

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT



SUBSURFACE INVESTIGATION

STATE JOB NO. BB0414

FEDERAL AID PROJECT NO. NHPP-540-1(262)66

PORTER RD.-HWY. 112/71B WIDENING & INTCHNG. IMPVTS. (S)

STATE HIGHWAY 49 SECTION 28

IN WASHINGTON COUNTY

LETTING OF AUGUST 10, 2016

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**GEOTECHNICAL INVESTIGATION
AHTD JOB BB0414: PORTER RD.-HWY. 112/71B
WIDENING & INTCHNG. IMPVTS. (S)
ON-CALL DESIGN TASK ORDER NO. B015
FAYETTEVILLE, WASHINGTON COUNTY, ARKANSAS**

INTRODUCTION

This report presents the final results of the geotechnical investigation performed for AHTD Job BB0414: Porter Rd.-Hwy 112/71B Widening & Intchng. Impvts (S). These services were authorized by the subconsultant agreement dated September 7, 2012 and modified by a supplemental subconsultant agreement dated June 13, 2014. Preliminary results were provided throughout the course of this study. This final report incorporates the Engineer's (Garver, LLC) comments of the initial report submittal of December 22, 2015.

AHTD Job BB0414 consists of the widening approximately 2.0 miles of Interstate 49 (I-49) from four (4) lanes to six (6) lanes. The widened alignment extends from Porter Road (Exit 65) through the Highway 112/71B Interchange (Exit 67) and the reconstruction of the Highway 112/71B Interchange.

The project includes two (2) new bridges at the planned I-49 overpass over Highway 71B (Bridges A7380 and B7380). The two (2) I-49 over Highway 71B overpass bridges will be continuous composite plate girder units about 367 and 309 ft long, respectively. The bridges will each have three (3) bents (one interior bent and abutments at the bridge ends). Bridge A7380 will have pavement grades ranging from about El 1248.9 on the south approach to about El 1248.9 on the north approach. The pavement grades planned for Bridge B7380 will vary from about El 1253.9 on the south approach to about El 1252.3 on the north approach. Abutment end slopes are planned

with 2-horizontal to 1-vertical (2H:1V) configurations with concrete riprap cover and side slopes are planned for 3-horizontal to 1-vertical (3H:1V) configurations with vegetation cover.

An elevated section of the Highway 112 Ramp to I-49 Northbound extending over an at-grade I-49 to Highway 71B Ramp is also included in this project. This elevated structure will be a continuous composite plate girder unit approximately 539 ft long with a 34 ft wide deck. The planned structure includes four (4) bents (two (2) interior bents and abutments at bridge ends). Pavement grades are planned from about El 1259.2 on the southwest approach to about El 1258.8 on the northeast approach. Abutment end slopes are planned with 2H:1V configurations with concrete riprap cover and side slopes with 3H:1V configurations and vegetation cover.

Also included in this project is the reconfiguration of the existing bridge structure at the Highway 112 overpass over I-49 (Bridge No. 05692). The existing Highway 112 Bridge over I-49 is a continuous composite plate girder unit bridge with five (5) bents (three (3) interior bents and two (2) abutments). The existing structure has a 306-ft-long, 58-ft-wide deck with grades varying from about El 1254.2 on the south approach to about El 1246.8 on the north approach. Current end slopes are configured at 2H:1V with concrete riprap cover and side slopes have 3H:1V configurations with vegetation cover. New plans include widening the elevated deck on both the east and west to create an 86.7-ft-wide deck. Additionally, the existing end slope of the northern abutment (Bent 5) will be reconfigured to allow for a new Collector – Distributor Road constructed at grade between Bents 4 and 5. A soil nail/MSE wall (Retaining Wall No. 1) is planned for retention of the existing embankment fill at Bent 5.

Replacement of the existing bridges at the I-49 over Van Ashe Drive location (Bridges A5918 and B5918) is also included in the project. The replacement bridges will be single-span composite plate girder structures supporting an elevated deck for I-49 traffic (Bridge A5918 for southbound and Bridge B5918 for northbound) over Van Ashe Drive. The bridges will both be about 120-ft-long. Bridge A will have a 73-ft-wide deck while Bridge B will have an 85-ft-wide deck. Pavement grades vary from about El 1256.4 to El 1257.7 on the south approaches to about El 1259.5 to El 1260.5 on the north approaches. Additionally, the end slopes will be reconfigured with MSE walls (Retaining Walls 7 and 8) retaining the bridge end embankments to provide room for a widened Van Ashe Drive.

In support of the new roadway alignments and bridge structures, nine (9) retaining walls are also planned in BB0414. These walls are summarized in Table 1 below.

Table 1: BB0414 Retaining Walls

Retaining Wall No.	Wall Type	Project Facet	Approx. Length (ft)	Approx. Max Height (ft)
1	Soil Nail/MSE	Hwy 112 over I-49 – Bent 5	259	24
2	MSE	Collector-Distributor	1115	14
3	MSE	Concrete Median Barrier Wall	933	11
4	MSE	I-49NB Ramp to Hwy 71B	162	16
5	MSE	I-49 over 71B - Bent 1	455	23
6	MSE	Concrete Median Barrier Wall	688	9
7	MSE	I-49 over Van Asche – Bent 1	276	19
8	MSE	I-49 over Van Asche – Bent 2	285	19
9	MSE	I-49 Widening	1034	15

The purposes of this geotechnical investigation were to explore subsurface conditions in the BB0414 wall and bridge locations within the project alignment. The data developed through the field and laboratory studies have been utilized to develop recommendations to guide design and construction of bridge and wall foundations, embankments, roadways, and earthwork. These purposes were achieved by a multi-phased study that has included:

- ◆ Drilling sample and core borings and excavating test pits to evaluate subsurface conditions and obtain samples for laboratory testing.
- ◆ Performing laboratory tests to evaluate pertinent engineering properties of the foundation and subgrade strata.
- ◆ Analyzing field and laboratory data to develop recommendations for bridge and wall foundation design, embankment configurations, and construction considerations.

The relationship of these factors to design and construction of the new structures, walls, and embankments has been considered in developing the recommendations and considerations discussed in the following report sections.

SUBSURFACE EXPLORATION

Subsurface conditions at the structure and wall locations were explored by performing 51 sample borings and test pits. The alignment vicinity is shown in Attachment 1. A summary of the exploration program is included as Plates 1 and 2 of Attachment 2. The following paragraphs provide information related to the subsurface exploration performed for each project facet. In general, borings performed for bridge structures are labeled with an “S” (i.e., S1, S2, etc.), borings performed for retaining walls are labeled with “W” (i.e., W7, W8, etc.), and test pits performed within the alignment are identified with a “TP” designation (i.e., TP-1, TP-1B, etc.).

Boring log and/or test pit logs are provided in the appropriate attachments. Generalized subsurface profiles are also included in the attachments. The approximate ground surface elevations shown on the boring and test pit logs have been inferred from the topographic information provided by the Engineer (Garver, LLC). It must be recognized that the elevations shown are approximate and actual elevations may vary. It should also be recognized that the stratigraphy illustrated on the generalized subsurface profiles has been inferred between discrete boring locations. In view of the natural variations in stratigraphy and conditions, variations from the stratigraphy illustrated by the profiles should be anticipated. Additionally, the natural transition between strata is generally gradual, and the stratigraphy described on the boring logs or in the report narrative may vary.

Highway 112 over I-49& Retaining Wall No. 1

Subsurface conditions in the proposed reconfiguration of the Highway 112 over I-49 bridge location and Retaining Wall No. 1 were investigated by drilling seven (7) sample and core borings to about 18.5-to 65-ft depth. The approximate location of this facet of the project is shown on the Site Vicinity Map provided as Plate 1 in Attachment 3. The approximate location of the borings performed for this portion of the project are shown on the Plan of Borings provided as Plates 2A and 2B of Attachment 3. Logs of the borings which include descriptions of subsurface conditions and soil and rock stratigraphy revealed by the borings and results of field and laboratory tests are provided as Plates 3 through 9 in Attachment 3. Photographs of rock cores are also included in Attachment 3. To aid in visualizing subsurface conditions, Generalized Subsurface Profiles for both the bridge structure and retaining wall alignment are presented in Attachment 3. Boring S3 was not performed due to the limited access in the concrete-lined median swale of I-49.

I-49 over Highway 71B and Retaining Wall No. 5

Subsurface conditions in the proposed alignment of the bridges planned for the I-49 over Highway 71B bridge location and Retaining Wall No. 5 were investigated by drilling 10 sample and core borings to 20- to 60-ft depth. The approximate location of this facet of the project is shown on the Site Vicinity Map provided as Plate 1 in Attachment 4. The approximate location of the borings performed for this portion of the project are shown on the Plan of Borings provided as Plates 2A, 2B, and 2C of Attachment 4. Logs of the borings which include descriptions of soil and rock conditions and results of the field and laboratory tests are provided as Plates 3 through 12 of Attachment 4. Photographs of rock cores are included as Plates 13 and 14 in

Attachment 4. Generalized Subsurface Profiles for the two (2) bridge alignments and the retaining wall alignment are presented in Attachment 4. Boring S12 was not drilled due to limited access.

Highway 112 Ramp to I-49 Northbound

Four (4) sample and core borings were drilled in the proposed alignment of the bridge structure planned for Highway 112 Ramp to I-49NB to 37- to 50-ft depth. The approximate bridge location is shown on Plate 1 of Attachment 5. The approximate boring locations are shown on Plate 2 of Attachment 5. Logs of the borings which include descriptions of subsurface soil and rock stratigraphy and field and laboratory results are provided in Attachment 5. Photographs of rock cores are also included as Plates 7 through 9 of Attachment 5. A Generalized Subsurface Profile is presented on Plate 10 of Attachment 5.

Retaining Wall No. 4

Three (3) sample borings were drilled to about 20-ft depth in the proposed alignment of Wall No. 4. This site vicinity is shown on Plate 1 of Attachment 6. The approximate boring locations are shown on the Plan of Borings, Plate 2 of Attachment 6. Logs of the borings descriptions of subsurface stratigraphy and field and laboratory test results are included as Plates 3 through 5 of Attachment 6. To aid in visualizing subsurface conditions, a Generalized Subsurface Profile along the wall alignment is presented in Attachment 6.

I-49 over Van Ashe Drive

Subsurface conditions at the I-49 over Van Ashe Drive bridge replacement were investigated by drilling five (5) sample borings to about 20- to 70-ft depth. The site vicinity is shown on Plate 1 of Attachment 7. The approximate boring locations are shown on the Plan of Borings, Plate 2 of Attachment 7. Boring logs with descriptions of subsurface stratigraphy and field and laboratory tests results are provided as Plates 3 through 7 of Attachment 7. A generalized subsurface profile is provided on Plate 8 of Attachment 7. Boring W30 was not drilled because of limited access.

Retaining Wall Nos. 2 and 3

Nine (9) sample borings were drilled to 25- to 31-ft depth in the area of the Retaining Wall No. 2 alignment. The Retaining Wall No. 3 location is primarily within the current I-49 alignment. The access limitations imposed by the I-49 location, the highway traffic and the existing concrete-paved swale prevented drilling borings or excavating test pits at the Wall No. 3 location. The Wall No. 2 borings (Borings W37 through W41) were drilled at locations less than

100 ft from the Wall No. 3 alignment. Consequently, it was considered appropriate to utilize the data developed from Borings W37 through W41 to develop geotechnical recommendations for Wall No. 3.

The Wall No. 2 / Wall No. 3 site vicinity is shown on Plate 1 of Attachment 8. The approximate Wall No. 2 boring locations are shown on Plate 2 of Attachment 8. Logs of the borings, with descriptions of subsurface stratigraphy and results of field and laboratory tests are provided as Plates 3 through 11 of Attachment 8. A generalized subsurface profile of the Wall No. 2 alignment is provided as Plate 12 of Attachment 8. A generalized subsurface profile of the Wall No. 3 alignment was not developed.

Retaining Wall No. 6

Subsurface conditions at the Retaining Wall No. 6 were explored by drilling six (6) sample borings to 12- to 20-ft depth. The site vicinity is shown as Plate 1 of Attachment 9 and the approximate boring locations are shown on Plate 2 of Attachment 9. Boring logs are included as Plates 3 through 8 of Attachment 9. A generalized subsurface profile is shown on Plate 9 of Attachment 9.

Retaining Wall No. 9

Due to the hillside wall location which precluded access to drilling equipment, subsurface conditions at this location were explored by excavating seven (7) test pits to about 2.5- to 11.5-ft depth. The wall vicinity is shown on Plate 1 of Attachment 10. The approximate test pit locations are shown on the Plan of Test Pits provided as Plate 2 of Attachment 10. Test pit logs are provided as Plates 3 through 9 of Attachment 10. Because of the hillside wall alignment, with nearby elevations higher than the ground surface at test pit locations, a subsurface profile was not developed for this wall.

Drilling and Sampling Methodology

The sample locations were selected by Grubbs, Hoskyn, Barton & Wyatt Consulting Engineers (GHBW). The borings were drilled with either a truck-mounted SIMCO 2400 or truck-mounted Mobile B-53 rotary-drilling rigs using dry-auger drilling procedures or a combination of dry-auger and rotary-wash drilling methods. Sampling of the overburden soils and weathered rock was accomplished using a 2-in.-diameter split barrel sampler and Standard Penetration Test (SPT) procedures. The SPT N-values are tabulated on the boring logs in the "Blows Per Ft" column. Where rock hardness precluded recovery via the SPT, cuttings were obtained for use in visual classification.

Representative samples of the competent bedrock were obtained using an NQ_{WL}-size double-tube core barrel with a diamond bit. For each core run, the percent recovery was determined as the ratio of recovery to total length of core run. Rock Quality Designation (RQD) was also determined for each core run as the sum of intact, sound rock core greater than 4-in. length divided by the total length of the run and expressed in percent. Both these values are presented in the right hand column of the log forms, opposite the corresponding core run. Photographs of the rock core samples are provided in the appropriate attachments. Where rock was not cored cuttings were collected for visual examination. In some cases, coring was attempted but abandoned during drilling. This was typically due to rock conditions which resulted in plugging of the core barrel or other mechanical failures.

The test pits were excavated with a Komatsu Advance track-mounted excavator fitted with a 3-ft-wide bucket and rock teeth. Representative bulk samples were obtained from test pit side walls or excavation spoil. Undrained soil and weathered shale shear strength (cohesion) was estimated using a calibrated hand penetrometer on test pit side walls or intact pieces of excavation spoil. Estimated shear strength values are plotted on the log forms, in tons per sq ft, as circles enclosing an "x".

All samples were removed from samplers in the field. Samples were visually classified and placed in appropriate containers to prevent moisture loss and/or disturbance during transfer to our laboratory for further examination and testing.

Groundwater conditions were observed during and at the completion of drilling of borings or excavation of test pits. Observations regarding groundwater are shown in the lower right-hand portion of the log forms. Groundwater conditions are also discussed in subsequent sections of this report.

As noted, the approximate ground surface elevations of the borings and test pits were inferred from the available topographic and plan alignment information. It must be recognized that these elevations and locations are approximate and actual surface elevations may vary.

Keys to the terms and symbols used on the logs are presented in Attachment 11 for both soil and rock.

LABORATORY TESTING

To evaluate pertinent soil and rock properties, laboratory tests consisting of shear strength tests, classification, and natural water content determinations were performed. Soil shear strength

was estimated in the field using hand penetrometer and SPT results. In addition, laboratory strength testing included three (3) unconsolidated-undrained triaxial compression tests. Undrained shear strength (cohesion) determined from the results of the compression tests is plotted at the appropriate depth, in tons per sq ft, as an open triangle.

To develop information on *in-situ* soil and weathered rock water contents to soil plasticity, natural water content determinations and classification tests were performed. A total of 316 natural water content determinations were performed to develop representative *in-situ* soil water content data. The results of these tests are plotted on the logs as solid circles, in accordance with the scale and symbols shown in the legend located in the upper-right corner.

To verify field classification and to evaluate soil plasticity, 80 liquid and plastic (Atterberg) limit determinations and 77 sieve analyses were performed on selected representative samples. The Atterberg limits are plotted on the logs as small pluses inter-connected with a dashed line using the water content scale. The percent of soil passing the No. 200 Sieve is noted in the "No. 200%" column on the log forms. Classification test results, as well as soil classification by the Unified Soil Classification System and AASHTO classification system, are summarized in Attachment 12.

Unconfined compressive strength of representative core samples of rock was evaluated by compression tests. Results of the laboratory compression tests are shown in lbs per sq inch at the appropriate depth on the boring logs. The total unit weight of intact cores was also measured and these data are also shown on the logs. The compression test results are summarized in Attachment 13.

GENERAL SITE and SUBSURFACE CONDITIONS

Site Conditions

Roadway Alignment. The existing Interstate 49 at this project location is typically a two-lane divided roadway with occasional three-lane sections for entrance and exit ramps. The typical road width is about 42-ft from outside pavement edge to outside pavement edge. The existing pavement grades vary from about El 1280 to El 1294 at the south project limits, undulating but generally falling to about El 1210 at approximate Sta 348+00 and finally rises to approximately El 1290 at the northern project limits, approximate Sta 393+16. The existing I-49 northbound and southbound lanes in this alignment include an overpass of the existing at-grade Van Asche Drive at approximate Sta 365+00. The southbound lane proceeds south from Van Asche Drive under an

elevated ramp and elevated Highway 112. The northbound I-49 lanes continue north from the Highway 112 interchange over the at-grade Highway 71B and continue north to Van Asche Drive.

The existing Highway 112 is a three (3) lane roadway (two drive lanes and a turning lane) that generally runs north-south in this vicinity with an elevated structure over I-49 at approximate I-49 Sta 292+41. The roadway varies from about 60- to 70-ft wide.

The Highway 71B alignment within the project is typically a divided highway with two (2) one-lane roadways that runs east-west extending east from the I-49/Hwy 112 Interchange. These roadways are about 40- to 50-ft wide. Additionally, the existing interchange and roadways within the project include multiple one-lane entrance and exit ramps, the majority of which were constructed at-grade.

The project alignment includes four (4) existing bridge structures: the I-49/Hwy 112 interchange, the I-49 Southbound Ramp to Highway 71B over an at-grade I-49 Southbound. The end slopes of the existing structures are covered with concrete riprap and graded to approximate 2-horizontal to 1-vertical (2H:1V) configurations. The existing side slopes are covered with vegetation and shaped to approximate 2-horizontal to 1-vertical (2H:1V) configurations.

Site Geology

The project alignment in Washington County, Arkansas is located within the Ozark Geologic Region. The Geologic Map of Fayetteville Quadrangle, Washington County, Arkansas¹ indicates the alignment to be underlain by sedimentary rocks of the Mississippi systems represented by (in ascending order) the Boone, Batesville Sandstone and Fayetteville Shale.

The project alignment also transverses the White River Fault north of the I-49 over Van Asche Drive bridge structures with a significant branch crossing near the I-49 and Highway 112 Interchange forming a prominent graben. The White River Fault is a normal fault, downthrown to the south. Total displacement on this fault is reported to be an estimated 20 meters.

The Boone Formation is widely distributed over northern Arkansas and is the predominant geologic unit of the project alignment. The Boone formation was initially named for its extensive exposures noted in Boone County. This formation consists of limestone, chert and cherty limestone. The chert-limestone content of the bedrock varies extensively, both horizontally and vertically. The limestone of the Boone is typically gray, compact, finely to coarsely crystalline, and massively bedded. The remains of crinoids may be numerous in some

¹ Bedrock Geology and Sea-Level History of Fayetteville Quadrangle, Washington County, Arkansas; King, Maria E., King, Jack T., and Boss, Stephen K., 2001

limestone beds. Because the limestone is nearly pure calcium carbonate, it is very soluble. As a result, sink holes, caves and fissures are of common occurrence. These are generally filled, or partially filled, with chert boulders, red clay, and stalactitic and stalagmitic material.

As noted, the chert content varies in the Boone. Chert in the Boone Formation is cryptocrystalline silica of organic origin. The chert may occur as widely separated nodules, connected nodules, in interbedded layers with limestone, or, more rarely, as bed. Unweathered chert is dense and hard, brittle and exhibits a conchoidal fracture. The Boone typically weathers to a red clay with numerous chert fragments, cobbles and boulders and discontinuous chert seams and layers (cherty clay). Though the residual clay often exhibits high plasticity, the residual soils typically classify as GC, clayey gravel, by the Unified system.

The Batesville Formation rests unconformable on the upper, eroded surface of the Boone Formation and is typically found to consist of sandstone or sandy limestone and has a distinctive basal breccias containing angular to sub-angular chert pebbles derived from erosion and weathering of the underlying Boone Formation.

The Fayetteville Shale Formation is a black to dark gray organic-rich, fissile shale which is subdivided into two (2) informally named stratigraphic units: the Upper Fayetteville and Lower Fayetteville Formations. The majority of this alignment is in the mapped Lower Fayetteville Shale which is black fissile shale characterized by abundant siderite-cemented septarian concretions at its base.

Seismic Conditions

In light of the subsurface conditions revealed by the borings performed for this project at the bridge structures and the local geology, a Seismic Site Class C (very dense soil and soft rock profile) is considered applicable with respect to the criteria of the 2011 Guide Specifications for Load and Resistance Factor Design (LRFD) Seismic Bridge Design² for all sites evaluated. Based on the bridge locations, the 1.0-sec period spectral acceleration coefficient (S_1) on Class B rock for the Bridge Structures is 0.052. The site coefficient (F_v) for S_1 adjusted for Site Seismic Class C is

² Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition, Washington, DC, American Association of State Highway and Transportation Officials, 2011.

1.70. Accordingly, the calculated design 1.0-sec period spectral acceleration coefficient (S_{D1}) is 0.089. Table 3.10.6-1 of the 2012 AASHTO LRFD Bridge Design Specifications³ indicates that a Seismic Performance Zone 1 is fitting for all bridge locations.

The 2012 AASHTO LRFD Seismic Bridge Design procedures indicate that the Peak Ground Acceleration (PGA) having a 7 percent chance of exceedance in 75 years (or mean return period of approximately 1000 years) for the bridge sites is predicted to be 0.052. For a Seismic Site Class C, the Site Coefficient for the PGA, F_{PGA} is determined to be 1.2. Consequently, a design PGA (A_s) value of 0.062 is considered fitting.

Subsurface Conditions

Based on the results of the borings and test pits, the subsurface conditions at the primary project facet locations may be summarized into general strata as follows.

- Fill: On-site fill generally forms the surface stratum, primarily near the abutment embankments and existing roadways. The extent of the fill varies from about 5 to 25 ft depth. The fill is generally comprised of stiff to very stiff brown, dark brown, gray, and reddish brown silty clay with varying amounts of chert fragments. The on-site fill exhibits variable but typically medium compaction and low compressibility. Fill depth, content, and location will vary across the areas of the study and depth.
- Cherty Clay: The natural soils below the on-site fill or at the surface are interbedded units of stiff to very stiff reddish tan and reddish brown cherty clay, silty clay and clay with variable amounts of chert fragments (cherty clay). There are also units of low hardness white and light gray chert with variable amounts of interbedded silty clay seams and layers. This cherty clay stratum represents residual soil weathered from the underlying cherty limestone bedrock. The overburden soils exhibit a wide range in shear strength as indicated by SPT N-values ranging from 8 blows per ft to in excess of 50 blows per foot. In general, the cherty clay and cherty gravel exhibit moderate shear strength or medium to high relative density and low compressibility. The chert fragment content varies widely in the overburden soils, as does the clay fines content.
- Chert Beds: Interbedded within the cherty clay overburden soils is low hardness light gray and white chert and weathered chert beds. The chert comprising these beds is typically highly fractured and contains discontinuous clay seams and layers.
- Clay: Natural overburden soils outside of the cherty clay generally consist of brown, tan and gray silty clay and clay. This clay stratum represents residual soil weathered from the underlying shale bedrock. The overburden clay soils exhibit a wide range in shear strength as indicated

³ AASHTO LRFD Bridge Design Specifications, AASHTO, 2012.

by SPT N-values ranging from 8 blows per ft to 30 blows per foot. In general, the silty clay and clay exhibit low to moderate shear strength and low to moderate compressibility.

Limestone: Below the overburden soils is hard to very hard light gray limestone with chert nodules, inclusions, seams, and layers. The chert content in the limestone varies widely and there are intervals where the chert is predominant and the limestone is the subordinate constituent. The limestone has some localized zones of closely-spaced, healed fractures. Some localized and discontinuous anomalous zones are present within the predominant cherty limestone. The cherty limestone exhibits high strength with laboratory compressive strength values ranging from 4330 to 13,360 lbs per sq inch. Limestone was encountered in the exploration program performed at the Hwy 112/I-49 Interchange and Retaining Wall No. 9 on the southern and north project limits.

Shale: In addition to limestone bedrock, shale was also encountered in our study. The shale bedrock generally consisted of low hardness brown, gray, and dark gray clayey shale and moderately hard dark gray shale. Weathering typically decreased with depth corresponding with an increase in rock competence and strength. The shale contains sandstone, limestone and siltstone partings and seams and carbonaceous layers. Shale was typically encountered in the central part of the proposed improved alignment, bounded by Hwy 112/I-49 Interchange on the south and Retaining Wall No. 9 on the north.

Groundwater Conditions

Groundwater was encountered in the borings at variable depths ranging from about 3.9- to 28-ft during drilling operations (September through December, 2014 and January, February and June 2015) for the bridge structures and retaining walls. There is the potential for shallow perched water to develop, particularly during periods of high seasonal precipitation. Perched water could accumulate in the overburden soils and fractured rock zones. Groundwater levels will vary with seasonal precipitation and surface runoff and infiltration.

ANALYSES and RECOMMENDATIONS

Bridge Foundations

Foundations for the new and widened bridge structures must satisfy two (2) basic and independent design criteria. First, foundations must have an acceptable factor of safety against bearing failure under maximum design loads. Secondly, foundation movement due to consolidation or swelling of the underlying strata should not exceed tolerable limits for the structures. Construction factors, such as installation of foundations, excavation procedures and surface and groundwater conditions, must also be considered.

In light of the results of the borings, the anticipated moderate to heavy bridge foundation loads, and our understanding of the project, we recommend that abutment and interior bent foundation loads of the widened and new bridge structures be supported on driven steel piling. As an alternative to driven piling for the interior bents of the Highway 112 Ramp to I-49 Northbound, footings founded in competent rock may also be considered. Recommendations for foundations are discussed in the following report sections for each structure.

Piling

We recommend that the foundation loads of the widened Highway 112 over I-49 bridge structure, the replacement I-49 bridges over Van Asche Drive and the new bridges planned at the I-49 over Highway 71B alignment and the Highway 112 Ramp to Northbound I-49 be supported on steel piles. The piles should extend through the embankment fill and overburden soils to bear in the competent moderately hard to hard dark gray shale or moderately hard to hard light gray limestone. Piles should be driven to practical refusal in the moderately hard to hard dark gray shale or limestone. Steel HP12x53 or HP14x73 piles fitted with rock points are recommended. Other pile sizes or types may be evaluated if desired.

Bearing capacities of piles driven to refusal must be determined using the AASHTO Load and Resistance Factor Design (LRFD) structural design procedure⁴. We recommend that nominal (ultimate) resistance (P_n) of steel piles be determined based on the yield strength of steel H piles (f_y) and the net end area (A_{net}) of the section. Given that the piles will be driven to refusal in hard rock with the potential for driving damage, we recommend a maximum allowable stress (σ_{all}) of $0.25 f_y$. An effective resistance factor (ϕ) of 0.50 is recommended for end-bearing piles. This effective resistance factor for steel piles has been based on the assumption of difficult driving.

It has been our experience that allowable pile capacities of 96 tons and 134 tons for HP12x53 or HP14x73 piles, respectively, are common for f_y 50 ksi steel. These capacities are based on allowable stress design (ASD). However, the appropriate factored bearing capacity as per LRFD criteria must be confirmed by the Engineer (Garver). Post-construction settlement of piles driven to refusal will be negligible. Given the predominantly preconsolidated condition of

⁴ Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures, Publication No. FHWA HI-98-032, National Highway Institute, May 2001.

the overburden soils, the age of existing embankments, and the anticipated length of time between new embankment construction and foundation construction, downdrag loads due to long-term embankment settlement are expected to be negligible.

We recommend that all piles extend through the embankment fill and overburden soils to bear in the competent rock. Estimated as-built pile tip elevations are expected to be on the order of El 1191 to El 1226 across the project alignment. Estimated pile lengths at the bridge bents (both abutment and intermediate) are summarized in the table below. Piles should bear at a minimum tip elevation of 10 ft below the pile cap, 5 ft below the bottom of retaining wall leveling pads, or 10 ft below natural grade, whichever is deeper. Depending on the embankment height and specific subsurface conditions encountered, preboring could be required to attain the recommended 10 ft minimum pile length.

Table 2: Estimated Pile Length

Bridge	Abutment	Station No	Estimated Minimum Pile Length, ft (below pile cap)	Estimated Tip El, ft
Highway 112 over Interstate 49 (Bridge No. 05692)	South Abutment – Bent 1	17+87	40	1208
	Bent 2	18+59	10*	1206
	Bent 3	19+42	10*	1208
	Bent 4	20+40	13	1204
	North Abutment - Bent 5	20+92	44-37	1196-1203
Highway 112 Ramp to Northbound Interstate 49	West Abutment – Bent 1	312+09	27	1215
	Bent 2	313+62	10*	1220
	Bent 3	315+94	10*	1216
	East Abutment - Bent 4	317+48	34	1214
Bridge A – Interstate 49 Southbound over Highway 71B	South Abutment – Bent 1A	324+00	34	1203
	Bent 2	325+89	17	1197
	North Abutment – Bent 3A	327+78	46	1194

Bridge	Abutment	Station No	Estimated Minimum Pile Length, ft (below pile cap)	Estimated Tip El, ft
Bridge B – Interstate 49 Northbound over Highway 71B	South Abutment – Bent 1B	325+11	37	1202
	Bent 2	326+61	21	1194
	North Abutment – Bent 3B	328+11	51	1191
Bridge A - Northbound I-49 over Van Asche Drive	South Abutment – Bent 1A	364+79	27	1223
	North Abutment – Bent 2A	366+00	22	1230
Bridge B - Southbound I-49 over Van Asche Drive	South Abutment – Bent 1B	364+38	23	1225
	North Abutment – Bent 2B	365+58	23	1228

* Minimum pile length of 10 ft controls pile length.

** Minimum penetration 5 ft below wall leveling pad controls pile length.

Piles should be installed in compliance with AHTD Standard Specifications Section 805. Piles should be carefully examined prior to driving and piles with structural defects should be rejected. Any splices in steel piles should develop the full cross-sectional capacity of un-spliced piles. We recommend a minimum of one (1) test pile be driven at an abutment and interior bent of each bridge location prior to driving production piles to confirm estimated pile length and suitability of the pile-hammer system. As a minimum, safe bearing capacity of test piles and production piles should be determined by AHTD Standard Specifications Section 805.09, Method A.

Pile installation should be monitored by qualified personnel to maintain specific and complete driving records and observe pile installation procedures. Driving records should be available for review by the Engineer or the Department (AHTD) during pile installation. We recommend that the steel H-piles be driven with a hammer system capable of delivering at least 40,000 ft-lbs per blow for both the HP 12x53 or HP 14x73 piles driven to refusal in rock. This value is based on the results of a drivability analysis using wave equation analyses (WEAP) methods. The results of the wave equation drivability analysis are provided in Attachment 14.

Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may typically be defined as a penetration of 0.5 in. or less for the final 10 blows, but should be field verified by the Engineer or Department during driving.

Footings – Hwy 112 Ramp to NB I-49 Bents 2 and 3

As an alternative to driven piling, the foundation loads of the interior bents of the Highway 112 Ramp to Northbound Interstate 49 may be supported on footings founded at least 2 ft into the competent hard light gray and gray limestone. Footings founded as recommended may be sized based on a maximum nominal/ultimate bearing pressure (q_{ult}) of 100 kips per sq foot. This recommended ultimate bearing value has been calculated with respect to competence of the hard limestone. A resistance factor (ϕ) of 0.45 is recommended for footings bearing in competent hard limestone. Accordingly, a factored unit bearing resistance (q_R) of 45 kips per sq ft is considered appropriate. Post-construction settlement of foundations supported in the competent hard limestone as recommended is expected to be negligible.

Uplift resistance of footings will be developed by the weight of the structure and the foundation units. The passive resistance of the overburden soils and rock within 2 ft below final grade should be neglected. Below 2-ft depth, a maximum nominal/ultimate lateral passive resistance value of 1000 lbs per sq ft may be assumed for the stiff to very stiff cherty clay, and chert. For the competent hard limestone bearing stratum, an increased maximum nominal/ultimate lateral passive resistance value of 3000 lbs per sq ft may be utilized. A resistance factor (ϕ) of 0.50 is recommended for passive pressure resistance. Footings must be in hard contact with the overburden soils and limestone to utilize the recommended passive resistance values. Where footings are overexcavated and formed, a limiting maximum nominal/ultimate lateral passive resistance value of 400 lbs per sq ft should be utilized. Resistance to sliding may also be evaluated using an ultimate friction value ($\tan \delta$) of 0.70 for concrete on the competent limestone. A resistance factor (ϕ) of 0.8 is recommended for sliding resistance.

Footings must extend through on-site fill, the overburden soils and any weathered limestone zones to bear fully in the competent hard light gray limestone. A minimum embedment of 24 in. into the competent limestone and a minimum footing depth of 5 ft below lowest adjacent grade are recommended.

Based on the results of the borings, the minimum as-built footing bottom elevation is estimated to be on the order of El 1222 to El 1218. Estimated minimum footing bottom elevations are summarized in the table below.

Table 3: Estimated Minimum Footing Bottom Elevation

Bridge	Bent	Estimated Footing Depth Below Existing Grade, ft	Estimated Minimum Footing Bottom El, ft
Highway 112 Ramp to Northbound Interstate 49	Bent 2	13	1220
	Bent 3	15	1218

Actual as-built footing depths will depend on final grading plans and specific subsurface conditions. Any overexcavation of footings must be backfilled with concrete. Weathered zones or open fractures exposed at the bearing stratum elevation should be excavated, cleaned out, and filled with concrete. Use of dental concrete to level footing bottoms and to repair minor deficient areas is suitable.

The results of the borings indicate that the limestone bearing stratum is strong and competent. However, there can be voids or other discontinuities in the limestone bearing. Consequently, we recommend that the competence of the bearing stratum be verified by probe holes advanced into the limestone. Probe holes should be advanced from the excavated footing bottom a minimum depth of 5 ft or one (1) foundation width dimension, whichever is greater. A frequency of one (1) probe hole per 100 sq ft of footing area or at least two (2) probe holes for each individual footing is recommended.

Probe holes should have a minimum 3-in. diameter. The sides of the probe hole should be scratched with a sharpened steel rod bent at a 90° angle to help detect discontinuities or other weak zones. Probing should be observed by the Engineer to verify suitable bearing.

Where probing indicates weak zones or rock discontinuities, deepening footing excavations will be warranted. Where deepened, probing should verify suitable bearing below the new footing bottom elevation. The use of dental concrete is suitable for repair of localized discontinuities or areas of weak rock.

Footings should have a minimum width of 48 inches. All footing excavations and probe holes should be observed by the Engineer to verify suitable bearing. Any footing undercuts or overbreaks should be backfilled with concrete.

Rock excavation methods will be required for footing excavations. Some overbreak of excavations advanced into the hard limestone should be expected. All overbreaks and overexcavation of footing excavations should be backfilled with concrete.

Wingwall and Abutment Wall Lateral Earth Pressures

We understand that wingwalls and abutment walls will be backfilled with unclassified borrow or select material. Recommendations regarding lateral earth pressures for wingwalls and abutments are summarized below.

- Angle of internal friction (ϕ) for unclassified backfill: 20°
- Equivalent fluid pressure for unclassified backfill:
 - Active condition for walls that are free to rotate, backfilled with unclassified borrow, and fully drained: 65 lbs per sq ft per ft depth.
 - Active condition for walls that are free to rotate backfilled with unclassified borrow, and with no provision for internal drainage: 95 lbs per sq ft per ft depth.
- Angle of internal friction (ϕ) for SM-1 backfill: 32°
- Equivalent fluid pressure for SM-1 backfill:
 - Active condition for walls that are free to rotate, backfilled with SM-1 or clean granular backfill, and fully drained: 40 lbs per sq ft per ft depth.
 - Active condition for walls that are free to rotate, backfilled with SM-1 or clean granular backfill, and with no provision for internal drainage: 85 lbs per sq ft per ft depth.
- Ultimate sliding resistance:
 - Interaction friction angle (δ) for concrete on stable bearing stratum: 19°.
 - Interaction friction factor ($\tan \delta$) for concrete on stable bearing stratum: 0.34.
 - The sliding resistance values above are nominal/ultimate values.
 - A resistance factor (ϕ) of 0.8 is recommended for sliding resistance.

To utilize the lower earth pressure values of the “drained” condition, positive and continuous drainage from behind walls must be provided. The drainage zone should be backfilled with AHTD Standard Specifications Section 403 Class 3 Mineral Aggregate, AHTD Standard Specifications Section 816 filter blanket, or an alternative clean, free draining crushed stone, gravel, or granular soil zone approved by the Engineer or Department. Drainage zones should be fully isolated from the embankment fill, overburden soils, and shale or novaculite by a suitable geotextile complying with the criteria of AHTD Standard Specifications Section 625, Type 2. Water should be discharged from backfill by a system of regularly-spaced, functioning weep holes or a drain pipe.

Abutment Embankment Configurations

Abutment End Slopes. It is understood that the fill embankments of the proposed widened and new bridge structures will be constructed or reconfigured with the following end slope configurations.

Table 4: Planned Bridge End Slope Configurations

Bridge	Bent	End Slope Configuration	Approximate Max Height (ft)
Highway 112 over I-49 (Bridge 05692)	South Abutment – Bent 1	2H:1V	30
	North Abutment – Bent 5	Soil Nail/MSE Wall (Retaining Wall No. 1)	22.5
I-49 over Highway 71B (Bridges A7380 and B7380)	South Abutments – Bents 1A and 1B	MSE Wall (Retaining Wall No. 5)	32
	North Abutments – Bent 3	2H:1V	33
Highway 112 Ramp to Northbound I-49 (Bridge 07379)	West Abutment – Bent 1	2H:1V	26
	East Abutment – Bent 4	2H:1V	28
Interstate 49 over Van Asche Drive (A7381 and B7381)	South Abutments – Bent 1	MSE Wall (Retaining Wall No. 7)	22
	North Abutments – Bent 2	MSE Wall (Retaining Wall No. 8)	21

To evaluate suitability of the plan end slope configurations, slope stability analyses were performed at each bridge end slope configuration. A 250 lbs per sq ft uniform surcharge from vehicles was included for the stability analyses. To model the lower strength boundary of unclassified embankment fill, a cohesion value of 750 lbs per sq ft and an internal friction angle (ϕ) of 0° were assumed. This strength value is considered conservative for the predominantly silty clay and chert fragment blend fill, expected to be used on the project. The *in-situ* soil properties have been modeled based on the results of the laboratory testing program and our experience with similar soils.

Stability analyses were performed using the computer program PCSTABL5M and a Modified Bishop (circular) analysis. For retaining walls, a critical wall section was evaluated, based on consideration of soil conditions and wall height. For the side slopes, three (3) general loading conditions were evaluated, i.e., End of Construction, Long Term, and Seismic Conditions. A horizontal acceleration coefficient (k_h) value of 0.06 or 0.03 was utilized in evaluation of the seismic stability of the embankment slopes, dependant on the embankment configuration. The

results of the stability analyses of embankment slopes are provided for each project facet in the Attachments 15 through 23.

The stability analyses results indicated acceptable calculated minimum factor of safety values for cases evaluated.

Abutment Side Slopes

It is understood that all fill embankments of the proposed widened and new bridge structures will be constructed or reconfigured with the side slopes configured at 3 Horizontal to 1 Vertical (3H:1V). To evaluate suitability of the plan end slope configurations, slope stability analyses were also performed at each embankment side slope location. The values and properties used for end slope stability analyses were also translated to side slope stability analyses where applicable. The results of the stability analyses of embankment side slopes are provided for each project facet in the Attachments 15 through 23.

As with the end slopes, the stability analyses results for side slopes indicated acceptable calculated minimum factor of safety values for cases evaluated.

Retaining Walls

Soil Nail Wall. Retaining Wall No. 1 will be a combination soil nail/MSE wall at Bent 5 of the Highway 112 Bridge over I-49. Wall height is expected to range from about 2 ft to 22.5 feet. The backslope behind the wall will be horizontal. Preliminary design of soil nail walls was performed utilizing the methodology of FHWA Circular No. 7⁵. The parameters utilized for the preliminary soil nail design include the following.

◆ Soil nail wall back soils:	On-site cherty clay embankment fill
◆ Total unit weight (γ):	125 lbs per cu ft
◆ Effective cohesion intercept (c'):	500
◆ Effective angle of internal friction (ϕ'):	31°
◆ Ultimate soil-grout bond strength (q_u):	7.54 lbs per sq in.
◆ Drillhole diameter:	4 in.
◆ Bar yield strength:	60 kips per sq in.
◆ Anchor batter:	15°

The results of these analyses for preliminary design are summarized in Table 5 below.

⁵ Geotechnical Engineering Circular No. 7 Soil Nail Walls; FHWA-IF-03-017; 2003.

Table 5: Preliminary Design – Soil Nail Wall (Retaining Wall No. 1) - H = 22.5 ft

Vertical bar spacing (S_V), ft	5
Horizontal bar spacing (S_H), ft	5
Minimum bar length, ft	31
Bar size	#6
Bar length/wall height ratio (L/H)	1.4

Final design of soil nail wall will be provided by the Contractor. Final design could vary from the preliminary design above depending on specific wall design, including nail spacing and length, wall height, wall backslope, surcharge loads, nail installation method, drillhole diameter, and design grout-soil bond strength. We recommend that the design grout-soil bond strength be confirmed by at least one (1) verification test. We also recommend that a minimum of 10 percent or at least three (3) production anchors, whichever number is greater, be proof-tested to at least 1.3 times the design load for each wall.

The Contractor should select the most suitable anchor type and installation method for the particular system being utilized. The Contractor’s soil nail wall design, including the load test program, proposed anchor layout, corrosion protection details, connection to wall face, and the work plan should be reviewed and approved by the Engineer or Department (AHTD) prior to acceptance and the start of work.

The foundation stratum at the plan bearing elevation for the soil nail wall is expected to consist of stiff reddish brown cherty clay on-site fill with chert cobbles and moderately hard tan and light gray chert with interbedded clay seams and layers. For the soil nail wall supported in the stiff cherty clay on-site fill or moderately hard chert with clay seams an ultimate / nominal unit bearing resistance of 12,000 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.50 is recommended for the soil nail wall bearing. Consequently, a factored unit bearing resistance (q_R) of 6000 lbs per sq ft is recommended.

MSE Walls

General. We understand that MSE Walls are planned at nine (9) locations in the project alignment (Retaining Walls No. 1 through 9). The approximate wall length and maximum height is summarized in Table 1, presented previously in this report. Design drawings for the retaining walls are provided in Attachments 3 through 10 with the corresponding project facet. It is understood that MSE walls will be designed by Others on behalf of the Contractor. MSE wall backfill in the reinforced zone must comply with the Designer’s specifications. As a minimum, the

reinforced zone backfill is expected to comply with AHTD Standard Specifications Section 302, SM-1 or Section 303, Class 7.

MSE Retaining Wall No. 1

Retaining Wall No. 1 will be a combination soil nail/MSE wall at Bent 5 of the Highway 112 Bridge over I-49. The planned MSE portion of Wall No. 1 will have a maximum height of about 13 feet. The upper MSE wall segment will be supported on the soil retained by the soil nail wall. This wall height will vary.

The MSE wall bearing stratum at the plan bearing elevation is expected to consist of on-site embankment fill comprised of stiff reddish brown cherty clay with chert cobbles. For the MSE wall supported in the stiff cherty clay embankment fill an ultimate / nominal unit bearing resistance of 6250 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for the MSE wall bearing. Consequently, a factored unit bearing resistance (q_R) of 4060 lbs per sq ft is considered suitable.

MSE Retaining Wall No. 2

MSE Retaining Wall No. 2 will be located on the north side of the planned Collector-Distributor Road east of the Highway 112/I-49 interchange. The wall will be approximately 1115 ft long with a maximum height of 14 feet. The wall has a plan subgrade/leveling pad elevation that varies from approximately El 1210 to El 1213.

With the anticipated MSE Wall No. 2 leveling pad/subgrade at about El 1210 to El 1213, the foundation stratum at the plan subgrade elevation is expected to vary from firm to stiff gray, tan and brown silty clay. The results of the borings drilled at the MSE Wall No. 2 location indicate that undercuts on the order of 2 to 6 ft, more or less, will be warranted to develop suitable bearing capacity at the wall location. Undercuts for MSE Wall No. 2 must extend to the natural stiff gray and tan silty clay.

Anticipated undercut requirements are summarized in Attachment 24. Undercut requirements must be field verified by the Engineer or Department at the time of construction. MSE wall undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7). Undercuts should generally have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom unless otherwise directed by the Engineer or Department.

For the MSE wall supported in the natural stiff silty clay, an ultimate / nominal unit bearing resistance of 8500 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is

recommended for wall bearing. Consequently, a factored unit bearing resistance (q_R) of 5525 lbs per sq ft is considered suitable. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.30 between the MSE wall reinforced zone base and subgrade soil. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be negligible.

To evaluate suitability of the plan MSE Retaining Wall No. 2 configuration, slope stability analyses were performed at approximate Sta 9+50. The results of the stability analyses of Retaining Wall No. 2 is provided in Attachment 20.

MSE Retaining Wall No. 3

MSE Retaining Wall No. 3 is a median barrier wall extending approximately along the centerline of I-49 from Sta 293+42 to Sta 302+75. This wall will be approximately 933 ft long with a maximum height of about 11 feet. The wall has a plan subgrade/leveling pad elevation that varies from approximately El 1221 to El 1224.

Based on the results of the borings performed for Wall No. 2, near the location of Wall No. 3, the foundation stratum at the plan subgrade elevation is expected to vary from on-site fill comprised of stiff to very stiff brown, reddish brown, brown and tan cherty clay to natural stiff gray, tan, and brown silty clay. The results of the Wall No. 2 borings indicate that undercut for bearing will be minor to negligible. However, undercut requirements at this location must be field verified by the Engineer or Department at the time of construction

For the MSE wall supported in the anticipated stiff to very stiff cherty clay/silty clay bearing strata, an ultimate / nominal unit bearing resistance of 6500 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing. Consequently, a factored unit bearing resistance (q_R) of 4225 lbs per sq ft is considered suitable. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

To evaluate suitability of the plan MSE Retaining Wall No. 3 configuration, slope stability analyses were performed at approximate Sta 297+00. The results of the stability analyses of Retaining Wall No. 3 are provided in Attachment 23. These results indicate that global stability of this MSE wall as planned is acceptable.

MSE Retaining Wall No. 4

MSE Retaining Wall No. 4 will be located on the south side of the planned I-49 Northbound Ramp to Highway 71. The wall will be approximately 162 ft long with a maximum height of 16 feet. The wall has a plan subgrade/leveling pad elevation of about El 1225.

With the anticipated MSE Wall No. 4 subgrade at about El 1225, the foundation stratum at the plan subgrade elevation is expected to consist of very stiff to hard brown and tan cherty clay with some chert cobbles. The results of the borings drilled at the MSE Wall No. 4 location indicate that minimal undercut is expected. However, undercut requirements must be field verified by the Engineer or Department at the time of construction.

For the MSE wall supported in the natural very stiff cherty clay an ultimate / nominal unit bearing resistance of 10,000 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing. Consequently, a factored unit bearing resistance (q_R) of 6500 lbs per sq ft is considered suitable. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.35 between the MSE wall reinforced zone base and subgrade soil. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be negligible.

To evaluate suitability of the plan MSE Retaining Wall No. 4 configuration, slope stability analyses were performed at approximate Sta 0+40. The results of the stability analyses of Retaining Wall No. 2 is provided in Attachment 18.

MSE Retaining Wall No. 5

MSE Retaining Wall No. 5 will be located on the south side of the Highway 71B at the I-49 over 71B elevated structures. The wall will be approximately 455 ft long with a maximum height of 23 feet. The wall has a plan subgrade/leveling pad elevation that varies from approximately El 1217 to El 1218.

MSE Wall Undercut. With the anticipated MSE Wall No. 5 subgrade at about El 1217 to El 1218, the foundation stratum at the plan subgrade elevation is expected to vary from firm to stiff tan and gray silty clay. The results of the borings drilled at the MSE Wall No. 5 location indicate that undercuts on the order of 5 to 12 ft, more or less, will be warranted to develop suitable bearing capacity at the wall location. Undercuts for MSE Wall No. 5 must extend to the natural stiff tan and gray silty clay or the low hardness to moderately hard brown, gray, to dark

gray weathered shale. Undercut requirements must be field verified by the Engineer or Department at the time of construction. The MSE wall undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7). Undercuts should have a minimum width determined by 1-horizontal to 2-vertical projection from the edge of the footing to the undercut bottom.

For the MSE wall supported in the natural stiff silty clay, low hardness to moderately hard weathered shale, or crushed stone aggregate base undercut backfill, an ultimate / nominal unit bearing resistance of 7000 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing and a factored unit bearing resistance (q_R) of 4500 lbs per sq ft is recommended. A minimum wall embedment depth of 2 ft below lowest adjacent grade is recommended.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.30 between the MSE wall reinforced zone base and the bearing stratum. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be negligible.

To evaluate suitability of the plan MSE Retaining Wall No. 5 configuration, slope stability analyses were performed at approximate Sta 2+80. The results of the stability analyses of Retaining Wall No. 5 are provided in Attachment 16.

Aggregate Pier Foundation Alternative – MSE Wall No. 5. As an alternative to supporting MSE Wall No. 5 on undercut backfill, consideration may be given to using aggregate piers to improve foundation support and reduce settlement. Using aggregate piers also has the advantage of improved wall global stability. The aggregate piers should be located under the reinforced soil zone of the MSE wall.

Aggregate pier design must be provided by the Contractor and approved by the Engineer or Department. Aggregate pier elements are typically constructed by drilling 24- to 30-in.-diameter holes from the MSE wall subgrade elevation and ramming thin lifts of well-graded aggregate within the holes to form very stiff, high-density aggregate piers. The first lift of compacted aggregate backfill forms a bulb below the bottoms of the piers, thereby prestressing and prestraining the soils to an approximate depth equal to one (1) pier diameter. Subsequent lifts are typically about 12-in. thick. Ramming should be performed with a high-energy beveled tamper that densifies the aggregate and forces the aggregate laterally into the sidewalls of the pier excavation. This action increases the lateral stress in the surrounding soil and further stiffens the stabilized

composite soil mass. Aggregate pier installation results in strengthening and stiffening of the foundation stratum.

Based on the subsurface conditions found in the MSE Wall No. 2 alignment and preliminary aggregate pier design, an average aggregate pier length on the order of 10 ft below the wall subgrade with an aggregate pier spacing on the order of 6 to 10 ft on center would be anticipated. The aggregate pier spacing should provide an area ratio on the order of 20 to 30 percent aggregate pier to plan wall reinforced zone footprint area. The wall foundation area stabilized by aggregate piers should cover the complete footprint of the MSE wall reinforced zone.

The preliminary aggregate pier design for the MSE Wall No. 5 alignment indicates a maximum nominal / ultimate bearing resistance (q_{ult}) of 8800 lbs per sq ft for the improved bearing stratum. A resistance factor (ϕ) of 0.65 is recommended with respect to bearing. Accordingly, a factored unit bearing resistance (q_R) of 5720 lbs per sq ft is estimated with the use of aggregate piers. A composite nominal/ultimate coefficient of sliding ($\tan \delta$) value of 0.5 may appropriately be assumed between the reinforced wall backfill on the composite soil/rammed aggregate pier bearing stratum. A composite nominal/ultimate coefficient of sliding ($\tan \delta$) value of 0.5 may appropriately be assumed between the reinforced wall backfill on the composite soil/rammed aggregate pier bearing stratum. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance.

The appropriate final design bearing pressure and friction coefficient must be determined by the Aggregate Pier Designer depending on the system utilized.

MSE Retaining Wall No. 6

MSE Retaining Wall No. 6 is a median barrier wall located at the centerline of I-49 at Sta 347+57 to Sta 354+45. The wall will be approximately 688 ft long with a maximum height of about 12 feet. The wall has a plan subgrade / leveling pad elevation that varies from approximately El 1214 to El 1218.

With the anticipated MSE Wall No. 6 subgrade at about El 1214 to El 1218, the foundation stratum at the plan subgrade elevation is expected to vary from stiff to very stiff brown cherty clay on-site fill, dark brown silty clay with chert fragments to firm gray and brown clay to compacted fill. The results of the borings drilled at the MSE Wall No. 6 location indicate that undercuts on the order of 2 to 5 ft, more or less, will be warranted to develop suitable bearing capacity at the Wall No. 6 location. Undercuts for MSE Wall No. 6 must extend to the stiff reddish brown cherty clay, or stiff brown and gray clay or silty clay. Anticipated undercut requirements are summarized in Attachment 24. Undercut requirements must be field verified by

the Engineer or Department at the time of construction. MSE wall undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7). Undercuts should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom to the extent possible.

For the MSE wall supported in the recommended stiff cherty clay/clay/silty clay or crushed stone base undercut backfill bearing strata, an ultimate / nominal unit bearing resistance of 9000 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing. Consequently, a factored unit bearing resistance (q_R) of 5850 lbs per sq ft is considered suitable. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.30 between the MSE wall reinforced zone base and bearing strata. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be negligible.

Global stability of the plan MSE Retaining Wall No. 6 configuration was evaluated by performing slope stability analyses at approximately Sta 3+50. The results of the stability analyses of Retaining Wall No. 6 are provided in Attachment 21.

MSE Retaining Walls No. 7 and 8

MSE Retaining Wall Nos. 7 and 8 will be located on the south and north abutments of the I-49 bridge structures over Van Asche Drive, respectively. Retaining Wall No. 7 will be approximately 276 ft long with a maximum height of 19 ft while Retaining Wall No. 8 will be about 285 ft long with a maximum height of 18 feet. Retaining Wall Nos. 7 and 8 have a plan subgrade/leveling pad elevations of El 1231 and El 1234, respectively.

With the anticipated subgrade elevations at about El 1231 and El 1234, the retaining wall foundation stratum is expected to vary from stiff to very stiff gray, brown, and reddish tan silty clay, stiff gray clay, or moderately hard tan, gray and dark gray weathered shale. The results of the borings drilled at the MSE Wall Nos. 7 and 8 locations indicate that undercuts on the order of 2 to 5 ft, more or less, will be warranted to develop suitable bearing capacity at the wall location. Estimated undercut requirements are summarized in Attachment 24. Undercut requirements must be field verified by the Engineer or Department at the time of construction. MSE wall undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section

303, Class 7). Undercuts should have a minimum width determined by 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom to the extent possible.

For the MSE wall supported in the recommended bearing strata, an ultimate / nominal unit bearing resistance of 8300 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing. A factored unit bearing resistance (q_R) of 5395 lbs per sq ft is considered appropriate. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.30 between the MSE wall reinforced zone base and the bearing stratum. A resistance factor (ϕ) of 1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be less than 1 inch.

Global stability at Wall Nos. 7 and 8 were evaluated by performing slope stability analyses for both structures. The results of the stability analyses of Retaining Wall Nos. 7 and 8 are provided in Attachment 19.

MSE Retaining Wall No. 9

MSE Retaining Wall No. 9 will be located on the west side of the Interstate 49 north of the bridge structure over Van Asche Drive. The wall will be approximately 1034 ft long with a maximum height of 16 feet. The wall has a plan subgrade/leveling pad elevation that varies from approximately El 1260 on the south limits to about El 1290 on the north.

With the anticipated MSE Wall No. 9 subgrade elevations varying from about El 1260 to El 1290, the foundation stratum at the plan subgrade elevation is expected to consist of low hardness light gray, dark gray and reddish brown highly weathered limestone. Based on the results of the test pits excavated at the MSE Wall No. 9 location, we anticipate minimal undercut will be required for bearing capacity. However, undercut requirements must be field verified by the Engineer or Department at the time of construction.

For the MSE wall supported in the recommended bearing strata an ultimate / nominal unit bearing resistance of 10,000 lbs per sq ft is recommended. A resistance factor (ϕ) of 0.65 is recommended for wall bearing. Consequently, a factored unit bearing resistance (q_R) of 6500 lbs per sq ft is considered suitable. A minimum embedment depth of 2 ft below lowest adjacent grade is recommended for the MSE wall.

Resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan \delta$) value of 0.35 between the MSE wall reinforced zone base and subgrade soil. A resistance factor (ϕ) of

1.0 is recommended for evaluation of sliding resistance. Long-term post-construction settlement of the wall foundation bearing stratum is expected to be negligible.

To evaluate suitability of the plan MSE Retaining Wall No. 9 configuration, slope stability analyses were performed at approximate Sta 2+00. The results of the stability analyses of Retaining Wall No. 9 are provided in Attachment 22.

Site Grading Considerations

We expect that site grading will include both cut and fill. Subgrade preparation in the new embankment areas should begin with stripping the topsoil and any unsuitable surface soils. The stripping depth is expected to be on the order of 6 to 12 in., depending on location. Deeper stripping on the order of 12 to 18 in., more or less, is anticipated for heavily-wooded areas.

After stripping and performing any cut, and prior to placing fill, the subgrade should be evaluated by proof-rolling with a loaded tandem-wheel dump truck or similar equipment where accessible. Areas identified to be soft or that exhibit pumping should be undercut, processed and recompacted, stabilized with additives, or replaced with suitable fill, whichever is appropriate. Depending on seasonal site conditions and final grading plans, undercuts on the order of 2 ft below existing grades, more or less, could be warranted to stabilize localized areas of weak surface soils. Undercut requirements must be field verified by the Engineer or Department during the work.

Embankments should be constructed in accordance with AHTD criteria (AHTD Standard Specifications Section 210). Where localized seepage into undercuts or excavations is a problem, excavations should be backfilled with SM-1 (AHTD Standard Specifications Section 302) or stone backfill (AHTD Standard Specifications Section 207). The granular backfill should be vented to positive discharge if possible.

Fill and backfill should be placed in nominal 6- to 10-in.-thick loose lifts. All fill and backfill must be placed in horizontal lifts. Fills placed against existing slopes should be benched into the existing slope face as new fill is constructed. The in-place density and water content should be determined for each lift of fill and backfill. Each lift of backfill and fill should be tested and approved prior to placing subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Positive surface drainage should be established at the start of the work, be maintained during construction and following completion of the project to prevent surface water ponding and

subsequent saturation of subgrade soils. Density and water content of all earthwork should be maintained until the embankments and bridge work are completed. Subgrade soils that become saturated by ponding water or runoff should be excavated to undisturbed soils. The embankment subgrade should be evaluated by the Engineer or Department during subgrade preparation and prior to starting embankment construction.

Perched groundwater was encountered across the project alignment in August through December 2014 and January, February and June 2015. Seepage into isolated excavations such as footings can probably be controlled by ditching or sump-and-pump methods. If seepage into excavations becomes a problem, backfill should consist of clean sand (AHTD Standard Specifications Section 302, SM-1) or clean, crushed stone (AHTD Standard Specifications Section 207). Sand or stone backfill should be vented to positive discharge at daylight or into storm drainage lines where possible.

Where surface seeps or springs are encountered during site grading, we recommend the seepage be directed via French drains or blanket drains to positive discharge at daylight or to storm drainage lines. We also recommend that blanket drains be constructed in any existing drainage features to be filled in the grading work. Blanket drains should consist of at least 8 to 12 in. of clean filter stone (AHTD Standard Specifications Section 403, Class 3 Mineral Aggregate, AHTD Standard Specifications Section 816 filter blanket, or an approved alternate) fully encapsulated by a filter fabric. A fabric complying with AHTD Standard Specifications Section 625, Type 2 or an approved equal is recommended. Drains should direct water to positive discharge at daylight or into storm drain lines.

Piles should be installed in compliance with AHTD Standard Specifications Section 805. Piles should be carefully examined prior to driving and piles with structural defects should be rejected. Any splices in steel piles should develop the full cross-sectional capacity of un-spliced piles.

Pile installation should be monitored by qualified personnel to maintain specific and complete driving records and observe pile installation procedures. Driving records should be available for review by the Engineer during pile installation. We recommend that steel H-piles be driven with a hammer system capable of delivering at least 40,000 ft-lbs per blow for both the HP 12x53 or HP 14x73 piles driven to refusal in rock. Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may be defined as a penetration of 0.5 in. or less for the final 10 blows.

CLOSING

The Engineer or the Department should monitor site preparation, grading work and all foundation construction. Subsurface conditions significantly at variance with those encountered in the borings and test pits should be brought to the attention of the Geotechnical Engineer. The conclusions and recommendations of this report should then be reviewed in light of the new information.

The following illustrations are attached and complete this report.

Attachment 1	Site Vicinity Map
Attachment 2	Subsurface Exploration Summary
Attachment 3	Hwy 112 over I-49 Borings
Attachment 4	I-49 over Hwy 71B/MSE Wall No. 5 Borings
Attachment 5	Hwy 112 Ramp to I-49NB Borings
Attachment 6	Retaining Wall No. 4 Borings
Attachment 7	I-49 over Van Asche Drive Borings
Attachment 8	Retaining Wall No. 2 Borings
Attachment 9	Retaining Wall No. 6 Borings
Attachment 10	Retaining Wall No. 9 Test Pits
Attachment 11	Soil and Rock Legends
Attachment 12	Laboratory Test Results
Attachment 13	Rock Core Summary
Attachment 14	Wave Equation Analysis Results
Attachment 15	Hwy 112 over I-49 Stability Analyses Results
Attachment 16	I-49 over Hwy 71B/MSE Wall No. 5 Stability Analyses Results
Attachment 17	Hwy 112 Ramp to I-49NB Stability Analyses Results
Attachment 18	Retaining Wall No. 4 Stability Analyses Results
Attachment 19	I-49 over Van Asche Drive Stability Analyses Results
Attachment 20	Retaining Wall No. 2 Stability Analyses Results
Attachment 21	Retaining Wall No. 6 Stability Analyses Results
Attachment 22	Retaining Wall No. 9 Stability Analyses Results
Attachment 23	Retaining Wall No. 3 Stability Analyses Results
Attachment 24	Estimated Undercut Requirements for Walls

* * * * *

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, or if we may be of additional assistance during final design or construction, please call on us.

Sincerely,

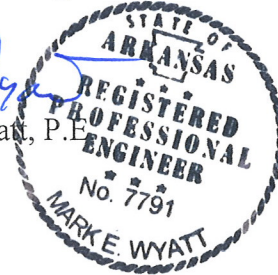
GRUBBS, HOSKYN,
BARTON & WYATT, INC.



Matthew R. Satterfield, P.E.
Senior Project Engineer



Mark E. Wyatt, P.E.
President



MRS/MEW:jw

Copies Submitted: Garver, LLC
Attn: Mr. Lawren Wilcox, P.E. (1+Electronic)
Attn: Mr. John Cantabery, P.E. (1-Electronic)

ATTACHMENT 1

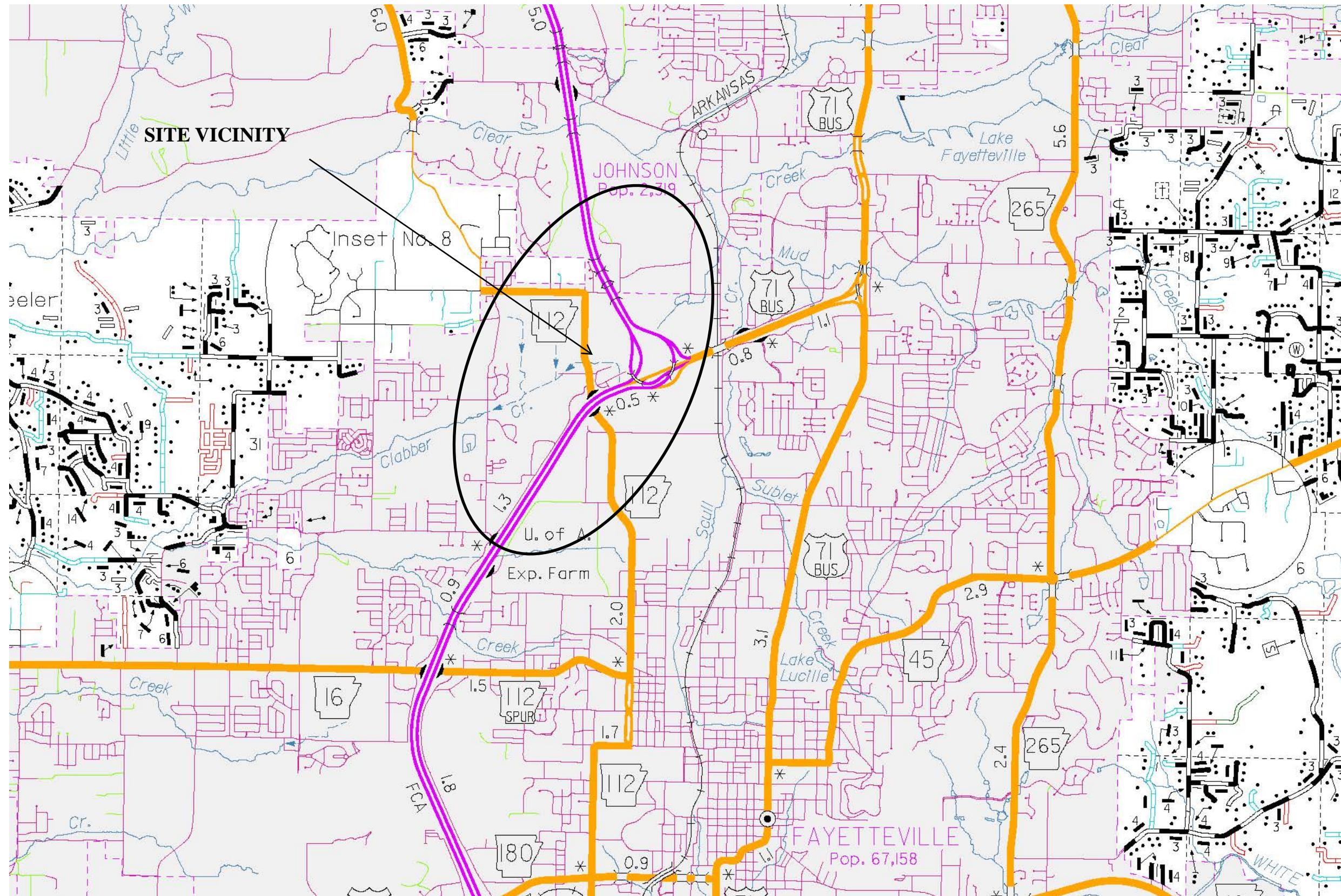


Image taken from General Highway Map of Washington County, Arkansas prepared by AHTD, 12-13-11



SITE VICINITY MAP
JOB BB0414 - PORTER RD.-HWY. 112/71B
WIDENING & INTCHNG. IMPVTS. (F).
WASHINGTON COUNTY, ARKANSAS

Not to Scale

Job No. 14-073

PLATE 1

ATTACHMENT 2

SUMMARY OF SUBSURFACE EXPLORATION

PROJECT: BB0414 - Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, Washington County, Arkansas

GHBW JOB No.: 14-073

Boring / Test Pit No.	Sta	Offset, ft		Depth, ft	Project Facet
Hwy 112 over I-49 / Wall No. 1					<i>see Attachment 3</i>
S1	Hwy 112 Sta 17+59	30	RT	65	bridge Bent 1
S2	Hwy 112 Sta 18+55	46	LT	50	bridge Bent 2
S3	Hwy 112 Sta 19+60	45	RT	NA	bridge Bent 3 - not drilled due to limited access in concrete-lined median swale
S4	Hwy 112 Sta 20+15	50	LT	40	bridge Bent 4
S5	Hwy 112 Sta 21+40	37	RT	65	bridge Bent 5 / abutment wall
S6	Hwy 112 Sta 21+10	40	LT	60	bridge Bent 5 / abutment wall
W7	Hwy 112 Sta 20+25	120	LT	18.5	abutment Wall No. 1
W8	Hwy 112 Sta 21+59	110	RT	23.5	abutment Wall No. 1
I-49 over Hwy 71B / MSE Wall No. 5					<i>see Submittal Attachment 4</i>
S9	I-49 Sta 323+75	55	LT	60	SB bridge Bent 1A
S10	I-49 Sta 325+75	45	LT	50	SB bridge Bent 2A
S11	I-49 Sta 327+55	50	LT	60	SB bridge Bent 3A
S12	I-49 Sta 325+25	50	RT	NA	NB bridge Bent 1B - not drilled due to limited access
S13	I-49 Sta 326+70	45	RT	50	NB bridge Bent 2B
S14	I-49 Sta 328+15	50	RT	60	NB bridge Bent 3B
W15	I-49 Sta 323+00	90	LT	20	MSE Wall No. 5 Sta 3+35, CL
W16	I-49 Sta 324+30	45	LT	20	MSE Wall No. 5 Sta 2+00, CL
W17	I-49 Sta 325+25	8	RT	20	MSE Wall No. 5 Sta 0+90, CL
W18	I-49 Sta 325+90	55	RT	20	MSE Wall No. 5 Sta 0+00, CL
W23	I-49 Sta 321+47	108	LT	20	MSE Wall No. 5 Sta 4+55, CL
Hwy 112 Ramp to I-49 NB					<i>see Submittal Attachment 5</i>
RP19	Ramp Sta 312+00	0	CL	50	Elevated ramp, Bent 1
RP20	Ramp Sta 313+60	0	CL	50	Elevated ramp, Bent 2
RP21	Ramp Sta 315+90	0	CL	37	Elevated ramp, Bent 3
RP22	Ramp Sta 317+55	0	CL	40	Elevated ramp, Bent 4

SUMMARY OF SUBSURFACE EXPLORATION

PROJECT: BB0414 - Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, Washington County, Arkansas

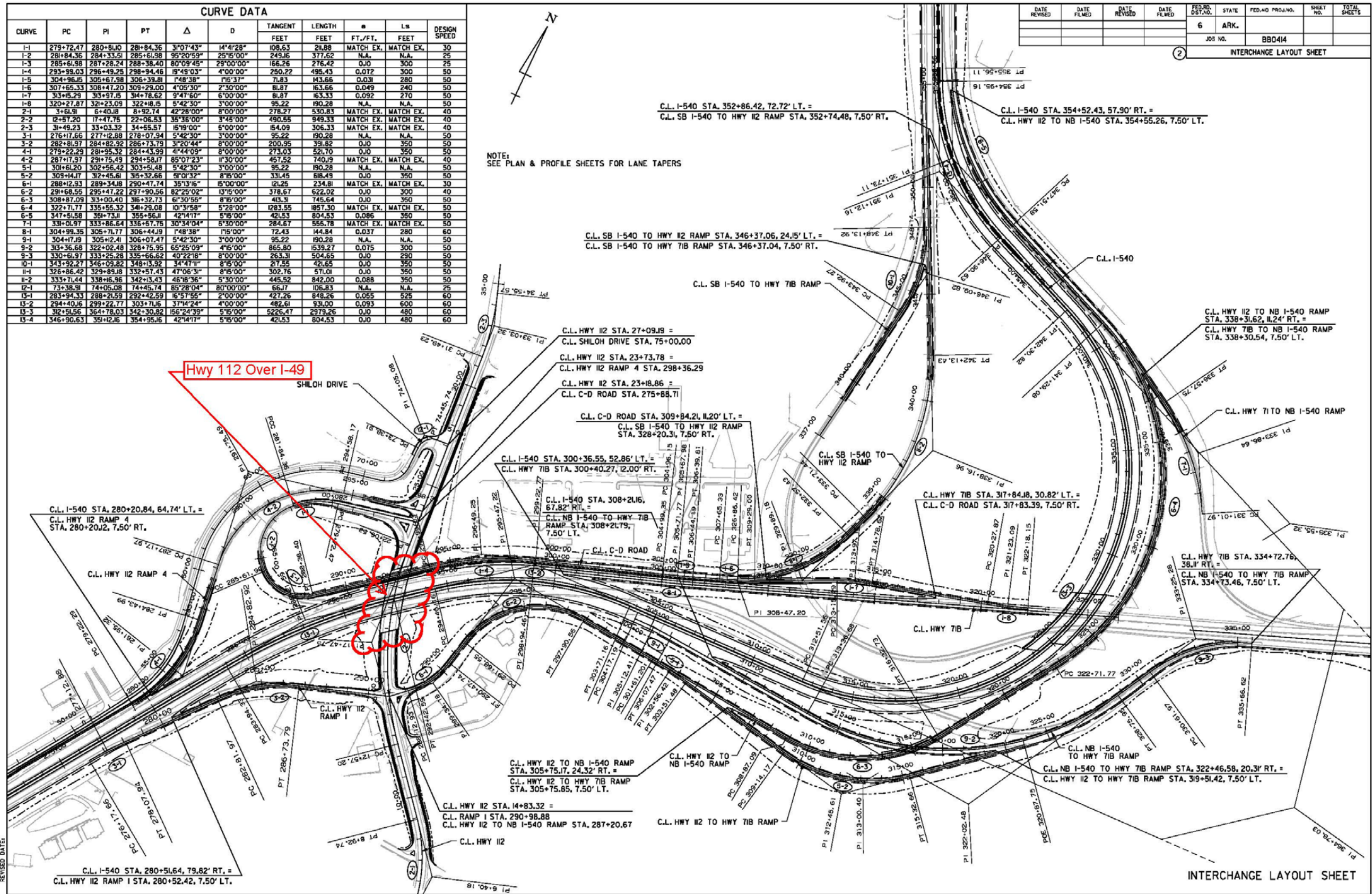
GHBW JOB No.: 14-073

Boring / Test Pit No.	Sta	Offset, ft		Depth, ft	Project Facet
MSE Wall No. 4					<i>see Submittal Attachment 6</i>
W24	Wall No. 4 Sta 0+00	0	CL	20	MSE Wall No. 4
W25	Wall No. 4 Sta 0+80	0	CL	20	MSE Wall No. 4
W26	Wall No. 4 Sta 1+60	0	CL	20	MSE Wall No. 4
I-49 over Van Asche / MSE Wall Nos. 7 and 8					<i>see Submittal Attachment 7</i>
S27	I-49 Sta 364+47	0	CL	70	bridge Bent 1
S28	I-49 Sta 366+30	0	CL	60	bridge Bent 2
W29	I-49 Sta 365+30	112	LT	20	south abutment, Wall No. 7
W31	I-49 Sta 363+90	100	RT	20	south abutment, Wall No. 7
W32	I-49 Sta 365+05	116	RT	20	north abutment, Wall No. 8
Retaining Wall No. 2					<i>see Submittal Attachment 8</i>
W33	Collector-Distributor Sta 306+24	16	LT	30	Ret Wall No. 2 Sta 0+00, 9 ft LT
W34	Collector-Distributor Sta 304+83	2	RT	25	Ret Wall No. 2 Sta 1+40, 26 ft LT
W35	Collector-Distributor Sta 303+42	7	RT	30	Ret Wall No. 2 Sta 2+79, 30 ft LT
W36	Collector-Distributor Sta 302+02	11	RT	30	Ret Wall No. 2 Sta 4+22, 30 ft LT
W37	Collector-Distributor Sta 300+63	17	RT	30	Ret Wall No. 2 Sta 5+60, 39 ft LT
W38	Collector-Distributor Sta 299+24	22	RT	30	Ret Wall No. 2 Sta 7+00, 35 ft LT
W39	Collector-Distributor Sta 297+86	40	RT	30	Ret Wall No. 2 Sta 8+38, 56 ft LT
W40	Collector-Distributor Sta 296+50	49	RT	31	Ret Wall No. 2 Sta 9+74, 64 ft LT
W41	Collector-Distributor Sta 295+14	44	RT	30	Ret Wall No. 2 Sta 11+15, 59 ft LT
Retaining Wall No. 6					<i>see Submittal Attachment 9</i>
W50	I-49 Sta 354+45	0	CL	20	Wall No. 6 Sta 0+00, CL
W51	I-49 Sta 353+29	0	CL	20	Wall No. 6 Sta 1+16, CL
W52	I-49 Sta 351+72	0	CL	12	Wall No. 6 Sta 2+73, CL
W53	I-49 Sta 350+35	0	CL	12	Wall No. 6 Sta 4+18, CL
W54	I-49 Sta 349+04	0	CL	12	Wall No. 6 Sta 5+43, CL
W55	I-49 Sta 347+85	0	CL	13.5	Wall No. 6 Sta 6+88, CL
Retaining Wall No. 9					<i>see Submittal Attachment 10</i>
TP-1	I-49 Sta 378+25	120	LT	10	Wall No. 9 Sta 8+05, 20 ft LT
TP-1B	I-49 Sta 378+25	79	LT	2.5	Wall No. 9 Sta 8+05, 22 ft RT
TP-2	I-49 Sta 376+29	117	LT	11	Wall No. 9 Sta 6+05, 15 ft LT
TP-3	I-49 Sta 374+36	119	LT	11.5	Wall No. 9 Sta 4+05, 18 ft LT
TP-4	I-49 Sta 372+38	113	LT	8	Wall No. 9 Sta 2+05, 10 ft LT
TP-4B	I-49 Sta 372+34	77	LT	2.5	Wall No. 9 Sta 2+01, 25 ft RT
TP-5	I-49 Sta 370+58	104	LT	3	Wall No. 9 Sta 0+25, CL

ATTACHMENT 3

CURVE	PC	PI	PT	Δ	D	TANGENT		L	Ls	DESIGN SPEED
						FEET	FEET			
1-1	279+72.47	280+84.00	281+94.36	31°07'43"	14°41'28"	108.63	21.88	MATCH EX.	MATCH EX.	30
1-2	281+84.36	284+33.51	285+61.98	95°20'59"	25°15'00"	249.16	377.62	N.A.	N.A.	25
1-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	OJO	300	25
1-4	293+99.03	296+49.25	298+94.46	19°49'03"	4°00'00"	250.22	495.43	0.072	300	50
1-5	304+96.16	305+67.38	306+39.88	148°38'	118°37'	71.83	143.66	0.031	280	50
1-6	307+65.33	308+47.20	309+29.00	4°28'30"	2°30'00"	81.87	163.66	0.049	240	50
1-7	313+59.29	314+41.62	315+24.00	9°47'60"	6°00'00"	81.87	163.33	0.092	270	50
1-8	320+21.87	321+23.09	322+18.15	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
2-1	3+61.98	6+40.18	8+92.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.	MATCH EX.	40
2-2	12+57.20	17+47.75	22+06.53	35°36'00"	3°48'00"	490.55	949.33	MATCH EX.	MATCH EX.	40
2-3	31+49.23	33+03.32	34+55.57	15°19'00"	5°00'00"	154.09	306.33	MATCH EX.	MATCH EX.	40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
3-2	282+81.97	284+82.92	286+73.79	31°20'44"	8°00'00"	200.95	391.82	OJO	350	50
4-1	279+22.29	281+95.32	284+43.99	41°44'09"	8°00'00"	273.03	521.70	OJO	350	50
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	11°30'00"	457.52	740.59	MATCH EX.	MATCH EX.	40
5-1	301+81.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
5-2	309+44.77	312+45.61	315+32.66	9°01'32"	8°15'00"	331.45	688.48	OJO	350	50
6-1	288+12.93	289+34.88	290+47.74	35°13'15"	15°00'00"	121.25	234.81	MATCH EX.	MATCH EX.	30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	OJO	300	40
6-3	308+87.09	313+04.40	316+32.73	61°30'55"	8°15'00"	413.31	745.64	OJO	360	50
6-4	322+71.77	335+55.32	348+29.08	101°3'58"	5°28'00"	1283.55	1857.30	MATCH EX.	MATCH EX.	50
6-5	347+51.58	351+73.11	355+56.11	42°14'17"	5°15'00"	421.53	804.53	0.086	360	50
7-1	331+01.97	333+86.64	336+57.75	30°34'04"	5°30'00"	284.67	556.78	MATCH EX.	MATCH EX.	50
8-1	304+99.35	305+71.77	306+44.19	148°38'	118°37'	72.43	144.84	0.037	280	60
9-1	304+17.19	305+62.41	306+107.47	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
9-2	313+56.61	314+41.62	315+24.00	65°25'09"	4°15'00"	865.80	1533.27	0.075	300	50
9-3	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	OJO	290	50
10-1	343+92.27	346+09.82	348+13.92	34°47'17"	8°15'00"	217.55	421.65	OJO	350	50
11-1	326+86.42	329+89.18	332+57.43	47°06'31"	8°15'00"	302.76	571.01	OJO	360	50
11-2	333+71.44	338+16.96	342+13.43	46°18'36"	5°30'00"	445.52	842.00	0.088	360	50
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	80°00'00"	66.77	106.83	N.A.	N.A.	25
13-1	283+94.33	288+21.59	292+42.59	15°57'55"	2°00'00"	427.26	848.26	0.055	525	60
13-2	294+40.16	299+22.77	303+71.16	37°14'24"	4°00'00"	482.61	931.00	0.093	600	60
13-3	312+51.56	314+78.03	317+30.82	156°24'39"	5°15'00"	522.47	2979.26	OJO	480	60
13-4	346+90.63	351+42.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	OJO	480	60

NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS



DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		BBO414		
INTERCHANGE LAYOUT SHEET								

Interchange layout plan provided by Garver, LLC

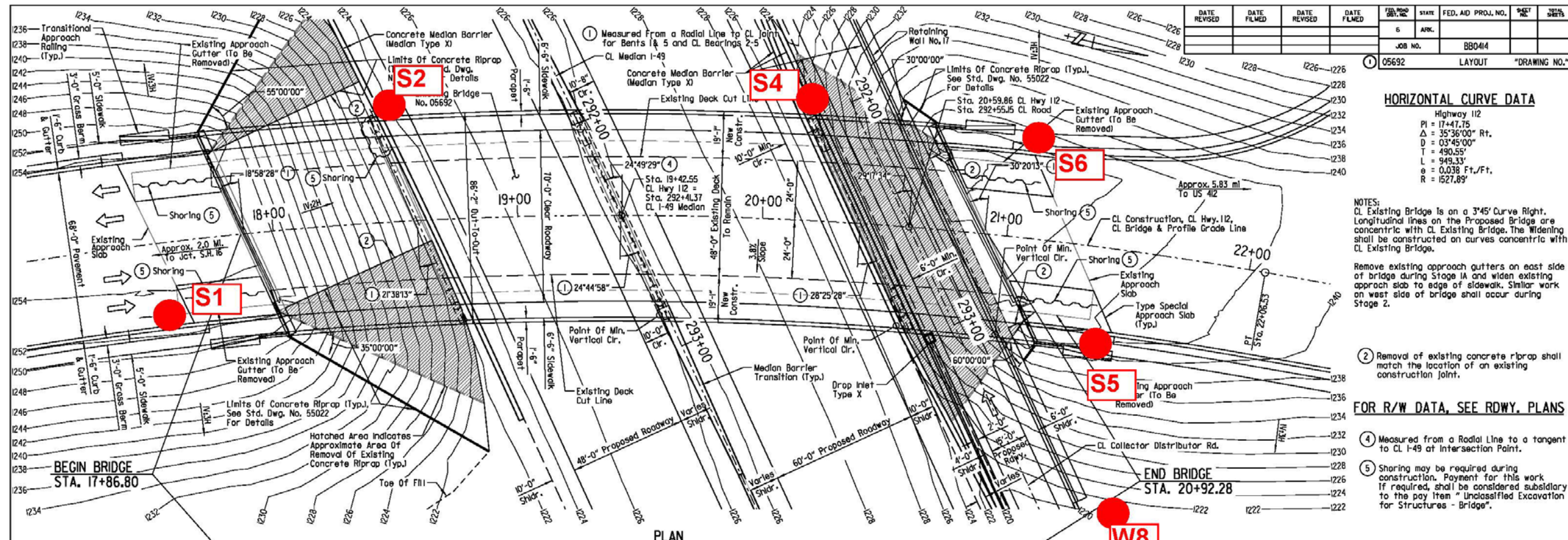


SITE VICINITY MAP
HIGHWAY 112 OVER INTERSTATE 49
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1



DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS	
				6	ARK.	B80414			
								05692	LAYOUT "DRAWING NO."

HORIZONTAL CURVE DATA
 Highway 112
 PI = 17+47.75
 Δ = 35°36'00" Rt.
 D = 03°45'00"
 L = 490.55'
 T = 949.33'
 e = 0.038 Ft./Ft.
 R = 1527.89'

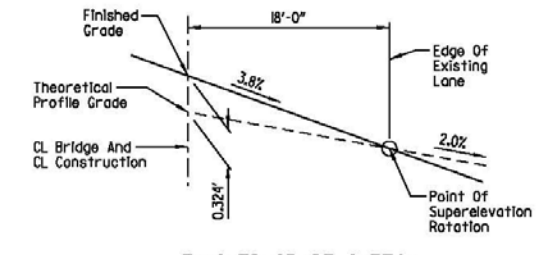
NOTES:
 1) CL Existing Bridge is on a 3°45' Curve Right. Longitudinal lines on the Proposed Bridge are concentric with CL Existing Bridge. The Widening shall be constructed on curves concentric with CL Existing Bridge.
 2) Remove existing approach gutters on east side of bridge during Stage 1A and widen existing approach slab to edge of sidewalk. Similar work on west side of bridge shall occur during Stage 2.

2) Removal of existing concrete riprap shall match the location of an existing construction joint.

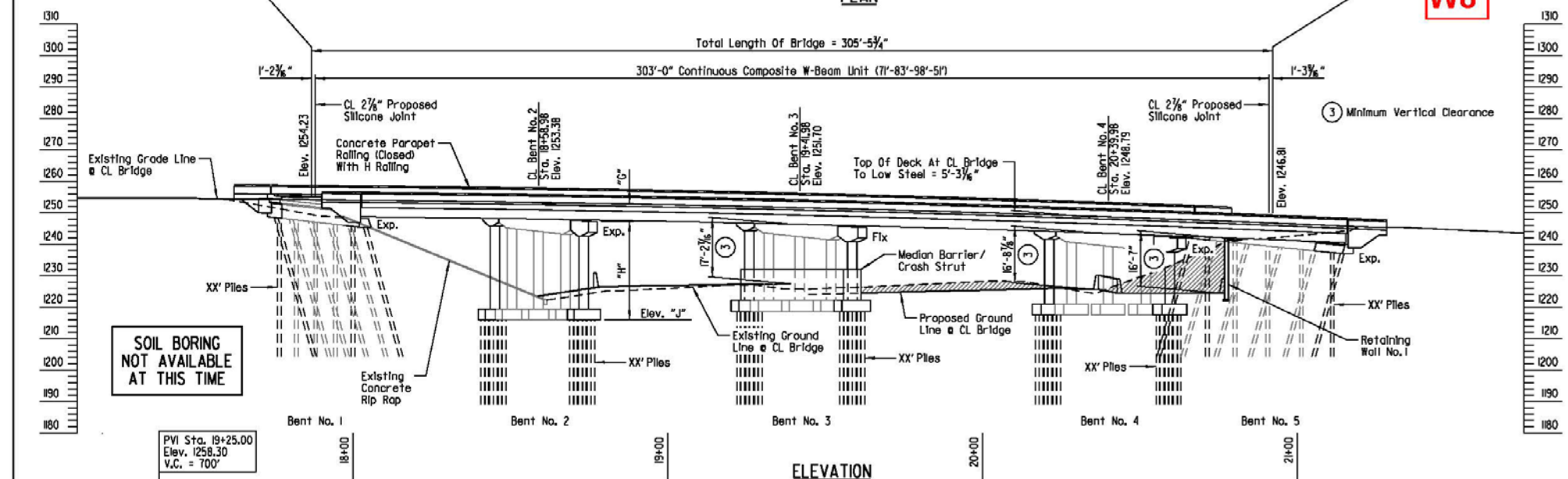
FOR R/W DATA, SEE RDWY. PLANS

4) Measured from a Radial Line to a tangent to CL I-49 at intersection Point.

5) Shoring may be required during construction. Payment for this work, if required, shall be considered subsidiary to the pay item "Unclassified Excavation for Structures - Bridge".



FINISHED GRADE SKETCH
 (Looking Forward)
 Scale: NTS
 NOTE: Elevations and stationing shown are along CL Bridge. Span lengths, total length of bridge, and CL Joint to beginning and end of bridge dimensions are measured along CL Bridge, unless noted otherwise.



VERTICAL CURVE DATA
 Highway 112
 (Profile Grade Along CL Bridge)
 PVI Sta. 19+25.00
 Elev. 1258.30
 V.C. = 700'
 +1.45%
 -6.00%

TABLE OF VARIABLES

Bent No.	CL Deck At CL Bent To Low Seat Of Cap	Low Seat of Cap To Bottom Of Ftg.	Bottom Of Ftg. Elevation
2	6'-0 1/2"	31'-6"	1215.81
3	6'-3 1/2"	27'-0"	1218.43
4	6'-7 1/2"	25'-0"	1217.18

NOTE:
 Except as noted, components of the existing bridge are to be retained and joined to the proposed work. Information and dimensions shown are based on existing bridge plans. The Contractor is to adhere strictly to the requirements for verification of the geometry of the existing bridge and its relationship to the proposed work to the existing structure. Payment for this work shall be considered subsidiary to the pay item "Modification of Existing Bridge Structure (Br. No. 05692)".

PRELIMINARY NOT FOR CONSTRUCTION

LAYOUT OF BRIDGE
 HIGHWAY 112
 OVER INTERSTATE 49
 PORTER RD. - HWY. 112/71B
 WIDENING & INTERCHNG. IMPVTS. (F)
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: PCC DATE: MAR. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
 DESIGNED BY: PCC DATE: MAR. 2014
 BRIDGE NO. 05692 DRAWING NO. XXXXX

Bridge layout plan provided by Garver, LLC

Note: Boring S3 not drilled due to limited access.



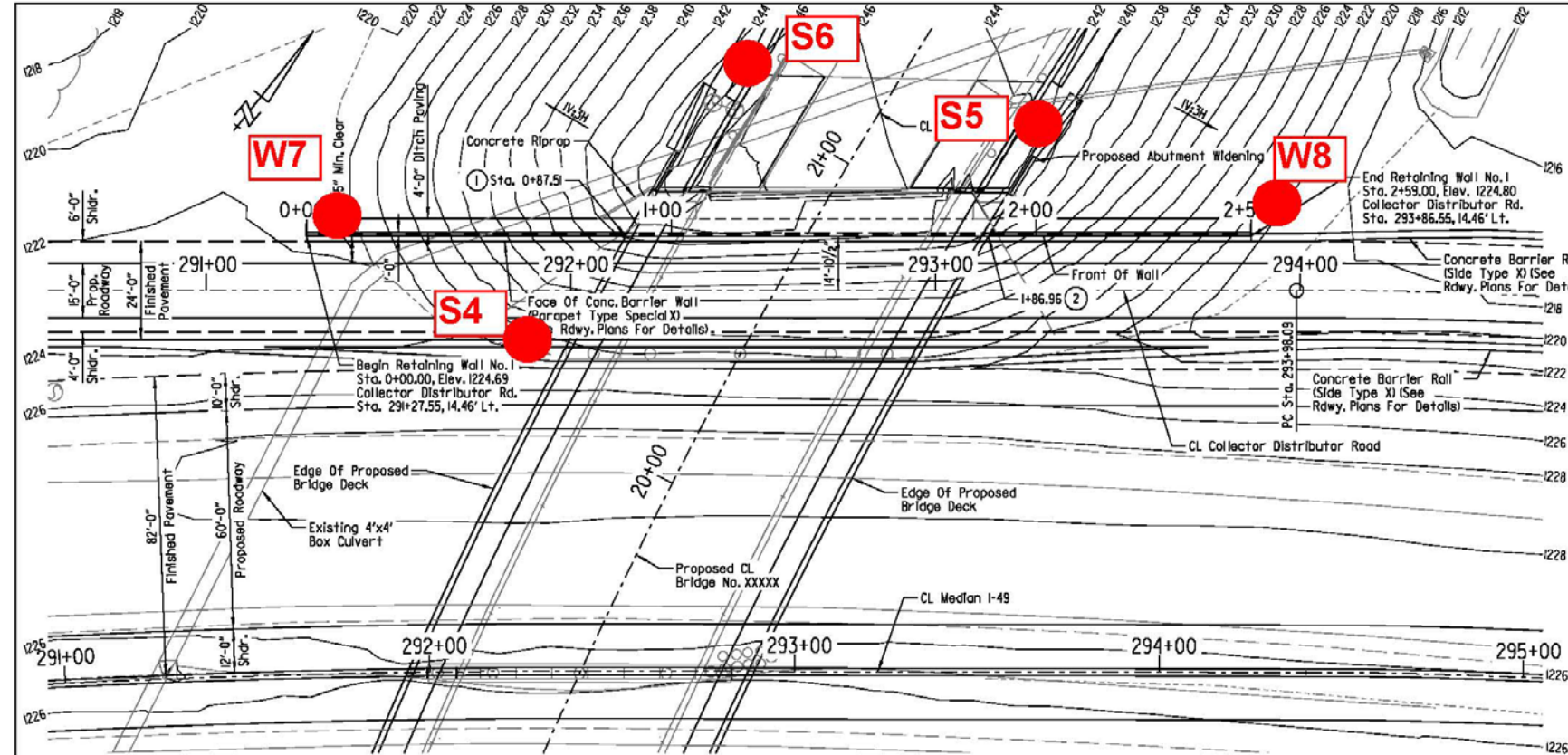
PLAN OF BORINGS
 HIGHWAY 112 OVER INTERSTATE 49
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2A

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.	BBD414			
				RET. WALL DETAILS "DRAWING NO."				



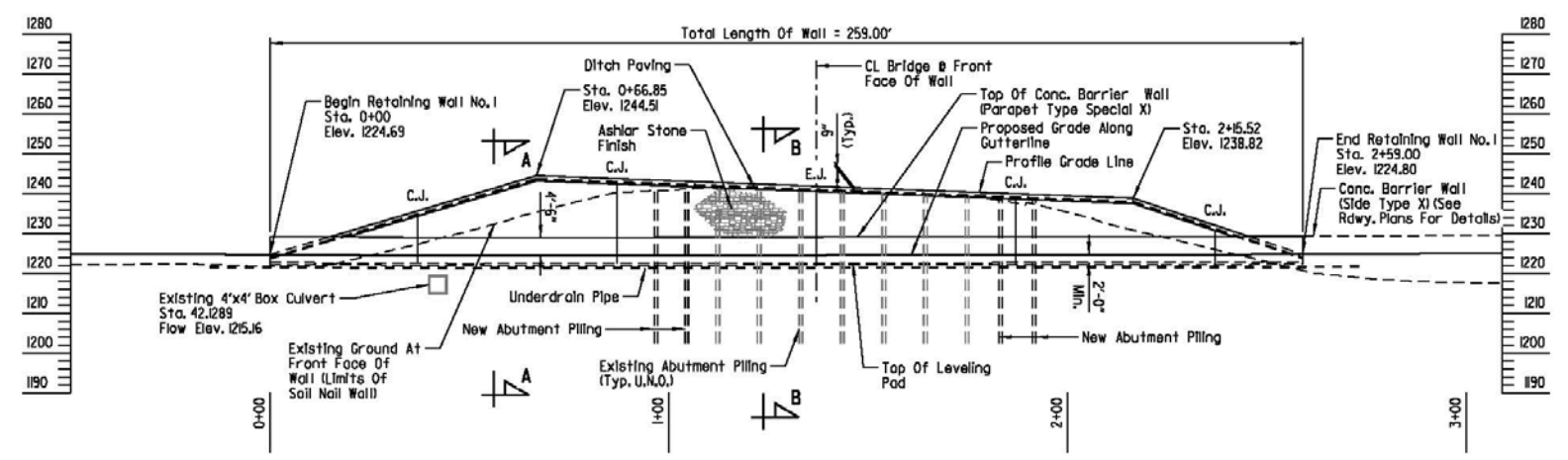
PLAN - RETAINING WALL NO. 1

NOTE:
Typical construction joint and expansion joint locations can be altered by the Contractor. Locations of the construction joints and/or expansion joint need to be shown in the working drawings for Engineer's approval.

NOTES:
For "GENERAL NOTES", "SECTION A-A" & "SECTION B-B", See Dwg. No. XXXX.
For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXX.
Offset dimensions for Retaining Wall No. 1 are measured from CL Collector Distributor Road to Profile Grade Line at top of front face of coping.
Elevations shown are at Profile Grade Line at top of front face of coping. For elevations along the retaining wall, see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.

- ① Collector Distributor Rd. Sta. 292+15.06, 14.46' Lt.
- ② Collector Distributor Rd. Sta. 293+14.50, 14.46' Lt.

