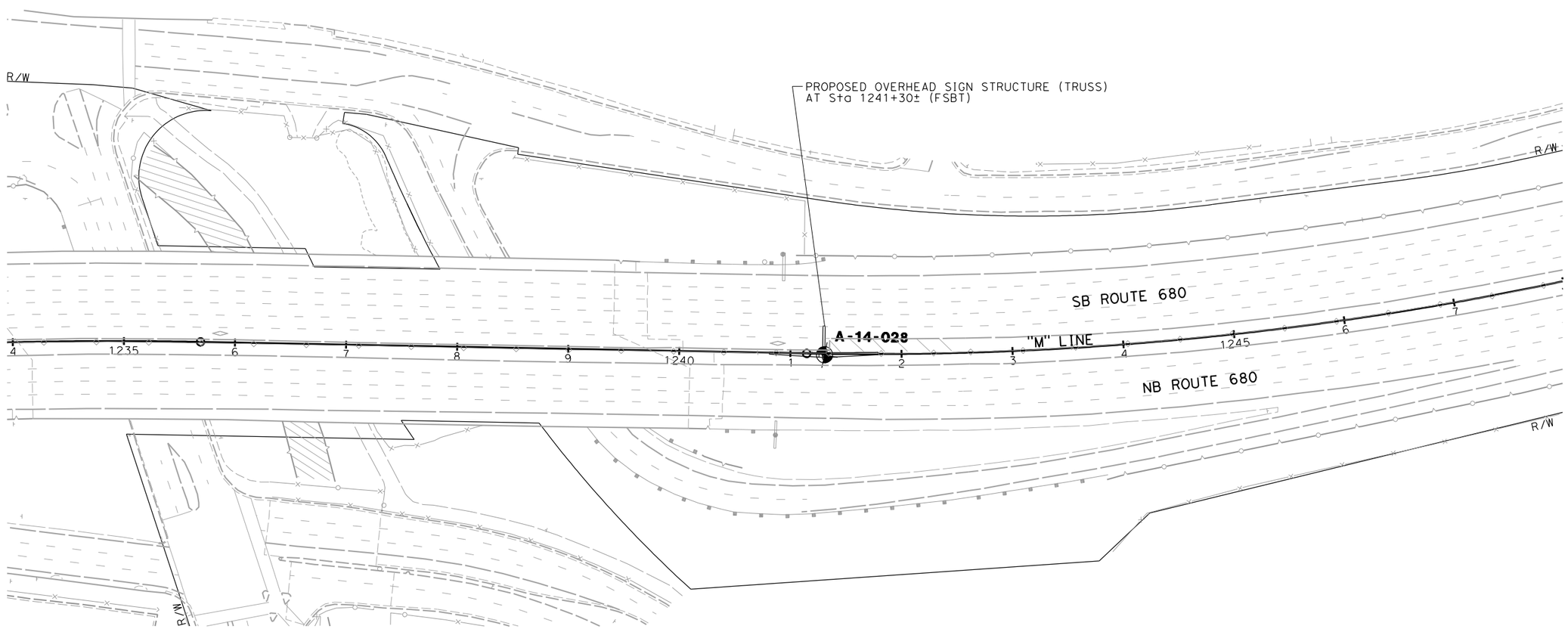

LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2V

REVISED BY	DATE REVISED
.	.
-	-

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 03-11-13
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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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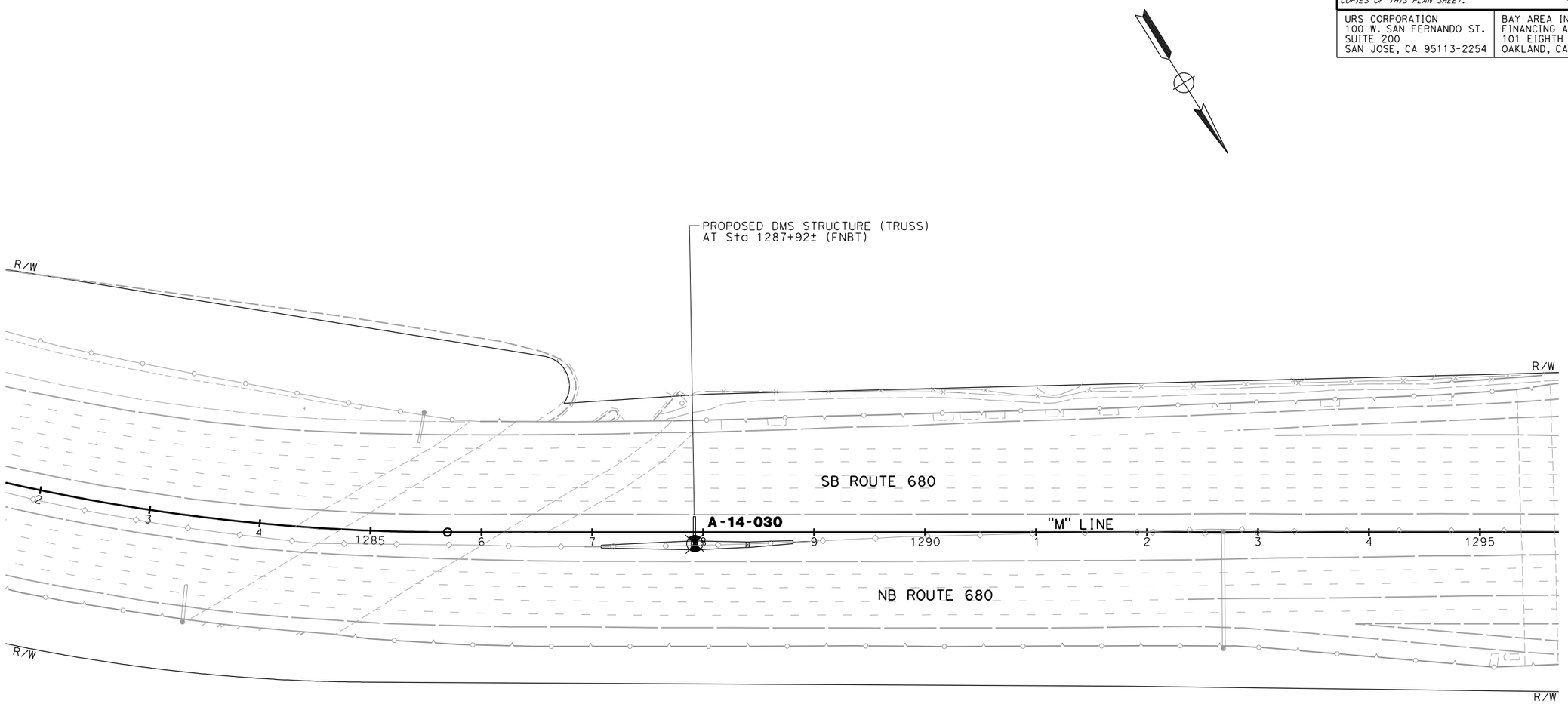
OAKLAND, CA 94607



LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2W

REVISED BY	DATE REVISED
-	-

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RAMSEY HISSEN

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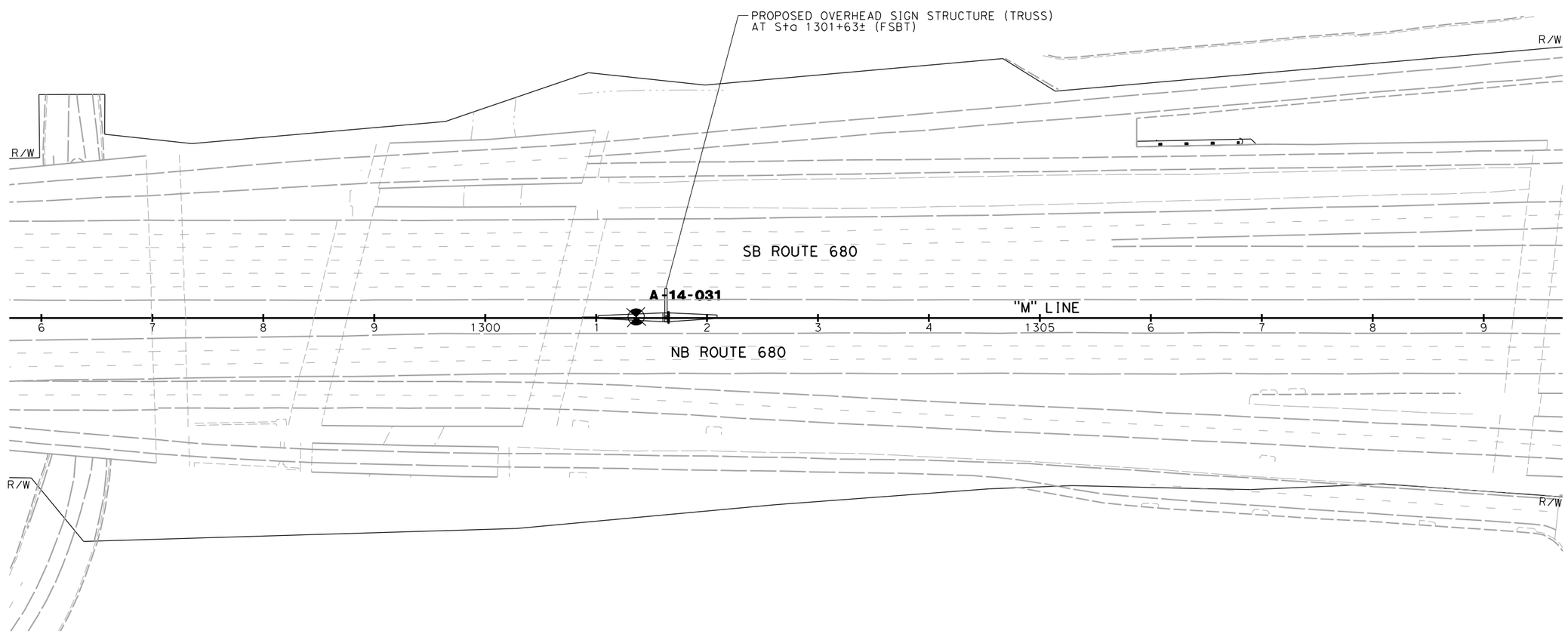
OAKLAND, CA 94607



LEGEND:

A-14-0XX **BORING LOCATION**

SITE AND BORING LOCATION PLAN

SCALE: 1" = 50'

FIGURE 2X

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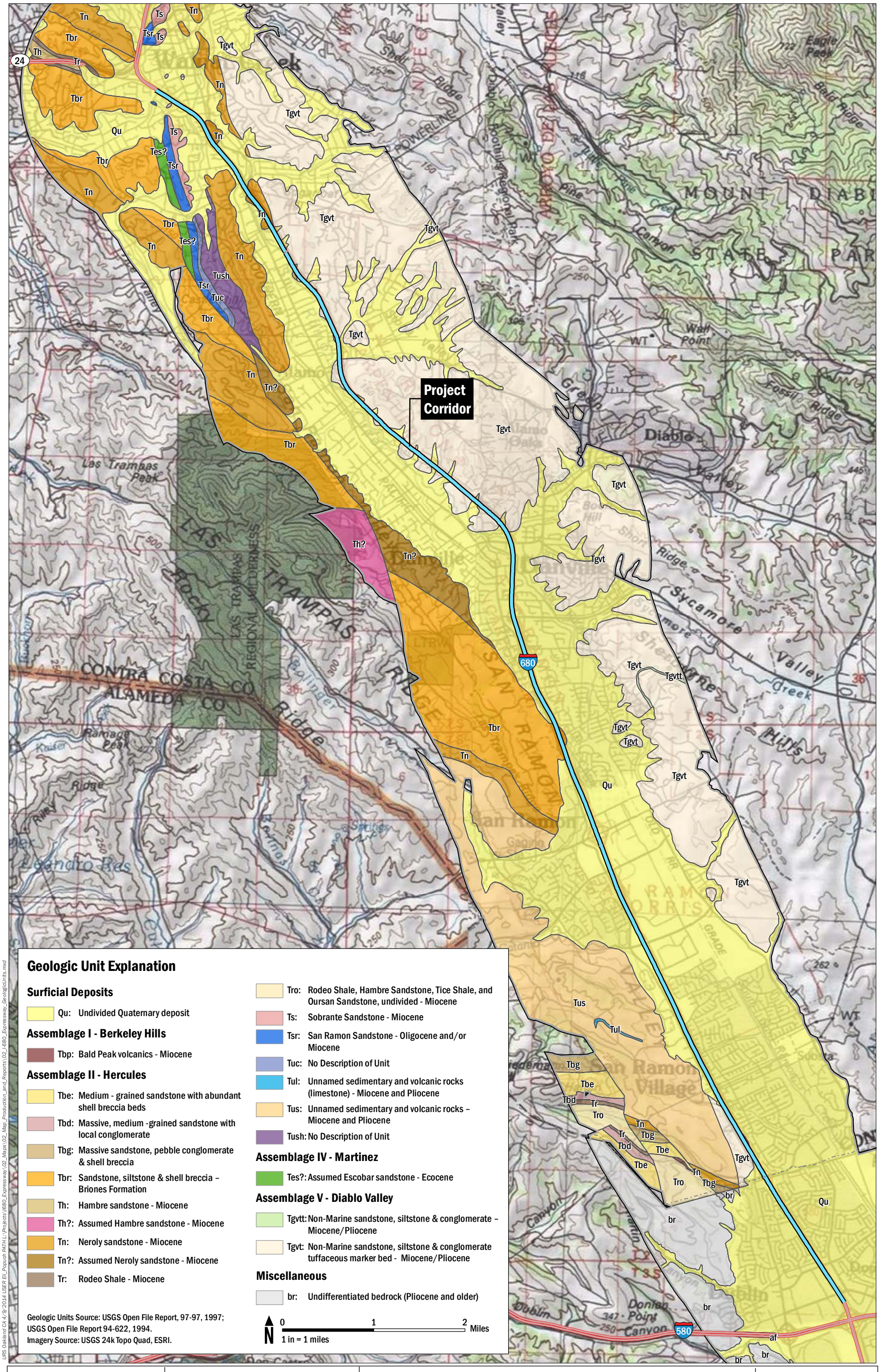
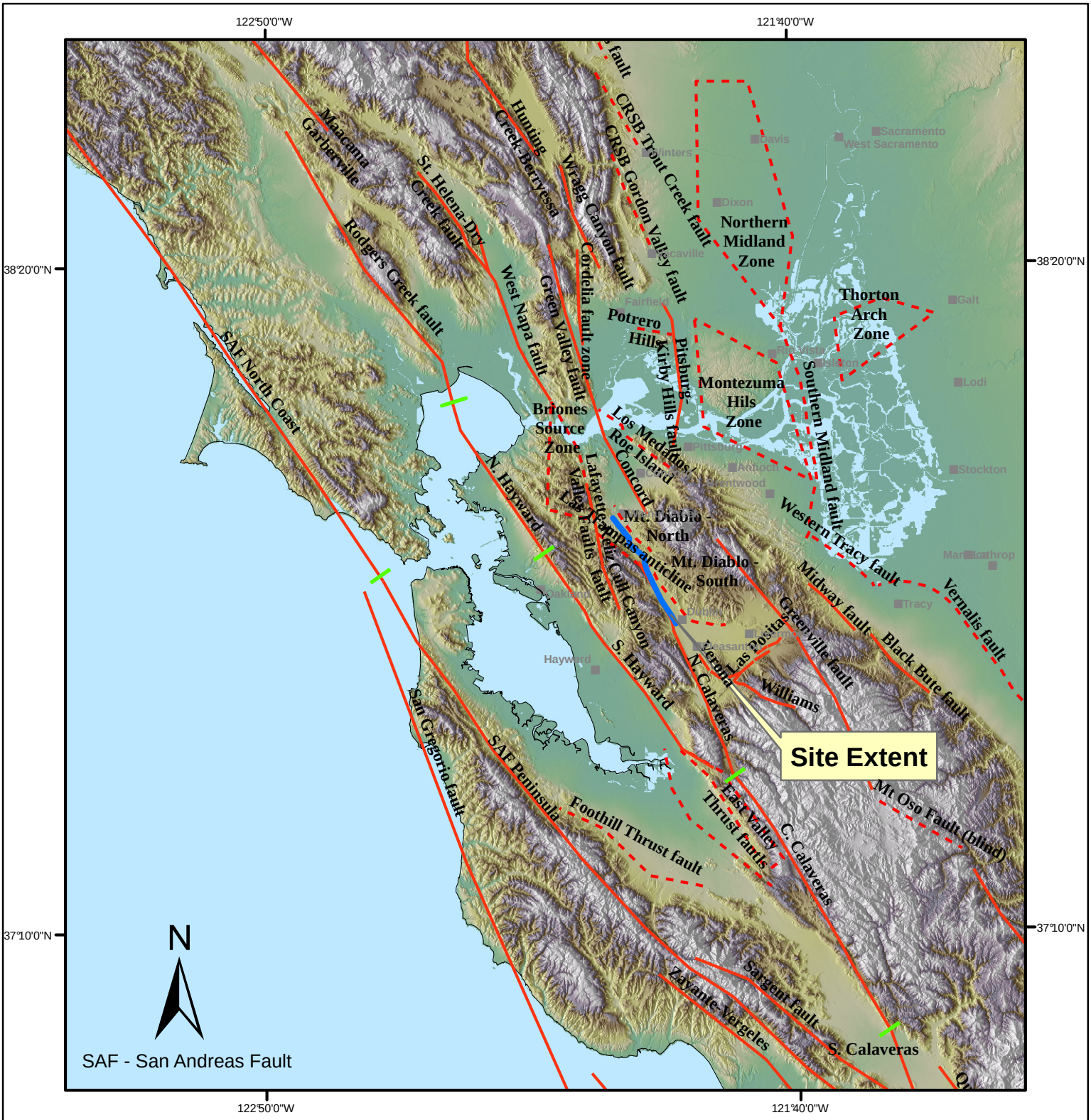


URS Oakland CA 4/9/2014 USER EIL_Popuch PATH L:\Projects\680_Expressway\02_Maps\02_Map_Production_and_Reports\02_I-680_Expressway_GeologicUnits.mxd

URS	I-680 Regional Express Network Project Number: 28645477	Regional Geologic Map Contra Costa County and Alameda County, California	Figure 3 July 8, 2014



10 5 0 10 Miles

0 5 10 20 30 40 Kilometers

Fault Source: URS Seismic Source Model

Faults with surface rupture

Blind faults and zones

Segment boundary

URS	Project No. 28645477 I-680 Regional Express Network	MAP OF MAJOR FAULTS IN THE SAN FRANCISCO BAY AREA	Figure 4

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

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OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

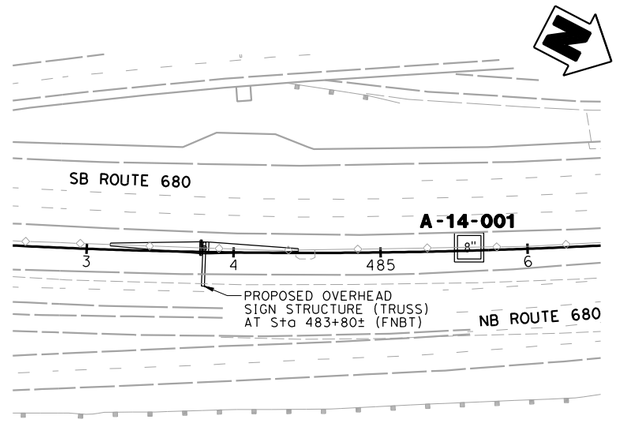
BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

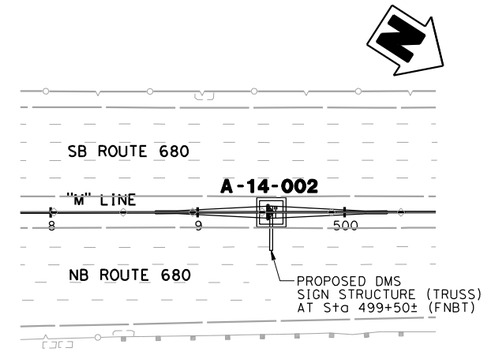
1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
2. Standard Penetration test sampler I.D. = 1.44 inch (1.4) Modified California sampler I.D. = 1.96 inch (2.0)
3. UC values reported are undrained shear strengths in tsf.

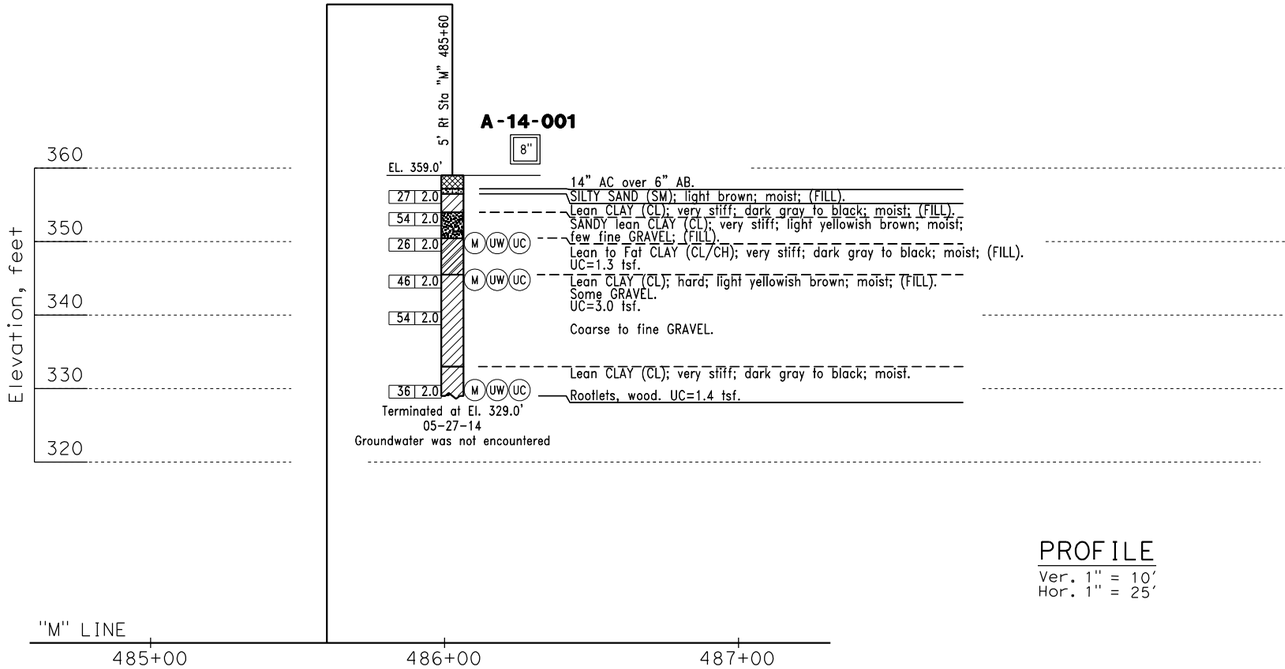
ABBREVIATIONS:

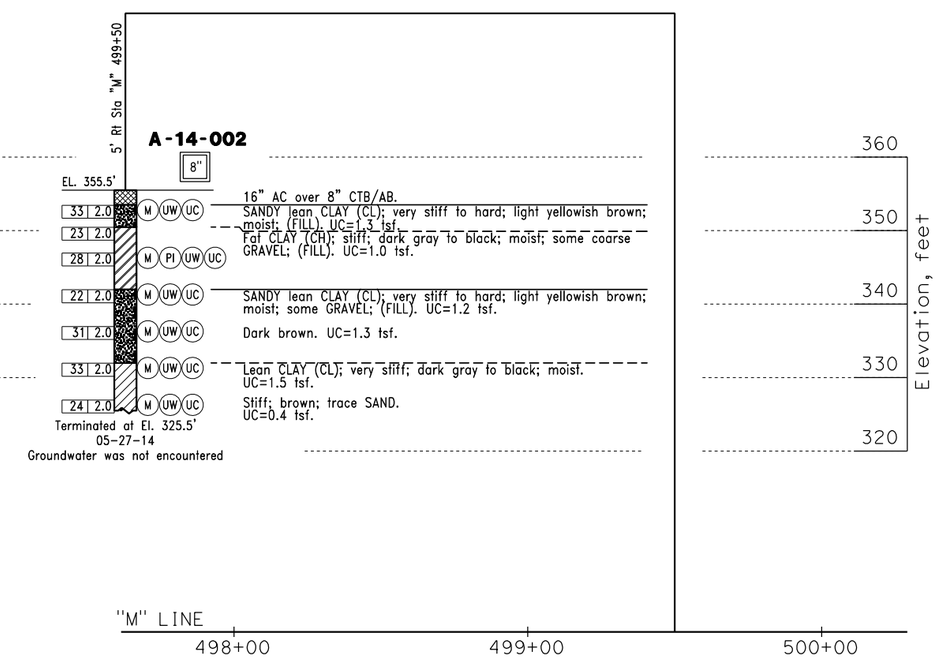
DMS: Dynamic Messaging Sign
FNBT: Facing Northbound Traffic



PLAN
1" = 50'







PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -		

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

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PLANS APPROVAL DATE

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OAKLAND, CA 94607

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All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

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BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

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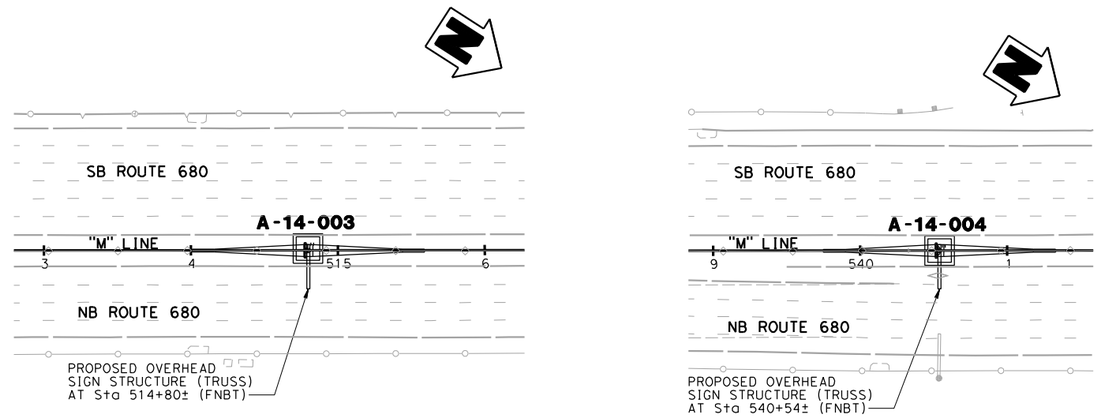
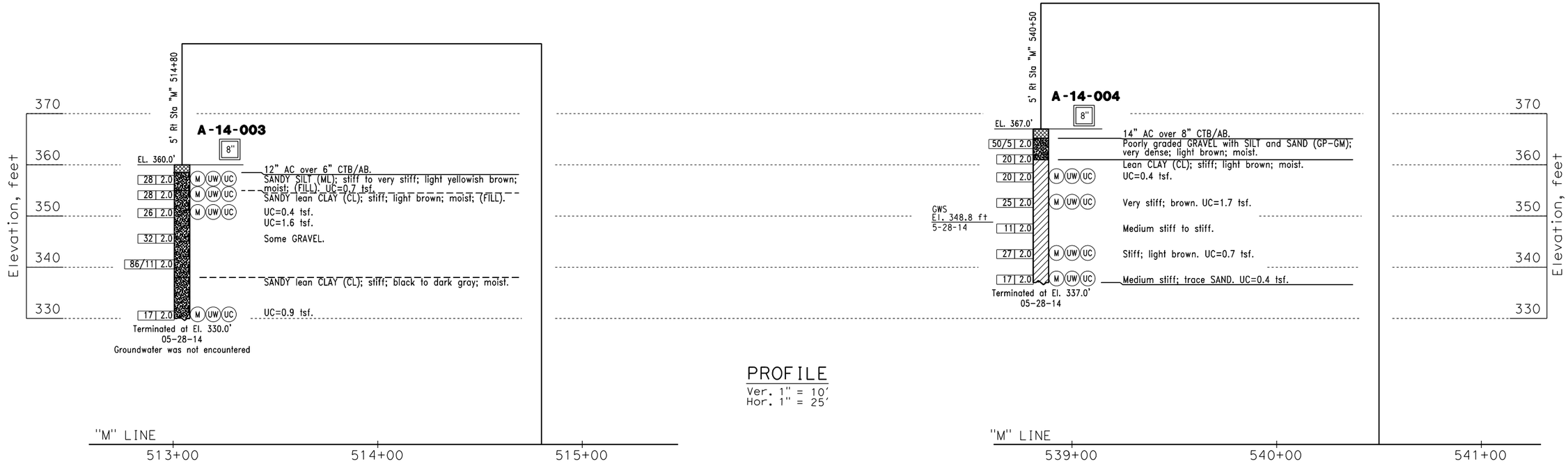
ABBREVIATIONS:

FNBT: Facing Northbound Traffic



PLAN
1" = 50'



PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang
SIGN OFF DATE	CHECKED BY	A. M. Moore	FIELD INVESTIGATION BY: DATE: -		PROJECT ENGINEER

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
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BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

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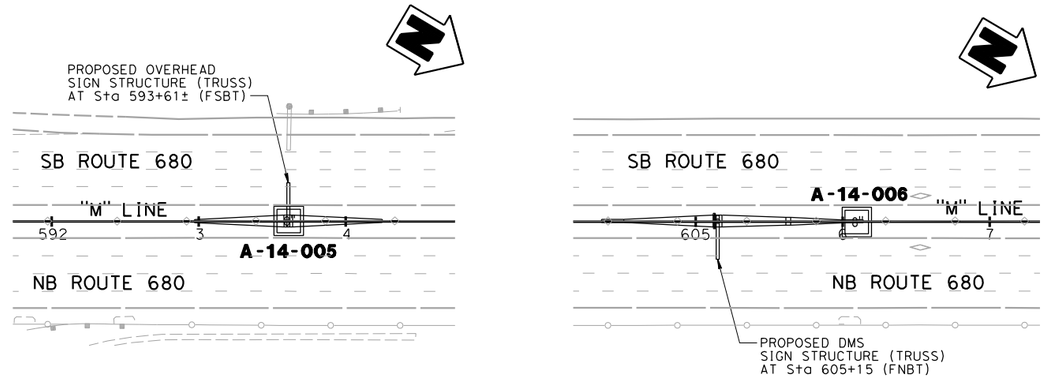
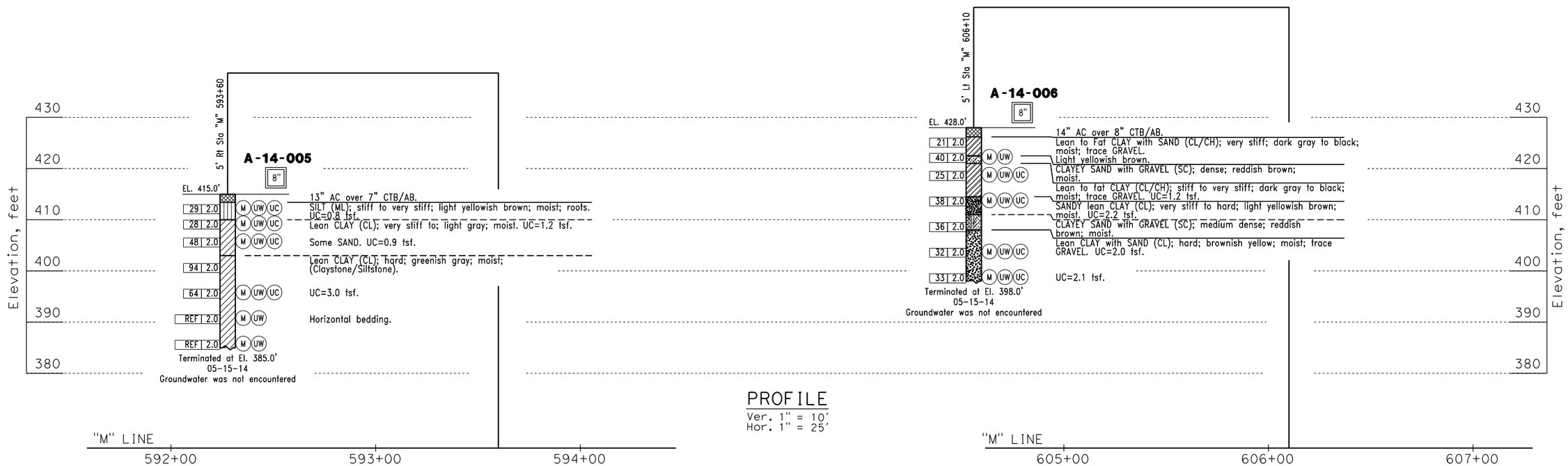


PLAN
1" = 50'



PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang	BRIDGE NO. N/A	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	A. M. Moore	FIELD INVESTIGATION BY: DATE: -		PROJECT ENGINEER	POST MILES N/A	LOG OF TEST BORINGS No. 3

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

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REVISION DATES | SHEET XX | OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

