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Job No. 15-019

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Attn: Mr. Shahriar Azad, P.E.

**RESULTS of GEOTECHNICAL INVESTIGATION  
INTERSTATE 30 ROADWAY WIDENING  
CA0601: HWY 70 – SEVIER ST (WIDENING) (S)  
I-30 BRIDGE REPLACEMENTS, SALINE COUNTY, ARKANSAS**

Dear Mr. Azad:

Presented herein are the results of the geotechnical investigation performed for the replacement bridges for Job CA0601: Hwy 70 – Sevier St (Widening) (S), on I-30 in Saline County, Arkansas. These services were authorized on behalf of Bridgefarmer & Associates, Inc. by the Subconsultant Agreement dated October 15, 2013. Notice to proceed with the field studies in the roadway alignment was received on February 20, 2015. Interim results of the geotechnical studies related to the four (4) replacement bridges included in this project phase have been provided previously.

The project consists of widening I-30 from the Hwy 70 interchange to the Sevier Street intersection, a total length of about 4.9 miles. The west end of the project begins at approximately Sta 248+88 and ends to the east at approximately Sta 531+75. The subject of this report is the four (4) replacement bridges. These include the South Street Bridge over I-30, I-30 bridges over the Saline River, I-30 bridges over the Saline River Relief, and the I-30 bridges over Highway 67. This report includes a summary of the field and laboratory studies performed for the project bridges. Recommendations for foundations, embankments, and construction considerations are discussed in this report.

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We appreciate the opportunity to be of service to you during this phase of the 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.**

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SCS/DGG/MEW:jw

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## **SUMMARY**

A geotechnical investigation has been performed for Job No. CA0601, the widening I-30 from the Hwy 70 interchange to the Sevier Street intersection, a total length of about 4.9 miles. The project will include four (4) replacement bridges: (1) the South Street Bridge over I-30, (2) I-30 bridges over the Saline River, (3) I-30 bridges over the Saline River Relief, and (4) the I-30 bridges over Highway 67. The purposes of this study phase were to explore subsurface conditions in the bridge alignments, to analyze field and laboratory data, and to develop recommendations for foundation design and construction. Specific results, conclusions and recommendations are discussed in the following report sections. The general information developed by this study includes the following.

- ◆ Subsurface conditions were explored by drilling 34 sample and core borings to depths ranging from 35 to 100 ft below existing grades.
- ◆ Laboratory testing was performed on representative soil and rock samples.
- ◆ Published information on Arkansas geology indicates that the bridge alignments traverse mapped geologic areas of Quaternary Alluvium, the Tertiary Wilcox and Midway groups, the middle Ordovician Period Womble Shale Formation, and the lower Ordovician Mazarn Shale Formation.
- ◆ Subsurface conditions generally consist of existing embankment fill, variable overburden soils and shale bedrock.
- ◆ Recommendations for piling and drilled shaft foundation systems have been developed and are discussed in the following report.
- ◆ Recommendations for lateral earth pressures on abutment walls and wing walls are provided in the report.
- ◆ Slope stability of the existing embankments was evaluated by performing slope stability analyses using the computer program SLOPE/W 2007 and a Morgenstern-Price analysis. The analyses indicated acceptable calculated factors of safety against sliding for all conditions evaluated.

## **1.0 INTRODUCTION**

### **1.1 Project Description**

The project consists of widening I-30 from the Hwy 70 interchange to the Sevier Street intersection, a total length of about 4.9 miles. The west end of the project begins at approximately Sta 248+88 and ends to the east at approximately Sta 531+75. The subject of this particular geotechnical investigation report is the four (4) replacement bridges. These include:

- South Street Bridge over I-30,
- I-30 bridges over the Saline River,
- I-30 bridges over the Saline River Relief, and
- I-30 bridges over Highway 67.

The project vicinity is shown in Attachment 1. The preliminary bridge layouts are also provided in Attachment 1.

The South Street replacement bridge is an overpass located at approximately I-30 log mile 115.82. The bridge location is shown on the Site Vicinity Map, Plate 1. The replacement bridge will be comprised of continuous composite W-beam unit with a total bridge length of approximately 250 feet. The replacement structure will include five (5) bents. Preliminary plans are to utilize a combination of steel pile and drilled shaft foundations for the replacement bridge. The new bridge will have simple side slopes with approximate 3 horizontal to 1 vertical (3H:1V) configurations and MSE walls at the abutments.

The I-30 over the Saline River replacement bridges will be continuous composite W-beam and plate girder units with a total bridge length of approximately 1063 feet. The replacement structures will each include 15 bents. Preliminary plans are to utilize foundation systems comprised of steel piles and drilled shafts for the replacement bridge. The new bridges will utilize simple slopes at the bridge ends, essentially using the existing embankments for the replacement bridges. It is understood that the existing bridges are supported on piling foundation systems.

The I-30 over the Saline River Relief replacement bridges will be comprised of continuous composite W-beam and plate girder units with a total bridge length of approximately 503 feet. The replacement structures will each include nine (9) bents. Preliminary plans are to utilize a foundation system comprised of steel piles for the replacement bridges. The new bridges will utilize simple slopes at the bridge ends, using the existing embankments and some new

embankment for the replacement bridges. It is understood that the existing bridge is supported on pile foundations.

The I-30 over Highway 67 replacement bridges will be continuous composite plate girder units. Bridges A and B will have a total length of approximately 151 ft and 150 ft, respectively. The replacement structures will each be single-span units. Preliminary plans are to utilize a foundation system comprised of steel piles for the replacement bridge. The new bridges will have MSE walls at the abutments returning back at the embankment sides. It is understood that the existing bridges are supported on pile foundations.

### 1.2 Purposes of This Study

The purposes of this study phase were to explore subsurface conditions in the bridge alignments. The data developed through the field and laboratory studies have been used to develop recommendations to guide design and construction of foundations. These purposes have been achieved by a multi-phased study that has included.

- ◆ Drilling sample and core borings to evaluate subsurface conditions and to obtain samples for laboratory testing.
- ◆ Performing laboratory tests to establish pertinent engineering properties of the foundation and subgrade strata.
- ◆ Analyzing field and laboratory data to develop recommendations for seismic site class, liquefaction potential, foundation design, stability of the existing embankment configurations, and construction considerations.

The relationship of these factors to design and construction of the new bridge and approaches has been considered in developing the recommendations and considerations discussed in the following report sections.

### 1.3 Variations in Subsurface Conditions

This report presents findings and conclusions regarding subsurface conditions in the project alignment and the replacement bridge sites. The interpretation of soil and groundwater conditions has been based on our knowledge of site geology, the results of the borings performed for this study phase, and our observations made during the site investigation. Although consideration has been given to minor variations in subsurface conditions, the recommendations and conclusions of this report may not be appropriate for localized, but potentially significant, variations in conditions.

The Engineer (Bridgefarmer & Associates, Inc.) or Department (Arkansas State of Highway and Transportation Department) or a designated representative thereof, should monitor site preparation, grading work, and all foundation construction. The recommendations contained

herein have been developed based on a discrete number of widely-spaced borings and site observations. Subsurface conditions significantly at variance with those encountered in the sample borings 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.

## **2.0 SUBSURFACE EXPLORATION**

### **2.1 General**

Subsurface conditions at the bridge locations were explored by drilling 34 sample and core borings to depths ranging from 35 to 100 ft below existing grades. The boring locations were selected based on the preliminary layout and plan and profile drawing available at the time of the field studies. The subsurface exploration program is summarized on Plates 10 through 13 of Attachment 1. Details of the subsurface exploration program are discussed in the following report sections.

### **2.2 Borings**

As noted, a total of 34 sample borings were performed to explore subsurface conditions at the bridge locations. The site vicinity is shown on Plate 1 of Attachment 1. The approximate boring locations are shown on the Plans of Borings provided in Attachments 2, 3, 4, and 5 for the South Street, Saline River, Saline River Relief, and Hwy 67 bridges, respectively. The subsurface conditions encountered in the borings, and the results of field and laboratory tests, are shown on the boring logs provided in each attachment. The approximate I-30 centerline station and offset of the boring locations are noted on the logs. The approximate ground surface elevation, as inferred from topographical information provided by the Engineer, is also shown on each log. It must be noted that the ground surface elevations shown are approximate and actual elevations may vary. The boring locations were determined by measurement to existing features.

Generalized subsurface profiles are included in the appropriate attachments. It should be recognized that the stratigraphy illustrated by the profiles has been inferred between discrete boring locations. In view of the natural variations in stratigraphy and subsurface 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 in the sections above may vary.

Keys to the terms and symbols used on the logs are presented in Attachment 6 for soil and rock strata respectively.

The bridge borings were drilled with truck-mounted Mobile B-53 and SIMCO 2800 rotary-drilling rigs using a combination of dry-auger, rotary-wash, and rock coring drilling procedures. Soil and weathered rock samples were typically obtained using a 2-in.-diameter split-barrel sampler



driven into the strata by blows of a 140-lb hammer dropped 30 in. in accordance with Standard Penetration Test (SPT) procedures. A safety hammer was used with the Mobile B-53 drill rig and an automatic hammer was used with the SIMCO 2800 rig. The number of blows required to drive the standard split-barrel sampler the final 12 in. of an 18-in. total drive, or portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the boring logs in the "Blows Per Ft" column. Where rock hardness precluded obtaining samples via the SPT, cuttings were obtained for use in visual classification.

To evaluate rock conditions, core samples were obtained. Rock cores were obtained using a 5-ft-long, NQ<sub>WL</sub>-size core barrel fitted with a diamond bit and using a wireline system. For each core run, the percent recovery was determined as the ratio of recovery to the total length of the core run. Rock Quality Designation (RQD) was also determined for each core run. RQD is defined 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 of these values are shown in the right hand column of the log forms, opposite the corresponding core run. Photographs of the rock cores are provided in Attachment 7.

All samples were removed from sampling tools in the field, examined, and visually classified by the geotechnical engineer, field geologist, or geotechnical technician. Samples were then placed in appropriate containers to prevent moisture loss and/or change in condition during transfer to our laboratory for further examination and testing.

### 2.3 Groundwater Observations

The borings were advanced using dry-auger procedures to the extent possible to facilitate groundwater observations. Observations regarding groundwater are noted in the lower portion of each log and are discussed in subsequent sections of this report. All boreholes were backfilled after obtaining final water level readings.

The borings were advanced using dry-auger drilling procedures to the extent possible to enhance groundwater observations. Groundwater conditions were observed during and following drilling operations. These observations are noted on the boring logs.

### **3.0 LABORATORY TESTING**

#### **3.1 General Considerations**

To evaluate pertinent physical and engineering characteristics of the soil and rock encountered in the borings, laboratory tests consisting of natural water content determinations, classification tests, and strength measurements of soils and rock test were performed on selected representative samples. The laboratory testing program included the following.

- ◆ Soil water content (AASHTO T-265)
- ◆ Liquid limit, plastic limit, and plasticity index (AASHTO T-89 and T-90)
- ◆ Grain size analyses (AASHTO T-88, and T-11)
- ◆ Point Load Strength Tests (ASTM D-5371)
- ◆ Unconfined compressive strength of rock cores (AASHTO T-226)

#### **3.2 Water Content Determinations**

A total of 230 natural water content determinations were performed to complete soil water content profiles for each boring and to measure the in-situ moisture content of the bulk samples. Water content results are plotted on the log forms in accordance with the scale and symbols shown in the legend located in the upper-right corner of the logs.

#### **3.3 Classification Tests**

To verify field classifications and to evaluate soil plasticity, 75 Atterberg (liquid and plastic) limit determinations and 79 sieve analyses, including three (3) hydrometer tests, were performed on selected representative soil samples and one (1) potential borrow sample. The Atterberg limits of the soil samples are plotted on the logs as plus signs connected with a dashed line. The percentage by weight of soil passing the No. 200 sieve is noted in the “- No. 200%” column on the far right side of the log forms. In addition, specific gravity was measured for use in each hydrometer analysis of particle size distribution. A summary of laboratory test results and classification by the Unified Soil Classification System and AASHTO classification is presented in Attachment 7. Grain-size distribution curves are also included in Attachment 7.

#### **3.4 Rock Strength Tests**

Compressive strength of representative core samples of shale was evaluated by a total of 2 compression tests. Results of the laboratory compression tests of rock cores 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 rock compression test results are also summarized in Attachment 8.

### 3.5 Point Load Strength Tests (ASTM D-5371-08)

Rock strength was also evaluated by point load tests performed on 1 representative core sample. For the point load test, a sample of rock is mounted between two pointed platens and loaded until the sample fails. The peak applied load is recorded and used to calculate the Point Load Index ( $I_s$ ). The Point Load Index value was used for strength classification of rock materials. This value was also used to approximate the uniaxial compressive rock strength. These test results are summarized in Attachment 8.

#### **4.0 GENERAL SITE and SUBSURFACE CONDITIONS**

##### **4.1 Site Conditions**

The project alignment starts at the Interstate 30 and Highway 70 interchange, Sta 248+88.06, and extends east to the I-30 and Sevier Street/South Street interchange, Sta 531+75.78. The project alignment locale is a mixture of undeveloped areas and commercial development. The existing I-30 is an interstate highway with two traffic lanes each direction and an asphalt concrete pavement section. The alignment also crosses the Saline River and Saline River Relief between Haskell (Hwy 67 interchange) and Benton. Surface drainage of the project area is highly variable. Surface drainage of the existing roadway is good and drainage of the surrounding terrain varies from poor to fair.

The South Street over I-30 bridge location is at approximately I-30 log mile 115.82 in the southwest portion of Benton, Arkansas. The existing overpass is on an embankment with interchange ramps on both sides of the interstate. The interstate directional lanes are separated by a grass-covered median with three beam guardrails. With the exception of the overpass embankment, the surrounding terrain is generally flat. Surface drainage is considered fair.

The Saline River Bridge is located at approximately I-30 log mile 114.38. The Saline River channel at the bridge location is relatively wide and well defined. The exposed sand and gravel are predominant in and near channel with a number of natural and fill terraces near the stream channel.

The I-30 bridges over the Saline River Relief are located at approximately I-30 log mile 113.95 in Saline County, Arkansas. The existing twin bridges cross a low area of the Saline River flood plain. The interstate roadway is on an existing embankment through this relatively low-lying area.

The I-30 bridges over Highway 67 are part of an interchange located at approximately I-30 log mile 113.73. This location is at approximately the southwestern edge of the Saline River flood plain. The land to the northeast is flat and poorly drained. To the southwest, the terrain is rolling. Higher terrain is located north and west of this location, representing the foothills of the Ouachita Mountains. The existing Highway 67 is a two-lane highway with north and south directional lanes. Drainage ditches are present along the west side of Highway 67 and around the north side slopes of the Highway 67 Bridges. Surface drainage in this area varies from poor to fair. The drainage along the current Hwy 67 alignment is poor at the existing underpass.

#### 4.2 Site Geology

The Geologic Map of Arkansas<sup>1</sup> indicates that the bridge alignments traverse mapped geologic areas of Quaternary Alluvium, the Tertiary Wilcox and Midway groups, the middle Ordovician Period Womble Shale Formation, and the lower Ordovician Mazarn Shale Formation. The alluvial deposits are the predominant geologic exposure in the Saline River flood plain. These are comprised of variable sand, silt, gravel and clay units, and mixtures of any or all of these clastic materials. The alluvium is underlain by the Tertiary Wilcox and Midway groups and the Ordovician Womble and Mazarn Formations.

The Wilcox Group is comprised of sandy, lignitiferous littoral clays, cross-bedded river sands, compact noncalcareous lacustrine or lagoonal clays, lignite lentils, and stratified deltaic silts. The upper layers of this formation typically have a larger proportion of sand. Within Central Arkansas, bauxite is commonly encountered at the base of the Wilcox near knobs of Cretaceous nepheline syenite. The Wilcox rests unconformably on the Midway Group. The thickness of the Wilcox Group ranges from a few feet to 1000 feet, with an average thickness of about 850 feet.

The Womble Shale typically consists of black, graphitic shale with thin layers of limestone, numerous quartz veins, silty sandstone, and some chert. The shale can often be somewhat slaty. Depending upon the extent of weathering, the rock hardness can range from soft to hard. The highly folded and steeply dipping units of the formation contain numerous inactive faults, folds and fractures. The formation is reported to range from 500 to 1200 feet thick. It rests conformably on the Blakely Sandstone.

Shale is predominant in the Mazarn Formation with subordinate units of siltstone, silty to conglomeritic sandstone, limestone, and chert. The shale is primarily gray to black. However, there are often thin layers of olive-gray silty shale or siltstone which are interbedded in the darker shale sequences. Variable thin to thick beds of sandstone are sometimes present in random horizons, primarily in the upper and lower portions of the formation. The chert is typically found in the upper part of the unit. Milky quartz veins are common in some areas. The Mazarn Shale is reported to

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<sup>1</sup> Geologic Map of Arkansas, Arkansas Geologic Commission and U.S. Geologic Survey; 1993

have a thickness ranging from 1000 ft to over 2500 feet. The Mazarn is conformable with the underlying Crystal Mountain Sandstone.

#### 4.3 Seismic Conditions

In light of the results of the borings and the surface geology at the Saline River Bridge location, a Seismic Site Class C (very dense soil and soft rock profile) is considered applicable for the bridge with respect to the criteria of the AASHTO LRFD Bridge Design Specifications Seventh Edition 2014<sup>2</sup>.

The 2014 edition of the AASHTO Guide Specifications indicates 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 locations is predicted to be 0.115. 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 0.138 is considered appropriate for the bridge site.

The seismic conditions and parameters developed and recommended for design of the South Street, Saline River, Saline River Relief, and Hwy 67 bridges are summarized in the table below.

**Summary of Seismic Conditions and Parameters**

<b>Structure</b>	<b>South Street</b>	<b>Saline River</b>	<b>Saline River Relief</b>	<b>Hwy 67</b>
<b>Seismic Site Class</b>	C	C	C	C
<b>Design 1.0-Second Spectral Acceleration, <math>S_{D1}</math></b>	0.136	0.136	0.136	0.133
<b>Seismic Performance Zone</b>	1	1	1	1
<b>Design Peak Ground Acceleration, <math>A_s</math></b>	0.132	0.144	0.144	0.132

#### 4.4 Subsurface Conditions – South Street over I-30

The subsurface conditions revealed by the borings at the South Street replacement bridge site are shown in detail on the boring logs, presented in Attachment 2. The borings indicate that the embankments are comprised of variable on-site fill extending to approximately 13- to 17-ft depth (see Borings S5 and S9). The embankment fill varies from stiff to very stiff silty/fine sandy clay to

<sup>2</sup> AASHTO LRFD Bridge Design Specifications, 7<sup>th</sup> Edition; AASHTO; 2014.



firm to stiff clay (see Boring S5). The on-site fill at the southeast bridge end is stiff to very stiff fine sandy clay and medium dense clayey fine sand (see Boring S9) extending from approximately 1- to 13-ft depth.

The surficial soils along the I-30 alignment (see Borings S6, S7 and S8) are comprised of on-site fill consisting of medium dense to dense clayey fine to coarse sand and dense silty fine to coarse sand extending to approximately 8-ft depth. The silty sand/clayey sand (A-2-4 and A-2-6) fill contains variable amounts of gravel and quartz fragments.

The variable on-site fill is underlain by a variable soil units including medium dense to dense clayey fine to medium sand, stiff fine sandy clay and dense sandy fine to coarse gravel. These overburden soils extend to variable depths of approximately 2 to 8.5 ft in the I-30 alignment (see Borings S6, S7 and S8) and 9- to 33-ft depth near the bridge ends (see Borings S5 and S9). Natural firm to stiff silty clay with shale fragments and weathered shale seams and layers is below the granular soil units and extends to approximately 8- to 13-ft depth.

The overburden soils are underlain by low hardness to moderately hard tan and dark gray weathered shale below about 11- to 13-ft depth (approximate El 334 to El 332) in the I-30 alignment and below about 33-ft depth ( $\pm$ El 336) at the bridge ends. The weathered shale is locally arenaceous (see Boring S9) and contains occasional silty clay laminations and seams, sandstone partings, seams and layers, and quartz veins and inclusions. The weathered shale is relatively flat bedded and exhibits high shear strength but very poor rock quality.

The basal stratum encountered in the borings is moderately hard to hard dark gray shale. The dark gray shale is present below about 13- to 18-ft depth (approximately El 332 to E 327) in the I-30 alignment (see Borings S7 and S8) and 28- to 45-ft depth ( $\pm$ El 336 to  $\pm$ El 319) near the bridge ends (see Borings S5 and S9).

#### 4.5 Subsurface Conditions –I-30 over Saline River

Subsurface conditions in the approximately 1100-ft alignment of the Saline River Bridges is dominated by the alluvial soils of the Saline River flood plain overlying shale bedrock. The existing embankment fill is comprised of medium dense to dense clayey fine sand and stiff to very stiff fine sandy clay. The fill extends to about 13 to 16 feet. The depth, compaction and content of the embankment fill is likely to vary across the site.

The natural overburden soils below the embankment fill or at the ground surface away from the embankments are predominantly medium dense sandy fine to coarse gravel, and very loose to

medium dense silty fine sand. Subordinate units of clayey silt, silty clay, and fine sandy clay are locally present. The overburden soils extend to depths of 10 to 30 ft below natural grades. The overburden soil zone is thinner nearer the river channel and becomes thickest near the bridge ends.

Moderately hard to hard weathered shale, slightly weathered shale, and shale are below the overburden soils. The weathered shale and shale units contain variable amounts of calcareous shale units and siltstone partings and seams. The weathered shale and shale are generally competent and exhibit fair to good rock quality.

#### 4.6 Subsurface Conditions –I-30 over Saline River Relief

The subsurface conditions in the Saline River Relief bridge alignments are typically a mixture of fine-grained alluvial and residual soils and granular alluvial soil units. The existing embankment fill is comprised of dense fine sandy silt, stiff to very stiff sandy, clayey silt and fine sandy clay, and dense silty fine sand. The embankment fill extends to variable depths of 17- to 23-ft depth. The depth, compaction and content of the embankment fill may vary across the site.

The natural overburden soils in the Saline River Relief vary from soft to very stiff silty clay to medium dense to dense clayey sand, silty sand, and sandy gravel. The natural overburden soils exhibit very low to moderate shear strength and moderate to high compressibility. The overburden soils extend to variable depths of 16 to 59 ft below natural grades.

For the most part, the overburden soils overlie moderately hard to hard weathered shale, slightly weathered shale, and shale. The shale units contain variable amounts of calcareous sandstone, quartz inclusions, and siltstone partings and seams. The weathered shale and shale are generally competent and exhibit fair to good rock quality.

A localized anomaly in the subsurface conditions was encountered near Sta 413 to Sta 414 (see Boring S14). At this location, very stiff to hard clay was found below the granular alluvial soils and extends to 59-ft depth. Below the clay, a stratum of moderately hard to hard limestone extends to 64-ft depth. The limestone is relatively coarse, but well cemented. Below the limestone is the slightly weathered shale.

#### 4.7 Subsurface Conditions –I-30 over Hwy 67

The existing embankment fill at the Hwy 67 Bridge site is generally firm to very stiff silty clay with a variable content of shale and sandstone fragments. The embankment fill extends to about 20 ft below the top of the existing embankment. Compaction of the embankment fill varies from poor to good.

The natural overburden soils below the embankment fill are variable strata of firm to stiff clay, stiff fine sandy clay, and firm to very stiff silty clay. The natural overburden soils exhibit low to moderate shear strength and moderate compressibility. The overburden soils extend to variable depths of approximately 14 to 22 ft below natural grades.

Below approximately 14 to 22 ft below natural grades, the overburden soils lie on moderately hard to hard weathered shale and shale with silty stone and sandstone seams. The weathered shale and shale are generally strong, competent and exhibit fair to good rock quality.

## **5.0 ANALYSES and RECOMMENDATIONS**

### **5.1 Liquefaction Analyses**

Liquefaction analyses were performed to evaluate the liquefaction potential of the subsurface soils. The analyses were performed utilizing the procedures proposed by Idriss and Boulanger<sup>3</sup> in 2008. Selected borings were evaluated for liquefaction triggering. These results indicate that some liquefaction triggering could occur in saturated and loose soil zones in the upper portions of the soil stratigraphy. However, where triggered the liquefaction depth is shallow and limited to 10 ft or less. Consequently, the liquefaction potential is not considered to be a design issue for the Saline County, Arkansas bridge sites. The results of liquefaction analyses are provided in Attachment 9.

### **5.2 Foundation Design**

Foundations for the replacement bridge structures must satisfy two (2) basic and independent design criteria: a) foundations must have an acceptable factor of safety against bearing failure under maximum design loads, and b) foundation movement due to consolidation or swelling of the underlying strata should not exceed tolerable limits for the structure. Construction factors, such as installation of foundations, excavation procedures and surface and groundwater conditions, must also be considered. Recommendations for foundations of the various bridges comprising this project are discussed in the following report sections.

### **5.3 South Street Bridge – Bridge End Pilings**

Steel piles are recommended for support of the foundation loads at the South Street Bridge ends. HP12x53 steel piles are considered a suitable section. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through the embankment fill, the on-site fill and natural overburden soils, and zones of highly weathered shale to develop safe bearing capacity in the competent moderately hard to hard shale. End-bearing piles should be driven to practical refusal. We recommend that all steel piles be fitted with rock points.

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<sup>3</sup> "Soil Liquefaction during Earthquakes." Earthquake Engineering Research Institute, MNO-12, Idriss and Boulanger, 2008.

Bearing capacity of steel piles driven to refusal should be determined using the LRFD structural design procedure<sup>4</sup>. We recommend that nominal (ultimate) resistance ( $P_n$ ) of steel piles be determined based on the yield strength of steel piles ( $f_y$ ) and the net end area ( $A_{net}$ ) of the section. An effective resistance factor ( $\phi_c$ ) of 0.50 is recommended for structural determination of factored bearing capacities in accordance with AASHTO LRFD Bridge Design Specifications regarding design of steel structures. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

It has been our experience that allowable compression pile capacities of 97 tons is common for  $f_y$  50 kips per sq in. HP12×53 piles. The 97-ton capacity is based on allowable stress design (ASD) with an allowable compressional stress of  $0.25f_y$ . However, the appropriate factored bearing capacity should be confirmed by the Engineer and the Department. Post-construction settlement of piles driven to refusal will be negligible. Since existing embankments will be incorporated into the new bridge, downdrag loads on piles due to long-term embankment settlement are considered to be negligible. Preboring may be required to advance piles through localized zones of large rock fragments in the fill or dense granular soils.

We recommend a minimum pile penetration extending at least 10 ft below existing grades (at the base of embankment fill) or to practical refusal at depths below existing grades. Estimated pile tip elevations are summarized in the following table.

**Estimated Tip Elevations of Steel Piles Driven to Refusal – South Street**

Bent No.	Estimated Pile Tip El, ft	Comments
1 (North Abutment)	330	Estimated 27 ft below plan pile cap bottom (El 357)
5 (South Abutment)	300	Estimated 59 ft below plan pile cap bottom (El 359)

It should be noted that tip elevations shown in the above table are estimates only based on the results of the borings and the inferred surface elevations at particular boring locations. As-built pile tip elevations may vary. Pile safe bearing capacity and final depth must be field verified. In light of the results of the borings, as well as the potential for fine to coarse gravel and rock fragments in the embankment fill and the overburden soils, pre-boring should be anticipated for installation of some piles. Estimated pre-bore elevations are summarized in the table below.

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<sup>4</sup> AASHTO LRFD Bridge Design Specifications, AASHTO, 2014.

**Estimated Pre-Bore Elevations – South Street**

<b>Bent No.</b>	<b>Estimated Pre-Bore El, ft</b>
1 (North Abutment)	335
5 (South Abutment)	323

Piles should be installed in compliance with AHTD Standard Specifications Section 805. Specific driveability analyses will be performed to evaluate suitable driving equipment. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer or Department prior to hammer acceptance and start of driving. We have recommended that all piles be fitted with rock points.

As a minimum, safe bearing capacity of production piles should be determined by AHTD Standard Specifications Section 805.09, Method A. 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. Driving records should be available for review by the Engineer during pile installation.

**5.4 South Street Bridge – Drilled Shafts for Interior Bents**

At the South Street bridge interior bents (Bents 2, 3 and 4), competent moderately hard weathered shale was encountered at depths of 11 to 13 ft below existing grades (approximately El 334 to El 332). We recommend that the foundation loads of the interior bents be supported on drilled shafts bearing in the competent moderately hard to hard tan and dark gray slightly weathered shale. Drilled shafts should be founded a minimum of two (2) shaft diameters into the moderately hard dark gray and tan slightly weathered shale and/or the moderately hard to hard dark gray shale. For drilled shafts founded as recommended, a maximum nominal bearing capacity of 120 kips per sq ft is recommended. A resistance factor ( $\phi_{stat}$ ) of 0.50 is recommended for drilled shaft end bearing. Consequently, a maximum factored end bearing capacity of 60 kips per sq ft is recommended for drilled shafts founded in the competent shale. Settlement of properly installed drilled shaft foundations founded in the competent shale should be negligible. We recommend that drilled shafts bearing in competent rock be sized for compression loads based on the end-bearing capacity alone.

Resistance to uplift loads will be developed by circumferential shaft friction. Drilled shafts will penetrate the overburden soils and low hardness highly weathered shale to bear in the



light gray to dark gray shale. Uplift resistance in the top 5 ft of shaft penetration and/or all penetration through the overburden soils, whichever is greater, should be neglected. For shaft penetration into the moderately hard to hard shale, a maximum nominal skin resistance value of 6500 lbs per sq ft is recommended. For evaluation of uplift capacity, a resistance factor ( $\phi_{up}$ ) of 0.40 is recommended for shaft skin friction.

Drilled shaft resistance to lateral forces will be developed by the passive resistance of the shale bearing stratum. If desired, detailed lateral load analyses can be performed when specific information on lateral loads, shaft dimensions, etc. are available.

As-built drilled shaft lengths will vary with the required penetration into the bearing stratum and specific subsurface conditions. Depending on specific subsurface conditions and rock quality, localized deepening or shortening of shaft depths will be warranted. All drilled shaft excavations must be observed by the Engineer or Department to verify suitable bearing and adequate penetration.

#### 5.5 Saline River Bridge –Piling - (Bents 1 and 2 and 13 through 15)

Steel piles are recommended for support of the foundation loads at or near the Saline River Bridge ends (Bents 1 and 15) and interior bents (Bents 2, 13 and 14). HP12x53 and HP14x102 steel piles are considered suitable sections. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through the embankment fill, the on-site fill and natural overburden soils, and zones of highly weathered shale to develop safe bearing capacity in the competent moderately hard to hard slightly weathered shale. End-bearing piles should be driven to practical refusal. We recommend that all steel piles be fitted with rock points.

Bearing capacity of steel piles driven to refusal should be determined using the LRFD structural design procedure<sup>5</sup>. We recommend that nominal (ultimate) resistance ( $P_n$ ) of steel piles be determined based on the yield strength of steel piles ( $f_y$ ) and the net end area ( $A_{net}$ ) of the section. An effective resistance factor ( $\phi_c$ ) of 0.50 is recommended for structural determination of factored bearing capacities in accordance with AASHTO LRFD Bridge Design Specifications regarding design of steel structures. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

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<sup>5</sup> AASHTO LRFD Bridge Design Specifications, AASHTO, 2014.

It has been our experience that allowable compression pile capacities of 97 tons and 188 tons are common for  $f_y$  50 kips per sq in. HP12×53 and HP14×102 piles, respectively. The 97-ton and 188-ton capacities are based on allowable stress design (ASD) with an allowable compressional stress of  $0.25f_y$ . However, the appropriate factored bearing capacity should be determined by the Engineer. Post-construction settlement of piles driven to refusal will be negligible. Since existing embankments will be incorporated into the new bridge, downdrag loads on piles due to long-term embankment or foundation soil settlement are considered to be negligible. Preboring may be required to advance piles through localized zones of large rock fragments in the fill or dense granular soils.

We recommend a minimum pile penetration extending at least 10 ft below existing grades (at the base of embankment fill) or to practical refusal at depths below existing grades. Estimated pile tip elevations are summarized in the table below.

**Estimated Tip Elevations of Steel Piles Driven to Refusal – Saline River Bridge**

<b>Bent No.</b>	<b>Estimated Pile Tip El, ft</b>	<b>Comments</b>
1 (West Abutment)	245	Estimated 44 ft below plan pile cap bottom (El 289)
2	243	Estimated 33 ft below existing grade (El 276)
13	242	Estimated 31 ft below existing grade (El 273)
14	244	Estimated 30 ft below existing grade (El 274)
15 (East Abutment)	247	Estimated 42 ft below plan pile cap bottom (El 289)

It should be noted that tip elevations shown in the above table are estimates only based on the results of the borings and the inferred surface elevations at particular boring locations. As-built pile tip elevations may vary. Pile safe bearing capacity and final depth must be field verified. In light of the results of the borings, as well as the potential for fine to coarse gravel and quartz fragments in the embankment fill and the overburden soils, pre-boring should be anticipated for installation of some piles. Estimated pre-bore elevations are summarized in the following table.

**Estimated Pre-Bore Elevations – Saline River Bridge**

<b>Bent No.</b>	<b>Estimated Pre-Bore El, ft</b>
1 (West Abutment)	250-247
2	247-243
13	255-245
14	251
15 (East Abutment)	Not Anticipated

Piles should be installed in compliance with AHTD Standard Specifications Section 805. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer or Department prior to hammer acceptance and start of driving. We have recommended that all piles be fitted with rock points.

As a minimum, safe bearing capacity of production piles should be determined by AHTD Standard Specifications Section 805.09, Method A. 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. Driving records should be available for review by the Engineer during pile installation.

**5.6 Saline River Bridge - Drilled Shafts (Bents 3 through 12)**

We understand that drilled shaft foundations are planned for Bents 3 through 12 of the Saline River Bridge. Supporting foundation loads of these interior bents on drilled shaft foundations is considered suitable. Drilled shafts should be founded a minimum of three (3) shaft diameters, into the moderately hard to hard light gray to dark gray shale. For drilled shafts founded in the moderately hard to hard shale as recommended, a maximum nominal bearing capacity of 130 kips per sq ft is recommended. A resistance factor ( $\phi_{stat}$ ) of 0.50 is recommended for drilled shaft end bearing. Consequently, a maximum factored end bearing capacity of 65 kips per sq ft is recommended for drilled shafts founded into the competent shale. Settlement of properly installed drilled shaft foundations founded in the competent shale should be negligible. We recommend that drilled shafts bearing in competent rock be sized for compression loads based on the end-bearing capacity alone.

Resistance to uplift loads will be developed by circumferential shaft friction. Drilled shafts will penetrate the overburden soils and low hardness highly weathered shale to bear in the light gray to dark gray shale. Uplift resistance in the top 5 ft of shaft penetration and/or all

penetration through the overburden soils, whichever is greater, should be neglected. For shaft penetration into the moderately hard to hard shale, a maximum nominal skin resistance value of 8000 lbs per sq ft is recommended. For evaluation of uplift capacity, a resistance factor ( $\phi_{up}$ ) of 0.40 is recommended for shaft skin friction.

Drilled shaft resistance to lateral forces will be developed by the passive resistance of the shale bearing stratum. If desired, detailed lateral load analyses can be performed when specific information on lateral loads, shaft dimensions, etc. are available.

As-built drilled shaft lengths will vary with the required penetration into the bearing stratum and specific subsurface conditions. Depending on specific subsurface conditions and rock quality, localized deepening or shortening of shaft depths will be warranted. All drilled shaft excavations must be observed by the Engineer or Department to verify suitable bearing and adequate penetration.

#### 5.7 Saline River Relief - Piling

Steel piles are recommended for support of the foundation loads at the Saline River Relief Bridge. HP12x53 and HP14x89 steel piles are considered suitable sections. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through the embankment fill, the on-site fill and natural overburden soils, and zones of highly weathered shale to develop safe bearing capacity in the competent moderately hard to hard slightly weathered shale. End-bearing piles should be driven to practical refusal. We recommend that all steel piles be fitted with rock points.

Bearing capacity of steel piles driven to refusal should be determined using the LRFD structural design procedure<sup>6</sup>. We recommend that nominal (ultimate) resistance ( $P_n$ ) of steel piles be determined based on the yield strength of steel piles ( $f_y$ ) and the net end area ( $A_{net}$ ) of the section. An effective resistance factor ( $\phi_c$ ) of 0.50 is recommended for structural determination of factored bearing capacities in accordance with AASHTO LRFD Bridge Design Specifications regarding design of steel structures. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

It has been our experience that allowable compression pile capacities of 97 tons and 163 tons are common for  $f_y$  50 kips per sq in. HP12x53 and HP14x89 piles, respectively. The 97-ton and 163-ton capacities are based on allowable stress design (ASD) with an allowable

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<sup>6</sup> AASHTO LRFD Bridge Design Specifications, AASHTO, 2014.

compressional stress of  $0.25 f_y$ . However, the appropriate factored bearing capacity should be confirmed by the Engineer and the Department. Post-construction settlement of piles driven to refusal will be negligible. Since existing embankments will be incorporated into the new bridge, downdrag loads on piles due to long-term embankment settlement are considered to be negligible.

We recommend a minimum pile penetration extending at least 10 ft below existing grades (at the base of embankment fill) or to practical refusal at depths below existing grades. Estimated pile tip elevations are summarized in the following table.

**Estimated Tip Elevations of Steel Piles Driven to Refusal – Saline River Relief**

<b>Bent No.</b>	<b>Estimated Pile Tip El, ft</b>	<b>Comments</b>
1 (West Abutment)	220	Estimated 73 ft below plan pile cap bottom (El 293)
2	208	Estimated 70 ft below existing grade (El 278)
3	208	Estimated 68 ft below existing grade (El 276)
4	208	Estimated 67 ft below existing grade (El 275)
5	208	Estimated 66 ft below existing grade (El 274)
6	250	Estimated 23 ft below existing grade (El 273)
7	250	Estimated 25 ft below existing grade (El 275)
8	250	Estimated 28 ft below existing grade (El 278)
9 (East Abutment)	250	Estimated 41 ft below plan pile cap bottom (El 291)

It should be noted that tip elevations shown in the above table are estimates only based on the results of the borings and the inferred surface elevations at particular boring locations. As-built pile tip elevations may vary. Pile safe bearing capacity and final depth must be field verified. In light of the results of the borings, as well as the potential for fine to coarse gravel and quartz fragments in the embankment fill and the overburden soils, pre-boring should be anticipated for installation of some piles. Estimated pre-bore elevations are summarized in the table below.

**Estimated Pre-Bore Elevations – Saline River Bridge**

<b>Bent No.</b>	<b>Estimated Pre-Bore El, ft</b>
1 (West Abutment)	258-226
2	261-210
3	261-210
4	260-210
5	259-210
6	259-252
7	259-252
8	257-252-
9 (East Abutment)	257-252

Piles should be installed in compliance with AHTD Standard Specifications Section 805. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer or Department prior to hammer acceptance and start of driving. We have recommended that all piles be fitted with rock points.

As a minimum, safe bearing capacity of production piles should be determined by AHTD Standard Specifications Section 805.09, Method A. 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. Driving records should be available for review by the Engineer during pile installation.

5.8 Hwy 67 - Piling

Steel piles are recommended for support of the foundation loads at the Hwy 67 Bridge ends. HP14x89 steel piles are considered suitable sections. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through the embankment fill, the on-site fill and natural overburden soils, and zones of highly weathered shale to develop safe bearing capacity in the competent moderately hard to hard shale. End-bearing piles should be driven to practical refusal. We recommend that all steel piles be fitted with rock points.

Bearing capacity of steel piles driven to refusal should be determined using the LRFD structural design procedure<sup>7</sup>. We recommend that nominal (ultimate) resistance ( $P_n$ ) of steel piles be determined based on the yield strength of steel piles ( $f_y$ ) and the net end area ( $A_{net}$ ) of the



section. An effective resistance factor ( $\phi_c$ ) of 0.50 is recommended for structural determination of factored bearing capacities in accordance with AASHTO LRFD Bridge Design Specifications regarding design of steel structures. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

It has been our experience that an allowable compression pile capacity of 163 tons is common for  $f_y$  50 kips per sq in. HP14×89 piles. The 163-ton capacity is based on allowable stress design (ASD) with an allowable compressional stress of  $0.25 f_y$ . However, the appropriate factored bearing capacity should be confirmed by the Engineer and the Department. Post-construction settlement of piles driven to refusal will be negligible. Since existing embankments will be incorporated into the new bridge, downdrag loads on piles due to long-term embankment settlement are considered to be negligible. Preboring may be required to advance piles through localized zones of large rock fragments in the fill or dense granular soils.

We recommend a minimum pile penetration extending at least 10 ft below existing grades (at the base of embankment fill) or to practical refusal at depths below existing grades. Estimated pile tip elevations are summarized in the table below.

**Estimated Tip Elevations of Steel Piles Driven to Refusal – Highway 67**

<b>Bent No.</b>	<b>Estimated Pile Tip El, ft</b>	<b>Comments</b>
1 (West Abutment)	261	Estimated 58 ft below plan pile cap bottom (El 319)
2 (East Abutment)	261	Estimated 53 ft below plan pile cap bottom (El 314)

It should be noted that tip elevations shown in the above table are estimates only based on the results of the borings and the inferred surface elevations at particular boring locations. As-built pile tip elevations may vary. Pile safe bearing capacity and final depth must be field verified. In light of the results of the borings, as well as the potential for fine to coarse gravel and quartz fragments in the embankment fill and the overburden soils, pre-boring should be anticipated for installation of some piles.

Piles should be installed in compliance with AHTD Standard Specifications Section 805. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer or Department prior to hammer acceptance and start of driving. We have recommended that all piles be fitted with rock points.

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<sup>7</sup> AASHTO LRFD Bridge Design Specifications, AASHTO, 2014.

As a minimum, safe bearing capacity of production piles should be determined by AHTD Standard Specifications Section 805.09, Method A. 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. Driving records should be available for review by the Engineer during pile installation.

### 5.9 Wingwall and Abutment Wall Lateral Earth Pressures

It is anticipated that wingwalls and abutment walls at the replacement bridges will be backfilled with either unclassified borrow or select material. Unclassified borrow is expected to be a locally available soils such as sandy clay, silty clay, clayey sand, and silty sand. Select material is expected to be SM-1 (AHTD Standard Specifications Section 302).

Recommendations regarding lateral earth pressures for wingwalls and abutment walls are summarized below.

- Total unit weight ( $\gamma$ ) for unclassified backfill: 125 lbs per cu ft
- Angle of internal friction ( $\phi$ ) 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: 63 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: 94 lbs per sq ft per ft depth.
- Angle of internal friction ( $\phi$ ) for SM-1 backfill: 32°
- Total unit weight ( $\gamma$ ) for SM-1: 125 lbs per cu ft
- 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.
- Nominal/ultimate sliding resistance:
  - Interaction friction angle ( $\delta$ ) for concrete on stable bearing stratum: 19°.
  - Interaction friction factor ( $\tan \delta$ ) for concrete on stable bearing stratum: 0.34.
  - A resistance factor ( $\phi$ ) 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. This may include a clean, free draining

crushed stone, gravel, or granular soil zone or a geosynthetic drainage board approved by the Engineer. Drainage zones should be fully isolated from all soil and shale by a suitable geotextile complying with AHTD Standard Specifications Subsection 625.02, Type 2. Water should be discharged from backfill by a system of regularly-spaced, functioning weep holes or a drain pipe.

#### 5.10 Abutment Embankment Slopes

It is understood that the fill embankments at bridge ends will for the most part utilize the current end slopes and side slopes. New mechanically stabilized earth (MSE) abutment walls are planned at the new South Street and Hwy 67 Bridges. These walls will be evaluated in the report on walls for this project.

To evaluate suitability of the plan embankment configurations, slope stability analyses were performed. A 250 lbs per sq ft uniform surcharge from vehicles was typically included for the stability analyses. Based on a bridge abutment slope height that is less than 20 ft at the Saline River Relief, a conservative 350 lbs per sq ft uniform surcharge from vehicles was included for stability analyses for all cases at the Saline River Relief Bridge.

Stability analyses were performed using the computer program SLOPE/W 2007<sup>8</sup> and a Morgenstern-Price analysis. Four (4) general loading conditions were analyzed with respect to global slope stability, depending on the particular embankment scenario.

- 1) End of construction. This condition utilizes total stress soil shear strength parameters.
- 2) Long-term condition. This condition utilizes effective stress soil shear strength parameters.
- 3) Seismic condition. Analysis of this condition assumes the long-term condition but includes additional seismic forces. A horizontal acceleration coefficient ( $k_h$ ) value, which is equal to one-half of the design peak ground acceleration value ( $A_s$ ), was utilized in the stability analyses.
- 4) Rapid drawdown condition (for slopes where the design high water is higher than ground surface elevation). This loading condition assumes that flooding has impounded water against the embankment, with the water level eventually dropping from the flood condition (design high water) to ground surface too rapidly for the embankments to drain. The water surface elevations and drawdown elevation are shown on the stability analyses results.

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<sup>8</sup> Slope/W 2007; GEO-SLOPE International; March 2008.

The results of the stability analyses are provided in Attachments 10, 11, 12, and 13 for the South Street, Saline River, Saline River Relief, and Hwy 67 Bridges, respectively. In all cases, it is our opinion that the results of the analyses indicate stability of the plan embankment end and side slope configurations are acceptable. Consequently, it is our conclusion that the plan embankment slope configurations are suitable with respect to slope stability.

#### 5.11 Site Grading and Subgrade Preparation

Site preparation will begin with clearing and grubbing any trees in new embankment areas and stripping the organic-containing surface soils. Where fill depths in excess of 3 ft are planned, stumps may be left after close cutting trees to grade, as per AHTD criteria. Otherwise, the tree stumps must be completely excavated and properly backfilled. The depth of stripping will be variable, with deeper stripping depths in the low-lying, poorly drained, and/or heavily wooded areas, and less stripping required on hillsides and in the higher areas. In general, the stripping depth is estimated to be about 6 to 12 in. in cleared areas, but may be 18 to 24 in. or more in wooded areas.

Following stripping, and prior to fill placement or otherwise continuing with subgrade preparation, the extent of weak and unsuitable soils should be determined. Proof-rolling is recommended to evaluate subgrade stability. Proof-rolling should be performed with a loaded tandem-wheel dump truck or similar equipment. Unstable soils exhibiting a tendency to rut and/or pump should be undercut and replaced with suitable fill. Care should be taken that undercuts, stump holes, etc. are properly backfilled with compacted fill. Subgrade stability must be field verified during site preparation.

Localized undercuts on the order of 2 to 3 ft may be required for the abutment embankments. Undercuts for embankments may be backfilled with suitable embankment fill. Should excavations or deeper undercuts encounter shallow water or seepage, or if areas of seepage or seasonal springs are encountered during the work, backfill should consist of clean crushed stone (AASHTO M43 #57) or stone backfill (AHTD Standard Specifications, Section 207) to an elevation above the inflow of seepage. In areas of seepage infiltration, the granular fill should be fully encapsulated with a filter fabric complying with AHTD Standard Specifications Subsection 625.02, Type 2.

In areas of deep fills, the potential exists for use of thick initial lifts ("bridging"), as per AHTD criteria. Bridge lifts will be subject to some consolidation. Settlement of a primarily

granular fill suitable for use in bridging would be expected to be relatively rapid and long-term post-construction settlement would not be expected to be a significant concern. Where clayey soils are placed in thick lifts, long term settlement will be more significant. We recommend that the use of “bridging” techniques be limited to granular borrow soils, i.e., sand or gravel. Where fill amounts are limited to less than about 3 ft, bridging will be less effective and the need for undercut is considered more likely. Use of bridging techniques and fill lift thickness should be specifically approved by the Engineer or Department.

Subgrade preparation and mass undercuts should extend at least 10 ft beyond the embankment toes to the extent possible. The existing drainage features should be completely mucked out and all loose and/or organic soils removed.

We recommend that the outer 24 in. of embankment fill for all fill slopes, i.e., tops and sides of the embankments, should have a plasticity index (PI) within the range of 5 to 18, inclusive. Embankment fill should be placed and compacted as per AHTD Standard Specifications Section 210.

Fill should typically be placed in horizontal, nominal 6- to 10-in. loose lifts. Existing slopes should be benched as required to maintain horizontal lifts on sidehill fills. Thicker bridge lift placement may be utilized, as per AHTD site work criteria, where approved by the Engineer. Each lift of fill or backfill should be properly compacted, tested, and approved prior to placement of subsequent lifts.

## **6.0 CONSTRUCTION CONSIDERATIONS**

### **6.1 Groundwater and Seepage Control**

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 is completed. Subgrade soils and embankment fill that becomes saturated by ponding water or runoff should be excavated to undisturbed soils. The embankment subgrade foundations should be evaluated by the Engineer during subgrade preparation.

Shallow groundwater is likely to be encountered in the near-surface soils and fractured rock zones. The volume of groundwater produced will be highly variable depending on the soil conditions and the proximity of surface water in the immediate vicinity of the work. Fractured rock units in particular may produce a significant groundwater seepage volume. In addition, seasonal surface seeps should be anticipated.

Seepage into isolated excavations or undercuts can probably be controlled by ditching or sump-and-pump methods. If seepage into excavations becomes a problem, backfill should consist of clean crushed stone (AASHTO M43 #57) or stone backfill (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 drainage features encountered in the grading work which will be covered by fill.

### **6.2 Piling**

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. Pre-boring could be required at some locations to advance piles through zones of localized sandstone cobbles and boulders.

Pile installation should be monitored by qualified personnel to maintain specific and complete driving records and observe pile installation procedures. Safe bearing capacity of production piles should be determined by AHTD Standard Specifications Section 805.09, Method A. Driving records should be available for review by the Engineer during pile installation. The hammer-pile system should be evaluated by the Engineer or Department prior to beginning driving. 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. As-built pile capacities should be evaluated by use of an appropriate dynamic formula.

#### 6.3 Drilled Shafts

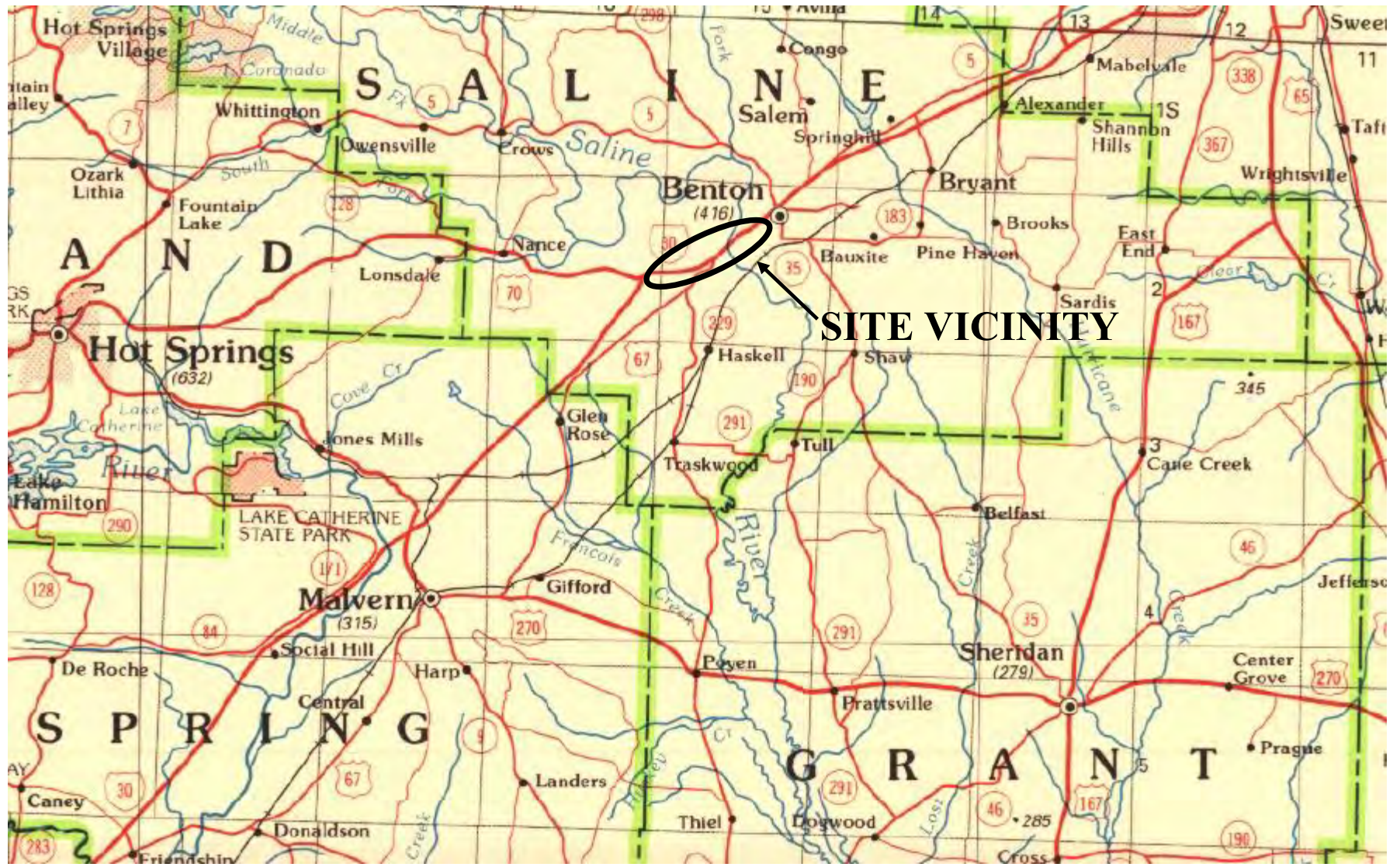
All drilled shaft excavations should be observed by the Engineer or the Department. Hard drilling will be experienced when advancing drilled shafts into the hard shale. Heavy-duty drilling equipment and rock drilling tools will be required to advance shaft excavations to the recommended minimum penetration into the shale. Coring or other rock excavation methods will be required to achieve the recommended minimum penetration into the rock bearing stratum. Shaft excavation, steel placement and concreting should be completed expeditiously to reduce the possibility of changes in foundation conditions.

#### 6.4 Rock Excavation

Rock was encountered in the borings. Rock excavation methods are likely to be required for some site grading cuts, utility installation, and/or in foundation excavations. Some overbreak of excavations advanced into the weathered shale and shale should be anticipated.

## **ATTACHMENT 1**





**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

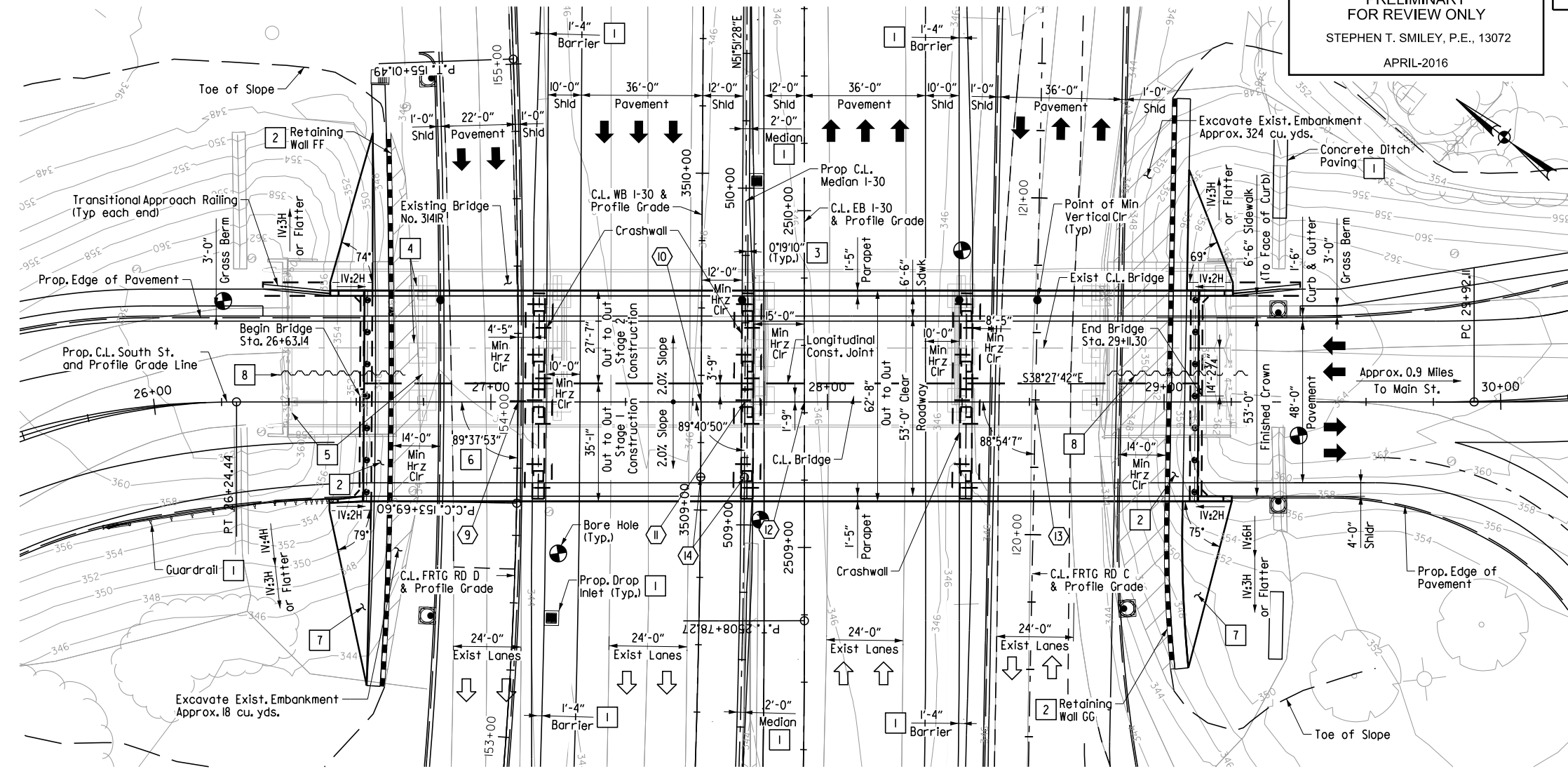
Site Vicinity Map  
CA0601: Hwy 70 – Sevier St (Widening)(S)  
I-30 - Saline County, Arkansas

Job No. 15-019

Plate 1

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For R/W Data, See Roadway Plans



check & coordination  
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APRIL-2016

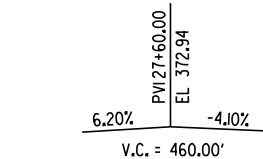
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. RD. DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.	CA0601		168	836
				[Brdg*] BRIDGE LAYOUT		[Dwg*]		

Notes:  
1. C.L. Bridge, P.G.L. and all longitudinal edges are parallel to C.L. South St.  
2. All Bents are parallel to Prop. C.L. Median I-30

- See Rdwy Plans
- See Retaining Wall Plans
- Skew angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- Existing foundations. (Typ.)
- Existing substructures. (Typ.)
- Angle is measured to a local tangent.
- Concrete Riprap to be placed at a IV:2H max slope near wing walls.
- Shoring may be required during construction. See Project Bridge General Notes regarding Shoring, on Dwg. No. XXXX2
- Prop. C.L. South St. Sta 27+08.04 = C.L. FRTG RD D Sta 153+99.67
- Prop. C.L. South St. Sta 27+62.46 = C.L. WB I-30 Sta 3509+32.09
- Prop. C.L. South St. Sta 27+75.46 = Prop. C.L. Median I-30 Sta 509+36.53
- Prop. C.L. South St. Sta 27+93.14 = C.L. EB I-30 Sta 2509+43.25
- Prop. C.L. South St. Sta 28+61.78 = Prop. C.L. FRTG RD C Sta 120+39.44
- WB I-30 P.T. Sta 3509+09.78, Prop. C.L. Median I-30 P.T. Sta 509+14.15

Table of Variables				
		"A"	"B"	"C"
Bent 2	4'-5 3/16"	15'-6"	25'-0"	321.33
Bent 3	4'-5 1/4"	15'-6"	26'-0"	321.19
Bent 4	4'-5 1/4"	15'-0"	26'-6"	321.16
"A"	Low side of Cap to Top of Drilled Shaft			
"B"	Drilled Shaft Length			
"C"	Tip of D.S. Elevation			

- \* Top of Deck @ C.L. of Bridge to Low Beam
- \*\* Top of Deck @ C.L. Bent @ C.L. Bridge to Low Side Top of Cap



### VERTICAL CURVE DATA

(Along Profile Grade)

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

### SHEET 1 OF 3 LAYOUT OF SOUTH ST. BRIDGE OVER INTERSTATE 30

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH  
CHECKED BY: STS  
DESIGNED BY: JH  
BRIDGE NO. [Brdg\*]  
DATING: 12/1/2014  
12/21/2014  
11/15/2014  
DRAWING NO. [Dwg\*]  
FILENAME: bca06014\_1  
SCALE: 1" = 20'

Elevations shown are along C.L. Bridge. Stationing is along C.L. South St. Stations shown in Elevation View are determined by projection from C.L. Bridge to C.L. South St.

Note: Bridge PGL is coincident with C.L. South St. and C.L. Bridge is 1'-9" left of C.L. South St.

### PLAN

### ELEVATION



For R/W Data, See Roadway Plans

See key-plan Dwg. No. XXXXI  
for location and type of approach  
slabs and approach gutters.

check & coordination

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APRIL-2016

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.	CA0601		161	836
				[Brdg*] BRIDGE LAYOUT		[Dwg*]		

- 1 Skew Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint.
- 2 Existing foundations, Typ.
- 3 Existing substructures, Typ.
- 4 Shoring may be required during construction, (Typ.) See Project Bridge General Notes regarding Shoring, on Dwg. No. XXXX2

**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

**SHEET 3 OF 9  
LAYOUT OF BRIDGES  
OVER SALINE RIVER**

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
**ARKANSAS STATE HIGHWAY COMMISSION**  
LITTLE ROCK, ARK.

DRAWN BY: **AKH** DATES: **9/15/2014** FILENAME: **bca06013\_13**  
CHECKED BY: **JH** DATES: **10/1/2014** SCALE: **1" = 20'**  
DESIGNED BY: **STS** DATES: **9/1/2014**  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]

**PLAN**

6/2/09 PM

4/7/2016

sts

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Elevations shown are along C.L. Bridge. Stationing is along C.L. Median I-30. Stations shown in Elevation View are determined by projection from C.L. Bridge to C.L. Median I-30.

check & coordination

PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

APRIL-2016

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.	CA0601		162	836
				1 [Brdg*] BRIDGE LAYOUT		[Dwg*]		

### HYDRAULIC DATA

FLOOD DESCRIPTION	FREQUENCY	TOTAL DISCHARGE (1)	DISCHARGE (2)	NATURAL WATER SURFACE ELEVATION (3)	WATER SURFACE ELEV. WITH BACKWATER
	YEARS	CFS	CFS	FEET	FEET
DESIGN	050	93,000	80,062	284.25	285.23
BASE	0100	104,500	88,628	285.63	286.68
EXTREME	0500	130,100	108,074	287.80	289.07
OVERTOPPING	>0500	>0500	>0500	>0500	>0500

1. Discharge includes water through Saline River and Saline River Relief Channels.

2. Discharge includes water through Saline River Channel.

3. Unconstricted water surface elevation without structure or roadway approaches.

0100 Backwater elevation for existing structure = 286.68 feet.  
Proposed Low Bridge Chord Elev. = 291.00 feet.  
Drainage Area = 569.0 sq. miles.  
Historical H.W. Elev. = 288.0 feet (1927).  
Ordinary H.W. Elev. = 273.43 feet.

P.V.C. Sta. 430+75.00 ELEV. 295.40	P.V.I. Sta. 432+00.00 ELEV. 295.40	P.V.I. Sta. 433+25.00 ELEV. 295.78	P.V.C. Sta. 438+25.00 ELEV. 297.28	P.V.I. Sta. 439+50.00 ELEV. 297.65	P.V.I. Sta. 440+75.00 ELEV. 297.28	P.V.C. Sta. 445+75.00 ELEV. 295.78	P.V.I. Sta. 447+00.00 ELEV. 295.40	P.V.T. Sta. 448+25.00 ELEV. 295.40
0.00%		+0.30%			-0.30%			0.00%
V.C. = 250.00'			V.C. = 250.00'			V.C. = 250.00'		

### ELEVATION - BRIDGE A

\* Top of Deck @ C.L. of Bridge to Low Beam

\*\* Note: For Table of Variables, see Dwg. No. XXXXI

1 Measured along C.L. Bridge

2 Measured along C.L. Median I-30

3 Top of Pile Encasement elevation shall be 3ft above existing ground or 3ft above OHWM whichever is greater.

Note: Bridge B PCL is 13'-8" right of C.L. Median I-30 and C.L. Bridge B is 30'-9" right of C.L. Median I-30.

### ELEVATION - BRIDGE B

### VERTICAL CURVE DATA - BRIDGE A & B

(Along Either Profile Grade)

**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

**SHEET 4 OF 9**  
**LAYOUT OF BRIDGES**  
**OVER SALINE RIVER**

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22

**ARKANSAS STATE HIGHWAY COMMISSION**  
LITTLE ROCK, ARK.

DRAWN BY: **AKH** DATES: **9/15/2014** FILENAME: **bsca06013\_14**  
CHECKED BY: **JH** DATES: **10/1/2014** SCALE: **1" = 20'**  
DESIGNED BY: **STS** DATES: **9/1/2014**  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]

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STS  
S:\14407\0\1\06\N\Plans\Bridges\Layout\bc06013\_15.dgn

Elevations shown are along C.L. Bridge. Stationing is along C.L. Median I-30. Stations shown in Elevation View are determined by projection from C.L. Bridge to C.L. Median I-30.

Note: Bridge A PGL is 13'-8" left of C.L. Median I-30 and C.L. Bridge A is 30'-9" left of C.L. Median I-30.

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PRELIMINARY  
FOR REVIEW ONLY  
  
STEPHEN T. SMILEY, P.E., 13072  
  
APRIL-2016

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.	CA0601	163	836	
				1 [Brdg*] BRIDGE LAYOUT [Dwg*]				

WB Bridge AXXXX - Table of Variables				
	**	"A"	"B"	"C"
Bent 3	4'-6 13/16"	15'-0"	38'-6"	238.12
Bent 4	4'-7 7/16"	15'-0"	36'-0"	240.81
Bent 5	4'-8 15/16"	15'-0"	38'-6"	238.37
Bent 6	4'-8 15/16"	15'-6"	37'-6"	239.10
Bent 7	4'-9 5/8"	15'-6"	37'-0"	239.78
Bent 8	4'-10 1/4"	15'-6"	38'-0"	238.76
Bent 9	4'-9 1/8"	15'-6"	34'-6"	242.29
Bent 10	4'-8 13/16"	15'-6"	34'-0"	242.60
Bent 11	4'-9 7/16"	15'-0"	32'-6"	244.31
Bent 12	4'-11 1/16"	15'-0"	32'-6"	243.99
"A"	Low side of Cap to Top of Drilled Shaft			
"B"	Drilled Shaft Length			
"C"	Tip of D.S. Elevation			

\* Top of Deck @ C.L. of Bridge to Low Beam

\*\* Top of Deck @ C.L. Bent @ C.L. Bridge to Low Side Top of Cap

### ELEVATION - BRIDGE A

1 Measured along C.L. Bridge

2 Measured along C.L. Median I-30

Note: Bridge B PGL is 13'-8" right of C.L. Median I-30 and C.L. Bridge B is 30'-9" right of C.L. Median I-30.

EB Bridge BXXXX - Table of Variables				
	**	"A"	"B"	"C"
Bent 3	4'-9 7/16"	14'-6"	37'-6"	239.22
Bent 4	4'-9 7/16"	15'-0"	33'-6"	242.96
Bent 5	4'-10 15/16"	15'-0"	36'-0"	240.52
Bent 6	4'-10 15/16"	15'-0"	38'-6"	238.25
Bent 7	4'-10 15/16"	15'-6"	37'-0"	239.54
Bent 8	4'-10 1/2"	15'-6"	37'-6"	239.22
Bent 9	4'-8 7/16"	15'-6"	38'-0"	238.92
Bent 10	4'-8 3/4"	15'-6"	36'-0"	240.86
Bent 11	4'-7 7/16"	15'-6"	33'-6"	243.16
Bent 12	4'-9 1/16"	15'-0"	32'-6"	244.34
"A"	Low side of Cap to Top of Drilled Shaft			
"B"	Drilled Shaft Length			
"C"	Tip of D.S. Elevation			

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

### SHEET 5 OF 9 LAYOUT OF BRIDGES OVER SALINE RIVER

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH  
CHECKED BY: JH  
DESIGNED BY: STS  
BRIDGE NO. [Brdg\*]  
DATE: 9/15/2014  
DATE: 10/1/2014  
DATE: 9/1/2014  
FILENAME: bca06013\_15  
SCALE: 1" = 20'  
DRAWING NO. [Dwg\*]

6/2/25/PM 4/7/2016 sts

Elevations shown are along C.L. Bridge. Stationing is along C.L.I-30. Stations shown in elevation are determined by projection from C.L. Bridge to C.L.I-30.

check & coordination

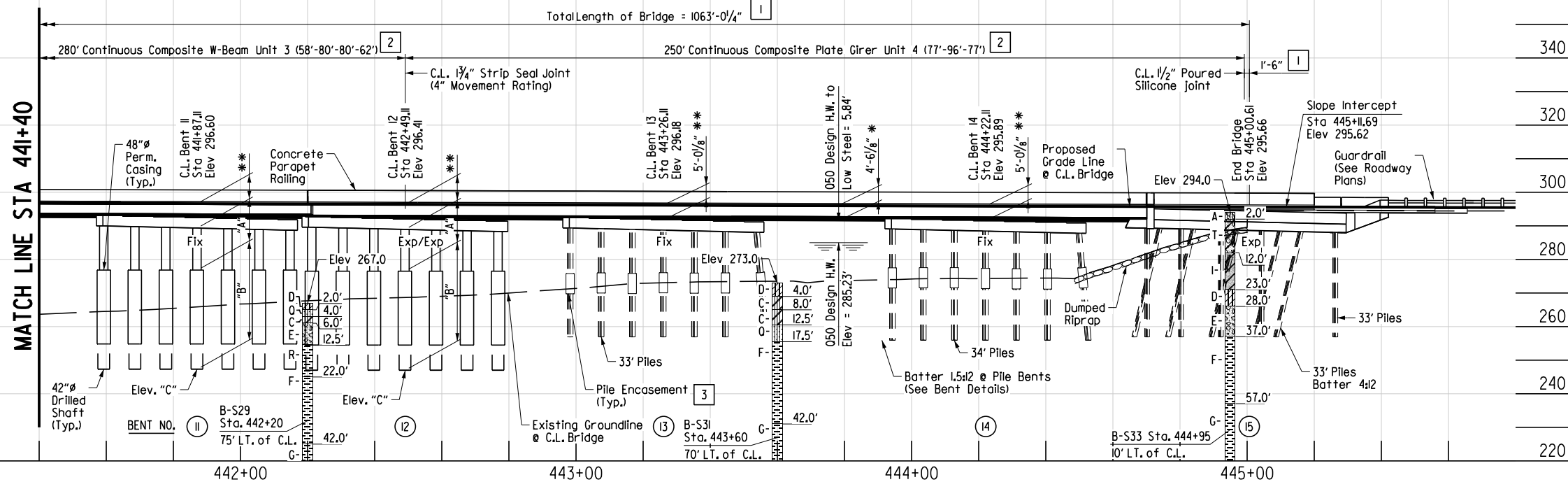
PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

APRIL-2016

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.	CA0601	I64	836	
				[Brdg*] BRIDGE LAYOUT [Dwg*]				

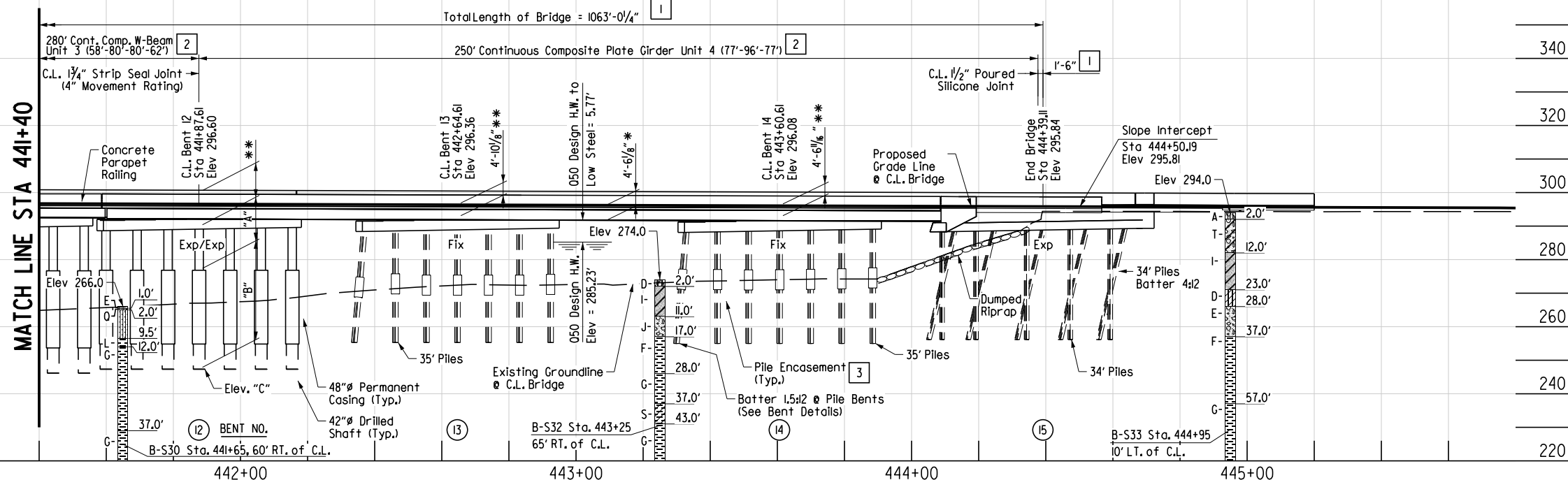
Note: Bridge A PGL is 13'-8" left of C.L.I-30 and C.L. Bridge A is 30'-9" left of C.L.I-30.



ELEVATION - BRIDGE A

- \* Top of Deck @ C.L. of Bridge to Low Beam
- \* Note: For Table of Variables, see Dwg. No. XXXXI
- 1 Measured along C.L. Bridge
- 2 Measured along C.L. Median I-30
- 3 Top of Pile Encasement elevation shall be 3ft above existing ground or 3ft above OHWM whichever is greater.

Note: Bridge B PGL is 13'-8" right of C.L.I-30 and C.L. Bridge B is 30'-9" right of C.L.I-30.



ELEVATION - BRIDGE B

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 6 OF 9  
LAYOUT OF BRIDGES  
OVER SALINE RIVER

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22

ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 9/15/2014 FILENAME: bca06013.16  
CHECKED BY: JH DATE: 10/1/2014 SCALE: 1" = 20'  
DESIGNED BY: STS DATE: 9/1/2014  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]

For R/W Data, See Roadway Plans

## HORIZONTAL CURVE DATA

See key-plan Dwg. No. XXXXI  
for location and type of approach  
slabs and approach gutters.

C.L. Median I-30

PI Sta = 396+53.01  
Delta = 30°17'33" LT  
Degree = 1°00'00"  
Tangent = 1550.93'  
Length = 3029.26'  
Radius = 5729.58'  
PC Sta = 381+02.09  
PT Sta = 411+31.35  
PC Brg = N73°05'27"E  
PT Brg = N42°47'54"E

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.		CA0601	152	836
				[Brdg*]		BRIDGE LAYOUT		[Dwg*]

### Notes:

- C.L. Bridge A & B and their respective PGLs are concentric to C.L. Median I-30.
- C.L. Bridge C and respective PGL is parallel to C.L. US 67 Ramp 3
- All Bridge A & B longitudinal edges of deck and approaches are concentric to C.L. Median I-30 U.N.O.
- All Bents are parallel to each other.

The proposed bridges are positioned to avoid interference with the existing substructures. The Contractor shall verify the location of the existing substructures before constructing the new substructures. Any adjustments required to fit the proposed bridge shall be submitted to the Engineer for approval.

- See Roadway Plans
- Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- Existing foundations, Typ.
- Existing substructures, Typ.
- Shoring may be required during construction, (Typ.) See Project Bridge General Notes regarding Shoring, on Dwg. No. XXXX2

check & coordination

PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

APRIL-2016

## PLAN

MATCH LINE STA 414+60

## SUPERELEVATION TRANSITION DETAIL FOR BRIDGE A & B

Length Of Superelevation Transition = 900'  
Begin Transition 409+06.35  
End Transition 418+06.35  
For additional information, see Std. Dwg. SE-1.