FOR R/W DATA, SEE RDWY. PLANS



ELEVATION - RETAINING WALL NO. 1
(Looking At Front Face)

LEGEND
U.N.O. = Unless Noted Otherwise
C.J. = Construction Joint
E.J. = Expansion Joint

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

PRELIMINARY NOT FOR CONSTRUCTION

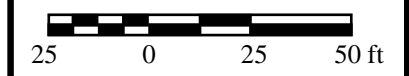
SHEET 1 OF 11
RETAINING WALL DETAILS
WASHINGTON COUNTY
ROUTE 49 SEC. 28
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.
DRAWN BY: PCC DATE: MAR. 2014 FILENAME: -
CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
DESIGNED BY: PCC DATE: MAR. 2014
BRIDGE NO. DRAWING NO. XXXXX

I:\working\14-073\14-073-01\Drawings\14-073-01-RWALL-S01-1.dgn
 3/17/14 3:17:55 PM
 WORKSPACE: AHTD Bridge
 \\gts001\14-073-01\Drawings\14-073-01-RWALL-S01-1.dgn
 REVISION DATE:

Bridge layout plan provided by Garver, LLC



PLAN OF BORINGS
HIGHWAY 112 OVER INTERSTATE 49
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2B



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S1

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Hwy 112 Sta 17+59, 30 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1253±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			6 inches: Asphalt Concrete	47									
			12 inches: Crushed Stone Base	18									
5			Stiff reddish brown cherty clay w/chert cobbles (fill)	25									
				16									57
10				14									
			- very stiff below 13 ft	42									
20				31									44
25				48									
30	△	△	Moderately hard tan and light gray chert w/interbedded clay seams and layers	50/9"									
35	△	△		50/8"									
40	△	△		50/7"									
45	△	△		31									
50	□	□	Hard light gray limestone w/numerous chert nodules and inclusions - 30% water loss at 46 ft	25/0"									
55	□	□		25/0"									
60	□	□		25/0"									
65	□	□		25/0"									

LGBNEW 14-073 HWY 112 OVER I-49 GPJ 12-17-15

COMPLETION DEPTH: 65.0 ft
DATE: 11-25-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 11/25/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S2

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger to 8 ft /Wash

LOCATION: Approx Hwy 112 Sta 18+55, 46 ft Lt

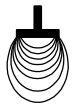
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1224±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
5			Stiff reddish brown silty clay w/trace chert fragments and occasional clay pockets	21			●						
				16			●						
				19		+	●	+					93
10			Moderately hard light gray chert w/interbedded clay seams and layers - auger refusal at 8 ft	50/6"					●				
				25/0"									
15			Hard light gray limestone w/chert nodules and inclusions - 50% water loss at 15 ft	25/0"									
				25/0"									
20				25/0"									
				25/0"									
25				25/0"									
				25/0"									
30				25/0"									
				25/0"									
35				25/0"									
				25/0"									
40				25/0"									
				25/0"									
45				25/0"									
				25/0"									
50				25/0"									

LGBNEW 14-073 HWY 112 OVER I-49.GPJ 12-17-15

COMPLETION DEPTH: 50.0 ft
DATE: 9-25-14

DEPTH TO WATER
IN BORING: Dry to 8 ft

DATE: 9/25/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S4

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Hwy 112 Sta 20+15, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD		
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1224±													
5			Medium dense gray crushed limestone and shale fragments w/some fines (fill) Very stiff reddish brown cherty clay w/fine to coarse chert fragments and cobbles	14									
				27									
				50/8"									
				26						63			
10			- auger refusal at 10 ft	50/8"									
15			Moderately hard tan and light gray chert w/interbedded clay seams and layers	25/0"							24		
				25/0"									
20			Moderately hard to hard light gray limestone w/numerous chert nodules and inclusions										
25			Moderately hard to hard light gray limestone w/numerous chert nodules and inclusions										
30			Moderately hard to hard light gray limestone w/numerous chert nodules and inclusions										
35			Moderately hard to hard light gray limestone w/numerous chert nodules and inclusions										
40			Moderately hard to hard light gray limestone w/numerous chert nodules and inclusions										

q_u = 8810 psi, TUW = 168 pcf

COMPLETION DEPTH: 40.0 ft
DATE: 11-24-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 11/24/2014

RECRODN200-2 14-073 HWY 112 OVER I-49.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S5

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Hwy 112 Sta 21+40, 37 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1244±						
5			Crushed Stone Base and shale fragments (fill)	32					
			Very stiff reddish brown cherty clay w/chert cobbles (fill)	41					
				50/9"					44
				27					
10			- auger refusal at 10 ft	37					
15				28					
20				50/8"					
25				45					
30				50/7"					
35			Very stiff gray silty clay	32					93
40			Very stiff tan and light gray fine to coarse sandy clay w/chert nodules	34					
45				34					74
50			Hard light gray limestone w/numerous chert nodules and inclusions - 20% water loss at 50 ft	25/0"					
55				25/0"					
60				25/0"					
65				25/0"					

LGBNEW 14-073 HWY 112 OVER I-49 GPJ 12-17-15

COMPLETION DEPTH: 65.0 ft
DATE: 11-19-14

DEPTH TO WATER
IN BORING: 35 ft

DATE: 11/19/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S6

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Hwy 112 Sta 21+10, 40 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1246±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
32			Crushed Stone Base (fill)										
29			Stiff to very stiff reddish brown cherty clay w/chert cobbles (fill)										
26													
24													
20													
15				50/9"									45
20				45									
25			- with more chert below 23 ft	50/8"									31
30			Stiff gray and brown clay w/some chert fragments	50/7"									
35				15									
40				14									77
45			Hard light gray limestone w/numerous chert nodules and inclusions	25/0"									
50				25/0"									
55				25/0"									
60				25/0"									
65													

LGBNEW 14-073 HWY 112 OVER I-49 GPJ 12-17-15

COMPLETION DEPTH: 60.0 ft
DATE: 12-2-14

DEPTH TO WATER
IN BORING: Dry to 25 ft

DATE: 12/2/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W7

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx Hwy 112 Sta 20+25, 120 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1222±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
5	▲▲▲▲▲		Very stiff reddish brown cherty clay (fill) - firm to stiff below 4 ft	28 50/10"			●	●	+				43
10	▲▲▲▲▲		Firm gray and light brown clay - firm to stiff at 8 to 11 ft - stiff, light brown and gray below 11 ft	9 10 22			+	●	+				93
15	▲▲▲▲▲		Stiff brown, gray and reddish brown cherty clay w/chert nodules	25/0"			+	●	+				93
20			Hard gray limestone w/chert inclusions - auger refusal at 18.5 ft										
25													

LGBNEW 14-073 HWY 112 OVER I-49.GPJ 12-17-15

COMPLETION DEPTH: 18.5 ft
DATE: 11-18-14

DEPTH TO WATER
IN BORING: 6 ft

DATE: 11/18/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W8

BB0414: Hwy 112 over I-49
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx Hwy 112 Sta 21+59, 110 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1220±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Firm to stiff brown and reddish brown silty clay w/some chert fragments (fill)	10									
			- stiff below 2 ft	18									
5			Stiff gray silty clay, slightly sandy w/occasional clay seams and layers	16									93
			- firm to stiff at 6 to 8 ft	10									
			- firm below 8 ft	9									93
10			Stiff tan and gray silty clay, slightly sandy w/chert nodules										
				18									
			- very stiff below 18 ft	30									89
20				25/0"									
25			Hard gray limestone w/chert inclusions auger refusal at 23.5 ft										

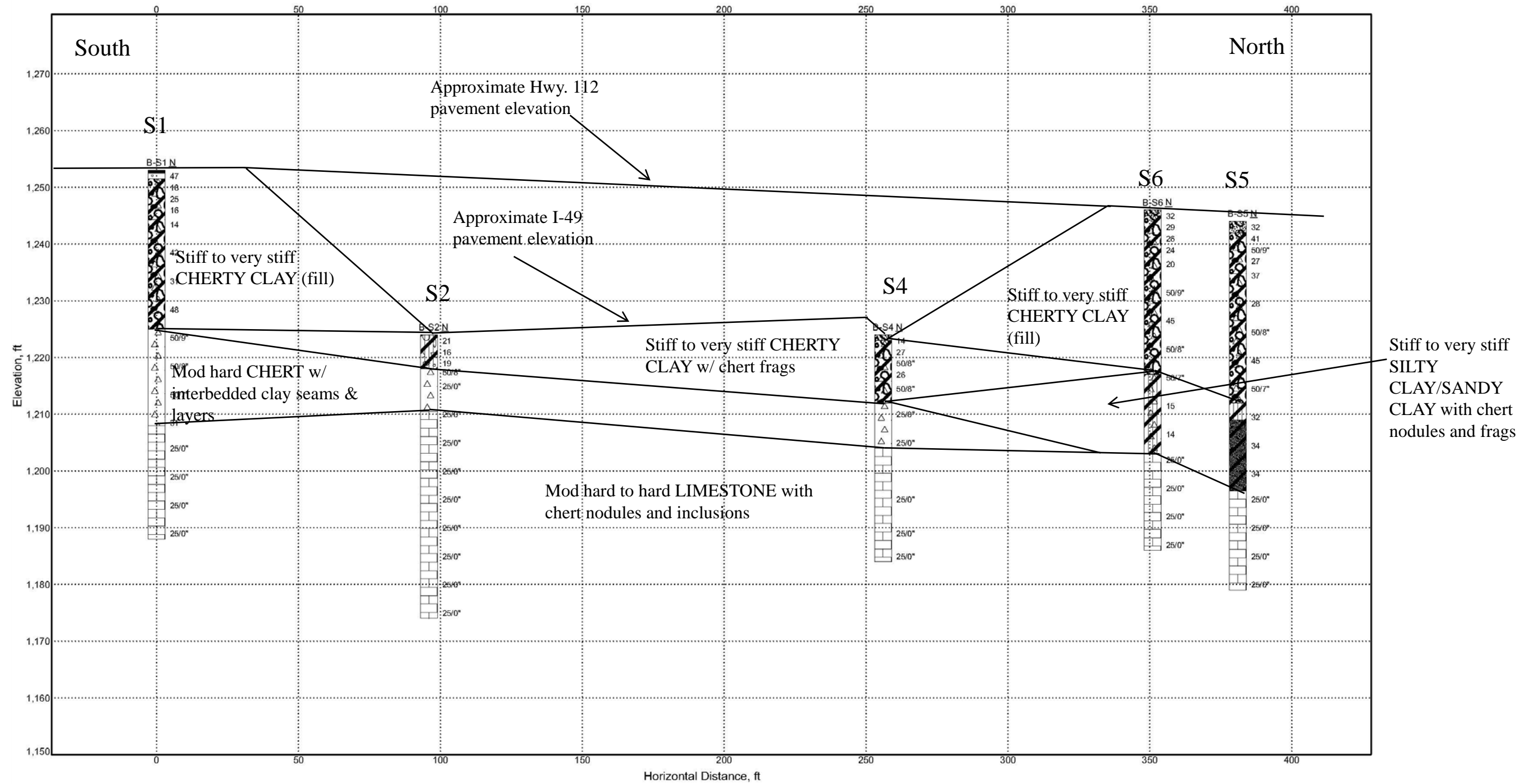
LGBNEW 14-073 HWY 112 OVER I-49.GPJ 12-17-15

COMPLETION DEPTH: 23.5 ft
DATE: 11-18-14

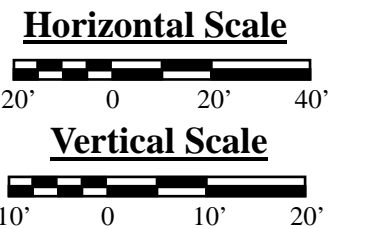
DEPTH TO WATER
IN BORING: 10 ft

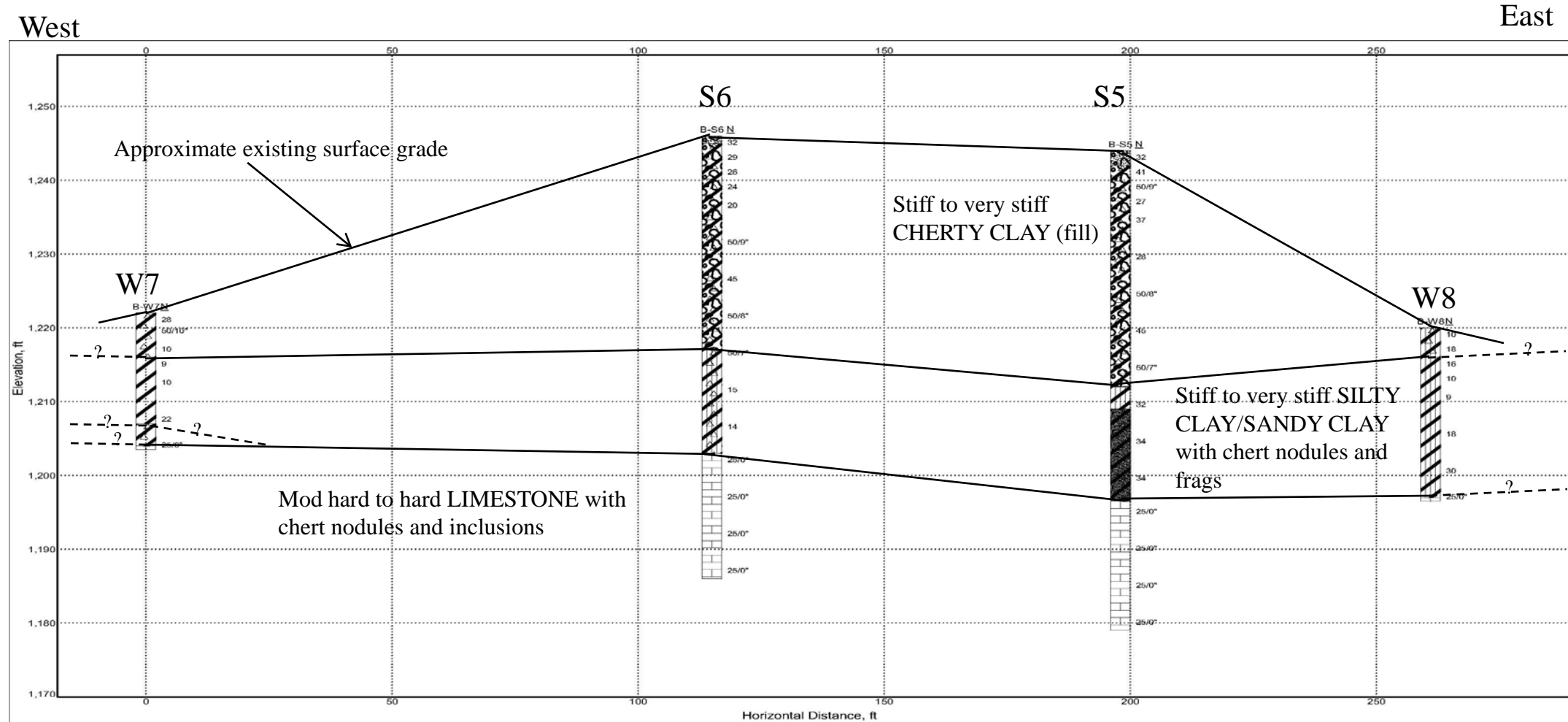
DATE: 11/18/2014





Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.



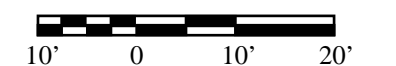


- Notes:** 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
Retaining Wall No. 1
 Porter Rd.-Hwy. 112/71B Widening & Interchng. Impvts. (F)
 Washington County, Arkansas

Job No. 14-073

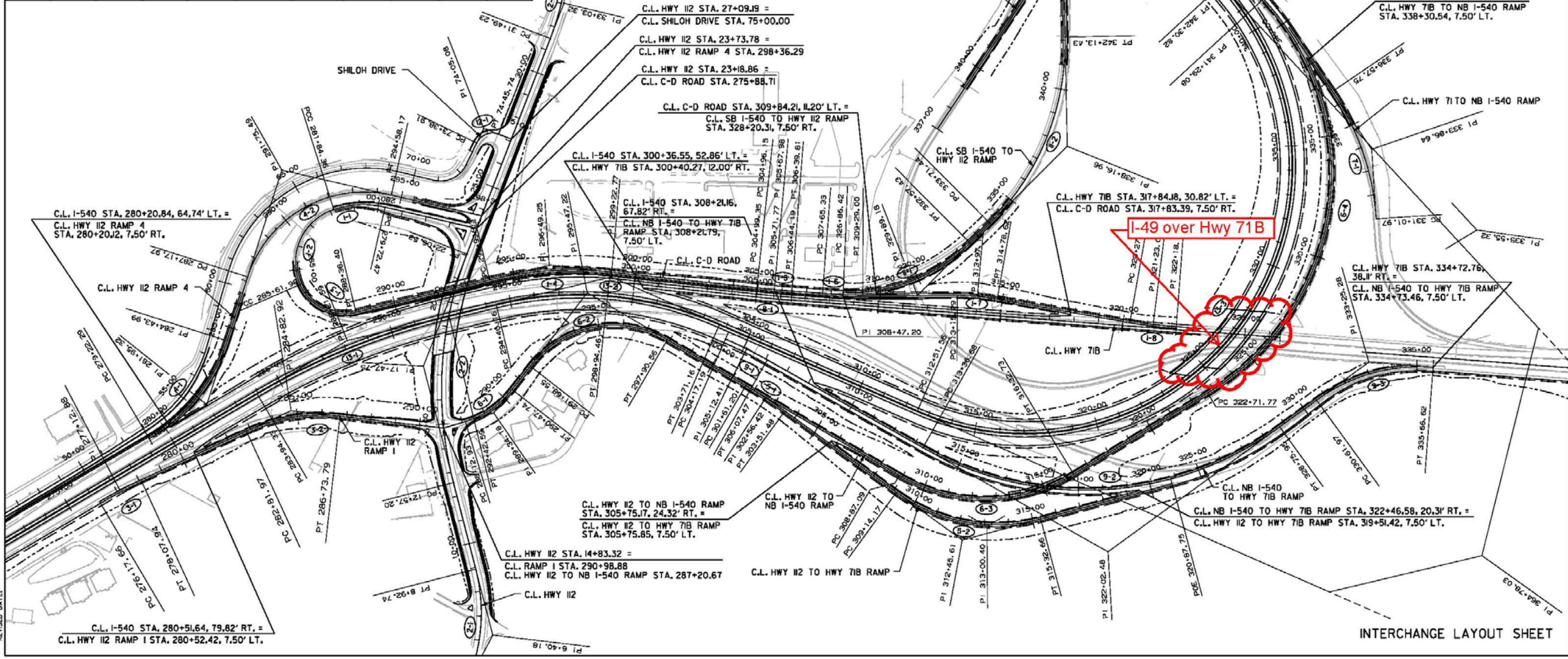
PLATE 12

ATTACHMENT 4

CURVE	PC	PI	PT	Δ	D	TANGENT		Ls	DESIGN SPEED		
						FEET	FEET				
1-1	279+72.47	280+81.00	281+84.36	3°07'43"	144'28"	108.63	21.88	MATCH EX.	MATCH EX.	30	
1-2	281+84.36	284+33.51	285+61.98	95°20'59"	25'16"00"	249.66	377.62	N.A.	N.A.	25	
1-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	0.00	0.00	300	25
1-4	293+99.03	296+49.25	298+94.46	19°49'03"	4°00'00"	250.22	495.43	0.012	0.012	300	50
1-5	304+96.45	305+67.98	306+39.81	1°48'38"	1°16'37"	71.83	143.66	0.031	0.031	280	50
1-6	307+65.33	308+47.20	309+29.00	4°05'30"	2°30'00"	81.87	163.66	0.049	0.049	240	50
1-7	313+85.29	315+97.15	317+78.62	9°47'60"	6°00'00"	81.87	163.33	0.092	0.092	270	50
1-8	320+27.87	321+23.09	322+18.25	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50	50
2-1	3+61.9	5+40.18	8+19.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.	MATCH EX.	40	40
2-2	12+51.20	17+47.75	22+06.53	35°38'00"	3°48'00"	490.55	949.33	MATCH EX.	MATCH EX.	40	40
2-3	3+49.23	33+03.32	34+55.57	15°19'00"	5°00'00"	54.09	306.33	MATCH EX.	MATCH EX.	40	40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50	50
3-2	282+81.97	284+82.92	286+73.79	3°20'44"	8°00'00"	200.95	391.82	0.00	0.00	350	50
4-1	279+22.29	281+95.32	284+43.99	4°44'09"	8°00'00"	273.03	521.70	0.00	0.00	350	50
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	1°30'00"	457.52	740.19	MATCH EX.	MATCH EX.	40	40
5-1	301+61.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50	50
5-2	309+14.17	312+45.61	315+32.66	5°01'32"	8°15'00"	331.45	618.49	0.00	0.00	350	50
6-1	288+12.93	289+34.88	290+47.74	35°13'16"	15°00'00"	121.25	234.81	MATCH EX.	MATCH EX.	30	30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	0.00	0.00	300	40
6-3	308+87.09	313+00.40	316+32.73	6°30'55"	8°19'00"	483.9	745.64	0.00	0.00	350	50
6-4	322+71.77	325+55.32	328+29.08	10°31'58"	5°28'00"	1283.55	1857.30	MATCH EX.	MATCH EX.	50	50
6-5	347+61.58	351+73.11	355+86.11	4°21'47"	5°18'00"	421.53	804.53	0.086	0.086	350	50
7-1	331+01.97	333+86.64	336+67.75	30°34'04"	5°30'00"	284.67	555.78	MATCH EX.	MATCH EX.	50	50
8-1	304+99.35	305+71.77	306+44.19	1°48'38"	1°16'37"	72.43	144.84	0.037	0.037	280	60
9-1	304+17.19	305+12.41	306+07.47	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50	50
9-2	313+36.68	322+02.48	328+75.95	65°25'09"	4°16'00"	865.80	1539.27	0.075	0.075	300	50
9-3	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	0.00	0.00	290	50
10-1	343+92.27	346+09.82	348+13.52	34°47'11"	8°15'00"	277.55	421.65	0.00	0.00	350	50
10-2	326+86.42	329+89.18	332+57.43	47°08'31"	8°15'00"	302.76	571.01	0.00	0.00	350	50
11-1	333+71.44	338+95.96	342+35.43	48°18'36"	5°30'00"	445.52	842.00	0.088	0.088	350	50
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	80°00'00"	66.77	106.83	N.A.	N.A.	25	25
13-1	283+94.33	288+21.59	292+42.59	16°57'56"	2°00'00"	427.26	848.26	0.055	0.055	525	60
13-2	294+40.16	299+22.77	303+71.6	37°14'24"	4°00'00"	482.61	931.00	0.093	0.093	600	60
13-3	312+51.56	314+78.03	316+30.82	156°24'39"	5°15'00"	522.47	2979.26	0.00	0.00	480	60
13-4	346+90.63	351+12.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	0.00	0.00	480	60

NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
							JOB NO.	BBO414
								INTERCHANGE LAYOUT SHEET

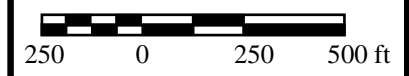


2/10/2014 10:31:40 AM
 NETWORK
 WORKSPACE, MTD
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 REVISED DATE:

Interchange layout plan provided by Garver, LLC

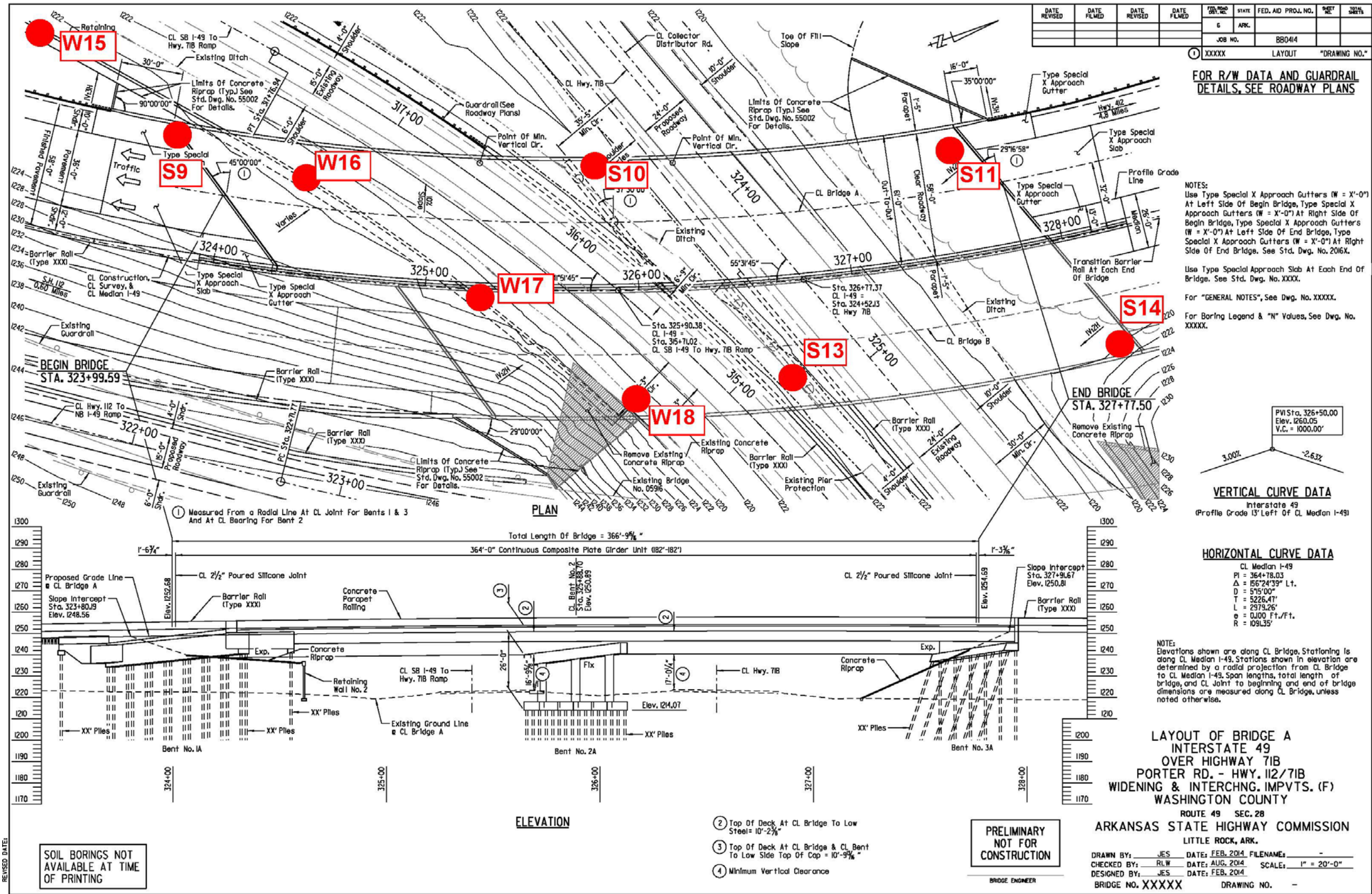


SITE VICINITY MAP
INTERSTATE 49 OVER HIGHWAY 71B
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1



Bridge layout plan provided by Garver, LLC

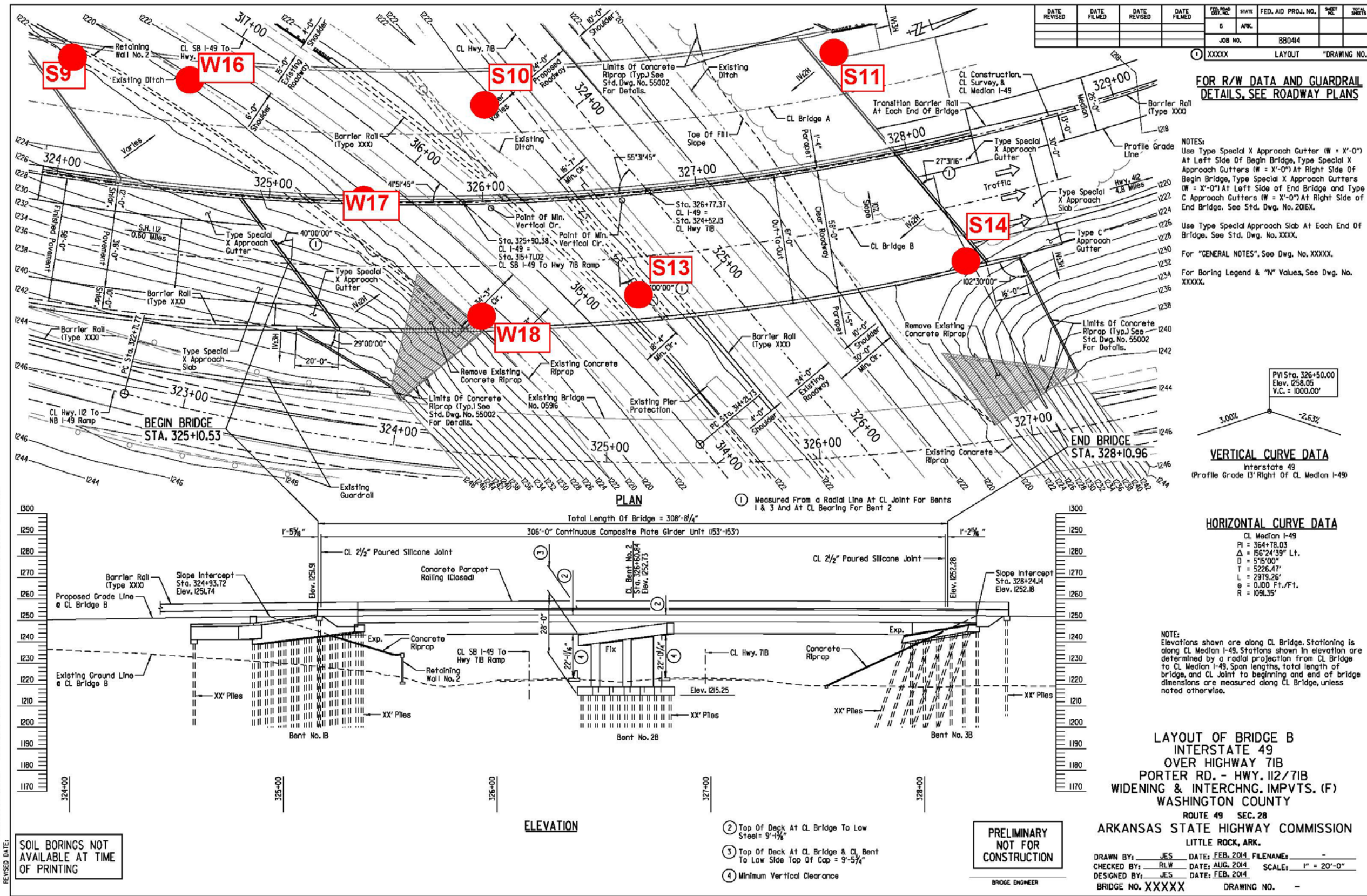


PLAN OF BORINGS
 INTERSTATE 49 OVER HIGHWAY 71 BUSINESS
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2A



Bridge layout plan provided by Garver, LLC

Note: Boring S12 not drilled due to limited access.

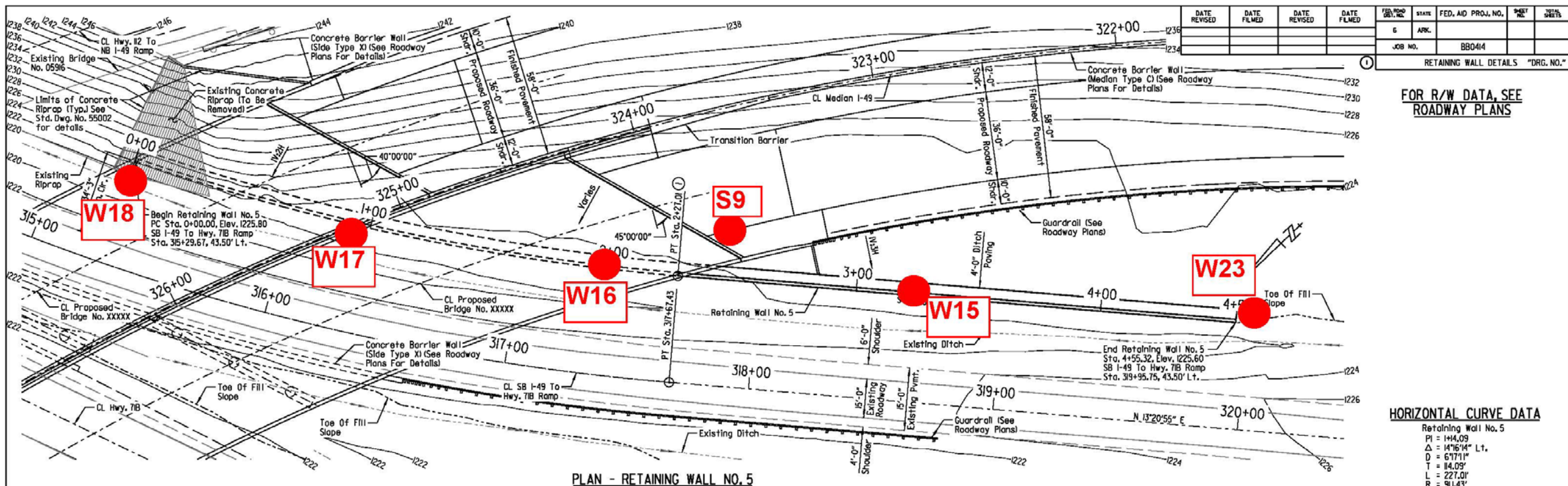


PLAN OF BORINGS
 INTERSTATE 49 OVER HIGHWAY 71 BUSINESS
 WASHINGTON COUNTY, ARKANSAS

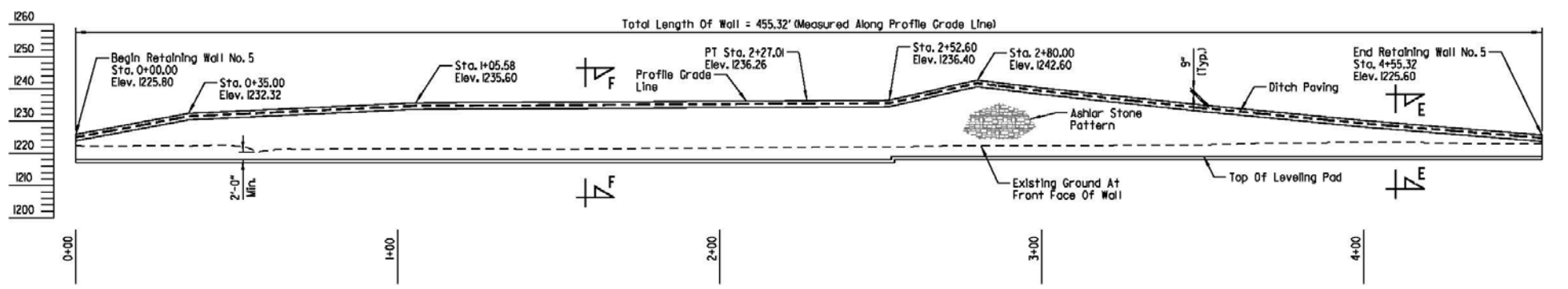


Job No. 14-073

PLATE 2B



PLAN - RETAINING WALL NO. 5



NOTE:
For "GENERAL NOTES", "SECTION E-E" & "SECTION F-F", See Dwg. No. XXXXX & XXXXX.
For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
Offset dimensions for Retaining Wall No. 5 are measured from CL SB I-49 to Hwy. 71B Ramp to Profile Grade Line at top of front face of coping.
Elevations shown are at Profile Grade Line at top of front face of coping. For elevations along retaining wall, see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

LEGEND
UNO. = Unless Noted Otherwise

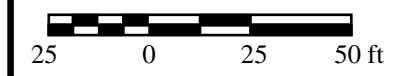
PRELIMINARY NOT FOR CONSTRUCTION
BRIDGE ENGINEER

SHEET 5 OF 11
RETAINING WALL DETAILS
WASHINGTON COUNTY
ROUTE 49 SEC. 28
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.
DRAWN BY: JES DATE: FEB. 2014 FILENAME: -
CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
DESIGNED BY: JES DATE: FEB. 2014
BRIDGE NO. DRAWING NO. -

MSE wall layout plan provided by Garver, LLC



PLAN OF BORINGS
MSE WALL NO. 5
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2C



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S9

BB0414: I-49 over Hwy 71B
Fayetteville, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx I-49 Sta 323+75, 55 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1227±						
5			Firm dark gray silty clay w/some organics	9					
			Firm reddish tan and gray silty clay w/occasional silt pockets - stiff below 2 ft						
10			Stiff reddish tan and gray clay, slightly sandy w/occasional silt pockets and ferrous stains and nodules						
			- very stiff below 13 ft						
15				102					88
20			Moderately hard dark gray shale, carbonaceous	50/3"					
25			- moderately hard to hard below 23 ft	25/0"					
30				25/0"					
35				25/0"					
40				25/0"					
45				25/0"					
50				25/0"					
55				25/0"					
60				25/0"					

COMPLETION DEPTH: 60.0 ft
DATE: 9-24-14

DEPTH TO WATER
IN BORING: 15 ft

DATE: 9/24/2014

LGBNEW_14-073_I-49 OVER 71B.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S10

BB0414: I-49 over Hwy 71B
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx I-49 Sta 325+75, 45 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1223±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff brown silty clay w/some shale fragments and crushed stone (fill) - very stiff below 2 ft	19			●						
				33			●						
5			Stiff gray silty clay w/occasional silt pockets	16			●						
			Stiff to very stiff tan and gray silty clay w/ferrous nodules and stains and occasional silt pockets	15			+	●	- - -	+	△		91
10				15				●					
15				16				●					
20			Low hardness brown and dark gray weathered clayey shale, carbonaceous	29					●				
			- moderately hard below 23 ft	50/3"					●				
25			Moderately hard to hard dark gray shale	25/0"									
30				25/0"									
35			- with medium close sandstone partings and seams below 35 ft	25/0"									
40				25/0"									
45				25/0"									
50				25/0"									

LGBNEW_14-073_I-49 OVER 71B.GPJ 12-17-15

COMPLETION DEPTH: 50.0 ft
DATE: 8-26-14

DEPTH TO WATER
IN BORING: 8 ft

DATE: 8/26/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S11

BB0414: I-49 over Hwy 71B
Fayetteville, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx I-49 Sta 327+55, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT			
			SURF. EL: 1220±								
5			Stiff brownish gray clayey silt, dry	22							
			Stiff tan and gray clay w/occasional silt partings, ferrous stains and nodules - very stiff at 4 to 8 ft	20							
			- stiff at 8 to 13 ft	30					93		
			- very stiff with trace chert fragments below 13 ft	26							
10				18							
15				29							
20			Moderately hard brown and dark gray weathered clayey shale, carbonaceous	50/8"							
25				50/3"							
30			Moderately hard to hard dark gray shale, carbonaceous w/very close interbedded limestone and siltstone seams - with occasional pyrite inclusions from 26 - 28 ft - calcareous sandstone layer at 26.1 - 26.5 ft, 27.4 - 27.7 ft, 28.3 - 28.7 ft, 29 - 29.3 ft								
35										80	48
40											
45											
50											
55											
60											

COMPLETION DEPTH: 60.0 ft
DATE: 8-27-14

DEPTH TO WATER
IN BORING: 11 ft

DATE: 8/27/2014

RECRODN200-2 14-073 I-49 OVER 71B.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S13

BB0414: I-49 over Hwy 71B
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx I-49 Sta 326+70, 45 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT							
			SURF. EL: 1224±			0.2	0.4	0.6	0.8	1.0	1.2	1.4			
						+									
						10	20	30	40	50	60	70			
29			Very stiff brown fine sandy clay w/trace organics and trace fine gravel (fill)	29											
26				26											
5			Stiff tan and gray silty clay w/occasional silt pockets	17											
15				15											
10			- with ferrous nodules and stains and trace fine gravel below 8 ft	13									86		
13				13											
15				17											
20			Low hardness brown and dark gray weathered clayey shale, carbonaceous - moderately hard below 18 ft	50/10"											
25				50/4"											
30			Moderately hard to hard dark gray siltstone w/interbedded shale seams and limestone inclusions - limestone layer at 30 - 30.7 ft	25/0"											
35			- calcareous sandstone layer from 34.1 - 34.5 ft - occasional pyrite inclusions below 35 ft - limestone layer at 37 - 37.2 ft - with mudstone partings at 39.6 ft												
40															
45			Moderately hard to hard dark gray shale w/medium close sandstone partings and seams	25/0"											
50				25/0"											
55															

RECRODN200-2 14-073 I-49 OVER 71B.GPJ 12-17-15

COMPLETION DEPTH: 50.0 ft
DATE: 8-26-14

DEPTH TO WATER
IN BORING: 4 ft

DATE: 8/26/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S14

BB0414: I-49 over Hwy 71B
Fayetteville, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx I-49 Sta 328+15, 50 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
SURF. EL: 1220±										
5	[Symbol]	[Symbol]	Very stiff gray and reddish tan silty clay w/chert fragments (fill) - stiff, slightly sandy with less chert below 2 ft	25		●	+	---	+	65
				21		●				
10	[Symbol]	[Symbol]	Stiff tan and gray silty clay w/ferrous stains and nodules and occasional silt partings	16			●			93
				11		+	---	+		
				12			●			
15	[Symbol]	[Symbol]	- with trace chert fragments below 13 ft	17			●			
20	[Symbol]	[Symbol]	Low hardness to moderately hard reddish tan and dark gray weathered clayey shale, carbonaceous	50/9"			●	+	---	+
25	[Symbol]	[Symbol]	Moderately hard dark gray with some tan slightly weathered shale w/medium close sandstone partings, seams and layers	50/2"						
30	[Symbol]	[Symbol]	Moderately hard to hard dark gray shale w/medium close sandstone partings and seams	25/0"						
35	[Symbol]	[Symbol]		25/0"						
40	[Symbol]	[Symbol]		25/0"						
45	[Symbol]	[Symbol]		25/0"						
50	[Symbol]	[Symbol]		25/0"						
55	[Symbol]	[Symbol]		25/0"						
60	[Symbol]	[Symbol]		25/0"						

COMPLETION DEPTH: 60.0 ft
DATE: 8-28-14

DEPTH TO WATER
IN BORING: 8 ft

DATE: 8/28/2014

LGBNEW_14-073_I-49 OVER 71B.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W15

BB0414: Wall #5
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 323+00, 90 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1222±						
14			Stiff brown silty clay w/occasional silt pockets and trace organics (fill)	14					
			- firm to stiff below 2 ft	10					
5			Firm to stiff tan and gray silty clay w/ferrous stains and nodules and occasional silt pockets	10					90
			- stiff below 6 ft	11					
			- less silty below 8 ft	14					
15			Low hardness dark gray and brown weathered clayey shale, carbonaceous	38					
			Moderately hard reddish tan and dark gray weathered shale, carbonaceous	50/3"					
20									
25									

COMPLETION DEPTH: 20.0 ft
DATE: 8-29-14

DEPTH TO WATER
IN BORING: 16 ft

DATE: 8/29/2014

LGBNEW_14-073_WALL #5.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W16

BB0414: Wall #5
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 324+30, 45 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1222±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff brown silty clay w/chert fragments (fill)	22		●	+	-	-	+			87
5			Very stiff tan and gray silty clay w/ferrous stains and nodules	25		●							
			- firm to stiff from 4 to 6 ft	10		●							
			- firm below 6 ft	8		+	●	-	-	+			81
			- less silty below 8 ft	8		●							
15			Low hardness dark gray and brown weathered clayey shale	31		●							
20			Moderately hard reddish tan and dark gray weathered shale, carbonaceous	50/8"		●							

LGBNEW_14-073_WALL #5.GPJ 12-17-15

COMPLETION DEPTH: 20.0 ft
DATE: 8-28-14

DEPTH TO WATER
IN BORING: 15 ft

DATE: 8/28/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W17

BB0414: Wall #5
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 325+25, 8 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1222±						
			Stiff brown silty clay w/trace chert fragments (fill)	16		●	+ - - +		88
5			Stiff tan and gray silty clay w/ferrous stains and nodules	18		●			
			- with occasional silt partings below 6 ft	13		●			
			- slightly silty below 8 ft	11		+ ● - +			90
10				12		●			
			- water at 13 ft						
15			Low hardness brown and dark gray weathered clayey shale, carbonaceous	37		●			
			Moderately hard tan and dark gray weathered shale, carbonaceous						
20				50/3"		●			
25									

COMPLETION DEPTH: 20.0 ft
DATE: 8-28-14

DEPTH TO WATER
IN BORING: 13 ft

DATE: 8/28/2014

LGBNEW 14-073 WALL #5.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W18

BB0414: Wall #5
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 325+90, 55 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
SURF. EL: 1222±									
			Stiff brownish gray clayey silt w/a little chert fragments (fill)	18			●	++	81
			Stiff tan and gray silty clay w/ferrous stains and nodules and occasional silt pockets	13			●		
5			- slightly silty below 4 ft	11			●		
			- stiff to very stiff below 8 ft	11			+	●	+
10				24			●		
			- water at 12 ft						
15			Moderately hard reddish tan and dark gray weathered shale, carbonaceous	50/9"			●		
20				50/2"			●		
25									

COMPLETION DEPTH: 20.0 ft
DATE: 8-28-14

DEPTH TO WATER
IN BORING: 12 ft

DATE: 8/28/2014

LGBNEW 14-073 WALL #5.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W23

BB0414: Wall #5
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 321+47, 108 ft Lt

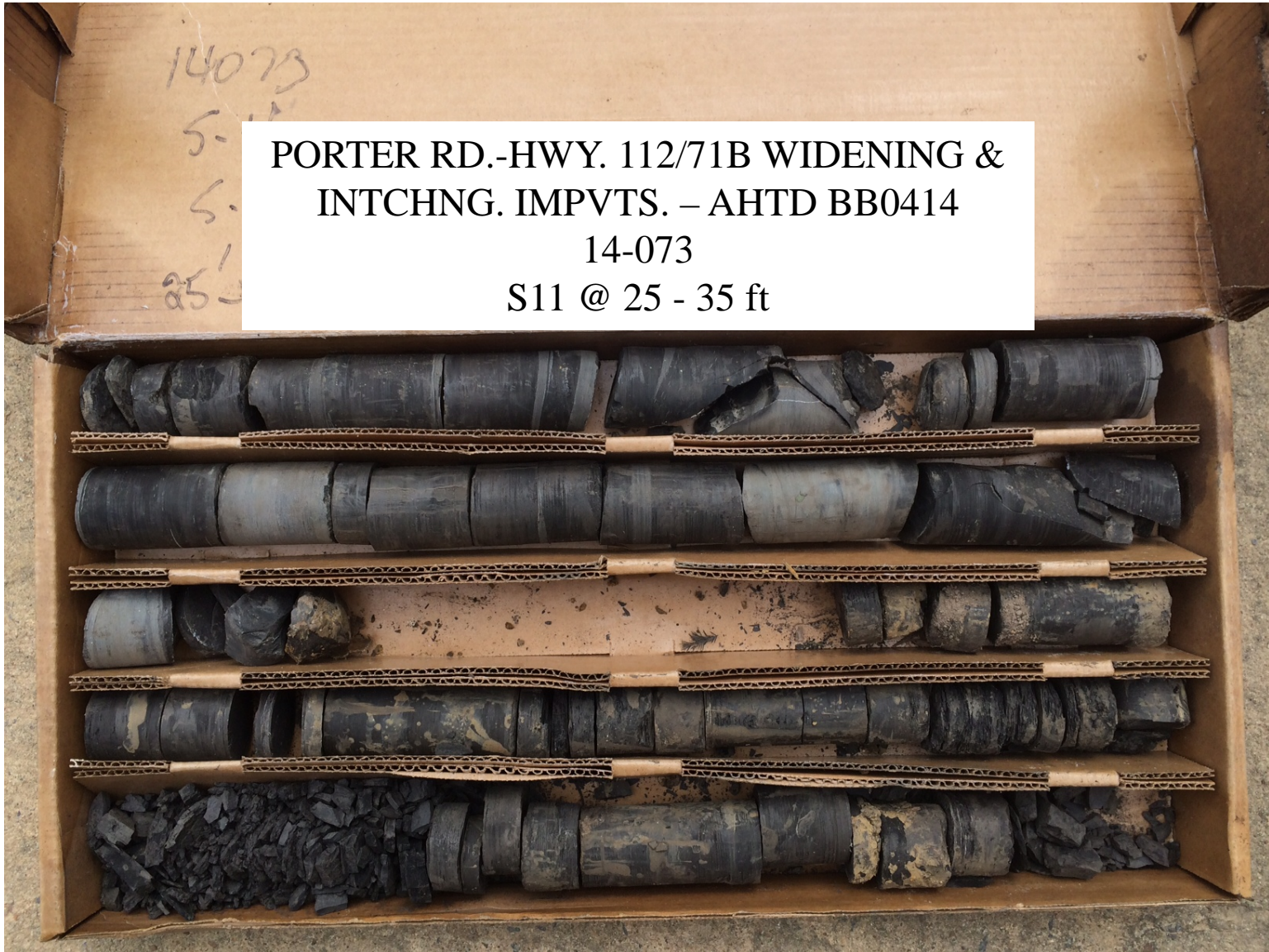
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1222±						
			Stiff brown silty clay w/trace chert fragments (fill)	14					
				13					
5			Firm tan and gray silty clay w/ferrous stains and nodules and occasional silt pockets	9					
			- firm to stiff at 6 to 8 ft	10					
			-stiff, less silty below 8 ft	13					
10			- with trace chert fragments below 10 ft						
				27					
15			Low hardness brown and gray weathered clayey shale						
			Moderately hard tan and dark gray weathered shale, carbonaceous						
20				50/3"					
25									

COMPLETION DEPTH: 20.0 ft
DATE: 8-29-14

DEPTH TO WATER
IN BORING: 15 ft

DATE: 8/29/2014

LGBNEW 14-073 WALL #5.GPJ 12-17-15

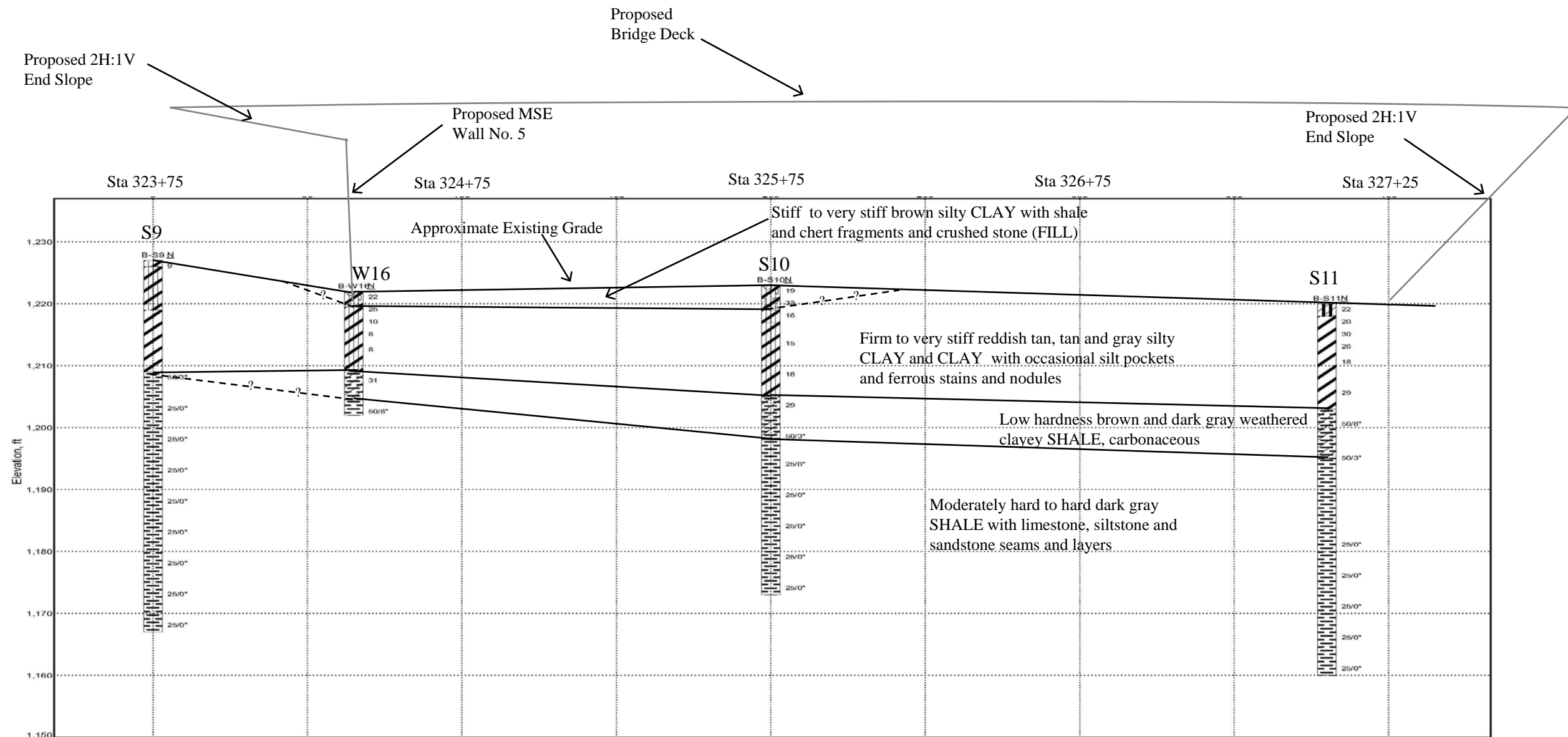


PORTER RD.-HWY. 112/71B WIDENING &
INTCHNG. IMPVTS. – AHTD BB0414

14-073

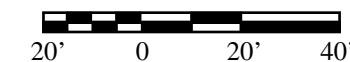
S13 @ 30 – 35 and 35 – 40 ft





Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



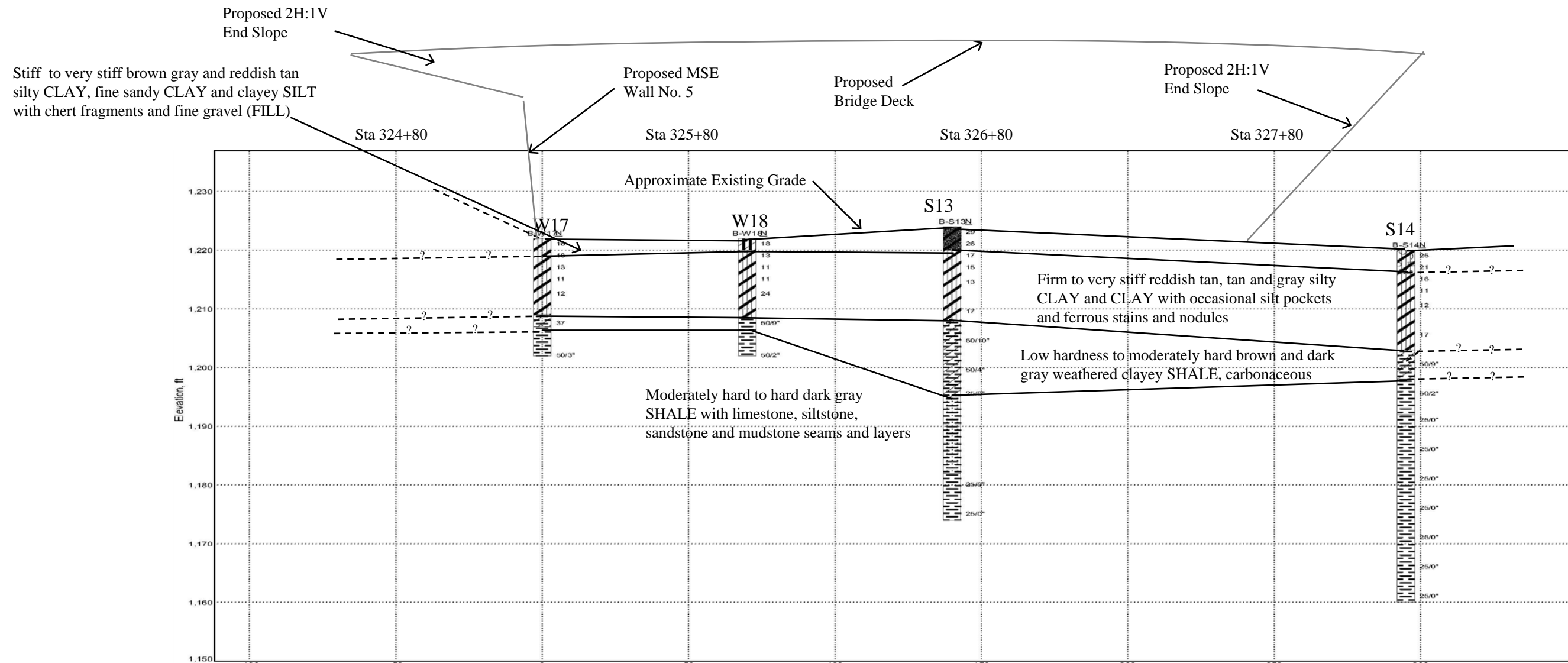
Vertical Scale



Generalized Subsurface Profile
 Interstate 49 Southbound over Highway 71B – Bridge A
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening &
 Interchg. Impvts. (F) – Washington County, Arkansas

Job No. 14-073

PLATE 15



Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



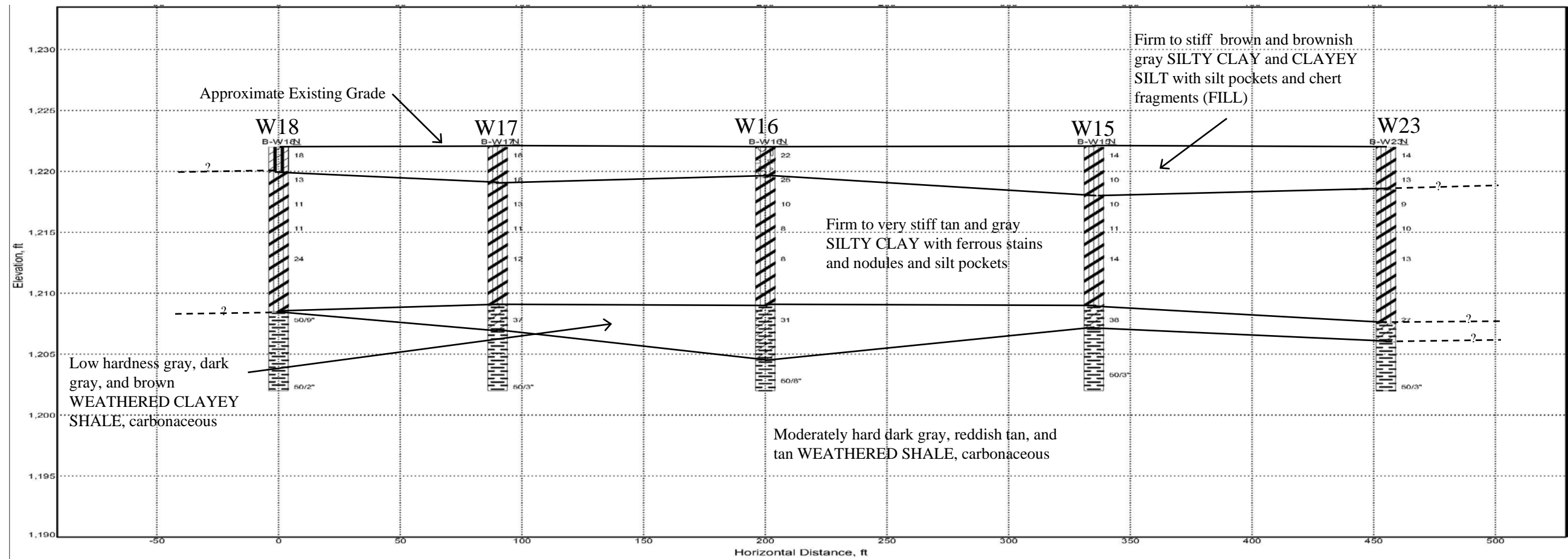
Vertical Scale



Generalized Subsurface Profile
 Interstate 49 Northbound over Highway 71B – Bridge B
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening &
 Interchg. Impvts. (F) – Washington County, Arkansas

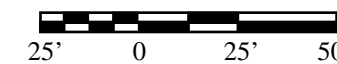
Job No. 14-073

PLATE 16



- Notes:** 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale

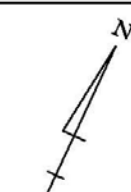


Vertical Scale



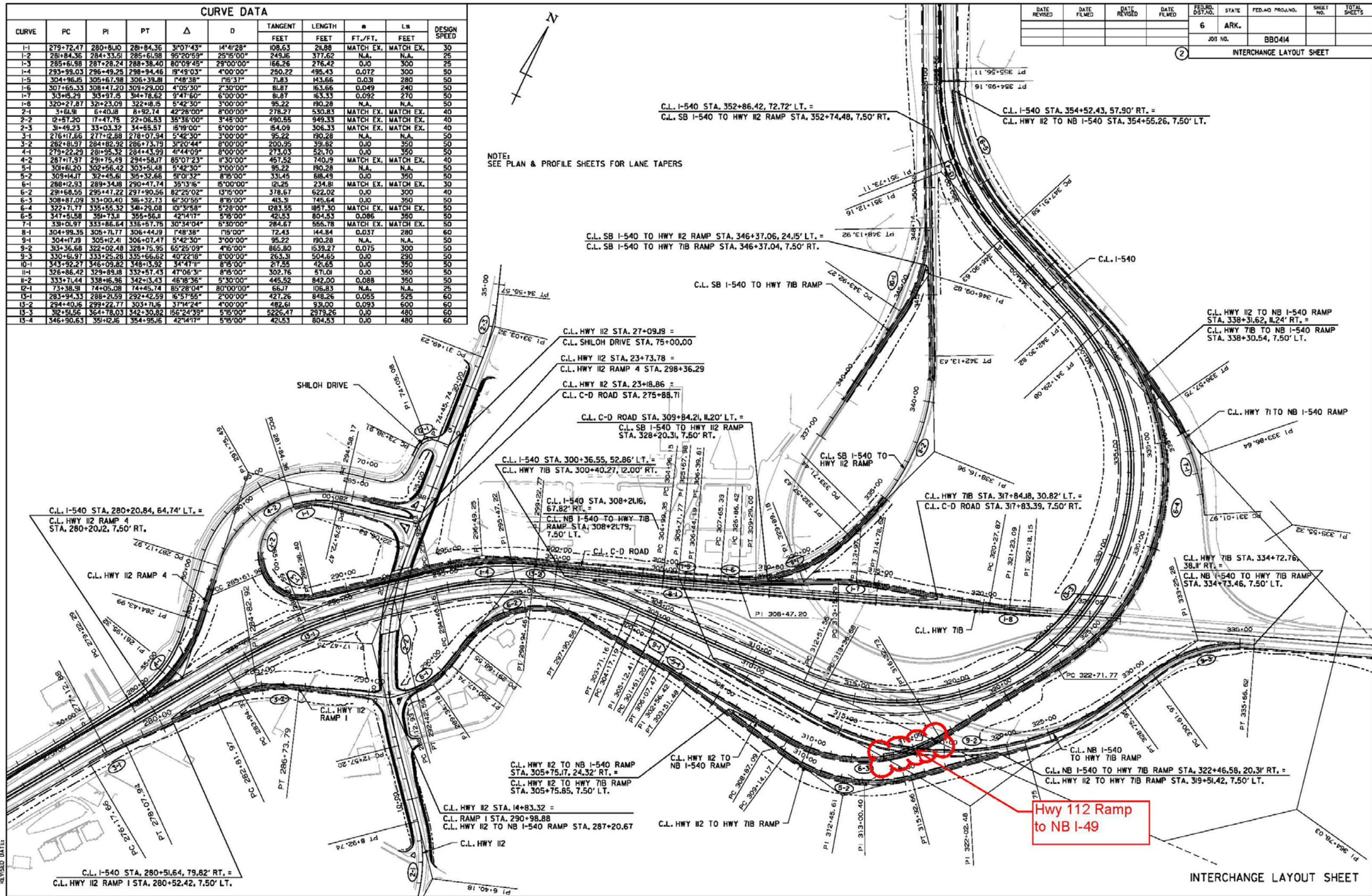
ATTACHMENT 5

CURVE DATA										
CURVE	PC	PI	PT	Δ	D	TANGENT	LENGTH	#	Ls	DESIGN SPEED
						FEET	FEET	FT./FT.	FEET	
I-1	279+72.47	280+81.00	281+84.36	3°07'43"	14'41'28"	108.63	21.88	MATCH EX.	MATCH EX.	30
I-2	281+84.36	284+33.51	285+61.98	95°20'59"	25'55'00"	249.36	377.62	N.A.	N.A.	25
I-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	0.0	300	25
I-4	293+98.03	296+49.25	298+94.46	9°43'03"	4°00'00"	250.22	495.43	0.072	300	50
I-5	304+96.85	305+67.98	306+39.81	1°48'38"	1°56'37"	71.83	143.66	0.031	280	50
I-6	307+65.33	308+47.20	309+29.00	4°05'30"	2°30'00"	81.87	163.66	0.049	240	50
I-7	313+95.29	313+97.15	314+78.62	9°47'60"	6°00'00"	81.87	163.33	0.092	270	50
I-8	320+27.87	321+23.09	322+18.15	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
2-1	3+64.91	6+40.18	8+92.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.	MATCH EX.	40
2-2	12+57.20	17+47.75	22+06.53	35°36'00"	3°48'00"	490.55	949.33	MATCH EX.	MATCH EX.	40
2-3	31+49.23	33+03.32	34+55.57	16°19'00"	5°00'00"	154.09	306.33	MATCH EX.	MATCH EX.	40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
3-2	282+81.97	284+82.92	286+73.79	31°20'44"	8°00'00"	200.95	391.82	0.0	350	50
4-1	279+22.29	281+25.32	284+43.99	41°44'03"	8°00'00"	213.03	521.70	0.0	350	50
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	11°30'00"	457.52	740.19	MATCH EX.	MATCH EX.	40
5-1	301+61.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
5-2	309+14.17	312+45.61	315+32.66	51°01'32"	8°15'00"	331.45	518.49	0.0	350	50
6-1	288+12.93	289+34.18	290+47.74	35°13'16"	5°00'00"	121.25	234.81	MATCH EX.	MATCH EX.	30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	0.0	300	40
6-3	308+87.09	313+00.40	316+32.73	61°30'56"	8°15'00"	415.31	746.64	0.0	350	50
6-4	322+71.77	335+55.32	341+29.08	101°31'58"	5°28'00"	1283.55	1857.30	MATCH EX.	MATCH EX.	50
6-5	347+61.58	351+73.11	355+86.11	42°14'17"	5°15'00"	421.53	804.53	0.086	350	50
7-1	331+01.97	333+86.64	336+57.75	30°34'04"	5°30'00"	284.67	565.78	MATCH EX.	MATCH EX.	50
8-1	304+99.35	305+71.77	306+44.19	1°48'38"	1°56'37"	72.43	144.84	0.031	280	50
9-1	304+17.19	305+12.41	306+07.47	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
9-2	313+36.68	312+02.48	311+75.95	65°25'09"	4°15'00"	865.80	1539.27	0.075	300	50
9-3	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	0.0	290	50
10-1	343+92.27	346+09.82	348+13.92	34°47'11"	8°15'00"	217.55	421.65	0.0	350	50
11-1	326+86.42	329+89.18	332+57.43	47°06'31"	8°15'00"	302.76	571.01	0.0	350	50
11-2	333+71.44	338+16.96	342+13.43	46°18'36"	5°30'00"	445.52	842.00	0.088	350	50
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	8°00'00"	66.17	106.83	N.A.	N.A.	25
13-1	283+94.33	288+21.59	292+42.59	16°57'55"	2°00'00"	427.26	848.26	0.055	525	60
13-2	294+40.16	299+22.77	303+71.5	37°47'24"	4°00'00"	482.61	931.00	0.093	600	60
13-3	312+51.55	314+78.03	312+30.82	152°24'39"	5°15'00"	525.47	2979.26	0.0	480	60
13-4	346+90.63	351+42.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	0.0	480	60



NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. RD. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
							JOB NO. BBO414	
INTERCHANGE LAYOUT SHEET								

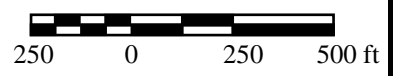


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 REVISION DATE:

Interchange layout plan provided by Garver, LLC

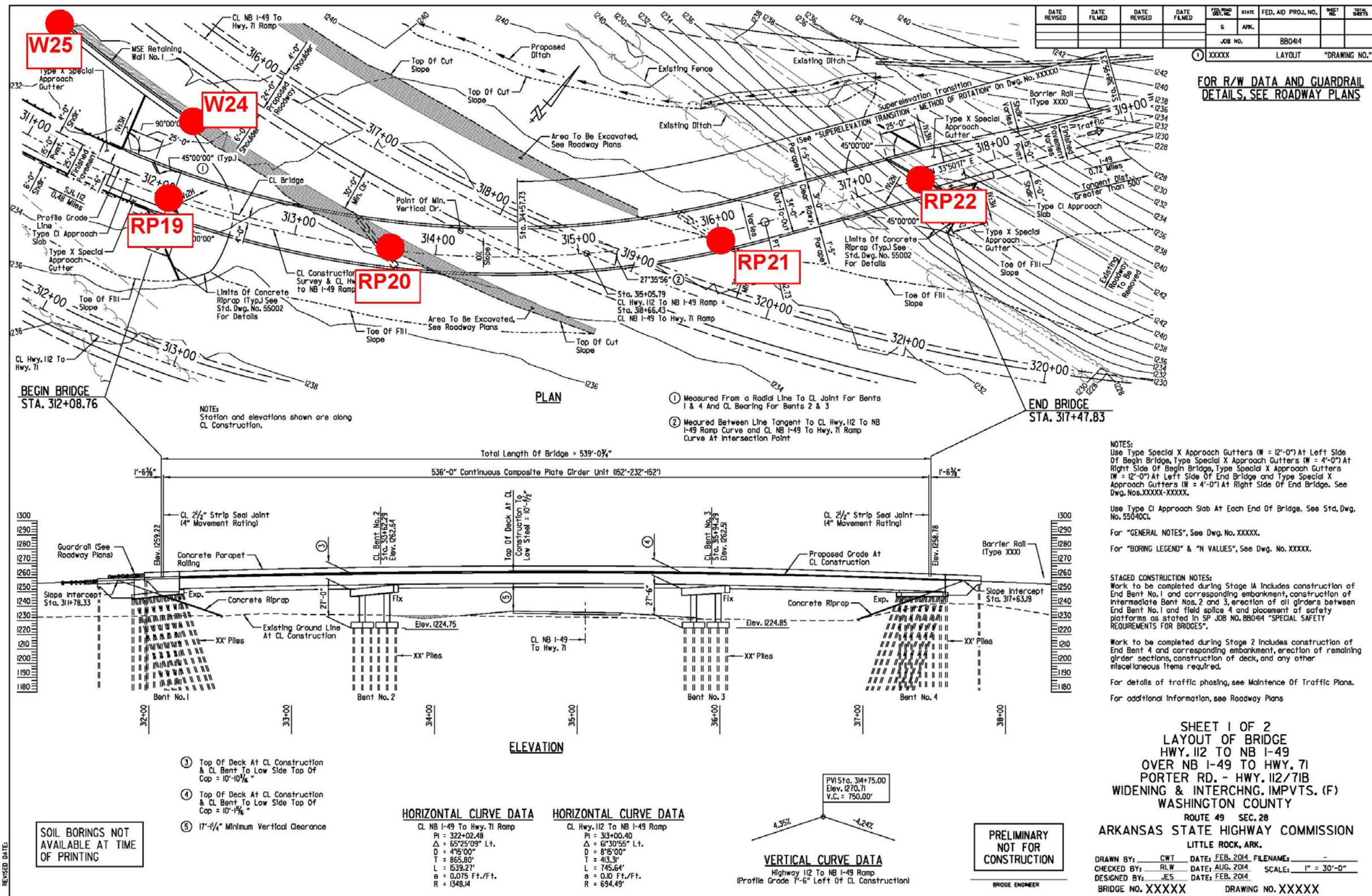


SITE VICINITY MAP
HIGHWAY 112 RAMP TO INTERSTATE 49 NORTHBOUND
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1



Bridge layout plan provided by Garver, LLC



PLAN OF BORINGS
HIGHWAY 112 RAMP TO INTERSTATE 49 NORTHBOUND
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. RP19

BB0414: Hwy 112 Ramp to I-49NB
Fayetteville, Arkansas

TYPE: Auger to 3.5 ft /Wash

LOCATION: App. Hwy 112 Ramp to I-49NB Sta 312+00, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT							
			SURF. EL: 1233±			0.2	0.4	0.6	0.8	1.0	1.2	1.4			
						+			●						
						+									
			Stiff brown clayey silt	14											
5			Very stiff reddish brown and brown silty clay w/chert fragments and ferrous nodules	39										73	
			Very stiff to hard reddish brown cherty clay w/chert seams, layers and inclusions - water at 8 ft	25/0"											
10				25/0"											
				25/0"											
15			- auger refusal at 12.5 ft Hard light gray and gray limestone w/chert nodules and inclusions, slightly stylolitic	25/0"											
20															
25															
30				25/0"											
35				25/0"											
40				25/0"											
45				25/0"											
50				25/0"											
55															

NOTE: Drilled with rock bit below core run. No loss of circulation, no voids.

q_u = 12,450 psi, TUW = 166 pcf

q_u = 11,470 psi, TUW = 166 pcf

COMPLETION DEPTH: 50.0 ft
DATE: 9-18-14

DEPTH TO WATER
IN BORING: 8 ft

DATE: 9/18/2014

RECROD200-2 14-073_RAMP.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. RP20

BB0414: Hwy 112 Ramp to I-49NB
Fayetteville, Arkansas

TYPE: Auger to 10.5 ft /Wash

LOCATION: App. Hwy 112 Ramp to I-49NB Sta 313+60, CL

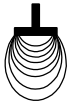
DEPTH, FT	SYMBOL SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
					PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
		SURF. EL: 1233±			0.2	0.4	0.6	0.8	1.0	1.2	1.4			
					10	20	30	40	50	60	70			
		Stiff dark brown clayey silt	16			●								
		Stiff reddish tan and tan silty clay w/chert fragments	22		●		+					83		
5		Very stiff tan and reddish brown cherty clay	31		●									
			47				●							
10		- water at 8 ft - firm below 8 ft	8			+				●		87		
		- auger refusal at 10.5 ft	25/0"											
15		Hard light gray and gray limestone w/chert nodules and inclusions and calcareous seams, slightly stylolitic - calcite inclusions at 15.2 ft - near-vertical healed fracture at 16 ft											97	47
20													98	88
			50/0"											
			50/0"											
			50/0"											
			50/0"											
			50/0"											
			50/0"											
			50/0"											
			50/0"											
50														
		NOTE: Drilled with rock bit below core run. No loss of circulation, no voids.												
55														

COMPLETION DEPTH: 50.0 ft
DATE: 9-17-14

DEPTH TO WATER
IN BORING: 8 ft

DATE: 9/17/2014

RECROD200-2 14-073_RAMP.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. RP21

BB0414: Hwy 112 Ramp to I-49NB
Fayetteville, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: App. Hwy 112 Ramp to I-49NB Sta 315+90, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT			
			SURF. EL: 1233±								
5			Stiff dark brown clayey silt Stiff tan silty clay w/ferrous nodules and some fine to coarse chert fragments	18		●					
				19		● +	+			79	
				16		●					
				81		+ ⊗ △ ●	+			72	
10			- low hardness highly weathered chert layer at 7.5 ft Very stiff to hard reddish brown cherty clay w/chert seams - water at 10 ft - chert seam at 11 ft - auger refusal at 12.5 ft	50/7"		●					
15			Hard light gray and gray slightly weathered limestone w/chert inclusions, slightly stylolitic	25/0"							
20										77	48
40			NOTE: Drilled with rock bit below core run. No loss of circulation, no voids.								
COMPLETION DEPTH: 37.0 ft				DEPTH TO WATER IN BORING: 10 ft				DATE: 9/16/2014			
DATE: 9-16-14											

RECROD\200-2 14-073_RAMP.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. RP22

BB0414: Hwy 112 Ramp to I-49NB
Fayetteville, Arkansas

TYPE: Auger to 28 ft /Wash

LOCATION: App. Hwy 112 Ramp to I-49NB Sta 317+55, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1242±						
5			6 inches: Crushed Stone Base Very stiff reddish brown silty clay w/numerous chert fragments (fill)	50/9"					43
				30					
				35					
				50/9"					
10			Very stiff reddish brown cherty clay w/chert seams	50/8"					86
				25/0"					
20			Very stiff reddish tan and gray clay w/occasional silt pockets and ferrous nodules and stains	28					
25				40					
30			Moderately hard to hard light gray slightly weathered limestone w/occasional silty clay seams	25/0"					
35			Hard light gray and gray limestone w/chert nodules and inclusions	25/0"					
40				25/0"					

NOTE: Drilled with rock bit. No loss of circulation, no voids.

COMPLETION DEPTH: 40.0 ft
DATE: 9-23-14

DEPTH TO WATER
IN BORING: 21 ft

DATE: 9/23/2014

LGBNEW_14-073_RAMP.GPJ_12-17-15

PORTER RD.-HWY. 112/71B WIDENING &
INTCHNG. IMPVTS. – AHTD BB0414

14-073

RP19 @ 15 - 25 ft

14-073
RP19
15'-25'





14073
RP-20
14-073
RP20
12'-22'

PORTER RD.-HWY. 112/71B WIDENING &
INTCHNG. IMPVTS. - AHTD BB0414
14-073
RP20 @ 12 - 22 ft

14-073
RP21
S-849

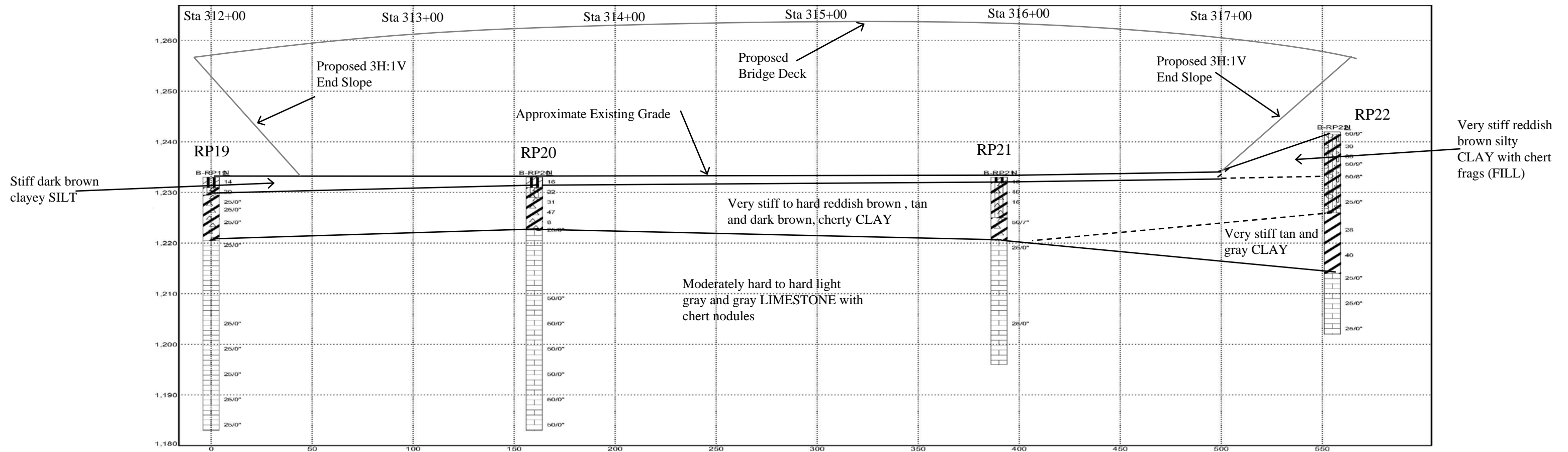
14-073
RP21
14'-24'

PORTER RD.-HWY. 112/71B WIDENING &
INTCHNG. IMPVTS. – AHTD BB0414
14-073
RP21 @ 14 - 24 ft



PICTURE OF CORING SAMPLES
Porter Rd.-Hwy. 112/71B Widening & Intchn. Impvts.
AHTD Job No. BB0414– Fayetteville, Arkansas
Boring RP21, 14- 24 FT

Job No. 14-073
Plate 9



Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
 Highway 112 Ramp to Northbound Interstate 49
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening &
 Interchg. Impvts. (F) – Washington County, Arkansas

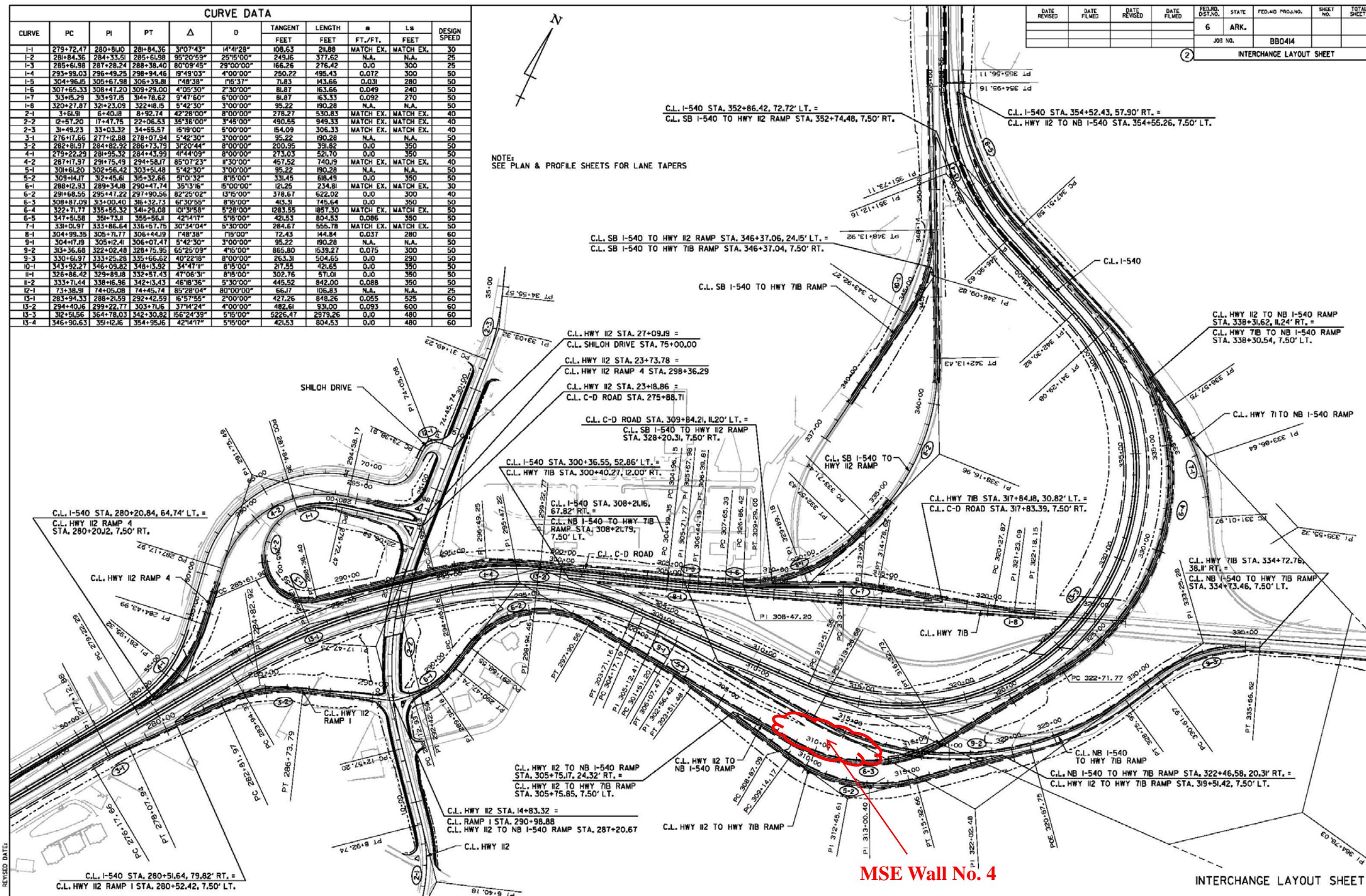
Job No. 14-073

PLATE 10

ATTACHMENT 6

CURVE	PC	PI	PT	Δ	D	TANGENT		Ls	DESIGN SPEED	
						FEET	FEET			
1-1	279+72.47	280+81.00	281+84.36	3°07'43"	14°41'28"	108.63	218.88	MATCH EX.	MATCH EX.	30
1-2	281+84.36	284+33.51	285+61.98	95°20'59"	25°15'00"	249.16	377.62	N.A.	N.A.	25
1-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	0.0	0.0	300
1-4	293+99.03	296+49.25	298+94.46	19°49'03"	4°00'00"	250.22	495.43	0.072	0.0	300
1-5	304+96.05	305+67.98	305+39.81	748°38'	75°31'	71.83	143.66	0.031	0.0	280
1-6	307+65.33	308+41.20	309+29.00	4°05'30"	2°30'00"	81.87	153.66	0.049	0.0	240
1-7	313+85.29	315+97.5	317+82.62	9°47'50"	6°00'00"	81.87	153.33	0.092	0.0	270
1-8	320+27.87	321+23.09	322+18.05	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
2-1	3+61.91	6+40.18	8+92.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.	MATCH EX.	40
2-2	12+87.20	17+47.75	22+06.53	35°36'00"	3°45'00"	490.55	949.33	MATCH EX.	MATCH EX.	40
2-3	31+49.23	33+03.32	34+55.57	15°19'00"	6°00'00"	64.09	306.33	MATCH EX.	MATCH EX.	40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
3-2	282+81.97	284+82.92	286+73.79	3°20'44"	8°00'00"	200.95	391.82	0.0	0.0	350
4-1	279+22.29	281+95.32	284+43.99	4°44'09"	8°00'00"	273.03	521.70	0.0	0.0	350
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	8°30'00"	457.52	740.9	MATCH EX.	MATCH EX.	40
5-1	301+61.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
5-2	309+14.17	312+45.6	315+32.66	9°01'32"	8°15'00"	331.45	618.49	0.0	0.0	350
6-1	288+12.93	289+34.18	290+47.74	35°13'15"	15°00'00"	121.25	234.81	MATCH EX.	MATCH EX.	30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	0.0	0.0	300
6-3	308+87.09	313+00.40	316+32.73	6°30'55"	8°15'00"	413.3	745.64	0.0	0.0	350
6-4	322+71.77	335+55.32	348+29.08	10°31'58"	5°28'00"	1283.55	1857.30	MATCH EX.	MATCH EX.	50
6-5	347+51.58	351+73.11	355+95.11	42°14'17"	5°15'00"	421.53	804.53	0.086	0.0	350
7-1	331+01.97	333+86.64	336+57.75	30°34'04"	8°30'00"	284.67	555.78	MATCH EX.	MATCH EX.	50
8-1	304+99.35	305+71.77	306+44.19	748°38'	75°00"	72.43	144.84	0.037	0.0	280
9-1	304+17.9	305+12.41	306+07.41	5°42'30"	3°00'00"	95.22	190.28	N.A.	N.A.	50
9-2	313+85.29	315+97.5	317+82.62	65°25'09"	4°15'00"	865.80	1539.27	0.015	0.0	300
9-3	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	0.0	0.0	290
10-1	343+92.27	346+09.82	348+13.92	34°47'11"	8°15'00"	217.55	421.65	0.0	0.0	350
11-1	326+86.42	329+89.18	332+57.43	47°06'31"	8°15'00"	302.76	571.01	0.0	0.0	350
11-2	333+71.44	338+16.96	342+13.43	46°18'36"	5°30'00"	445.52	842.00	0.088	0.0	350
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	80°00'00"	66.17	106.83	N.A.	N.A.	25
13-1	283+94.33	288+21.59	292+42.59	15°57'55"	2°00'00"	427.26	848.26	0.055	0.0	600
13-2	294+40.16	299+22.77	303+71.16	37°14'24"	4°00'00"	482.61	931.00	0.093	0.0	600
13-3	312+51.56	314+78.03	317+30.82	156°24'39"	5°15'00"	522.47	2579.26	0.0	0.0	480
13-4	346+90.63	351+12.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	0.0	0.0	480

NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS



REVISED DATE:
2/10/2014 10:53:40 AM
KERSHNER, GREGORY
L:\2014\11\07 - I-540 widening & interchange improvement\Drawings\FELLS.dgn

Interchange layout plan provided by Garver, LLC



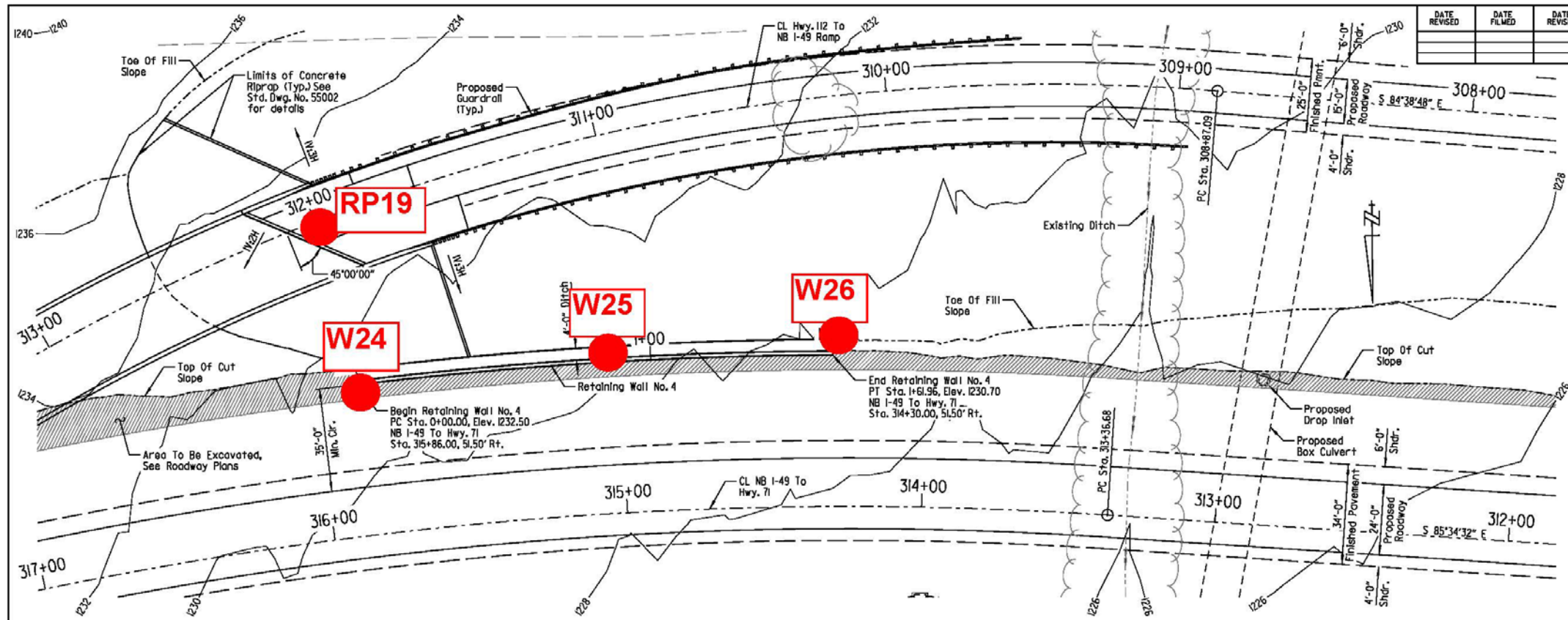
SITE VICINITY MAP
MSE WALL NO. 4
WASHINGTON COUNTY, ARKANSAS



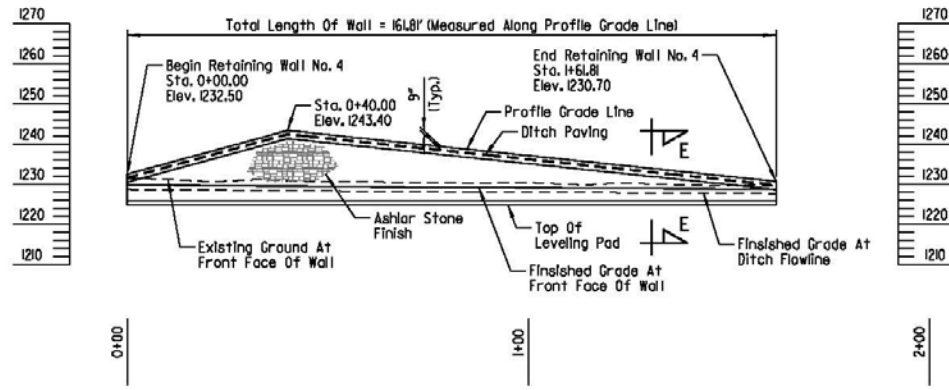
Job No. 14-073

PLATE 1

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.	B80414		
				JOB NO. B80414				
				RETAINING WALL DETAILS "DRAWING NO."				



PLAN - RETAINING WALL NO. 4



ELEVATION - RETAINING WALL NO. 4
Looking At Front Face

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

NOTES:
 For "GENERAL NOTES" & "SECTION E-E", See Dwg. No. XXXXX & XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 4 are measured from CL NB I-49 To Hwy. 71 Ramp to Profile Grade Line at top of front face of coping.
 Elevations shown are at Profile Grade Line at top of front face of coping. For elevations along retaining wall, see "TABLE OF WALL ELEVATIONS" On Dwg. No. XXXXX.

