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

P.O. Box 30970
Little Rock, Arkansas 72260-0970
#1 Trigon Place 72209
(501) 455-2536
FAX (501) 455-4137

October 31, 2016
Job No. 14-030

Bridgefarmer & Associates, Inc.
12801 North Central Expressway, Suite 400
Dallas, Texas 75243

Attn: Mr. Shahriar Azad, P.E.

GEOTECHNICAL REPORT
RETAINING WALLS and CUT SLOPES
AHTD JOB CA0608
BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING)(S)
LITTLE ROCK, PULASKI COUNTY, ARKANSAS

INTRODUCTION

Submitted herewith is the final report of the geotechnical investigation performed relevant to the retaining walls and cut slopes associated with the Job CA0608 I-630 widening project. These walls and cut slopes are part of the AHTD Job CA0608: Baptist Hospital-University Avenue (Widening)(S) project in Little Rock, Pulaski County, Arkansas. Foundation and embankment recommendations for the CA0608 bridges were submitted on March 20, 2015 under a separate cover. Recommendations for pavement subgrade support were provided on February 17, 2015. Interim recommendations for walls were provided in the design memoranda submitted over the period of April 1, to April 20, 2015. The revised report incorporates the noise barrier walls planned for the project.

We understand that the project will include 12 new retaining walls (Walls AA through HH, JJ, KK, MM, and NN) in project alignment. Of these, Wall AA was initially planned as a soil nail retaining wall on the south side of Ramp 2 of I-630 Exit 7, which is near the Baptist Health Hospital. However, revised plans modified this section of the alignment to a cut slope with plan 2-horizontal to 1-vertical (2H:1V) configuration. The other walls are planned at various locations as conventional cantilevered concrete walls, mechanically stabilized earth (MSE) walls, and/or soil nail walls. The various wall facets included in the CA0608 project are summarized in Table 1 below.

Table 1: Summary of CA0608 Retaining Walls Slopes

Project Facet	Location	Type	Length, ft	Height, ft
Wall AA –	Ramp 2, I-630 interchange at Baptist Hospital exit	Soil nail	1344	6 to 18
Wall BB	South side of bikeway roundabout, east of Rock Creek	MSE	100	2 to 11
Wall CC	North side of bikeway roundabout, east of Rock Creek	Cantilevered	86	2 to 6
Wall DD	South upper wingwall at west abutment of Rodney Parham	MSE	346	5 to 7
Wall EE	North wingwall (Wall EE-1) and abutment wall (Wall EE-2) at east abutment of Rodney Parham	MSE	740	5 to 23
Wall FF	South side of I-630, west of Hughes Street	Primarily soil nail wall, some MSE	202	6 to 10
Wall GG	South abutment of Hughes Street	MSE	111	4 to 16
Wall HH	South side of I-630, east of Hughes Street	Primarily soil nail wall, some MSE	254	2 to 11
Wall JJ	North side of I-630, west of Hughes Street	Primarily soil nail wall, some MSE	1074	6 to 13
Wall KK	North abutment of Hughes Street	MSE	143	2 to 23
Wall MM	North side of I-630, east of Hughes Street	Primarily soil nail wall, some MSE	493	6 to 9
Wall NN	South side of I-630, 1000 ft east of Hughes Street	Soil nail wall	147	2 to 9

The existing highway embankment at the west end of the Rodney Parham Bridge is presently retained by conventional cantilevered retaining walls. We understand that these existing walls will remain for the replacement bridge and will be utilized in conjunction with a new concrete barrier wall on the left (north) and an upper MSE wall (Wall DD) on the right (south) to retain the widened roadway. Relevant design drawings of the existing lower retaining walls at Rodney Parham are provided in Attachment 1. The available drawings indicate that wall backfill is comprised of sand with clean crushed stone behind the wall heel forming a drainage zone.

At the existing east bridge abutment of the Rodney Parham Bridge, simple slopes are currently utilized to transition grades. Current plans are for the north embankment side slope to be modified by incorporating an upper MSE wall (Wall EE-1) to retain the widened roadway section. Wall EE-1 will turn at the northeast abutment corner and continue to the south to form the abutment wall (Wall EE-2) for the east bridge end. The plans indicate that no significant modification will be made to the south side slope to accommodate the widened roadway.

As noted, a concrete barrier wall is planned at the west end of the Rodney Parham Bridge between approximately Sta 1118+50 and Sta 1124+00. In addition, concrete barrier walls will also be included on other portions of the alignment, specifically between approximately Sta 1145+00 to Sta 1152+00. The concrete barrier walls will be relatively short and will be less than 5 ft high.

The general locations of the various new and existing walls and cut slops associated with the I-630 widening project are indicated on the key plan provided in Attachment 2. Current layout drawings of Walls BB through HH, JJ, KK, MM and NN are included in Attachment 3. The base drawings of the key plan and layouts are provided by the Engineer (Bridgefarmer).

Bearing capacity, sliding, and global stability analyses have been performed for the wall locations below. Unless noted otherwise, the referenced stationing in this submittal refers to I-630 stationing.