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PLANS APPROVAL DATE

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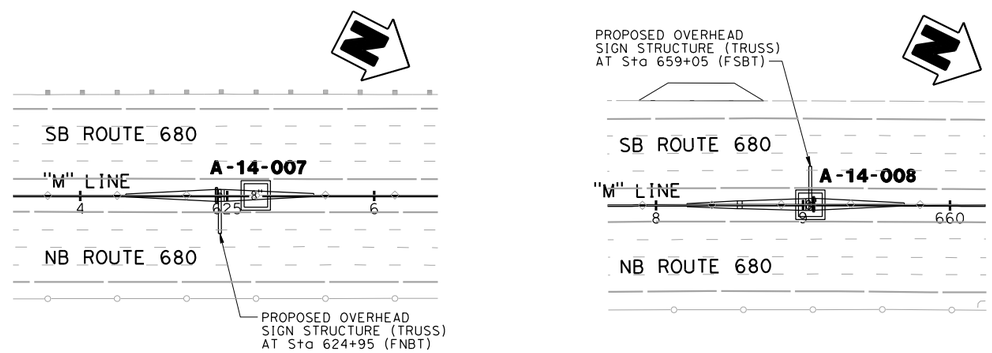
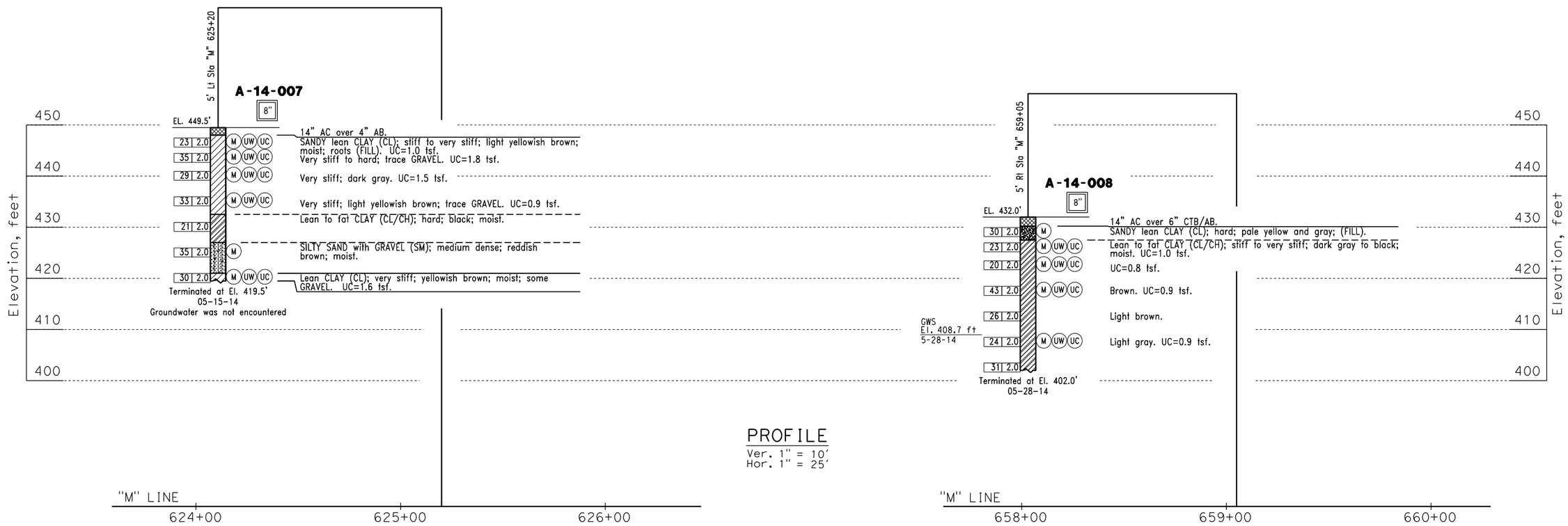


PLAN
1" = 50'



PROFILE
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Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER	BRIDGE NO. N/A	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -			POST MILES N/A	LOG OF TEST BORINGS No. 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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PLANS APPROVAL DATE

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BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
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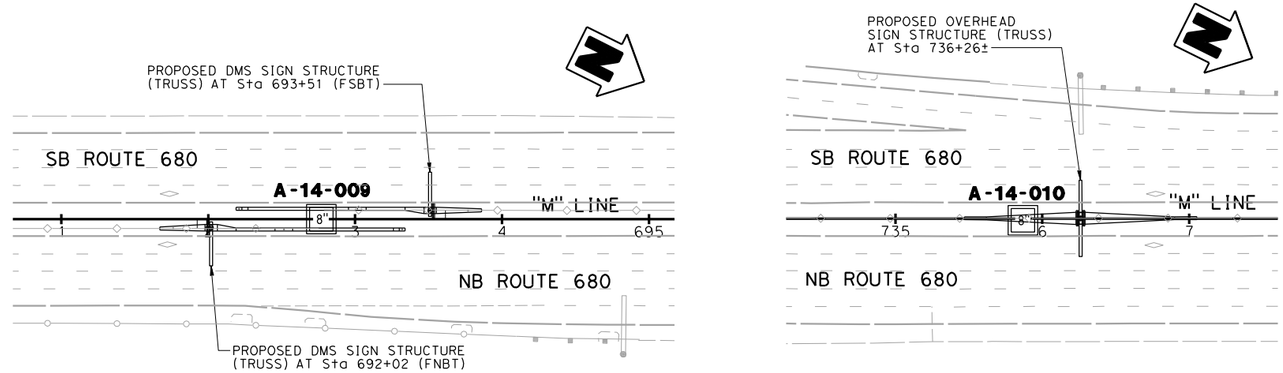
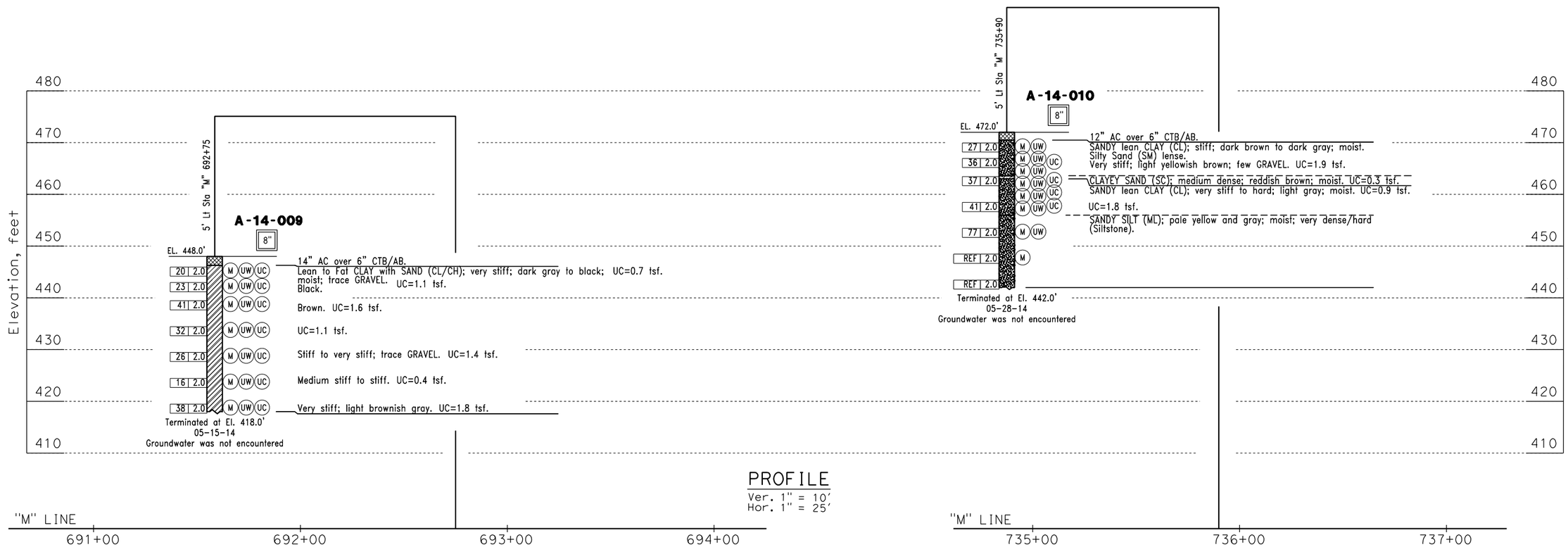
3. UC values reported are undrained shear strengths in tsf.

ABBREVIATIONS:

DMS: Dynamic Messaging Sign
FNBT: Facing Northbound Traffic
FSBT: Facing Southbound Traffic



PLAN
1" = 50'



PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang
SIGN OFF DATE	CHECKED BY	A. M. Moore	FIELD INVESTIGATION BY: DATE: -		PROJECT ENGINEER

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 5

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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URS CORPORATION
100 WEST SAN FERNANDO STREET, SUITE 200
SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

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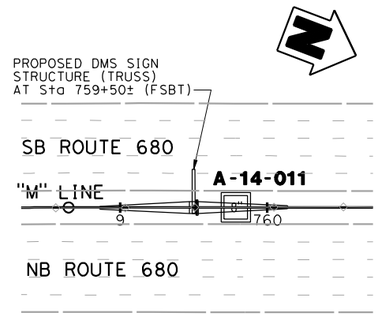
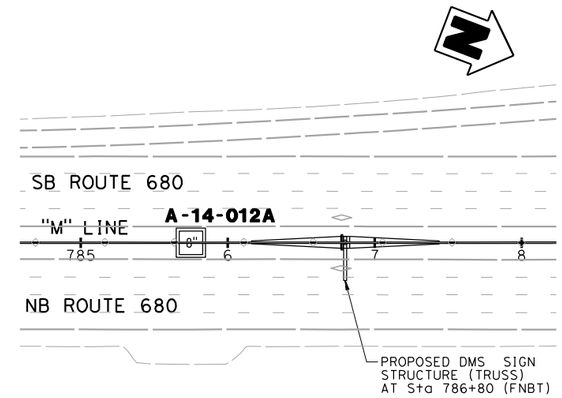
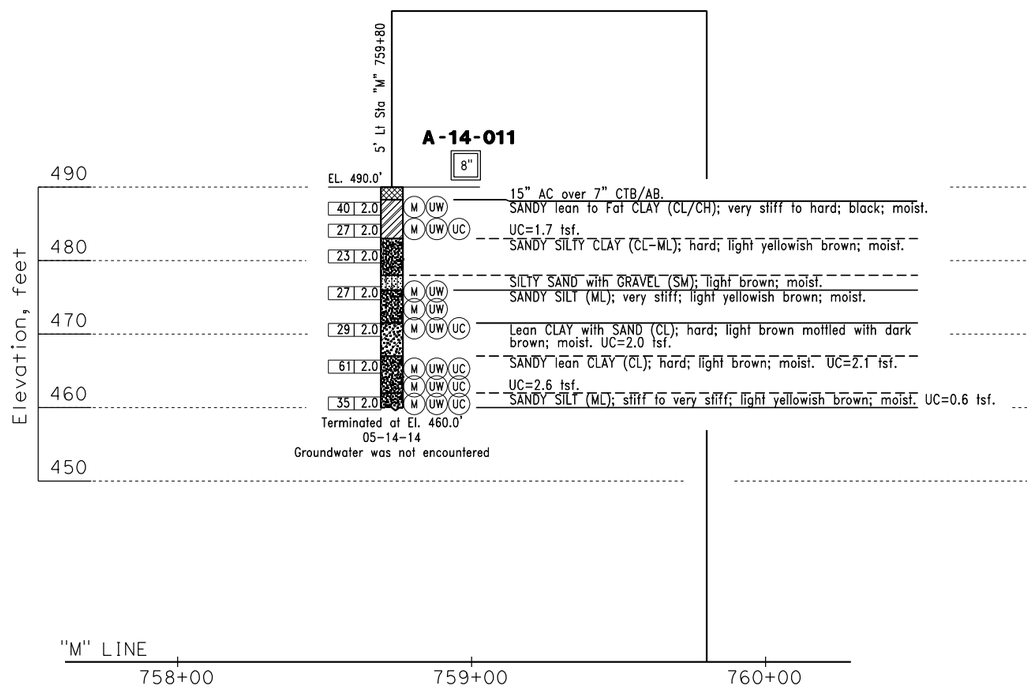
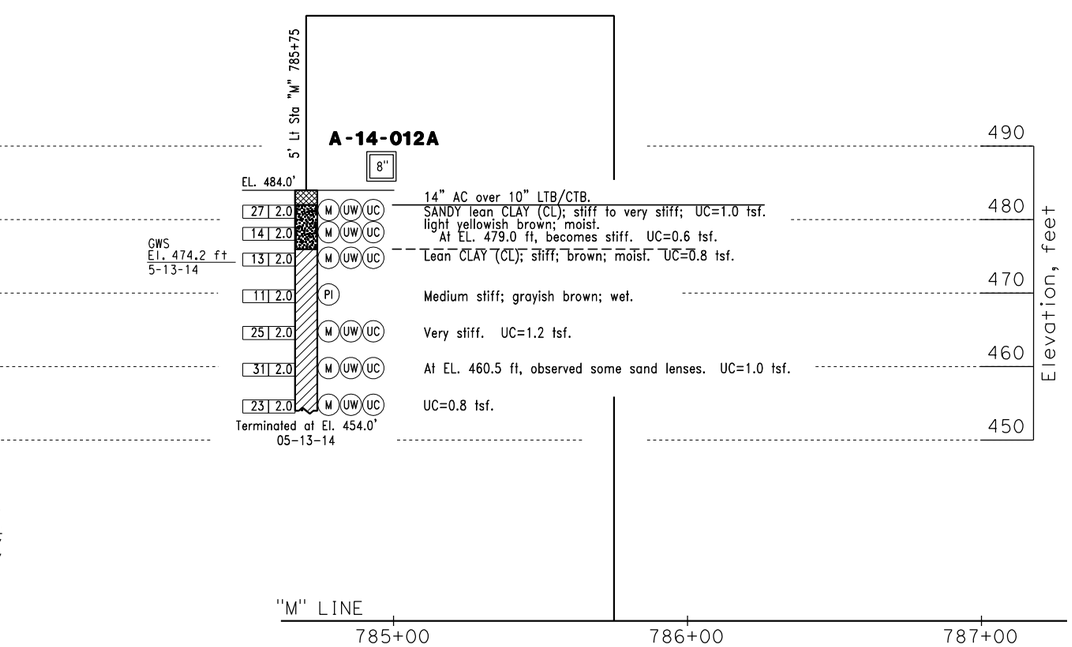




PLAN
1" = 50'





PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER	BRIDGE NO. N/A	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -			POST MILES N/A	LOG OF TEST BORINGS No. 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET XX | OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

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All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

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BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

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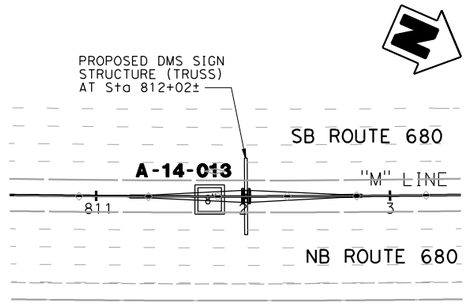
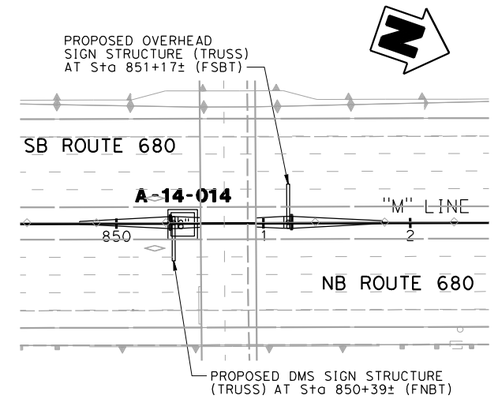
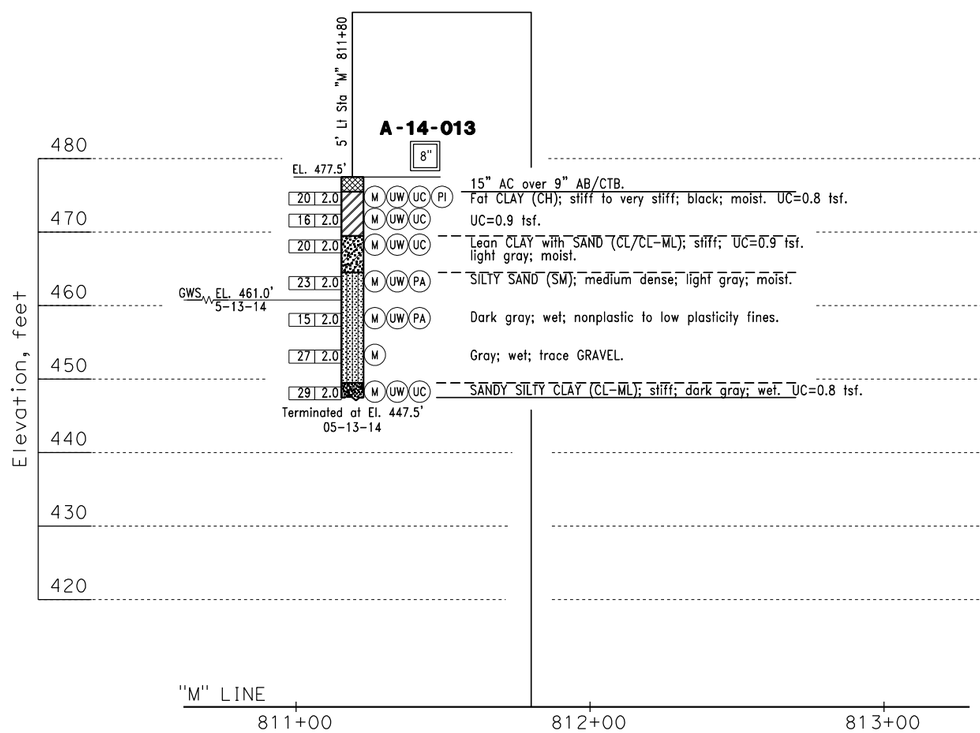
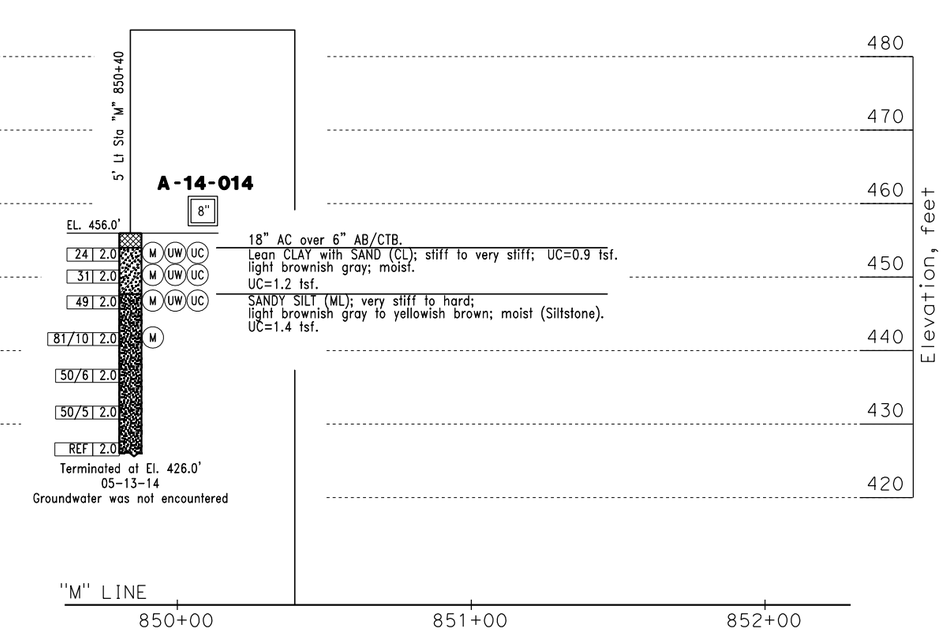
FSBT: Facing Southbound Traffic





PLAN
1" = 50'





PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -		

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET XX | OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

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BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
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BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

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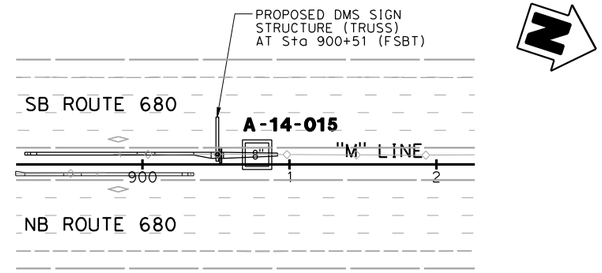
FSBT: Facing Southbound Traffic



PLAN
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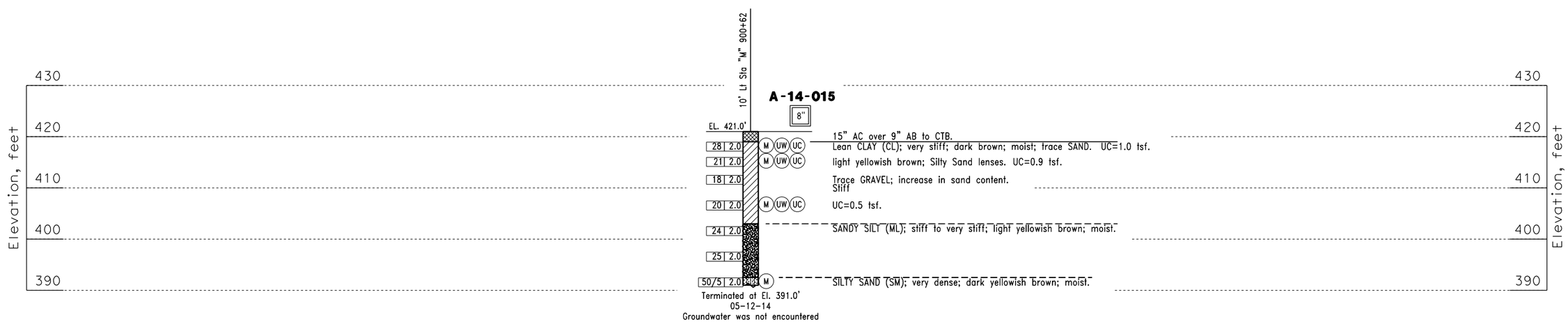
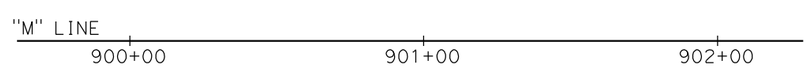


PROFILE
Ver. 1" = 10'
Hor. 1" = 25'



DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang
SIGN OFF DATE	CHECKED BY	A. M. Moore	FIELD INVESTIGATION BY: DATE: -		PROJECT ENGINEER

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 8

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET XX | OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

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BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

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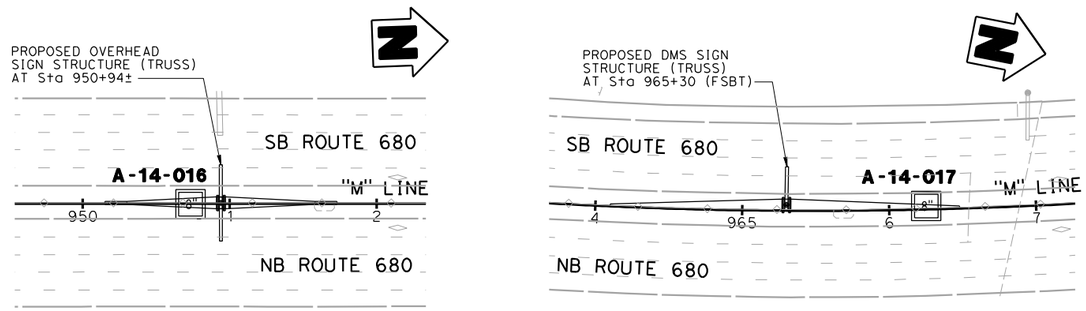

PLAN
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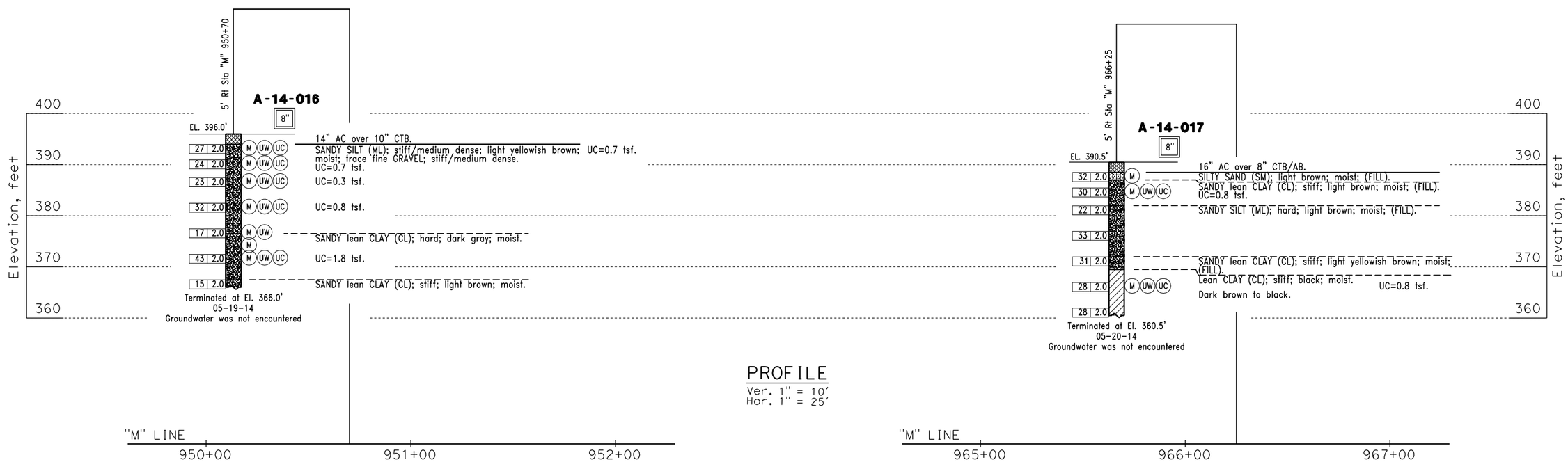

PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang
SIGN OFF DATE	CHECKED BY	A. M. Moore	FIELD INVESTIGATION BY: DATE: -		PROJECT ENGINEER

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 9

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
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BENCH MARK:

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BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

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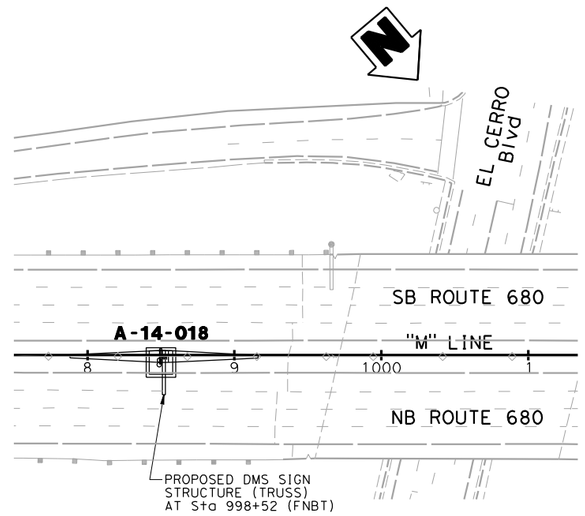

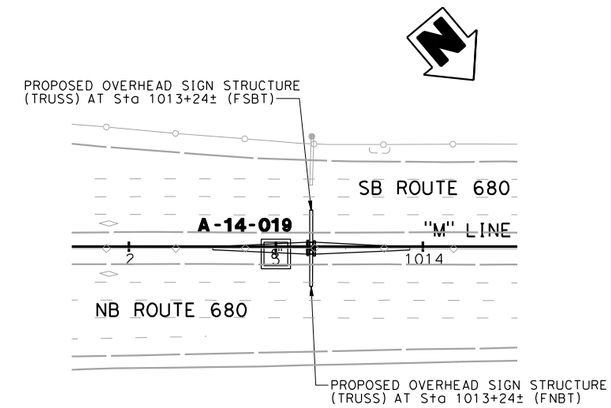

PLAN
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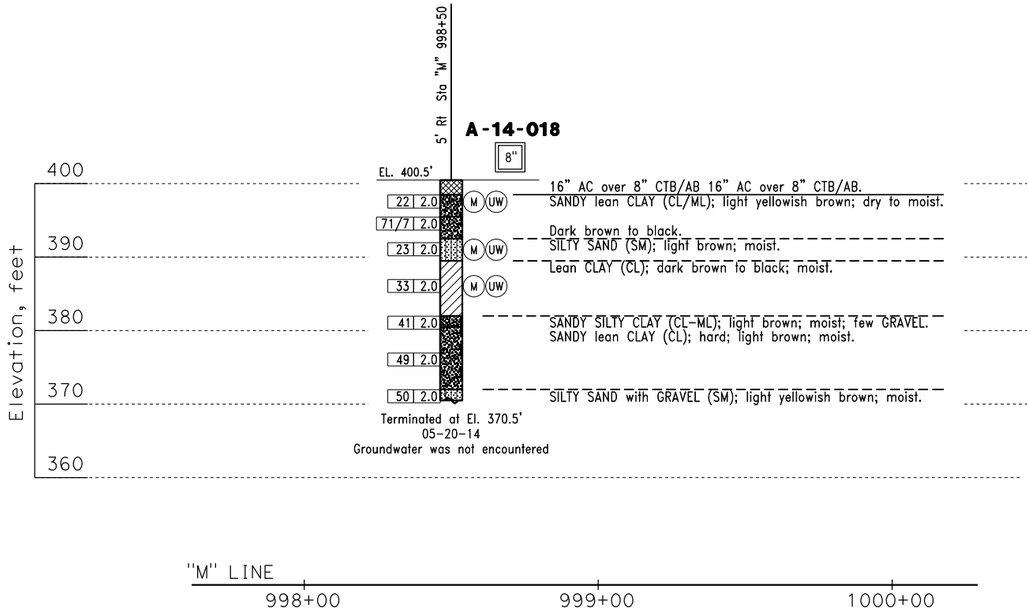

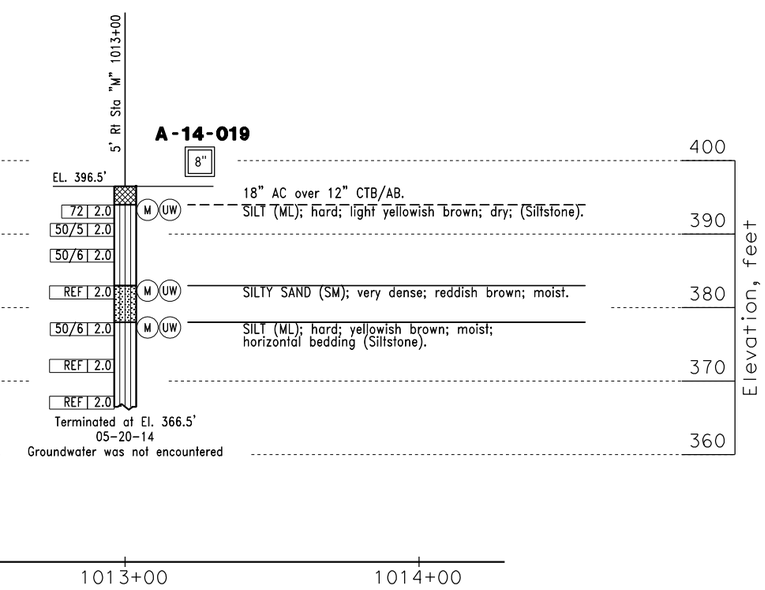

PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

"M" LINE
998+00 999+00 1000+00

"M" LINE
1012+00 1013+00 1014+00

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

S. Huang
PROJECT ENGINEER

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 10

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

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BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

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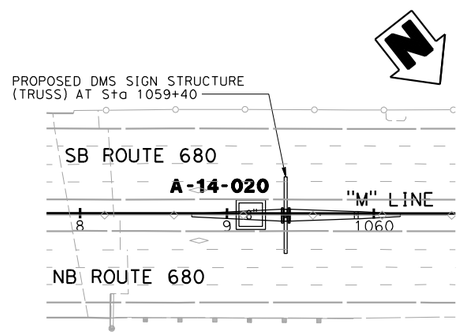
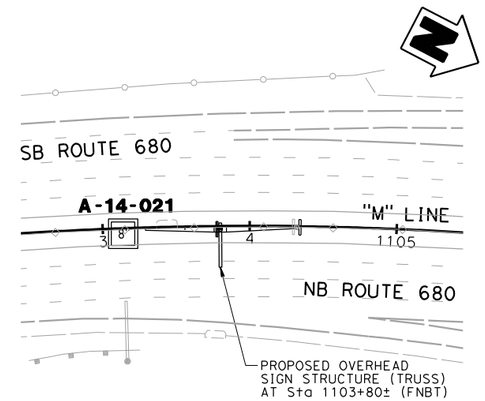
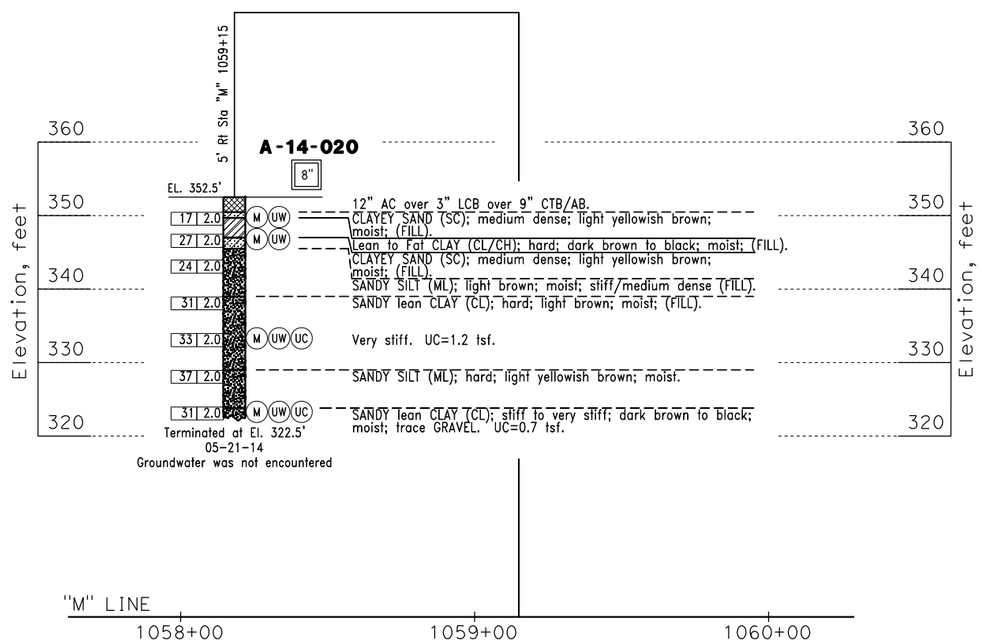
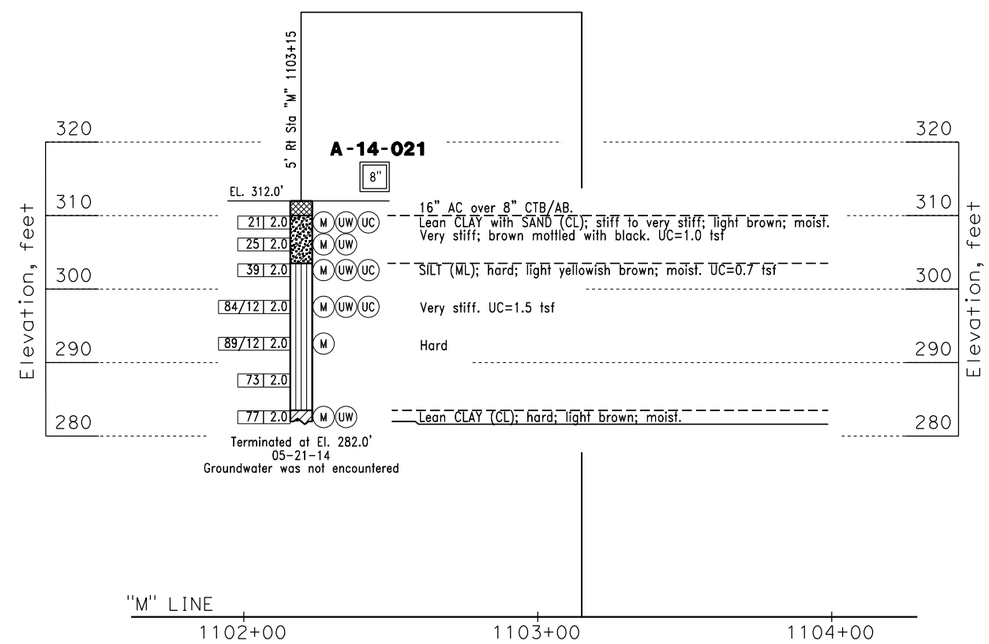