PRELIMINARY NOT FOR CONSTRUCTION

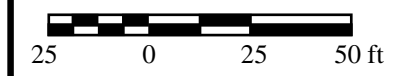
LEGEND
 U.N.O. = Unless Noted Otherwise

SHEET 4 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: CWT DATE: FEB. 2014 FILENAME: _____
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
 DESIGNED BY: JES DATE: FEB. 2014
 BRIDGE NO. _____ DRAWING NO. XXXXX

MSE wall layout plan provided by Garver, LLC



PLAN OF BORINGS
 MSE WALL NO. 4
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W24

BB0414: Wall #4
Fayetteville, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Wall #4 Sta 0+00, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1231±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Firm to stiff dark brown clayey silt, moist	10									
			Very stiff tan and brown silty clay w/chert fragments and ferrous nodules and stains	31									87
5			Hard reddish brown and tan cherty clay w/some chert cobbles	50/4"									
			- more cherty below 7 ft										
			- water at 8 ft										
10				25/0"									
			- auger refusal at 12.5 ft										
			Moderately hard to hard light gray cherty limestone	25/0"									
15													
20													
25													

COMPLETION DEPTH: 20.0 ft
DATE: 9-19-14

DEPTH TO WATER
IN BORING: 8 ft

DATE: 9/19/2014

LGBNEW_14-073_WALL #4.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W25

BB0414: Wall #4
Fayetteville, Arkansas

TYPE: Auger to 13.5 ft /Wash

LOCATION: Approx Wall #4 Sta 0+80, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1231±						
			Firm dark brown clayey silt, sandy w/occasional rootlets	8					77
			Stiff tan and brown silty clay w/ferrous nodules and stains	16					
5			Very stiff to hard reddish brown and tan cherty clay	40					
				37					66
			- hard with more chert below 8.5 ft	50/6"					
10			- water at 11 ft						
			- auger refusal at 13.5 ft	25/0"					
15			Moderately hard to hard light gray and gray weathered limestone w/chert nodules and inclusions						
20				25/0"					
25									

COMPLETION DEPTH: 20.0 ft
DATE: 9-19-14

DEPTH TO WATER
IN BORING: 11 ft

DATE: 9/19/2014

LGBNEW 14-073 WALL #4.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W26

BB0414: Wall #4
Fayetteville, Arkansas

TYPE: Auger to 14 ft /Wash

LOCATION: Approx Wall #4 Sta 1+60, CL

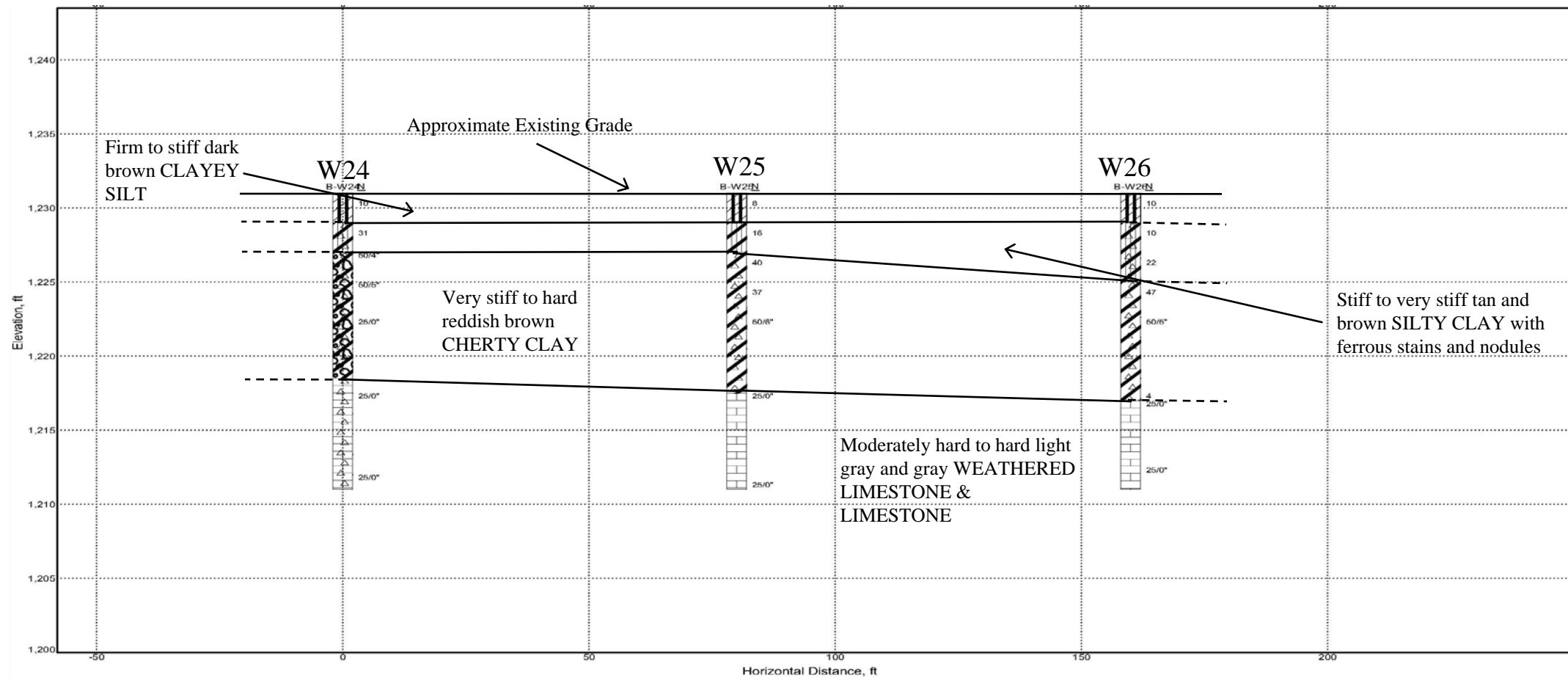
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1231±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Firm to stiff dark brown clayey silt	10			●						
			Firm to stiff tan and brown silty clay w/chert fragments and ferrous nodules and stains	10			●						
5			- stiff below 4 ft	22		+	●	- - - -	+				81
			Very stiff to hard reddish brown and tan cherty clay	47				●					
			- with more chert below 8 ft	50/5"			+	●	- - - -	+			55
10			- water at 11 ft										
			- friable highly weathered chert layer at 13.5 ft	4				●					
15			- auger refusal at 14 ft	25/0"									
			Moderately hard to hard light gray and gray weathered limestone w/chert nodules and inclusions	25/0"									
20													
25													

COMPLETION DEPTH: 20.0 ft
DATE: 9-18-14

DEPTH TO WATER
IN BORING: 11 ft

DATE: 9/18/2014

LGBNEW 14-073 WALL #4.GPJ 12-17-15



Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
 Retaining Wall No. 4
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening & Interchg. Impvts. (F) – Washington County, Arkansas

Job No. 14-073

PLATE 6

ATTACHMENT 7

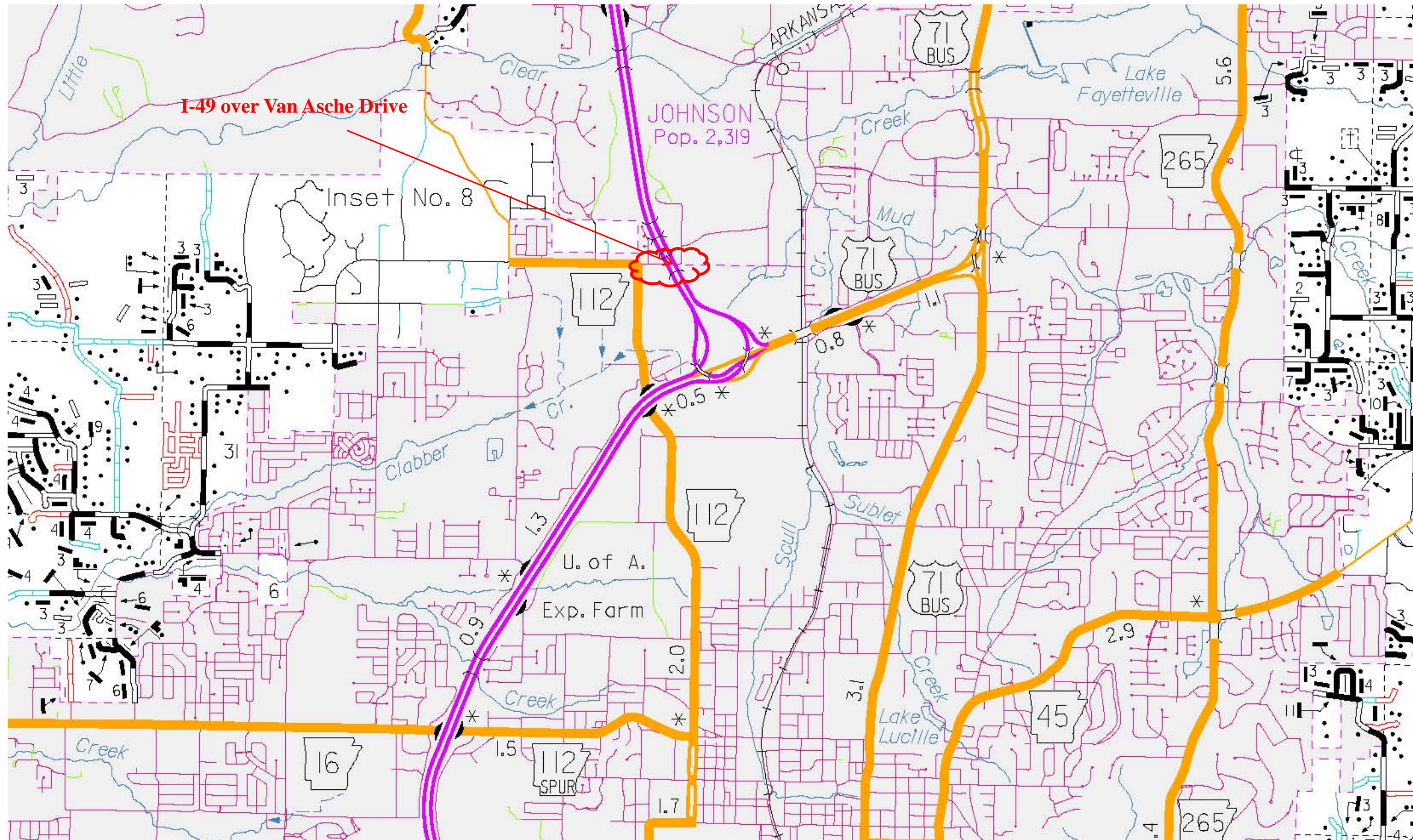


Image taken from General Highway Map of Washington County, Arkansas prepared by AHTD, 12-13-11

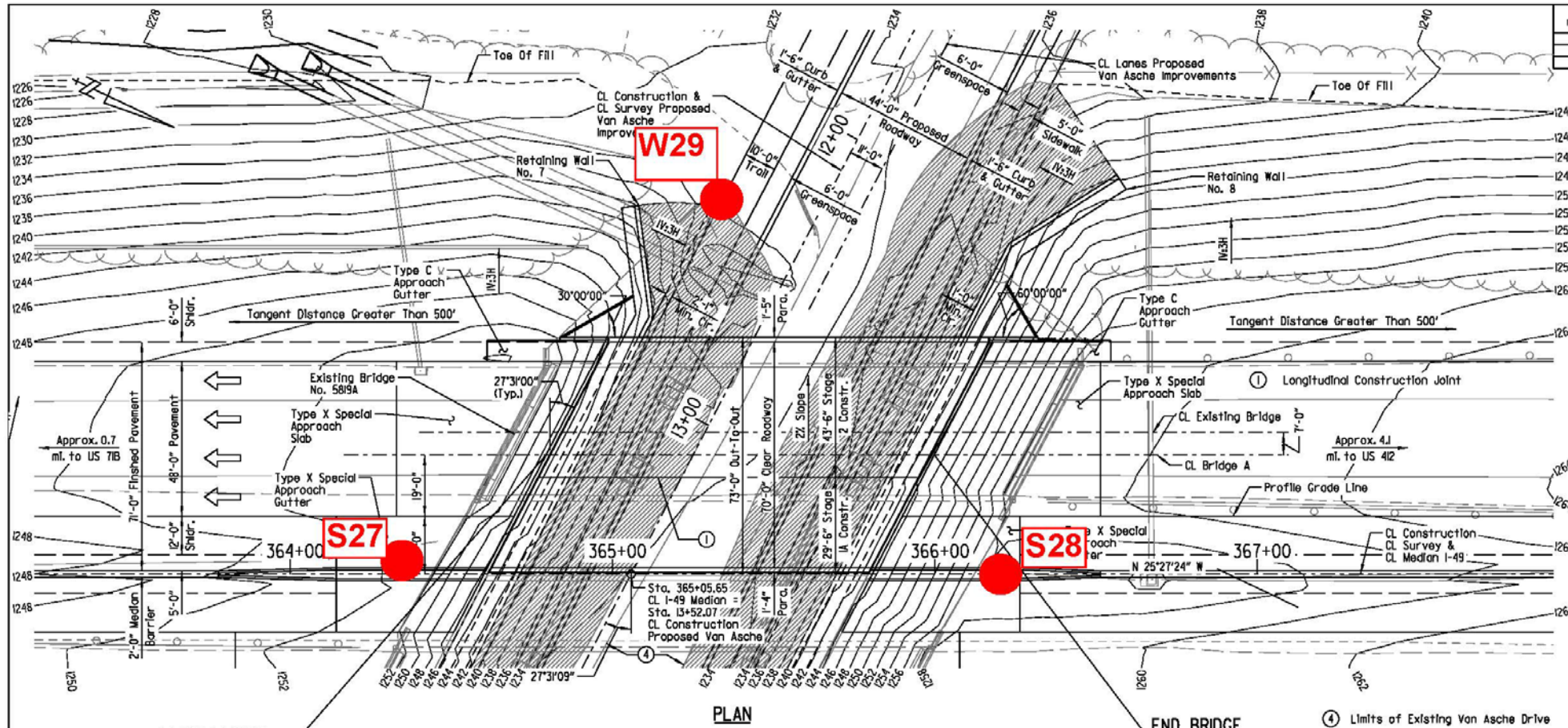


SITE VICINITY MAP
INTERSTATE 49 OVER VAN ASCHE DRIVE
WASHINGTON COUNTY, ARKANSAS

Not to Scale

Job No. 14-073

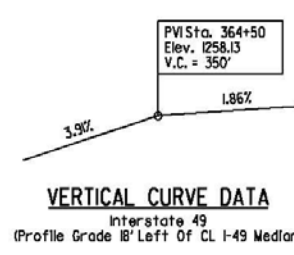
PLATE 1



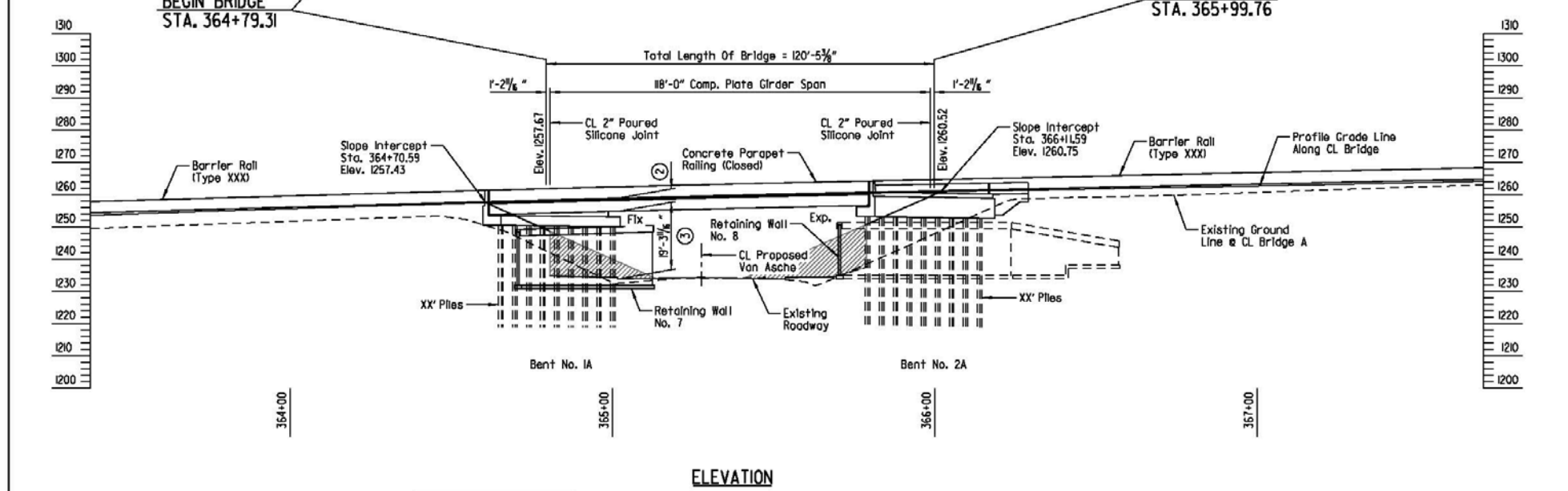
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
							JOB NO.	BBO414
							XXXXX	LAYOUT "DRAWING NO."

NOTES:
 Use Type C Approach Gutters (W = 6'-0") AT Left Side Of Bridge Bridge and Type Special Approach Gutters At Right Side Of Bridge, See Dwg. Nos. XXXXX.
 Use Type Special Approach Slab At Each End Of Bridge. See Dwg. No. XXXX.
 For GENERAL NOTES, See Dwg. No. XXXXX.
 For Boring Legend & "N" Values, See Dwg. No. XXXXX.

NOTE:
 Van Asche Improvements are currently under construction. Upon completion "PLAN" & "ELEVATION" will reflect improvements to Van Asche Drive.



NOTE:
 Elevations shown are along CL Bridge. Stationing is along CL Median I-49. Span lengths, total length of bridge, and CL joint to beginning and end of bridge dimensions are measured along CL Bridge, unless noted otherwise.



FOR R/W DATA AND GUARDRAIL DETAILS, SEE ROADWAY PLANS

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

- ② Top Of Deck At Profile Grade Line To Low Steel = 5'-9/2"
- ③ Minimum Vertical Clearance

PRELIMINARY NOT FOR CONSTRUCTION
 BRIDGE ENGINEER

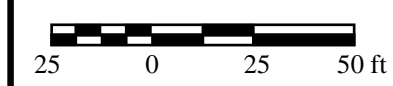
LAYOUT OF BRIDGE A INTERSTATE 49 OVER VAN ASCHE DRIVE PORTER RD. - HWY. 112/71B WIDENING & INTERCHNG. IMPVTS. (F) WASHINGTON COUNTY ROUTE 49 SEC. 28 ARKANSAS STATE HIGHWAY COMMISSION LITTLE ROCK, ARK.
 DRAWN BY: PCC DATE: AUG. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1"=20'-0"
 DESIGNED BY: PCC DATE: AUG. 2014
 BRIDGE NO. XXXXX DRAWING NO. XXXXX

Bridge layout plan provided by Garver, LLC

Note: Boring W30 not drilled due to limited access.

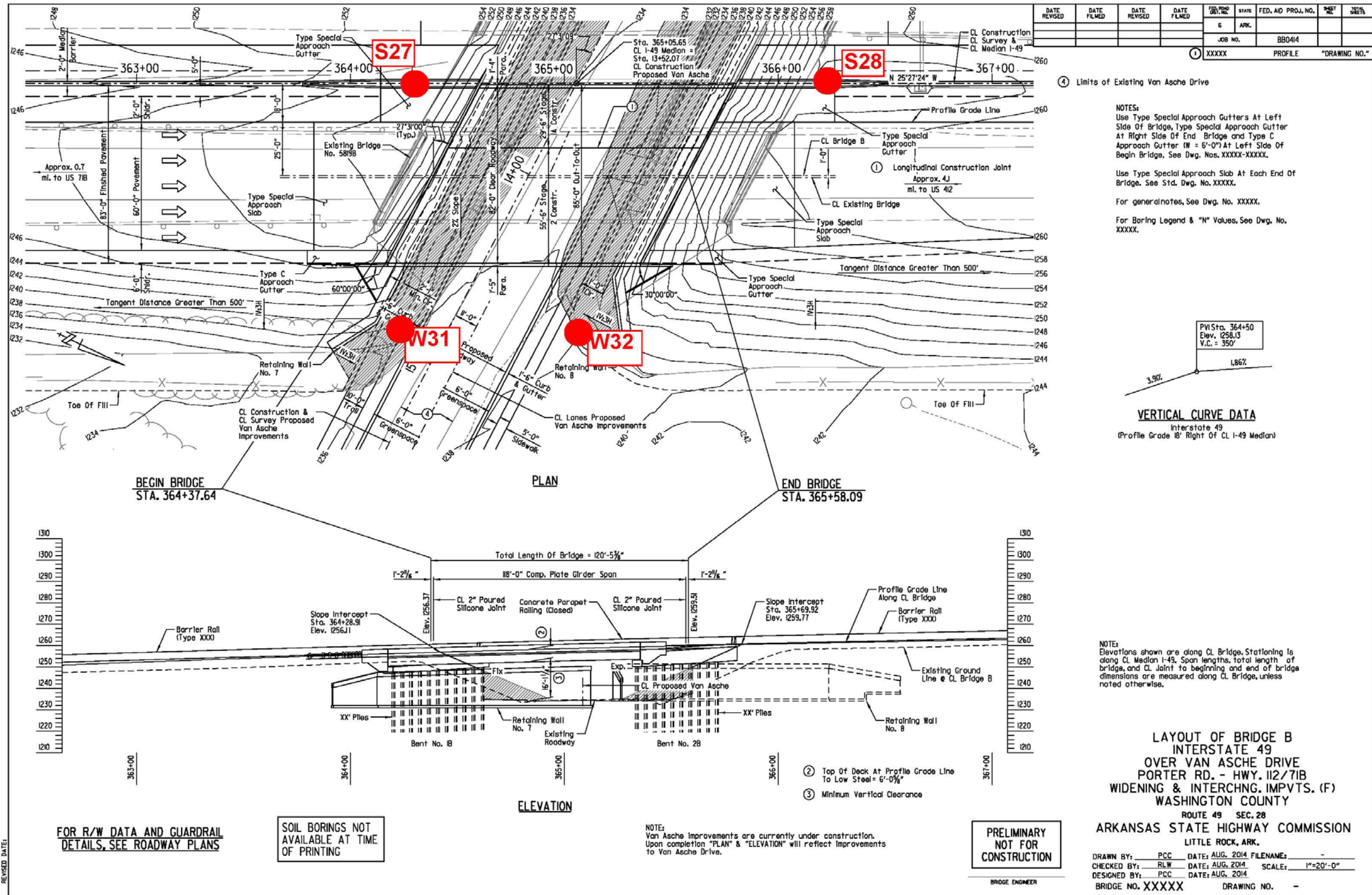


PLAN OF BORINGS INTERSTATE 49 OVER VAN ASCHE DRIVE WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2A



Bridge layout plan provided by Garver, LLC

Note: Boring W30 not drilled due to limited access.



PLAN OF BORINGS
INTERSTATE 49 OVER VAN ASCHE DRIVE
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2B



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S27

BB0414: I-49 over Van Asche
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 364+47, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1252±						
9			Firm dark brown silty clay, sandy (fill)	9					60
5			Stiff to very stiff reddish brown cherty clay with chert cobbles (fill) - stiff below 6 ft	29					
25				16					
10				20					
15				50/10"					28
20			- with more chert fragments below 13 ft	50/9"					
25			Stiff gray and reddish tan silty clay w/a little chert fragments	22					85
30				14					
35			Moderately hard tan, gray and dark gray weathered shale	25/0"					
40			Moderately hard to hard dark gray shale and clayey shale	25/0"					
45				25/0"					
50				25/0"					
55				25/0"					
60				25/0"					
65				25/0"					
70				25/0"					

COMPLETION DEPTH: 70.0 ft
DATE: 11-20-14

DEPTH TO WATER
IN BORING: 25 ft

DATE: 11/20/2014

LGBNEW_14-073_VAN ASCHE.GPJ_12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. S28

BB0414: I-49 over Van Asche
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 366+30, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1257±						
5			Stiff dark brown silty clay (fill)	16					
			Stiff to very stiff reddish brown and dark brown cherty clay w/cobbles (fill)	24					
				50/10"					
				24					
10				23					53
				24					
15				24					
			- very stiff below 18 ft	30					
20									
			Firm gray and tan silty clay w/some fine chert fragments	9					73
25									
30			Moderately hard tan, gray and dark gray weathered shale	50/3"					
			Moderately hard to hard dark gray shale and clayey shale	25/0"					
35				25/0"					
40				25/0"					
45				25/0"					
50				25/0"					
55				25/0"					
60				25/0"					

COMPLETION DEPTH: 60.0 ft
DATE: 11-19-14

DEPTH TO WATER
IN BORING: 23 ft

DATE: 11/19/2014

LGBNEW_14-073_VAN ASCHE.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W29

BB0414: Wall #7
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 365+30, 112 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1234±						
			Very stiff dark brown silty clay (fill)	35					
			Stiff reddish brown cherty clay (fill)	12					
5			- water at 4 ft Very soft gray and tan silty clay w/fine to coarse sand and sized chert nodules - firm to stiff reddish tan and tan with chert fragments below 6 ft	2					85
				10					
10			Stiff gray clay w/some chert nodules and fragments	21					55
				50/5"					
15			Moderately hard tan, gray and dark gray weathered clayey shale						
				50/2"					
20									
25									

LGBNEW_14-073_WALL #7.GPJ 1-18-16

COMPLETION DEPTH: 20.0 ft
DATE: 10-23-14

DEPTH TO WATER
IN BORING: 4 ft

DATE: 10/23/2014



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W31

BB0414: Wall #7
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 363+90, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1236±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff reddish brown and dark brown silty clay w/chert fragments (fill)	22									
			- very stiff, cherty clay below 2 ft	32									42
5			Stiff gray and brown silty clay w/occasional chert fragments	20									
			- water at 7 ft	22									
			- very stiff below 8 ft	31									
10			Low hardness tan, gray and dark gray weathered clayey shale										
			- moderately hard below 13 ft	50/4"									
15													
20													
25													

COMPLETION DEPTH: 20.0 ft
DATE: 10-24-14

DEPTH TO WATER
IN BORING: 7 ft

DATE: 10/24/2014

LGBNEW_14-073_WALL #7.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W32

BB0414: Wall #8
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 365+05, 116 ft Rt

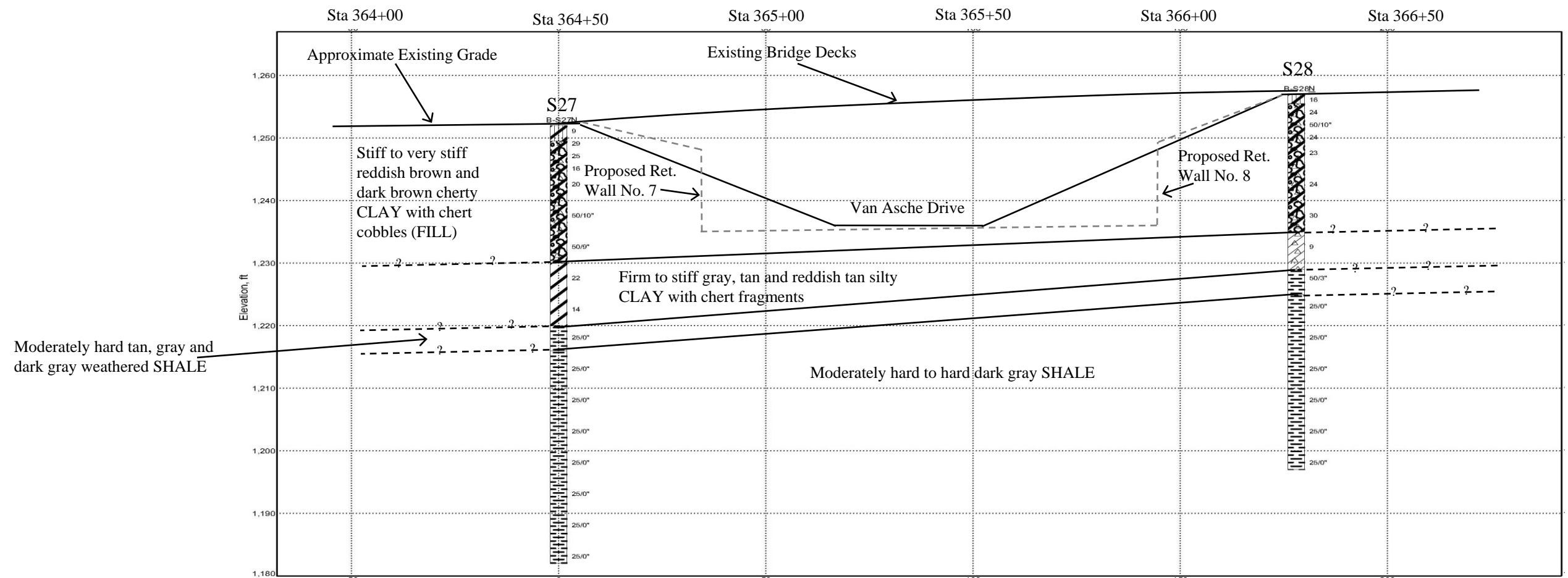
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1238±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Medium dense reddish tan and brown chert fragments w/fine sandy silt and clayey silt pockets (fill)	13		●		++					11
			Very stiff reddish brown cherty clay (fill)	31			●						
5			- water at 4 ft - stiff below 4 ft	14			●						
			Very stiff tan and gray silty clay w/chert fragments	28			+●	--	+				85
10				30			●						
			Moderately hard brown and dark gray weathered clayey shale w/ferrous stains	50/8"					●				
15													
20				50/3"					●				
25													

LGBNEW_14-073_WALL #8.GPJ 12-17-15

COMPLETION DEPTH: 20.0 ft
DATE: 10-23-14

DEPTH TO WATER
IN BORING: 4 ft

DATE: 10/23/2014



Moderately hard tan, gray and dark gray weathered SHALE

- Notes:** 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
 Interstate 49 over Van Asche Drive
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening & Interchg. Impvts. (F) – Washington County, Arkansas

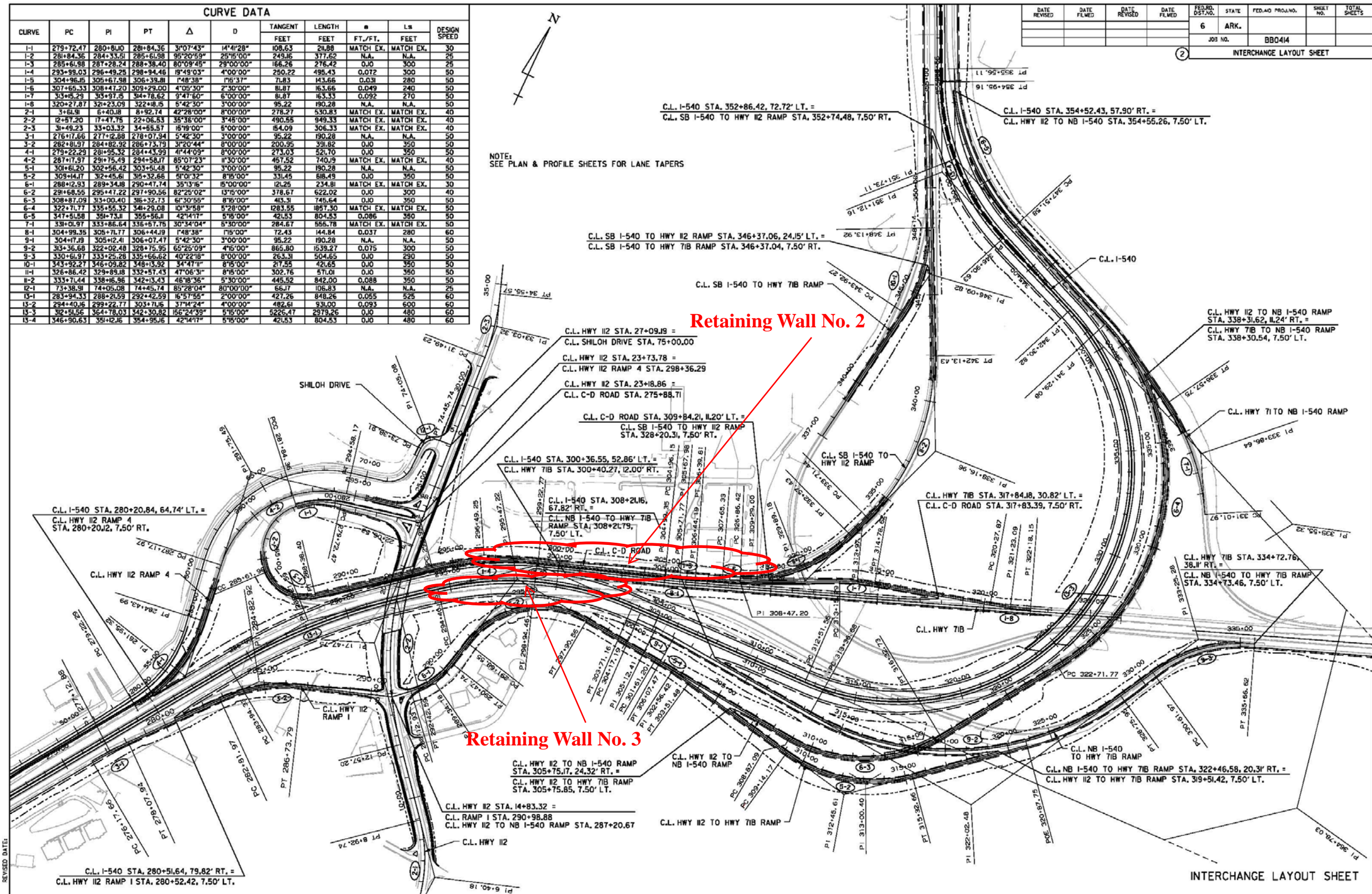
Job No. 14-073

PLATE 8

ATTACHMENT 8

CURVE	PC	PI	PT	Δ	D	TANGENT		Ls	DESIGN SPEED
						FEET	FEET		
1-1	279+72.47	280+81.00	281+84.36	3°07'43"	14°41'28"	108.63	218.88	MATCH EX.	30
1-2	281+84.36	284+33.51	285+61.98	95°20'59"	25°15'00"	249.16	377.62	N.A.	25
1-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	OJO	300
1-4	293+99.03	296+49.25	298+94.46	19°49'03"	4°00'00"	250.22	495.43	0.072	300
1-5	304+96.05	305+67.98	306+39.81	748°38'	1°53'17"	71.83	143.66	0.031	280
1-6	307+65.33	308+41.20	309+29.00	4°03'30"	2°30'00"	81.87	153.66	0.049	240
1-7	313+85.29	315+97.5	318+78.62	9°47'50"	6°00'00"	81.87	153.33	0.092	270
1-8	320+27.87	321+23.09	322+18.05	5°42'30"	3°00'00"	95.22	190.28	N.A.	50
2-1	3+61.91	6+40.18	8+92.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.	40
2-2	12+87.20	17+47.75	22+06.53	35°36'00"	3°45'00"	490.55	949.33	MATCH EX.	40
2-3	31+49.23	33+03.32	34+55.57	15°19'00"	6°00'00"	64.09	306.33	MATCH EX.	40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.	50
3-2	282+81.97	284+82.92	286+73.79	3°20'44"	8°00'00"	200.95	391.82	OJO	350
4-1	279+22.29	281+95.32	284+43.99	4°44'09"	8°00'00"	273.03	521.70	OJO	350
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	1°30'00"	457.52	740.9	MATCH EX.	40
5-1	301+61.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.	50
5-2	309+14.17	312+45.6	315+32.66	9°01'32"	8°15'00"	331.45	618.49	OJO	350
6-1	288+12.93	289+34.18	290+47.74	35°13'15"	15°00'00"	121.25	234.81	MATCH EX.	30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	OJO	300
6-3	308+87.09	313+00.40	316+32.73	6°30'55"	8°15'00"	413.3	745.64	OJO	350
6-4	322+71.77	335+55.32	348+29.08	10°31'58"	5°28'00"	1283.55	1857.30	MATCH EX.	50
6-5	347+51.58	351+73.11	355+96.11	42°14'17"	5°15'00"	421.53	804.53	0.086	350
7-1	331+01.97	333+86.64	336+57.75	30°34'04"	8°30'00"	284.67	555.78	MATCH EX.	50
8-1	304+99.35	305+71.77	306+44.19	748°38'	1°50'00"	72.43	144.84	0.037	280
8-2	304+99.35	305+71.77	306+44.19	748°38'	1°50'00"	72.43	144.84	N.A.	50
9-1	313+85.29	315+97.5	318+78.62	9°47'50"	6°00'00"	81.87	153.33	0.015	300
9-2	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	OJO	290
10-1	343+92.27	346+09.82	348+13.92	34°47'11"	8°15'00"	271.55	421.65	OJO	350
11-1	326+86.42	329+89.18	332+57.43	47°06'31"	8°15'00"	302.76	571.01	OJO	350
11-2	333+71.44	338+16.96	342+13.43	46°18'36"	5°30'00"	445.52	842.00	0.088	350
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	80°00'00"	66.17	106.83	N.A.	25
13-1	283+94.33	288+21.59	292+42.59	15°57'55"	2°00'00"	427.26	848.26	0.055	525
13-2	294+40.16	299+22.77	303+71.16	37°14'24"	4°00'00"	482.61	931.00	0.093	600
13-3	312+51.56	314+78.03	312+30.82	156°24'39"	5°15'00"	522.47	2579.26	OJO	480
13-4	346+90.63	351+12.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	OJO	480

NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS



DATE REVISED	DATE FILED	DATE REVISED	DATE FILED	FED. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO. BBD414				
INTERCHANGE LAYOUT SHEET								

Interchange layout plan provided by Garver, LLC

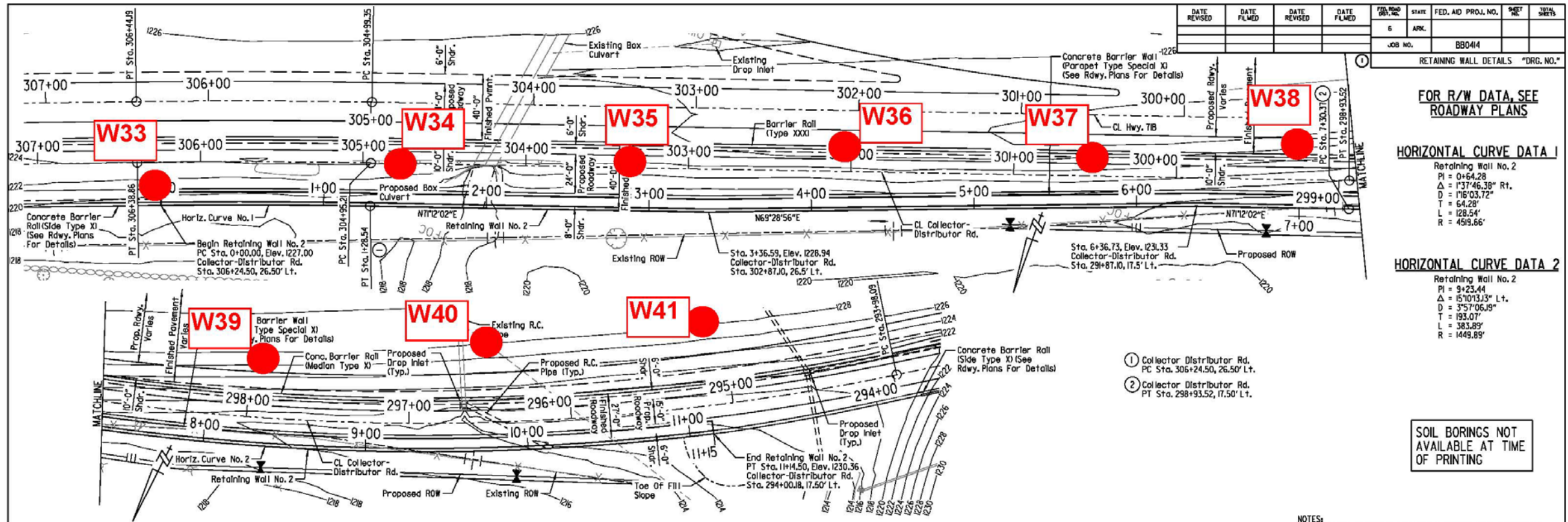


SITE VICINITY MAP
RETAINING WALL NOS. 2 AND 3
WASHINGTON COUNTY, ARKANSAS

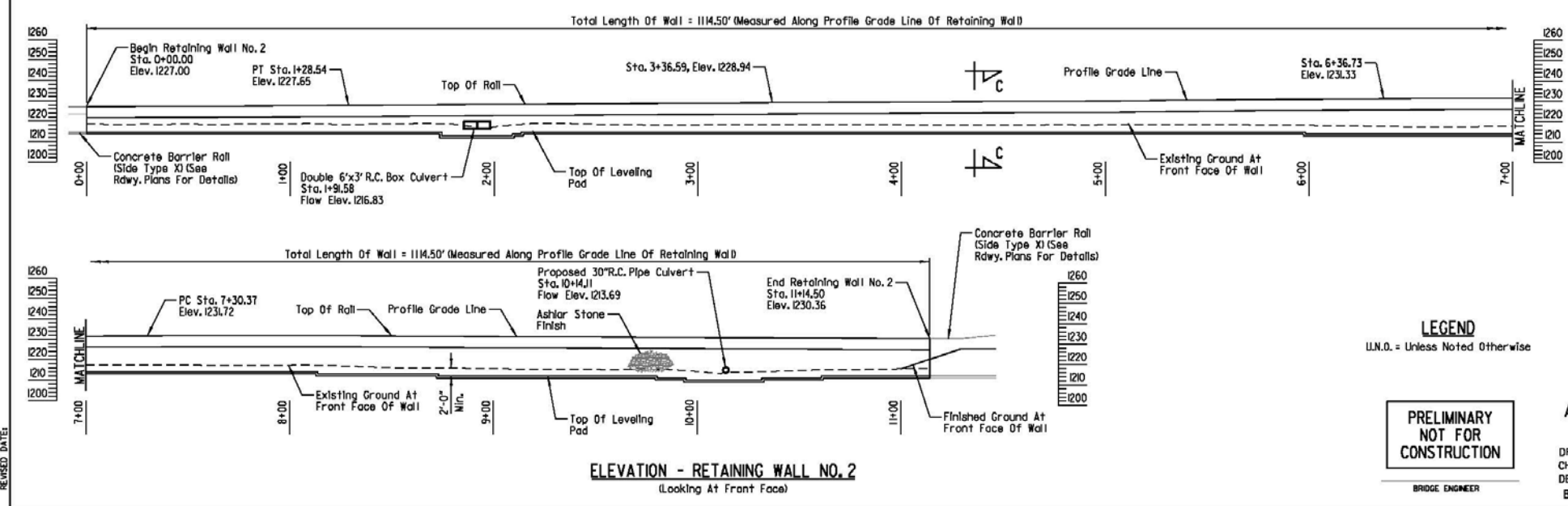


Job No. 14-073

PLATE 1



PLAN - RETAINING WALL NO. 2



ELEVATION - RETAINING WALL NO. 2
 (Looking At Front Face)

NOTES:
 For "GENERAL NOTES" & "SECTION C-C", See Dwg. Nos. XXXXX & XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for MSE Retaining Wall No. 2 are measured from CL Collector-Distributor Rd. to Profile Grade Line at top of back face of concrete barrier.
 Elevations shown are at Profile Grade Line at top of back face of concrete barrier. For elevations along the retaining wall, see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.

LEGEND
 U.N.O. = Unless Noted Otherwise

PRELIMINARY
 NOT FOR
 CONSTRUCTION

BRIDGE ENGINEER

SHEET 2 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.

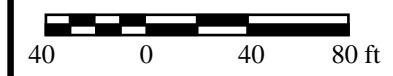
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 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 30'-0"
 DESIGNED BY: JES DATE: FEB. 2014
 BRIDGE NO. DRAWING NO. XXXXX

8/29/2014 3:37:05 PM
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 REVISION DATE:

Retaining wall layout plan provided by Garver, LLC

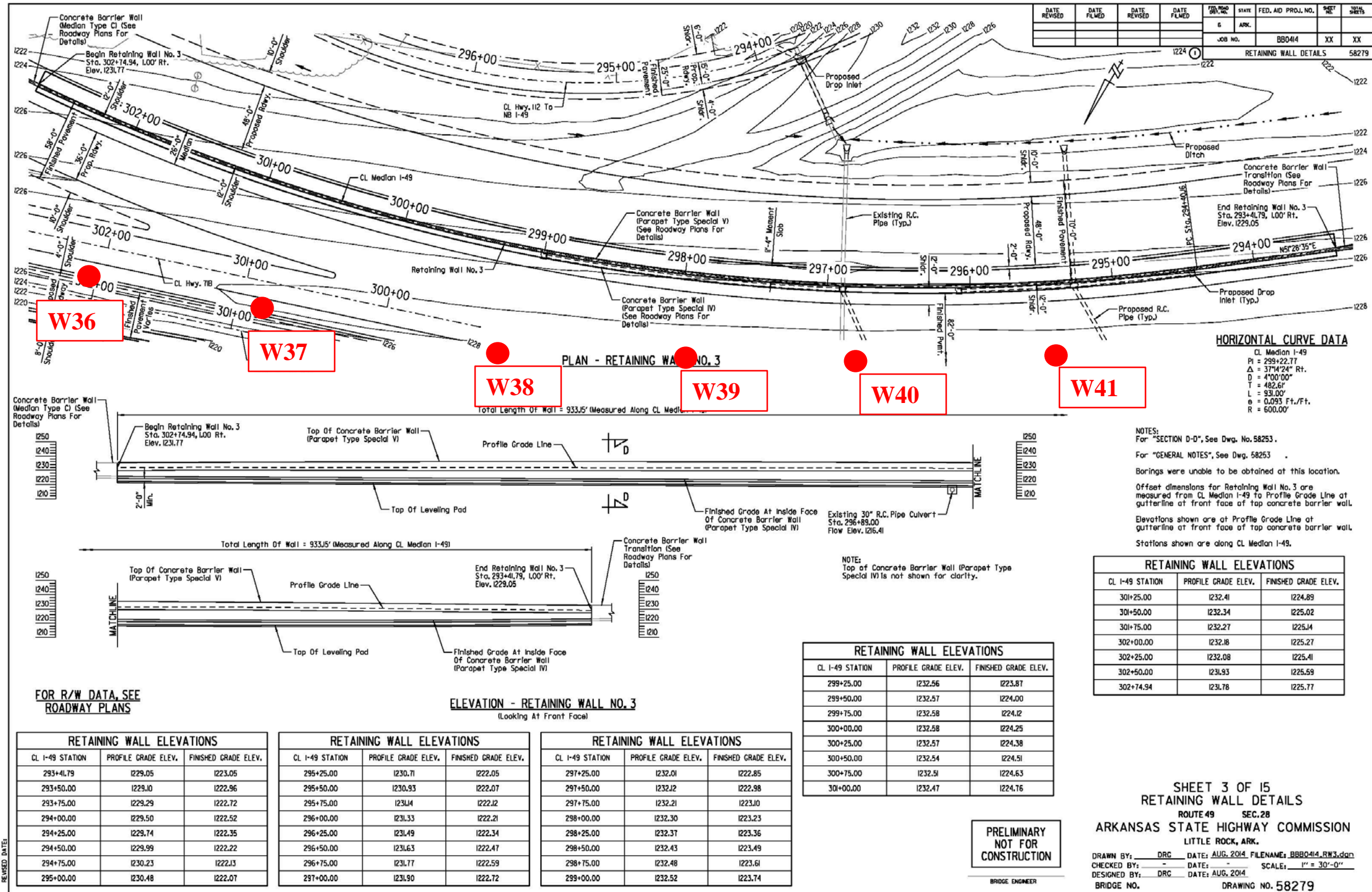


PLAN OF BORINGS
 RETAINING WALL NO. 2
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2A



DATE REVISED	DATE FILED	DATE REVISED	DATE FILED	FED. PROJ. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.		XX	XX
				JOB NO.	BB0414		RETAINING WALL DETAILS	58279

HORIZONTAL CURVE DATA

CL Median I-49
 PI = 299+22.77
 Δ = 37°14'24" Rt.
 D = 4°00'00"
 T = 482.6'
 L = 933.00'
 e = 0.093 ft./ft.
 R = 600.00'

NOTES:
 For "SECTION D-D", See Dwg. No. 58253.
 For "GENERAL NOTES", See Dwg. 58253.
 Borings were unable to be obtained at this location.
 Offset dimensions for Retaining Wall No. 3 are measured from CL Median I-49 to Profile Grade Line at gutterline at front face of top concrete barrier wall.
 Elevations shown are at Profile Grade Line at gutterline at front face of top concrete barrier wall.
 Stations shown are along CL Median I-49.

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
301+25.00	1232.41	1224.89
301+50.00	1232.34	1225.02
301+75.00	1232.27	1225.14
302+00.00	1232.18	1225.27
302+25.00	1232.08	1225.41
302+50.00	1231.93	1225.59
302+74.94	1231.78	1225.77

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
299+25.00	1232.56	1223.81
299+50.00	1232.57	1224.00
299+75.00	1232.58	1224.12
300+00.00	1232.58	1224.25
300+25.00	1232.57	1224.38
300+50.00	1232.54	1224.51
300+75.00	1232.51	1224.63
301+00.00	1232.47	1224.76

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
293+41.79	1229.05	1223.05
293+50.00	1229.10	1222.96
293+75.00	1229.29	1222.72
294+00.00	1229.50	1222.52
294+25.00	1229.74	1222.35
294+50.00	1229.99	1222.22
294+75.00	1230.23	1222.13
295+00.00	1230.48	1222.07

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
295+25.00	1230.71	1222.05
295+50.00	1230.93	1222.07
295+75.00	1231.14	1222.12
296+00.00	1231.33	1222.21
296+25.00	1231.49	1222.34
296+50.00	1231.63	1222.47
296+75.00	1231.77	1222.59
297+00.00	1231.90	1222.72

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
297+25.00	1232.01	1222.85
297+50.00	1232.12	1222.98
297+75.00	1232.21	1223.10
298+00.00	1232.30	1223.23
298+25.00	1232.37	1223.36
298+50.00	1232.43	1223.49
298+75.00	1232.48	1223.61
299+00.00	1232.52	1223.74

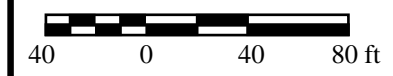
PRELIMINARY
 NOT FOR
 CONSTRUCTION

SHEET 3 OF 15
 RETAINING WALL DETAILS
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: DRG DATE: AUG. 2014 FILENAME: BB0414_RW3.dwg
 CHECKED BY: DATE: SCALE: 1" = 30'-0"
 DESIGNED BY: DRG DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. 58279

Retaining wall layout plan provided by Garver, LLC



**PLAN OF BORINGS
 RETAINING WALL NO. 3
 WASHINGTON COUNTY, ARKANSAS**



Job No. 14-073

PLATE 2B



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W33

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 306+24, 16 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
SURF. EL: 1220±													
			Stiff brown and reddish tan cherty clay w/trace organics (fill)	13									
				24									
5			Stiff gray clay	17									
			- firm, brown, tan and gray with occasional silt pockets below 6 ft	10									97
			- with some ferrous stains and concretions below 8 ft	9									
10			- water at 8.5 ft										
			- stiff, gray and tan below 13 ft	20									
15				21									
20													
25			Low hardness gray, reddish tan and tan weathered shale w/silty clay seams and layers	50									
30			Moderately hard to hard dark gray shale	50/3"									

COMPLETION DEPTH: 30.0 ft
DATE: 1-29-15

DEPTH TO WATER
IN BORING: 8.5 ft

DATE: 1/29/2015

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W34

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 304+83, 2 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1225±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff reddish tan and brown cherty clay w/trace organics (fill)	16			●						
			Stiff tan and brown silty clay	20			●	+					91
5			- firm, tan and gray with clay seams and layers at 4 to 6 ft	8			●						
			- stiff with some silt pockets and seams and occasional ferrous stains below 6 ft	11			●						
			- water at 8.3 ft	16			●						
10													
			- with occasional shale fragments below 13 ft	21			●						
15													
			- very stiff below 18 ft	30			●	+		+			89
20													
			Moderately hard dark gray shale	50/5"			●						
25													
			NOTE: Water at 2.1 ft at 4 hours.										
30													

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 25.0 ft
DATE: 1-29-15

DEPTH TO WATER
IN BORING: 8.3 ft

DATE: 1/29/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W35

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 303+42, 7 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1225±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			6 inches: Asphalt Concrete			+							
			12 inches: Crushed Stone Base	50/1"									
			Stiff to very stiff reddish tan and brown cherty clay w/numerous chert fragments and cobbles (fill)	27									
5				17		+		+					27
			Stiff brown clay	12									
			-gray and tan with some ferrous stains below 8 ft	14									
10													
			- firm to stiff at 13 to 18 ft - water at 13.2 ft	10									
15													
			- stiff with occasional shale fragments at 18 to 22 ft	19									
20													
			- very stiff to hard below 22 ft	50									
25													
			Moderately hard dark gray shale	50/5"									
30													

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 30.0 ft
DATE: 1-29-15

DEPTH TO WATER
IN BORING: 13.2 ft

DATE: 1/29/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W36

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 302+02, 11 ft Rt

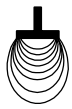
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1226±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			6 inches: Asphalt Concrete										
			12 inches: Crushed Stone Base	50/1"									
5			Very stiff brown and reddish tan cherty clay w/chert fragments and cobbles (fill)	24									
			- stiff below 6 ft	27									
				21									
10			Stiff tan and gray silty clay w/some silt pockets and seams	13									82
			- water at 13 ft										
			- with clay seams and layers below 13 ft	11									
20				19									
			- very stiff with shale fragments below 23 ft	36									89
25													
			Moderately hard to hard dark gray shale	50/2"									
30													
			NOTE: Water at 20.5 ft after 10 minutes.										

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 30.0 ft
DATE: 1-29-15

DEPTH TO WATER
IN BORING: 13 ft

DATE: 1/29/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W37

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 300+63, 17 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1225±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Crushed Stone Base	50/8'									
				50/7"									
5			Very stiff reddish brown cherty clay w/chert fragments and cobbles (fill)	26			+	●	- - - -	+			47
				27				●					
10			Stiff dark gray silty clay w/trace rootlets	15					●				
				15					●				
			- very stiff, tan and gray with trace shale fragments below 16 ft	24			+	●	- - - -	+			87
				27					●				
25			Moderately hard tan, gray and dark gray weathered shale										
				50/11"									
30													

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 30.0 ft
DATE: 2-3-15

DEPTH TO WATER
IN BORING: 25 ft

DATE: 2/3/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W38

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx C-D Rd. Sta 299+24, 22 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1226±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			4 inches: Asphalt Concrete			10	20	30	40	50	60	70	
			18 inches: Portland Cement Concrete										
			18 inches: Crushed Stone Base	50/7"									
5			Very stiff reddish brown cherty clay (fill)	35									
			- stiff below 6 ft	16									
10				18									
			Stiff gray and tan silty clay	12									87
15			- very stiff, tan and gray below 16 ft	25									
20				26									
25			Moderately hard tan and dark gray weathered shale	50/11"									
30													

COMPLETION DEPTH: 30.0 ft
DATE: 2-3-15

DEPTH TO WATER
IN BORING: 25 ft

DATE: 2/3/2015

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W39

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger to 11.5 ft /Wash

LOCATION: Approx C-D Rd. Sta 297+86, 40 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1228±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			4 inches: Asphalt Concrete	50/7"									
			Crushed Stone Base	50/6"									
5			Stiff reddish brown cherty clay w/chert fragments and cobbles (fill)	16									
			- with more chert cobbles below 8 ft	15									
10				25/0"									
			Soft dark gray clay	6									
15			- firm to stiff, brown and gray at 16 to 22 ft	10									
20			- stiff below 22 ft	22									
25													89
			Moderately hard to hard light gray limestone	25/0"									
30													

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 30.0 ft
DATE: 2-3-15

DEPTH TO WATER
IN BORING: 28 ft

DATE: 2/3/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W40

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger to 11 ft /Wash

LOCATION: Approx C-D Rd. Sta 296+50, 49 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
SURF. EL: 1227±									
			4 inches: Asphalt Concrete						
			8 inches: Portland Cement Concrete	25/0"					
			Crushed Stone Base	50/8"					
5			Stiff reddish brown cherty clay w/chert fragments and cobbles (fill)	21					38
			- with more chert cobbles below 8 ft	22					
10				25/0"					
			Firm dark gray clay	8					
			- stiff, brown and gray below 17 ft	23					
15				24					
			- stiff to very stiff with shale fragments below 22 ft						
20									
25									
			Moderately hard light gray weathered limestone	25/0"					
30			Moderately hard to hard light gray limestone						

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

COMPLETION DEPTH: 31.0 ft
DATE: 2-3-15

DEPTH TO WATER
IN BORING: 28 ft

DATE: 2/3/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W41

BB0414: Retaining Wall No. 2
Fayetteville, Arkansas

TYPE: Auger to 11 ft /Wash

LOCATION: Approx C-D Rd. Sta 295+14, 44 ft Rt

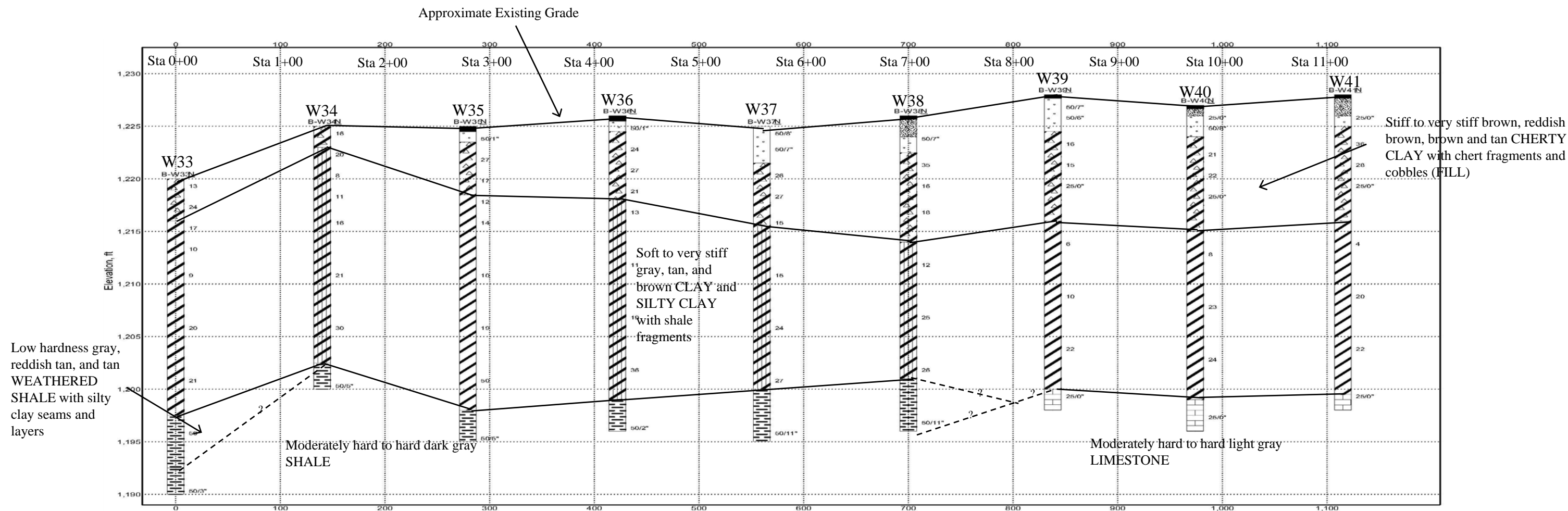
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1228±						
			4 inches: Asphalt Concrete						
			20 inches: Portland Cement Concrete						
			Crushed Stone Base	25/0"					
5			Very stiff reddish brown cherty clay w/chert fragments and cobbles (fill)	36					41
			- with more chert cobbles below 8 ft	25/0"					
10			Very soft to soft gray clay	4					
			- stiff, brown and tan below 17 ft	20					
15			- gray and brown below 22 ft	22					92
20			Moderately hard to hard light gray limestone	25/0"					
25									
30									

COMPLETION DEPTH: 30.0 ft
DATE: 2-3-15

DEPTH TO WATER
IN BORING: 28.5 ft

DATE: 2/3/2015

LGBNEW_14-073_RETAINING WALL #2.GPJ 12-22-15

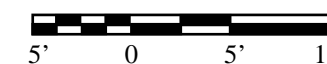


- Notes:** 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
 Retaining Wall No. 2
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening &
 Interchg. Impvts. (F) – Washington County, Arkansas

Job No. 14-073

PLATE 12

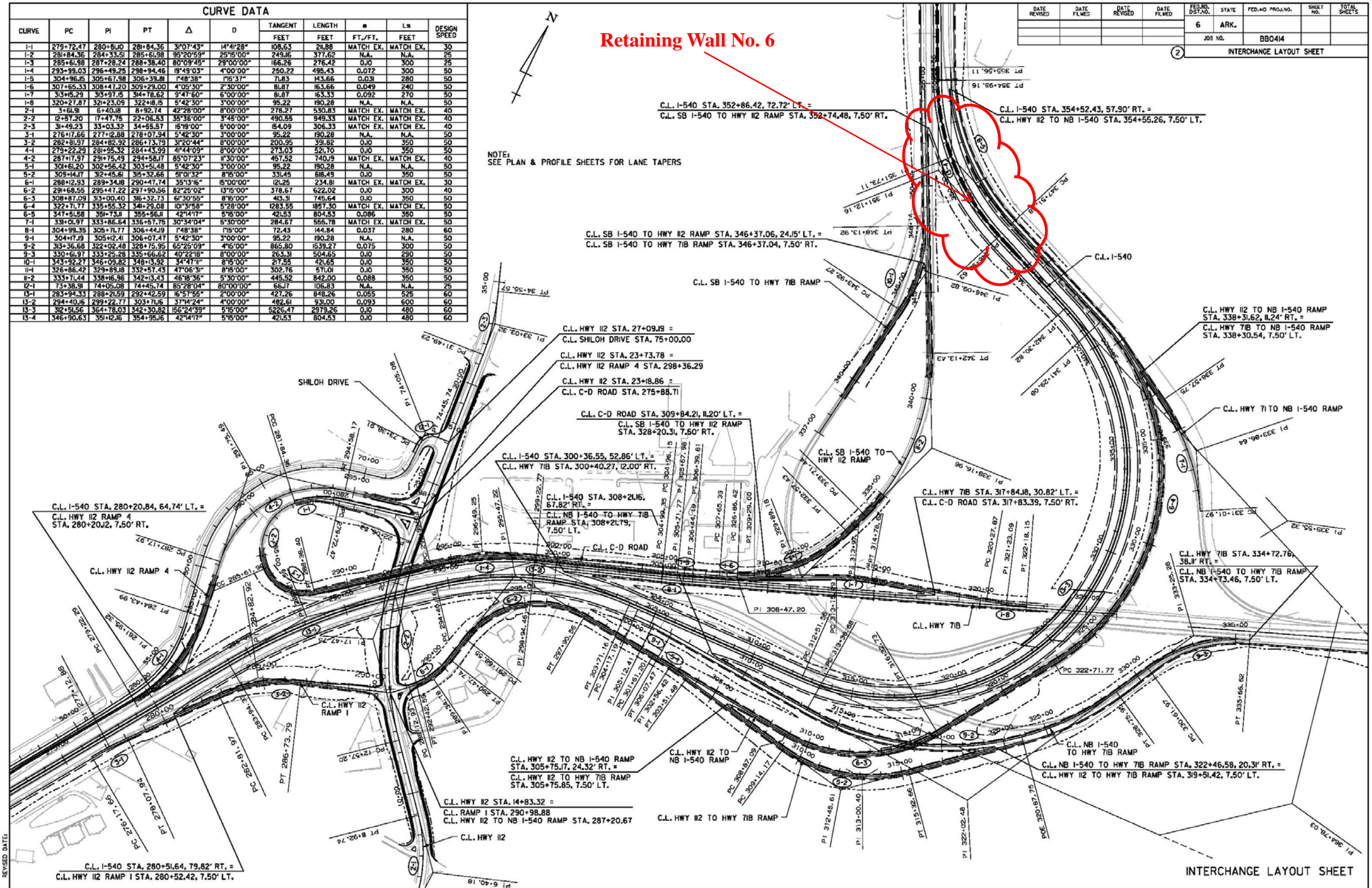
ATTACHMENT 9

CURVE	PC	PI	PT	Δ	D	TANGENT		LENGTH	e	LS	DESIGN SPEED
						FEET	FEET				
I-1	279+72.47	280+81.00	281+84.36	3°07'43"	14°41'28"	108.63	21.88	MATCH EX.			30
I-2	281+84.36	284+33.51	285+61.98	95°20'59"	25°15'00"	249.16	377.62	N.A.			25
I-3	285+61.98	287+28.24	288+38.40	80°09'45"	29°00'00"	166.26	276.42	OJO			25
I-4	293+99.03	296+49.25	298+94.46	19°49'03"	4°00'00"	280.22	495.43	O.072			50
I-5	304+96.05	305+67.98	306+39.81	148°38'	1°53'17"	71.83	143.66	O.031			50
I-6	307+65.33	308+41.20	309+29.00	4°03'30"	2°30'00"	81.87	153.66	O.049			50
I-7	313+85.29	315+97.5	318+78.62	9°47'50"	6°00'00"	81.87	153.33	O.092			50
I-8	320+27.87	321+23.09	322+18.05	5°42'30"	3°00'00"	95.22	190.28	N.A.			50
2-1	3+61.91	6+40.18	8+92.74	42°28'00"	8°00'00"	278.27	530.83	MATCH EX.			40
2-2	12+87.20	17+47.75	22+06.53	35°38'00"	3°45'00"	490.55	949.33	MATCH EX.			40
2-3	31+49.23	33+03.32	34+55.57	15°19'00"	6°00'00"	64.09	306.33	MATCH EX.			40
3-1	276+17.66	277+12.88	278+07.94	5°42'30"	3°00'00"	95.22	190.28	N.A.			50
3-2	282+81.97	284+82.92	286+73.79	3°20'44"	8°00'00"	200.95	391.82	OJO			50
4-1	279+22.29	281+95.32	284+43.99	4°44'09"	8°00'00"	273.03	521.70	OJO			50
4-2	287+17.97	291+75.49	294+58.17	85°07'23"	1°30'00"	457.52	740.9	MATCH EX.			40
5-1	301+61.20	302+56.42	303+51.48	5°42'30"	3°00'00"	95.22	190.28	N.A.			50
5-2	309+14.17	312+45.61	315+32.66	9°01'32"	8°00'00"	331.45	618.49	OJO			50
6-1	288+12.93	289+34.18	290+47.74	35°13'15"	15°00'00"	121.25	234.81	MATCH EX.			30
6-2	291+68.55	295+47.22	297+90.56	82°25'02"	13°15'00"	378.67	622.02	OJO			40
6-3	308+87.09	313+00.40	316+32.73	6°30'55"	8°15'00"	413.3	745.64	OJO			50
6-4	322+71.77	335+55.32	348+29.08	10°31'58"	5°28'00"	1283.55	1857.30	MATCH EX.			50
6-5	347+51.58	351+73.11	355+95.11	42°14'17"	5°15'00"	421.53	804.53	O.086			50
7-1	331+01.97	333+86.64	336+57.75	30°34'04"	8°30'00"	284.67	555.78	MATCH EX.			50
8-1	304+99.35	305+71.77	306+44.19	148°38'	1°50'00"	72.43	144.84	O.037			280
8-2	304+99.35	305+71.77	306+44.19	148°38'	1°50'00"	72.43	144.84	O.037			280
9-1	304+99.35	305+71.77	306+44.19	148°38'	1°50'00"	72.43	144.84	O.037			280
9-2	304+99.35	305+71.77	306+44.19	148°38'	1°50'00"	72.43	144.84	O.037			280
9-3	330+61.97	333+25.28	335+66.62	40°22'18"	8°00'00"	263.31	504.65	OJO			290
10-1	343+92.27	346+09.82	348+13.92	34°47'11"	8°15'00"	217.55	421.65	OJO			50
11-1	326+86.42	329+89.18	332+57.43	47°06'31"	8°15'00"	302.76	571.01	OJO			50
11-2	333+71.44	338+16.96	342+13.43	46°18'36"	5°30'00"	445.52	842.00	O.088			50
12-1	73+38.91	74+05.08	74+45.74	85°28'04"	80°00'00"	66.17	106.83	N.A.			25
13-1	283+94.33	288+21.59	292+42.59	15°57'55"	2°00'00"	427.26	848.26	O.055			60
13-2	294+40.16	299+22.77	303+71.16	37°14'24"	4°00'00"	482.61	931.00	O.093			60
13-3	312+51.56	314+78.03	317+30.82	156°24'39"	5°15'00"	522.47	2579.26	OJO			480
13-4	346+90.63	351+12.16	354+95.16	42°14'17"	5°15'00"	421.53	804.53	OJO			60

Retaining Wall No. 6

NOTE:
SEE PLAN & PROFILE SHEETS FOR LANE TAPERS

DATE REVISED	DATE FILED	DATE REVISED	DATE FILED	FED. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO. BBD414		INTERCHANGE LAYOUT SHEET		



Interchange layout plan provided by Garver, LLC



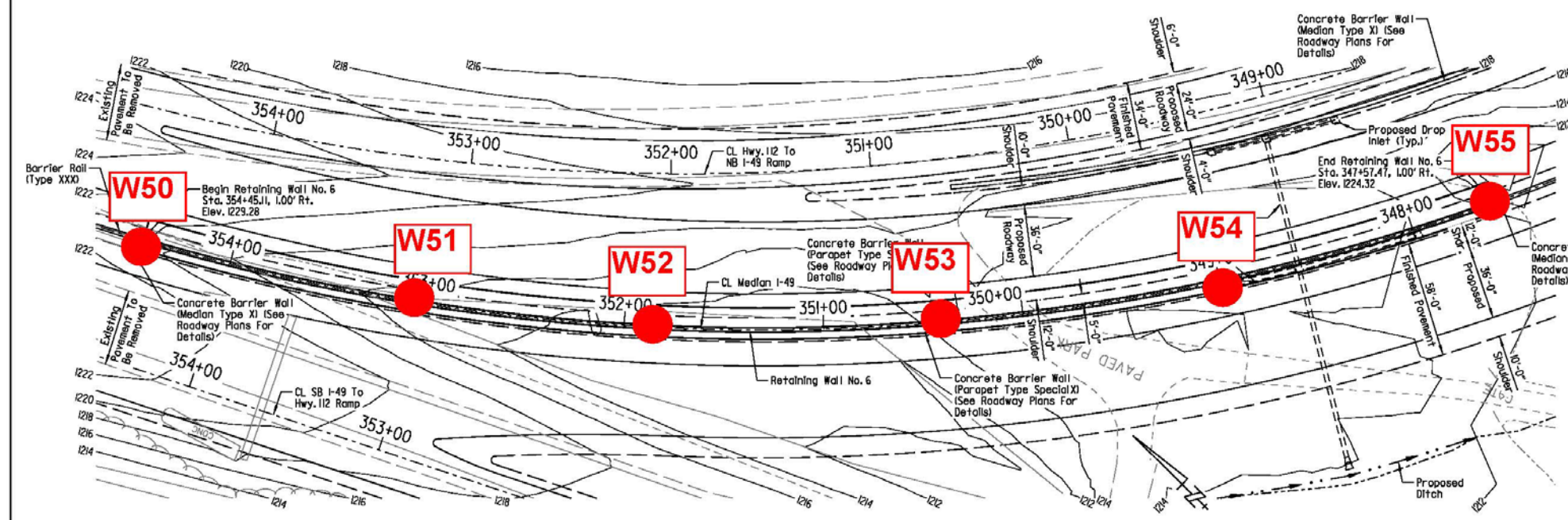
SITE VICINITY MAP RETAINING WALL NO. 6 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

DATE REVISED	DATE FILED	DATE REVISED	DATE FILED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
						JOB NO.	BBO414	
RETAINING WALL DETAILS "DWG NO."								



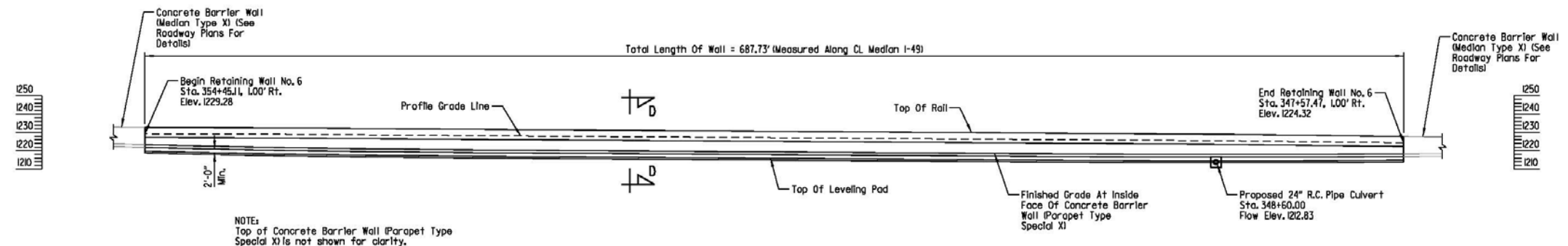
FOR R/W DATA, SEE ROADWAY PLANS

HORIZONTAL CURVE DATA

CL Median I-49
 PI = 354+22.16
 $\Delta = 42^\circ 14' 17''$ Rt.
 D = 576.00'
 T = 424.53'
 L = 804.53'
 e = 0.00 Ft./Ft.
 R = 480.00'

NOTES:
 For "GENERAL NOTES" & "SECTION D-D", See Dwg. No. XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 6 are measured from CL Median I-49 to Profile Grade Line at gutterline at front face of top concrete barrier.
 Elevations shown are at Profile Grade Line at gutterline at front face of top concrete barrier. For elevations along the retaining wall see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.
 Stations shown are along CL Median I-49.

PLAN - RETAINING WALL NO. 6



ELEVATION - RETAINING WALL NO. 6
 (Looking At Front Face)

NOTE:
 Top of Concrete Barrier Wall (Parapet Type Special X) is not shown for clarity.

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

PRELIMINARY NOT FOR CONSTRUCTION

SHEET 6 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: DRG DATE: AUG. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 30'-0"
 DESIGNED BY: DRG DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. XXXXX

8/28/2014 3:36:00 PM
 I:\PROJECTS\2014\14-073\14-073-06-RWALL-506-L0.dgn
 REVISION DATE:

Retaining wall layout plan provided by Garver, LLC



PLAN OF BORINGS
 RETAINING WALL NO. 6
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 2



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W50

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 354+45, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1220±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
5			Soft brown silty clay w/organics (fill) Stiff reddish brown cherty clay w/chert fragments and cobbles (fill) - stiff to very stiff below 2 ft	22									
				50/9"									
				50/7"			+			+			51
				22									
10			Stiff to very stiff tan and gray silty clay, slightly sandy	24			+			+			82
15			Low hardness dark gray weathered shale w/ferrous stains and concretions - moderately hard below 13 ft	50/10"									
20				50/6"									
25													

COMPLETION DEPTH: 20.0 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 9 ft

DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W51

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 353+29, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
SURF. EL: 1216±									
			Stiff reddish brown and brown fine sandy clay w/occasional chert fragments and trace organics (fill)	12					
			Stiff reddish brown cherty clay (fill)	15					
5			- firm below 3 ft	9					29
			Soft brown and gray clay w/shale fragments	4					89
10			Low hardness tan and dark gray highly weathered shale w/interbedded silty clay seams and layers	50					
15			Moderately hard tan, gray and dark gray weathered shale	50/2"					
20									
25									

COMPLETION DEPTH: 20.0 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 3.9 ft

DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W52

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 351+72, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1213±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff reddish brown and brown fine sandy clay w/trace chert fragments and trace organics (fill)	18									
			Very stiff reddish brown cherty clay (fill)	38									33
5			Low hardness tan, reddish tan and dark gray highly weathered shale w/silty clay seams and layers	24									
			- moderately weathered below 6 ft	50									
10			Moderately hard dark gray shale	50/4"									
			- auger refusal at 12 ft										
15													
20													
25													

COMPLETION DEPTH: 12.0 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 10.4 ft

DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W53

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 350+35, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1215±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff to very stiff dark brown silty clay w/chert fragments and occasional concrete debris (fill)	32									
				34									58
5			Low hardness dark gray highly weathered shale w/clay seams and layers	38									
			Moderately hard tan, gray and dark gray weathered shale	50/6"									
10				50/3"									
			- auger refusal at 12 ft										
15													
20													
25													

COMPLETION DEPTH: 12.0 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 4.9 ft

DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W54

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 349+04, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1216±						
			Very stiff brown and dark brown fine sandy clay w/chert and shale fragments (fill)	28					
			- stiff, brown and gray with wood debris below 2 ft	15					
5			Firm brown and gray silty clay	10					82
			- stiff below 6 ft	28					
10			Moderately hard tan, gray and dark gray weathered shale w/ferrous stains in fractures	50/9"					
			- auger refusal at 12 ft						
15									
20									
25									

COMPLETION DEPTH: 12.0 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 7.4 ft

DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. W55

BB0414: Retaining Wall #6
Fayetteville, Arkansas

TYPE: Auger

LOCATION: Approx I-49 Sta 347+85, CL

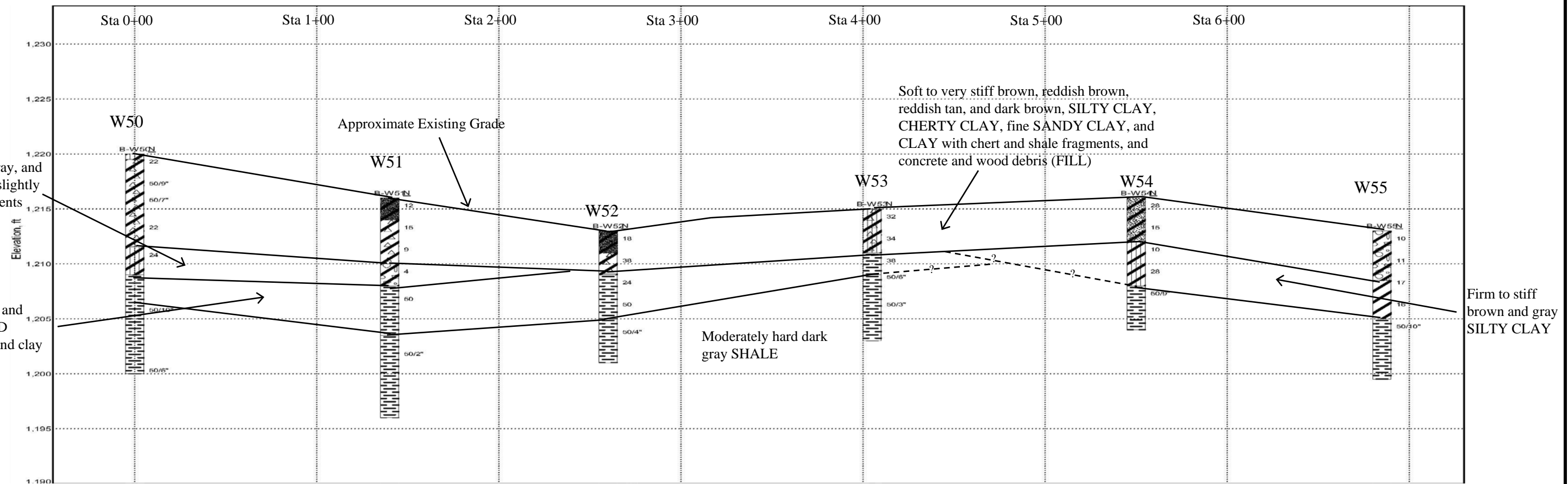
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
SURF. EL: 1213±									
10		X	Firm to stiff dark brown and reddish brown clay w/shale fragments, trace organics and occasional wood debris (fill) - stiff below 2 ft	10					
11									76
5		X	Stiff gray and brown clay w/ferrous stains	17					
16									94
10		X	Moderately hard tan, gray and dark gray weathered shale w/clay seams and layers	50/10"					
13.5									
- auger refusal at 13.5 ft									

COMPLETION DEPTH: 13.5 ft
DATE: 1-15-15

DEPTH TO WATER
IN BORING: 4.5 ft

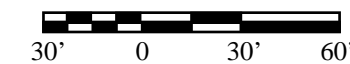
DATE: 1/15/2015

LGBNEW_14-073_WALL #6.GPJ 12-22-15



Notes: 1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
 2. Ground surface elevation at boring locations are approximate.

Horizontal Scale



Vertical Scale



Generalized Subsurface Profile
 Retaining Wall No. 6
 AHTD BB0414 – Porter Rd.-Hwy. 112/71B Widening &
 Interchg. Impvts. (F) – Washington County, Arkansas

Job No. 14-073

PLATE 9

ATTACHMENT 10

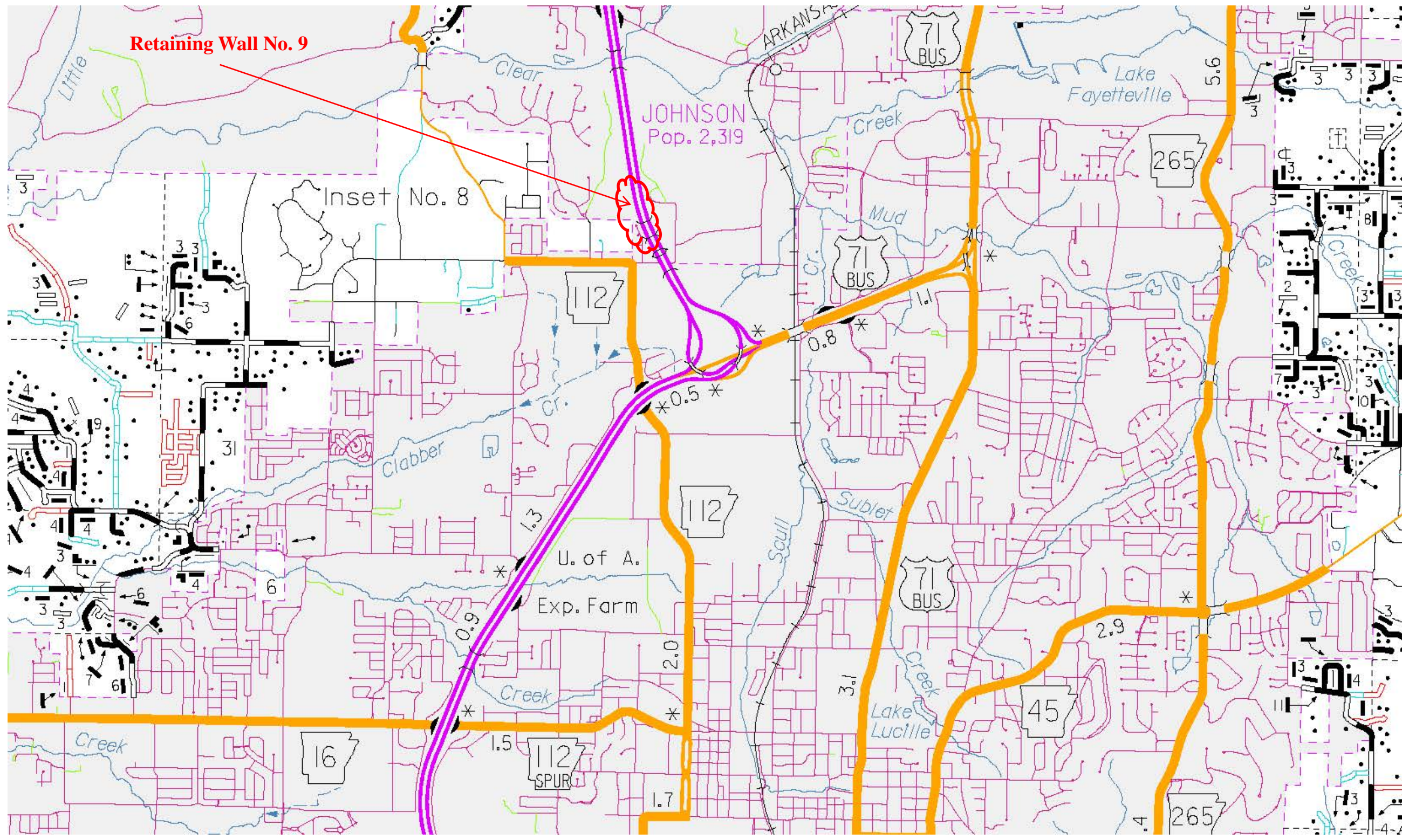


Image taken from General Highway Map of Washington County, Arkansas prepared by AHTD, 12-13-11

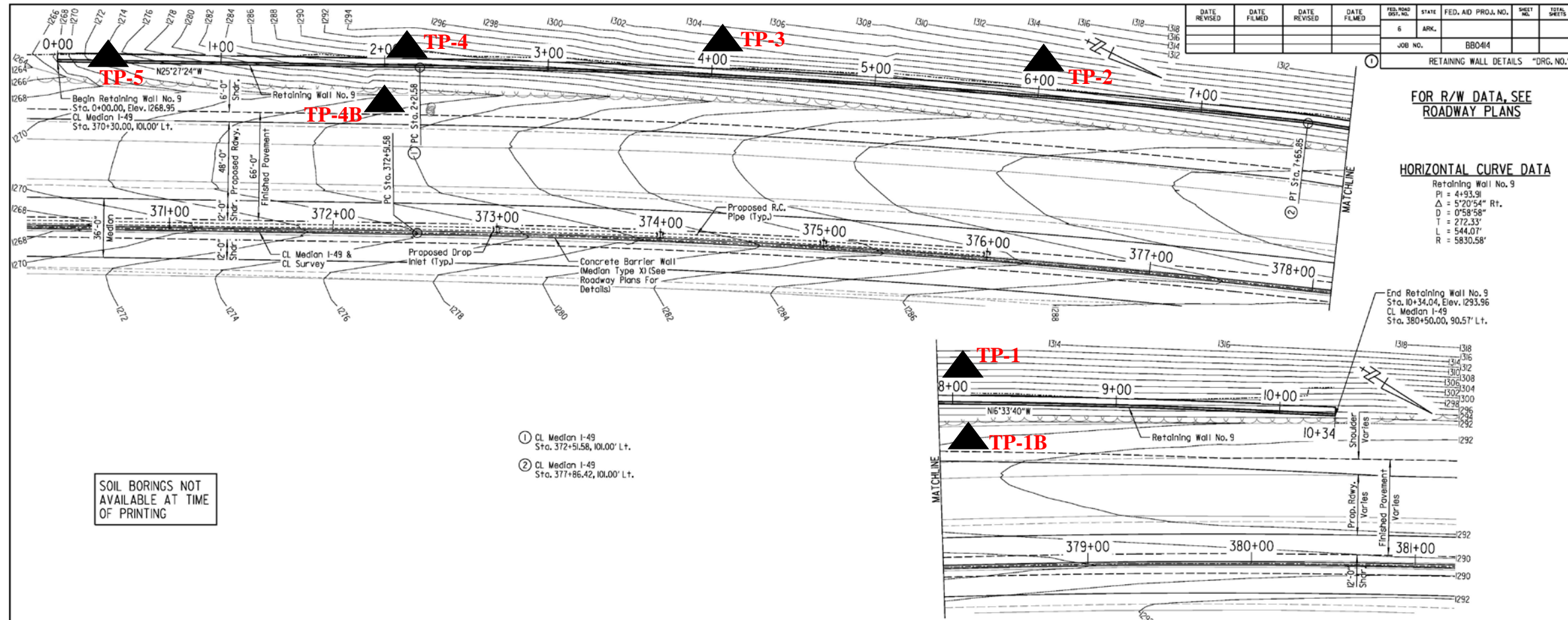


SITE VICINITY MAP
RETAINING WALL NO. 9
WASHINGTON COUNTY, ARKANSAS

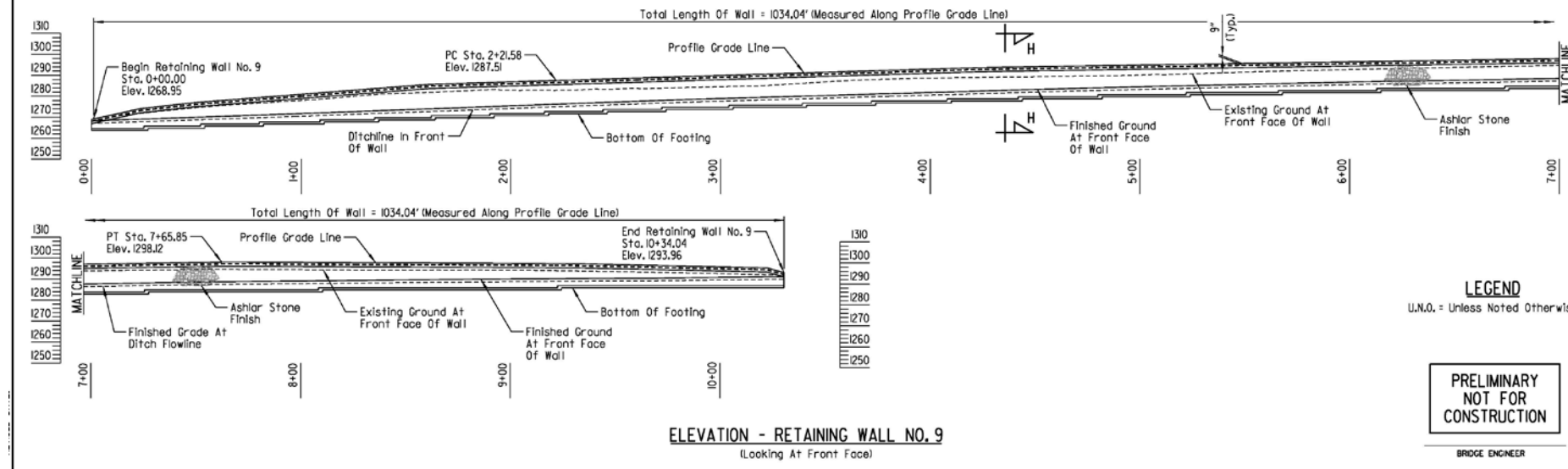
Not to Scale

Job No. 14-073

PLATE 1



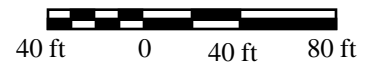
PLAN - RETAINING WALL NO. 9



NOTES:
 For "GENERAL NOTES" & "SECTION H-H", See Dwg. No. XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 9 are measured from CL Median I-49 to Profile Grade Line at front face of retaining wall.
 Elevations shown are at Profile Grade Line at front face of retaining wall. For elevations along the retaining wall, see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.

SHEET 9 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.

DRAWN BY: JES DATE: AUG. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 30'-0"
 DESIGNED BY: JES DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. -



PLAN OF TEST PITS
 BB0414: Retaining Wall #9
 Fayetteville, Arkansas

Scale: As Shown
 Date: August 2015

Job No. 14-073

PLATE 2



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 1

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 378+25, 120 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %	
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
						PLASTIC LIMIT WATER CONTENT LIQUID LIMIT +-----+-----+ 10 20 30 40 50 60 70								
			SURF. EL: 1304±											
			Stiff brownish gray silty clay w/chert and limestone fragments - with some organics to 2 ft											
			Very stiff reddish brown silty clay w/chert fragments (cherty clay)											
			Low hardness light gray, dark gray and reddish brown highly weathered limestone w/weathered chert seams and layers - with occasional silty clay seams and layers to 6 ft											
5														
			Low hardness to moderately hard light gray and dark gray weathered limestone w/some weathered chert seams and occasional clay pockets and seams, moderately to highly fractured, undulating bedding with apparent dip = ±60° E											
10														
			- backhoe limit at 10 ft											
15														

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 10.0 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 1B

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 378+25, 79 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
			SURF. EL: 1292±						
			Firm to stiff brownish gray silty clay w/some chert fragments and organics						
			Very stiff reddish brown silty clay w/chert fragments (cherty clay)						
			Moderately hard light gray and dark gray weathered limestone w/close chert seams						
			- backhoe refusal at 2.5 ft						
5									
10									
15									

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 2.5 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 2

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 376+29, 117 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						PLASTIC LIMIT		WATER CONTENT			LIQUID LIMIT		
						+	-			+			
						10	20	30	40	50	60	70	
	▨		Stiff brownish gray silty clay w/chert fragments and organics						● ⊗ +				51
5	△		Low hardness light gray, dark gray and reddish brown highly weathered limestone w/close weathered chert seams and layers and occasional silty clay seams						●			⊗ →	
10	△		Moderately hard light gray and dark gray weathered limestone w/chert inclusions and seams									⊗ →	
			- backhoe limits at 11.ft -----										
15			COMPLETION DEPTH: 11.0 ft										
			DATE: 6-17-15										
			DEPTH TO WATER IN TEST PIT: 11 ft										
			DATE: 6/17/2015										

LTPNEW 14-073_WALL #9 TP.GPJ 12-17-15



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 3

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 374+36, 119 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1300±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff brownish gray silty clay w/chert fragments and some organics				●	⊗					
			Very stiff reddish brown silty clay w/chert fragments (cherty clay)				●					⊗	
5			Low hardness light gray, dark gray and reddish brown highly weathered limestone, fossiliferous w/occasional vugs and silty clay seams and layers - undulating bedding, apparent dip = ±50°E				+	●				+	⊗
10													
15			Moderately hard light gray and dark gray weathered limestone w/occasional chert seams - backhoe limit at 11.5 ft										⊗

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 11.5 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 4

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 372+38, 113 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT				- No. 200 %			
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1288±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
			Stiff brownish gray silty clay w/some chert fragments and silt pockets, organics to 1.5 ft										40
			Very stiff reddish brown silty clay w/some chert fragments (cherty clay)										
5			Low hardness light gray, dark, and reddish brown highly weathered limestone w/chert seams and layers, moderately fractured - with occasional silty clay seams to 6 ft										-NON-PLASTIC
			- backhoe limit at 8 ft										
10													
15													

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 8.0 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 4B

BB0414: Retaining Wall #9
Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 372+34, 77 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT				- No. 200 %										
						0.2	0.4	0.6	0.8		1.0	1.2	1.4							
			SURF. EL: 1276±																	
			Stiff brownish gray silty clay w/some chert fragments and organics					●												
			Very stiff reddish brown silty clay w/chert fragments (cherty clay)																	
			Low hardness to moderately hard light gray and dark gray weathered limestone w/occasional chert seams		●															
			- refusal at 2.5 ft																	
5																				
10																				
15																				

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 2.5 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF TEST PIT NO. 5

BB0414: Retaining Wall #9

Fayetteville, Arkansas

TYPE: Excavator

LOCATION: Approx I-49 Sta 370+58, 104 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT						- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	
			SURF. EL: 1273±									
			Stiff brownish gray silty clay w/silt pockets and chert fragments - with some organics to 2 ft									39
			Low hardness light gray, dark gray and reddish brown highly weathered limestone w/weathered chert seams and layers - with occasional silty clay seams to 2.5 ft - refusal at 3 ft									
5												
10												
15												

LTPNEW 14-073 WALL #9 TP.GPJ 12-17-15

COMPLETION DEPTH: 3.0 ft
DATE: 6-17-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 6/17/2015

ATTACHMENT 11



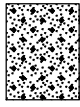
SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

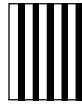
(SHOWN IN SYMBOLS COLUMN)



Gravel



Sand



Silt

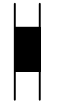


Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)



Shelby
Tube



Rock
Core



Split
Spoon



No
Recovery



Cutting

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) Clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	N-VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0-15%
LOOSE	4-10	15-35%
MEDIUM DENSE	10-30	35-65%
DENSE	30-50	65-85%
VERY DENSE	50 and above	85-100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) Inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FT.
VERY SOFT	Less than 0.25
SOFT	0.25-0.50
FIRM	0.50-1.00
STIFF	1.00-2.00
VERY STIFF	2.00-4.00
HARD	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.

FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

LAMINATED - composed of thin layers of varying color and texture.

INTERBEDDED - composed of alternate layers of different soil types.

CALCAREOUS - containing appreciable quantities of calcium carbonate.

WELL GRADED - having a wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953



BORING LOG TERMS – ROCK

ROCK TYPES
(SHOWN IN SYMBOLS COLUMN)



Sandstone



Limestone



Siltstone



Coal



Shale

<p>Joint Characteristics -</p> <p>Bedding Characteristics -</p> <p>Lithologic Characteristics -</p> <p>Parting - Seam - Layer - Stratum -</p> <p>Hardness-</p> <p>Texture -</p> <p>Structure -</p>	<p><u>Spacing</u></p> <p>Very Close Close Moderately Close Wide Very Wide</p> <p>Very Thin Thin Medium Thick Massive</p> <p>Clayey Shaly Calcareous (limy) Siliceous Sandy (Arenaceous) Silty Plastic Seams</p> <p>Less than 1/16 inch 1/16 to 1/2 inch 1/2 to 12 inches Greater than 12 inches</p> <p>Soft (S) - Reserved for plastic material alone.</p> <p>Friable (F) - Easily crumbled by hand, pulverized or reduced to powder and is too soft to be cut with a pocket knife.</p> <p>Low Hardness (LH) - Can be gouged deeply or carved with a pocket knife.</p> <p>Moderately Hard (MH) - Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.</p> <p>Hard (H) - Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.</p> <p>Very hard (VH) - Cannot be scratched with a pocket knife. Knife steel marks left on surface.</p> <p>Fine - Barely seen with naked eye Medium - Barely seen up to 1/8 in. Coarse - 1/8 in. to 1/4 in.</p> <p><u>Bedding</u> Flat - 0° - 5° Gently Dipping - 5° - 35° Moderately Dipping - 35° - 55° Steeply Dipping - 55° - 85°</p> <p>Fractures, scattered Open Cemented or Tight</p> <p>Fractures, closely spaced Open Cemented or Tight</p> <p>Brecciated (Sheared and Fragmented) Open Cemented or Tight</p> <p>Joints Faulted Slickensides</p>	<p><u>Degree of Weathering -</u></p> <p>Fresh - No visible signs of decomposition or discoloration. Rings under hammer impact.</p> <p>Slightly Weathered - Slight discoloration inwards from open fractures, otherwise similar to fresh.</p> <p>Moderately Weathered - Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock, but cores cannot be broken by hand or scraped by knife. Texture preserved.</p> <p>Highly Weathered - Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric</p> <p>Completely Weathered - Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.</p> <p>Residual Soil - Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.</p>	<p><u>Solution and Void Conditions -</u></p> <p>Solid, contains no voids Yuggy (pitted) Vesicular (igneous) Porous Cavities Cavernous</p> <p><u>Swelling Properties -</u></p> <p>Nonswelling Swelling</p> <p><u>Slaking Properties -</u></p> <p>Nonslaking Slakes slowly on exposure Slakes readily on exposure</p>	<p><u>Rock Quality Designation (RQD) -</u></p> <table border="0"> <thead> <tr> <th>RQD (Percent)</th> <th>Diagnostic Description</th> </tr> </thead> <tbody> <tr> <td>Greater than 90</td> <td>Excellent</td> </tr> <tr> <td>75 - 90</td> <td>Good</td> </tr> <tr> <td>50 - 75</td> <td>Fair</td> </tr> <tr> <td>25 - 50</td> <td>Poor</td> </tr> <tr> <td>Less than 25</td> <td>Very Poor</td> </tr> </tbody> </table>	RQD (Percent)	Diagnostic Description	Greater than 90	Excellent	75 - 90	Good	50 - 75	Fair	25 - 50	Poor	Less than 25	Very Poor
RQD (Percent)	Diagnostic Description															
Greater than 90	Excellent															
75 - 90	Good															
50 - 75	Fair															
25 - 50	Poor															
Less than 25	Very Poor															

ATTACHMENT 12

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING								
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
S1	6.5-7.5	24	36	17	19	100	100	100	92	81	68	57	CL	A-6
S1	19-20	22	45	18	27	100	93	77	70	61	51	44	SC	A-7-6
S2	4.5-5.5	21	34	16	18	----	----	----	----	----	----	93	CL	A-6
S4	6.5-7.5	26	45	18	27	100	100	100	90	81	71	63	CL	A-7-6
S4	13.5-14	----	57	19	38	100	100	98	83	52	27	24	SC	A-2-7
S5	4-5	23	41	17	24	100	100	74	62	54	48	45	SC	A-7-6
S5	34-35	24	46	15	31	100	100	100	99	98	97	93	CL	A-7-6
S5	44-45	20	40	16	24	100	100	97	95	91	83	74	CL	A-6
S6	13.5-14.5	25	49	18	31	100	91	78	66	56	50	45	SC	A-7-6
S6	24-25	21	46	18	28	68	58	54	48	41	35	31	GC	A-2-7
S6	39-40	34	50	15	35	100	87	86	86	83	81	77	CL/CH	A-7-6
W7	2-3	18	37	16	21	100	100	80	69	59	50	43	SC	A-6
W7	6.5-7.5	24	38	15	23	100	100	100	99	98	97	93	CL	A-6
W7	14-15	24	48	15	33	100	100	100	99	98	97	93	CL	A-7-6

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING								
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
W8	4.5-5.5	18	26	17	9	100	100	100	99	98	98	93	CL	A-4
W8	9-10	25	38	15	23	100	100	100	99	98	97	93	CL	A-6
W8	19-20	27	43	15	28	100	100	100	99	97	96	89	CL	A-7-6
S9	14-15	24	57	17	40	----	----	----	----	----	----	88	CH	A-7-6
S10	7-7.5	25	44	15	29	----	----	----	----	----	----	91	CL	A-7-6
S11	4.5-5.5	16	51	15	36	----	----	----	----	----	----	93	CH	A-7-6
S11	19-20	----	39	26	13	----	----	----	----	----	----	----	SHALE	SHALE
S13	9-10	19	40	13	27	---	---	---	---	---	---	86	CL	A-6
S14	0.5-1.5	10	32	17	15	----	----	----	----	----	----	65	CL	A-6
S14	6.5-7.5	26	43	15	28	----	----	----	----	----	----	93	CL	A-7-6
S14	18.5-19.5	----	40	25	15	----	----	----	----	----	----	----	SHALE	SHALE
W15	4.5-5.5	18	35	15	20	----	----	----	----	----	----	90	CL	A-6

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.	
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING									
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200			
W16	0.5-1.5	10	35	23	12	----	----	----	----	----	----	----	87	CL	A-6
W16	6.5-7.5	22	33	14	19	----	----	----	----	----	----	----	81	CL	A-6
W17	0.5-1.5	8	31	21	10	----	----	----	----	----	----	----	88	CL	A-6
W17	6.5-7.5	21	34	14	20	----	----	----	----	----	----	----	90	CL	A-6
W18	0.5-1.5	15	28	24	4	----	----	----	----	----	----	----	80	ML	A-4
W18	6.5-7.5	24	36	13	23	----	----	----	----	----	----	----	92	CL	A-6
RP19	2.5-3.5	18	39	16	23	---	---	---	---	---	---	---	72	CL	A-6
RP20	2.5-3.5	15	36	16	20	100	100	96	95	94	91	83	CL	A-6	
RP20	8.5-9.5	----	63	21	42	100	100	99	97	95	92	87	CH	A-7-6	
RP21	2.5-3.5	14	38	16	22	100	100	95	94	90	86	79	CL	A-6	
RP21	6.5-7.5	38	49	16	33	100	100	90	85	80	76	72	CL	A-7-6	
RP22	4.5-5.5	16	38	17	21	100	100	96	84	72	54	43	SC	A-6	
RP22	19-20	21	41	15	26	----	----	----	----	----	----	86	CL	A-7-6	

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING								
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
W24	2.5-3.5	13	35	17	18	100	100	100	98	97	95	87	CL	A-6
W25	0.5-1.5	23	25	20	5	100	100	100	98	96	92	77	ML	A-4
W25	6.5-7.5	34	68	22	46	100	100	81	78	74	69	66	CH	A-7-6
W26	4.5-5.5	19	39	16	23	100	100	96	90	87	86	81	CL	A-6
W26	8.5-9	26	41	18	23	100	100	91	81	73	63	55	CL	A-7-6
S27	0.5-1.5	18	40	30	10	100	100	84	77	72	67	59	ML	A-4
S27	14-15	36	42	19	23	100	100	67	54	41	32	28	SC	A-7-6
S27	24-25	23	37	17	20	100	100	99	95	92	89	85	CL	A-6
S28	9-10	31	57	24	33	100	100	82	73	66	59	53	CH	A-7-6
S28	24-25	24	33	18	15	100	100	89	83	80	77	73	CL	A-6
W29	4.5-5.5	29	29	17	12	100	100	100	95	91	90	85	CL	A-6
W29	9-10	19	53	18	35	100	100	78	70	65	60	55	CH	A-7-6
W31	2.5-3.5	19	33	16	17	100	75	70	60	54	47	42	SC	A-6

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING								
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
W32	0.5-1.5	7	32	28	4	100	100	60	34	24	17	11	GM	A-2-4
W32	6.5-7.5	21	35	17	18	100	100	100	96	94	90	85	CL	A-6
W33	6.5-7.5	28	54	16	38	----	----	----	----	----	----	97	CH	A-7-6
W34	2.5-3.5	20	30	19	11	----	----	----	----	----	----	91	CL	A-6
W34	19-20	22	56	17	39	----	----	----	----	----	----	88	CH	A-7-6
W35	5-6	24	43	17	26	----	----	----	----	----	----	26	SC	A-2-7
W36	9-10	20	27	16	11	----	----	----	----	----	----	82	CL	A-6
W36	24-25	19	50	15	35	----	----	----	----	----	----	89	CL/CH	A-7-6
W37	4.5-5.5	24	47	17	30	----	----	----	----	----	----	47	SC	A-7-6
W37	19-20	22	41	15	26	----	----	----	----	----	----	87	CL	A-7-6
W38	14-15	20	30	15	15	----	----	----	----	----	----	87	CL	A-6
W39	24-25	20	46	14	32	----	----	----	----	----	----	89	CL	A-7-6

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS							UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING								
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
W40	4.5-5.5	15	47	17	30	----	----	----	----	----	----	38	SC	A-7-6
W41	4.5-5.5	17	41	15	26	----	----	----	----	----	----	41	SC	A-7-6
W41	24-25	21	48	14	34	----	----	----	----	----	----	92	CL	A-7-6
W50	4-5	24	47	19	28	----	----	----	----	----	----	50	CL	A-7-6
W50	9-10	18	30	17	13	100	100	99	97	94	89	82	CL	A-6
W51	4.5-5.5	27	----	----	----	75	61	53	45	39	33	29	GC	A-2-7
W51	6.5-7.5	31	46	23	23	----	----	----	----	----	----	89	CL	A-7-6
W52	2.5-3.5	25	----	----	----	100	72	63	54	46	38	33	SC	A-2-7
W53	2.5-3.5	22	37	19	18	100	100	84	81	74	66	58	CL	A-6
W54	4.5-5.5	31	39	22	17	----	----	----	----	----	----	82	CL	A-6
W55	2.5-3.5	28	54	22	32	----	----	----	----	----	----	76	CH	A-7-6
W55	6.5-7.5	26	49	22	27	----	----	----	----	----	----	94	CL	A-7-6

SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: BB0414: Porter Rd.-HWY. 112/71B Widening & Intchng. Impvts.