- Walls at the Baptist Health Hospital and Rock Creek Locations
    - Cross sections at Wall AA at Sta 1067+50 and Sta 1072+00
    - A cross section at Sta 1111+00 for Wall BB
    - A cross section at Sta 111+41 (bikeway stationing) for Wall CC
- Walls at the Rodney Parham Bridge locations
    - A representative cross (transverse) section at Sta 1123+00 (west bridge end)
    - A critical cross (transverse) section at Sta 1123+95.83 (west bridge end)
    - A representative cross (transverse) section at Sta 1129+00 (east bridge end)

  - A profile (longitudinal) section for evaluation of the east abutment wall (Wall EE-2)

- Walls associated with the Hughes Street Bridge
  - A cross section at Sta 1148+00 where the soil nail wall is the highest (13 ft)
  - A cross section at Sta 1154+25 (Hughes Street overpass location) where the MSE walls are the highest (23 ft)
  - A cross section at Sta 1168+00 where the soil nail wall is localized and has the steepest backslope

Cross sections at these wall locations are included in Attachment 4. The profile section for evaluation of the east abutment wall (Wall EE-2) was developed utilizing the bridge layout drawings received on March 27, 2015.

In addition to bearing capacity and stability analyses performed at these sections, lateral earth pressure distribution for the existing lower retaining walls was evaluated at the Sta 1123+00 and Sta 1123+95.83 cross sections.

The project also includes three (3) noise barrier walls: NB2, NB3, and NB4. The walls are typically proprietary light-weight sound walls with heights of 4 to 21 feet. The walls are supported on both footing and drilled shaft foundations, depending on the wall locations. The specifics of the walls are summarized below.

- Noise Barrier Wall NB2
  - The wall alignment extends from approximately I-630 Sta 1112+30 to I-630 Sta 1134+29, a length of about 2199 feet.
  - Wall heights vary from about 14 to 21 ft above final grade.
  - Wall NB2 will utilize shallow foundations.
- Noise Barrier Wall NB3
  - The wall alignment extends from approximately I-630 Sta 1132+00 to I-630 Sta 1148+50, a length of approximately 1650 feet.
  - Wall heights vary from about 4 to 20 ft above final grade.
  - Wall NB3 will utilize shallow foundations from the start of wall at approximately I-630 Sta 1132+00 to I-630 Sta 1143+40.
  - From I-630 Sta 1143+40 to the end of Wall NB3 at I-630 Sta 1148+50, drilled shaft foundations will be used.
- Noise Barrier Wall NB4
  - The wall alignment extends from approximately I-630 Sta 1154+70 to I-630 Sta 1171+20, a length of approximately 1650 feet.
  - Wall heights vary from about 8 to 17 ft above final grade.
  - From the start of the wall at I-630 Sta 1154+70 to approximately I-630 Sta 1162+60, Wall NB4 will utilize drilled shaft foundations.

- Wall NB4 will utilize shallow foundations from about I-630 Sta 1162+60 to the end of the wall at approximately I-630 Sta 1171+20.

Maximum foundation loads of the noise barrier walls are expected to include minor axial loads, a maximum 6.4 kips shear, and 64.5 kip-ft maximum overturning moment.

The purposes of this study phase were to explore subsurface conditions in the wall alignments, utilize these subsurface data as well as that developed from other project phases where appropriate, and to develop recommendations to guide design and construction of walls and wall foundations. The results of the field and laboratory studies relevant to this project phase are discussed in the following report sections. Conclusions and recommendations are discussed in subsequent report sections.

SUBSURFACE EXPLORATION

Wall AA at Baptist Health Hospital Location

Subsurface conditions in the vicinity of Ramp 2 of I-630 Exit 7 were investigated by performing eight (8) sample borings or test pits advanced to depths of 2 to 17 ft below existing grades. The existing cut slope in the Ramp 2 Wall AA alignment was not accessible to drilling equipment. Consequently, soil and rock conditions in this area were evaluated by mapping the cut slope face. Logs developed by cut slope mapping are provided for locations of W10, W11, and W12. Logs of these borings, test pits and mapped cuts are included in Attachment 5.

Walls BB and CC at Rock Creek Locations

Subsurface conditions in the vicinity of Walls BB and CC were explored by numerous borings performed in the vicinity of the Rock Creek Bridge and the adjacent pedestrian bridge. Specifically, three (3) borings were drilled in the wall alignment or in close proximity. These logs are provided in Attachment 6.

Walls DD and EE at the Rodney Parham Bridge Locations

Subsurface exploration program in the Rodney Parham Bridge wall alignments includes 17 sample borings performed to 7- to 50-ft depth. These borings includes Borings S1 through S4, Borings W1 through W9, Boring W1A, and Borings W27 through W29. Logs of these borings are included in Attachment 7.

Walls Associated with the Hughes Street Bridge – Walls FF, GG, HH, JJ, KK, MM, and NN

Subsurface conditions in the Hughes Street bridge alignment and wall alignments were initially evaluated by drilling 26 sample borings to depths of 2.3 to 80 ft below existing grades. To

further investigate subsurface conditions in the Hughes Bridge wall alignments, and to develop data on the condition and dip of the predominant weathered shale in the vicinity of the back of wall, 14 test pits (Test Pits A through N) were excavated to 2.5- to 4.5-ft depth and one (1) boring (Boring W19A) was drilled to 30-ft depth. The approximate boring and test pit locations are shown on the Plan of Borings and Test Pits, Plates 1a and 1b included in Attachment 8. The results of the borings and test pits, showing soil and rock stratigraphy and the results of the field and laboratory tests, are presented on the logs provided as Plates 2 through 43 of Attachment 8. The approximate ground surface elevation at the boring and test pit locations, as inferred from the topographic information provided by the Engineer, is shown on each log. It must be recognized that these elevations are approximate only and actual elevations may vary. Keys to the terms and symbols used on the logs are included as Plates 44 and 45 of Attachment 8.