**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

SHEET 1 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: **AKH** DATES: **9/15/2014** FILENAME: **bca06012.11**  
CHECKED BY: **JH** DATES: **10/1/2014** SCALE: **1" = 20'**  
DESIGNED BY: **STS** DATES: **9/1/2014**  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]

6/2/2016 PM

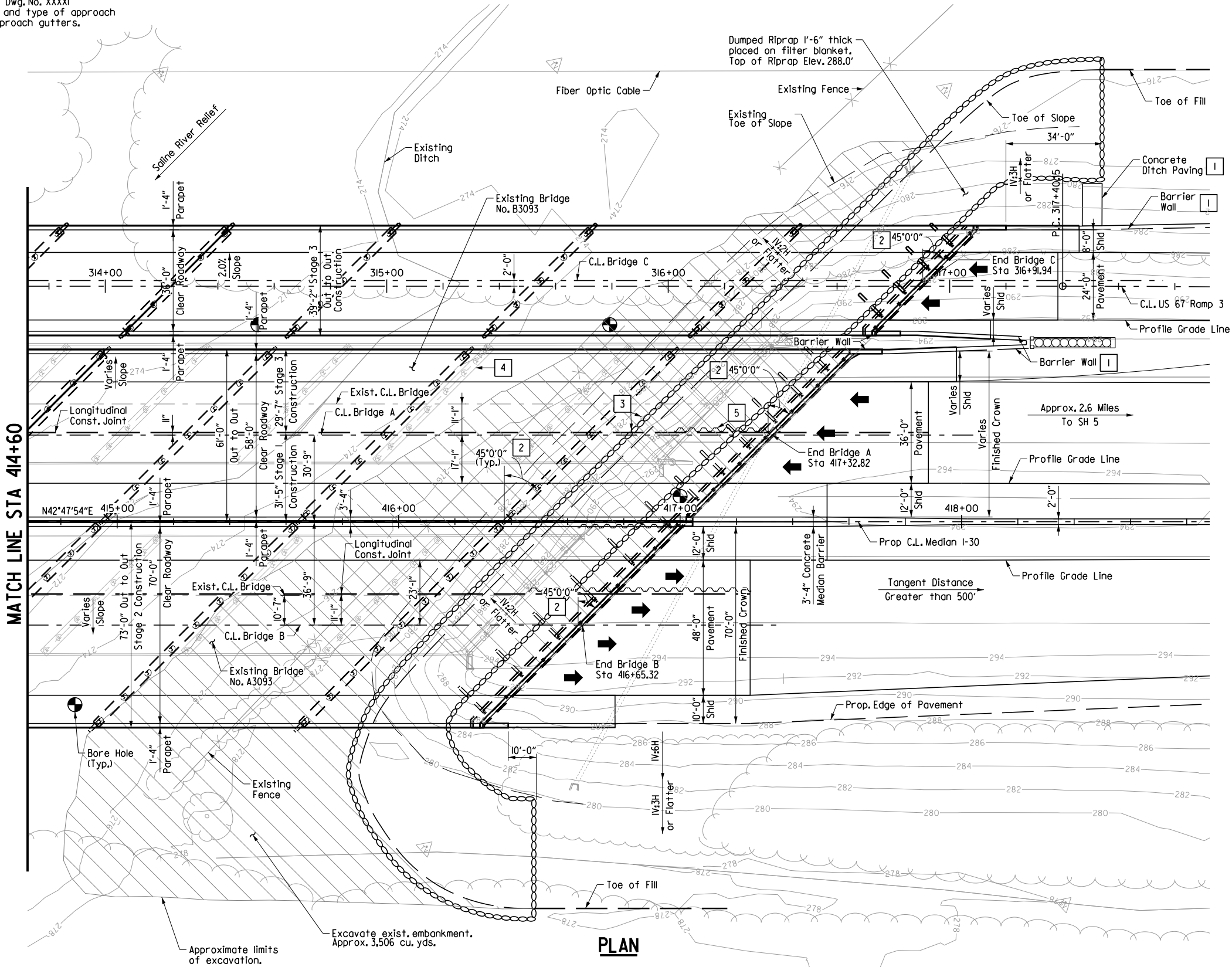
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For R/W Data, See Roadway Plans

See key-plan Dwg. No. XXXXI  
for location and type of approach  
slabs and approach gutters.



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.		CA0601	153	836
				[Brdg*] BRIDGE LAYOUT		[Dwg*]		

NOTE:  
The contractor shall remove the embankment at the existing end of bridge for staged reconstruction. From the proposed end of bridge, cut down at IV:2H slope towards the channel, to a bench Elev. 275. Approx. 3,506 cu. yds. of excavation.

- 1 See Roadway Plans
- 2 Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- 3 Existing foundations, Typ.
- 4 Existing substructures, Typ.
- 5 Shoring may be required during construction, (Typ.) See Project Bridge General Notes regarding Shoring, on Dwg. No. XXXX2

check & coordination

PRELIMINARY  
FOR REVIEW ONLY  
STEPHEN T. SMILEY, P.E., 13072  
APRIL-2016

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 2 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH  
CHECKED BY: JH  
DESIGNED BY: STS  
DATE: 9/15/2014  
DATE: 10/1/2014  
DATE: 9/1/2014  
FILENAME: bca06012\_12  
SCALE: 1" = 20'  
BRIDGE NO. [Brdg\*]  
DRAWING NO. [Dwg\*]



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4/7/2016  
sts  
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Elevations shown are along C.L. Bridge. Stationing is along C.L. Median I-30. Stations shown in Elevation View are determined by a radial projection from C.L. Bridge to C.L. Median I-30.

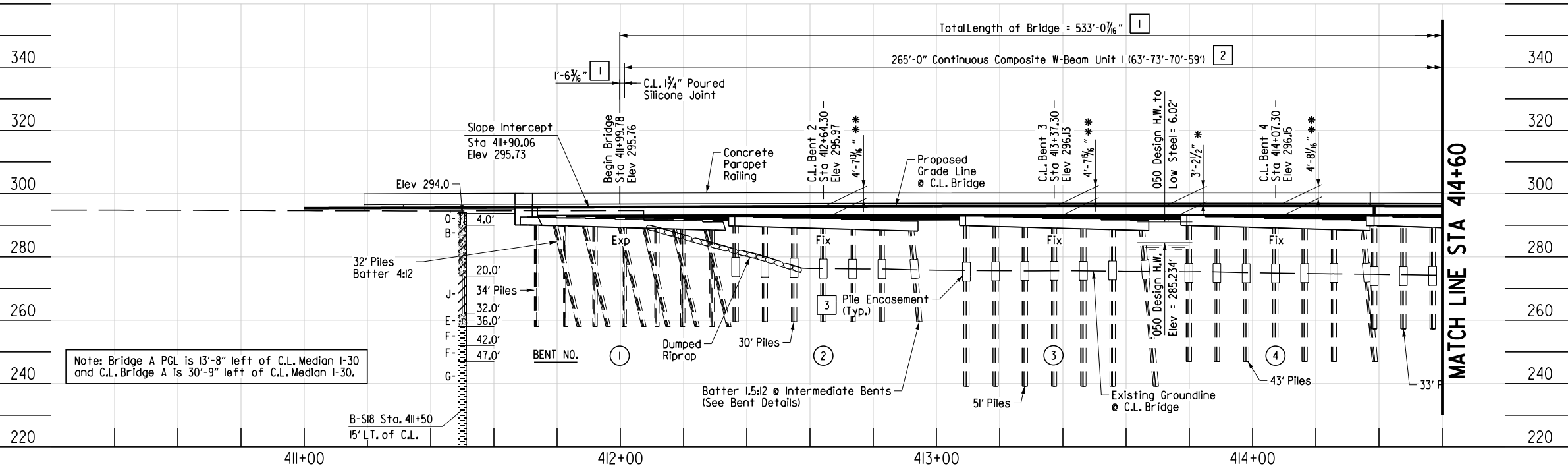
check & coordination

PRELIMINARY  
FOR REVIEW ONLY

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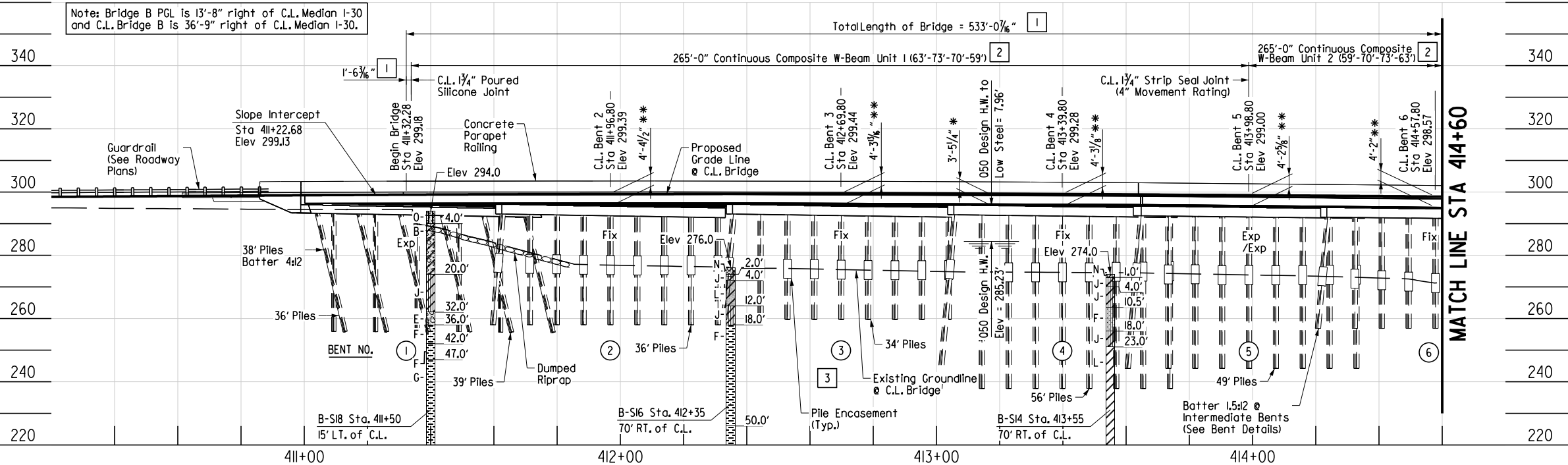
APRIL-2016

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.		CA0601	154	836
				[Brdg*] BRIDGE LAYOUT		[Dwg*]		



ELEVATION - BRIDGE A

- \* Top of Deck @ C.L. of Bridge to Low Beam
- \* \* Top of Deck @ C.L. Bent @ C.L. Bridge to Low Side Top of Cap
- 1 Measured along C.L. Bridge
- 2 Measured along C.L. Median I-30
- 3 Top of Pile Encasement elevation shall be 3ft above existing ground or 3ft above OHWM whichever is greater.



ELEVATION - BRIDGE B

VERTICAL CURVE DATA - BRIDGE A  
(Along WB Profile Grade)

VERTICAL CURVE DATA - BRIDGE B  
(Along EB Profile Grade)

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 3 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH  
CHECKED BY: JH  
DESIGNED BY: STS  
BRIDGE NO. [Brdg\*]  
DATE: 9/15/2014  
DATE: 10/1/2014  
DATE: 9/1/2014  
DRAWING NO. [Dwg\*]  
FILENAME: bca06012\_13  
SCALE: 1" = 20'

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APRIL-2016

HYDRAULIC DATA

1. Discharge includes water through Saline River and Saline River Relief Channels.
2. Discharge includes water through Saline River Relief Channel.
3. Unconstricted water surface elevation without structure or roadway approaches.

0100 Backwater elevation for existing structure = 286.68 feet.  
Proposed Low Bridge Chord Elev. = 291.25 feet.  
Drainage Area = 569.0 sq. miles.  
Historical H.W. Elev. = 288.0 feet (1927).  
Ordinary H.W. Elev. = 273.46 feet.



- 1 Measured along C.L. Bridge
- 2 Measured along C.L. I-30
- 3 Top of Pile Encasement elevation shall be 3ft above existing ground or 3ft above OHWM whichever is greater.



DRAWN BY: AKH      DATE: 9/15/2014      FILENAME: bca06012\_14  
 CHECKED BY: JH      DATE: 10/1/2014      SCALE: 1" = 20'  
 DESIGNED BY: STS      DATE: 9/1/2014

BRIDGE NO. [Brdg#]      DRAWING NO. [Dwg#]

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4/7/2016  
sts  
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Elevations shown are along C.L. Bridge. Stationing is along C.L. US 67 Ramp 3. Stations shown in elevation are determined by radial projection from C.L. Bridge to C.L. US 67 Ramp 3.

check & coordination

PRELIMINARY  
FOR REVIEW ONLY

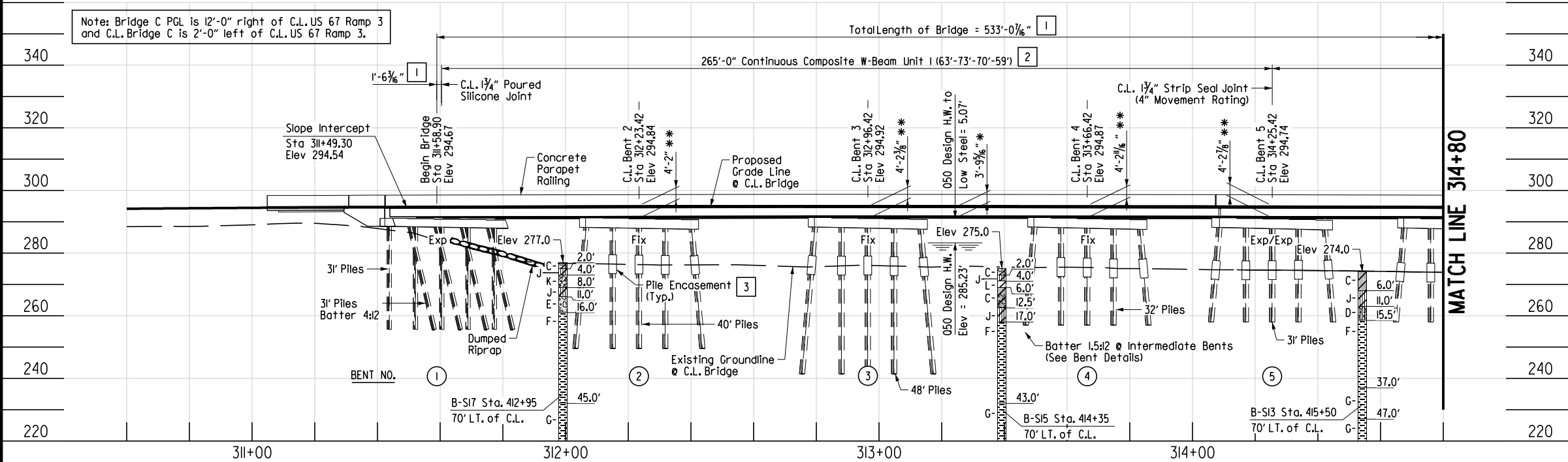
STEPHEN T. SMILEY, P.E., 13072

APRIL-2016

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.	CA0601		155	836
				[Brdg*] BRIDGE LAYOUT		[Dwg*]		

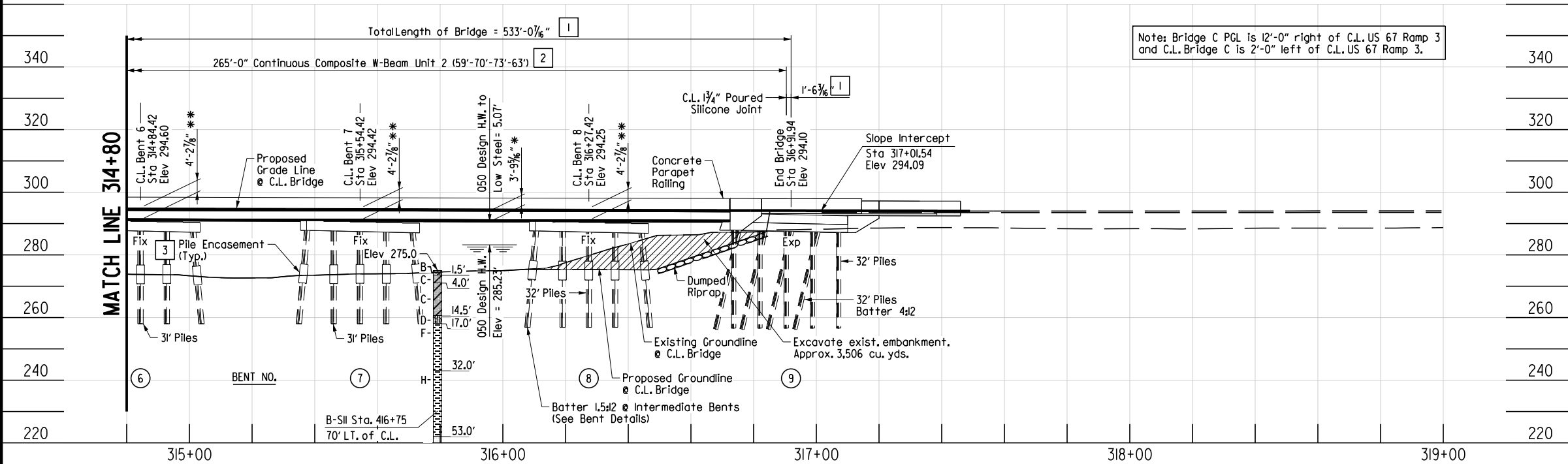
HYDRAULIC DATA					
FLOOD DESCRIPTION	FREQUENCY	TOTAL DISCHARGE (1)	DISCHARGE (2)	NATURAL WATER SURFACE ELEVATION (3)	WATER SURFACE ELEV. WITH BACKWATER
	YEARS	CFS	CFS	FEET	FEET
DESIGN	050	93,000	12,938	284.25	285.23
BASE	0100	104,500	15,872	285.63	286.68
EXTREME	0500	130,100	22,026	287.80	289.07
OVERTOPPING	>0500	>0500	>0500	>0500	>0500

1. Discharge includes water through Saline River and Saline River Relief Channels.
2. Discharge includes water through Saline River Relief Channel.
3. Unconstricted water surface elevation without structure or roadway approaches.
- 0100 Backwater elevation for existing structure = 286.68 feet.  
Proposed Low Bridge Chord Elev. = 290.30 feet.  
Drainage Area = 569.0 sq. miles.  
Historical H.W. Elev. = 288.0 feet (1927).  
Ordinary H.W. Elev. = 273.46 feet.

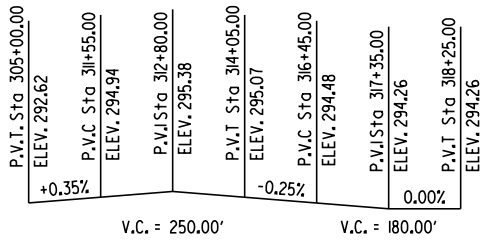


ELEVATION - BRIDGE C

- \* Top of Deck @ C.L. of Bridge to Low Beam
- 1 Measured along C.L. Bridge
- \*\* Top of Deck @ C.L. Bent @ C.L. Bridge to Low Side Top of Cap
- 2 Measured along C.L. US 67 Ramp 3
- 3 Top of Pile Encasement elevation shall be 3ft above existing ground or 3ft above OHWM whichever is greater.



ELEVATION - BRIDGE C



VERTICAL CURVE DATA - BRIDGE C  
(Along Bridge C Profile Grade)

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 5 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH  
CHECKED BY: JH  
DESIGNED BY: STS  
BRIDGE NO. [Brdg\*]  
DATE: 9/15/2014  
DATE: 10/1/2014  
DATE: 9/1/2014  
DRAWING NO. [Dwg\*]  
FILENAME: bsca06012\_15  
SCALE: 1" = 20'

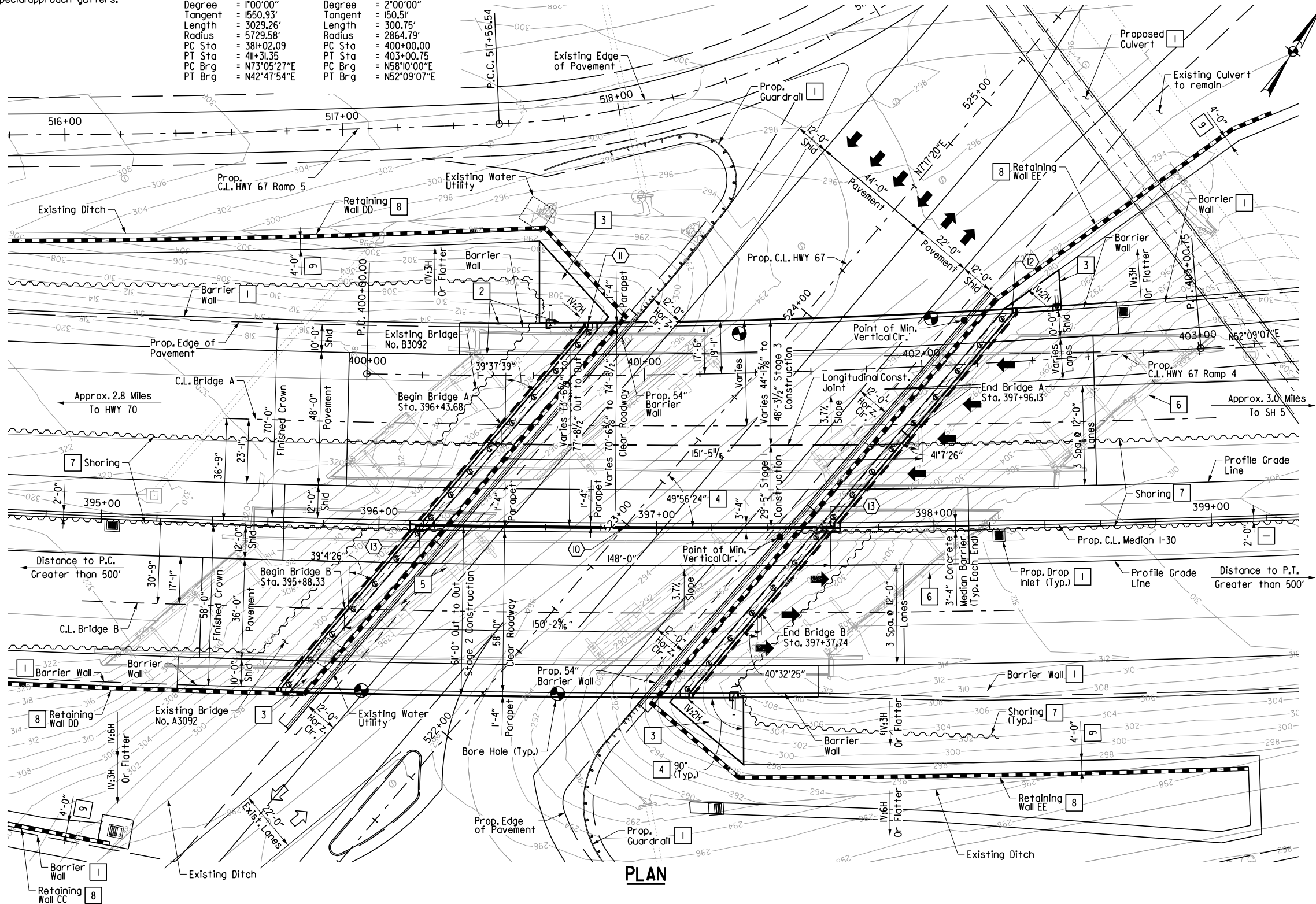
For R/W Data, See Roadway Plans

## HORIZONTAL CURVE DATA

See Dwg. No. XXXXI for location and type of special approach slabs and special approach gutters.

C.L. Median I-30		C.L. HWY 67 Ramp 4 Curve 1	
PI Sta	= 396+53.01	PI Sta	= 401+50.51
Delta	= 30°17'33" LT	Delta	= 06°00'54" LT
Degree	= 1°00'00"	Degree	= 2°00'00"
Tangent	= 1550.93'	Tangent	= 150.51'
Length	= 3029.26'	Length	= 300.75'
Radius	= 5729.58'	Radius	= 2864.79'
PC Sta	= 381+02.09	PC Sta	= 400+00.00
PT Sta	= 411+31.35	PT Sta	= 403+00.75
PC Brg	= N73°05'27"E	PC Brg	= N58°10'00"E
PT Brg	= N42°47'54"E	PT Brg	= N52°09'07"E

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.		CA0601	147	836
				[Brdg*]		BRIDGE LAYOUT		[Dwg*]



- Notes:
1. C.L. Bridges and PGLs are concentric to C.L. Median I-30.
  2. All longitudinal edges of deck and approaches are concentric to C.L. Median I-30 U.N.O.
  3. Skew angle is measured from a radial line to the C.L. Bridge at the C.L. of Joint.

- 1 See Roadway Plans
- 2 Longitudinal edges are concentric to C.L. HWY 67 Ramp 4 Curve 1.
- 3 Concrete Riprap to be placed at a 1V:2H max slope near wing walls. See Retaining Wall Plans for slope between End Bent and MSE wall.
- 4 Angle is measured to local tangent.
- 5 Existing foundations, Typ.
- 6 Existing substructures, Typ.
- 7 See Project Bridge General Notes regarding Shoring, Dwg. No. XXXX2
- 8 See Retaining Wall Plans
- 9 Concrete Ditch Paving (See Retaining Wall Plans)
- 10 Prop. C.L. Median I-30 Sta. 396+88.28 = Prop. C.L. HWY 67 Sta. 522+98.74
- 11 C.L. Joint @ Edge of Deck Prop. C.L. Median I-30 Sta. 396+74.83 Offset 73.80' LT
- 12 C.L. Joint @ Edge of Deck Prop. C.L. Median I-30 Sta. 398+29.78 Offset 77.96' LT
- 13 Nominal Composite Plate Girder Span Limits: Begin Span Sta. 396+14.67 End Span Sta. 397+62.67

check & coordination

PRELIMINARY  
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STEPHEN T. SMILEY, P.E., 13072  
APRIL-2016

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 1 OF 5  
LAYOUT OF I-30 BRIDGES  
OVER US 67

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

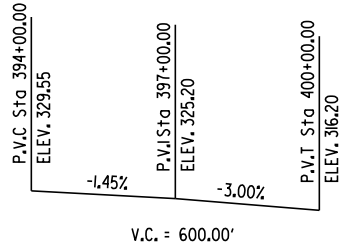
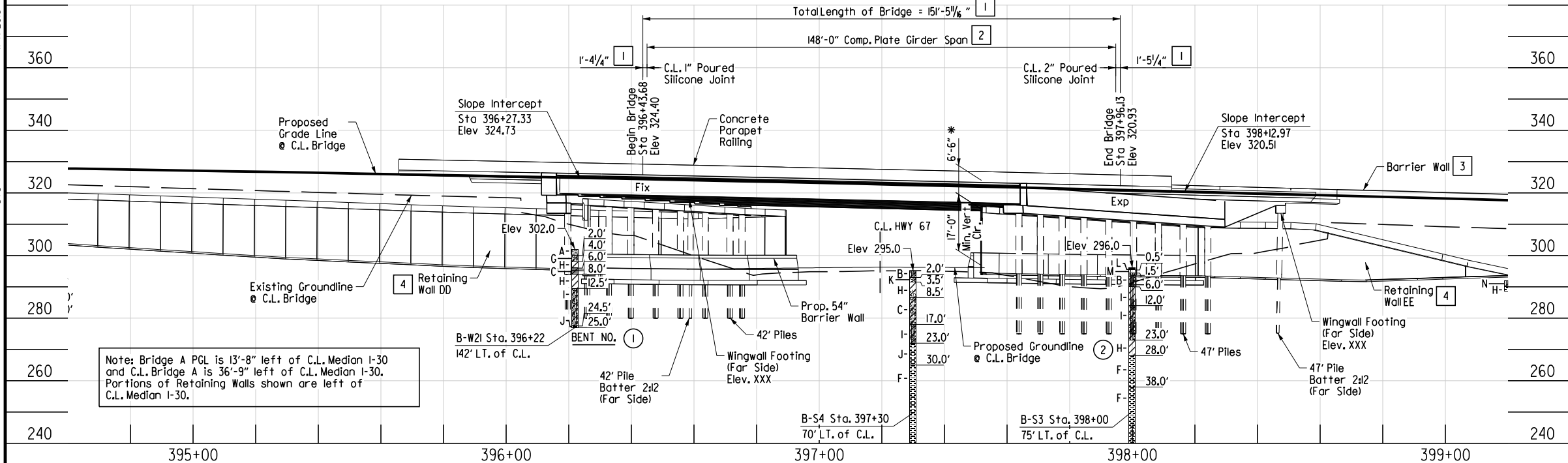
DRAWN BY: AKH  
CHECKED BY: JH  
DESIGNED BY: STS  
BRIDGE NO. [Brdg\*]  
DATE: 9/15/2014  
DATE: 10/1/2014  
DATE: 9/1/2014  
DRAWING NO. [Dwg\*]  
FILENAME: bca0601.11  
SCALE: 1" = 20'

S:\14407\0\1\06\N\Plans\Bridges\Layout\bc060112.dgn 4/7/2016 6:22:21 PM

Elevations shown are along C.L. Bridge. Stationing is along C.L. Median I-30. Stations shown in Elevation View are determined by a radial projection from C.L. Bridge to C.L. Median I-30.

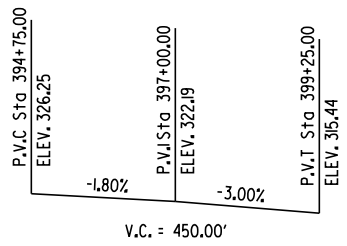
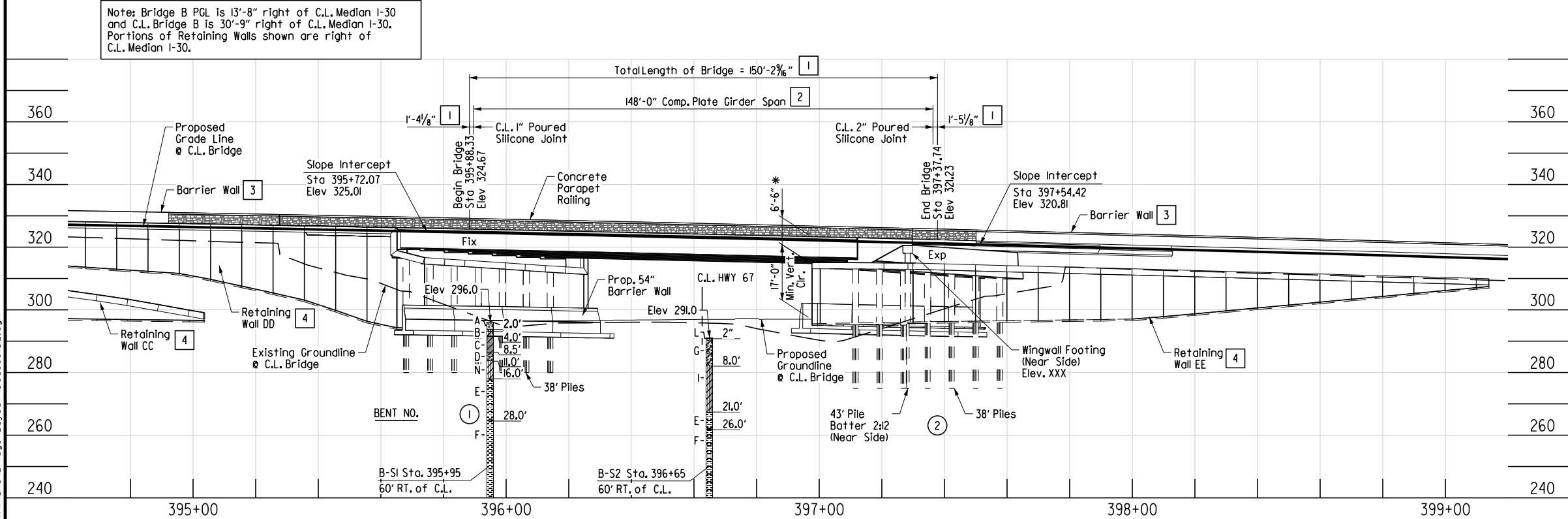
check & coordination  
**PRELIMINARY  
FOR REVIEW ONLY**  
STEPHEN T. SMILEY, P.E., 13072  
APRIL-2016

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.	CA0601		148	836
				[Brdg*] <b>BRIDGE LAYOUT</b>		[Dwg*]		



- [1] Measured along C.L. Bridge
- [2] Measured along C.L. Median I-30
- [3] See Rdwy Plans
- [4] See Retaining Wall Plans

\* Top of Deck @ C.L. of Bridge to Low Beam



**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

**SHEET 2 OF 5  
LAYOUT OF I-30 BRIDGES  
OVER US 67**

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
**ARKANSAS STATE HIGHWAY COMMISSION**  
LITTLE ROCK, ARK.

DRAWN BY: **AKH** DATES: **9/15/2014** FILENAME: **bc060112**  
CHECKED BY: **JH** DATES: **10/1/2014** SCALE: **1" = 20'**  
DESIGNED BY: **STS** DATES: **9/1/2014**  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]

## SUBSURFACE EXPLORATION SUMMARY

PROJECT: CA0601: I-30 Widening

LOCATION: Saline County, AR

GHBW JOB No.: 15-019

Boring No.	CL Station	Offset from CL, ft		Bent/Wall No.	Approx Surface El, ft	Boring Completion Depth, ft
			South St			
S5	26+21	30	LT	1	364	80
S5A	26+19	89	LT	1	348	27
S6	27+20	45	RT	2	345	50
S7	27+80	35	RT	3	345	50
S8	28+40	45	LT	4	345	40
S9	29+40	10	RT	5	364	80

## SUBSURFACE EXPLORATION SUMMARY

PROJECT: CA0601: I-30 over Saline River

LOCATION: Saline County, AR

GHBW JOB No.: 15-019

Boring No.	CL Station	Offset from CL, ft		Bent No.	Approx Surface El, ft	Completion Depth, ft
S19	433+85	10	LT	1	294	90
S20	434+15	58	RT	2	275	80
S21	436+00	70	LT	3	269	80
S22	435+80	65	RT	4	259	80
S23	436+95	10	LT	5	259	80
S24	437+20	60	RT	6	258	80
S25	439+25	70	LT	7	259	80
S26	438+85	62	RT	8	261	80
S26A	440+00	65	LT	8	260	35
S27	440+58	73	LT	9	261	80
S28	440+27	55	RT	10	263	80
S29	442+20	75	LT	11	267	80
S30	441+65	60	RT	12	266	80
S31	443+60	70	LT	13	273	80
S32	443+25	65	RT	14	274	80
S33	444+95	10	LT	15	294	90

## **SUBSURFACE EXPLORATION SUMMARY**

PROJECT: CA0601: I-30 over Saline River Relief

LOCATION: Saline County, AR

GHBW JOB No.: 15-019

<b>Boring No.</b>	<b>CL Station</b>	<b>Offset from CL, ft</b>		<b>Bent No.</b>	<b>Approx Surface El, ft</b>	<b>Boring Completion Depth, ft</b>
S10	417+00	9	LT	9	294	90
S11	416+75	70	LT	8	275	90
S12	414+85	65	RT	7	275	80
S13	415+50	70	LT	6	274	78
S14	413+55	70	RT	5	274	80
S15	414+35	70	LT	4	275	80
S16	412+35	70	RT	3	276	80
S17	412+95	70	LT	2	277	80
S18	411+50	15	LT	1	294	100



## **SUBSURFACE EXPLORATION SUMMARY**

PROJECT: CA0601: I-30 over Highway 67

LOCATION: Saline County, AR

GHBW JOB No.: 15-019

<b>Boring No.</b>	<b>CL Station</b>	<b>Offset from CL, ft</b>		<b>Bent/Wall No.</b>	<b>Approx Surface El, ft</b>	<b>Boring Completion Depth, ft</b>
S1	395+95	60	RT	Bent 1	296	65
S2	396+65	60	RT	Bent 2	291	65
S3	398+00	75	LT	Bent 2	296	75
S4	397+30	70	LT	Bent 1	295	60
W21	396+22	142	LT	Wall DD	302	25
W22	394+50	120	LT	Wall DD	306	25
W27	399+20	142	LT	Wall EE	292	3.5

## **ATTACHMENT 2**

# PLATE 1



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

# LOG OF BORING NO. S5

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 26+21, 30 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: 364±										
			1 inch: Asphalt Concrete	45	122	●	+	+					32
			Stiff to very stiff reddish tan, tan and gray silty clay w/some fine sand pockets, shale fragments and crushed stone (fill)	27		●	+	-	-	+			34
5			- stiff to very stiff, reddish brown fine sandy clay with some medium to coarse sand, fine gravel and shale fragments below 2 ft	8	87		+	-	-	●	-	-	73
			Firm reddish tan and olive gray clay w/occasional fine sand pockets and trace fine gravel (fill)	13				●					
10			- stiff below 6 ft - with some sandstone fragments below 8 ft	17		+	●	-	-	+			77
			- firm to stiff, with some fine sand pockets, shale and sandstone fragments and fine gravel below 13 ft	10				●					
20			Dense reddish brown clayey fine sand w/fine to coarse gravel	50		●	+	-	-	+			27
25			Dense to very dense reddish tan sandy fine to coarse gravel, slightly clayey	50/6"			●						
30			Moderately hard to hard dark gray shale w/medium close sandstone partings and seams and quartz veins	30/0"									
35				30/0"									
40				30/0"									
				30/0"									

COMPLETION DEPTH: 80.0 ft  
DATE: 8-20-15

DEPTH TO WATER  
IN BORING: Dry to 20 ft

DATE: 8/20/2015



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

# LOG OF BORING NO. S5

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 26+21, 30 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT				
						+	●	+				
						10	20	30	40	50	60	70
50				30/0"								
55				30/0"								
60				30/0"								
65			- with medium close to close quartz veins and quartz inclusions below 64 ft	30/0"								
70				30/0"								
75				30/0"								
80				30/0"								
85												

COMPLETION DEPTH: 80.0 ft  
DATE: 8-20-15

DEPTH TO WATER  
IN BORING: Dry to 20 ft

DATE: 8/20/2015

LGBNEW 15-019 S5-S9 SOUTH ST OVER I-30.GPJ 4-14-16



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

# LOG OF BORING NO. S5A

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 13.5 ft /Wash

LOCATION: Approx Sta 26+19, 89 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
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						PLASTIC LIMIT +	WATER CONTENT ●								LIQUID LIMIT +			
			SURF. EL: 348±			10	20	30	40	50	60	70						
			Soft dark brown fine sandy clay w/some crushed stone (fill)	5														
			- stiff, dark brown fine sandy clay with some fine to coarse gravel below 2 ft	5/30-0"														
5			Dense reddish brown clayey fine to medium sand w/some fine to coarse gravel	50/6"														
			Very stiff gray, tan and reddish tan fine sandy clay w/occasional shale and sandstone fragments	37														
10			Very stiff reddish tan and gray silty clay w/occasional clay seams and some weathered shale seams and layers (completely weathered shale)	30														
			- water at 13.5 ft - auger refusal at 13.5 ft	30/0"														
15			Moderately hard to hard dark gray shale w/medium close fine-grained sandstone partings and seams, flat bedded	30/0"														
20			- with close fine-grained sandstone seams below 21 ft											19	0			
			- with close fine-grained sandstone seams and layers and occasional calcareous inclusions below 24 ft											21	0			
25														40	14			
30																		
COMPLETION DEPTH: 27.0 ft																		
DATE: 4-6-16																		
DEPTH TO WATER IN BORING: 13.5 ft																		
DATE: 4/6/2016																		

RECRODN200-2 15-019, S5-S9, SOUTH ST OVER I-30, GPJ 4-14-16



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

# LOG OF BORING NO. S6

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Sta 27+20, 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 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			SURF. EL: 345±			PLASTIC LIMIT +			WATER CONTENT ●			LIQUID LIMIT +	
						10	20	30	40	50	60	70	
			Loose brown silt w/crushed stone (fill)	50		●							
5			Dense reddish tan silty fine to coarse sand w/fine to coarse gravel (fill)	50/10"		●			-NON-PLASTIC-				14
			- with more quartz gravel and occasional clay pockets and trace crushed stone below 2 ft	50/10"		●							
			- with more clay below 6 ft	32		●							
10			- water at 8 ft	14				+	●	+			38
			Stiff gray, tan and reddish tan silty clay w/shale fragments and highly weathered shale seams and sandstone partings and seams (completely weathered shale)	50/2"									
15			Moderately hard tan and dark gray weathered shale w/occasional silty clay laminations and seams and close sandstone partings	30/0"									
20			Moderately hard dark gray and tan slightly weathered shale w/medium close sandstone partings	30/0"									
25			- with medium close quartz veins and quartz inclusions below 23 ft	30/0"									
30				30/0"									
35				30/0"									
40			Moderately hard to hard dark gray shale w/medium close sandstone partings and quartz veins and quartz inclusions	30/0"									
45				30/0"									
50				30/0"									
COMPLETION DEPTH: 50.0 ft				DEPTH TO WATER				DATE: 8/27/2015					
DATE: 8-27-15				IN BORING: 8 ft									

LGBNEW 15-019, S5-S9, SOUTH ST OVER I-30, GP J 4-14-16



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

# LOG OF BORING NO. S7

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 4 ft /Wash

LOCATION: Approx Sta 27+80, 35 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 345±											
5			6 inches: Crushed Stone Base Medium dense gray, reddish tan and reddish brown clayey fine sand w/some medium to coarse sand and fine to coarse gravel (fill) - dense below 2 ft	26		●							26	
				50/9"		●	+	-	-	+				
				50/10"		●								
				50/9"		●								
10			Dense tan and reddish brown clayey fine to coarse sand w/fine to coarse gravel - with some quartz cobbles below 6 ft	19										
				30/0"										
15			Stiff reddish brown, gray and tan silty clay w/weathered shale seams and weathered fine-grained sandstone seams										10	0
20			Low hardness tan and dark gray highly weathered shale	30/0"										
25			Moderately hard to hard dark gray shale w/medium close sandstone partings and seams, apparent dip = 40°±	30/0"										
30			- with less sandstone below 30 ft	30/0"										
35				30/0"										
40				30/0"										
45				30/0"										
50				30/0"										
55														

COMPLETION DEPTH: 50.0 ft  
DATE: 7-24-15

DEPTH TO WATER  
IN BORING: Dry to 4 ft

DATE: 7/24/2015





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

# LOG OF BORING NO. S8

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 4.5 ft /Wash and Core

LOCATION: Approx Sta 28+40, 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 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						PLASTIC LIMIT +	WATER CONTENT ●						LIQUID LIMIT +					
			SURF. EL: 345±			10	20	30	40	50	60	70						
5		X	Dense brown and tan clayey fine to coarse sand w/fine to coarse gravel and trace organics (fill)	37		●												
			Dense reddish tan and tan clayey fine to coarse sand w/fine gravel	52		●	+	-	+						17			
			- auger refusal at 4.5 ft	50/6"		●												
10		X	Firm tan, brownish yellow and gray silty clay, shaly w/weathered shale seams	39		●	+	-	+					19				
				9			+	-	●	+								
15		X	Moderately hard dark gray slightly weathered shale, flat bedded w/very close sandstone seams and layers and quartz veins	50/4"				●										
20		X	Moderately hard to hard dark gray shale	50/0"														
25			- core barrel blocked off at 21 ft											12	0			
30				50/2"														
35				30/0"														
40				30/0"														
COMPLETION DEPTH: 40.0 ft				DEPTH TO WATER				DATE: 7/28/2015										
DATE: 7-29-15				IN BORING: Dry to 4.5 ft														

COMPLETION DEPTH: 40.0 ft  
DATE: 7-29-15

DEPTH TO WATER  
IN BORING: Dry to 4.5 ft

DATE: 7/28/2015



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

# LOG OF BORING NO. S9

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 25 ft /Wash and Core

LOCATION: Approx Sta 29+40, 10 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 364±											
			2 inches: Asphalt Concrete											
			9 inches: Crushed Stone Base	32										
5			Very stiff tan and reddish brown fine sandy clay w/some fine sand pockets and seams and fine to coarse gravel (fill)	13										
			Medium dense reddish brown and reddish tan clayey fine sand w/trace fine gravel and occasional clay pockets (fill)	12									50	
				14										
10			Stiff tan, reddish tan and gray fine sandy clay w/some fine gravel and fine to medium sand pockets (possible fill)	24									33	
			- tan, gray and reddish brown with occasional calcareous pockets below 6 ft	12									49	
15			Medium dense reddish brown clayey fine to medium sand w/some fine to coarse gravel	50									26	
20			Stiff tan, reddish tan and gray fine sandy clay w/numerous fine sand pockets and trace fine gravel											
25			Dense tan, gray, reddish brown and reddish tan clayey fine to medium sand w/some fine gravel and shale fragments	29										
			- medium dense, moist below 23 ft											
30			Dense tan sandy fine to coarse gravel, slightly silty	50/9"										
35			Low hardness tan and dark gray moderately weathered shale, arenaceous w/medium close sandstone partings and seams	50										
40			- moderately hard with close fine-grained sandstone partings below 38 ft	50/6"										
45			- with close quartz veins and inclusions below 43 ft										10	0
			- numerous mechanical fractures in core run at 43 - 48 ft											
			Moderately hard to hard dark gray shale											
COMPLETION DEPTH: 80.0 ft														
DATE: 8-24-15														
DEPTH TO WATER														
IN BORING: Dry to 25 ft														
DATE: 8/24/2015														

RECROD200-2 15-019, S5-S9, SOUTH ST OVER I-30, GPJ 4-14-16



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

# LOG OF BORING NO. S9

CA0601: South Street over I-30  
Benton, Arkansas

TYPE: Auger to 25 ft /Wash and Core

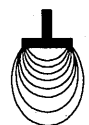
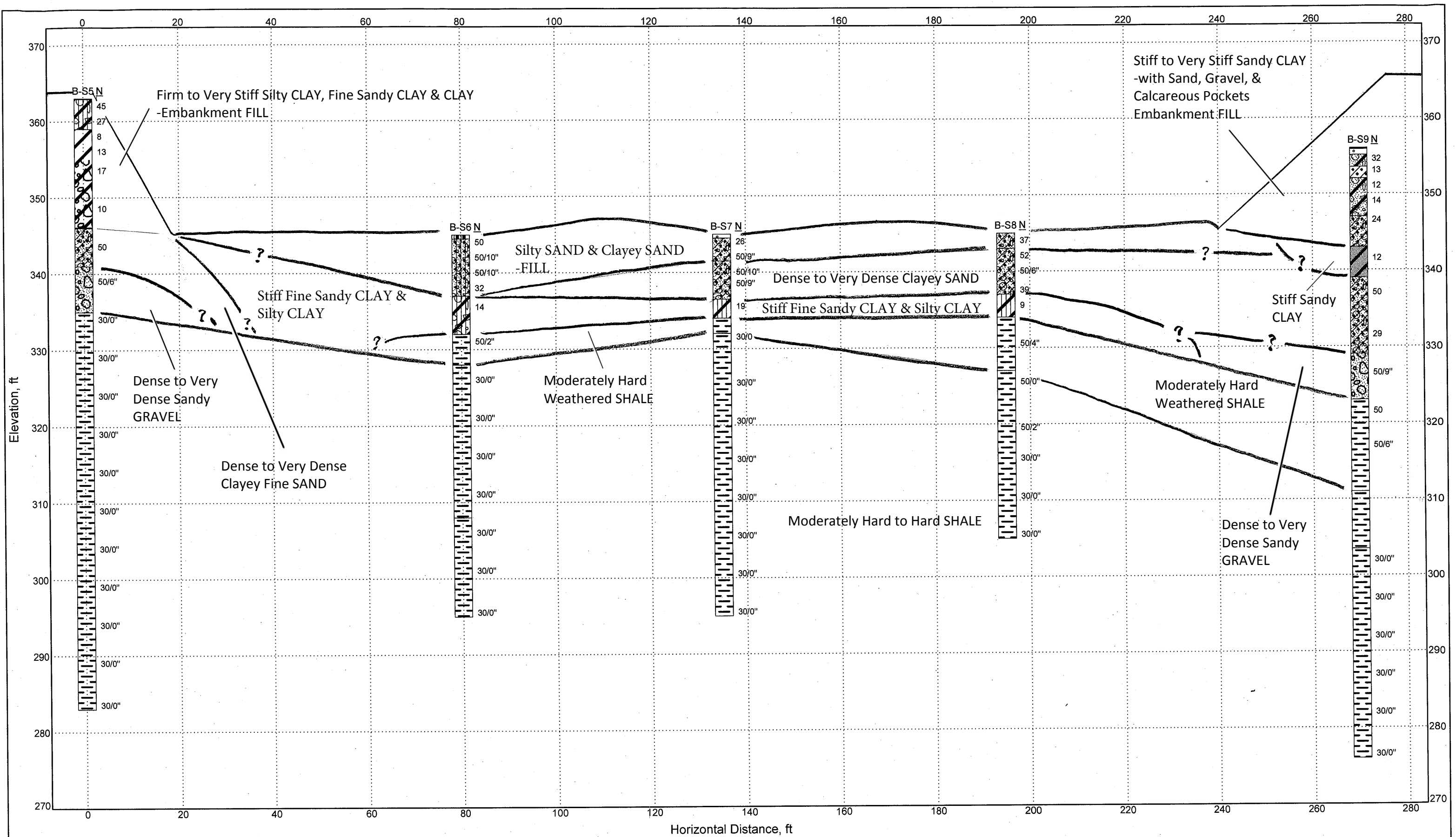
LOCATION: Approx Sta 29+40, 10 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						PLASTIC LIMIT +	WATER CONTENT ●						LIQUID LIMIT +					
						10	20	30	40	50	60	70						
55			Moderately hard to hard dark gray shale w/medium close sandstone partings and quartz veins and occasional quartz inclusions	30/0"														
60				30/0"														
65				30/0"														
70				30/0"														
75				30/0"														
80				30/0"														
85																		
90																		
95																		

COMPLETION DEPTH: 80.0 ft  
DATE: 8-24-15

DEPTH TO WATER  
IN BORING: Dry to 25 ft

DATE: 8/24/2015



Grubbs, Hoskyn,  
Barton & Wyatt, Inc.

NOTES:  
1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.  
2. Ground surface approximate.

SCALE:  
1" = 50' Horizontal  
1" = 3' Vertical

Generalized Subsurface Profile  
CA0601: South Street over I-30  
Benton, Arkansas

Project Number: 15-019

## **ATTACHMENT 3**

For R/W Data See Roadway Plans

See Dwg. No. XXXX for location and type of special approach slabs and special approach gutters.

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.	CA0601		159	836
				[Brdg#]	BRIDGE LAYOUT	[Dwg#]		

Notes:  
1. C.L. Bridges and PGLs are parallel to C.L. Median I-30.  
2. All longitudinal edges of deck and approaches are parallel to C.L. Median I-30.

The proposed bridges are positioned to avoid interference with the existing substructures. The Contractor shall verify the location of the existing substructures before constructing the new substructures. Any adjustments required to fit the proposed bridge shall be submitted to the Engineer for approval.

- 1 Skew Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- 2 Existing foundations, Typ.
- 3 Existing substructures, Typ.
- 4 Shoring will be required during construction (Typ.). See SP Job CA0601 "Shoring".

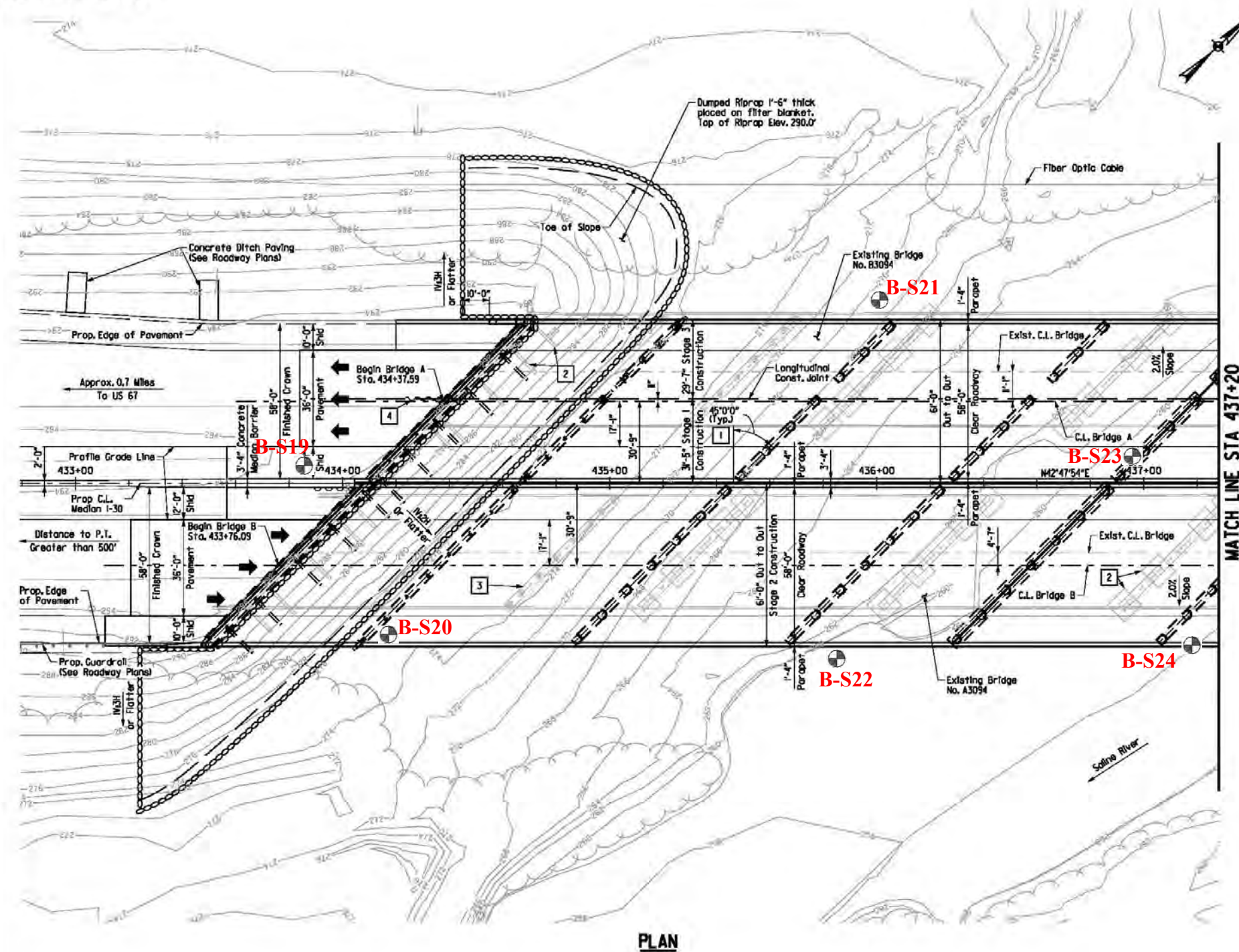
60% SUBMITTAL

PRELIMINARY  
FOR REVIEW ONLY  
STEPHEN T. SMILEY, P.E., 13072  
SEPTEMBER-2015

**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

**SHEET 1 OF 9**  
**LAYOUT OF BRIDGES**  
**OVER SALINE RIVER**  
HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
**ARKANSAS STATE HIGHWAY COMMISSION**  
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 9/15/2014 FILENAME: D0006013.d  
CHECKED BY: JH DATE: 10/11/2014 SCALE: 1" = 20'  
DESIGNED BY: STS DATE: 9/11/2014  
BRIDGE NO. [Brdg#] DRAWING NO. [Dwg#]



⊙ Boring Location

**PLAN of BORINGS**  
**CA0601: I-30 over Saline River**  
**Saline County, Arkansas**

Scale: As Shown

Date: February 2016

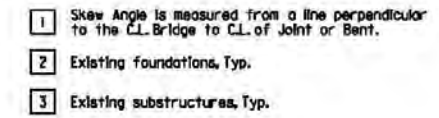
Job No. 15-019

PLATE 1a



60% SUBMITTAL  
PRELIMINARY  
FOR REVIEW ONLY  
STEPHEN T. SMILEY, P.E., 13072  
SEPTEMBER-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FEED- BACK NO.	STATE	FEDLAD PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.	CA0601	160	836	
				(1) [Brdg*]	BRIDGE LAYOUT			[Dwg*]



**SHEET 2 OF 9**  
**LAYOUT OF BRIDGES**  
**OVER SALINE RIVER**  
HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22  
**ARKANSAS STATE HIGHWAY COMMISSION**  
LITTLE ROCK, ARK.

DRAWN BY: <u>AKH</u>	DATE: <u>9/15/2004</u>	FL. NAME: <u>00060613_12</u>
CHECKED BY: <u>JH</u>	DATE: <u>10/14/2004</u>	SCALE: <u>1" = 20'</u>
DESIGNED BY: <u>SYS</u>	DATE: <u>9/1/2004</u>	

**BRIDGE NO. [LBRdg#]                      DRAWING NO. [Dwg#]**



**PLAN of BORINGS**  
**CA0601: I-30 over Saline River**  
**Saline County, Arkansas**

**Scale: As Shown**

**Date: February 2016**

**Job No. 15-019**

**PLATE 1b**



For R/W Data, See Roadway Plans

See Dwg. No. 10001 for location and type of special approach slabs and special approach gutters.

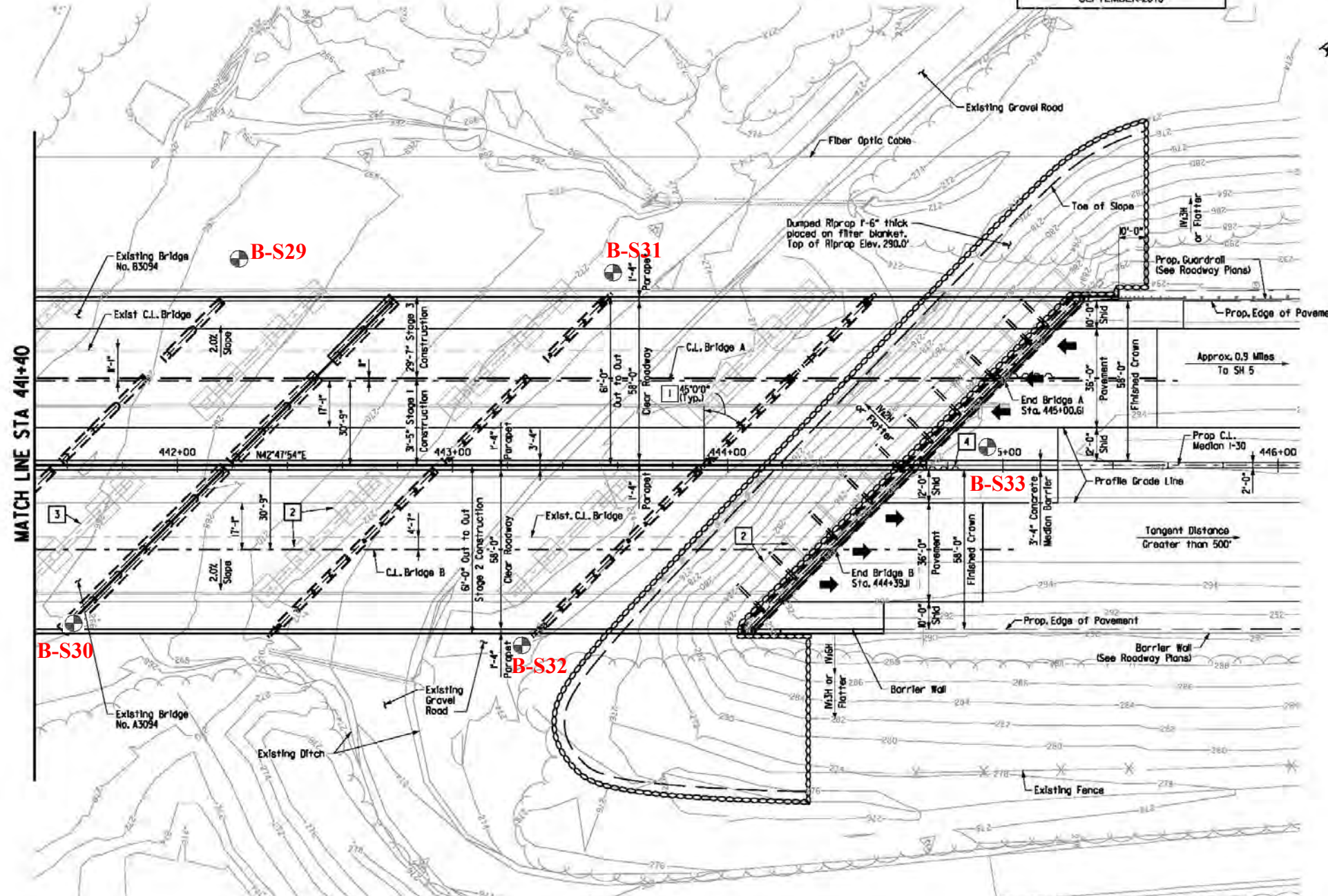
60% SUBMITTAL

PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

SEPTEMBER-2015

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.	CA0601	161	836	
				[Brdg*]	BRIDGE LAYOUT	[Dwg*]		



- 1 Skew Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint.
- 2 Existing foundations, Typ.
- 3 Existing substructures, Typ.
- 4 Shoring will be required during construction (Typ.). See SP Job CA0601 "Shoring".

⊕ Boring Location

PLAN

25 ft 0 25 ft 50 ft

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 3 OF 9  
LAYOUT OF BRIDGES  
OVER SALINE RIVER

HWY 70 - SEVIER ST. (WIDENING) (S)

SALINE COUNTY

ROUTE 30 SEC. 22

ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 9/15/2014 FILENAME: b0006003.13  
CHECKED BY: JH DATE: 10/1/2014 SCALE: 1" = 20'  
DESIGNED BY: STS DATE: 9/1/2014  
BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]





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

# LOG OF BORING NO. S19

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 433+85, 10 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: 294±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
						10	20	30	40	50	60	70	
5			Dense brown and reddish brown fine sand w/some quartz fragments and crushed stone and occasional clayey fine sand pockets (fill)	50/10"		●							42
			Dense tan and brown clayey fine sand w/some fine sandy clay pockets and quartz fragments and fine to coarse gravel (fill)	37		●							
			- less crushed stone below 6 ft	25		●	+	+					
				27		●							
10				32		●							63
			Stiff brown silty clay, slightly sandy w/occasional fine sand partings and quartz fragments and clay pockets with some fine gravel	22		●							
15			Stiff tan and brownish gray clayey silt, sandy w/occasional silty fine sand partings and fine sandy clay pockets	19		●	+	+					
20			- firm reddish brown and brown with occasional organic stains and inclusions below 23 ft	8		+	●	+					
25			Medium dense tan and brown fine gravel w/a little coarse gravel, slightly sandy	13					●				4
			- ±100% water loss from 27 to 45 ft										
			- with more sand at 33 to 35 ft	25									
			- with coarse gravel below 38 ft	24					●				
30													
35													
40													
45			Moderately hard light gray and dark gray shale, slightly weathered w/medium close siltstone partings and quartz inclusions and occasional calcareous inclusions	25/0"									

COMPLETION DEPTH: 90.0 ft  
DATE: 10-10-15

DEPTH TO WATER  
IN BORING: Dry to 20 ft

DATE: 10/9/2015



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

# LOG OF BORING NO. S19

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 433+85, 10 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
						<div> <div>PLASTIC LIMIT</div> <div>WATER CONTENT</div> <div>LIQUID LIMIT</div> </div>							
						10	20	30	40	50	60	70	
55			- with occasional pyrite inclusions below 58 ft	25/0"									
60				25/0"									
65			Moderately hard to hard light gray and dark gray shale w/medium close siltstone partings and calcite inclusions	25/0"									
70				25/0"									
75			- with medium close sandstone partings below 73 ft	25/0"									
80				25/0"									
85				25/0"									
90				25/0"									
95													

COMPLETION DEPTH: 90.0 ft  
DATE: 10-10-15

DEPTH TO WATER  
IN BORING: Dry to 20 ft

DATE: 10/9/2015



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

# LOG OF BORING NO. S20

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 28.5 ft /Wash

LOCATION: Approx Sta 434+15, 58 ft Rt

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: 275±			PLASTIC LIMIT	WATER CONTENT				LIQUID LIMIT		
						10	20	30	40	50	60	70	
5			Medium dense reddish tan fine sandy silt w/some medium sand	26		●							55
				16		●							
				17		●							
			Stiff brown fine sandy clay w/occasional fine sand pockets	17			●						15
10			Medium dense tan, reddish tan, reddish brown silty fine to coarse sand w/fine gravel	16		●							
				16									
15													9
			Medium dense brown and tan sandy fine gravel, slightly silty w/a little coarse gravel	29		●							
20													
25			Moderately hard light and dark gray weathered shale, slightly clayey w/medium close siltstone partings	50/8"		●							50/0"
30			Moderately hard light gray and dark gray weathered shale w/medium close to close siltstone partings and occasional pyrite inclusions	50/2"		●							
			- less weathered below 33 ft	50/1"									50/0"
35													
			- with medium close sandstone partings and quartz inclusions below 38 ft	50/0"									
40													50/0"
			Moderately hard to hard light gray and dark gray shale w/medium close sandstone partings and quartz inclusions and occasional calcareous inclusions	50/0"									
45													
				50/0"									

COMPLETION DEPTH: 80.0 ft  
DATE: 10-1-15

DEPTH TO WATER  
IN BORING: 17 ft

DATE: 10/1/2015



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

# LOG OF BORING NO. S20

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 28.5 ft /Wash

LOCATION: Approx Sta 434+15, 58 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
						<div> <div>PLASTIC LIMIT</div> <div>WATER CONTENT</div> <div>LIQUID LIMIT</div> </div>							
						10	20	30	40	50	60	70	
55			- with interbedded calcareous siltstone partings below 53 ft	50/0"									
60			- with occasional pyrite inclusions below 58 ft	50/0"									
65				50/0"									
70			- with medium close quartz veins and sandstone partings below 68 ft	25/0"									
75				25/0"									
80			- with less quartz below 78 ft	25/0"									
85													
90													
95													

COMPLETION DEPTH: 80.0 ft  
DATE: 10-1-15

DEPTH TO WATER  
IN BORING: 17 ft

DATE: 10/1/2015



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

# LOG OF BORING NO. S21

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 18.5 ft /Wash

LOCATION: Approx Sta 436+00, 70 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: 269±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
						10	20	30	40	50	60	70	
5		X	Medium dense tan and brown fine to coarse sand w/some fine to coarse gravel	16									7
			- dense below 4 ft	10									
			30										
10		X	Medium dense brown and tan sandy fine to coarse gravel, slightly silty	19									
			22										
15		X	Moderately hard gray and dark gray shale, slightly weathered w/medium close to close quartz veins and siltstone partings	50/4"									
				25/0"									
				50/1"									
				25/0"									
				30									
35		X	Moderately hard to hard dark gray shale w/close quartz veins and inclusions, medium close sandstone partings and occasional calcareous inclusions - no core recovery at 31 - 33 ft	25/0"									
				25/0"									
				25/0"									
				25/0"									
				45									
40		X	- core barrel plugged at 44 ft, coring abandoned	25/0"									
				25/0"									
				25/0"									
45		X	- with medium close quartz veins below 48 ft	25/0"									
				25/0"									
COMPLETION DEPTH: 80.0 ft DATE: 9-30-15				DEPTH TO WATER IN BORING: 7 ft				DATE: 9/30/2015					

LGBNEW 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S21

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 18.5 ft /Wash

LOCATION: Approx Sta 436+00, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT				
						+	●	+				
						10	20	30	40	50	60	70
55				25/0"								
60				50/0"								
65				50/0"								
70			- harder below 66 ft	50/0"								
75				50/0"								
80				50/0"								
85												
90												
95												

COMPLETION DEPTH: 80.0 ft  
DATE: 9-30-15

DEPTH TO WATER  
IN BORING: 7 ft

DATE: 9/30/2015

LGBNEW 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S22

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 435+80, 65 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
			SURF. EL: 259±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +				
						10	20	30	40	50	60	70			
5			Medium dense tan and brown sandy fine to coarse gravel, slightly silty	11			●						6		
10			Medium dense brownish gray sandy fine to coarse gravel, slightly clayey												
15			Moderately hard tan and dark gray shale, slightly weathered w/occasional pyrite and calcareous inclusions and medium close siltstone partings	50/2"											
20			- moderately hard to hard below 18 ft	50/1"											
25			- with medium close sandstone partings and quartz inclusions below 23 ft	50/0"											
30				50/0"											
35			- with medium close to close siltstone partings and seams below 33 ft	50/0"											
40				50/0"											
45			Moderately hard to hard light gray and dark gray shale w/medium close siltstone partings and sandstone partings and seams	50/0"											
				50/0"											
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER				DATE: 10/2/2015							
DATE: 10-2-15				IN BORING: 0.5 ft											

RECROD200-2 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S22

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 435+80, 65 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
55			- with occasional pyrite inclusions and medium close to close sandstone partings and seams below 55 ft	50/0"											
60			- calcareous sandstone seam at 58 ft												
			- with occasional calcareous inclusions below 58.5 ft												
65				50/0"											
70				50/0"											
75				50/0"											
80				50/0"											
85															
90															
95															

COMPLETION DEPTH: 80.0 ft  
DATE: 10-2-15

DEPTH TO WATER  
IN BORING: 0.5 ft

DATE: 10/2/2015





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

# LOG OF BORING NO. S23

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12 ft /Wash

LOCATION: Approx Sta 436+95, 10 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
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						<div><div>PLASTIC LIMIT</div><div>WATER CONTENT</div><div>LIQUID LIMIT</div><div>10203040506070</div></div>												
			SURF. EL: 259±															
			Loose reddish brown sandy fine to coarse gravel - with occasional cobbles below 2 ft	7														
5			- more coarse gravel below 6 ft												3			
10			Moderately hard tan, light gray and dark gray weathered shale w/medium close siltstone partings and calcareous inclusions	50/3"														
15																		
20				50/1"														
25			Moderately hard to hard light gray and dark gray shale w/medium close sandstone partings and occasional calcareous inclusions	50/0"														
30			- with medium close to close siltstone partings and seams below 28 ft	50/0"														
35				50/0"														
40				50/0"														
45			Moderately hard to hard light gray and dark gray shale w/medium close quartz veins and inclusions and occasional pyrite inclusions	50/0"														
			- with medium close sandstone partings below 48 ft	50/0"														
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER				DATE: 10/1/2015										
DATE: 10-1-15				IN BORING: 0.5 ft														

RECROD200-2 15-019 I-30 OVER SALINE RIVER, S19-33 GPJ 4-1-16

15-019



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

# LOG OF BORING NO. S23

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12 ft /Wash

LOCATION: Approx Sta 436+95, 10 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
55			- with very close sandstone seams and interbedded siltstone partings and occasional pyrite inclusions below 55 ft	50/0"											
60			- steep calcite filled fractures at 58 ft												
65			- with interbedded calcareous sandstone seams below 59 ft with medium close silt partings	50/0"											
70				50/0"											
75				50/0"											
80				50/0"											
			NOTE: Set casing to 11 ft.												
85															
90															
95															

COMPLETION DEPTH: 80.0 ft  
DATE: 10-1-15

DEPTH TO WATER  
IN BORING: 0.5 ft

DATE: 10/1/2015



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

# LOG OF BORING NO. S24

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 437+20, 60 ft Rt

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
SURF. EL: 258±						PLASTIC LIMIT: 10 WATER CONTENT: 40 LIQUID LIMIT: 70				
5			Medium dense brown and tan sandy fine to coarse gravel - more coarse gravel below 2 ft - with some cobble below 3 ft	14		●				2
10			Low hardness dark gray and tan highly weathered shale w/some silty clay seams and layers							
15			Moderately hard light gray and dark gray shale, slightly weathered w/medium close to close siltstone partings and seams	50/3"						
20				50/1"						
25				50/0"						
30				50/0"						
35				50/0"						
40			Moderately hard to hard dark gray shale w/close siltstone partings and seams	50/0"						
45				50/0"						
				50/0"						

COMPLETION DEPTH: 80.0 ft  
 DATE: 10-3-15

DEPTH TO WATER  
 IN BORING: At Surface

DATE: 10/3/2015

LGBNEW 15-019, I-30 OVER SALINE RIVER, S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S24

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 437+20, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
55			- with interbedded medium close sandstone partings and seams below 58 ft	50/0"									
60				50/0"									
65				50/0"									
70				50/0"									
75				50/0"									
80				50/0"									
85			NOTE 1: Surface water at 6 in. NOTE 2: Set 11 ft casing. NOTE 3: Street water level 6 in.										
90													
95													

COMPLETION DEPTH: 80.0 ft  
DATE: 10-3-15

DEPTH TO WATER  
IN BORING: At Surface

DATE: 10/3/2015



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

# LOG OF BORING NO. S25

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Sta 439+25, 70 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
						<div><div><div></div></div><div><div>0.2</div><div>0.4</div><div>0.6</div><div>0.8</div><div>1.0</div><div>1.2</div><div>1.4</div></div></div> <div><div>PLASTIC LIMIT</div><div>WATER CONTENT</div><div>LIQUID LIMIT</div></div> <div><div>+</div><div>•</div><div>+</div></div> <div><div>10</div><div>20</div><div>30</div><div>40</div><div>50</div><div>60</div><div>70</div></div>									
			SURF. EL: 259±												
			Dense brown sandy fine to coarse gravel w/a little cobbles	50/10"											
			Medium dense tan and brown fine to coarse sand, slightly silty w/a little fine gravel	16											
5			Loose brown clayey fine to coarse sand w/fine to coarse gravel												
			Loose to medium dense brown fine to medium sand w/a little fine to coarse gravel and occasional cobbles												
10			Moderately hard dark gray shale, slightly weathered w/medium close siltstone partings and sandstone partings and seams	50/2"											
15															
20			- with less sandstone below 18 ft	50/2"											
25			- moderately hard to hard with occasional calcite inclusions below 23 ft	50/0"											
30			- less calcite with medium close quartz inclusions below 28 ft	50/0"											
35			Moderately hard to hard dark gray shale w/medium close to close siltstone partings and occasional calcareous inclusions	50/0"											
40				50/0"											
45				50/0"											
				50/0"											
				50/0"											
				50/0"											
				50/0"											
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**Grubbs, Hoskyn,  
Barton & Wyatt, Inc.**  
Consulting Engineers

# LOG OF BORING NO. S25

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Sta 439+25, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
55			- attempted core at 55 to 58 ft; core barrel plugged off	50/0"											
60			- with close siltstone partings and seams and occasional pyrite inclusions below 58 ft	50/0"											0 0
65															
70			- with occasional calcareous inclusions below 68 ft	50/0"											
75				50/0"											
80			NOTE: Cased to 11 ft.	50/0"											
85															
90															
95															

COMPLETION DEPTH: 80.0 ft  
DATE: 10-8-15

DEPTH TO WATER  
IN BORING: 2 ft

DATE: 10/8/2015



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

# LOG OF BORING NO. S26

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 438+85, 62 ft Rt

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: 261±										
						PLASTIC LIMIT	WATER CONTENT				LIQUID LIMIT		
						+	10	20	30	40	50	60	70
5			Loose brown and tan sandy fine gravel	10									4
			Medium dense tan and brown sandy fine to coarse gravel	14									
			- with occasional cobbles below 6 ft	18									
10			Moderately hard to hard dark gray shale w/medium close quartz veins and inclusions and siltstone partings and seams	50/1"									4
15													
20			- could not start core run at 20 ft due to surface caning	50/1"									
25													
30													
35													
40			Moderately hard to hard light gray and dark gray shale w/occasional pyrite inclusions	50/0"									4
45													
			- with medium close to close siltstone partings below 48 ft	50/0"									4

COMPLETION DEPTH: 80.0 ft

DATE: 10-5-15

DEPTH TO WATER

IN BORING: At Surface

DATE: 10/5/2015



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

# LOG OF BORING NO. S26

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 438+85, 62 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
55			- with occasional calcareous inclusions below 68 ft	50/0"									
				50/0"									
60				50/0"									
				50/0"									
65				50/0"									
				50/0"									
70				50/0"									
				50/0"									
75													
80													
85													
90													
95													