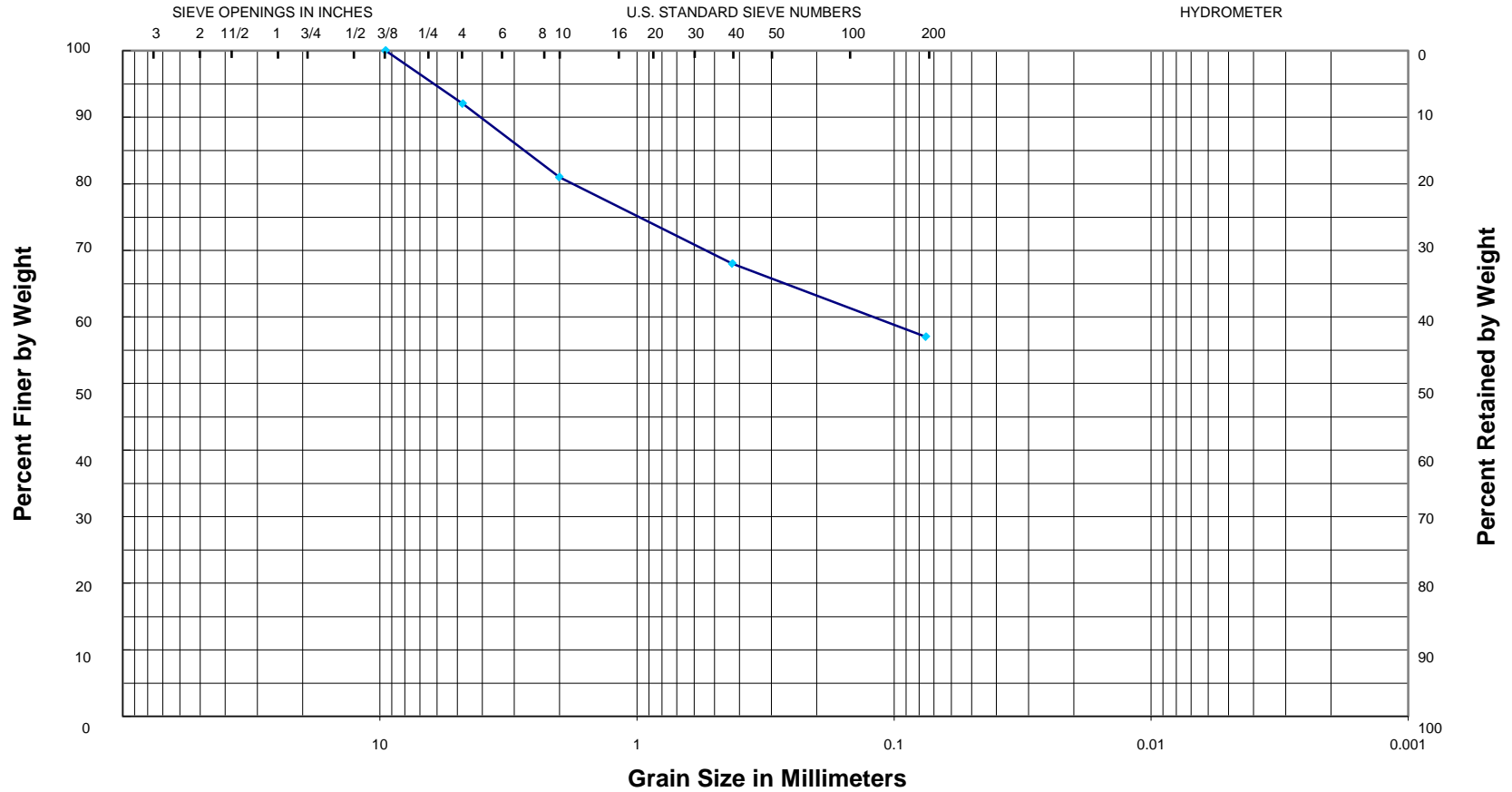
LOCATION: Fayetteville, AR

JOB NUMBER: 14-073

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS								UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING									
						1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200			
TP-1	1.5-2.5	17	46	25	21	----	----	----	----	----	----	----	----	CL	A-7-6
TP-2	0.5-1	22	29	24	5	----	----	----	----	----	----	51	ML	A-4	
TP-3	3-4.5	38	68	24	44	----	----	----	----	----	----	----	CH	A-7-6	
TP-4	0-1.5	21	31	23	8	----	----	----	----	----	----	40	SC	A-4	
TP-4	3-4	9	Non-Plastic			----	----	----	----	----	----	----	Chert	Chert	
TP-5	0.5-1.5	18	Non-Plastic			----	----	----	----	----	----	39	SM	A-4	

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S1, 6.5-7.50 ft
 Atterberg Limits: LL=36, PL=17, PI=19

Description: Reddish brown cherty clay w/cobbles
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



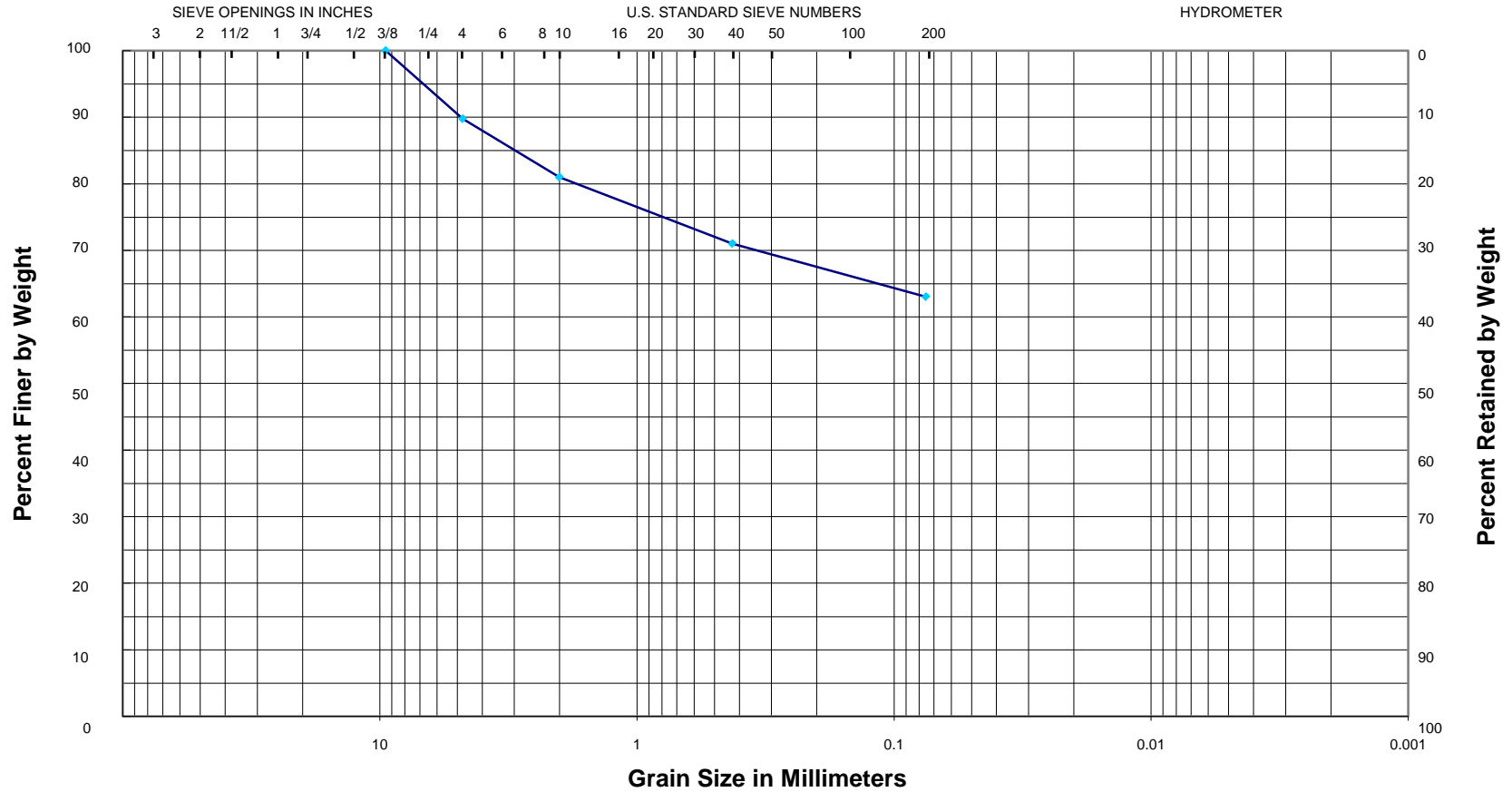
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S1, 19-20 ft
Atterberg Limits: LL=45, PL=18, PI=27

Description: Reddish brown cherty clay w/cobbles
Classification: USCS = SC; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S4, 6.5-7.5ft
 Atterberg Limits: LL=45, PL=18, PI=27

Description: Reddish brown cherty clay w/fine to coarse chert gravel and cobbles
 Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



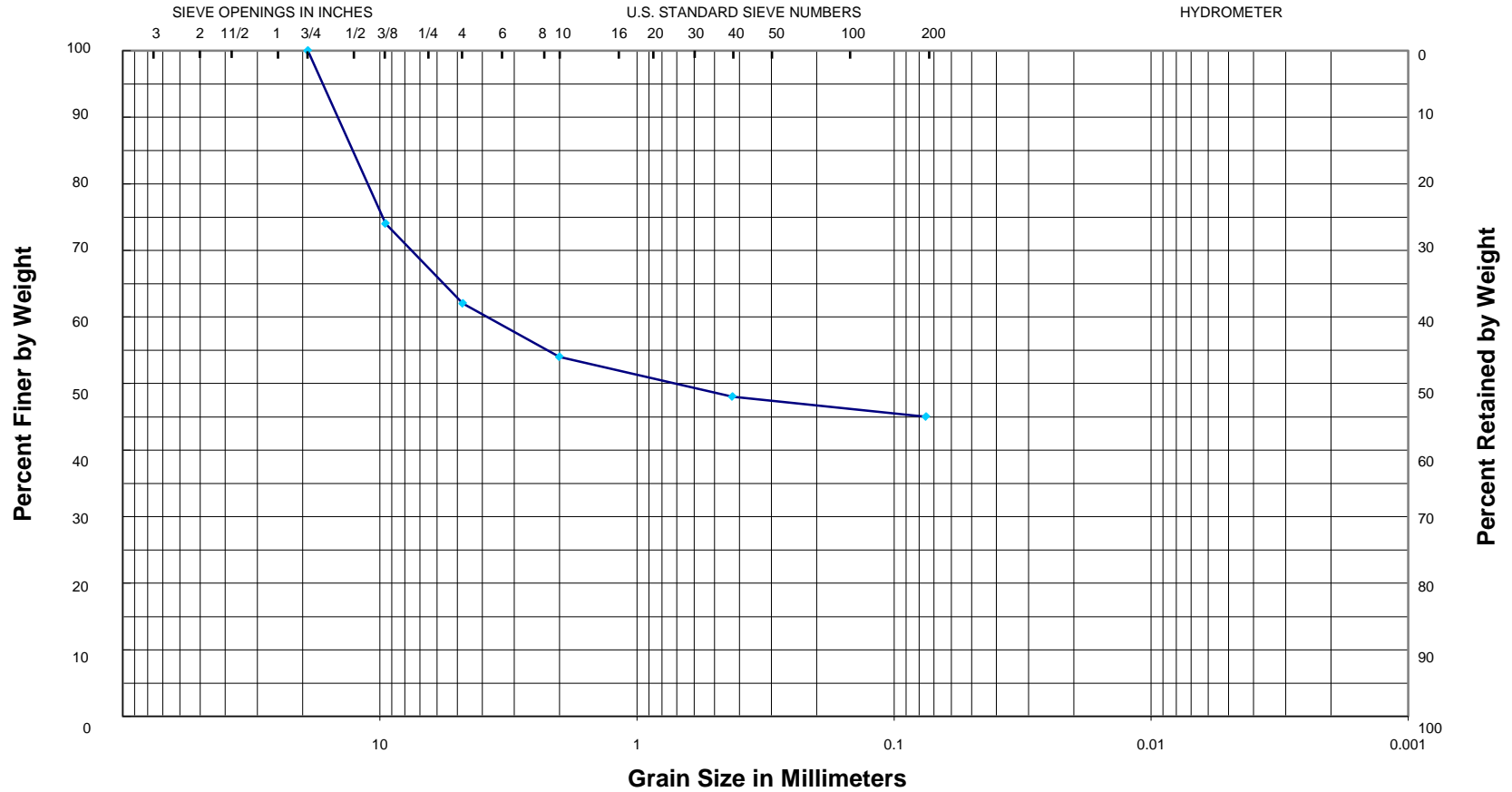
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S4, 13.5-14 ft
 Atterberg Limits: LL=57, PL=19, PI=38

Description: Tan and light gray chert w/
 interbedded clay seams and layers
 Classification: USCS = SC; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



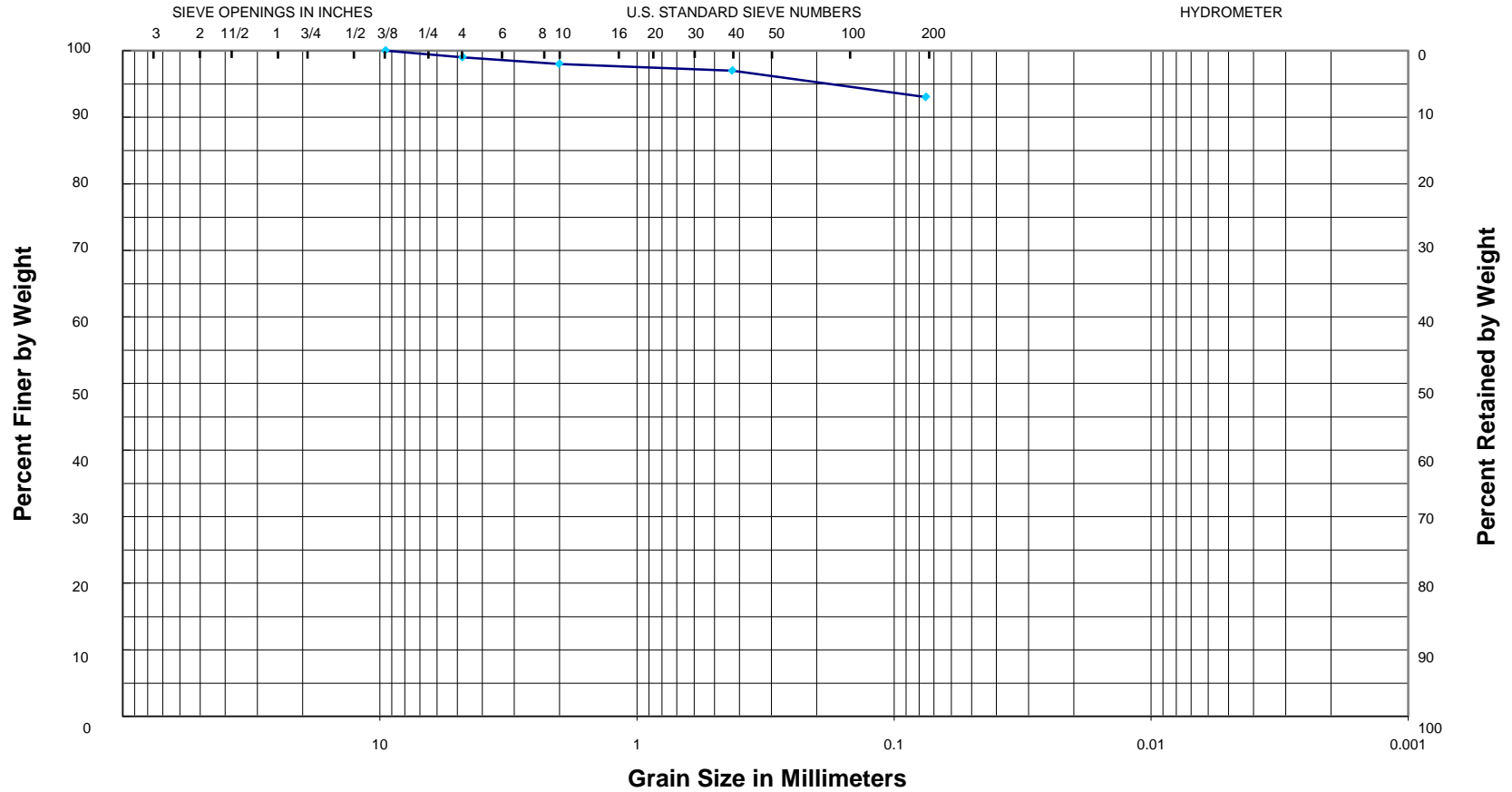
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S5, 4-5 ft
 Atterberg Limits: LL=41, PL=17, PI=24

Description: Reddish brown cherty clay w/chert cobbles
 Classification: USCS = SC; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



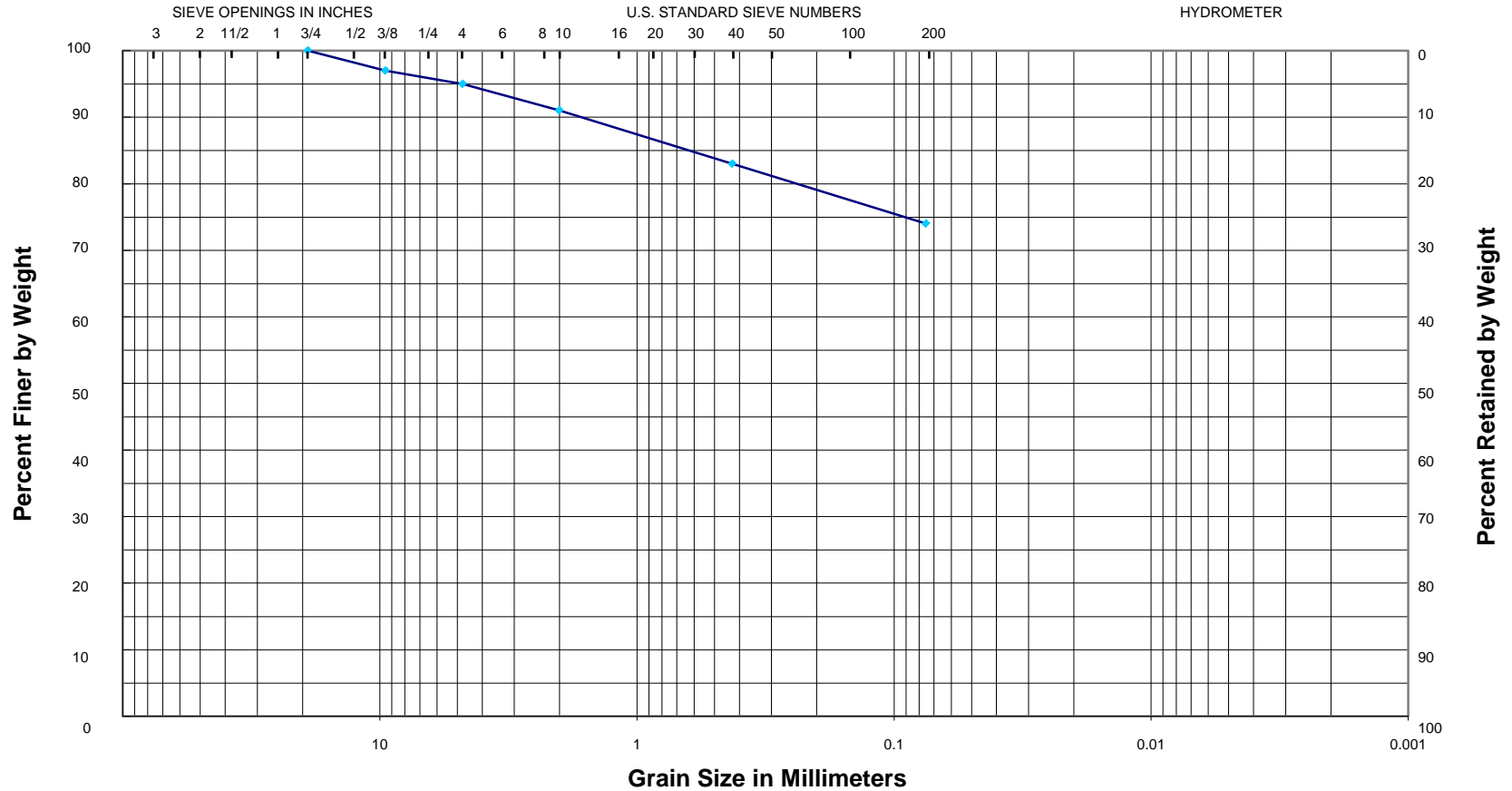
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring S5, 34-35 ft
 Atterberg Limits: LL=46, PL=15, PI=31

Description: Gray silty clay, slightly sandy
 Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



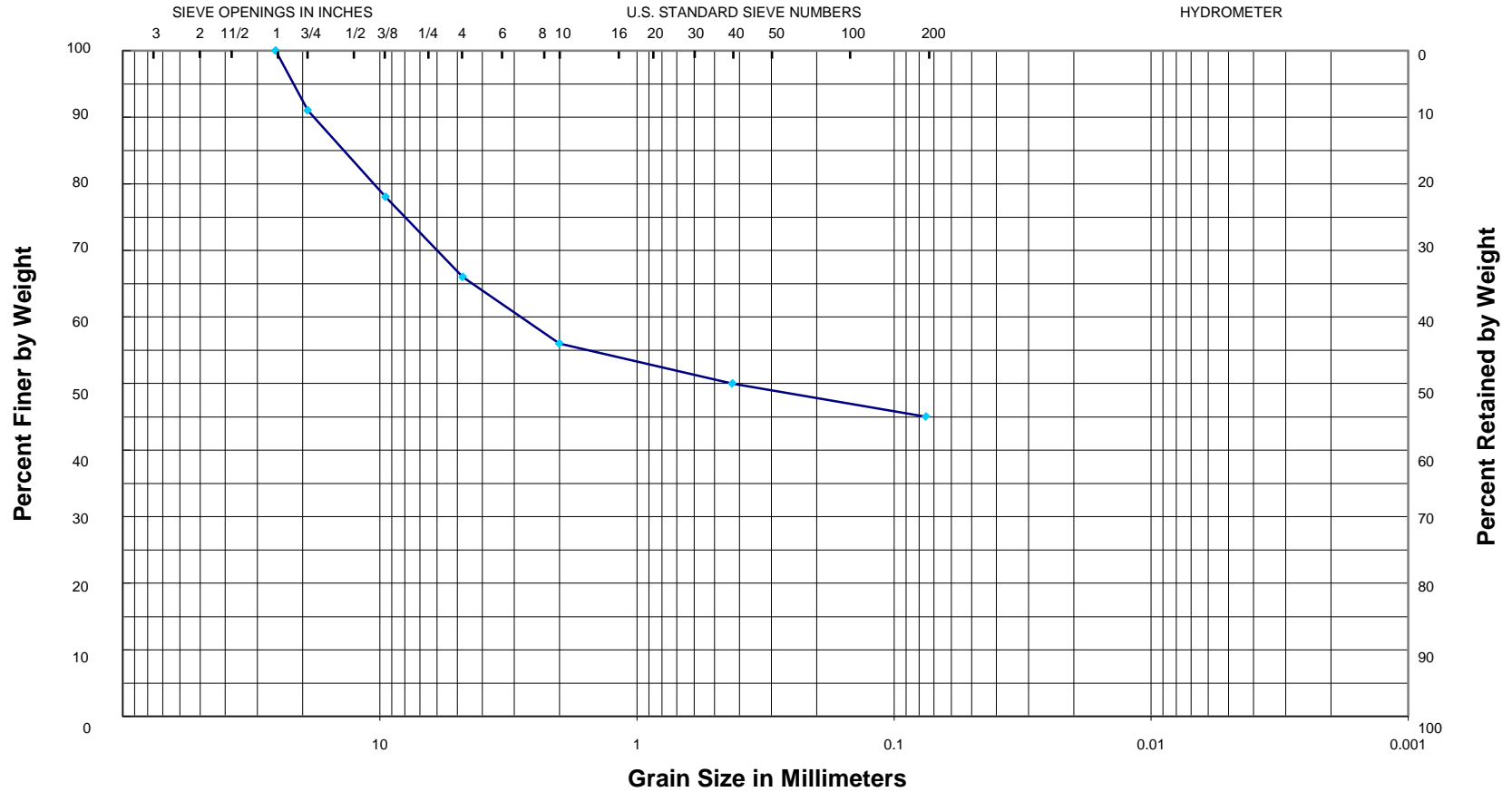
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S5, 44-45 ft
 Atterberg Limits: LL=40, PL=16, PI=24

Description: Tan and light gray fine to coarse sandy clay w/chert nodules
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S6, 13.5-14-.5 ft
 Atterberg Limits: LL=49, PL=18, PI=31

Description: Reddish brown cherty clay w/cobbles
 Classification: USCS = SC; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



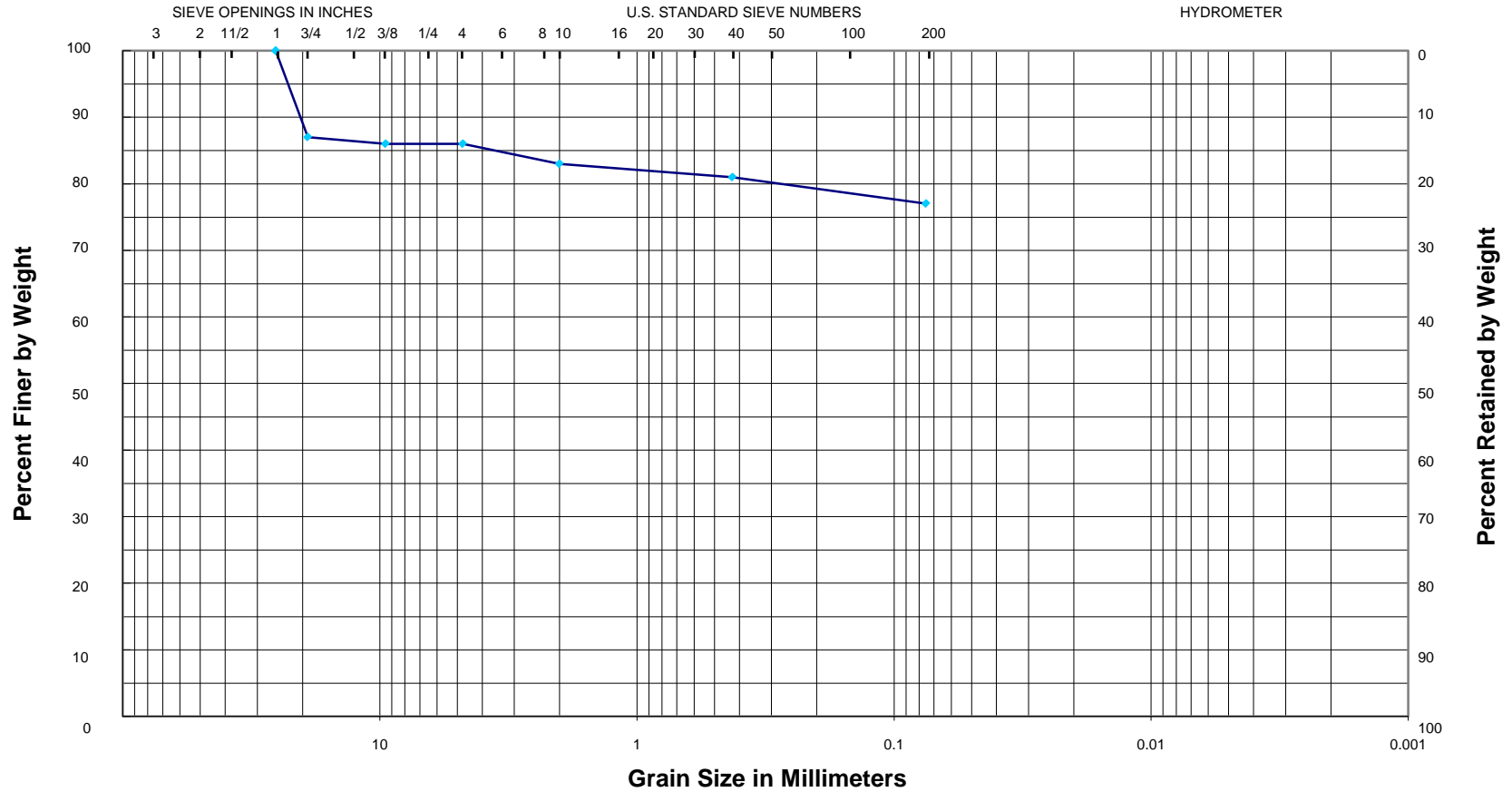
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S6, 24-25 ft
Atterberg Limits: LL=46, PL=18, PI=28

Description: Reddish brown cherty clay w/cobbles
Classification: USCS = GC; AASHTO = A-2-7

14-073

GRAIN SIZE CURVE



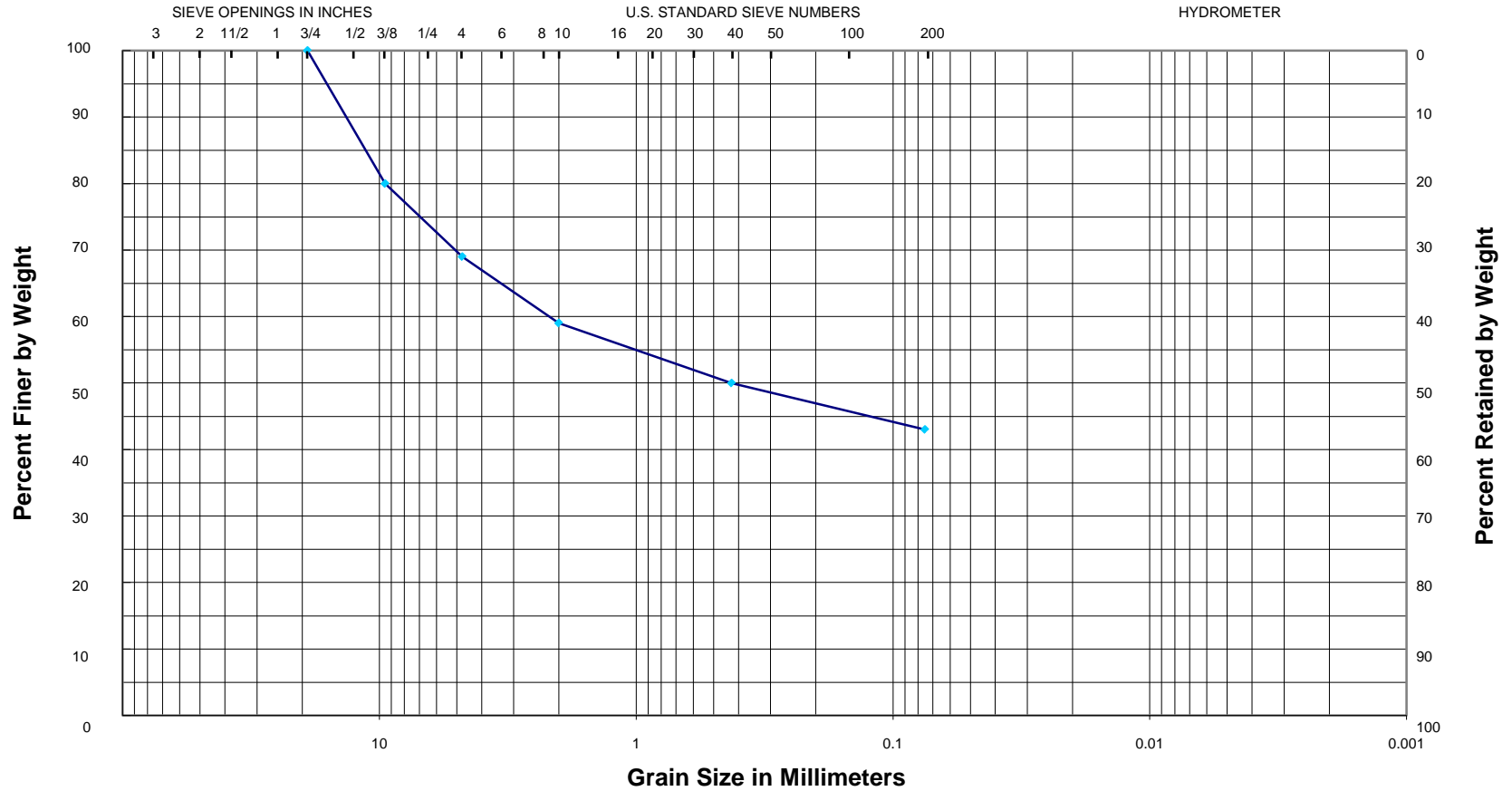
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S6, 39-40 ft
 Atterberg Limits: LL=50, PL=15, PI=35

Description: Gray and brown silty clay with chert fragments
 Classification: USCS = CL/CH; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



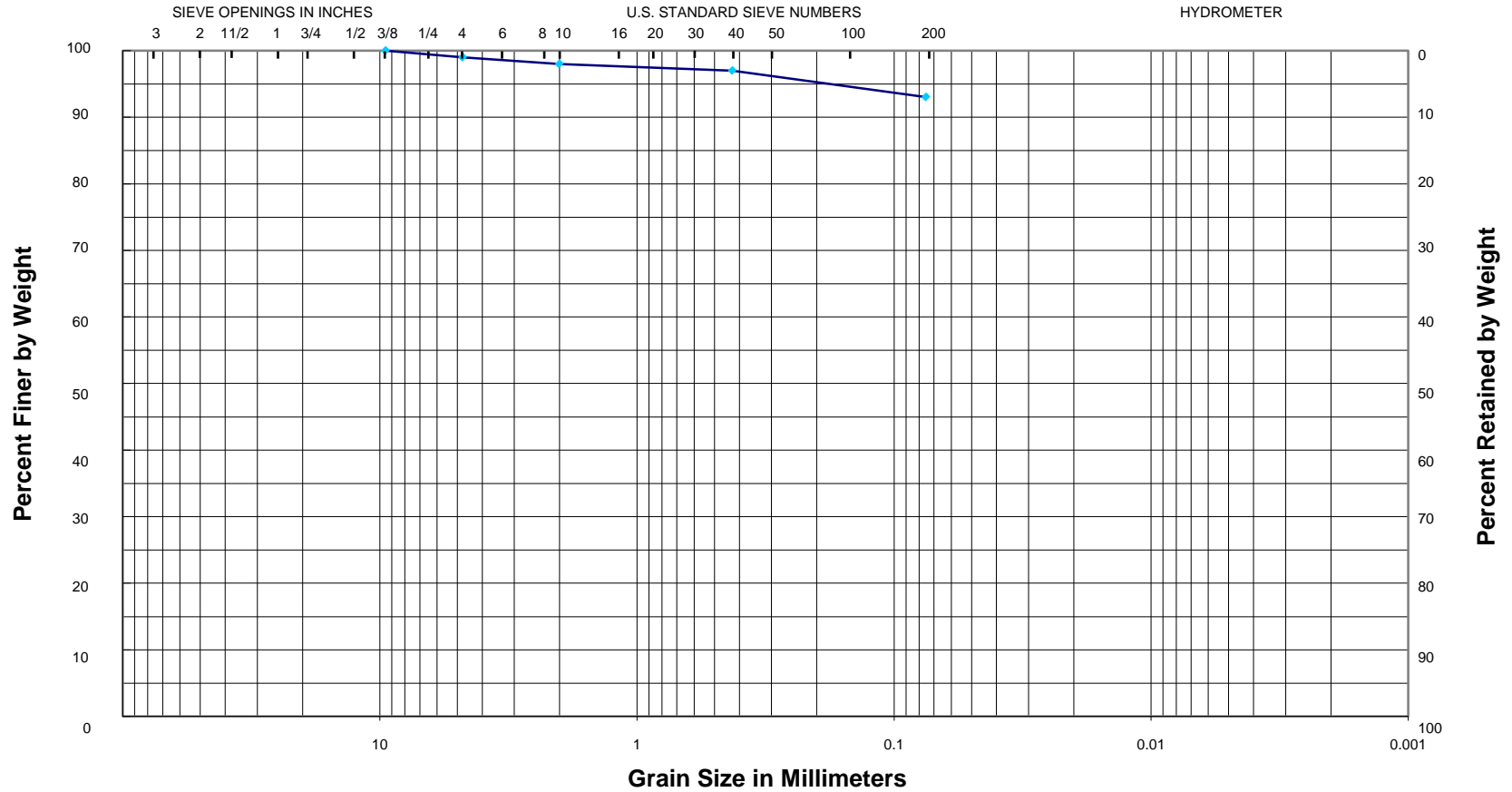
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W7, 2-3 ft
Atterberg Limits: LL=37, PL=16, PI=21

Description: Reddish brown cherty clay
Classification: USCS = SC; AASHTO = A-6

14-073

GRAIN SIZE CURVE



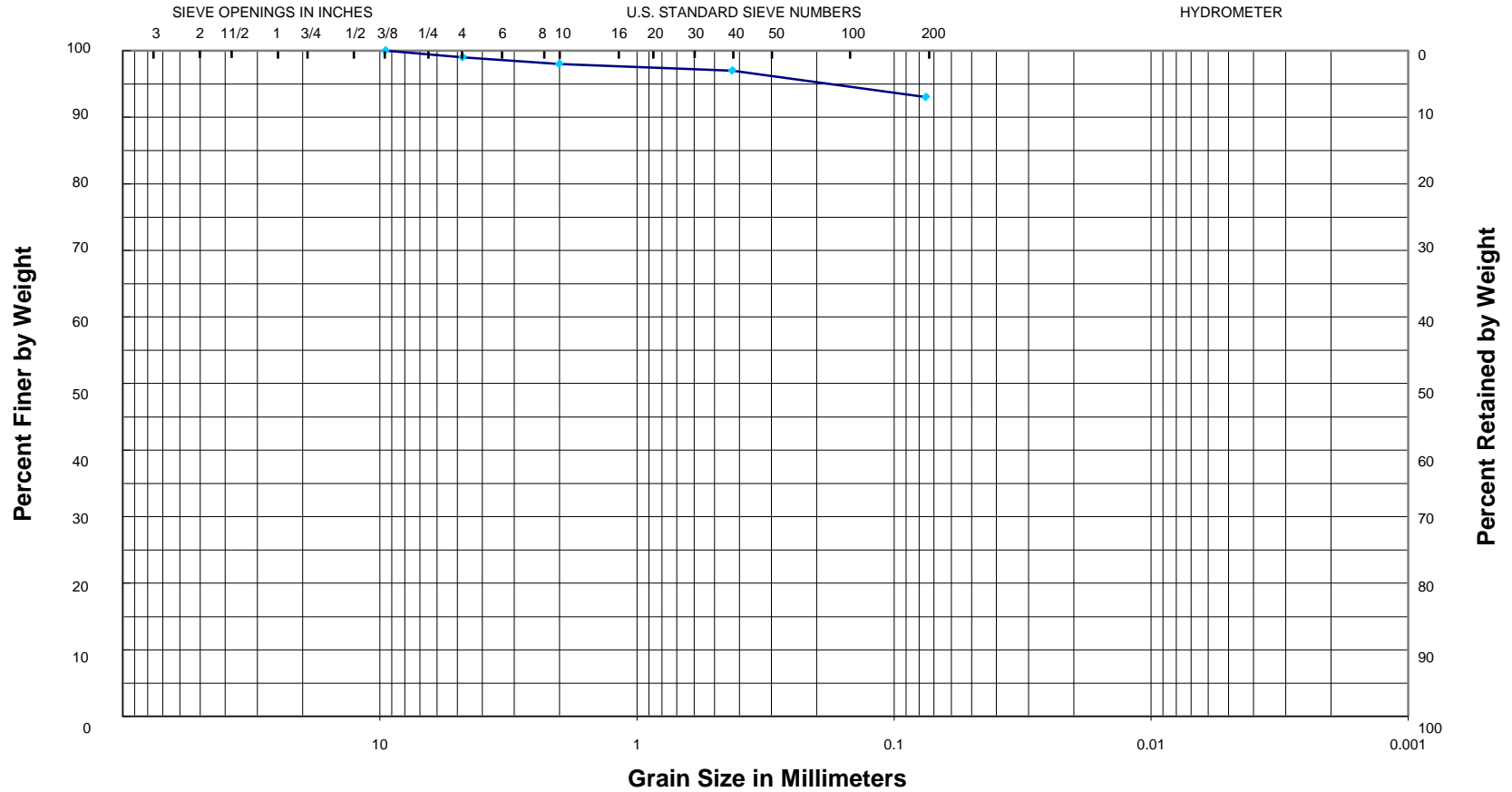
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W7, 6.5-7.5 ft
 Atterberg Limits: LL=38, PL=15, PI=23

Description: Gray and light brown clay
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



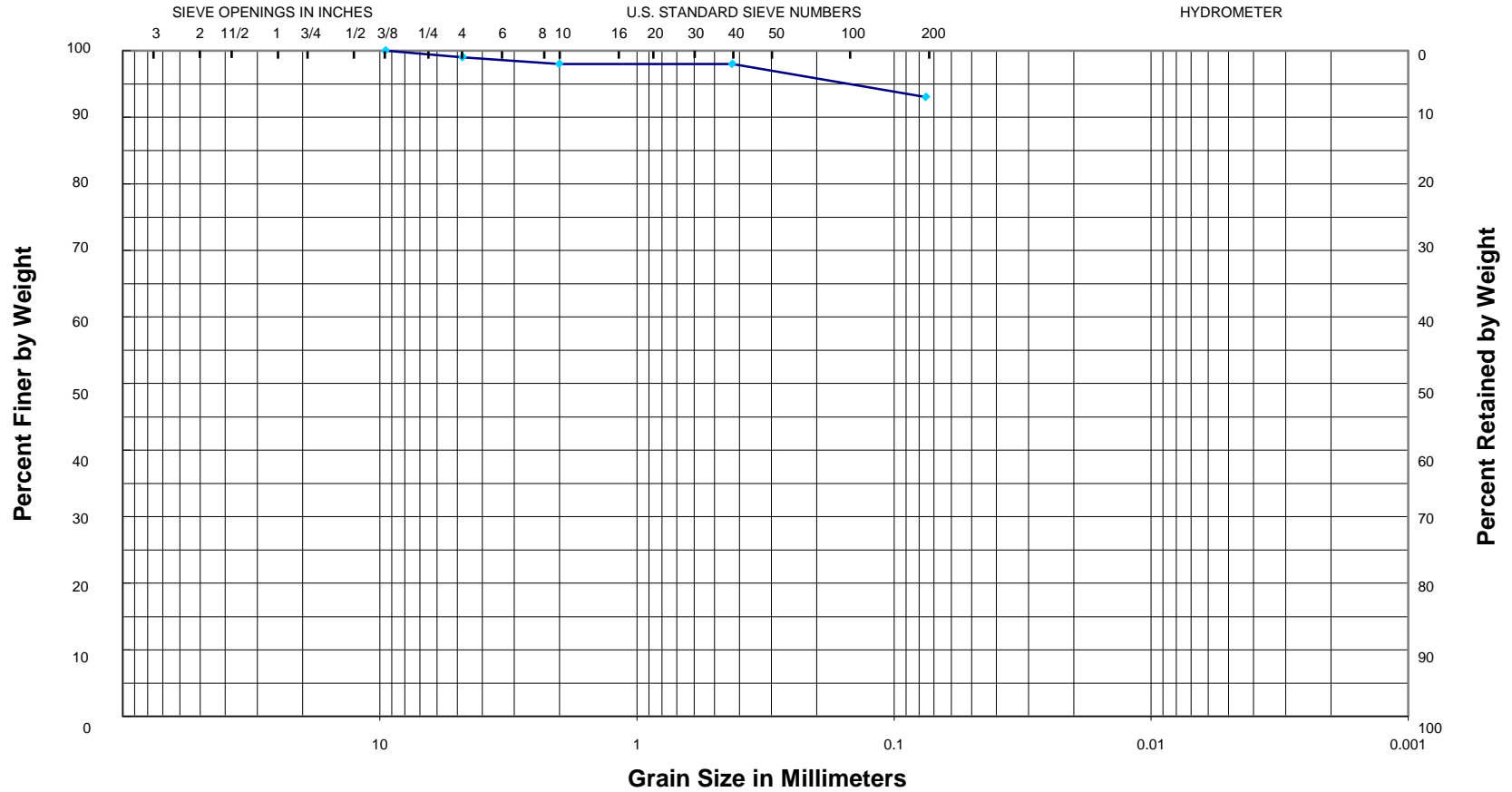
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W7, 14-15 ft
Atterberg Limits: LL=48, PL=15, PI=33

Description: Light brown and gray clay
Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



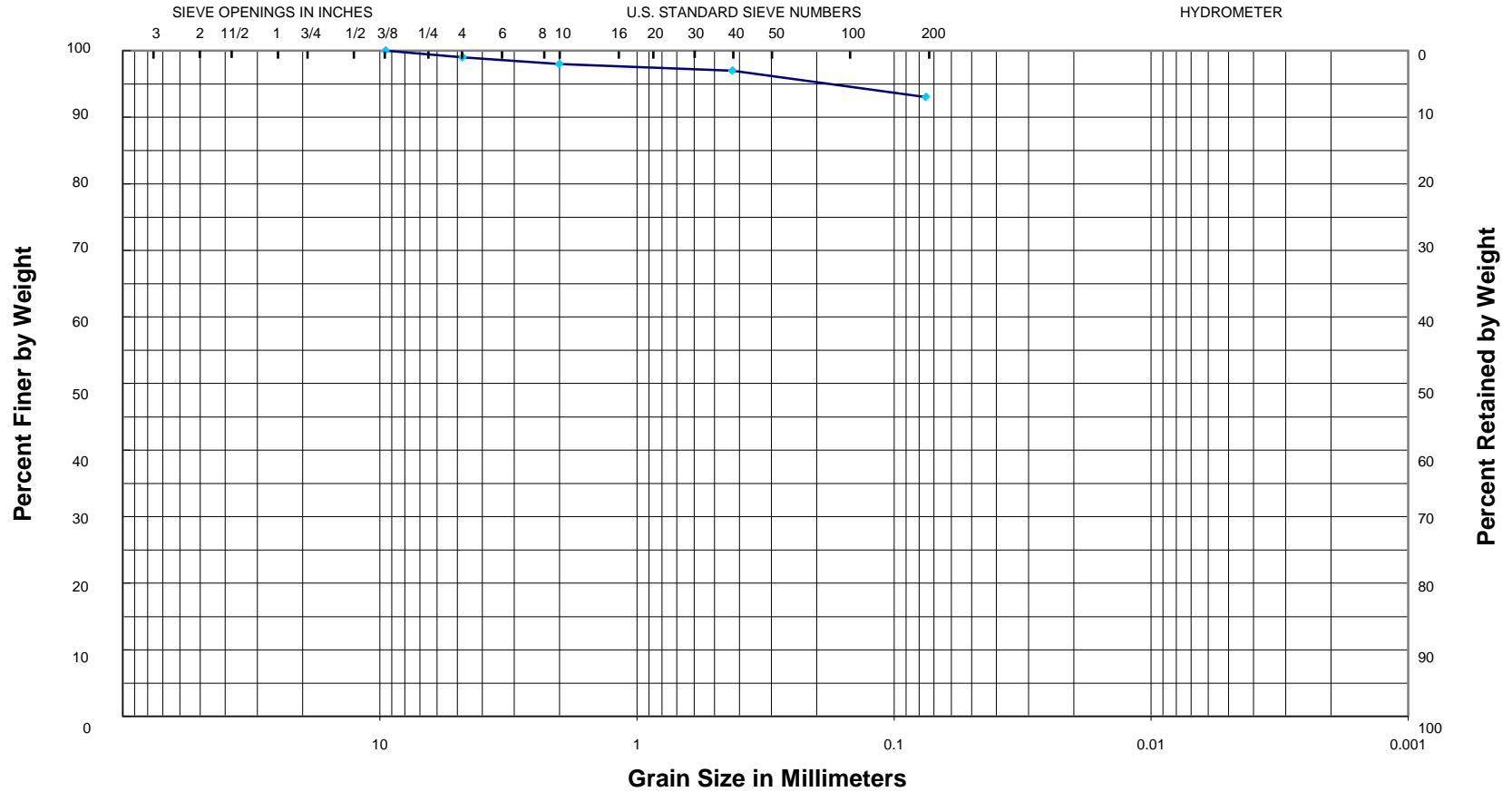
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W8, 4.5-5.5 ft
Atterberg Limits: LL=26, PL=17, PI=9

Description: Gray silty clay, slightly sandy
Classification: USCS = CL; AASHTO = A-4

14-073

GRAIN SIZE CURVE



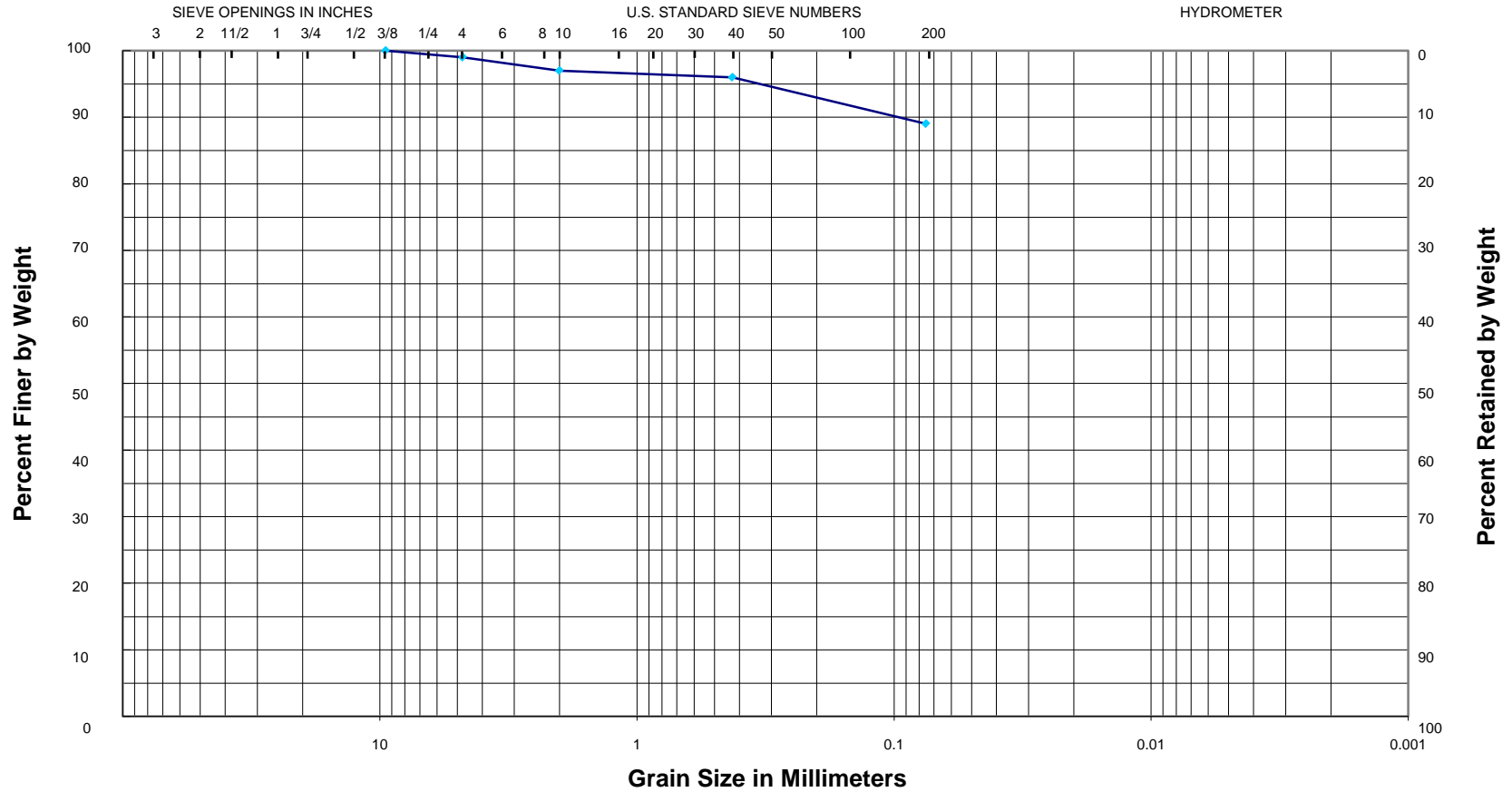
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W8, 9-10 ft
 Atterberg Limits: LL=38, PL=15, PI=23

Description: Gray silty clay, slightly sandy
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



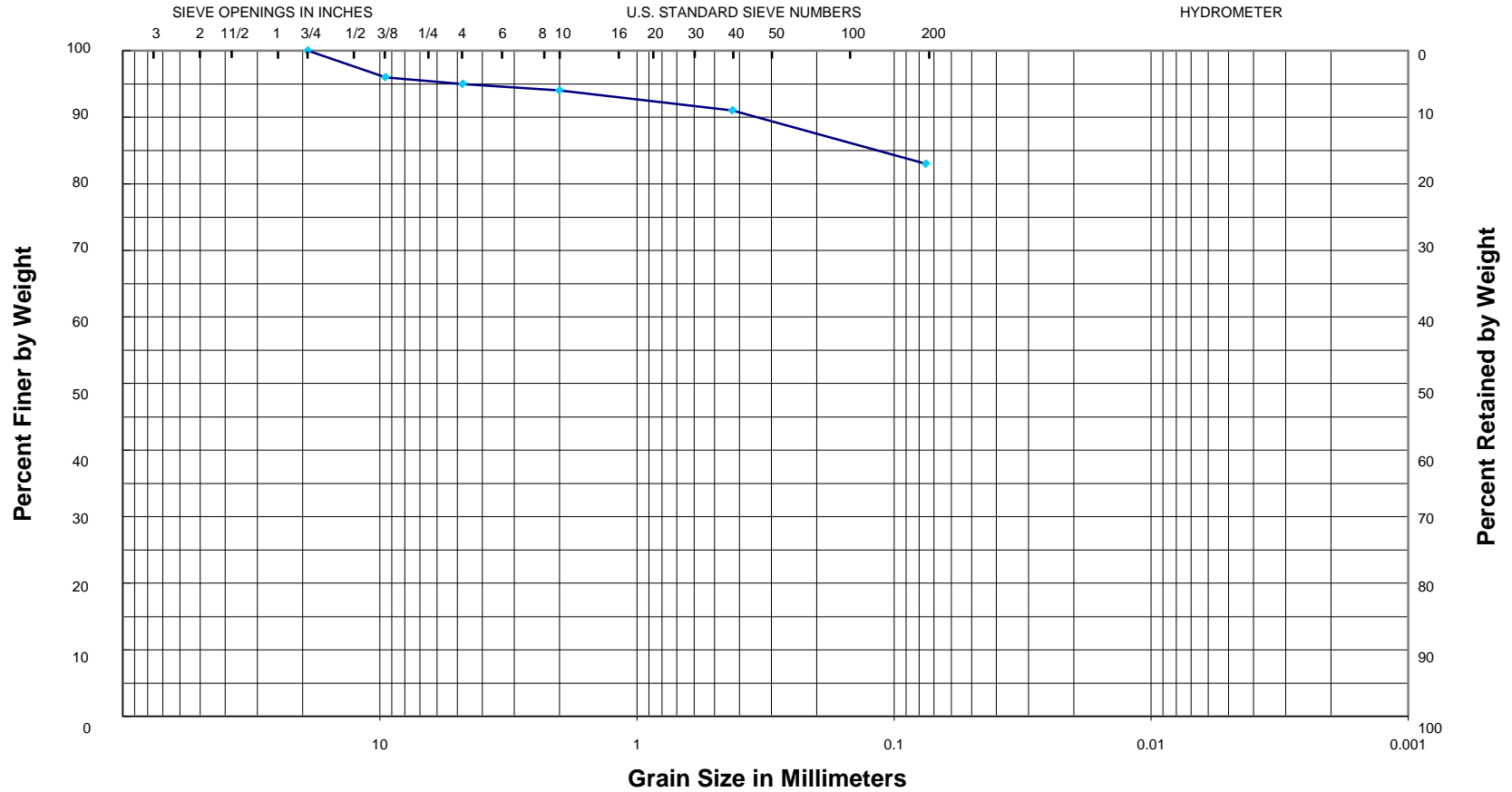
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W8, 19-20 ft
 Atterberg Limits: LL=43, PL=15, PI=28

Description: Tan and gray silty clay, slightly sandy
 Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



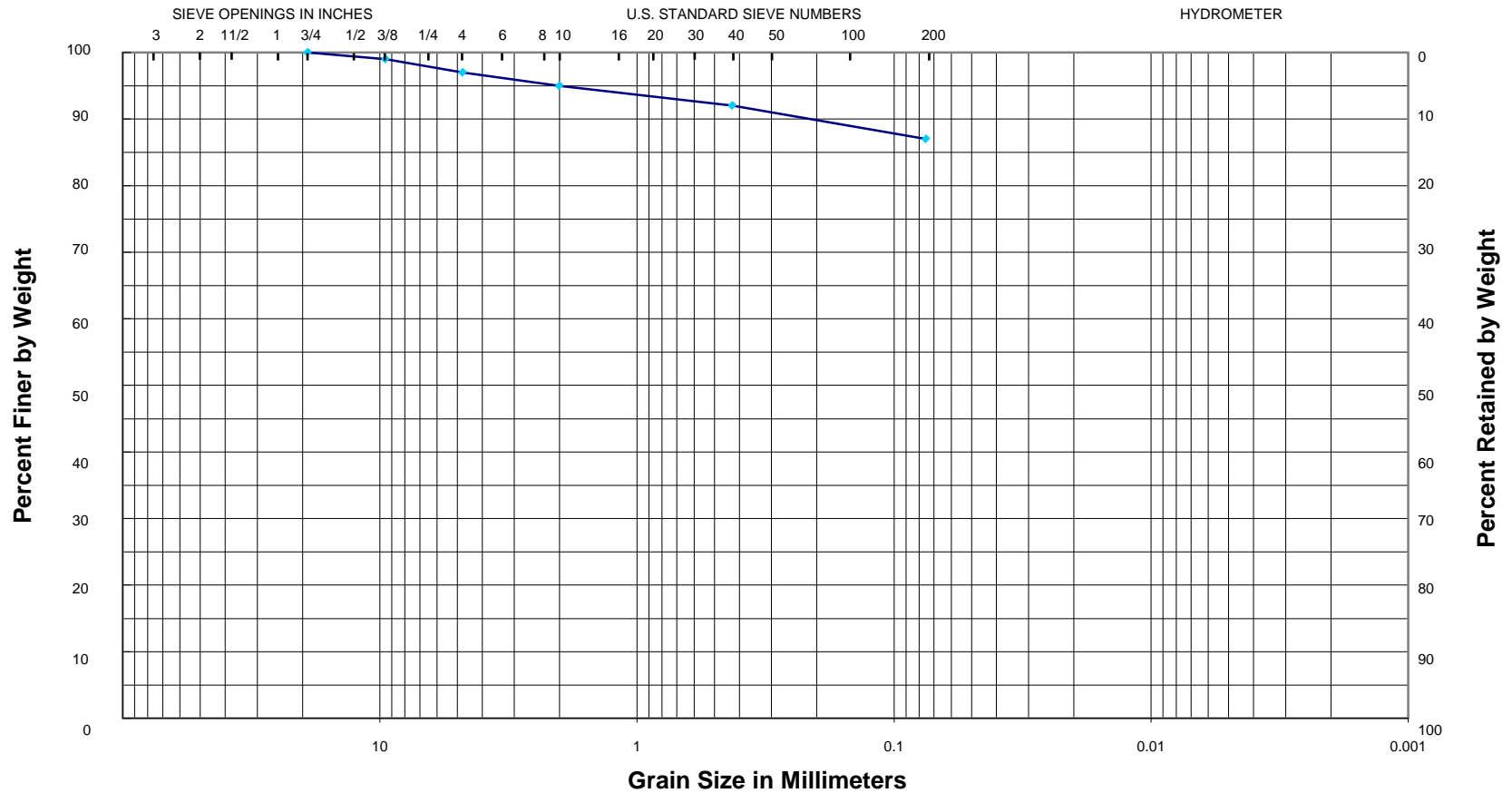
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring RP20, 2.5-3.5 ft
 Atterberg Limits: LL=36, PL=16, PI=20

Description: Reddish tan and tan silty clay w/chert fragments
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



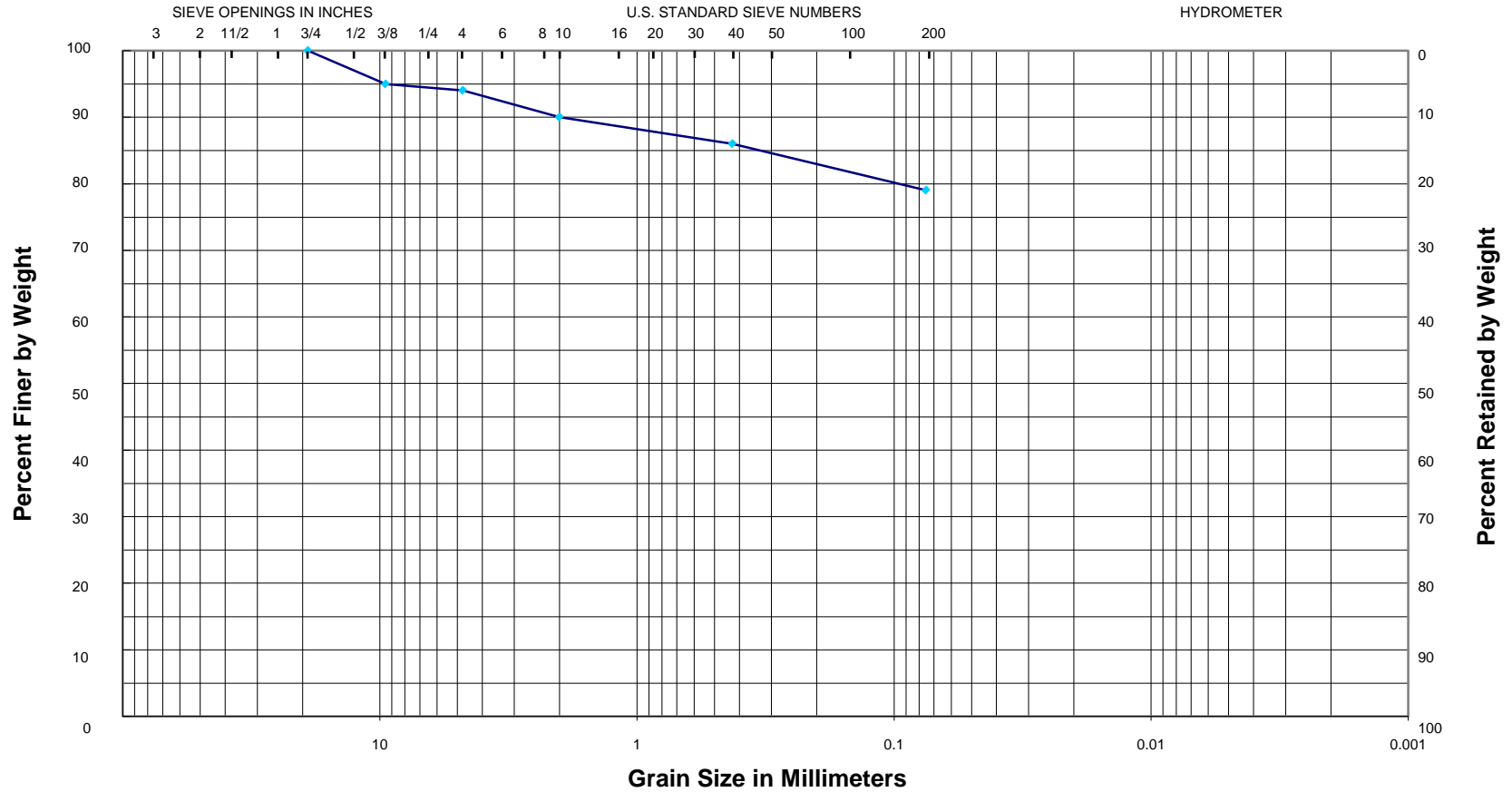
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring RP20, 8.5-9.5 ft
 Atterberg Limits: LL=63, PL=21, PI=42

Description: Tan and reddish brown cherty clay
 Classification: USCS = CH; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



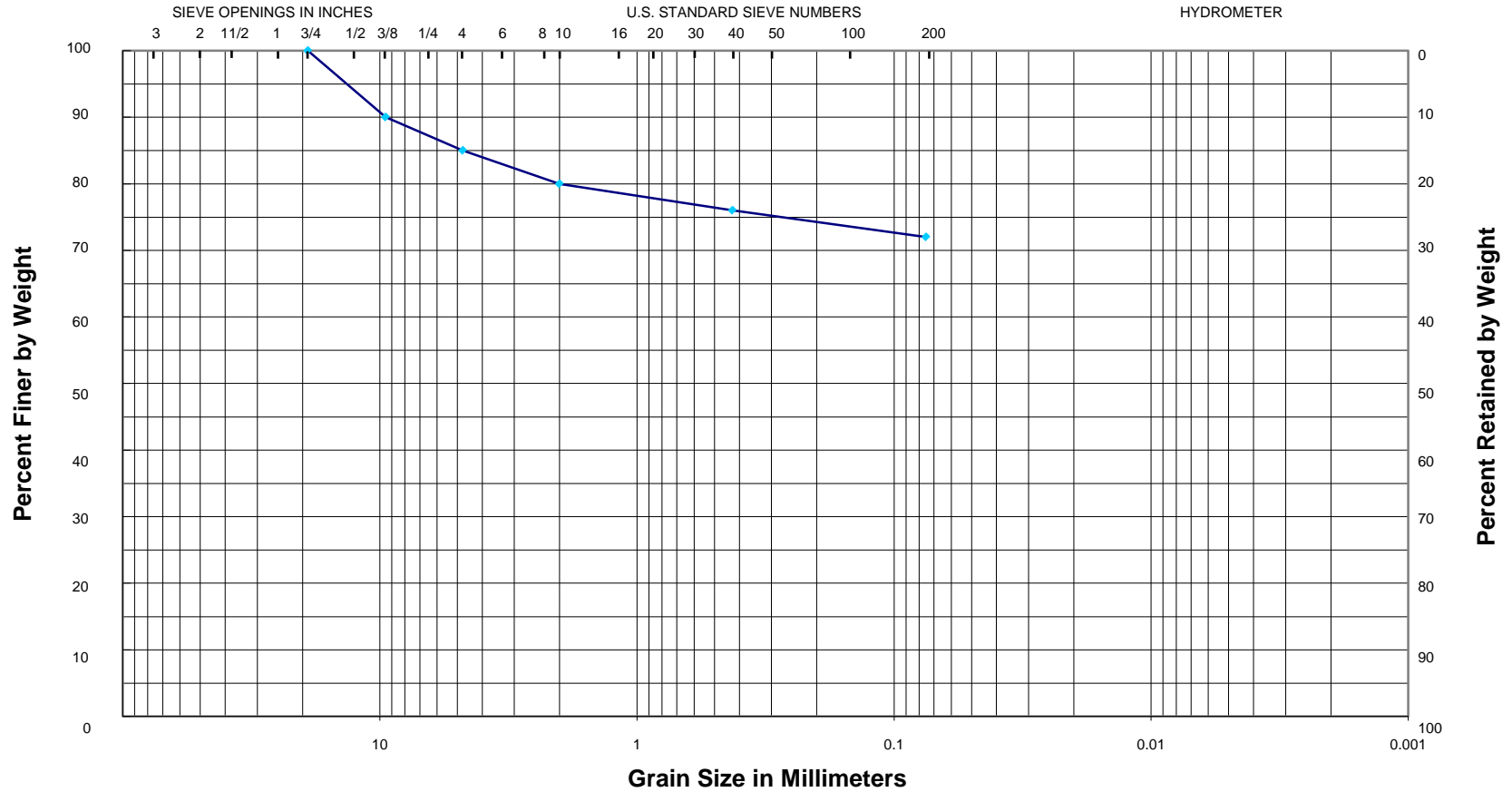
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring RP21, 2.5-3.5 ft
Atterberg Limits: LL=38, PL=16, PI=22

Description: Tan silty clay
Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



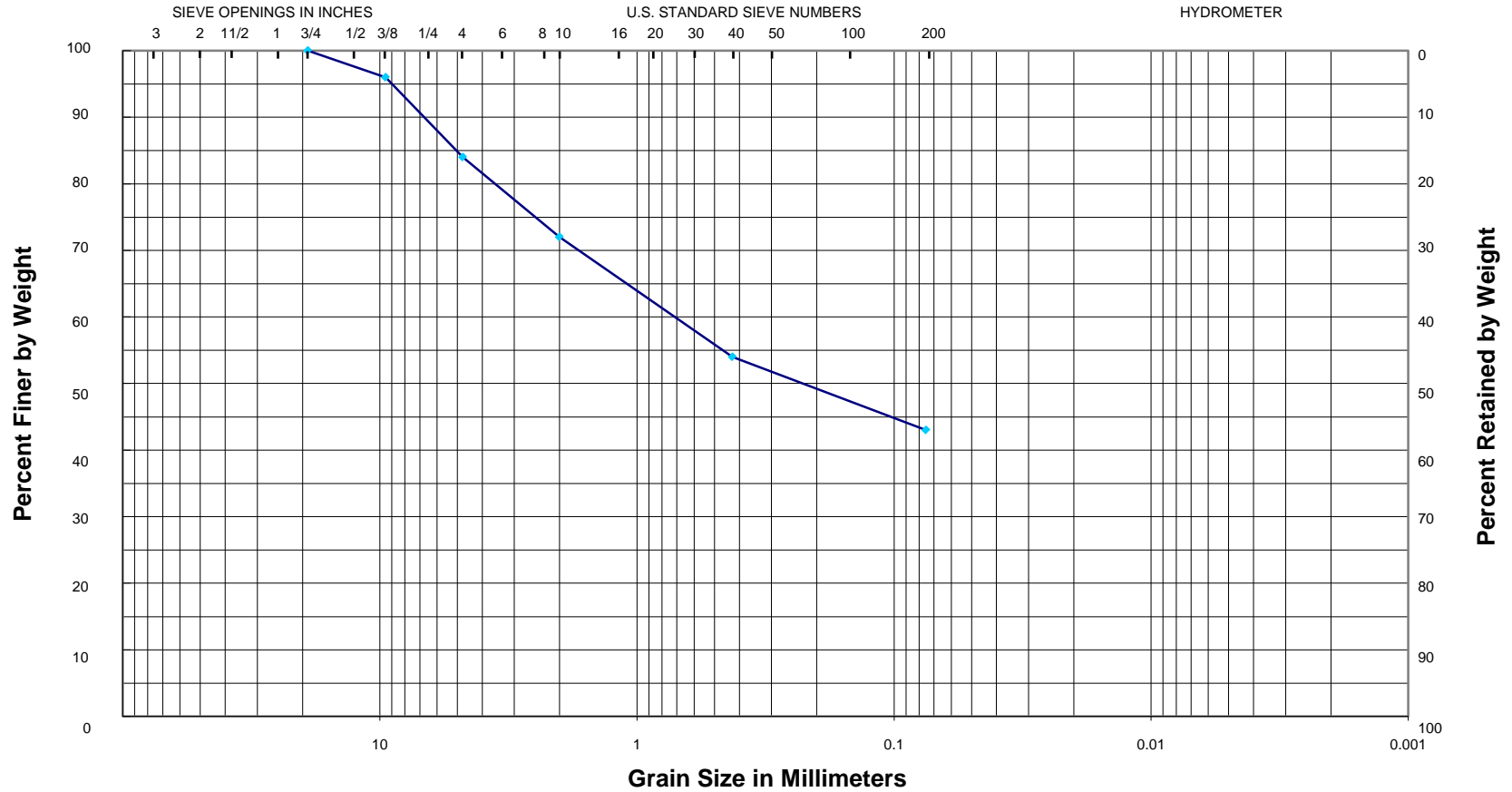
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring RP21, 6.5-7.5 ft
 Atterberg Limits: LL=49, PL=16, PI=33

Description: Tan silty clay
 Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



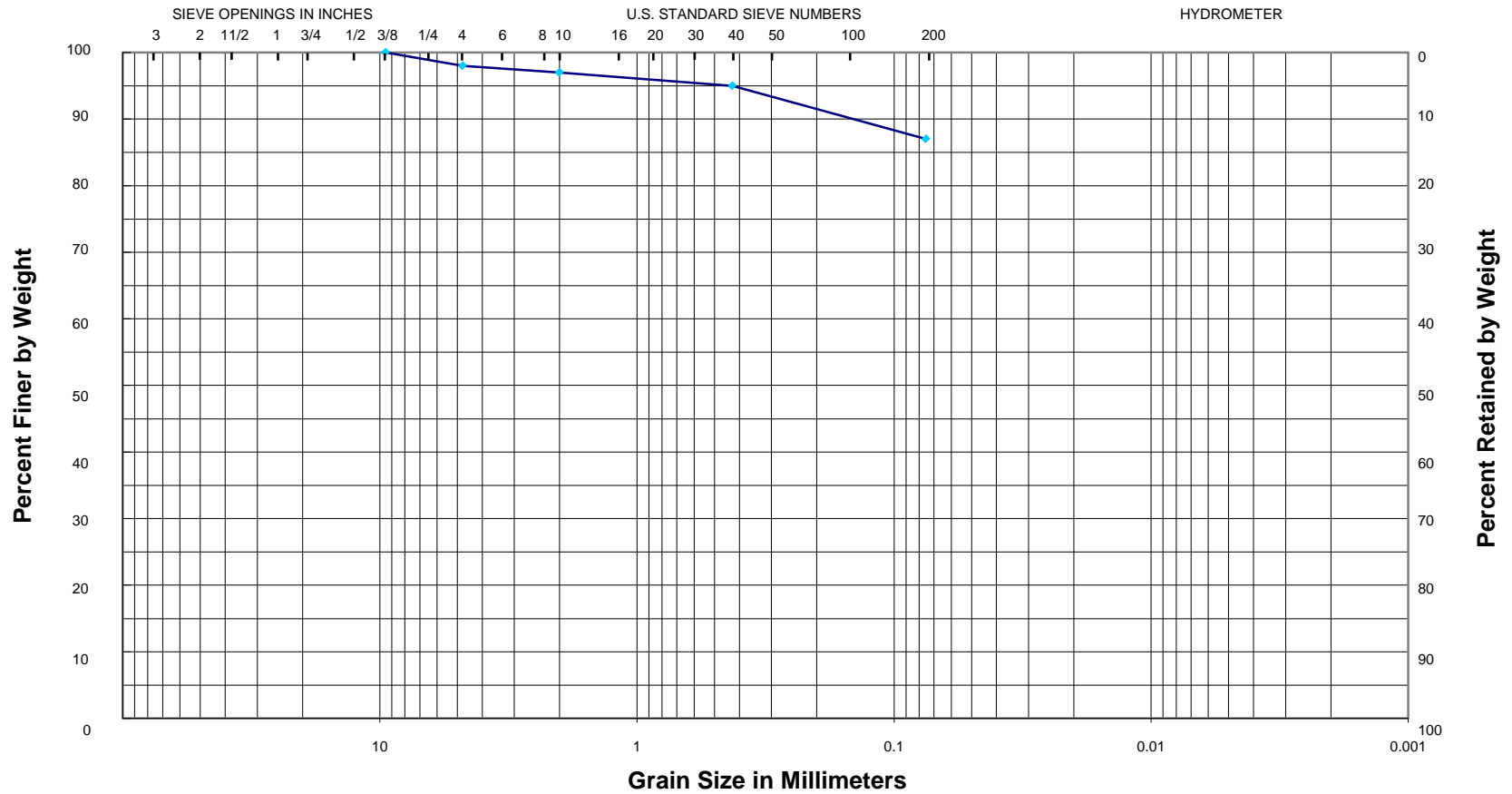
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring RP22, 4.5-5.5 ft
Atterberg Limits: LL=38, PL=17, PI=21

Description: Reddish brown silty clay w/chert fragments
Classification: USCS = SC; AASHTO = A-6

14-073

GRAIN SIZE CURVE



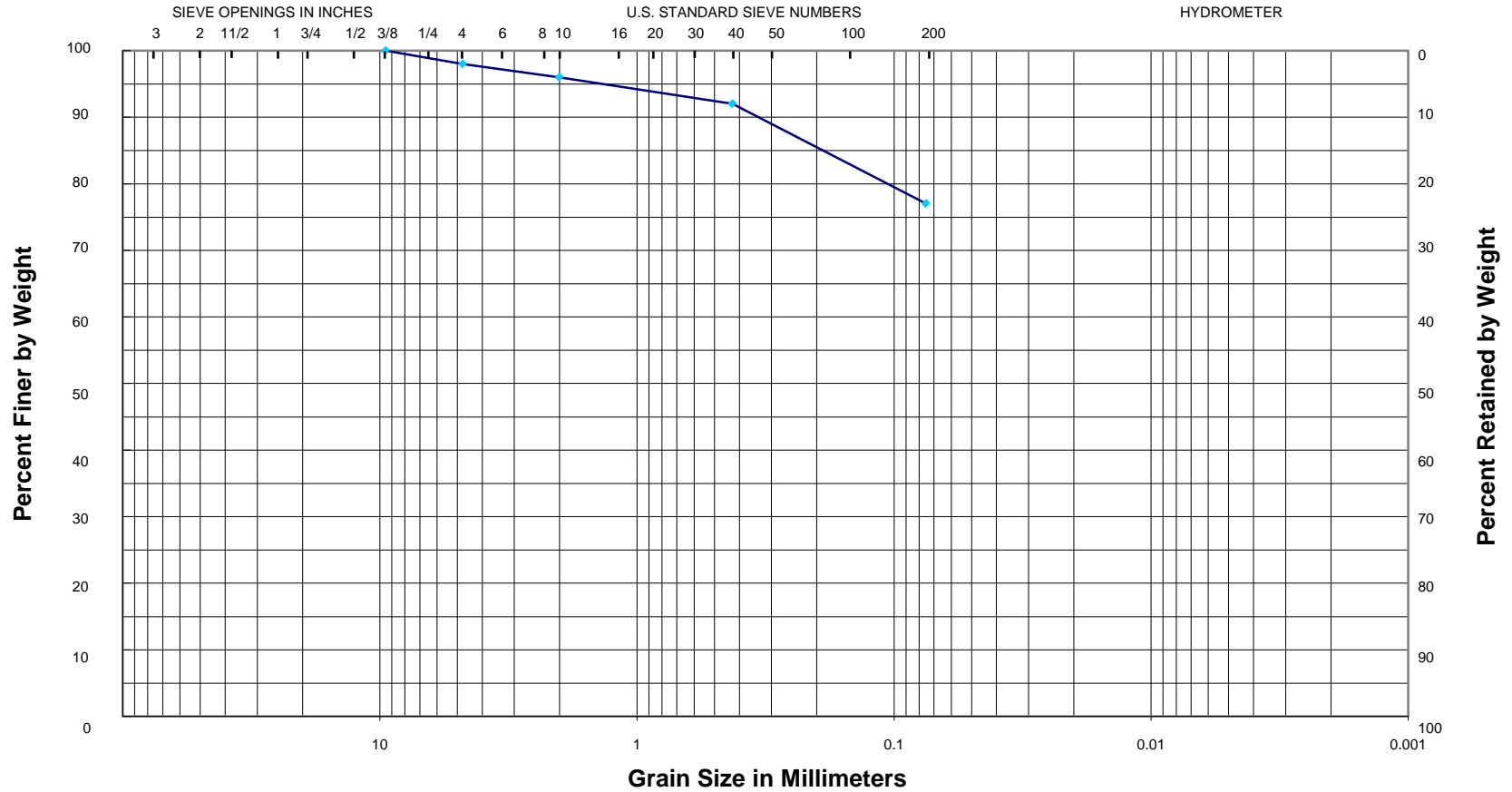
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W24, 2.5-3.5 ft
 Atterberg Limits: LL=35, PL=17, PI=18

Description: Tan and brown silty clay w/chert fragments
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



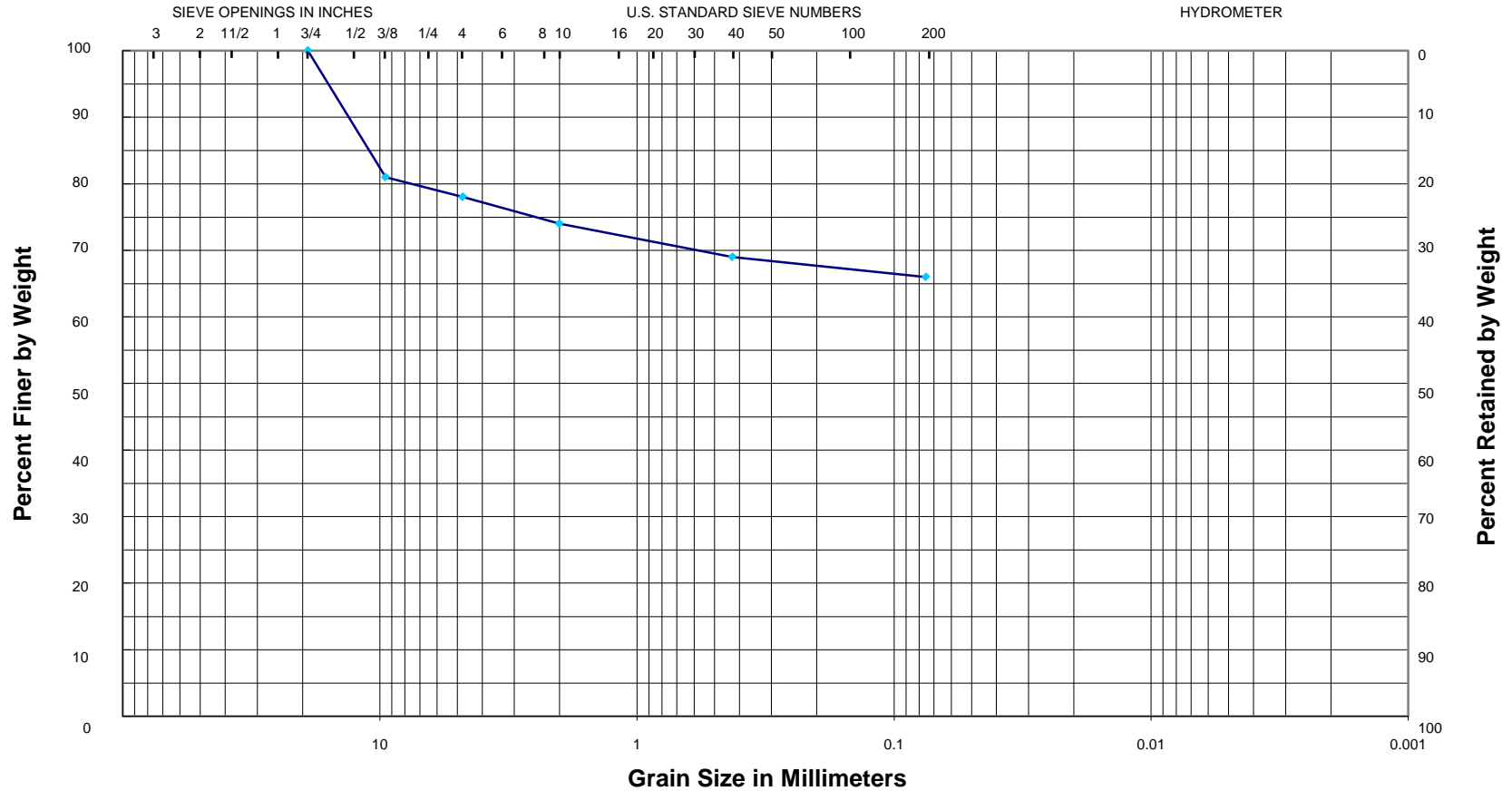
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W25, 0.5-1.5 ft
Atterberg Limits: LL=25, PL=20, PI=5

Description: Dark brown silt, sandy
Classification: USCS = ML; AASHTO = A-4

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W25, 6.5-7.5 ft
 Atterberg Limits: LL=68, PL=22, PI=46

Description: Reddish brown and tan cherty clay
 Classification: USCS = CH; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



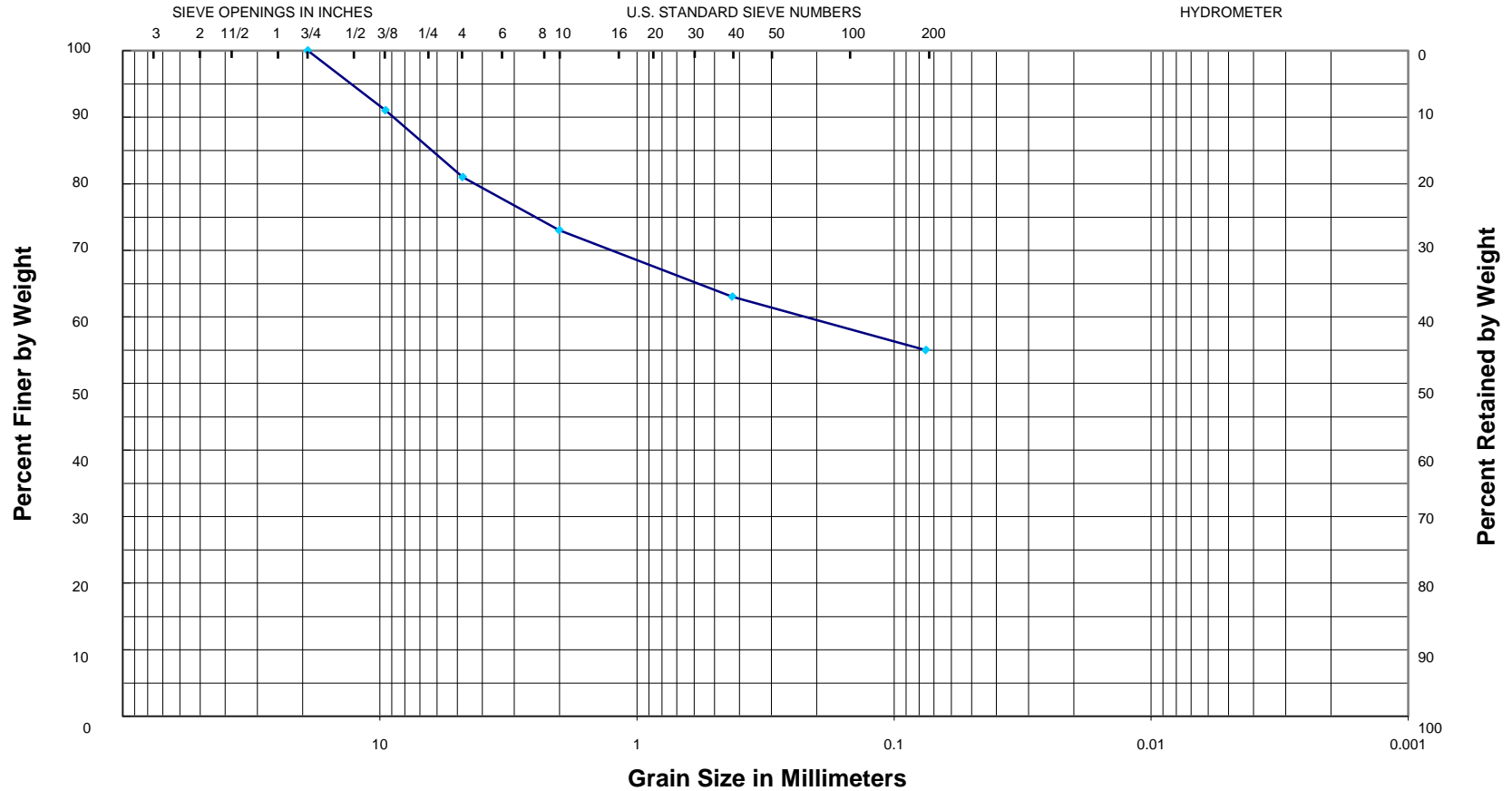
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W26, 4.5-5.5 ft
Atterberg Limits: LL=39, PL=16, PI=23

Description: Tan and brown silty clay w/chert fragments
Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



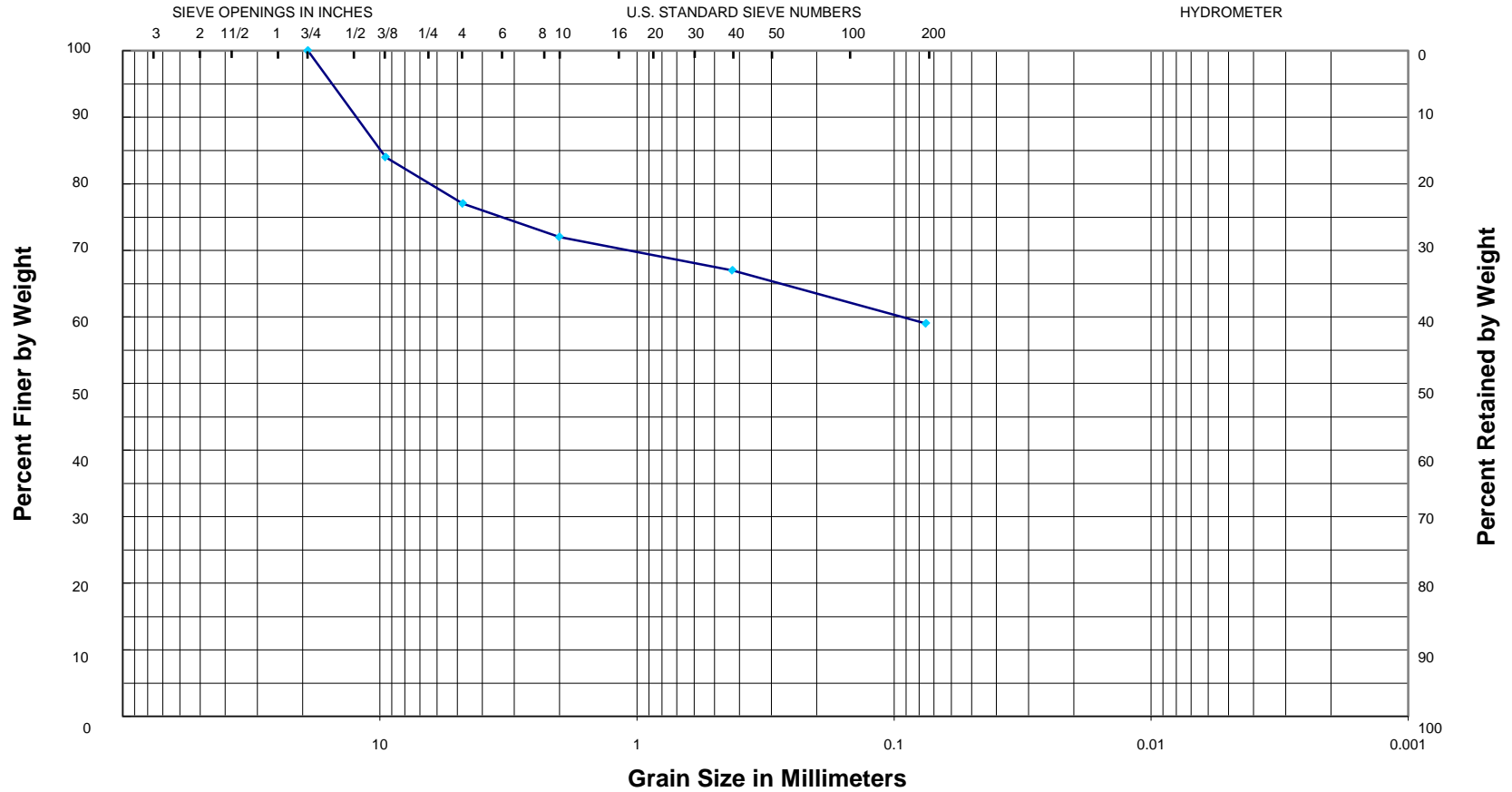
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W26, 8.5-9 ft
 Atterberg Limits: LL=41, PL=18, PI=23

Description: Reddish brown and tan cherty clay
 Classification: USCS = CL; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



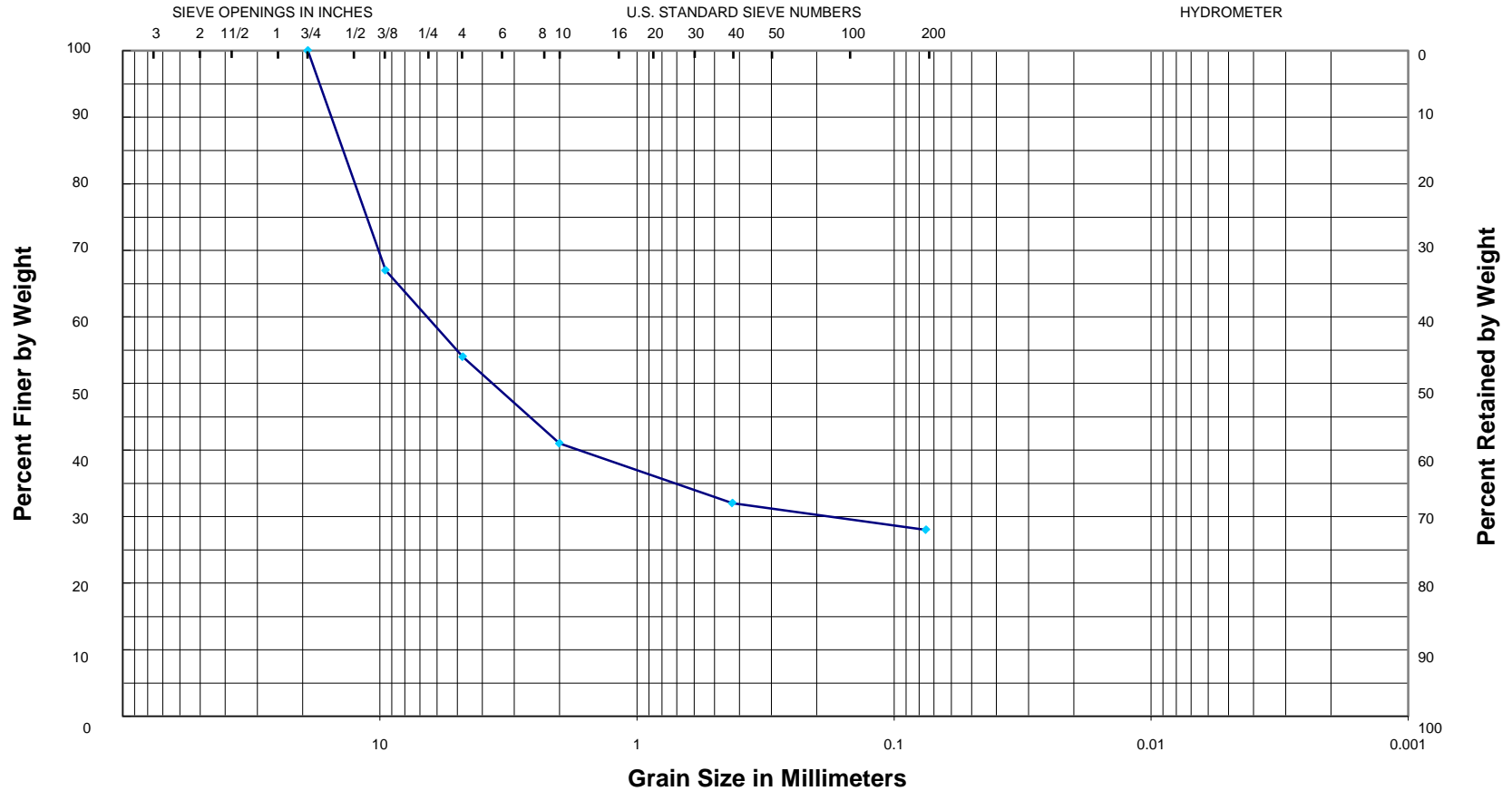
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S27, 0.5-1.5 ft
Atterberg Limits: LL=40, PL=30, PI=10

Description: Dark brown silty clay, sandy
Classification: USCS = ML; AASHTO = A-4

14-073

GRAIN SIZE CURVE



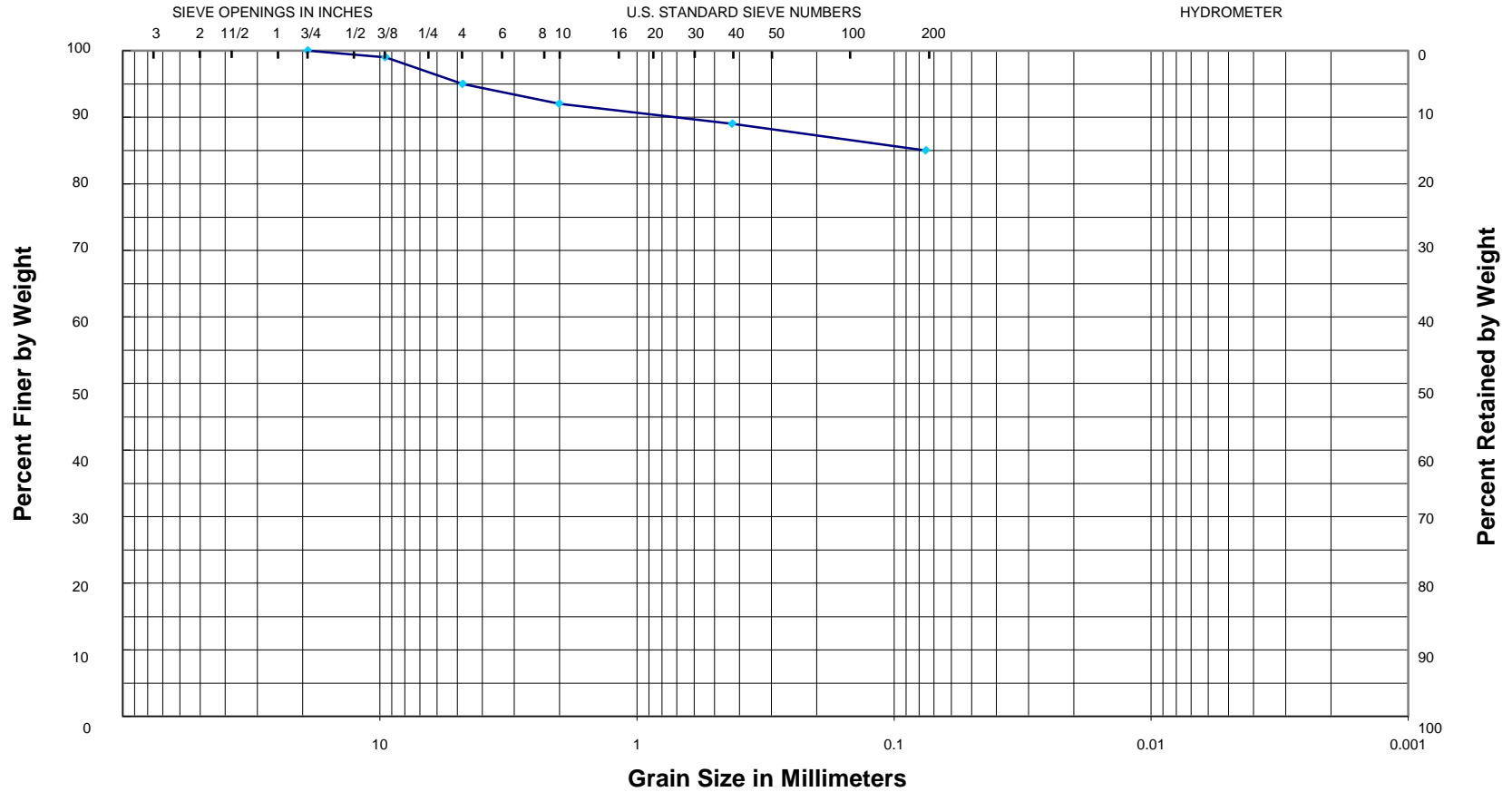
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring S27, 14-15 ft
Atterberg Limits: LL=42, PL=19, PI=23