PLAN
1" = 50'





PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -		

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 11

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET XX | OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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URS CORPORATION
100 WEST SAN FERNANDO STREET, SUITE 200
SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

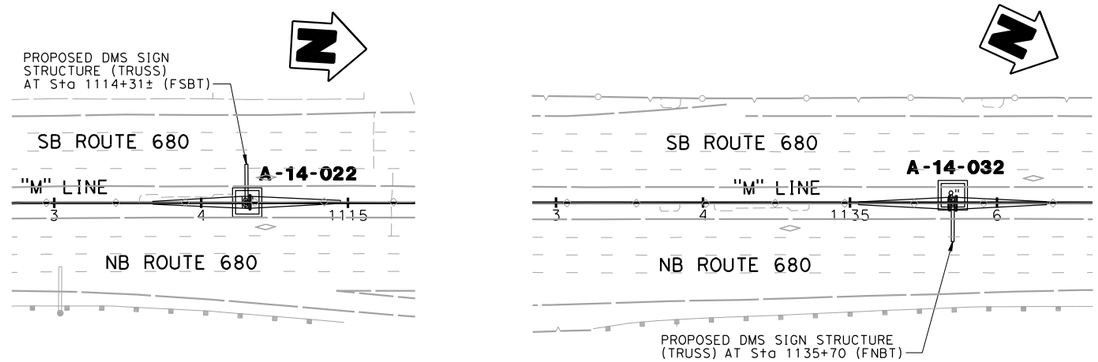
BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

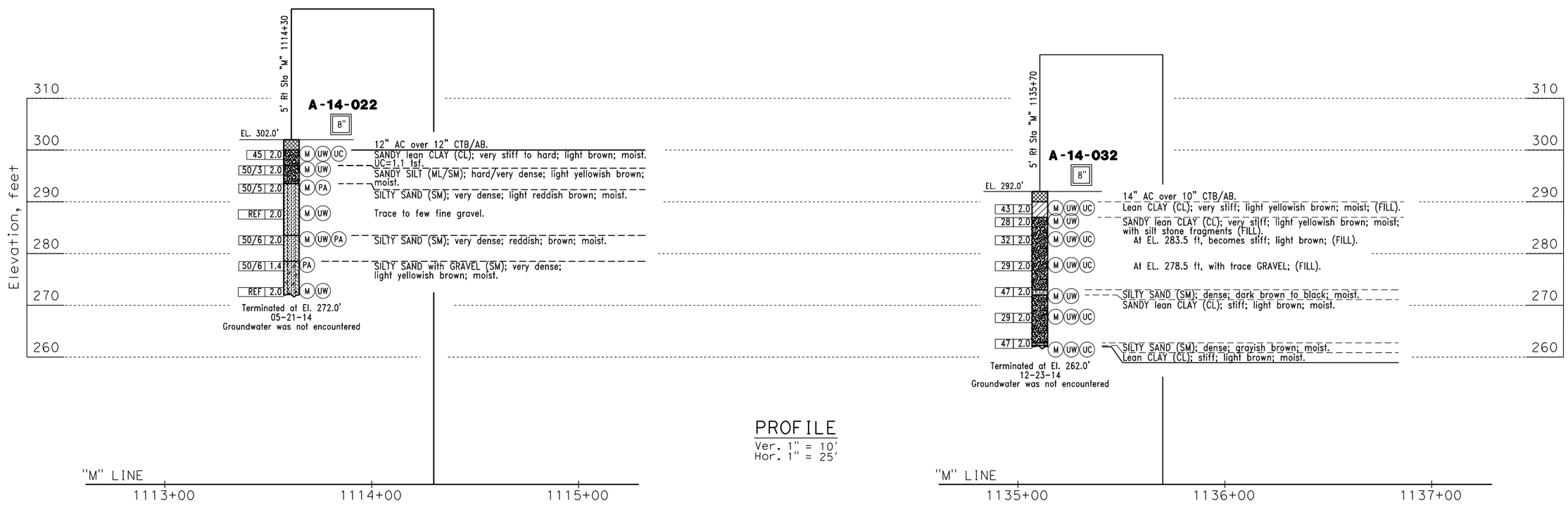
1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
2. Standard Penetration test sampler I.D. = 1.44 inch (1.4) Modified California sampler I.D. = 1.96 inch (2.0)
3. UC values reported are undrained shear strengths in tsf.

ABBREVIATIONS:

DMS: Dynamic Messaging Sign
FNBT: Facing Northbound Traffic
FSBT: Facing Southbound Traffic



PLAN
1" = 50'



PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER	BRIDGE NO. N/A	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -			POST MILES N/A	LOG OF TEST BORINGS No. 12

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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URS CORPORATION
100 WEST SAN FERNANDO STREET, SUITE 200
SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
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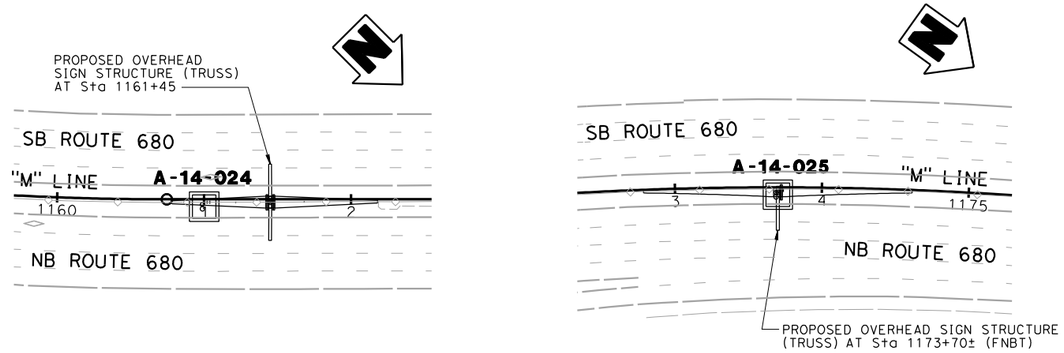
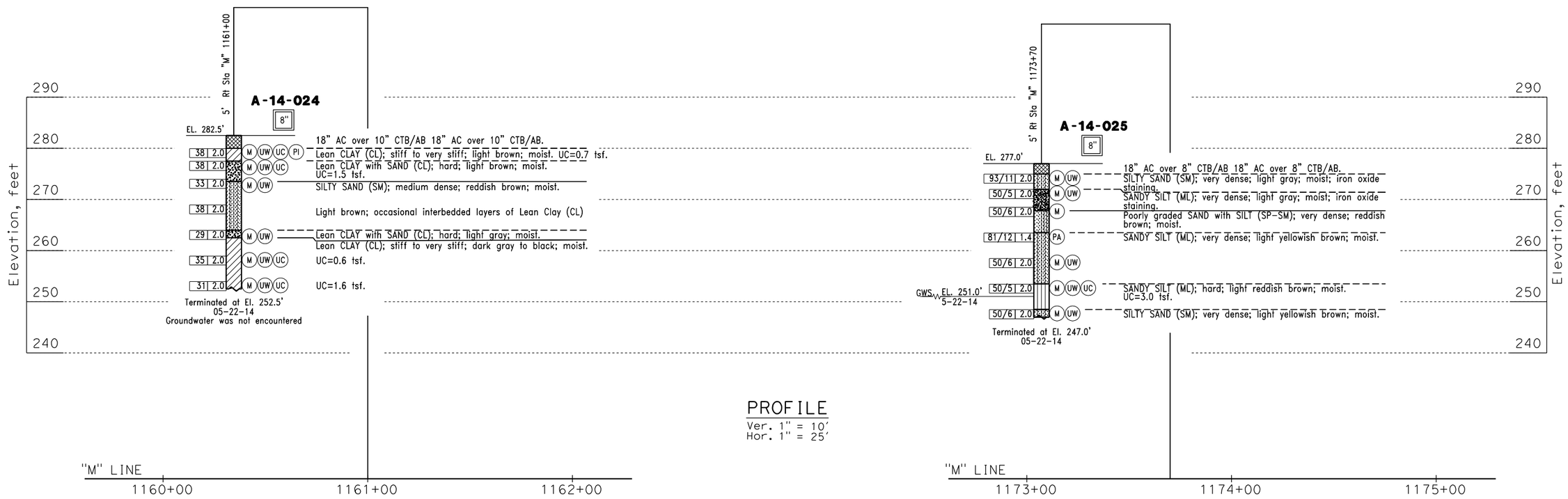
3. UC values reported are undrained shear strengths in tsf.

ABBREVIATIONS:

FNBT: Facing Northbound Traffic
FSBT: Facing Southbound Traffic



PLAN
1" = 50'



PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -		

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 13

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

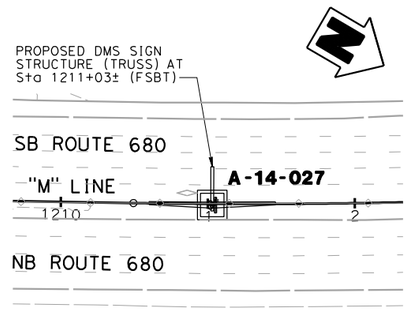
BM No. 1, Monument 501, El 9.35, N2045276.165 E6019489.935
BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
BM No. 3, Monument 505, El 10.21, N2043140.717 E6021760.224
BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

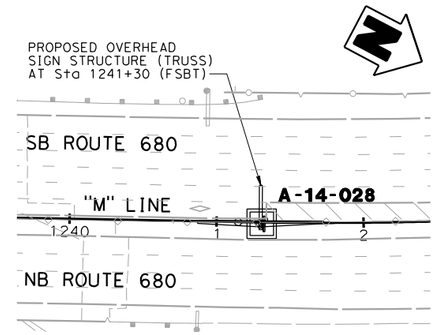
NOTES:

1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
2. Standard Penetration test sampler I.D. = 1.44 inch (1.4) Modified California sampler I.D. = 1.96 inch (2.0)
3. UC values reported are undrained shear strengths in tsf.

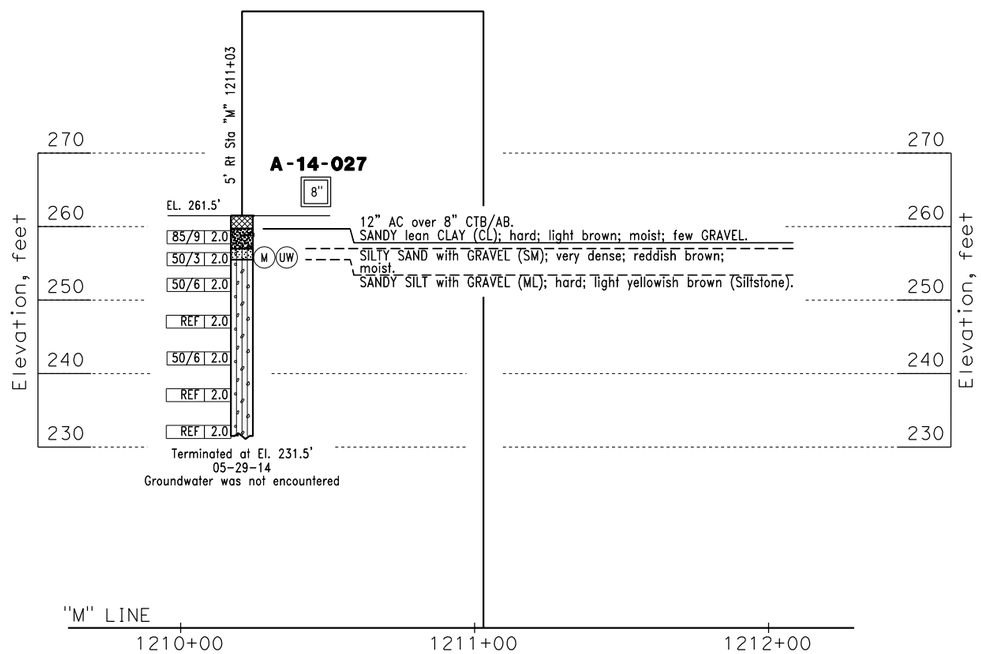
ABBREVIATIONS:

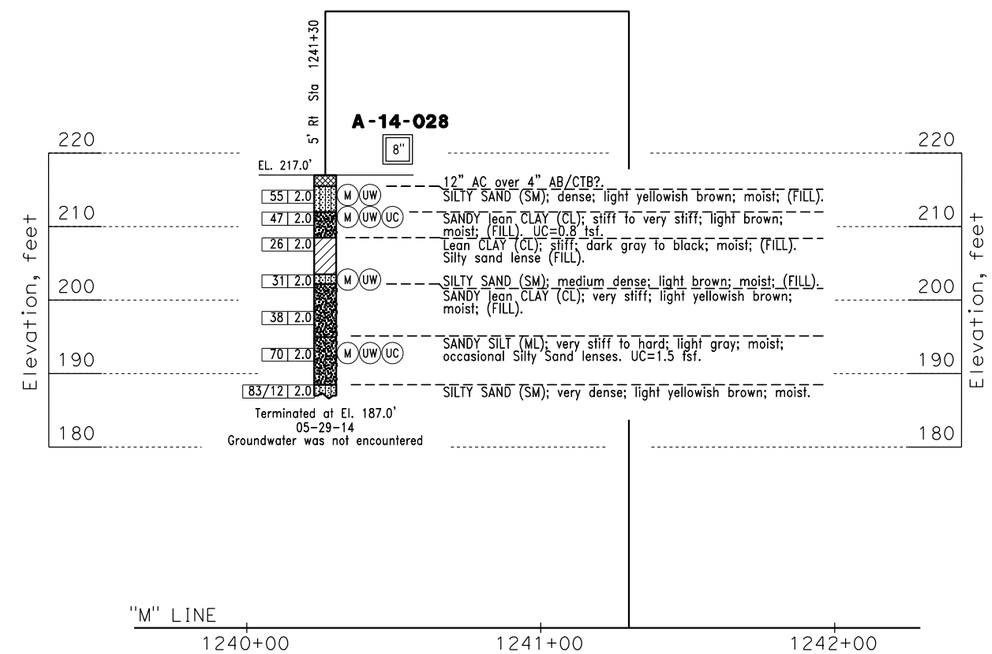
DMS: Dynamic Messaging Sign
FSBT: Facing Southbound Traffic





PLAN
1" = 50'





PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER	BRIDGE NO. N/A	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -			POST MILES N/A	LOG OF TEST BORINGS No. 14

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala/CC	680	R21.0-R21.9/ R0.0-14.0		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 3-31-16 GEOTECHNICAL STATE OF CALIFORNIA

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SAN JOSE, CA 95113-2254

BAY AREA INFRASTRUCTURE FINANCING AUTHORITY
101 EIGHTH St, 3rd Floor
OAKLAND, CA 94607

BENCH MARK:

All elevations based on vertical datum NAVD88.
All stations and offsets based on California Coordinate System Zone-III, Epoch 1991.

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BM No. 2, Monument 1003, El 10.93, N2043769.910 E6021712.494
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BM No. 4, Monument 74, El 35.48, N2042621.214 E6022476.873
BM No. 5, Monument 510, El 12.66 N2042355.119 E6022633.562

NOTES:

1. This LOTB Sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).
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3. UC values reported are undrained shear strengths in tsf.

ABBREVIATIONS:

DMS: Dynamic Messaging Sign
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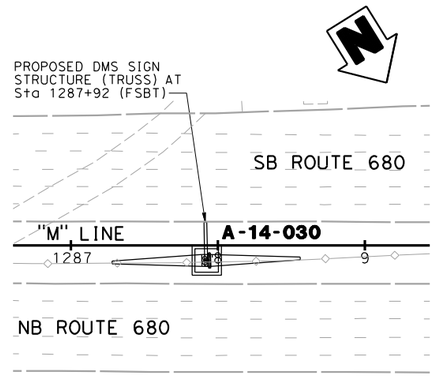
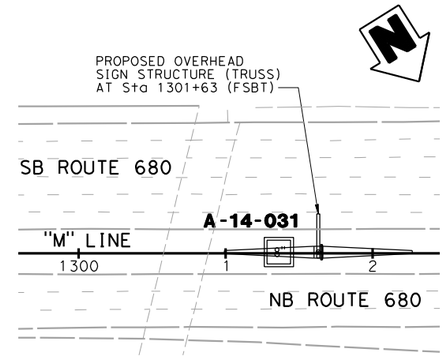




PLAN
1" = 50'

PROFILE
Ver. 1" = 10'
Hor. 1" = 25'

DESIGN OVERSIGHT	DRAWN BY	B. Vuong	M. Thummaluru FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	S. Huang PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. M. Moore	DATE: -		

BRIDGE NO. N/A
POST MILES N/A

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS No. 15

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 04140004891 CONTRACT NO.: 04-3G9501

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET XX OF XX

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

Boring or Sample No.	Date Sampled	Station	Line	Distance from Line (feet)	Depth (feet)	Sieve Analysis (Percent Passing)		Atterberg Limits			In-Place Conditions	
						%<#4	%<#200	Liquid Limit	Plasticity Index	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)
A-14-001	5/27/2014	485+60	M	Rt.5	8.5					5,310	24	100
A-14-001	5/27/2014	485+60	M	Rt.5	13.5					12,140	14	122
A-14-001	5/27/2014	485+60	M	Rt.5	28.5					5,630	27	94
A-14-002	5/27/2014	499+50	M	Rt.5	2.0					5,280	19	99
A-14-002	5/27/2014	499+50	M	Rt.5	5.0			65	45			
A-14-002	5/27/2014	499+50	M	Rt.5	8.5					3,900	15	99
A-14-002	5/27/2014	499+50	M	Rt.5	13.5					4,690	15	112
A-14-002	5/27/2014	499+50	M	Rt.5	18.5					5,000	15	113
A-14-002	5/27/2014	499+50	M	Rt.5	23.5					5,850	25	95
A-14-002	5/27/2014	499+50	M	Rt.5	28.5					1,470	23	95
A-14-003	5/28/2014	514+80	M	Rt.5	2.0					2,660	17	110
A-14-003	5/28/2014	514+80	M	Rt.5	5.0					1,670	28	90
A-14-003	5/28/2014	514+80	M	Rt.5	8.5					6,260	17	113
A-14-003	5/28/2014	514+80	M	Rt.5	28.5					3,440	27	95
A-14-004	5/28/2014	540+50	M	Rt.5	8.5					1,720	27	89
A-14-004	5/28/2014	540+50	M	Rt.5	13.5					6,620	19	108
A-14-004	5/28/2014	540+50	M	Rt.5	23.5					2,580	27	95
A-14-004	5/28/2014	540+50	M	Rt.5	28.5					1,730	25	98
A-14-005	5/15/2014	593+60	M	Rt.5	2.0					3,250	32	80
A-14-005	5/15/2014	593+60	M	Rt.5	5.0					4,710	25	92
A-14-005	5/15/2014	593+60	M	Rt.5	8.5					3,620	25	91
A-14-005	5/15/2014	593+60	M	Rt.5	18.5					11,860	22	102
A-14-005	5/15/2014	593+60	M	Rt.5	23.5						16	104
A-14-005	5/15/2014	593+60	M	Rt.5	28.5						16	106
A-14-006	5/15/2014	606+10	M	Lt.5	5.0						24	84
A-14-006	5/15/2014	606+10	M	Lt.5	8.5					4,760	23	101
A-14-006	5/15/2014	606+10	M	Lt.5	13.5					8,600	13	116
A-14-006	5/15/2014	606+10	M	Lt.5	23.5					7,880	20	105
A-14-006	5/15/2014	606+10	M	Lt.5	28.5					8,470	18	109
A-14-007	5/15/2014	625+20	M	Lt.5	2.0					4,130	19	106
A-14-007	5/15/2014	625+20	M	Lt.5	5.0					7,210	14	112
A-14-007	5/15/2014	625+20	M	Lt.5	8.5					5,860	23	99
A-14-007	5/15/2014	625+20	M	Lt.5	13.5					3,440	21	103
A-14-007	5/15/2014	625+20	M	Lt.5	23.5						5	
A-14-007	5/15/2014	625+20	M	Lt.5	28.5					6,500	20	107
A-14-008	5/28/2014	659+05	M	Rt.5	2.0						22	
A-14-008	5/28/2014	659+05	M	Rt.5	5.0					4,040	21	106
A-14-008	5/28/2014	659+05	M	Rt.5	8.5					3,100	22	98
A-14-008	5/28/2014	659+05	M	Rt.5	13.5					3,470	20	106
A-14-008	5/28/2014	659+05	M	Rt.5	23.5					3,630	22	104
A-14-009	5/14/2014	692+75	M	Lt.5	2.0					2,740	21	101
A-14-009	5/14/2014	692+75	M	Lt.5	5.0					4,480	19	107
A-14-009	5/14/2014	692+75	M	Lt.5	8.5					6,570	19	104
A-14-009	5/14/2014	692+75	M	Lt.5	13.5					4,290	19	104

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

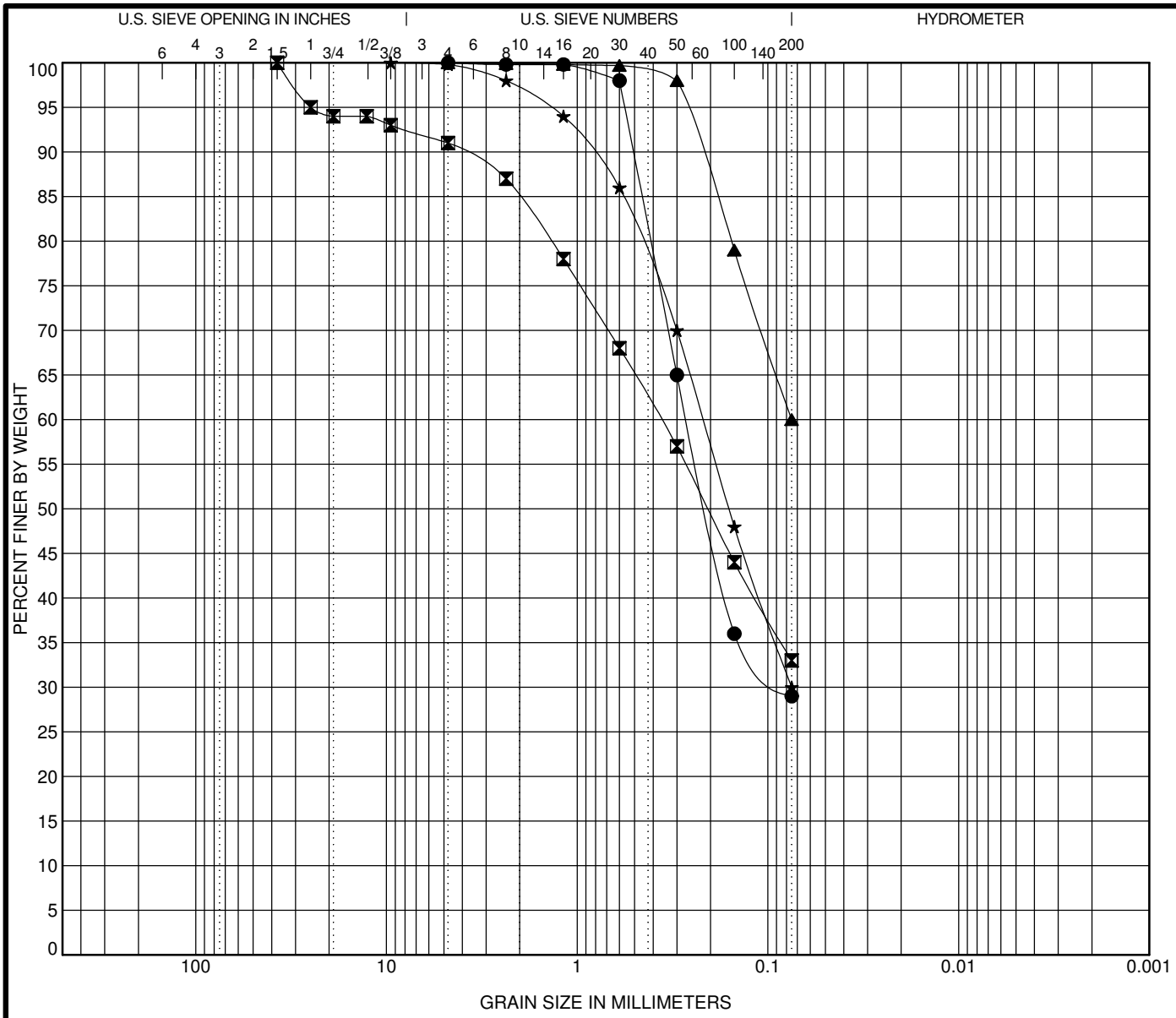
Boring or Sample No.	Date Sampled	Station	Line	Distance from Line (feet)	Depth (feet)	Sieve Analysis (Percent Passing)		Atterberg Limits			In-Place Conditions	
						%<#4	%<#200	Liquid Limit	Plasticity Index	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)
A-14-009	5/14/2014	692+75	M	Lt.5	18.5					5,630	19	106
A-14-009	5/14/2014	692+75	M	Lt.5	23.5					1,520	17	110
A-14-009	5/14/2014	692+75	M	Lt.5	28.5					7,370	19	110
A-14-010	5/28/2014	735+90	M	Lt.5	2.0						18	104
A-14-010	5/28/2014	735+90	M	Lt.5	2.0						14	112
A-14-010	5/28/2014	735+90	M	Lt.5	5.0					7,550	16	114
A-14-010	5/28/2014	735+90	M	Lt.5	8.5					1,320	15	109
A-14-010	5/28/2014	735+90	M	Lt.5	8.5					3,530	16	113
A-14-010	5/28/2014	735+90	M	Lt.5	13.5					7,350	16	114
A-14-010	5/28/2014	735+90	M	Lt.5	18.5						19	103
A-14-010	5/28/2014	735+90	M	Lt.5	23.5						14	
A-14-011	5/14/2014	759+80	M	Lt.5	2.0						17	93
A-14-011	5/14/2014	759+80	M	Lt.5	5.0					6,650	19	104
A-14-011	5/14/2014	759+80	M	Lt.5	13.5						6	96
A-14-011	5/14/2014	759+80	M	Lt.5	13.5						15	101
A-14-011	5/14/2014	759+80	M	Lt.5	18.5					8,070	17	115
A-14-011	5/14/2014	759+80	M	Lt.5	23.5					8,370	14	117
A-14-011	5/14/2014	759+80	M	Lt.5	23.5					10,390	15	115
A-14-011	5/14/2014	759+80	M	Lt.5	28.5					2,330	18	106
A-14-012A	5/13/2014	785+75	M	Lt.5	2.0					4,190	19	103
A-14-012A	5/13/2014	785+75	M	Lt.5	5.0					2,200	20	103
A-14-012A	5/13/2014	785+75	M	Lt.5	8.5					3,060	23	99
A-14-012A	5/13/2014	785+75	M	Lt.5	13.5			40	24			
A-14-012A	5/13/2014	785+75	M	Lt.5	18.5					4,610	18	110
A-14-012A	5/13/2014	785+75	M	Lt.5	23.5					3,840	21	103
A-14-012A	5/13/2014	785+75	M	Lt.5	28.5					3,190	23	101
A-14-013	5/13/2014	811+80	M	Lt.5	2.0			66	50	3,190	27	92
A-14-013	5/13/2014	811+80	M	Lt.5	5.0					3,790	25	97
A-14-013	5/13/2014	811+80	M	Lt.5	8.5					3,590	23	95
A-14-013	5/13/2014	811+80	M	Lt.5	13.5		37			830	21	103
A-14-013	5/13/2014	811+80	M	Lt.5	18.5		17			1,680	22	101
A-14-013	5/13/2014	811+80	M	Lt.5	23.5		15				13	
A-14-013	5/13/2014	811+80	M	Lt.5	28.5					3,010	21	102
A-14-014	5/13/2014	850+40	M	Lt.5	2.0					3,620	21	100
A-14-014	5/13/2014	850+40	M	Lt.5	5.0					4,630	20	104
A-14-014	5/13/2014	850+40	M	Lt.5	8.5					5,490	17	107
A-14-014	5/13/2014	850+40	M	Lt.5	13.5						15	
A-14-015	5/12/2014	900+62	M	Lt.5	2.0					4,190	22	96
A-14-015	5/12/2014	900+62	M	Lt.5	5.0					3,550	21	90
A-14-015	5/12/2014	900+62	M	Lt.5	13.5					2,050	22	92
A-14-015	5/12/2014	900+62	M	Lt.5	28.5						21	
A-14-016	5/19/2014	950+70	M	Rt.5	2.0					2,790	14	103
A-14-016	5/19/2014	950+70	M	Rt.5	5.0					2,930	21	101
A-14-016	5/19/2014	950+70	M	Rt.5	8.5					1,060	19	106

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

Boring or Sample No.	Date Sampled	Station	Line	Distance from Line (feet)	Depth (feet)	Sieve Analysis (Percent Passing)		Atterberg Limits			In-Place Conditions	
						%<#4	%<#200	Liquid Limit	Plasticity Index	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)
A-14-016	5/19/2014	950+70	M	Rt.5	13.5					3,330	20	101
A-14-016	5/19/2014	950+70	M	Rt.5	18.5						24	91
A-14-016	5/19/2014	950+70	M	Rt.5	18.5						23	
A-14-016	5/19/2014	950+70	M	Rt.5	23.5					7,060	6	124
A-14-017	5/20/2014	966+25	M	Rt.5	2.0						17	
A-14-017	5/20/2014	966+25	M	Rt.5	5.0					3,010	19	100
A-14-017	5/20/2014	966+25	M	Rt.5	18.5					2,820	20	106
A-14-017	5/20/2014	966+25	M	Rt.5	23.5					3,040	23	100
A-14-017	5/20/2014	966+25	M	Rt.5	28.5						24	101
A-14-018	5/20/2014	988+50	M	Rt.5	2.0						22	126
A-14-018	5/20/2014	988+50	M	Rt.5	8.5						19	101
A-14-018	5/20/2014	988+50	M	Rt.5	13.5						19	105
A-14-019	5/20/2014	1013+00	M	Rt.5	2.0						19	100
A-14-019	5/20/2014	1013+00	M	Rt.5	5.0					3,110	20	106
A-14-019	5/20/2014	1013+00	M	Rt.5	8.5						20	99
A-14-019	5/20/2014	1013+00	M	Rt.5	13.5						14	114
A-14-019	5/20/2014	1013+00	M	Rt.5	18.5						19	100
A-14-020	5/21/2014	1059+15	M	Rt.5	2.0						19	92
A-14-020	5/21/2014	1059+15	M	Rt.5	2.0					2,530	27	95
A-14-020	5/21/2014	1059+15	M	Rt.5	5.0						21	108
A-14-020	5/21/2014	1059+15	M	Rt.5	13.5					3,510	22	102
A-14-020	5/21/2014	1059+15	M	Rt.5	18.5					4,640	24	99
A-14-020	5/21/2014	1059+15	M	Rt.5	23.5					4,950	23	101
A-14-020	5/21/2014	1059+15	M	Rt.5	28.5					2,700	24	93
A-14-021	5/21/2014	1103+15	M	Rt.5	2.0					4,160	24	97
A-14-021	5/21/2014	1103+15	M	Rt.5	5.0						24	91
A-14-021	5/21/2014	1103+15	M	Rt.5	8.5					2,610	23	91
A-14-021	5/21/2014	1103+15	M	Rt.5	13.5					5,960	22	106
A-14-021	5/21/2014	1103+15	M	Rt.5	18.5						13	
A-14-021	5/21/2014	1103+15	M	Rt.5	28.5						21	101
A-14-022	5/21/2014	1114+30	M	Rt.5	2.0					4,550	20	101
A-14-022	5/21/2014	1114+30	M	Rt.5	5.0						19	105
A-14-022	5/21/2014	1114+30	M	Rt.5	8.5	100	27				13	
A-14-022	5/21/2014	1114+30	M	Rt.5	13.5						16	108
A-14-022	5/21/2014	1114+30	M	Rt.5	18.5		38				18	104
A-14-022	5/21/2014	1114+30	M	Rt.5	23.5	88	33					
A-14-022	5/21/2014	1114+30	M	Rt.5	28.5						16	105
A-14-023	5/22/2014	1133+40	M	Rt.5	2.0					3,120	17	104
A-14-023	5/22/2014	1133+40	M	Rt.5	5.0					2,310	21	101
A-14-023	5/22/2014	1133+40	M	Rt.5	8.5						18	106
A-14-023	5/22/2014	1133+40	M	Rt.5	18.5						16	112
A-14-023	5/22/2014	1133+40	M	Rt.5	23.5						16	
A-14-023	5/22/2014	1133+40	M	Rt.5	28.5					3,750	22	100
A-14-024	5/22/2014	1161+00	M	Rt.5	2.0			47	26			