The supplemental test pits were excavated with a mini track excavator equipped with an 18-in. bucket. Representative bulk samples were obtained from test pit sidewalls or from excavation spoil. Undrained shear strength of soil and weathered shale was estimated using a calibrated hand penetrometer on test pit sidewalls or on intact pieces of excavation spoil. Estimated shear strength values are plotted on the log forms, in tons per sq ft, as circles enclosing an "x".

Groundwater conditions were also observed during test pit excavation. The observations regarding groundwater are noted in the lower-right portion of each log and are discussed in subsequent sections of this report. The test pits were backfilled after obtaining final groundwater level readings.

Walls Associated with Noise Barrier Walls NB2, NB3/Berm B, and NB4

Subsurface conditions in the noise barrier walls were evaluated by drilling 15 borings (Borings NSA1 through NSA15) in or near the noise barrier wall alignments. It should be noted that Borings NSA9 through NSA15 were initially drilled in the plan alignment of Berm B, which has since been eliminated from the project. The approximate boring locations are shown on the Plan of Borings, Plates 1a through 1e of Attachment 9. Boring logs, showing soil and rock stratigraphy and the results of the field and laboratory tests, are presented on Plates 2 through 16 of Attachment 9. The approximate ground surface elevation at the boring locations, as inferred from the topographic information provided by the Engineer, is shown on each log. It must be recognized

that these elevations are approximate only and actual elevations may vary. Keys to the terms and symbols used on the logs are included as Plates 17 and 18 of Attachment 9.

Groundwater conditions were also observed during drilling operations. The observations regarding groundwater are noted in the lower-right portion of each log. All boreholes were backfilled after obtaining final water level measurements.

ANALYSES and RECOMMENDATIONS

General Wall Design Considerations

Recommendations for walls are summarized on the table provided in Attachment 10. Detailed results of analyses and recommendations for walls are discussed in the following paragraphs.

MSE Walls. It is understood that MSE walls will be designed by Others on behalf of the Contractor. MSE wall backfill in the reinforced zone must comply with the Designer's specifications. As a minimum, the reinforced zone backfill is expected to comply with AHTD Standard Specifications Section 302, SM-1 or Section 303, Class 7. Consequently, the reinforced backfill should have a minimum total unit weight (γ) of 125 lbs per cu ft and a minimum angle of internal friction (ϕ) of 28°.

Soil Nail Walls. Soil nail walls are planned for Wall AA (at Ramp 2) and several walls at Hughes Street. Considerations related to wall design are discussed in the following paragraphs.

Wall AA. The height of Wall AA is expected to range from about 6 ft to 18 feet. The backslope behind the wall will have a plan configuration of 2-horizontal to 1-vertical (2H:1V). Preliminary design of the soil nail walls has been performed utilizing the methodology of FHWA Circular No. 7[1] and evaluation of anchorage capacity to resist lateral earth pressure loads on the wall face. The parameters utilized for the preliminary soil nail wall design are summarized below.

- Soil nail wall block soils: moderately hard weathered shale, steeply bedded
- Total unit weight (γ): 140 lbs per cu ft
- Effective cohesion intercept (c'): 0
- Effective angle of internal friction (ϕ'): 31°
- Ultimate soil-grout bond strength (q_u): 18 lbs per sq in.
- Drill hole diameter: 4 in.

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

- Bar yield strength: 60 kips per sq in.
- Anchor batter: 20°
- Assumed Nominal Grout Bond: 30 lbs per sq in. (shale)

Analyses and preliminary design have been performed for two (2) wall sections, representing different wall heights. These include:

(1) Sta 1067+50 with a wall height of about 18 ft, wall bottom at El 390, the top of the wall at ±El 408, and with a 2H:1V backslope extending to ±El 413.

(2) Sta 1072+00 with a wall height of about 10 ft, wall bottom at El 390, the top of the wall at ±El 400, and with a 2H:1V backslope extending to ±El 413.

For the purposes of the preliminary analyses to determine anchor length, the backslope above the top of the wall has been treated as a soil surcharge, with the lateral earth pressure distributed based on the active earth pressure coefficient.

The results of the preliminary analyses for these two (2) wall sections are summarized in Tables 2 and 3 below.

Table 2: Preliminary Design - Soil Nail Wall AA at Sta 1067+50 (H = 18 ft)

Vertical bar spacing (S_V), ft	5
Horizontal bar spacing (S_H), ft	5
Minimum bar length, ft	26
Bar size	#6
Bar length/wall height ratio (L/H)	1.4

Table 3: Preliminary Design – Soil Nail Wall AA at Sta 1072+00 (H = 10 ft)

Vertical bar spacing (S_V), ft	5
Horizontal bar spacing (S_H), ft	5
Minimum bar length, ft	21
Bar size	#6
Bar length/wall height ratio (L/H)	2.1

The horizontal and vertical wall spacing evaluated was 5 ft each way. For the preliminary design, the nail spacing was assumed to be staggered, with the first run of nails located at 1.5 ft above the wall bottom. For the 18-ft-high wall section, four (4) horizontal runs of anchors were evaluated. As the wall height becomes lower, the number of horizontal anchor rows will decrease. For the 10-ft-high wall, two (2) horizontal runs of anchors were evaluated.

Hughes Street Walls. The soil nail walls at Hughes Street are expected to range from about 2 ft to 13 ft high. The backslope behind walls will vary from near horizontal to 2-horizontal to 1-vertical (2H:1V) or flatter at Wall NN. Preliminary design of soil nail walls was

performed utilizing the methodology of FHWA Circular No. 7[2]. The parameters utilized for the preliminary design include the following.