Description: Reddish brown cherty clay w/chert cobbles
Classification: USCS = SC; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



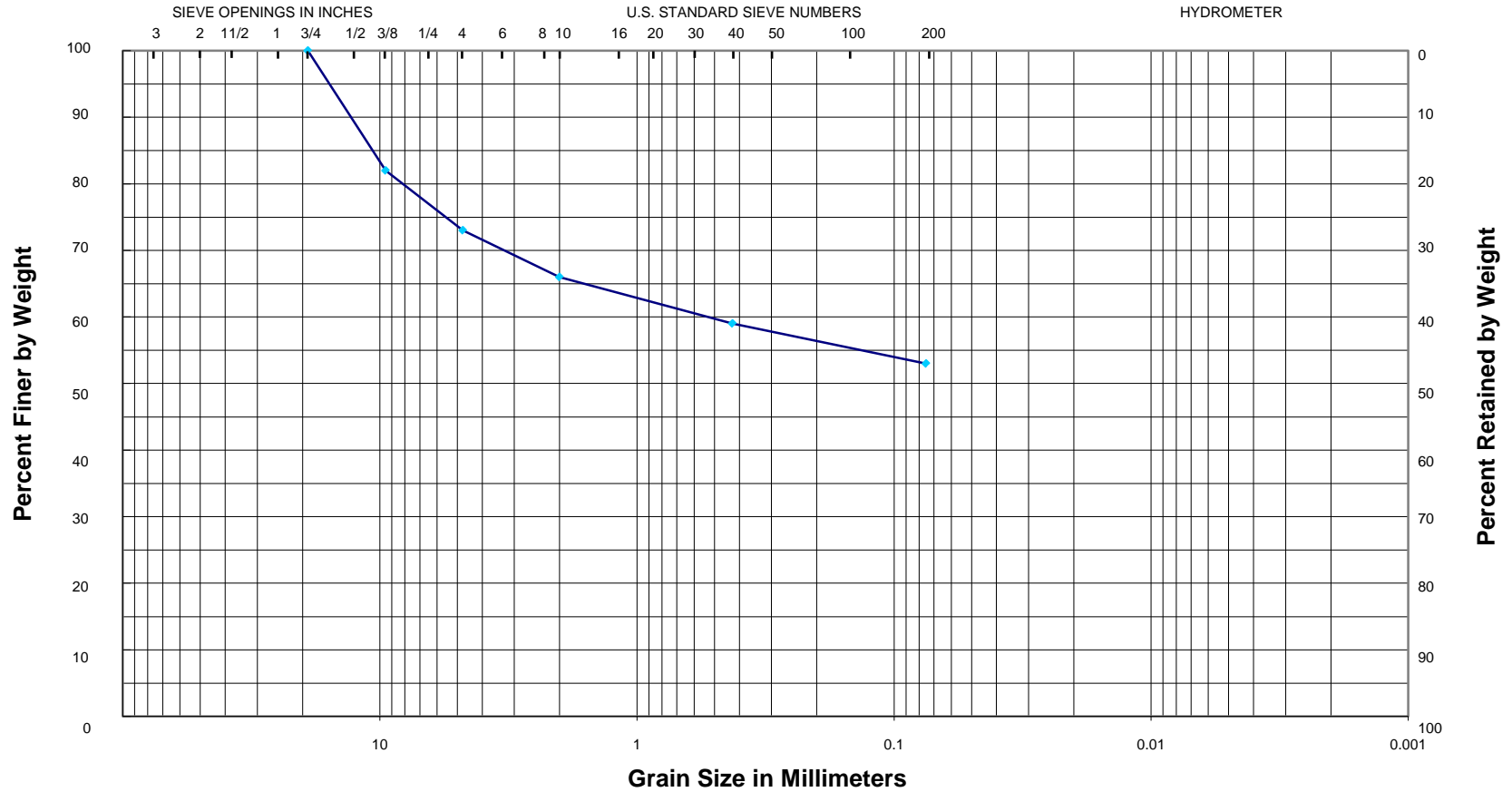
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S27, 24-25 ft
 Atterberg Limits: LL=37, PL=17, PI=20

Description: Gray and reddish tan clay w/a little
 chert fragments
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



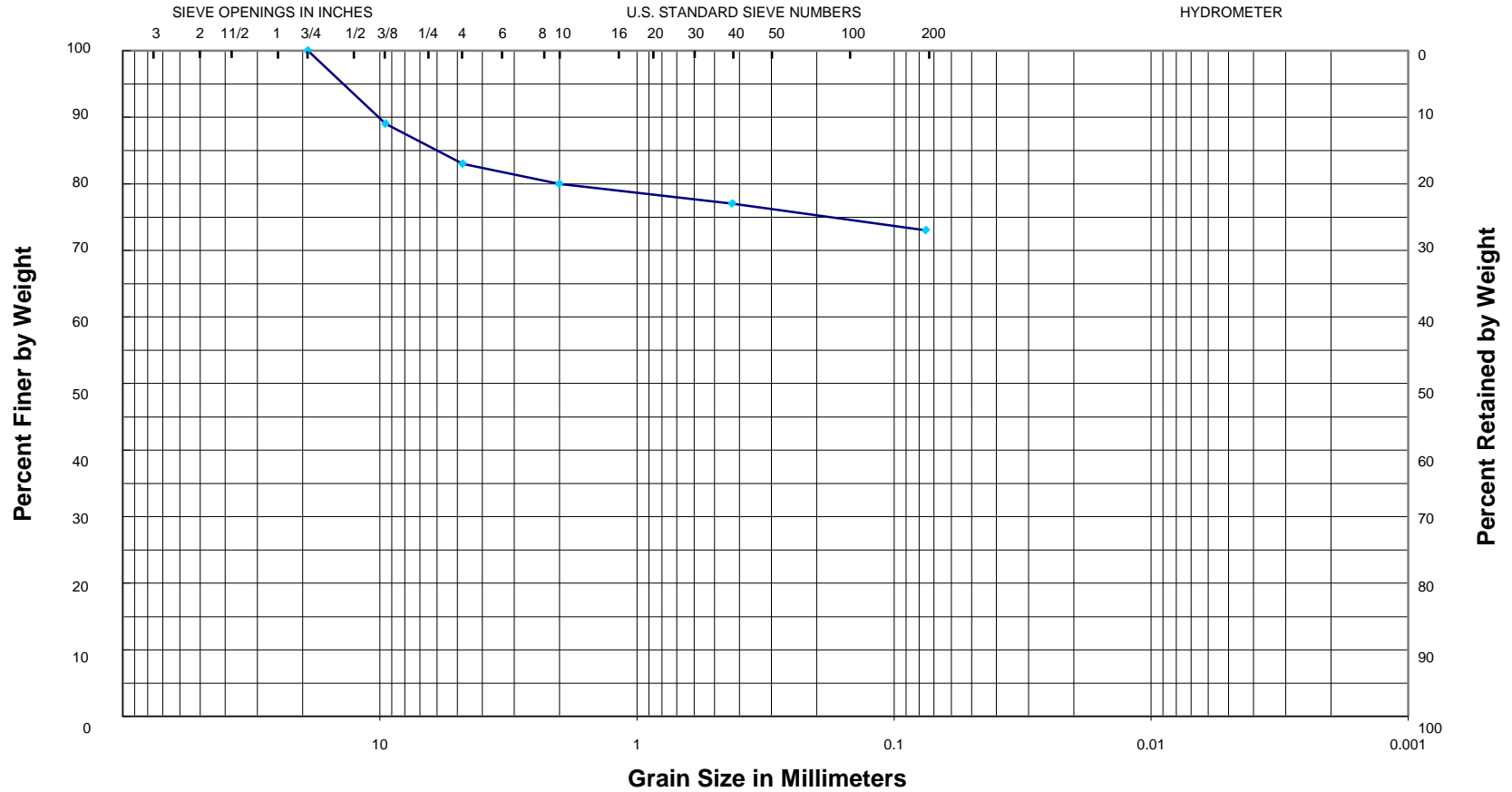
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring S28, 9-10 ft
Atterberg Limits: LL=57, PL=24, PI=33

Description: Reddish brown and dark brown
cherty clay w/cobbles
Classification: USCS = CH; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



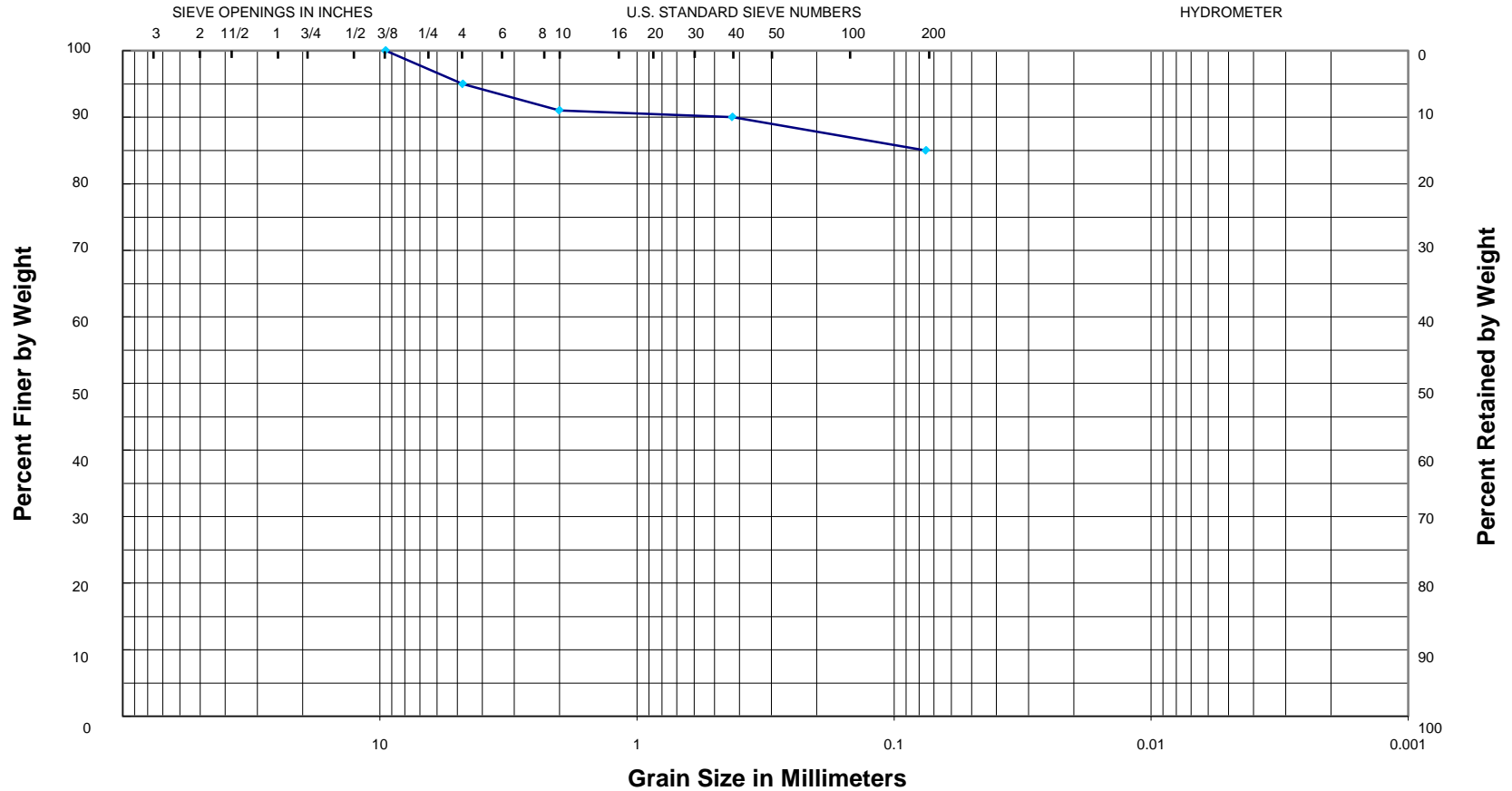
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring S28, 24-25 ft
 Atterberg Limits: LL=33, PL=18, PI=15

Description: Gray and tan clay w/some fine chert fragments
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



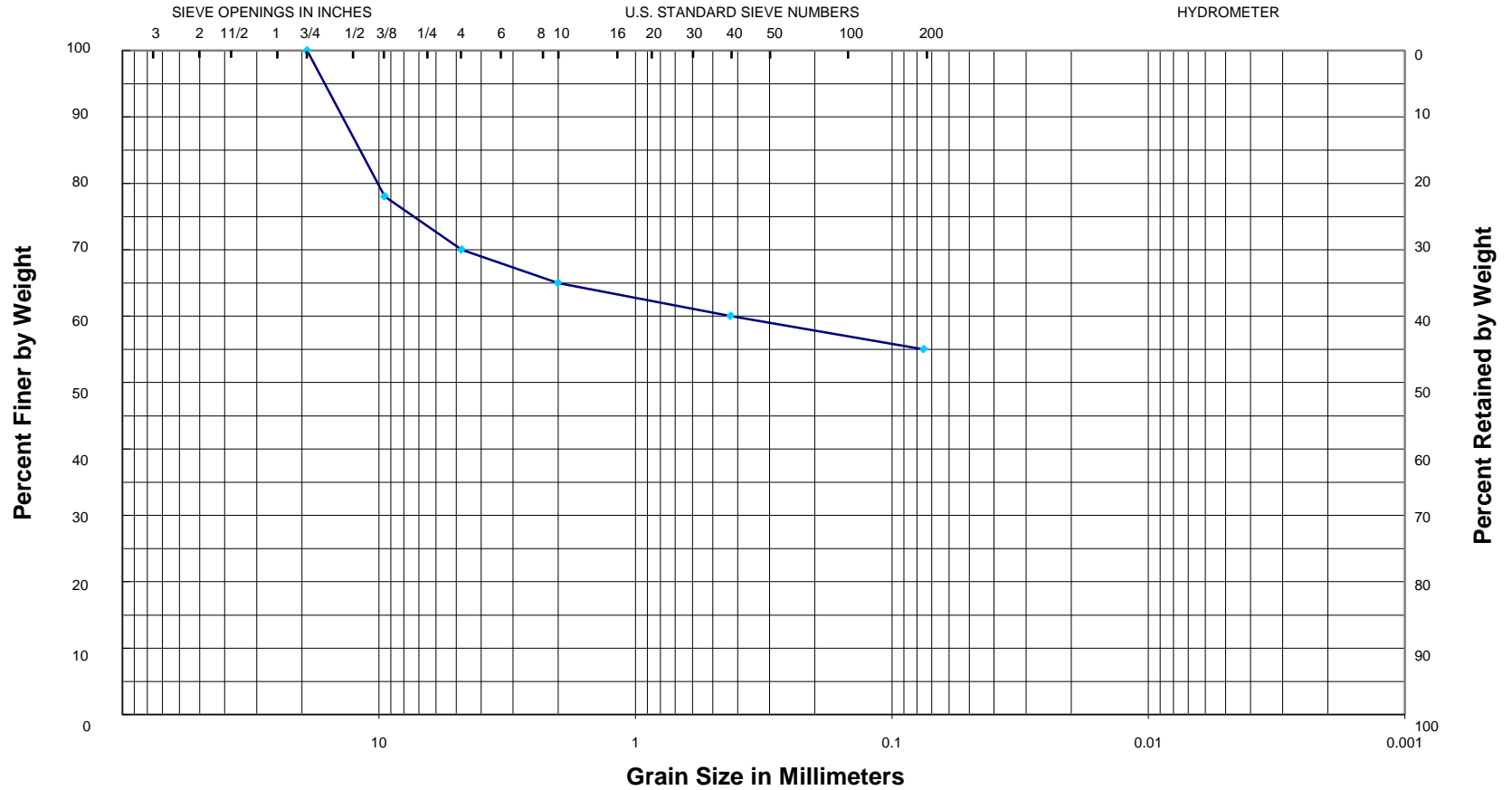
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W29, 4.5-5.5 ft
 Atterberg Limits: LL=29, PL=17, PI=12

Description: Gray and tan silty clay w/fine to coarse sand
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W29, 9-10 ft
 Atterberg Limits: LL=53, PL=18, PI=35

Description: Gray clay w/some chert fragments
 Classification: USCS = CH; AASHTO = A-7-6

14-073

GRAIN SIZE CURVE



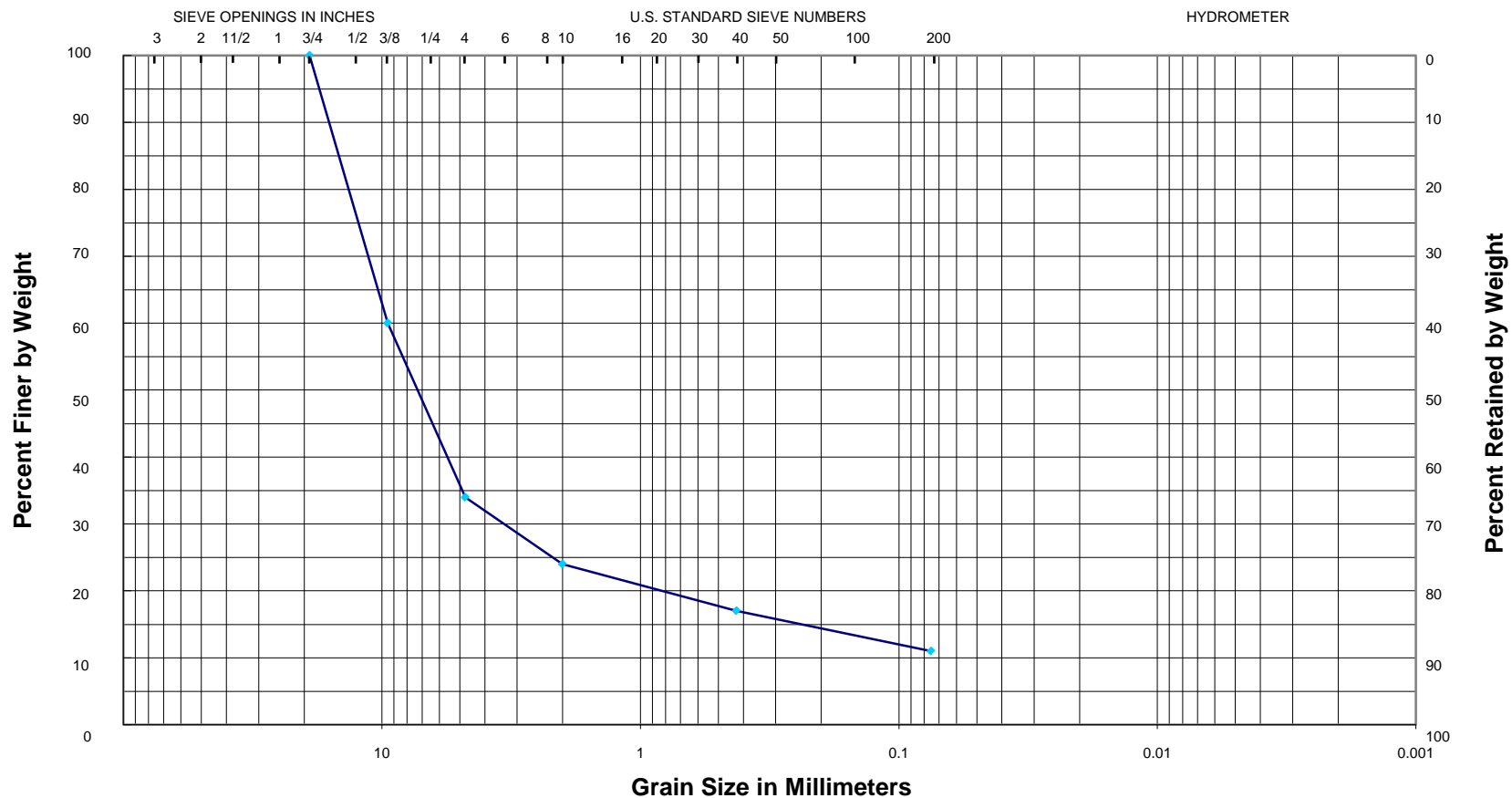
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W31, 2.5-3.5 ft
Atterberg Limits: LL=33, PL=16, PI=17

Description: Reddish brown cherty clay
Classification: USCS = SC; AASHTO = A-6

14-073

GRAIN SIZE CURVE



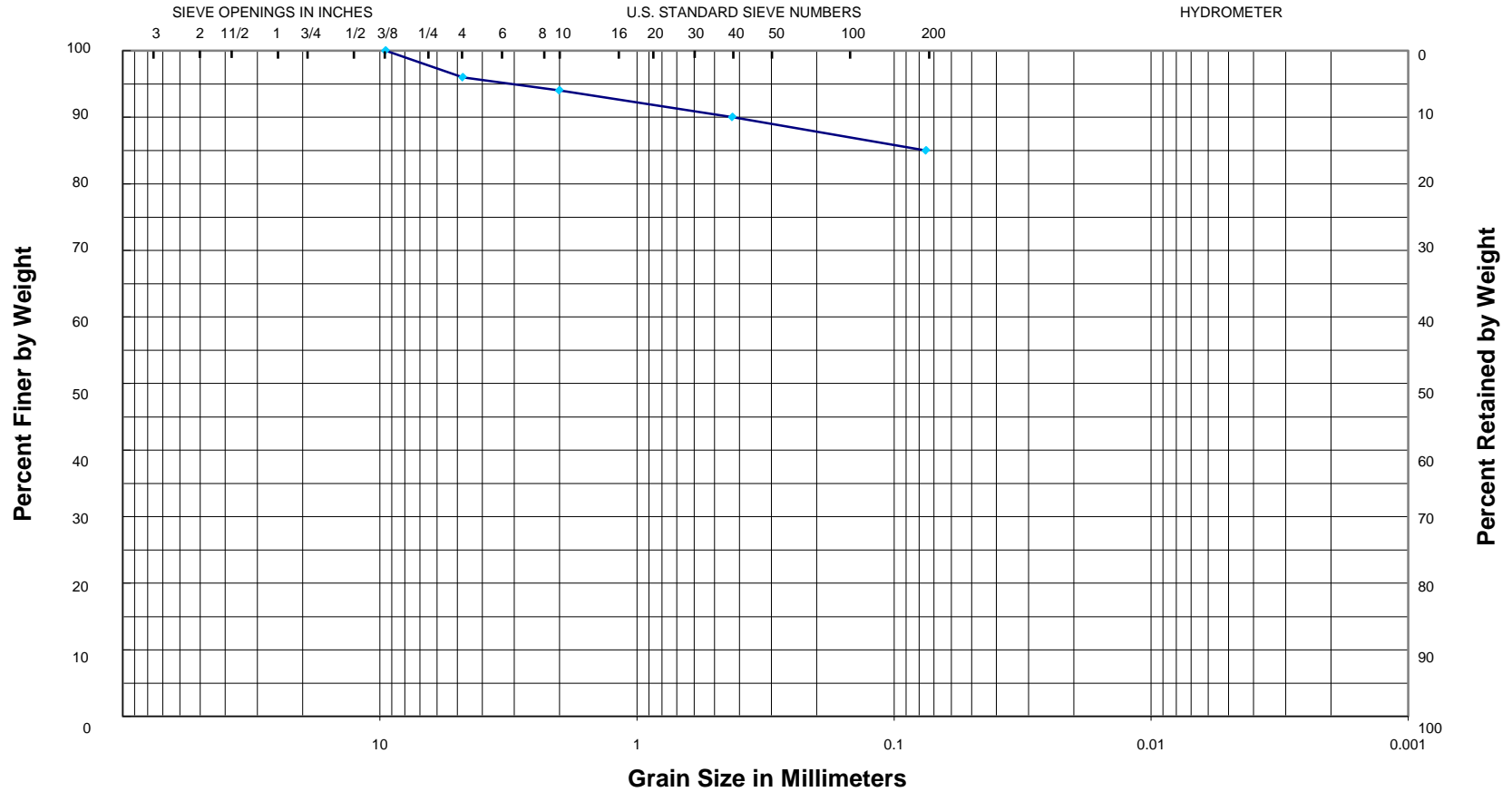
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W32, 0.5-1.5 ft
 Atterberg Limits: LL=32, PL=28, PI=4

Description: Reddish tan and brown chert fragments
 Classification: USCS = GM; AASHTO = A-2-4

14-073

GRAIN SIZE CURVE



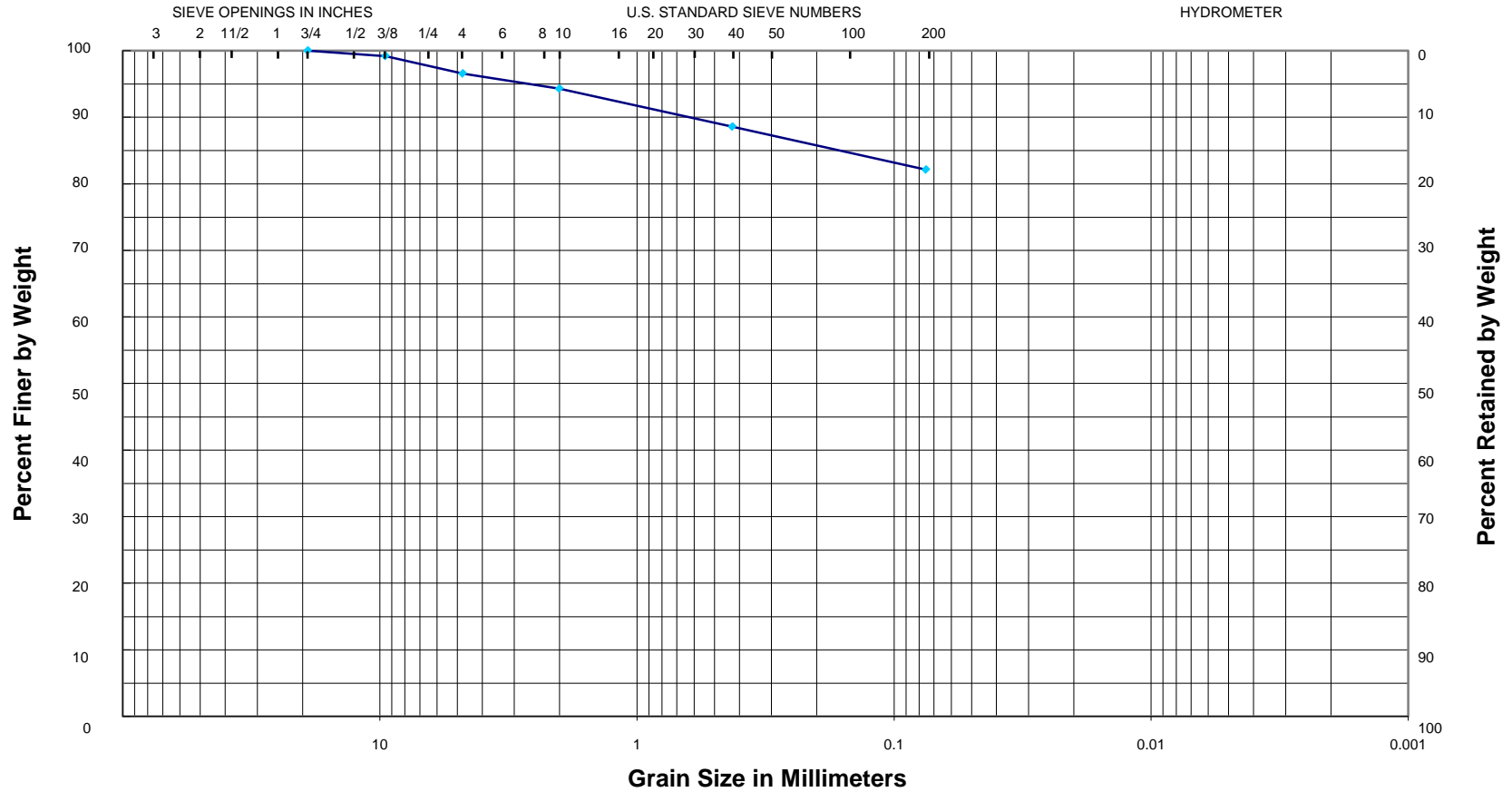
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W32, 6.5-7.5 ft
Atterberg Limits: LL=35, PL=17, PI=18

Description: Tan and gray clay w/chert fragments
Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



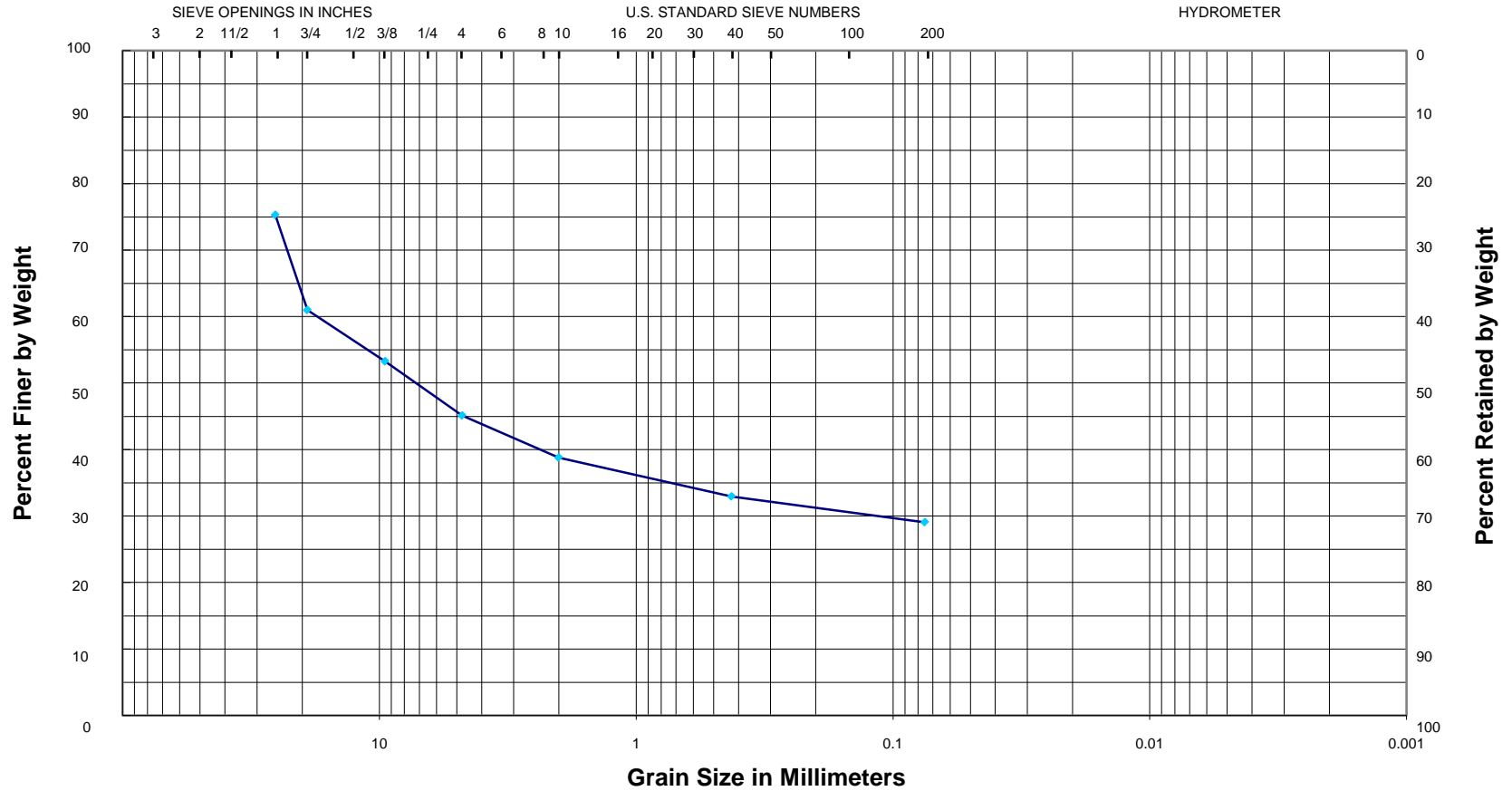
GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W50, 9-10 ft
 Atterberg Limits: LL=30, PL=17, PI=13

Description: Tan and gray silty clay w/fine sand
 Classification: USCS = CL; AASHTO = A-6

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W51, 4.5-5.5 ft
Atterberg Limits: ---

Description: Reddish brown cherty clay
Classification: USCS = GC; AASHTO = A-2-7

14-073

GRAIN SIZE CURVE



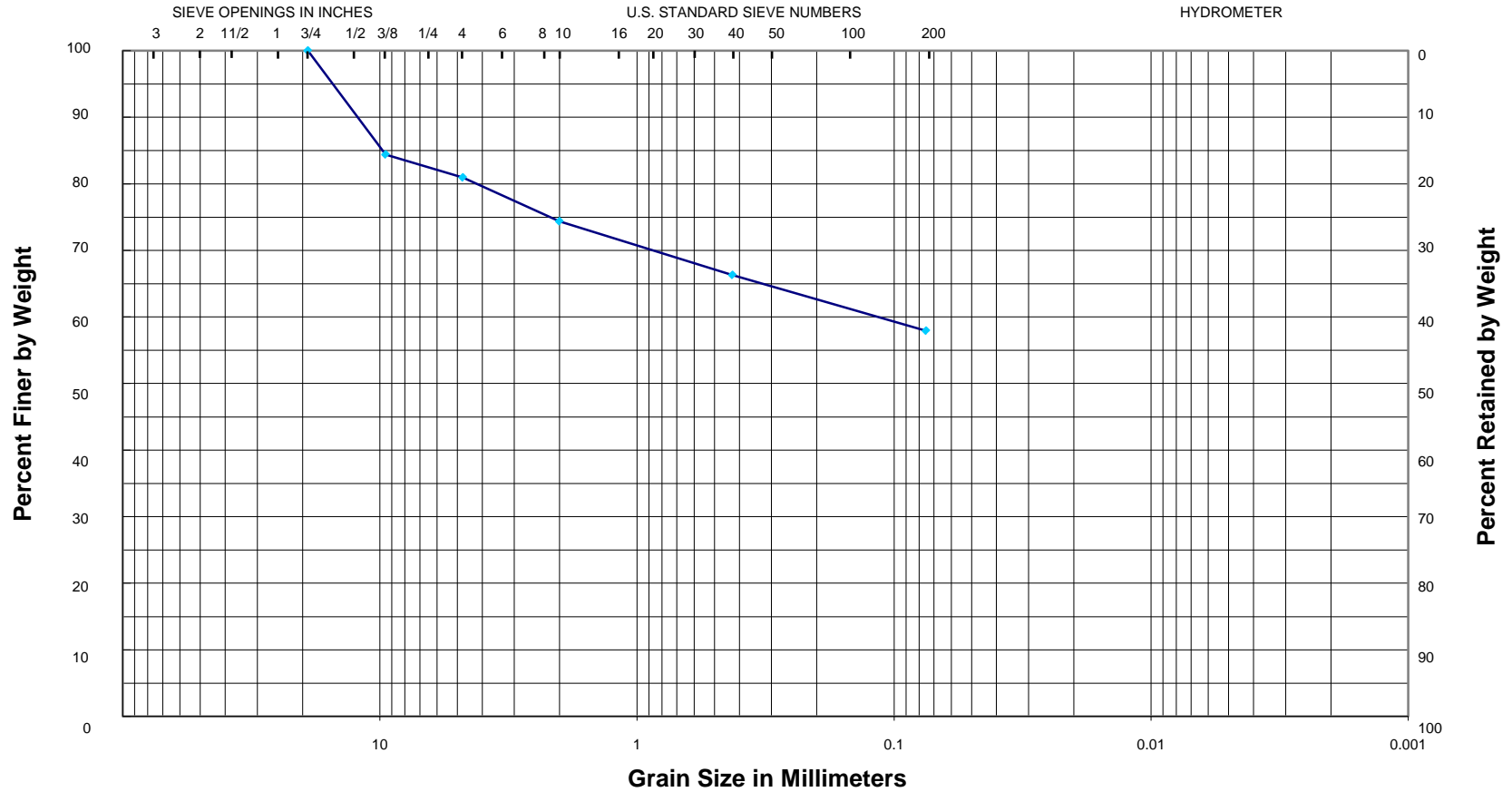
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: Boring W52, 2.5-3.5 ft
Atterberg Limits: ---

Description: Reddish brown cherty clay
Classification: USCS = SC; AASHTO = A-2-7

14-073

GRAIN SIZE CURVE



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring W53, 2.5-3.5 ft
Atterberg Limits: LL=37, PL=19, PI=18

Description: Dark brown silty clay w/chert fragments
Classification: USCS = CL; AASHTO = A-6

ATTACHMENT 13

SUMMARY of ROCK COMPRESSION TEST RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

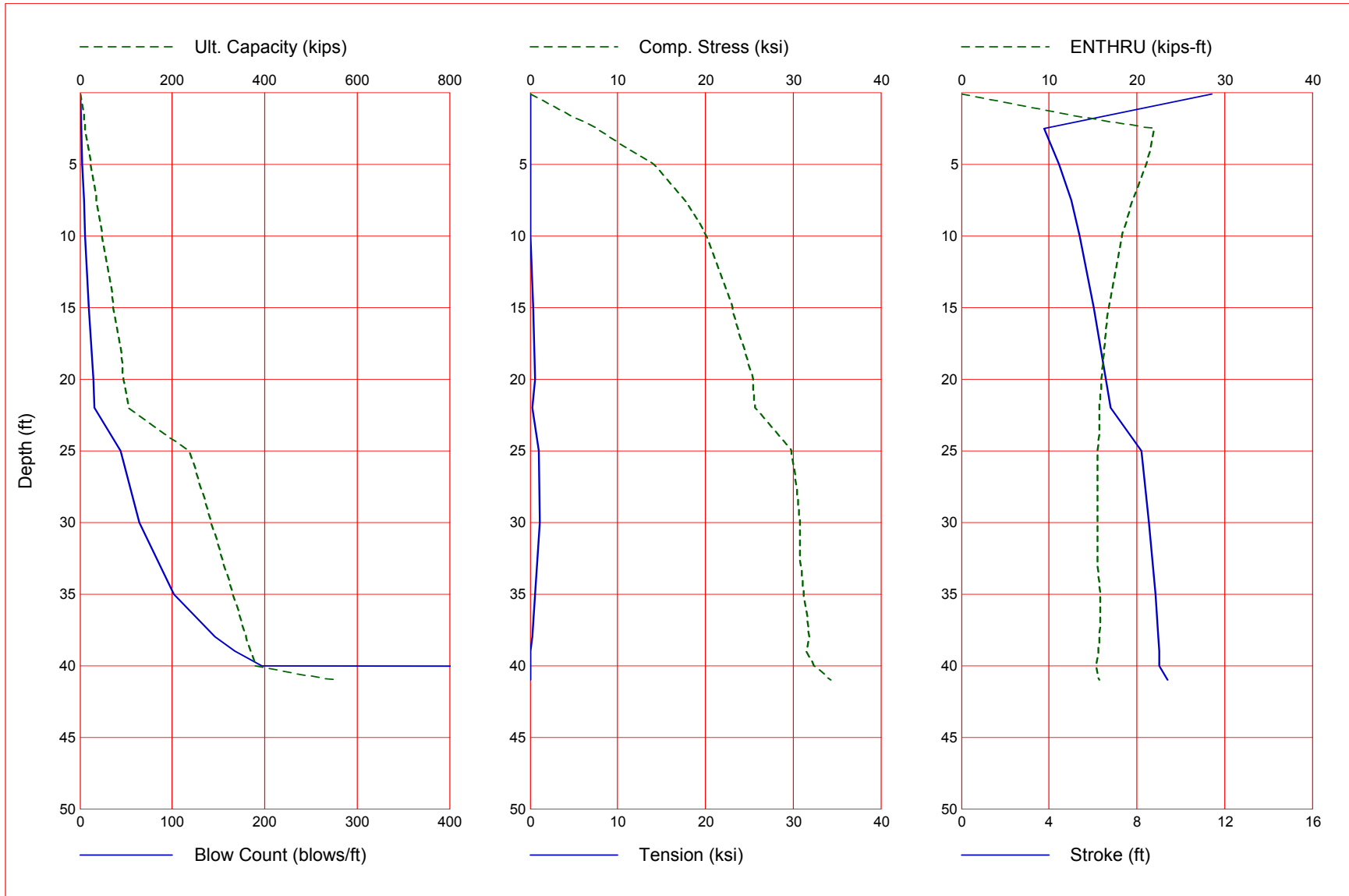
LOCATION: Washington County, AR

GHBW JOB NO.: 14-073

Boring No.	Depth, ft	Project Facet	Rock Type	Core Rec, %	Core RQD, %	Total Unit Wt, pcf	Compressive Strength (ASTM D-7012), psi
S4	23-23.5	Hwy 112 over I-49	Limestone	49	43	168	8810
S13	30-30.6	I-49 over 71B	Limestone	100	85	171	4860
S13	34.5-35	I-49 over 71B	Siltstone	100	85	147	2140
S13	37.1-38	I-49 over 71B	Siltstone	100	70	141	2470
S13	38-38.5	I-49 over 71B	Siltstone	100	70	148	2710
RP19	16-17	Hwy 112 Ramp to I-49 NB	Limestone	96	70	166	12450
RP19	21-22	Hwy 112 Ramp to I-49 NB	Limestone	98	83	166	11470
RP20	14-15	Hwy 112 Ramp to I-49 NB	Limestone	97	47	156	13360
RP20	18.5-19.5	Hwy 112 Ramp to I-49 NB	Limestone	98	88	167	10770
RP21	17-17.5	Hwy 112 Ramp to I-49 NB	Limestone	77	48	157	7650
RP21	19-19.8	Hwy 112 Ramp to I-49 NB	Limestone	88	85	155	12800
RP21	21-22.5	Hwy 112 Ramp to I-49 NB	Limestone	88	85	149	4330

ATTACHMENT 14

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



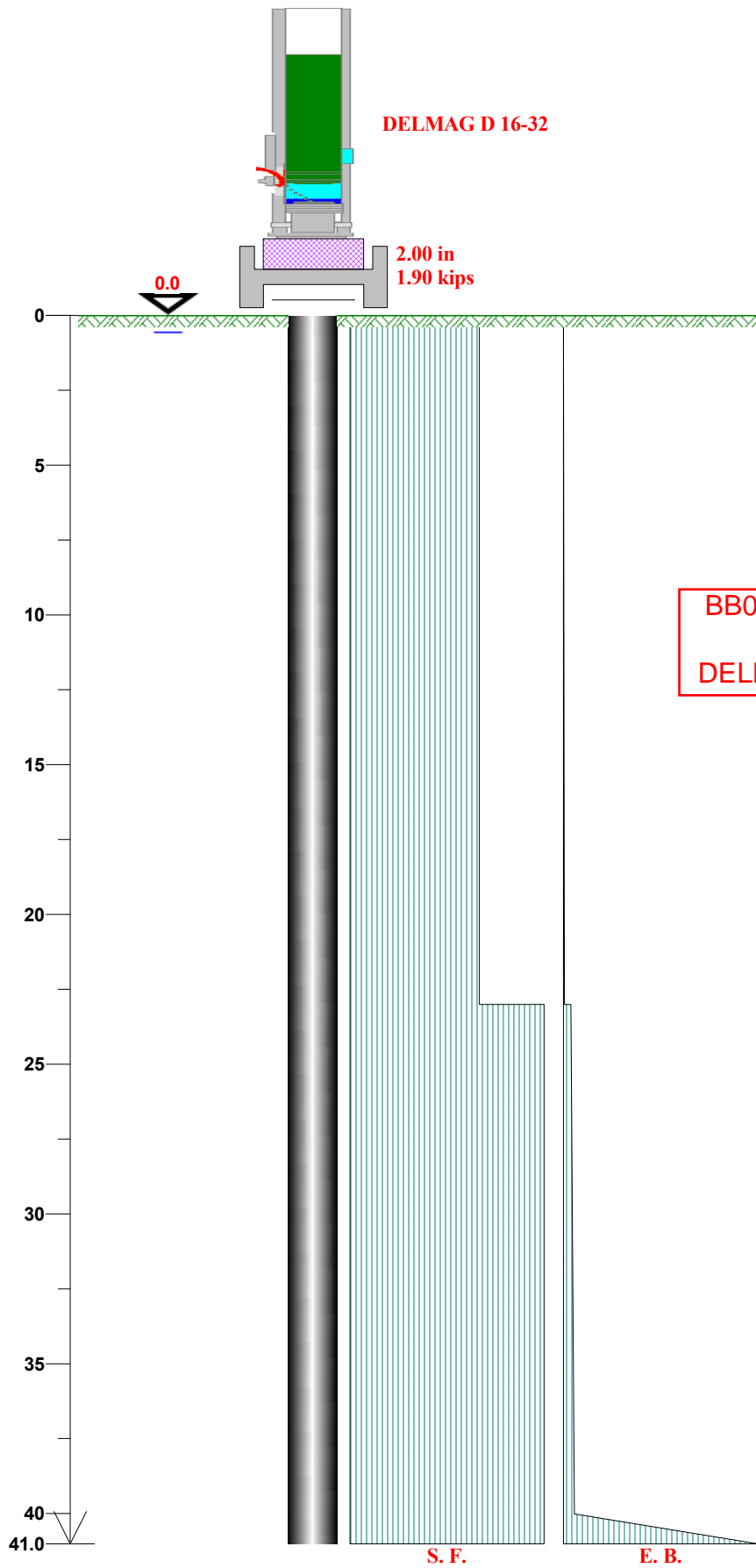
BB0414 - Hwy 112 over I-49 - Bent 1
HP 12x53
DELMAG D16-32 Hammer - 40 ft-kips

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
0.1	0.5	0.4	0.1	0.0	0.000	0.000	11.42	0.0
2.5	11.9	9.9	2.0	1.5	7.660	0.000	3.78	22.0
5.0	23.8	19.9	3.9	2.6	14.145	0.000	4.46	21.1
7.5	35.7	29.8	5.9	4.2	17.600	0.000	5.00	19.5
10.0	47.5	39.7	7.8	6.0	20.094	0.000	5.41	18.3
15.0	71.3	59.6	11.7	9.8	23.088	-0.421	6.04	16.8
20.0	95.1	79.4	15.7	14.3	25.490	-0.550	6.60	15.9
22.0	104.6	87.4	17.2	16.2	25.600	-0.214	6.81	15.7
25.0	236.4	103.2	133.2	43.9	29.841	-1.054	8.23	15.5
30.0	284.1	133.0	151.1	64.2	30.720	-1.132	8.54	15.5
35.0	331.9	162.8	169.1	102.2	31.224	-0.547	8.86	15.8
38.0	360.5	180.7	179.8	145.9	31.811	-0.264	8.98	15.7
39.0	370.0	186.6	183.4	167.4	31.569	0.000	9.01	15.6
40.0	379.6	192.6	187.0	197.4	32.337	0.000	9.04	15.3
41.0	553.7	198.5	355.1	9999.0	34.267	0.000	9.39	15.7

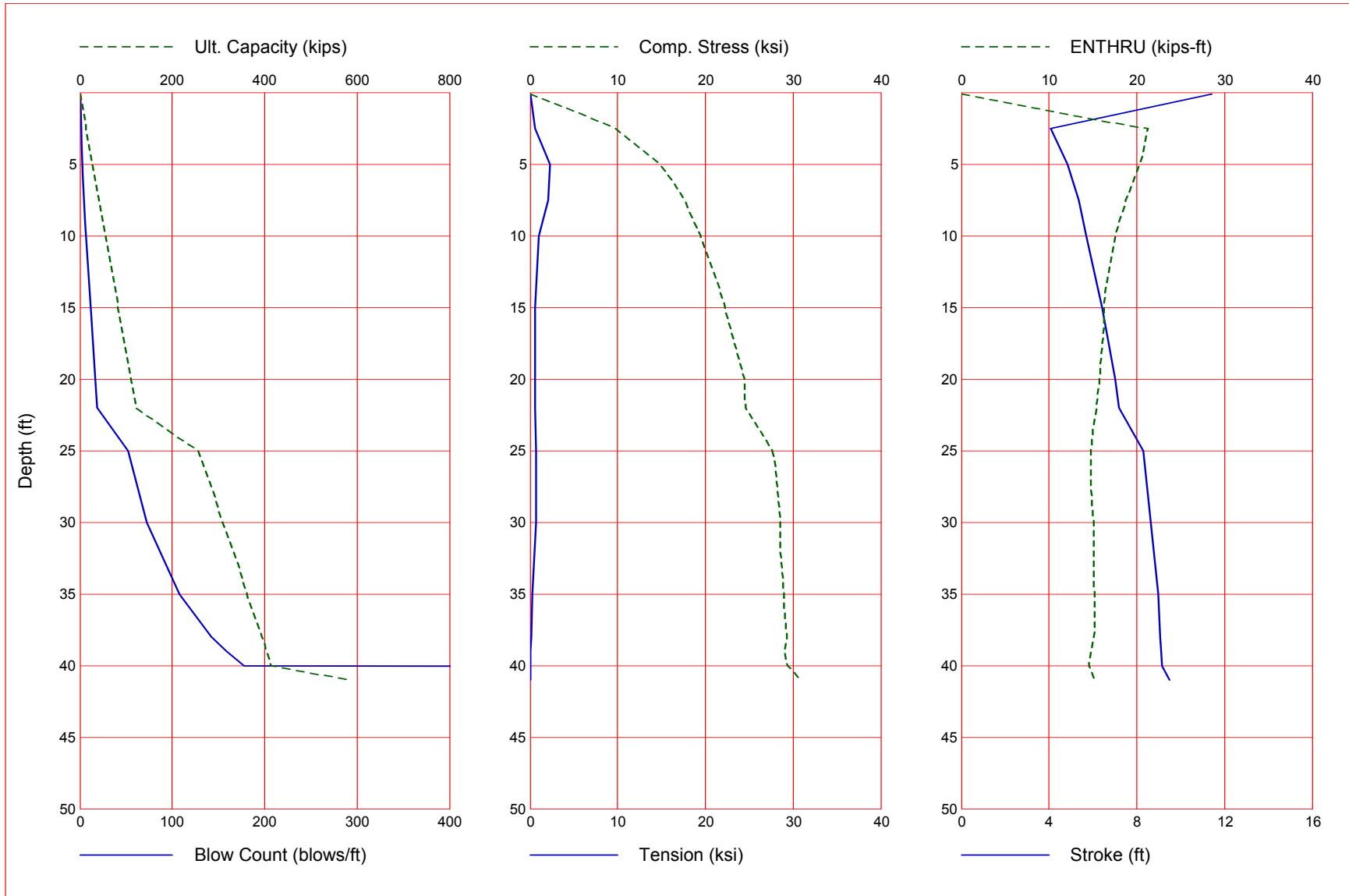
Refusal occurred; no driving time output possible

BB0414 - Hwy 112 over I-49 - Bent 1
HP 12x53
DELMAG D16-32 Hammer - 40 ft-kips



BB0414 - Hwy 112 over I-49 - Bent 1
HP 12x53
DELMAG D16-32 Hammer - 40 ft-kips

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



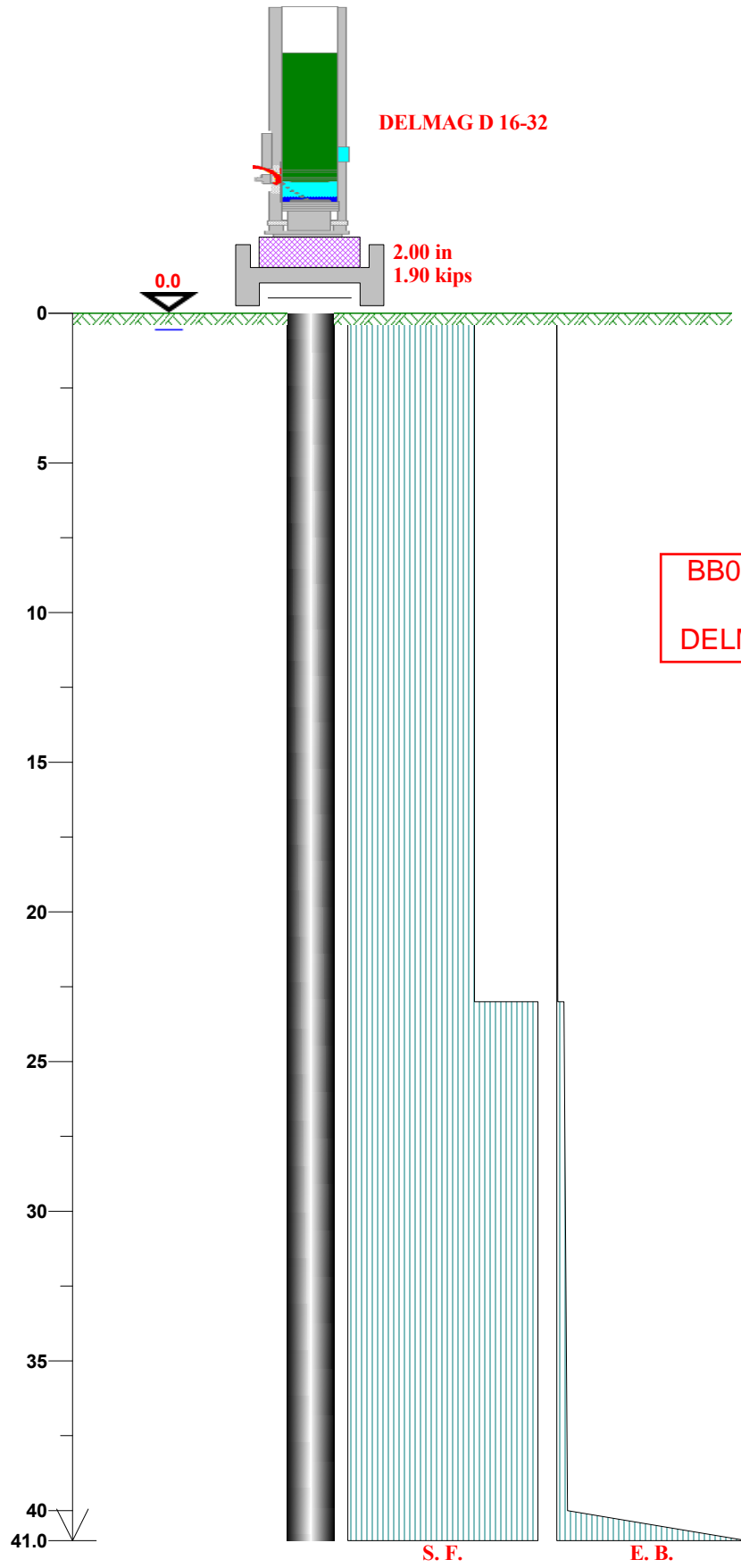
BB0414 - Hwy 112 over I-49 - Bent 1
HP 14x73
DELMAG D16-32 Hammer - 40 ft-kips

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
0.1	0.5	0.5	0.1	0.0	0.000	0.000	11.42	0.0
2.5	13.7	11.8	2.0	1.7	9.720	-0.543	4.09	21.3
5.0	27.4	23.5	3.9	3.0	14.890	-2.327	4.84	20.3
7.5	41.1	35.2	5.9	4.9	17.600	-2.091	5.35	18.7
10.0	54.8	47.0	7.8	7.0	19.414	-0.979	5.70	17.5
15.0	82.2	70.5	11.7	11.6	22.272	-0.534	6.41	16.3
20.0	109.7	94.0	15.7	17.0	24.521	-0.625	7.01	15.7
22.0	120.6	103.4	17.2	19.1	24.566	-0.561	7.18	15.4
25.0	255.4	122.2	133.2	52.0	27.661	-0.692	8.30	14.8
30.0	308.6	157.4	151.1	72.8	28.578	-0.651	8.65	15.1
35.0	361.8	192.7	169.1	107.8	28.946	-0.283	8.96	15.2
38.0	393.7	213.8	179.8	141.8	29.262	-0.189	9.07	15.1
39.0	404.3	220.9	183.4	158.5	28.948	0.000	9.10	14.8
40.0	415.0	228.0	187.0	177.9	29.379	0.000	9.14	14.6
41.0	590.1	235.0	355.1	9999.0	30.896	0.000	9.49	15.2

Refusal occurred; no driving time output possible

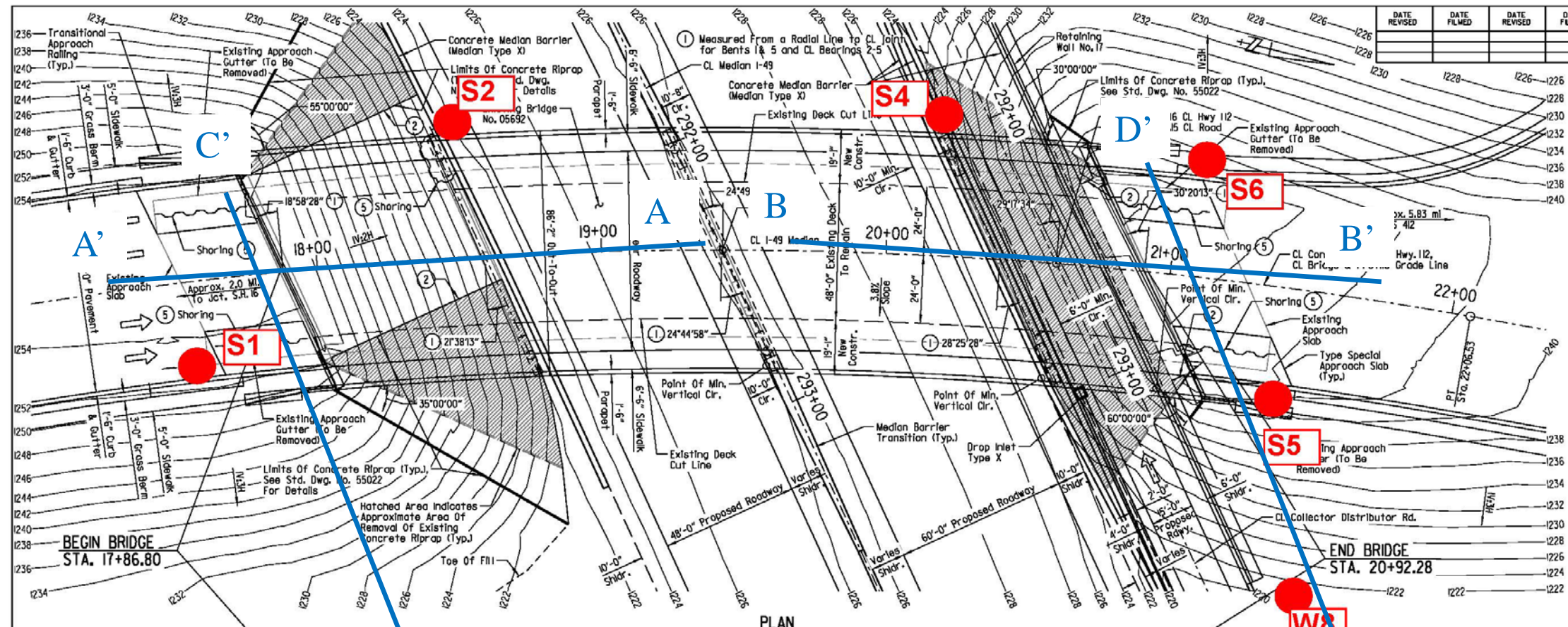
BB0414 - Hwy 112 over I-49 - Bent 1
HP 14x73
DELMAG D16-32 Hammer - 40 ft-kips



BB0414 - Hwy 112 over I-49 - Bent 1
HP 14x73
DELMAG D16-32 Hammer - 40 ft-kips

ATTACHMENT 15

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.	B80414		
				JOB NO.		B80414		
				05692		LAYOUT "DRAWING NO."		



HORIZONTAL CURVE DATA

Highway 112
 PI = 17+47.75
 Δ = 35°36'00" Rt.
 D = 03°45'00"
 L = 490.55'
 T = 949.33'
 e = 0.038 Ft./Ft.
 R = 1527.89'

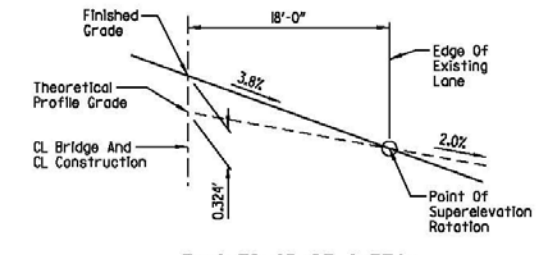
NOTES:
 1) CL Existing Bridge is on a 3°45' Curve Right. Longitudinal lines on the Proposed Bridge are concentric with CL Existing Bridge. The Widening shall be constructed on curves concentric with CL Existing Bridge.
 2) Remove existing approach gutters on east side of bridge during Stage 1A and widen existing approach slab to edge of sidewalk. Similar work on west side of bridge shall occur during Stage 2.

3) Removal of existing concrete riprap shall match the location of an existing construction joint.

FOR R/W DATA, SEE RDWY. PLANS

4) Measured from a Radial Line to a tangent to CL I-49 at Intersection Point.

5) Shoring may be required during construction. Payment for this work, if required, shall be considered subsidiary to the pay item "Unclassified Excavation for Structures - Bridge".



FINISHED GRADE SKETCH
 (Looking Forward)
 Scale: NTS

NOTE:
 Elevations and stationing shown are along CL Bridge. Span lengths, total length of bridge, and CL Joint to beginning and end of bridge dimensions are measured along CL Bridge, unless noted otherwise.

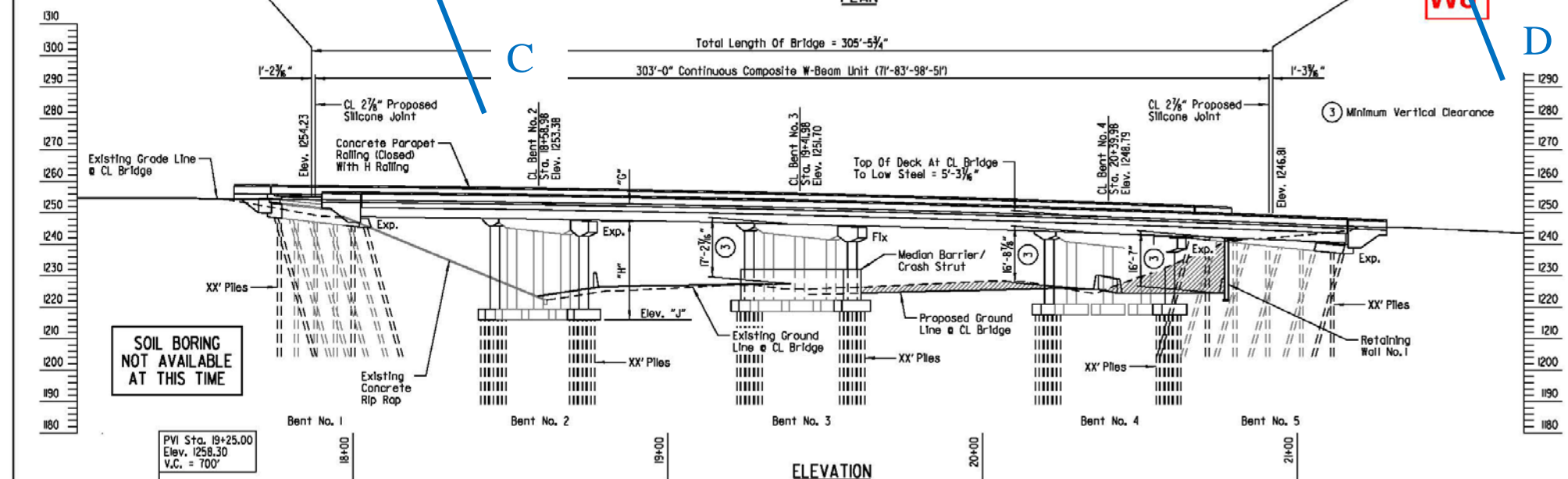


TABLE OF VARIABLES

Bent No.	CL Deck At CL Bent To Low Seat Of Cap	Low Seat of Cap To Bottom Of Ftg.	Bottom Of Ftg. Elevation
2	6'-0 1/2"	31'-6"	1215.81
3	6'-3 1/2"	27'-0"	1218.43
4	6'-7 1/2"	25'-0"	1217.18

NOTE:
 Except as noted, components of the existing bridge are to be retained and joined to the proposed work. Information and dimensions shown are based on existing bridge plans. The Contractor is to adhere strictly to the requirements for verification of the geometry of the existing bridge and its relationship to the proposed work to the existing structure. Payment for this work shall be considered subsidiary to the pay item "Modification of Existing Bridge Structure (B.No. 05692)".

PRELIMINARY NOT FOR CONSTRUCTION

LAYOUT OF BRIDGE
HIGHWAY 112
OVER INTERSTATE 49
PORTER RD. - HWY. 112/71B
WIDENING & INTERCHNG. IMPVTS. (F)
WASHINGTON COUNTY
 ROUTE 49 SEC. 28
ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: PCC DATE: MAR. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
 DESIGNED BY: PCC DATE: MAR. 2014
 BRIDGE NO. 05692 DRAWING NO. XXXXX

Bridge layout plan provided by Garver, LLC



APPROXIMATE PROFILE ALIGNMENT
HIGHWAY 112 OVER INTERSTATE 49
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

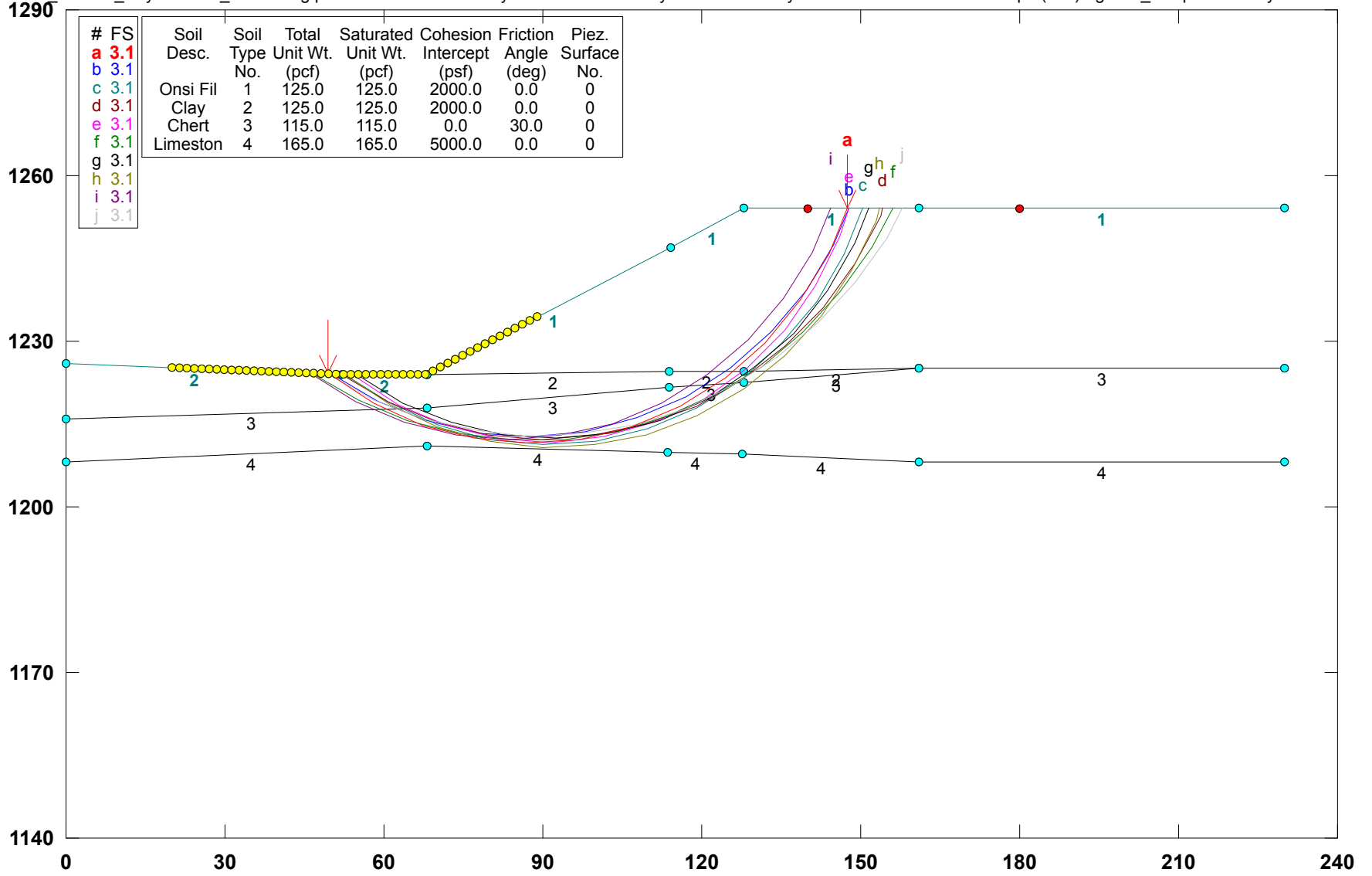
GHBW JOB NO.: 14-073

Project Facet	Project Feature	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Hwy 112 over I-49	Bent 1 End Slope	A-A'	End of Construction	3.10
			Long Term	1.60
			Seismic*	1.40
	Bent 1 Side Slope	B-B'	End of Construction	4.80
			Long Term	1.90
			Seismic*	1.80
	Bent 3 End Slope	C-C'	End of Construction	3.10
			Long Term	2.00
			Seismic*	1.70
	Bent 3 Side Slope	D-D'	End of Construction	3.90
			Long Term	2.10
			Seismic*	1.70

*Kh = 1.0*As for Simple Slope and 0.5*As for Retaining Walls

Hwy 112 over I-49 - Bent 1 - End Slope (A-A') - 2H:1V - H=30' - End of Constr.

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -end slope (a-a') - global_eoc.pl2 Run By: Matt Satterfield, PE

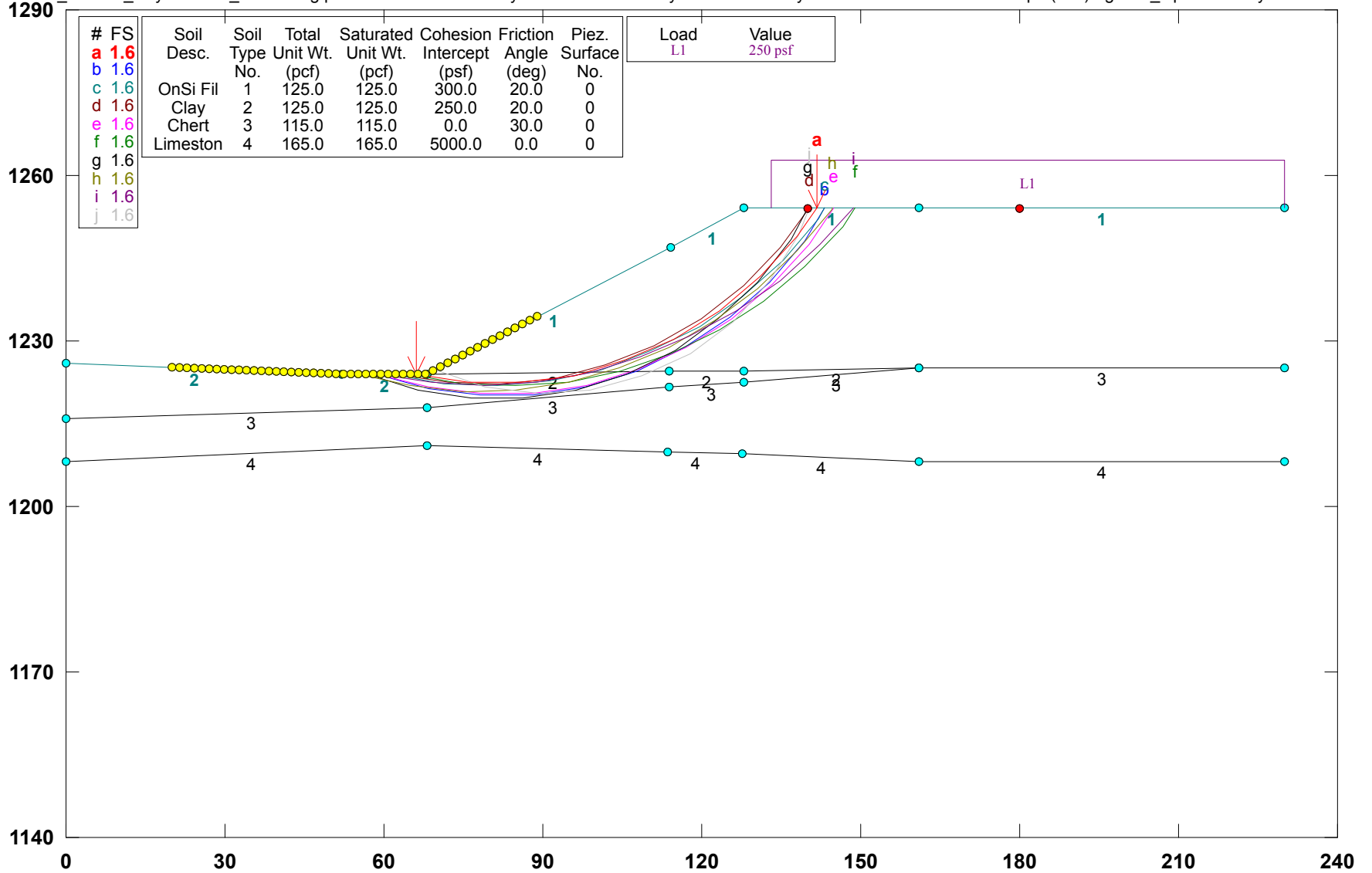


PCSTABL5M/si FSmin=3.1
Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 1 - End Slope (A-A') - 2H:1V - H=30' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -end slope (a-a') - global_lt.pl2 Run By: Matt Satterfield, PE

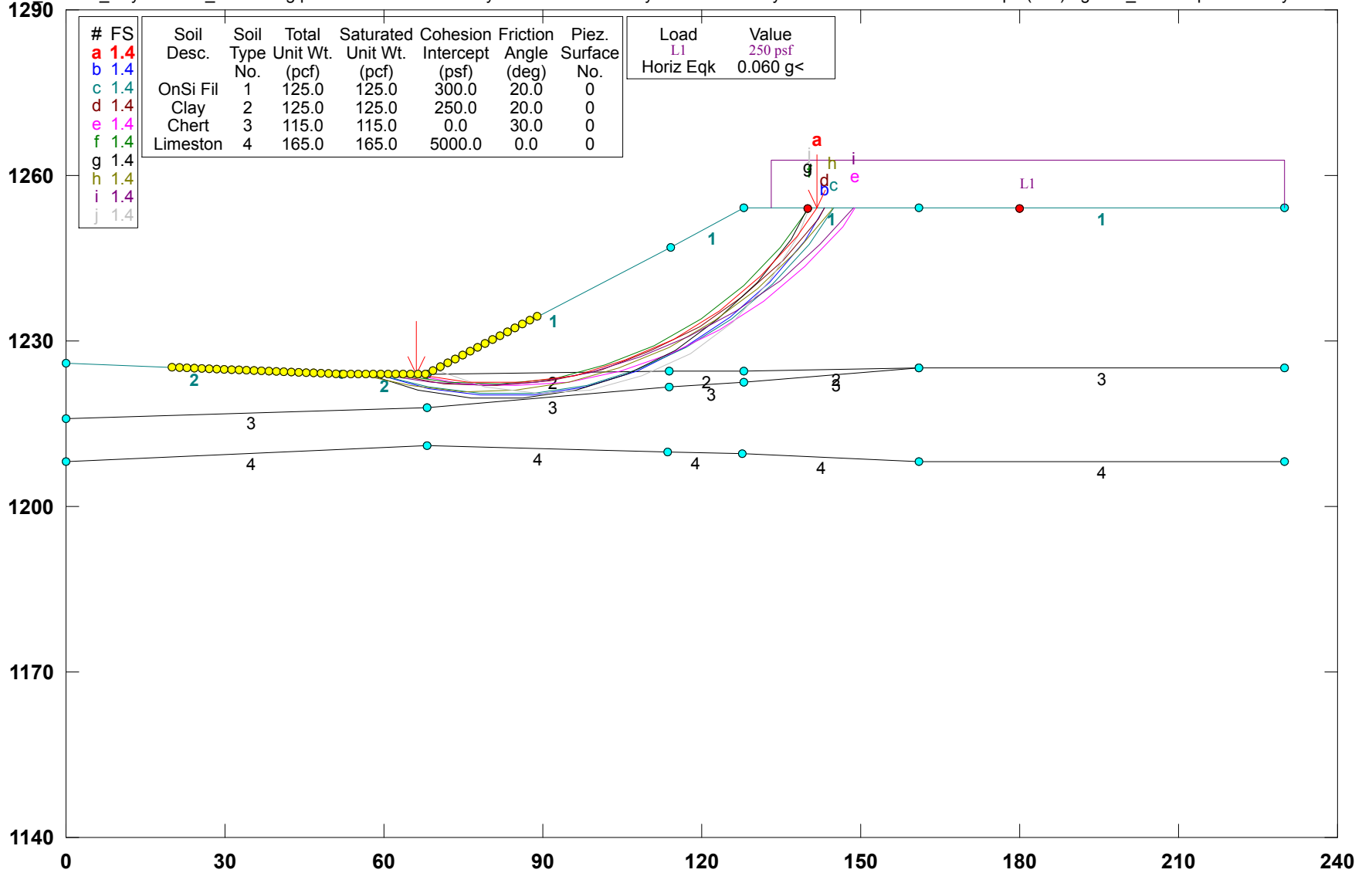


PCSTABL5M/si FSmin=1.6
Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 1 - End Slope (A-A') - 2H:1V - H=30' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -end slope (a-a') - global_seismic.pl2 Run By: Matt Satterfield, PE



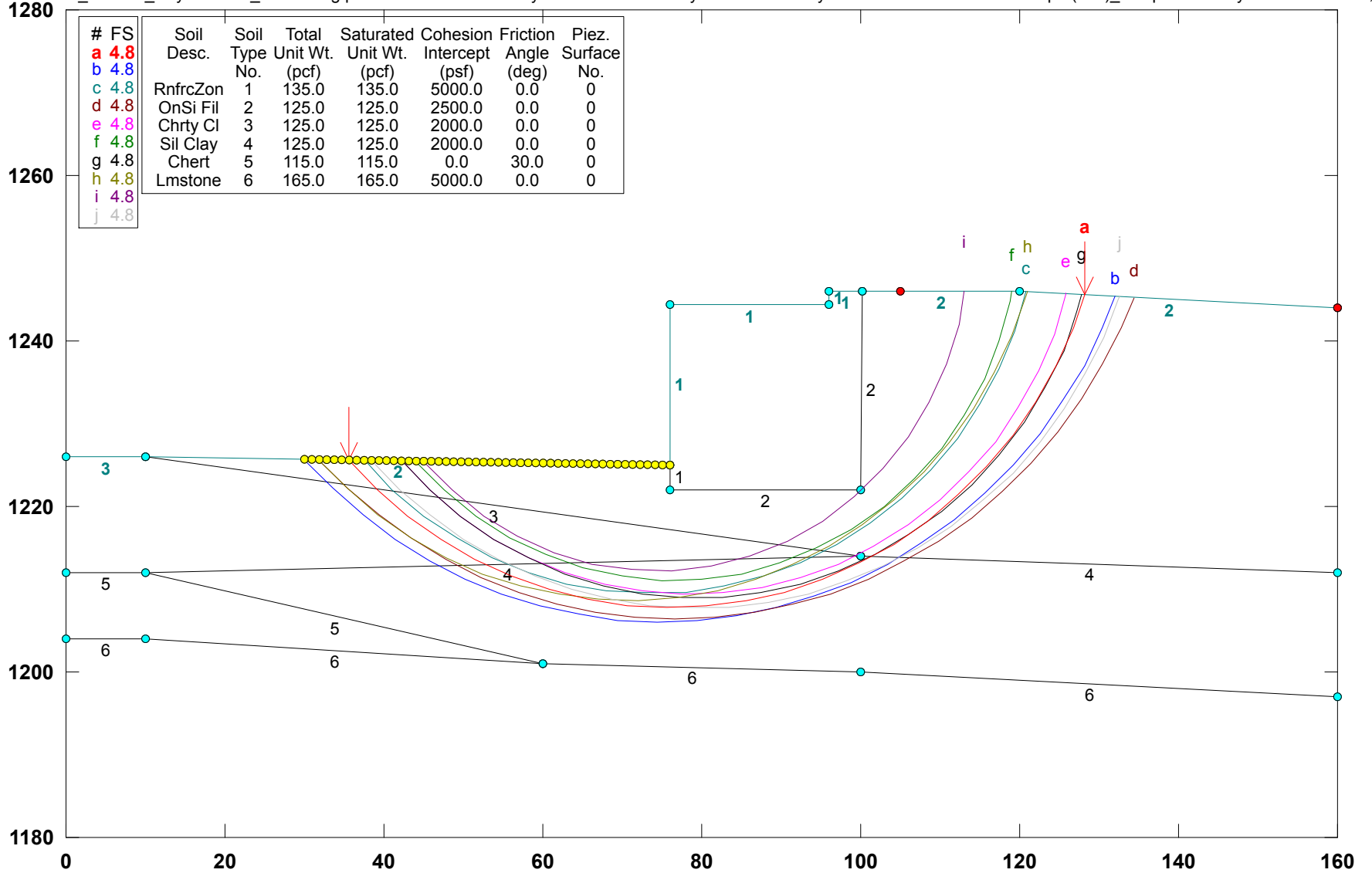
PCSTABL5M/si FSmin=1.4

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - End Slope/ Wall 1 (B-B') - H=22' - End of Constr

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 -end slope (b-b')_eoc.pl2 Run By: Matt Satterfield, PE



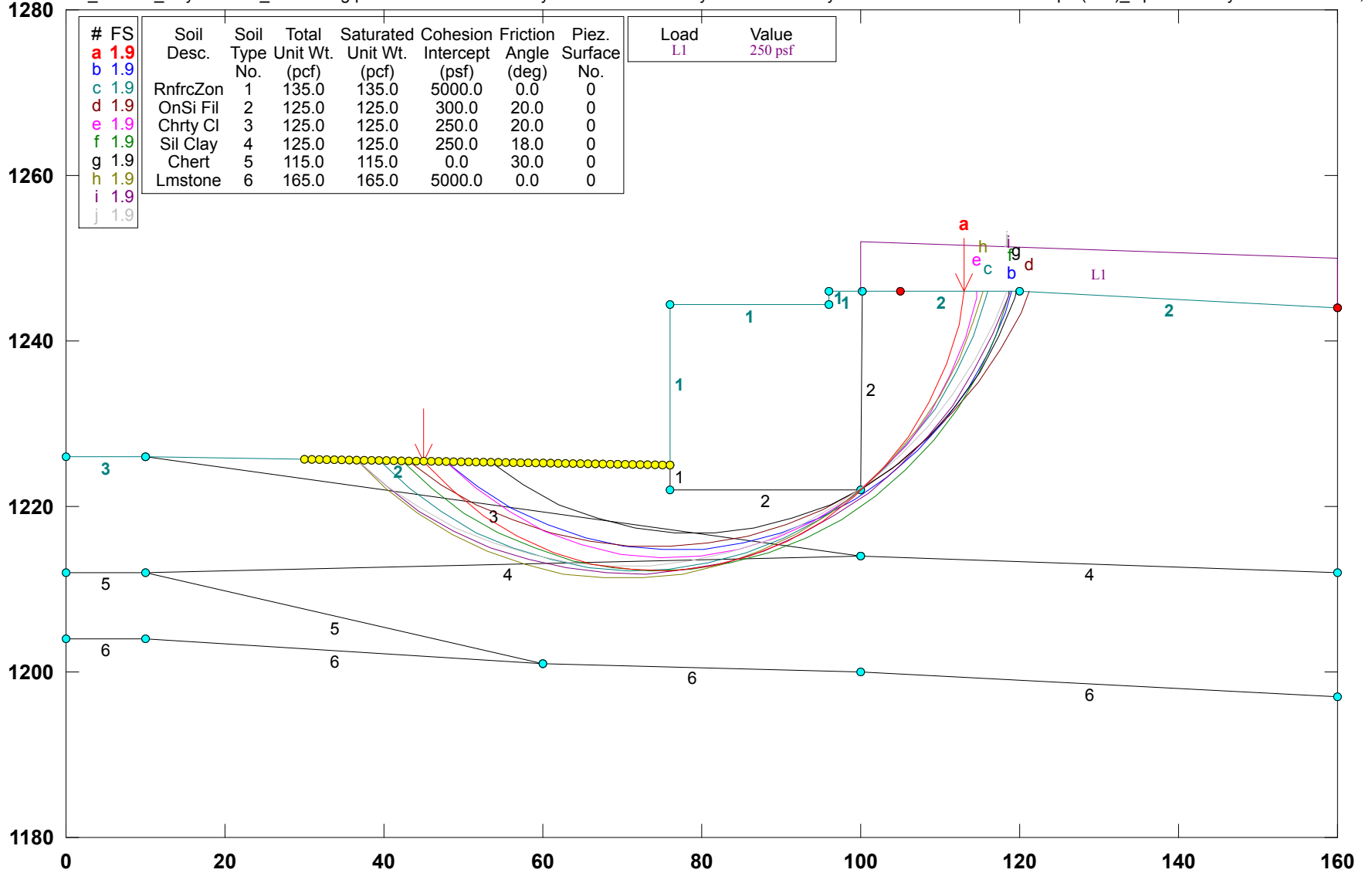
PCSTABL5M/si FSmin=4.8

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - End Slope/ Wall 1 (B-B') - H=22' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 -end slope (b-b')_lt.pl2 Run By: Matt Satterfield, PE



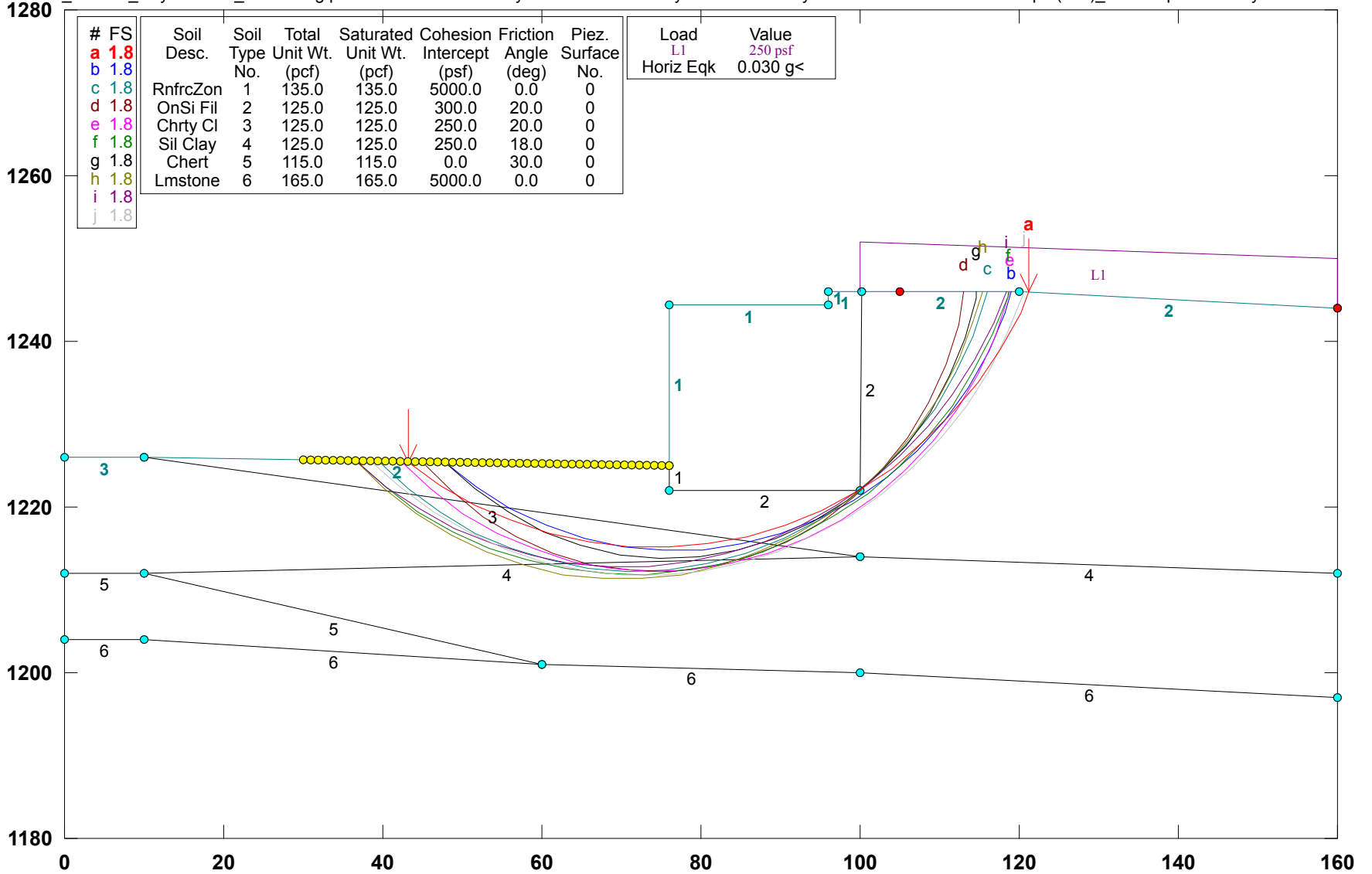
PCSTABL5M/si FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - End Slope/ Wall 1 (B-B') - H=22' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 -end slope (b-b')_seismic.pl2 Run By: Matt Satterfield, PE



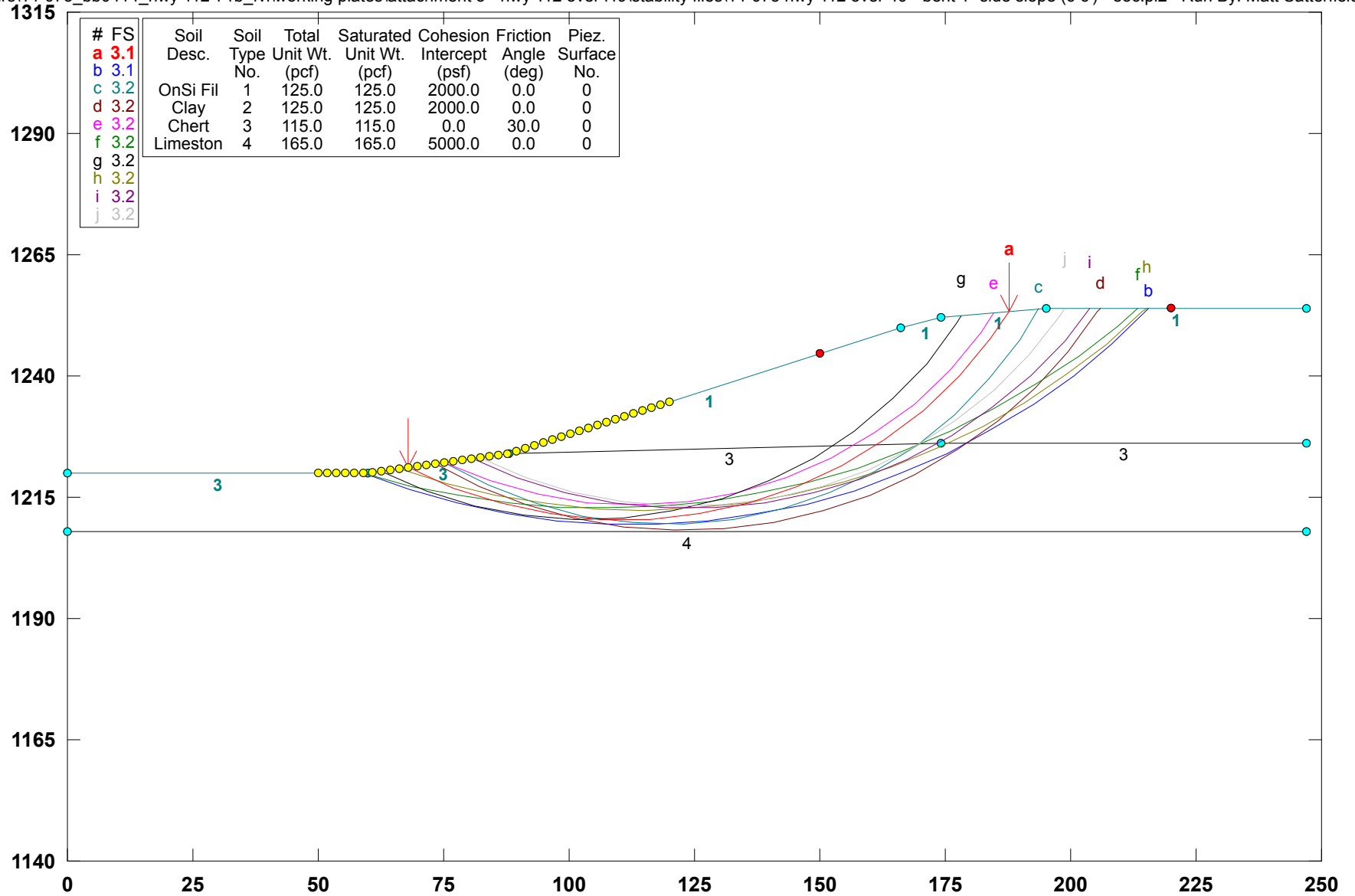
PCSTABL5M/si FSmin=1.8

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 1 Side Slope - (C-C') - 3H:1V - H=30' - End of Const.