COMPLETION DEPTH: 80.0 ft  
DATE: 10-5-15

DEPTH TO WATER  
IN BORING: At Surface

DATE: 10/5/2015

LGBNEW 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16





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

# LOG OF BORING NO. S26A

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 440+00, 65 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 260±			PLASTIC LIMIT +			WATER CONTENT ●			LIQUID LIMIT +		
						10	20	30	40	50	60	70		
5			Loose brown and tan sandy fine gravel	10										
			Medium dense tan and brown sandy fine to coarse gravel	14										
			- with occasional cobbles below 6 ft	18									4	
10														
			Moderately hard to hard dark gray shale w/close quartz veins and inclusions and very close to close siltstone partings and seams, dip = ±30°	50/1"										
15														
				50/1"										
20														
				50/0"										
25			- with very close siltstone seams below 25 ft										90	65
30														
			- with close sandstone partings and seams below 32 ft										82	66
35														
			NOTE: Set 12 ft casing.											
COMPLETION DEPTH: 35.0 ft						DEPTH TO WATER IN BORING: At Surface						DATE: 2/19/2016		
DATE: 2-19-16						q <sub>u</sub> = 760 psi, TUW = 154 pcf								

RECROD200-2 15-019 I-30 OVER SALINE RIVER S19-33 GPJ 4-1-16



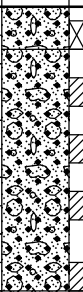
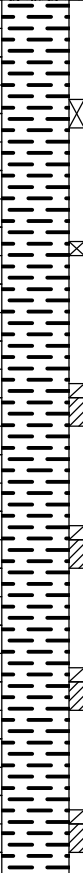
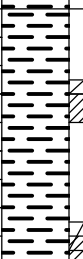
**Grubbs, Hoskyn,  
Barton & Wyatt, Inc.**  
Consulting Engineers

# LOG OF BORING NO. S27

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 440+58, 73 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 +	
			SURF. EL: 261±			10	20	30	40	50	60	70	
			Dense brown sandy fine to coarse gravel w/occasional cobbles	50/8"									7
5			Medium dense brown and gray sandy fine to coarse gravel, slightly silty										
10													
			Moderately hard dark gray shale, slightly weathered w/medium close sandstone partings and occasional quartz inclusions	50/2"									
15													
20			- moderately hard to hard, light gray and dark gray w/close siltstone partings below 18 ft	50/1"									
25			- less weathered with occasional pyrite inclusions below 23 ft	50/0"									
30			- with occasional calcareous inclusions below 28 ft	50/0"									
35					50/0"								
40					50/0"								
			Moderately hard to hard light and dark gray shale w/medium close siltstone partings and occasional pyrite and calcareous inclusions	50/0"									
45													
			- with medium close sandstone partings and seams below 48 ft	50/0"									
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER									
DATE: 10-7-15				IN BORING: 2 ft				DATE: 10/7/2015					

LGBNEW 15-019, I-30 OVER SALINE RIVER, S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S27

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12.5 ft /Wash

LOCATION: Approx Sta 440+58, 73 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
55			- with medium close quartz veins and inclusions below 63 ft	50/0"									
60				50/0"									
65				50/0"									
70				50/0"									
75			- with interbedded very close to close calcareous sandstone partings, seams and layers below 73 ft	50/0"									
80				50/0"									
NOTE: Cased to 11 ft.													
85													
90													
95													

COMPLETION DEPTH: 80.0 ft  
DATE: 10-7-15

DEPTH TO WATER  
IN BORING: 2 ft

DATE: 10/7/2015

LGBNEW 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S28

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12 ft /Wash

LOCATION: Approx Sta 440+27, 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 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div><div>PLASTIC LIMITWATER CONTENTLIQUID LIMIT</div><div>10203040506070</div></div>												
			SURF. EL: 263±															
			Dense tan and brown sandy fine to coarse gravel	50/6"														
			Medium dense brown and dark gray fine to coarse sand, slightly silty w/fine to coarse gravel	28														
5			Dense to very dense brown and tan sandy fine to coarse gravel - caving at 4 ft	50/7"												5		
10			Moderately hard dark gray shale w/occasional pyrite inclusions															
				50/3"														
15																		
				50/1"														
20			Moderately hard to hard light gray and dark gray siltstone w/very close shale seams and layers and pyrite inclusions, dip = ±30°													90	65	
25			Moderately hard to hard dark gray shale, calcareous w/very close siltstone seams and layers and pyrite nodules, dip = ±30°													82	66	
30																		
				50/0"														
35																		
				50/0"														
40																		
			Moderately hard to hard light gray and dark gray shale w/medium close siltstone partings and occasional pyrite and calcareous inclusions	50/0"														
45			- with medium close quartz inclusions below 48 ft	50/0"														
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER														
DATE: 2-12-16				IN BORING: 5 ft														DATE: 2/12/2016

RECRODN200-2 15-019 I-30 OVER SALINE RIVER S19-33 GPJ 4-1-16



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

# LOG OF BORING NO. S28

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 12 ft /Wash

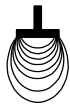
LOCATION: Approx Sta 440+27, 55 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
55			- with occasional calcite inclusions below 55 ft	50/0"											
60				50/0"											
65			- with close to medium close sandstone partings and seams below 63 ft	50/0"											
70				50/0"											
75				50/0"											
80			NOTE: Set 11 ft casing.	50/0"											
85															
90															
95															

COMPLETION DEPTH: 80.0 ft  
DATE: 2-12-16

DEPTH TO WATER  
IN BORING: 5 ft

DATE: 2/12/2016



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

# LOG OF BORING NO. S29

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 442+20, 75 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 267±											
			Stiff tan and brown clayey silt, sandy	15			●							
			Medium dense reddish brown and brown silty fine sand w/some medium sand	14			●							
5			Firm to stiff brown and gray silty clay, sandy w/occasional organic inclusions and fine sand pockets	10				●						
			Medium dense brown sandy fine to coarse gravel, silty - dense to very dense below 8 ft	26			●						13	
10			- water at 8 ft - with occasional cobbles below 8 ft	50/6"			●							
15			Moderately hard gray, tan and dark gray weathered shale, clayey, slightly arenaceous w/occasional calcareous clay laminations and seams, interbedded siltstone partings, seams, occasional pyrite and quartz inclusions	50/7"			●	+						
20			- with medium close siltstone partings and occasional silty clay laminations below 18 ft	50/7"			●							
25			Moderately hard to hard dark gray shale, slightly weathered w/medium close siltstone partings and occasional calcite inclusions and partings	25/0"										
30			- with medium close siltstone partings and occasional calcareous inclusions below 28 ft	50/2"										
35				25/0"										
40				25/0"										
45			Moderately hard to hard dark gray shale w/medium close siltstone partings and occasional calcareous inclusions	25/0"										
				25/0"										

COMPLETION DEPTH: 80.0 ft  
DATE: 10-8-15

DEPTH TO WATER  
IN BORING: 8 ft

DATE: 10/8/2015



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

# LOG OF BORING NO. S29

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

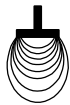
LOCATION: Approx Sta 442+20, 75 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT												- No. 200 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>														
						PLASTIC LIMIT +	WATER CONTENT ●								LIQUID LIMIT +					
						10	20	30	40	50	60	70								
55			- with occasional pyrite inclusions and quartz inclusions below 54 ft	25/0"																
60			- with close quartz veins and inclusions below 58 ft - core from 60 to 65 ft, no recovery	25/0"											0	0				
65				25/0"																
70			- with occasional calcite inclusions below 68 ft	25/0"																
75				25/0"																
80			NOTE: Set 15 ft of casing.	25/0"																
85																				
90																				
95																				
COMPLETION DEPTH: 80.0 ft DATE: 10-8-15				DEPTH TO WATER IN BORING: 8 ft				DATE: 10/8/2015												

COMPLETION DEPTH: 80.0 ft  
DATE: 10-8-15

DEPTH TO WATER  
IN BORING: 8 ft

DATE: 10/8/2015



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

CA0601: I-30 over Saline River  
Saline County, Arkansas

LOCATION: Approx Sta 441+65, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. %	% Recovery	% RQD
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
			SURF. EL: 266±												
			Medium dense brown sandy fine gravel	7											
			Firm brown fine sandy clay w/some fine to coarse gravel	4											
5			Loose gray and brown silty fine sand w/trace fine gravel and organics	3											
			- very loose at 2 to 6 ft	5											
			- with a little medium sand below 4 ft												
10			- loose below 6 ft	29											
			Low hardness light gray tan and dark gray highly weathered shale												
15			Moderately hard to hard gray and dark gray shale w/medium close sandstone partings	50/2"											
20			- fine-grained sandstone layer at 19 to 20 ft	50/1"											
25			- with occasional calcareous inclusions below 23 ft	50/0"											
30			- with frequent calcite inclusions and occasional quartz inclusions below 28 ft	50/0"											
35				50/0"											
40			Moderately hard to hard light gray and dark gray shale w/medium close to close siltstone partings and quartz inclusions	50/0"											
45			- with occasional calcite inclusions below 43 ft	50/0"											
				50/0"											
			- core run at 48 - 53 ft, barrel blocked off, no recovery											0	0
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER											
DATE: 10-6-15				IN BORING: 9 ft				DATE: 10/6/2015							





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

# LOG OF BORING NO. S30

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 441+65, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD				
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +							
						0.2	0.4	0.6	0.8	1.0	1.2	1.4			
			- with medium close sandstone partings below 48 ft												
55				50/0"											
60				50/0"											
65			- with occasional quartz inclusions below 63 ft and medium close to close calcite partings below 63 ft	50/0"											
70				50/0"											
75				50/0"											
80				50/0"											
85															
90															
95															

COMPLETION DEPTH: 80.0 ft  
DATE: 10-6-15

DEPTH TO WATER  
IN BORING: 9 ft

DATE: 10/6/2015



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

# LOG OF BORING NO. S31

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 443+60, 70 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 273±											
			Very stiff gray and brown clayey silt, sandy, dry	33										
				28										
5			Stiff gray and brown silty clay w/some ferrous stains and nodules and occasional silt pockets	15									79	
			- firm to stiff below 6 ft	10									96	
10			Stiff reddish brown and gray silty clay, sandy w/occasional clay pockets and silt pockets and partings	17									88	
15			Medium dense gray and brown silty fine sand w/occasional fine sandy clay pockets and fine sand seams and occasional organic stains and inclusions	16									44	
20			Moderately hard to hard dark gray shale, slightly weathered w/close sandstone partings and seams and occasional pyrite inclusions	50/2"										
25				50/2"										
30			- less weathered with occasional quartz inclusions below 28 ft	25/0"										
35				50/0"										
40				25/0"										
45			Moderately hard to hard dark gray shale w/occasional quartz inclusions	25/0"										
				25/0"										
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER				DATE: 10/5/2015						
DATE: 10-5-15				IN BORING: 17 ft										

RECROD200-2 15-019 I-30 OVER SALINE RIVER, S19-33.GPJ 4-1-16

15-019



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

# LOG OF BORING NO. S31

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

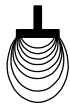
LOCATION: Approx Sta 443+60, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD					
						PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +								
						0.2	0.4	0.6	0.8	1.0	1.2	1.4				
55			- mechanical fractures in core run at 50 - 55 ft													
60			- with interbedded siltstone partings and seams below 56 ft	25/0"												
65			- less quartz below 63 ft	25/0"												
70				25/0"												
75				25/0"												
80			NOTE: Set 20 ft casing.	25/0"												
85																
90																
95																

COMPLETION DEPTH: 80.0 ft  
DATE: 10-5-15

DEPTH TO WATER  
IN BORING: 17 ft

DATE: 10/5/2015



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

# LOG OF BORING NO. S32

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 443+25, 65 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
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						PLASTIC LIMIT +	WATER CONTENT ●								LIQUID LIMIT +			
			SURF. EL: 274±			10	20	30	40	50	60	70						
			Stiff to very stiff brown and tan clayey silt, sandy w/fine to coarse gravel (fill)	50/4"														
5			Very stiff tan and brown fine sandy clay w/occasional quartz fragments and silt pockets, dry	39		●												
			- stiff at 4 to 6 ft	24		●												
			- with occasional fine sandy silt partings below 4 ft	21		●	+	-	+						74			
10			- very stiff with some fine to coarse gravel below 8 ft	50/9"		●												
15			Medium dense brown fine to coarse sand w/fine gravel and a little coarse gravel, slightly silty, moist	20		●									8			
			- water at 12 ft															
20			Moderately hard gray, tan and dark gray weathered shale, slightly clayey w/occasional silty clay laminations	50/7"		●	+	+										
25			- dark gray, less weathered with less silt and silty clay below 23 ft	50/1"														
30			Moderately hard to hard dark gray shale w/occasional calcareous inclusions and quartz inclusions	25/0"														
35			- with less quartz below 33 ft	25/0"														
40			Moderately hard gray clayey shale w/calcareous fine sandy clay pockets and calcareous inclusions	50/5"														
45			Moderately hard to hard dark gray shale w/medium close sandstone partings and occasional calcareous inclusions	50/0"														
			- light gray and dark gray with close calcareous siltstone	25/0"														
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER														
DATE: 10-1-15				IN BORING: 12 ft								DATE: 10/1/2015						

RECRODN200-2 15-019 I-30 OVER SALINE RIVER, S19-33 GPJ 4-1-16



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

# LOG OF BORING NO. S32

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 443+25, 65 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %	% Recovery	% RQD	
						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			
			partings below 48 ft													
				25/0"												
55																
				25/0"												
60																
65																
			- with pyrite inclusions and interbedded calcareous siltstone partings and seams below 65 ft												50	0
70			- numerous mechanical breaks in core run at 65 - 70 ft													
			- with vertical limestone seams and calcite inclusions at 66.5 to 67 ft												0	0
			- with medium close to close calcareous inclusions below 70 ft													
75			- no recovery in core run at 70 - 75 ft													
			- 75 ft													
			- interbedded calcite layer at 70.5 ft													
80			- with medium close sandstone partings below 75 ft													
85																
90																
95																

COMPLETION DEPTH: 80.0 ft  
DATE: 10-1-15

DEPTH TO WATER  
IN BORING: 12 ft

DATE: 10/1/2015



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

# LOG OF BORING NO. S33

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 40 ft /Wash

LOCATION: Approx Sta 444+95, 10 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: 294±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
						10	20	30	40	50	60	70	
			Dense brown silty fine sand w/some crushed stone (fill)	50/10"		●							
5			Stiff gray, tan and brown fine sandy clay w/some fine to coarse gravel and shale fragments and some fine sand seams and layers (fill)	18			●						
			- stiff with some clay pockets below 4 ft	23			●						
10			- tan, gray, reddish tan and brown fine sandy clay w/some quartz fragments and fine sand pockets below 6 ft	14			●		+				79
			- more sandy with some fine to coarse gravel below 8 ft	18			●						
15			Stiff tan and brownish gray fine sandy clay, silty w/occasional clay pockets	18			●		+				73
20			- firm with less gravel and occasional organic stains below 18 ft	7			●						
25			Firm to stiff brownish gray clayey silt, slightly sandy w/occasional silty clay pockets and organic stains, moist	10			+	●	+				83
30			Medium dense tan and brown fine to coarse sand, slightly silty w/some fine to coarse gravel	20									
			- water at 30 ft										
35			- with some fine sandy clay pockets below 33 ft	16			●		+	+			12
40			Moderately hard light gray and dark gray shale, slightly weathered w/medium close to close siltstone partings and seams	50/3"			●						
45			- moderately hard to hard with occasional silty clay seams and layers below 43 ft	50/2"			●						
				50/0"									
COMPLETION DEPTH: 90.0 ft				DEPTH TO WATER				DATE: 10/12/2015					
DATE: 10-12-15				IN BORING: 30 ft									

LGBNEW 15-019 I-30 OVER SALINE RIVER S19-33.GPJ 4-1-16



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

# LOG OF BORING NO. S33

CA0601: I-30 over Saline River  
Saline County, Arkansas

TYPE: Auger to 40 ft /Wash

LOCATION: Approx Sta 444+95, 10 ft Lt

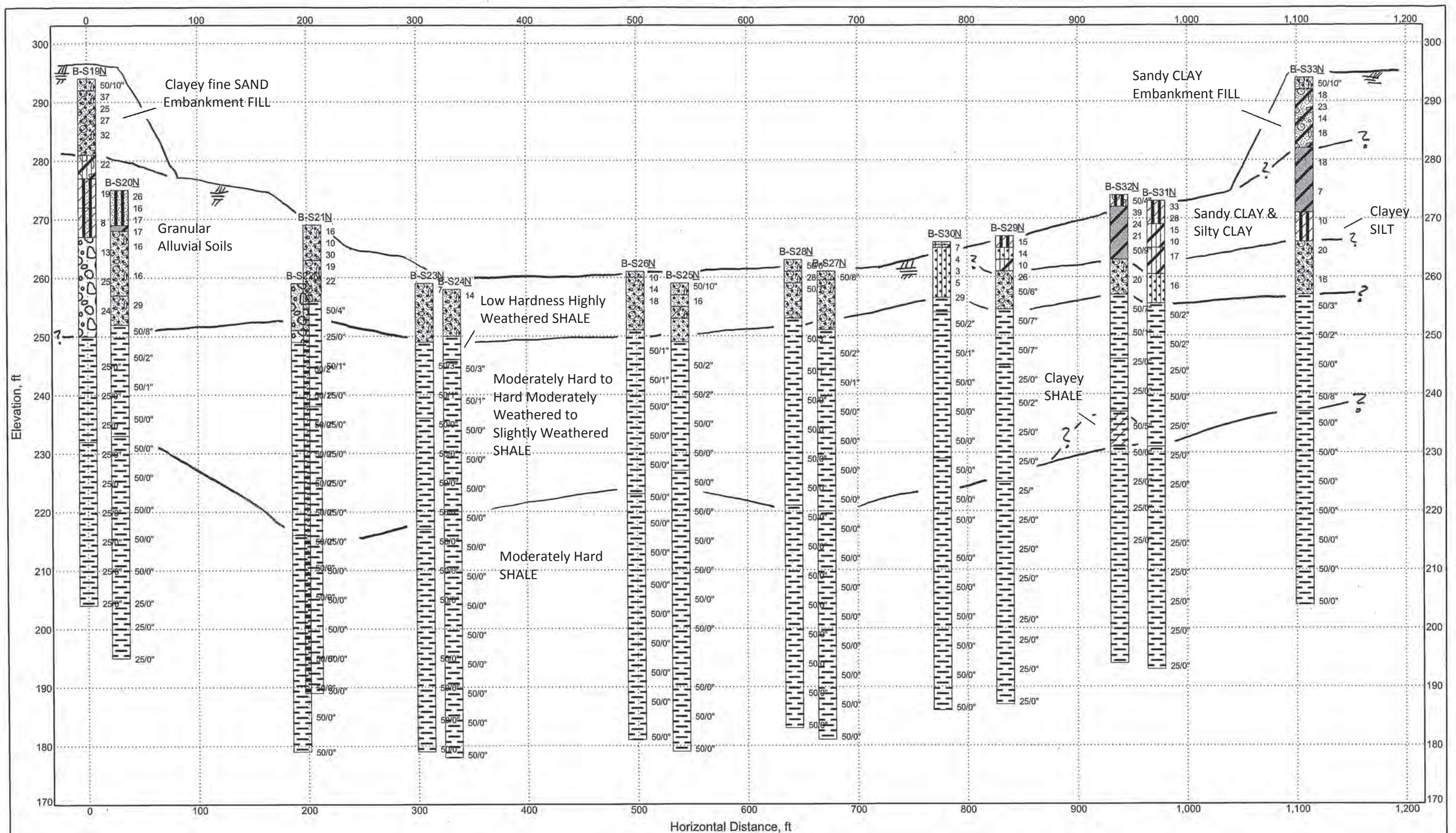
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						<div> <div>PLASTIC LIMIT</div> <div>WATER CONTENT</div> <div>LIQUID LIMIT</div> </div>							
						10	20	30	40	50	60	70	
55			- with interbedded very close to close siltstone seams and layers and occasional calcareous inclusions below 53 ft	50/8"									
60			Moderately hard to hard dark gray shale w/occasional quartz inclusions and calcareous inclusions	50/0"									
65			- light gray and dark gray with medium close siltstone partings below 63 ft	50/0"									
70			- with occasional pyrite inclusions below 68 ft	50/0"									
75				50/0"									
80			- with less siltstone and medium close sandstone partings and seams below 78 ft	50/0"									
85				50/0"									
90				50/0"									
95			NOTE: Set 30 ft casing.										

COMPLETION DEPTH: 90.0 ft  
DATE: 10-12-15

DEPTH TO WATER  
IN BORING: 30 ft

DATE: 10/12/2015





**NOTES:**  
 1. Boring locations typically offset from centerline.  
 2. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.  
 3. Ground surface approximate.

**SCALE:**  
 1" = 50' Horizontal  
 1" = 3' Vertical



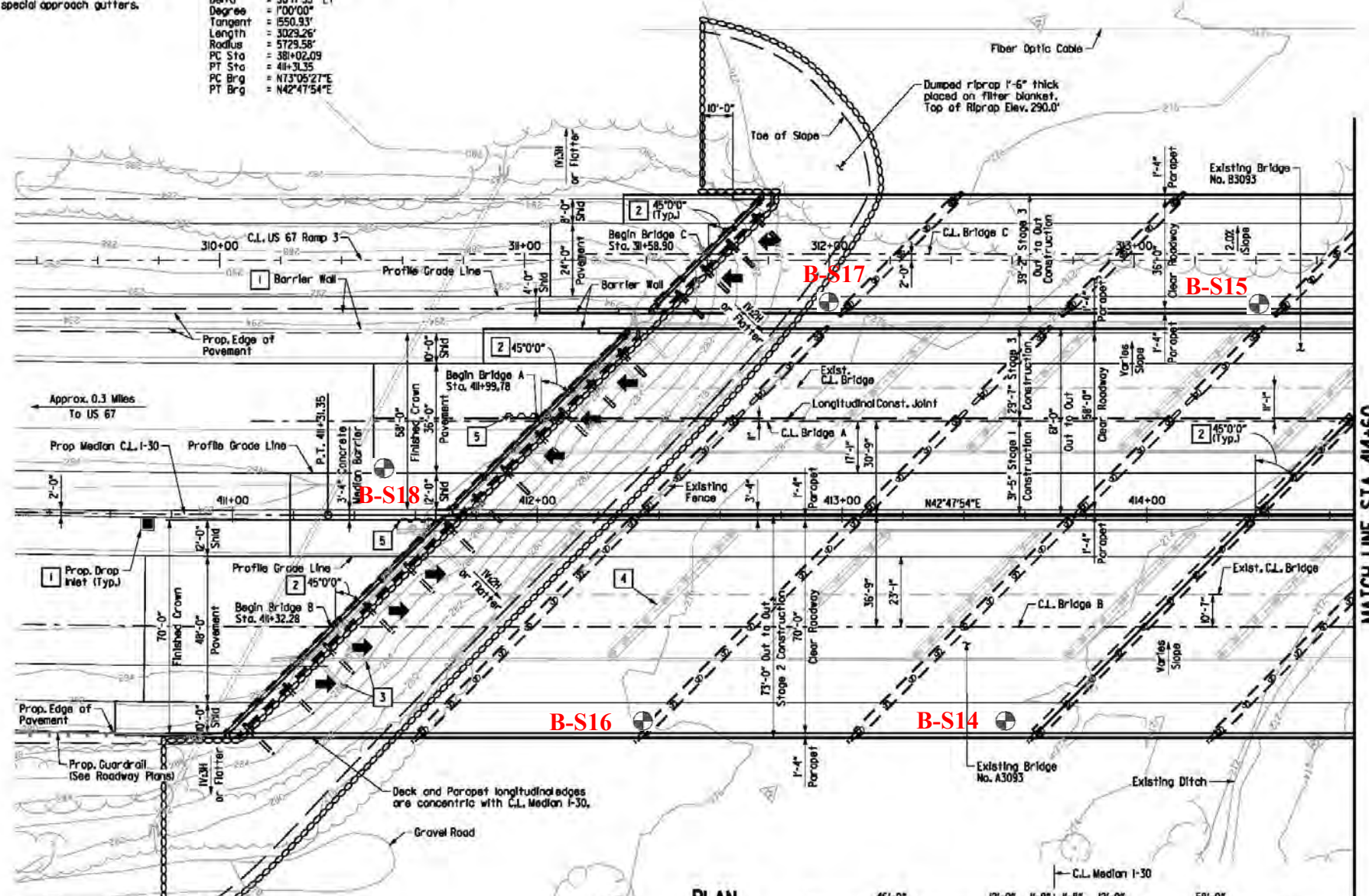
## **ATTACHMENT 4**

For R/W Data See Roadway Plans

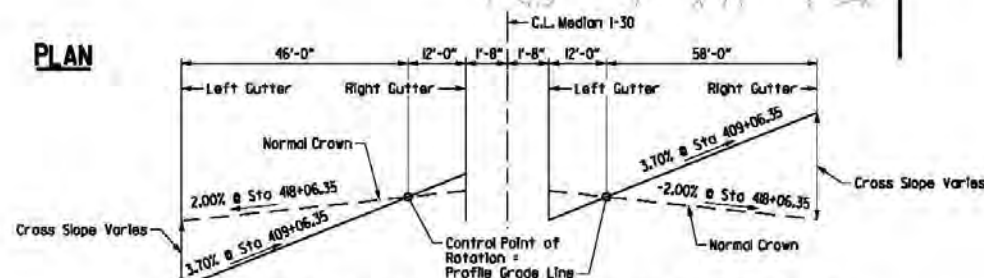
# HORIZONTAL CURVE DATA

C.L. Median I-30  
 PI Sta = 396+53.0  
 Delta = 30°17'33" LT  
 Degree = 1°00'00"  
 Tangent = 1550.93'  
 Length = 3029.26'  
 Radius = 5729.58'  
 PC Sta = 381+02.09  
 PT Sta = 411+31.35  
 PC Brg = N13°05'27"E  
 PT Brg = N42°47'54"E

See Dwg. No. XXXX for location and type of special approach slabs and special approach gutters.



PLAN



## SUPERELEVATION TRANSITION DETAIL FOR BRIDGE A & B

Length Of Superelevation Transition = 900'  
 Begin Transition 403+06.35  
 End Transition 412+06.35  
 For additional information, see Std. Dwg. SE-1

⊕ Boring Location

25 ft 0 25 ft 50 ft

DATE REVISION	DATE FILED	DATE REVISION	DATE FILED	FED. NO.	STATE	FED. PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
						CA0601	152	836

① [Brdg\*] BRIDGE LAYOUT [Dwg\*]

- Notes:
- C.L. Bridge A & B and their respective PGLs are concentric to C.L. Median I-30.
  - C.L. Bridge C and respective PGL is parallel to C.L. US 67 Ramp 3.
  - All Bridge A & B longitudinal edges of deck and approaches are concentric to C.L. Median I-30 U.N.O.
  - All Bents are parallel to each other.

The proposed bridges are positioned to avoid interference with the existing substructures. The Contractor shall verify the location of the existing substructures before constructing the new substructures. Any adjustments required to fit the proposed bridge shall be submitted to the Engineer for approval.

- See Roadway Plans
- Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- Existing foundations, Typ.
- Existing substructures, Typ.
- Shoring will be required during construction (Typ.). See SP Job CA0601 "Shoring".

60% SUBMITTAL

PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

SEPTEMBER-2015

BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 1 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)

SALINE COUNTY

ROUTE 30 SEC. 22

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

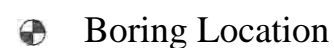
DRAWN BY: ARH DATE: 9/15/2014  
 CHECKED BY: JH DATE: 10/1/2014  
 DESIGNED BY: SYS DATE: 9/1/2014  
 BRIDGE NO. [Brdg\*] DRAWING NO. [Dwg\*]



See Dwg. No. XXXX for location and type of special approach slabs and special approach cutters.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FOLIO NO.	STATE	FOLIO PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	153	836

① [Bridge] BRIDGE LAYOUT [Drawn]



- 1 See Roadway Plans
- 2 Angle is measured from a line perpendicular to the C.L. Bridge to C.L. of Joint or Bent.
- 3 Existing foundations, Typ.
- 4 Existing substructures, Typ.
- 5 Shoring will be required during construction (Typ.). See SP Job CA0601 "Shoring".

60% SUBMITTAL

PRELIMINARY  
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

SEPTEMBER-2016


**BRIDGEFARMER & ASSOCIATES, INC.**  
CONSULTING ENGINEERS

SHEET 2 OF 8  
LAYOUT OF BRIDGES  
OVER SALINE RIVER RELIEF

HWY 70 - SEVIER ST. (WIDENING) (S)

SEVIER ST. RIDE  
SALINE COUNTY  
POWER CO. 25000

ROUTE 30 SEC. 22  
ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 9/15/2014 FILE NAME: bcc06012.d  
 CHECKED BY: JH DATE: 10/1/2014 SCALE: 1" = 20'  
 DESIGNED BY: STS DATE: 9/1/2014  
 BRIDGE NO. [Brdg#] DRAWING NO. [Dwg#]



**PLAN OF BORINGS**  
**CA0601: I-30 over Saline River Relief**  
**Saline County, Arkansas**

**Scale: As Shown**

**Date: February 2016**

**Job No. 15-019**

**PLATE 1b**



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

# LOG OF BORING NO. S10

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 40 ft /Wash

LOCATION: Approx Sta 417+00, 9 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: 294±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
						10	20	30	40	50	60	70	
			Dense brown silty fine sand w/some fine to coarse gravel (fill) - tan clayey fine sand below 2 ft	50/7"		●							
				50/7"		●							
5			Very stiff reddish tan fine sandy clay w/occasional clayey fine sand seams and shale fragments (fill) - with a little fine to coarse gravel and quartz fragments below 6 ft - with more quartz fragments and occasional clay pockets and fine sandy pockets below 8 ft	35		●							68
				25		●	+	+					
10				38		●							
			- with less quartz and gravel below 13 ft	26		●							
15			Stiff reddish tan fine sandy clay w/occasional silty fine sand partings and seams and organic stains	18		●	+	+					54
20						●	+	+					
			- more sandy below 23 ft, moist	17		●							
25			Dense reddish brown silty fine to medium sand w/some fine to coarse gravel	44		●							13
30													
			- water at 32 ft										
35			Dense reddish brown sandy fine gravel, silty w/trace cobbles	53		●							20
40			Moderately hard light gray and dark gray weathered shale, slightly clayey w/close siltstone partings	50/2"		●							
45			- less weathered, less clayey with occasional quartz inclusions and calcareous inclusions below 43 ft	50/2"		●							
50			Moderately hard to hard dark gray shale w/medium close quartz veins and occasional quartz and calcareous inclusions, calcite inclusions and sandstone partings	50/0"									
				50/0"									

COMPLETION DEPTH: 90.0 ft  
DATE: 10-14-15

DEPTH TO WATER  
IN BORING: 32 ft

DATE: 10/14/2015



CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

LOCATION: Approx Sta 417+00, 9 ft Lt

- No. 200 %

DATE: 10/14/2015



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

# LOG OF BORING NO. S11

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 19 ft /Wash

LOCATION: Approx Sta 416+75, 70 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: 275±										
5			Very stiff tan fine sandy clay w/some fine gravel and quartz fragments and fine sand pockets (fill)	50									
				22									
			Stiff gray, tan and brown fine sandy clay w/occasional clay partings and seams and ferrous stains and nodules	11									
				10									
10			Stiff gray, tan and brown fine sandy clay w/occasional fine sand pockets and some ferrous stains and nodules	9									
			- firm to stiff at 6 to 8 ft, moist										
			- firm with more sand pockets with trace clay partings below 8 ft										
15			Medium dense brown and tan silty fine to coarse sand w/fine to coarse gravel, wet	29									
			Moderately hard tan, gray and dark gray weathered shale, slightly clayey w/occasional silty clay laminations and calcareous inclusions	50/5"									
20													
				50/1"									
25													
				50/0"									
30													
			Moderately hard tan, light gray and dark gray highly weathered shale, steeply bedded w/interbedded silty clay seams and siltstone partings	50/8"									
35													
			- with some calcareous fine sandy clay seams below 37 ft	50/6"									
40													
			- less weathered with less clay below 43 ft	50/2"									
45													
			- dark gray with a little tan and light gray below 48 ft	50/1"									
COMPLETION DEPTH: 90.0 ft				DEPTH TO WATER				DATE: 9/15/2015					
DATE: 9-15-15				IN BORING: Dry to 19.5 ft									

LGBNEW 15-019, S10-S18, I-30 OVER SALINE RIVER RELIEF.GPJ 4-1-16



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

# LOG OF BORING NO. S11

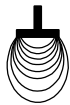
CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 19 ft /Wash

LOCATION: Approx Sta 416+75, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
						<div> <div>PLASTIC LIMIT</div> <div>WATER CONTENT</div> <div>LIQUID LIMIT</div> </div>							
						10	20	30	40	50	60	70	
55			Hard brownish gray calcareous fine-grained sandstone w/occasional chert and calcite inclusions	50/0"									
60			Moderately hard to hard dark gray shale w/occasional calcareous inclusions	50/0"									
65				50/1"									
70			- with pyrite inclusions below 68 ft	80/1"									
75				50/0"									
80				30/0"									
85				30/0"									
90				30/0"									
95			NOTE: Set 18 ft casing										
COMPLETION DEPTH: 90.0 ft				DEPTH TO WATER				DATE: 9/15/2015					
DATE: 9-15-15				IN BORING: Dry to 19.5 ft									

LGBNEW 15-019\_S10-S18\_I-30 OVER SALINE RIVER RELIEF.GPJ 4-1-16



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

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

LOCATION: Approx Sta 414+85, 65 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
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>									
						PLASTIC LIMIT +	WATER CONTENT ●					LIQUID LIMIT +			
SURF. EL: 275±						10	20	30	40	50	60	70			
5			Stiff to very stiff tan and brown silty clay, slightly sandy w/some ferrous stains	26			20								
			Stiff gray, tan and brown fine sandy clay w/some quartz fragments	22		18									
			Loose gray and tan silty fine to coarse gravel	7		20									
				7		20									
10							25								
15			Dense reddish tan sandy fine to coarse gravel, slightly clayey	50		18	22						40		
20			Moderately hard light gray and dark gray moderately weathered shale w/medium close to close quartz veins and siltstone partings	50/2"		20	22								
25			- with occasional calcareous inclusions below 23 ft	25/0"											
30			- with occasional pyrite inclusions below 28 ft	25/0"											
35			- less weathered below 33 ft	25/0"											
40				25/0"											
45			- with occasional calcite inclusions below 43 ft - no recovery in core run from 44 to 49 ft	25/0"									0	0	
50			Moderately hard to hard dark gray shale w/medium close to close siltstone partings and occasional calcite inclusions	25/0"											
55			- no core recovery in run at 54 - 58.5 ft - with fewer siltstone partings	25/0"									0	0	
COMPLETION DEPTH: 80.0 ft DATE: 9-28-15				DEPTH TO WATER IN BORING: 12 ft				DATE: 9/28/2015							

RECRQDN200-2 15-019 S10-S18 I-30 OVER SALINE RIVER RELIEF.GPJ 4-1-16





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

# LOG OF BORING NO. S12

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 18.5 ft /Wash

LOCATION: Approx Sta 414+85, 65 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div>0.20.40.60.81.01.21.4</div><div>PLASTIC LIMITWATER CONTENTLIQUID LIMIT</div><div>10203040506070</div></div>												
			below 58 ft															
65			- with occasional pyrite inclusions below 68 ft	25/0"														
70				25/0"														
75				25/0"														
80				25/0"														
			NOTE: Set 20 ft casing.															
85																		
90																		
95																		
100																		
105																		
110																		
115																		

COMPLETION DEPTH: 80.0 ft  
DATE: 9-28-15

DEPTH TO WATER  
IN BORING: 12 ft

DATE: 9/28/2015



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

# LOG OF BORING NO. S13

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 16 ft /Wash

LOCATION: Approx Sta 415+50, 70 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 274±											
5			Stiff reddish tan and brownish gray fine sandy clay w/occasional fine sand pockets and quartz fragments - with some clay laminations, fine gravel and fine to coarse sand pockets below 4 ft - water at 5.5 ft	19			●						52	
				13			+			+				
				12			●							
10			Soft gray, reddish tan, tan and reddish brown silty clay, slightly sandy w/some clay pockets and seams and fine sand pockets, ferrous stains and nodules - stiff below 8.5 ft	15			●							
15				34			●	+	+				12	
20			Dense brown and tan silty fine to coarse sand, slightly clayey w/some fine gravel	50/4"			●							
25			Moderately hard tan and dark gray weathered shale, carbonaceous - with medium close sandstone partings below 21 ft - with very close to close siltstone partings below 24 ft	50/1"			●							
30													68	23
35			- with occasional quartz inclusions below 32 ft	50/2"			●							
40			Moderately hard to hard light gray and dark gray shale w/medium close siltstone partings and occasional quartz veins and inclusions	30/0"										
45			- with less quartz below 43 ft	30/0"										
50			Moderately hard to hard dark gray shale w/close quartz veins and inclusions, apparent dip = 10 - 15°	30/0"										
55			- less quartz w/medium close sandstone partings below 53 ft	30/0"										
			- with medium close quartz	30/0"										
COMPLETION DEPTH: 78.0 ft				DEPTH TO WATER				DATE: 9/18/2015						
DATE: 9-18-15				IN BORING: 5.5 ft										

RECROD200-2 15-019, S10-S18, I-30 OVER SALINE RIVER RELIEF, GP J, 4-1-16



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

# LOG OF BORING NO. S13

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 16 ft /Wash

LOCATION: Approx Sta 415+50, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						<div>PLASTIC LIMIT                      WATER CONTENT                      LIQUID LIMIT</div> <div><div>+</div><div>●</div><div>+</div></div> <div>10203040506070</div>												
65			veins and occasional sandstone inclusions below 58 ft - with close quartz veins and quartz inclusions below 63 ft	30/0"														
70			- with occasional calcareous inclusions below 70 ft	30/0"														
75			- with close siltstone partings from 73 to 75 ft - with interbedded limestone seams and quartz inclusions at 74 ft											70	40			
80			NOTE: Set 16 ft casing.															
85																		
90																		
95																		
100																		
105																		
110																		
115																		

COMPLETION DEPTH: 78.0 ft  
DATE: 9-18-15

DEPTH TO WATER  
IN BORING: 5.5 ft

DATE: 9/18/2015



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

# LOG OF BORING NO. S14

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 413+55, 70 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	
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>									
						PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +				
			SURF. EL: 274±			10	20	30	40	50	60	70			
5			Dense reddish tan, gray and tan clayey fine sand w/quartz and sandstone fragments and some Portland cement concrete debris (fill)	50/9"		●									
			27			●									
			19			+	●	+						89	
			15			●									
10			Stiff tan and gray silty clay, slightly sandy w/some fine sand pockets and occasional silt pockets - firm below 4 ft	7			●								
			Stiff tan and olive gray silty clay w/ferrous stains and nodules and occasional fine sand partings - water at 4.5 ft - with more ferrous stains and nodules and occasional fine sand partings and quartz fragments below 6 ft - firm below 8 ft	38			●							15	
20			Dense dark gray silty fine to medium sand w/occasional clay pockets and a little coarse sand and fine gravel - auger refusal at 18 ft	50/8"		●	+	-	+						
25			Very stiff to hard dark gray silty clay, shaly w/pyrite inclusions	26					●						
			Very stiff light bluish green, light gray and gray clay w/calcareous inclusions												
30				44				+	●	-	-	+	85		
			- very stiff to hard below 33 ft												
35				50/11"					●						
40				53					●						
45				50/8"					●						
			- with occasional calcite inclusions below 46 ft												
				50/4"											
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER				DATE: 9/10/2015							
DATE: 9-10-15				IN BORING: 4.5 ft											

RECROD200-2 15-019, S10-S18, I-30 OVER SALINE RIVER RELIEF, GPJ 4-1-16



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

# LOG OF BORING NO. S14

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 413+55, 70 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT						- No. 200 %	% Recovery	% RQD	
						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			
			- very stiff to hard below 50 ft					●	+	- - - - -	+		⊗ →		
55				50/4"											
			- with numerous calcite partings and inclusions and very close limestone partings below 57 ft	50/1"											
60			Moderately hard to hard light gray and gray limestone w/calcite nodules and inclusions	50/2"											
65			Moderately hard to hard dark gray shale, slightly weathered w/medium close sandstone partings and pyrite inclusions	50/1"											
70				50/1"											
75			- with novaculite inclusions at 75 ft - no recovery in core run at 76 - 80 ft	50/1"										0	0
80															
85															
90															
95															
COMPLETION DEPTH: 80.0 ft DATE: 9-10-15				DEPTH TO WATER IN BORING: 4.5 ft				DATE: 9/10/2015							

RECROD200-2 15-019 S10-S18 I-30 OVER SALINE RIVER RELIEF GPJ 4-1-16



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

# LOG OF BORING NO. S15

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 18.5 ft /Wash

LOCATION: Approx Sta 414+35, 70 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
						0.2	0.4	0.6	0.8	1.0	1.2			
			SURF. EL: 275±											
			Very stiff gray, tan and brown fine sandy clay, calcareous w/some fine gravel and fine sand pockets and calcareous inclusions	26										
5			Firm to stiff dark bluish gray silty clay w/trace fine sand	10								91		
			Soft tan, reddish tan and brownish gray clay w/trace fine gravel and some ferrous stains and nodules	6										
10			Soft gray, tan and reddish brown fine sandy clay w/trace fine gravel, occasional clay seams and silt pockets and fine to medium sand with ferrous stains and nodules	6										
			- water at 7 ft	12										
15			- with more gravel and occasional quartz fragments and cobbles below 8 ft, wet	18								76		
20			Stiff bluish gray silty clay, slightly sandy w/occasional fine to medium sand seams and trace fine gravel	25/0"										
25			Moderately hard light gray and dark gray shale, slightly weathered w/close to medium close siltstone partings	25/0"									0	0
30			- with occasional pyrite inclusions below 23 ft	25/0"										
35			- no recovery in core run at 24 - 29 ft	25/0"										
40				25/0"										
45			Moderately hard to hard dark gray shale	25/0"										
				25/0"										

COMPLETION DEPTH: 80.0 ft  
DATE: 9-25-15

DEPTH TO WATER  
IN BORING: 7 ft

DATE: 9/25/2015



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

# LOG OF BORING NO. S15

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 18.5 ft /Wash

LOCATION: Approx Sta 414+35, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div> <div><div>PLASTIC LIMIT</div><div>WATER CONTENT</div><div>LIQUID LIMIT</div></div> <div><div>+</div><div>●</div><div>+</div></div> <div><div>10203040506070</div></div>												
55			- with medium close quartz veins and quartz inclusions below 53 ft	25/0"														
60			- with occasional pyrite and calcareous inclusions below 58 ft	25/0"														
65			- with less quartz below 63 ft	25/0"														
70				25/0"														
75			- with medium close to close sandstone partings below 73 ft	25/0"														
80				25/0"														
85			NOTE: Set 20 ft casing.															
90																		
95																		

COMPLETION DEPTH: 80.0 ft  
DATE: 9-25-15

DEPTH TO WATER  
IN BORING: 7 ft

DATE: 9/25/2015



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

# LOG OF BORING NO. S16

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 412+35, 70 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	
						<div><div></div></div>									
						0.2	0.4	0.6	0.8	1.0	1.2				1.4
			SURF. EL: 276±			PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT			
						10	20	30	40	50	60	70			
			Medium dense gray, dark gray, reddish tan and reddish brown clayey fine to coarse sand w/some fine to coarse gravel and asphalt concrete and Portland Cement Concrete debris (fill)	25		●									
5				6			+	●		+				88	
				5				●							
				8				●							
10			Soft tan and olive gray silty clay w/some ferrous stains and nodules and occasional organic inclusions	6		+	●	-	+				61		
15			Soft reddish tan and gray fine sandy clay w/trace fine gravel - water at 6 ft - firm at 6 - 8 ft - with clayey fine gravel layer at 7 ft	WOH			+	●		+				84	
							●								
20			- soft below 8 ft - with some clayey fine gravel seams below 9 ft	50/7"											
25			Very soft gray silty clay, slightly sandy w/some organic inclusions, moist - with some fine to coarse gravel below 16 ft	50/6"		●		+	-	+					
30			Moderately hard light gray and dark gray moderately weathered shale, carbonaceous w/medium close siltstone partings and pyrite inclusions	50/7"			●								
35				50/7"			●								
40			- with very close quartz veins below 37 ft	41											
45				50/10"											
50				50/5"											
55			Moderately hard dark gray shale w/medium close to close siltstone partings and quartz veins												
COMPLETION DEPTH: 80.0 ft				DEPTH TO WATER											
DATE: 9-8-15				IN BORING: 6 ft								DATE: 9/8/2015			

COMPLETION DEPTH: 80.0 ft  
DATE: 9-8-15

DEPTH TO WATER  
IN BORING: 6 ft

DATE: 9/8/2015





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

# LOG OF BORING NO. S16

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 412+35, 70 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div></div><div>0.20.40.60.81.01.21.4</div></div>												
						PLASTIC LIMIT +	WATER CONTENT ●						LIQUID LIMIT +					
						10	20	30	40	50	60	70						
			- with pyrite inclusions at 61 ft - with very close quartz veins and siltstone seams below 63 ft - core barrel plugged at 64 ft, no recovery in 64 - 69 ft run											60	0			
65																0	0	
70																		
75																		
80				50/4"														
85																		
90																		
95																		
100																		
105																		
110																		
115																		

COMPLETION DEPTH: 80.0 ft  
DATE: 9-8-15

DEPTH TO WATER  
IN BORING: 6 ft

DATE: 9/8/2015



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

# LOG OF BORING NO. S17

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 412+95, 70 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 277±											
			Very stiff brown fine sandy clay w/some ferrous stains and quartz fragments	28		●								
5			Stiff reddish tan, gray and brownish gray silty clay w/occasional fine sand pockets and seams and ferrous stains and nodules	11			●							
				18		●								
10			Loose tan, gray, reddish brown and reddish tan clayey fine sand w/some fine to coarse gravel and occasional clay pockets	12		●			+				28	
			- water at 4 ft	8		+	●	+					86	
15			- with less clay below 6 ft	50/8"		●							15	
20			Firm gray and brown silty clay, slightly sandy w/ferrous stains and nodules and trace shale fragments, moist	50/3"		●								
			Dense tan sandy fine to coarse gravel, silty	50/1"										
25			Moderately hard tan and dark gray weathered shale, slightly carbonaceous	50/1"									0	0
			- light gray and dark gray with medium close sandstone partings and quartz inclusions below 23 ft	50/1"										
30			- core barrel plugged at 24 ft, no core recovery in run at 24' - 29 ft	50/0"										
35			- with close siltstone partings below 28 ft	50/0"										
			- with occasional calcareous clay seams below 33 ft	50/0"										
40			- with medium close to close quartz veins and quartz inclusions below 38 ft	50/0"										
45			- with occasional calcareous inclusions below 43 ft	50/0"										
50			Moderately hard to hard dark gray and light gray shale w/close quartz veins and siltstone partings	50/0"										
55				50/0"										
			Moderately hard to hard dark	50/5"										
COMPLETION DEPTH: 80.0 ft														
DATE: 9-22-15														
DEPTH TO WATER														
IN BORING: 4 ft														
DATE: 9/21/2015														

RECROD200-2 15-019, S10-S18, I-30 OVER SALINE RIVER RELIEF, GPJ 4-1-16



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

# LOG OF BORING NO. S17

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Approx Sta 412+95, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT						- No. 200 %	% Recovery	% RQD	
						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			
65			gray shale w/medium close sandstone partings and quartz veins and quartz inclusions with occasional calcareous inclusions	50/0"											
70				50/0"											
75				50/0"											
80			- with close quartz veins and more calcareous inclusions below 78 ft NOTE: Set 19 ft casing.	50/0"											
85															
90															
95															
100															
105															
110															
115															

COMPLETION DEPTH: 80.0 ft  
DATE: 9-22-15

DEPTH TO WATER  
IN BORING: 4 ft

DATE: 9/21/2015



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

# LOG OF BORING NO. S18

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 40 ft /Wash

LOCATION: Approx Sta 411+50, 15 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 +	
SURF. EL: 294±						10	20	30	40	50	60	70	
5			Dense brown fine sandy silt w/some fine to coarse gravel and quartz fragments (fill) - dense reddish brown clayey fine sand with trace fine gravel below 2 ft	50/7"	●								
			50/8"	●									
10			Very stiff reddish tan, gray and brown fine sandy clay w/some fine to coarse gravel and clay layers (fill) - stiff with trace quartz fragments at 6 to 13 ft	28	●								
			14	●	+	+							52
15			- gray, tan, reddish tan and brown with a little fine gravel and quartz and shale fragments below 8 ft - very stiff at 13 to 18 ft	20	●	- - -	+						66
			30	●	+	- -	+					62	
20			- stiff, slightly sandy with more gravel, shale fragments and quartz fragments below 18 ft	17	●								
			10										
25			- very stiff with less ferrous stains below 28 ft	29	●								
35			Dense brown sandy fine to coarse gravel, slightly silty, wet	50/7"	●								12
			50/2"										
45			Moderately hard light gray and dark gray slightly weathered shale w/close siltstone partings and seams	50/1"	●								
			50/0"										
50			Moderately hard dark gray shale w/medium close sandstone partings and quartz veins and inclusions	50/0"									
			50/0"										
COMPLETION DEPTH: 100.0 ft				DEPTH TO WATER									DATE: 10/13/2015
DATE: 10-13-15				IN BORING: 32 ft									

LGBNEW 15-019, S10-S18, I-30 OVER SALINE RIVER RELIEF GPJ 4-1-16



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

# LOG OF BORING NO. S18

CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

TYPE: Auger to 40 ft /Wash

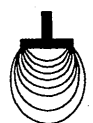
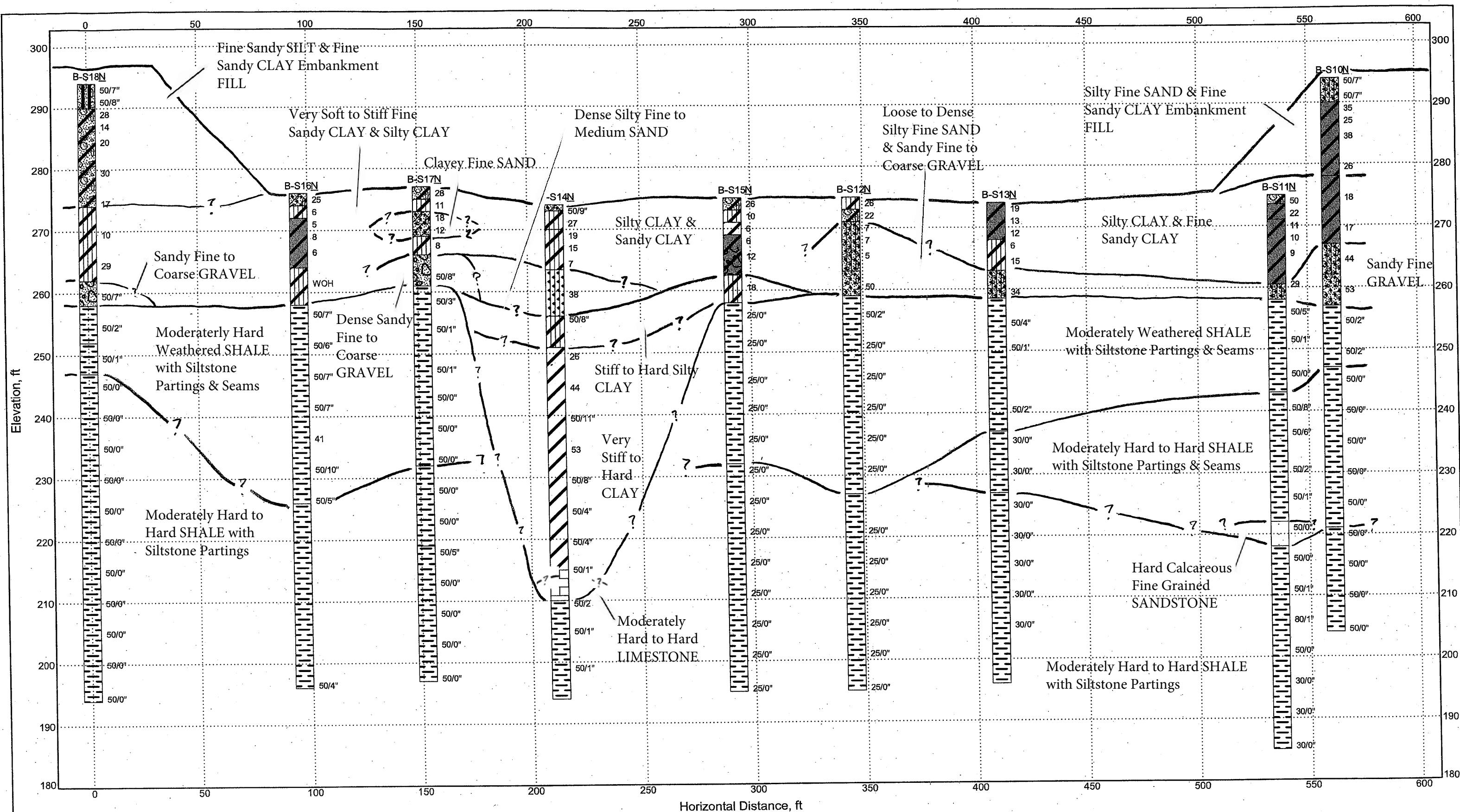
LOCATION: Approx Sta 411+50, 15 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	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	
60			- moderately hard to hard with clayey sandstone partings below 62 ft	50/0"									
65				50/0"									
70				50/0"									
75				50/0"									
80				50/0"									
85				50/0"									
90				50/0"									
95				50/0"									
100				50/0"									
105				50/0"									
NOTE: Set 40 ft casing.													

COMPLETION DEPTH: 100.0 ft  
DATE: 10-13-15

DEPTH TO WATER  
IN BORING: 32 ft

DATE: 10/13/2015



Grubbs, Hoskyn,  
Barton & Wyatt, Inc.

NOTES:  
1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.  
2. Ground surface approximate.

SCALE:  
1" = 50' Horizontal  
1" = 3' Vertical

Generalized Subsurface Profile  
CA0601: I-30 over Saline River Relief  
Saline County, Arkansas

Project Number: 15-019

## **ATTACHMENT 5**

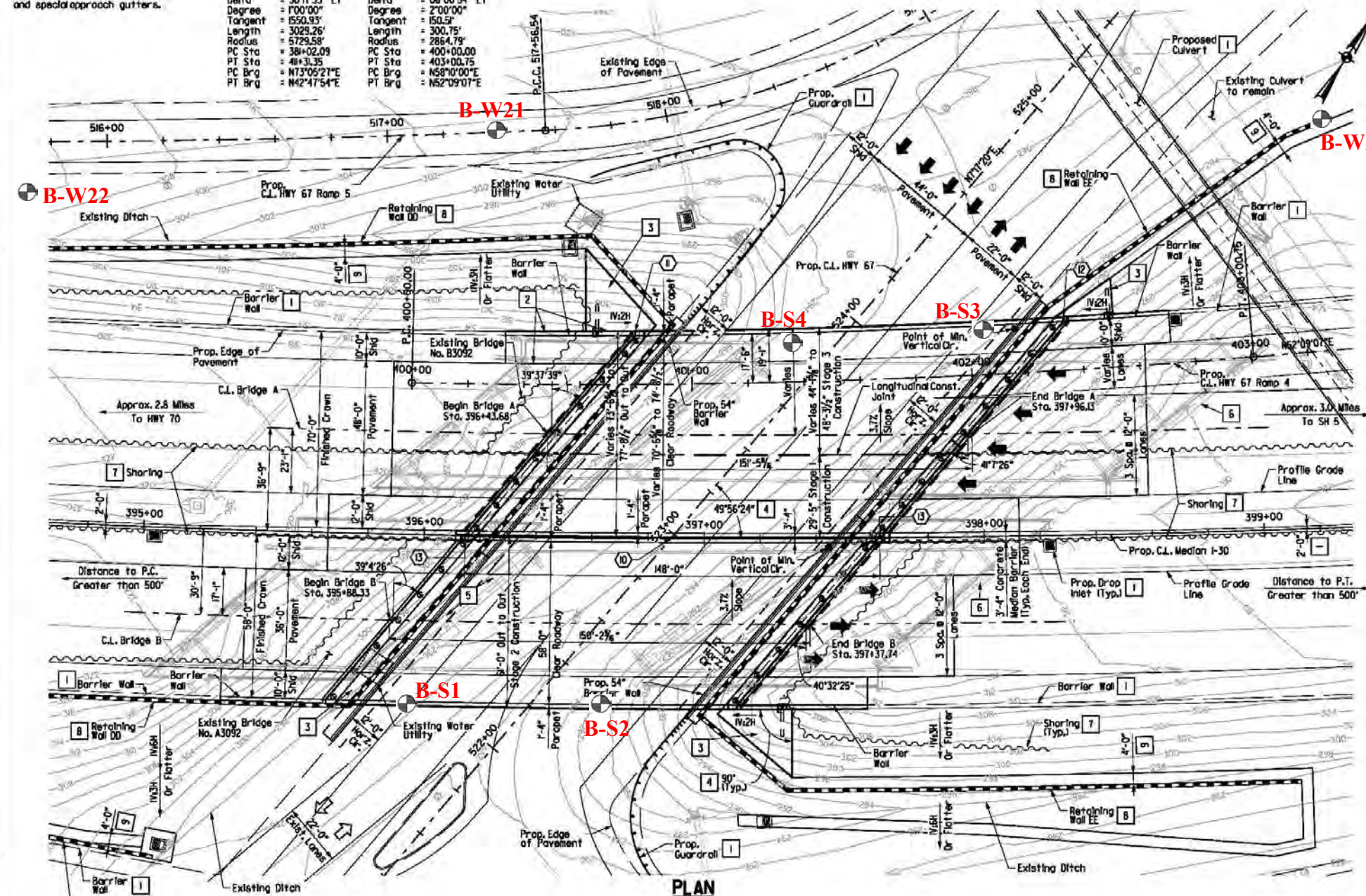


For R/W Data, See Roadway Plans

See Dwg. No. XXXX for location and type of special approach slabs and special approach gutters.

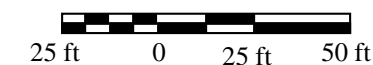
# HORIZONTAL CURVE DATA

C.L. Median I-30		C.L. HWY 67 Ramp 4 Curve 1	
PI Sta	= 396+53.01	PI Sta	= 401+50.51
Delta	= 30°17'33" LT	Delta	= 06°00'54" LT
Length	= 1550.93'	Length	= 150.5'
Radius	= 5729.58'	Radius	= 2864.79'
PC Sta	= 38+02.09	PC Sta	= 400+00.00
PT Sta	= 40+31.35	PT Sta	= 403+00.75
PC Brg	= N73°09'27"E	PC Brg	= N58°10'00"E
PT Brg	= N42°17'54"E	PT Brg	= N52°09'07"E



- Notes:
1. C.L. Bridges and P.O.s are concentric to C.L. Median I-30.
  2. All longitudinal edges of deck and approaches are concentric to C.L. Median I-30 U.N.D.
  3. Skew angle is measured from a radial line to the C.L. Bridge at the C.L. of Joint.

- 1 See Roadway Plans
- 2 Longitudinal edges are concentric to C.L. HWY 67 Ramp 4 Curve 1.
- 3 Concrete Riprap to be placed at a 1V:2H max slope near wing walls. See Retaining Wall Plans for slope between End Bent and MSE wall.
- 4 Angle is measured to local tangent.
- 5 Existing foundations, Typ.
- 6 Existing substructures, Typ.
- 7 Shoring will be required during construction. See SP Job CA0601 "Shoring".
- 8 See Retaining Wall Plans
- 9 Concrete Ditch Paving (See Retaining Wall Plans)
- 10 Prop. C.L. Median I-30 Sta. 396+88.28 = Prop. C.L. HWY 67 Sta. 522+98.74
- 11 C.L. Joint @ Edge of Deck Prop. C.L. Median I-30 Sta. 396+74.83 Offset 73.80' LT
- 12 C.L. Joint @ Edge of Deck Prop. C.L. Median I-30 Sta. 398+29.78 Offset 77.36' LT
- 13 Nominal Composite Plate Girder Span Limits: Begin Span Sta. 396+44.67 End Span Sta. 397+62.67



BRIDGEFARMER & ASSOCIATES, INC.  
CONSULTING ENGINEERS

SHEET 1 OF 5  
LAYOUT OF I-30 BRIDGES  
OVER US 67

HWY 70 - SEVIER ST. (WIDENING) (S)  
SALINE COUNTY  
ROUTE 30 SEC. 22

ARKANSAS STATE HIGHWAY COMMISSION  
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 9/15/2014 FILENAME: D000601.D  
CHECKED BY: JH DATE: 10/1/2014 SCALE: 1" = 20'  
DESIGNED BY: STS DATE: 9/1/2014  
BRIDGE NO. [Brdg#] DRAWING NO. [Dwg#]





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

# LOG OF BORING NO. S1

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash and Core

LOCATION: Approx Sta 395+95, 60 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 296±											
			Medium dense brown, tan and red fine to medium sand w/some fine to coarse gravel and shale fragments, crushed stone and occasional fine sandy clay pockets (fill)	28		●								
5			Firm brownish gray silty clay w/some shale fragments and fine sand pockets (fill)	9			●							
			Firm to stiff tan and reddish tan fine sandy clay w/occasional fine sand partings and ferrous stains and nodules and trace fine to coarse gravel	10			●							
			- stiff below 6 ft	15		+	●	---	+				69	
10			Dense gray and reddish tan clayey fine sand w/quartz fragments	38		●	+	---	+				28	
			Very stiff tan and gray silty clay, slightly sandy w/some highly weathered shale seams and layers and occasional silt partings (completely weathered shale)	39			●							
15			Moderately hard tan and dark gray moderately weathered shale, slightly arenaceous w/medium close sandstone partings	50/6"			●							
20			- with occasional micaceous inclusions below 23 ft	50/9"			●							
25			Moderately hard to hard tan and dark gray shale w/close quartz veins and sandstone partings and occasional quartz inclusions	50/0"										
30			- no recovery in core run at 28 to 33 ft, barrel plugged with quartz	30/0"									0	0
35				30/0"										
				30/0"										

COMPLETION DEPTH: 65.0 ft  
DATE: 8-25-15

DEPTH TO WATER  
IN BORING: 19 ft

DATE: 8/25/2015



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

# LOG OF BORING NO. S1

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 20 ft /Wash and Core

LOCATION: Approx Sta 395+95, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL  (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT										- No. 200 %	% Recovery	% RQD
						<div><div>0.20.40.60.81.01.21.4</div><div><div>PLASTIC LIMIT</div><div>WATER CONTENT</div><div>LIQUID LIMIT</div></div><div><div>+</div><div>●</div><div>+</div></div><div>10203040506070</div></div>												
45			- with medium close quartz veins and sandstone partings below 43 ft	30/0"														
50				30/0"														
55				30/0"														
60			Moderately hard to hard dark gray shale w/medium close sandstone partings and quartz inclusions	30/0"														
65			- with less quartz below 63 ft	30/0"														
70																		
75																		

COMPLETION DEPTH: 65.0 ft  
DATE: 8-25-15

DEPTH TO WATER  
IN BORING: 19 ft

DATE: 8/25/2015



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

# LOG OF BORING NO. S2

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Sta 396+65, 60 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 291±											
			2 inches: Asphalt Concrete	16										
			Stiff gray, tan and reddish brown fine sandy clay w/some fine to coarse gravel (fill)	12										
5			- firm brown silty clay at 4 to 6 ft	7									49	
			- very stiff fine sandy clay below 6 ft	26										
10			Very stiff tan, reddish tan and gray silty clay w/some weathered shale seams and occasional quartz fragments	27									30	
			- stiff with occasional quartz cobbles below 13 ft	21										
15														
20				21										
25			Moderately hard light gray and dark gray weathered shale w/medium close siltstone partings and sandstone partings and occasional calcareous inclusions	50/5"										
			- with quartz veins and inclusions at 23 to 24 ft											
30			Moderately hard to hard light gray and dark gray shale w/medium close siltstone partings and sandstone partings	50/1"										
			- with occasional pyrite inclusions below 30 ft											
35				50/1"										
			- arenaceous shale layer with calcareous mudstone inclusions at 35.5 - 36.5 ft										17	13
			- with very close interbedded siltstone seams and layers below 36 ft											
COMPLETION DEPTH: 65.0 ft				DEPTH TO WATER				DATE: 10/17/2015						
DATE: 10-17-15				IN BORING: Dry to 10 ft										

RECRODN200-2 15-019, S1-S4, I-30 OVER HWY 67, GPJ 4-1-16



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

## LOG OF BORING NO. S2

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Approx Sta 396+65, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			PLASTIC LIMIT +	WATER CONTENT ●	LIQUID LIMIT +	No. 200 %	% Recovery	% RQD
						0.2	0.4	0.6						
45			- with occasional calcite inclusions below 48 ft	50/1"										
50				50/0"										
55				30/0"										
60				30/0"										
65			NOTE: Set 22 ft casing.	30/0"										
70														
75														

COMPLETION DEPTH: 65.0 ft  
DATE: 10-17-15

DEPTH TO WATER  
IN BORING: Dry to 10 ft

DATE: 10/17/2015

RECRODN200-2 15-019, S1-S4 I-30 OVER HWY 67.GPJ 4-1-16



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

# LOG OF BORING NO. S3

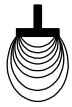
CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 398+00, 75 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: 296±			PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
						10	20	30	40	50	60	70	
			7.5 inches: Asphalt Concrete	50/4"									
			12 inches: Crushed Stone Base										
5			Stiff tan and dark gray silty clay w/shale and sandstone fragments and some quartz fragments (fill) - firm below 4 ft	12		●							
				8		●							
			Firm tan and reddish tan silty clay, sandy w/some ferrous stains and nodules, moist - stiff with occasional clay laminations, fine sand pockets and a little fine to coarse gravel below 8 ft	8		+	●	+					80
10				19		●							
			Firm brown, tan and reddish tan silty clay w/quartz fragments and some fine to coarse gravel	9		●							
15													
			- stiff with more fine quartz fragments and occasional clay laminations below 18 ft	17		●	+						37
20													
			Firm tan and gray silty clay w/shell fragments and organic stains	8		+	●	+					90
25													
			Moderately hard light gray and dark gray slightly weathered shale w/close siltstone seams and layers	50/3"		●							
30													
			- with close quartz and sandstone partings and occasional calcareous inclusions below 33 ft	50/1"									
35													
			Moderately hard to hard light gray and dark gray shale w/medium close sandstone partings and occasional quartz and calcareous inclusions	50/0"									
40													
				50/0"									
COMPLETION DEPTH: 75.0 ft				DEPTH TO WATER				DATE: 10/17/2015					
DATE: 10-17-15				IN BORING: 13 ft									

LGBNEW 15-019, S1-S4, I-30 OVER HWY 67.GPJ 4-1-16



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

# LOG OF BORING NO. S3

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 398+00, 75 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	
						0.2	0.4	0.6		0.8
50			- with less quartz and occasional pyrite inclusions below 53 ft	50/0"						
55				50/0"						
60				50/0"						
65			- with less sandstone and more calcareous inclusions below 63 ft	50/0"						
70				50/0"						
75			NOTE: Set 40 ft casing.	50/0"						
80										
85										

COMPLETION DEPTH: 75.0 ft  
DATE: 10-17-15

DEPTH TO WATER  
IN BORING: 13 ft

DATE: 10/17/2015

LGBNEW 15-019 S1-S4 I-30 OVER HWY 67.GPJ 4-1-16



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

# LOG OF BORING NO. S4

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 397+30, 70 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
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
			SURF. EL: 295±											
			Very stiff tan, dark gray and reddish tan silty clay w/some clay pockets and shale fragments and crushed stone and trace glass fragments (fill)	31										
			Stiff olive green, reddish tan, gray and tan clay w/some shale fragments (fill)	12									55	
5			Stiff tan, reddish tan and light bluish gray clay w/calcareous nodules and ferrous stains and nodules	14										
			- with shale and quartz fragments below 6 ft	22										
10			Stiff tan, gray and reddish brown fine to medium sandy clay w/shale fragments and fine quartz gravel	16									26	
			- water at 13 ft											
15			- moist, with more sand and more shale fragments below 13 ft	23										
			Very stiff tan and gray silty clay w/shale fragments	36									47	
20			Low hardness tan and dark gray highly weathered shale w/calcareous silty clay seams and close sandstone partings and quartz veins	22										
25			Moderately hard tan and dark gray weathered shale w/calcareous silty clay seams and sandstone partings and quartz inclusions	50/6										
30			- with massive, very close quartz veins at 27 - 36 ft	25/0"									22	0
COMPLETION DEPTH: 60.0 ft														
DATE: 10-8-15														
DEPTH TO WATER IN BORING: 13 ft														
DATE: 8/31/2015														

RECRODN200-2 15-019 S1-S4 I-30 OVER HWY 67 GPJ 4-14-16



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

CA0601: I-30 over Hwy 67  
Saline County, Arkansas

LOCATION: Approx Sta 397+30, 70 ft Lt

[illegible]

DATE: 8/31/2015

RECRODN200-2 15-019 S1-S4 1-30 OVER HWY 67.GPJ 4-14-16





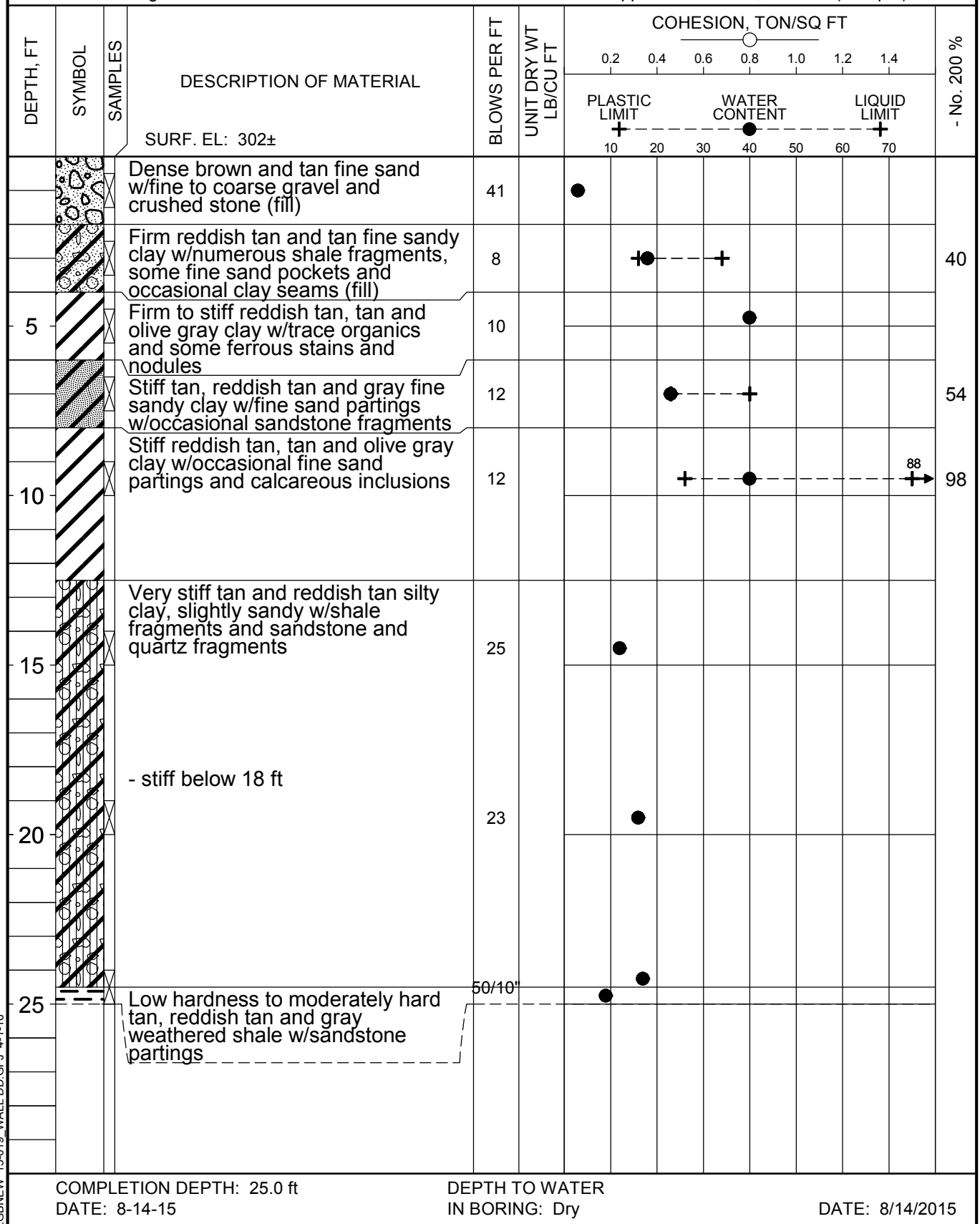
**Grubbs, Hoskyn,  
Barton & Wyatt, Inc.**  
Consulting Engineers

# LOG OF BORING NO. W21

CA0601: I-30 Widening - Wall DD  
Saline County, Arkansas

TYPE: Auger

LOCATION: Approx Sta 396+22, 142 ft Lt (Ramp 5)



COMPLETION DEPTH: 25.0 ft  
DATE: 8-14-15

DEPTH TO WATER  
IN BORING: Dry

DATE: 8/14/2015



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

# LOG OF BORING NO. W22

CA0601: I-30 Widening - Wall DD  
Saline County, Arkansas

TYPE: Auger

LOCATION: Approx Sta 394+50, 120 ft Lt (Ramp 5)

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 +	
			SURF. EL: 306±			10	20	30	40	50	60	70				
			Dense to very dense tan and reddish tan fine sand w/fine to coarse gravel and some crushed stone (fill)	51		●										
			Stiff gray, reddish tan and tan silty clay w/numerous shale fragments and sandstone fragments (fill)	11			●									
5			Firm to stiff tan and olive gray clay, slightly blocky w/occasional silt partings and calcareous inclusions and trace fine gravel	10				+	●				91	91		
			Stiff tan fine sandy clay w/occasional fine sand partings	19			●									
10			Firm to stiff tan and olive gray clay, slightly blocky w/occasional fine sand partings and calcareous inclusions	10					●							
15			Stiff reddish tan and gray silty clay, slightly sandy w/some fine gravel, quartz fragments, ferrous stains and nodules and occasional fine sand pockets	20			●									
20			Moderately hard brown, gray and tan weathered shale w/close sandstone seams and silty clay seams	50/8"			●									
			Moderately hard gray, reddish tan and dark gray weathered shale													
25				50/3"		●										
COMPLETION DEPTH: 25.0 ft																
DATE: 8-13-15																
DEPTH TO WATER IN BORING: Dry																
DATE: 8/13/2015																

LGBNEW 15-019 WALL DD.GPJ 4-1-16



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

# LOG OF BORING NO. W27

CA0601: I-30 Widening - Wall EE  
Saline County, Arkansas

TYPE: Auger

LOCATION: Approx Sta 399+20, 142 ft Lt

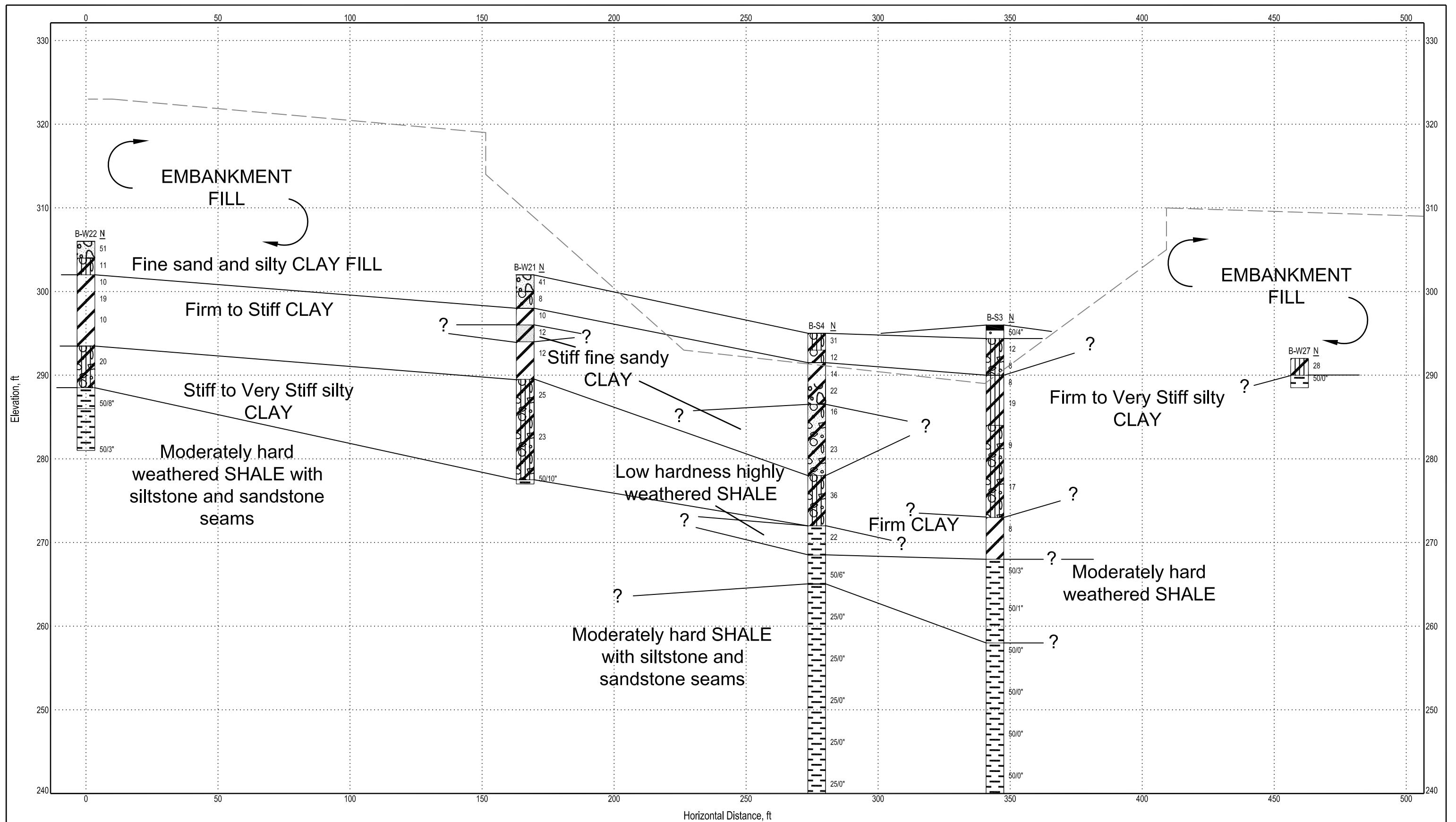
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						0.2	0.4	0.6		0.8	1.0	1.2	1.4
SURF. EL: 292±						PLASTIC LIMIT WATER CONTENT LIQUID LIMIT							
						10	20	30	40	50	60	70	
1			Very stiff gray, tan and reddish tan silty clay w/highly weathered shale seams and occasional quartz fragments (completely weathered shale)	28									
2													
3			Moderately hard to hard tan and gray weathered shale	50/0"		●	+	---	+				
4													
- auger refusal at 3.5 ft													
5													
6													
7													
8													
9													

COMPLETION DEPTH: 3.5 ft  
DATE: 8-13-15

DEPTH TO WATER  
IN BORING: Dry

DATE: 8/13/2015

LGBNEW 15-019 WALL EEGPJ 4-1-16



Grubbs, Hoskyn,  
Barton & Wyatt, Inc.