- Soil nail wall block soils: low hardness to moderately hard weathered shale, steeply bedded
- Total unit weight (γ): 140 lbs per cu ft
- Effective cohesion intercept (c'): 0
- Effective angle of internal friction (ϕ'): 31°
- Ultimate soil-grout bond strength (q_u): 14.5 lbs per sq in.
- Drillhole diameter: 4 in.
- Bar yield strength: 60 kips per sq in.
- Anchor batter: 20°
- Assumed Nominal Grout Bond: 14.5 lbs per sq in. (weathered shale)

Analyses and preliminary design were performed for two (2) representative wall sections: (1) Sta 1148+00, the section with maximum wall height (13 ft), and (2) Sta 1168+00, the section with the steepest backslope configuration. The results of these analyses for preliminary design are summarized in Tables 4 and 5 below. Conceptual sketches showing these wall locations in section and elevation views are provided in Attachment 10.

Table 4: Preliminary Design – Soil Nail Wall JJ at Sta 1148+00 (H = 13 ft)

Vertical bar spacing (S_V), ft	4
Horizontal bar spacing (S_H), ft	4
Minimum bar length, ft	16
Bar size	#6
Bar length/wall height ratio (L/H)	1.2

Table 5: Preliminary Design – Soil Nail Wall NN at Sta 1168+00 (H = 10 ft)

Vertical bar spacing (S_V), ft	4
Horizontal bar spacing (S_H), ft	4
Minimum bar length, ft	12
Bar size	#6
Bar length/wall height ratio (L/H)	1.2

Soil Nail Wall Design and Construction Considerations. Final design of soil nail walls will be developed by Others on behalf of the Contractor. Final design could vary from the preliminary designs above depending on nail spacing and length, wall height, wall backslope, surcharge loads, nail installation method, drillhole diameter, and design grout-soil bond strength. We recommend that the design grout-soil bond strength be confirmed by at least one (1) verification test for each wall. We also recommend that a minimum of 10 percent of anchors on

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

each wall or at least three (3) production anchors per wall, whichever number is greater, be proof-tested to at least 1.3 times the design load for each wall.

The Contractor should select the most suitable anchor type and installation method for the particular system being utilized. The Contractor's soil nail wall design, including the load test program, proposed anchor layout, corrosion protection details, connection to wall face, and the work plan should be reviewed and approved by the Engineer or Department prior to acceptance and the start of work. A sample Special Provision for soil nail walls is provided in Attachment 11.

Bearing and Sliding Stability – New Walls

MSE Wall BB. Wall BB will be an MSE wall located at the east end of the new bikeway bridge at Rock Creek, oriented north-south at the bridge end and returning east parallel to the bridge. The Wall BB layout drawings indicate a total wall length of about 100 ft, a maximum height of about 11 ft, and a subgrade planned at El 320± on the north, rising to about El 330 at the east end.

The results of borings performed in this area indicate that the wall will bear in the stable on-site embankment fill. Based on the results of the borings performed in this area, the embankment fill is predominantly stiff to very stiff tan, reddish tan, reddish brown, brown, gray, to dark gray silty clay with shale and sandstone fragments. In light of the results of the borings and the age of the existing embankment, the embankment fill is generally stable and expected to provide a suitable foundation stratum for the new wall.

Based on the anticipated bearing stratum of stiff to very stiff silty clay with shale and sandstone fragment fill, an ultimate / nominal unit bearing resistance of 6000 lbs per sq ft is recommended for Wall BB with minimum 2 ft embedment. A resistance factor (φ_b) of 0.65 is recommended with a resulting maximum factored unit bearing resistance (q_R) of 3900 lbs per sq ft considered to be suitable. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.0 inch.

The suitability of the MSE wall bearing stratum must be field verified by the Engineer or Department at the time of construction. The on-site fill contains occasional cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone fragments. Where cobbles or boulders are encountered at plan footing elevations, these large rock fragments should be removed and the cavities should be properly backfilled. Undercuts required to develop suitable bearing should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class

7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate. Undercuts should extend at least 5 ft outside the reinforced zone to the extent possible.

Resistance to wall sliding can be evaluated using an ultimate friction factor (tan δ) value of 0.35 between the MSE wall reinforced zone base and foundation soils. A resistance factor (φ_τ) of 1.0 is recommended for sliding resistance evaluation of MSE wall reinforced zone on foundation soils.

Conventional Cantilevered Wall CC. We understand that Wall CC will be a conventional cantilevered, reinforced concrete wall. The wall will have a total length of about 86 ft and a maximum height of 6 feet. The layout drawings indicate that the Wall CC footing is planned at approximately El 316. Based on the results of relevant borings drilled near the Wall CC alignment, the footings are expected to bear in the on-site embankment fill comprised of stiff to very stiff tan and dark gray to reddish tan and gray silty clay with shale and sandstone fragments.

For the wall continuous footing bearing in the compact, stiff to very stiff silty clay with shale and sandstone fragment fill, an ultimate / nominal unit bearing resistance of 6000 lbs per sq ft is recommended. A resistance factor (φ_b) of 0.50 is also recommended, with a factored unit bearing resistance (q_R) of 3000 lbs per sq ft considered to be suitable. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.0 inch.