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -side slope (c-c') - eoc.pl2 Run By: Matt Satterfield, PE



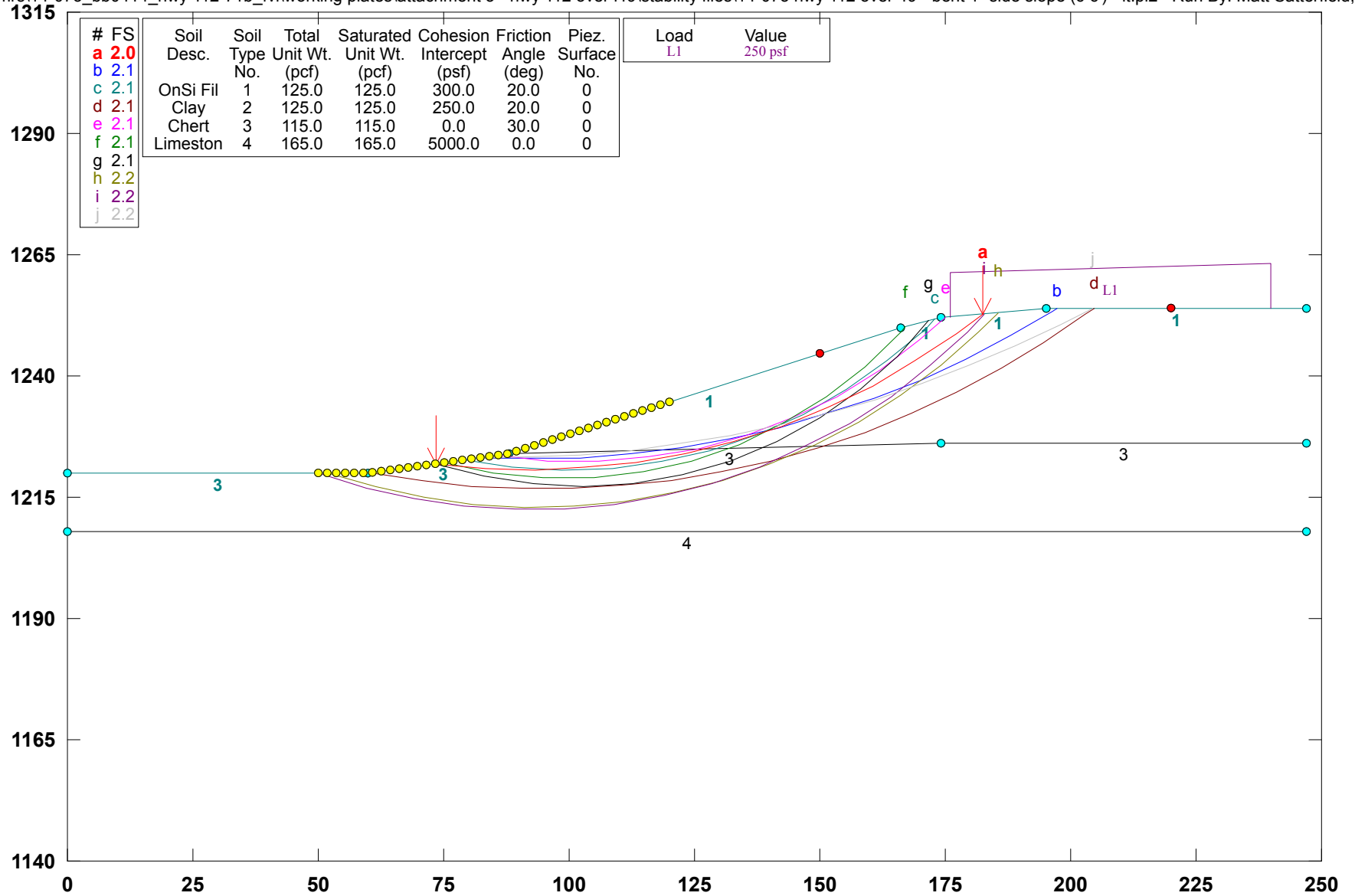
PCSTABL5M/si FSmin=3.1

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 1 Side Slope - (C-C') - 3H:1V - H = 30' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -side slope (c-c') - lt.pl2 Run By: Matt Satterfield, PE

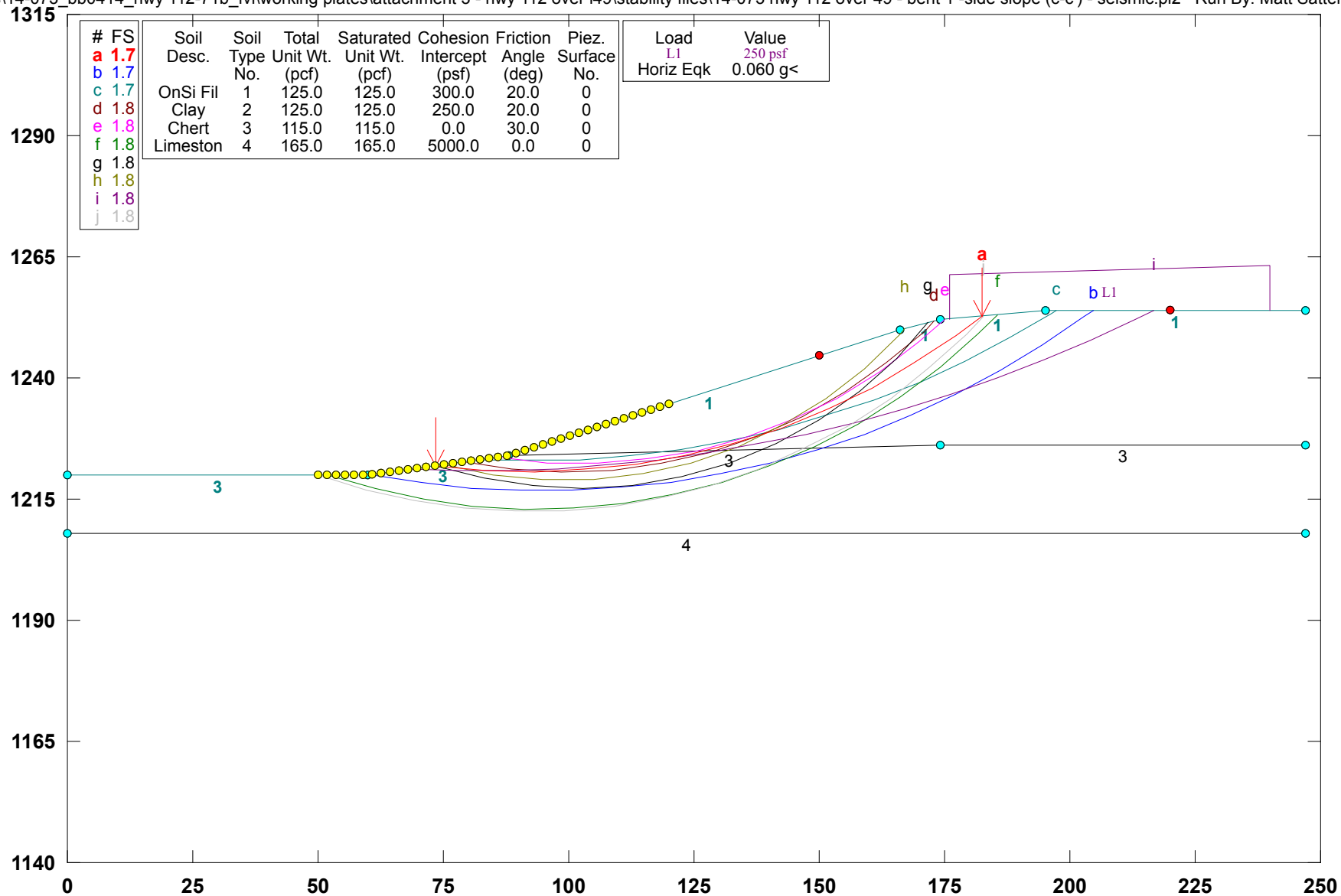


PCSTABL5M/si FSmin=2.0
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 1 Side Slope - (C-C') - 3H:1V - H = 30' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 1 -side slope (c-c') - seismic.pl2 Run By: Matt Satterfield, PE



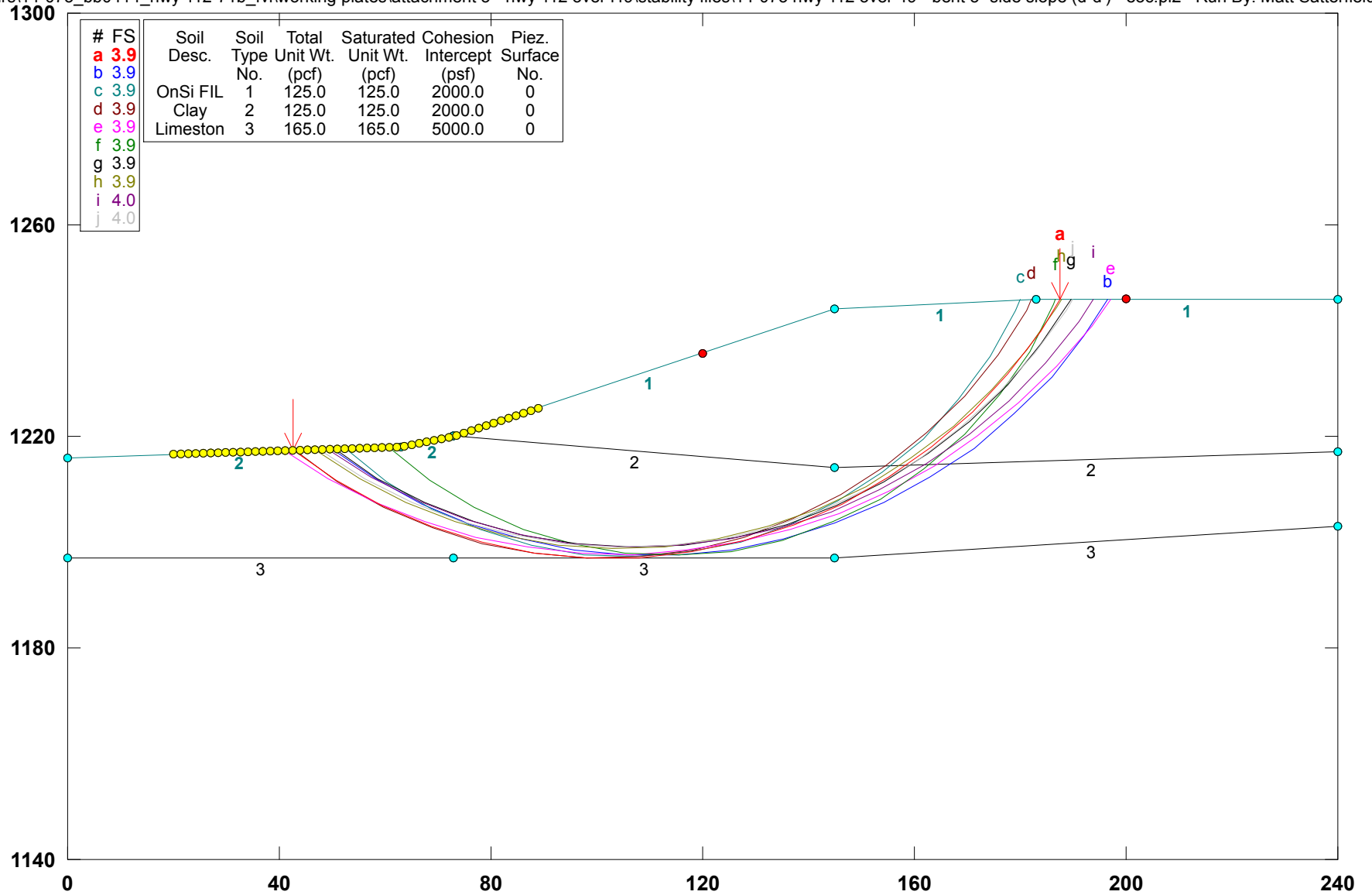
PCSTABL5M/si FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - Side Slope (D-D') - 3H:1V - H=24' - EOC

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 - side slope (d-d') - eoc.pl2 Run By: Matt Satterfield, PE



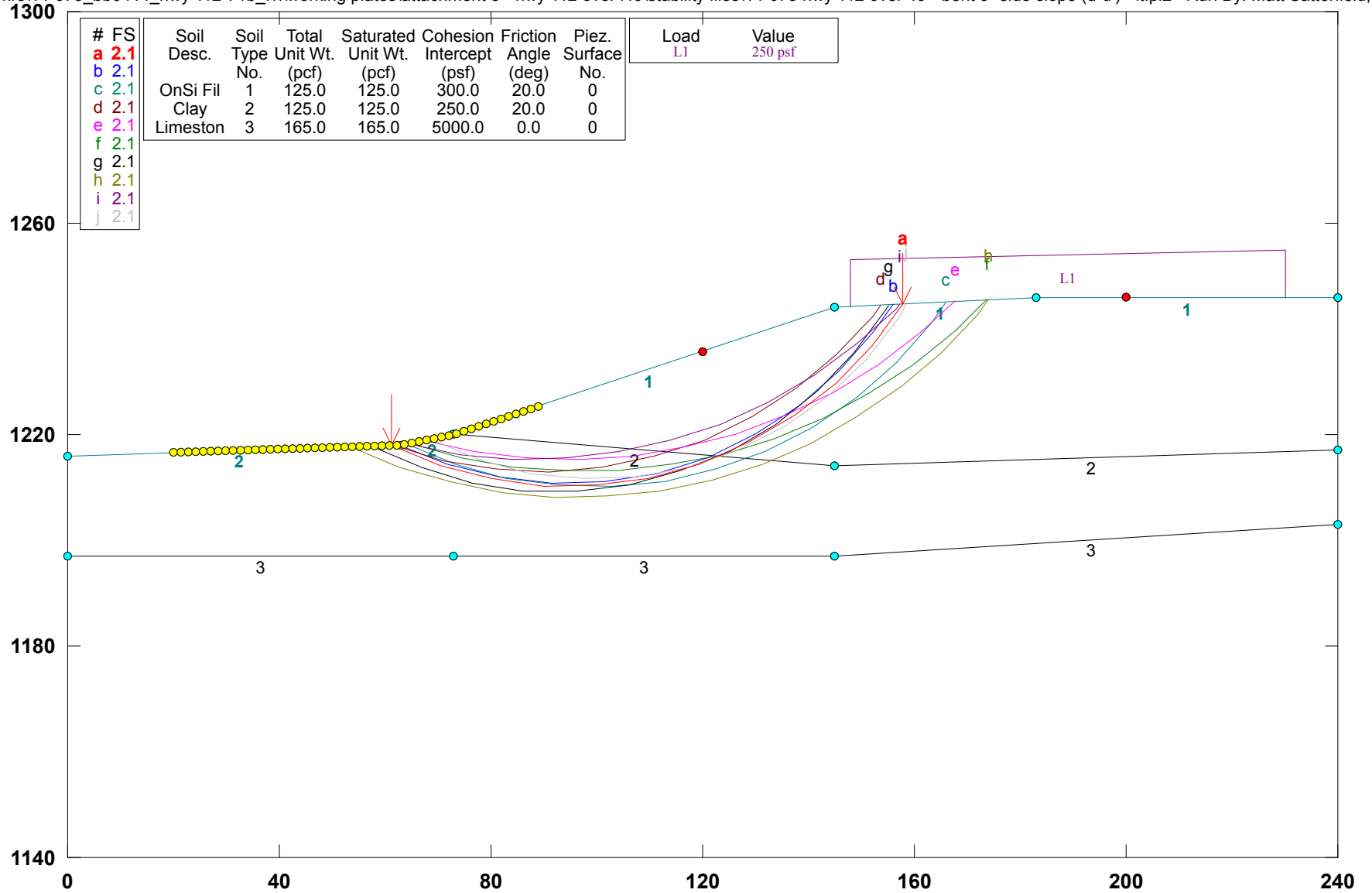
PCSTABL5M/si FSmin=3.9

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - Side Slope (D-D') - 3H:1V - H=24' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 -side slope (d-d') - lt.pl2 Run By: Matt Satterfield, PE



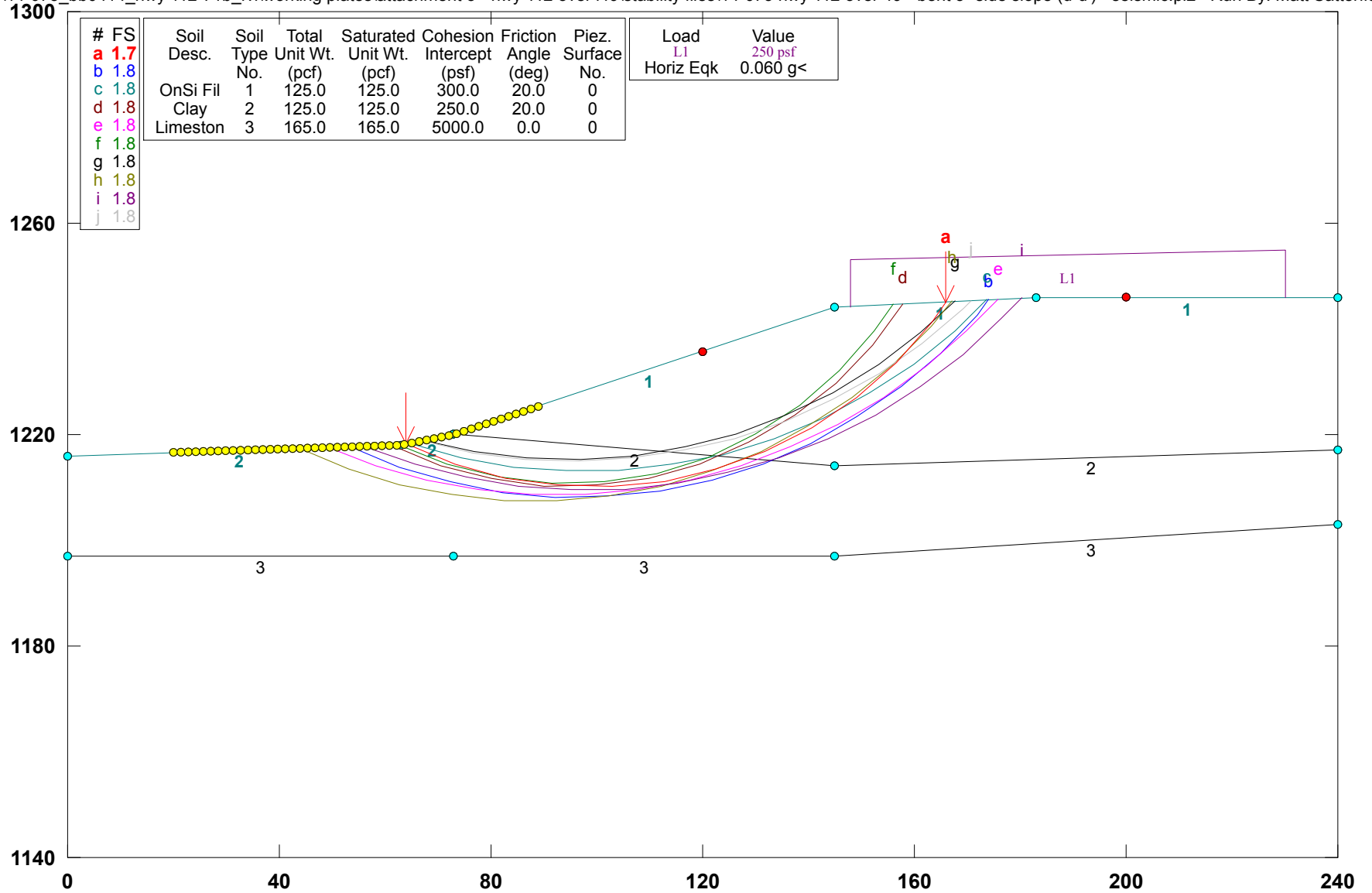
PCSTABL5M/si FSmin=2.1

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 over I-49 - Bent 5 - Side Slope (D-D') - 3H:1V - H=24' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 3 - hwy 112 over i49\stability files\14-073 hwy 112 over 49 - bent 5 -side slope (d-d') - seismic.pl2 Run By: Matt Satterfield, PE

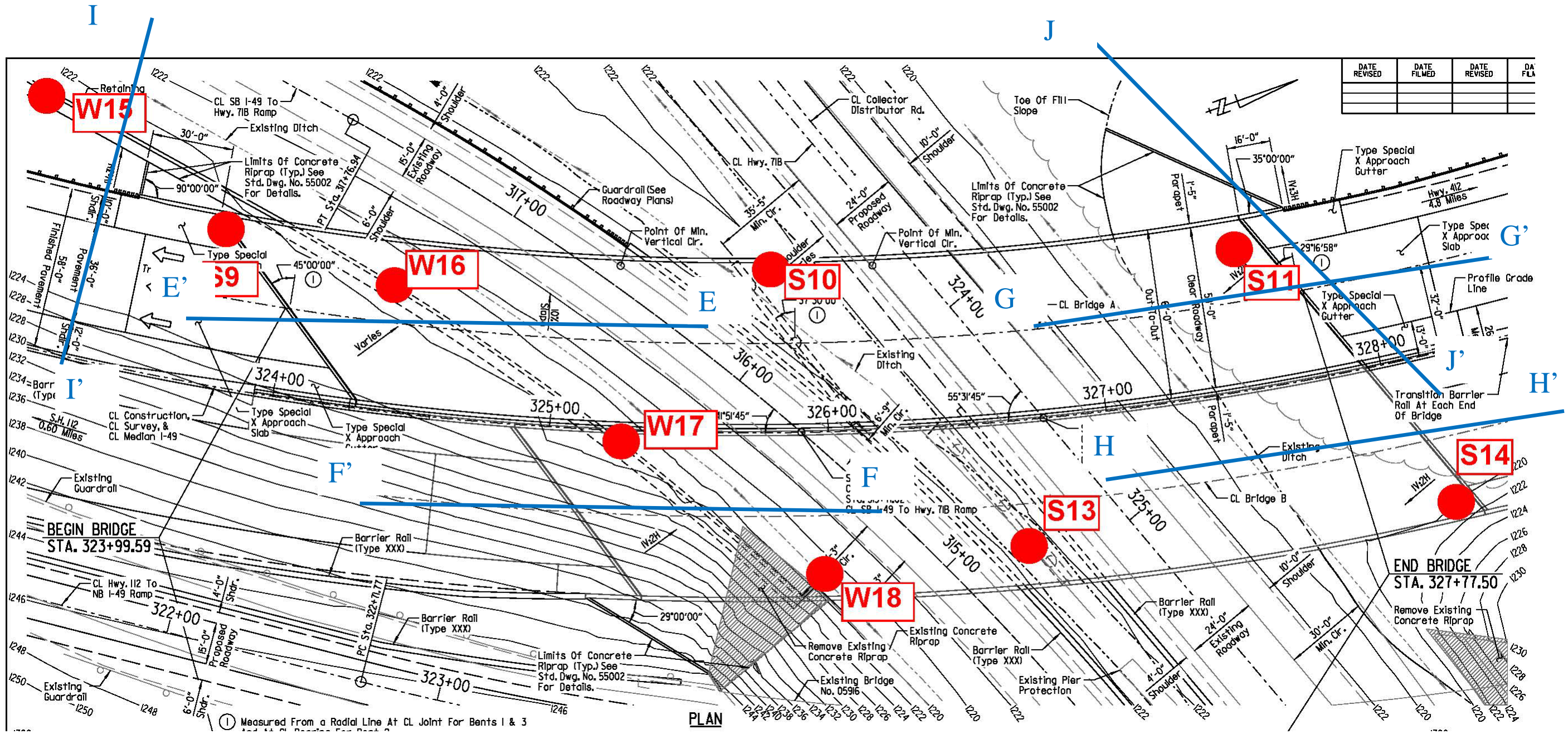


PCSTABL5M/si FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 16



Bridge layout plan provided by Garver, LLC



**APPROXIMATE PROFILE ALIGNMENT
INTERSTATE 49 OVER HIGHWAY 71 BUSINESS
WASHINGTON COUNTY, ARKANSAS**



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

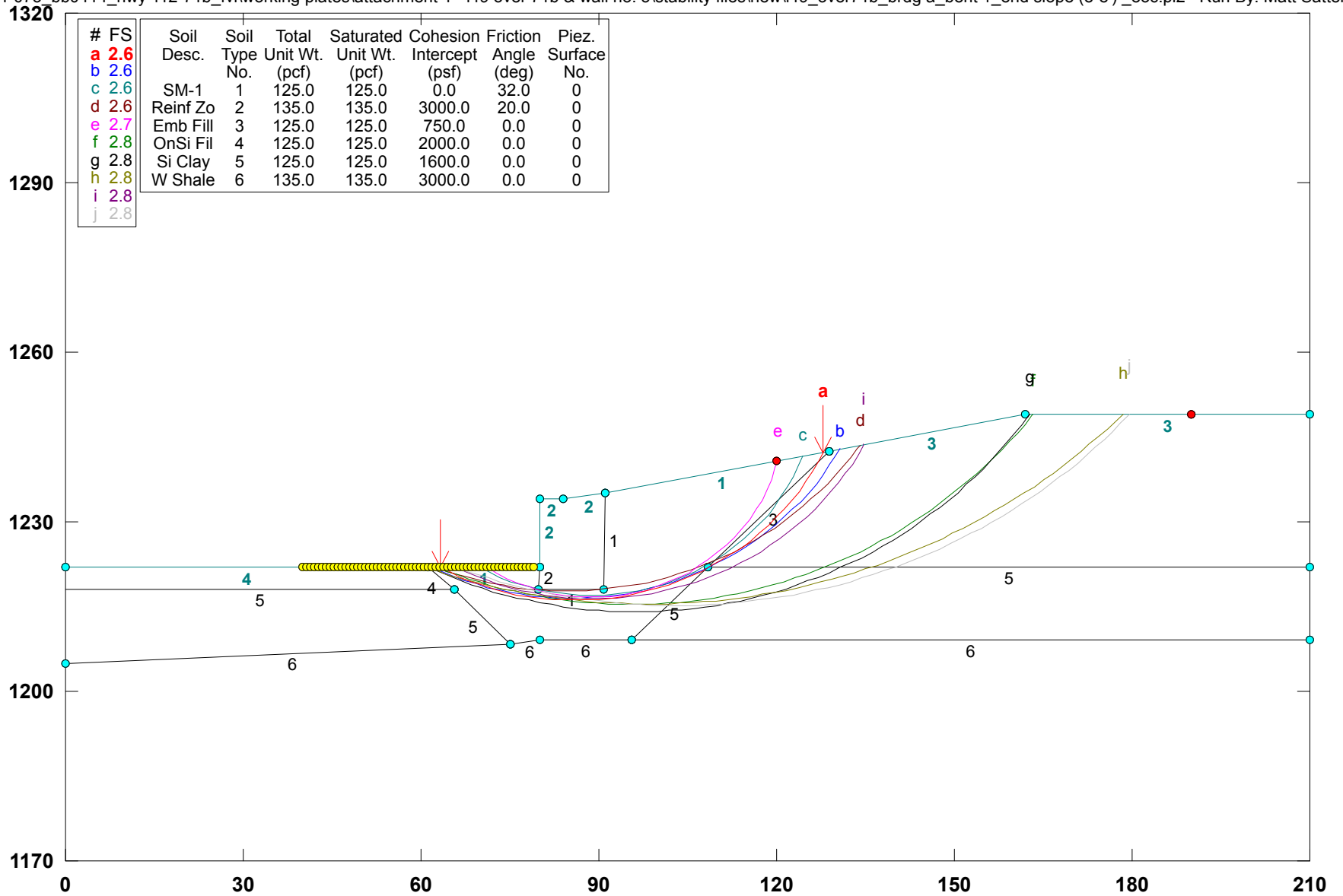
GHBW JOB NO.: 14-073

Project Facet	Project Feature	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
I-49 over 71B	Bridge A - Bent 1 End Slope	E-E'	End of Construction	2.6
			Long Term	2.3
			Seismic*	2.0
	Bridge B - Bent 1 End Slope	F-F'	End of Construction	2.2
			Long Term	2.0
			Seismic*	1.9
	Bridge A - Bent 3 End Slope	G-G'	End of Construction	1.6
			Long Term	1.5
			Seismic*	1.3
	Bridge B - Bent 3 End Slope	H-H'	End of Construction	1.6
			Long Term	1.5
			Seismic*	1.3
	Bridge A/B - Bent 1 - Side Slope	I-I'	End of Construction	1.5
			Long Term	1.4
			Seismic*	1.3
Bridge A/B - Bent 3 - Side Slope	J-J'	End of Construction	2.1	
		Long Term	2.0	
		Seismic*	1.7	

*Kh = 1.0*As for Simple Slope and 0.5*As for Retaining Walls

I49 Over 71B - Br. A - Bent 1- End Slope(E-E') - H=27' - End of Construction

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a_bent 1_end slope (e-e')_eoc.pl2 Run By: Matt Satterfield, PE

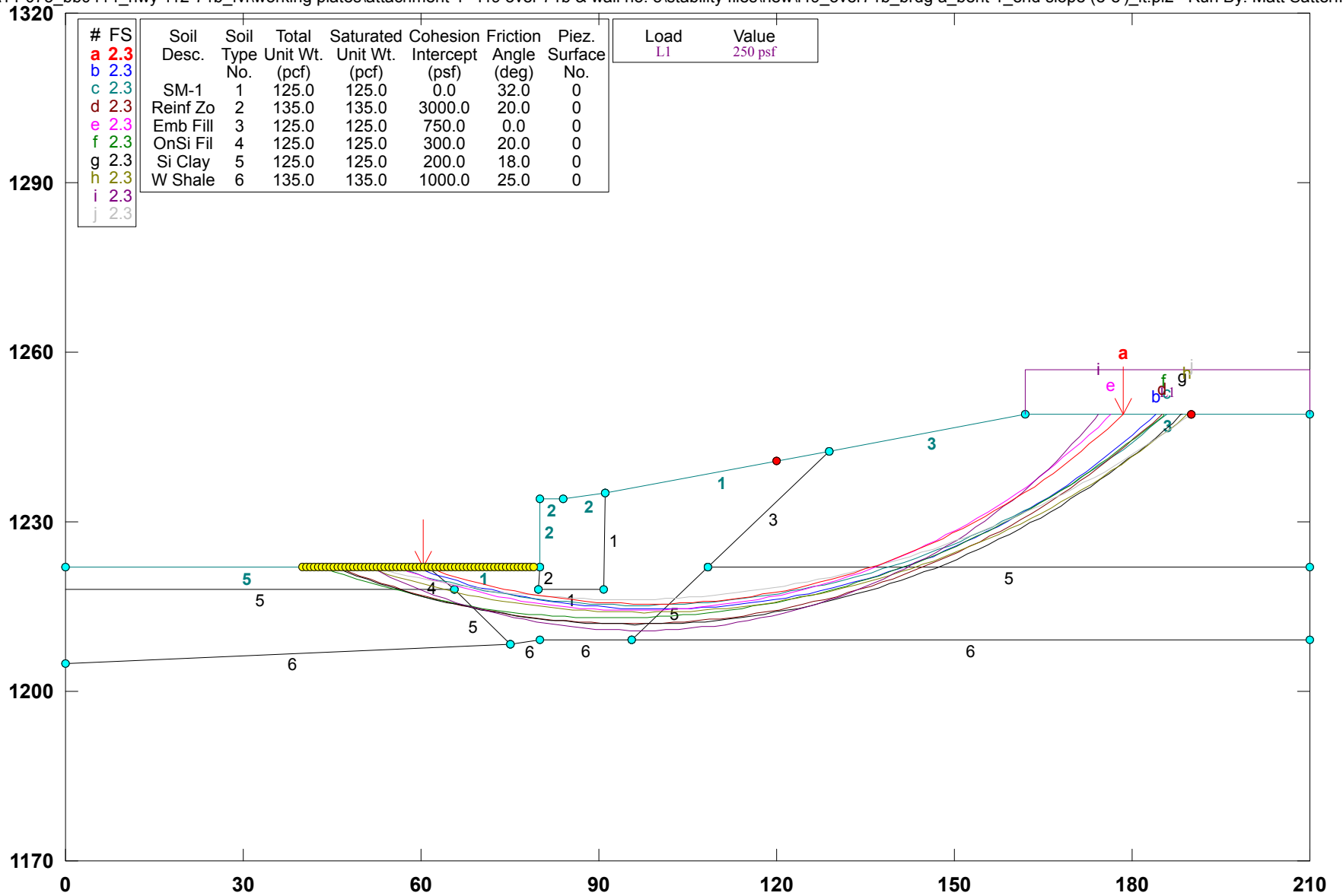


PCSTABL5M/si FSmin=2.6
Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. A - Bent 1- End Slope(E-E') - H=27' - Long Term

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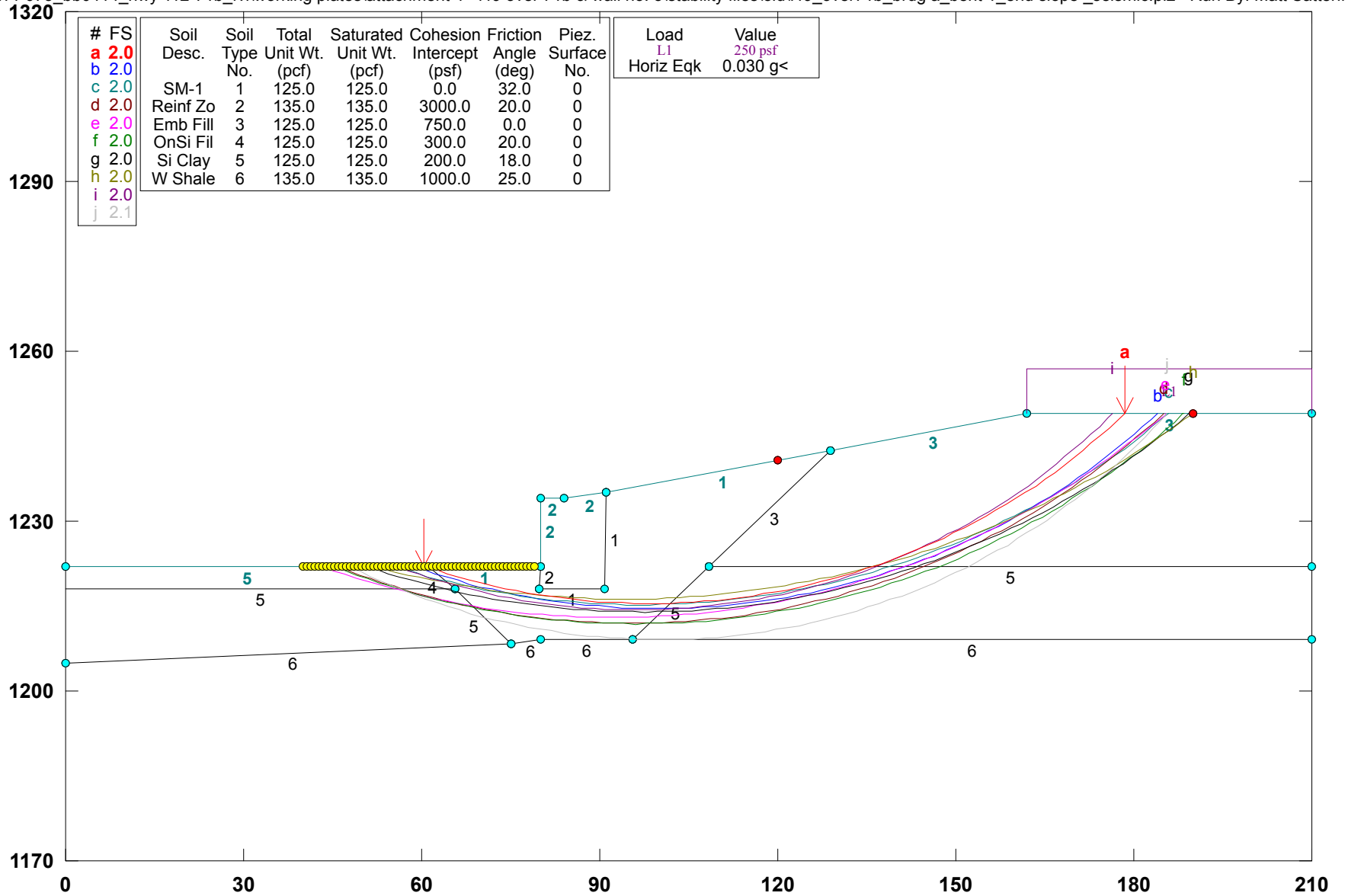


PCSTABL5M/si FSmin=2.3
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. A - Bent 1- End Slope(E-E') - H=27' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\old\i49_over71b_brdg a_bent 1_end slope_seismic.pl2 Run By: Matt Satterfield, PE

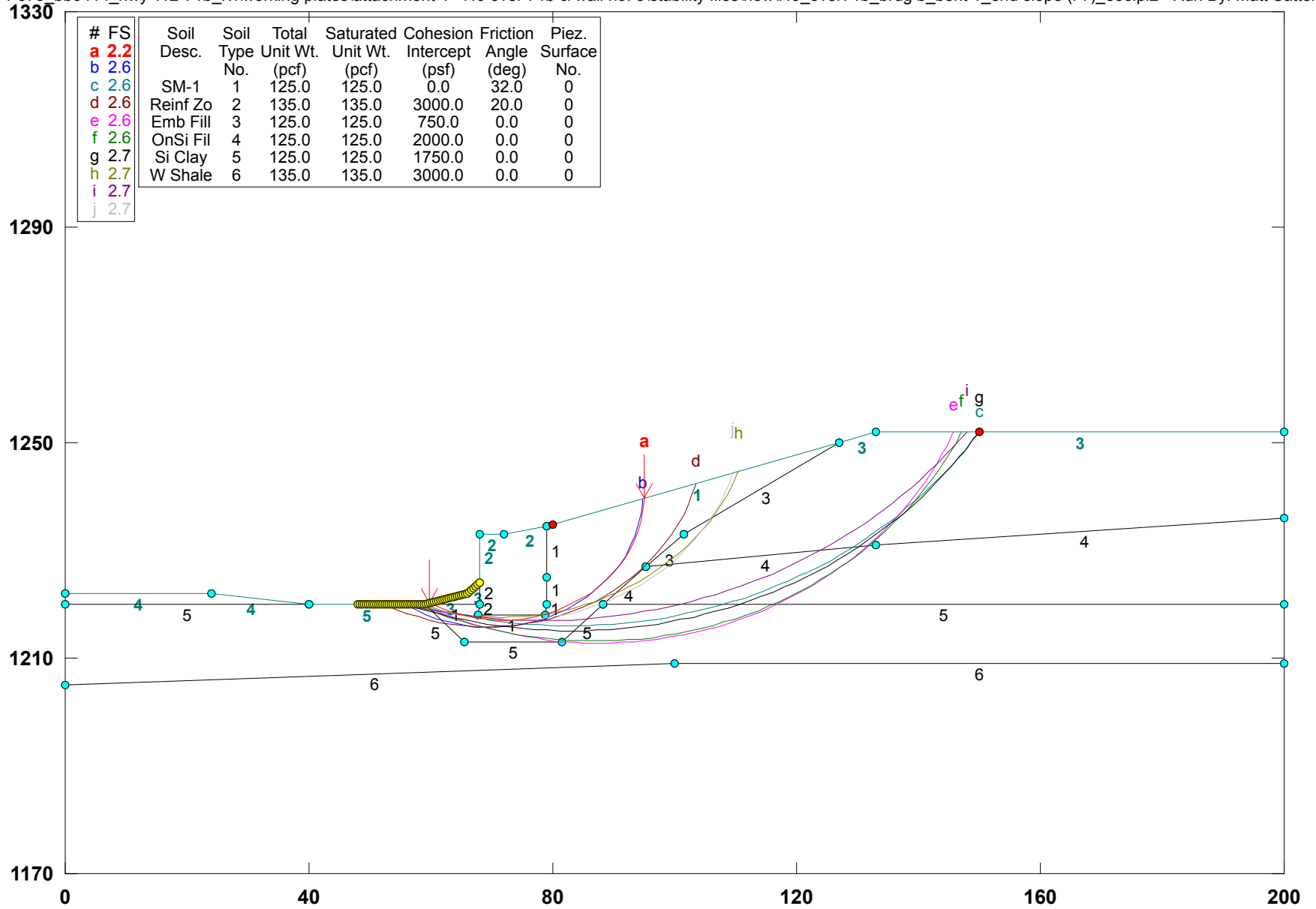


PCSTABL5M/si FSmin=2.0
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 1- End Slope(F-F') - H=32' - End of Construction

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg b_bent 1_end slope (f-f')_eoc.pl2 Run By: Matt Satterfield, PE



#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a	2.2							
b	2.6							
c	2.6							
d	2.6	Reinf Zo	2	135.0	135.0	3000.0	20.0	0
e	2.6	Emb Fill	3	125.0	125.0	750.0	0.0	0
f	2.6	OnSi Fil	4	125.0	125.0	2000.0	0.0	0
g	2.7	Si Clay	5	125.0	125.0	1750.0	0.0	0
h	2.7	W Shale	6	135.0	135.0	3000.0	0.0	0
i	2.7							
j	2.7							

PCSTABL5M/si FSmin=2.2
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 1- End Slope(F-F') - H=32' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachement 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg b_bent 1_end slope (f-f')_lt.pl2 Run By: Matt Satterfield, PE

1330

# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a 2.0							
b 2.0							
c 2.1	SM-1	1	125.0	125.0	0.0	32.0	0
d 2.1	Reinf Zo	2	135.0	135.0	3000.0	20.0	0
e 2.1	Emb Fill	3	125.0	125.0	750.0	0.0	0
f 2.1	OnSi Fil	4	125.0	125.0	400.0	26.0	0
g 2.1	Si Clay	5	125.0	125.0	300.0	24.0	0
h 2.1	W Shale	6	135.0	135.0	1000.0	25.0	0
i 2.1							
j 2.1							

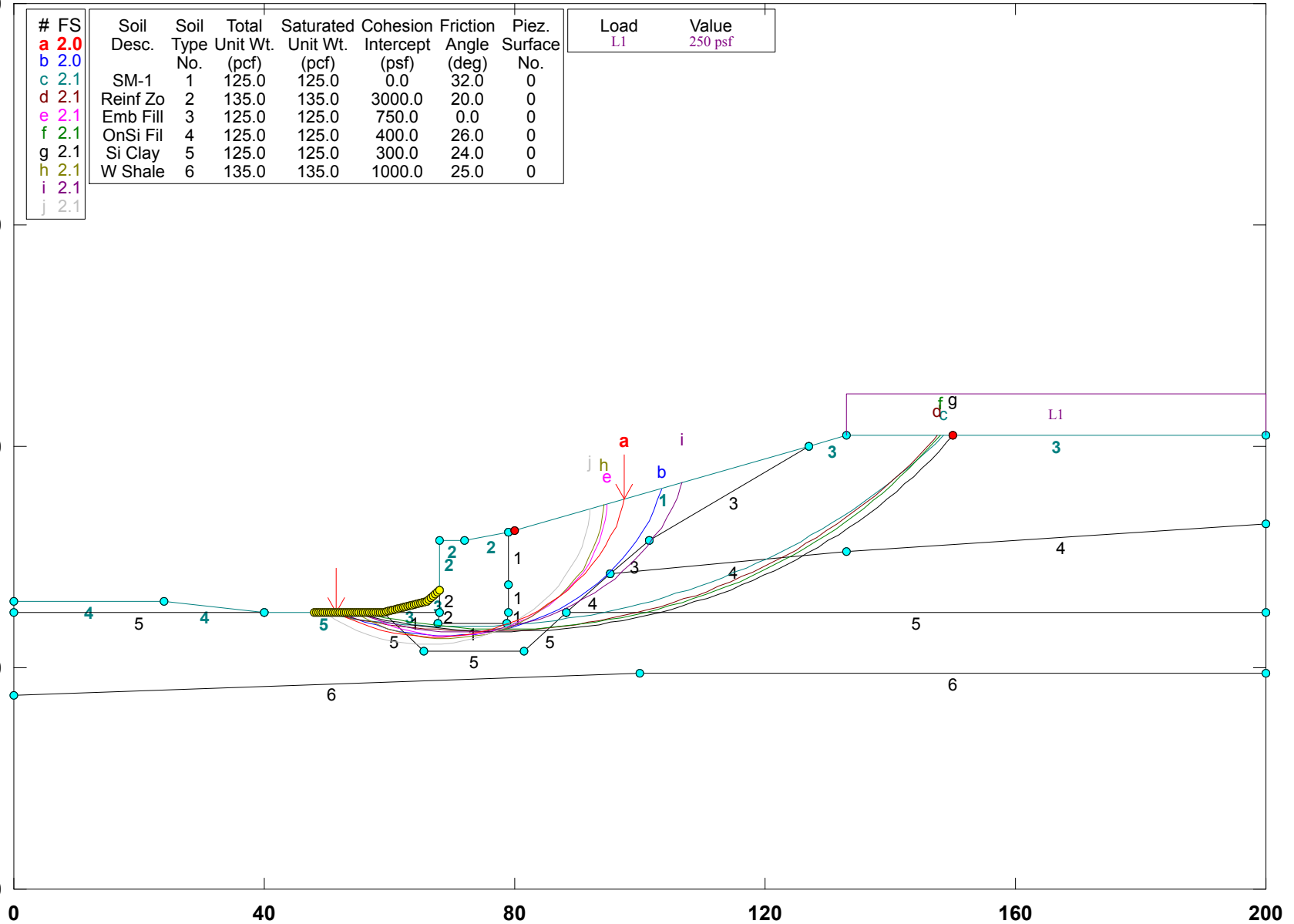
Load	Value
L1	250 psf

1290

1250

1210

1170



PCSTABL5M/si FSmin=2.0

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 1- End Slope(F-F') - H=32' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachement 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg b_bent 1_end slope (f-f')_seismic.pl2 Run By: Matt Satterfield, PE

1330

# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a 1.9							
b 1.9							
c 1.9	SM-1	1	125.0	125.0	0.0	32.0	0
d 1.9	Reinf Zo	2	135.0	135.0	3000.0	20.0	0
e 1.9	Emb Fill	3	125.0	125.0	750.0	0.0	0
f 1.9	OnSi Fil	4	125.0	125.0	400.0	26.0	0
g 2.0	Si Clay	5	125.0	125.0	300.0	24.0	0
h 2.0	W Shale	6	135.0	135.0	1000.0	25.0	0
i 2.0							
j 2.0							

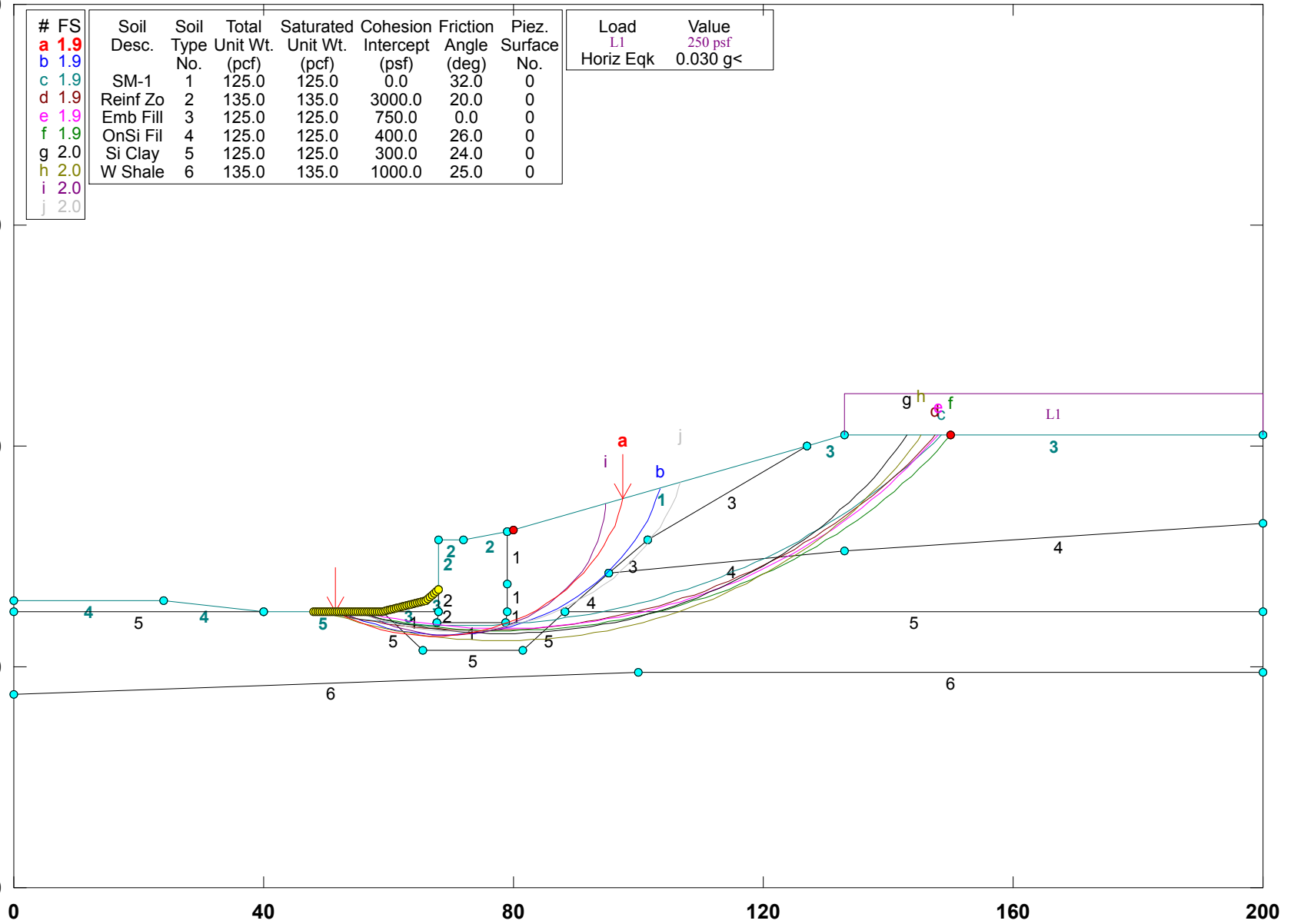
Load	Value
LI	250 psf
Horiz Eqk	0.030 g<

1290

1250

1210

1170



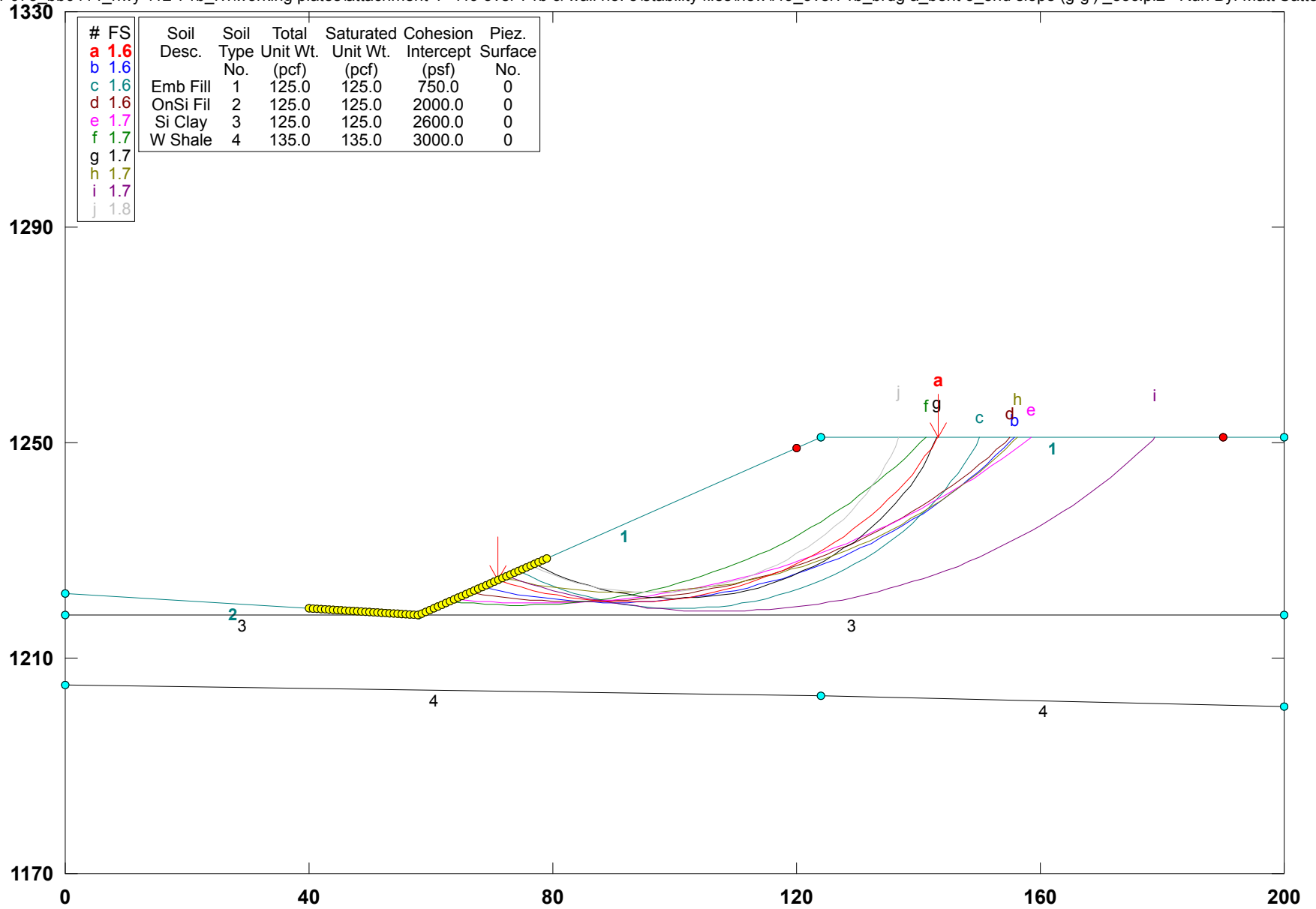
PCSTABL5M/si FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. A - Bent 3- End Slope(G-G') - 2H:1V - H=33' - End of Const.

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a_bent 3_end slope (g-g')_eoc.pl2 Run By: Matt Satterfield, PE

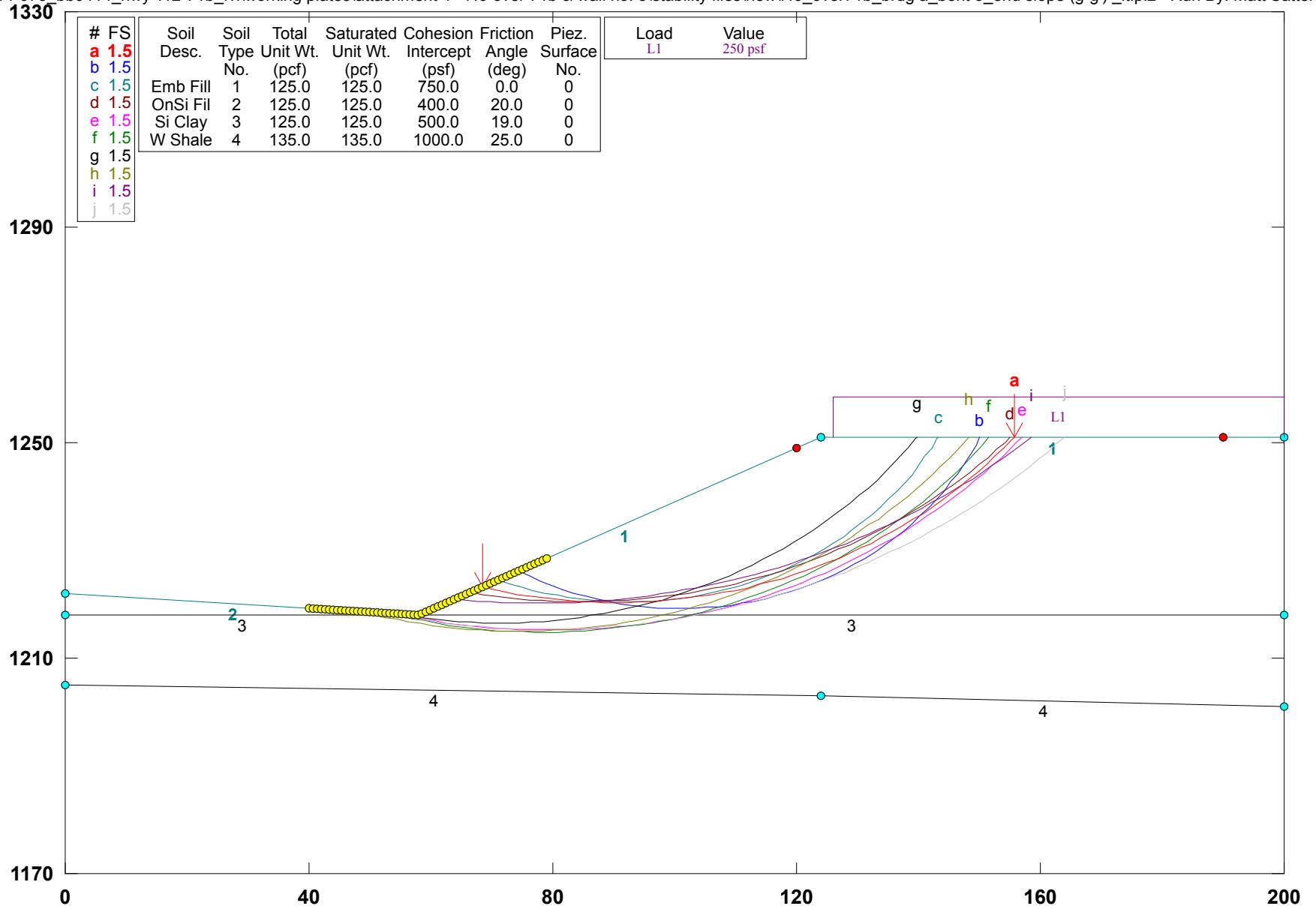


PCSTABL5M/si FSmin=1.6
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. A - Bent 3- End Slope(G-G') - 2H:1V - H=33' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a_bent 3_end slope (g-g')_lt.pl2 Run By: Matt Satterfield, PE



# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a 1.5							
b 1.5							
c 1.5	Emb Fill	1	125.0	125.0	750.0	0.0	0
d 1.5	OnSi Fil	2	125.0	125.0	400.0	20.0	0
e 1.5	Si Clay	3	125.0	125.0	500.0	19.0	0
f 1.5	W Shale	4	135.0	135.0	1000.0	25.0	0
g 1.5							
h 1.5							
i 1.5							
j 1.5							

Load	Value
L1	250 psf

PCSTABL5M/si FSmin=1.5
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. A - Bent 3- End Slope(G-G') - 2H:1V - H=33' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a_bent 3_end slope (g-g')_seismic.pl2 Run By: Matt Satterfield, PE

1330

# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a 1.3							
b 1.3							
c 1.3	Emb Fill	1	125.0	125.0	750.0	0.0	0
d 1.3	OnSi Fil	2	125.0	125.0	400.0	20.0	0
e 1.3	Si Clay	3	125.0	125.0	500.0	19.0	0
f 1.3	W Shale	4	135.0	135.0	1000.0	25.0	0
g 1.3							
h 1.3							
i 1.3							
j 1.3							

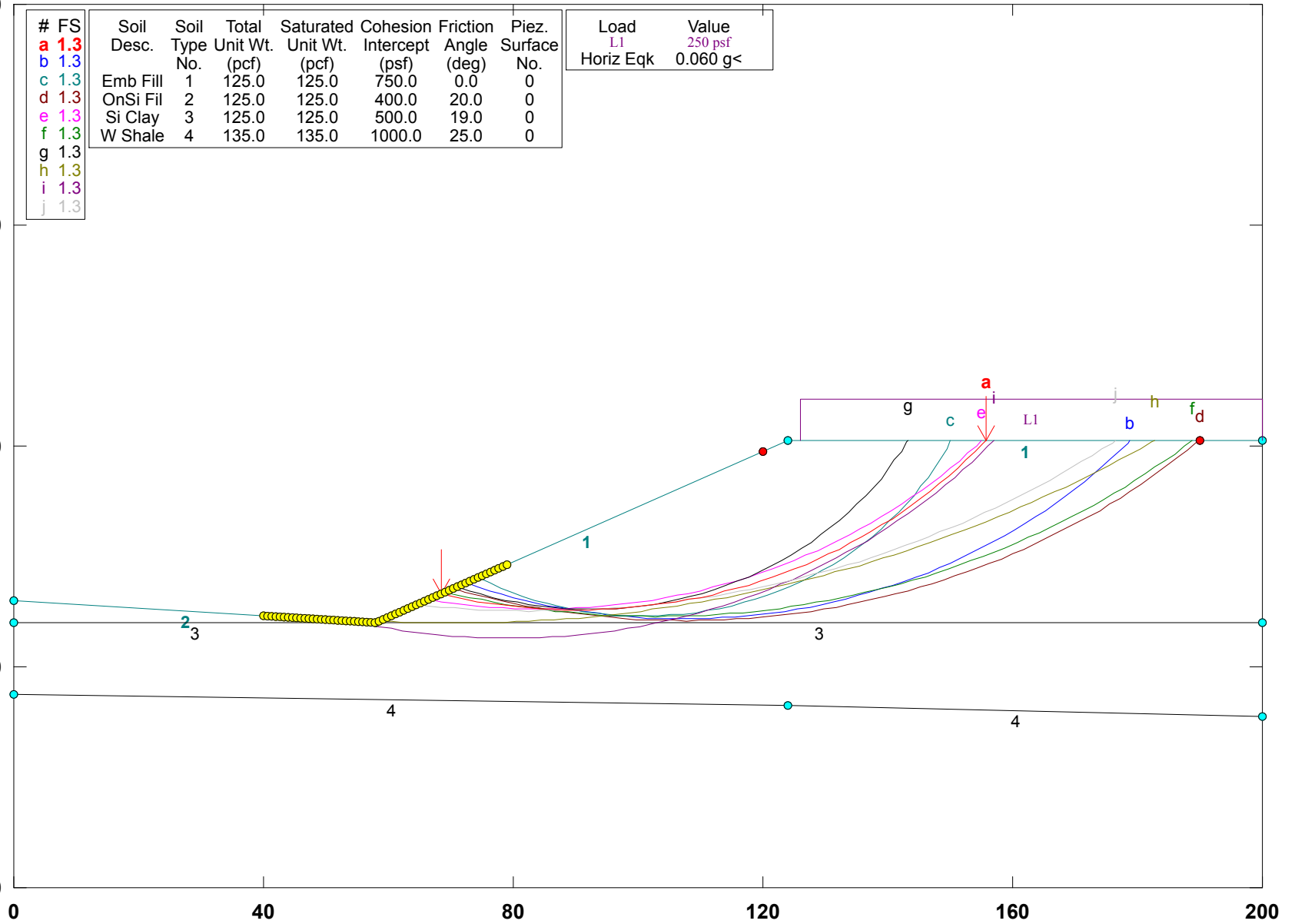
Load	Value
LI	250 psf
Horiz Eqk	0.060 g<

1290

1250

1210

1170



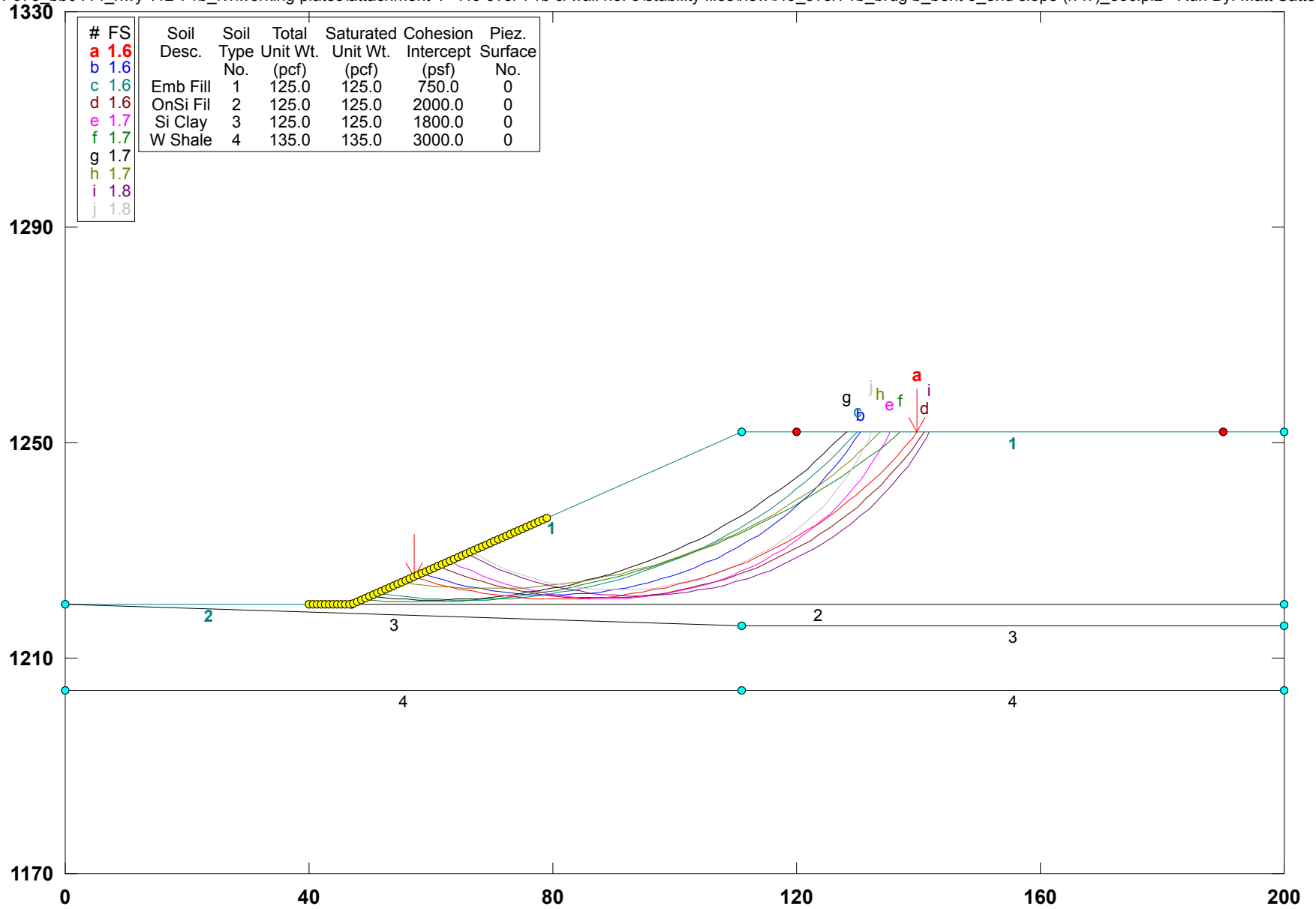
PCSTABL5M/si FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 3- End Slope(H-H') - 2H:1V - H=32' - End of Const

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachement 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg b_bent 3_end slope (h-h')_eoc.pl2 Run By: Matt Satterfield, PE

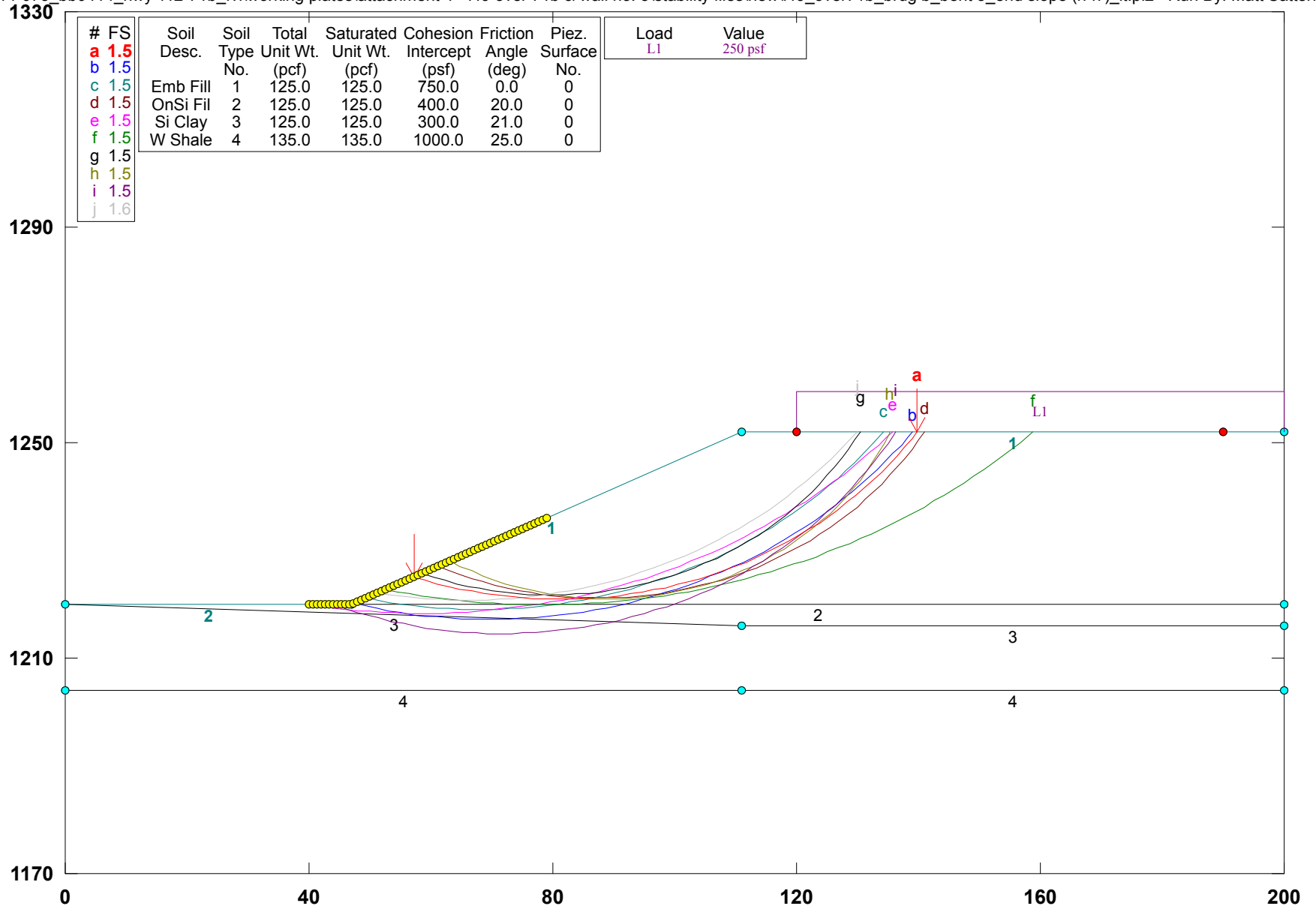


PCSTABL5M/si FSmin=1.6
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 3- End Slope(H-H') - 2H:1V - H=32' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg_b_bent 3_end slope (h-h')_lt.pl2 Run By: Matt Satterfield, PE



PCSTABL5M/si FSmin=1.5
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B - Br. B - Bent 3- End Slope(H-H') - 2H:1V - H=32' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg b_bent 3_end slope (h-h')_seismic.pl2 Run By: Matt Satterfield, PE

1330

#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a	1.3							
b	1.3							
c	1.3	Emb Fill	1	125.0	125.0	750.0	0.0	0
d	1.3	OnSi Fil	2	125.0	125.0	400.0	20.0	0
e	1.3	Si Clay	3	125.0	125.0	300.0	21.0	0
f	1.3							
g	1.3	W Shale	4	135.0	135.0	1000.0	25.0	0
h	1.3							
i	1.3							
j	1.3							

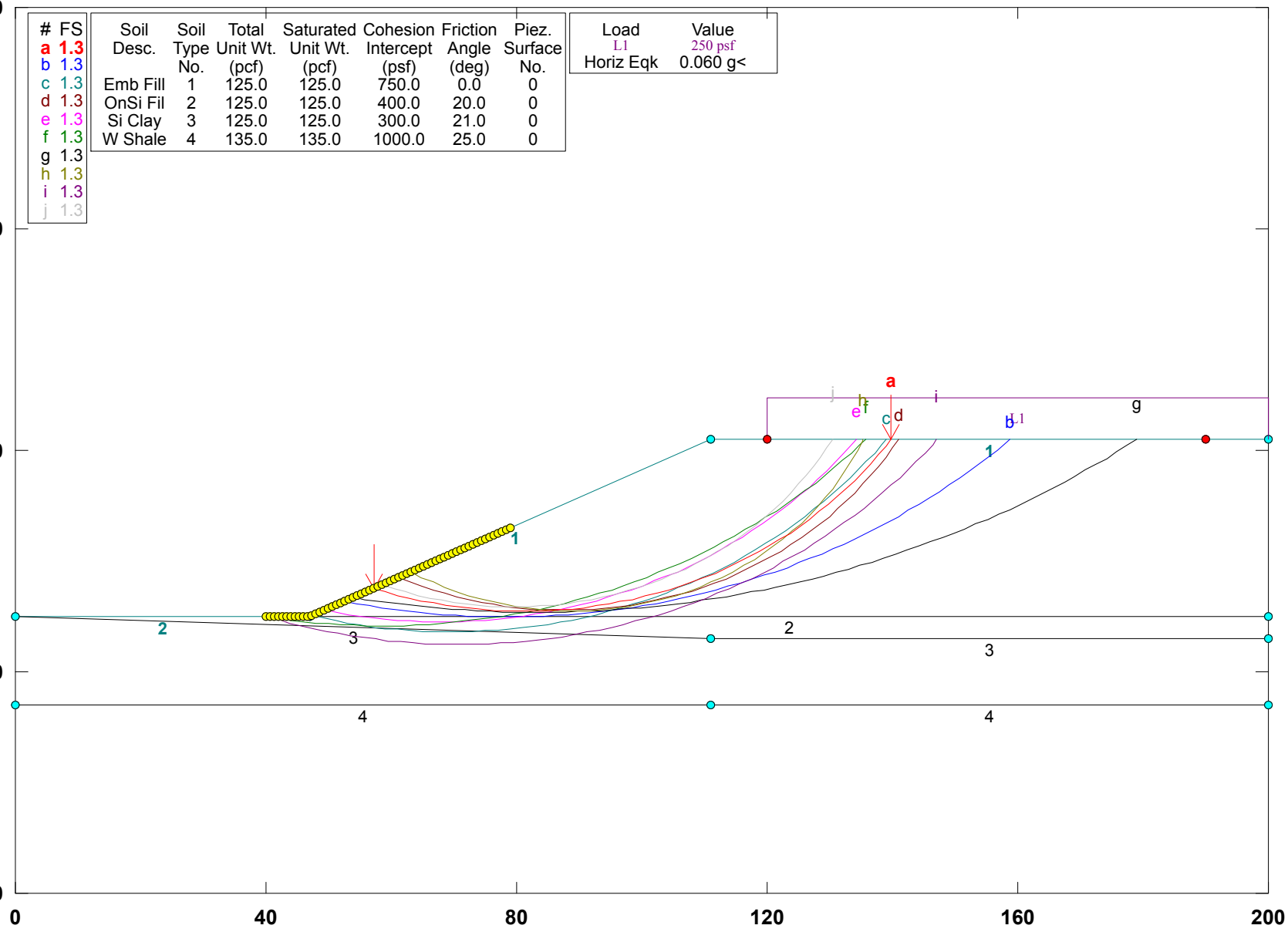
Load	Value
LI	250 psf
Horiz Eqk	0.060 g<

1290

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1170



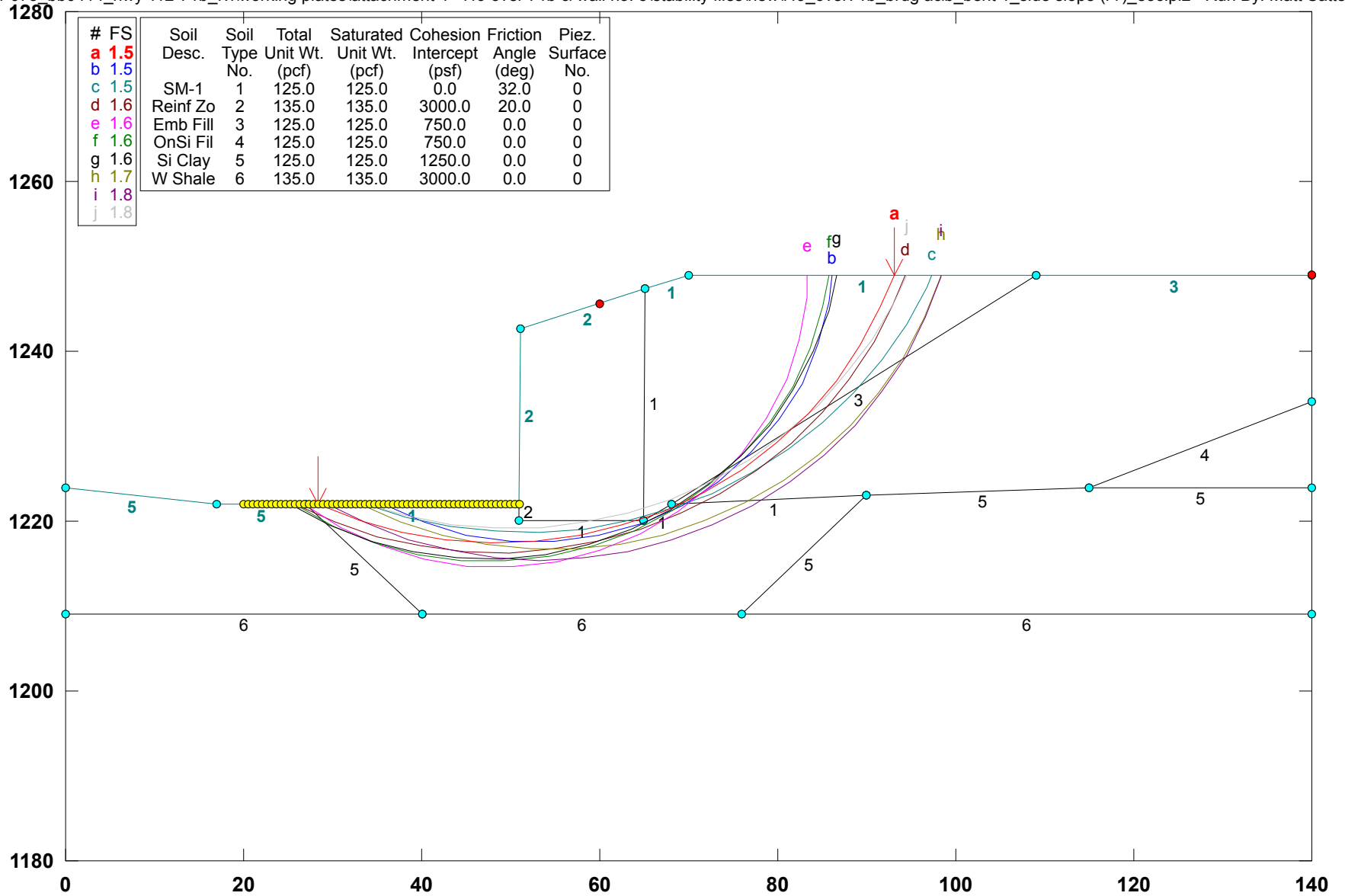
PCSTABL5M/si FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Wall No. 5- 20' ht - Bent 1 Side Slope (I-I') - EOC

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over_71b_brdg a&b_bent 1_side slope (i-i')_eoc.pl2 Run By: Matt Satterfield, PE

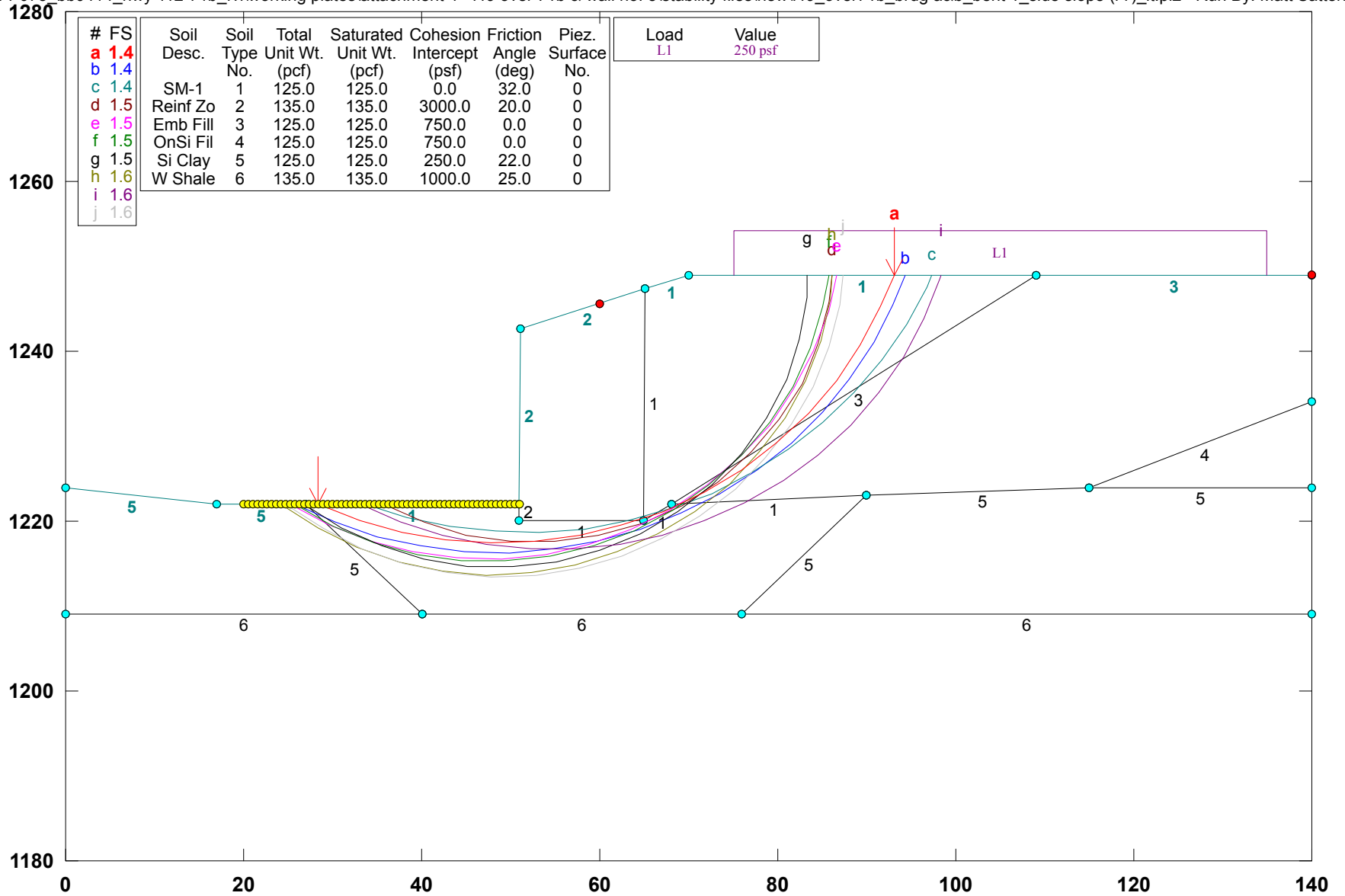


PCSTABL5M/si FSmin=1.5
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Wall No. 5- 20' ht - Bent 1 Side Slope (I-I') - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a&b_bent 1_side slope (i-i')_lt.pl2 Run By: Matt Satterfield, PE



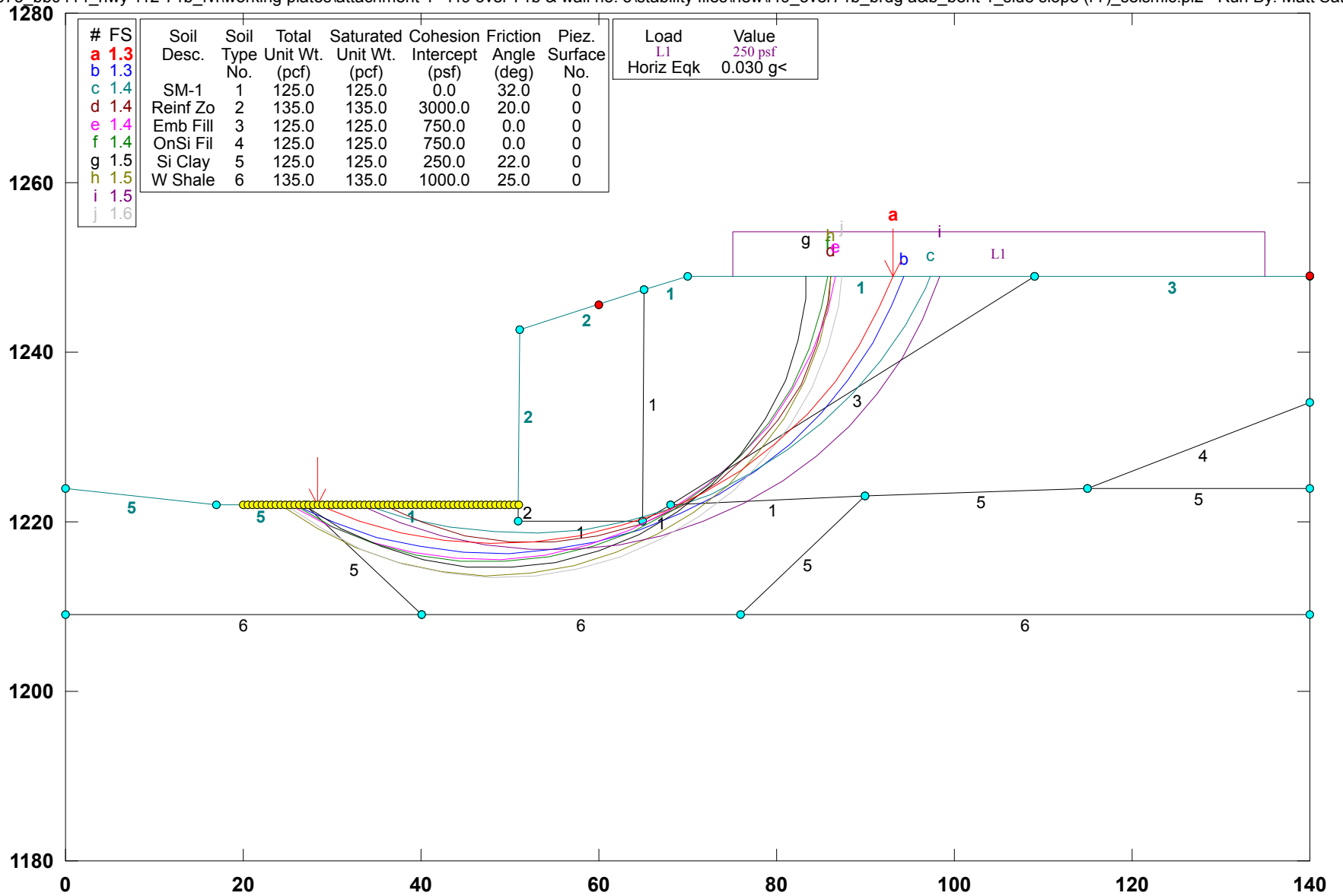
PCSTABL5M/si FSmin=1.4

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Wall No. 5- 20' ht - Bent 1 Side Slope (I-I') - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a&b_bent 1_side slope (i-i')_seismic.pl2 Run By: Matt Satterfield, PE



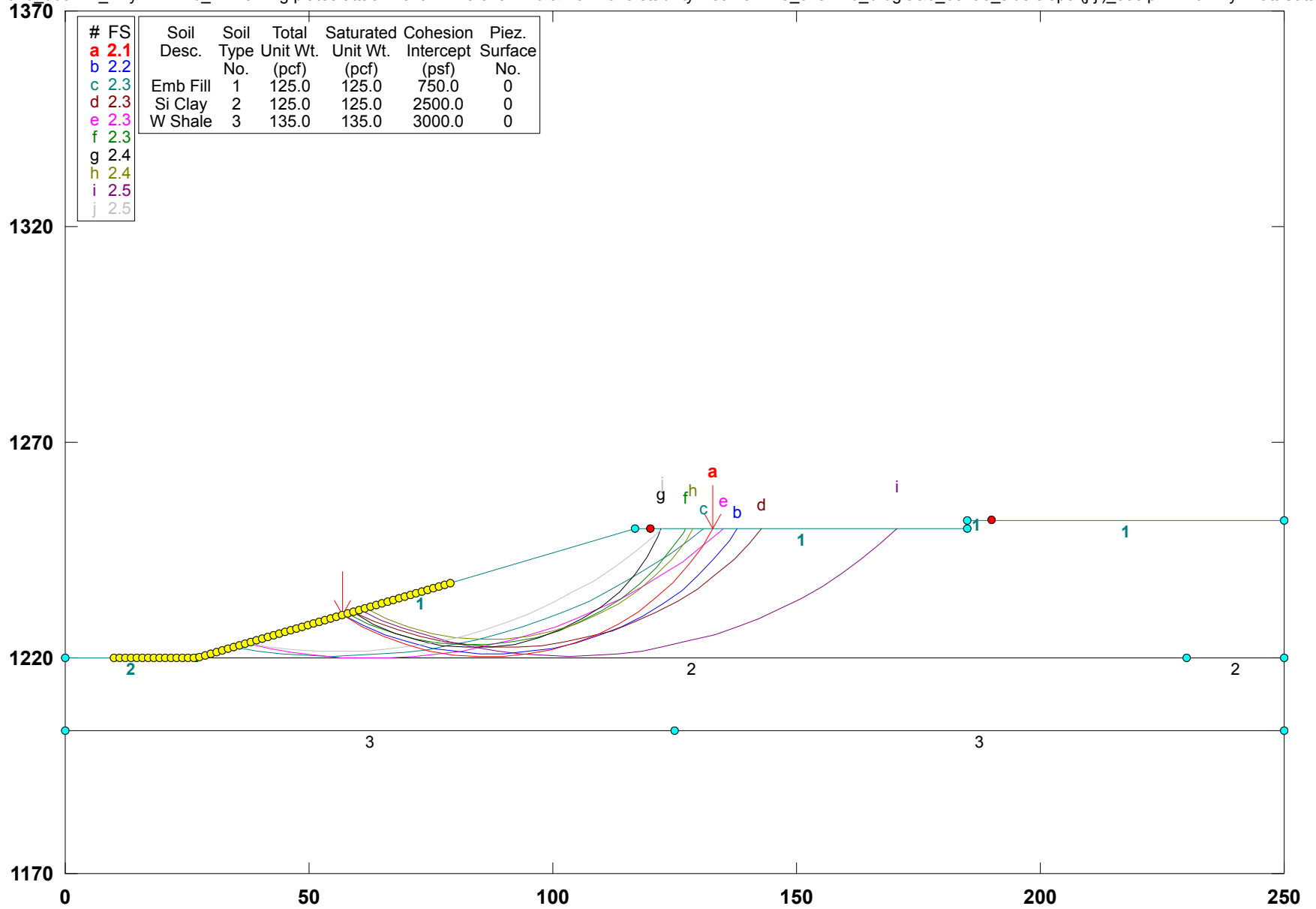
PCSTABL5M/si FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Bridges A/B - Bent 3- SideSlope (J-J') - 3H:1V - H=30' - EOC

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a&b_bent 3_side slope (j-j')_eoc.pl2 Run By: Matt Satterfield, PE

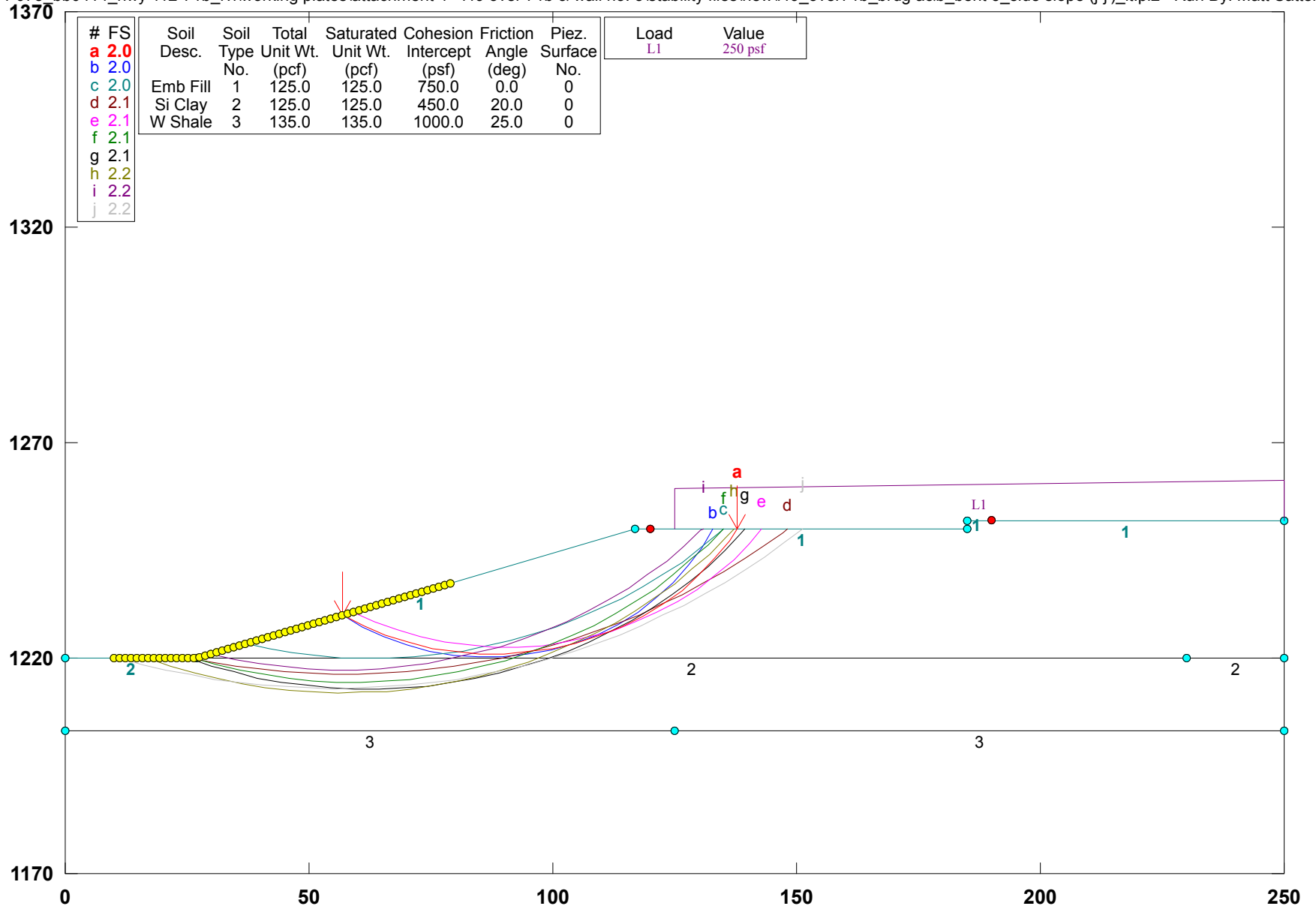


PCSTABL5M/si FSmin=2.1
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Bridges A/B - Bent 3- SideSlope (J-J') - 3H:1V - H=30' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a&b_bent 3_side slope (j-j')_lt.pl2 Run By: Matt Satterfield, PE

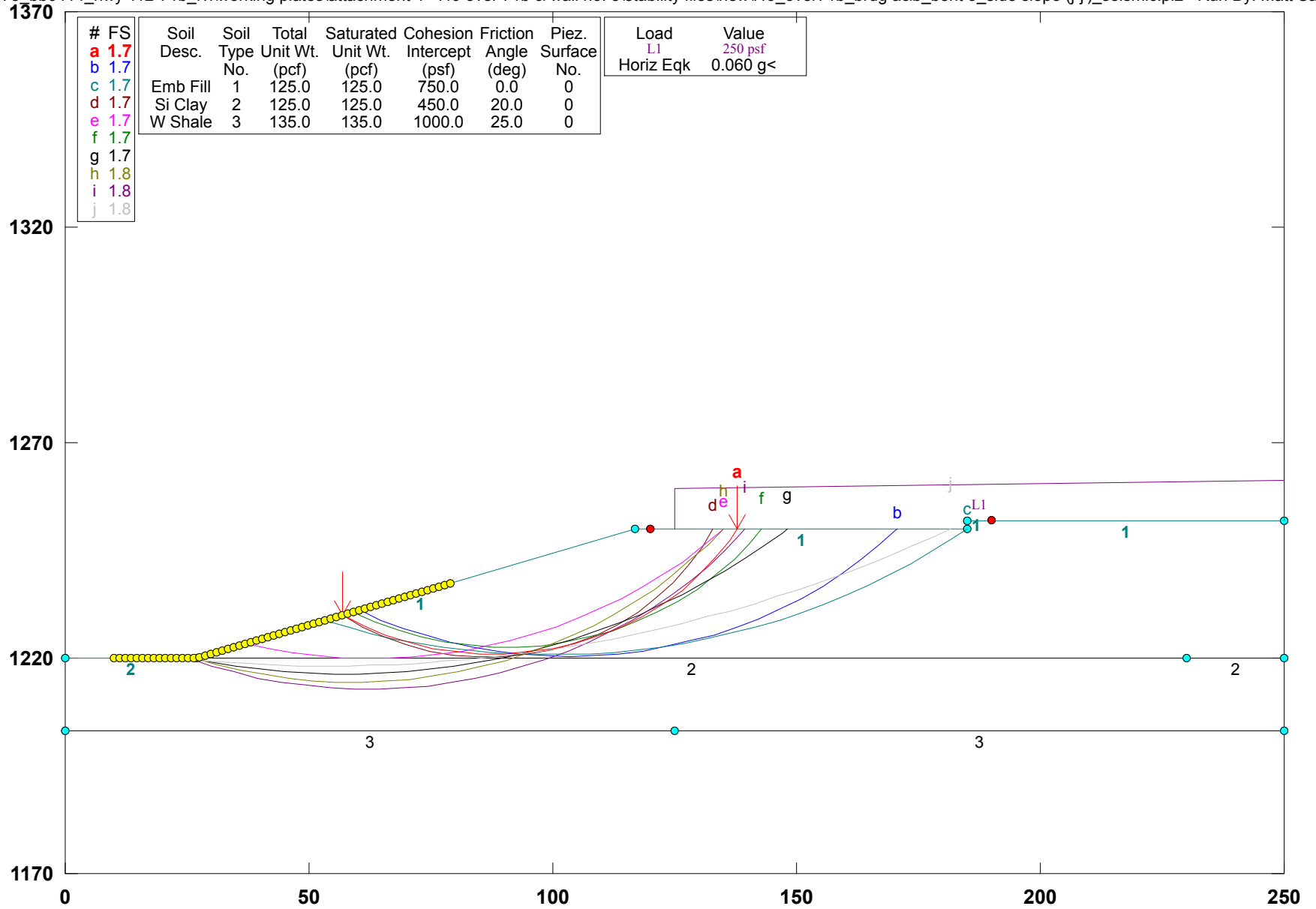


PCSTABL5M/si FSmin=2.0
 Safety Factors Are Calculated By The Modified Bishop Method



I49 Over 71B- Bridges A/B - Bent 3- SideSlope (J-J') - 3H:1V - H=30' - Seismic

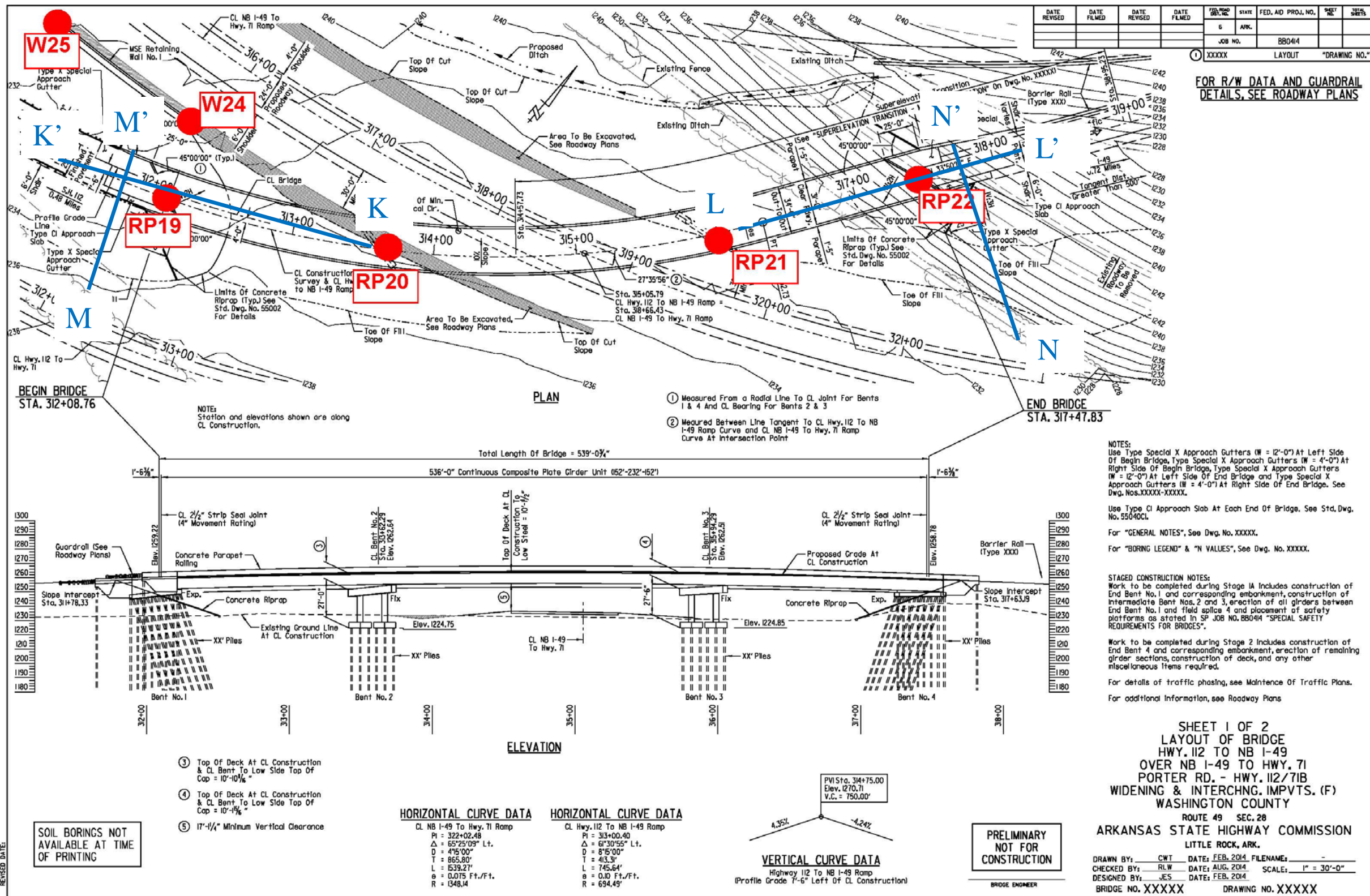
z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 4 - i49 over 71b & wall no. 5\stability files\new\i49_over71b_brdg a&b_bent 3_side slope (j-j')_seismic.pl2 Run By: Matt Satterfield, PE



PCSTABL5M/si FSmin=1.7
 Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 17



Bridge layout plan provided by Garver, LLC



**APPROXIMATE PROFILE ALIGNMENT
HIGHWAY 112 RAMP TO INTERSTATE 49 NORTHBOUND
WASHINGTON COUNTY, ARKANSAS**



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

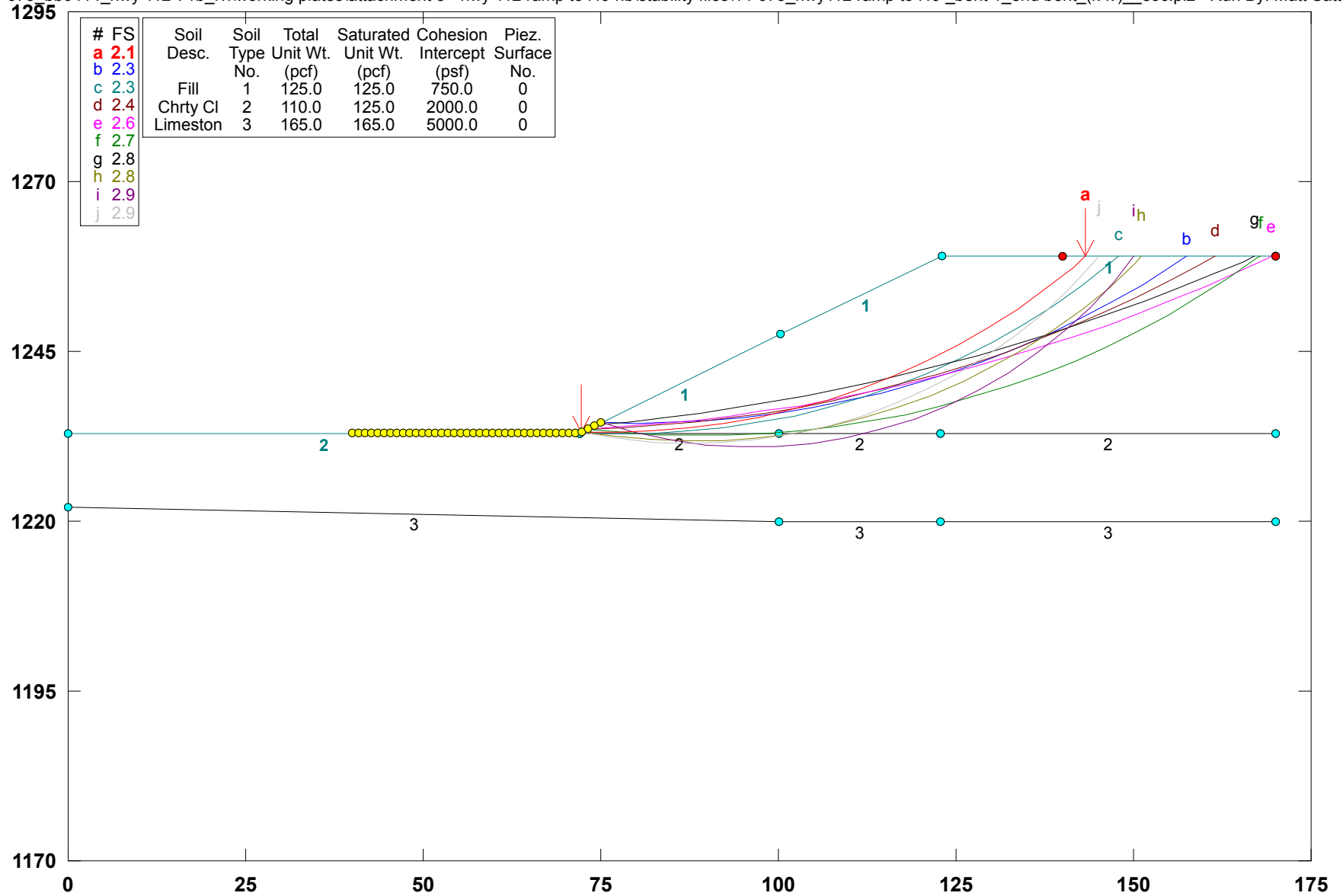
GHBW JOB NO.: 14-073

Project Facet	Project Feature	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Hwy 112 Ramp to I-49NB	Bent 1 End Slope	K-K'	End of Construction	2.1
			Long Term	1.6
			Seismic*	1.4
	Bent 1 Side Slope	L-L'	End of Construction	3.4
			Long Term	1.7
			Seismic*	1.5
	Bent 3 End Slope	M-M'	End of Construction	2.5
			Long Term	1.9
			Seismic*	1.6
	Bent 3 Side Slope	N-N'	End of Construction	3.8
			Long Term	2.1
			Seismic*	1.8