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

Boring or Sample No.	Date Sampled	Station	Line	Distance from Line (feet)	Depth (feet)	Sieve Analysis (Percent Passing)		Atterberg Limits			In-Place Conditions	
						%<#4	%<#200	Liquid Limit	Plasticity Index	Unconfined Compressive Strength (psf)	Water Content (%)	Dry Unit Weight (pcf)
A-14-024	5/22/2014	1161+00	M	Rt.5	2.5					2,620	22	100
A-14-024	5/22/2014	1161+00	M	Rt.5	5.0					5,980	21	106
A-14-024	5/22/2014	1161+00	M	Rt.5	8.5		41				18	103
A-14-024	5/22/2014	1161+00	M	Rt.5	18.5						23	93
A-14-024	5/22/2014	1161+00	M	Rt.5	23.5					2,440	25	98
A-14-024	5/22/2014	1161+00	M	Rt.5	28.5					6,540	22	103
A-14-025	5/22/2014	1173+70	M	Rt.5	2.0						17	108
A-14-025	5/22/2014	1173+70	M	Rt.5	5.0						16	115
A-14-025	5/22/2014	1173+70	M	Rt.5	8.5						15	
A-14-025	5/22/2014	1173+70	M	Rt.5	13.5	100	59					
A-14-025	5/22/2014	1173+70	M	Rt.5	18.5						17	111
A-14-025	5/22/2014	1173+70	M	Rt.5	23.5					12,140	15	117
A-14-025	5/22/2014	1173+70	M	Rt.5	28.5						18	109
A-14-027	5/29/2014	1211+05	M	Rt.5	5.0						29	
A-14-028	5/29/2014	1241+30	M	Rt.5	2.0						9	110
A-14-028	5/29/2014	1241+30	M	Rt.5	5.0					3,080	23	104
A-14-028	5/29/2014	1241+30	M	Rt.5	13.5						19	103
A-14-028	5/29/2014	1241+30	M	Rt.5	23.5					5,850	19	108
A-14-030	5/30/2014	1287+90	M	Rt.5	2.0					1,820	27	85
A-14-030	5/30/2014	1287+90	M	Rt.5	5.0					3,990	23	101
A-14-030	5/30/2014	1287+90	M	Rt.5	13.5		40				16	100
A-14-030	5/30/2014	1287+90	M	Rt.5	33.5					1,830	27	97
A-14-031	5/29/2014	1301+35	M	Rt.5	2.5						22	102
A-14-031	5/29/2014	1301+35	M	Rt.5	2.5						18	110
A-14-031	5/29/2014	1301+35	M	Rt.5	5.0						22	96
A-14-031	5/29/2014	1301+35	M	Rt.5	13.5						9	110
A-14-031	5/29/2014	1301+35	M	Rt.5	23.5						18	110
A-14-031	5/29/2014	1301+35	M	Rt.5	33.5		34					
A-14-031	5/29/2014	1301+35	M	Rt.5	38.5	99	29					
A-14-032	12/23/2014	1135+70	M	Rt.5	2.5					5760	22	126
A-14-032	12/23/2014	1135+70	M	Rt.5	5.0						22	118
A-14-032	12/23/2014	1135+70	M	Rt.5	8.5					2750	17	129
A-14-032	12/23/2014	1135+70	M	Rt.5	13.5					2010	15	128
A-14-032	12/23/2014	1135+70	M	Rt.5	19.5						19	119
A-14-032	12/23/2014	1135+70	M	Rt.5	23.5					3640	25	126
A-14-032	12/23/2014	1135+70	M	Rt.5	28.5					3240	21	128



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**A-14-022**	**8.5**	**Clayey SAND (SC)**					
⊠	**A-14-022**	**23.5**	**Clayey SAND (SC)**					
▲	**A-14-025**	**13.5**	**Sandy lean CLAY (CL)**					
★	**A-14-031**	**38.5**	**Clayey SAND (SC)**					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**A-14-022**	**8.5**	**4.75**	**0.266**	**0.083**		**0.0**	**71.0**	**29.0**	
⊠	**A-14-022**	**23.5**	**37.5**	**0.362**			**9.0**	**58.0**	**33.0**	
▲	**A-14-025**	**13.5**	**4.75**	**0.075**			**0.0**	**40.0**	**60.0**	
★	**A-14-031**	**38.5**	**9.5**	**0.219**	**0.075**		**0.2**	**69.8**	**30.0**	

URS

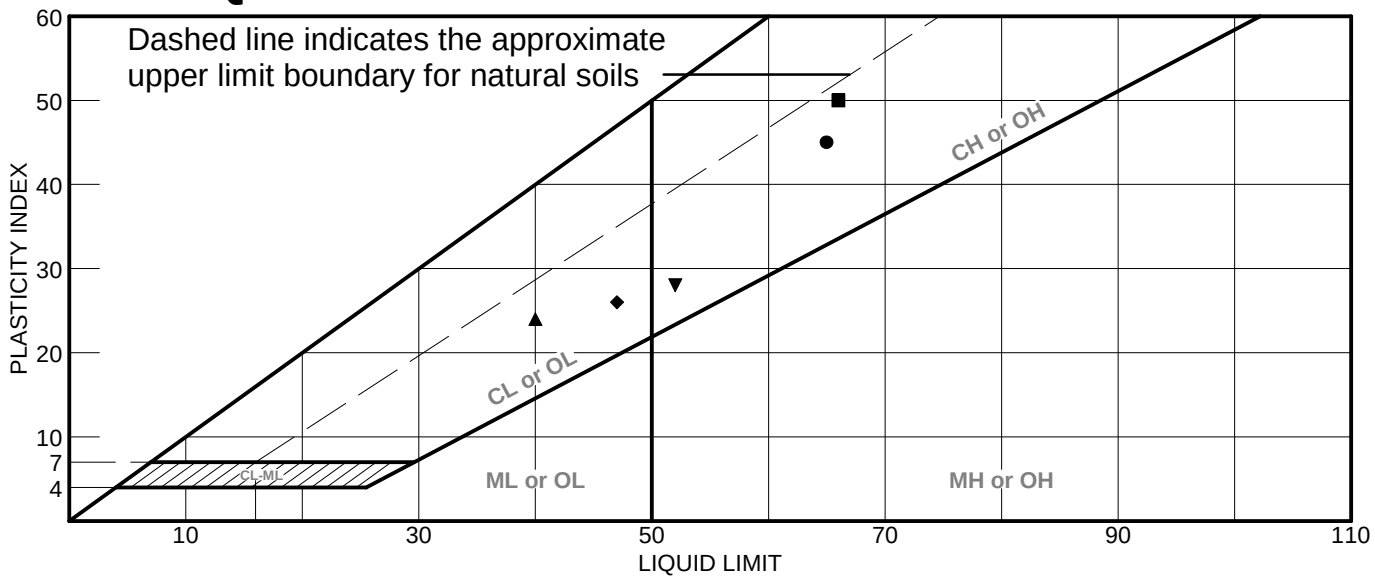
100 W. San Fernando St, Ste 200
San Jose, CA 95113

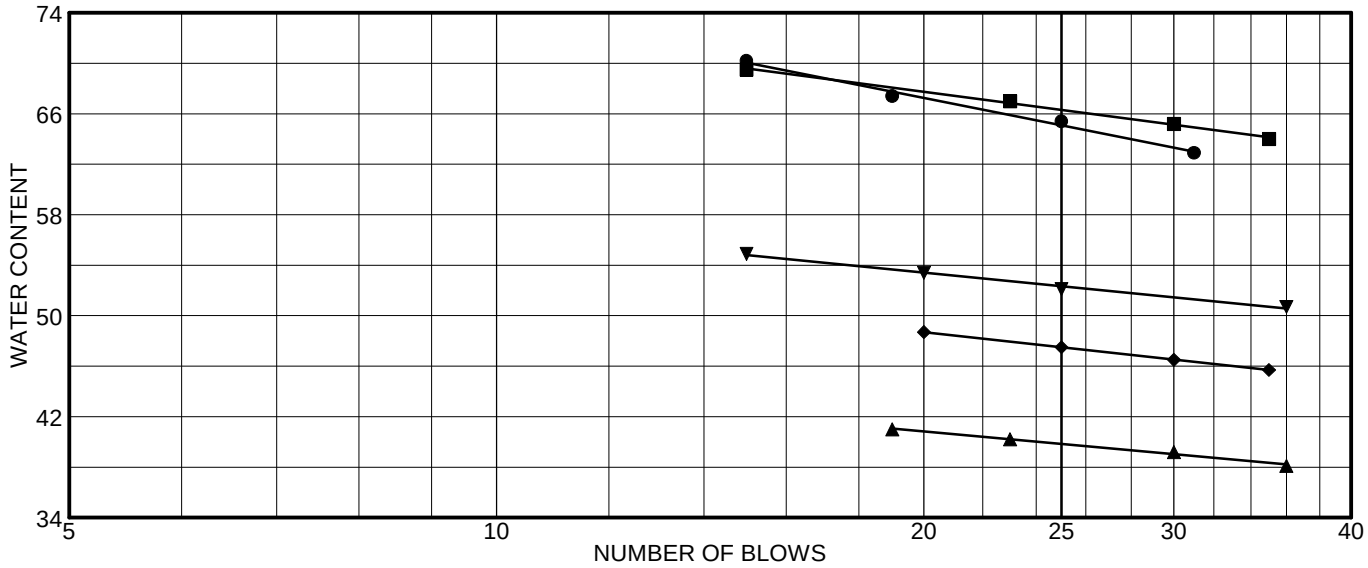
GRAIN SIZE DISTRIBUTION

Project Name: I-680 Express Lanes
Location:
Number: 28645477

URS GRAIN SIZE 28645477-I680EXPRESS.GPJ SNJ CT 1.GLB 10/15/14

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Very Dark Brown Fat CLAY	65	20	45			
■	Black Fat CLAY	66	16	50			
▲	Mottled Brown Lean CLAY	40	16	24			
◆	Grayish Brown Lean CLAY	47	21	26			
▼	Brown & Dark Brown Sandy Fat CLAY	52	24	28			

Project No. 033-167 **Client:** URS

Project: I 680 Overhead Sign Structures - 28645477

● **Source:** A-14-002 **Elev./Depth:** 5-6.5'
■ **Source:** A-14-013 **Elev./Depth:** 2-3.5'
▲ **Source:** A-14-012A **Elev./Depth:** 13.5-15'
◆ **Source:** A-14-024 **Elev./Depth:** 2'
▼ **Source:** A-14-029 **Elev./Depth:** 5-6.5'

Remarks:
●
■
▲
◆
▼

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: URS Corporation
Client's Project No.: 28645477
Client's Project Name: I-680 Express Lanes
Date Sampled: 11-Jul-14
Date Received: 14-Jul-14
Matrix: Soil
Authorization: Signed Chain of Custody and Work Authorization No.311755

Date of Report: 18-Jul-2014

Job/Sample No.	Sample I.D.	Moisture (%)	pH	Min.Resistivity** (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1407098-001	A-14 - 2-6.5'	-	7.97	420	-	70	240
1407098-002	004 - 2-6.5'	-	7.73	1,200	-	N.D.	N.D.
1407098-003	007 - 8-15'	-	8.06	430	-	29	210
1407098-004	009 - 5-15'	-	8.01	730	-	N.D.	61
1407098-005	010 - 2-10'	-	8.34	1,100	-	N.D.	16
1407098-006	016 - 13.5-20'	-	8.50	1,000	-	N.D.	86
1407098-007	20 - 5-15'	-	8.33	1,200	-	N.D.	N.D.
1407098-008	22 - 2-15'	-	8.23	770	-	N.D.	140
1407098-009	25 - 2-10'	-	7.62	1,200	-	N.D.	N.D.
1407098-010	027 - 5-15'	-	6.02	2,100	-	N.D.	110
1407098-011	30 - 5-15'	-	7.93	530	-	N.D.	190
1407098-012	31 - 18.5-25'	-	6.92	650	-	63	17

Method:	CT 226 [a]	CT 643 [b]	CT 643 [b]	-	CT 422 [c]	CT 417 [c]
Detection Limit:	-	-	-	50	15	15
Date Analyzed:	-	16-Jul-2014	15-Jul-2014	-	16-Jul-2014	16-Jul-2014

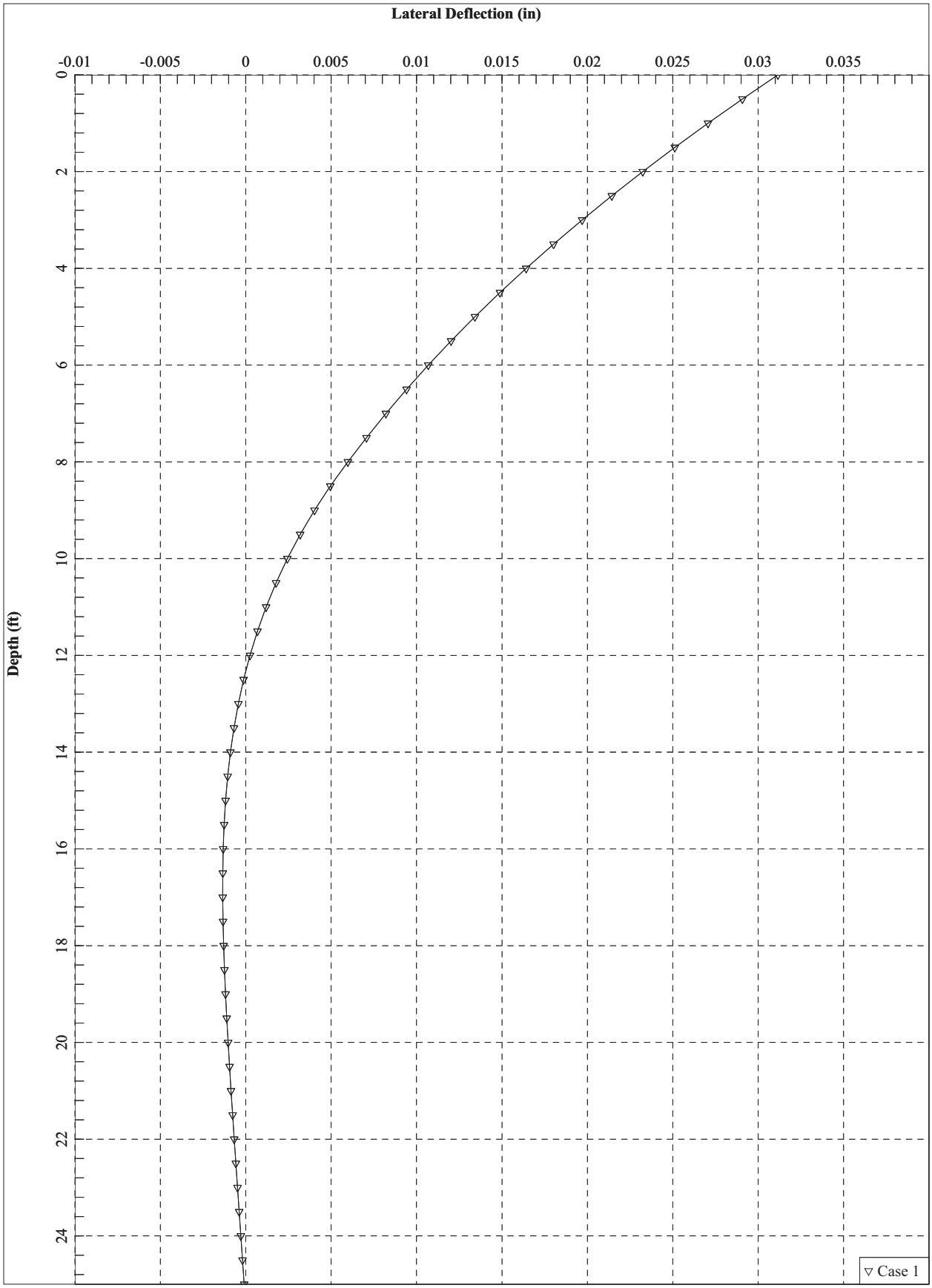
Cheryl McMillen
Laboratory Director

* Results Reported on an "As Received" Basis
N.D. - None Detected
** Smaller box used as limited amount of soil

[a] Rev. July 2010 [b] Rev. June 2007 [c] Rev. November 2006

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

Sign No: OS2-1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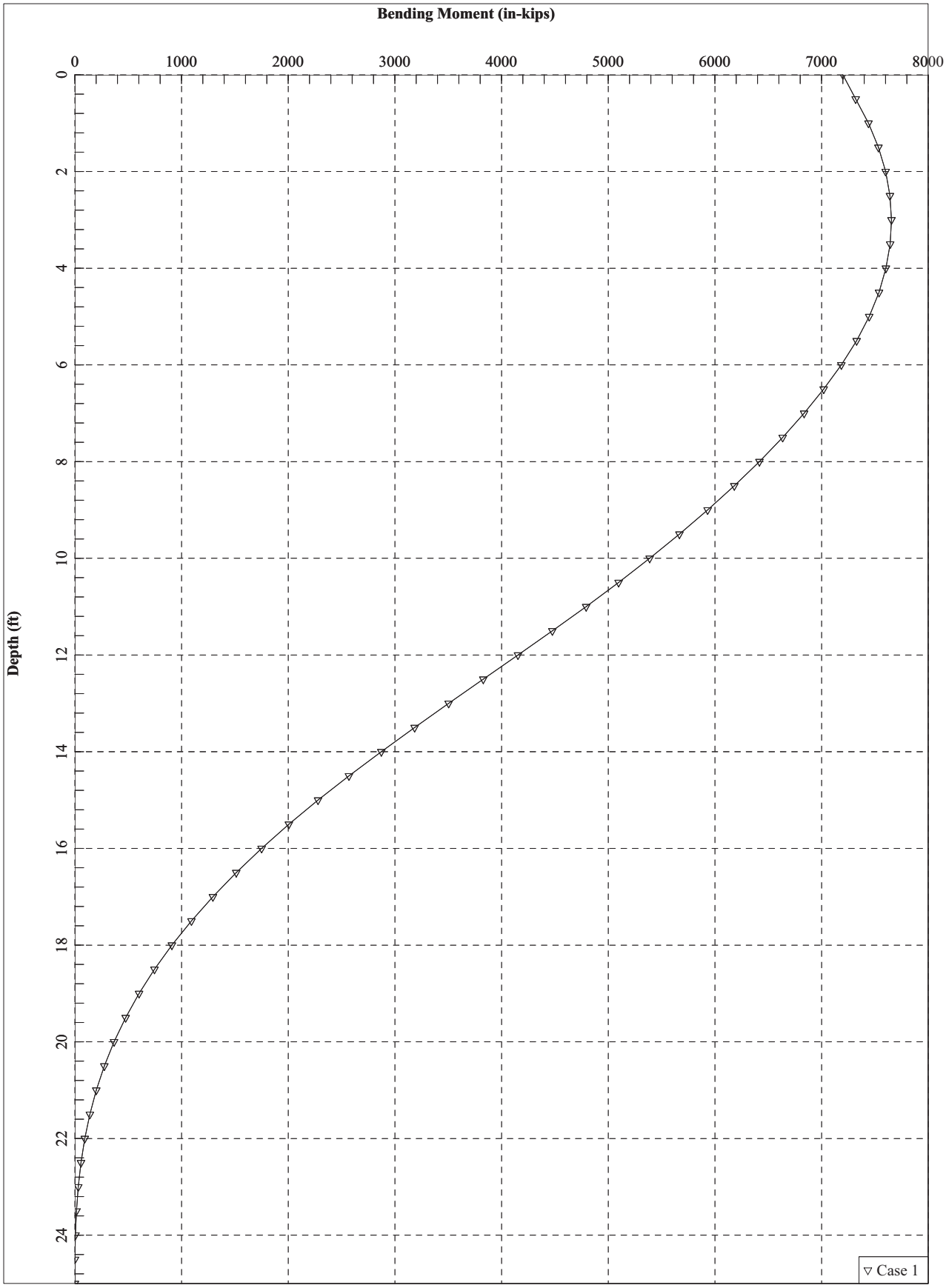
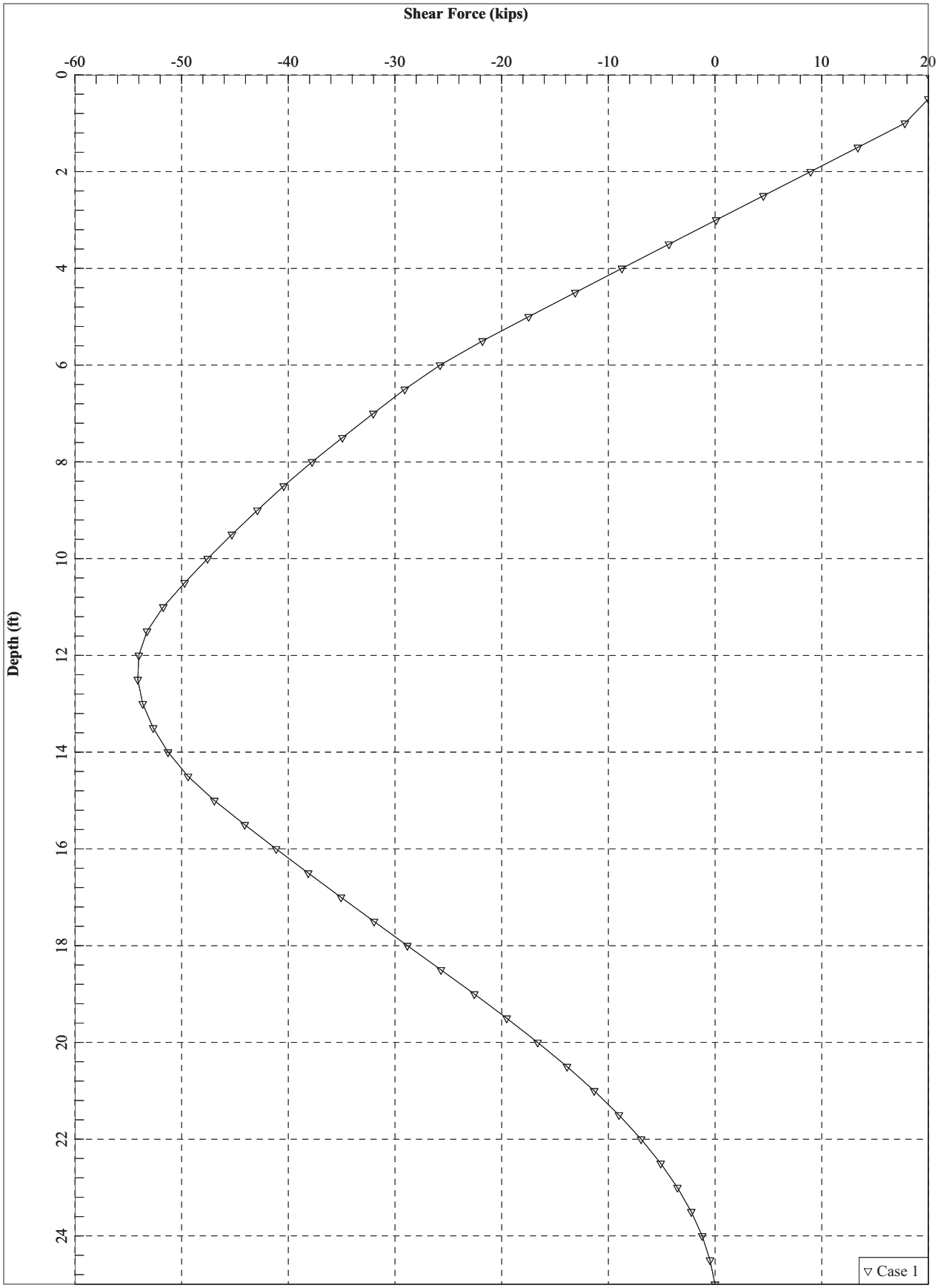
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

Sign No: OS2-1


Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
8000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

Sign No: OS2-1


Shear Force (kips)
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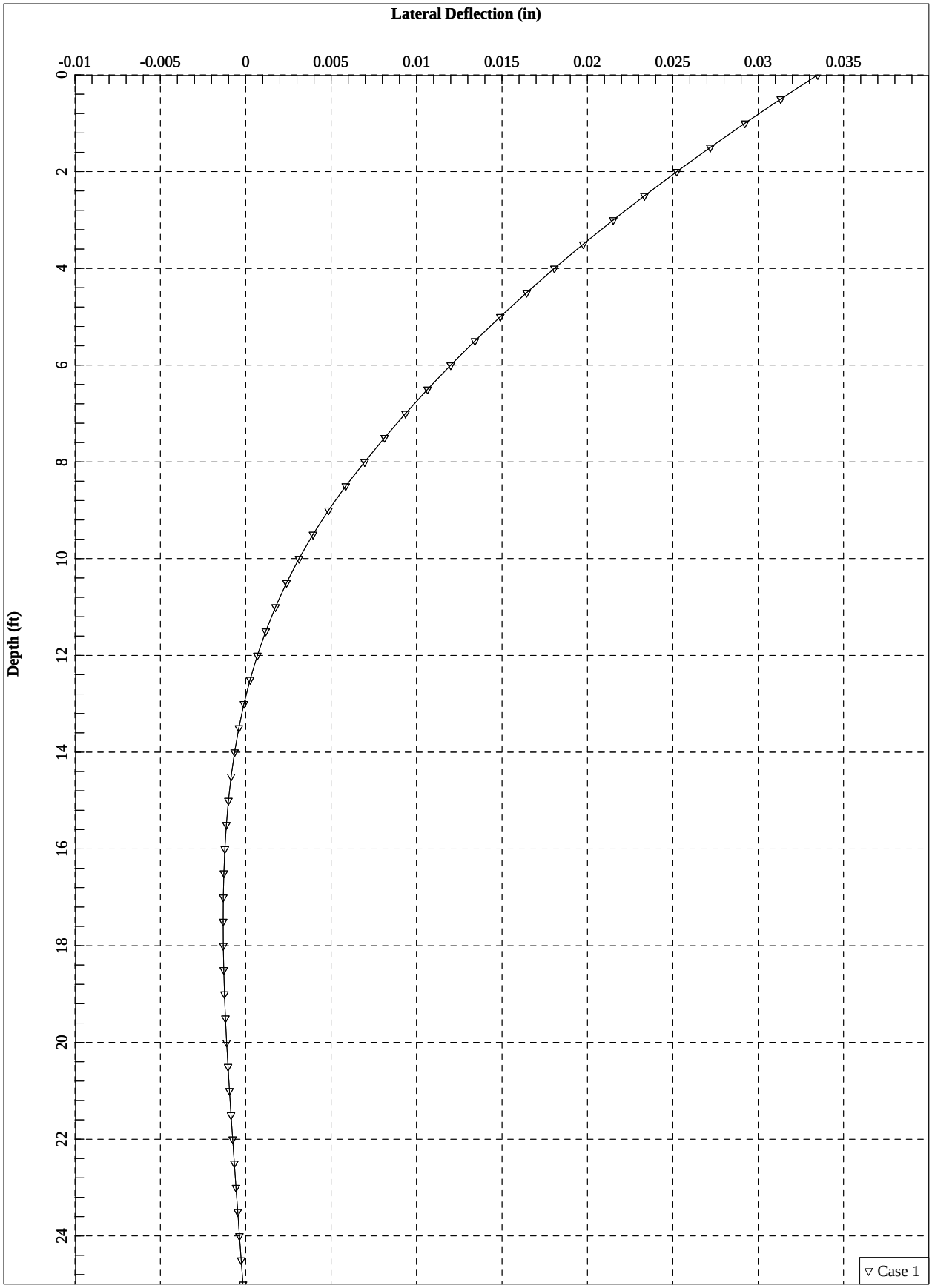
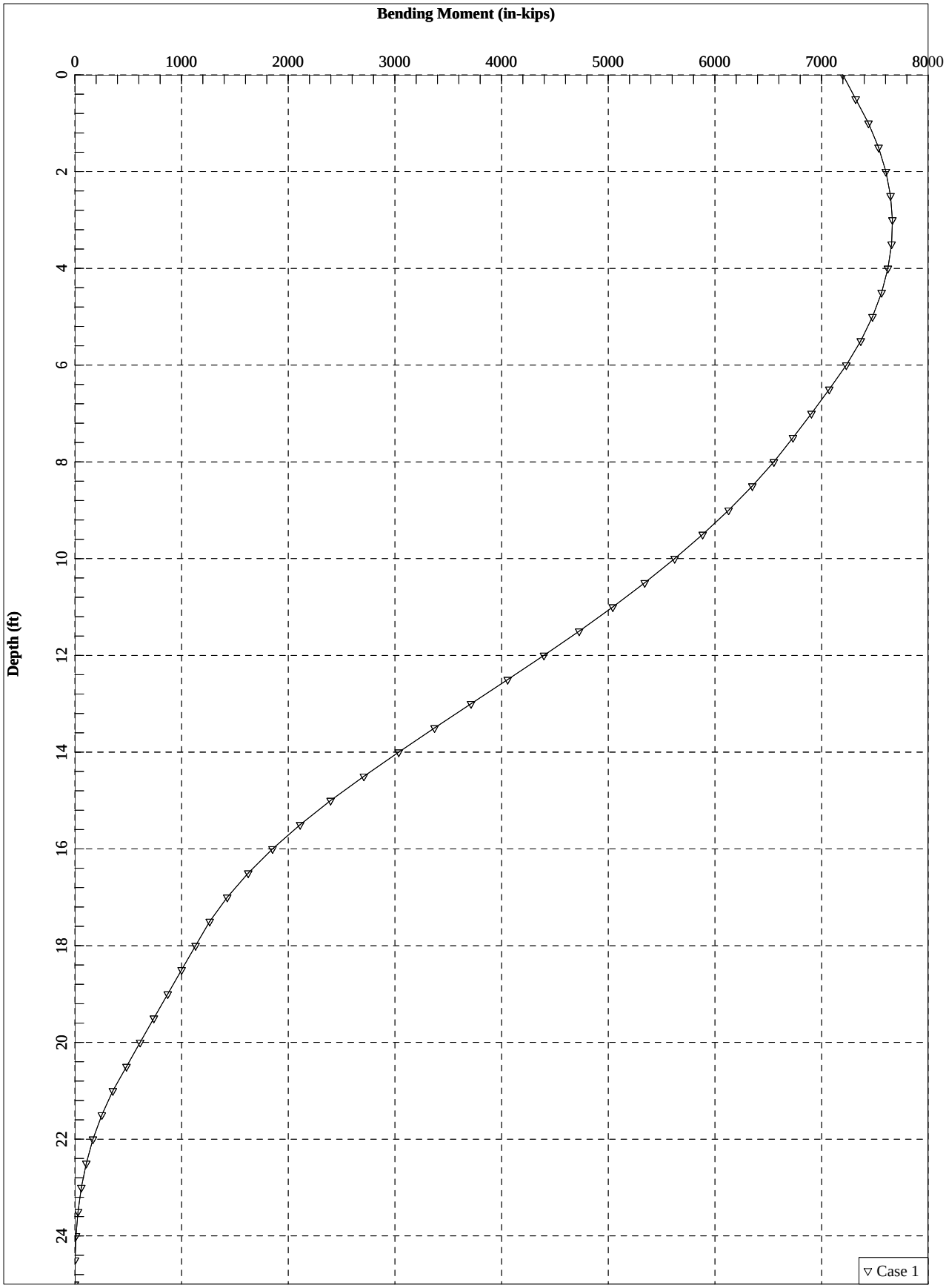
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

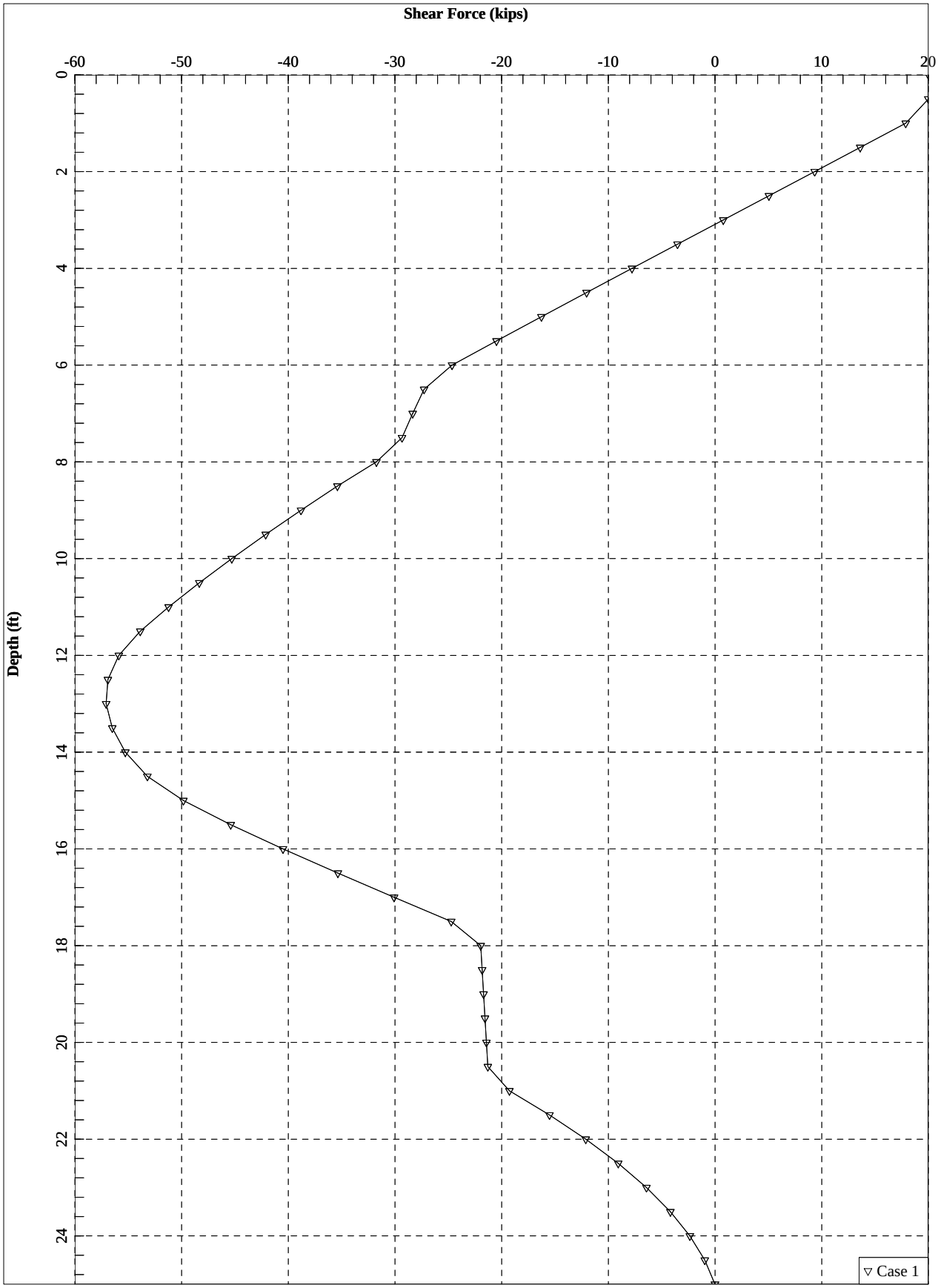
Sign No: OS9-2


Lateral Deflection (in)
-0.01
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