Resistance to wall sliding can be evaluated using an ultimate friction factor (tan δ) value of 0.35 between the retaining wall footing and the foundation soils. A resistance factor (φ_τ) of 0.8 is recommended for sliding resistance evaluation of retaining wall footings on foundation soils. That portion of the wall footing extending greater than 2 ft below lowest adjacent grade may also be considered to utilize an ultimate / nominal unit passive resistance of 500 lbs per sq ft of foundation area in hard contact with the compact on-site soils. A resistance factor (φ) of 0.75 is recommended for passive resistance of vertical foundation elements.

As discussed in the MSE Wall BB report section, suitability of the retaining wall bearing stratum must be field verified by the Engineer or Department at the time of construction. The on-site fill can contain variable amounts of cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone fragments as well as shale and concrete fragments of similar size. Where cobbles or boulders are encountered at the plan footing elevation, these large fragments must be excavated and properly backfilled. Undercuts required to develop suitable bearing should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class

7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate. Undercuts of the cantilevered retaining wall footing should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom.

MSE Wall DD. The wall layout drawings indicate that the MSE Wall DD subgrade is planned at El 331± to El 333±. Consequently, the wall is expected to bear in the stable embankment fill. Based on the results of the borings performed at the Rodney Parham Bridge location, the fill is comprised of stiff to very stiff brown, gray, tan, reddish tan, to reddish brown silty clay and clayey silt with a variable content of shale and/or sandstone fragments and fine to coarse gravel.

Suitability of the bearing stratum must be field verified by the Engineer or Department at the time of construction. The existing embankment fill contains occasional cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone and shale fragments as well as occasional concrete debris. Where cobbles or boulders are encountered in foundation excavations, these large fragments should be removed and the excavations properly backfilled. All wall undercut should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate.

An ultimate / nominal unit bearing resistance of 6250 lbs per sq ft is recommended for Wall DD bearing on the stiff to very stiff silty clay or the recommended undercut backfill. A resistance factor (φ_b) of 0.65 is recommended for bearing. Consequently, a factored unit bearing resistance (q_R) of 4060 lbs per sq ft is anticipated. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.5 inch.

Resistance to wall sliding can be evaluated using an ultimate friction factor (tan δ) value of 0.35 between the MSE wall reinforced zone and the foundation soils. A resistance factor (φ_τ) of 1.0 is recommended for evaluation of sliding resistance.

MSE Wall EE. The MSE Wall EE subgrade will vary from approximately El 340 to El 319. The wall is expected to generally bear in the on-site embankment fill comprised of stiff to very stiff silty clay and shale/sandstone fragment fill.

The results of the borings indicate that the stiff to very stiff silty clay and shale/sandstone fragment on-site embankment fill is generally stable and the potential for undercut is considered to be low. However, suitability of the wall bearing stratum and undercut requirements must be

field verified by the Engineer or Department at the time of construction. As noted previously, occasional cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone, shale, or concrete fragments could be present in the embankment fill. Large particles encountered at plan foundation elevations should be removed and the excavations should be properly backfilled. Any wall undercut should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate.

For Wall EE bearing in the on-site embankment fill or the recommended undercut backfill, an ultimate / nominal unit bearing resistance of 6250 lbs per sq ft is recommended. A resistance factor (φ_b) of 0.65 is recommended for the MSE wall. Consequently, a factored unit bearing resistance (q_R) of 4060 lbs per sq ft is considered suitable. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.5 inch.

Resistance to wall sliding can be evaluated using an <u>ultimate</u> friction factor (tan δ) value of 0.35 between the MSE wall reinforced zone base and foundation soils. A resistance factor (φ_τ) of 1.0 is recommended for evaluation of sliding resistance.

Where Wall EE extends around the east bridge end, the wall will be higher with a maximum height on the order of 23 feet. The results of the borings in this area (see Borings S2 and S4) indicate that the bearing stratum at approximately El 319 will be on-site fill comprised of stiff silty clay and shale/sandstone fragment fill. Where increased bearing capacity is required, the wall foundation soils may be undercut to the moderately hard to hard tan and gray weathered fine-grained sandstone or the moderately hard tan and gray weathered shale. In this case the undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate as previously recommended.

An ultimate / nominal unit bearing resistance of 7400 lbs per sq ft is recommended. A φ_b value of 0.65 is recommended for the factored bearing in this case and a q_R value of 4810 lbs per sq ft is anticipated. Differential settlement between walls supported in undercut sections and in the on-site fill is expected to be less than 0.5 inch.

For this condition, resistance to wall sliding can be evaluated using an <u>ultimate</u> friction factor (tan δ) value of 0.40 between the MSE wall reinforced zone base and foundation soils. A resistance factor (φ_τ) of 1.0 is recommended for evaluation of sliding resistance.

MSE Walls GG and KK. As shown in Table 1, Walls GG and KK will be located at the Hughes Street overpass bridge ends. In addition, about 10 ft of Walls FF, HH, JJ, and MM at the Hughes Street bridge ends will be MSE walls. It is understood that MSE walls will be designed by Others on behalf of the Contractor. MSE wall backfill in the reinforced zone must comply with the Designer's specifications. As a minimum, we recommend that the reinforced zone backfill comply with AHTD Standard Specifications Section 302, SM-1 or Section 303, Class 7. Consequently, the reinforced backfill should have a minimum total unit weight (γ) of 125 lbs per cu ft and a minimum angle of internal friction (ϕ) of 28°.