**NOTES:**

1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
2. Ground surface approximate.

SCALE: As shown

Generalized Subsurface Profile  
CA0601: I-30 over Hwy 67  
Saline County, Arkansas

Project Number: 15-019

## **ATTACHMENT 6**



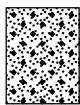
## SYMBOLS AND TERMS USED ON BORING LOGS

### SOIL TYPES

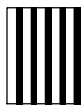
(SHOWN IN SYMBOLS COLUMN)



Gravel



Sand



Silt

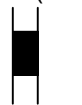


Clay

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.

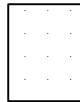
**POORLY GRADED** - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

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

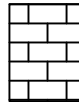


## BORING LOG TERMS – ROCK

### ROCK TYPES (SHOWN IN SYMBOLS COLUMN)



Sandstone



Limestone



Siltstone



Coal



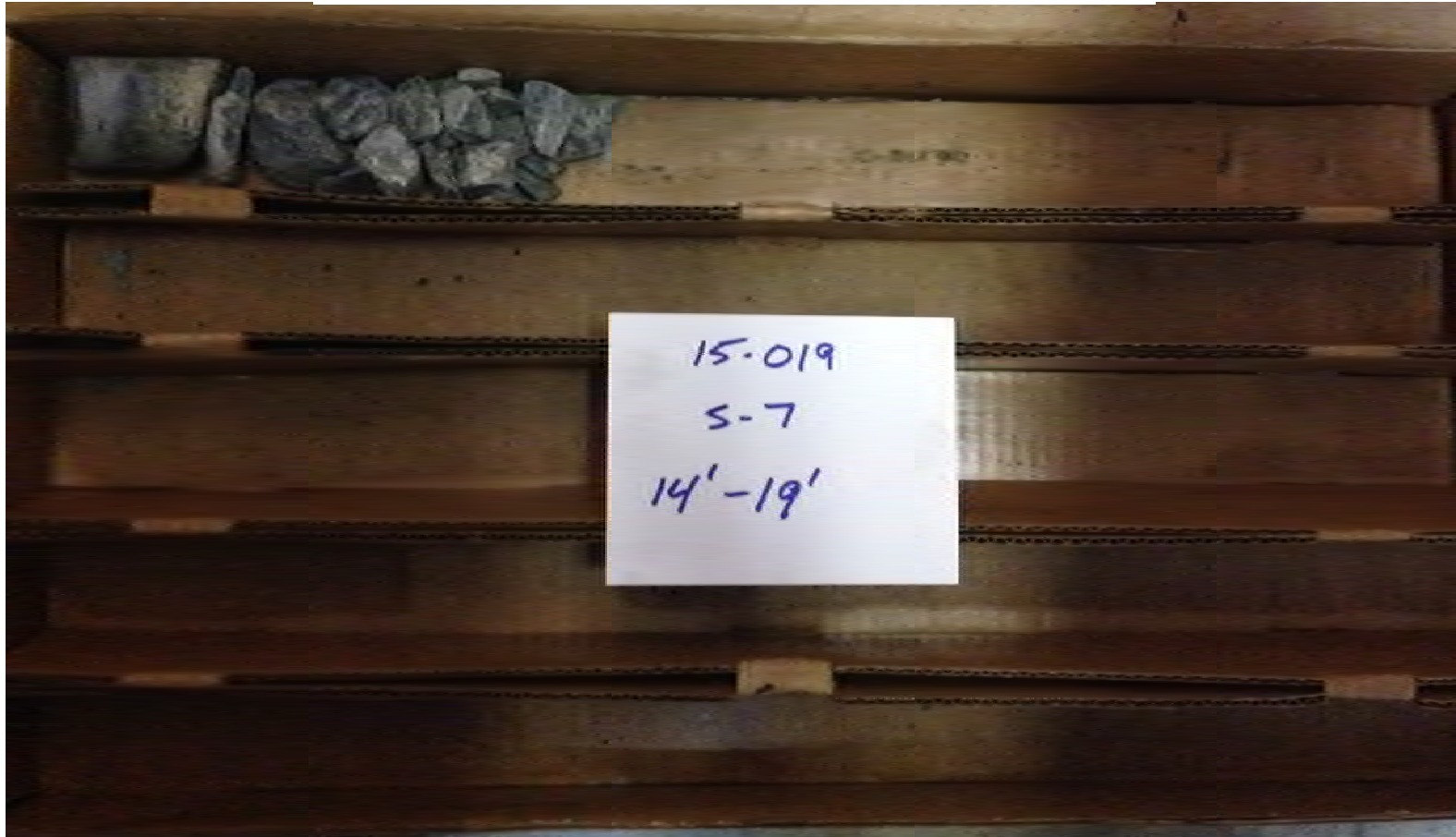
Shale

Joint Characteristics -		<u>Spacing</u> Very Close Close Moderately Close Wide Very Wide	0.75 to 2.5 in. 2.5 to 8 in. 8 to 24 in. 2 to 6 ft More than 6 ft	Degree of Weathering -		Fresh - No visible signs of decomposition or discoloration. Rings under hammer impact.
Bedding Characteristics -		Very Thin Thin Medium Thick Massive	0.75 to 2.5 in. 2.5 to 8 in. 8 to 24 in. 2 to 6 ft More than 6 ft			Slightly Weathered - Slight discoloration inwards from open fractures, otherwise similar to fresh.
Lithologic Characteristics -		Clayey Shaly Calcareous (limy) Siliceous Sandy (Arenaceous) Silty Plastic Seams				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.
Parting -	Less than 1/16 inch	Approximate Range of Uniaxial Compressive <u>Strength (psi)</u>				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 preserved.
Seam -	1/16 to 1/2 inch					
Layer -	1/2 to 12 inches					
Stratum -	Greater than 12 inches					Completely Weathered - Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Hardness and Degree of Cementation -		Very Soft - Can be peeled with a knife	140 - 3500			
		Soft - Can just be scraped with knife	3500 - 6900			
		Hard - Can be broken with single moderate blow with pick	6900 - 13,900			Residual Soil - Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.
		Very hard - Hand held specimen breaks with hammer end of pick under more than one blow	13,900 - 28,000	Solution and Void Conditions -		Solid, contains no voids Vuggy (pitted) Vesicular (igneous) Porous Cavities Cavernous
		Extremely Hard - Many blows with hammer required to break intact specimen	More than 28,000	Swelling Properties -		Nonswelling Swelling
		Poorly Cemented - Crumbles Easily		Slaking Properties -		Nonslaking Slakes slowly on exposure Slakes readily on exposure
Texture -		Fine - Barely seen with naked eye Medium - Barely seen up to 1/8 in. Coarse - 1/8 in. to 1/4 in.				
Structure -		Bedding Flat - 0° - 5° Gently Dipping - 5° - 35° Moderately Dipping - 55° - 85° Steeply Dipping - 55° - 85° Fractures, scattered Open Cemented or Tight Fractures, closely spaced Open Cemented or Tight Brecciated (Sheared and Fragmented) Open Cemented or Tight Joints Faulted Slickensides		Rock Quality Designation (RQD) -		<u>RQD (Percent)</u> Greater than 90 75 - 90 50 - 75 25 - 50 Less than 25
						<u>Diagnostic Description</u> Excellent Good Fair Poor Very Poor

**ATTACHMENT 7**



South Street over I-30  
AHTD Job CA0601  
15-019  
Boring S7 @ 14' – 19'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**  
SOUTH STREET OVER I-30  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S7, 14-15 FT

**Job No. 15-019**

South Street over I-30  
AHTD Job CA0601  
15-019  
Boring S8 @ 20' – 25'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**  
SOUTH STREET OVER I-30  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S8, 20-25 FT

**Job No. 15-019**

South Street over I-30  
AHTD Job CA0601  
15-019  
Boring S9 @ 43' – 48'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**  
SOUTH STREET OVER I-30  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S9, 43-48 FT

**Job No. 15-019**



I-30 over Saline River– AHTD Job CA0601  
15-019  
Boring S22 @ 55' – 60'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S22, 55-60 FT

**Job No. 15-019**



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601- SALINE COUNTY, ARKANSAS  
BORING S23, 55-60 FT

**Job No. 15-019**



S-142

25' →

I-30 over Saline River– AHTD Job CA0601

15-019

Boring S26A @ 25' – 35'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S26A, 25-35 FT

**Job No. 15-019**





**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

**I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601- SALINE COUNTY, ARKANSAS  
BORING S28, 20-30 FT**

**Job No. 15-019**



I-30 over Saline River– AHTD Job CA0601  
15-019  
Boring S31 @ 50' – 55'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**  
I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S31, 50-55 FT

**Job No. 15-019**





**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

I-30 OVER SALINE RIVER  
AHTD JOB NO. CA0601- SALINE COUNTY, ARKANSAS  
BORING S32, 65-75 FT

**Job No. 15-019**

I-30 over Saline River Relief  
AHTD Job CA0601  
15-019  
Boring S13 @ 23' – 28' , 74' – 79'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**  
**I-30 OVER SALINE RIVER RELIEF**  
**AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS**  
**BORING S13, 23-28 FT, 74-79 FT**

**Job No. 15-019**



I-30 over Saline River Relief  
AHTD Job CA0601  
15-019  
Boring S16 @ 59' – 64'



I-30 over Highway 67  
AHTD Job CA0601  
15-019  
Boring S2 @ 35' – 40'





I-30 over Highway 67  
AHTD Job CA0601  
15-019  
Boring S4 @ 55' – 60'



**Grubbs, Hoskyn,  
Barton & Wyatt, INC.**  
CONSULTING ENGINEERS

**ROCK CORE PHOTOGRAPH**

I-30 OVER Highway 67  
AHTD JOB NO. CA0601– SALINE COUNTY, ARKANSAS  
BORING S4, 55-60 FT

**Job No. 15-019**

## **ATTACHMENT 8**

# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - South Street over I-30

LOCATION: Saline County, AR

JOB NUMBER: 15-019

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		
S5	2.5-3.5	13	27	15	12	100	89	85	79	69	56	34	SC	A-2-4
S5	9-10	26	49	20	29	---	---	---	---	---	---	77	CL	A-7-6
S5	19-20	10	34	21	13	---	---	---	---	---	---	27	SC	A-2-4
S6	2.5-3.5	4	- Non Plastic -			---	---	---	---	---	---	14	SM	A-2-4
S6	9-10	31	33	23	10	---	---	---	---	---	---	37	GC	A-4
S7	2.5-3.5	11	30	16	14	---	---	---	---	---	---	26	SC	A-2-6
S8	2.5-3.5	8	25	15	10	---	---	---	---	---	---	17	SC	A-2-6
S8	6.5-7.5	13	29	17	12	100	100	78	61	44	28	19	SC	A-2-6
S8	9-10	35	38	22	16	---	---	---	---	---	---	---	CL	A-6
S9	4.5-5.5	18	41	13	28	---	---	---	---	---	---	50	CL	A-7-6
S9	9-10	11	23	17	6	100	100	98	86	76	56	33	SC	A-2-4
S9	14-15	14	27	16	11	---	---	---	---	---	---	49	SC	A-6
S9	18.5-19.5	13	43	25	18	---	---	---	---	---	---	26	SC	A-2-6
S9	34-35	31	26	18	8	---	---	---	---	---	---	---	SHALE	

# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - I-30 over Saline River

LOCATION: Saline County, AR

JOB NUMBER: 15-019

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS								UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING									
						2 in.	1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
S19	4.5-5.5	10	23	16	7	100	100	94	89	76	68	58	42	SC-SM	A-4
S19	19-20	14	22	17	5	---	---	---	---	---	---	---	63	CL-ML	A-4
S19	24-25	21	23	18	5	---	---	---	---	---	---	---	61	CL-ML	A-4
S19	29-30	23	---	---	---	100	100	86	44	20	8	4	3	GW	A-1-a
S19	39-40	21	---	---	---	100	70	68	51	20	11	6	4	GW	A-1-a
S20	4.5-5.5	13	- Non Plastic -			---	---	---	---	---	---	---	56	ML	A-4
S20	19-20	12	---	---	---	100	100	92	70	50	33	16	9	GP-GM	A-1-a
S21	6.5-7.5	12	---	---	---	100	90	72	52	38	36	14	7	GP	A-1-a
S22	4.5-5.5	10	---	---	---	100	100	77	41	26	18	10	6	GP-GM	A-1-a
S23	13.5-14	11	26	19	7	---	---	---	---	---	---	---	---	SHALE	
S24	0.5-1.5	6	---	---	---	100	82	77	36	21	12	4	2	GW	A-1-a
S26	4.5-5.5	10	---	---	---	100	100	87	70	46	29	10	4	GW	A-1-a
S27	6.5-7.5	13	---	---	---	100	91	88	76	59	43	22	7	GW-GM	A-1-a



# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - I-30 over Saline River

LOCATION: Saline County, AR

JOB NUMBER: 15-019

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS								UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING									
						2 in.	1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
S28	4.5-5.5	3	---	---	---	100	64	45	22	15	11	8	5	GP	A-1-a
S29	6.5-7.5	16	- Non Plastic -			---	---	---	---	---	---	---	12	GM	A-2-4
S29	14-14.6	15	37	21	16	---	---	---	---	---	---	---	---	SHALE	
S30	4.5-5.5	24	- Non Plastic -			100	100	100	100	100	98	79	34	SM	A-2-4
S31	2.5-3.5	17	25	20	5	---	---	---	---	---	---	---	79	CL-ML	A-4
S31	6.5-7.5	23	32	21	11	---	---	---	---	---	---	---	96	CL	A-6
S31	9-10	21	29	20	9	---	---	---	---	---	---	---	88	CL	A-4
S31	14-15	40	---	---	---	100	100	100	100	100	98	89	44	SC	A-6
S32	6.5-7.5	12	28	18	10	---	---	---	---	---	---	---	74	CL	A-4
S32	14-15	13	---	---	---	100	100	91	65	50	31	14	8	SM	A-1-a
S33	6.5-7.5	16	31	17	14	100	100	100	100	99	98	94	79	CL	A-6
S33	14-15	15	24	16	8	100	100	100	100	100	99	95	73	CL	A-4
S33	24-25	22	25	19	6	---	---	---	---	---	---	---	83	CL-ML	A-4
S33	34-35	10	21	16	5	100	100	93	67	53	39	24	12	SC-SM	A-1-a

# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - I-30 over Saline River Relief

LOCATION: Saline County, AR

JOB NUMBER: 15-019

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS								UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	PERCENT PASSING									
						2 in.	1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
S10	6.5-7.5	12	23	16	7	---	---	---	---	---	---	---	68	CL-ML	A-4
S10	19-20	16	21	17	4	---	---	---	---	---	---	---	54	CL-ML	A-4
S10	29-30	5	- Non Plastic -			100	100	92	72	56	42	21	13	SM	A-1-a
S10	34-35	15	---	---	---	100	88	84	64	55	43	27	20	GC	A-2-4
S11	6.5-7.5	21	23	17	6	---	---	---	---	---	---	---	47	SC	A-6
S11	19-19.5	11	26	16	10	---	---	---	---	---	---	---	---	SHALE	
S12	6.5-7.5	19	20	18	2	---	---	---	---	---	---	---	40	SM	A-2-4
S12	14-15	12	21	18	3	100	85	67	61	53	44	30	19	GM	A-1-b
S12	23.5-24	16	26	19	7	---	---	---	---	---	---	---	---	SHALE	
S13	2.5-3.5	21	43	21	22	---	---	---	---	---	---	---	52	CL	A-6
S13	14-15	15	22	18	4	---	---	---	---	---	---	---	12	GC-GM	A-2-4
S14	4.5-5.5	28	35	22	13	---	---	---	---	---	---	---	89	CL	A-6
S14	14-15	18	---	---	---	100	100	95	85	78	71	45	15	GC	A-2-4
S14	18-18.8	14	36	23	13	---	---	---	---	---	---	---	---	CL	A-6
S14	29-30	38	71	33	38	---	---	---	---	---	---	---	85	CH	A-7-6
S14	51-51.5	24	57	30	27	---	---	---	---	---	---	---	28	GC	A-2-7

# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - I-30 over Saline River Relief

LOCATION: Saline County, AR

JOB NUMBER: 15-019

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS PERCENT PASSING								UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	2 in.	1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
S15	2.5-3.5	21	42	21	21	---	---	---	---	---	---	---	91	CL	A-7-6
S15	6.5-7.5	25	35	20	15	---	---	---	---	---	---	---	72	CL	A-6
S15	14-15	26	24	16	8	---	---	---	---	---	---	---	76	CL	A-6
S15	19-20	---	27	20	7	---	---	---	---	---	---	---	---	SHALE	
S16	2.5-3.5	25	34	19	15	---	---	---	---	---	---	---	88	CL	A-6
S16	9-10	22	33	18	15	---	---	---	---	---	---	---	61	CL	A-6
S16	14-15	27	32	19	13	---	---	---	---	---	---	---	84	CL	A-6
S16	24-24.5	11	30	21	9	---	---	---	---	---	---	---	---	SHALE	
S17	6.5-7.5	21	41	21	20	---	---	---	---	---	---	---	28	SC	A-2-7
S17	9-10	25	32	20	12	---	---	---	---	---	---	---	86	CL	A-6
S17	14-15	16	---	---	---	---	---	---	---	---	---	---	15	GC	A-2-4
S18	6.5-7.5	13	23	17	6	---	---	---	---	---	---	---	52	CL-ML	A-4
S18	9-10	18	40	19	21	---	---	---	---	---	---	---	66	CL	A-6
S18	14-15	14	28	18	10	---	---	---	---	---	---	---	62	CL	A-6
S18	24-25	21	42	19	23	---	---	---	---	---	---	---	76	CL	A-7-6
S18	34-35	13	---	---	---	100	92	82	70	57	44	21	12	GM	A-1-a
S18	39-40	---	31	20	11	---	---	---	---	---	---	---	---	SHALE	

# SUMMARY OF CLASSIFICATION TEST RESULTS

PROJECT: CA0601 - I-30 over Highway 67

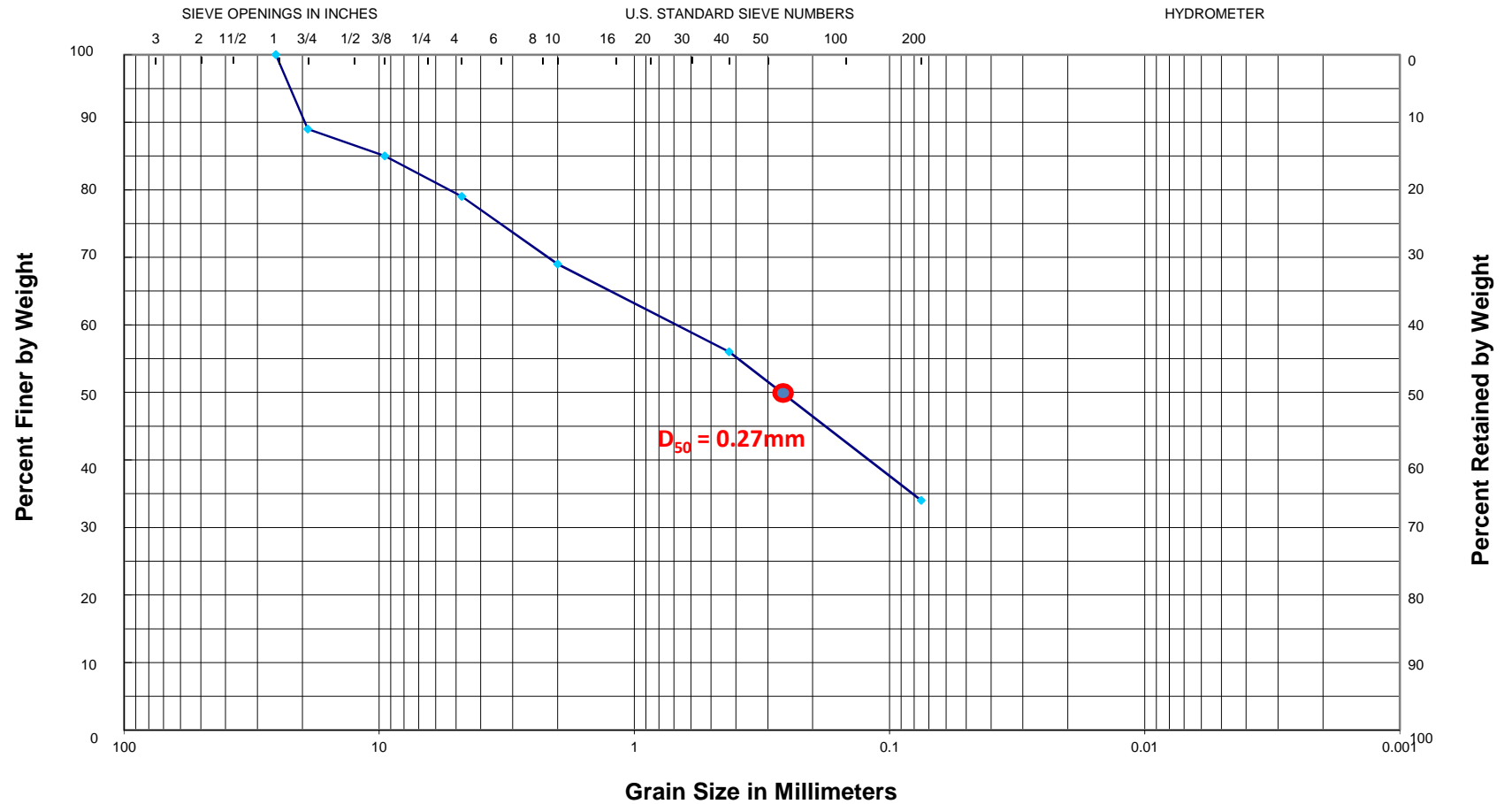
LOCATION: Saline County, AR

JOB NUMBER: 15-019

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			PERCENT PASSING No. 200	UNIFIED CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			
S1	6.5-7.5	28	48	19	29	69	CL	A-7-6
S1	9-10	12	41	23	18	28	GC	A-2-6
S2	4.5-5.5	20	42	21	21	49	SC	A-6
S2	9-10	14	40	21	19	30	GC	A-2-6
S3	6.5-7.5	26	35	19	16	80	CL	A-6
S3	19-20	18	31	18	13	37	GC	A-6
S3	24-25	29	44	21	23	90	CL	A-7-6
S4	2.5-3.5	26	68	22	46	55	CH	A-7-6
S4	9-10	15	42	21	21	26	GC	A-2-7
S4	19-20	21	40	21	19	47	SC	A-6
W21	2.5-3.5	18	34	16	18	40	GC	A-6
W21	6.5-7.5	23	40	23	17	54	CL	A-6
W21	9-10	40	88	26	62	98	CH	A-7-6
W22	4.5-5.5	38	91	23	68	91	CH	A-7-6
W27	2.5-3.5	6	32	16	16	---	SHALE	

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

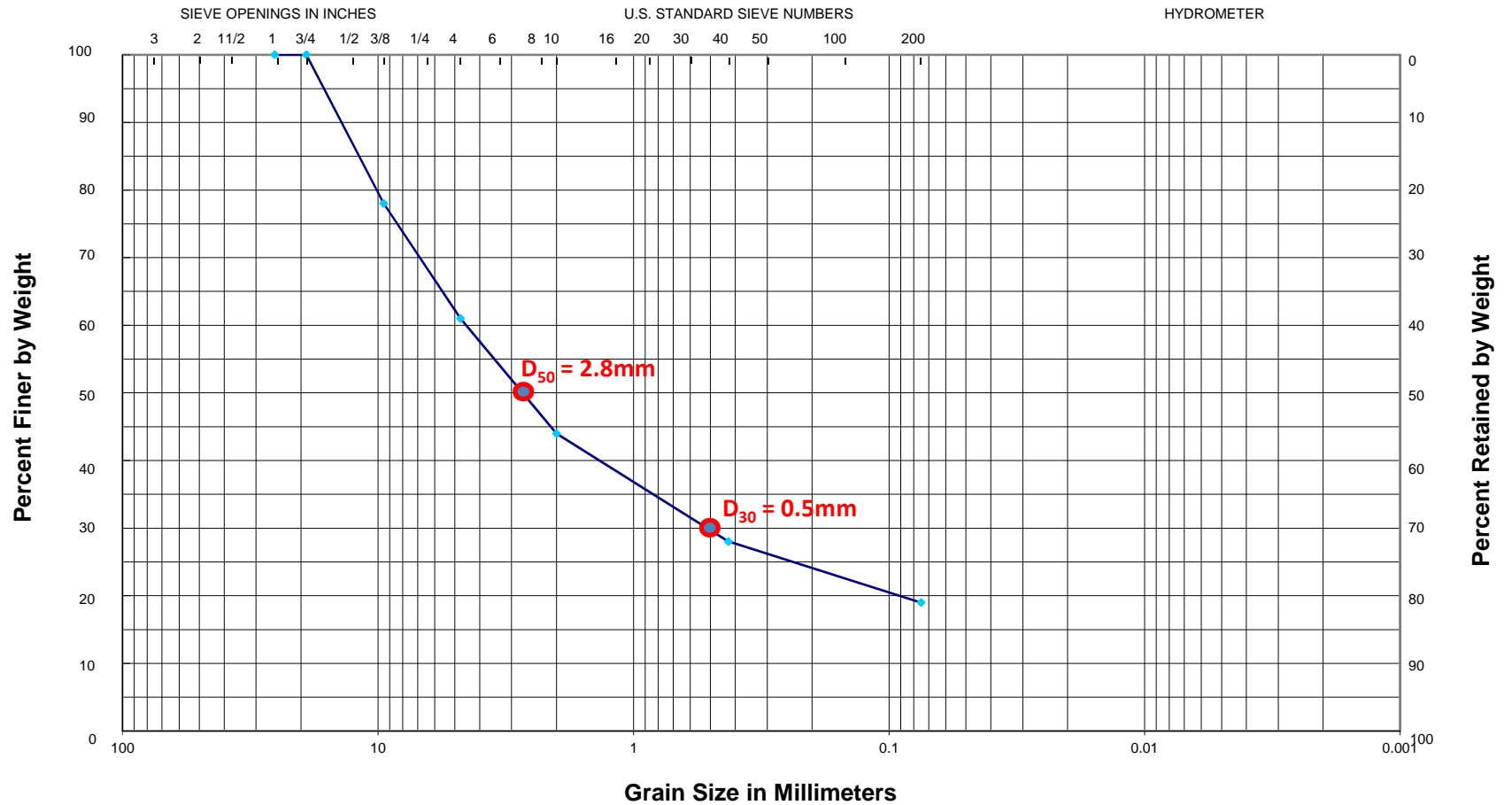
Sample: S-5, 2.5-3.5 ft; LL = 27; PL = 15; PI = 12

Description: Reddish tan, tan and gray silty clay with some fine sand pockets, shale fragments, crushed stone and occasional clay seams

**USCS = SC    AASHTO = A-2-4**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

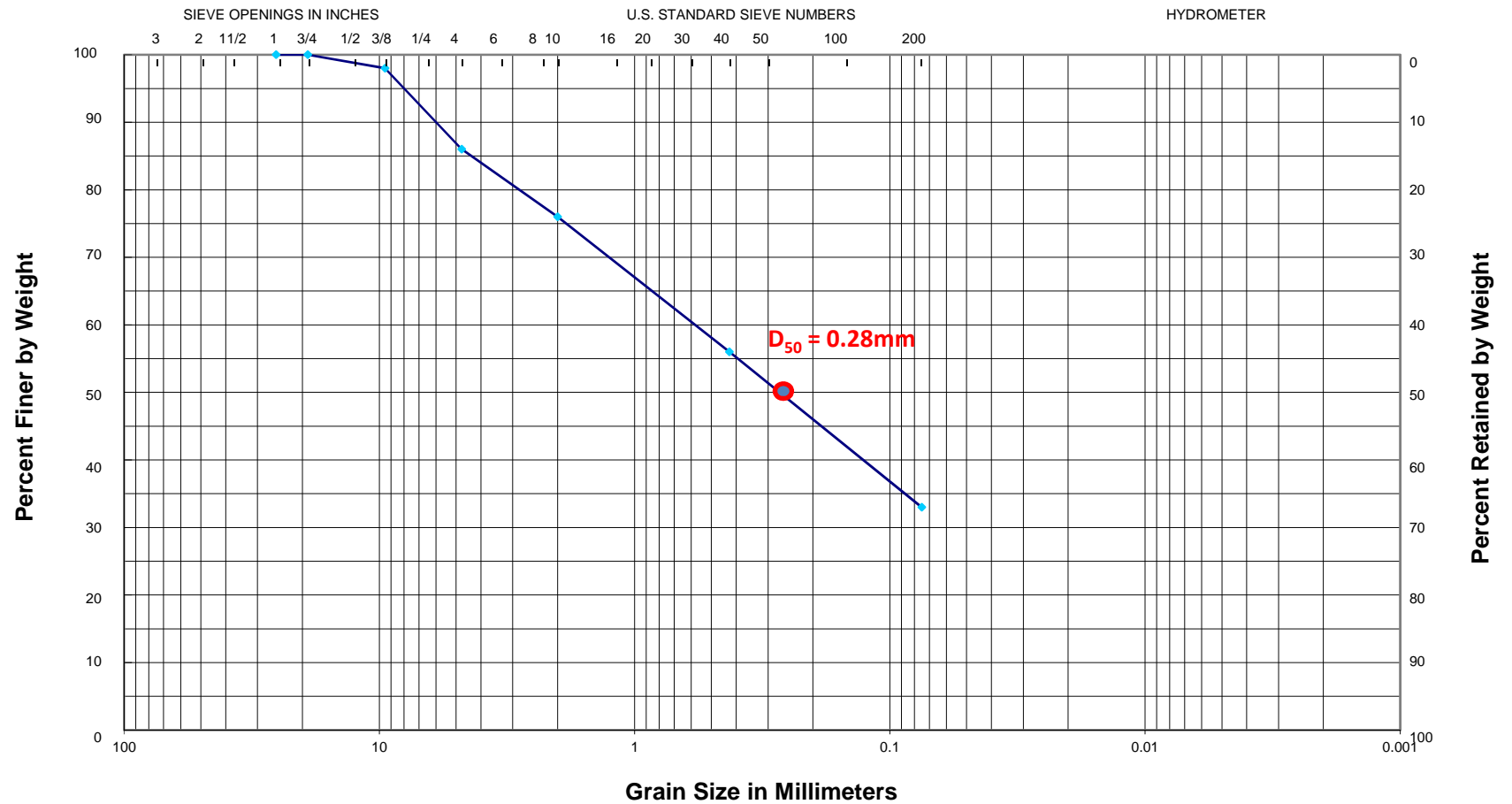
Sample: S-8, 6.5-7.5 ft; LL = 29; PL = 17; PI = 12

Description: Reddish tan and tan clayey fine to coarse sand with fine gravel

**USCS = SC      AASHTO = A-2-6**

15-019

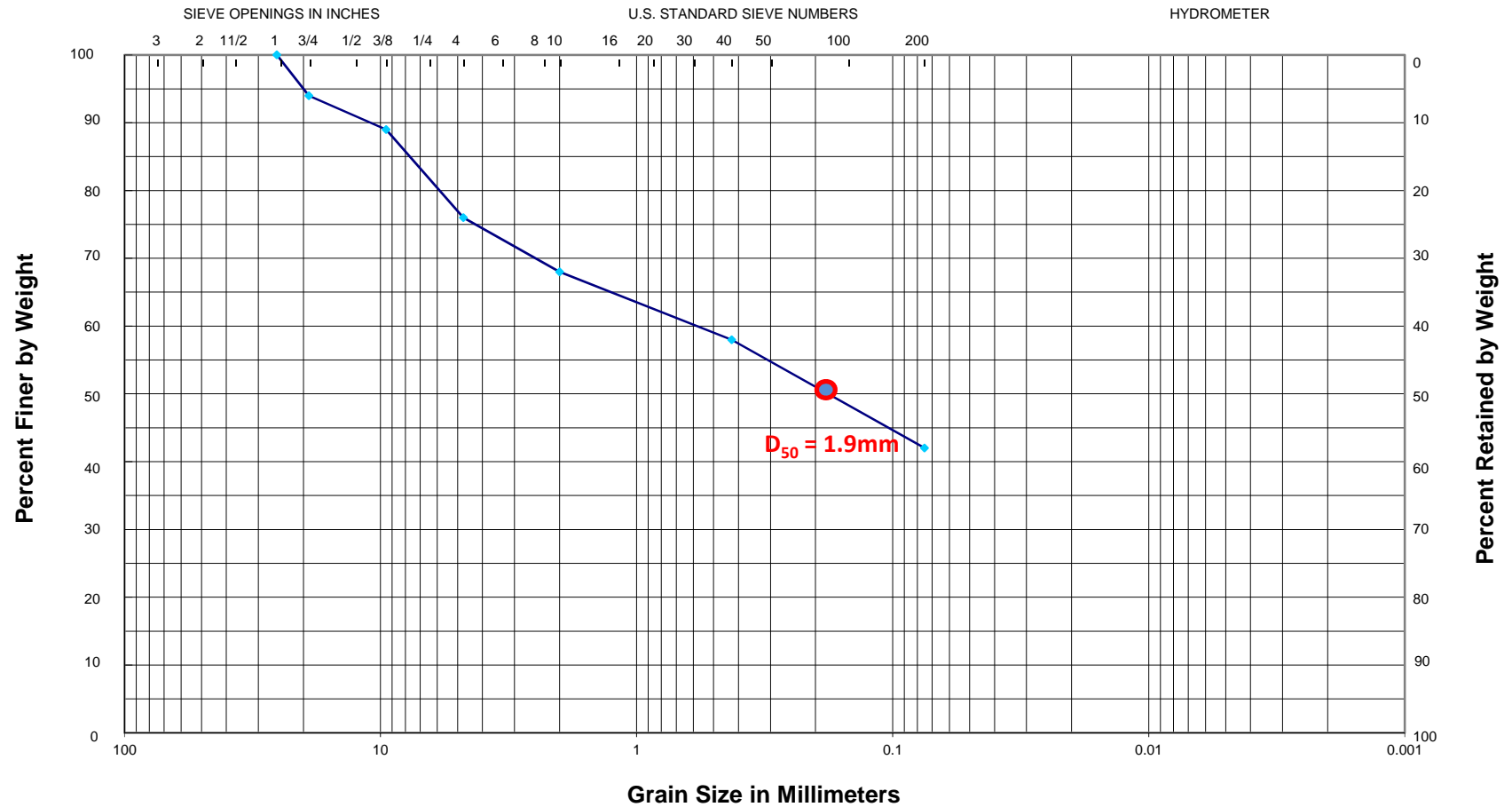
# GRAIN SIZE CURVE





15-019

## GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

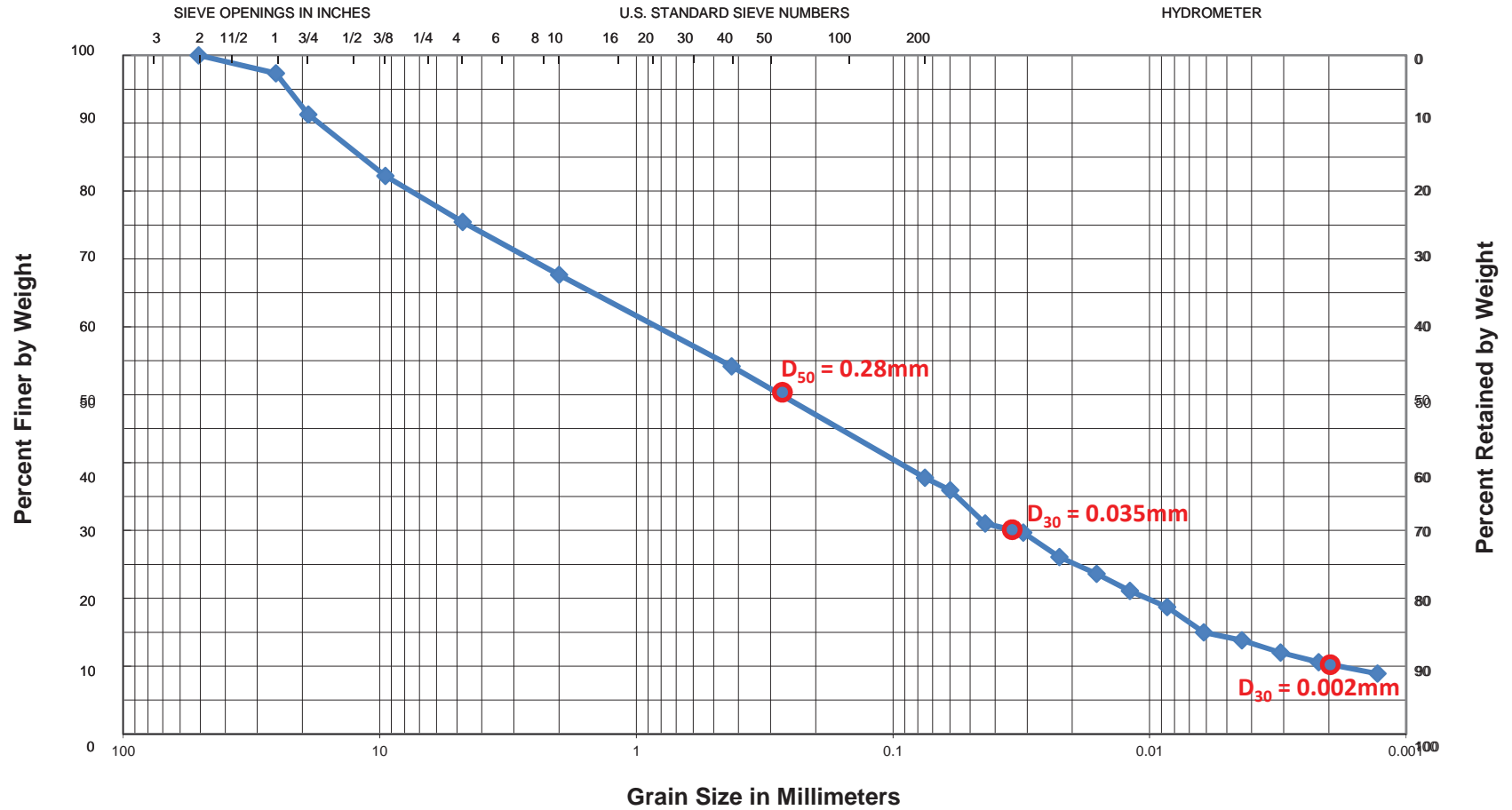
Sample: S-19; 4.5-5.5 ft; LL = 23; PL = 16; PI = 7;

Description: Tan and brown clayey fine sand w/ some fine sandy clay pockets and quartz fragments and fine to coarse gravel

**USCS = SC-SM      AASHTO = A-4**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

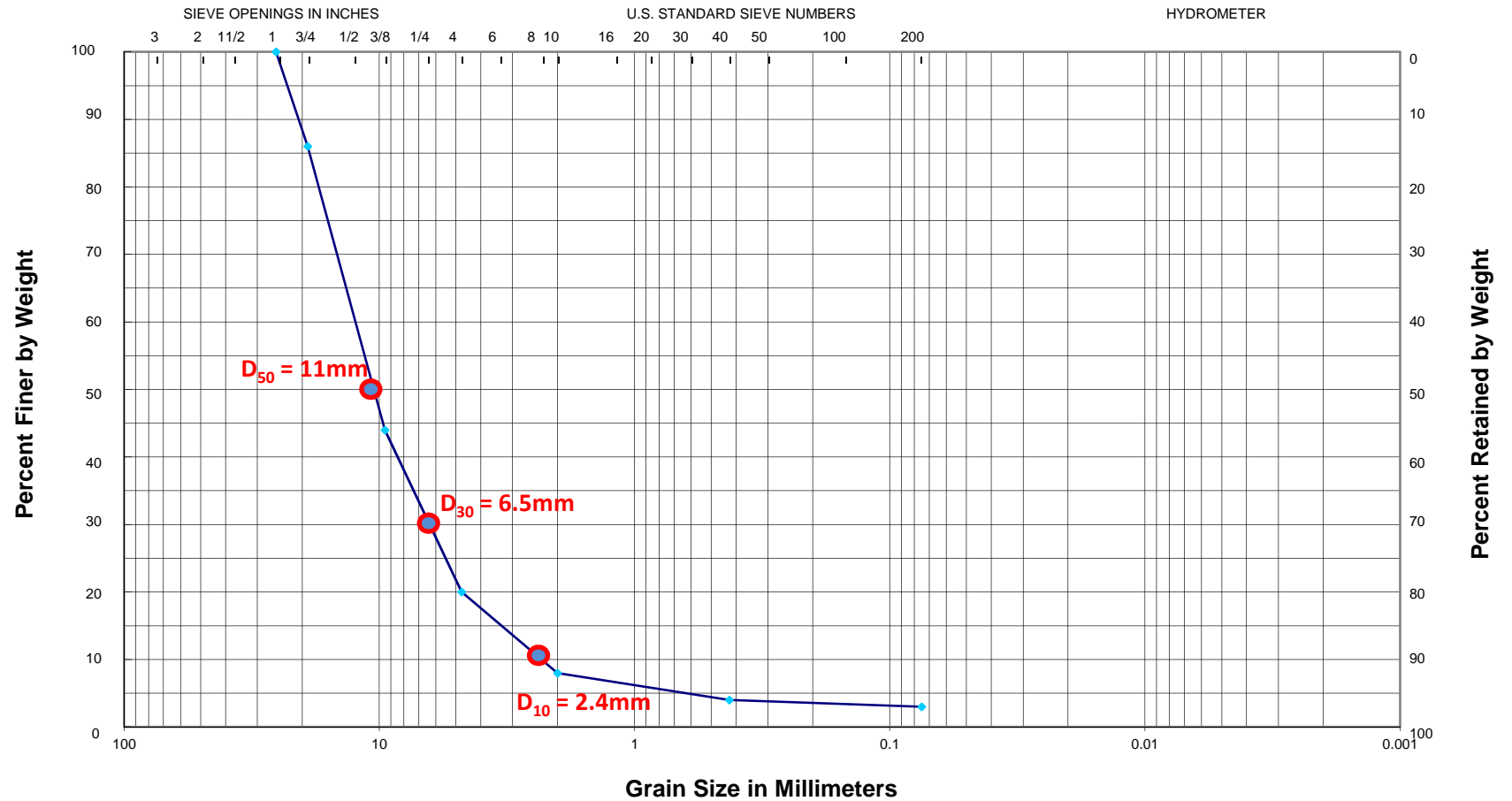
Sample: Boring S19, 2 -10 ft  
 Properties:  $G_s = 2.685$ ;  $LL = 23$ ,  $PL = 17$ ,  $PI = 6$ ;

Description: Tan and brown clayey fine sand w/ some fine sandy clay pockets and quartz fragments and fine to coarse gravel

**USCS = CL-ML; AASHTO = A-4**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

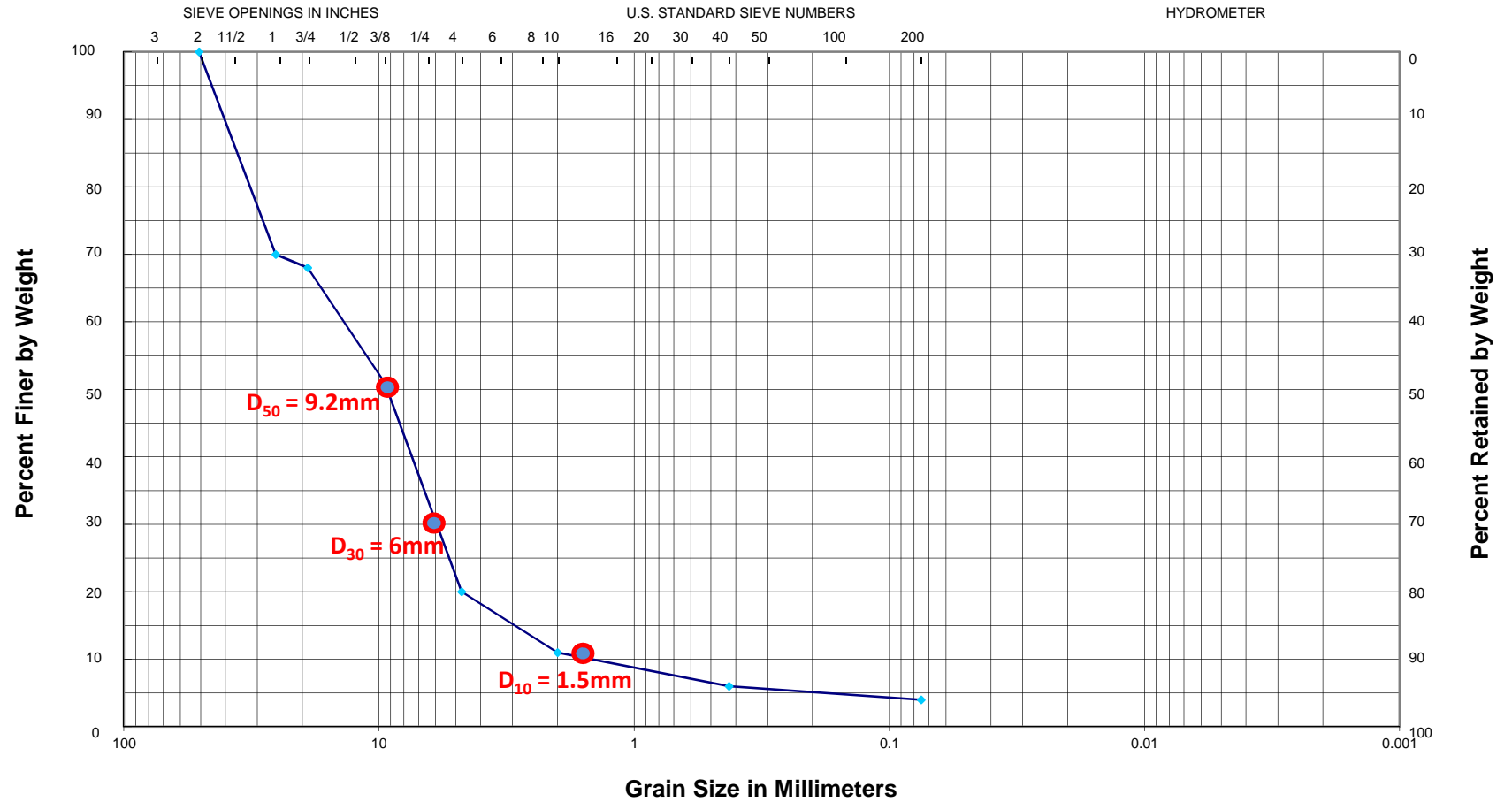
Sample: S-19; 29-30 ft;

Description: Tan and brown fine gravel w/ a little coarse gravel, slightly sandy

**USCS = GW    AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

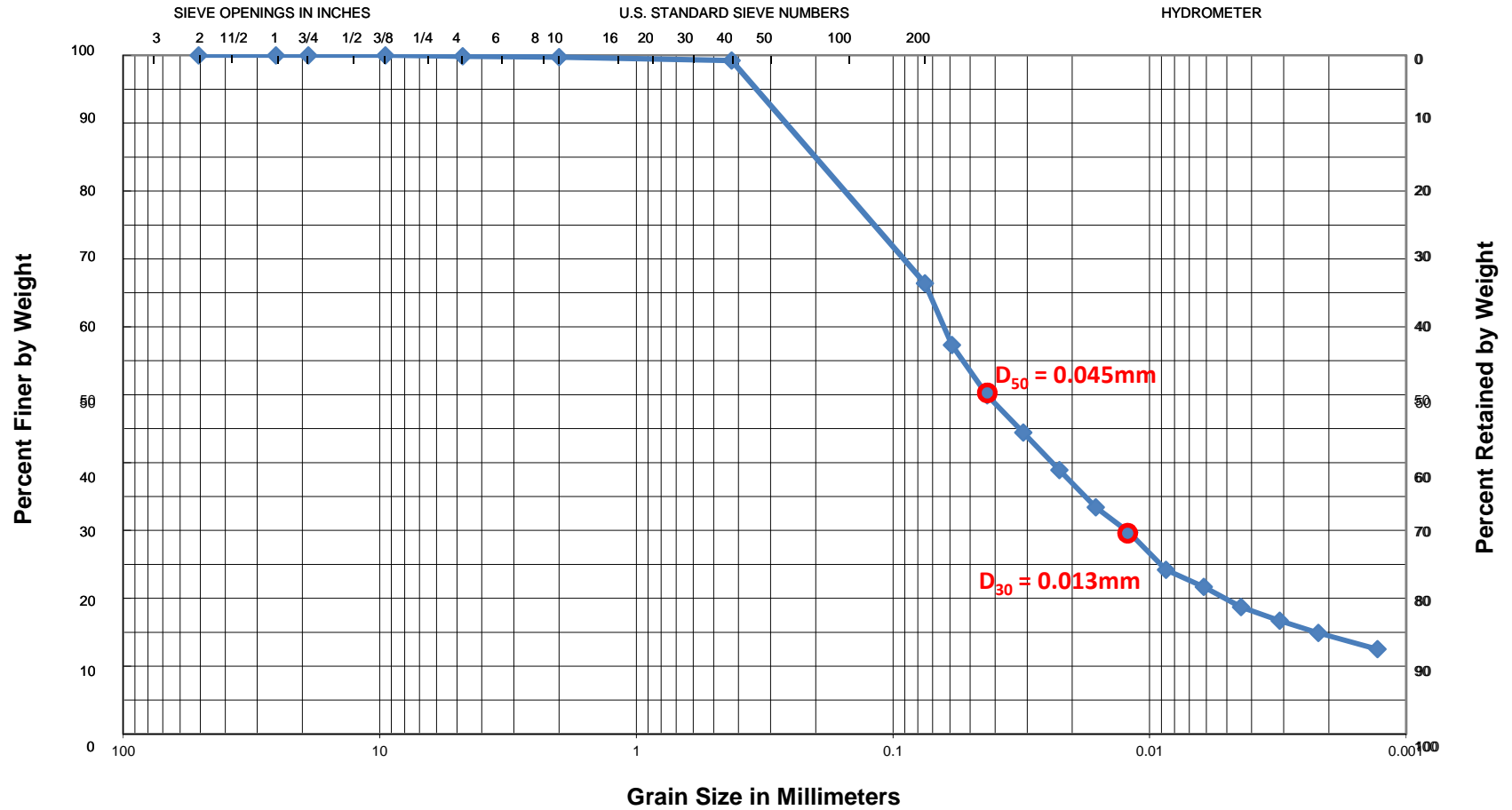


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-19; 39-40 ft;  
 Description: Brown and tan fine to coarse gravel, slightly sandy  
**USCS = GW    AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

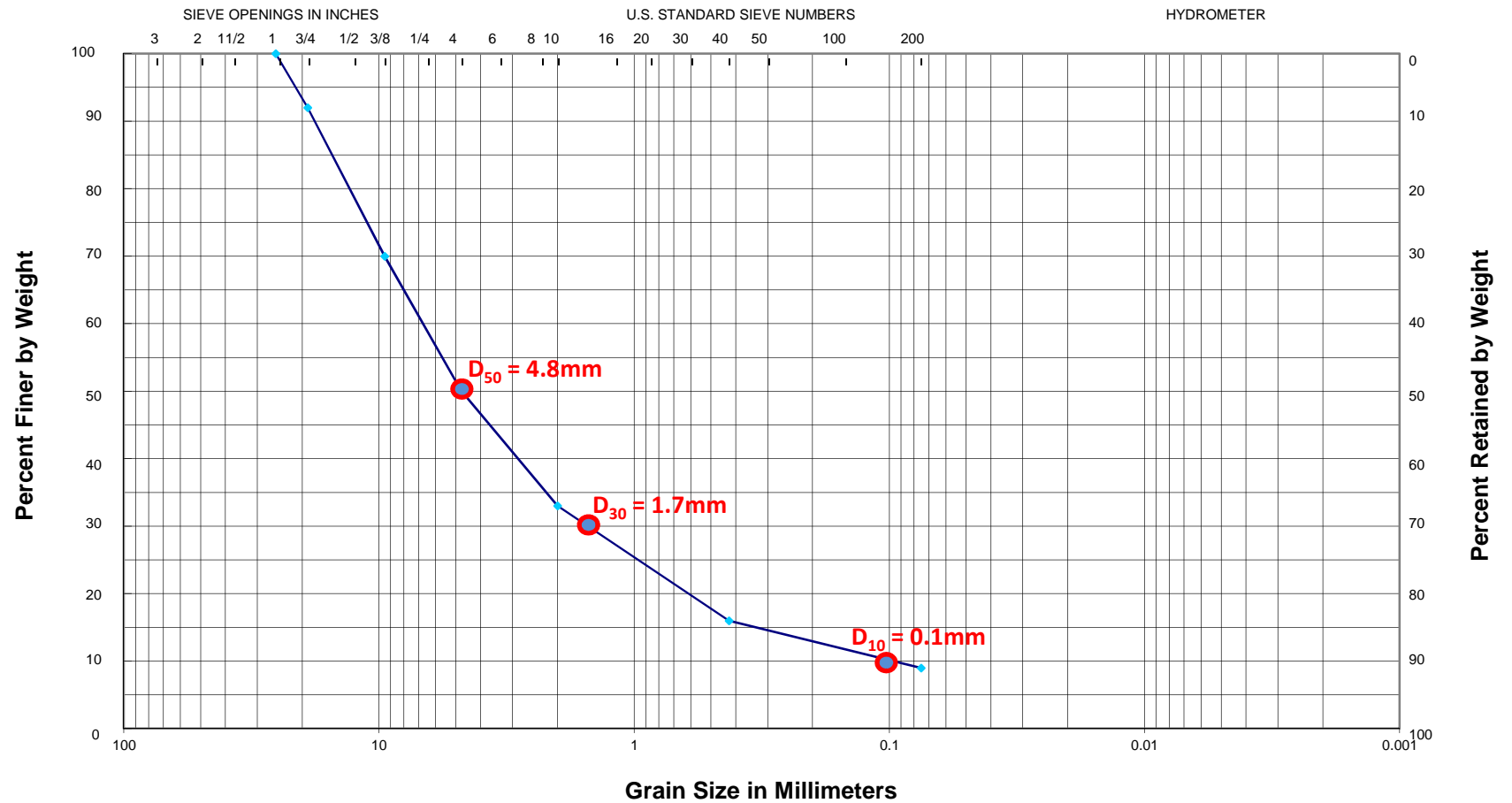
Sample: Boring S20, 0.5 -2.5 ft  
 Properties:  $G_s = 2.678$ ;  $LL = 23$ ,  $PL = 18$ ,  $PI = 5$ ;

Description: Reddish tan fine sandy silt, slightly clayey

**USCS = CL-ML; AASHTO = A-4**

15-019

# GRAIN SIZE CURVE

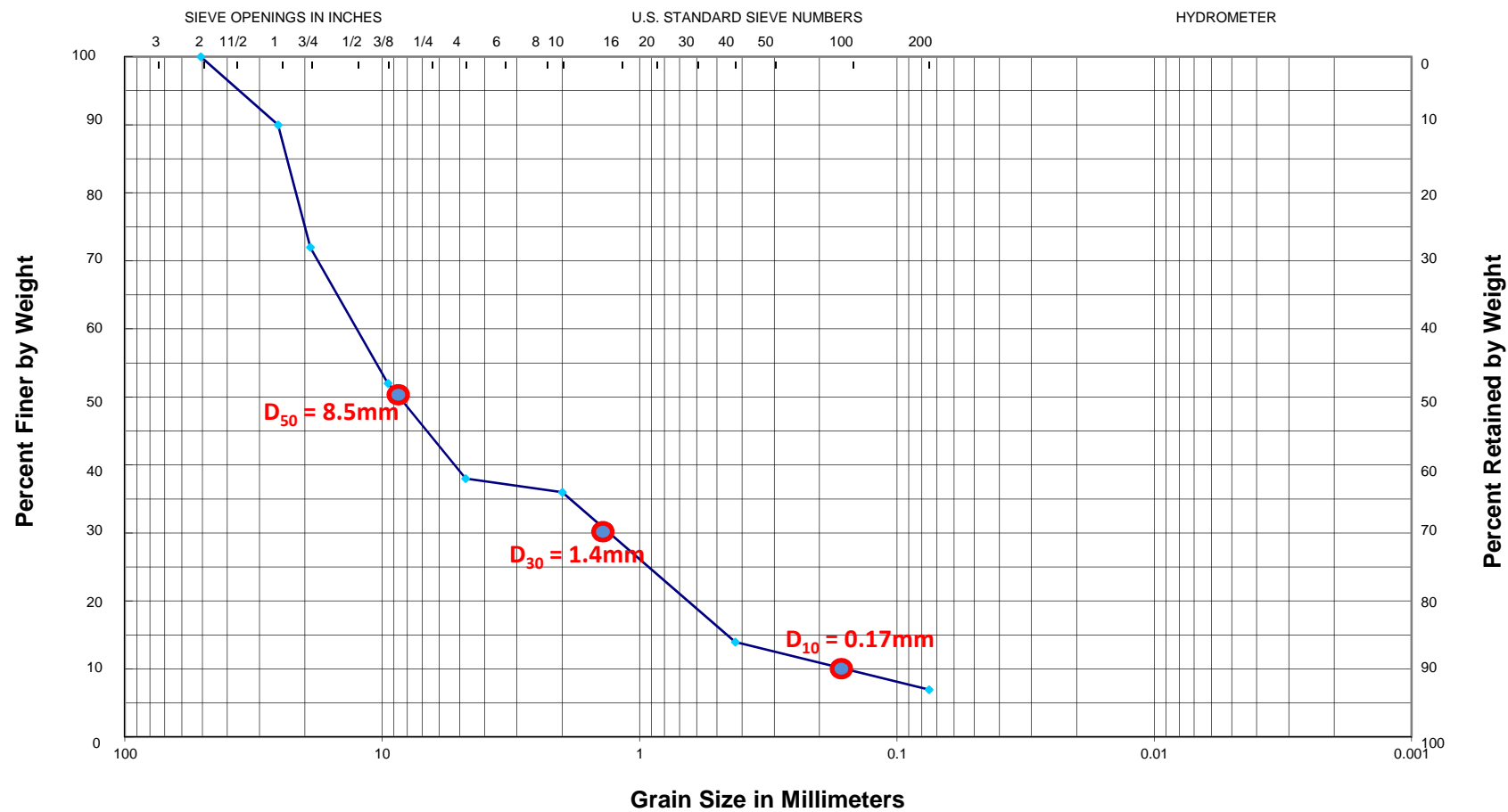


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-20; 19-20 ft;  
Description: Brown and tan sandy fine gravel with a little coarse gravel, slightly silty  
**USCS = GP-GM      AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-21; 6.5-7.5 ft;

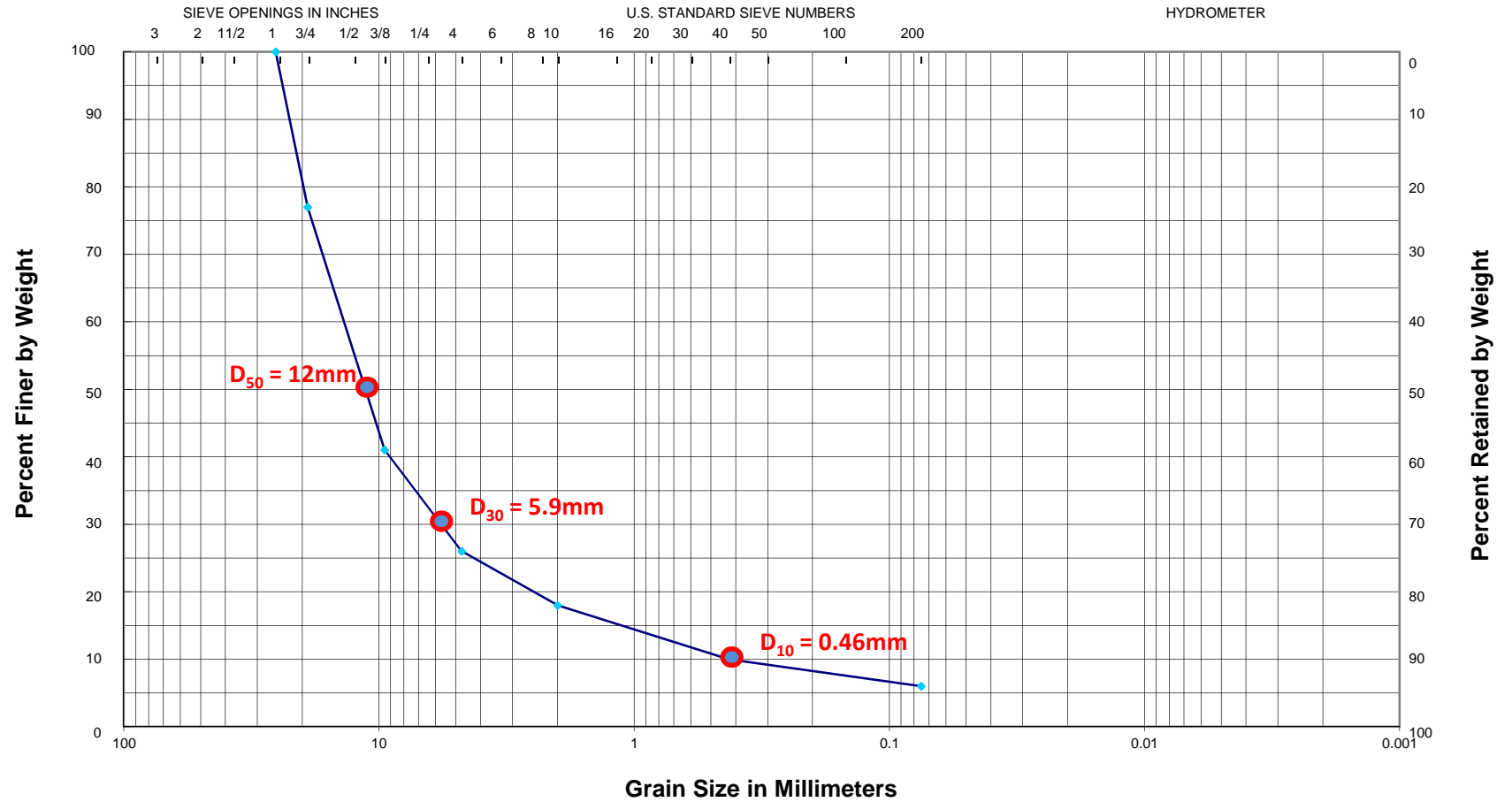
Description: Brown and tan sandy fine to coarse gravel, slightly silty

**USCS = GP    AASHTO = A-1-a**



15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

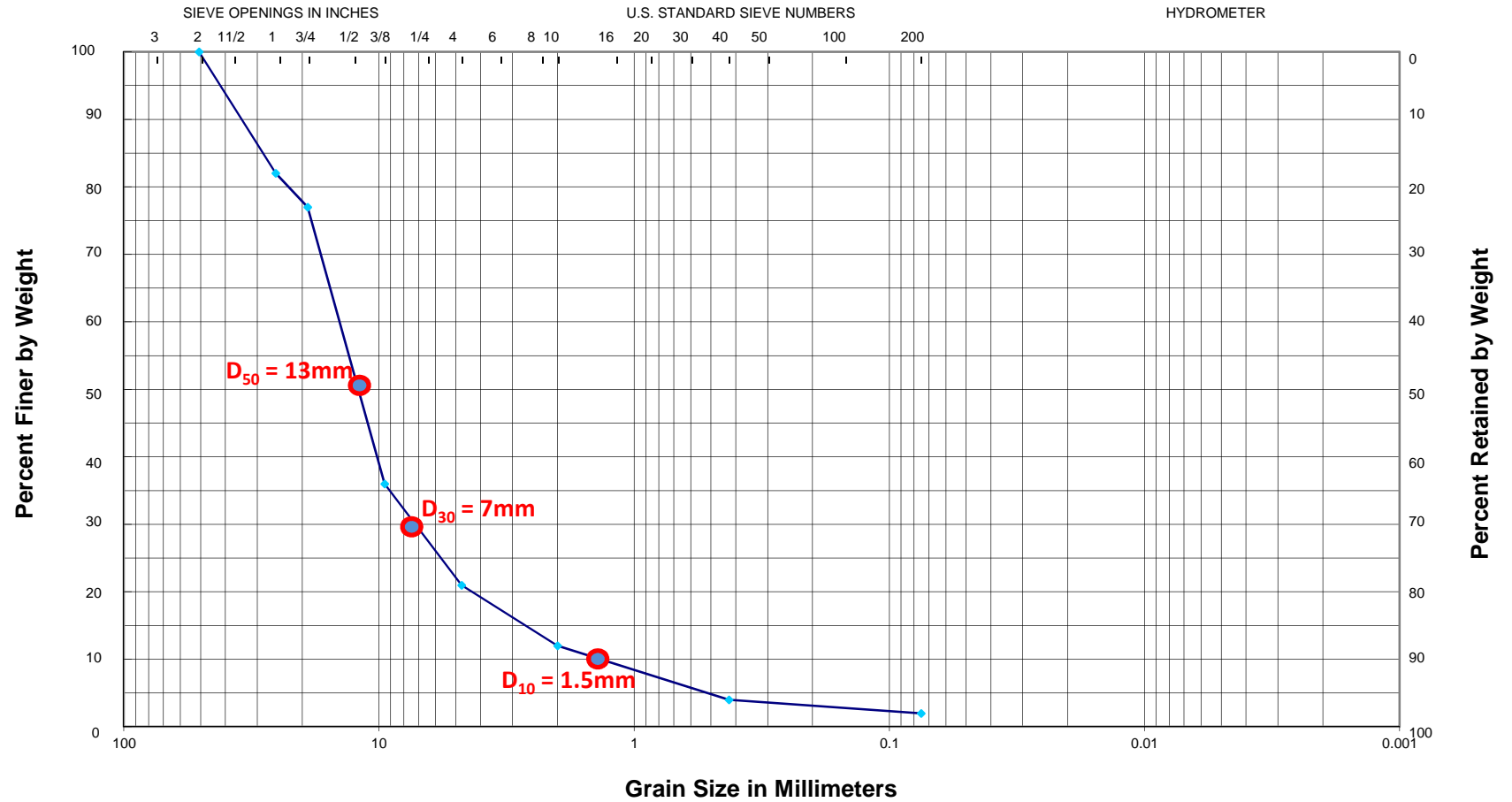
Sample: S-22; 4.5-5.5 ft;

Description: Tan and brown sandy fine to coarse gravel, slightly silty

**USCS = GP-GM      AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

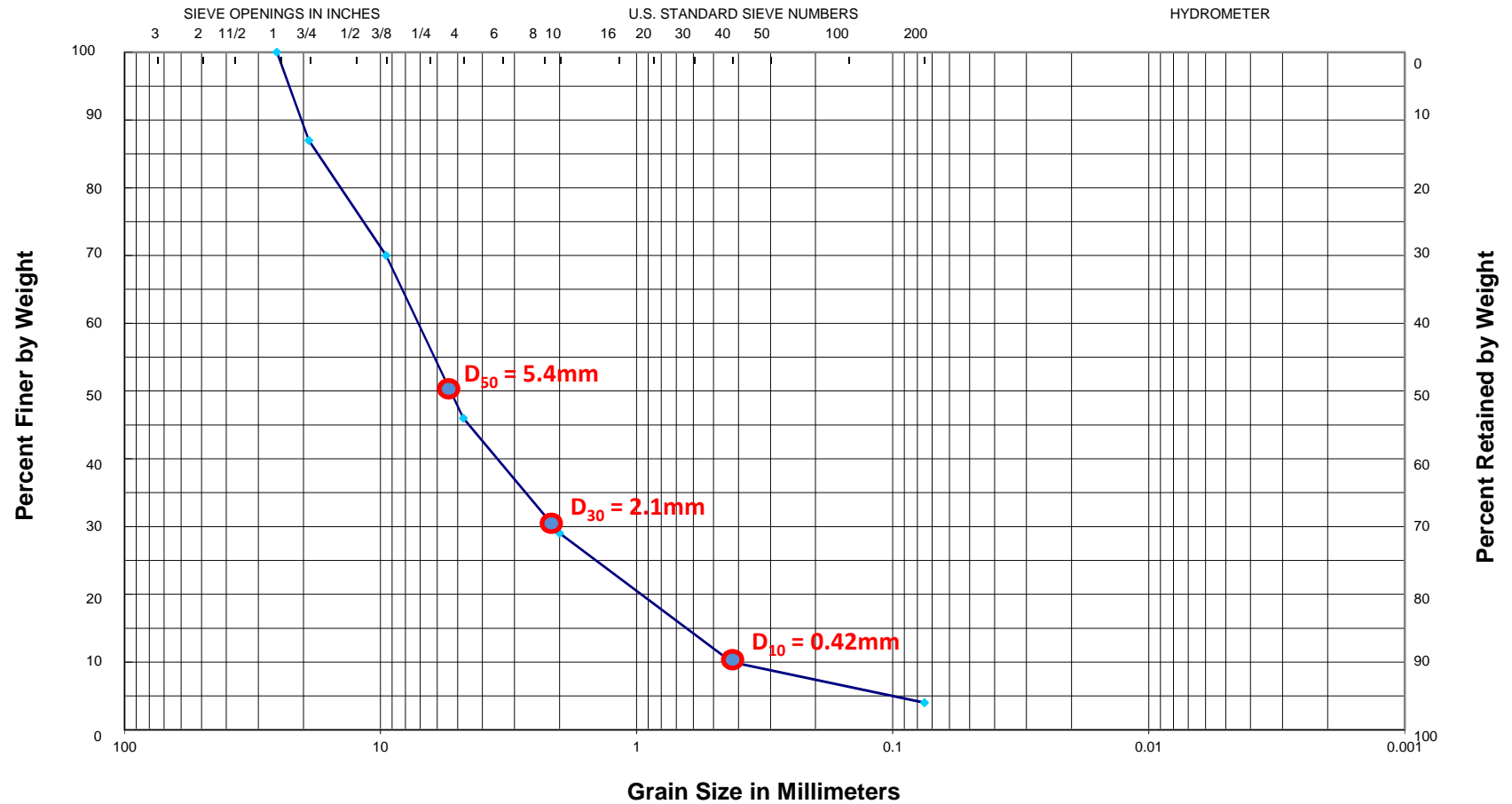


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-24; 0.5-1.5 ft;  
 Description: Brown and tan sandy fine to coarse gravel  
**USCS = GW    AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

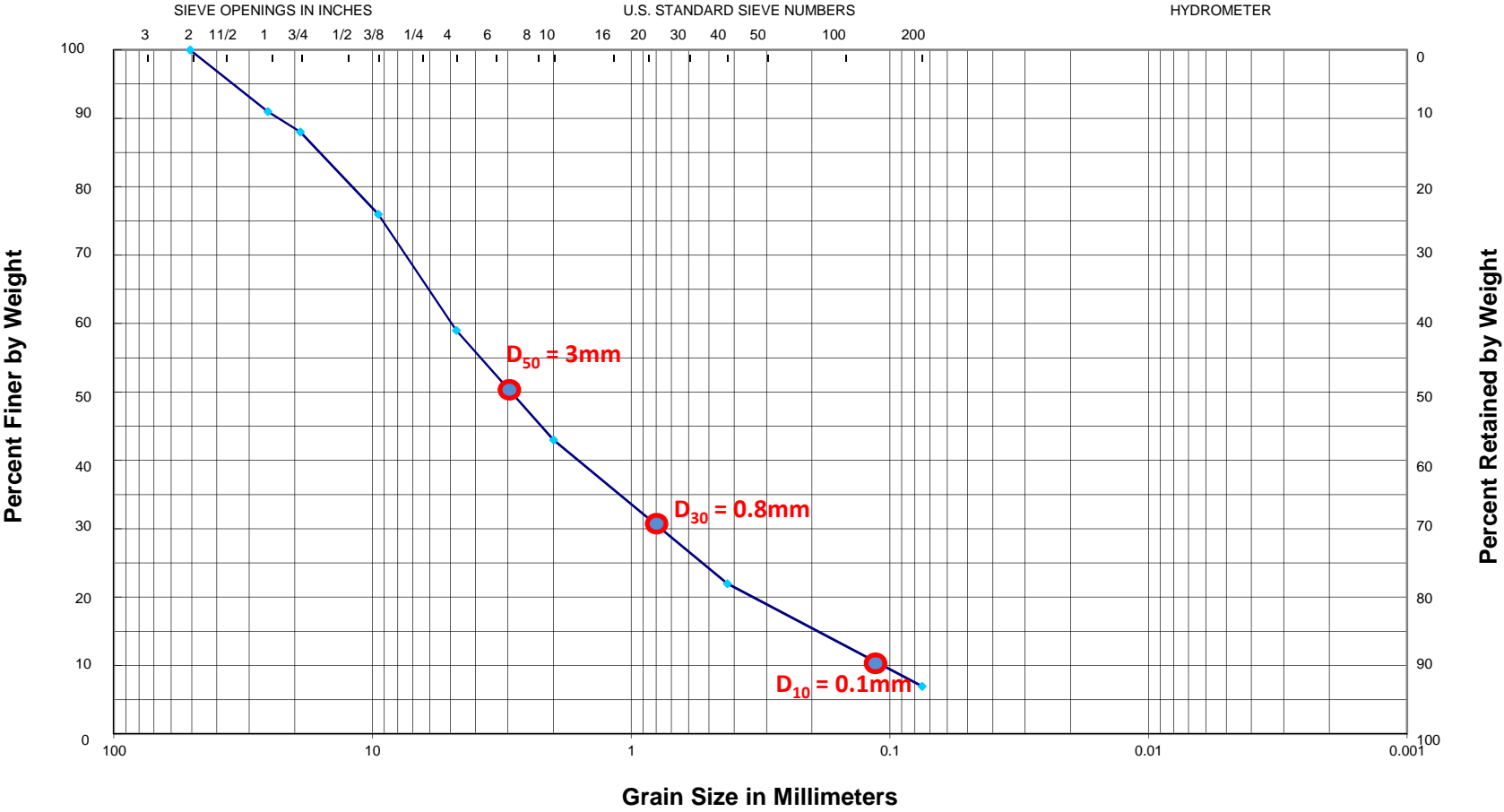


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-26; 4.5-5.5 ft;  
 Description: Tan and brown sandy fine to coarse gravel  
**USCS = GW    AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