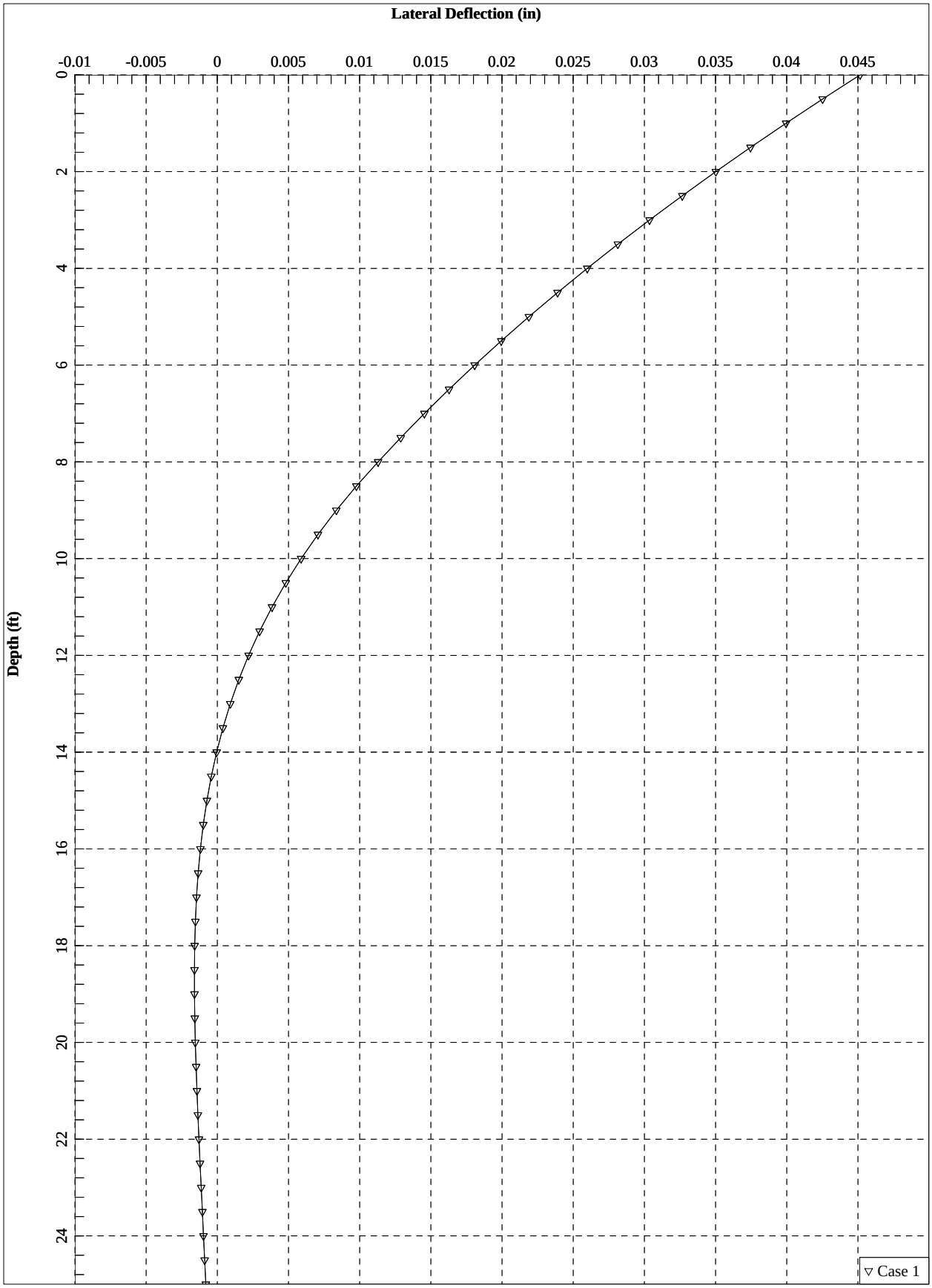
Sign No: OS9-2


Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
8000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

Sign No: OS9-2


Shear Force (kips)
-60
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Case 1

Sign No: OS 16-1 and 16-2



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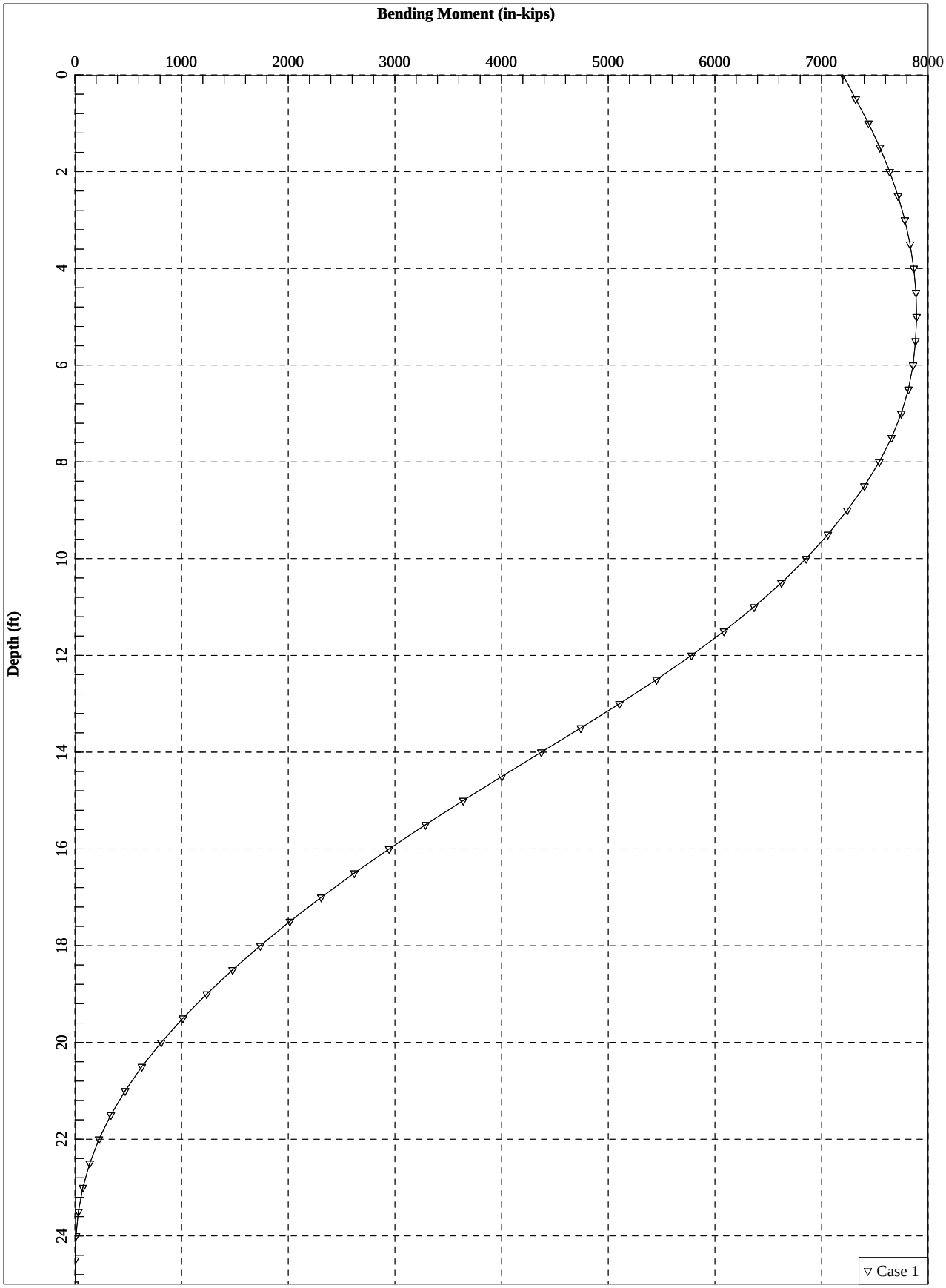

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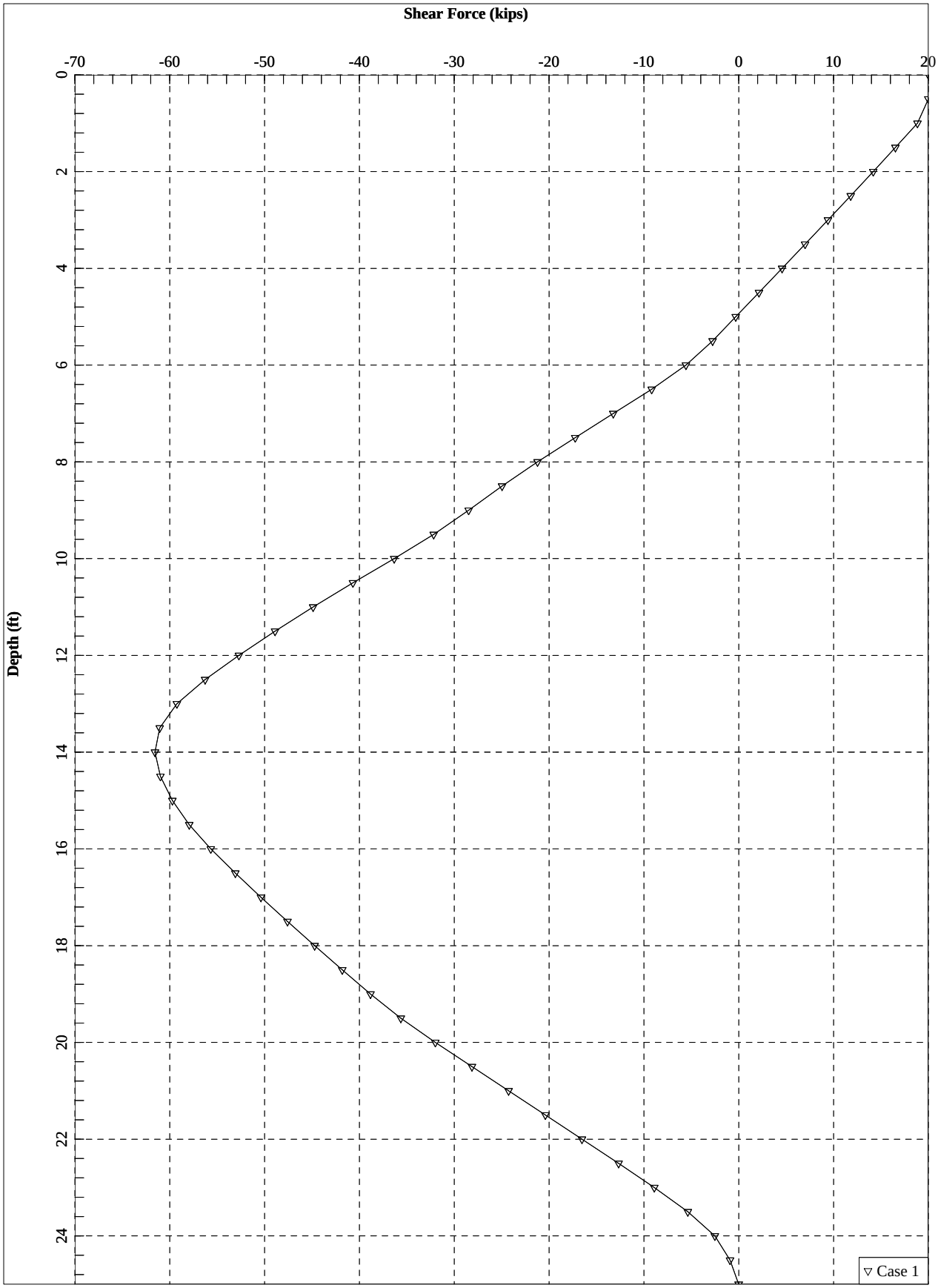

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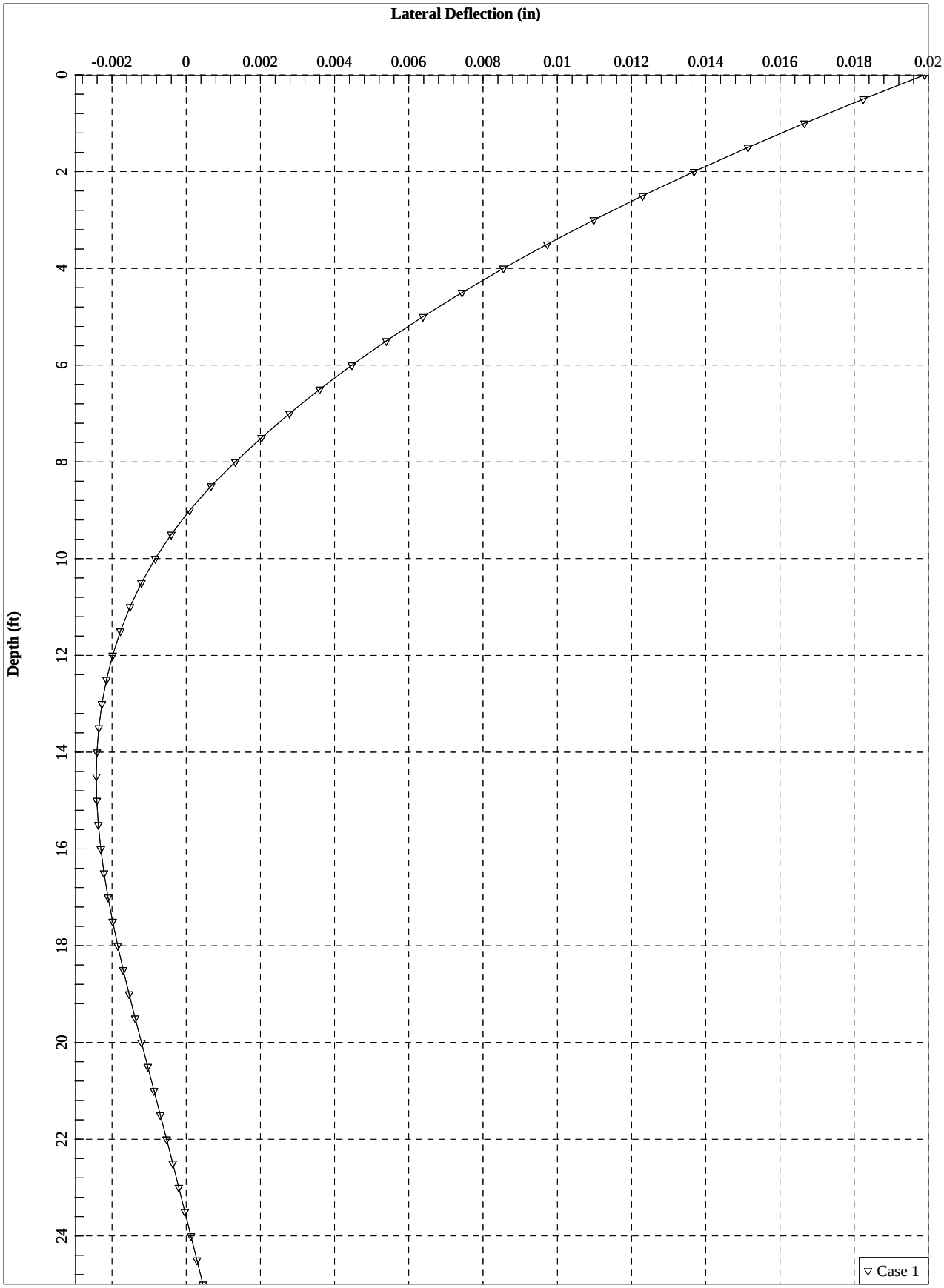

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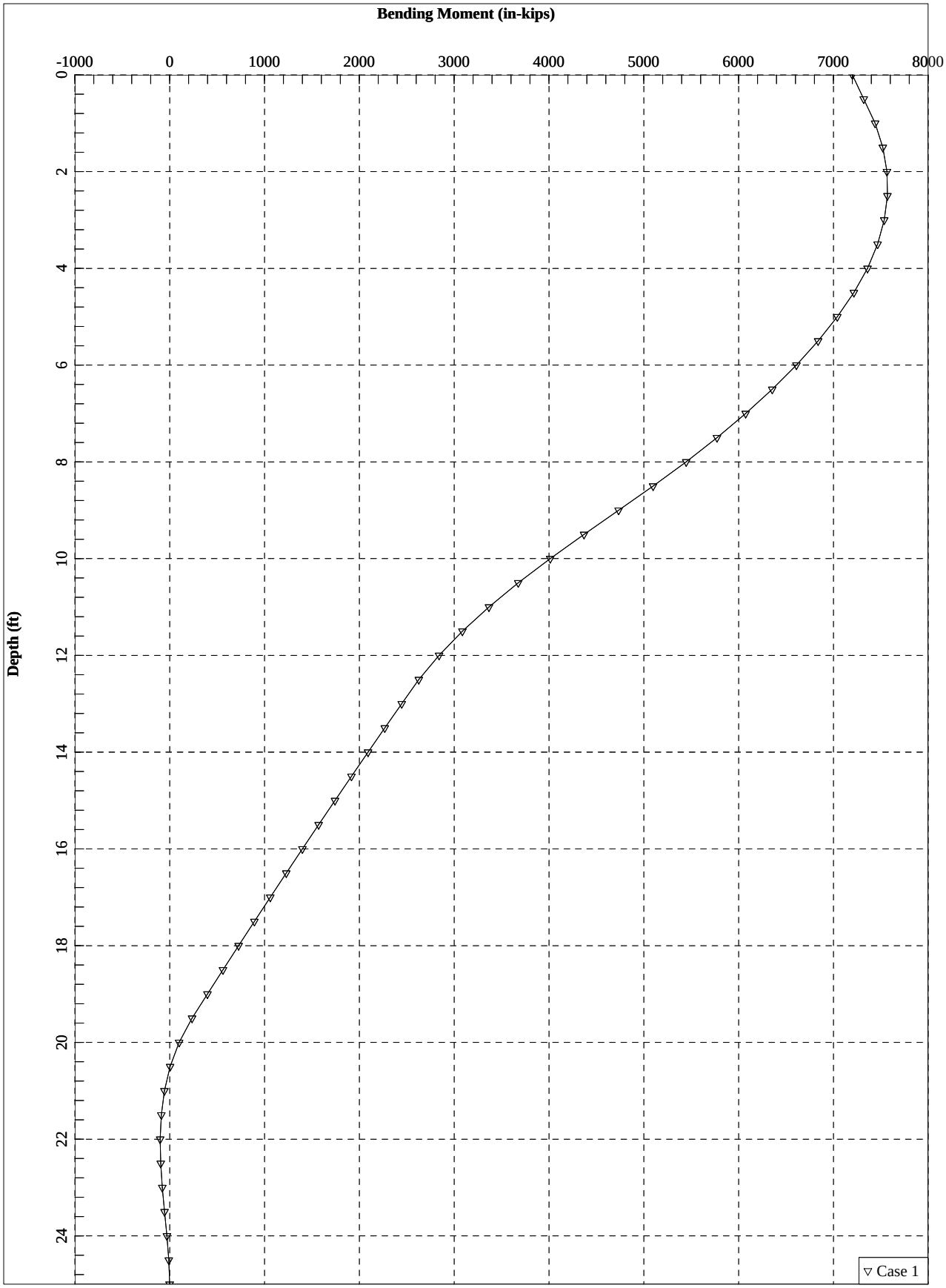

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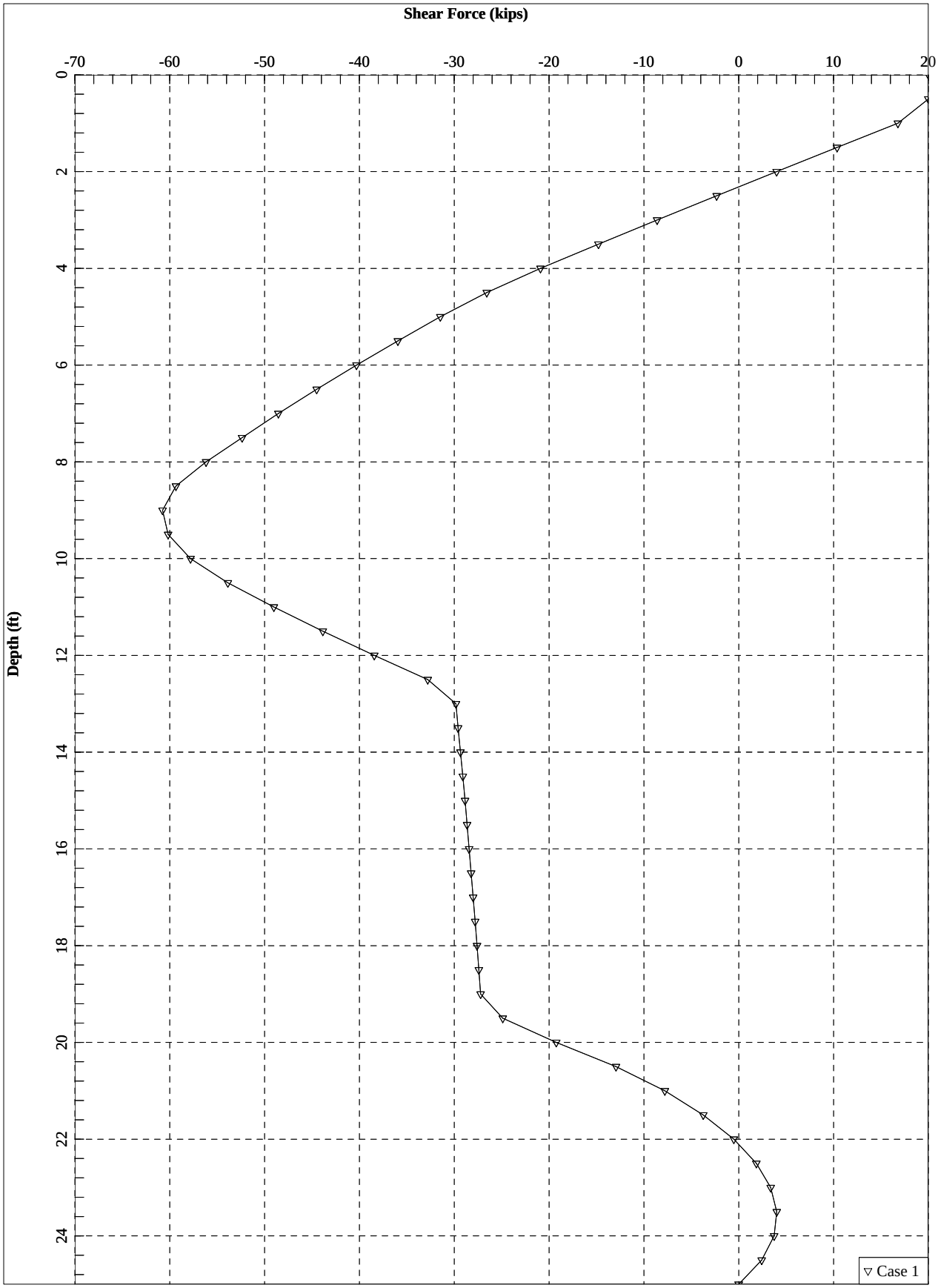

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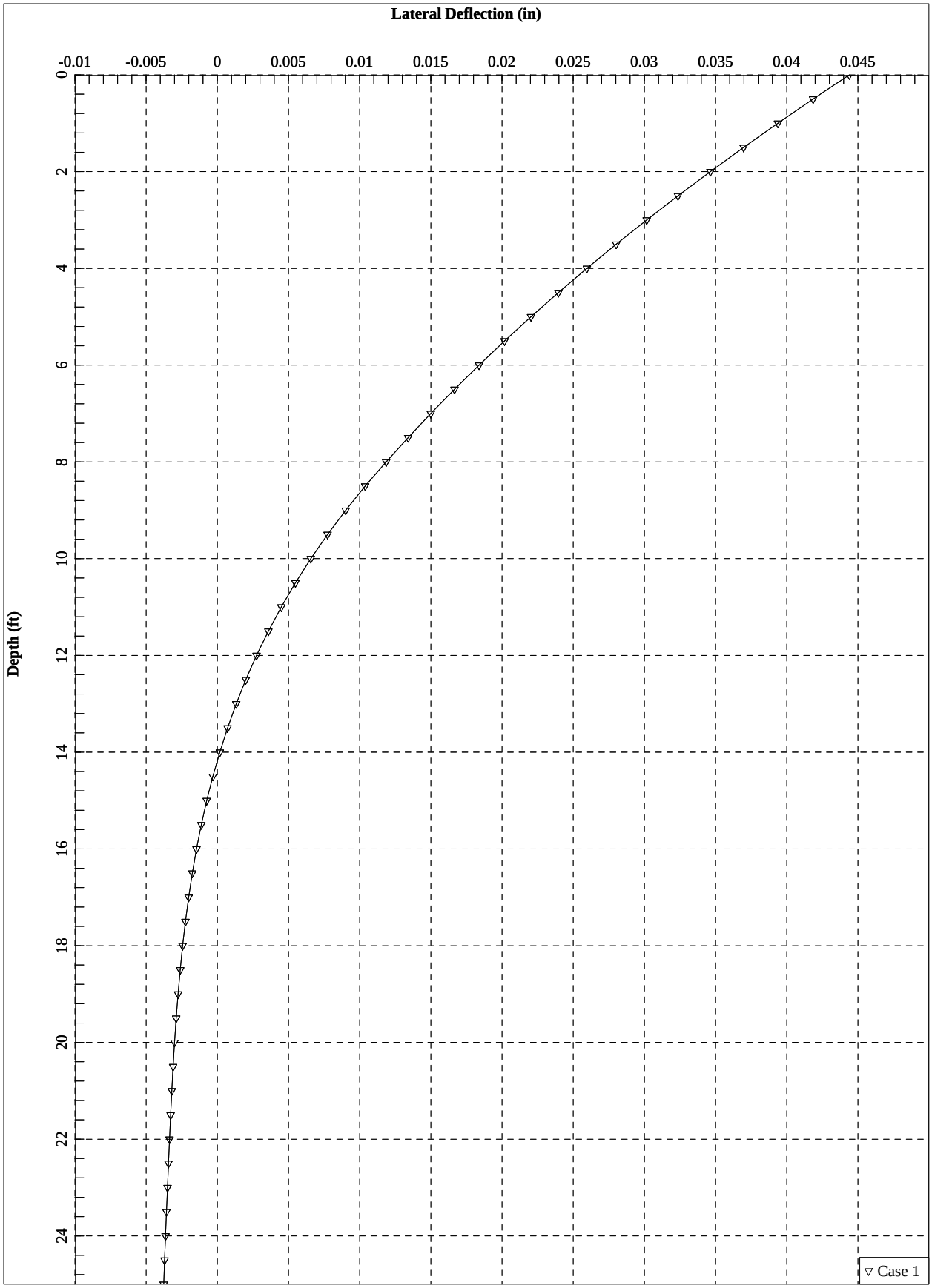

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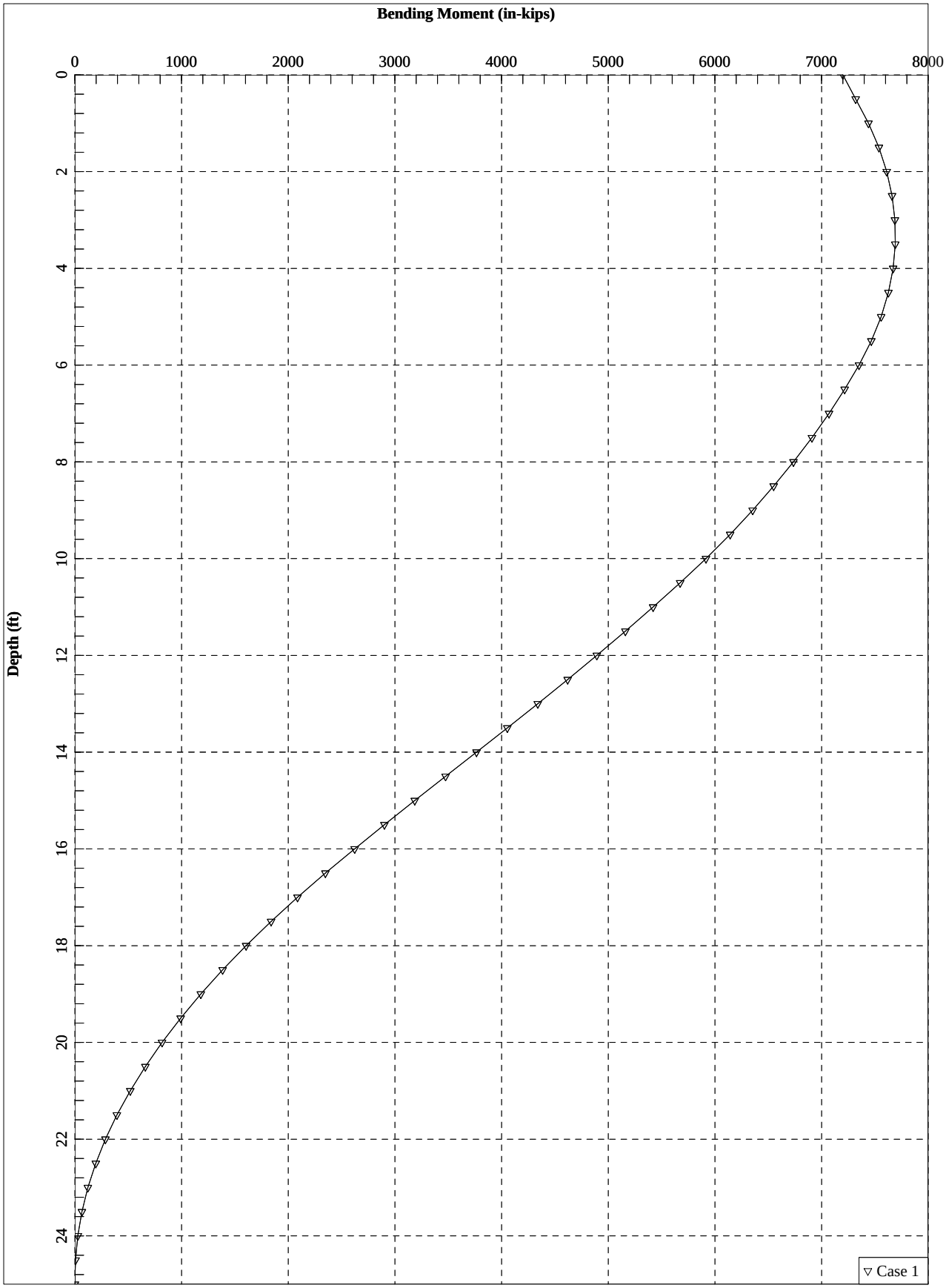