*Kh = 1.0*As for Simple Slope and 0.5*As for Retaining Walls

Hwy 112 Ramp to I49 - Bent 1 - End Slope(K-K')- 2H:1V - H=26' - End of Construct

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49 _bent 1_end bent_(k-k')__eoc.pl2 Run By: Matt Satterfield, PE

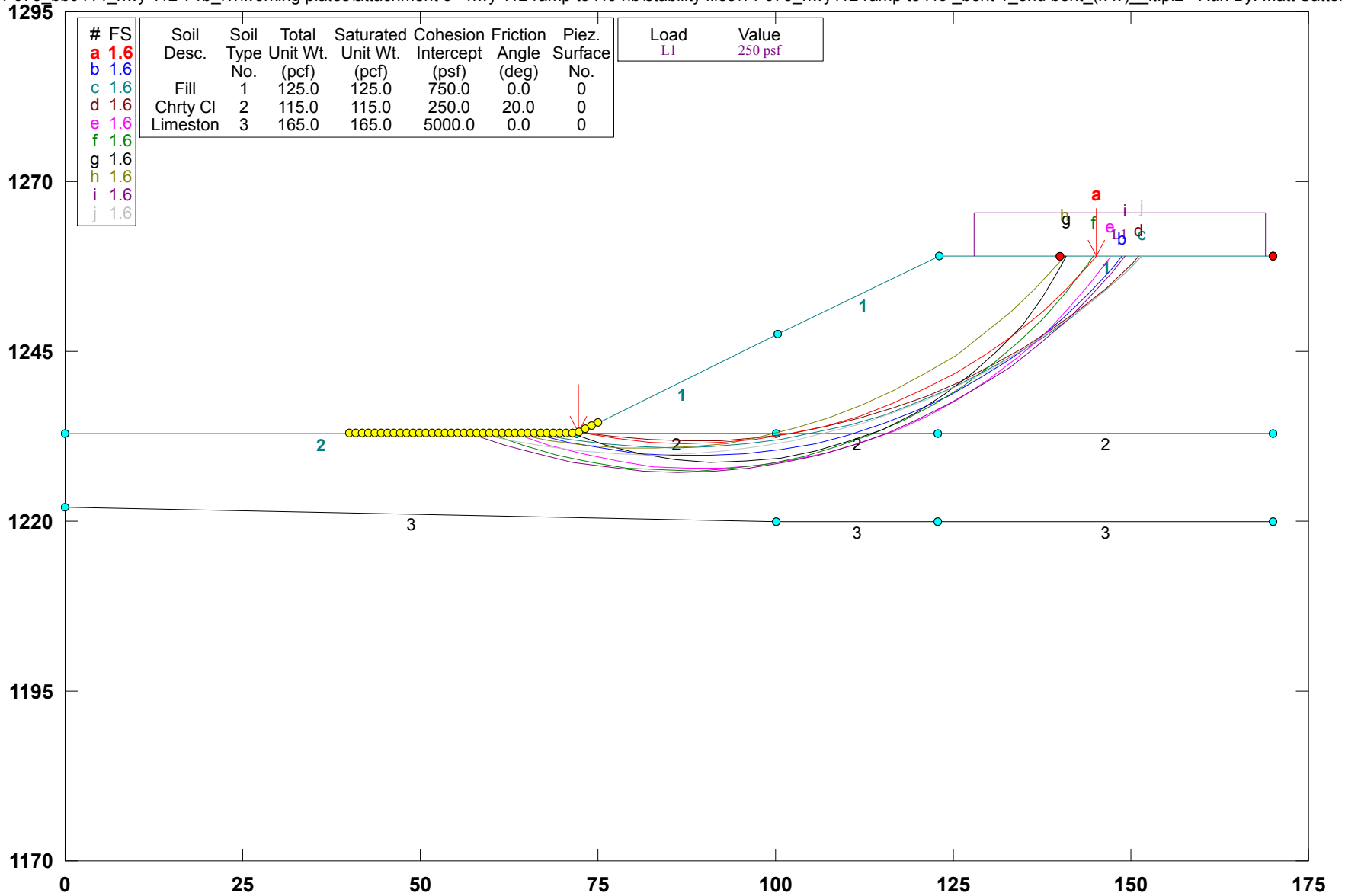


PCSTABL5M/si FSmin=2.1
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 1 - End Slope(K-K') - 2H:1V - H=26' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachement 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 1_end bent_(k-k')_lt.pl2 Run By: Matt Satterfield, PE

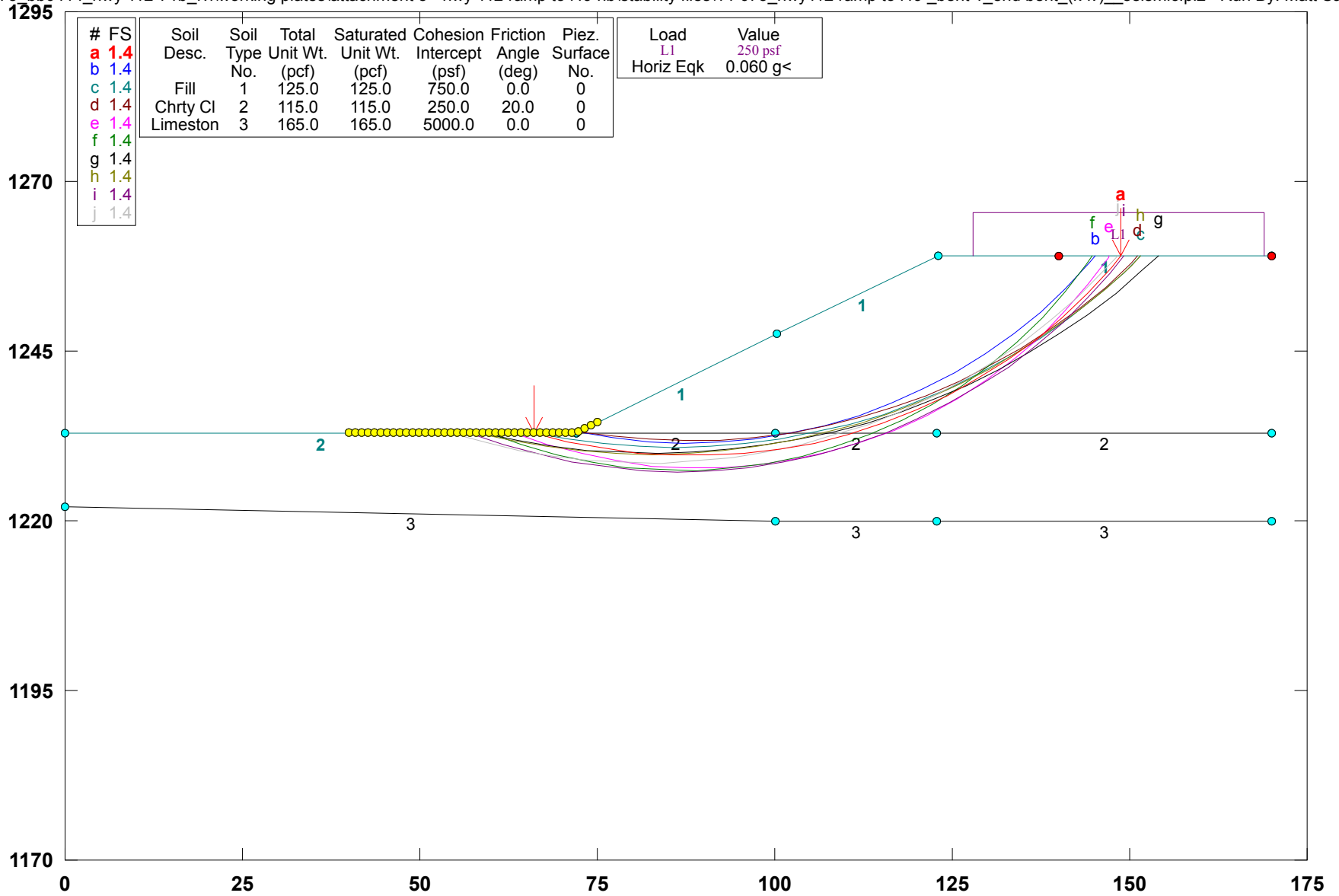


PCSTABL5M/si FSmin=1.6
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 1 - End Slope(K-K') - 2H:1V - H=26' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 1_end bent_(k-k')_seismic.pl2 Run By: Matt Satterfield, PE

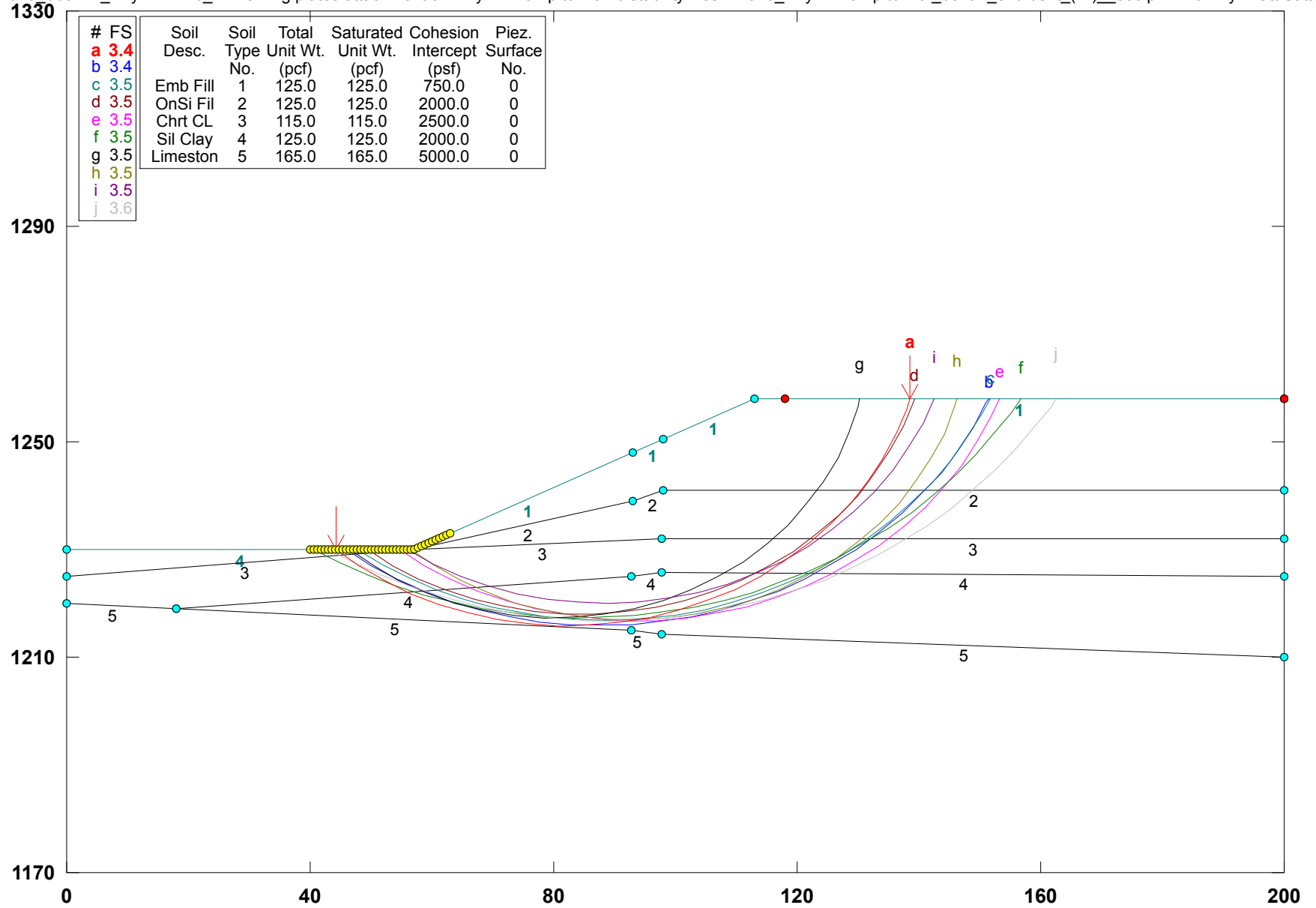


PCSTABL5M/si FSmin=1.4
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 - End Slope(L-L') - 2H:1V - H=28' - End of Const

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49 _bent 4_end bent_(l-l')_eoc.pl2 Run By: Matt Satterfield, PE

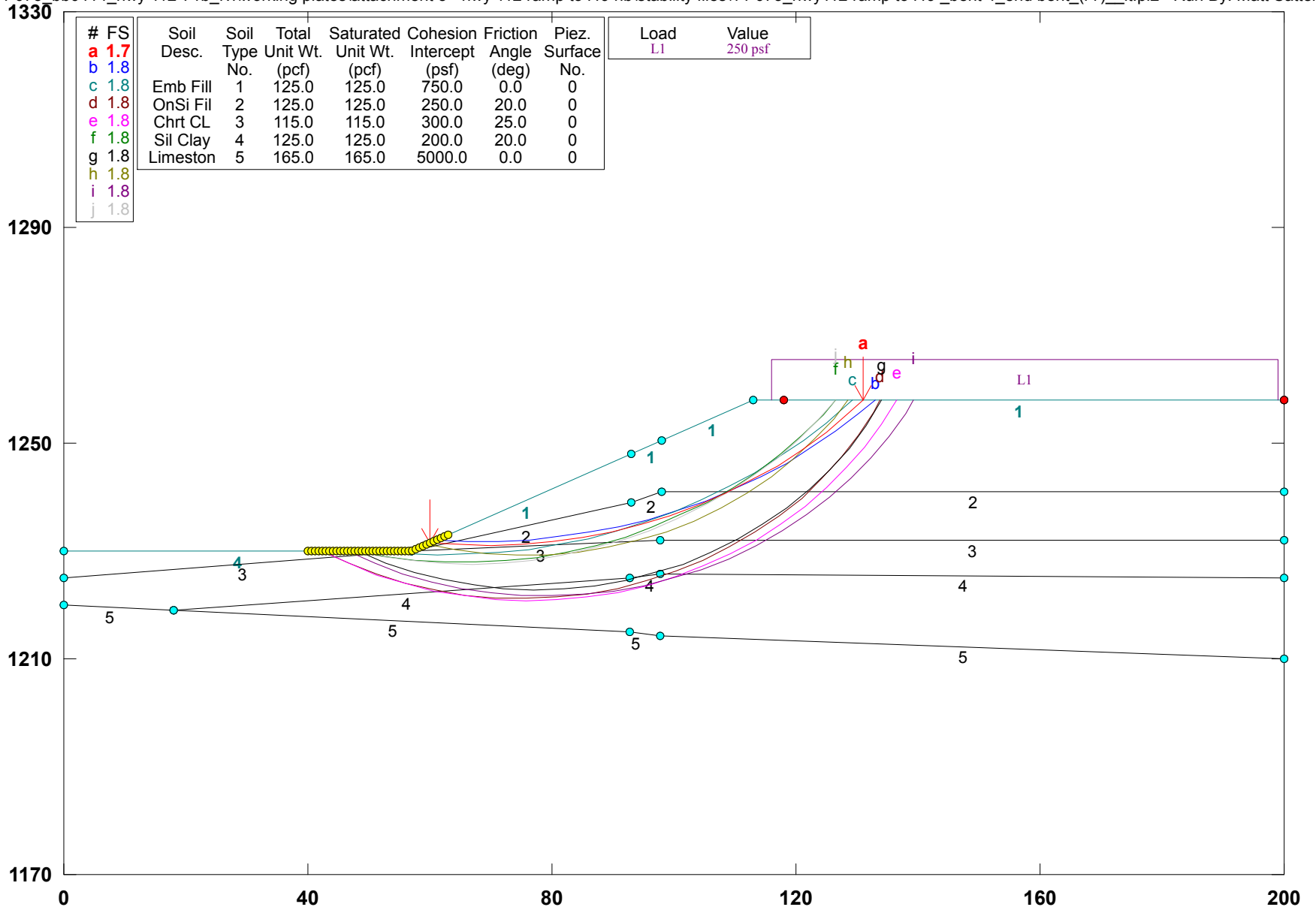


PCSTABL5M/si FSmin=3.4
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 - End Slope(L-L') - 2H:1V - H=28' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 4_end bent_(L-L')_lt.pl2 Run By: Matt Satterfield, PE

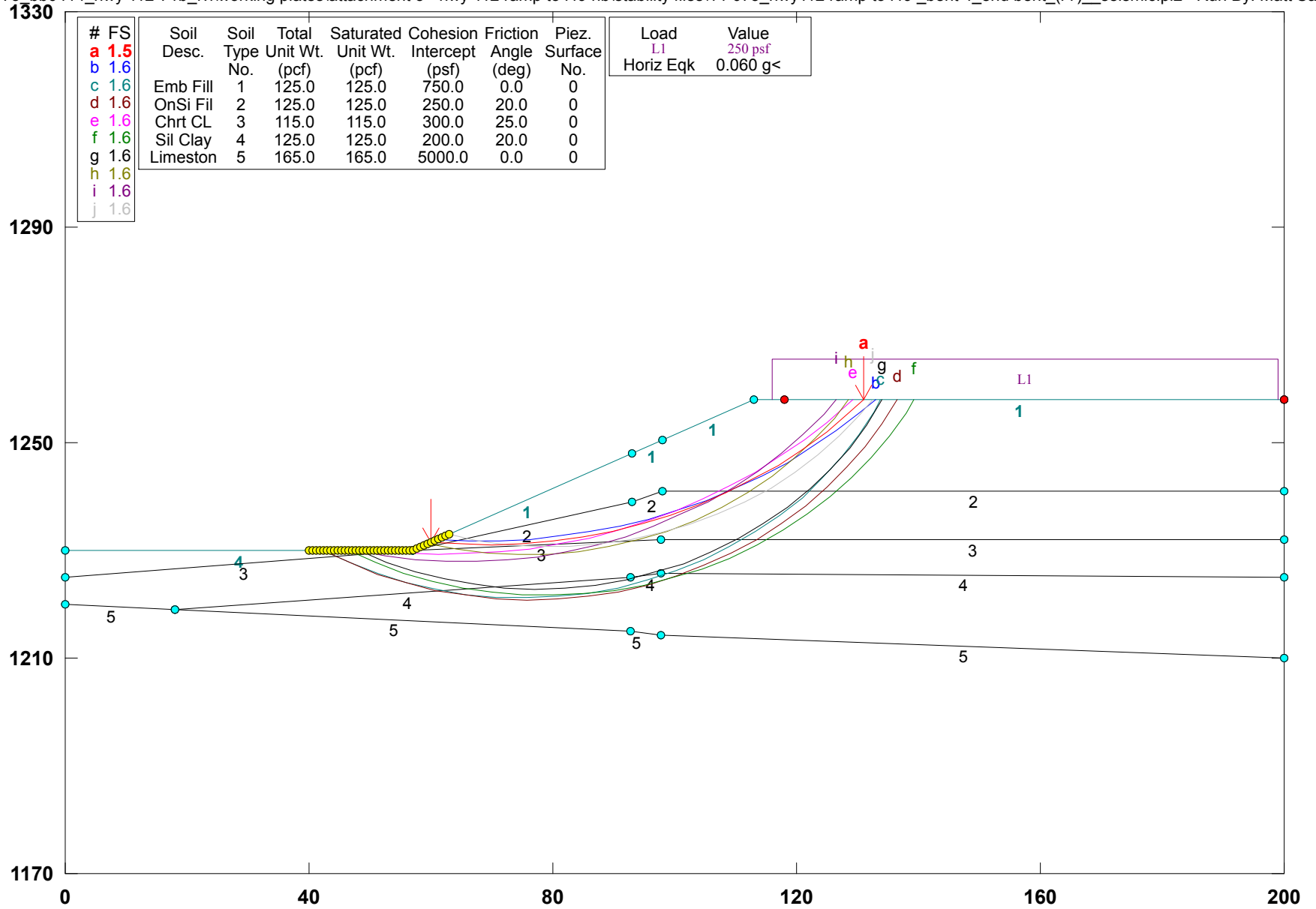


PCSTABL5M/si FSmin=1.7
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 - End Slope(L-L') - 2H:1V - H=28' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 4_end bent_(l-l')_seismic.pl2 Run By: Matt Satterfield, PE

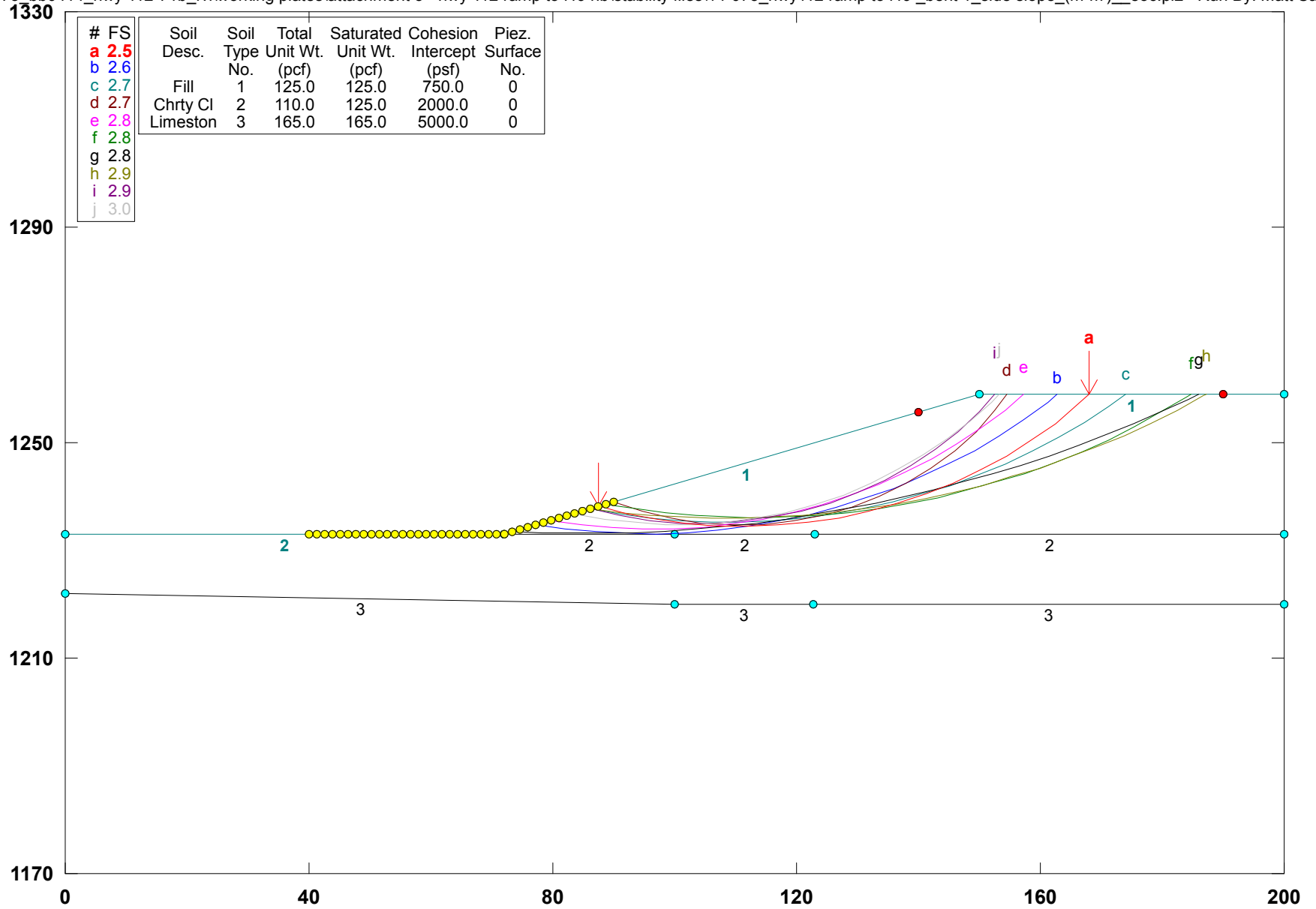


PCSTABL5M/si FSmin=1.5
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 1 -Side Slope(M-M')- 3H:1V - H=26' - End of Construct

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 1_side slope_(m-m')_eoc.pl2 Run By: Matt Satterfield, PE

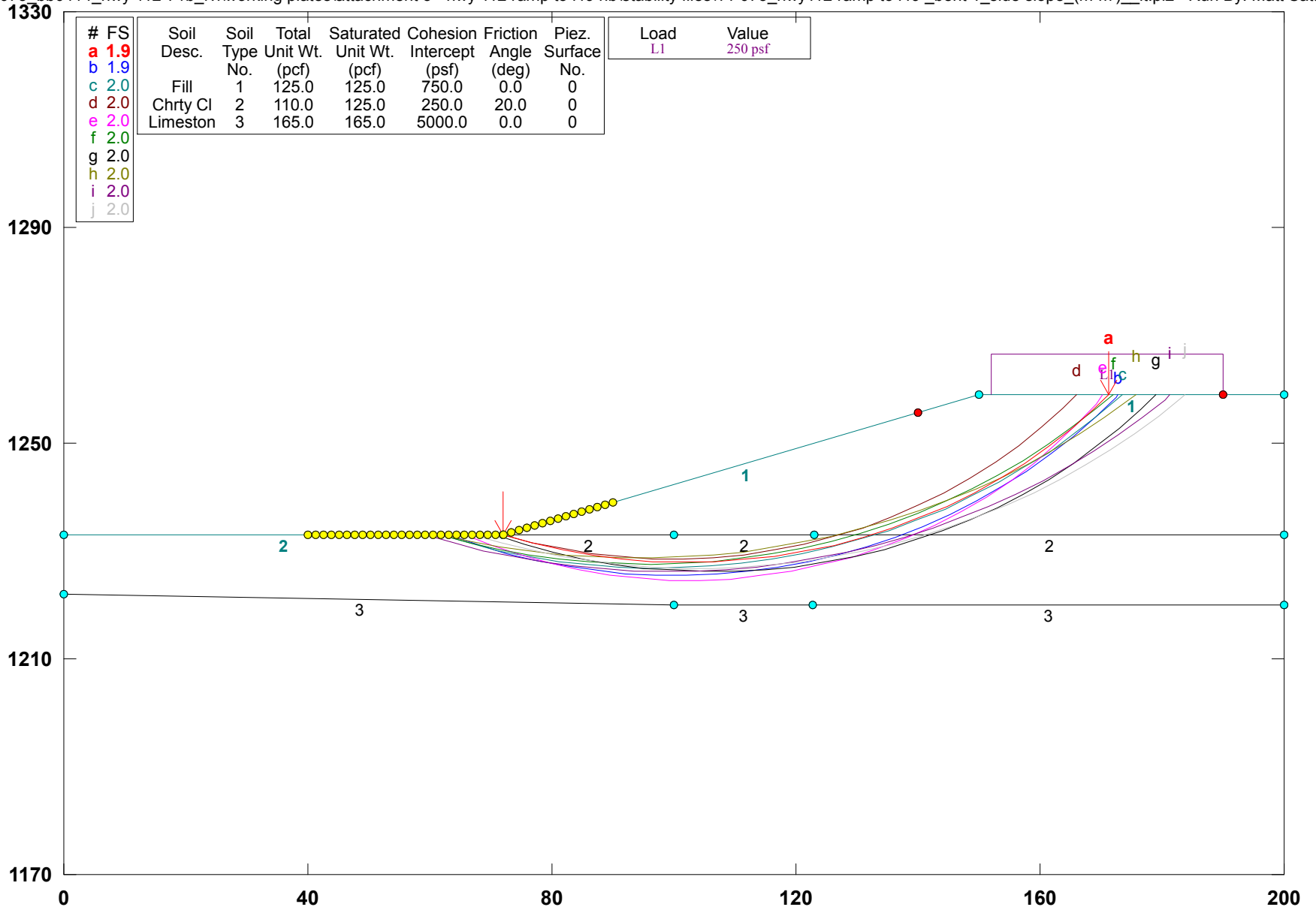


PCSTABL5M/si FSmin=2.5
 Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 1 -Side Slope(M-M')- 3H:1V - H=26' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 1_side slope_(m-m')_lt.pl2 Run By: Matt Satterfield, PE



# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.	Load	Value
a 1.9								LI	250 psf
b 1.9									
c 2.0	Fill	1	125.0	125.0	750.0	0.0	0		
d 2.0	Chrty Cl	2	110.0	125.0	250.0	20.0	0		
e 2.0	Limeston	3	165.0	165.0	5000.0	0.0	0		
f 2.0									
g 2.0									
h 2.0									
i 2.0									
j 2.0									

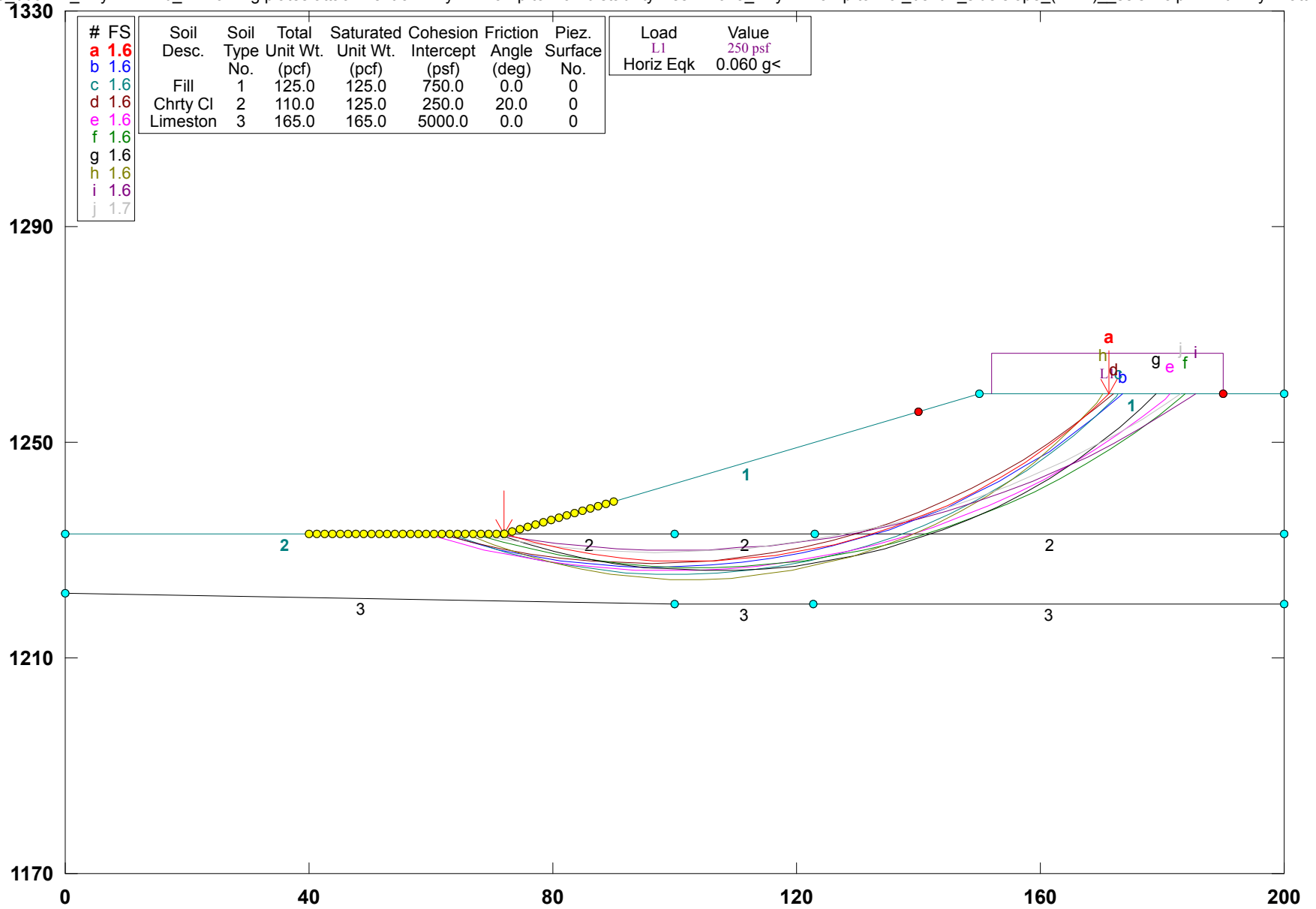
PCSTABL5M/si FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 1 -Side Slope(M-M')- 3H:1V - H=26' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49 _bent 1_side slope_(m-m')_seismic.pl2 Run By: Matt Satterfield, P



PCSTABL5M/si FSmin=1.6

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 -Side Slope(N-N') - 3H:1V - H=28' - End of Const

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49 _bent 4_side slope_(n-n')_eoc.pl2 Run By: Matt Satterfield, PE

1330

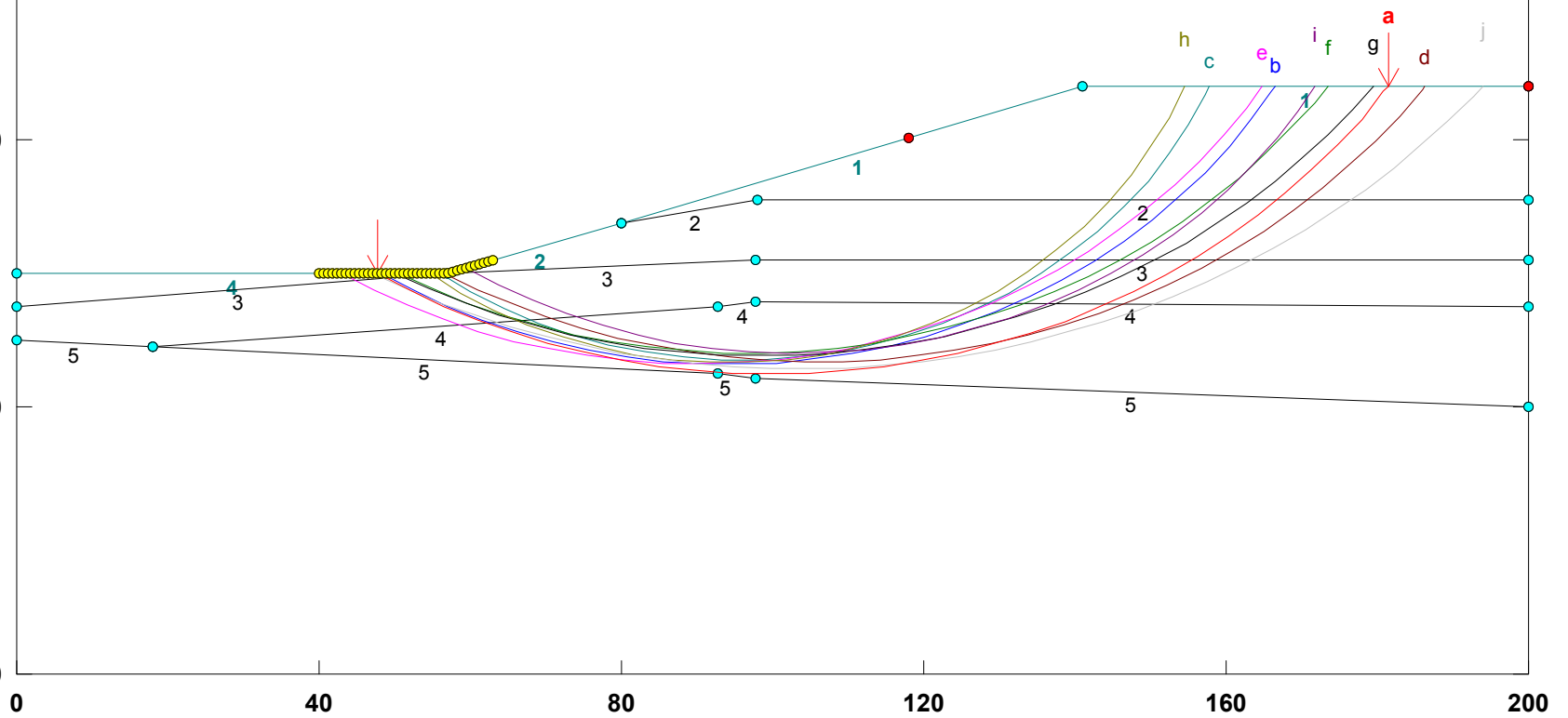
# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Piez. Surface No.
a 3.8						
b 3.9						
c 4.0	Emb Fill	1	125.0	125.0	750.0	0
d 4.0	OnSi Fil	2	125.0	125.0	2000.0	0
e 4.0	Chrt CL	3	115.0	115.0	2500.0	0
f 4.0	Sil Clay	4	125.0	125.0	2000.0	0
g 4.0	Limeston	5	165.0	165.0	5000.0	0
h 4.0						
i 4.0						
j 4.0						

1290

1250

1210

1170



PCSTABL5M/si FSmin=3.8

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 -Side Slope(N-N') - 3H:1V - H=28' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 4_side slope_(n-n')_lt.pl2 Run By: Matt Satterfield, PE

1330

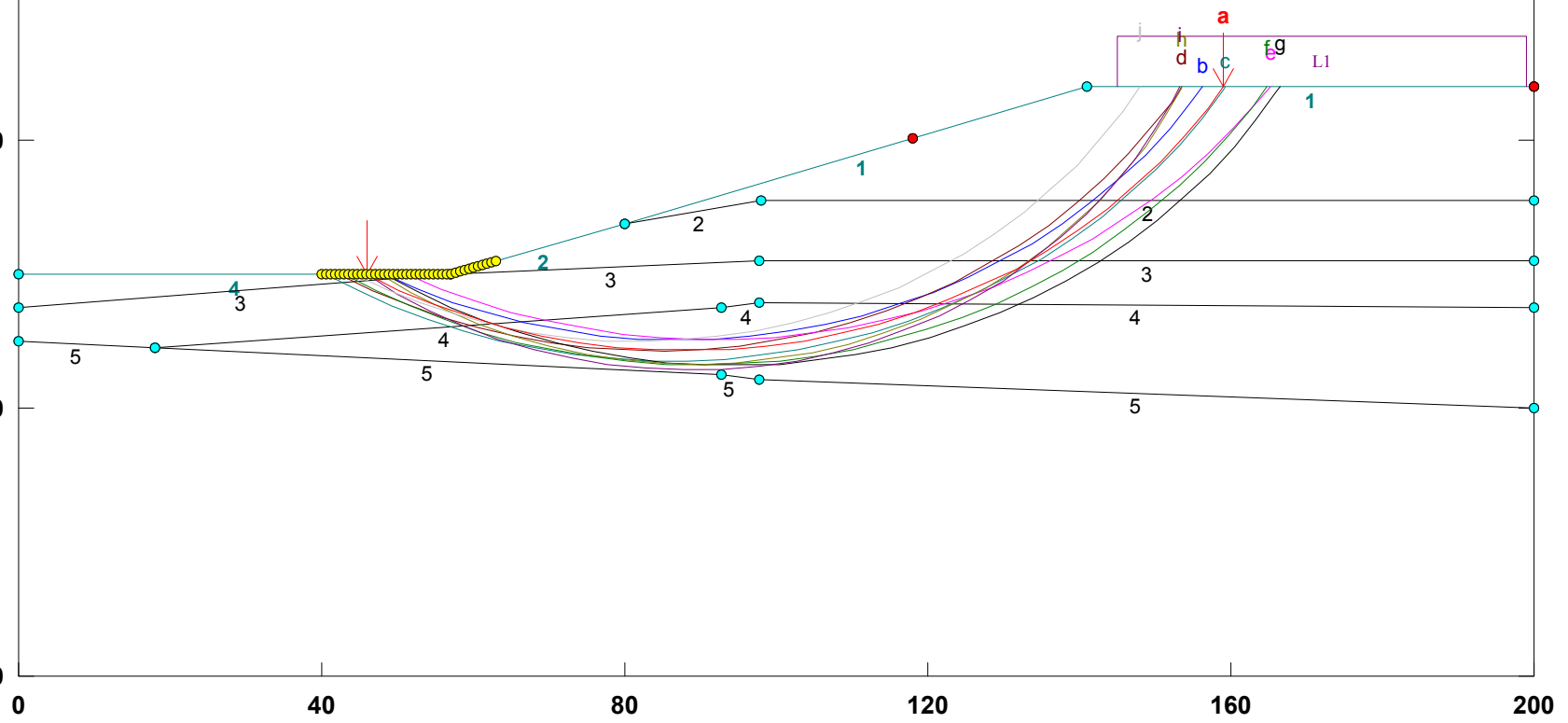
#	FS	Soil Desc.	Soil Type	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.	Load	Value
a	2.1								L1	250 psf
b	2.1									
c	2.1	Emb Fill	1	125.0	125.0	750.0	0.0	0		
d	2.1	OnSi Fil	2	125.0	125.0	250.0	20.0	0		
e	2.1	Chrt CL	3	115.0	115.0	300.0	25.0	0		
f	2.2	Sil Clay	4	125.0	125.0	200.0	20.0	0		
g	2.2	Limeston	5	165.0	165.0	5000.0	0.0	0		
h	2.2									
i	2.2									
j	2.2									

1290

1250

1210

1170



PCSTABL5M/si FSmin=2.1

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 112 Ramp to I49 - Bent 4 -Side Slope(N-N') - 3H:1V - H=28' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 5 - hwy 112 ramp to i49 nb\stability files\14-073_hwy112 ramp to i49_bent 4_side slope_(n-n')_seismic.pl2 Run By: Matt Satterfield, PE

1330

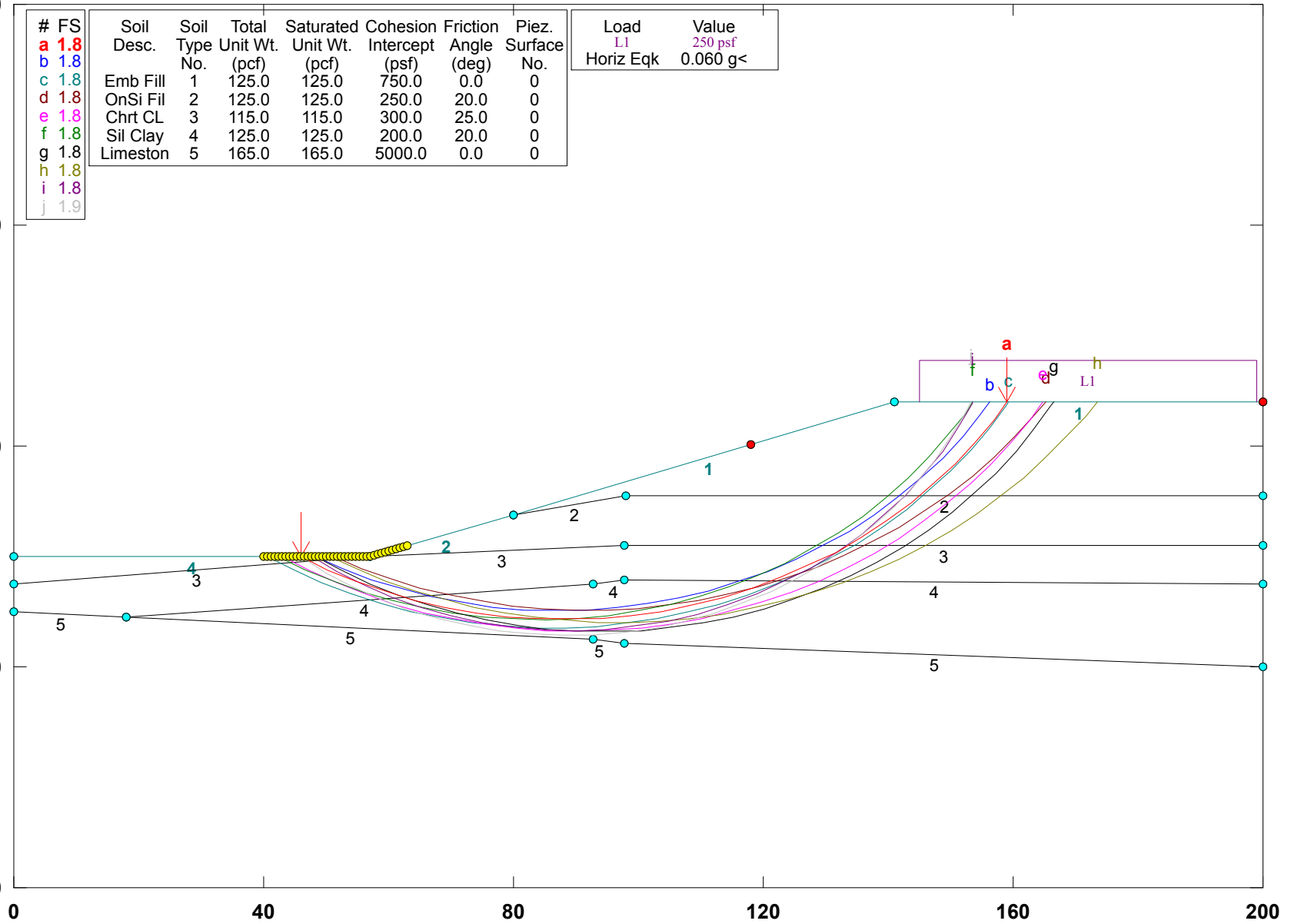
# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.	Load	Value
a 1.8								LI	250 psf
b 1.8								Horiz Eqk	0.060 g<
c 1.8	Emb Fill	1	125.0	125.0	750.0	0.0	0		
d 1.8	OnSi Fil	2	125.0	125.0	250.0	20.0	0		
e 1.8	Chrt CL	3	115.0	115.0	300.0	25.0	0		
f 1.8	Sil Clay	4	125.0	125.0	200.0	20.0	0		
g 1.8	Limeston	5	165.0	165.0	5000.0	0.0	0		
h 1.8									
i 1.8									
j 1.9									

1290

1250

1210

1170



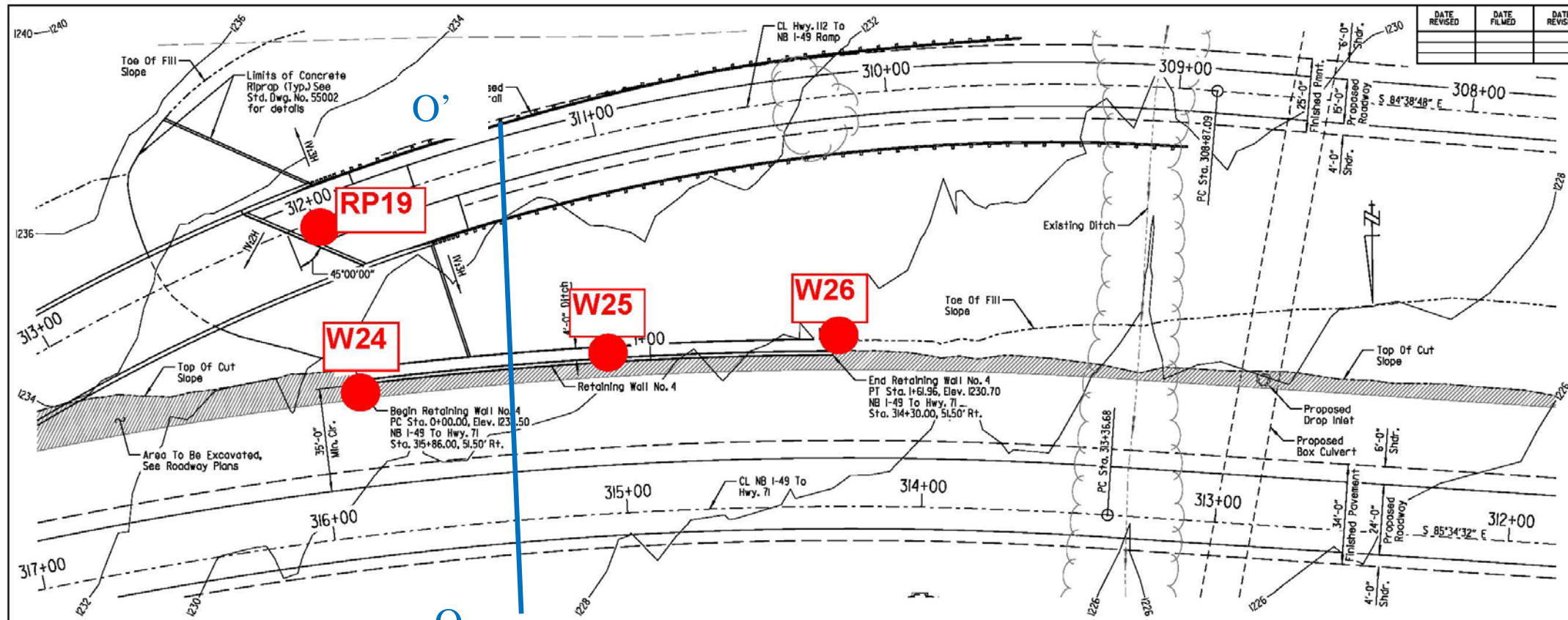
PCSTABL5M/si FSmin=1.8

Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 18

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.	B80414		
				JOB NO. B80414				
				RETAINING WALL DETAILS "DRAWING NO."				

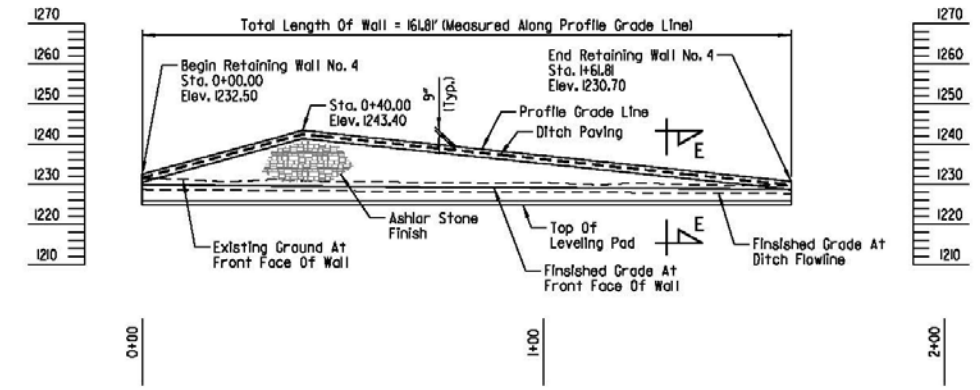


FOR R/W DATA, SEE ROADWAY PLANS

HORIZONTAL CURVE DATA

Retaining Wall No. 4
 PI = 0+81.07
 Δ = 6°37'48" Rt.
 D = 4°05'87"
 T = 81.07'
 L = 161.36'
 R = 1399.64'

PLAN - RETAINING WALL NO. 4



ELEVATION - RETAINING WALL NO. 4
Looking At Front Face

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

NOTES:
 For "GENERAL NOTES" & "SECTION E-E", See Dwg. No. XXXXX & XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 4 are measured from CL NB I-49 To Hwy. 71 Ramp to Profile Grade Line at top of front face of coping.
 Elevations shown are at Profile Grade Line at top of front face of coping. For elevations along retaining wall, see "TABLE OF WALL ELEVATIONS" On Dwg. No. XXXXX.

PRELIMINARY NOT FOR CONSTRUCTION

LEGEND
 U.N.O. = Unless Noted Otherwise

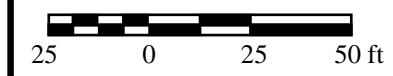
SHEET 4 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: CWT DATE: FEB. 2014 FILENAME: _____
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 20'-0"
 DESIGNED BY: JES DATE: FEB. 2014
 BRIDGE NO. _____ DRAWING NO. XXXXX

8/29/2014 3:37:58 PM
 WORKSPACE: MTD Bridge
 \\htr001\projects\2014\07707 - I-540 Widening & Interchange Improvement\Drawings\I-540-RTWALL-S04-L0.dgn
 REVISION DATE:

MSE wall layout plan provided by Garver, LLC



APPROXIMATE PROFILE ALIGNMENT
 MSE WALL NO. 4
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

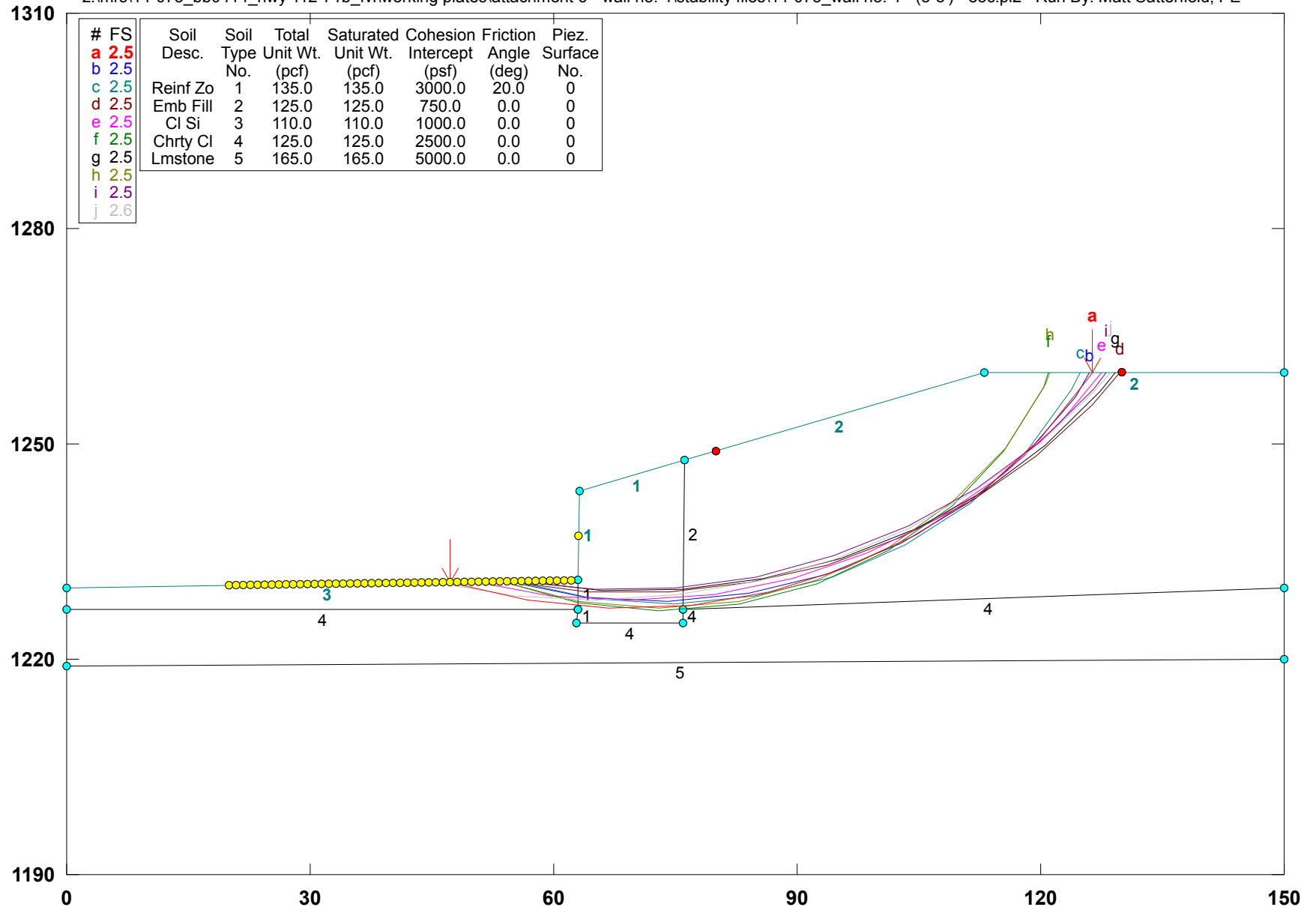
GHBW JOB NO.: 14-073

Project Facet	Approximate Location	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
MSE Wall No. 4	Sta 0+40	O-O'	End of Construction	2.5
			Long Term	1.7
			Seismic*	1.5

* $K_h = 1.0 * A_s$ for Simple Slope and $0.5 * A_s$ for Retaining Walls

BB0414: Retaining Wall No 4: Sta 0+40 - (O-O') - H=22' - End of Const.

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 6 - wall no. 4\stability files\14-073_wall no. 4 - (o-o') - eoc.pl2 Run By: Matt Satterfield, PE

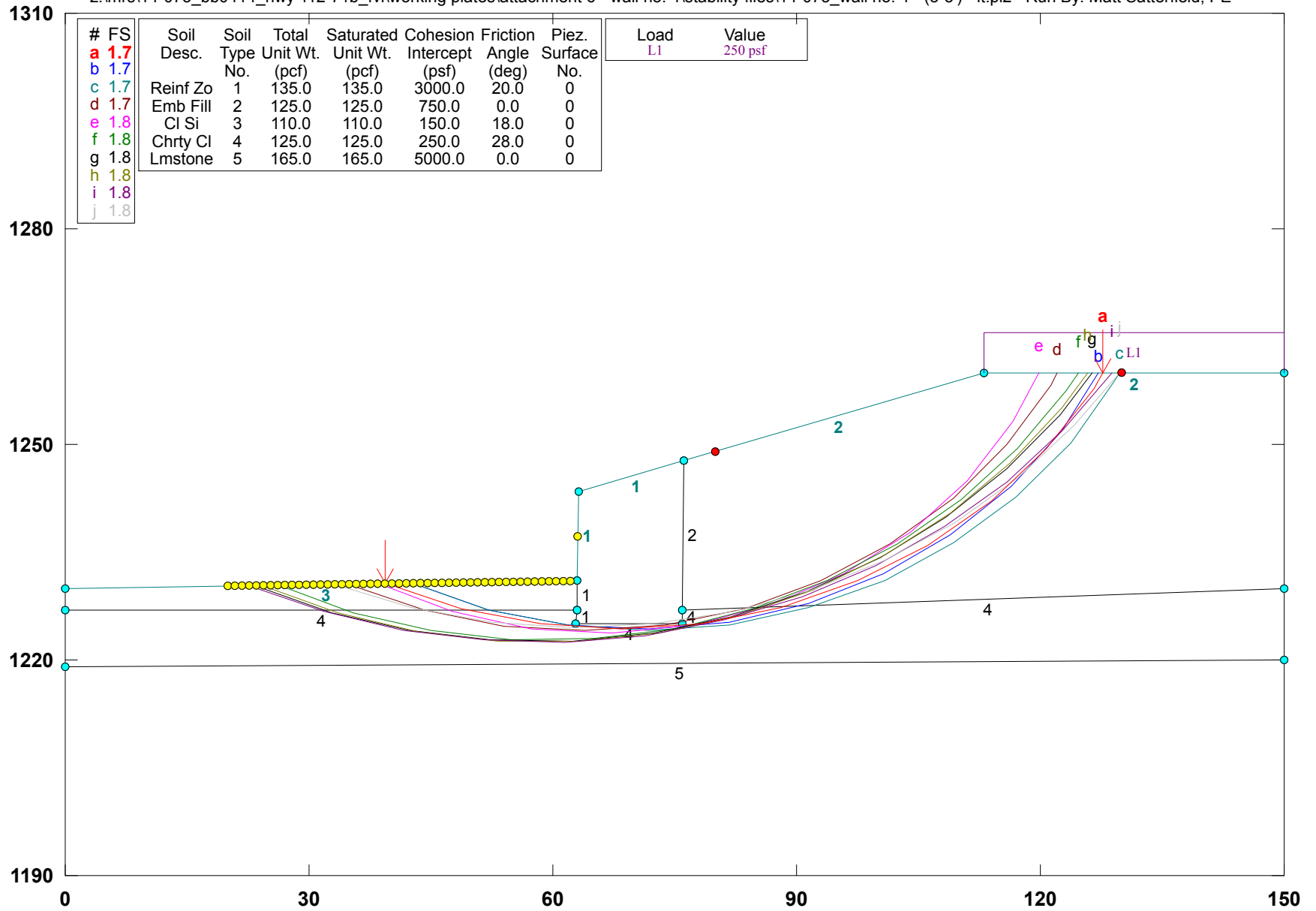


PCSTABL5M/si FSmin=2.5
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No 4: Sta 0+40 - (O-O') - H=22' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 6 - wall no. 4\stability files\14-073_wall no. 4 - (o-o') - lt.pl2 Run By: Matt Satterfield, PE



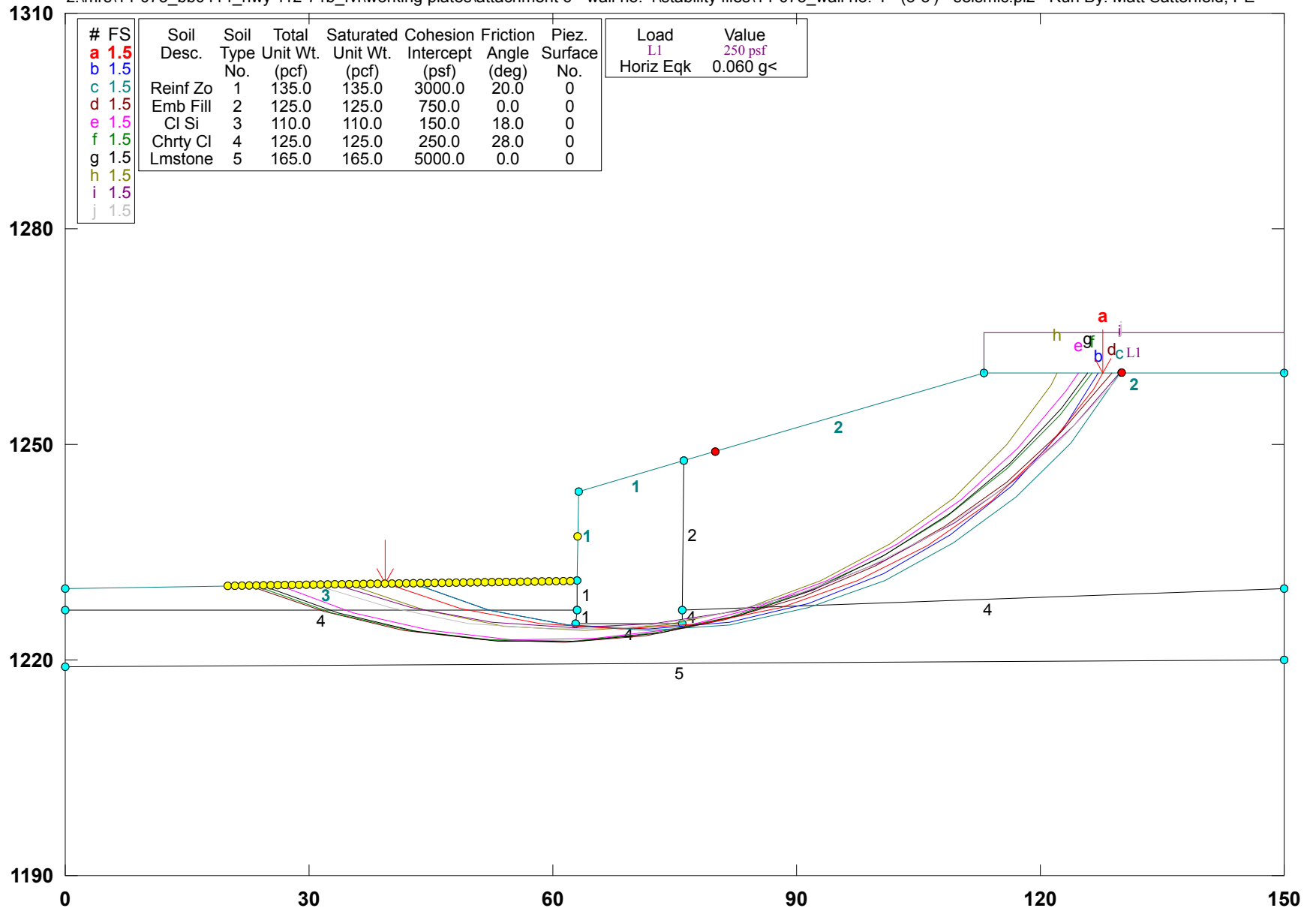
# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.	Load	Value
a 1.7								L1	250 psf
b 1.7									
c 1.7	Reinf Zo	1	135.0	135.0	3000.0	20.0	0		
d 1.7	Emb Fill	2	125.0	125.0	750.0	0.0	0		
e 1.8	Cl Si	3	110.0	110.0	150.0	18.0	0		
f 1.8	Chrtly Cl	4	125.0	125.0	250.0	28.0	0		
g 1.8	Lmstone	5	165.0	165.0	5000.0	0.0	0		
h 1.8									
i 1.8									
j 1.8									

PCSTABL5M/si FSmin=1.7
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No 4: Sta 0+40 - (O-O') - H=22' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 6 - wall no. 4\stability files\14-073_wall no. 4 - (o-o') - seismic.pl2 Run By: Matt Satterfield, PE



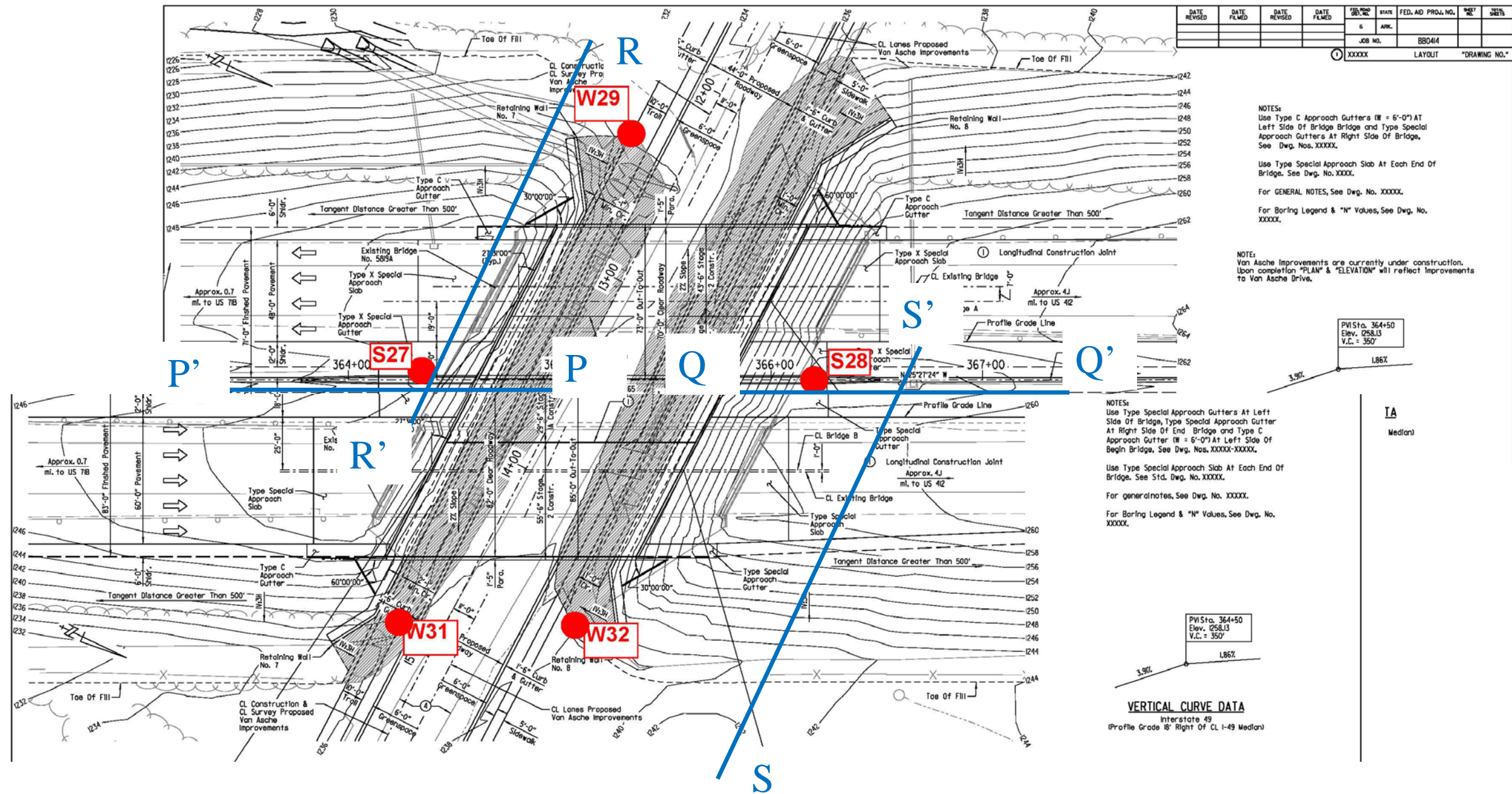
# FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a 1.5	Reinf Zo	1	135.0	135.0	3000.0	20.0	0
b 1.5	Emb Fill	2	125.0	125.0	750.0	0.0	0
c 1.5	Cl Si	3	110.0	110.0	150.0	18.0	0
d 1.5	Chrtly Cl	4	125.0	125.0	250.0	28.0	0
e 1.5	Lmstone	5	165.0	165.0	5000.0	0.0	0
f 1.5							
g 1.5							
h 1.5							
i 1.5							
j 1.5							

Load	Value
LI	250 psf
Horiz Eqk	0.060 g<

PCSTABL5M/si FSmin=1.5
Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 19



Bridge layout planS provided by Garver, LLC



**APPROXIMATE PROFILE ALIGNMENT
 INTERSTATE 49 OVER VAN ASCHE DRIVE
 WASHINGTON COUNTY, ARKANSAS**



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

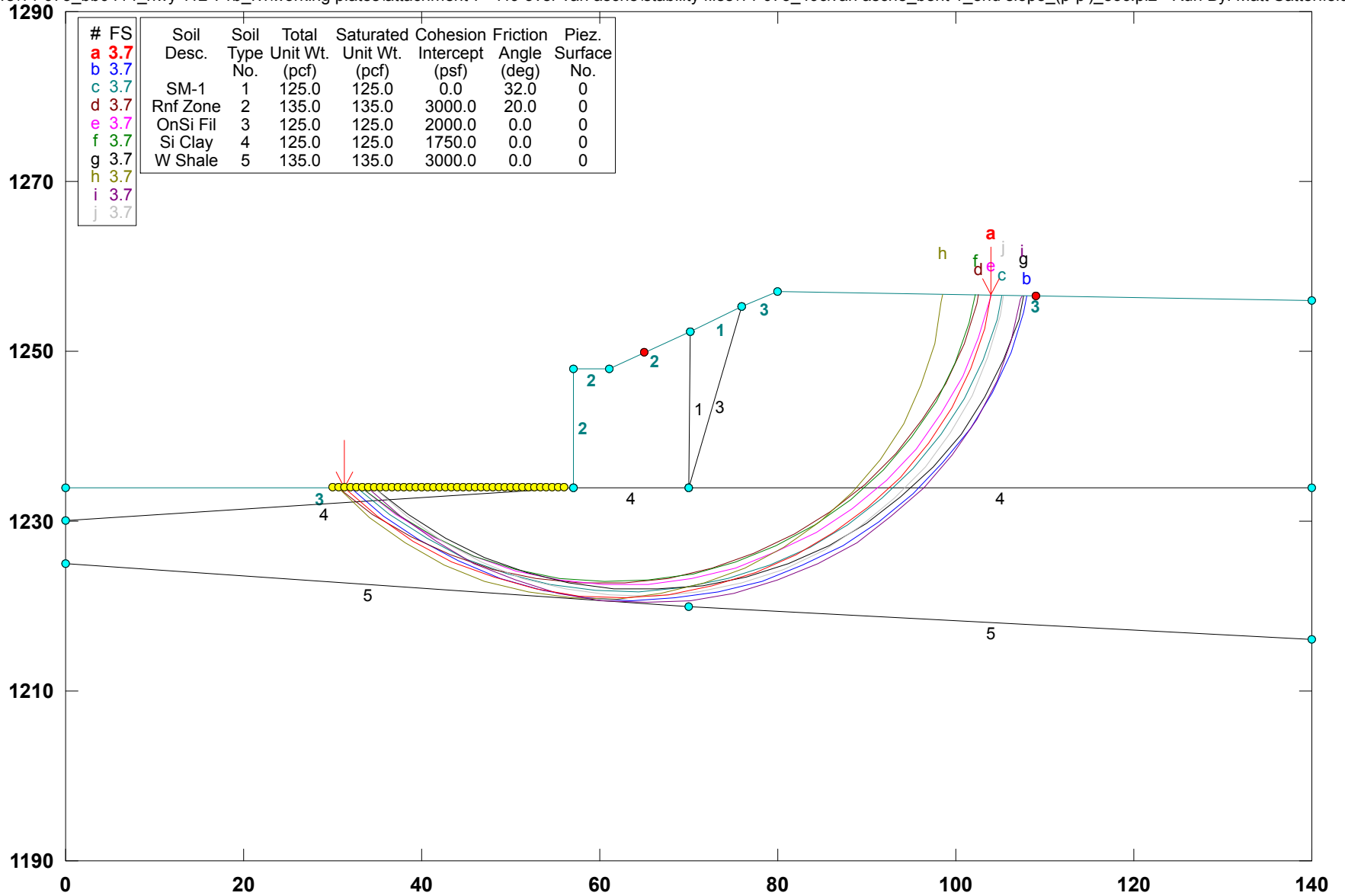
GHBW JOB NO.: 14-073

Project Facet	Project Feature	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
I-49 over Van Asche Drive	Bent 1 End Slope (MSE Wall No. 7)	P-P'	End of Construction	3.7
			Long Term	1.5
			Seismic*	1.3
	Bent 2 End Slope (MSE Wall No. 8)	Q-Q'	End of Construction	3.1
			Long Term	1.5
			Seismic*	1.5
	Bent 1 Side Slope	R-R'	End of Construction	5.5
			Long Term	2.4
			Seismic*	1.9
	Bent 3 Side Slope	S-S'	End of Construction	4.4
			Long Term	2.1
			Seismic*	1.7

*Kh = 1.0*As for Simple Slope and 0.5*As for Retaining Walls

I 49 over Van Asche- Bent 1- End Slope (P-P') - H=22' - End of Construct

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_end slope_(p-p')_eoc.pl2 Run By: Matt Satterfield, PE

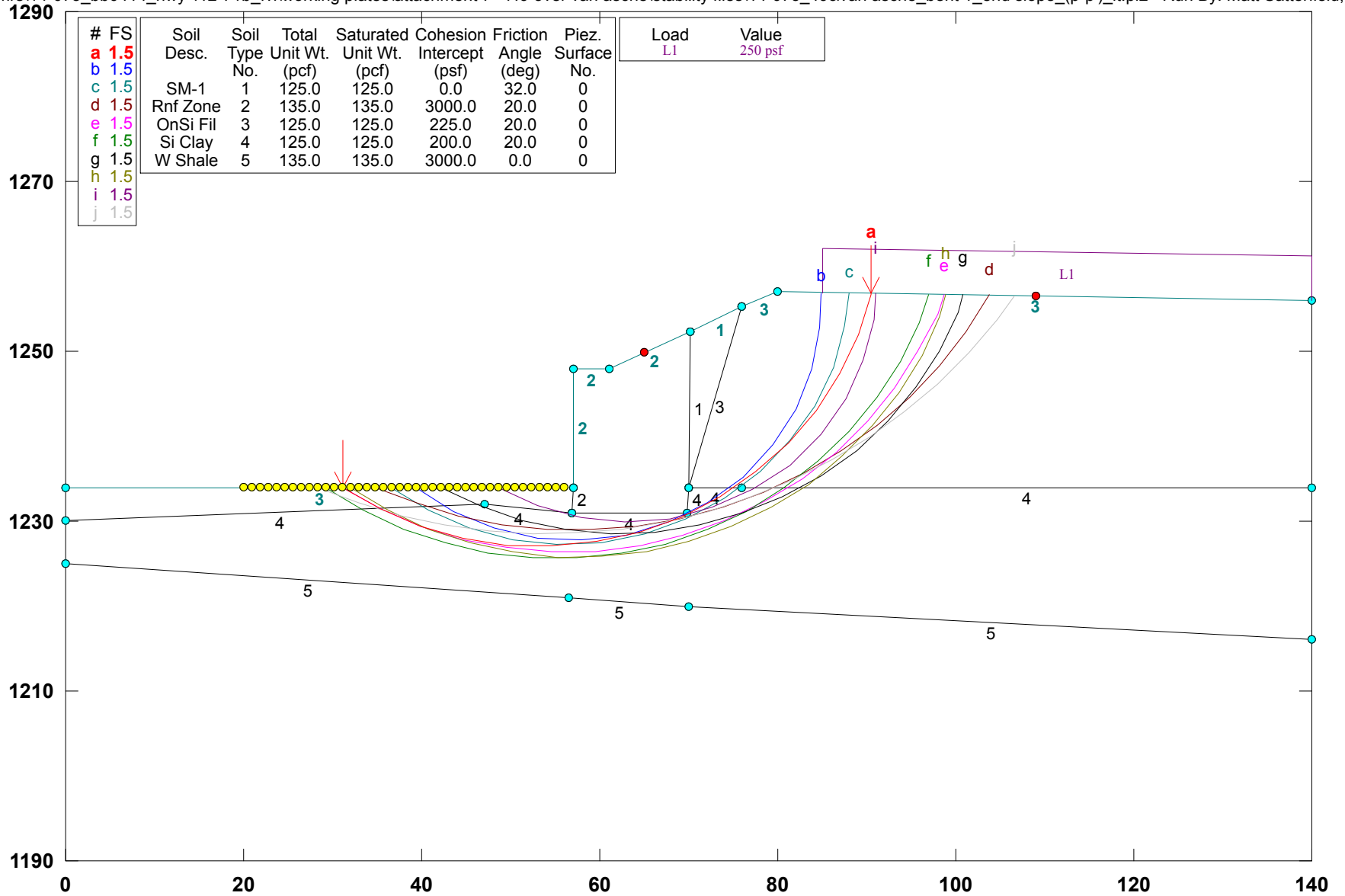


PCSTABL5M/si FSmin=3.7
 Safety Factors Are Calculated By The Modified Bishop Method



I 49 over Van Asche- Bent 1- End Slope (P-P') - H=22' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_end slope_(p-p')_lt.pl2 Run By: Matt Satterfield, PE

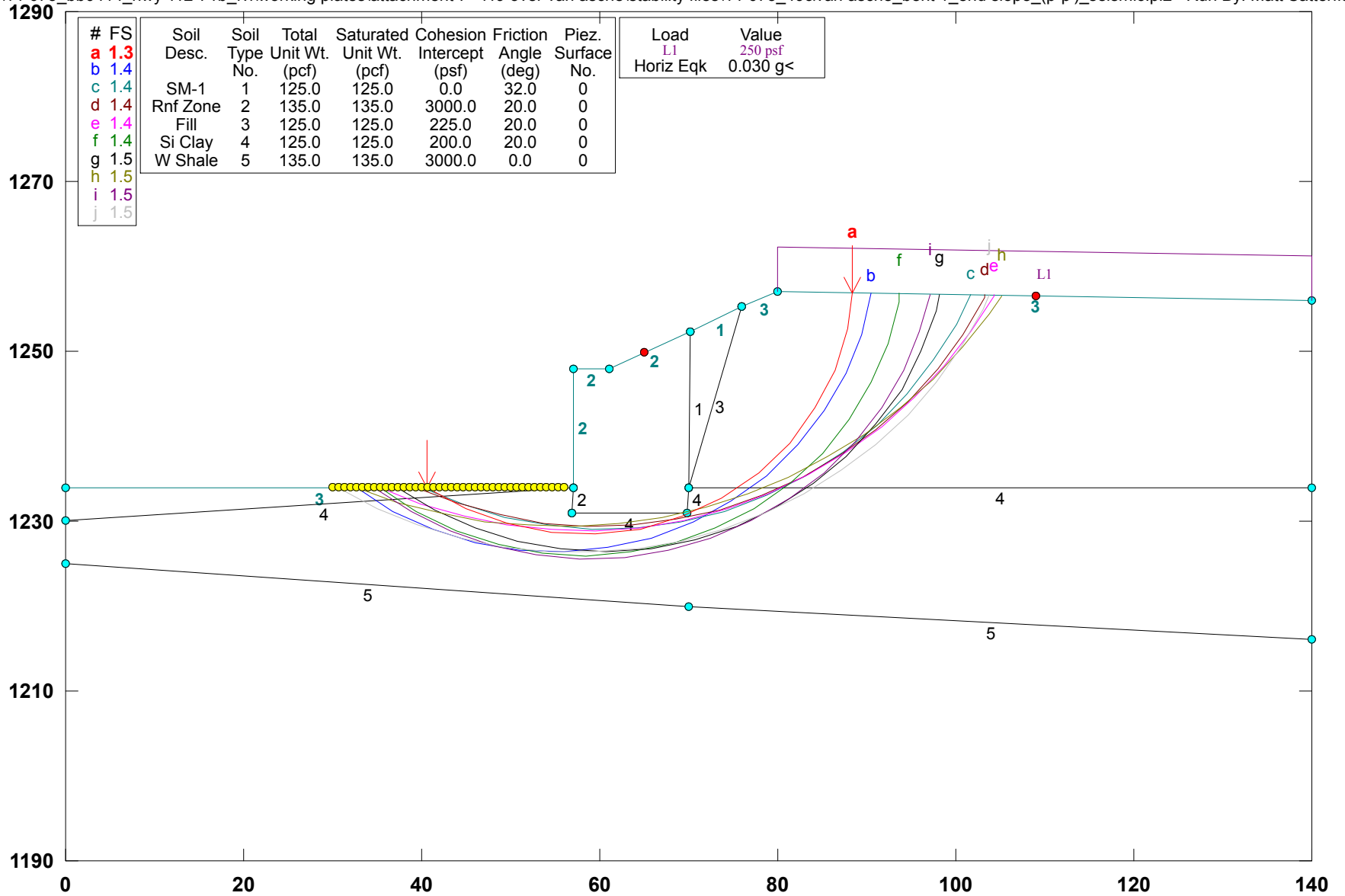


PCSTABL5M/si FSmin=1.5
 Safety Factors Are Calculated By The Modified Bishop Method



I 49 over Van Asche- Bent 1- End Slope (P-P') - H=22' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_end slope_(p-p')_seismic.pl2 Run By: Matt Satterfield, PE

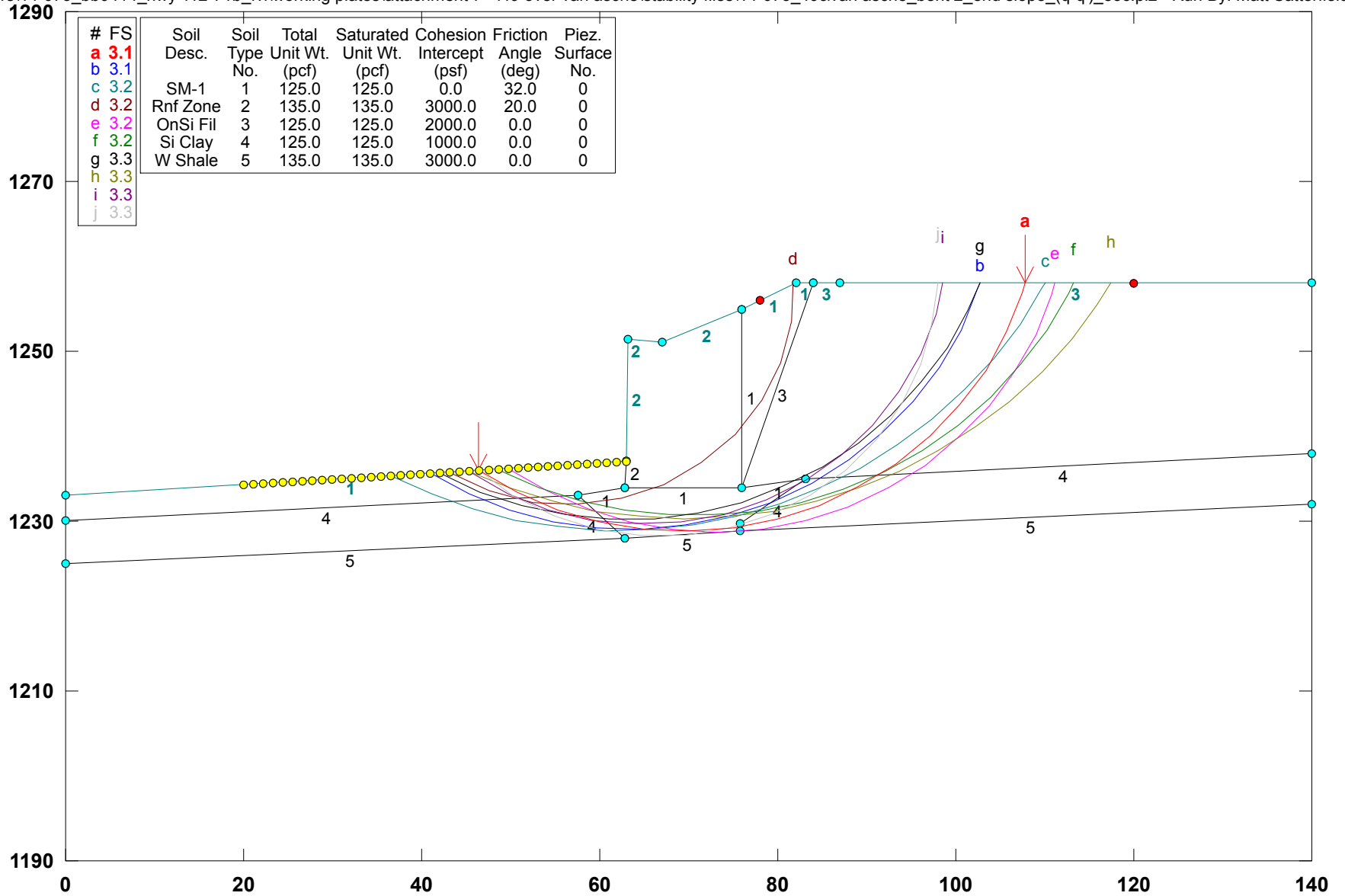


PCSTABL5M/si FSmin=1.3
 Safety Factors Are Calculated By The Modified Bishop Method



I 49 over Van Asche- Bent 2- End Slope (Q-Q') - H=21' - End of Construct

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 2_end slope_(q-q')_eoc.pl2 Run By: Matt Satterfield, PE



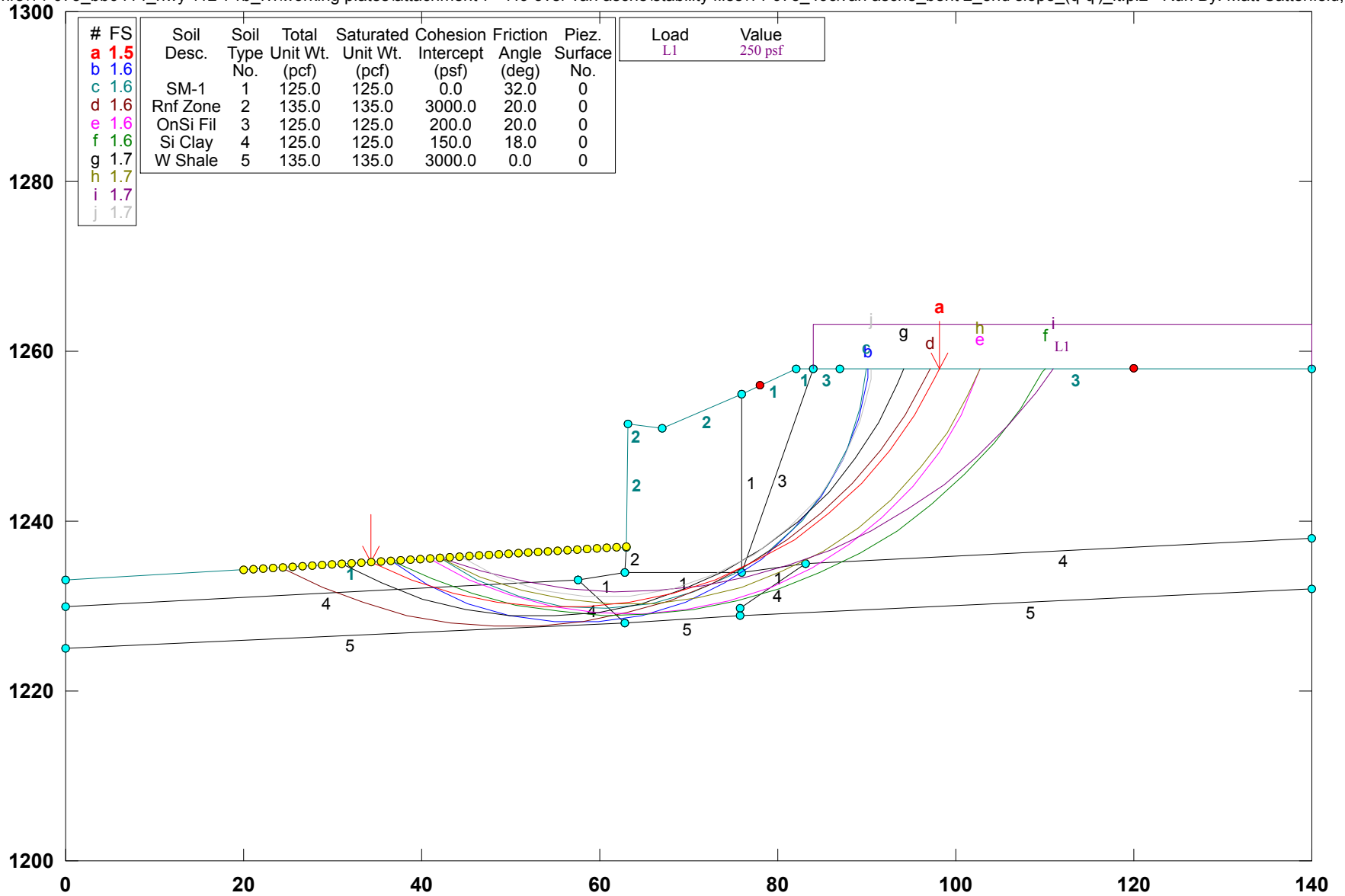
PCSTABL5M/si FSmin=3.1

Safety Factors Are Calculated By The Modified Bishop Method



Hwy 49 over Van Asche- Bent 2- End Slope(Q-Q') - H=21' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 2_end slope_(q-q')_lt.pl2 Run By: Matt Satterfield, PE

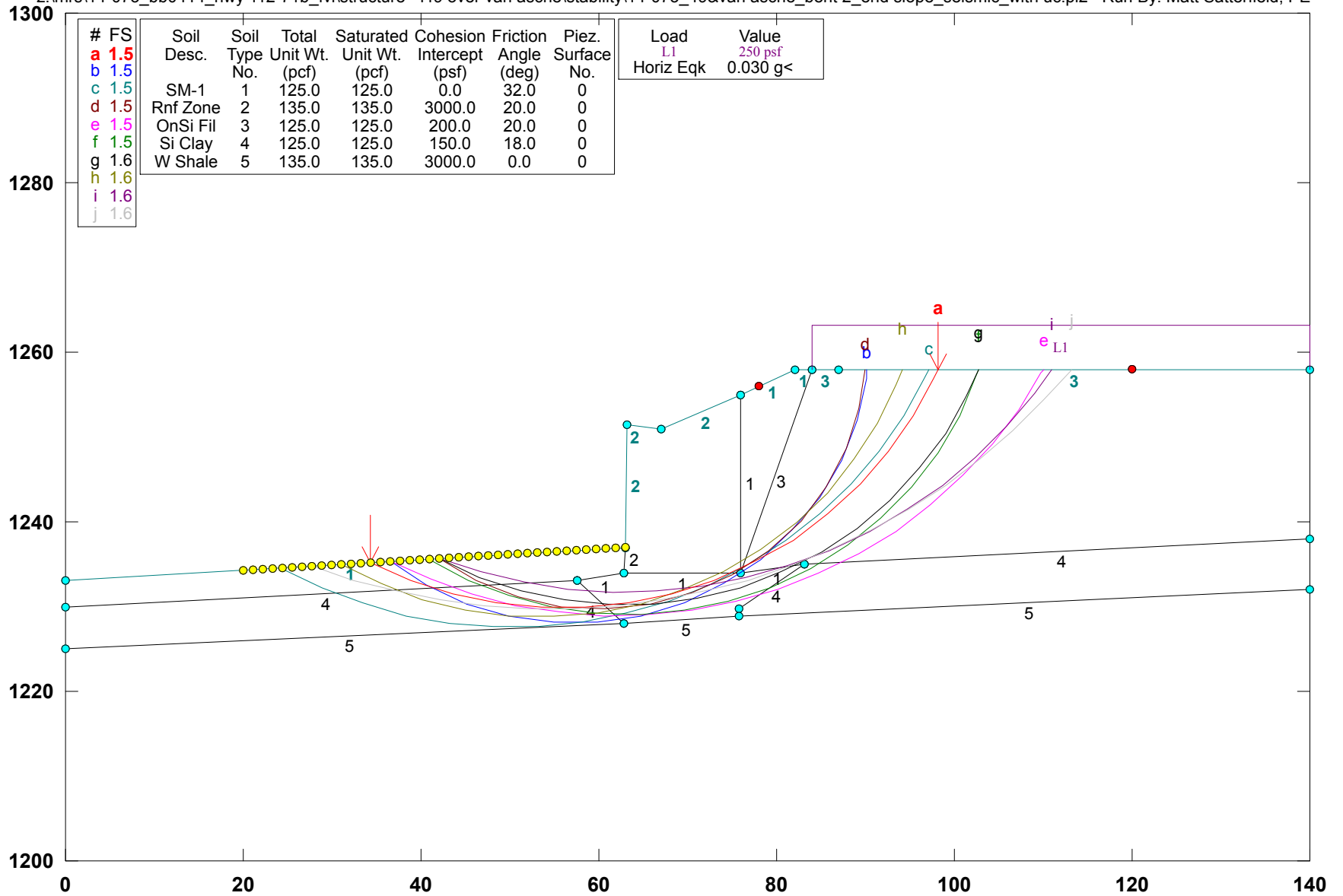


PCSTABL5M/si FSmin=1.5
Safety Factors Are Calculated By The Modified Bishop Method



Hwy 49 over Van Asche- Bent 2- End Slope(Q-Q') - H=21' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fv\structure - i49 over van asche\stability\14-073_49&van asche_bent 2_end slope_seismic_with uc.pl2 Run By: Matt Satterfield, PE



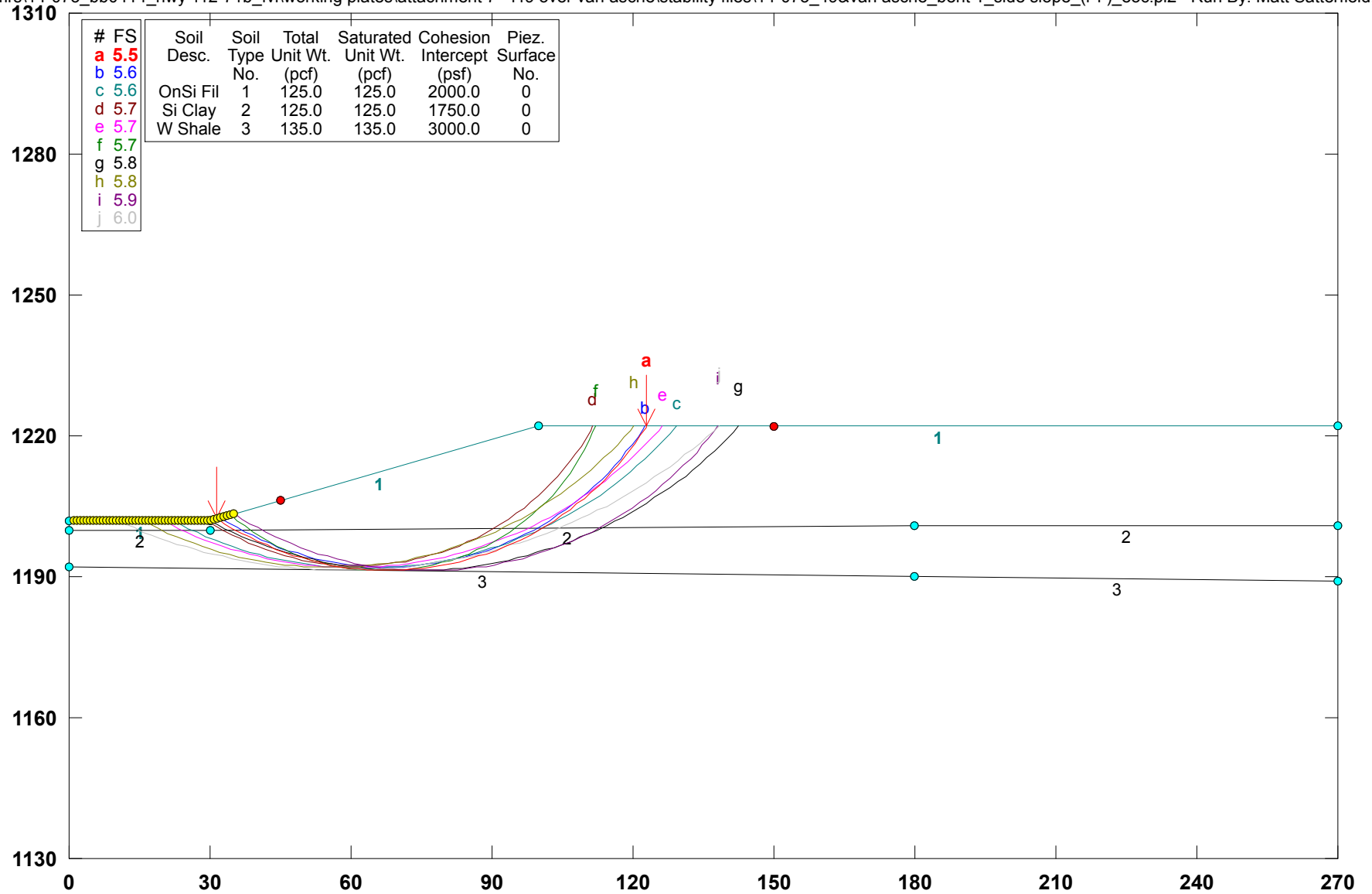
PCSTABL5M/si FSmin=1.5

Safety Factors Are Calculated By The Modified Bishop Method



I-49 over Van Asche - Bent 1- Side Slope(R-R') - 3H:1V- H=20' - End of Construct

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_side slope_(r-r')_eoc.pl2 Run By: Matt Satterfield, PE