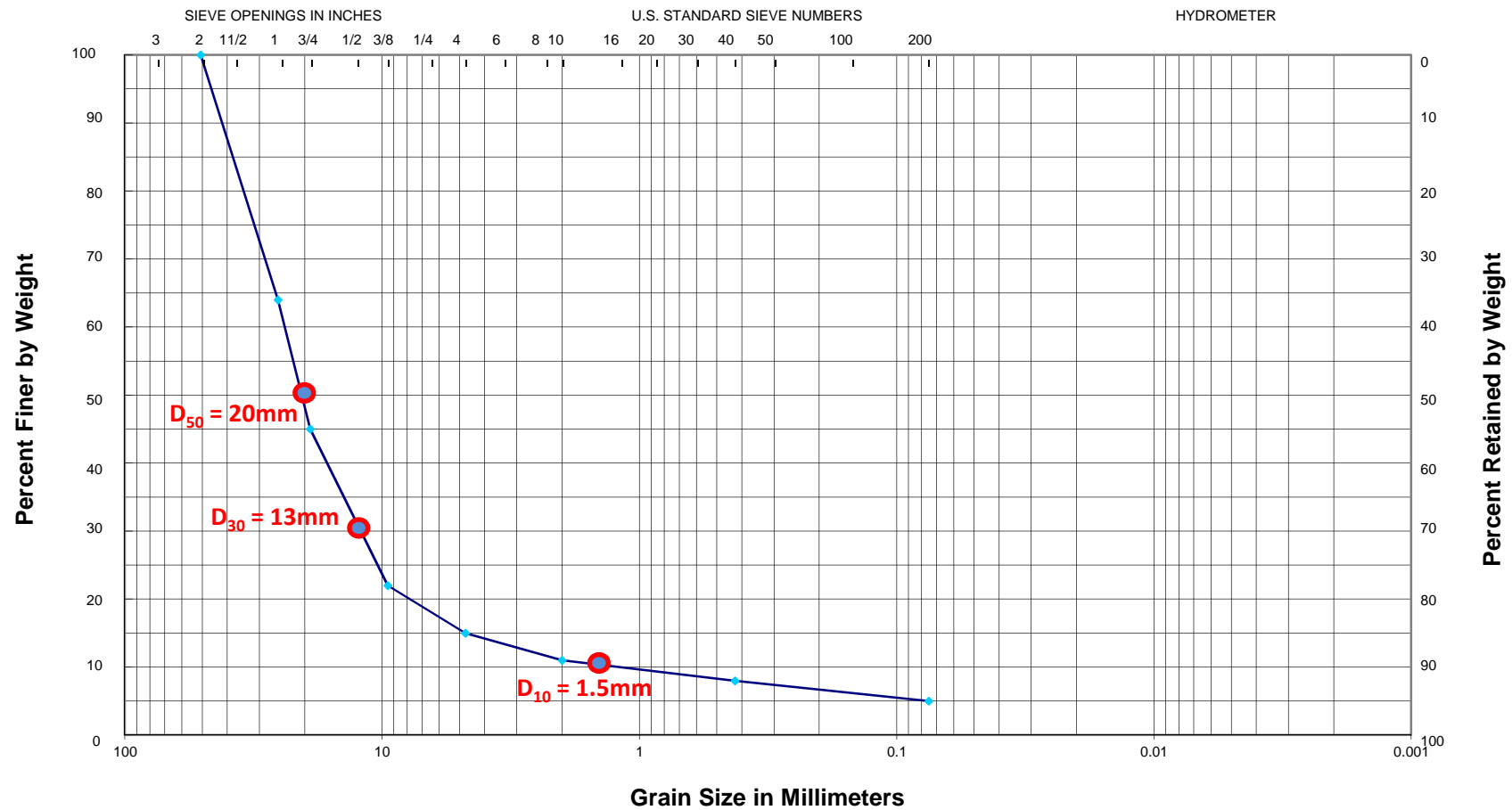


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-27; 6.5-7.5 ft;  
Description: Brown and tan sandy fine to coarse gravel, slightly silty  
**USCS = GW-GM    AASHTO = A-1-a**

15-019

GRAIN SIZE CURVE

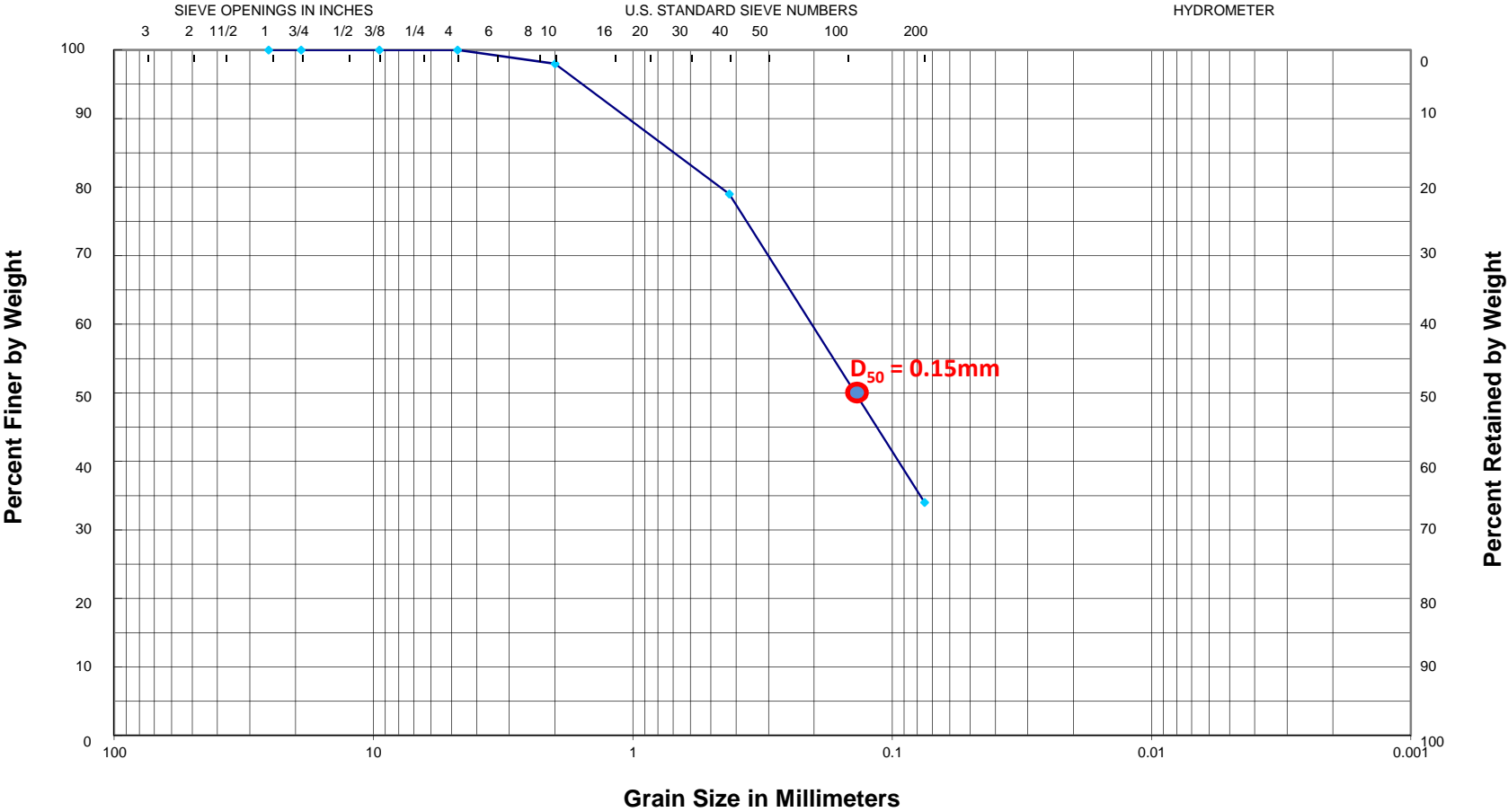


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-28; 4.5-5.5 ft;  
Description: Brown and tan sandy fine to coarse gravel  
**USCS = GP-GM      AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

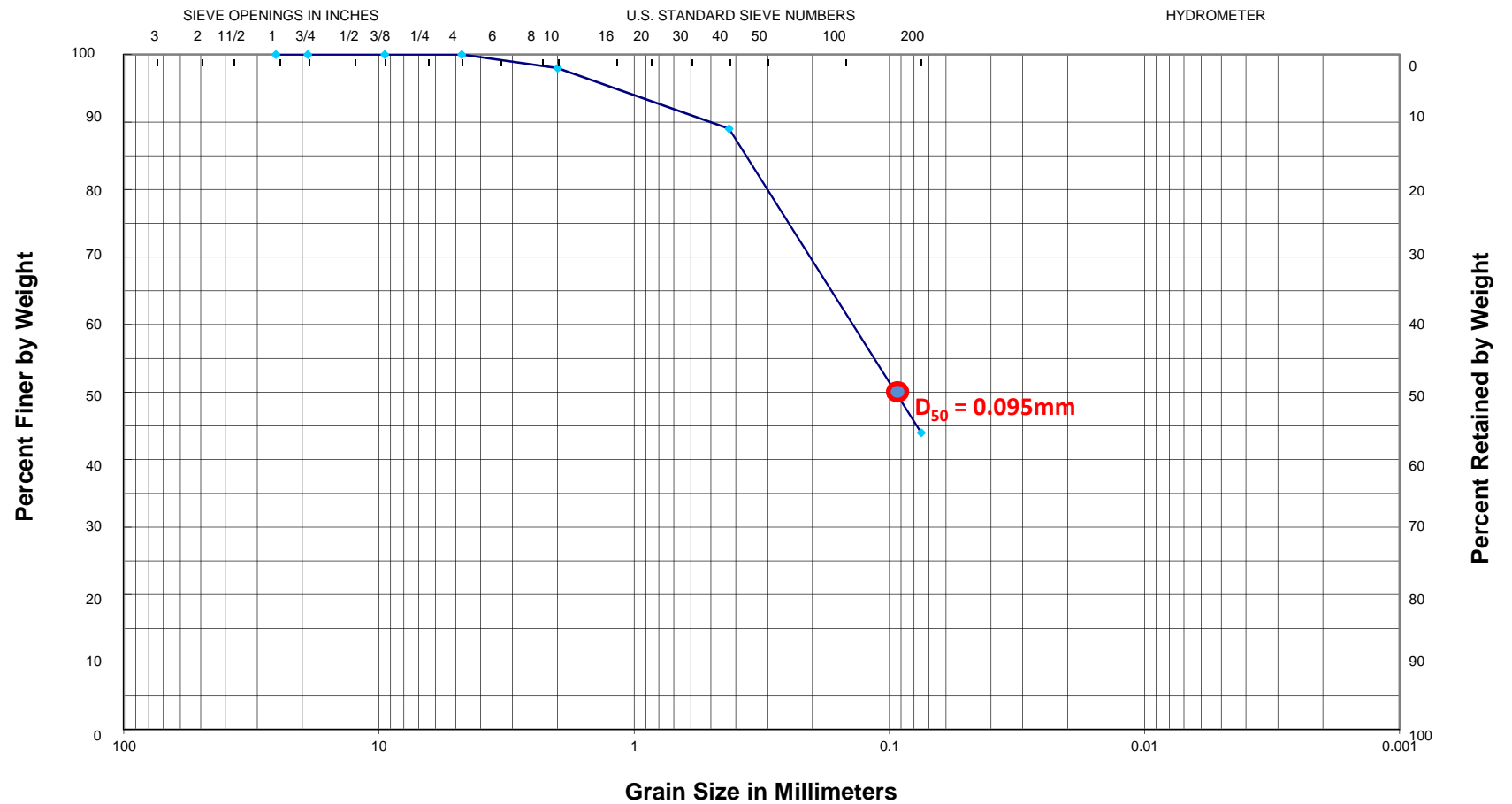


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-30; 4.5-5.5 ft; Non Plastic;  
Description: Gray and brown silty fine sand with a little medium sand  
**USCS = SM      AASHTO = A-2-4**

15-019

GRAIN SIZE CURVE

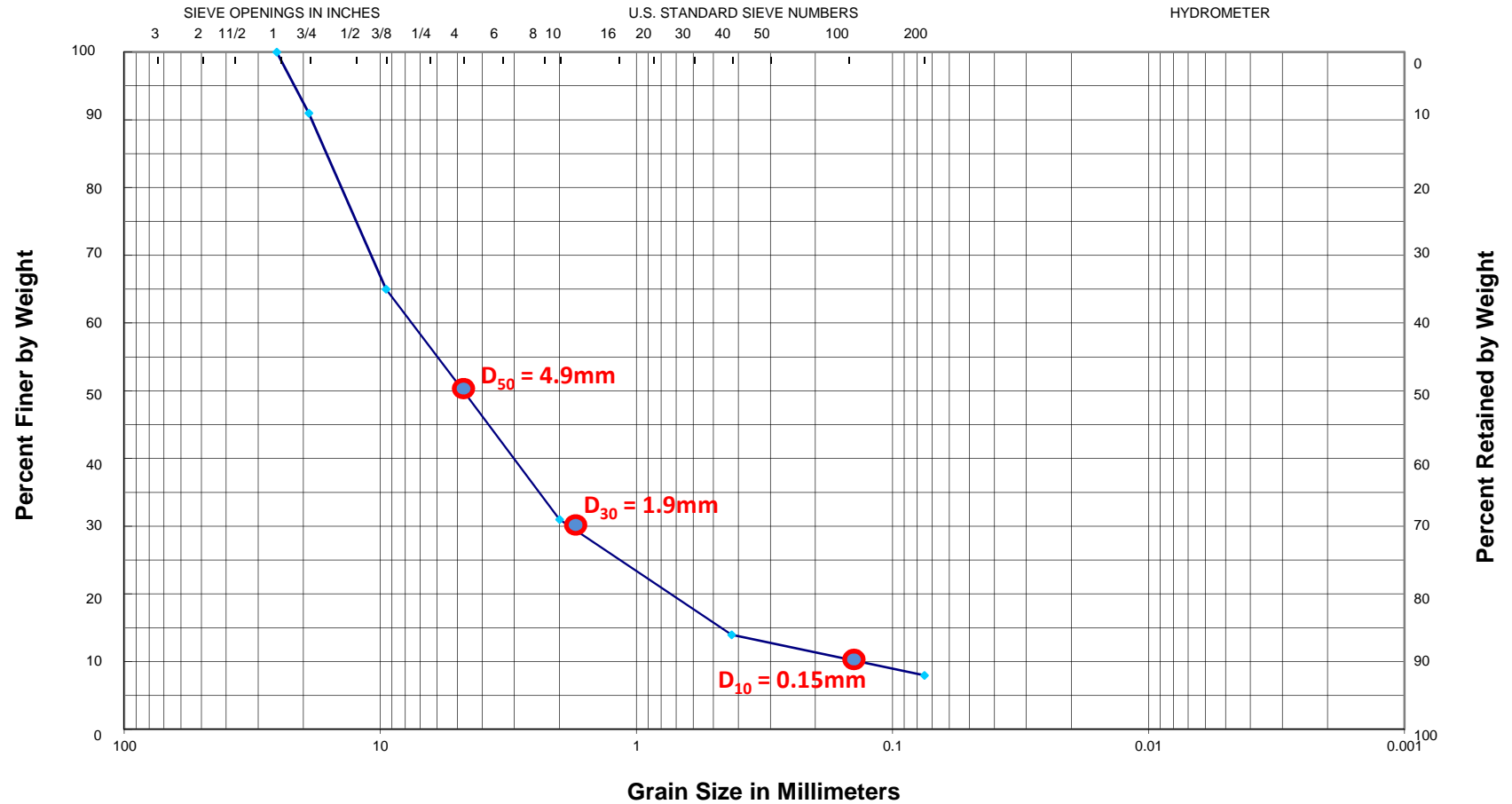


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-31; 14-15 ft;  
Description: Gray and brown silty fine sand w/ occasional fine sandy clay pockets and fine sand seams  
**USCS = SC    AASHTO = A-6**

15-019

## GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-32; 14-15 ft;

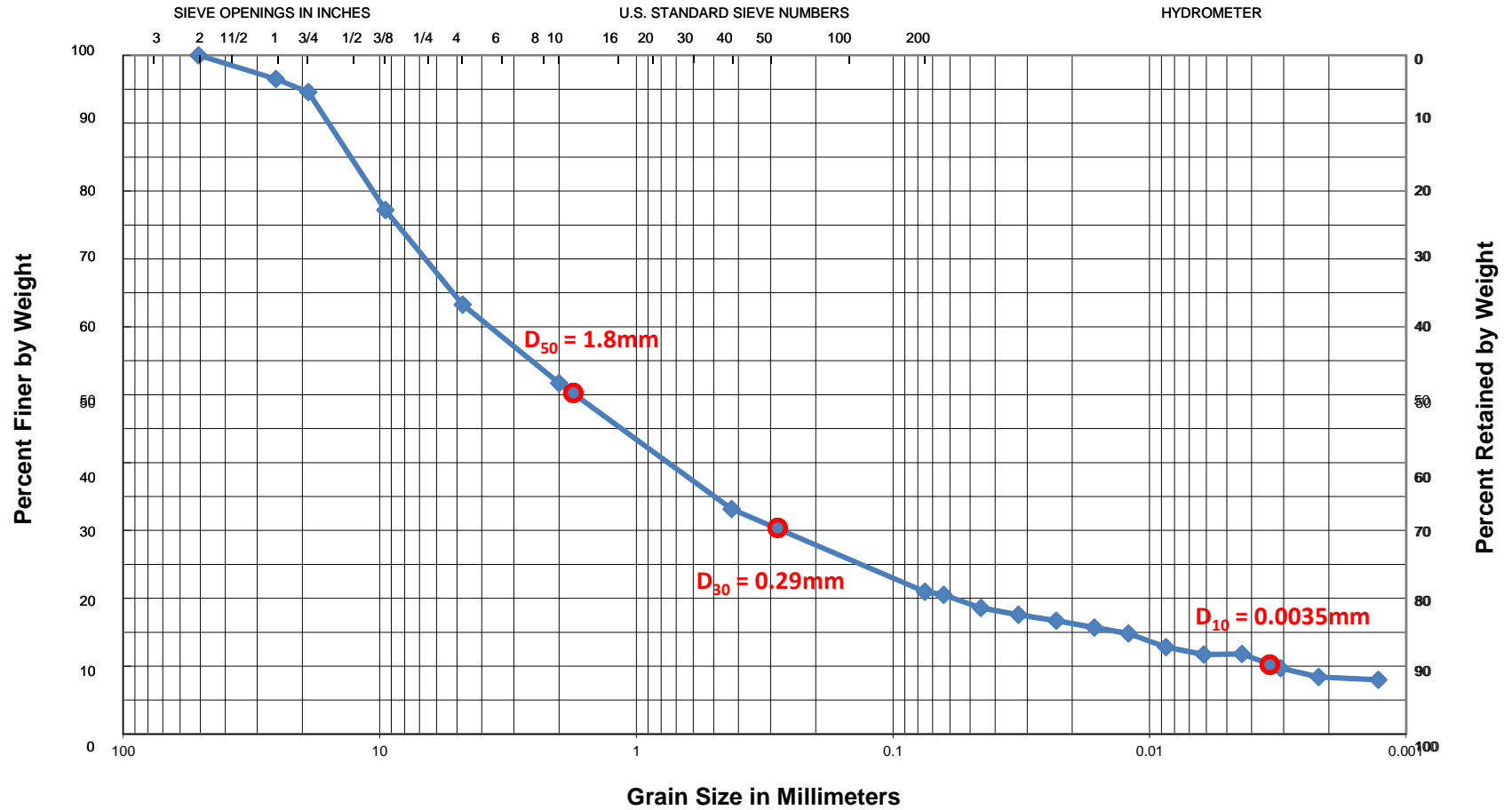
Description: Brown fine to coarse sand w/ fine gravel and a little coarse gravel, slightly silty

**USCS = SW      AASHTO = A-1-a**



15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

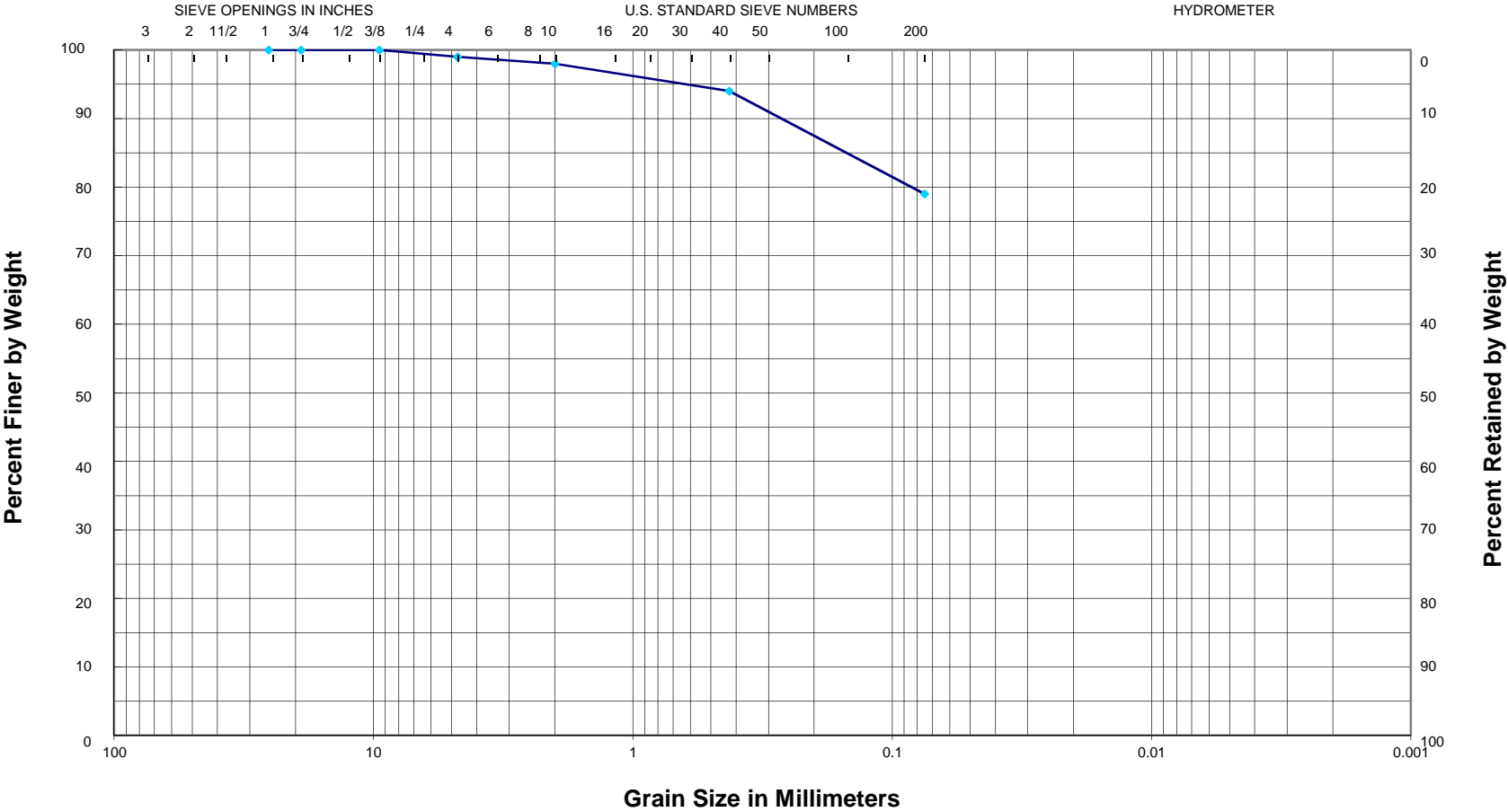
Sample: Boring S33, 2 -10 ft  
 Properties:  $G_s = 2.692$ ;  $LL = 28$ ,  $PL = 17$ ,  $PI = 11$ ;

**USCS = GC; AASHTO = A-2-6**

Description: tan and brown fine sandy clay with some fine to coarse gravel and some shale and quartz fragments

15-019

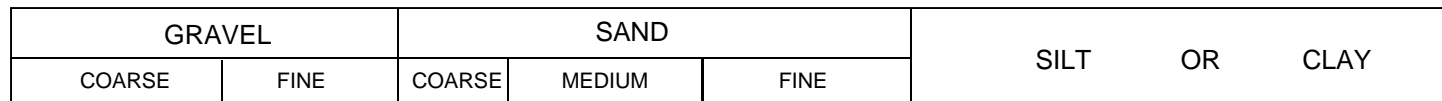
GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-33; 6.5-7.5 ft; LL = 31; PL = 17; PI = 14;  
Description: Tan, gray, reddish tan and brown fine sandy clay w/ some quartz fragments and fine sand pockets  
**USCS = CL    AASHTO = A-6**

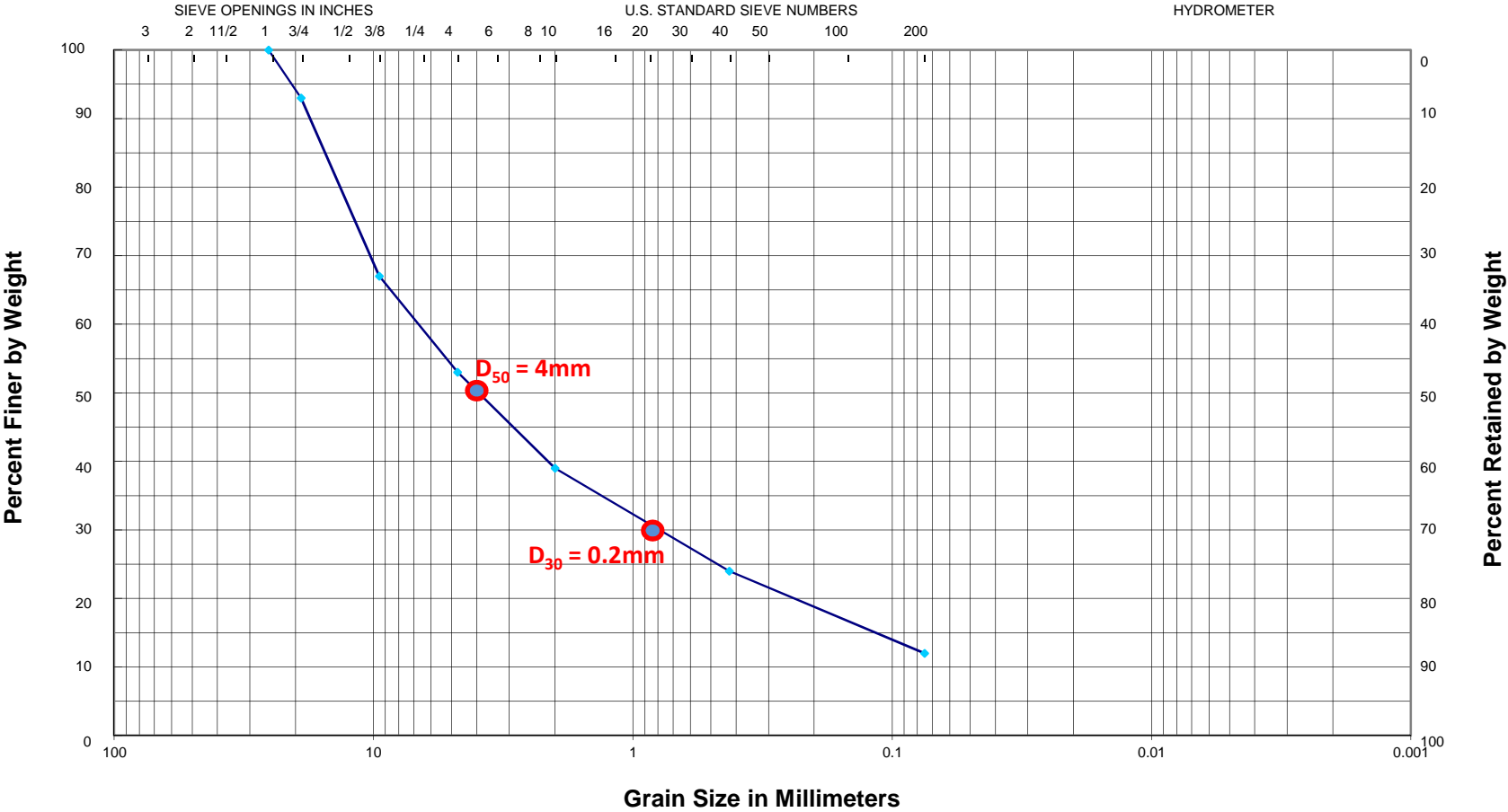
## GRAIN SIZE CURVE



**USCS = CL      AASHTO = A-6**

15-019

# GRAIN SIZE CURVE

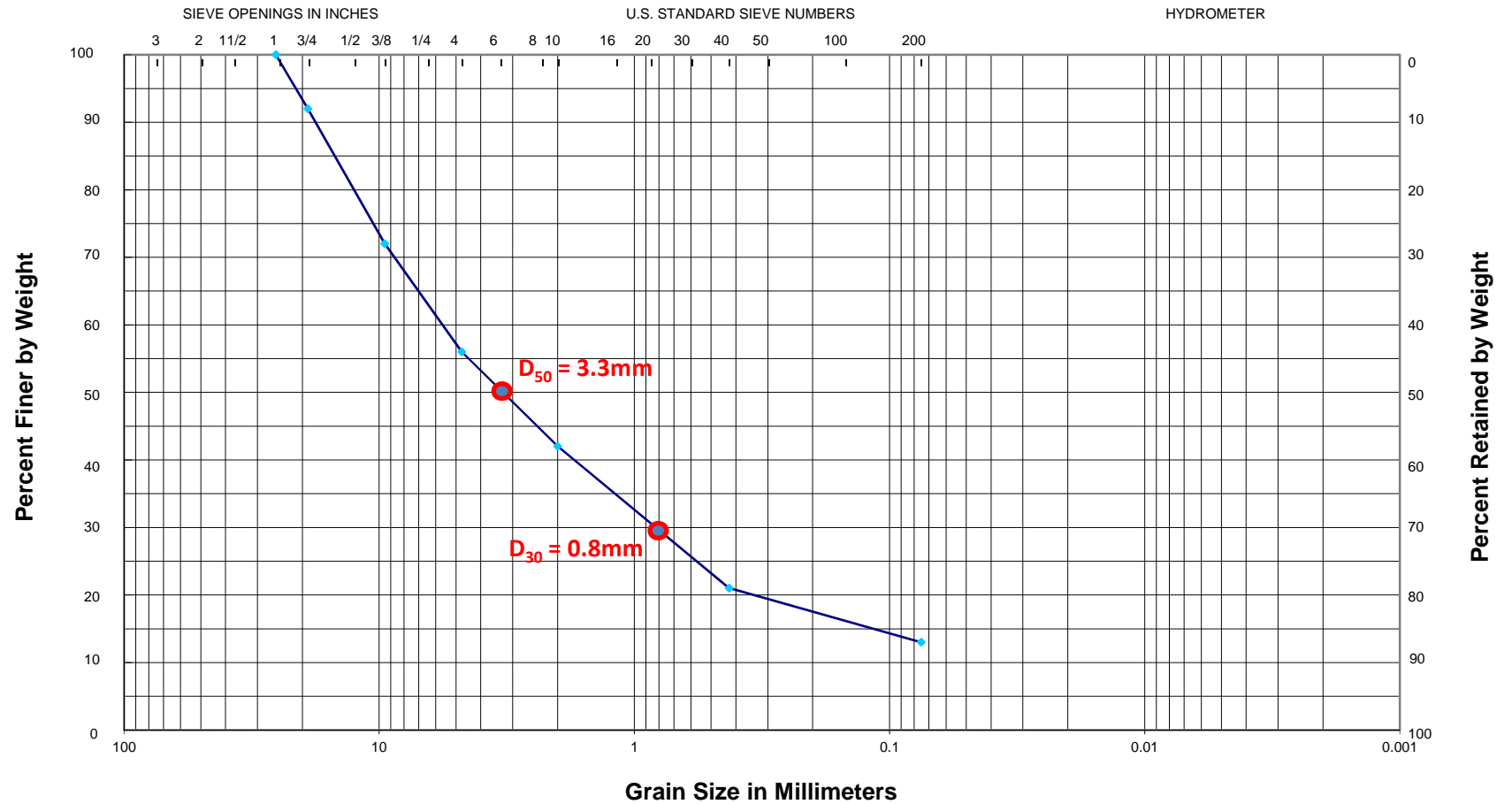


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-33; 34-35 ft; LL = 21; PL = 16; PI = 5;  
Description: Tan and brown fine to coarse sand, slightly silty w/ some fine to coarse gravel  
**USCS = SC-SM      AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

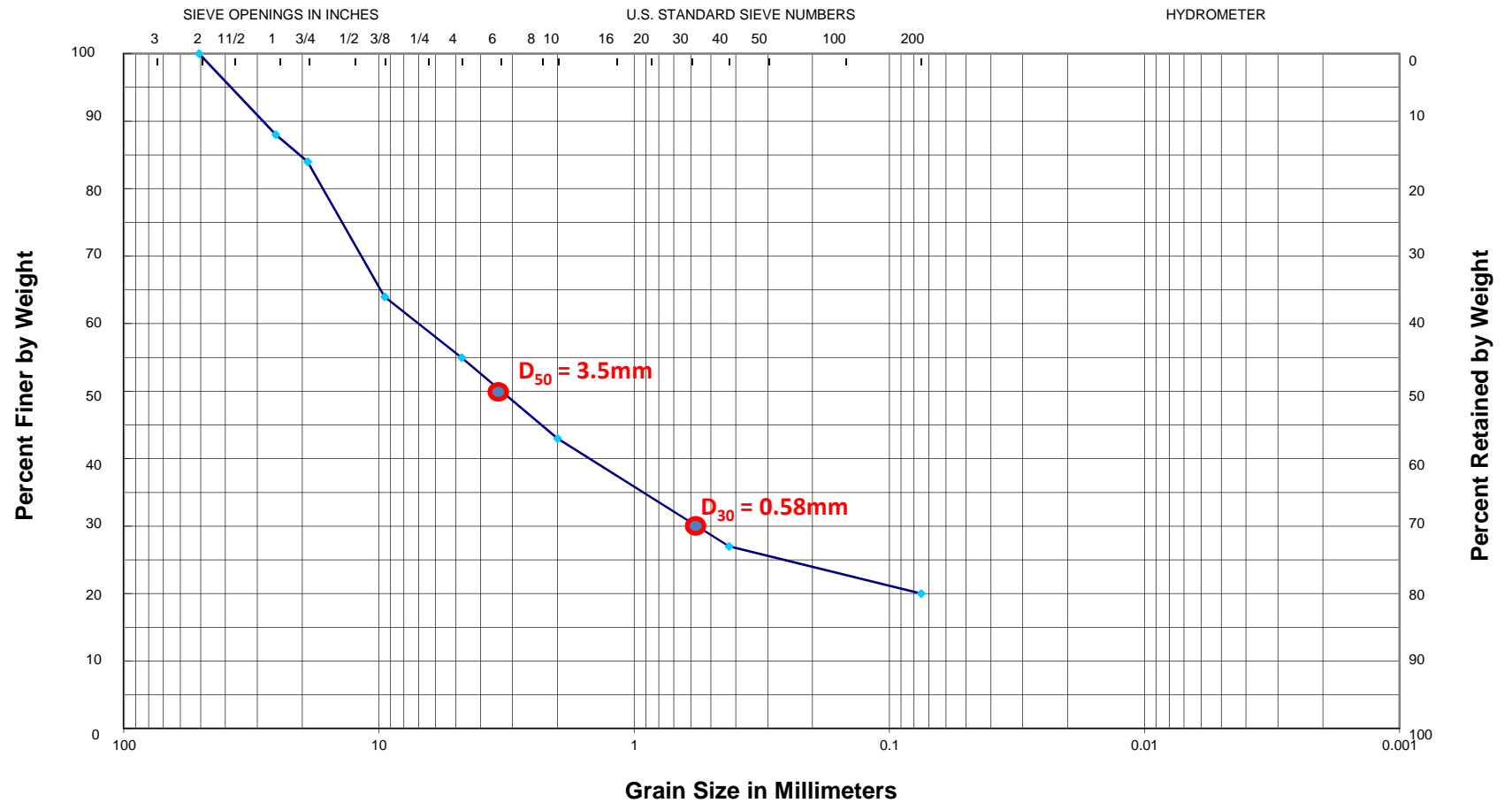
Sample: S-10, 29-30 ft; Non Plastic;

Description: Reddish brown silty fine to medium sand w/ some fine to coarse gravel

**USCS = SM      AASHTO = A-1-a**

15-019

# GRAIN SIZE CURVE

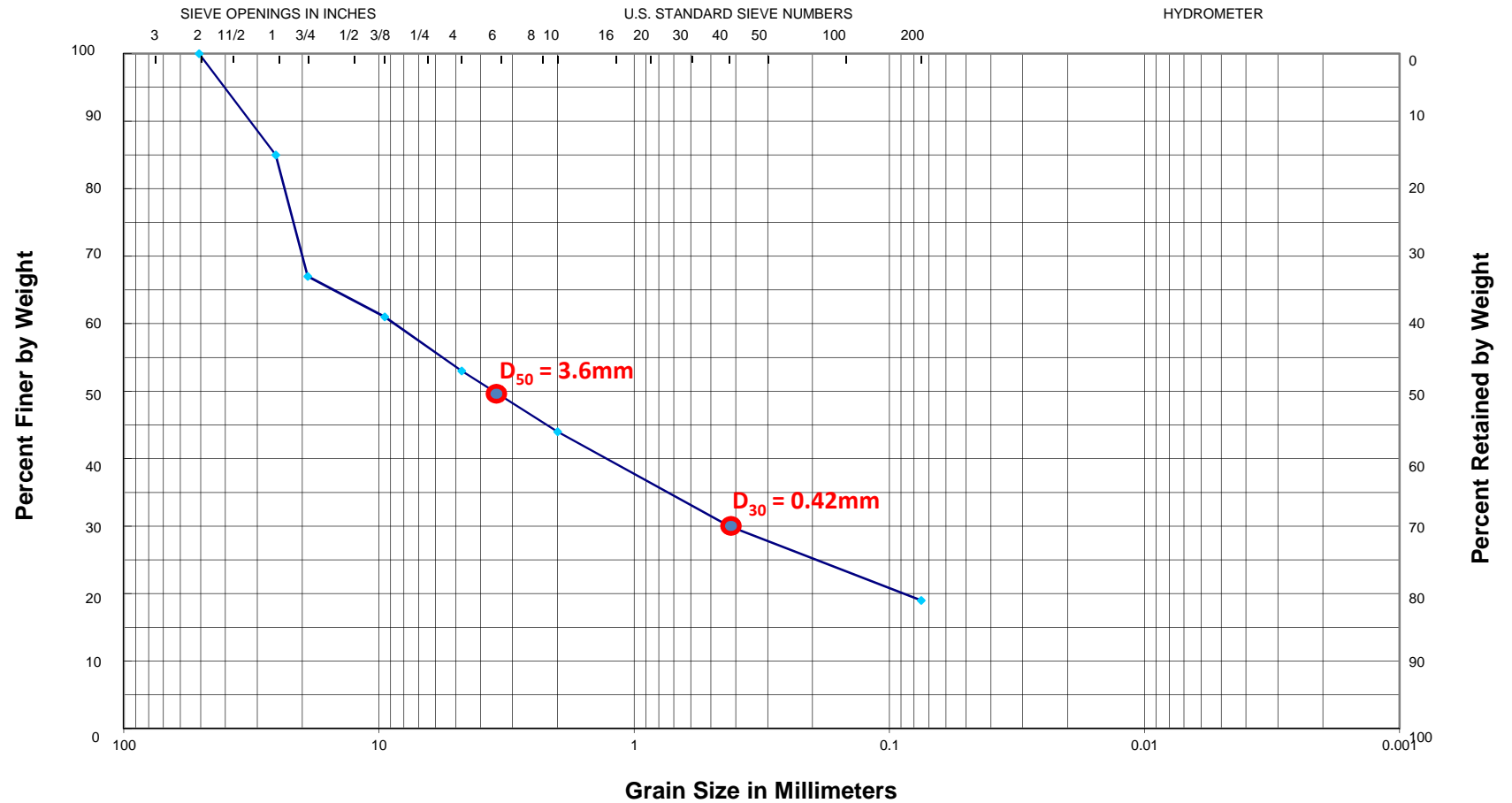


GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-10, 34-35 ft;  
Description: Reddish brown sandy fine to coarse gravel, slightly clayey  
**USCS = GC    AASHTO = A-2-4**

15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

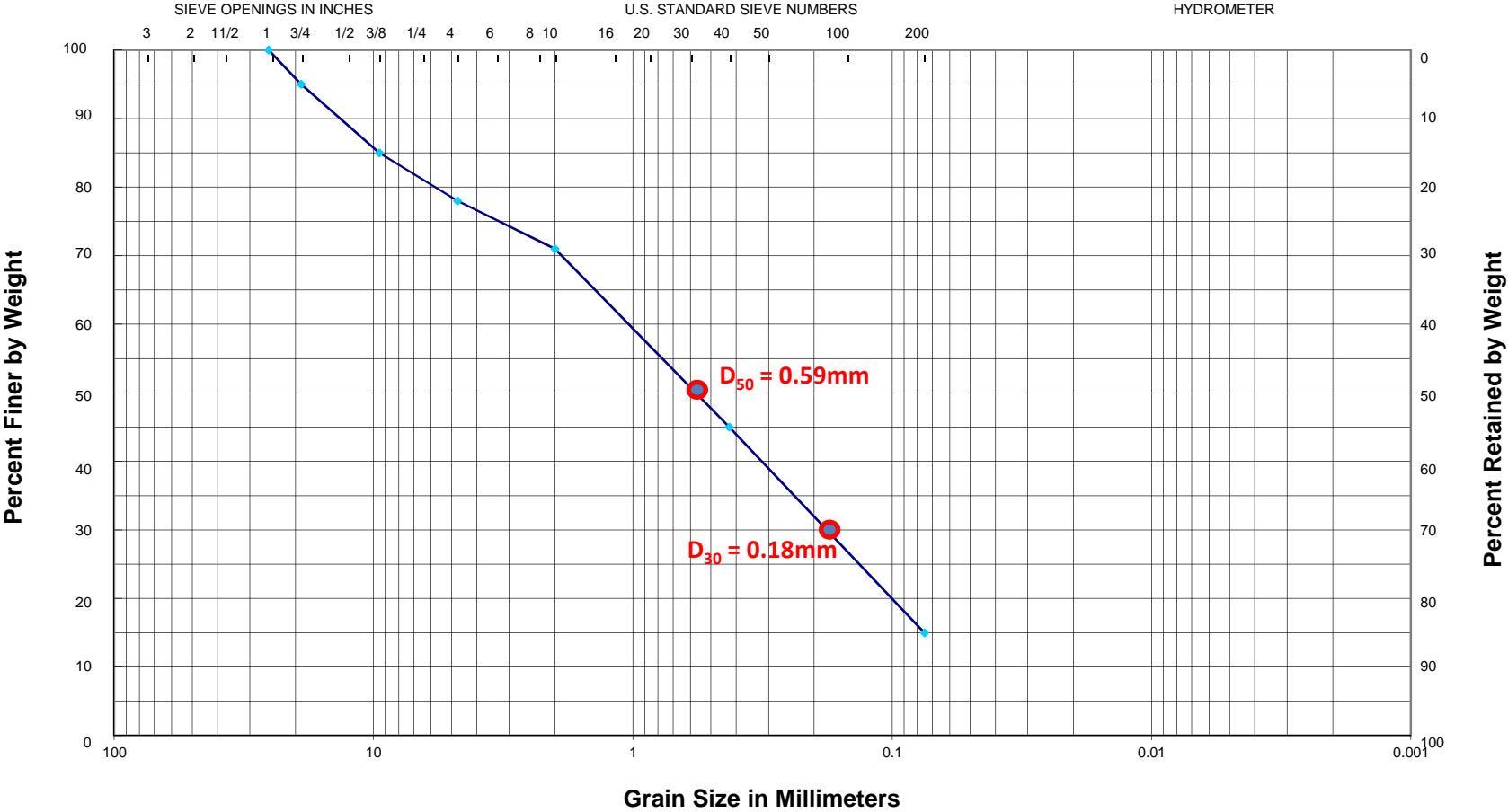
Sample: S-12, 14-15 ft; LL = 21; PL = 18; PI = 3

Description: Gray and tan silty fine to coarse sand, slightly clayey with some fine to coarse gravel

**USCS = GM      AASHTO = A-1-b**

15-019

# GRAIN SIZE CURVE



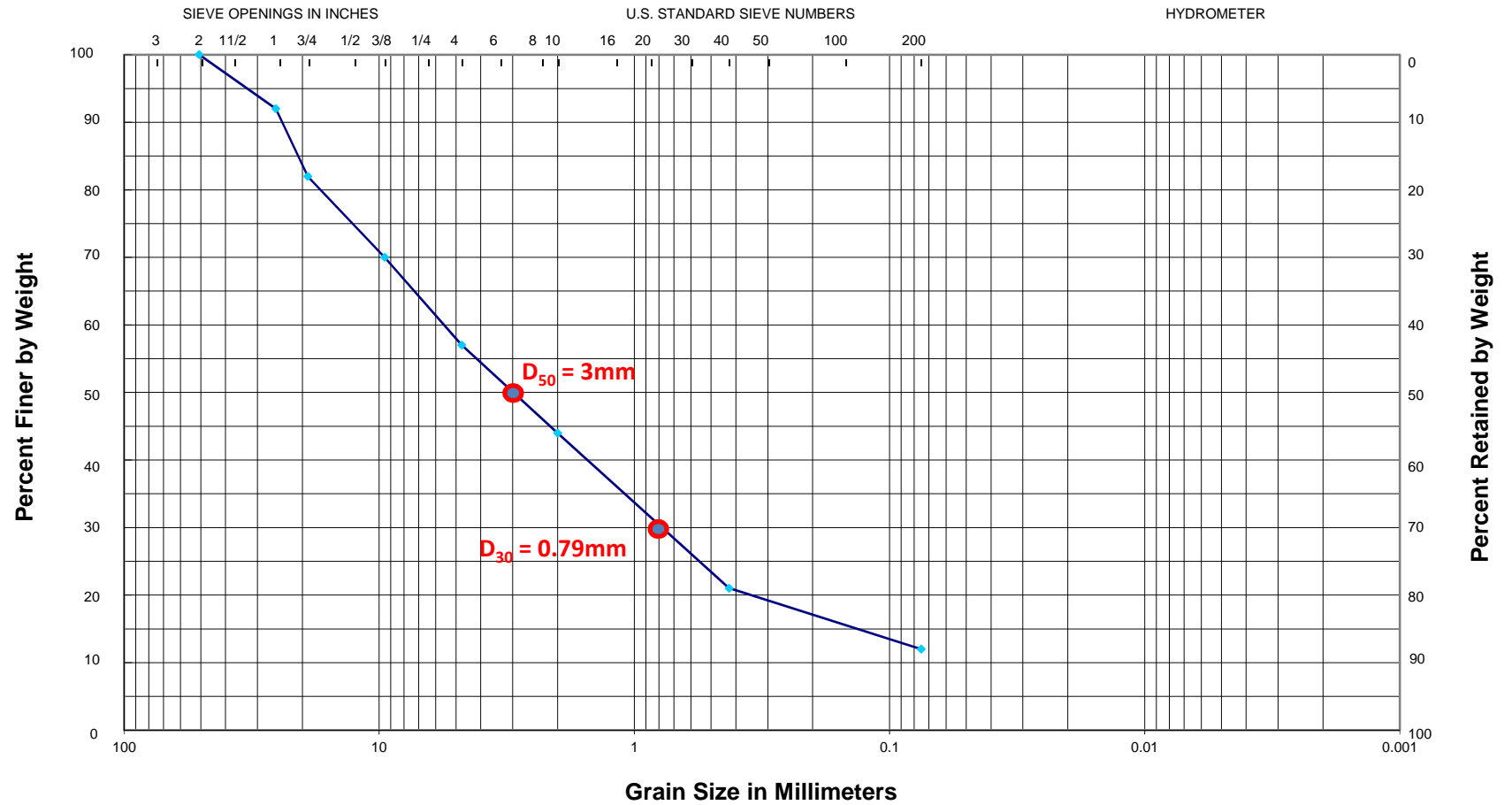
GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-14; 14-15 ft;  
Description: Dark gray fine to medium sand, slightly clayey w/ some fine to coarse gravel  
**USCS = GC    AASHTO = A-2-4**



15-019

# GRAIN SIZE CURVE



GRAVEL		SAND			SILT	OR	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			

Sample: S-18; 34-35 ft;  
 Description: Brown sandy fine to coarse gravel, slightly silty  
**USCS = GM    AASHTO = A-1-a**

# SUMMARY of POINT LOAD STRENGTH INDEX TEST RESULTS

PROJECT: CA0601: I-30 over Saline River

LOCATION: Saline County, Arkansas

JOB No.: 15-019

Boring No.	Test Type		Sample Depth, d, ft	Sample Diameter, D, in	Sample Length, L, in	Gauge Reading, p, psi	Equivalent Diameter, D <sub>e</sub> , in.	Uncorrected Point Load Strength Index, I <sub>s</sub> , psi	Correction Factor for I <sub>s</sub> , F	Size Corrected Point Load Strength Index, I <sub>s(50)</sub> , psi	Estimated Uniaxial Compressive Strength, σ <sub>c</sub> , psi	Rock Type	Maximum σ <sub>c</sub> , psi	Minimum σ <sub>c</sub> , psi	Average σ <sub>c</sub> , psi
	Method	Anisotropy													
S23	Axial	⊥*	55.1	1.868	2.253	450	2.31	147.80	1.08	158.98	3500	Shale	6400	1600	3760
S23	Axial	⊥	55.5	1.837	2.236	200	2.29	67.31	1.07	72.00	1600	Shale			
S23	Axial	⊥	55.8	1.867	1.824	400	2.08	162.37	1.03	166.52	3800	Shale			
S23	Axial	⊥	58.1	1.861	1.692	520	2.00	228.28	1.01	230.03	5400	Shale			
S23	Axial	⊥	56.7	1.858	2.430	400	2.40	122.46	1.09	133.83	2900	Shale			
S23	Axial	⊥	57.2	1.883	2.031	740	2.21	267.47	1.05	281.57	6400	Shale			
S23	Axial	⊥	57.4	1.882	1.497	350	1.89	171.72	0.98	168.77	4100	Shale			
S23	Axial	⊥	57.7	1.864	1.912	260	2.13	100.84	1.04	104.49	2400	Shale			
S28	Axial	⊥	20.1	1.866	1.612	650	1.96	298.70	1.00	297.92	7100	Siltstone	7100	1500	3770
S28	Axial	⊥	20.8	1.864	2.053	430	2.21	155.32	1.05	163.54	3700	Siltstone			
S28	Axial	⊥	21	1.851	1.143	420	1.64	274.41	0.92	252.85	6500	Siltstone			
S28	Axial	⊥	22.1	1.871	2.363	200	2.37	62.53	1.09	68.01	1500	Siltstone			
S28	Axial	⊥	24.1	1.844	1.537	180	1.90	87.79	0.98	86.39	2100	Siltstone			
S28	Axial	⊥	27.3	1.876	2.129	390	2.26	134.98	1.06	143.49	3200	Shale			
S28	Axial	⊥	27	1.871	1.745	230	2.04	97.38	1.02	98.93	2300	Shale			
S22	Axial	⊥	56.9	1.904	1.835	400	2.11	158.26	1.03	163.25	3700	Shale	9300	3000	4700
S22	Axial	⊥	56.7	1.829	1.716	390	2.00	171.77	1.01	172.96	4100	Shale			
S22	Axial	⊥	57.5	1.860	1.413	740	1.83	389.21	0.97	376.57	9300	Shale			
S22	Axial	⊥	58.2	1.906	1.987	380	2.20	138.70	1.05	145.69	3300	Shale			
S22	Axial	⊥	58.5	1.862	2.607	450	2.49	128.14	1.11	142.34	3000	Shale			
S22	Axial	⊥	58.7	1.843	2.225	750	2.28	252.82	1.07	270.36	6000	Shale			
S22	Axial	⊥	58.9	1.855	1.584	310	1.93	145.84	0.99	144.69	3500	Shale			
S31	Axial	⊥	50.7	1.905	1.317	750	1.79	413.22	0.96	395.65	9900	Shale			

# SUMMARY of POINT LOAD STRENGTH INDEX TEST RESULTS

PROJECT: CA0601: I-30 over Saline River

LOCATION: Saline County, Arkansas

JOB No.: 15-019

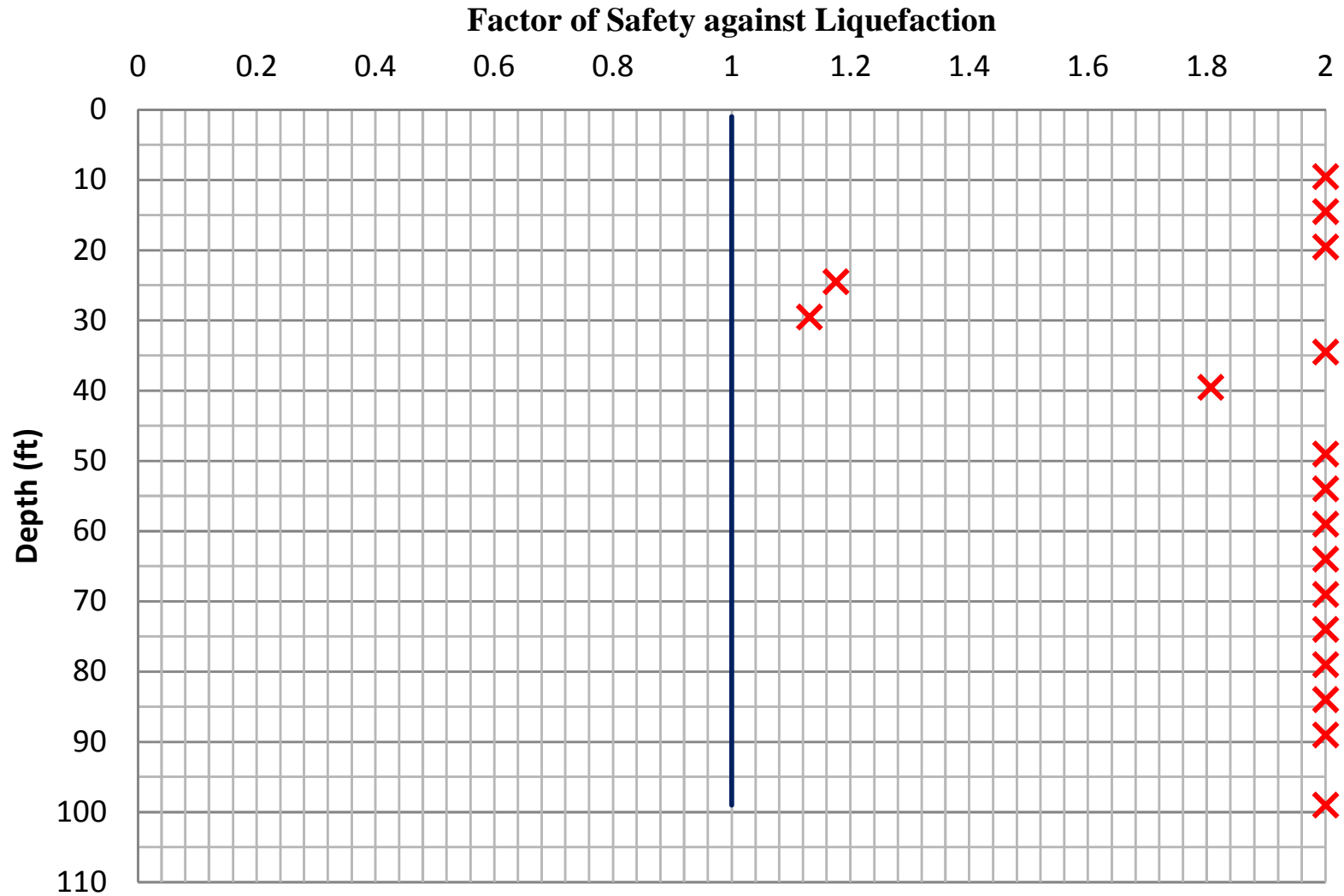
Boring No.	Test Type		Sample Depth, d, ft	Sample Diameter, D, in	Sample Length, L, in	Gauge Reading, p, psi	Equivalent Diameter, D <sub>e</sub> , in.	Uncorrected Point Load Strength Index, I <sub>s</sub> , psi	Correction Factor for I <sub>s</sub> , F	Size Corrected Point Load Strength Index, I <sub>s(50)</sub> , psi	Estimated Uniaxial Compressive Strength, σ <sub>c</sub> , psi	Rock Type	Maximum σ <sub>c</sub> , psi	Minimum σ <sub>c</sub> , psi	Average σ <sub>c</sub> , psi
	Method	Anisotropy													
S26A	Axial	⊥	26.2	1.858	1.338	150	1.78	83.40	0.96	79.69	2000	Shale	7400	1800	4173
S26A	Axial	⊥	26.6	1.882	1.662	170	2.00	75.13	1.01	75.59	1800	Shale			
S26A	Axial	⊥	26.8	1.853	1.959	290	2.15	110.43	1.04	114.90	2600	Shale			
S26A	Axial	⊥	27.2	1.888	1.548	300	1.93	141.89	0.99	140.60	3400	Shale			
S26A	Axial	⊥	28	1.883	1.493	270	1.89	132.76	0.98	130.41	3100	Shale			
S26A	Axial	⊥	29.8	1.851	1.459	500	1.85	255.92	0.97	249.13	6100	Shale			
S26A	Axial	⊥	30	1.905	1.256	240	1.75	138.65	0.95	131.35	3300	Shale			
S26A	Axial	⊥	31.5	1.859	1.676	630	1.99	279.51	1.01	280.98	6700	Shale			
S26A	Axial	⊥	32.1	1.845	1.957	600	2.14	229.70	1.04	238.71	5500	Shale			
S26A	Axial	⊥	32.6	1.857	1.073	450	1.59	312.18	0.91	283.80	7400	Shale			
S26A	Axial	⊥	33.2	1.861	1.635	370	1.97	168.09	1.00	168.08	4000	Shale			

Note 1) ⊥: Perpendicular to plane of weakness;

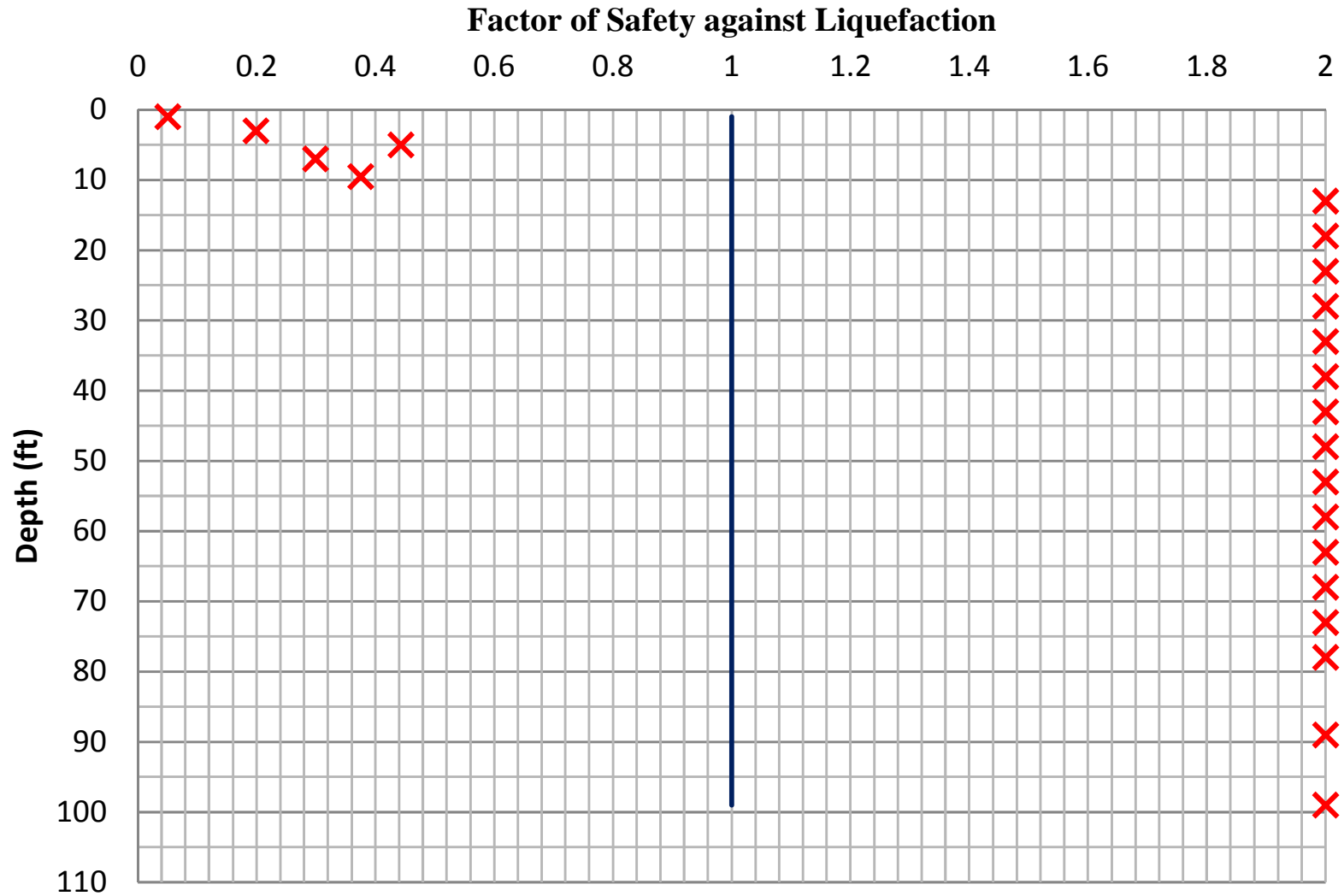
Note 2) Tests performed as per ASTM D5731

## **ATTACHMENT 9**

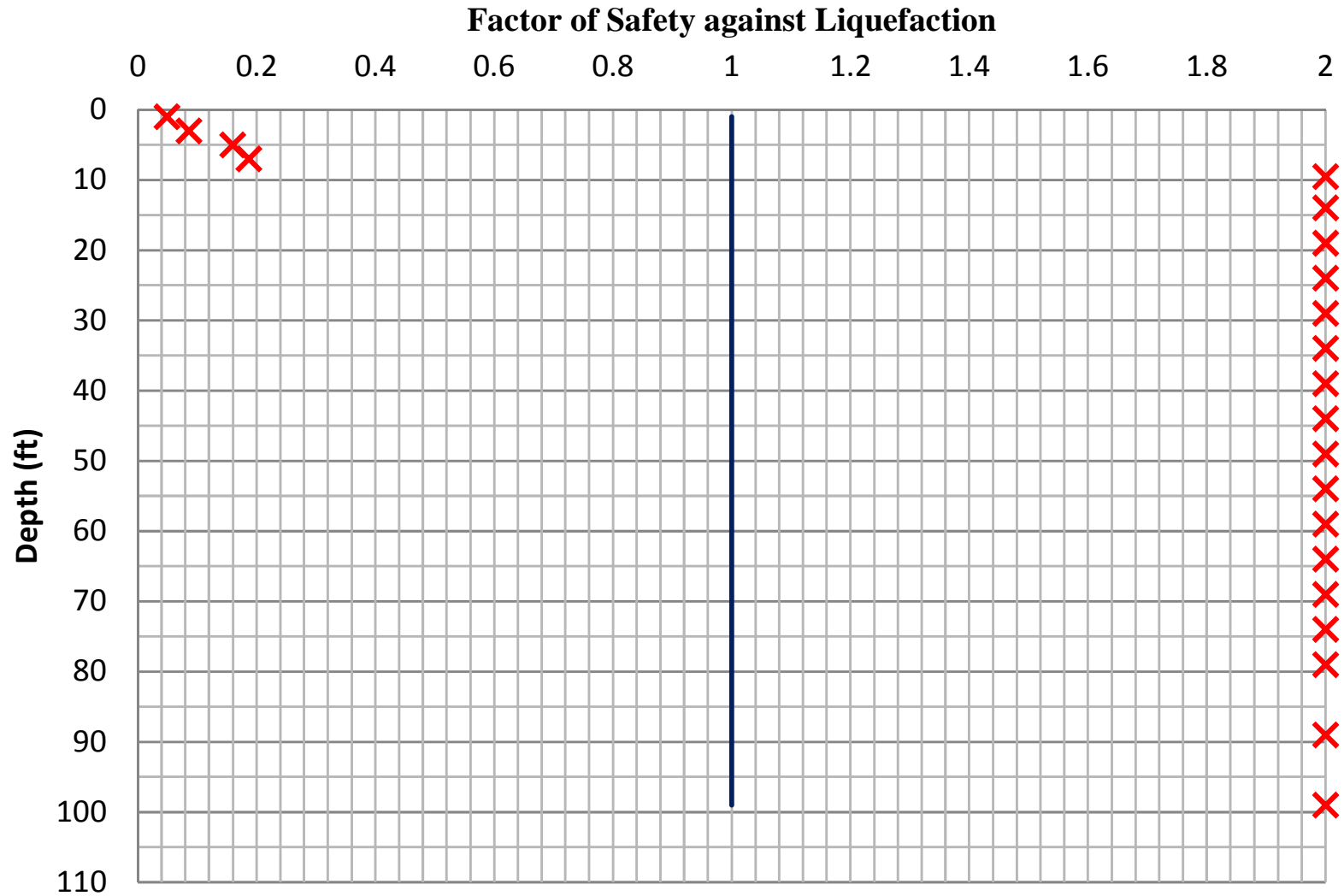
**Results of Liquefaction Analyses - I-30 over Saline River**  
**Station 433+85, 10 ft Left (Boring S19)**  
**AHTD Job No. CA0601: HWY 70 - Sevier St. (Widening)(S)**  
**Saline County, Arkansas**



**Results of Liquefaction Analyses - I-30 over Saline River**  
**Station 438+85, 62 ft Right (Boring S26)**  
**AHTD Job No. CA0601: HWY 70 - Sevier St. (Widening)(S)**  
**Saline County, Arkansas**



**Results of Liquefaction Analyses - I-30 over Saline River**  
**Station 441+65, 60 ft Right (Boring S30)**  
**AHTD Job No. CA0601: HWY 70 - Sevier St. (Widening)(S)**  
**Saline County, Arkansas**

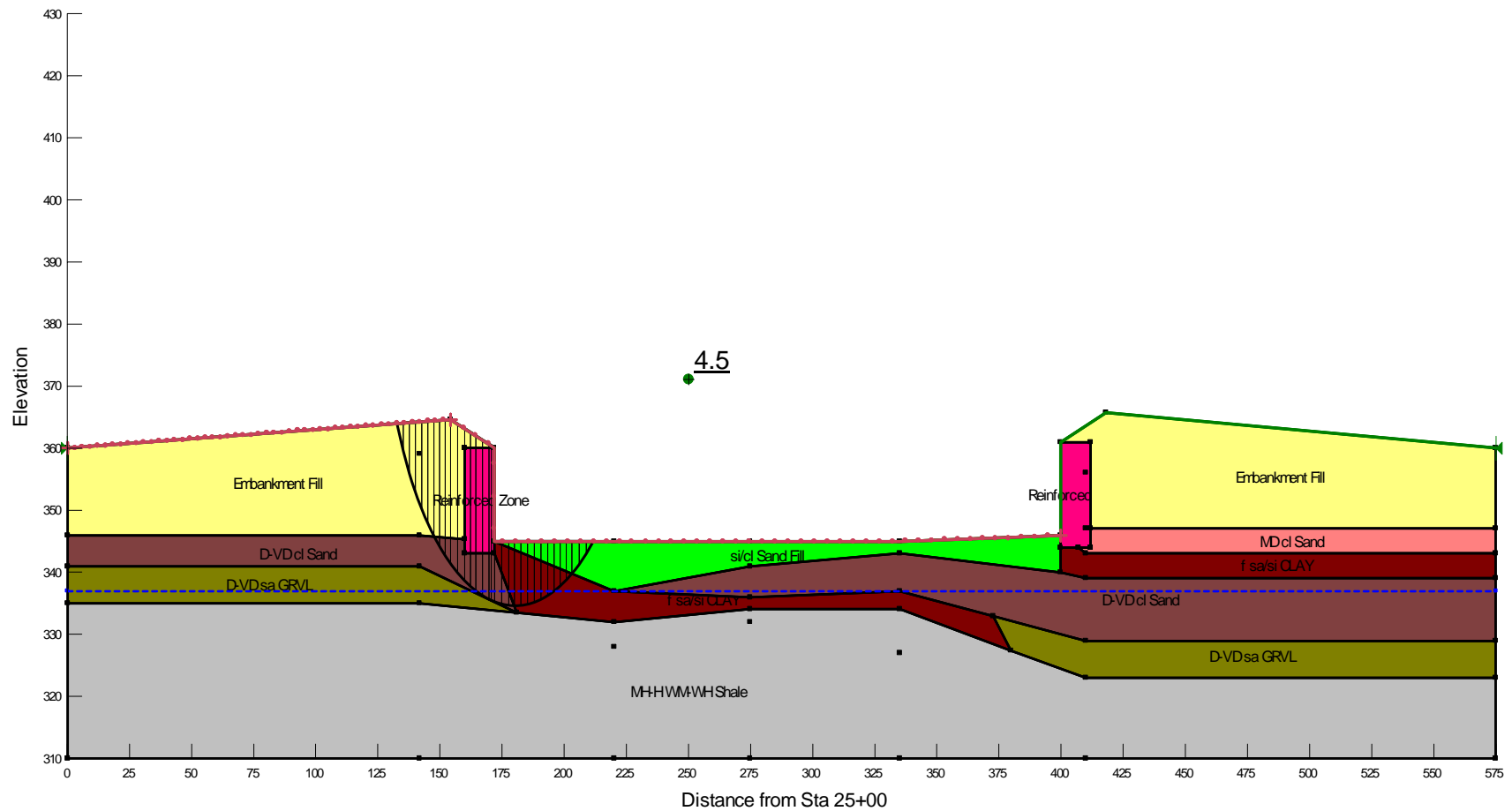


**ATTACHMENT 10**

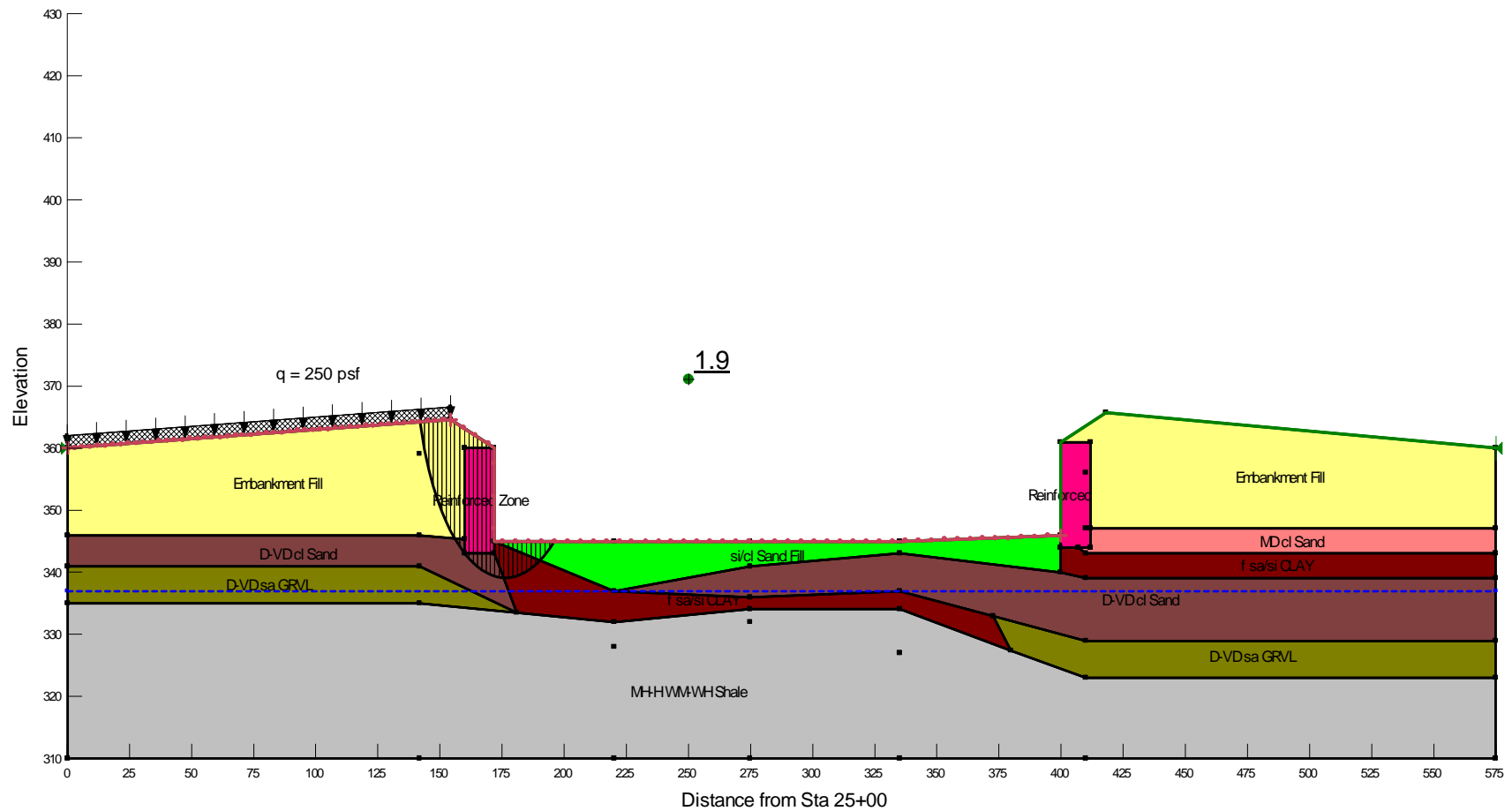


**Summary of Stability Analysis Results**  
**2H:1V End Slope with MSE Wall @ North Bridge Abutment**  
**South Street over I-30**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

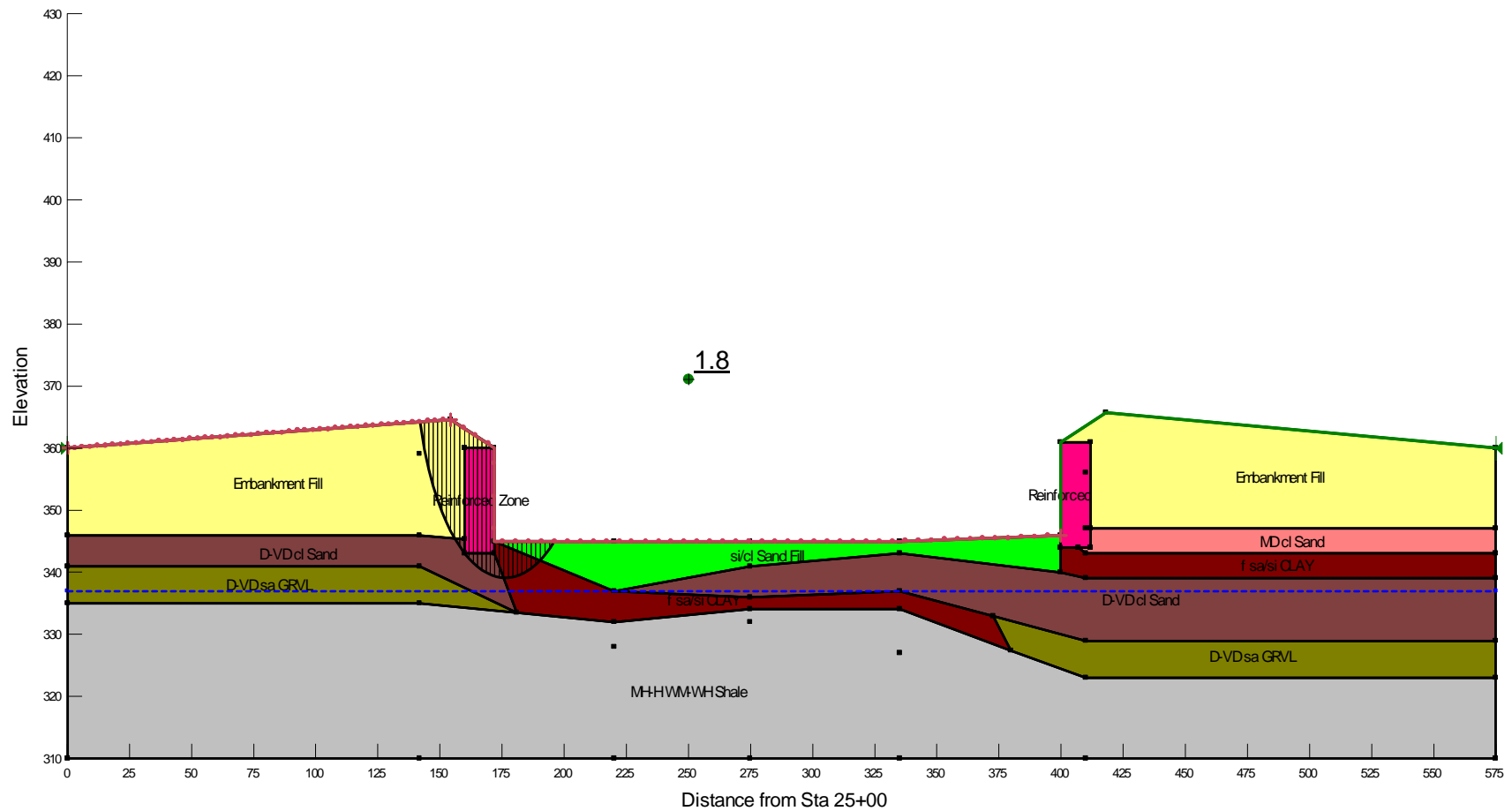
Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 1 (North Abutment)	End of Construction	4.5
	Long Term	1.9
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.8



Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope with MSE Wall @ North Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



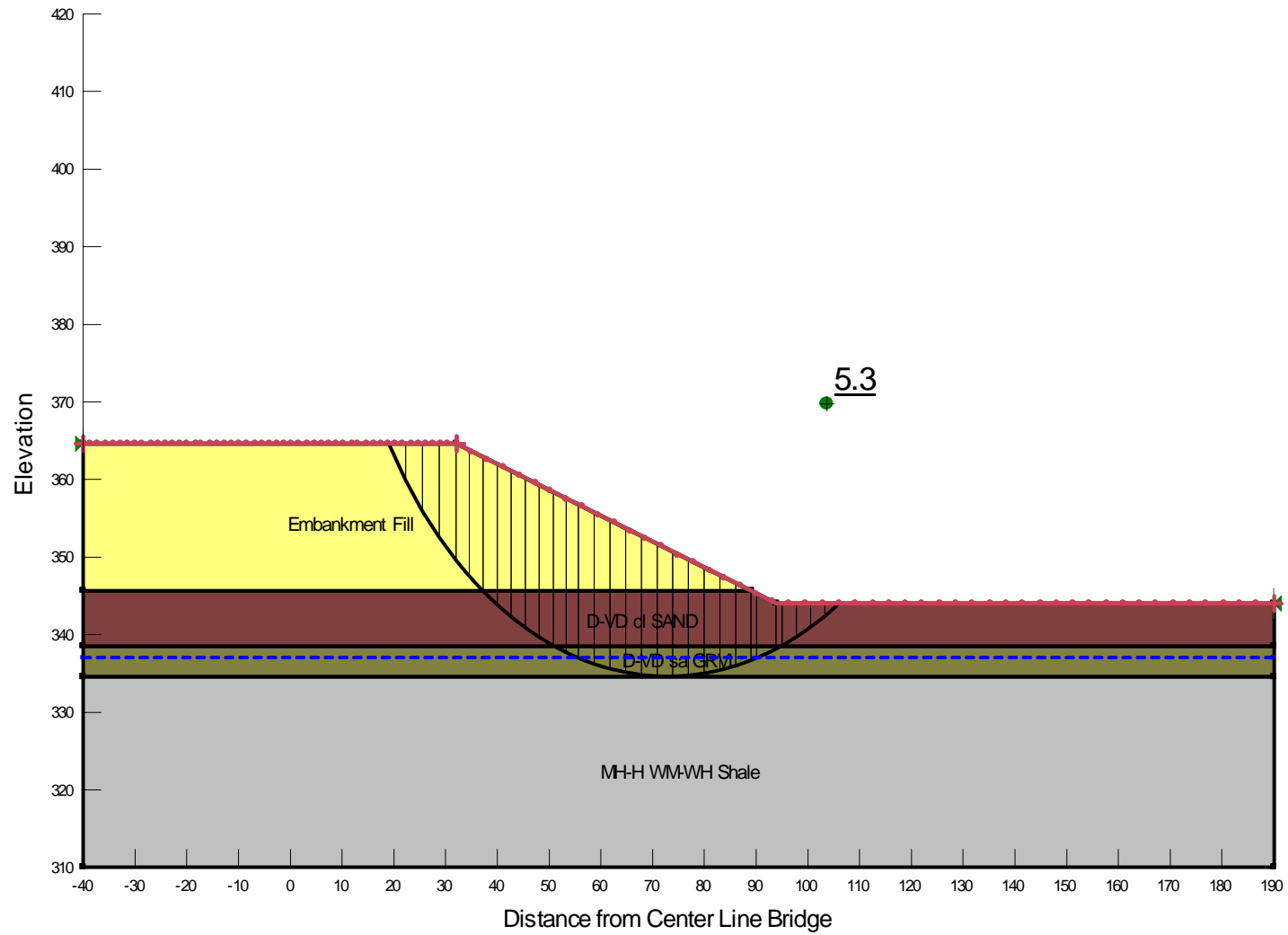
Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope with MSE Wall @ North Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



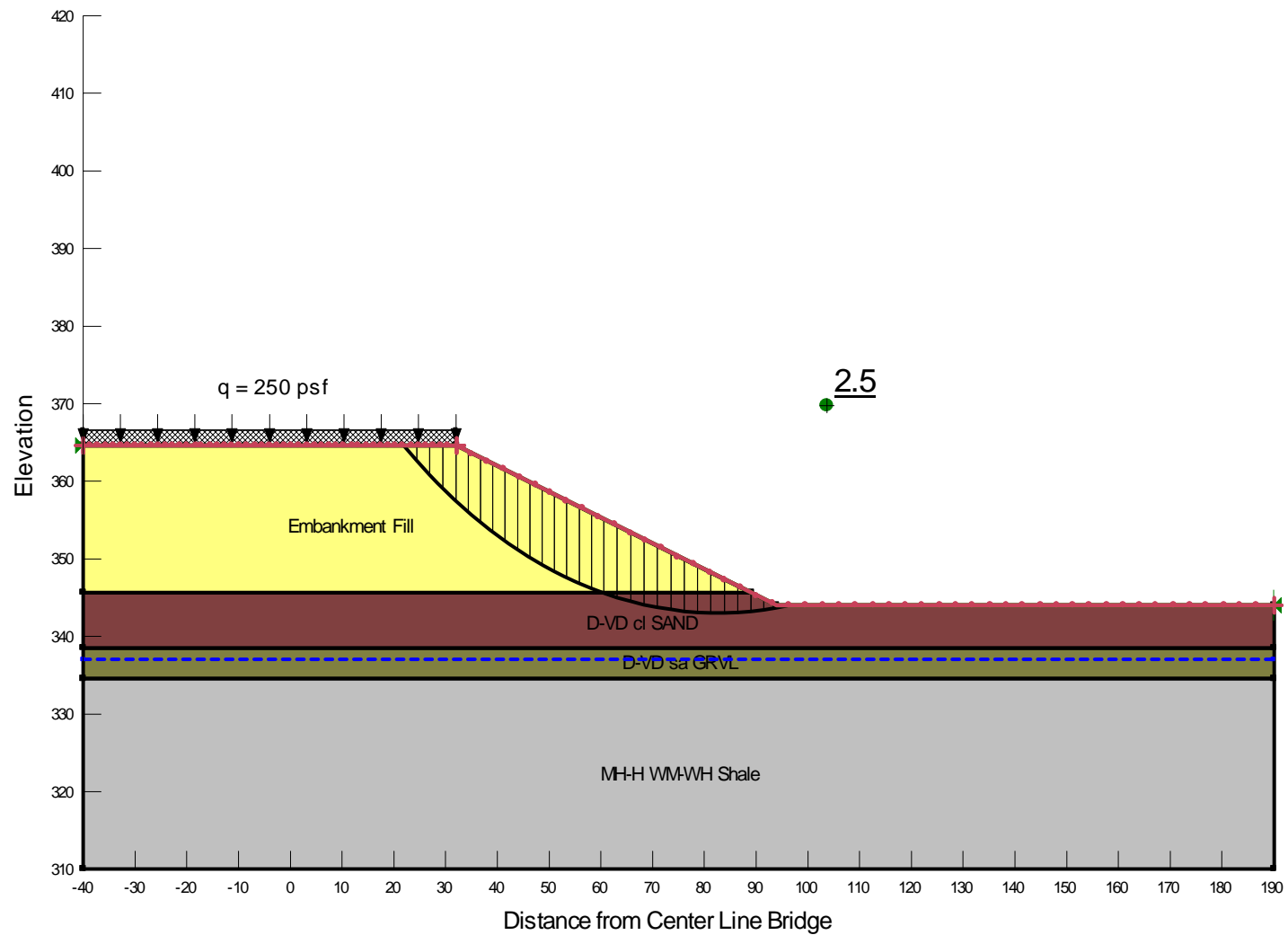
Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope with MSE Wall @ North Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ North Bridge Abutment**  
**South Street over I-30**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

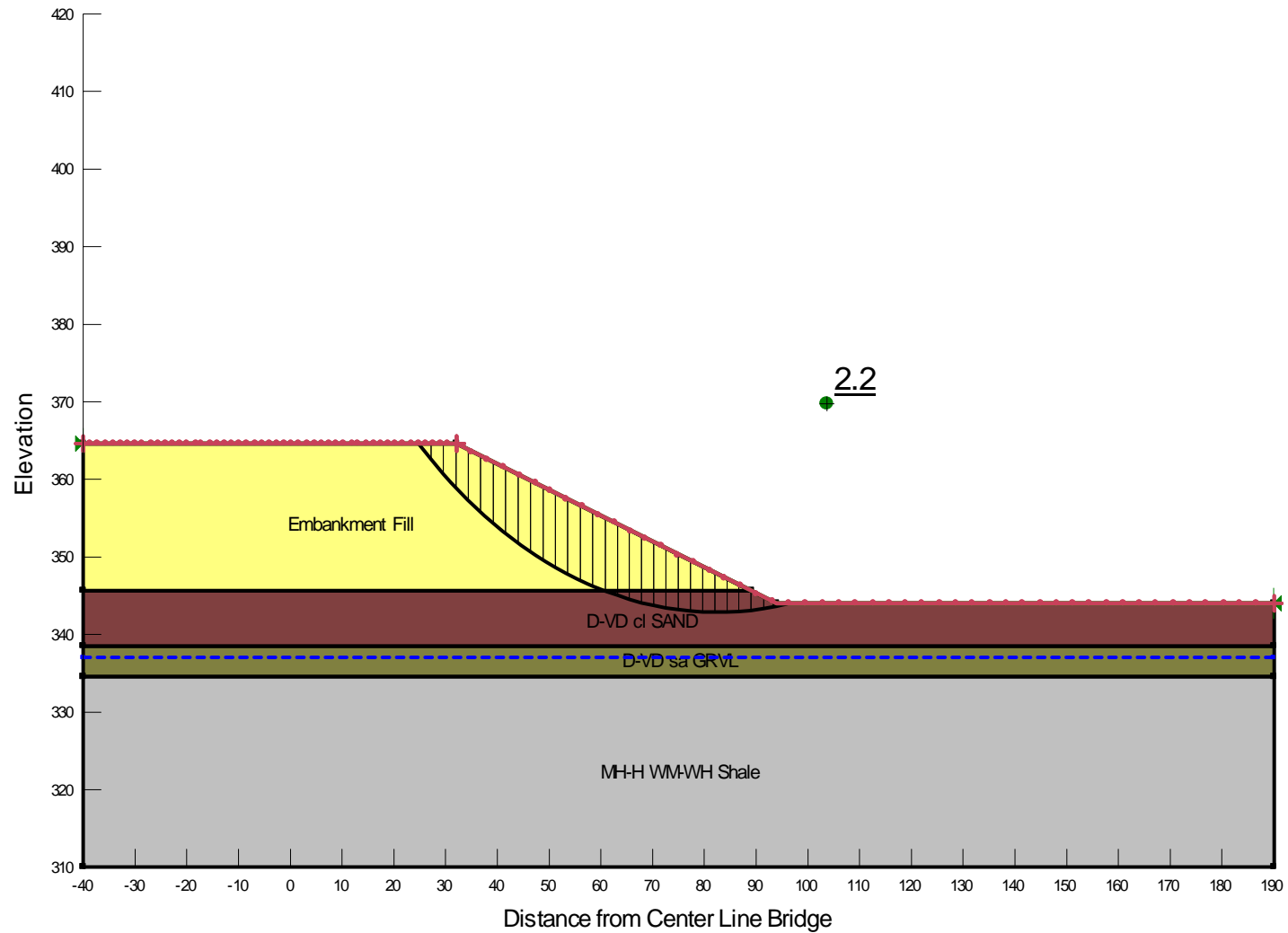
<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	5.3
	Long Term	2.5
	Seismic ( $k_h = 0.5A_s = 0.07$ )	2.2



Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ North Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ North Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

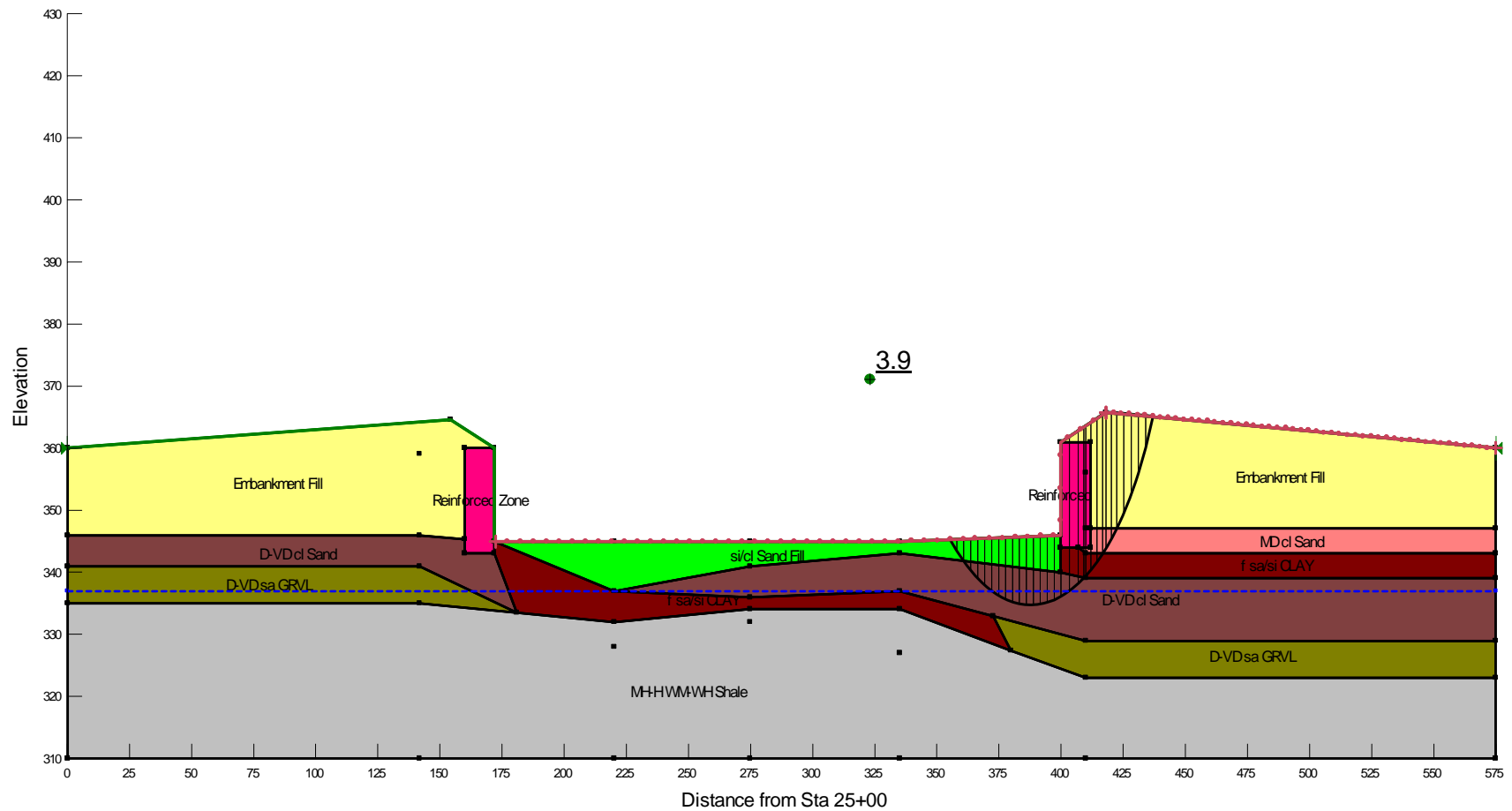


Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 3H:1V Side Slopes @ North Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

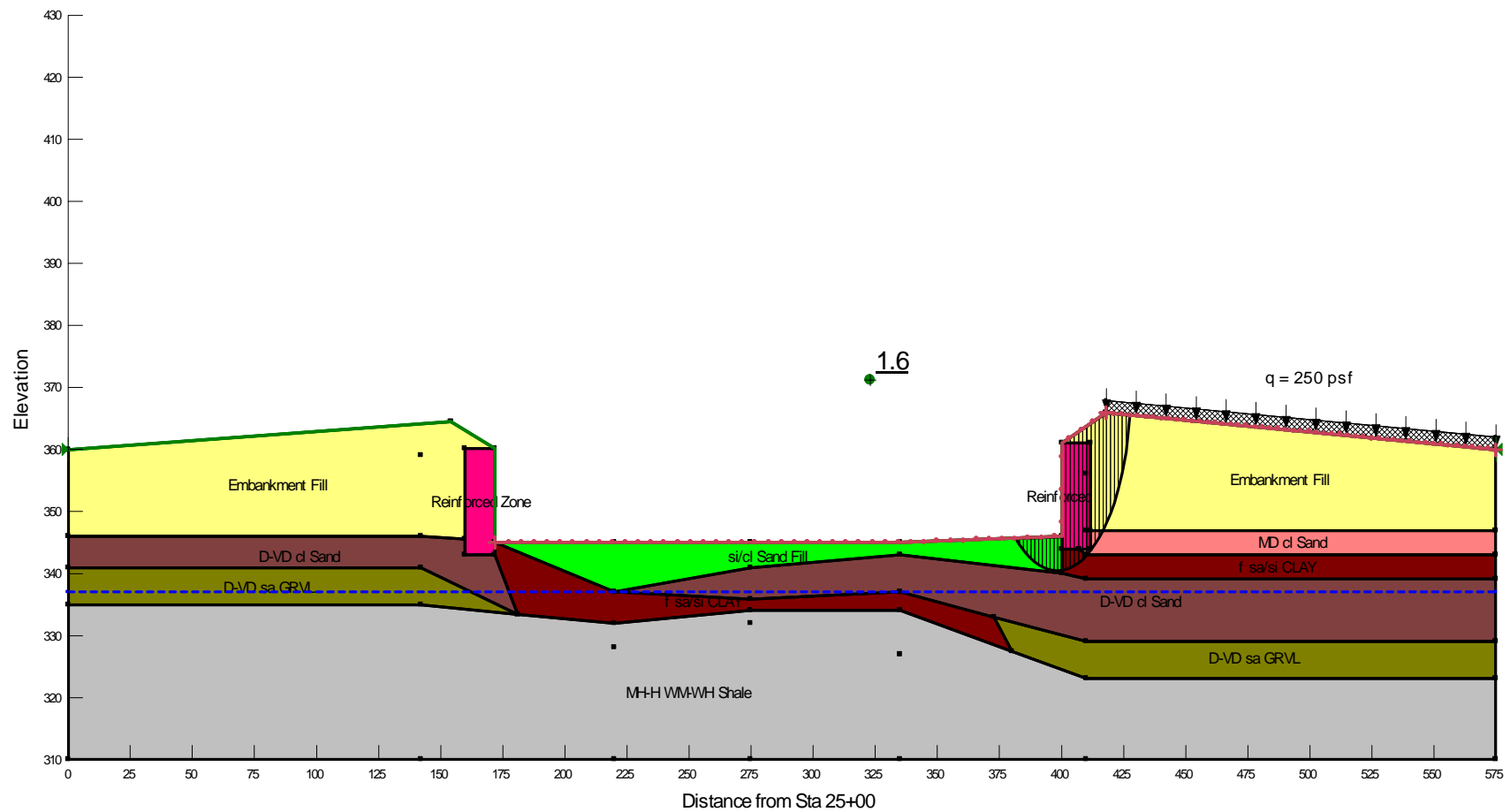


**Summary of Stability Analysis Results**  
**2H:1V End Slope with MSE Wall @ South Bridge Abutment**  
**South Street over I-30**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

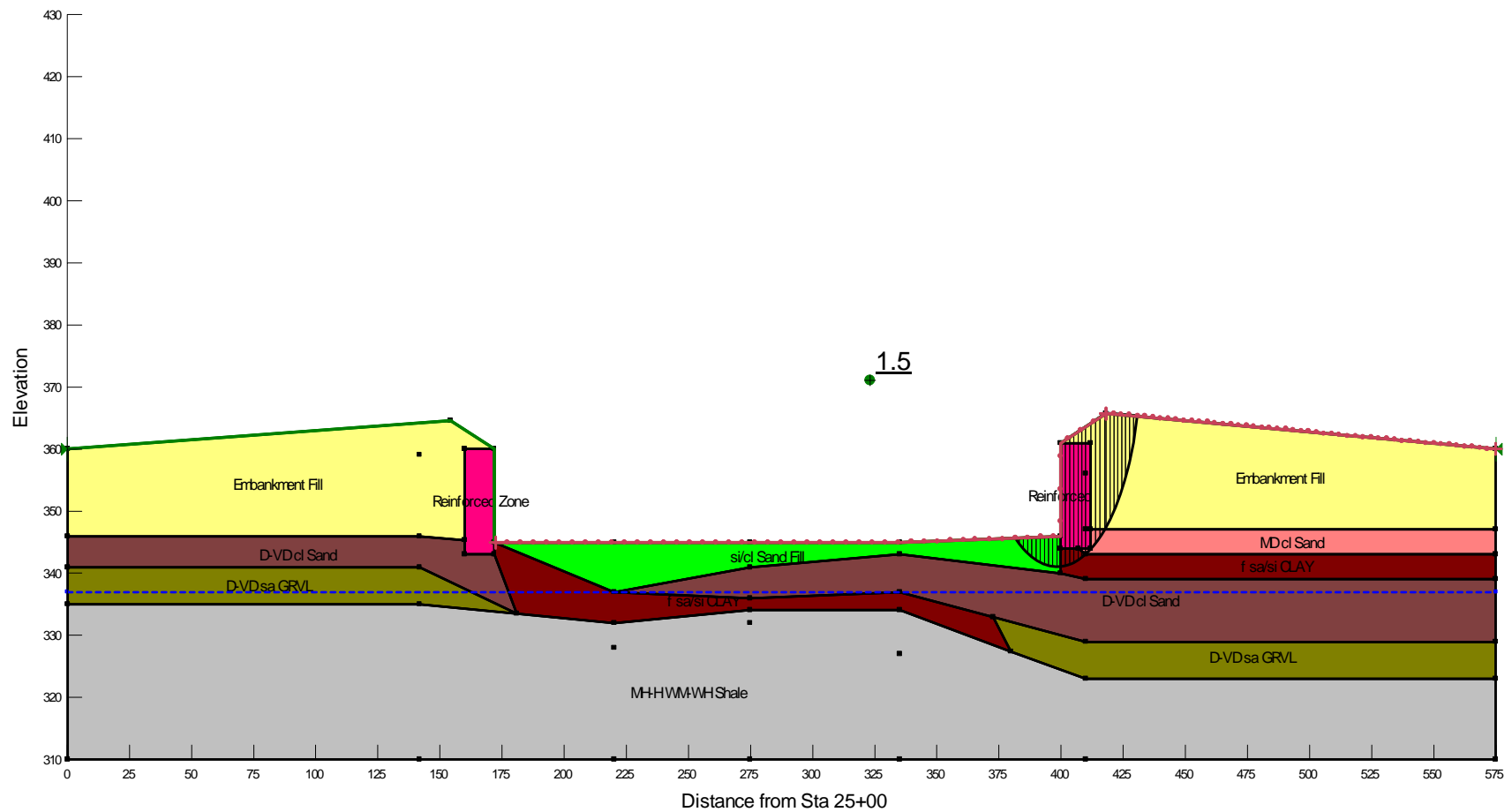
Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 5 (South Abutment)	End of Construction	3.9
	Long Term	1.6
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5



Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope with MSE Wall @ South Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



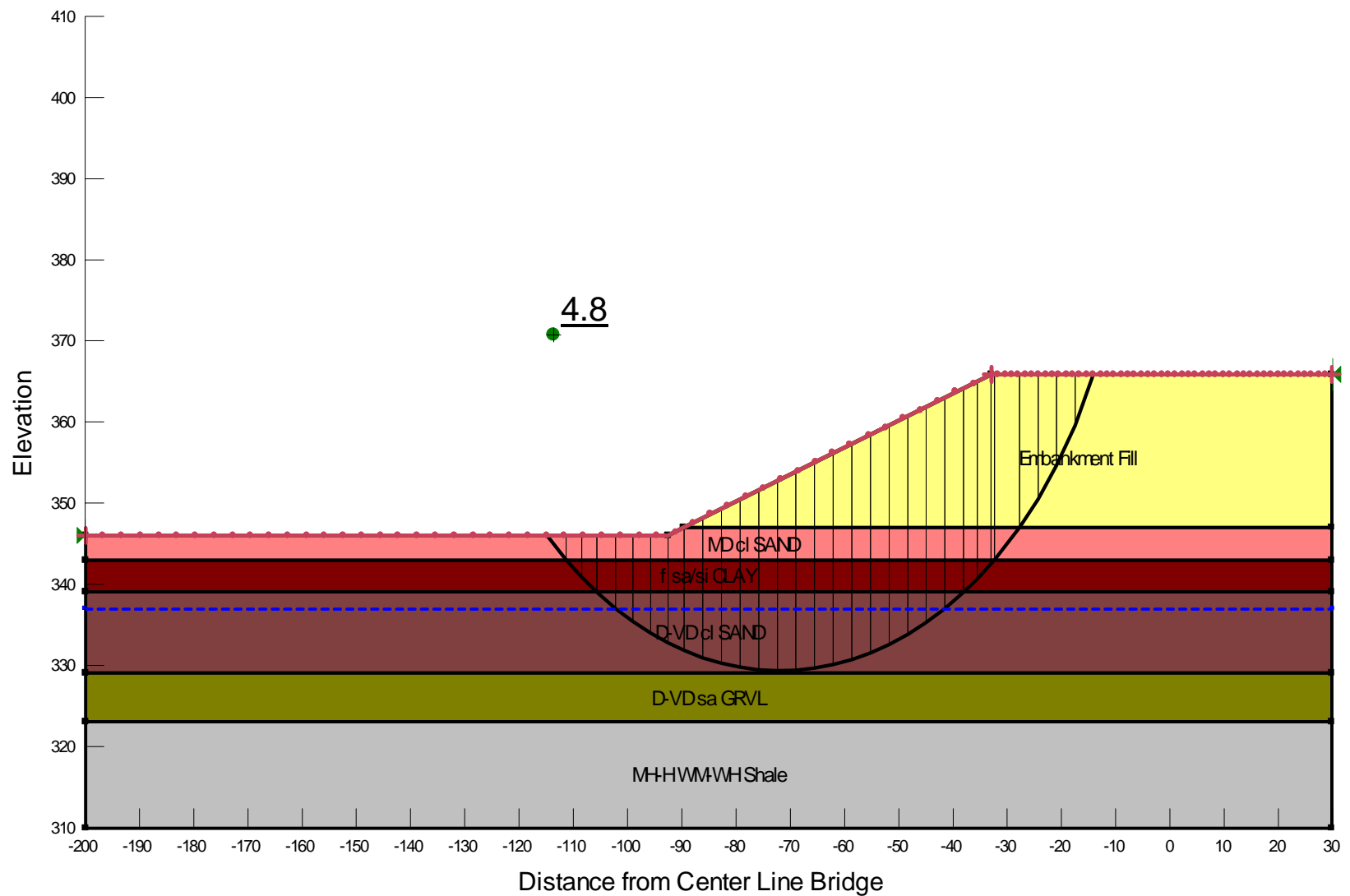
Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope with MSE Wall @ South Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope with MSE Wall @ South Abutment  
 Cross Section @ Center Line Bridge  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

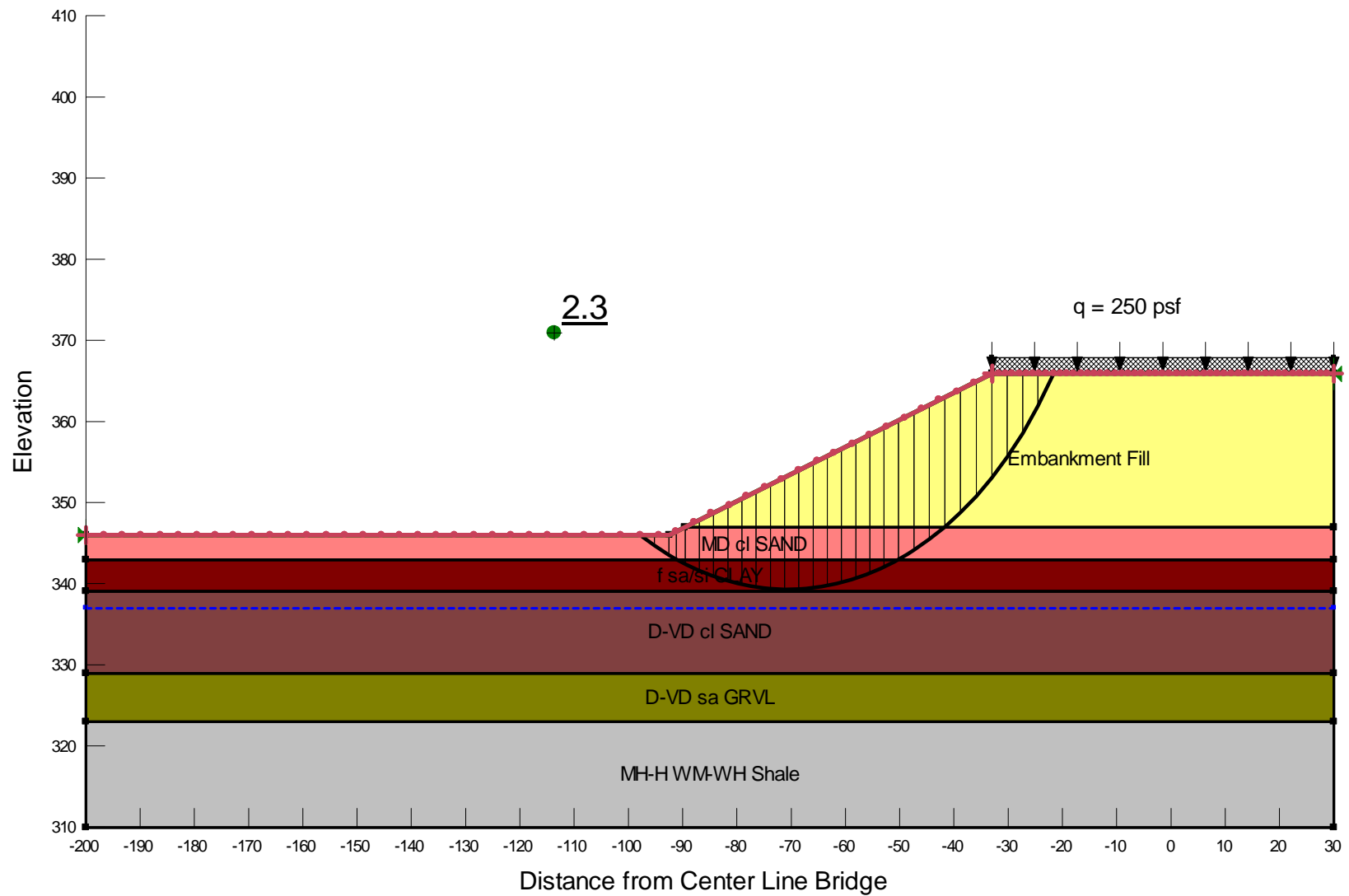
**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ South Bridge Abutment**  
**South Street over I-30**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	4.8
	Long Term	2.3
	Seismic ( $k_h = 0.5A_s = 0.07$ )	2.0

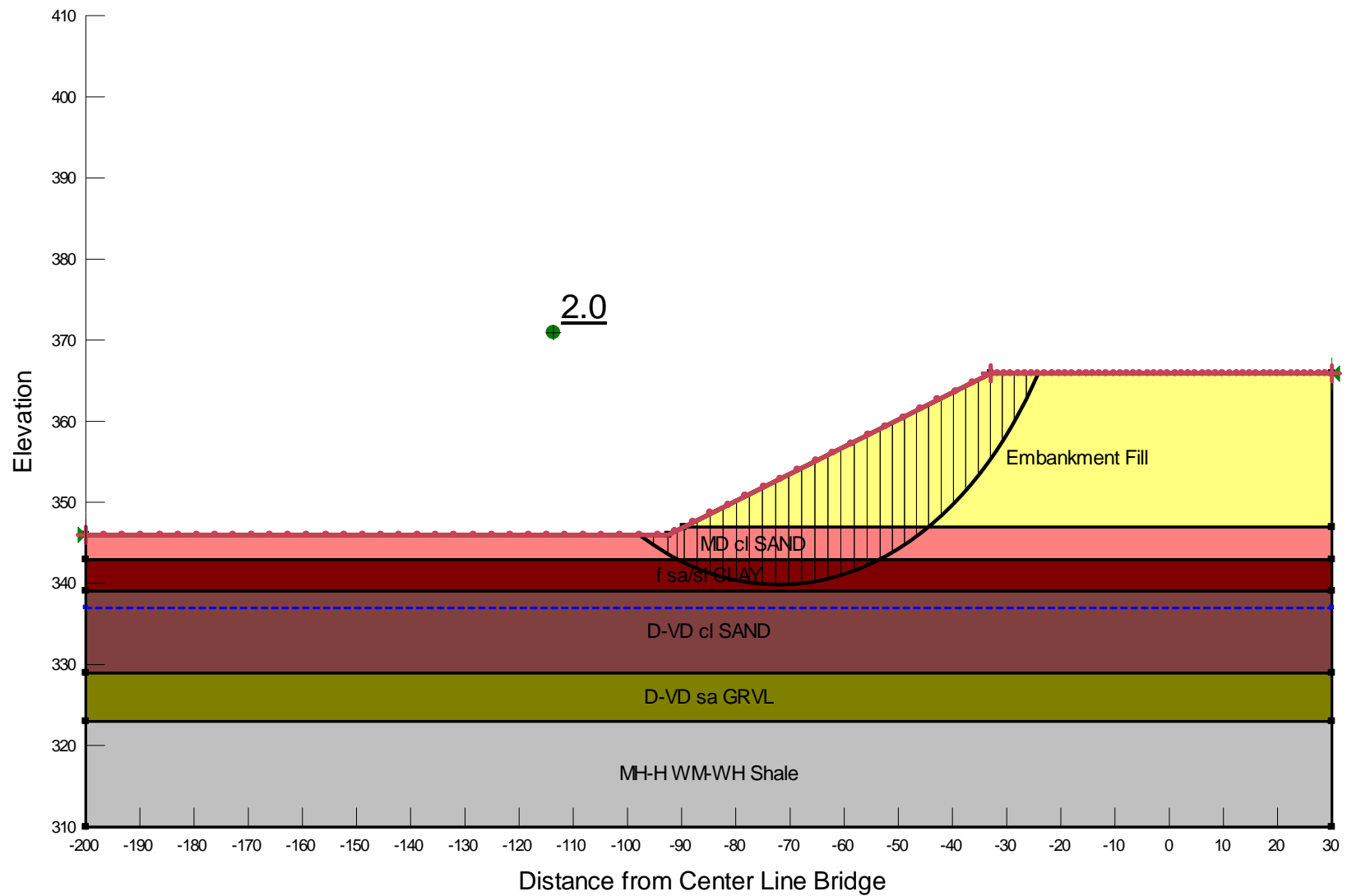


Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ South Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers



Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ South Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



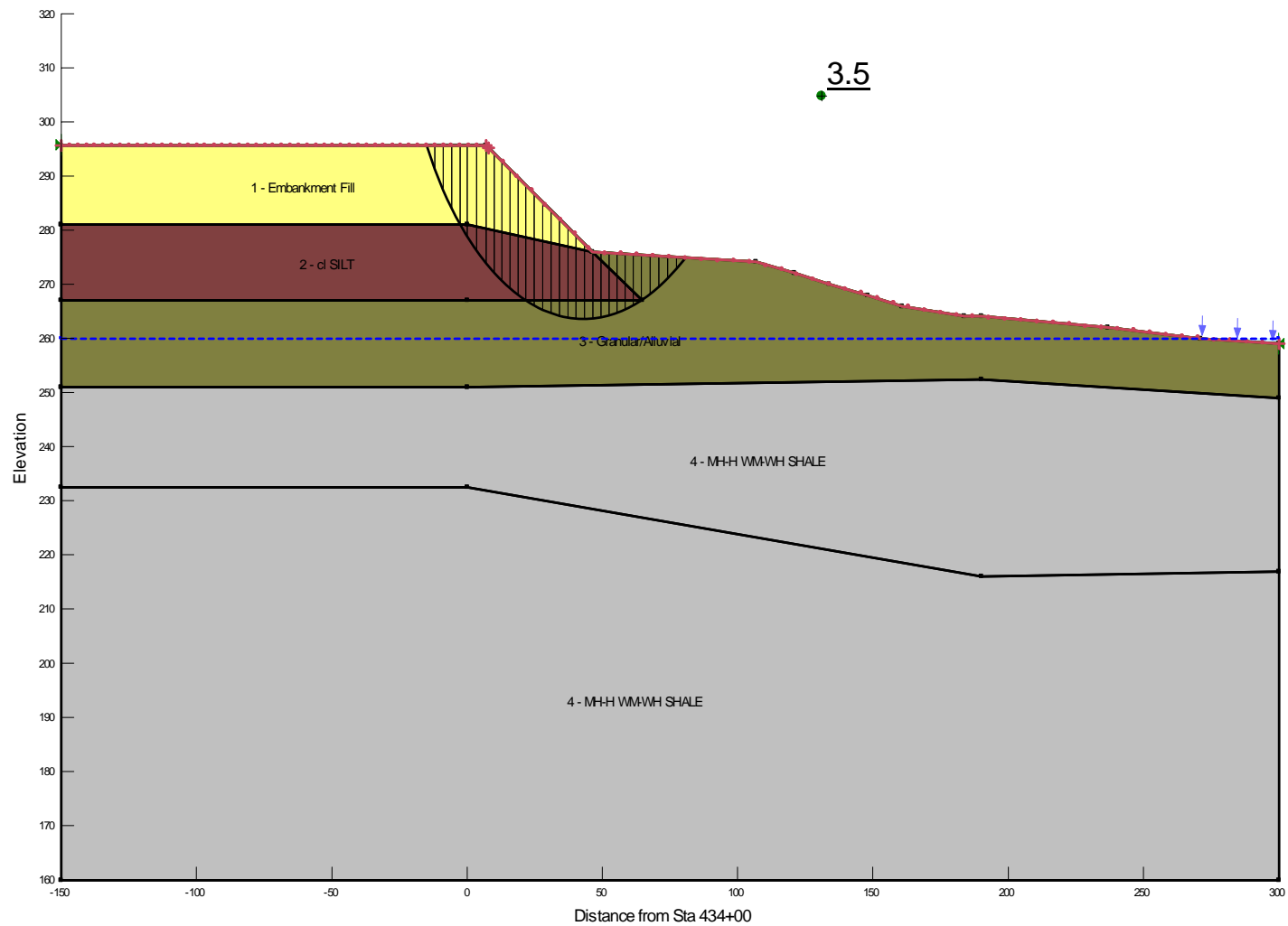
Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_S = 0.07$ )  
 3H:1V Side Slopes @ South Abutment  
 South Street over I-30  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



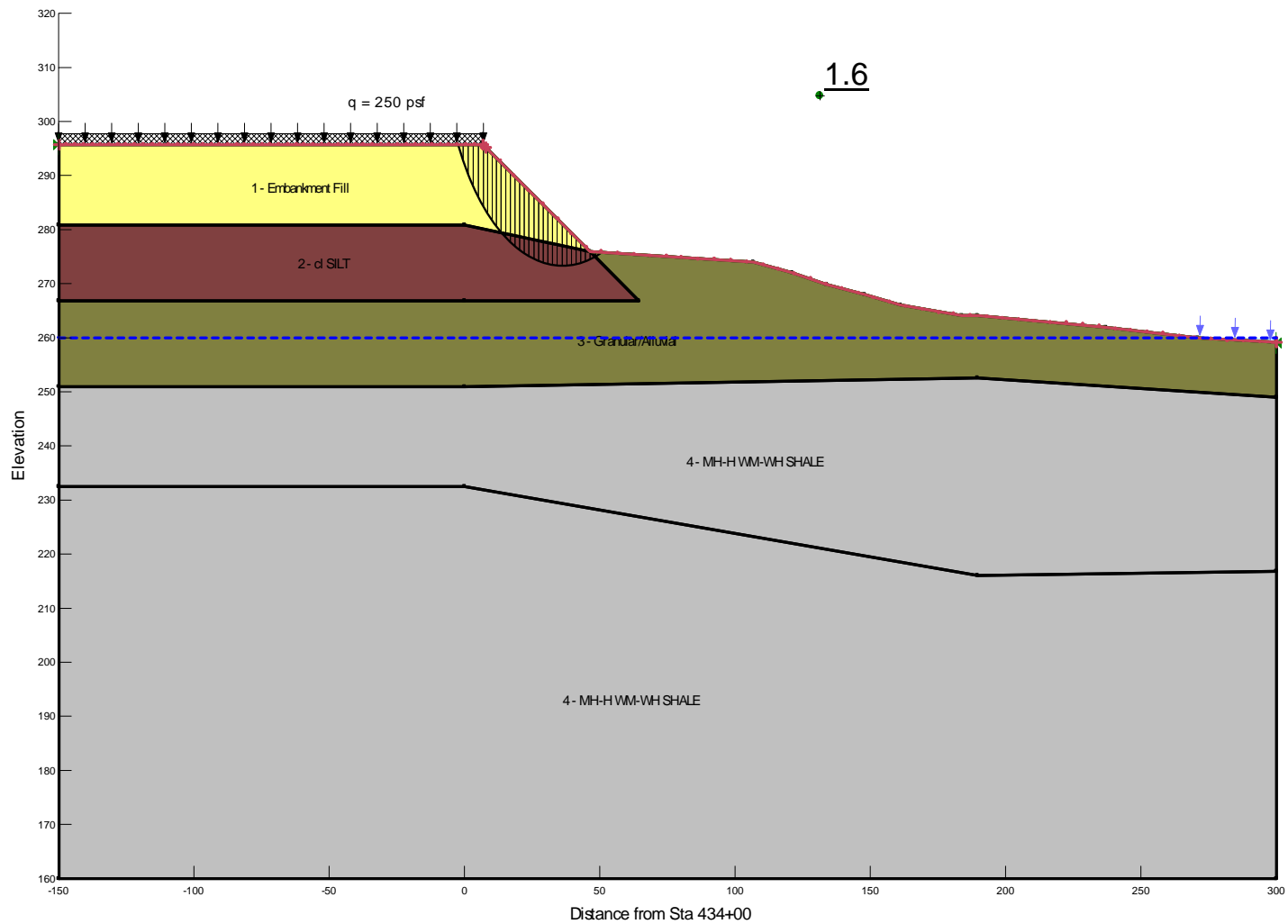
**ATTACHMENT 11**

**Summary of Stability Analysis Results**  
**2H:1V End Slope @ West Bridge Abutment**  
**I-30 over Saline River**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 1 (West Abutment)	End of Construction	3.5
	Long Term	1.6
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5
	Rapid Drawdown (Design high water to embankment toe)	1.6

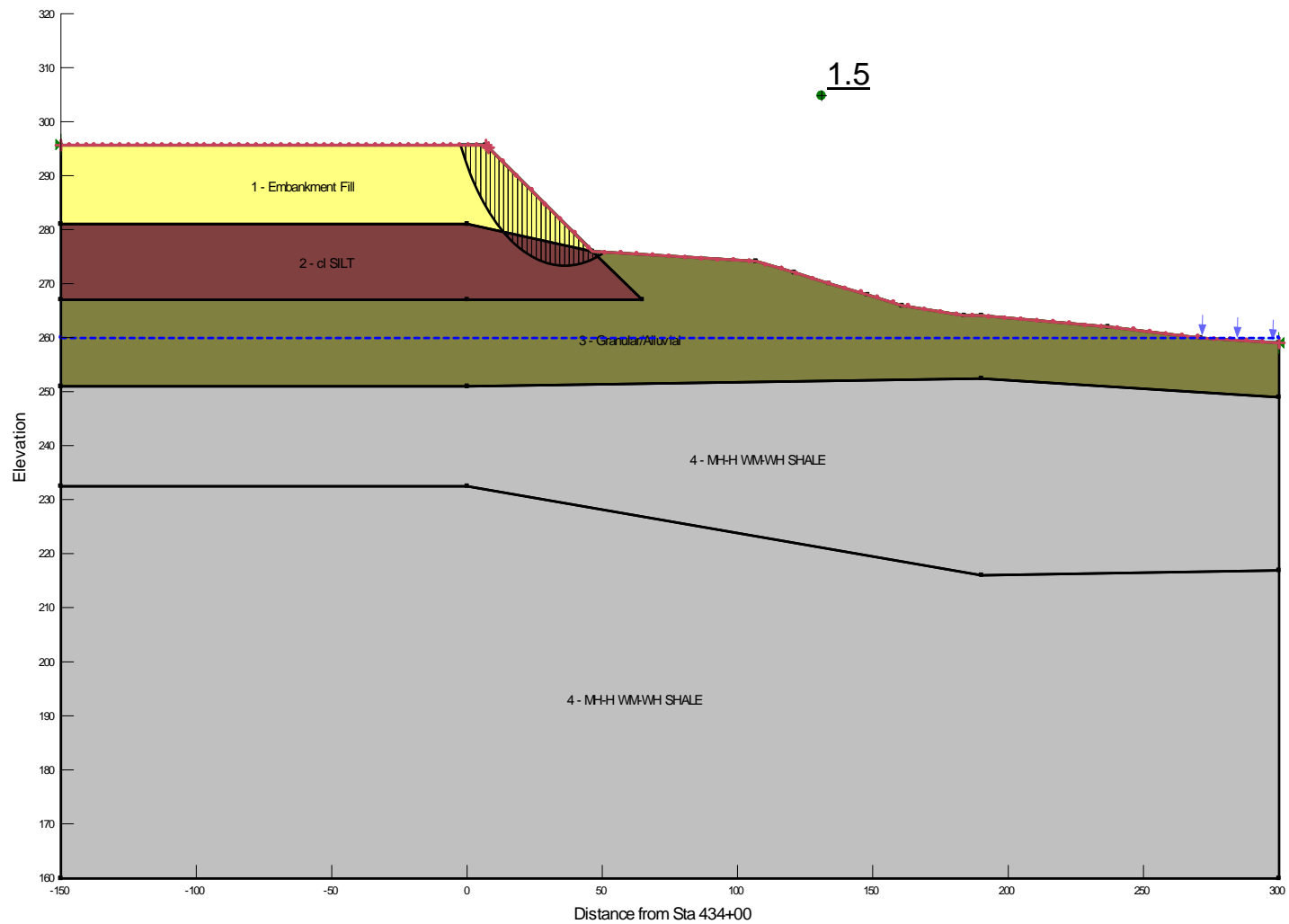


Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

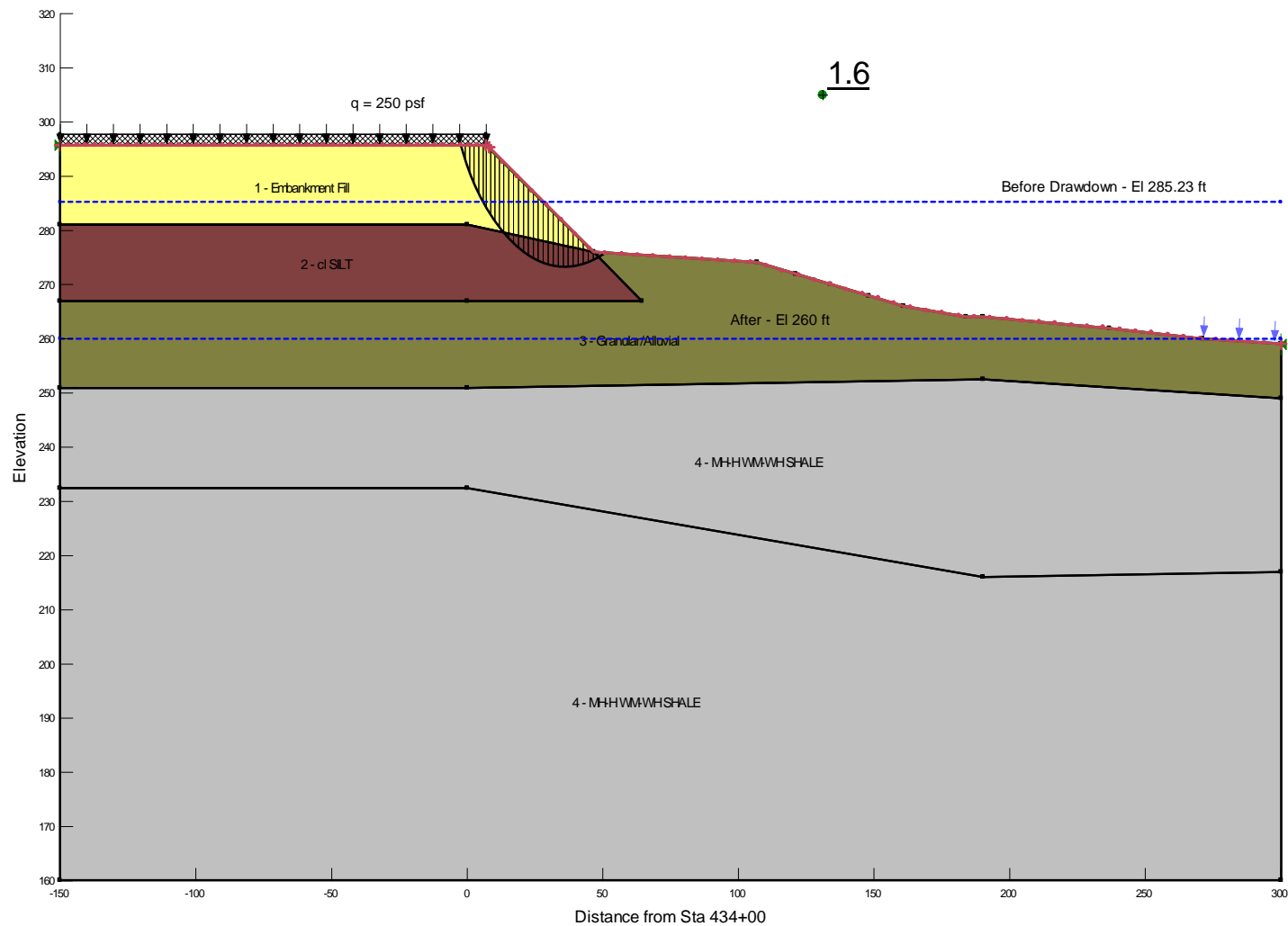


Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

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Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

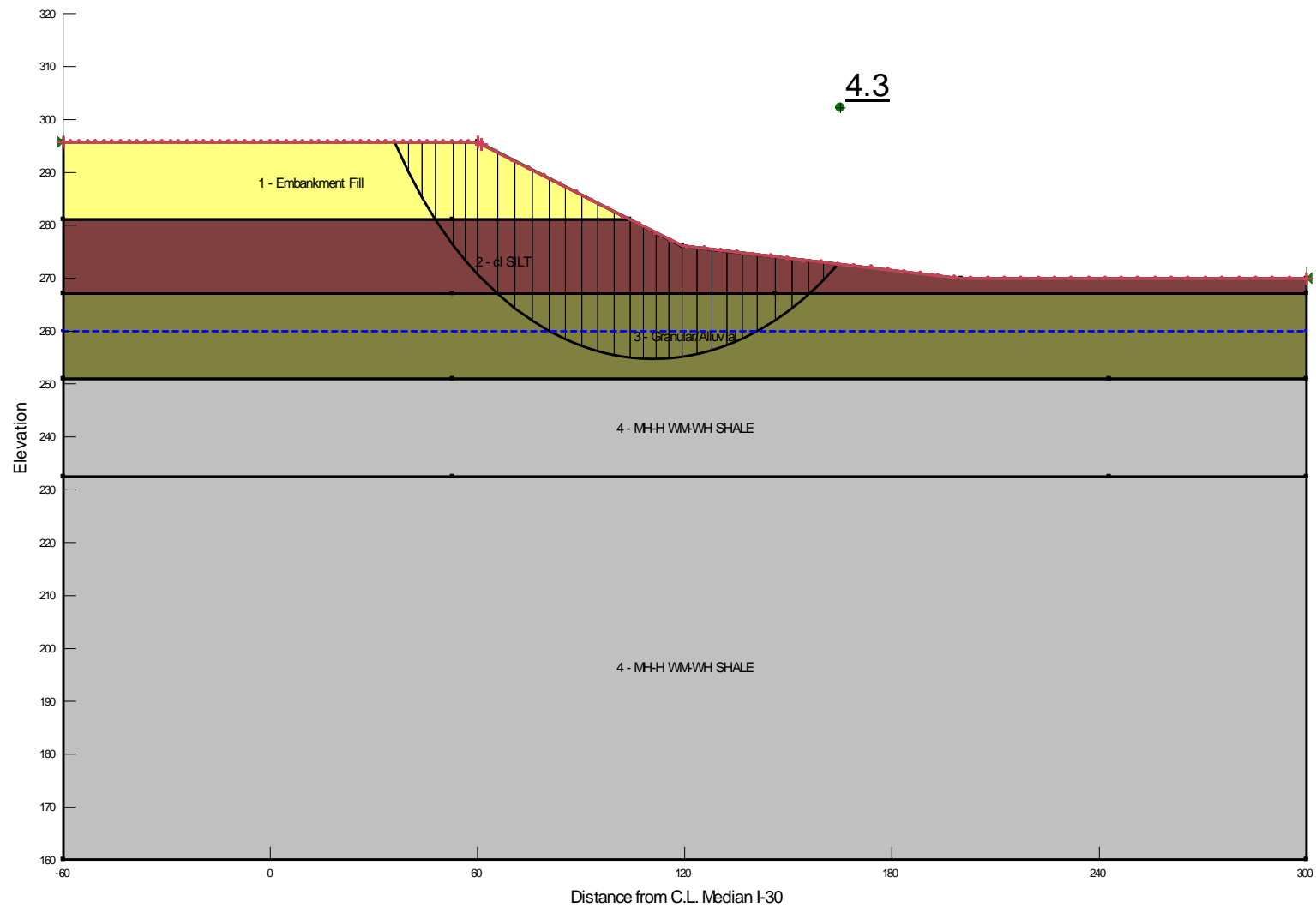


Results of Stability Analyses – Rapid Drawdown Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater from El 285.23 to El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

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**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ West Bridge Abutment**  
**I-30 over Saline River**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

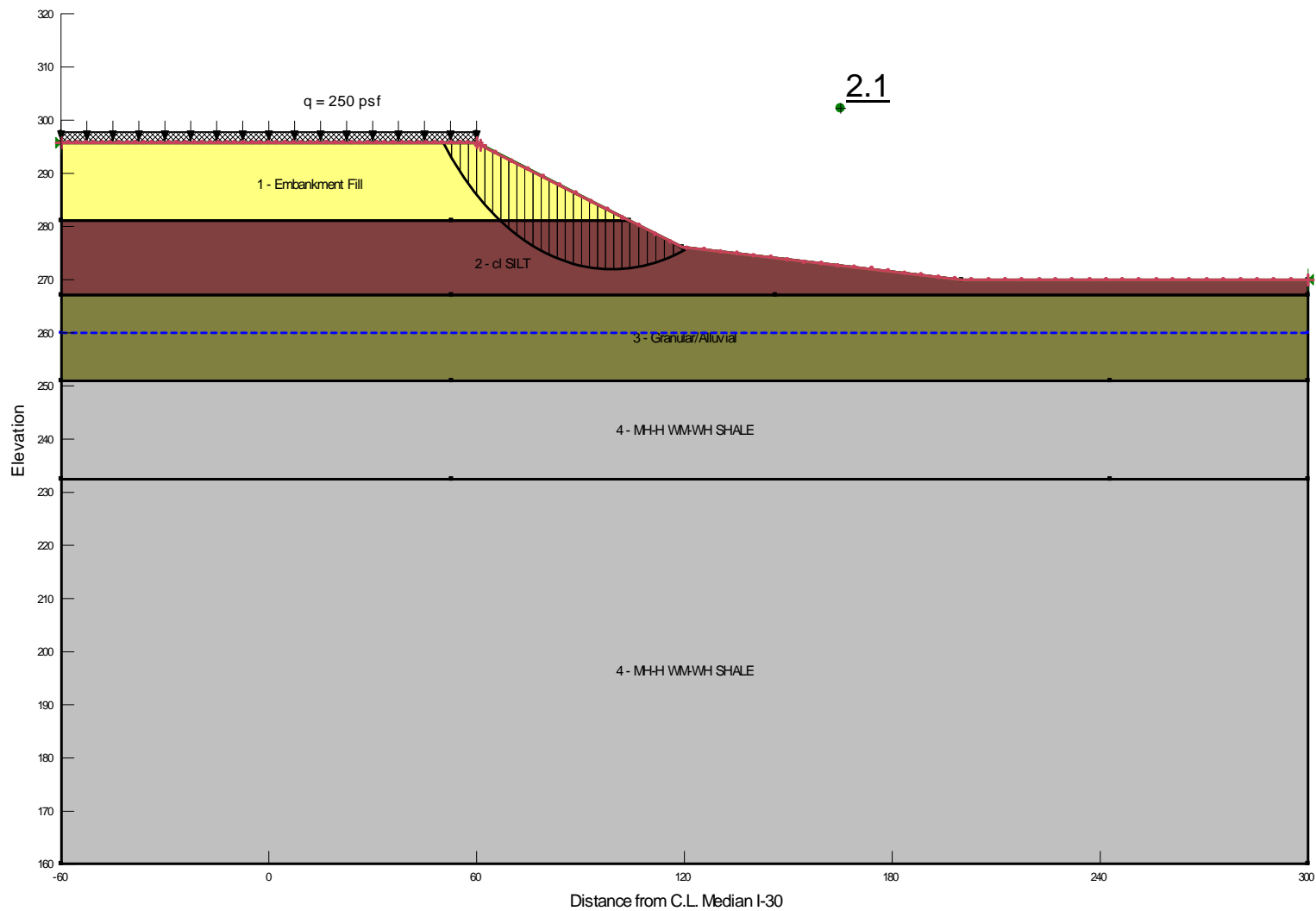
<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	4.3
	Long Term	2.1
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.8
	Rapid Drawdown (Design high water to embankment toe)	2.1



Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

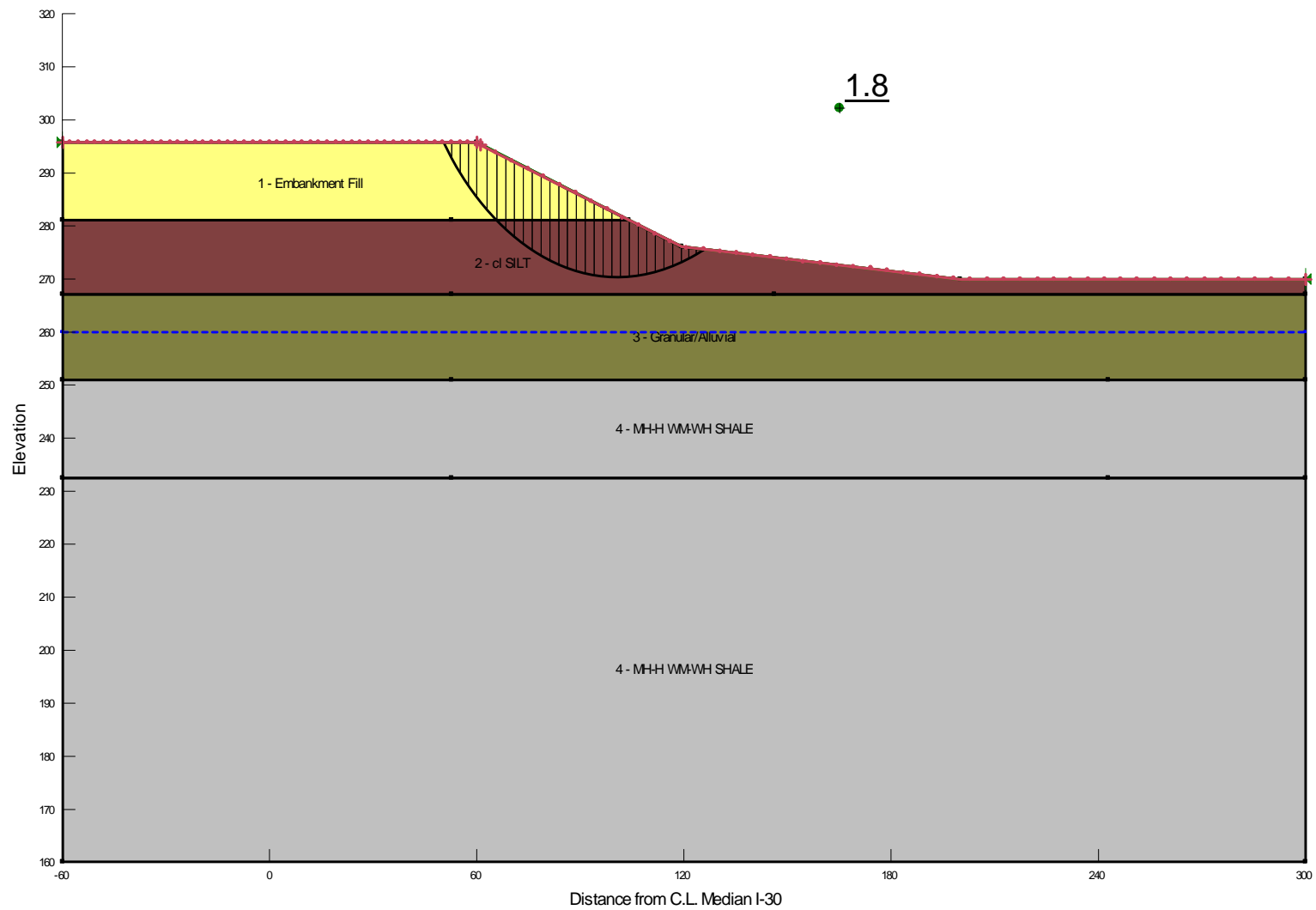
GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers





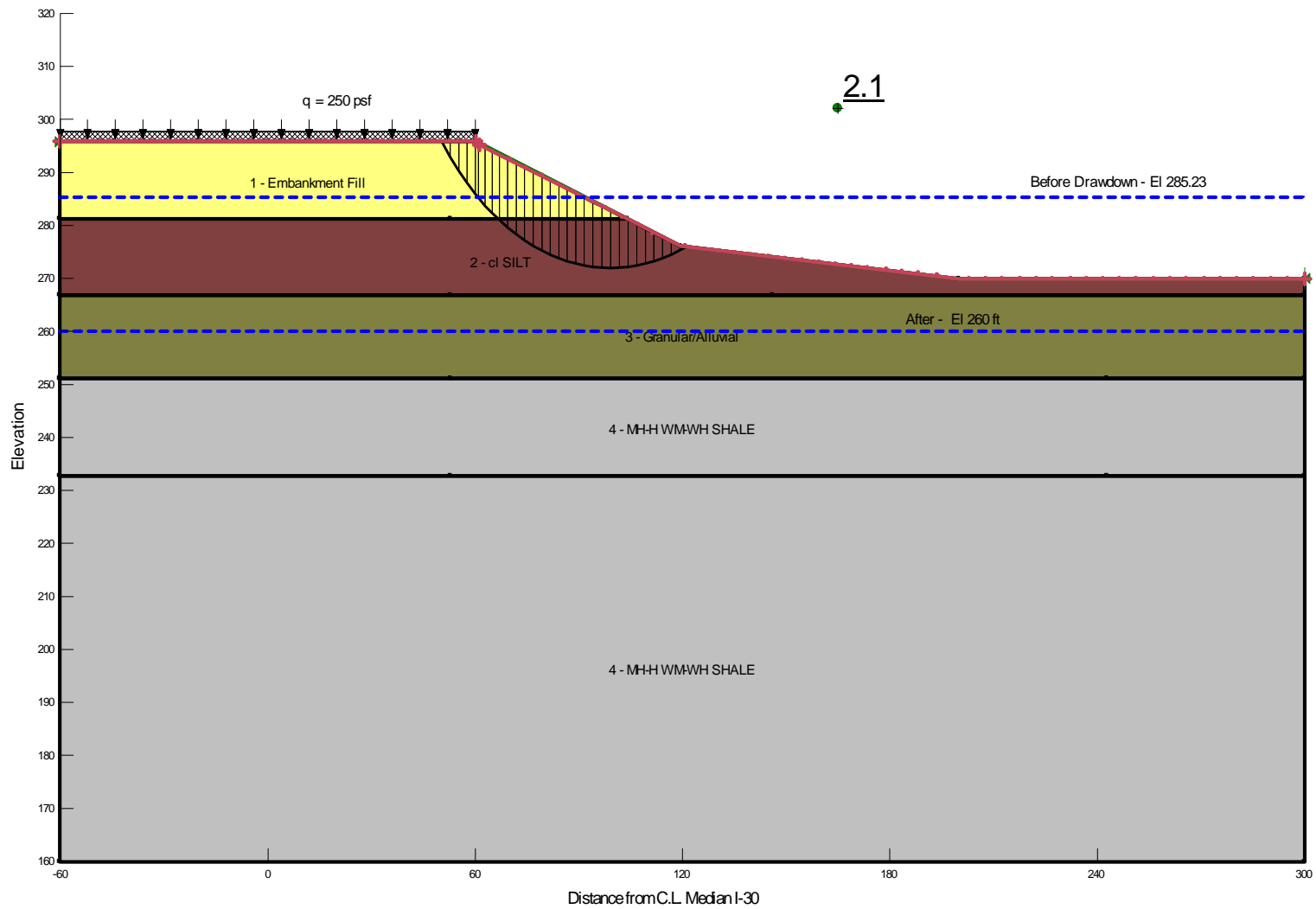
Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

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Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_S = 0.07$ )  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

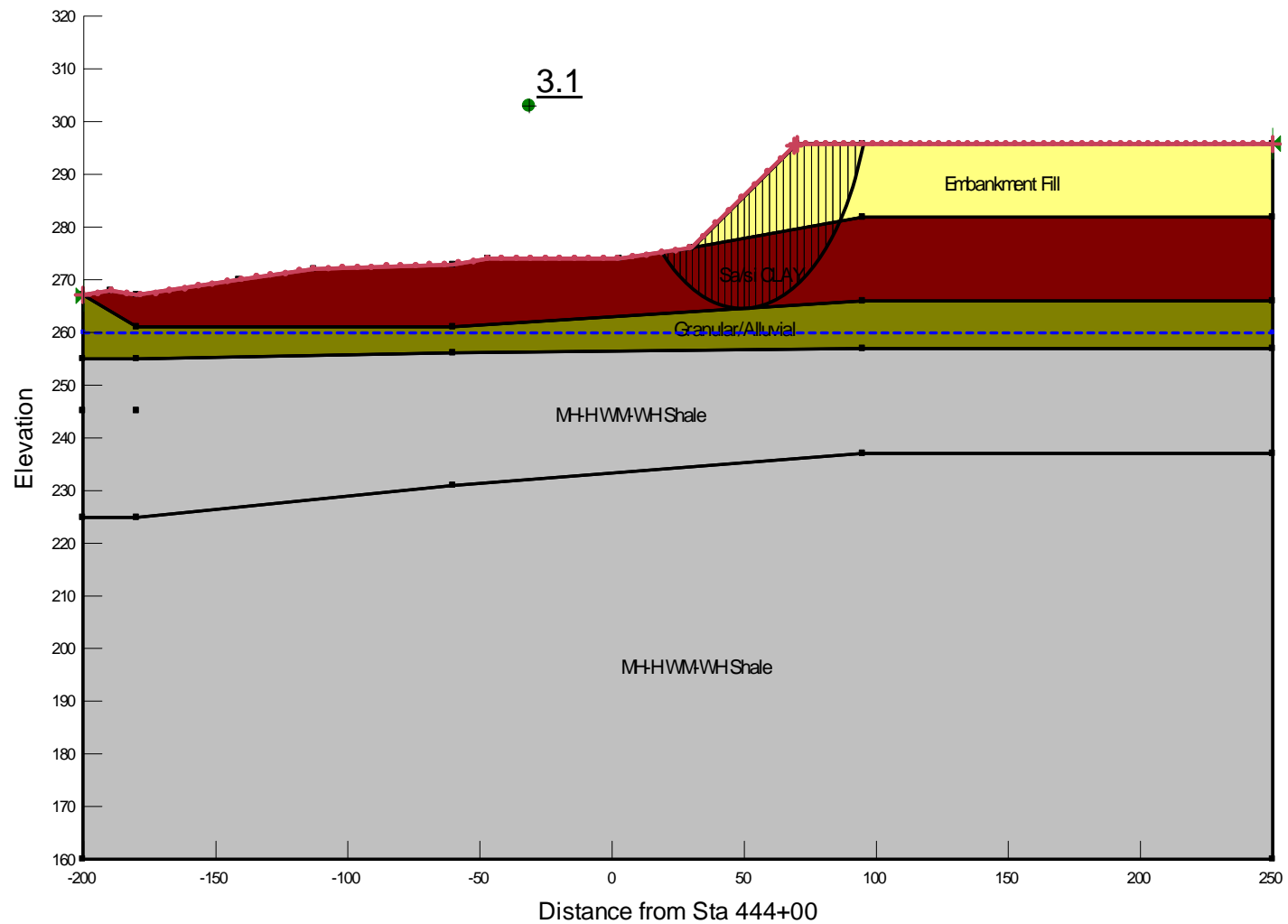
GRUBBS, HOSKYN, BARTON & WYATT, INC.  
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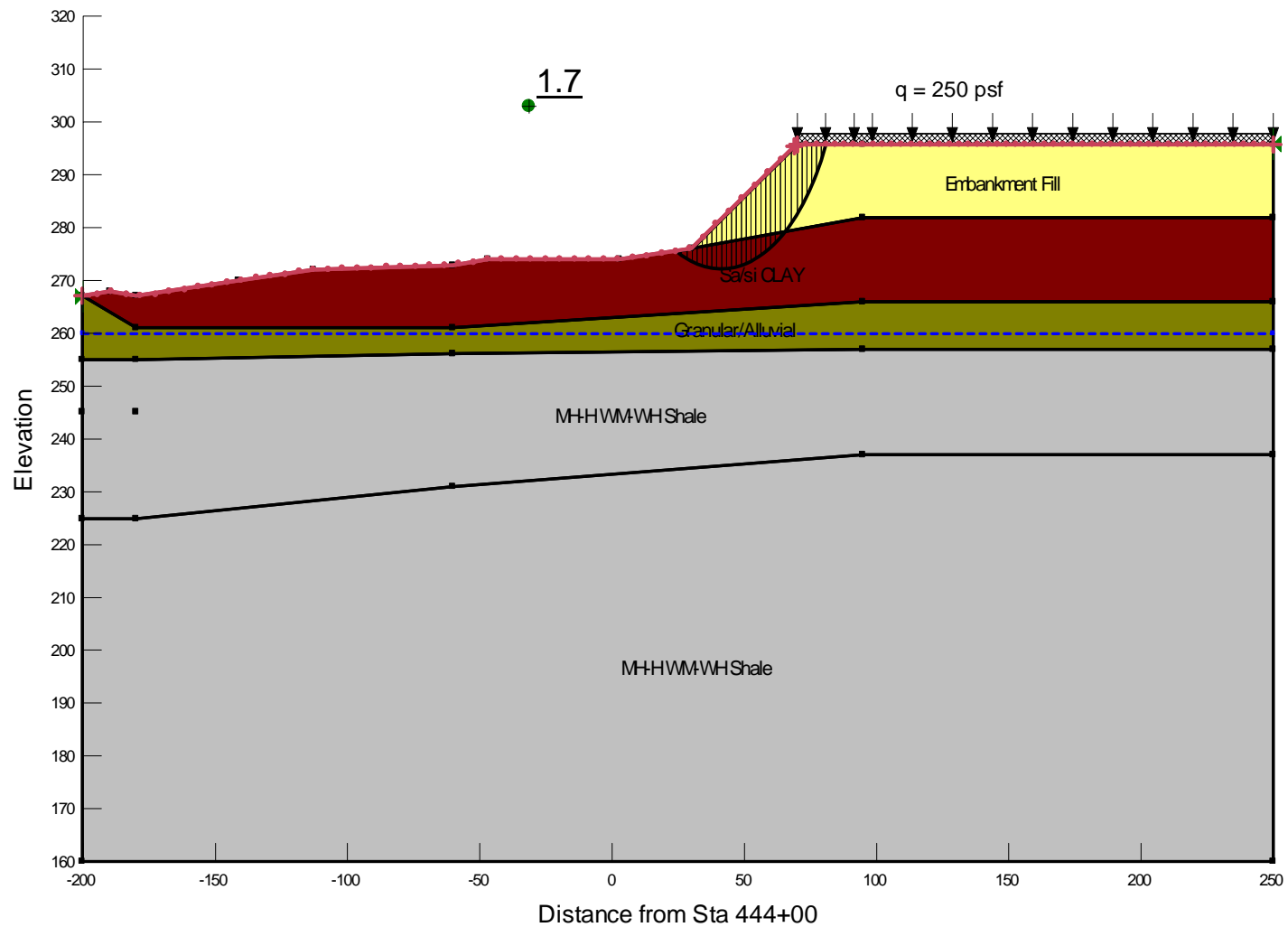
Results of Stability Analyses – Rapid Drawdown Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater from El 285.23 to El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**Summary of Stability Analysis Results**  
**2H:1V End Slope @ East Bridge Abutment**  
**I-30 over Saline River**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 15 (East Abutment)	End of Construction	3.1
	Long Term	1.7
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5
	Rapid Drawdown (Design high water to embankment toe)	1.7