The wall layout drawings indicate the MSE wall subgrade elevations are planned at El 379± to El 380±. The MSE walls are expected to bear in the moderately hard highly weathered shale or weathered shale. Where the MSE walls return along Hughes Street (i.e., wing wall sections of Walls GG and KK) the subgrade will vary from about El 379 to El 397 for Wall GG and El 380 to El 406 for Wall KK. These wall sections parallel to the bridge alignment will bear in the stable on-site silty clay and shale/sandstone fragment embankment fill, the localized stiff to very stiff silty clay overburden, the low hardness to moderately hard highly weathered shale, and the moderately hard weathered shale.

The abutment wall sections of Walls GG and HH with subgrade at El 379 to El 380 are expected to bear in the competent moderately hard gray and tan to maroon, gray and tan weathered shale. For the walls with a minimum 2 ft embedment, an ultimate / nominal unit bearing resistance of 18,000 lbs per sq ft is recommended. A resistance factor (φ_b) of 0.65 is recommended for the MSE walls. Consequently, a factored unit bearing resistance (q_R) of 11,700 lbs per sq ft is considered suitable for walls supported in the moderately hard weathered shale. Long-term post-construction settlement of the moderately hard weathered shale wall foundation stratum is expected to be negligible.

Where the MSE walls return back parallel to the bridge alignment and are bearing in the stable stiff to very stiff reddish tan, tan, and gray silty clay with shale/sandstone fragments embankment fill, the natural stiff to very stiff reddish tan, tan and gray silty clay overburden soils, or low hardness to moderately hard gray, tan, and maroon weathered shale, a q_{ult} value of 6250 lbs per sq ft is recommended for walls with a minimum 2 ft of embedment. A φ_b value of 0.65 is recommended for bearing. A maximum factored unit bearing resistance (q_R) of 4060 lbs per sq ft is anticipated. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.0 inch.

Suitability of the MSE wall bearing strata must be field verified by the Engineer or Department at the time of construction. For the MSE walls supported in the moderately hard weathered shale which require the higher bearing value, any undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7) or seal concrete (AHTD Standard Specifications Section 802, seal concrete). For MSE walls utilizing the lower bearing value, undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate. Undercuts should extend at least 5 ft outside the reinforced zone to the extent possible.

Resistance to MSE wall sliding can be evaluated using an ultimate friction factor (tan δ) value of 0.40 between the MSE wall reinforced zone and the weathered shale bearing stratum. For walls bearing in the compact on-site embankment fill or natural overburden soils, an ultimate friction factor (tanδ) value of 0.35 between the MSE wall reinforced zone and the bearing stratum is recommended. A resistance factor (φ_τ) of 1.0 is recommended for evaluation of sliding resistance.

Soil Nail Walls – Walls AA, FF, HH, JJ, MM, and NN. As noted, soil nail walls are planned for Walls AA, FF, HH, JJ, MM, and NN. There are short sections where walls intercept the MSE Walls at the bridge ends (Walls GG and KK) and soil nail walls terminate and MSE walls extend to the abutments. For the MSE wall sections, the recommendations provided in the preceding MSE Walls GG and KK walls report section are appropriate.

The soil nail block bottoms of the plan soil nail walls are expected to bear in the low hardness to moderately hard highly weathered shale and weathered shale. The highly weathered shale and weathered shale foundation strata are stable and exhibit low compressibility. Consequently, foundation bearing failure will be precluded by the high shear strength of the weathered shale bearing stratum. For the soil nail blocks bearing in the competent weathered shale, an ultimate / nominal unit bearing resistance of 18,000 lbs per sq ft is considered appropriate. The potential for bottom heave resulting from wall excavation and unbalanced loads is considered negligible.

We recommend the following parameters for evaluating soil nail wall sliding resistance for both static and seismic cases.

- Design peak horizontal ground acceleration coefficient (k_h): 0.16
- Design peak vertical ground acceleration coefficient (k_v): 0
- Total unit weight (γ) of soil nail wall block: 140 lbs per cu ft
- Effective angle of internal friction for active earth pressure coefficient determination (ϕ'): 31°
- Soil cohesive shear strength along wall base (c_b): 250 lbs per sq ft
- Effective angle of internal friction along wall base (ϕ'_b): 20°

Concrete Barrier Walls. Concrete barrier walls are planned on the north side of I-630, between approximately Sta 1118+50 and Sta 1124+00. This wall will be constructed on the backslope of the existing lower retaining wall which is located at the west bridge end of the Rodney Parham Bridge. The cross sections in this plan barrier wall alignment indicate the barrier wall footings at this location are planned at El 333± to El 335±. Based on the Typical Backfill Section of the existing lower retaining walls, the new concrete barrier wall is expected to bear in the sand wall backfill. In light of the age of the existing retaining walls, the sand wall backfill is considered to be densified and stable. However, subgrade and bearing stratum preparation for the new barrier wall should include tamping or vibrating the sand at the subgrade and bearing stratum elevation to provide a densified surface.

Concrete barrier walls will also be included on some other portions of the I-630 widening alignment, specifically between approximately Sta 1145+00 to Sta 1152+00. The barrier wall at this location will be constructed on the south side of I-630, west of the Hughes Street Bridge location. These concrete barrier walls will be supported in on-site embankment fill.

An ultimate / nominal unit bearing resistance of 4000 lbs per sq ft is recommended for the concrete barrier walls bearing on the existing retaining wall backfill or on-site embankment fill. A resistance factor (φ_b) of 0.5 is recommended for the concrete barrier wall. Consequently, a factored unit bearing resistance (q_R) of 2000 lbs per sq ft is considered suitable. Long-term post-construction settlement of the wall foundation soils is expected to be less than 1.0 inch.