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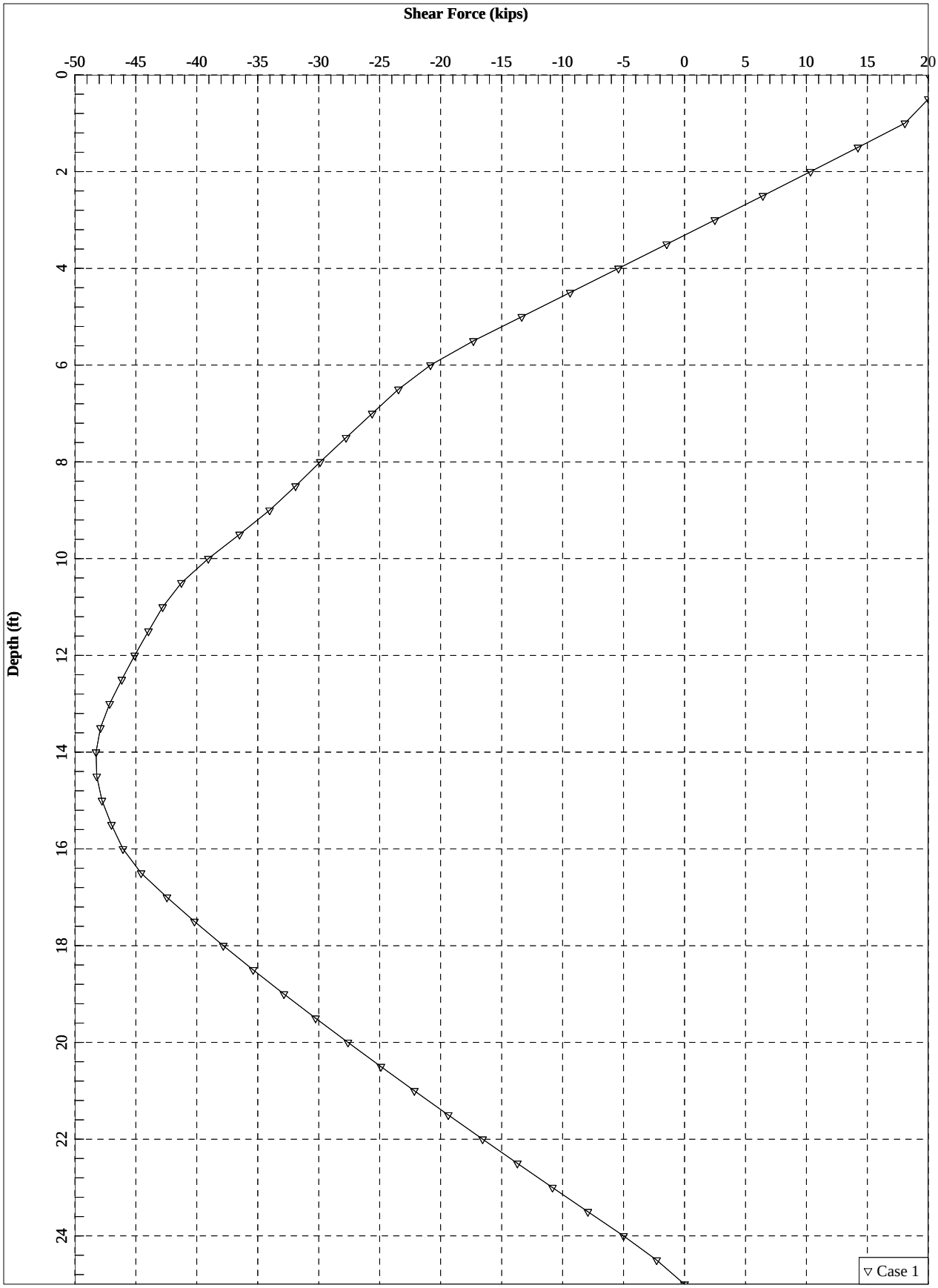
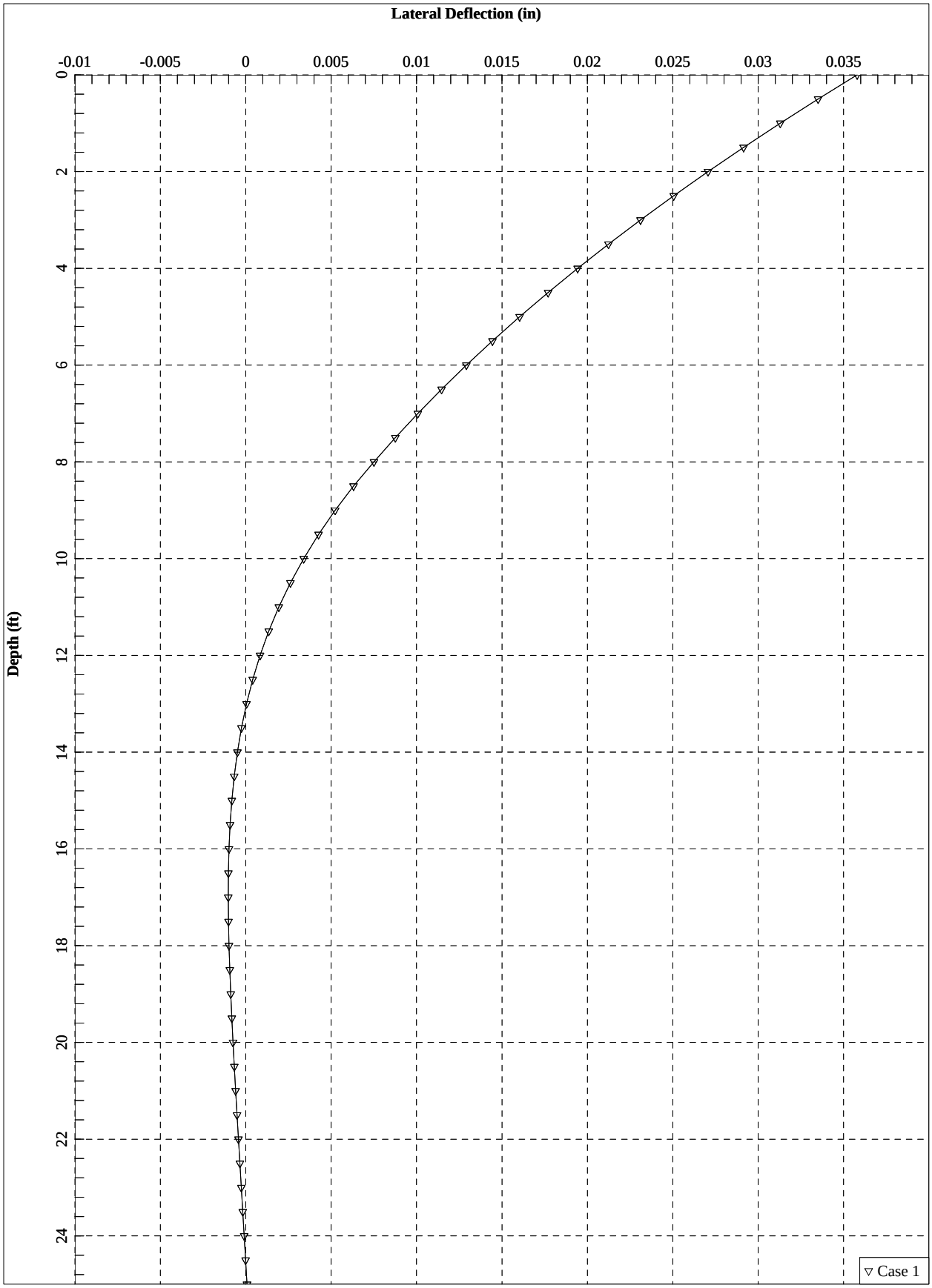
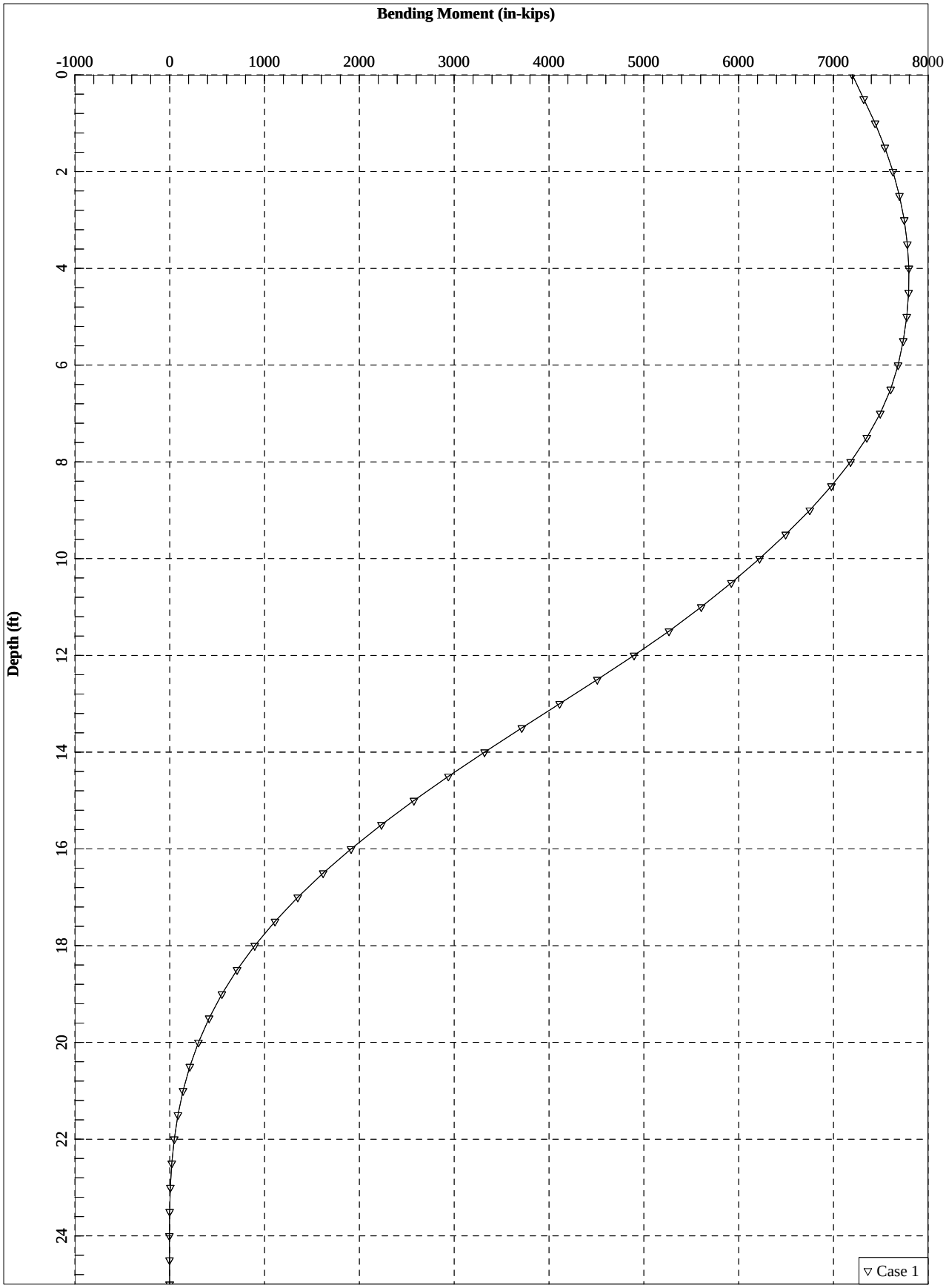


Sign No: OS27-1



Sign No: OS 27-1



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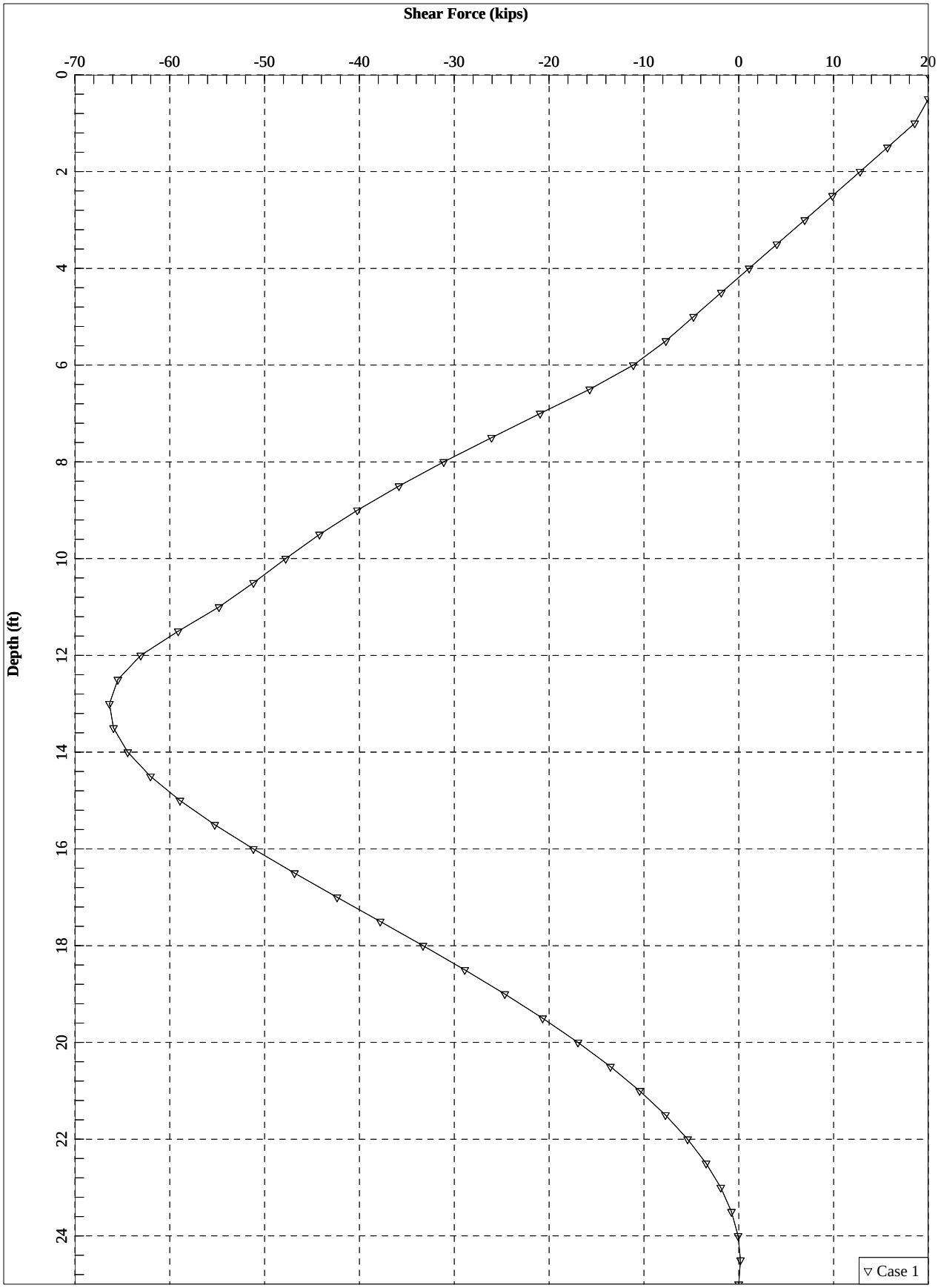
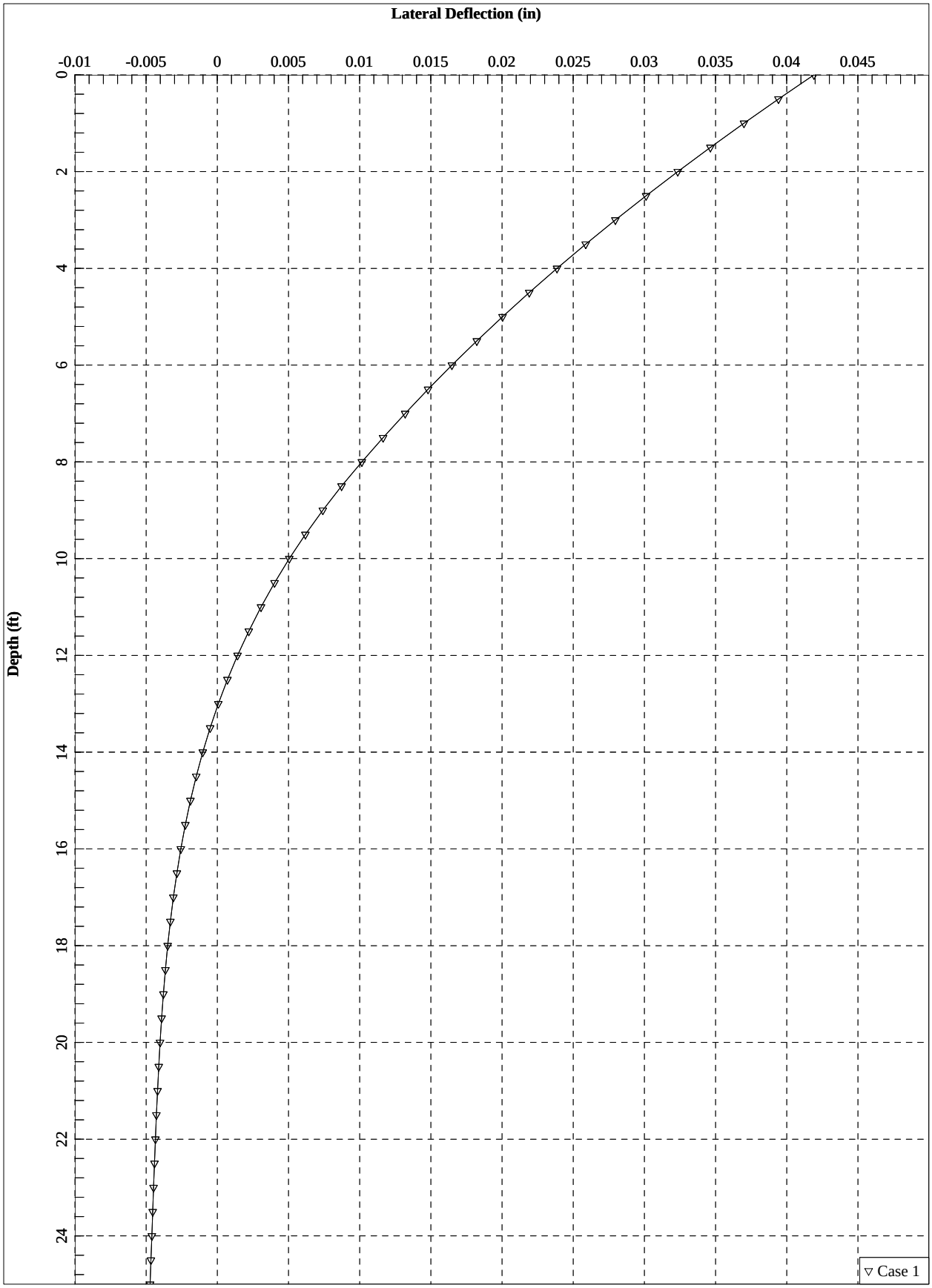


Sign No: OS30-1



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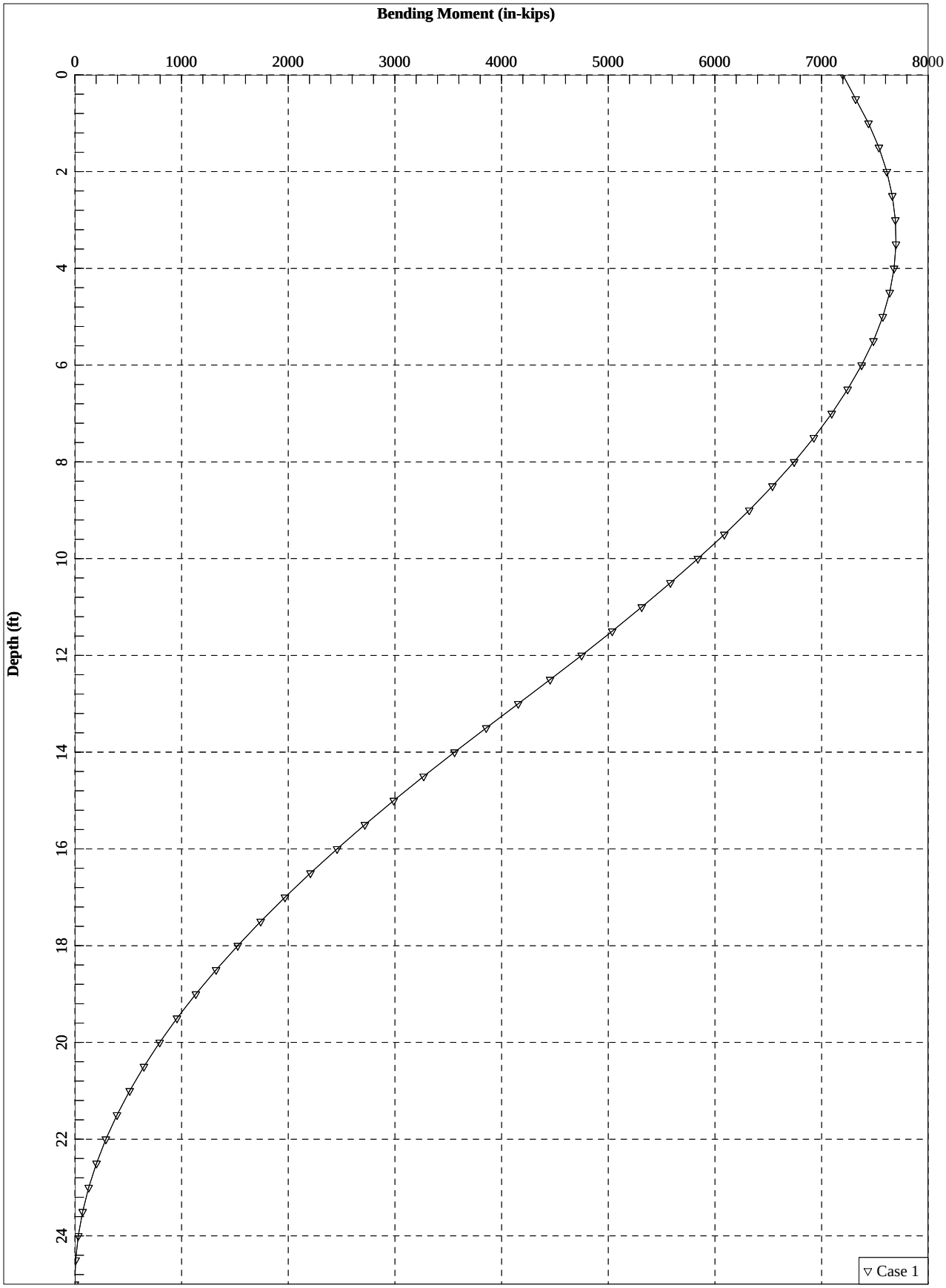

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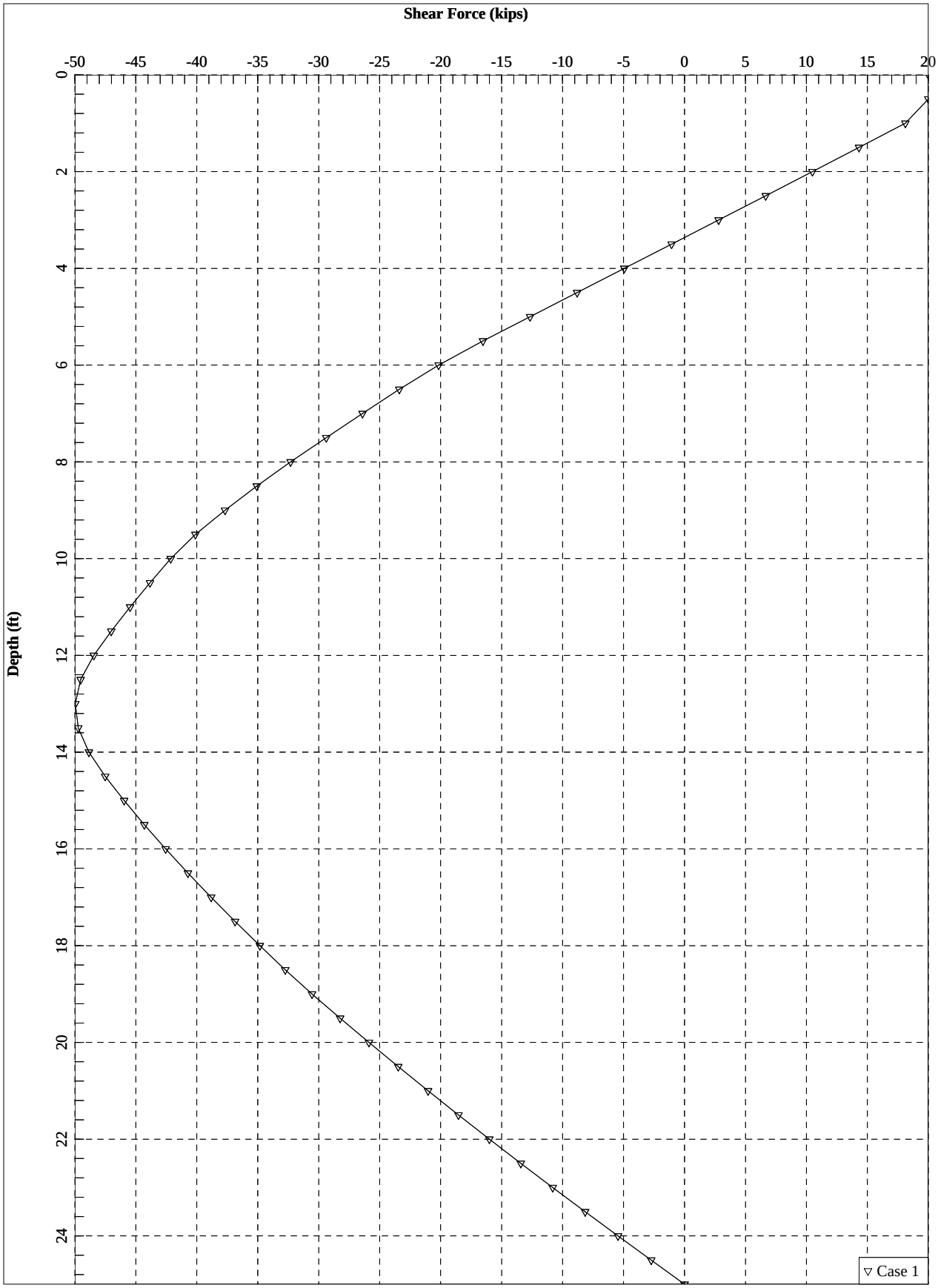
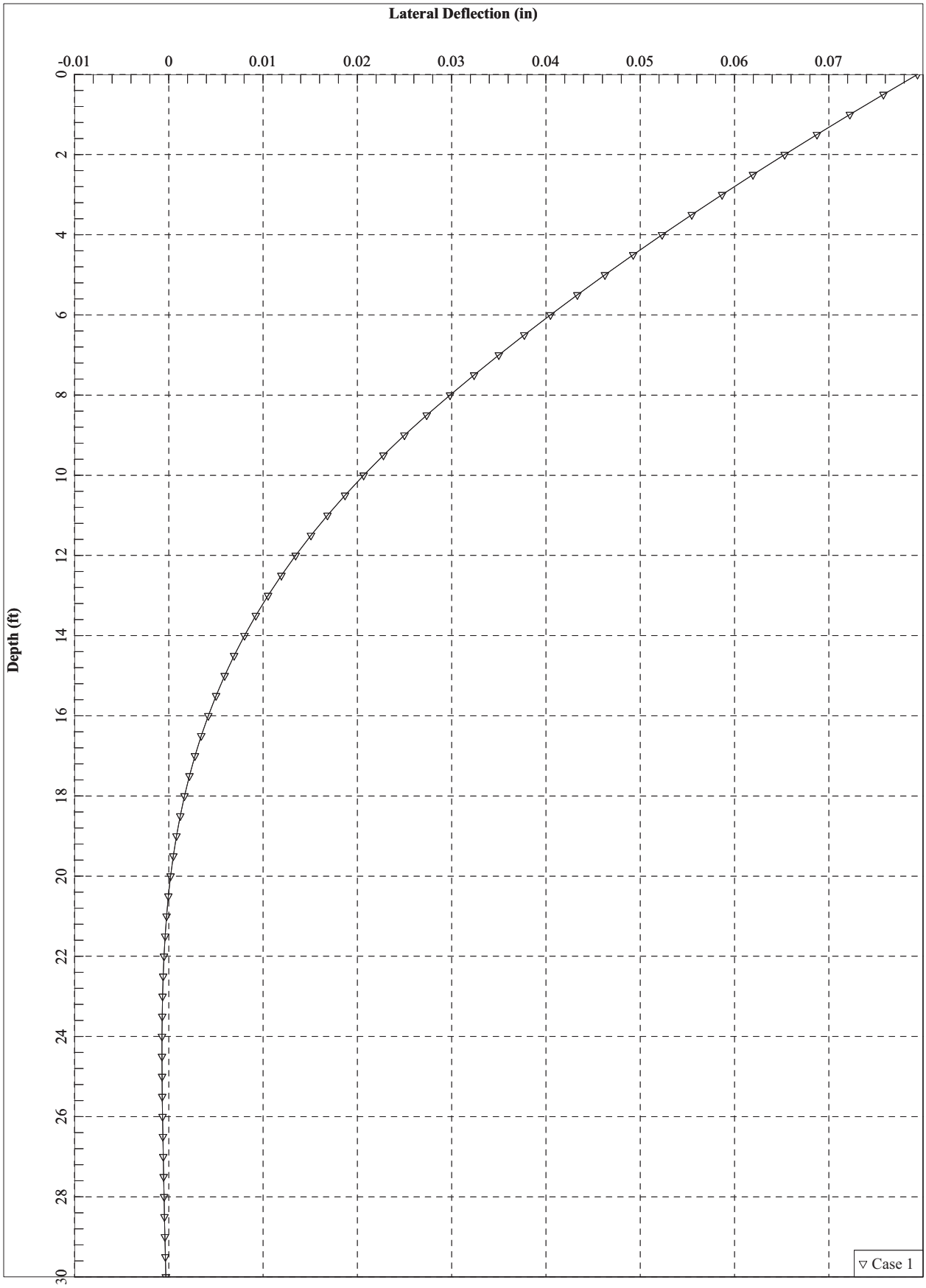


Sign No. OS34-1



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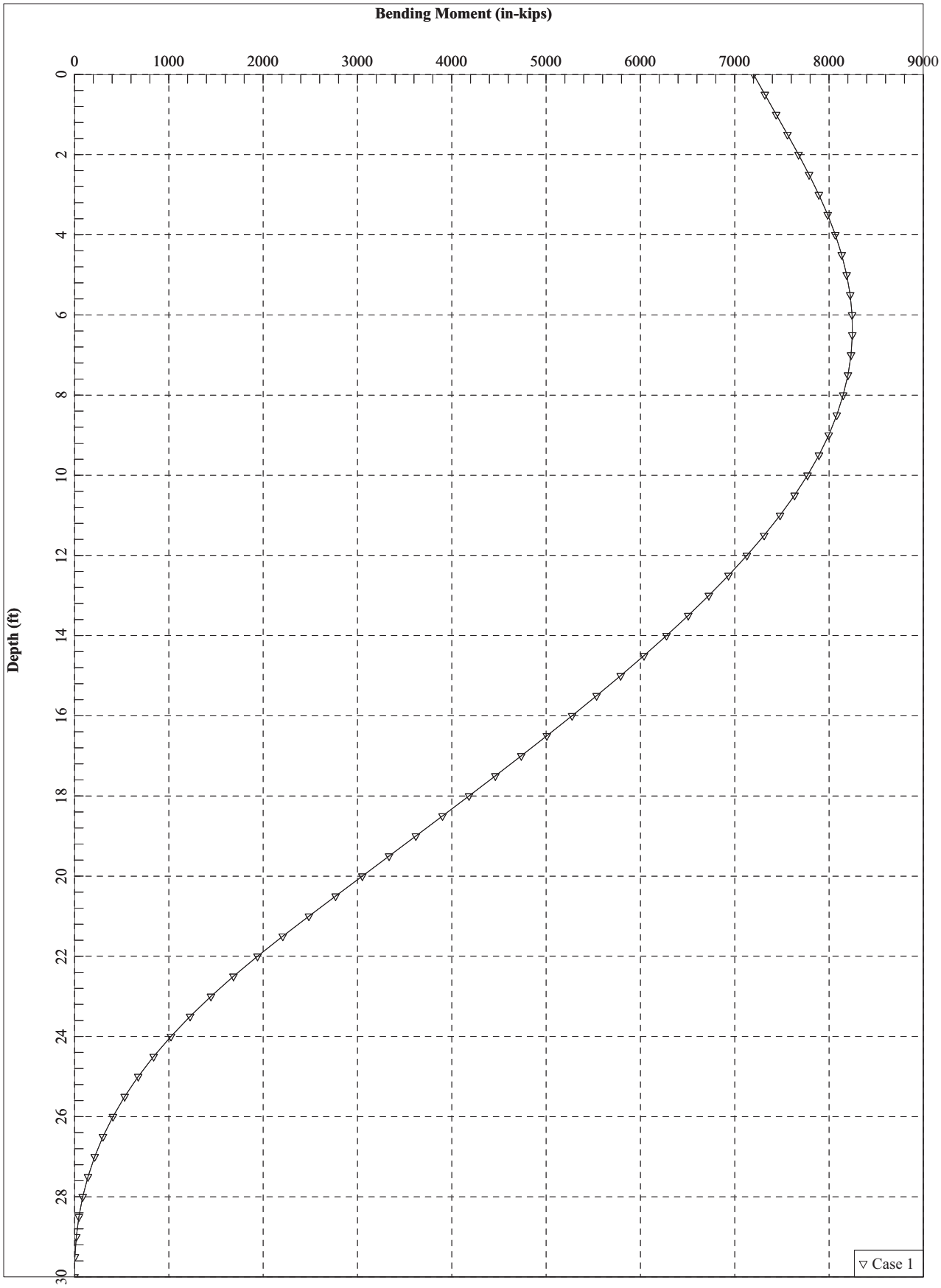

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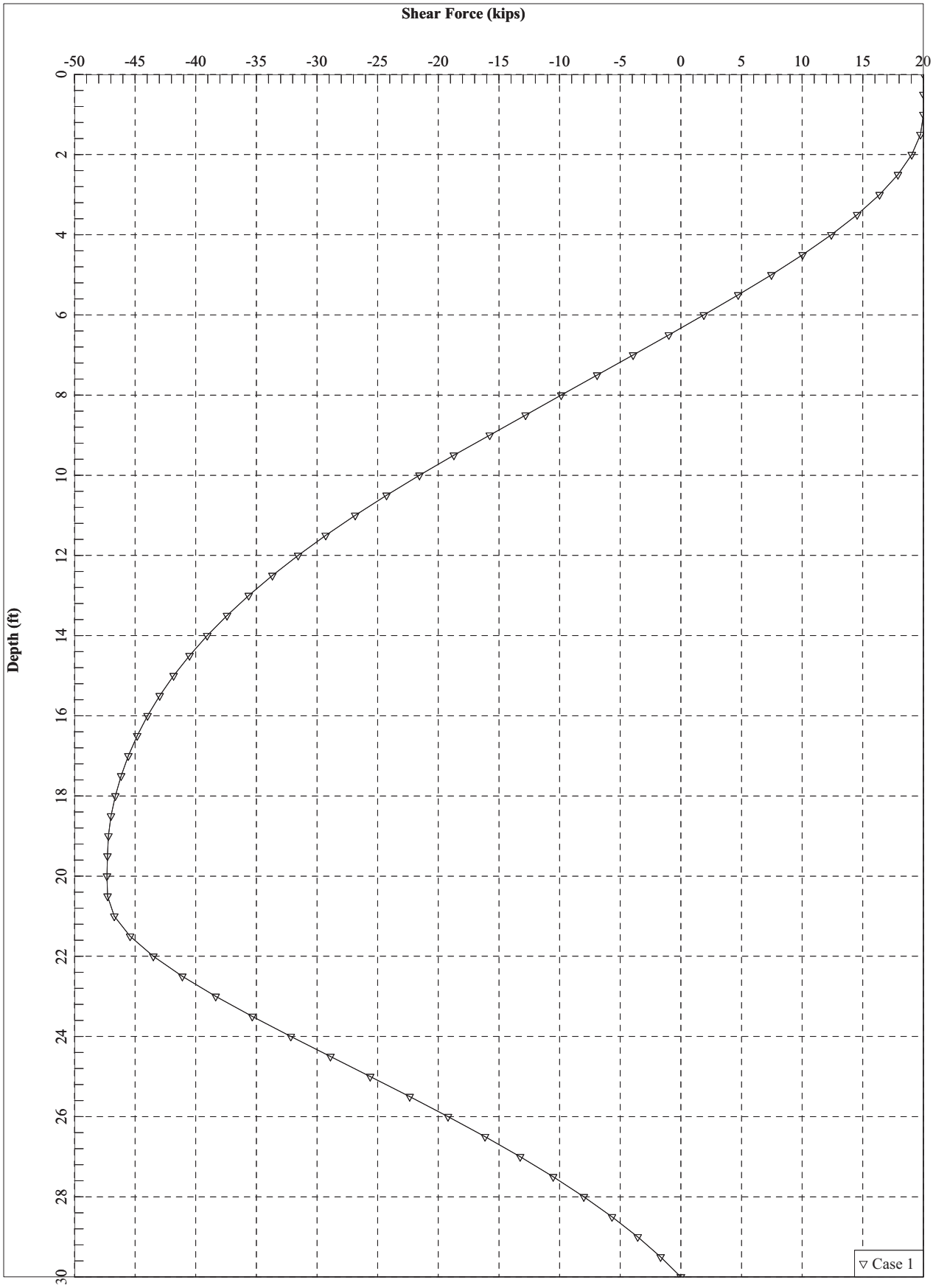