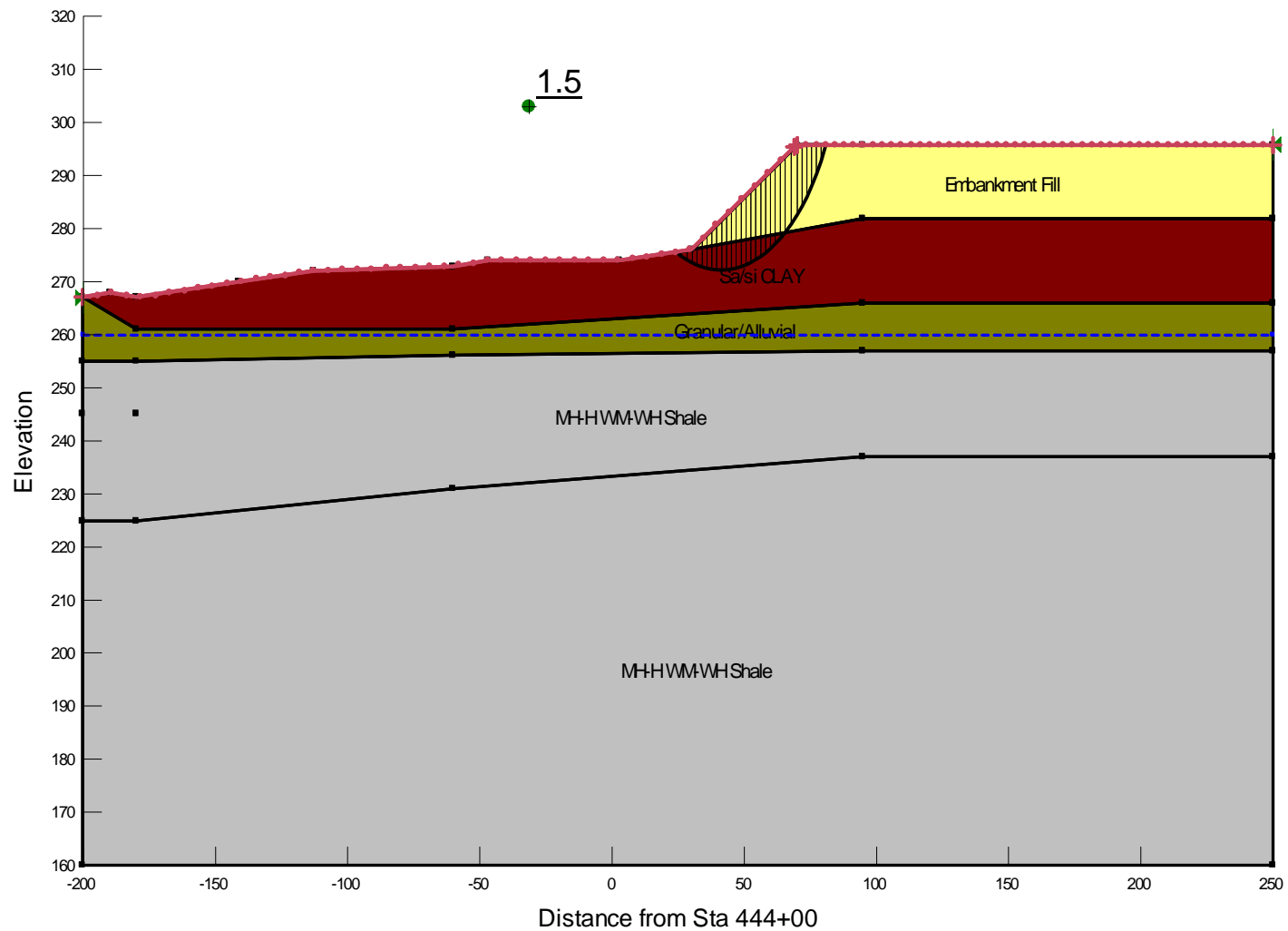


Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

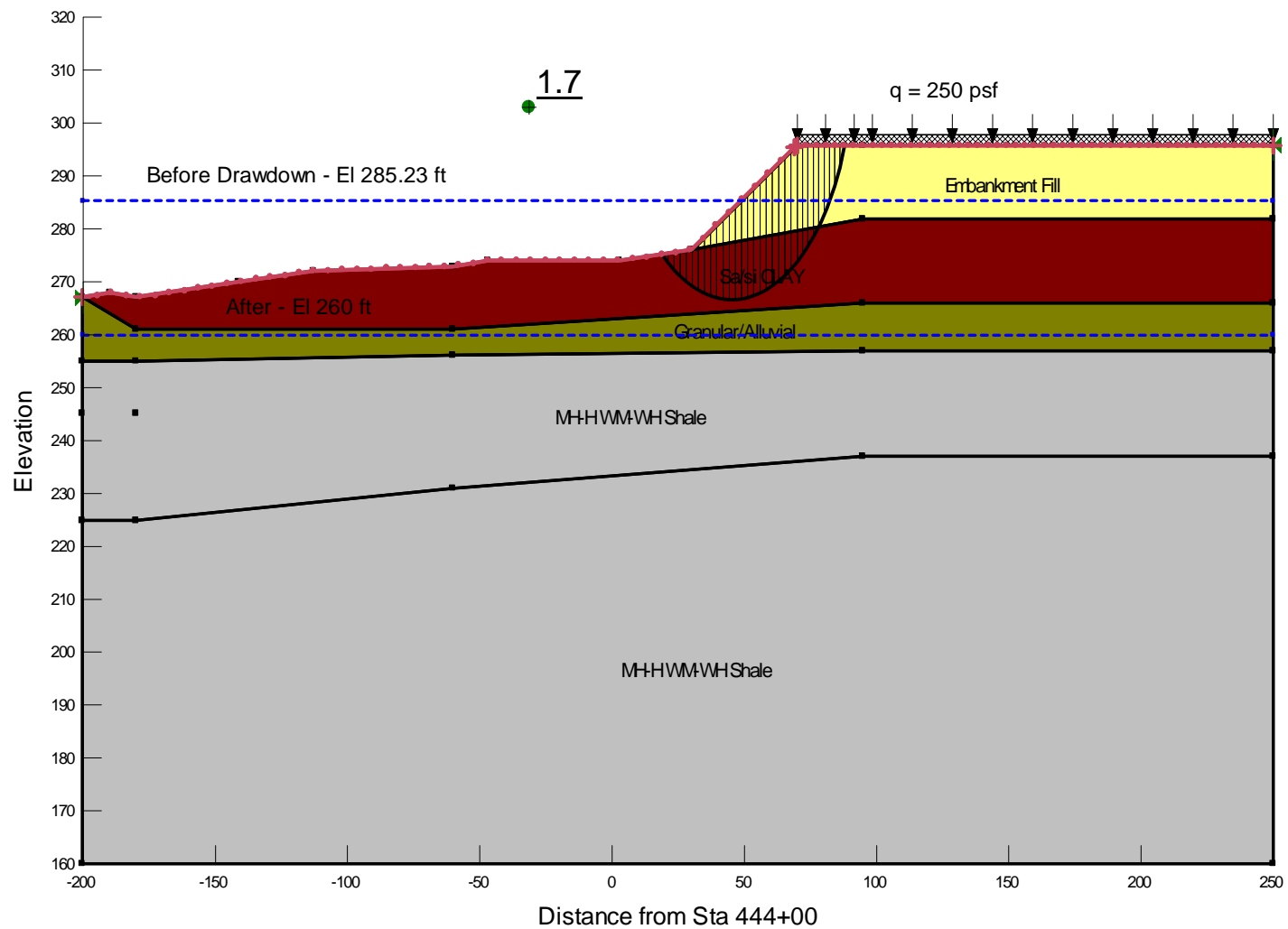


Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

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Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

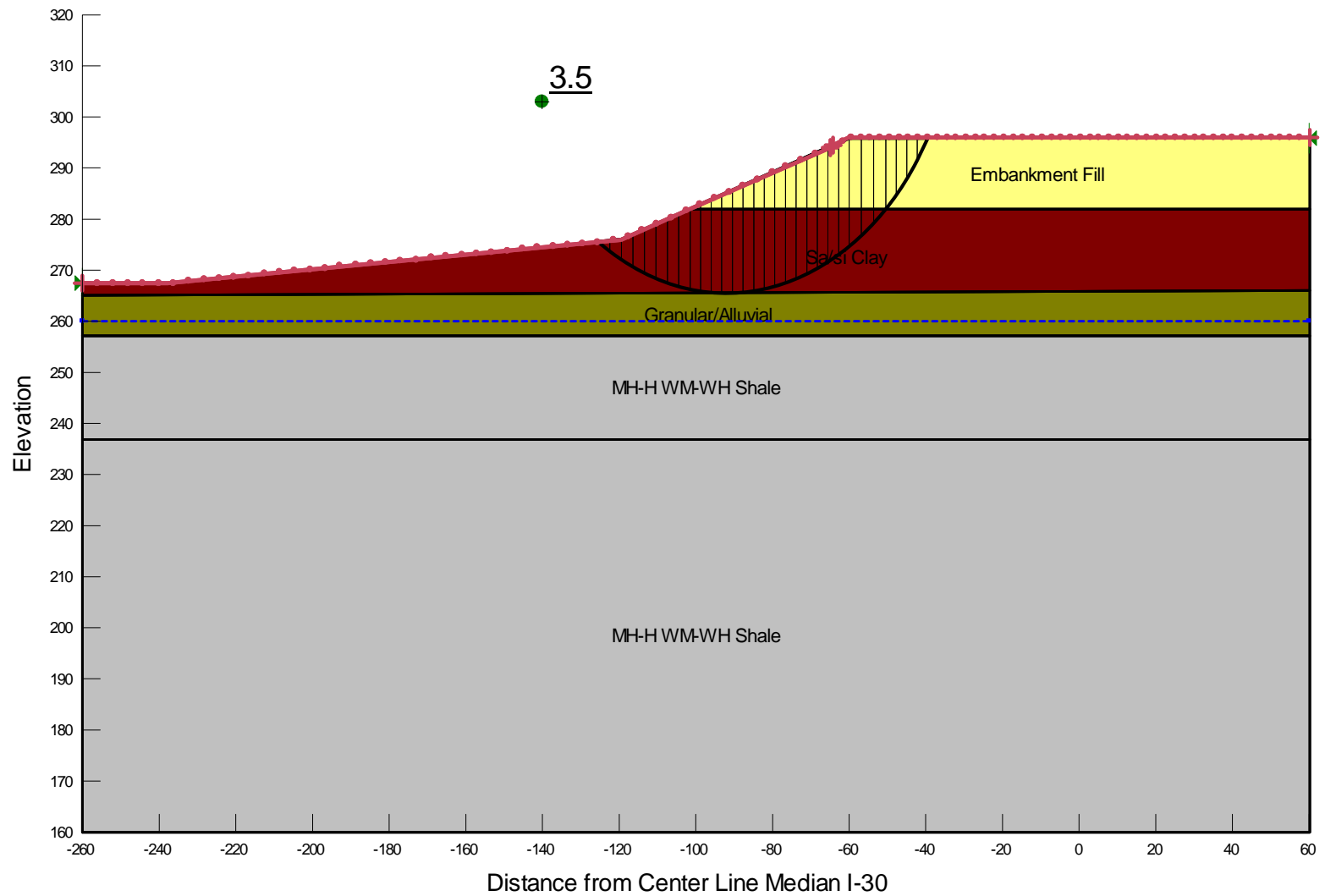


Results of Stability Analyses – Rapid Drawdown Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater from El 285.23 to El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



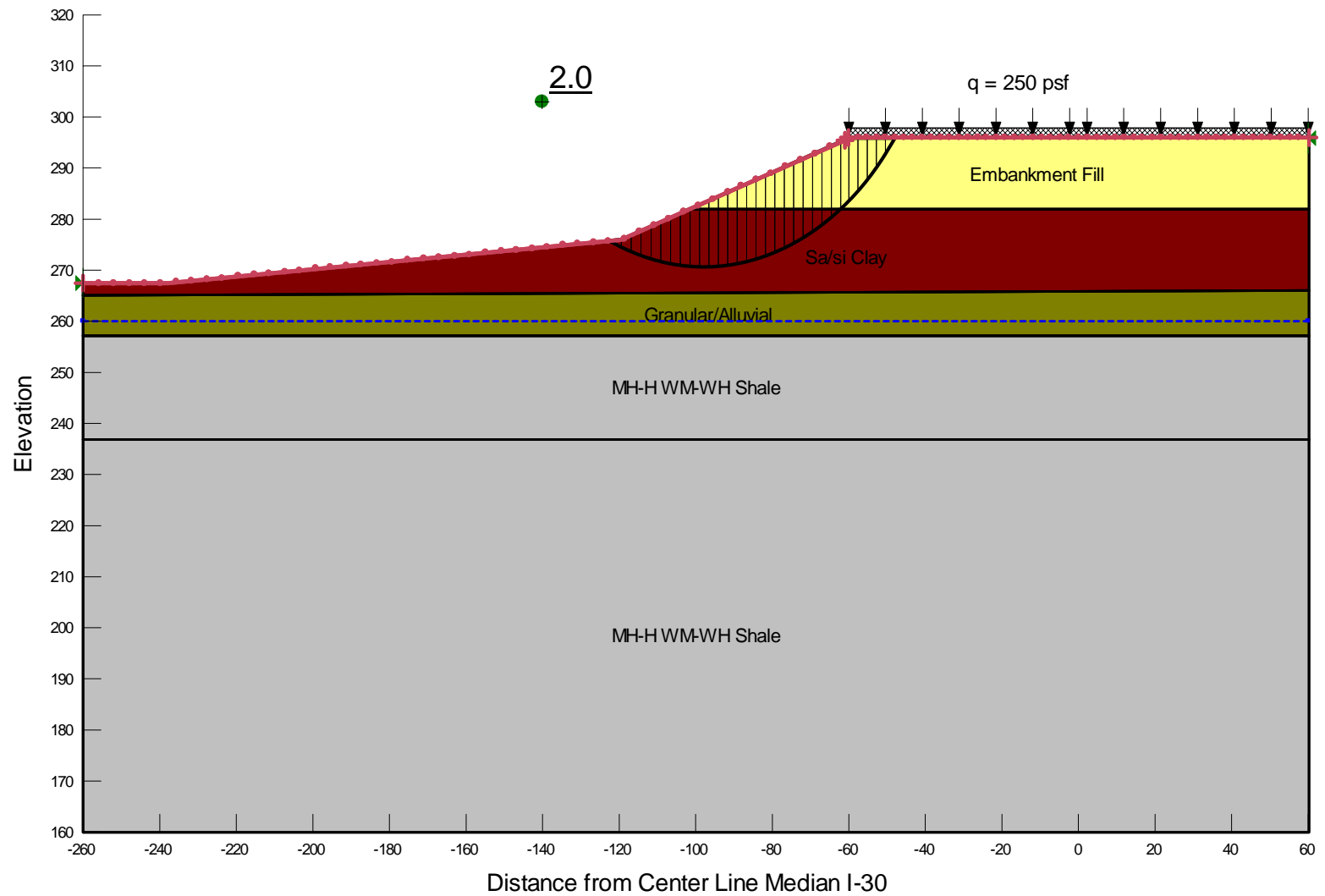
**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ East Bridge Abutment**  
**I-30 over Saline River**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	3.5
	Long Term	2.0
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.7
	Rapid Drawdown (Design high water to embankment toe)	2.0



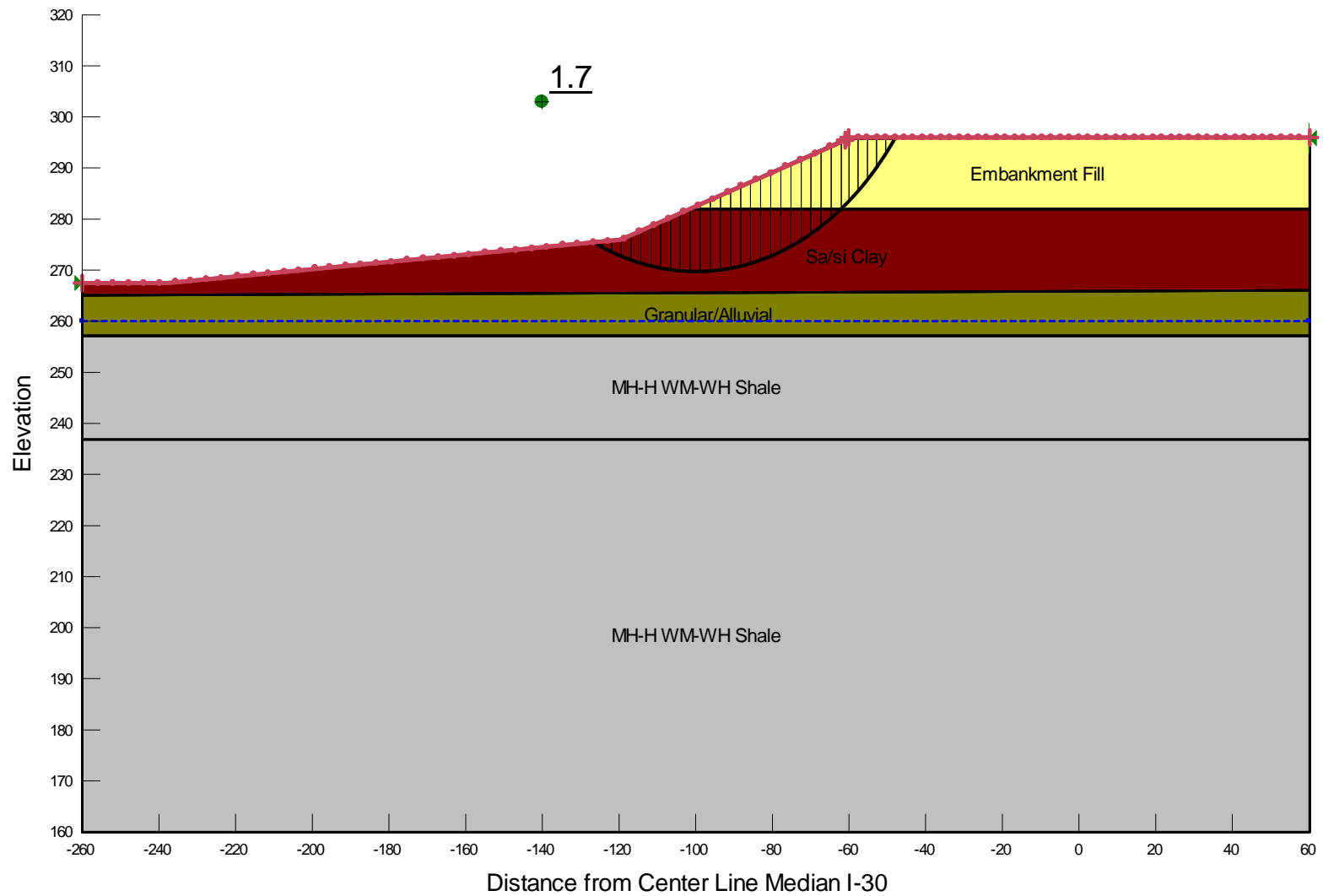
Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers



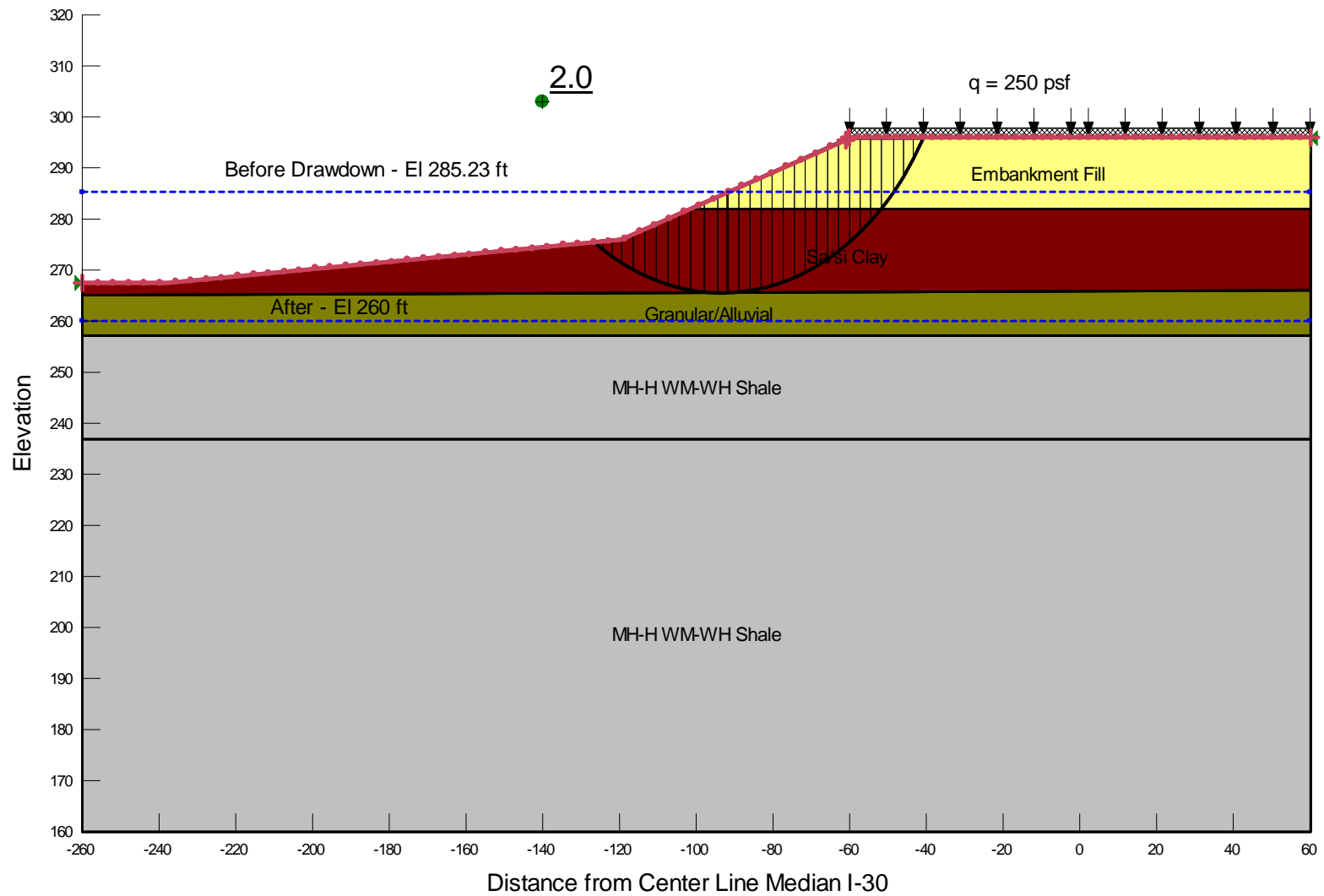
Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_S = 0.07$ )  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers

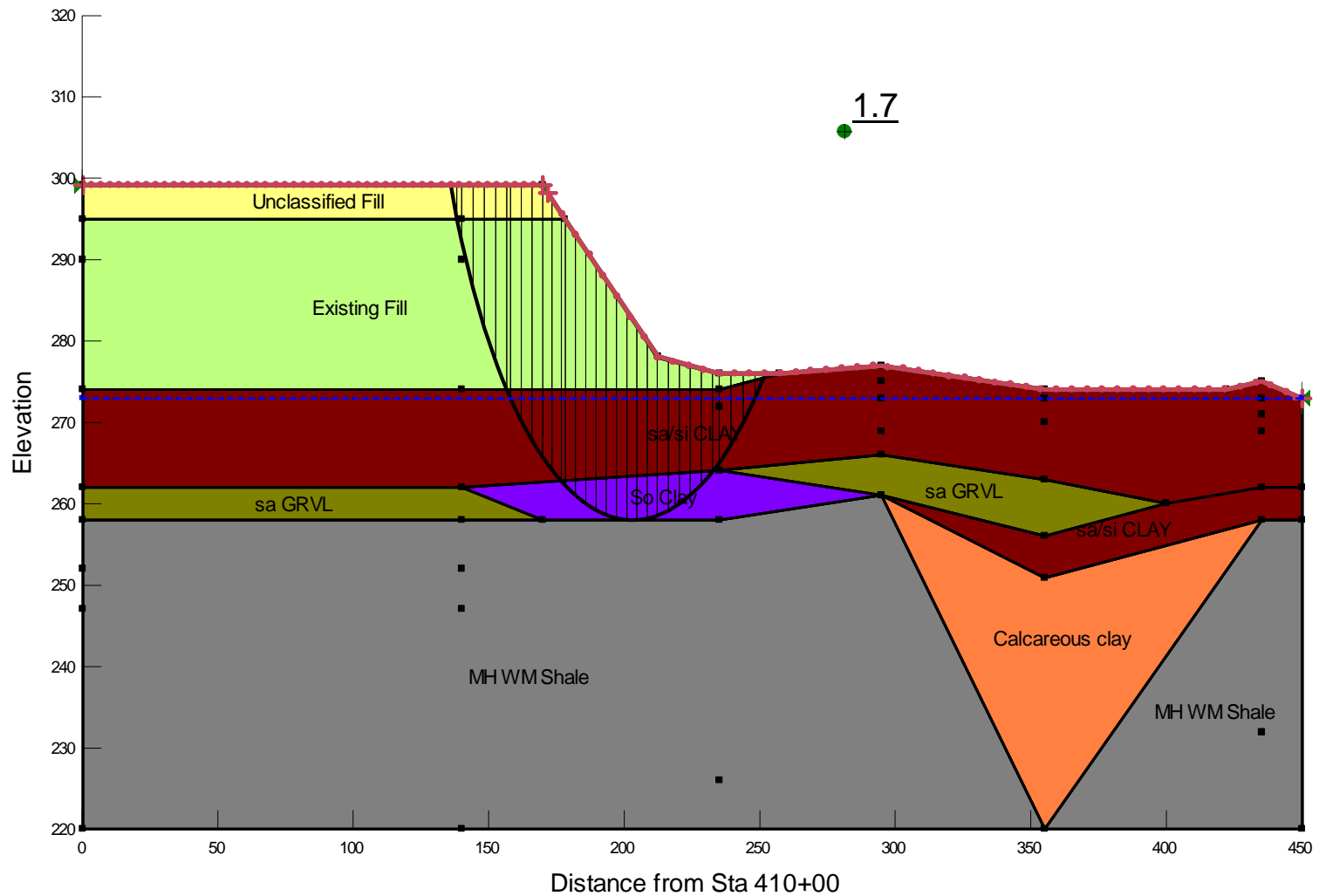


Results of Stability Analyses – Rapid Drawdown Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater from El 285.23 to El 260  
 I-30 over Saline River  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**ATTACHMENT 12**

**Summary of Stability Analysis Results**  
**2H:1V End Slope @ West Bridge Abutment**  
**I-30 over Saline River Relief**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

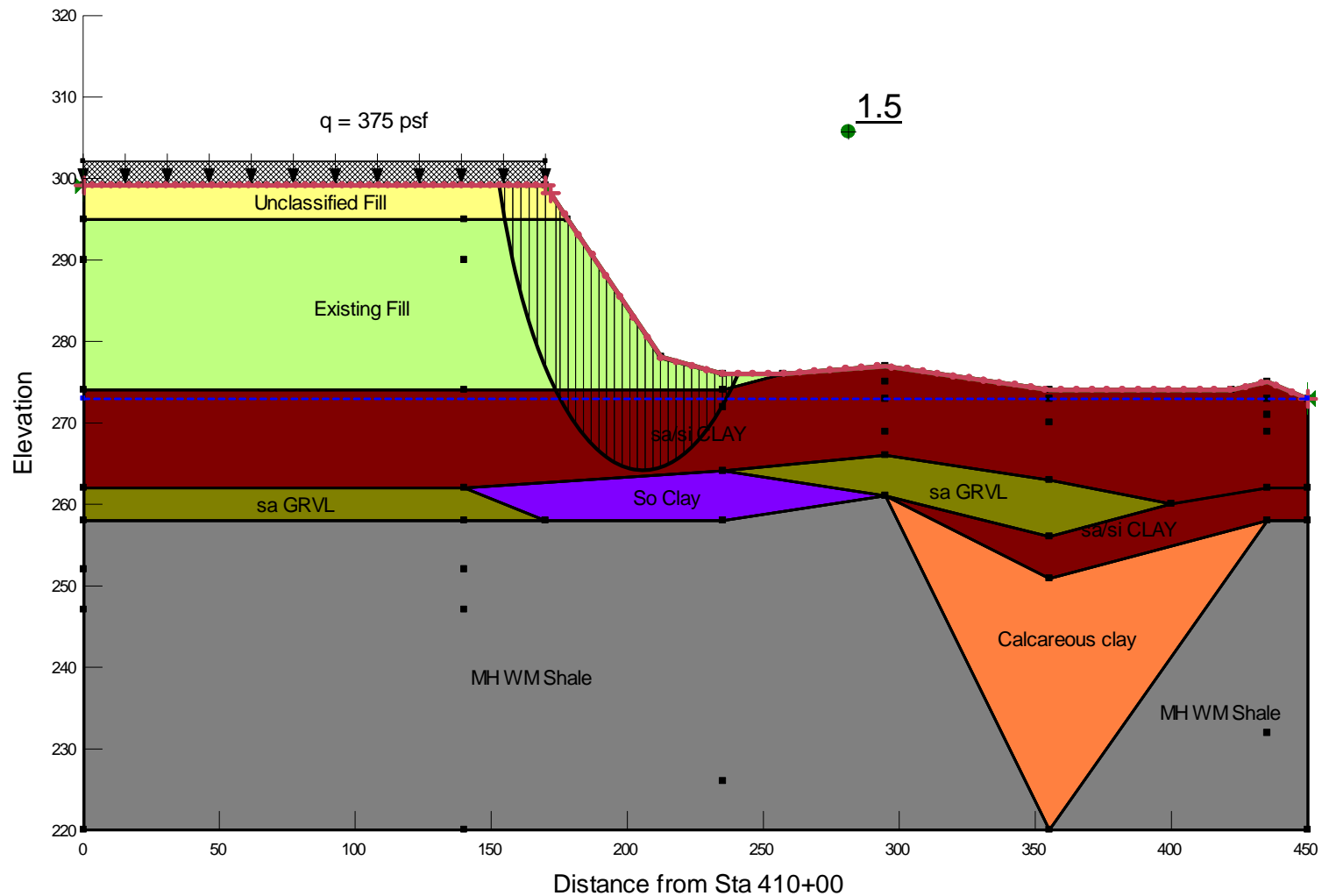
Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 1 (West Abutment)	End of Construction	1.7
	Long Term	1.5
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.4
	Rapid Drawdown (Design high water, El 285.23, to El 280)	1.2
	Rapid Drawdown (Design high water, El 285.23, to El 276)	1.1



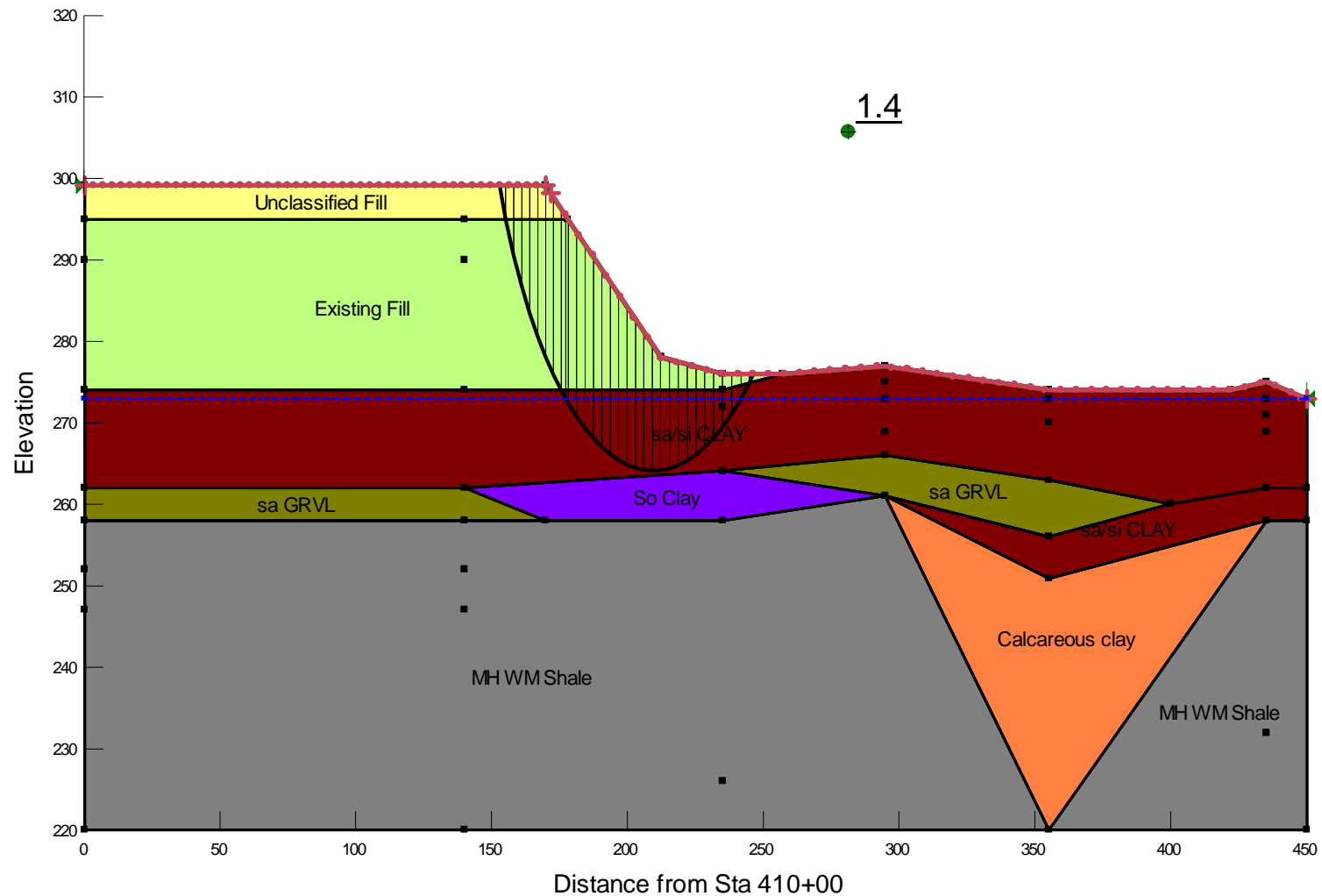
Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

GRUBBS, HOSKYN, BARTON & WYATT, INC.  
 Consulting Engineers

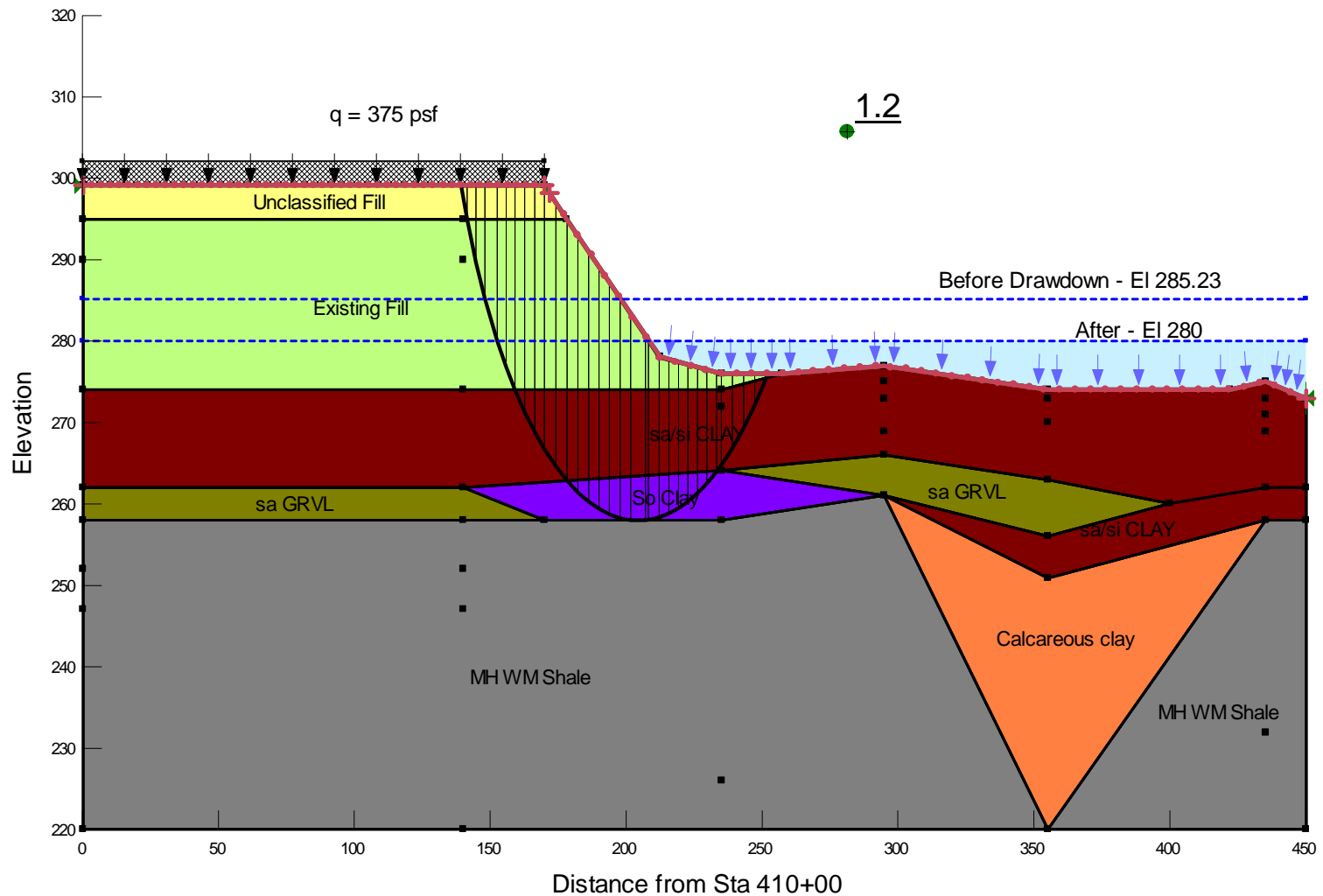




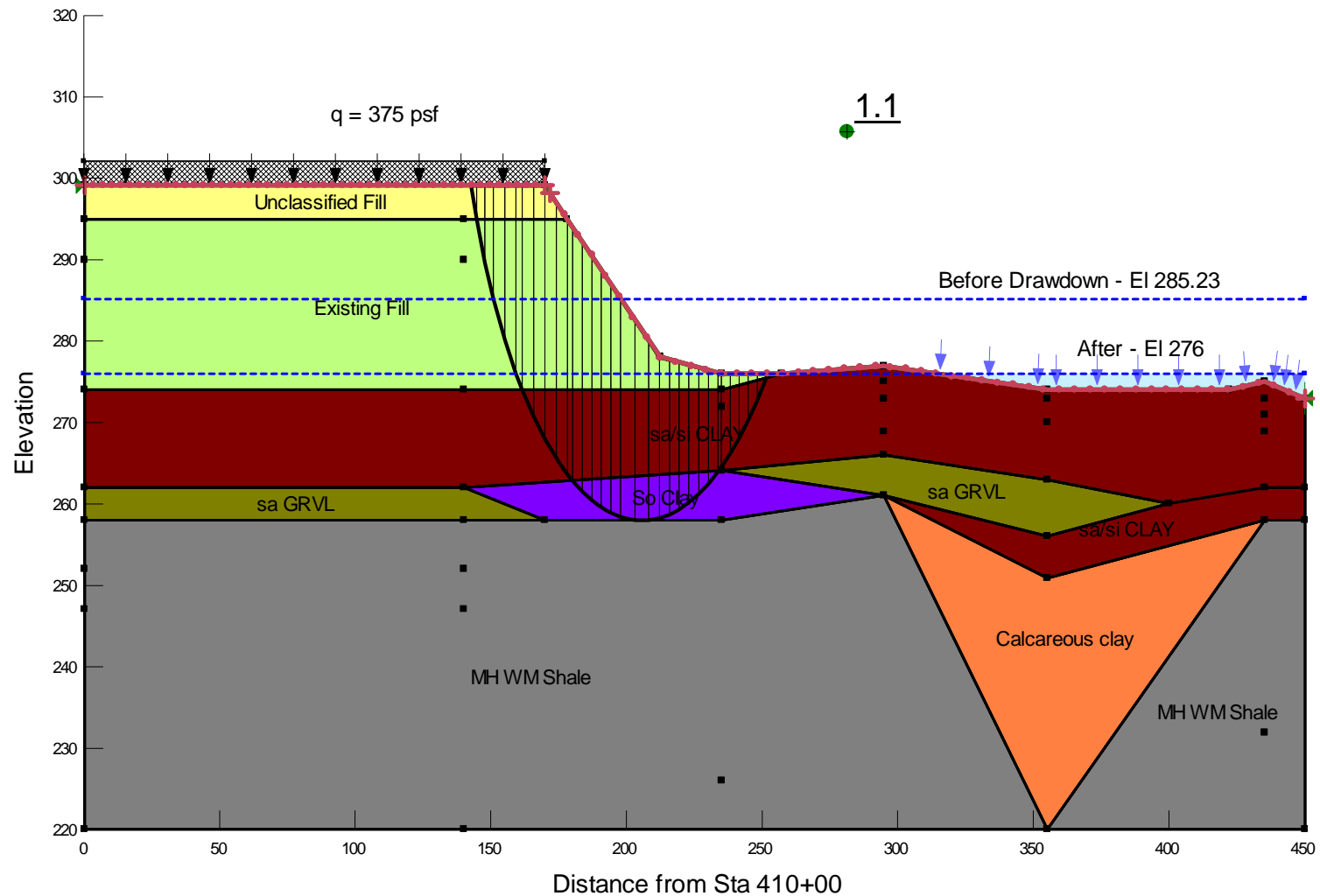
Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



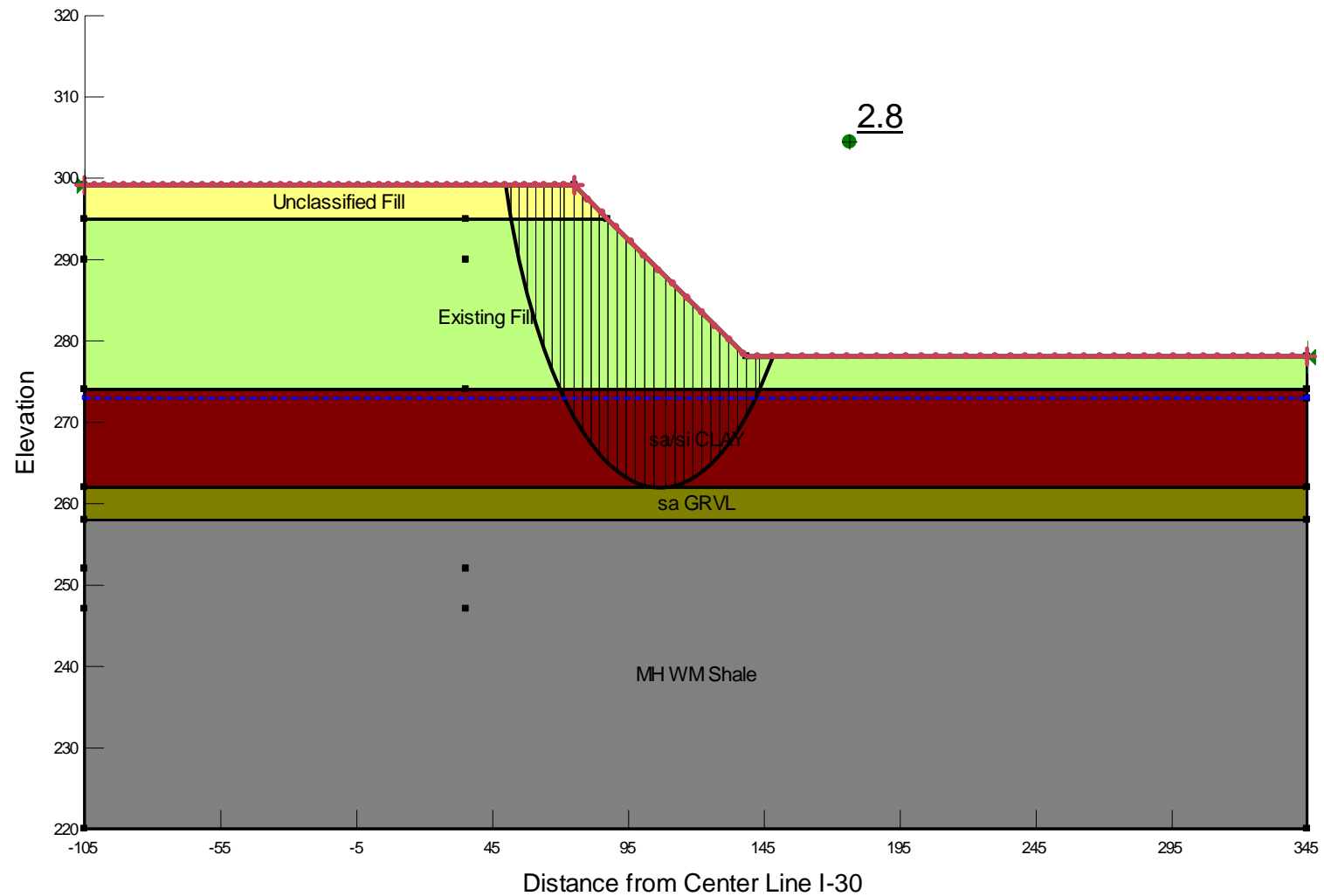
Results of Stability Analyses – Rapid Drawdown Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater from El 285.23 to El 280  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



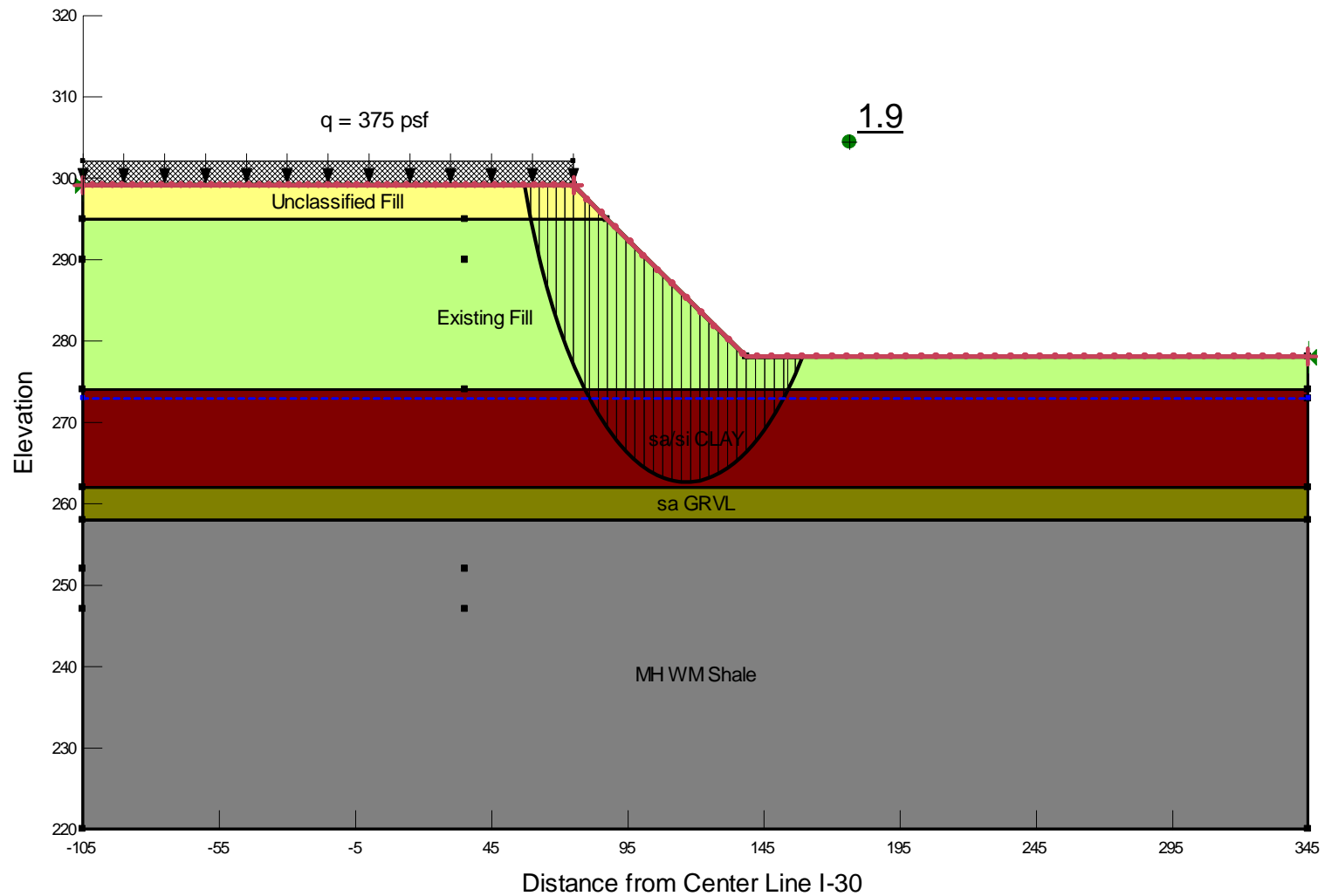
Results of Stability Analyses – Rapid Drawdown Condition  
 2H:1V End Slope @ West Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater from El 285.23 to El 276  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ West Bridge Abutment**  
**I-30 over Saline River Relief**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

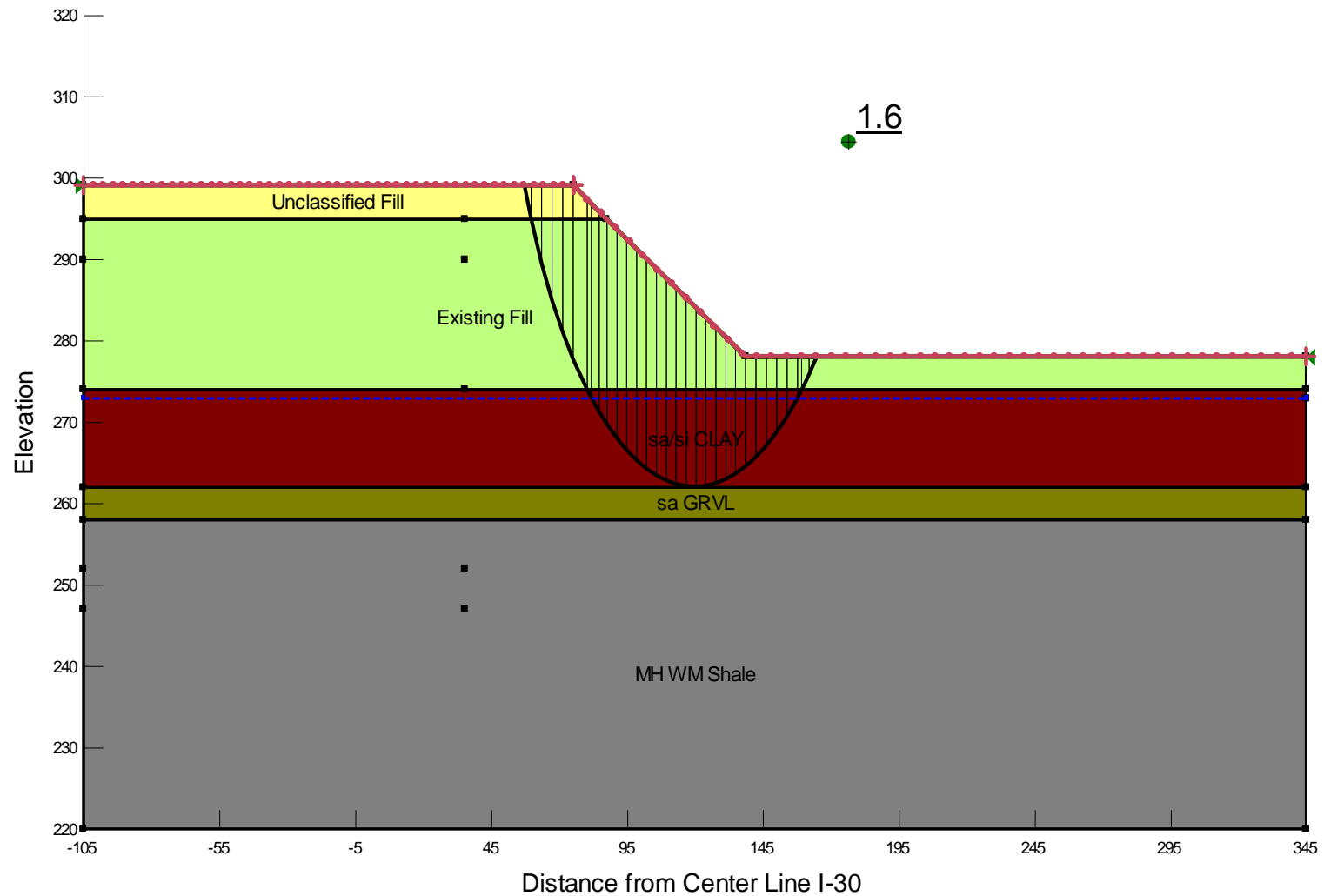
<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	2.8
	Long Term	1.9
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.6
	Rapid Drawdown (Design high water to embankment toe)	1.5



Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

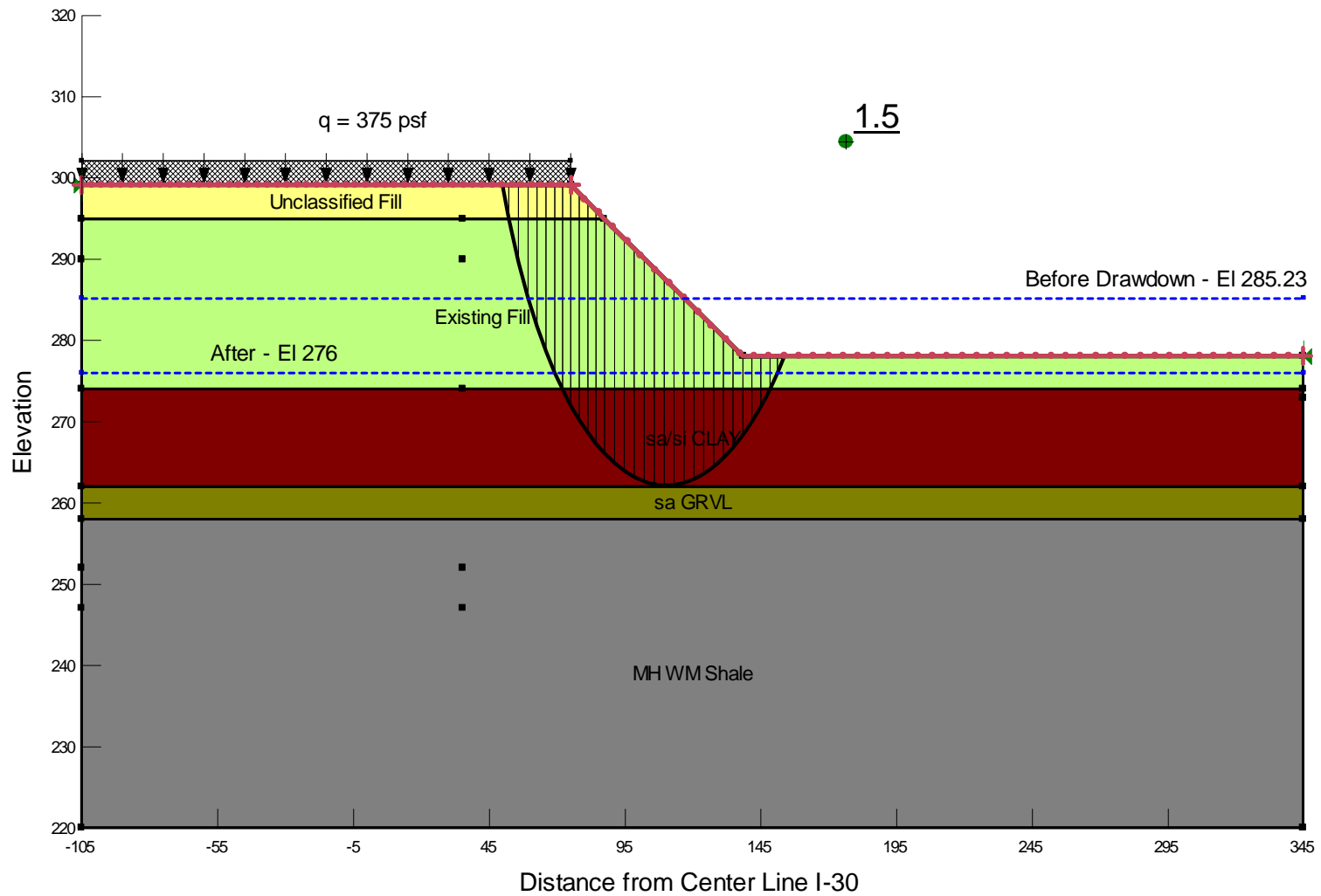


Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 3H:1V Side Slopes @ West Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

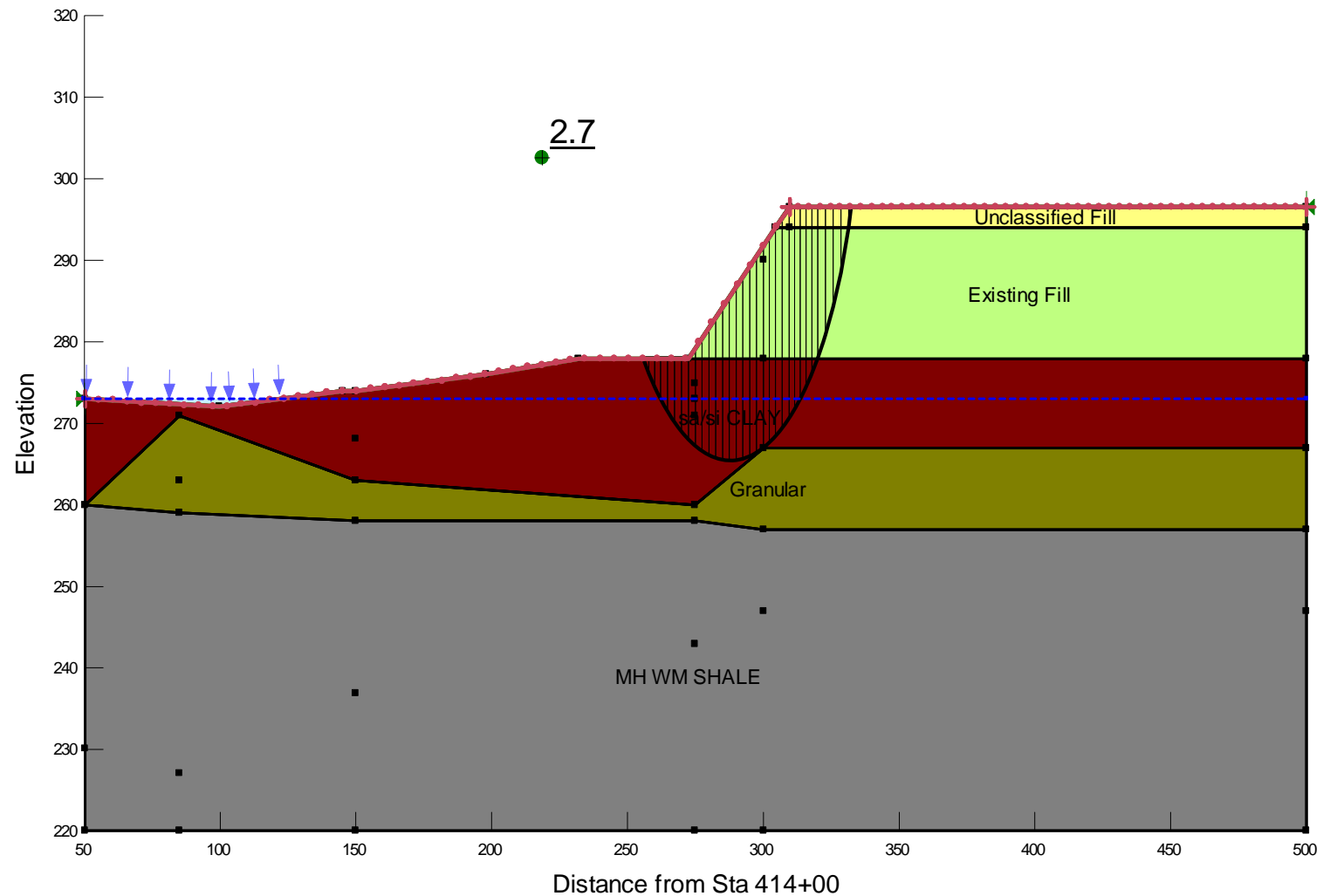




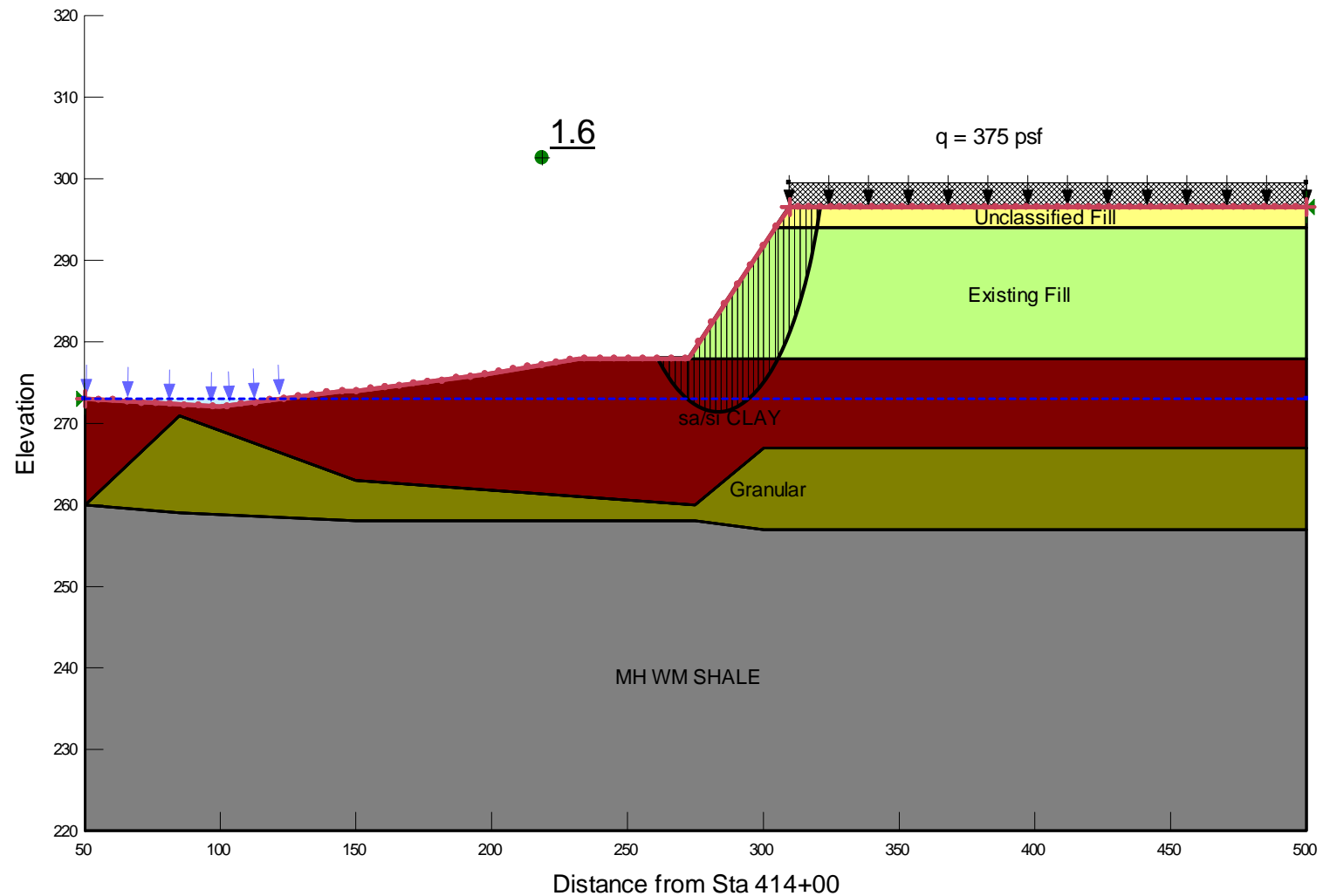
Results of Stability Analyses – Rapid Drawdown Condition  
 3H:1V Side Slopes @ West Abutment  
 Groundwater from El 285.23 to El 276  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**Summary of Stability Analysis Results**  
**2H:1V End Slope @ East Bridge Abutment**  
**I-30 over Saline River Relief**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

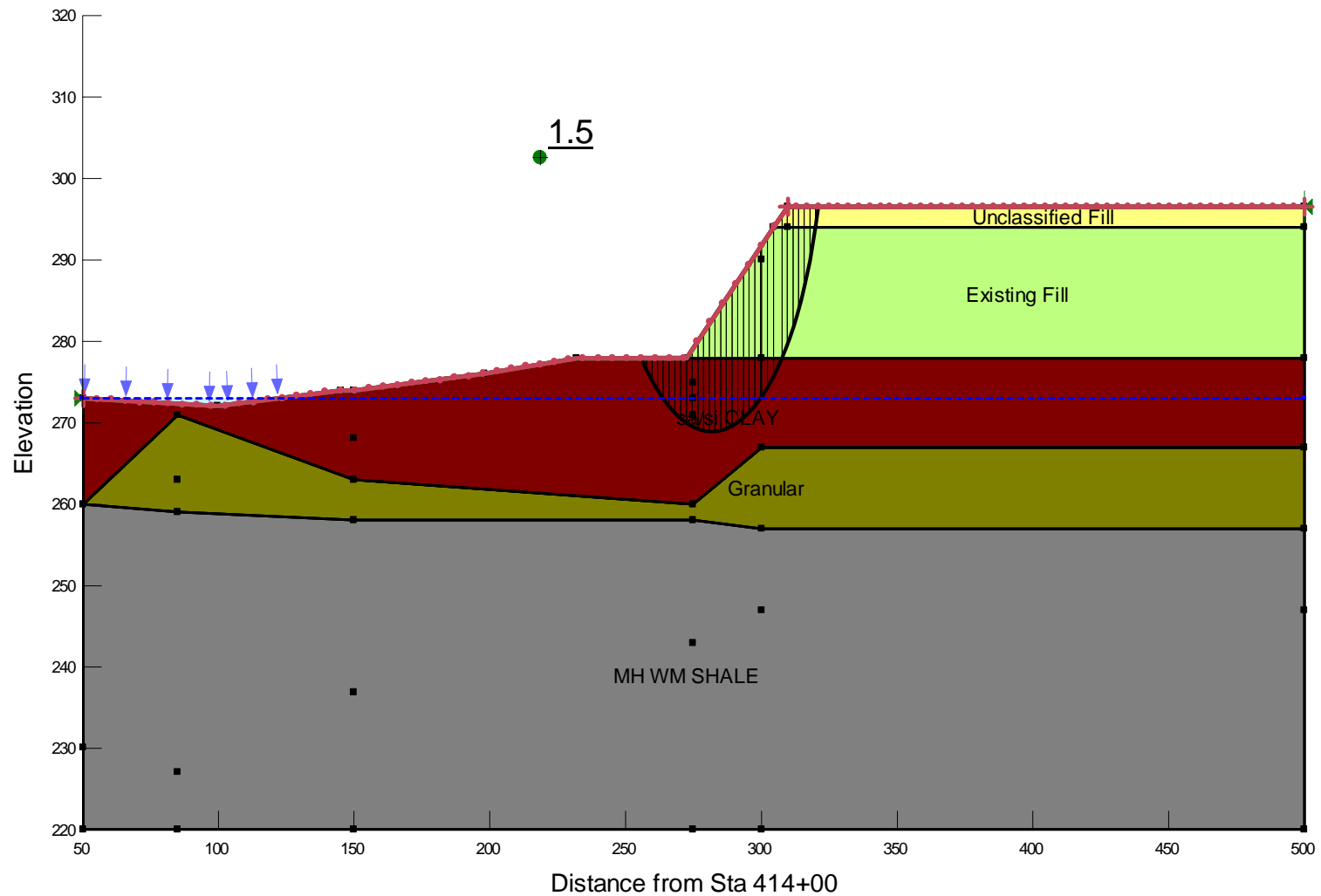
Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 9 (East Abutment)	End of Construction	2.7
	Long Term	1.6
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5
	Rapid Drawdown (Design high water to embankment toe)	1.4



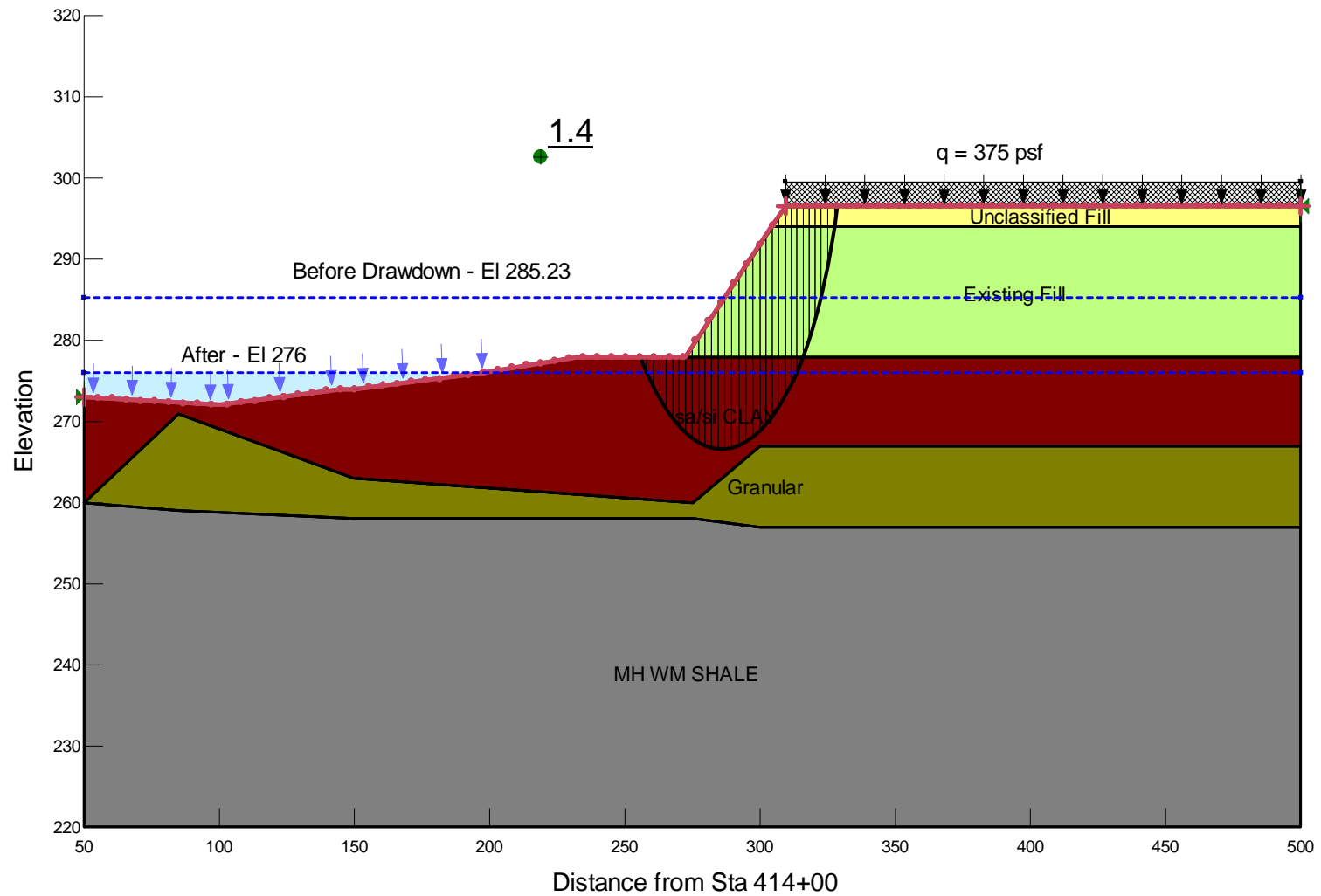
Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



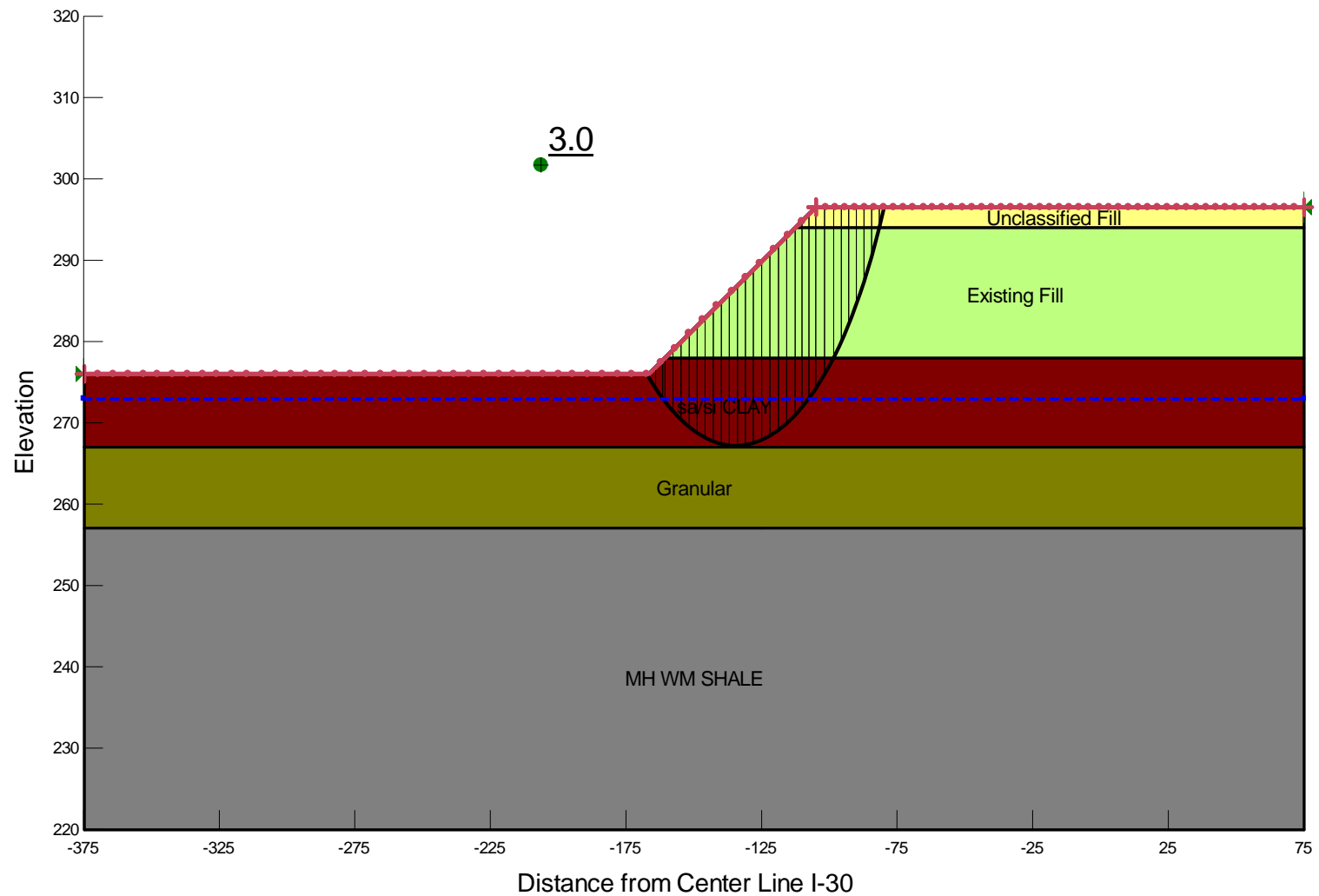
Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Rapid Drawdown Condition  
 2H:1V End Slope @ East Abutment  
 Cross Section @ Center Line Median I-30  
 Groundwater from El 285.23 to El 276  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

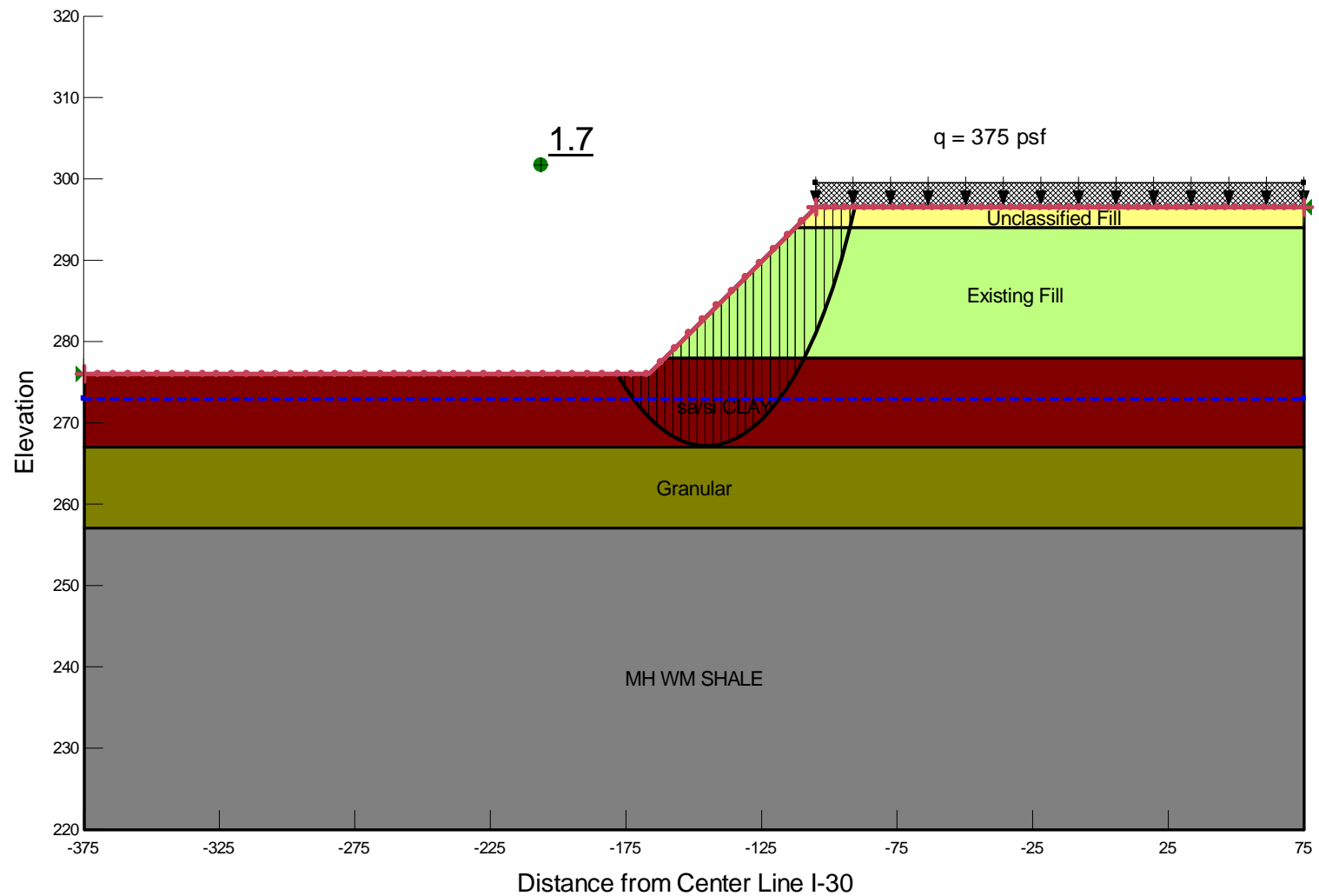
**Summary of Stability Analysis Results**  
**3H:1V Side Slopes @ East Bridge Abutment**  
**I-30 over Saline River Relief**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
Left and Right	End of Construction	3.0
	Long Term	1.7
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5
	Rapid Drawdown (Design high water to embankment toe)	1.5