For concrete barrier walls supported in the existing retaining wall backfill which is comprised of granular sand, resistance to wall sliding can be evaluated using an ultimate friction factor ($\tan\delta$) value of 0.40 between the concrete barrier wall footings and foundation soils. For concrete barrier walls supported in the on-site embankment fill of cohesive silty clay with rock

fragments, a tanδ value of 0.35 is considered suitable. A resistance factor (φ_τ) of 0.8 is recommended for evaluation of sliding resistance.

Global Stability of Retaining Walls

General. Stability analyses were performed to verify the global stability of the widened embankments which are comprised of existing walls, new walls, and / or slopes. As noted, ten (10) sections were selected for analyses. Where appropriate, both the local stability of the new walls and the overall stability of the embankments were evaluated in the global stability analyses. An average uniform surcharge of 275 lbs per sq ft was included to account for the surcharge of vehicle traffic loads.

Section view drawings at the ten (10) sections have been developed for the purposes of the stability analyses. Material properties are shown on the section drawings. These sections, as well as wall height at the selected sections, are summarized in Table 4 below. These sections are shown in the respective attachments containing the results of stability analyses.

Table 5: Summary of Sections Utilized for Stability Analyses

Station	Structure	Approximate Height, ft	Attachment
1067+50	Wall AA	18	13
1072+00	Wall AA	10	13
1111+00	Wall BB	11	14
111+41 (Bikeway Stationing)	Wall CC	5	15
1123+00	Wall DD, barrier wall, and existing lower retaining walls	Composite configuration	16
1123+95.83			17
1129+00	Wall EE-1	12	18
Wall EE-2	Wall EE-2	23	19
1148+00	Wall JJ	13	20
1154+25	Walls GG and KK	23	21
1168+00	Wall NN	10	22

To model the lower strength boundary of unclassified embankment fill (outside the reinforced zone), a cohesion value of 750 lbs per sq ft and an internal friction angle (ϕ) of 0° were assumed. A cohesion value of 0 lbs per sq ft and an internal friction angle (ϕ) of 30° were utilized for the backfill of the existing lower retaining walls for the Rodney Parham Bridge. It is understood that MSE walls will be designed by Others on behalf of the Contractor. MSE wall backfill in the reinforced zone must comply with the Designer's specifications. As a minimum, the

reinforced zone backfill is expected to comply with AHTD Standard Specifications Section 302, SM-1 or Section 303, Class 7. Consequently, the reinforced backfill should have a minimum total unit weight (γ) of 125 lbs per cu ft and a minimum angle of internal friction (ϕ) of 28°. For the purposes of stability analyses, the foundation soil properties were modeled based on the results of the borings and our experience with similar soils.

Stability analyses were performed using the computer program SLOPE/W 2007[3] and a Morgenstern-Price analysis or the computer program PCSTABL5M and a Modified Bishop (circular) analysis. Five (5) general loading conditions were analyzed with respect to global slope stability as summarized below.

1) End of excavation (for soil nail walls only). This condition utilizes residual soil shear strength parameters.
2) End of construction. This condition utilizes total stress soil shear strength parameters.
3) Long-term condition. This condition utilizes effective stress soil shear strength parameters.
4) 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 the design peak ground acceleration value (As), was utilized in the stability analyses. For the walls near the Hughes Street Bridge location, a k_h value of 0.16 was utilized. For the walls at the other locations, a k_h value of 0.13 was utilized.
5) Rapid drawdown condition (for walls 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.

An average groundwater level at about El 307 was used in the stability analyses. In addition, the stability analyses also considered a design high water level of El 320.5.

Results of Stability Analyses. The results of the stability analyses performed for the various cut slopes, walls, and embankments are summarized in Tables 5 through 14 below. Respective graphical results of the stability analyses are provided in Attachments 10 through 19, as summarized in Table 4 above.

---

[3] Slope/W 2007; GEO-SLOPE International; March 2008.

Table 6: Stability Analysis Results – Wall AA at Sta 1067+50 (H = 18 ft)

Design Loading Condition	Calculated Minimum Factor of Safety
End of Construction	4.1
Long Term	1.9
Seismic ($k_h = 1.0A_S = 0.13$)	1.6

Table 7: Stability Analysis Results – Wall AA at Sta 1072+00 (H = 10 ft)

Design Loading Condition	Calculated Minimum Factor of Safety
End of Construction	7.1
Long Term	2.7
Seismic ($k_h = 1.0A_S = 0.13$)	1.9

Table 8: Stability Analysis Results – Cut Slope at Ramp 2 Sta 210+00 (H=40 ft)

Design Loading Condition	Calculated Minimum Factor of Safety
End of Construction	2.6
Long Term	1.4
Seismic ($k_h = 1.0A_S = 0.13$)	1.0

Table 9: Stability Analysis Results – Wall BB at Sta 1111+00 (H = 11 ft)

Embankment Side	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left - slope)	End of Construction	Groundwater @ El 307±	5.8
South (right – Wall BB)			17.1
North (left - slope)	Long Term	Groundwater @ El 307±	3.1
South (right – Wall BB)			6.2
North (left - slope)		Design flood @ El 320.5±	2.8
South (right – Wall BB)			6.2
North (left - slope)	Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	1.8
South (right – Wall BB)			3.7
North (left - slope)	Rapid drawdown	Drawdown from	2.8

Embankment Side	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
South (right – Wall BB)		El 320.5± to ground surface	6.2