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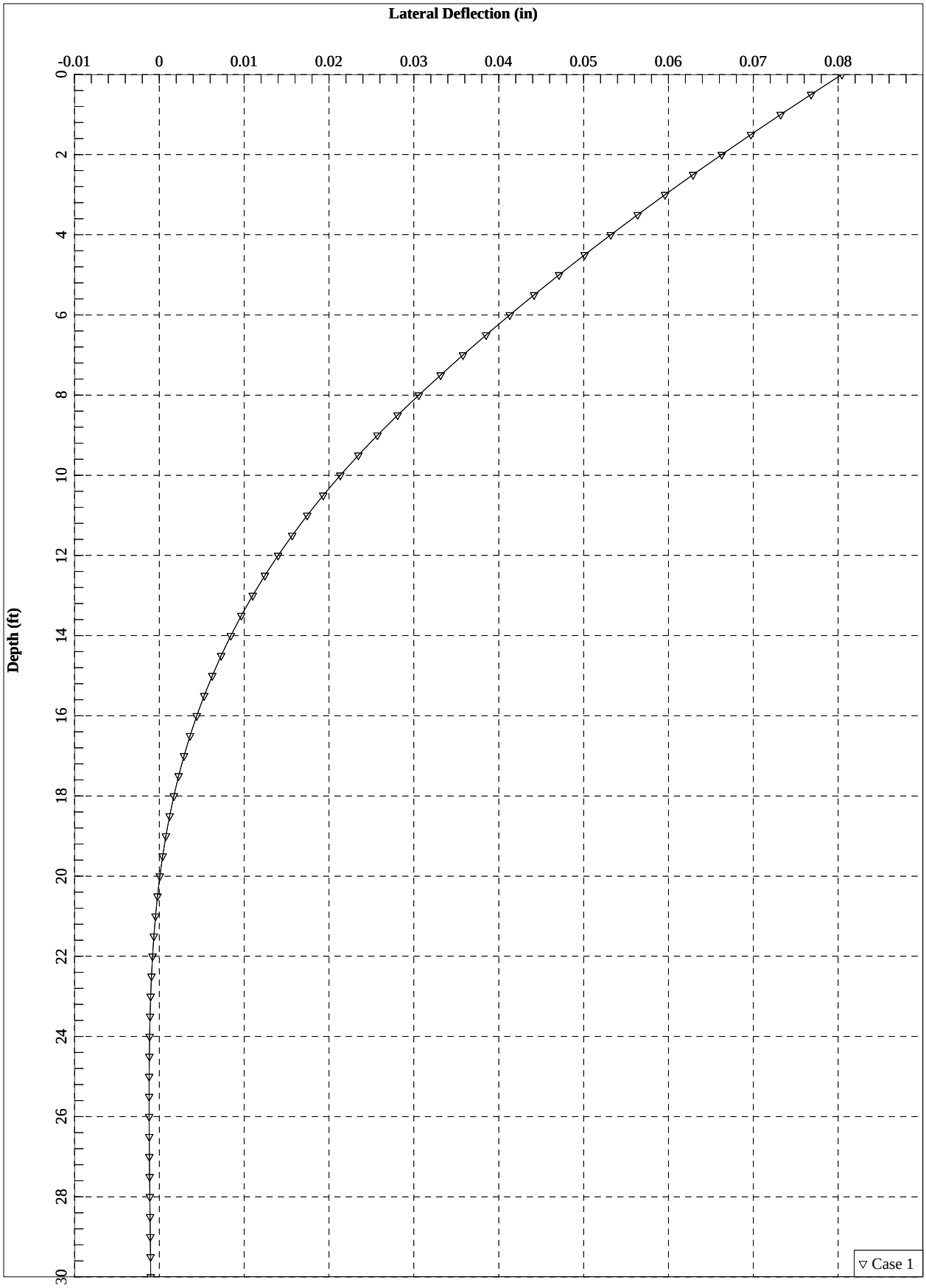

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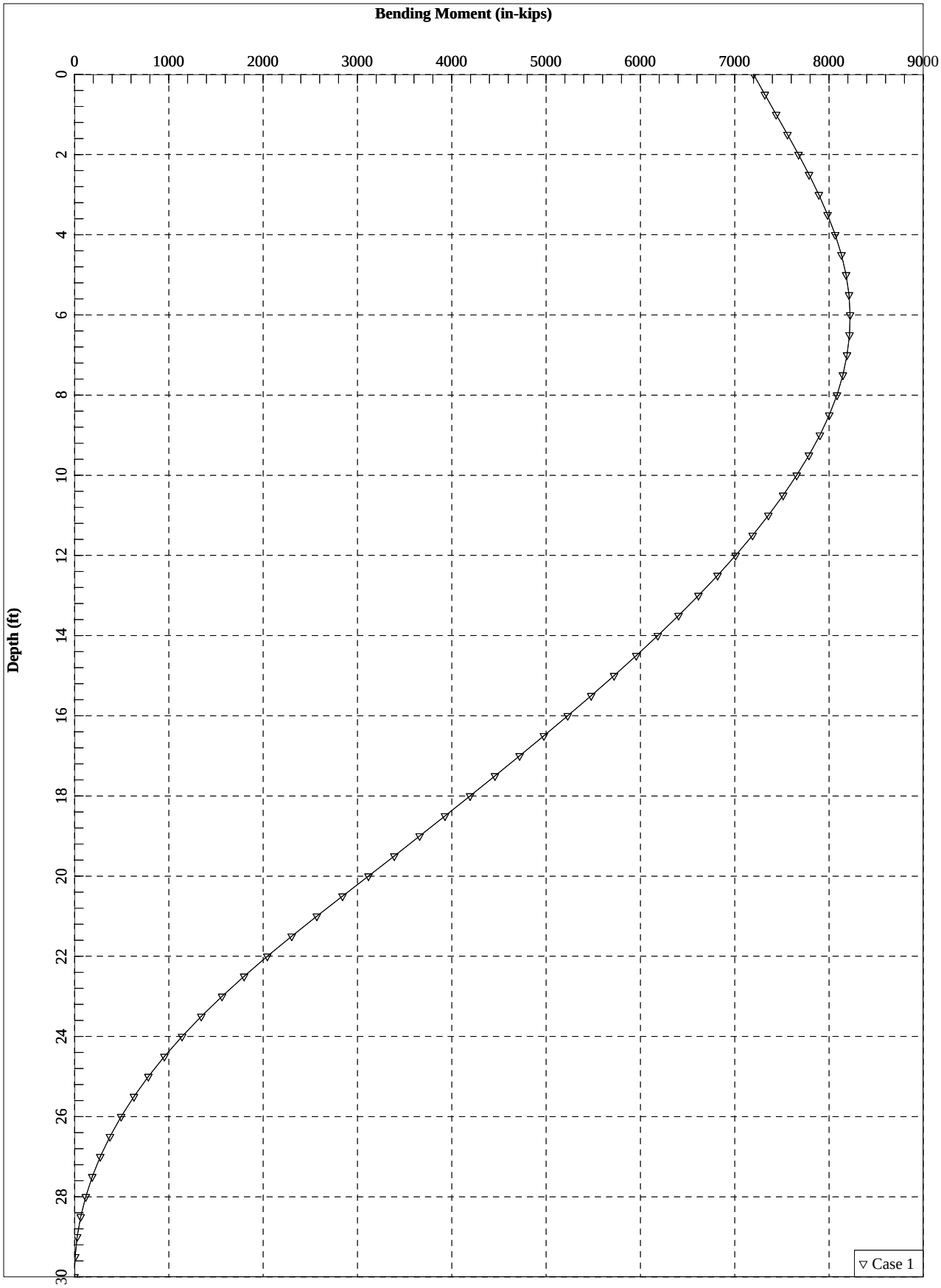

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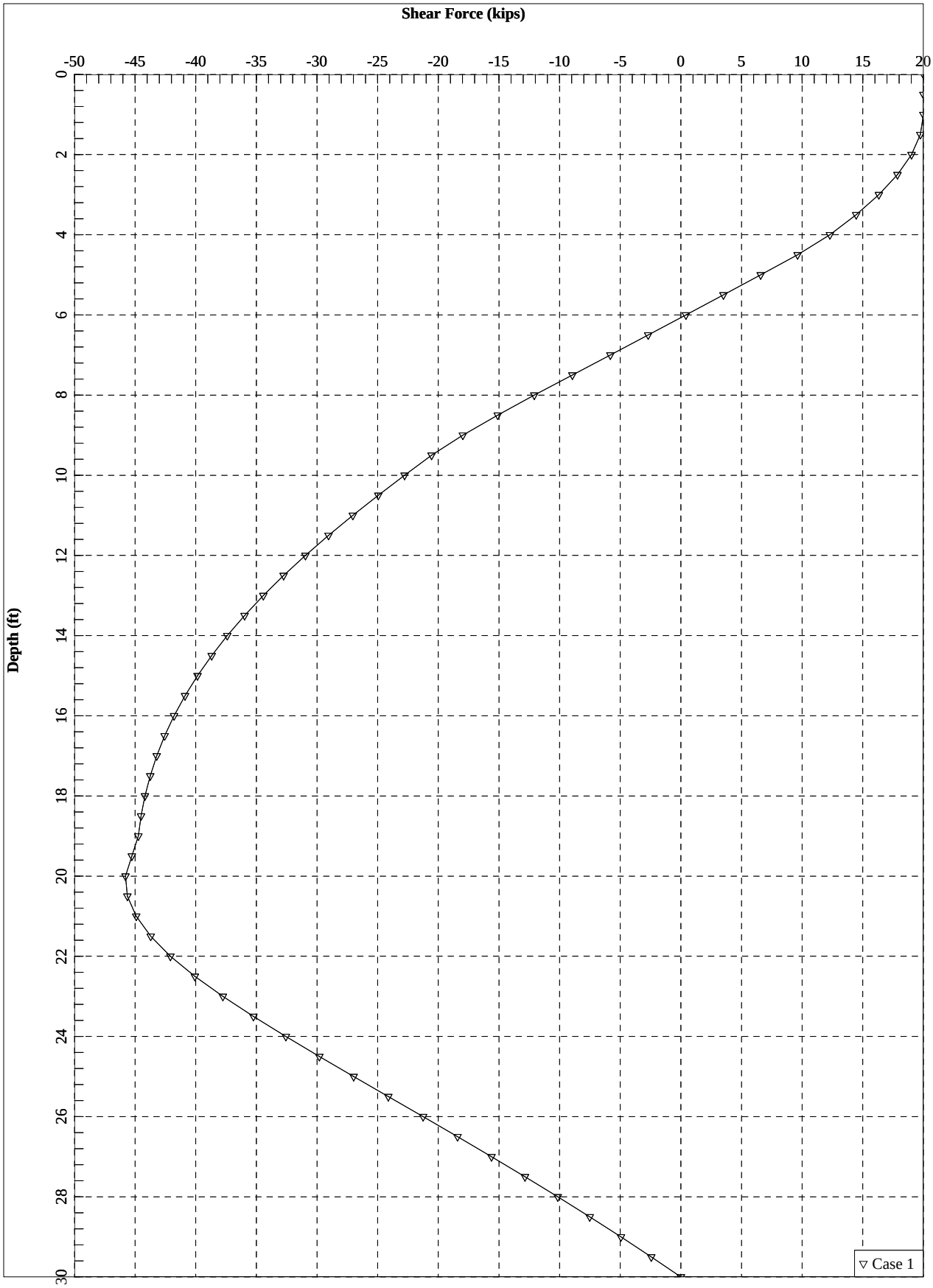

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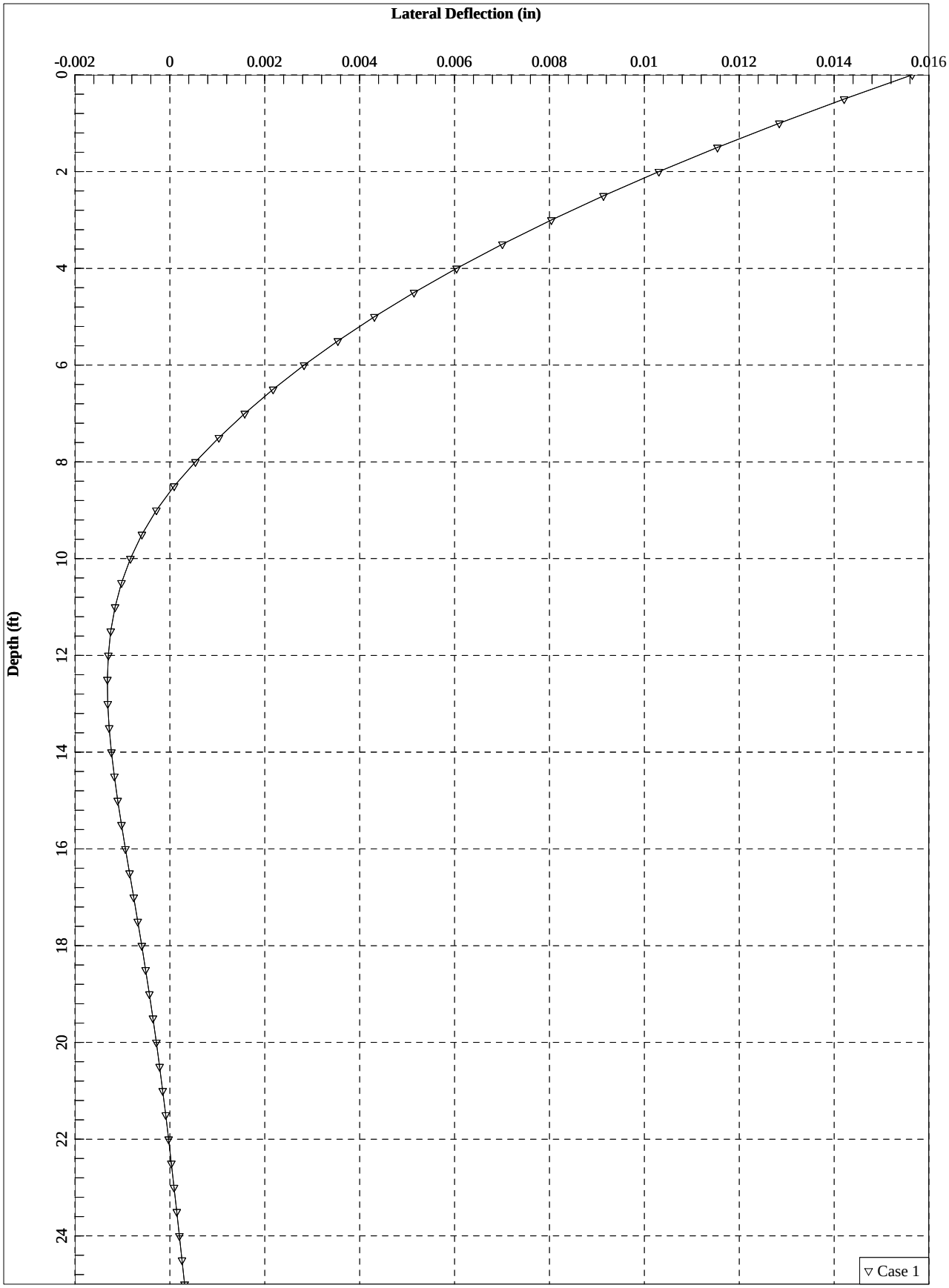

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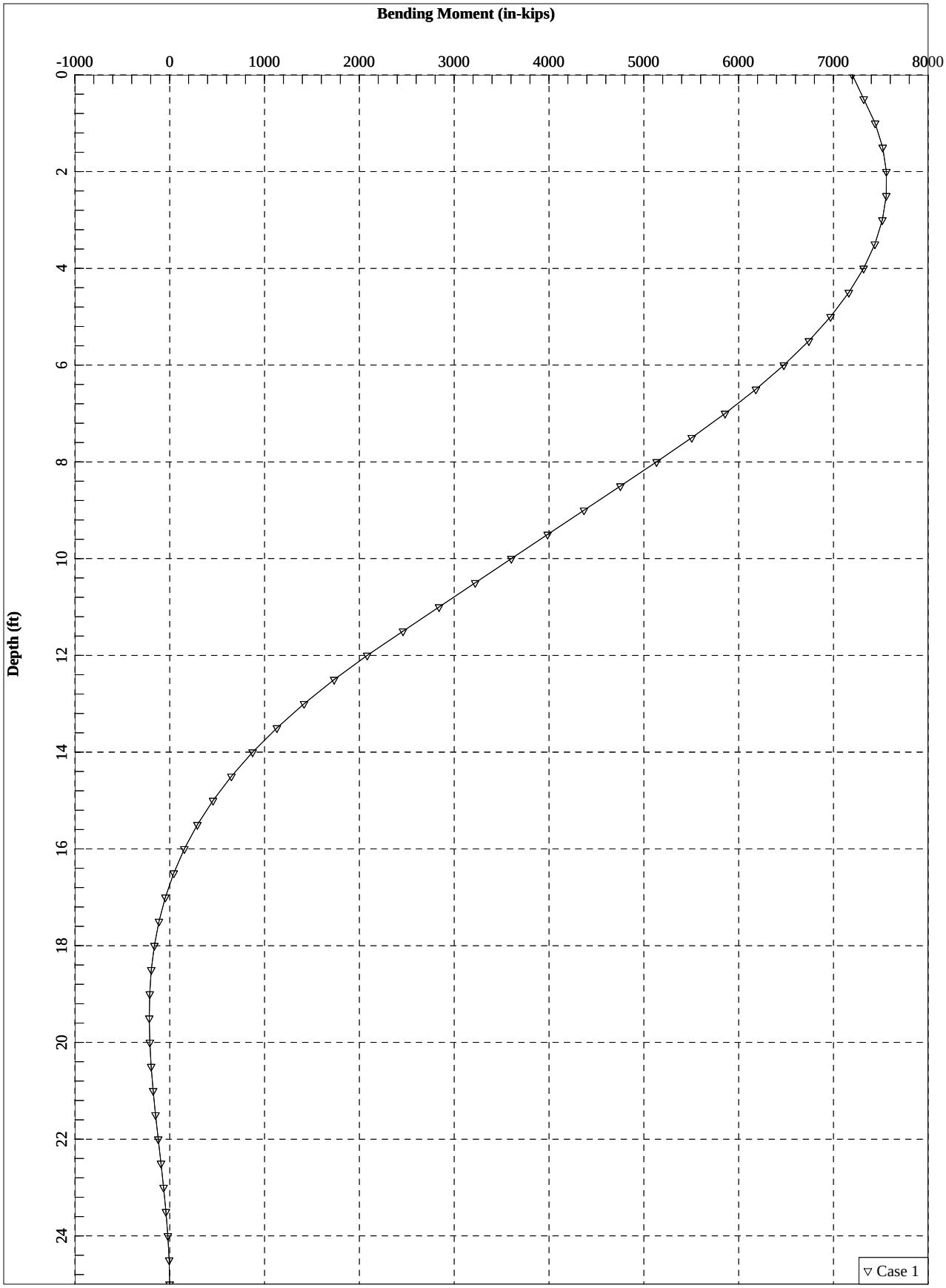

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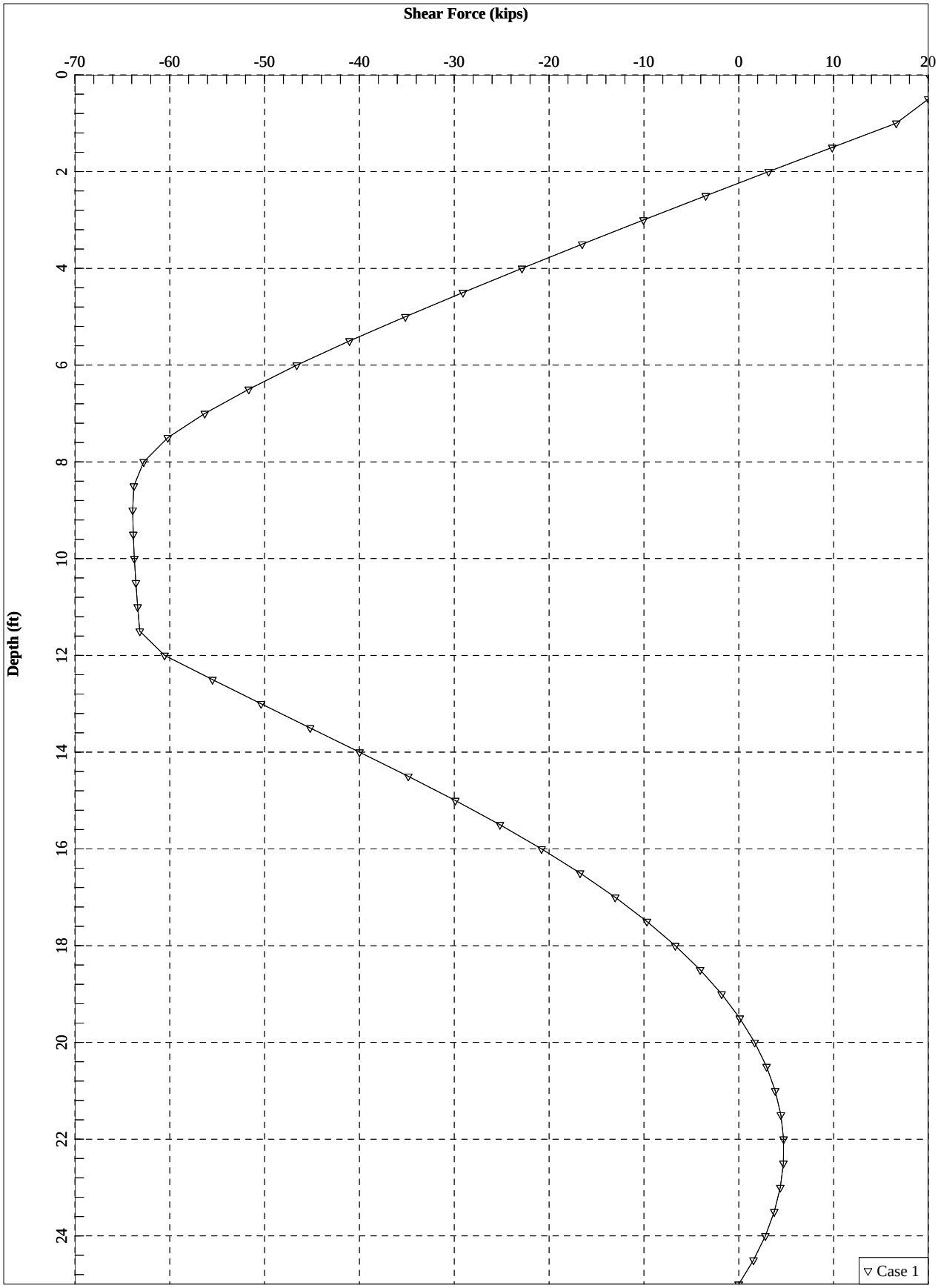
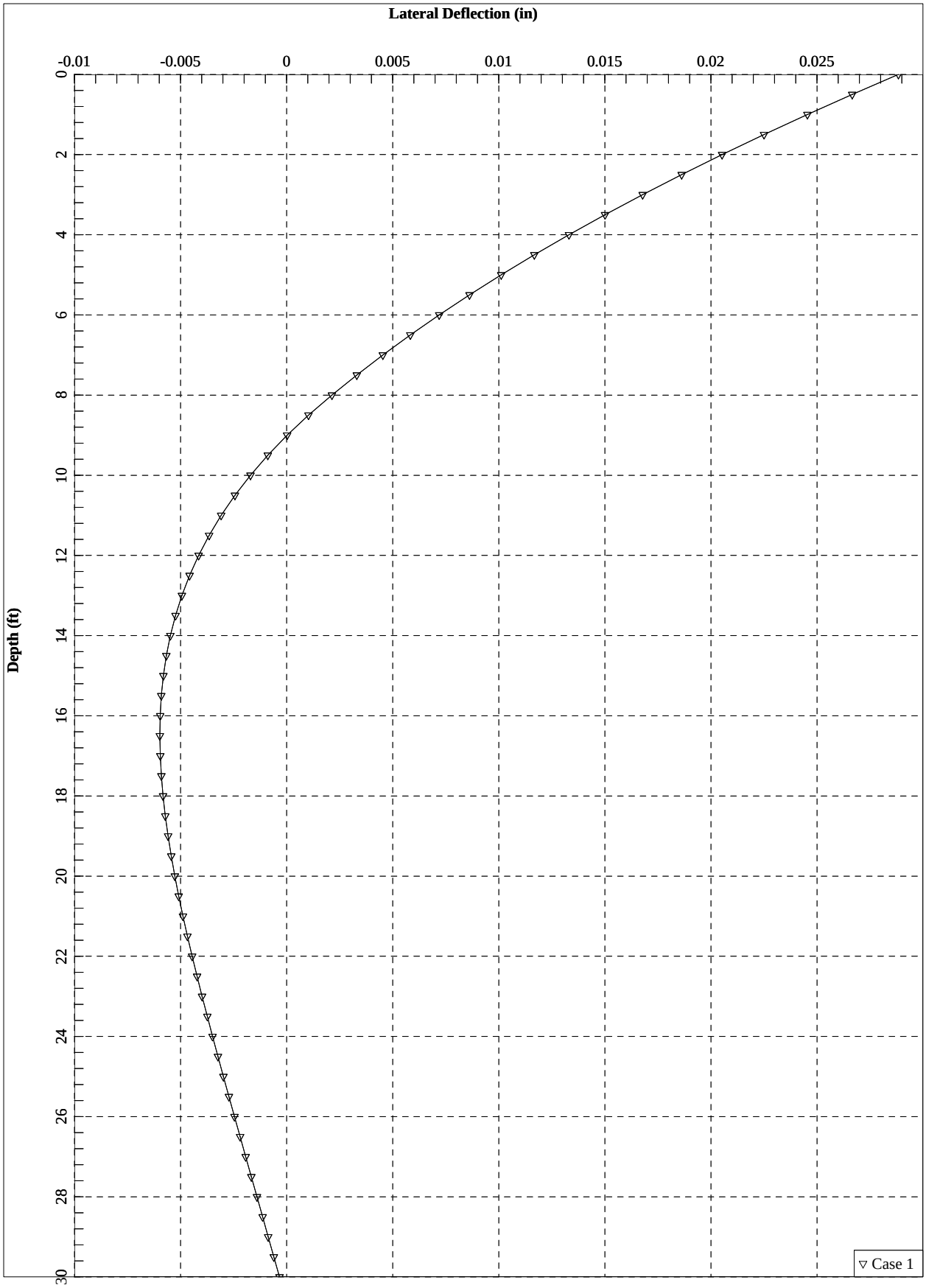


Sign No: OS44-1



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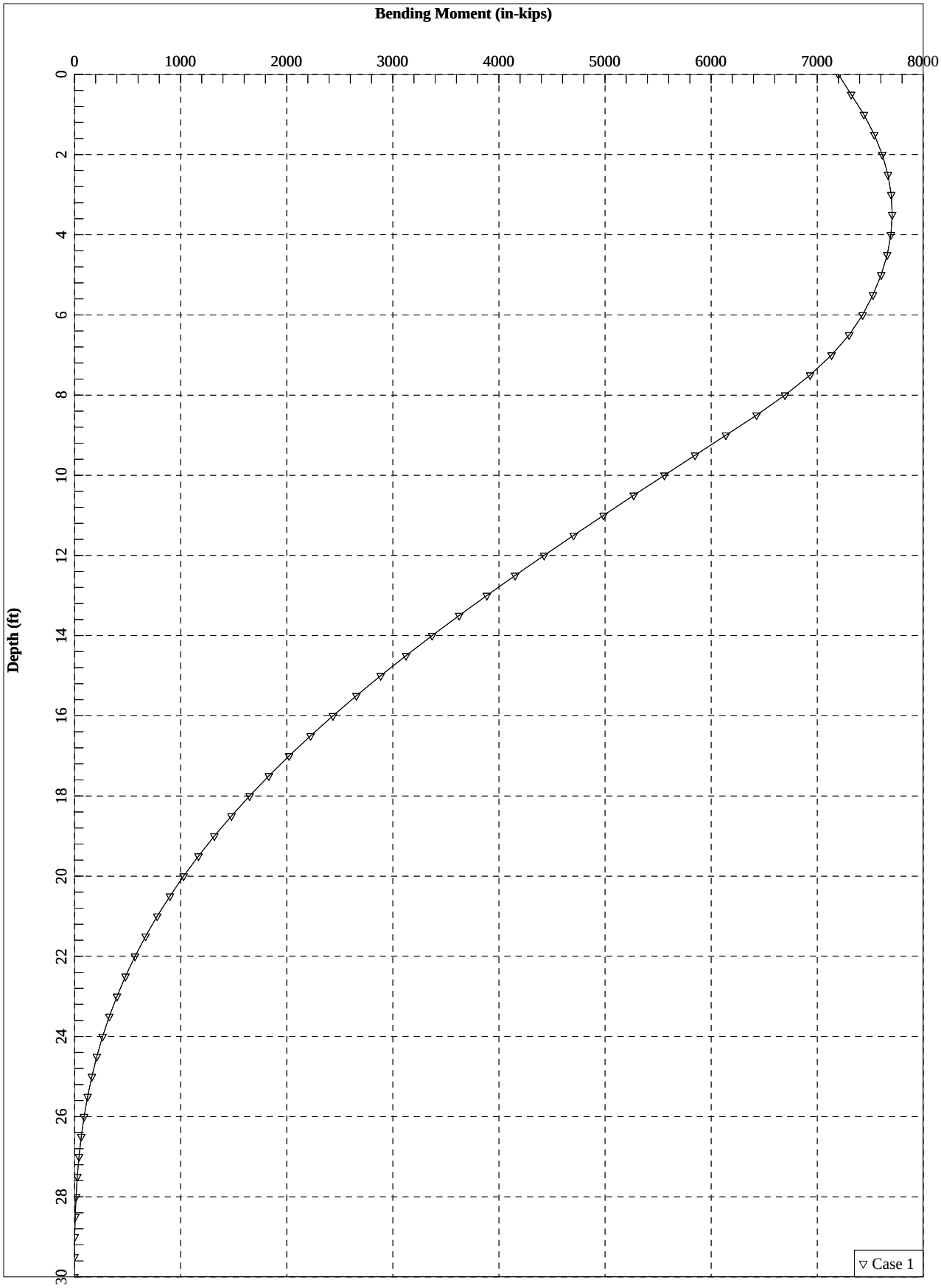