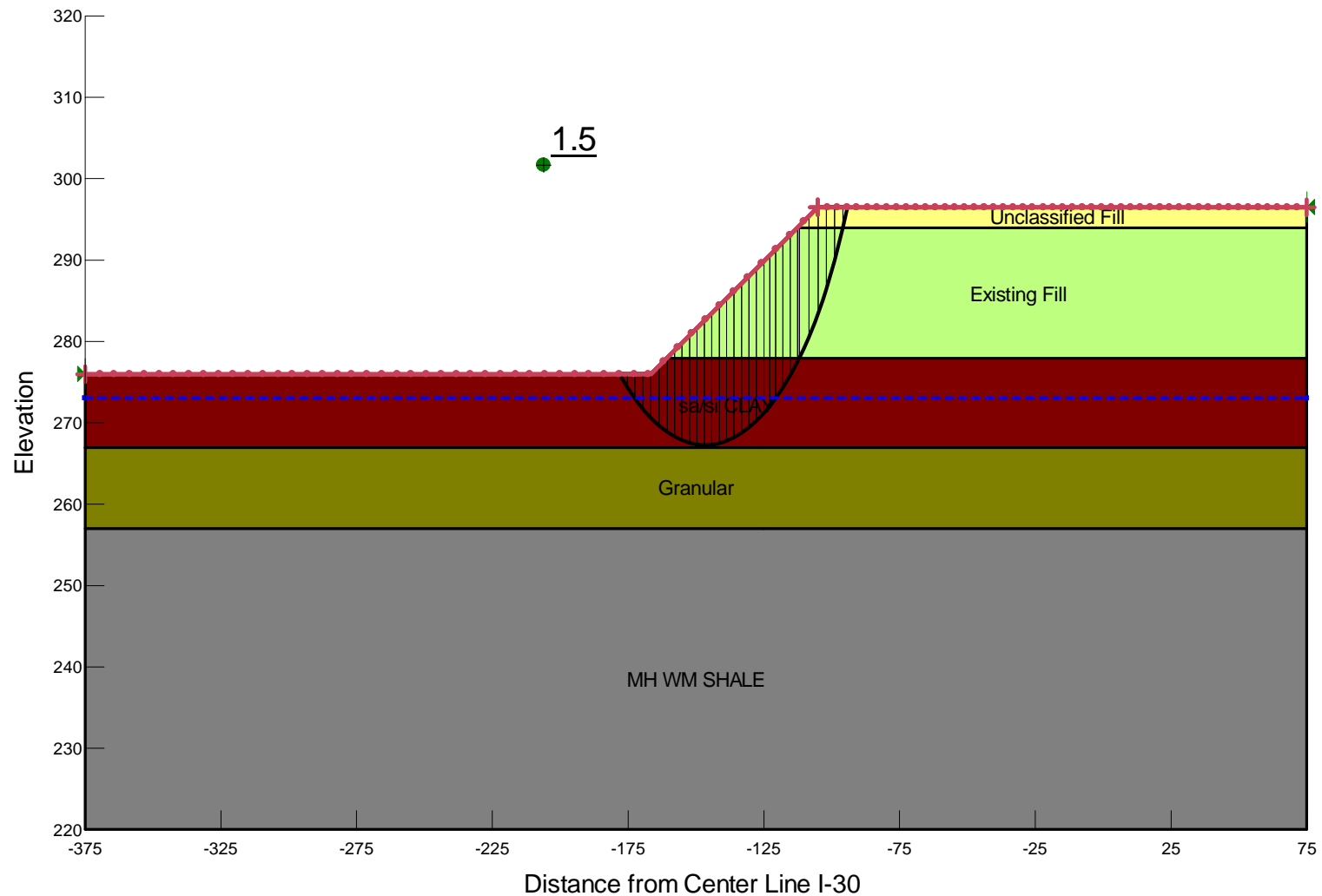


Results of Stability Analyses – End of Construction Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

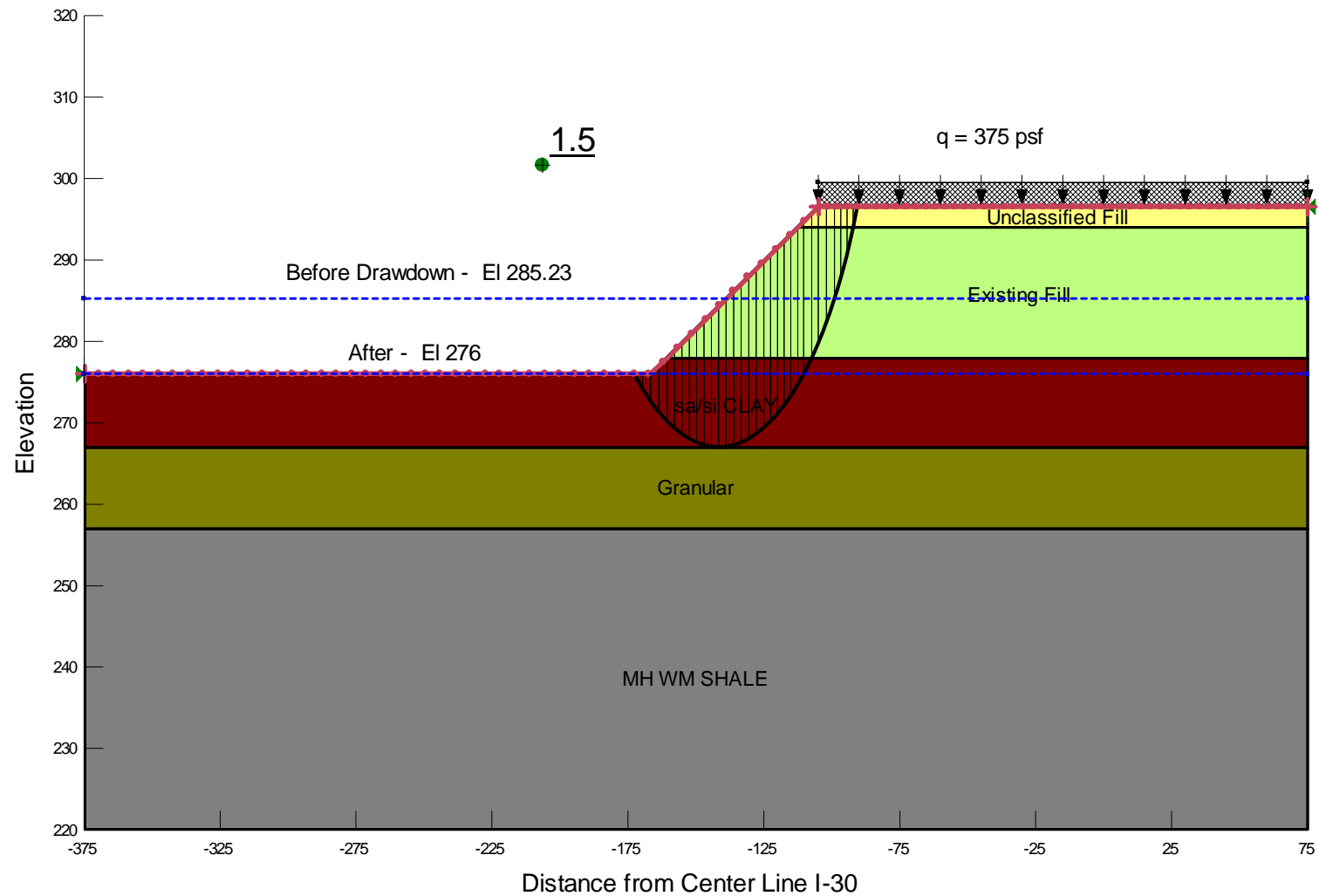




Results of Stability Analyses – Long Term Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 3H:1V Side Slopes @ East Abutment  
 Groundwater @ El 273  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

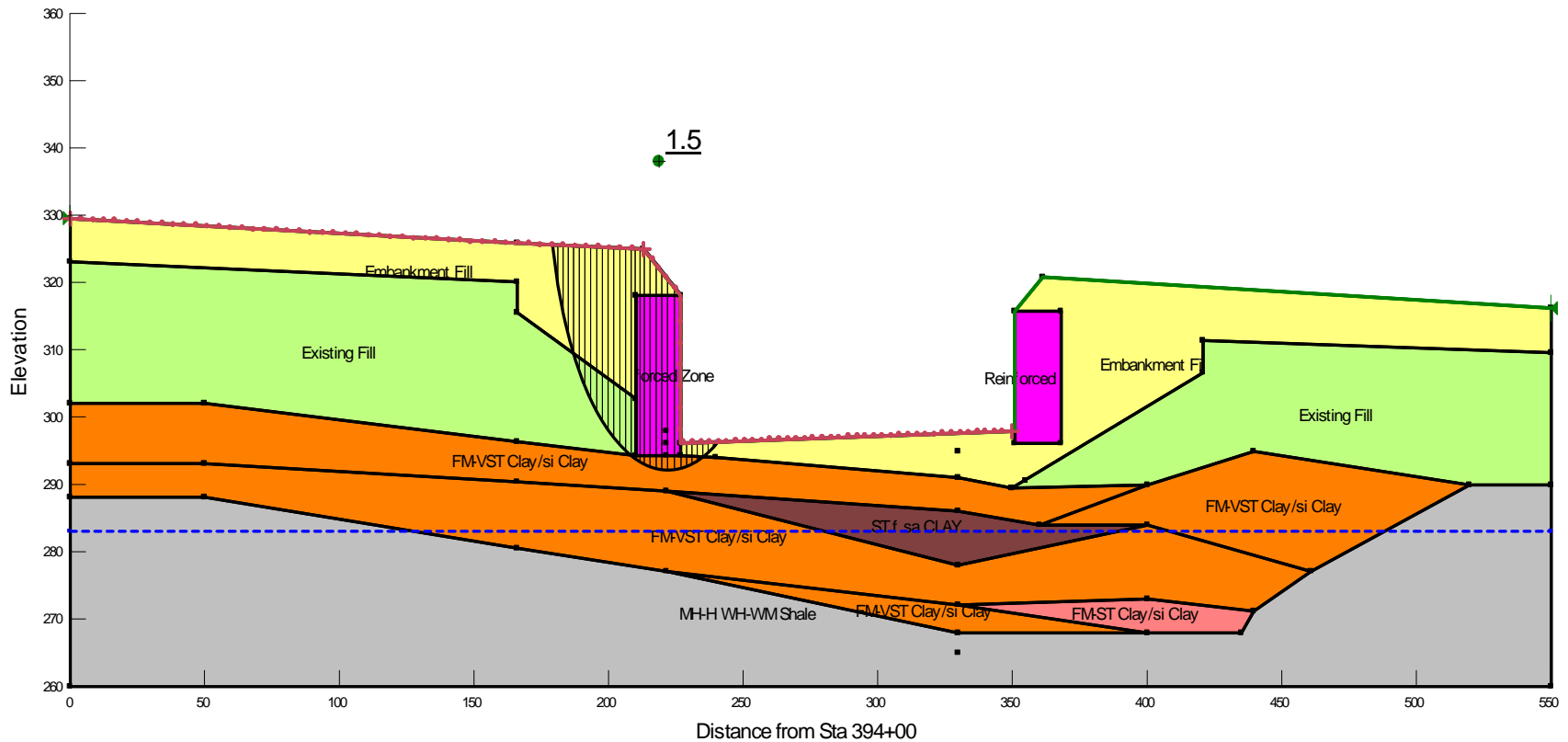


Results of Stability Analyses – Rapid Drawdown Condition  
 3H:1V Side Slopes @ East Abutment  
 Groundwater from El 285.23 to El 276  
 I-30 over Saline River Relief  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

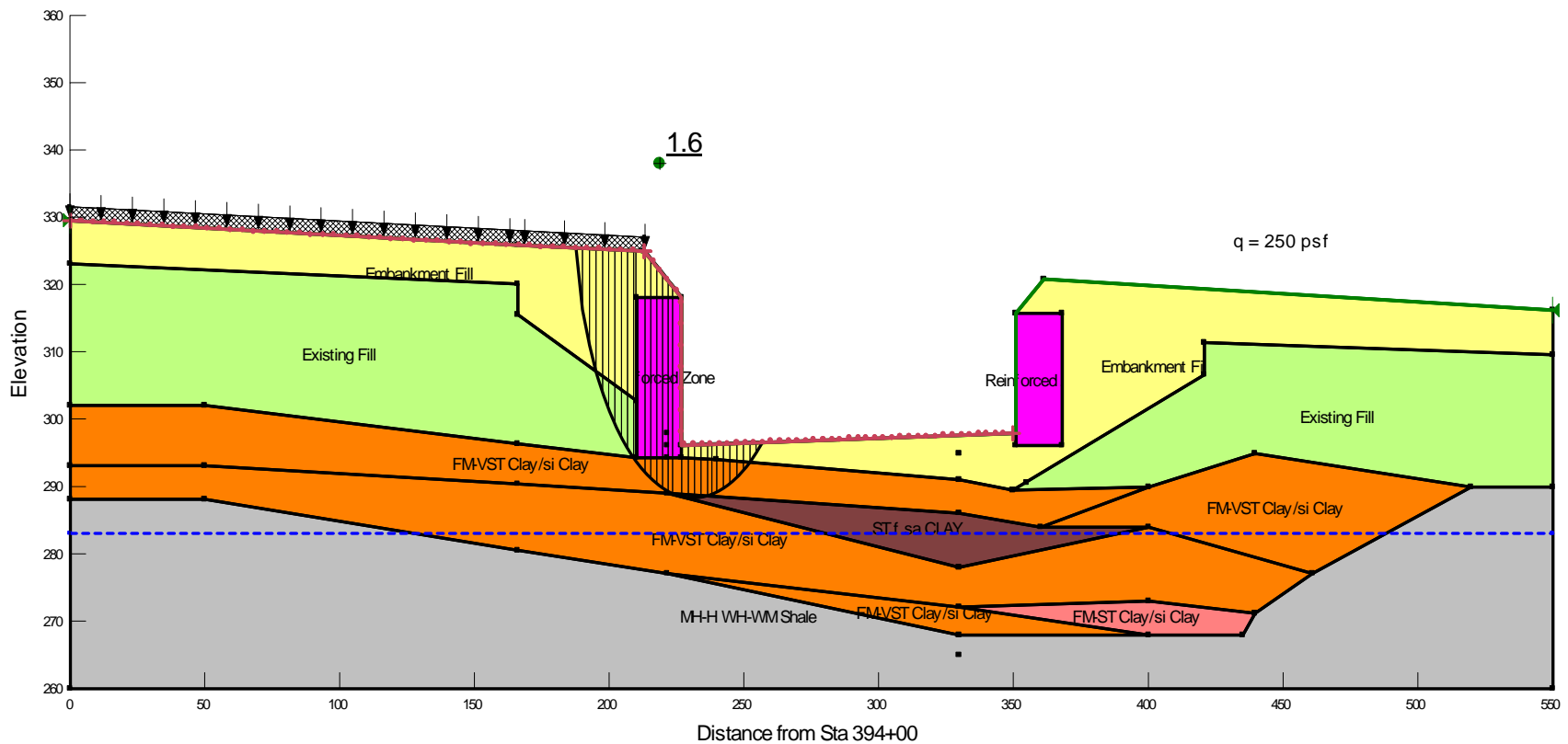
**ATTACHMENT 13**

**Summary of Stability Analysis Results**  
**2H:1V End Slope with MSE Wall @ West Bridge Abutment**  
**I-30 over Highway 67**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

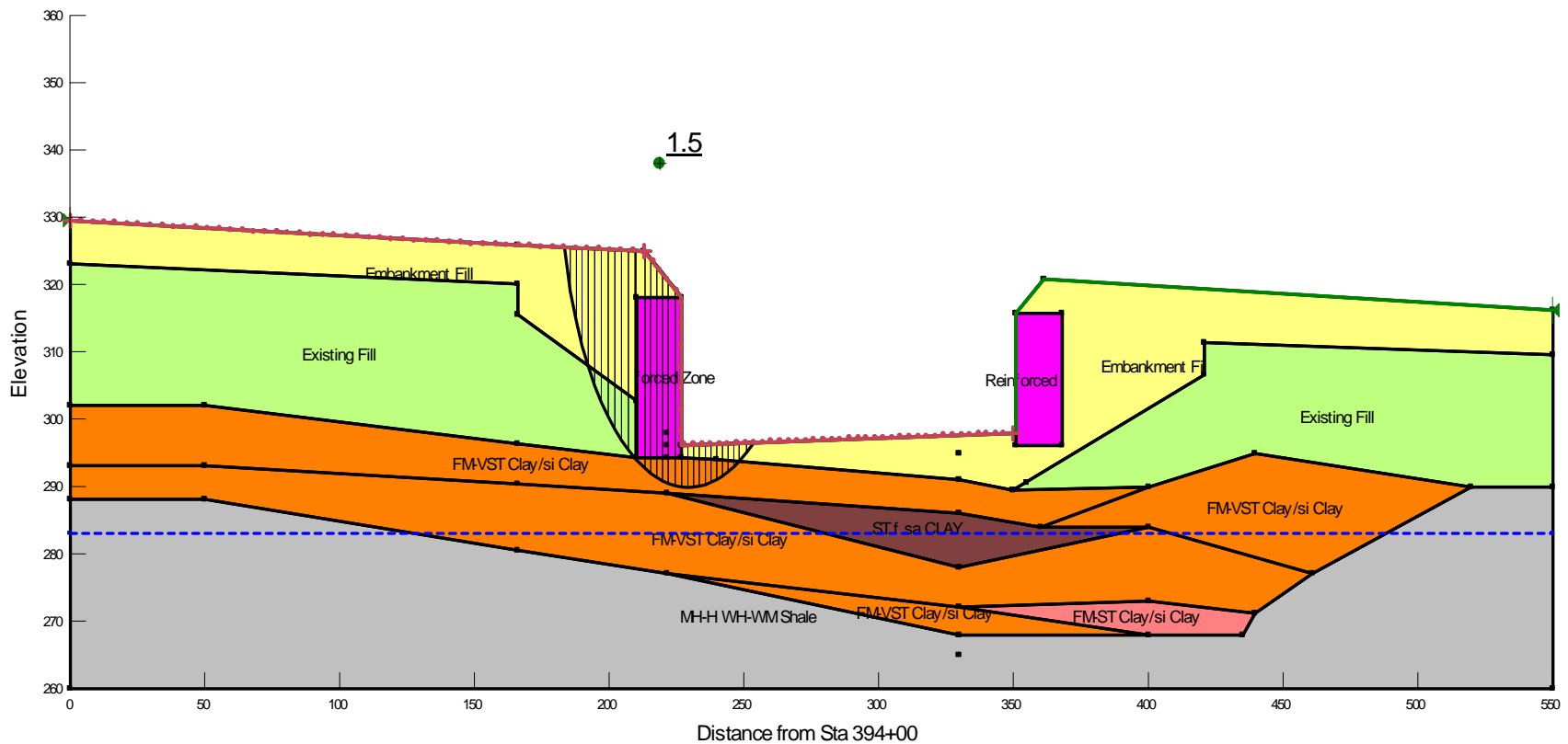
Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 1 (West Abutment)	End of Construction	1.5
	Long Term	1.6
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5



Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope with MSE Wall @ West Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope with MSE Wall @ West Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

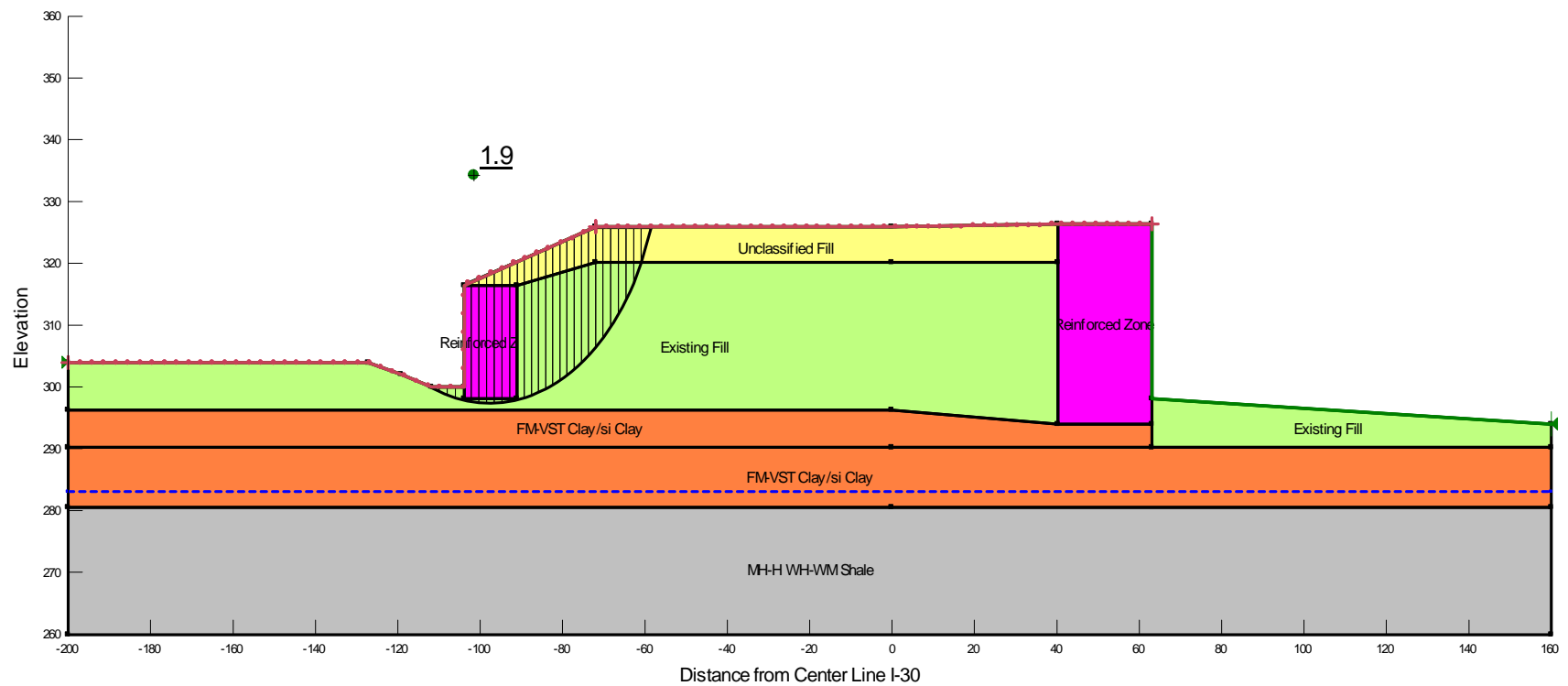


Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope with MSE Wall @ West Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

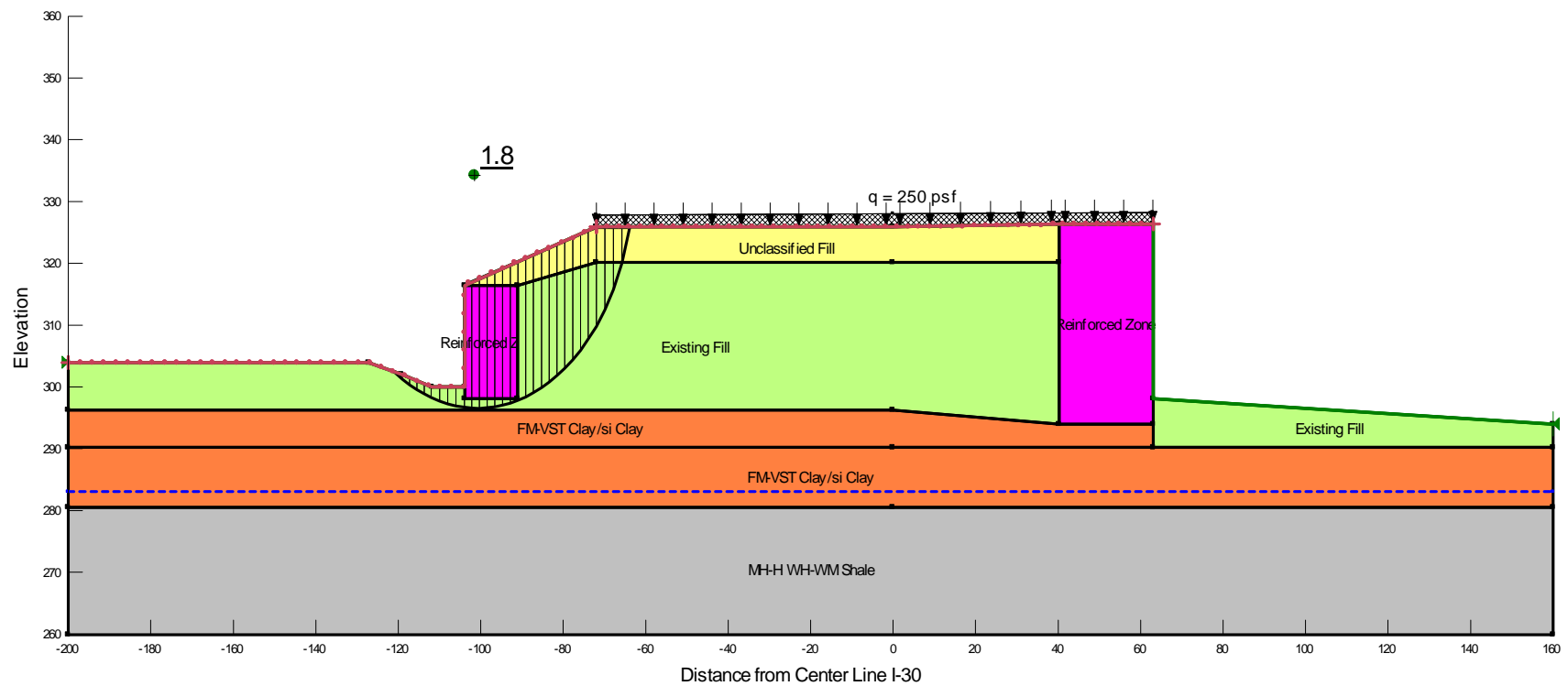


**Summary of Stability Analysis Results**  
**3H:1V Side Slopes with MSE Wall @ West Bridge Abutment**  
**I-30 over Highway 67**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

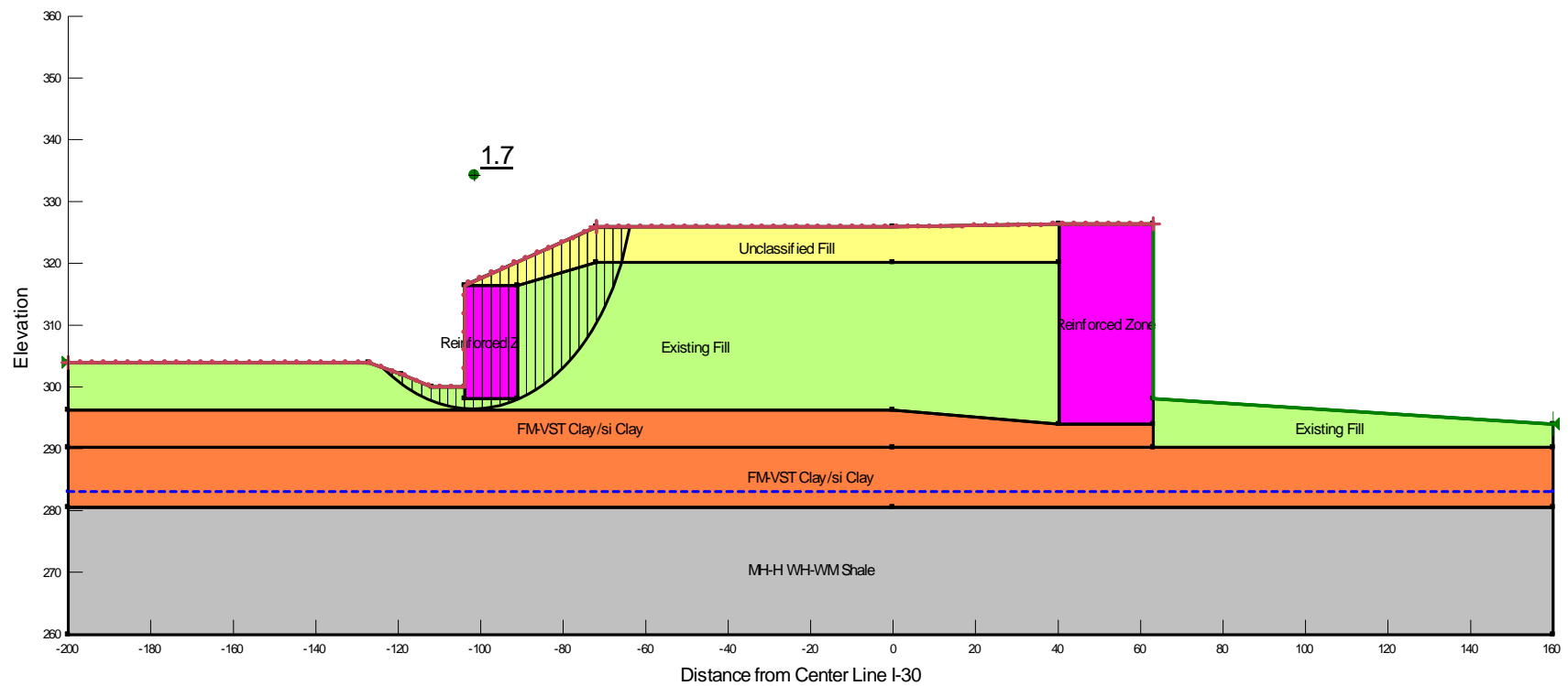
<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
North (Left)	End of Construction	1.9
	Long Term	1.8
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.7
South (Right)	End of Construction	1.6
	Long Term	1.7
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.6



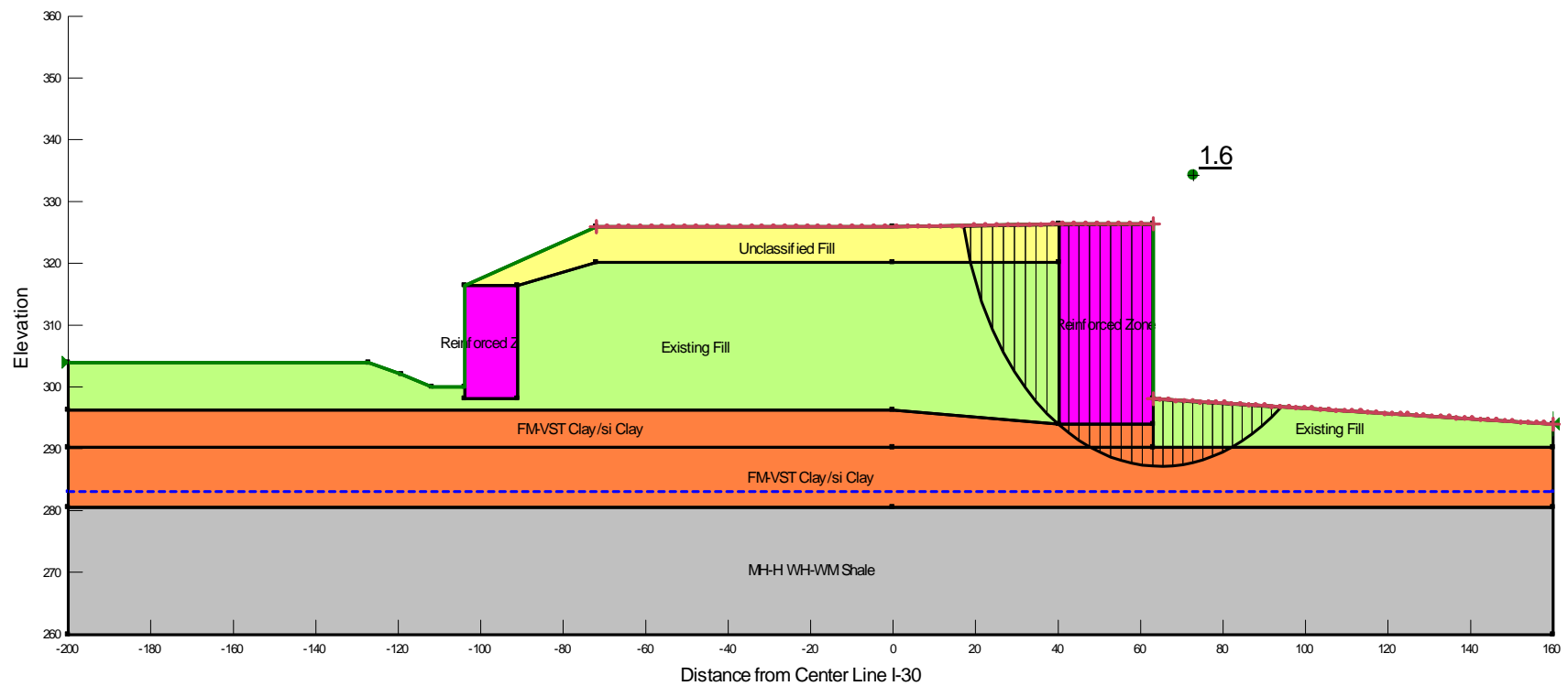
Results of Stability Analyses – End of Construction Condition  
 North (Left) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



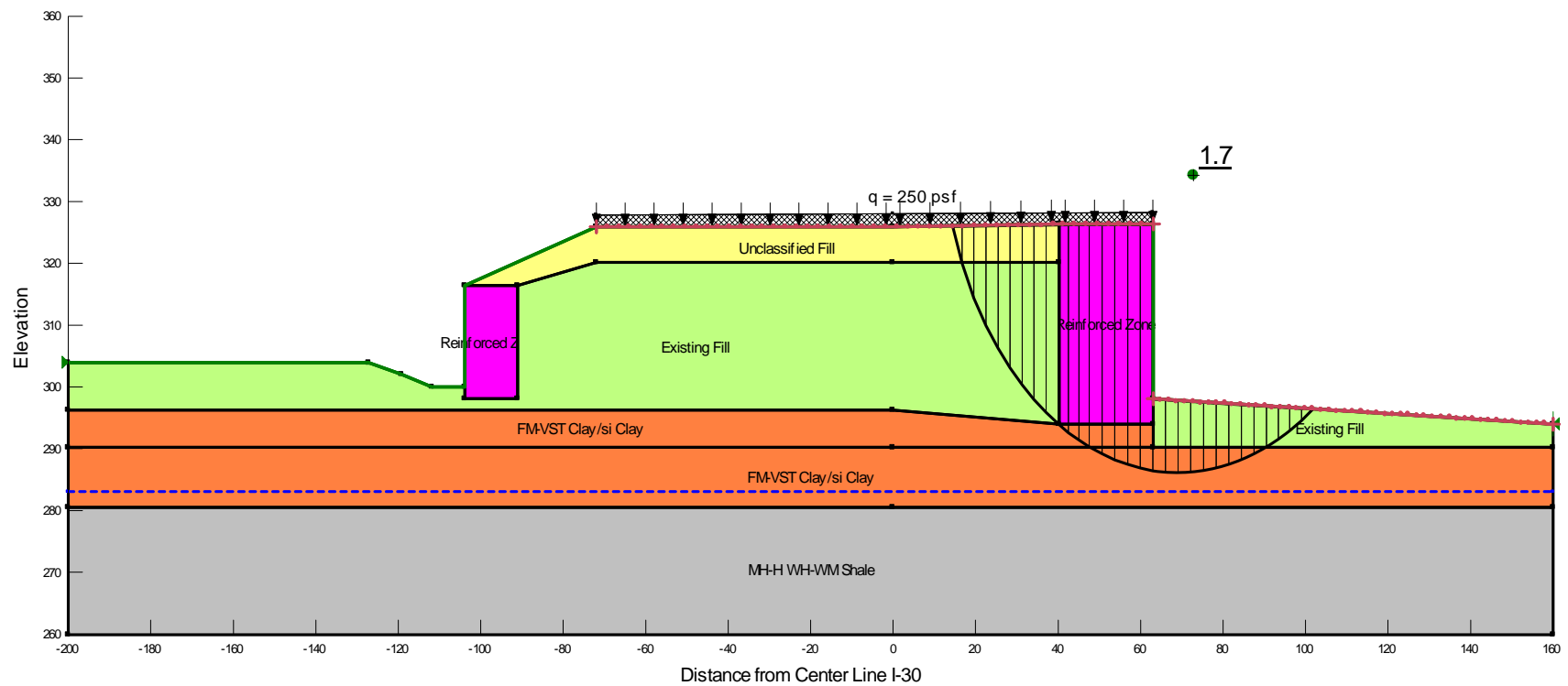
Results of Stability Analyses – Long Term Condition  
 North (Left) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



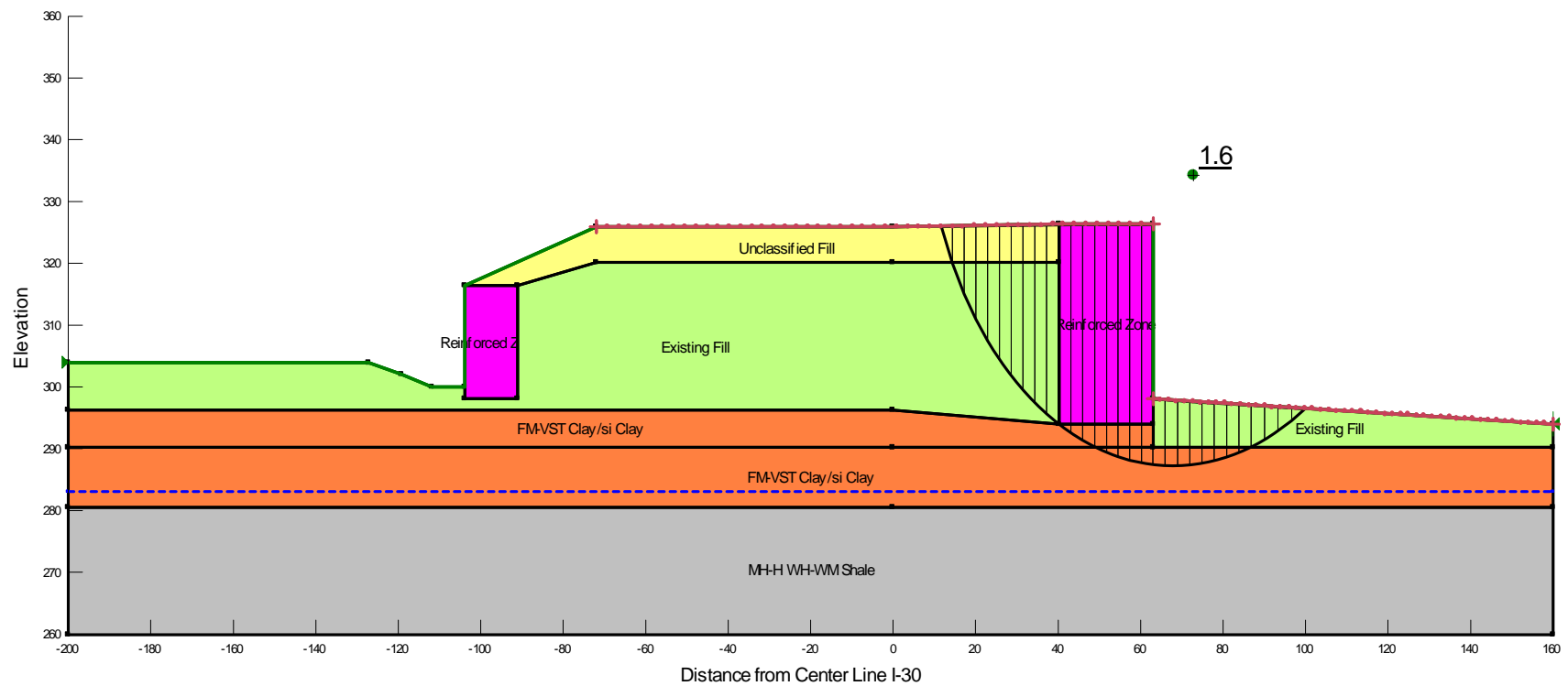
Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 North (Left) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – End of Construction Condition  
 South (Right) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Long Term Condition  
 South (Right) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

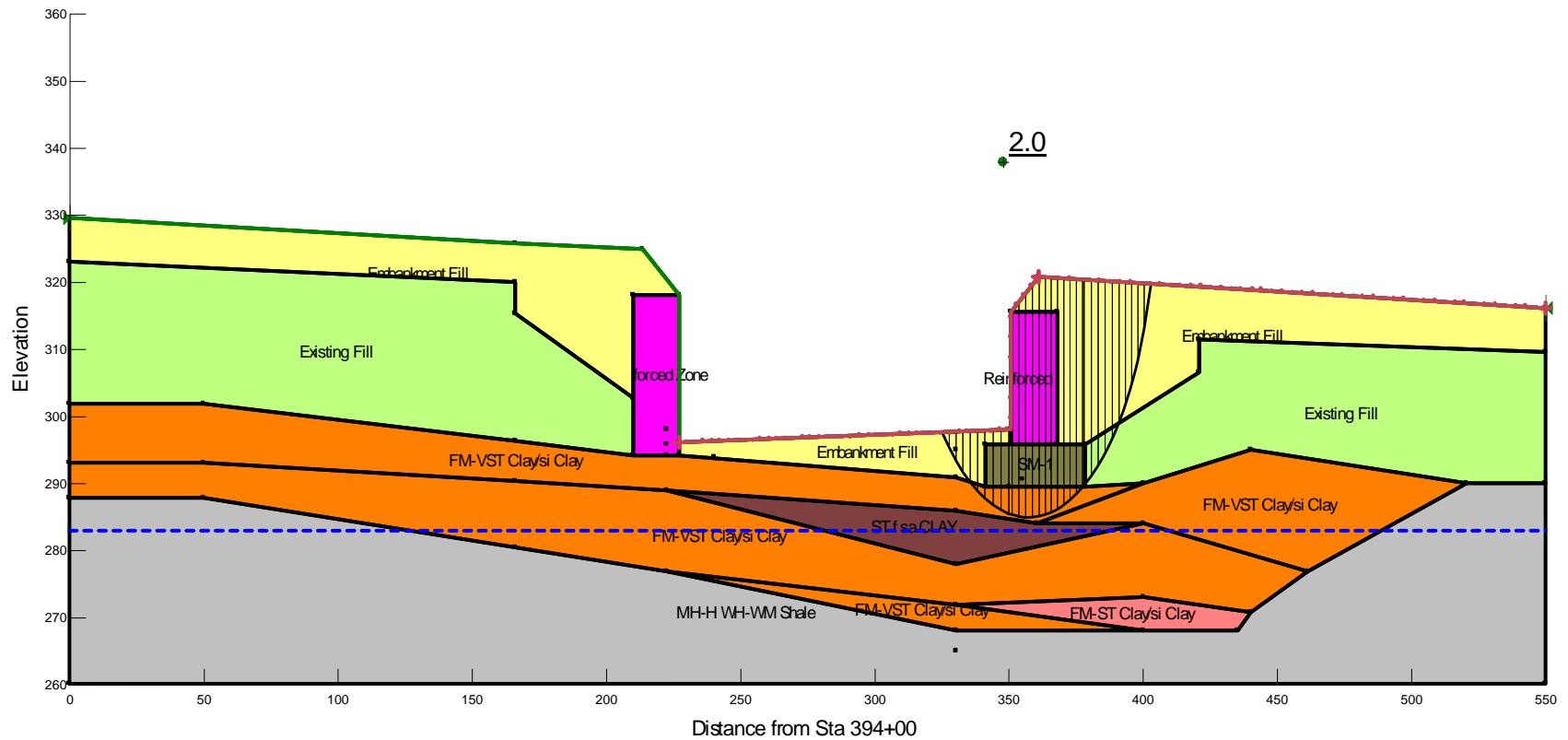


Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 South (Right) Side Slope @ West Bridge Abutment  
 Cross Section @ Sta 395+66  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

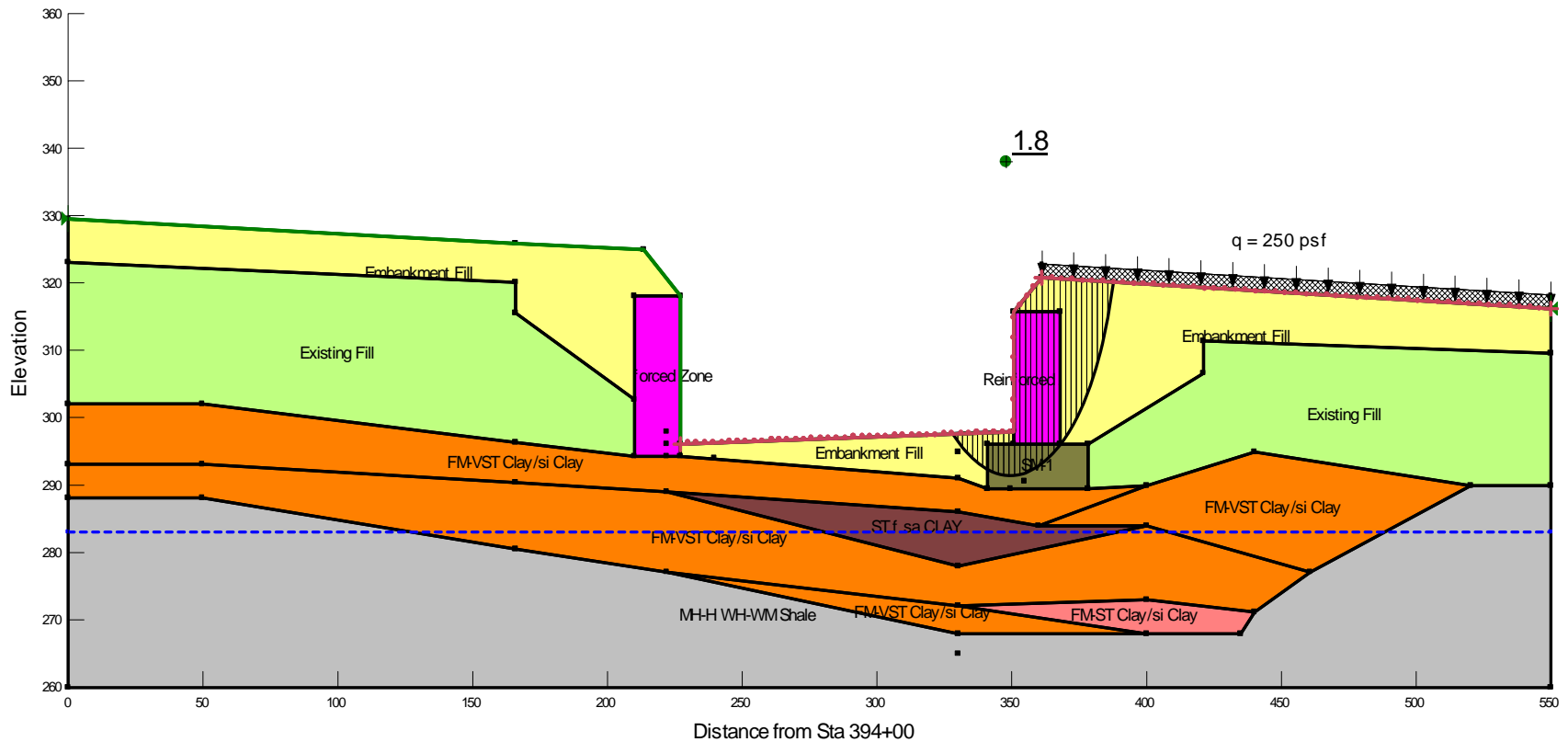
**Summary of Stability Analysis Results**  
**2H:1V End Slope with MSE Wall @ East Bridge Abutment**  
**I-30 over Highway 67**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

Bridge End	Design Loading Condition	Calculated Minimum Factor of Safety
Bent 2 (East Abutment)	End of Construction	2.0
	Long Term	1.8
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.8

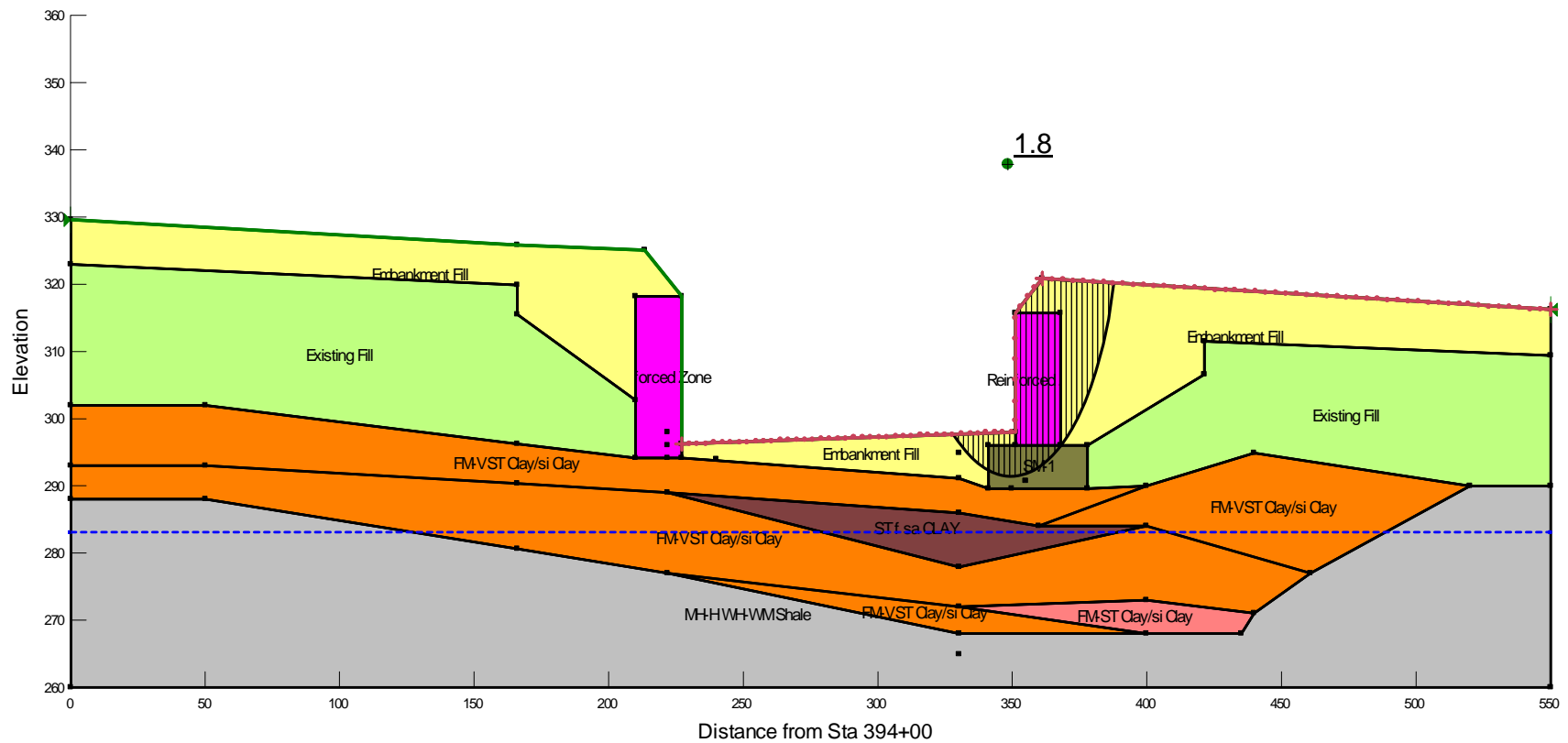




Results of Stability Analyses – End of Construction Condition  
 2H:1V End Slope with MSE Wall @ East Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



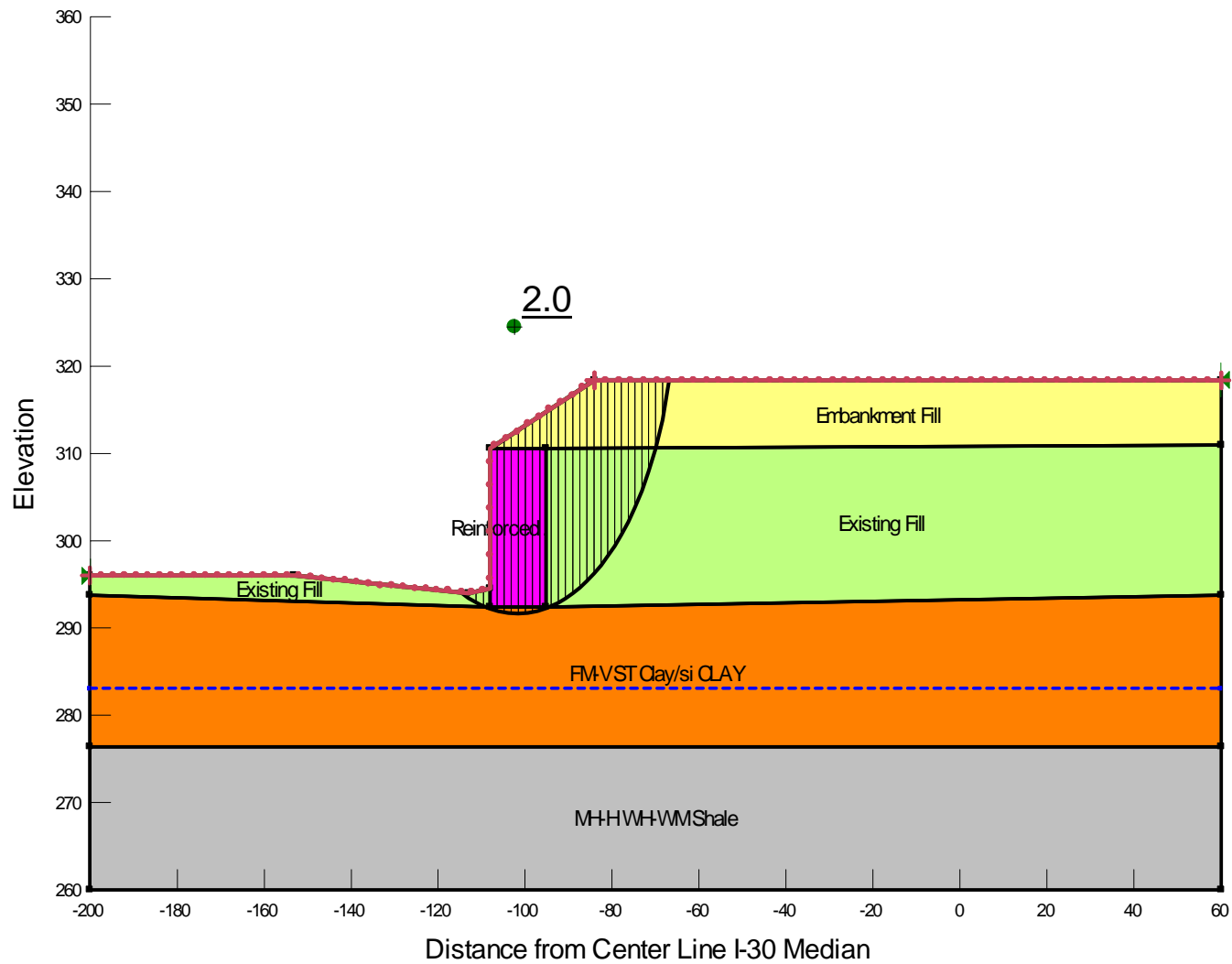
Results of Stability Analyses – Long Term Condition  
 2H:1V End Slope with MSE Wall @ East Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



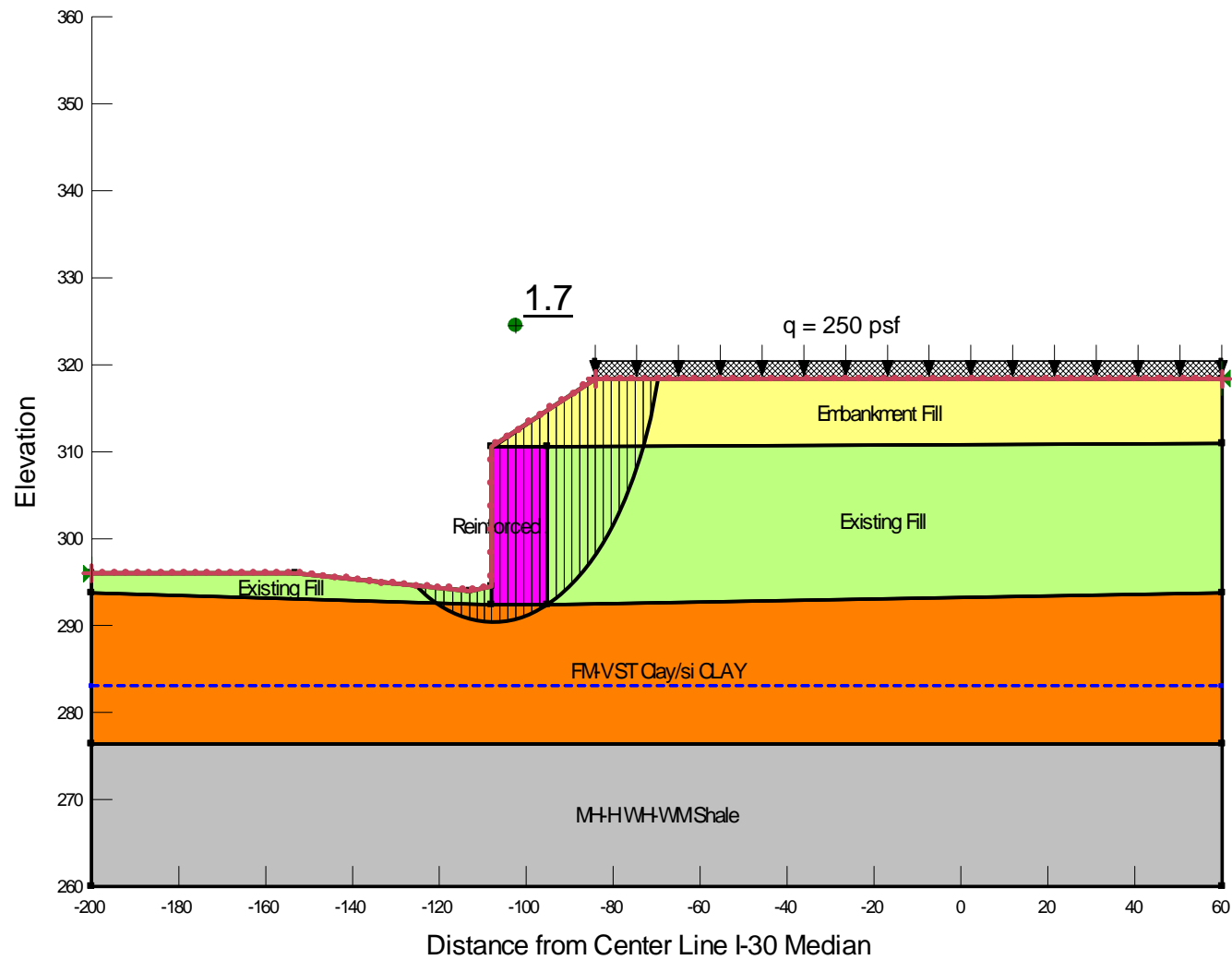
Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 2H:1V End Slope with MSE Wall @ East Abutment  
 Cross Section @ Center Line Bridge  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

**Summary of Stability Analysis Results**  
**3H:1V Side Slopes with MSE Wall @ East Bridge Abutment**  
**I-30 over Highway 67**  
**AHTD Job No. CA 0601 – HWY 70 – Sevier St. (Widening)(S)**

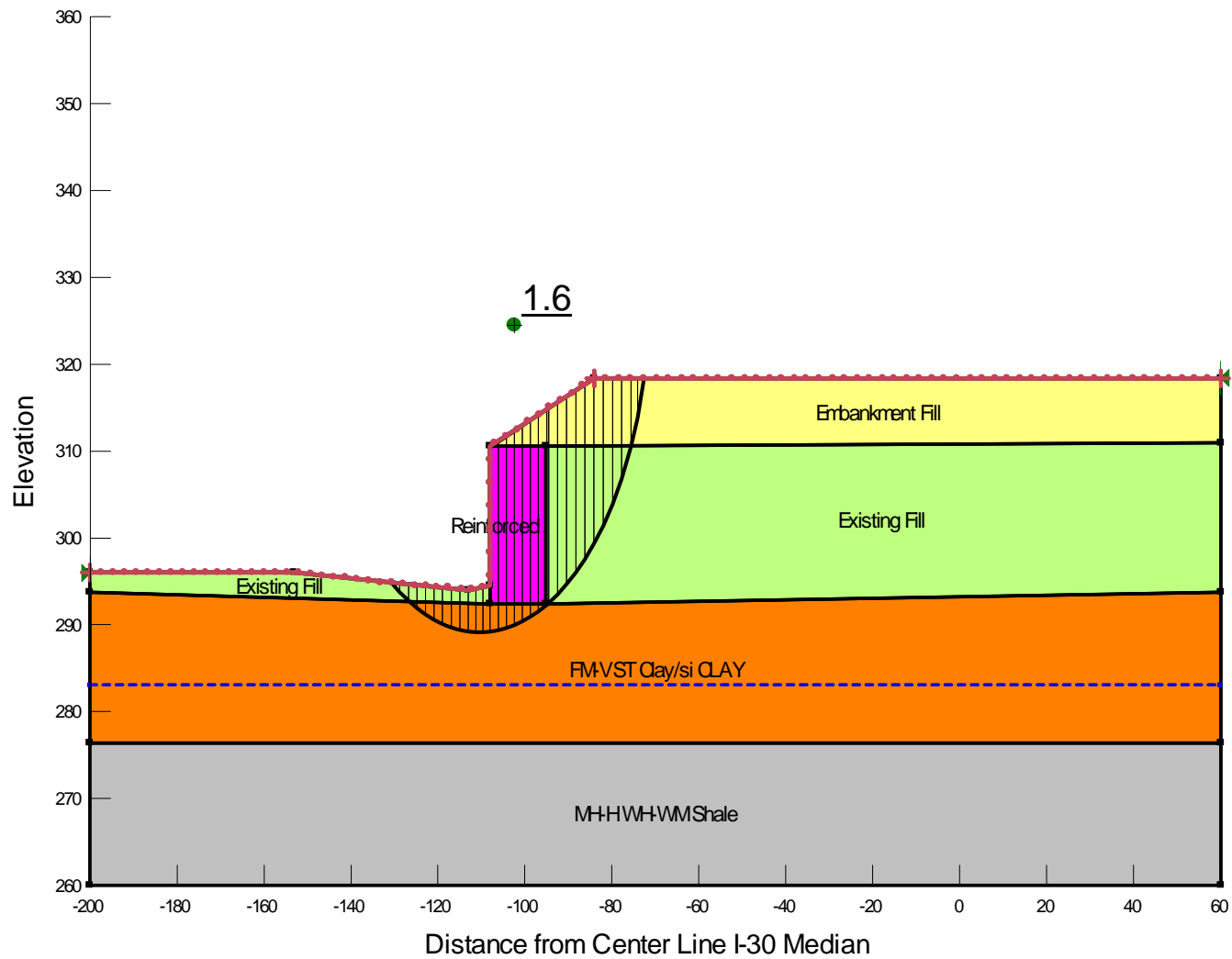
<b>Embankment Side</b>	<b>Design Loading Condition</b>	<b>Calculated Minimum Factor of Safety</b>
North (Left)	End of Construction	2.0
	Long Term	1.7
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.6
South (Right)	End of Construction	1.8
	Long Term	1.5
	Seismic ( $k_h = 0.5A_s = 0.07$ )	1.5



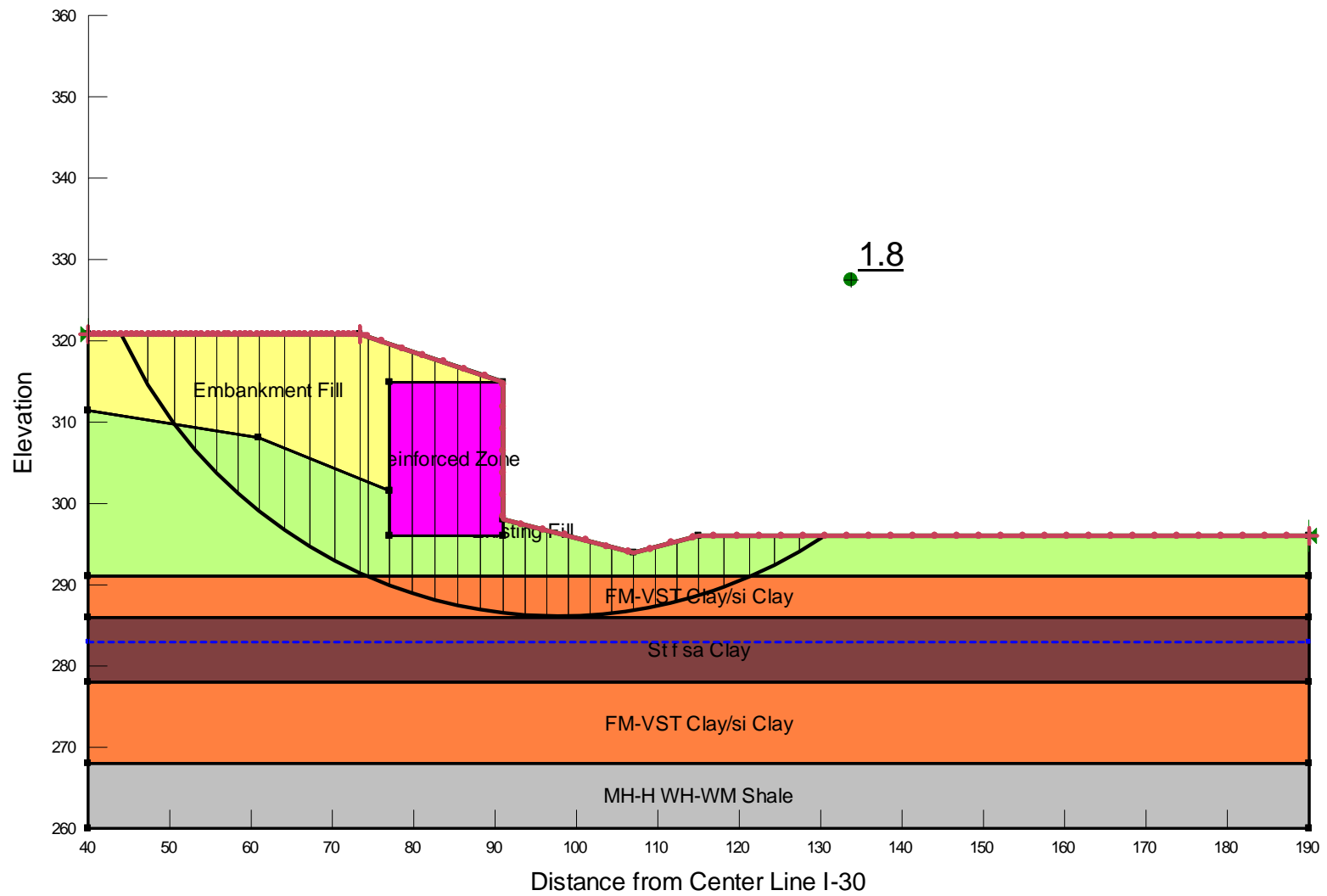
Results of Stability Analyses – End of Construction Condition  
 North (Left) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 398+59  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Long Term Condition  
 North (Left) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 398+59  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

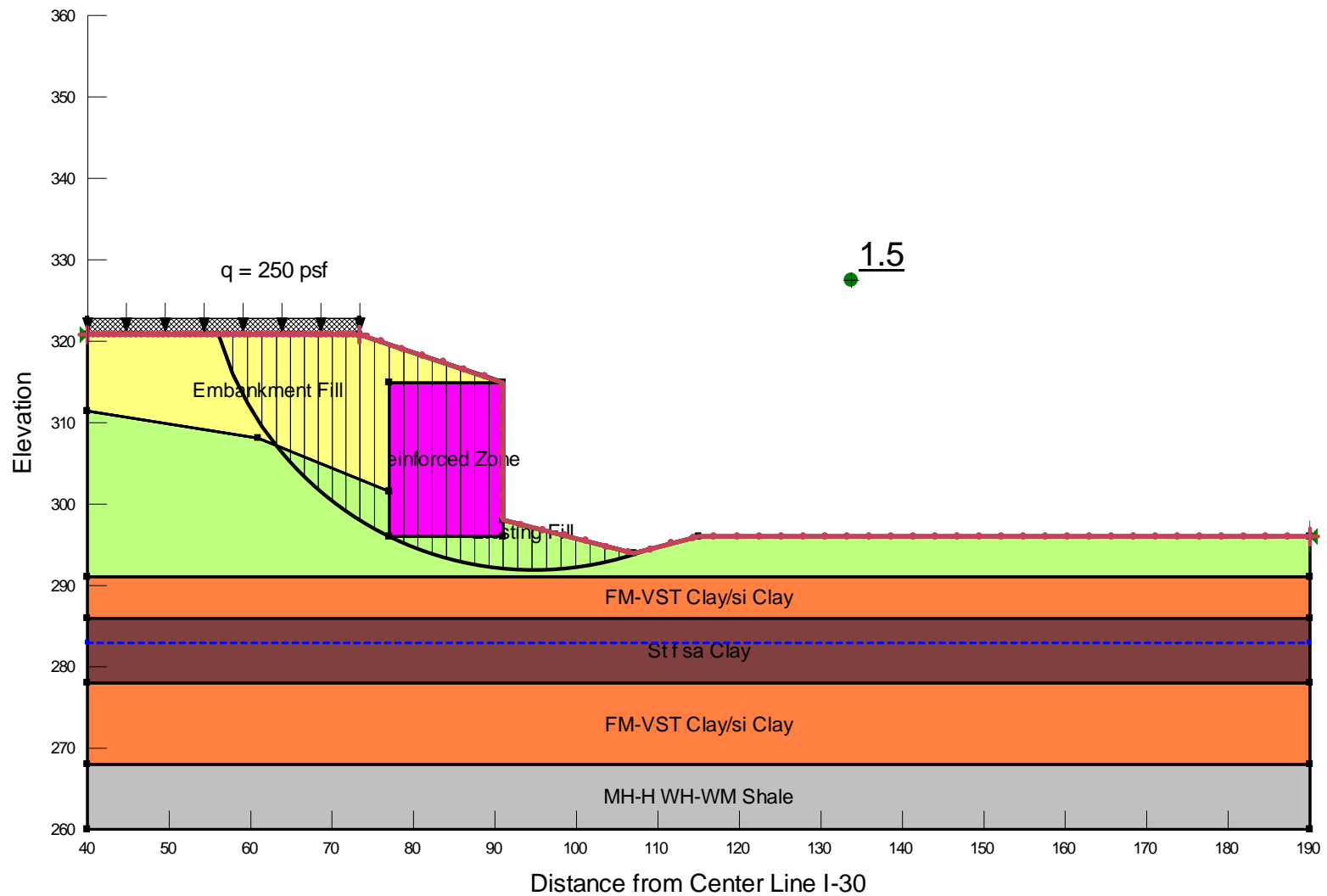


Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 North (Left) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 398+59  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)

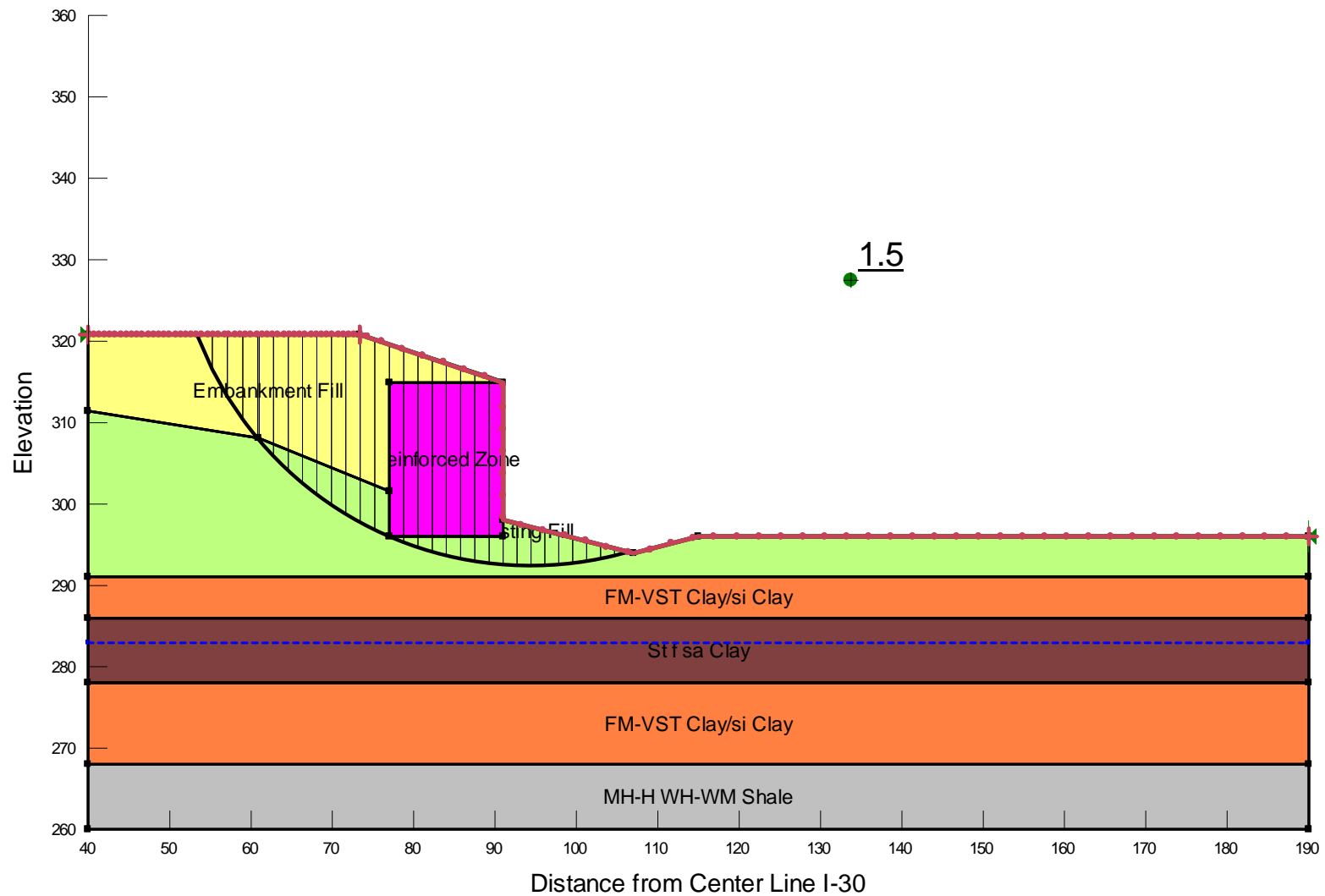


Results of Stability Analyses – End of Construction Condition  
 South (Right) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 397+31  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)





Results of Stability Analyses – Long Term Condition  
 South (Right) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 397+31  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)



Results of Stability Analyses – Seismic Condition ( $k_h = 0.5A_s = 0.07$ )  
 South (Right) Side Slope @ East Bridge Abutment  
 Cross Section @ Sta 397+31  
 I-30 over Highway 67  
 AHTD Job No. CA0601 – HWY 70 – Sevier St. (Widening)(S)