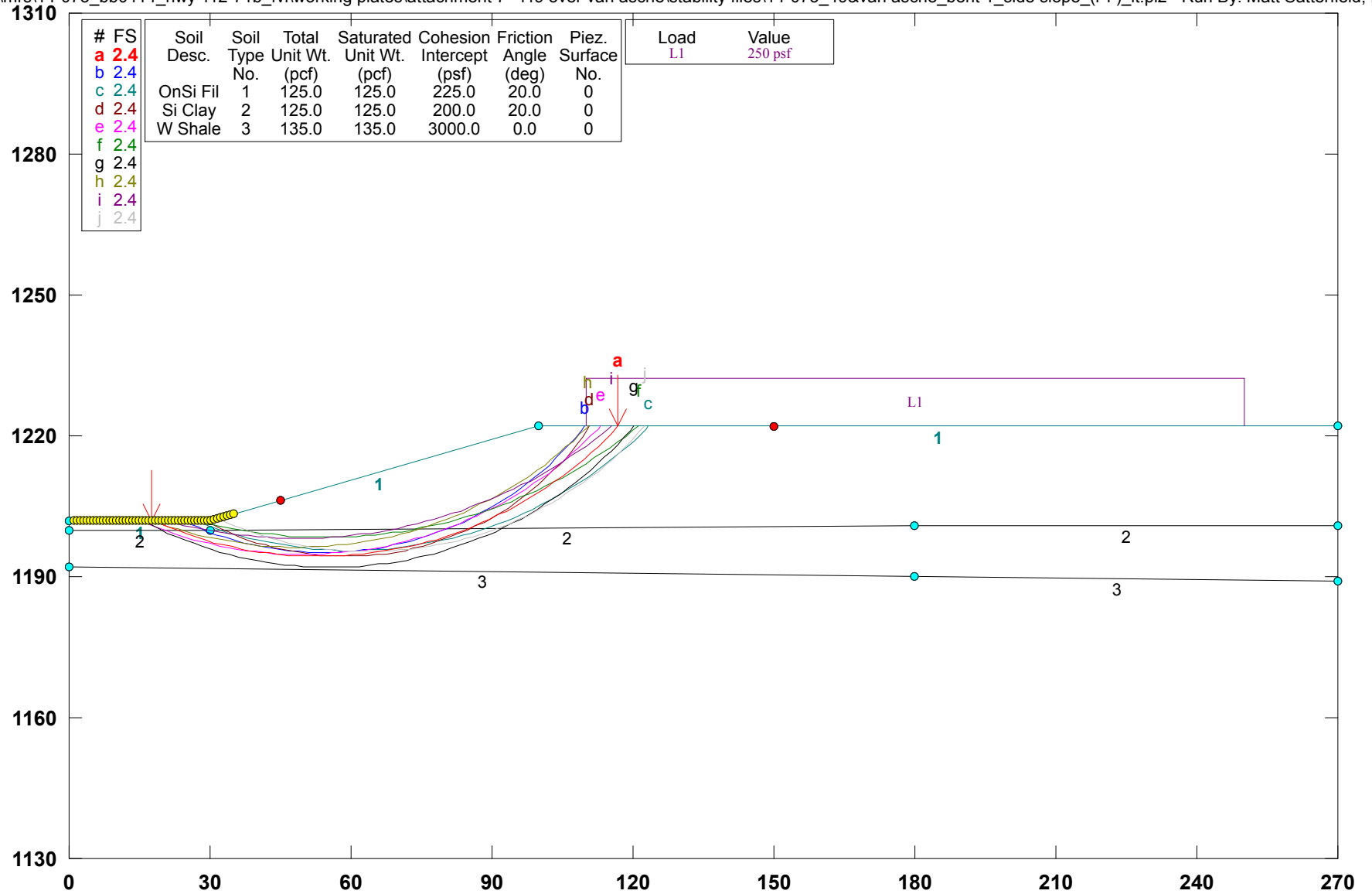
PCSTABL5M/si FSmin=5.5

Safety Factors Are Calculated By The Modified Bishop Method



I-49 over Van Asche - Bent 1- Side Slope(R-R') - 3H:1V- H=20' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_side slope_(r-r')_lt.pl2 Run By: Matt Satterfield, PE



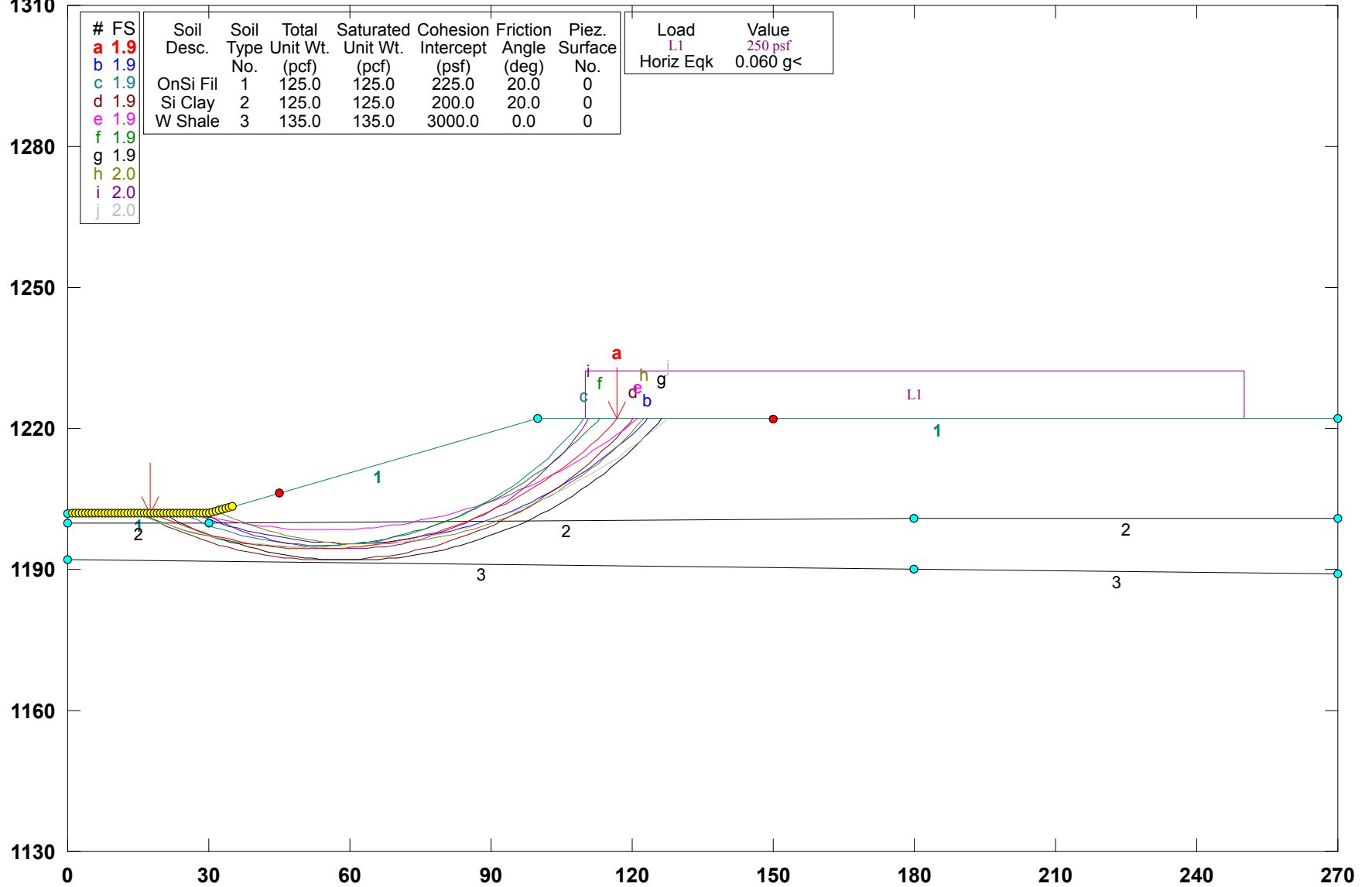
PCSTABL5M/si FSmin=2.4

Safety Factors Are Calculated By The Modified Bishop Method



I-49 over Van Asche - Bent 1- Side Slope(R-R') - 3H:1V- H=20' - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 1_side slope_(r-r')_seismic.pl2 Run By: Matt Satterfield, PE



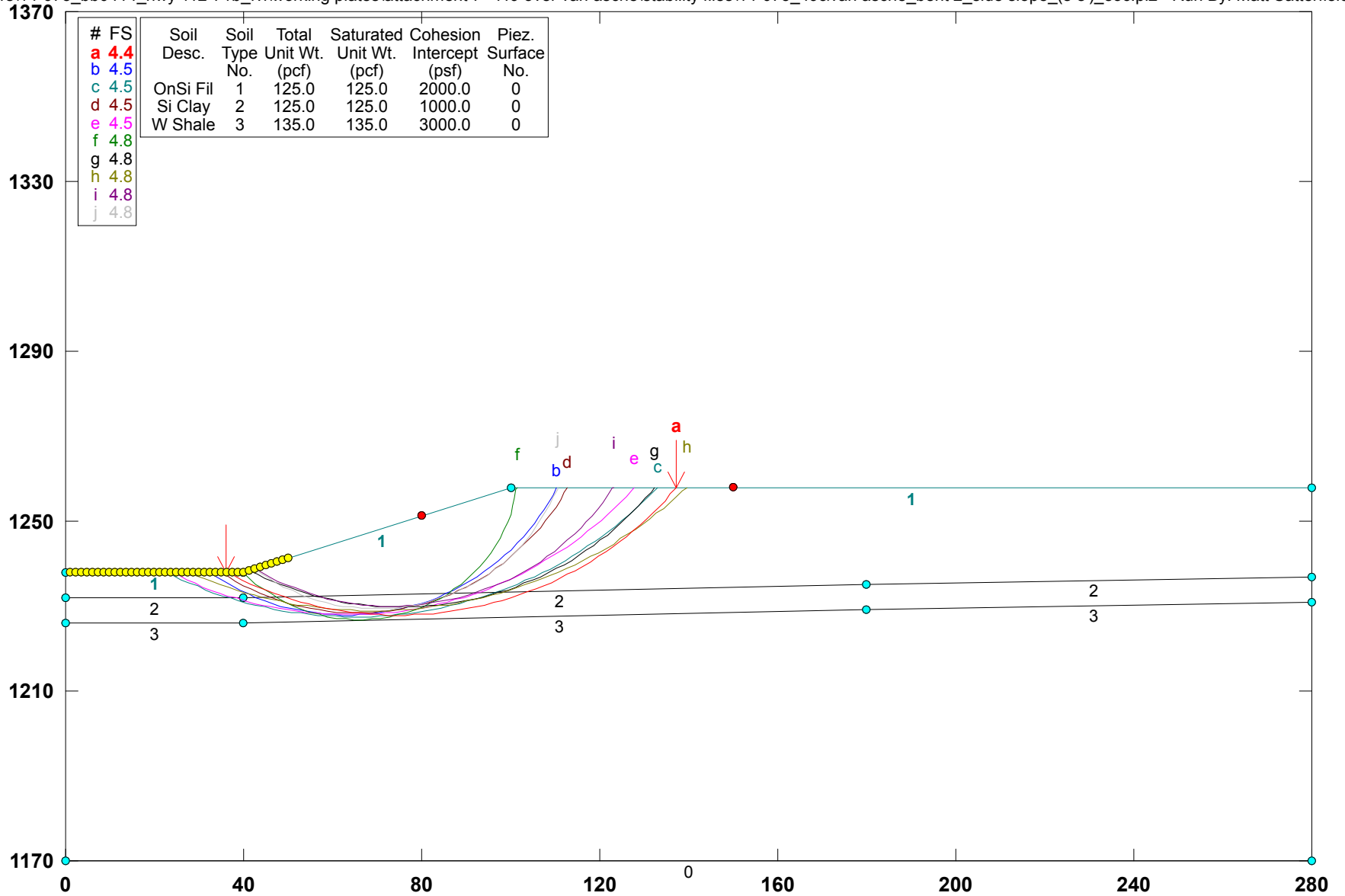
PCSTABL5M/si FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method



I49 over Van Asche - Bent 2 - Side Slope(S-S') - 3H:1V - H=20' - End of Constr

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 2_side slope_(s-s')_eoc.pl2 Run By: Matt Satterfield, PE

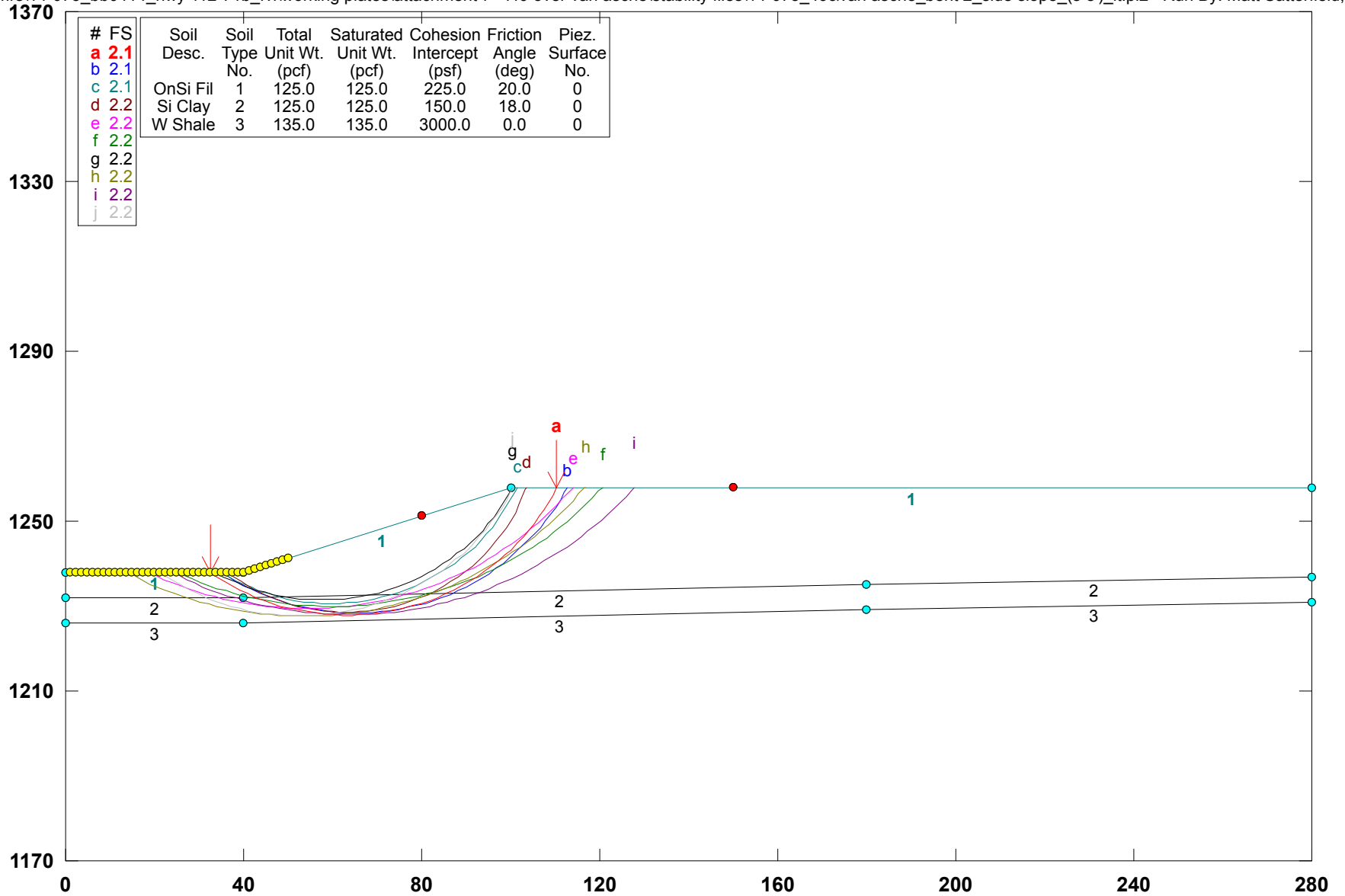


PCSTABL5M/si FSmin=4.4
 Safety Factors Are Calculated By The Modified Bishop Method



I49 over Van Asche - Bent 2 - Side Slope(S-S') - 3H:1V - H=20' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 7 - i49 over van asche\stability files\14-073_49&van asche_bent 2_side slope_(s-s')_lt.pl2 Run By: Matt Satterfield, PE

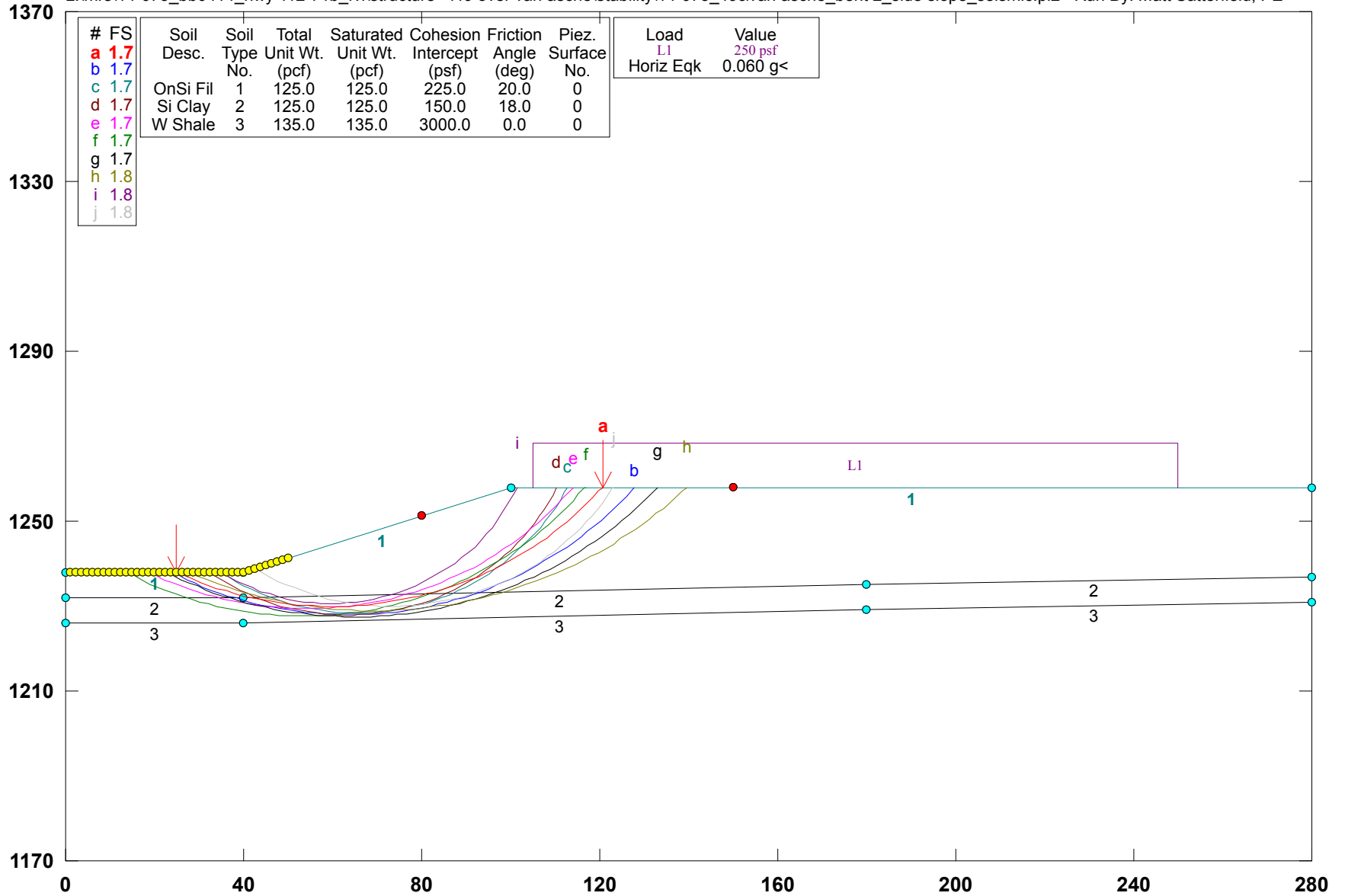


PCSTABL5M/si FSmin=2.1
 Safety Factors Are Calculated By The Modified Bishop Method



I49 over Van Asche - Bent 2 - Side Slope(S-S') - 3H:1V - H=20' - Seismic

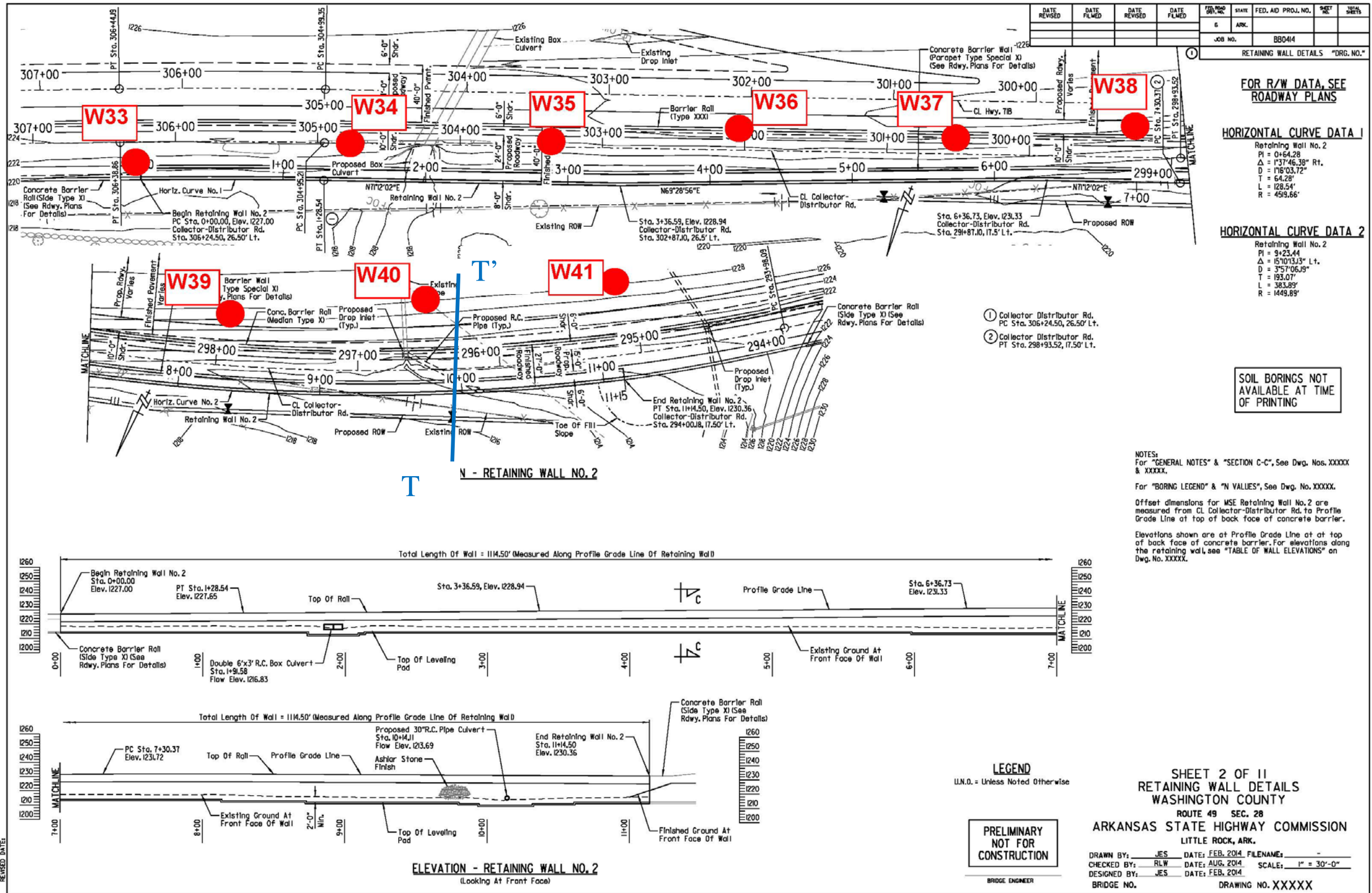
z:\mrs\14-073_bb0414_hwy 112-71b_fvl\structure - i49 over van asche\stability\14-073_49&van asche_bent 2_side slope_seismic.pl2 Run By: Matt Satterfield, PE



PCSTABL5M/si FSmin=1.7
 Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 20



Retaining wall layout plan provided by Garver, LLC



APPROXIMATE PROFILE ALIGNMENT
RETAINING WALL NO. 2
WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchng. Impvts. (Hwy 49)

LOCATION: Washington County, AR

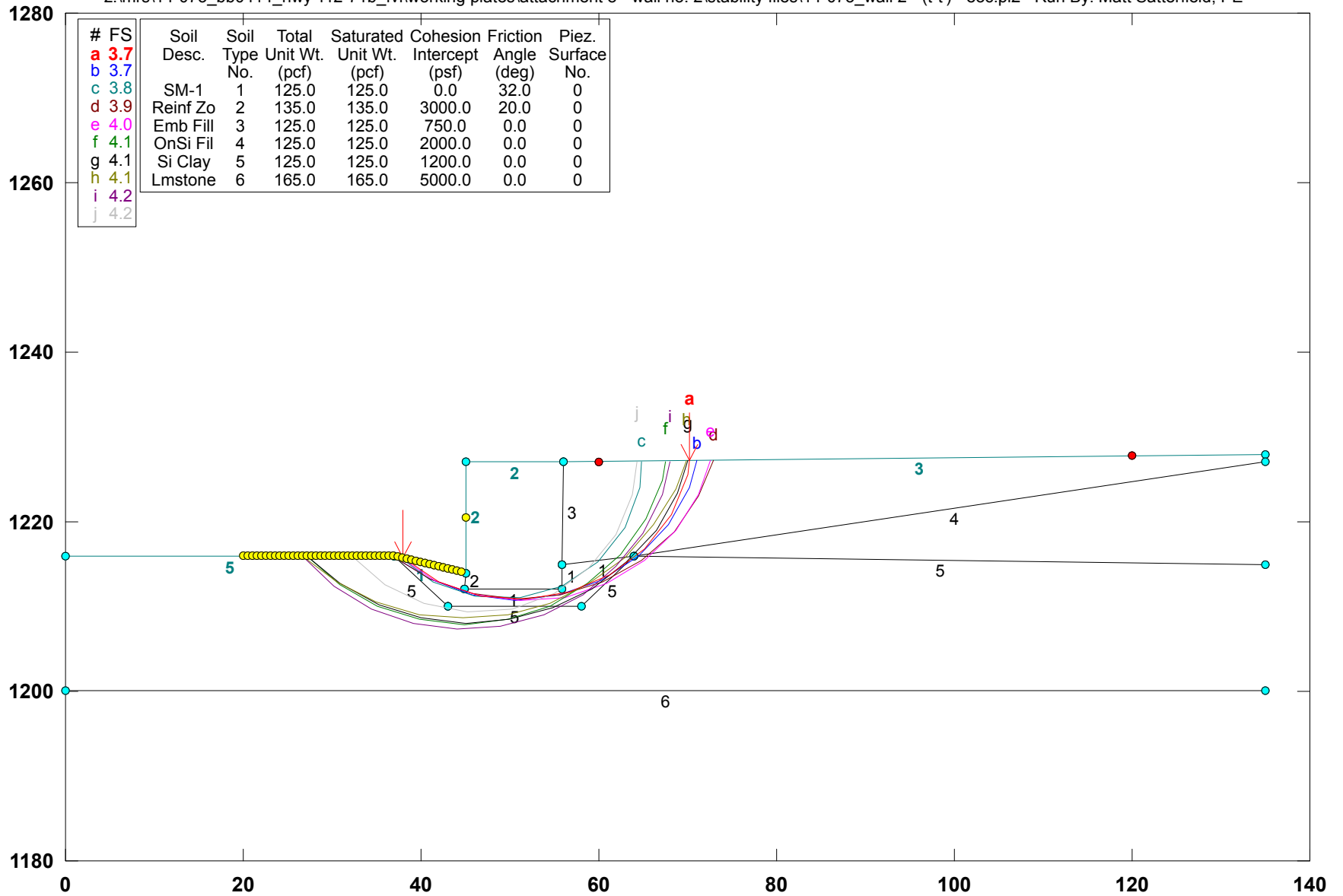
GHBW JOB NO.: 14-073

Project Facet	Approx. Location	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Retaining Wall No. 2	Sta 9+50	T-T'	End of Construction	3.7
			Long Term	2.3
			Seismic*	2.2

* $K_h = 1.0 A_s$ for Simple Slope and $0.5 A_s$ for Retaining Walls

BB0414: Retaining Wall No. 2 - Sta 9+50 (T-T') - H=15 ft - End of Constr.

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 8 - wall no. 2\stability files\14-073_wall 2 - (t-t') - eoc.pl2 Run By: Matt Satterfield, PE

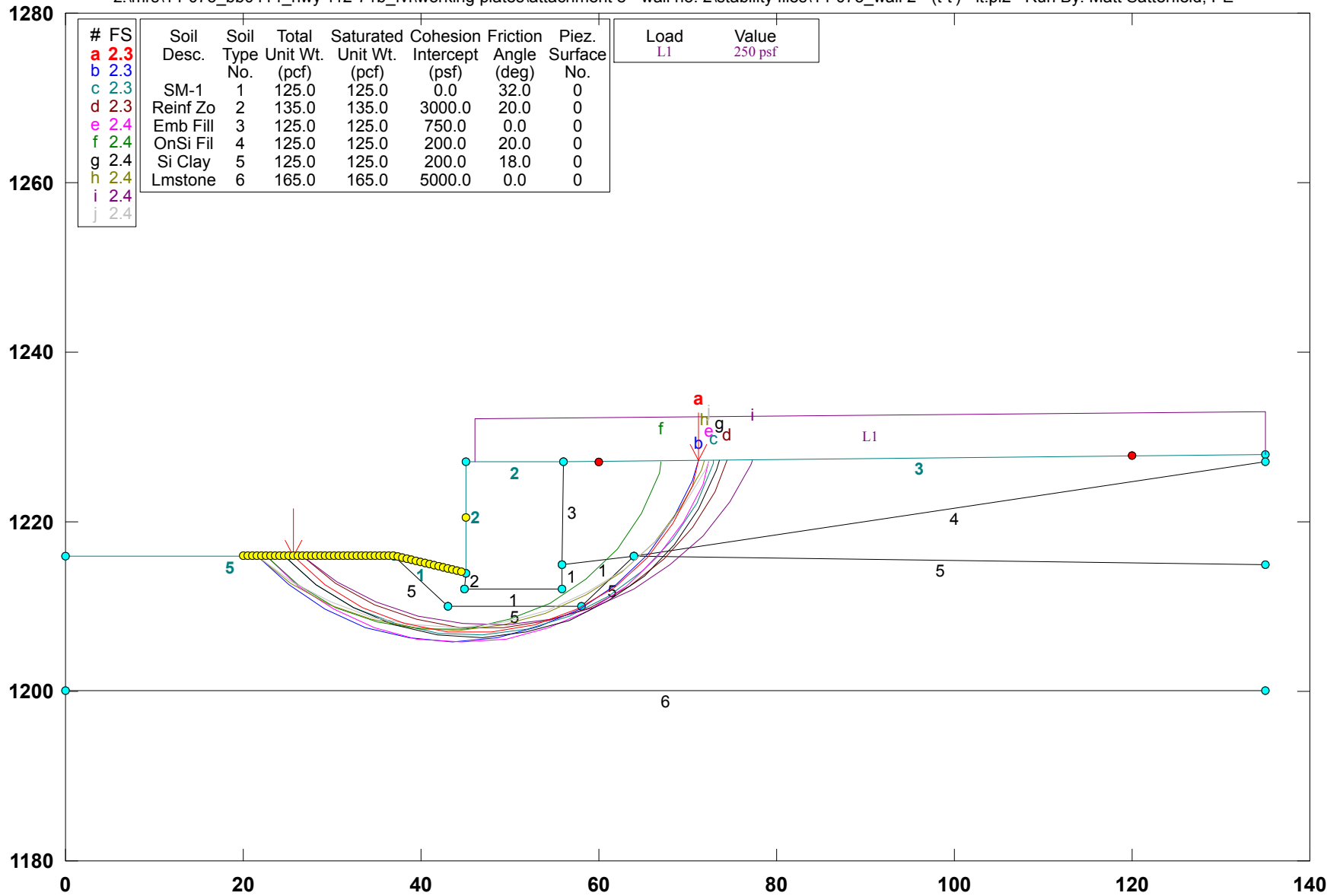


PCSTABL5M/si FSmin=3.7
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 2 - Sta 9+50 (T-T') - H=15 ft - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 8 - wall no. 2\stability files\14-073_wall 2 - (t-t') - lt.pl2 Run By: Matt Satterfield, PE



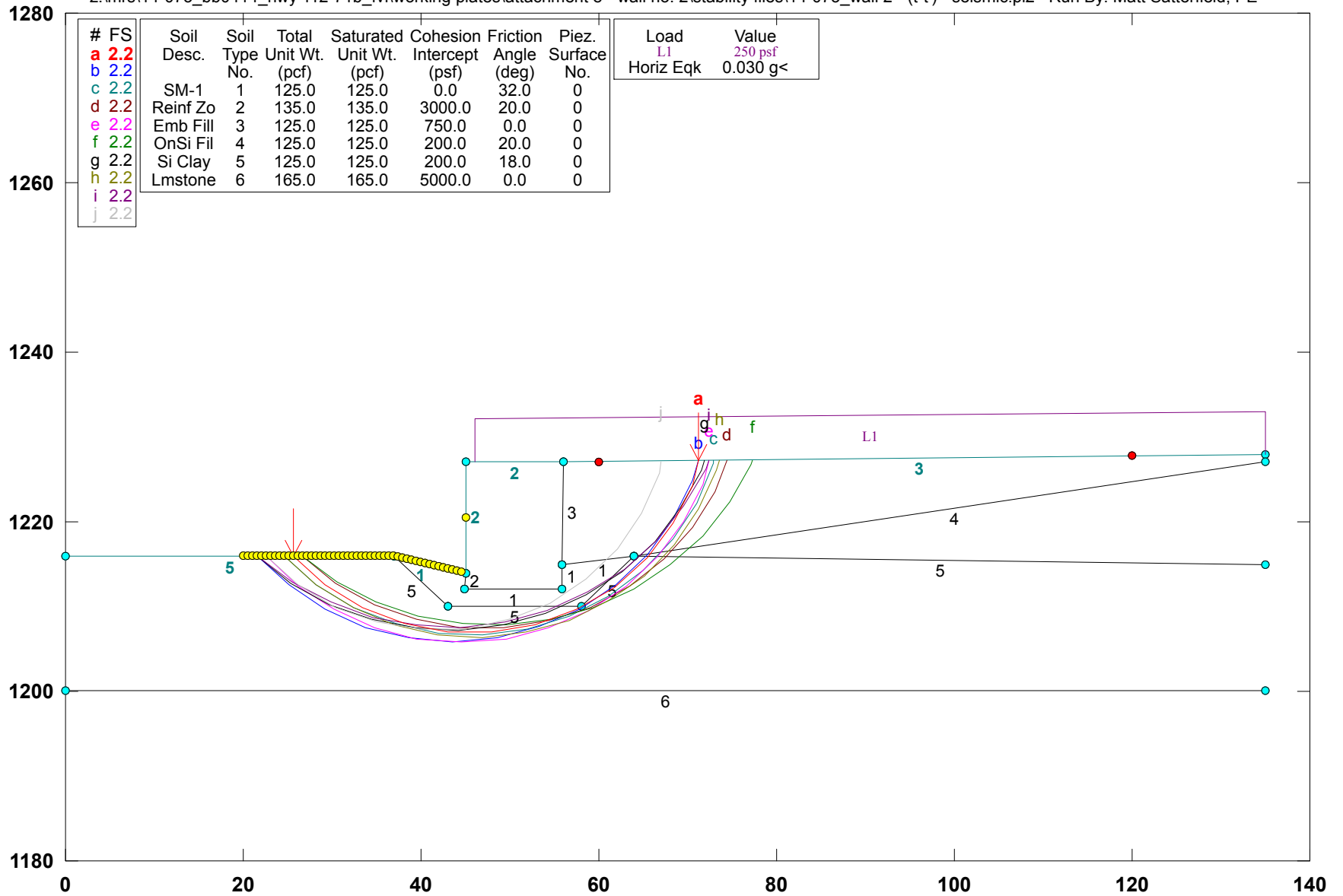
PCSTABL5M/si FSmin=2.3

Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 2 - Sta 9+50 (T-T') - H=15 ft - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 8 - wall no. 2\stability files\14-073_wall 2 - (t-t') - seismic.pl2 Run By: Matt Satterfield, PE

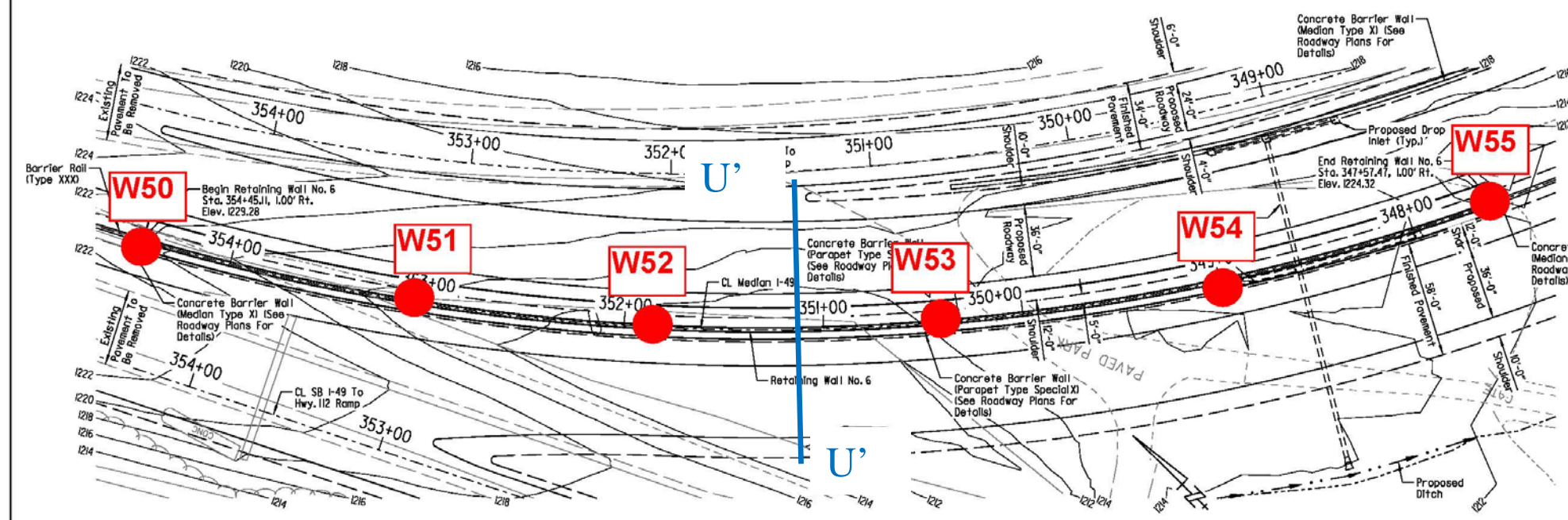


PCSTABL5M/si FSmin=2.2
 Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 21

DATE REVISION	DATE FILED	DATE REVISION	DATE FILED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
						JOB NO.	BBO414	
RETAINING WALL DETAILS "DWG NO."								

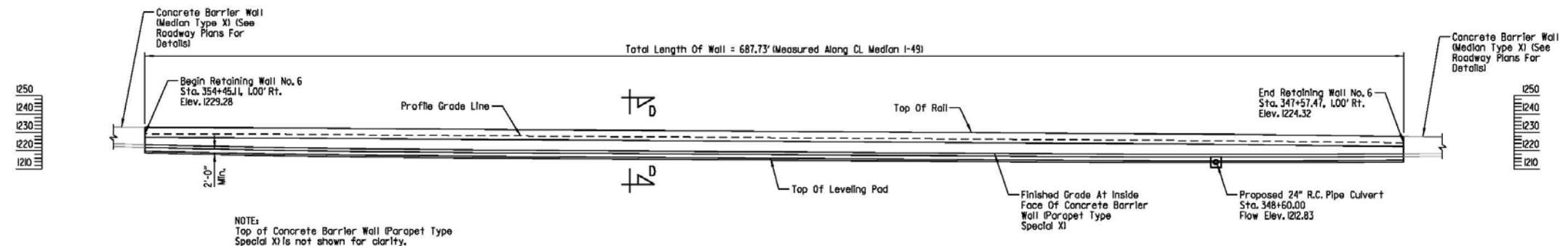


FOR R/W DATA, SEE ROADWAY PLANS

HORIZONTAL CURVE DATA
 CL Median I-49
 PI = 354+2.16
 Δ = 42°14'17" Rt.
 D = 5°15'00"
 T = 424.53'
 L = 804.53'
 e = 0.00 Ft./Ft.
 R = 480.00'

NOTES:
 For "GENERAL NOTES" & "SECTION D-D", See Dwg. No. XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 6 are measured from CL Median I-49 to Profile Grade Line at gutterline at front face of top concrete barrier.
 Elevations shown are at Profile Grade Line at gutterline at front face of top concrete barrier. For elevations along the retaining wall see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.
 Stations shown are along CL Median I-49.

PLAN - RETAINING WALL NO. 6



ELEVATION - RETAINING WALL NO. 6
 (Looking At Front Face)

NOTE:
 Top of Concrete Barrier Wall (Parapet Type Special X) is not shown for clarity.

SOIL BORINGS NOT AVAILABLE AT TIME OF PRINTING

PRELIMINARY NOT FOR CONSTRUCTION

SHEET 6 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: DRG DATE: AUG. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 30'-0"
 DESIGNED BY: DRG DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. XXXXX

8/28/2014 3:36:00 PM
 I:\PROJECTS\2014\14-073\14-073-06-RTWALL-506-L0.dgn
 REVISION DATE:

Retaining wall layout plan provided by Garver, LLC



APPROXIMATE PROFILE ALIGNMENT
 RETAINING WALL NO. 6
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchn. Impvts. (Hwy 49)

LOCATION: Washington County, AR

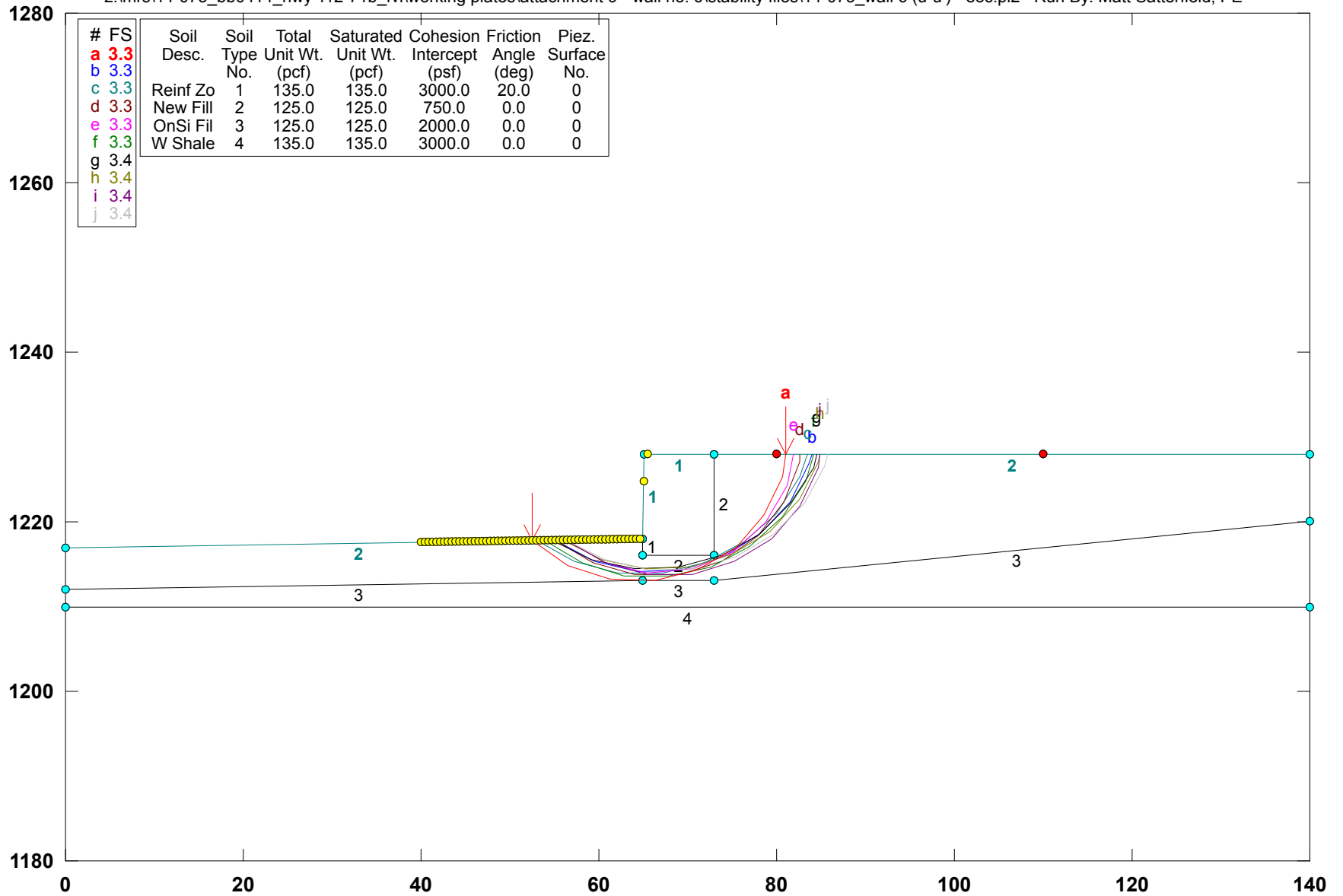
GHBW JOB NO.: 14-073

Project Facet	Approx. Location	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Retaining Wall No. 6	Sta 3+50	U-U'	End of Construction	3.3
			Long Term	2.6
			Seismic*	2.4

* $K_h = 1.0 A_s$ for Simple Slope and $0.5 A_s$ for Retaining Walls

BB0414: Retaining Wall No. 6 - Sta 3+50 (U-U') - H=12 ft - End of Constr.

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 9 - wall no. 6\stability files\14-073_wall 6 (u-u') - eoc.pl2 Run By: Matt Satterfield, PE

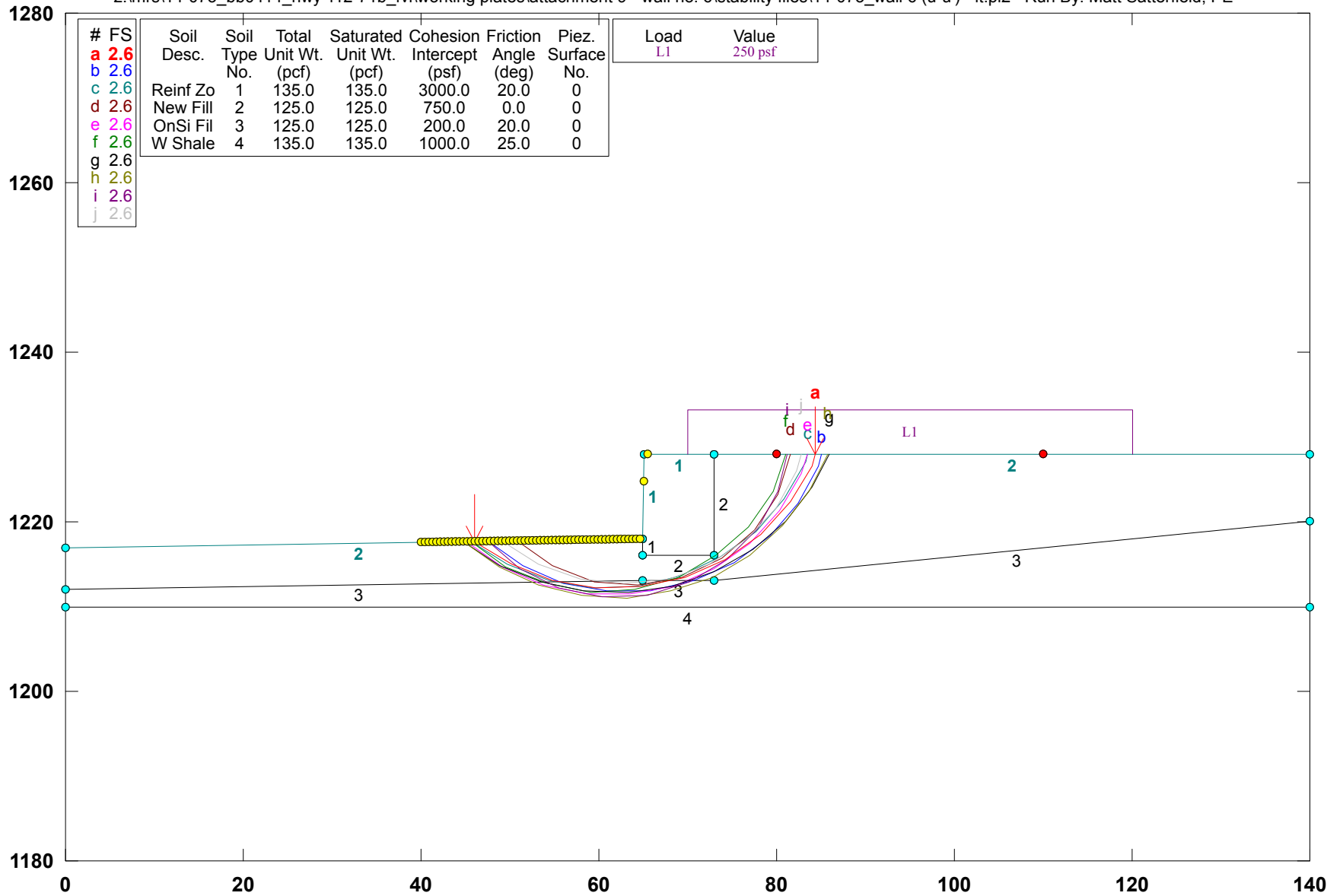


PCSTABL5M/si FSmin=3.3
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 6 - Sta 3+50 (U-U') - H=12 ft - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 9 - wall no. 6\stability files\14-073_wall 6 (u-u') - lt.pl2 Run By: Matt Satterfield, PE

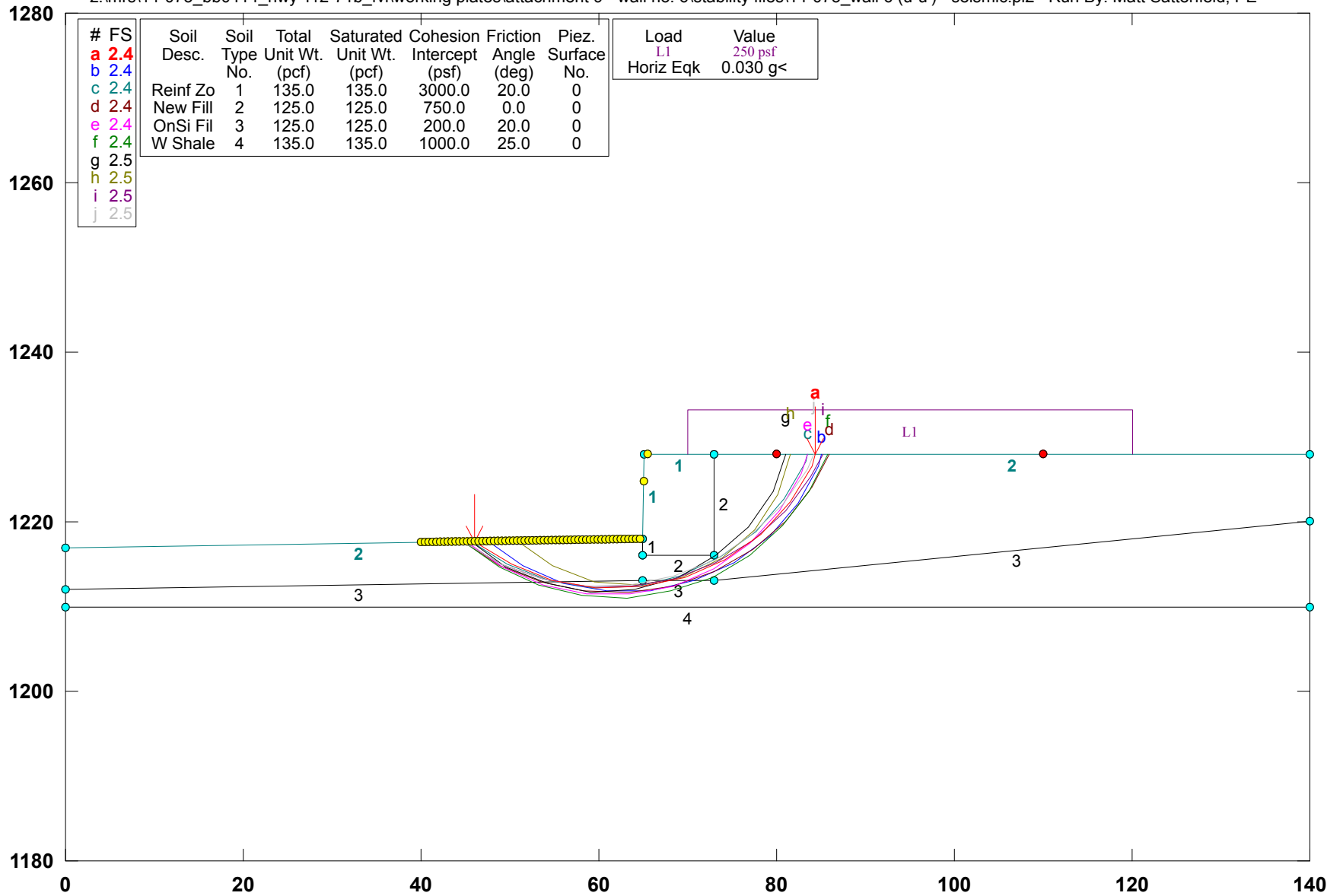


PCSTABL5M/si FSmin=2.6
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 6 - Sta 3+50 (U-U') - H=12 ft - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 9 - wall no. 6\stability files\14-073_wall 6 (u-u') - seismic.pl2 Run By: Matt Satterfield, PE

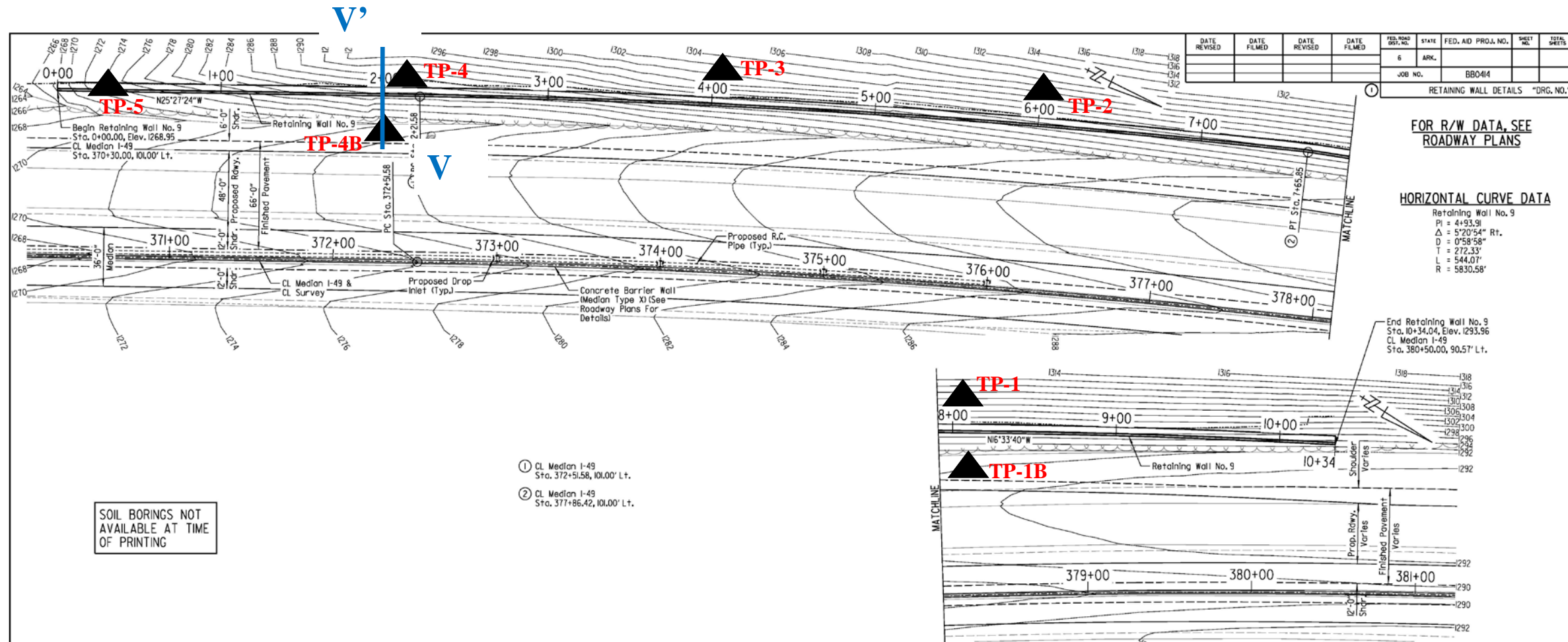


PCSTABL5M/si FSmin=2.4

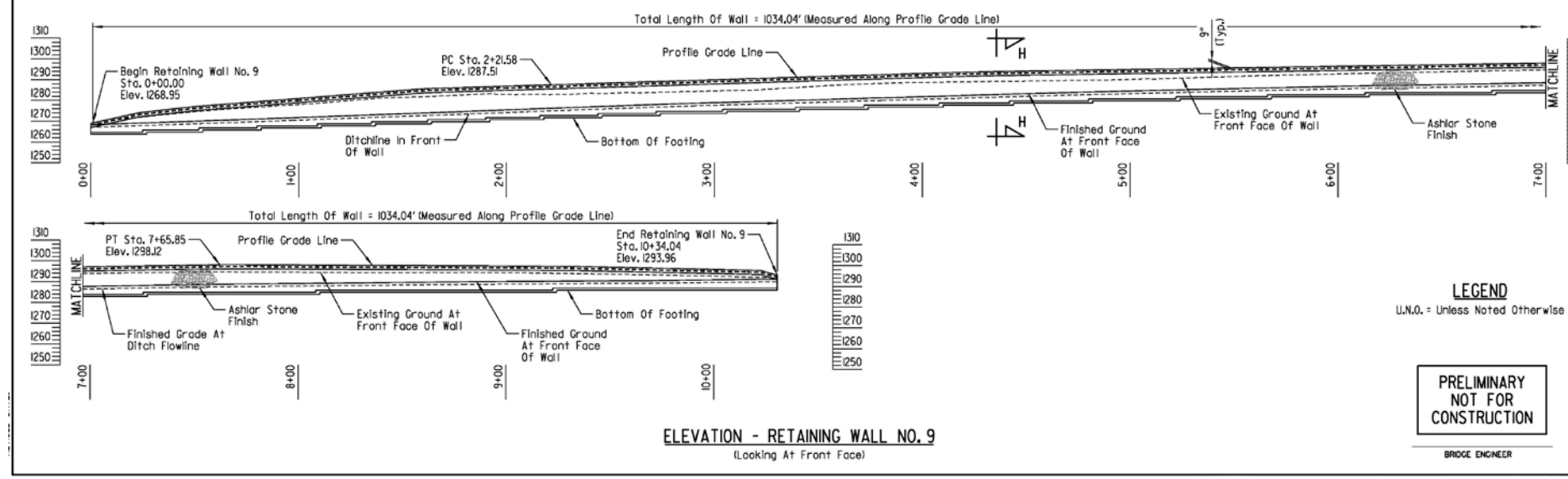
Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 22



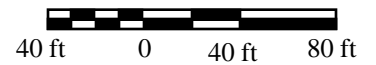
PLAN - RETAINING WALL NO. 9



NOTES:
 For "GENERAL NOTES" & "SECTION H-H", See Dwg. No. XXXXX.
 For "BORING LEGEND" & "N VALUES", See Dwg. No. XXXXX.
 Offset dimensions for Retaining Wall No. 9 are measured from CL Median I-49 to Profile Grade Line at front face of retaining wall.
 Elevations shown are at Profile Grade Line at front face of retaining wall. For elevations along the retaining wall, see "TABLE OF WALL ELEVATIONS" on Dwg. No. XXXXX.

SHEET 9 OF 11
 RETAINING WALL DETAILS
 WASHINGTON COUNTY
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.

DRAWN BY: JES DATE: AUG. 2014 FILENAME: -
 CHECKED BY: RLW DATE: AUG. 2014 SCALE: 1" = 30'-0"
 DESIGNED BY: JES DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. -



APPROXIMATE PROFILE ALIGNMENT
 BB0414: Retaining Wall #9
 Fayetteville, Arkansas

Scale: As Shown
 Date: August 2015

Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchn. Impvts. (Hwy 49)

LOCATION: Washington County, AR

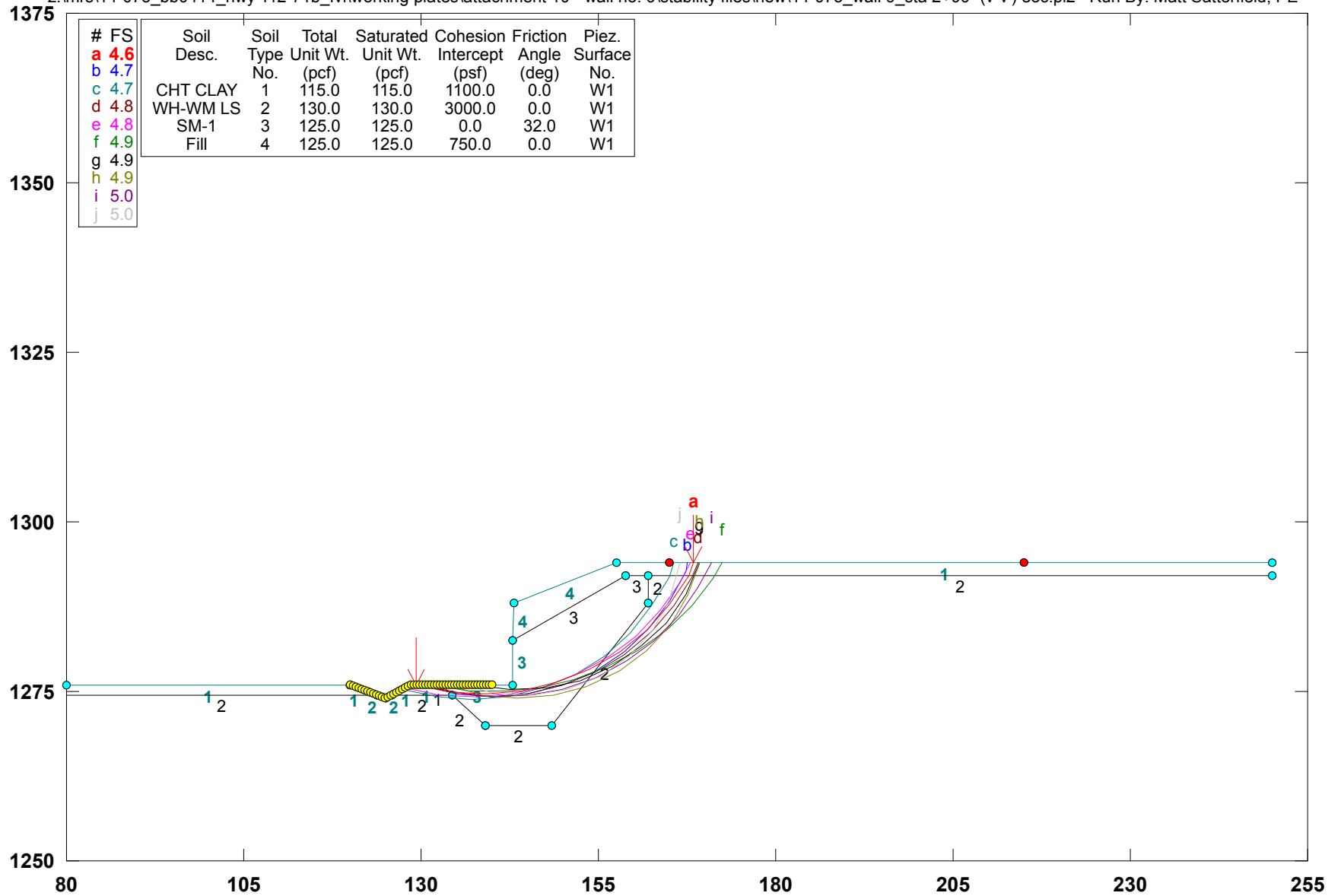
GHBW JOB NO.: 14-073

Project Facet	Approx. Location	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Retaining Wall No. 9	Sta 2+00	V-V'	End of Construction	4.6
			Long Term	2.2
			Seismic*	2.1

* $K_h = 1.0 A_s$ for Simple Slope and $0.5 A_s$ for Retaining Walls

BB0414: Wall No 9 - Sta 2+00 (V-V') - H=15' - End of Const.

z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 10 - wall no. 9\stability files\new\14-073_wall 9_sta 2+00- (v-v') eoc.pl2 Run By: Matt Satterfield, PE

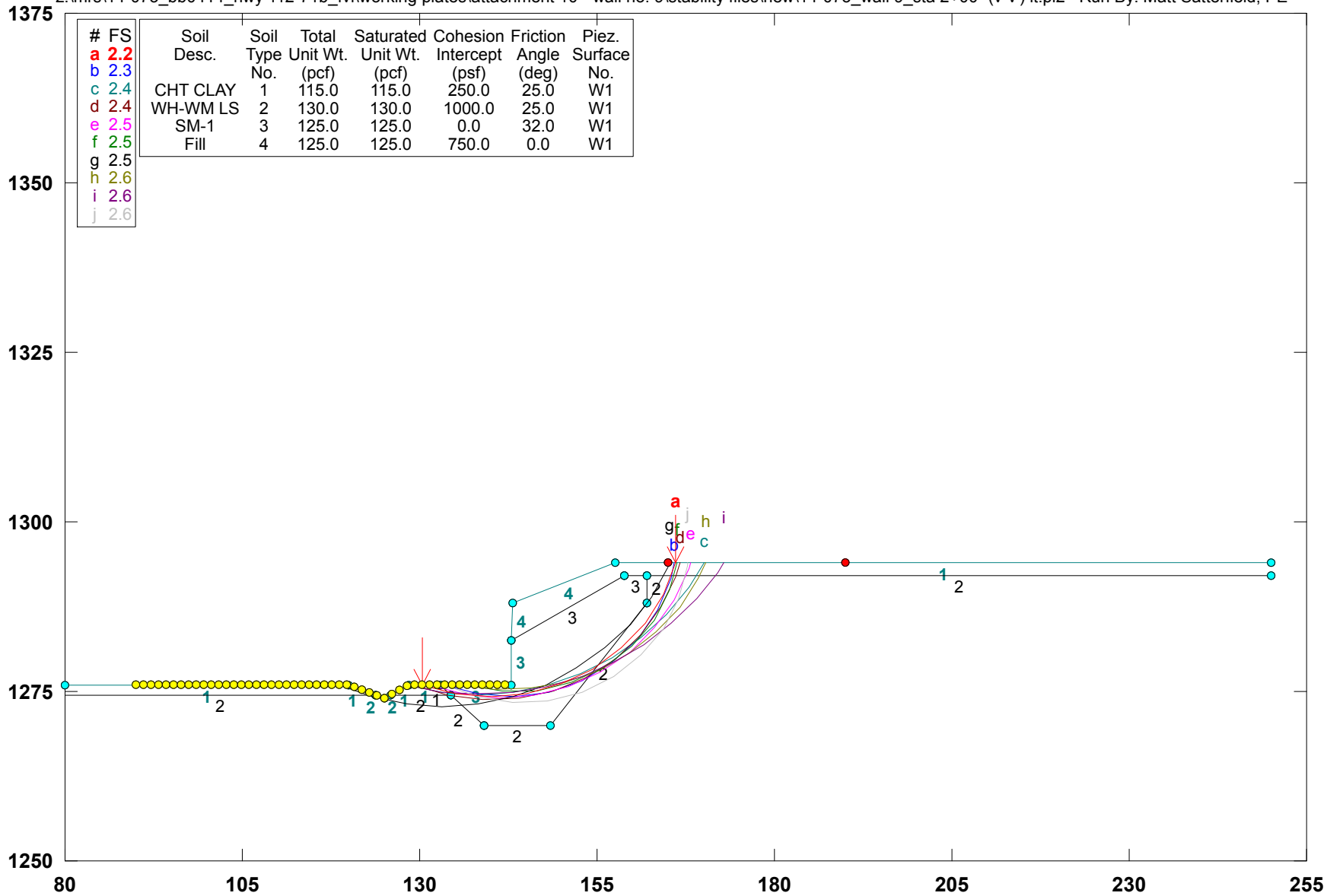


PCSTABL5M/si FSmin=4.6
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Wall No 9 - Sta 2+00 (V- V') - H:15' - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\working plates\attachment 10 - wall no. 9\stability files\new\14-073_wall 9_sta 2+00- (v-v') lt.pl2 Run By: Matt Satterfield, PE

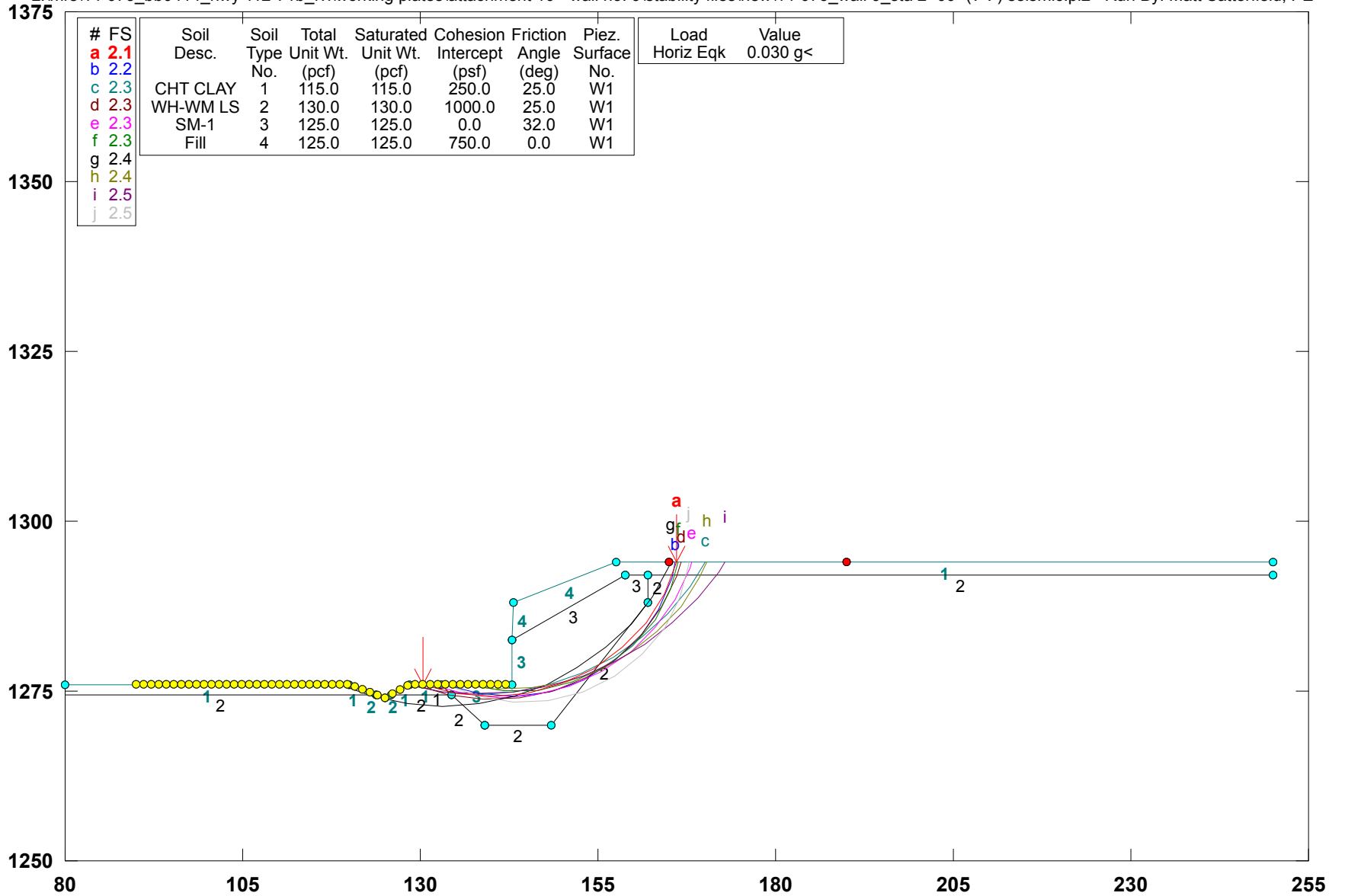


PCSTABL5M/si FSmin=2.2
 Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Wall No 9 - Sta 2+00 (V- V') - H:15' - Seismic

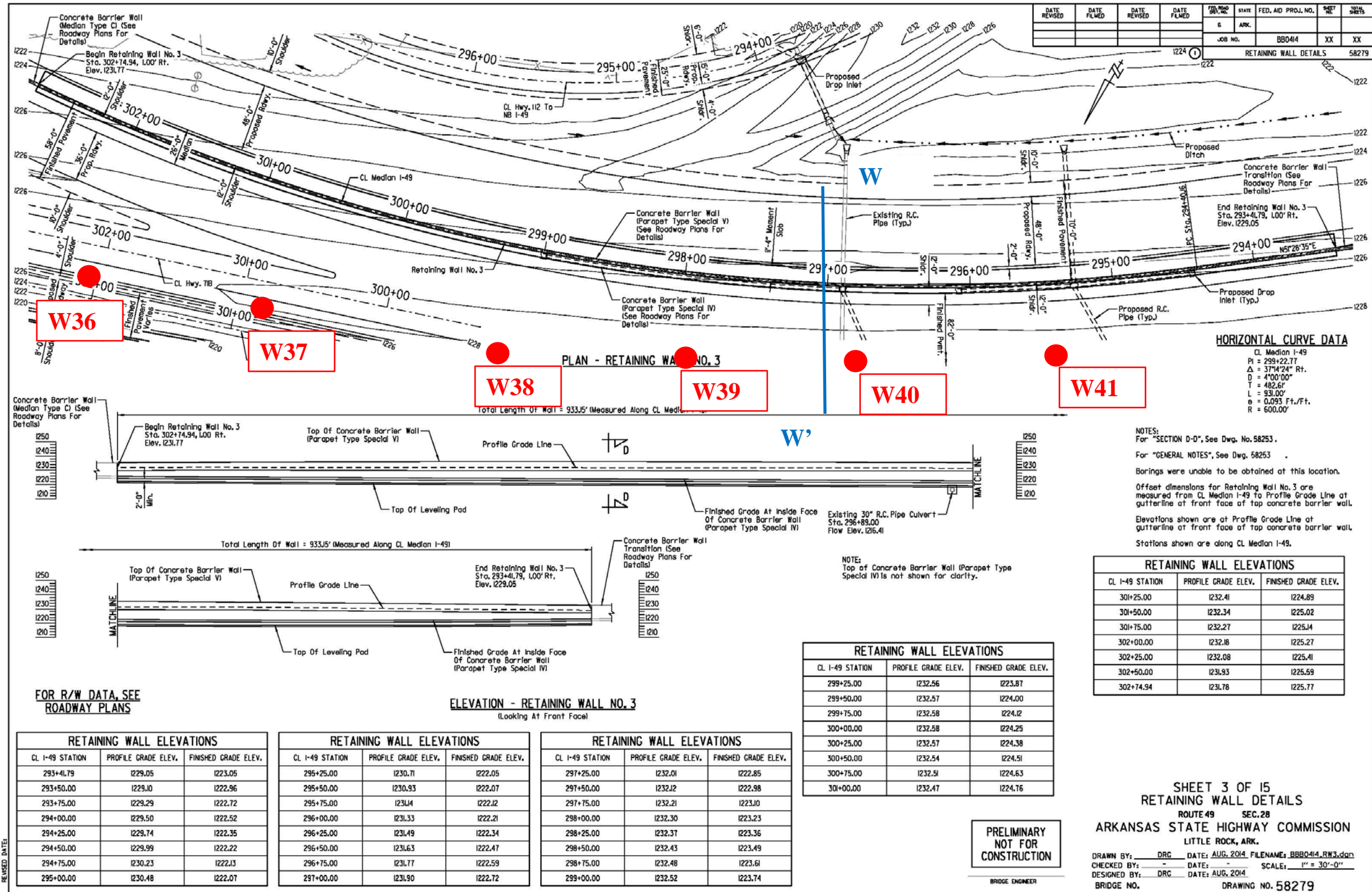
z:\mrs\14-073_bb0414_hwy 112-71b_fvl\working plates\attachment 10 - wall no. 9\stability files\new\14-073_wall 9_sta 2+00- (v-v') seismic.pl2 Run By: Matt Satterfield, PE



PCSTABL5M/si FSmin=2.1
Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 23



DATE REVISED	DATE FILED	DATE REVISED	DATE FILED	FED. PROJ. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.		XX	XX
				JOB NO.	BB0414		RETAINING WALL DETAILS	58279

HORIZONTAL CURVE DATA

CL Median I-49
 PI = 299+22.77
 Δ = 37°14'24" Rt.
 D = 4°00'00"
 T = 482.61'
 L = 933.00'
 e = 0.093 ft./ft.
 R = 600.00'

NOTES:
 For "SECTION D-D", See Dwg. No. 58253.
 For "GENERAL NOTES", See Dwg. 58253.
 Borings were unable to be obtained at this location.
 Offset dimensions for Retaining Wall No. 3 are measured from CL Median I-49 to Profile Grade Line at gutterline at front face of top concrete barrier wall.
 Elevations shown are at Profile Grade Line at gutterline at front face of top concrete barrier wall.
 Stations shown are along CL Median I-49.

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
301+25.00	1232.41	1224.89
301+50.00	1232.34	1225.02
301+75.00	1232.27	1225.14
302+00.00	1232.18	1225.27
302+25.00	1232.08	1225.41
302+50.00	1231.93	1225.59
302+74.94	1231.78	1225.77

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
299+25.00	1232.56	1223.81
299+50.00	1232.57	1224.00
299+75.00	1232.58	1224.12
300+00.00	1232.58	1224.25
300+25.00	1232.57	1224.38
300+50.00	1232.54	1224.51
300+75.00	1232.51	1224.63
301+00.00	1232.47	1224.76

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
293+41.79	1229.05	1223.05
293+50.00	1229.10	1222.96
293+75.00	1229.29	1222.72
294+00.00	1229.50	1222.52
294+25.00	1229.74	1222.35
294+50.00	1229.99	1222.22
294+75.00	1230.23	1222.13
295+00.00	1230.48	1222.07

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
295+25.00	1230.71	1222.05
295+50.00	1230.93	1222.07
295+75.00	1231.14	1222.12
296+00.00	1231.33	1222.21
296+25.00	1231.49	1222.34
296+50.00	1231.63	1222.47
296+75.00	1231.77	1222.59
297+00.00	1231.90	1222.72

RETAINING WALL ELEVATIONS

CL I-49 STATION	PROFILE GRADE ELEV.	FINISHED GRADE ELEV.
297+25.00	1232.01	1222.85
297+50.00	1232.12	1222.98
297+75.00	1232.21	1223.10
298+00.00	1232.30	1223.23
298+25.00	1232.37	1223.36
298+50.00	1232.43	1223.49
298+75.00	1232.48	1223.61
299+00.00	1232.52	1223.74

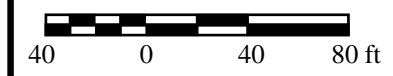
SHEET 3 OF 15
 RETAINING WALL DETAILS
 ROUTE 49 SEC. 28
 ARKANSAS STATE HIGHWAY COMMISSION
 LITTLE ROCK, ARK.
 DRAWN BY: DRG DATE: AUG. 2014 FILENAME: BB0414_RW3.dwg
 CHECKED BY: DATE: SCALE: 1" = 30'-0"
 DESIGNED BY: DRG DATE: AUG. 2014
 BRIDGE NO. DRAWING NO. 58279

PRELIMINARY
 NOT FOR
 CONSTRUCTION

Retaining wall layout plan provided by Garver, LLC



APPROXIMATE PROFILE ALIGNMENT
 RETAINING WALL NO. 3
 WASHINGTON COUNTY, ARKANSAS



Job No. 14-073

PLATE 1

SUMMARY of SLOPE STABILITY ANALYSIS RESULTS

PROJECT: AHTD BB0414: Porter Rd.-Hwy. 112/71B Widening & Intchn. Impvts. (Hwy 49)

LOCATION: Washington County, AR

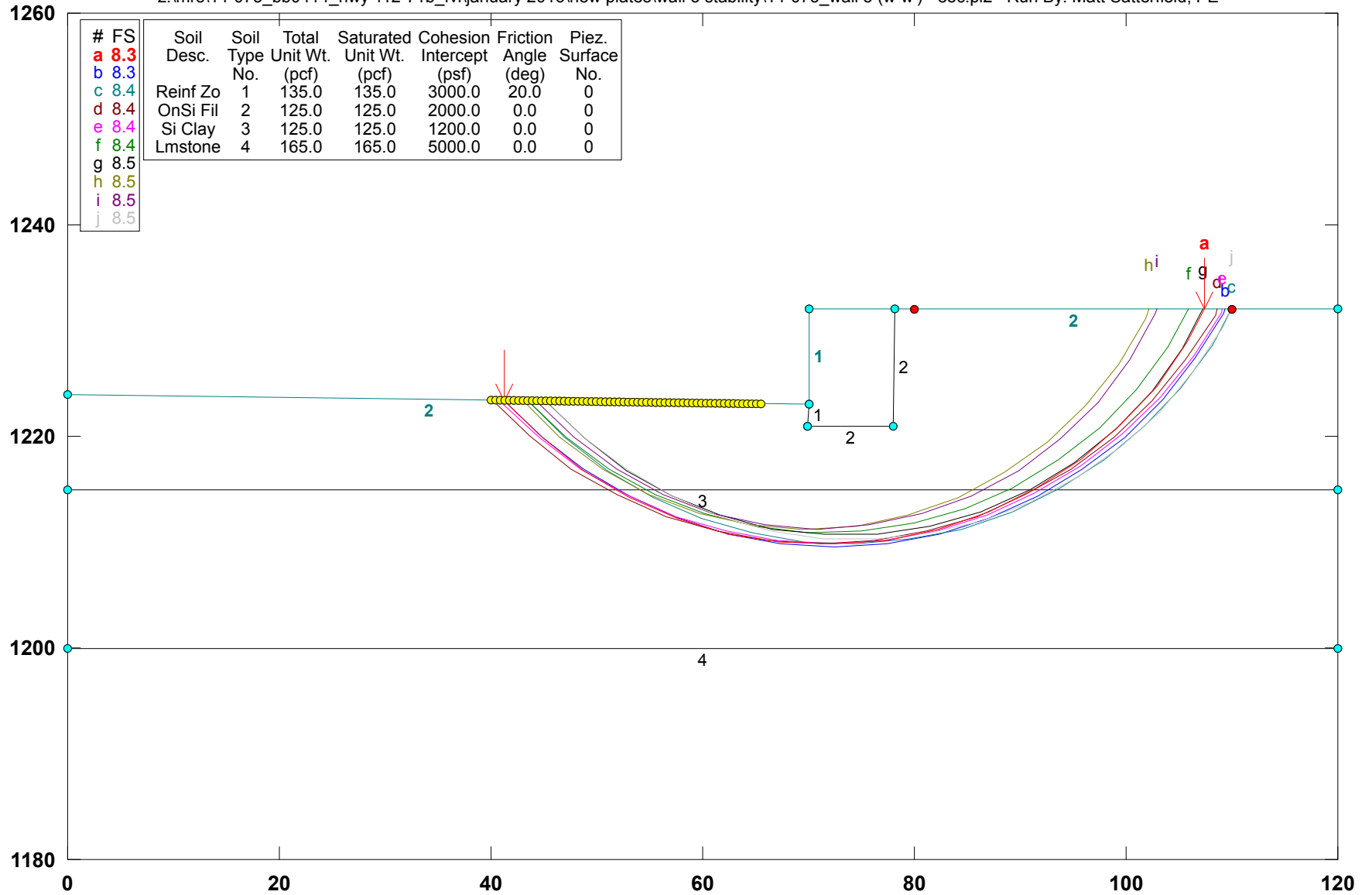
GHBW JOB NO.: 14-073

Project Facet	Approx. Location	Profile Section	Design Loading Condition	Calculated Minimum Factor of Safety
Retaining Wall No. 3	Sta 297+00	W-W'	End of Construction	8.3
			Long Term	1.7
			Seismic*	1.6

* $K_h = 1.0 A_s$ for Simple Slope and $0.5 A_s$ for Retaining Walls

BB0414: Retaining Wall No. 3 - Sta 297 +00 - (W-W') - H=11 ft - End of Constr.

z:\mrs\14-073_bb0414_hwy 112-71b_fv\january 2016\new plates\wall 3 stability\14-073_wall 3 (w-w') - eoc.pl2 Run By: Matt Satterfield, PE



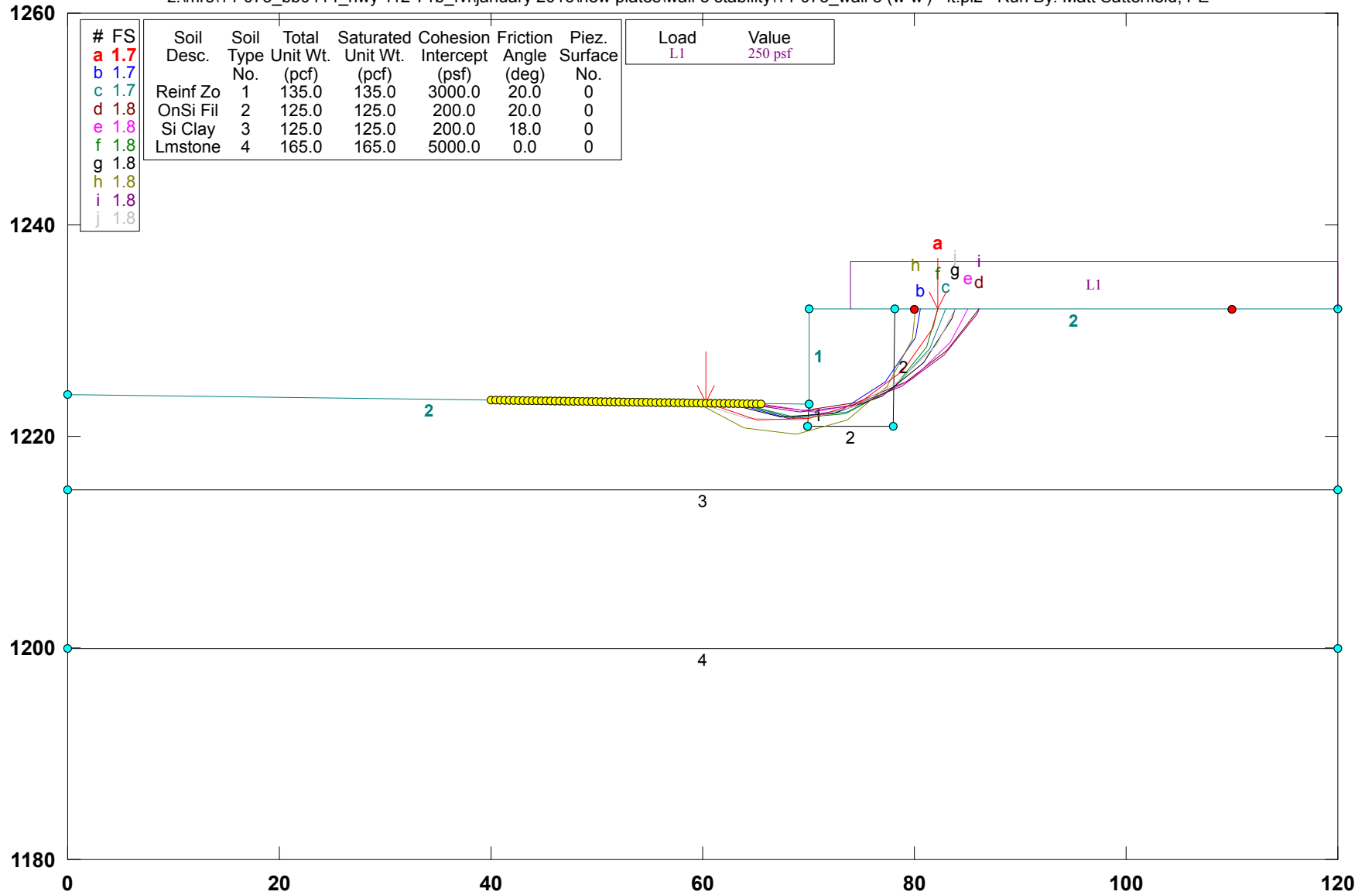
PCSTABL5M/si FSmin=8.3

Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 3 - Sta 297 +00 - (W-W') - H=11 ft - Long Term

z:\mrs\14-073_bb0414_hwy 112-71b_fv\january 2016\new plates\wall 3 stability\14-073_wall 3 (w-w') - lt.pl2 Run By: Matt Satterfield, PE



#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a	1.7	Reinf Zo	1	135.0	135.0	3000.0	20.0	0
b	1.7	OnSi Fil	2	125.0	125.0	200.0	20.0	0
c	1.7	Si Clay	3	125.0	125.0	200.0	18.0	0
d	1.8	Limestone	4	165.0	165.0	5000.0	0.0	0
e	1.8							
f	1.8							
g	1.8							
h	1.8							
i	1.8							
j	1.8							

Load	Value
L1	250 psf

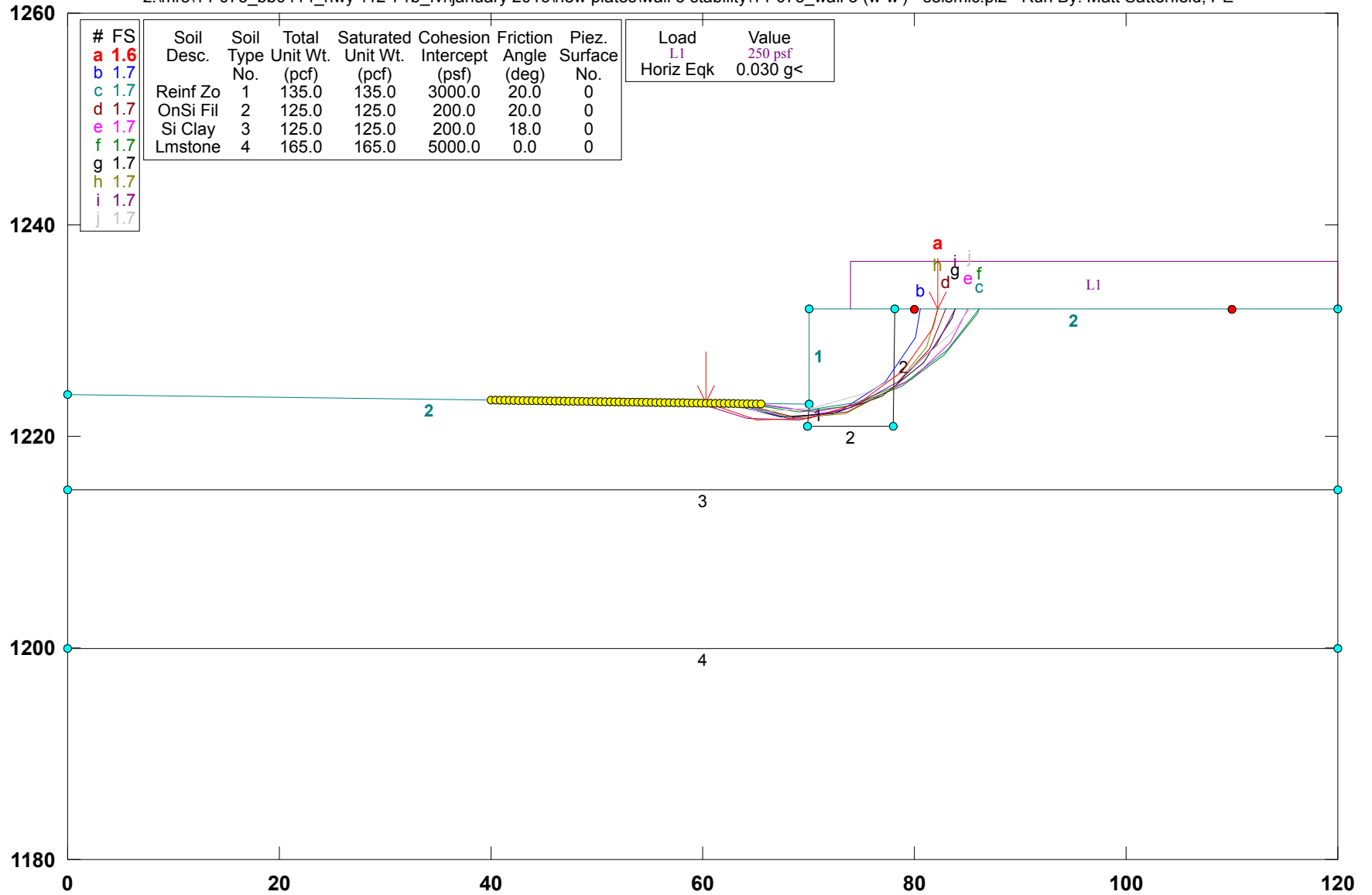
PCSTABL5M/si FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method



BB0414: Retaining Wall No. 3 - Sta 297 +00 - (W-W') - H=11 ft - Seismic

z:\mrs\14-073_bb0414_hwy 112-71b_fv\january 2016\new plates\wall 3 stability\14-073_wall 3 (w-w') - seismic.pl2 Run By: Matt Satterfield, PE



PCSTABL5M/si FSmin=1.6

Safety Factors Are Calculated By The Modified Bishop Method



ATTACHMENT 24

Summary of Recommendations for BB0414 Retaining Walls

PROJECT: AHTD JOB BB0414 - HWY 112/71B Widening & Interchange Improvements

LOCATION: Washington County, Arkansas

GHBW JOB NO.: 14-073

Project Facet	Location	Wall Type	Wall Length, ft	Approx Wall Height, ft	Relevant Borings or Test Pits	Estimated reinforcing strap length, ft	Anticipated undercut requirements, ft
Wall No. 2	North side of Collector-Distributor Rd - Hwy 112 over I-49	MSE	1115	14 to 24	W33, W34, W35, W36, W37, W38, W39, W40, W41	0.7H: 10-14	Approx Wall Sta 0+00 to 1+20: 4 ft below ftg bottom
							Approx Wall Sta 1+20 to 1+60: minimal undercut
							Approx Wall Sta 1+60 to 3+00: 4 ft below ftg bottom
							Approx Wall Sta 3+00 to 5+40: 5 ft below ftg bottom
							Approx Wall Sta 5+40 to 5+80: 4 ft below ftg bottom
							Approx Wall Sta 5+80 to 7+20: 5 ft below ftg bottom
							Approx Wall Sta 7+20 to 9+50: 6 ft below ftg bottom
							Approx Wall Sta 9+50 to 10+00: 2 ft below ftg bottom
							Approx Wall Sta 10+00 to 11+15: 3 ft below ftg bottom
Wall No. 3	CL Median I-49	MSE	933	8 to 11	W37, W38, W39, W40, W41	0.7H: 6-8	Minimal undercut
Wall No. 4	South side of Hwy 112 to NB I-49 Ramp	MSE	162	4 to 17	W24, W25, W26	0.7H: 3-12	Minimal undercut
Wall No. 5	South side of SB I-49 to Hwy 71B Ramp	MSE	455	5 to 21	W15, W16, W17, W18, W23	0.7H: 4-15	Approx Wall Sta 0+00 to 0+20: minimal undercut
							Approx Wall Sta 0+20 to 1+10: 5 ft below ftg bottom
							Approx Wall Sta 1+10 to 2+50: 9 ft below ftg bottom
							Approx Wall Sta 2+50 to 3+15: 12 ft below ftg bottom
							Approx Wall Sta 3+15 to 4+35: 7 ft below ftg bottom
							Approx Wall Sta 4+35 to 4+55: minimal undercut
Wall No. 6	CL Median I-49	MSE	688	11 to 12	W50, W51, W52, W53, W54, W55	0.7H: 7-8	Approx Wall Sta 0+00 to 0+20: minimal undercut
							Approx Wall Sta 0+20 to 2+50: 2 ft below ftg bottom
							Approx Wall Sta 2+50 to 4+30: minimal undercut
							Approx Wall Sta 4+30 to 5+60: 4 ft below ftg bottom
							Approx Wall Sta 5+60 to 6+88: 5 ft below ftg bottom

Summary of Recommendations for BB0414 Retaining Walls

PROJECT: AHTD JOB BB0414 - HWY 112/71B Widening & Interchange Improvements

LOCATION: Washington County, Arkansas

GHBW JOB NO.: 14-073

Project Facet	Location	Wall Type	Wall Length, ft	Approx Wall Height, ft	Relevant Borings or Test Pits	Estimated reinforcing strap length, ft	Anticipated undercut requirements, ft
Wall No. 7	South Abutment Wall of I-49 over Van	MSE	276	6 to 20	S27, W29, W31	0.7H: 4-14	Approx Wall Sta 0+00 to 2+00: minimal undercut
							Approx Wall Sta 2+00 to 2+76: 5 ft below ftg bottom
Wall No. 8	North Abutment Wall of I-49 over Van	MSE	285	8 to 18	S28, W32	0.7H: 6-13	Approx Wall Sta 0+00 to 2+65: 5 ft below ftg bottom
							Approx Wall Sta 2+65 to 2+85: 2 ft below ftg bottom
Wall No. 9	West side of I-49	MSE	1034	9 to 16	TP1, TP1B, TP2, TP3, TP4, TP4B, TP5	0.7H: 6-11	Minimal undercut

Notes: 1. Strap length is an estimate only. The Designer must select the length for use in final design.

2. The suitability of the MSE wall bearing stratum must be field verified by the Engineer or Department at the time of construction. The on-site native overburden and fill contains variable amounts of cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) chert and/or shale fragments. Where cobbles or boulders are encountered at plan footing elevations, these large rock fragments should be removed and the cavities should be properly backfilled.

(AHTD Standard Specifications Section 302, SM-1), or an approved alternate. Undercuts should have a minimum width determined by 1-horizontal to 2-vertical projection from the edge of the footing to the undercut bottom