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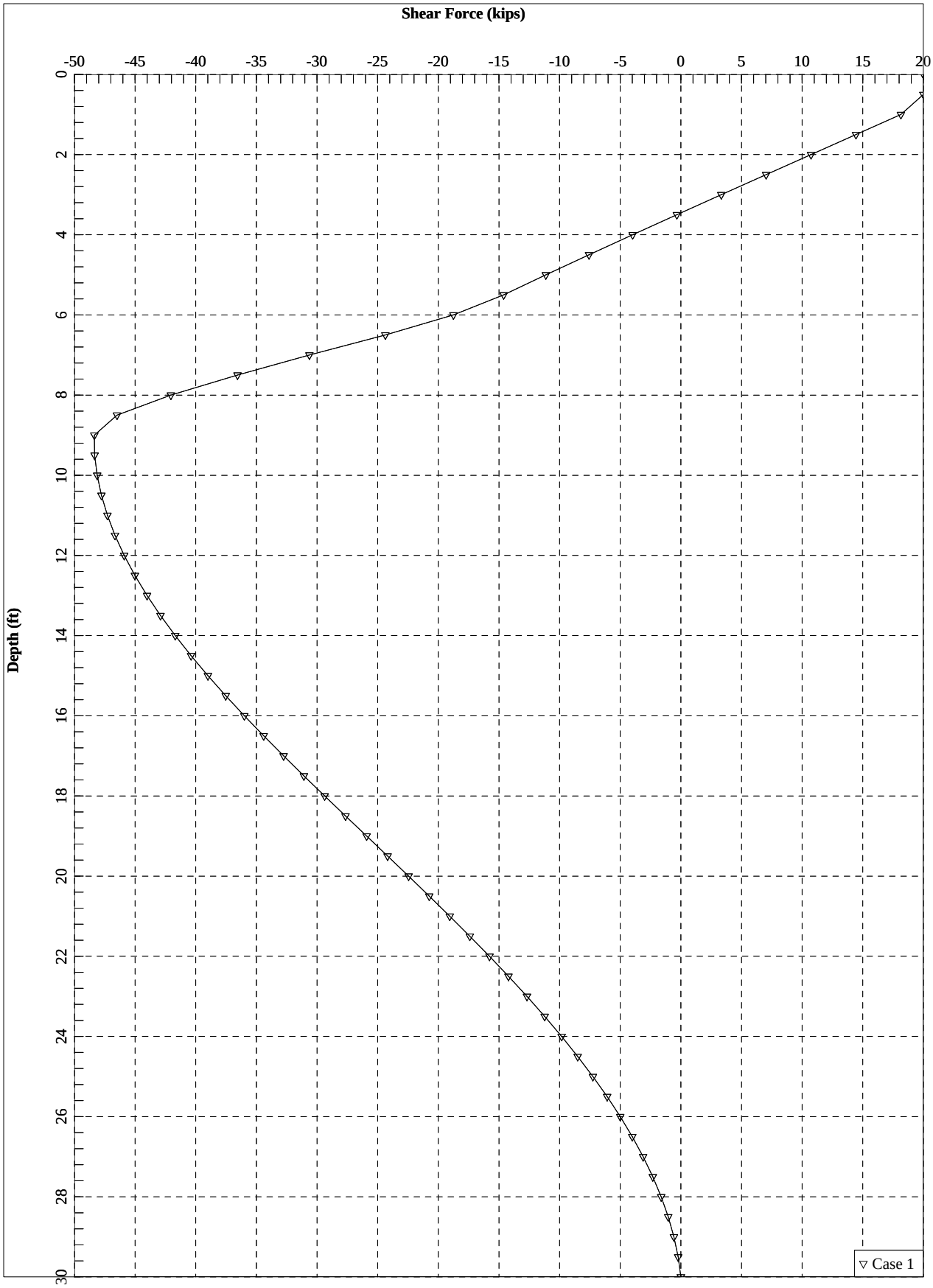
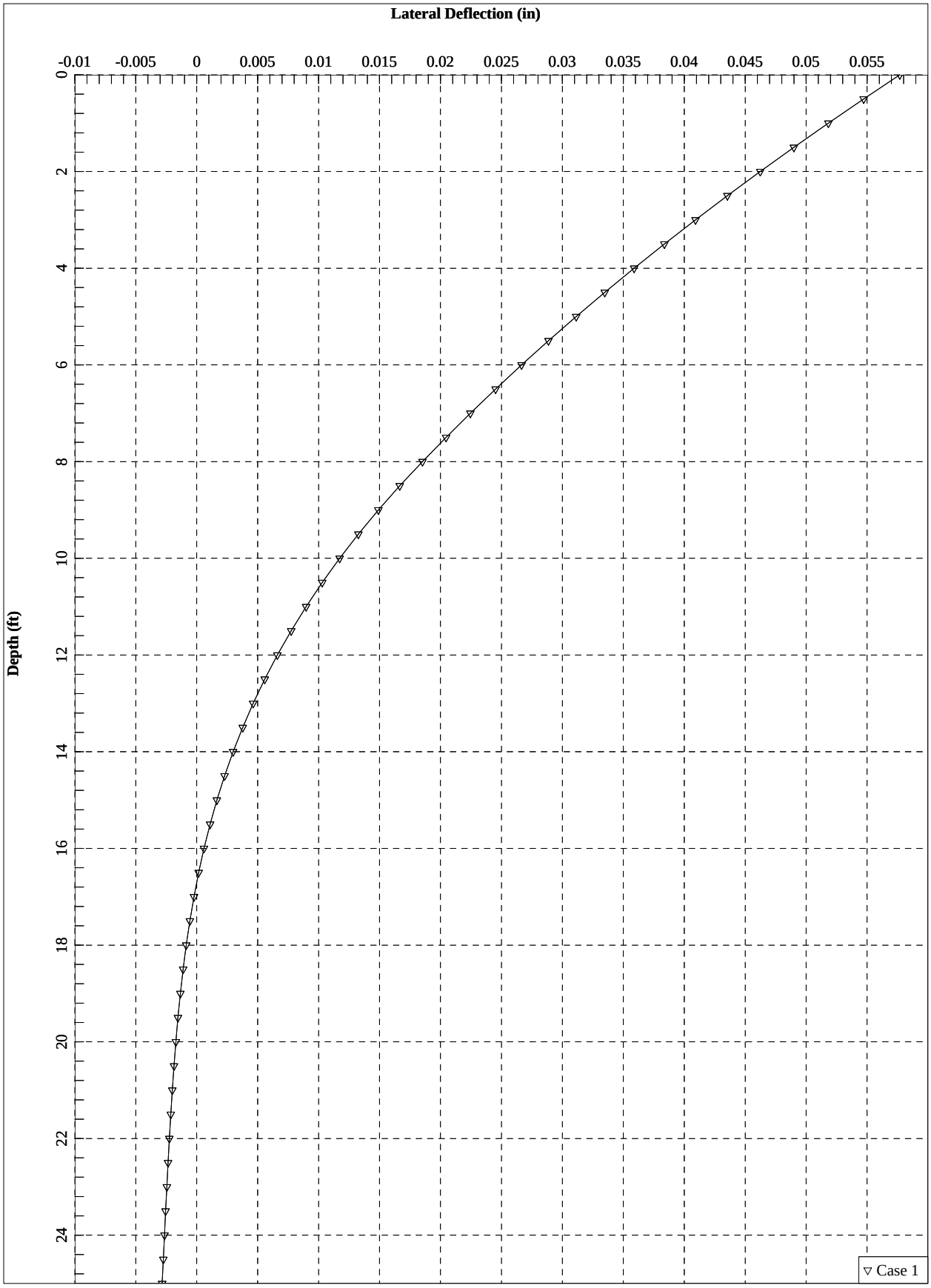


Sign No: OS45-1



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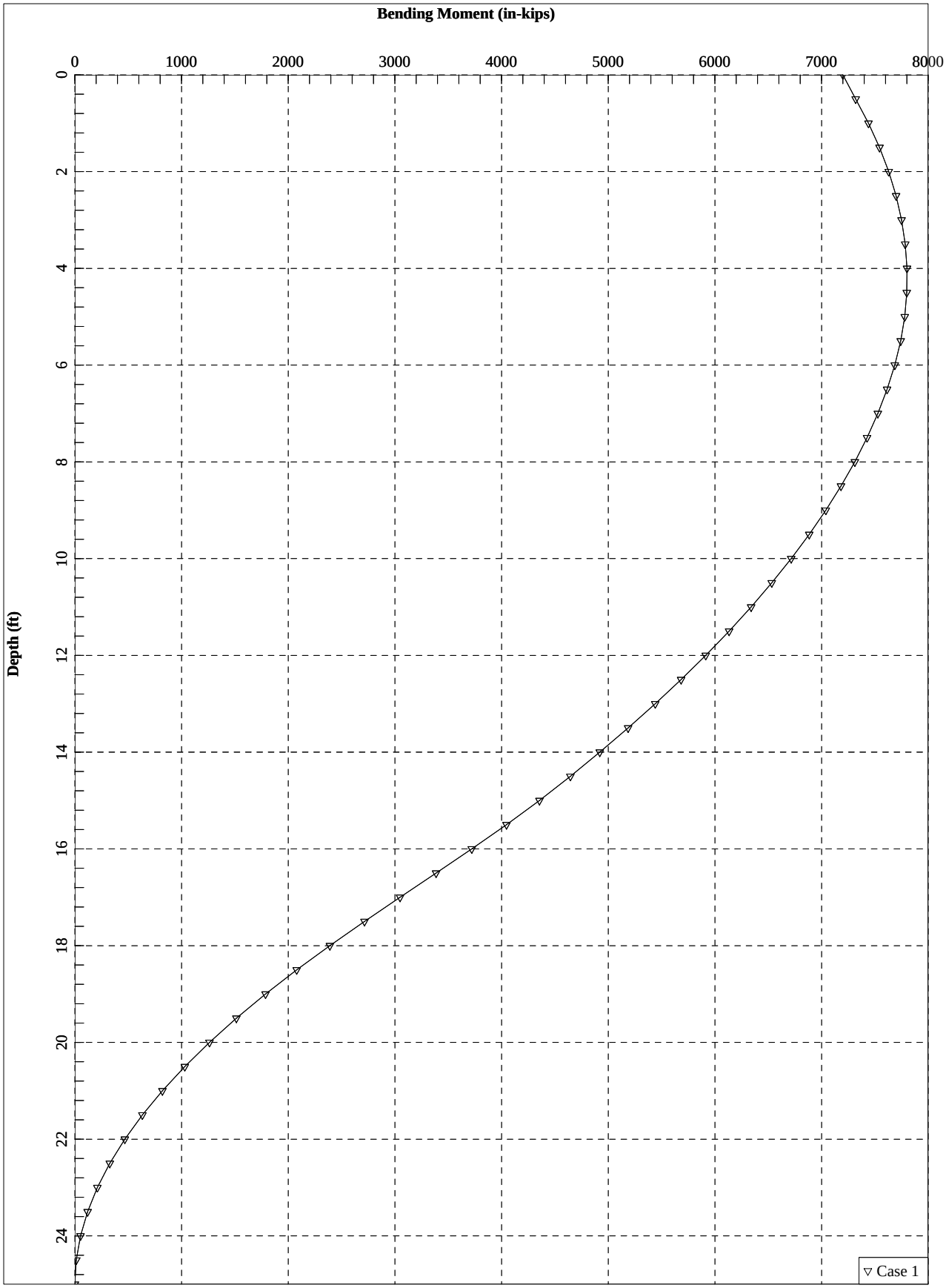

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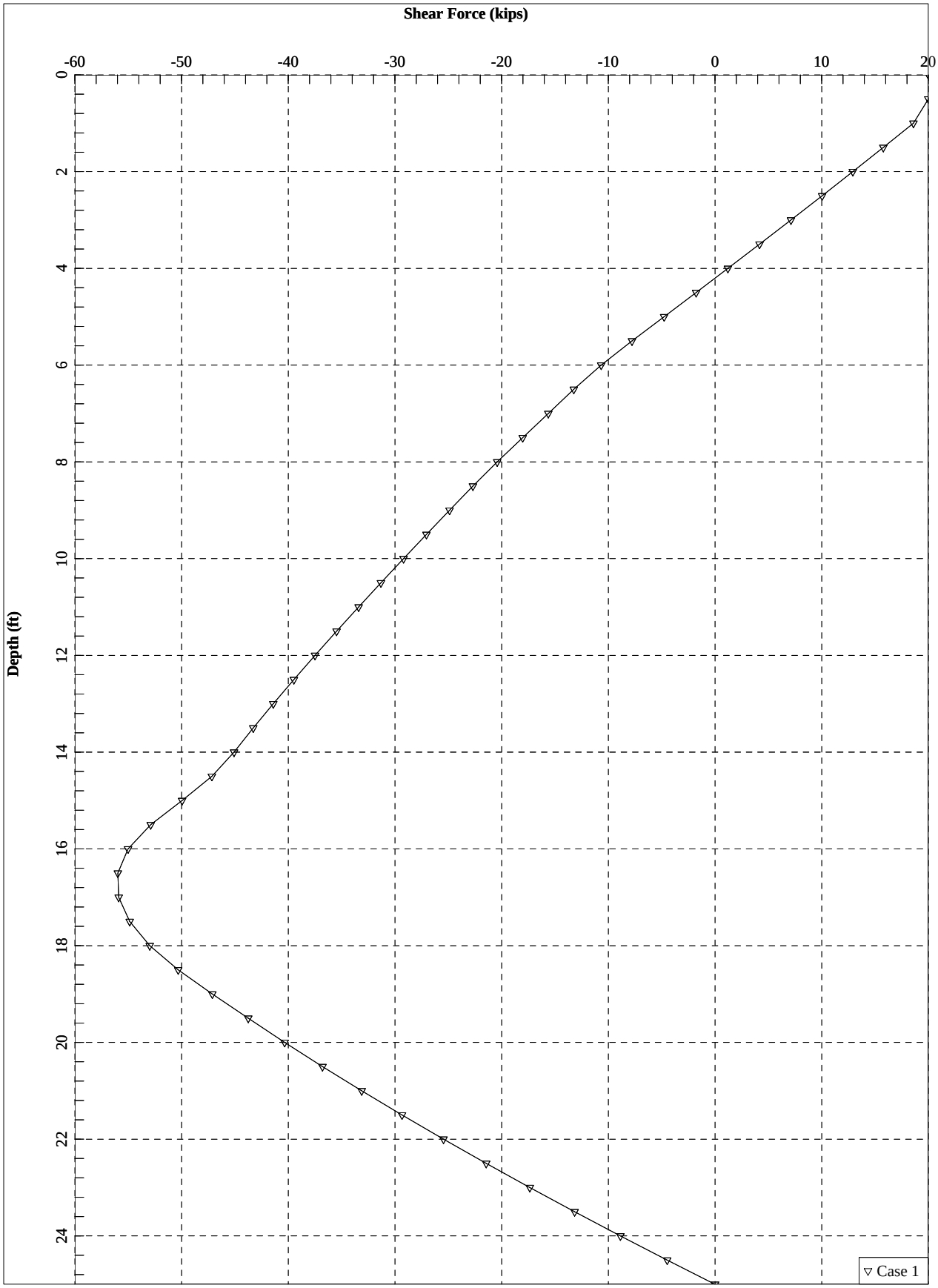
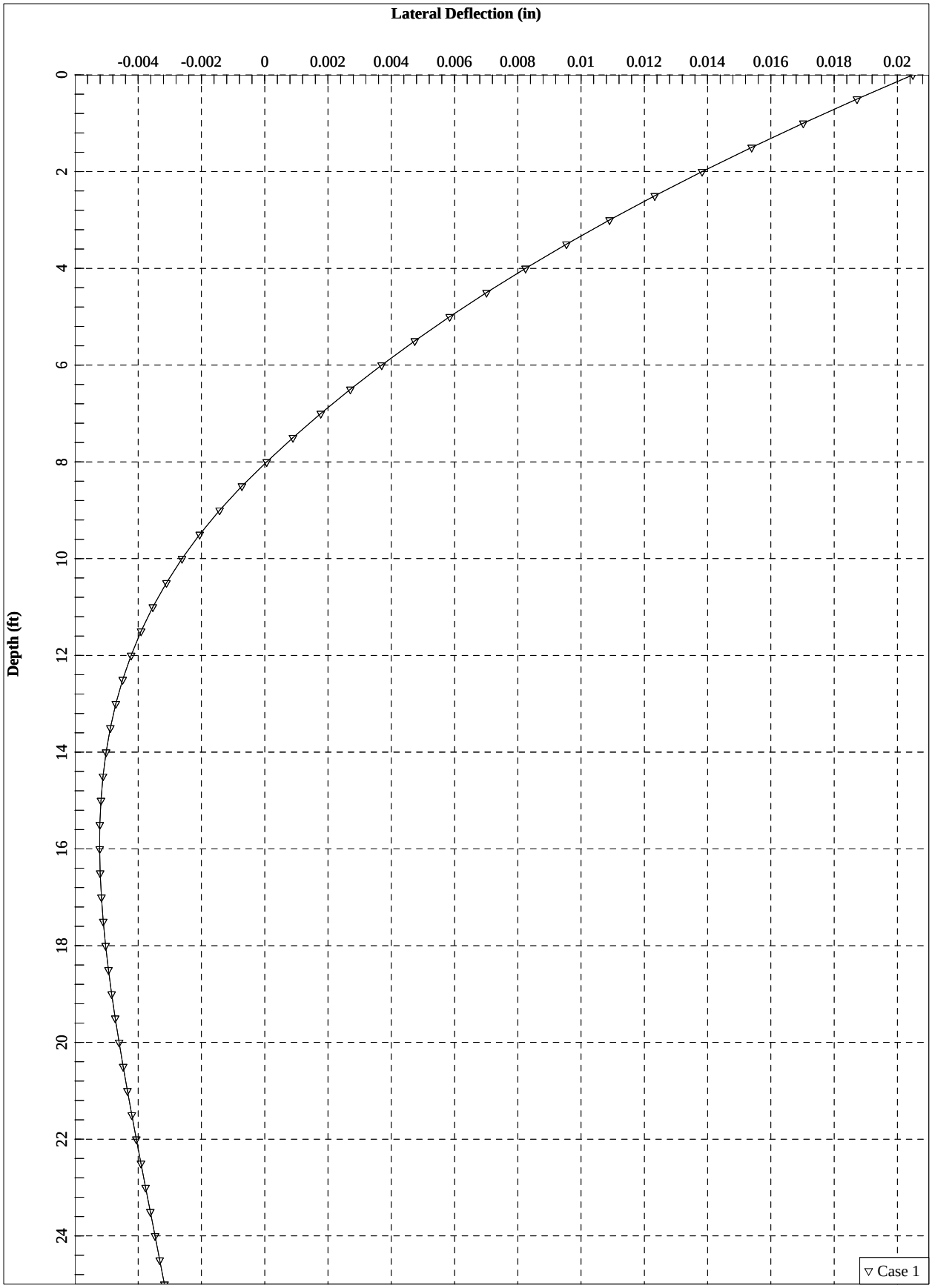


Sign No: OS50-1



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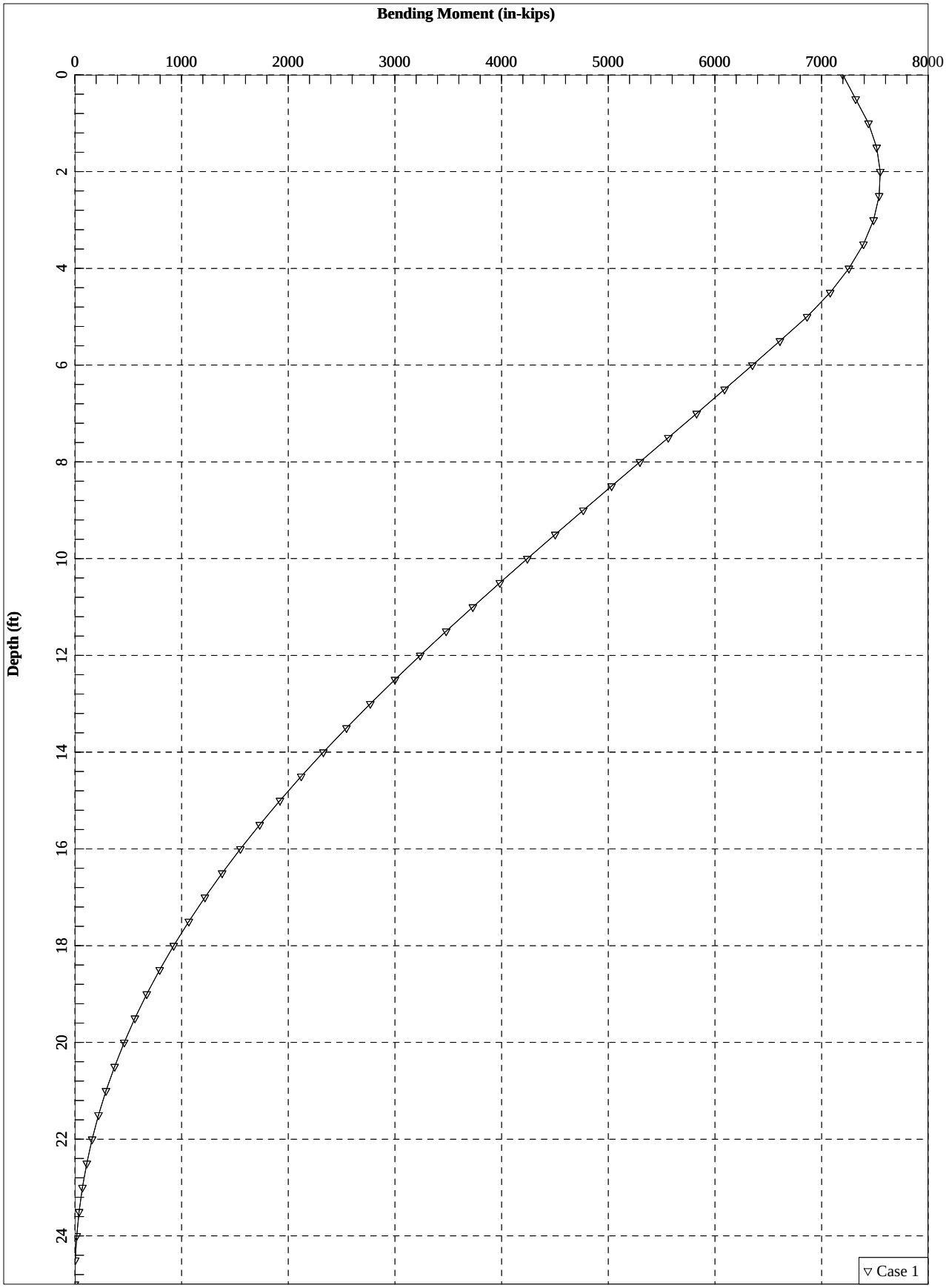

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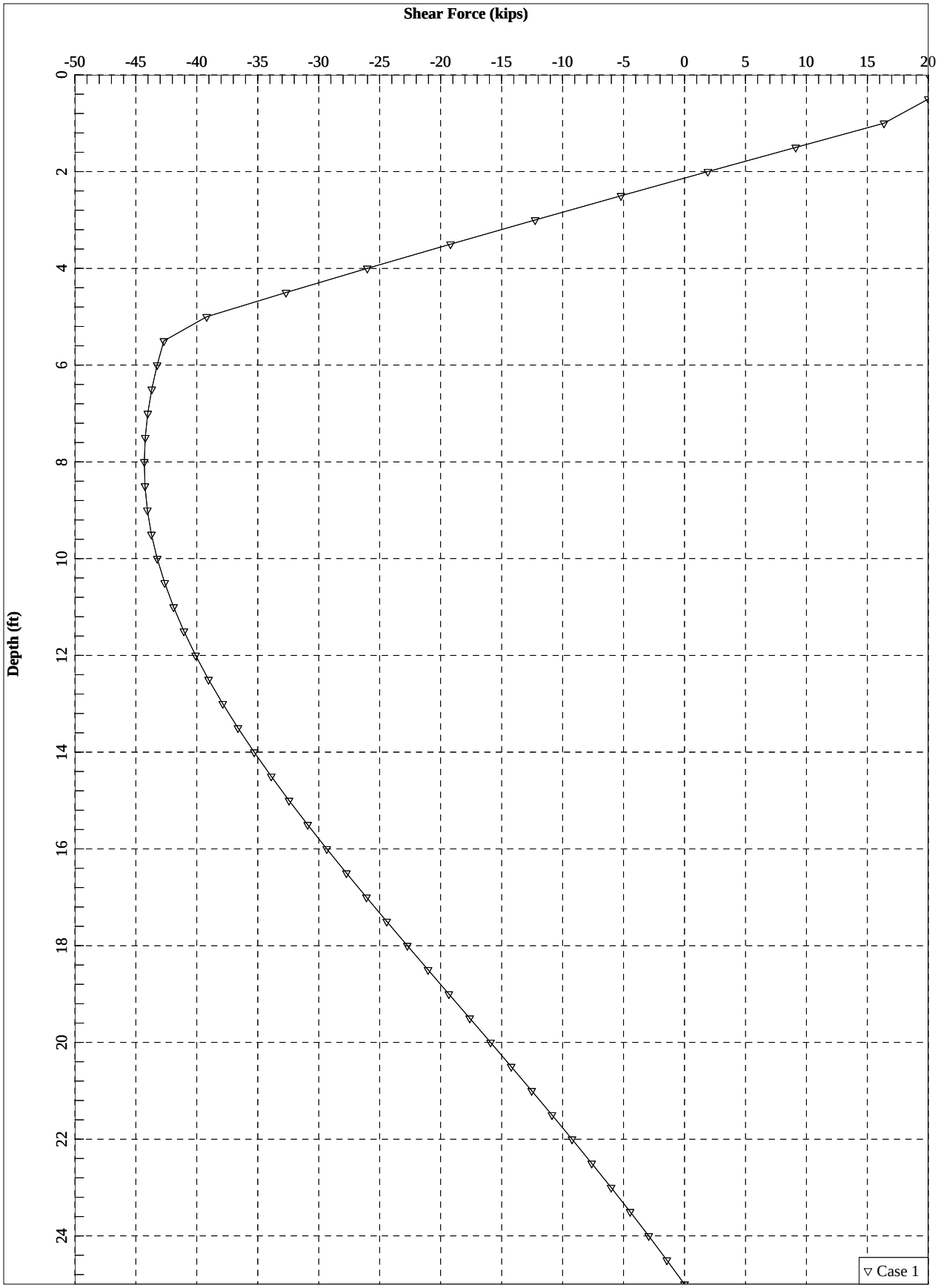
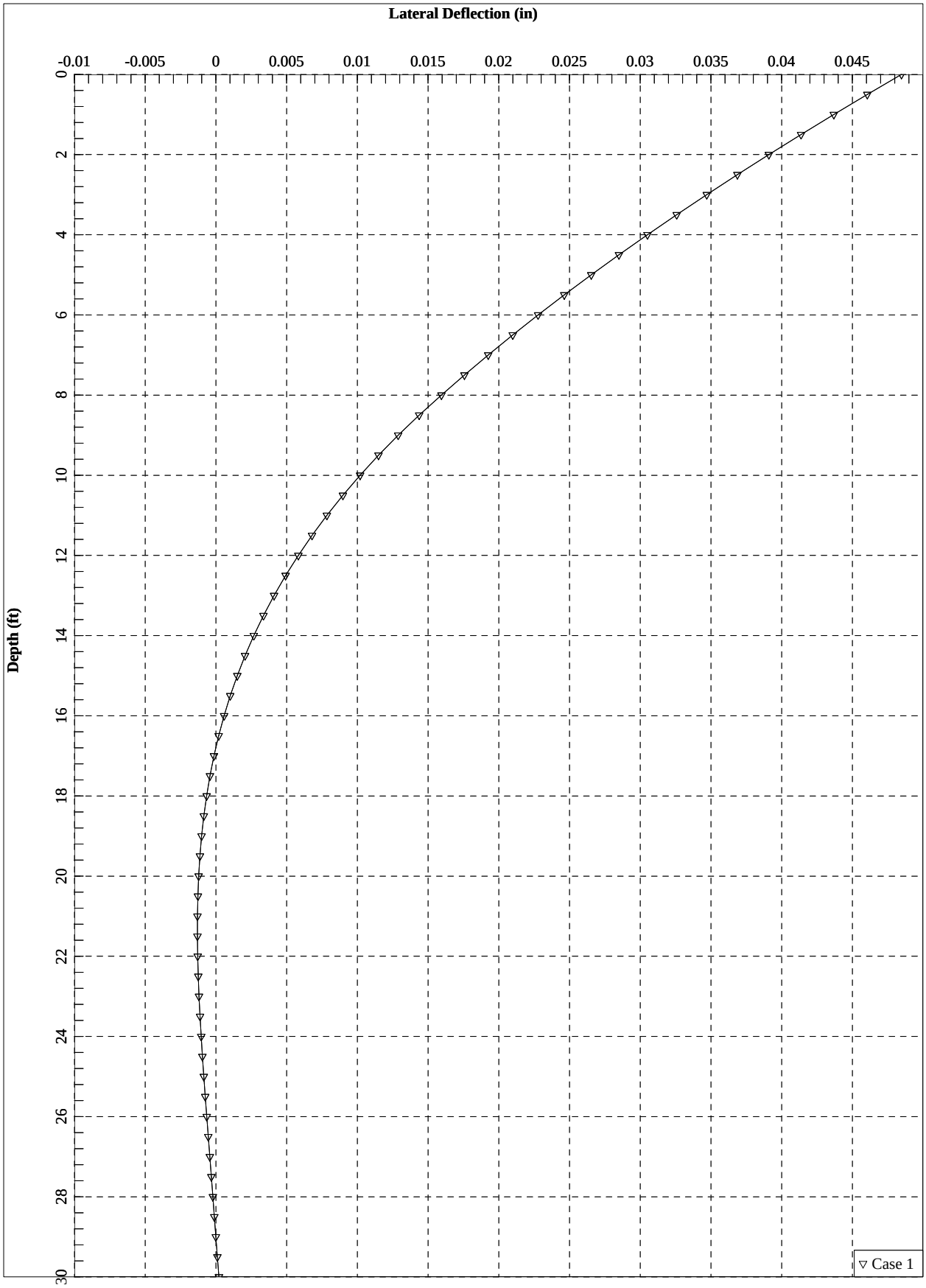


Sign No: OS55-1



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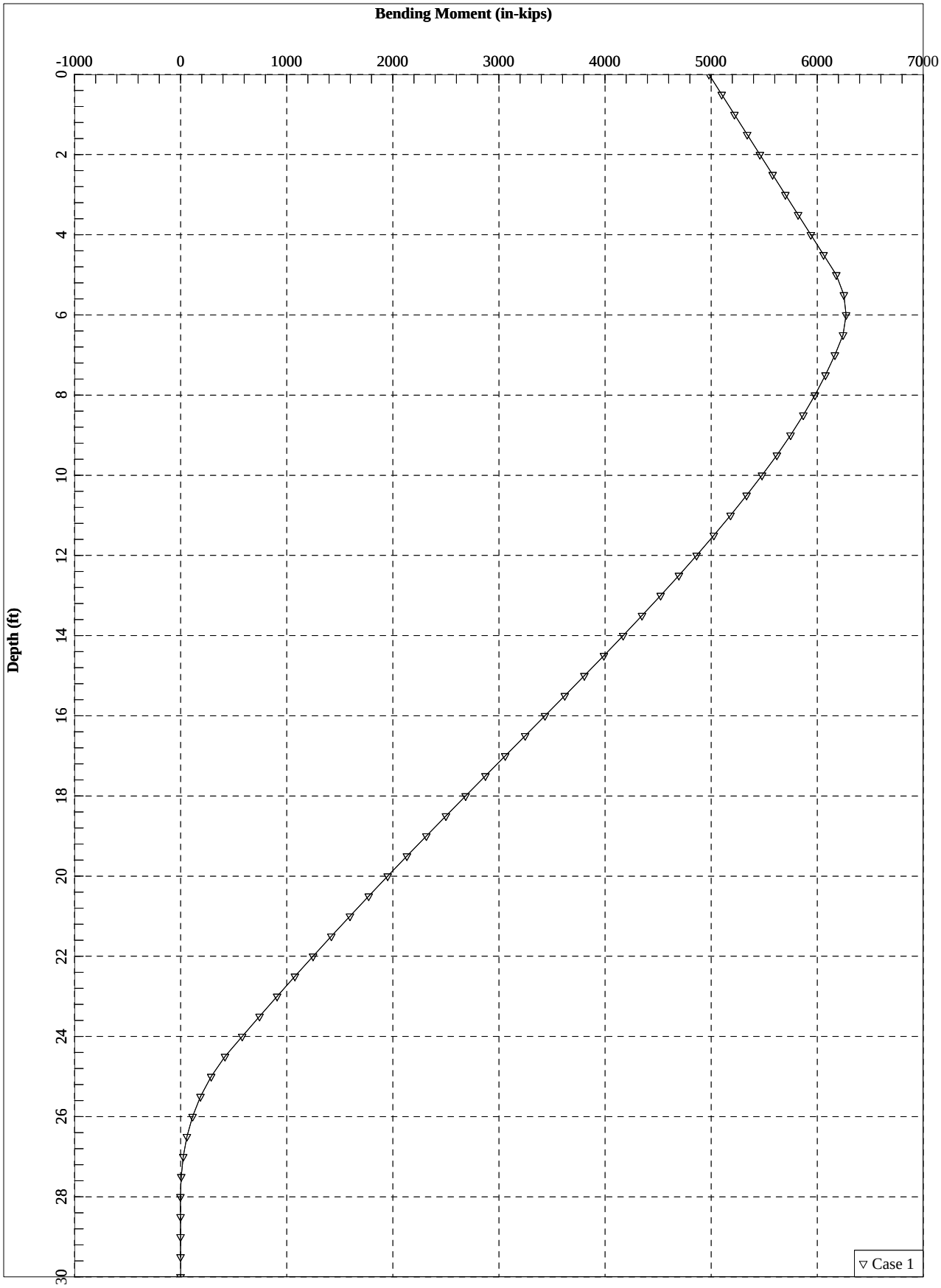
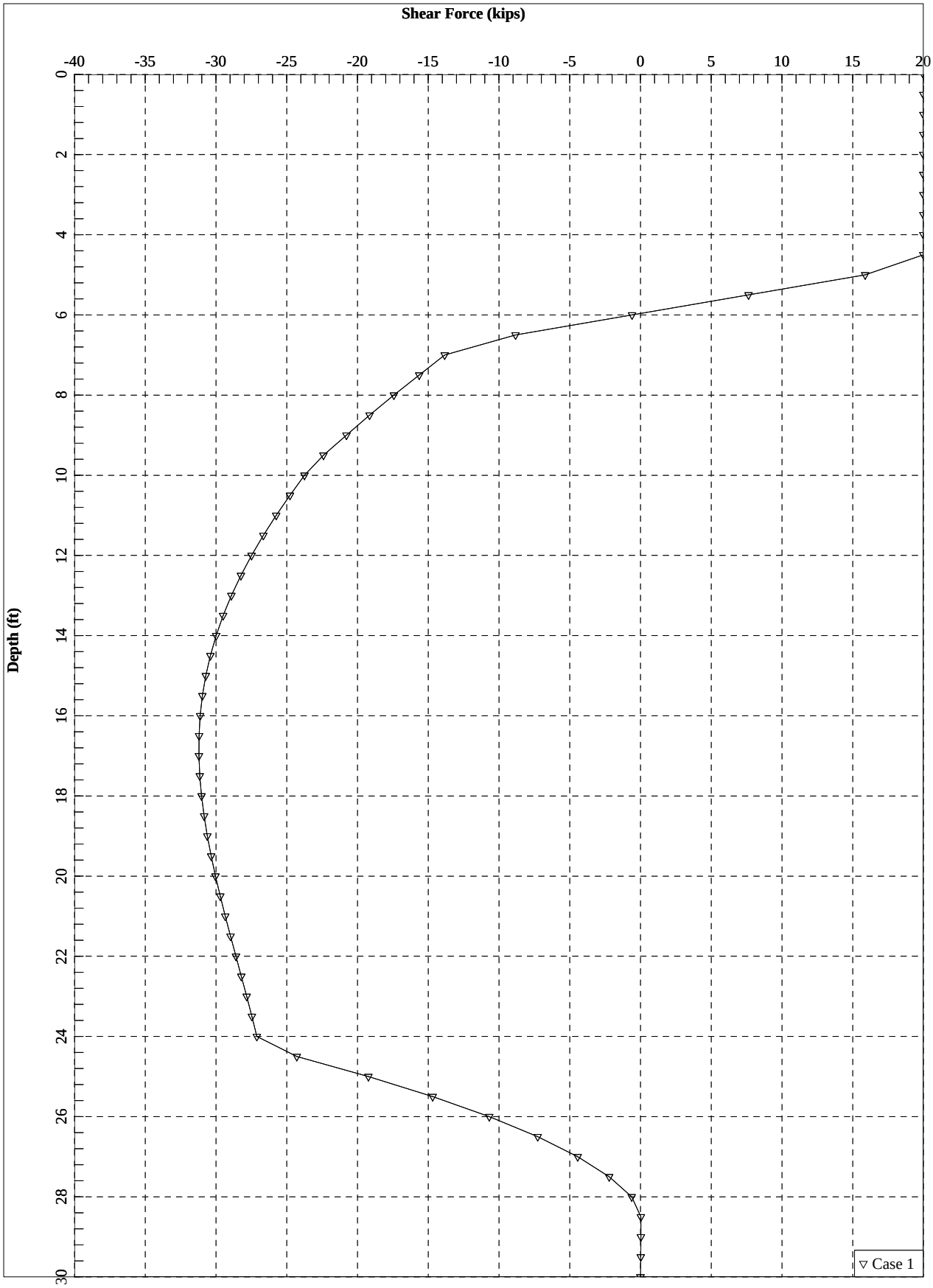
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