Table 10: Stability Analysis Results – Wall CC at Sta 111+41 (H = 5 ft)

Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
End of Construction	Groundwater @ El 307±	7.7
Long Term	Groundwater @ El 307±	3.5
	Design flood @ El 320.5±	3.2
Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	2.0
Rapid drawdown	Drawdown from El 320.5± to ground surface	2.6

Table 11: Stability Analysis Results – Sta 1123+00

Embankment Side	Failure Mode	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	Deep-seated failure below existing retaining wall	End of Construction	Groundwater @ El 307±	4.4
South (right)				3.2
South (right)	Localized failure below new MSE wall			4.1
North (left)	Deep-seated failure below existing retaining wall	Long Term	Groundwater @ El 307±	1.6
South (right)				1.8
South (right)	Localized failure below new MSE wall			1.9
North (left)	Deep-seated failure below existing retaining wall		Design flood @ El 320.5	1.7
South (right)				1.7
North (left)	Deep-seated failure below existing retaining wall	Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	1.2
South (right)				1.3

Embankment Side	Failure Mode	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
South (right)	Localized failure below new MSE wall			1.4
North (left)	Deep-seated failure below existing retaining wall	Rapid Drawdown	Drawdown from design flood to embankment toe	1.7
South (right)				1.5

Table 12: Stability Analysis Results – Sta 1123+95.83

Embankment Side	Failure Mode	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	Deep-seated failure below existing retaining wall	End of Construction	Groundwater @ El 307±	3.2
South (right)				2.9
South (right)	Localized failure below new MSE wall			5.7
North (left)	Deep-seated failure below existing retaining wall	Long Term	Groundwater @ El 307±	2.3
South (right)				2.7
South (right)	Localized failure below new MSE wall			3.2
North (left)	Deep-seated failure below existing retaining wall		Design flood @ El 320.5	1.8
South (right)				2.1
North (left)	Deep-seated failure below existing retaining wall	Seismic (k_h = $1.0A_S$ = 0.13)	Groundwater @ El 307±	1.2
South (right)				1.1
South (right)	Localized failure below new MSE wall			2.3
North (left)	Deep-seated failure below existing retaining wall	Rapid Drawdown	Drawdown from design flood to embankment toe	1.4
South (right)				1.2

Table 13: Stability Analysis Results – Sta 1129+00 (H = 10 ft)

Embankment Side	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	End of Construction	Groundwater @ El 307±	5.2
South (right)			6.5
North (left)	Long Term	Groundwater @ El 307±	1.9
South (right)			2.2
North (left)		Design flood @ El 320.5	1.9
South (right)			2.1
North (left)	Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	1.4
South (right)			1.5
North (left)	Rapid Drawdown	Drawdown from design flood to embankment toe	1.9
South (right)			2.1

Table 14: Stability Analysis Results – Wall EE-2 (H = 23 ft)

Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
End of Construction	Groundwater @ El 307±	3.7
Long Term	Groundwater @ El 307±	2.0
	Design flood @ El 320.5	1.9
Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	1.4

Table 15: Stability Analysis Results – Wall JJ at Sta 1148+00 (H = 13 ft)

Location	Design Loading Condition	Calculated Minimum Factor of Safety
Wall JJ cut slope	End of Excavation	1.9
Wall JJ	End of Construction	5.0
Upper slope above Wall JJ		6.0
South side – concrete barrier wall		9.4
Wall JJ	Long Term	2.3
Upper slope above Wall JJ		1.7
South side – concrete barrier wall		2.1
Wall JJ	Seismic ($k_h = 1.0A_S = 0.16$)	1.5

Location	Design Loading Condition	Calculated Minimum Factor of Safety
Upper slope above Wall JJ		1.3
South side – concrete barrier wall		1.5

Table 16: Stability Analysis Results – MSE Walls Sta 1154+25 (H = 23 ft)

Structure	Design Loading Condition	Calculated Minimum Factor of Safety
Wall KK @ north side	End of Construction	6.0
Wall GG @ south side		5.2
Wall KK @ north side	Long Term	2.0
Wall GG @ south side		2.6
Wall KK @ north side	Seismic ($k_h = 1.0A_S = 0.16$)	1.5
Wall GG @ south side		1.7

Table 17: Stability Analysis Results – Wall NN at Sta 1168+00

Structure	Design Loading Condition	Calculated Minimum Factor of Safety
Wall NN	End of Excavation	1.8
North fill section	End of Construction	10.5
Wall NN		10.0
North fill section	Long Term	3.5
Wall NN		2.5
North fill section	Seismic ($k_h = 1.0A_S = 0.16$)	2.0
Wall NN		1.8

The analyses results above confirm that global stability of the plan walls and /or embankments are within an acceptable range for all conditions evaluated.

Lateral Earth Pressures

New Cantilevered Retaining Wall and Concrete Barrier Walls. It is expected that the new cantilevered retaining wall (Wall CC) and the new concrete barrier walls will be backfilled with selected material or unclassified borrow. We recommend selected material SM-1 (AHTD Standard Specifications Section 302) be utilized for the wall backfill. The barrier wall is expected to be free to rotate. Consequently, active earth pressure will be mobilized against the concrete walls.

Recommendations regarding lateral earth pressures for the concrete walls are summarized below for fully drained or undrained conditions.

- SM-1
  - Total unit weight (γ) for SM-1: 125 lbs per cu ft
  - Angle of internal friction (ϕ) for SM-1 backfill: 32°
  - Equivalent fluid pressure (fully drained): 40 lbs per sq ft per ft depth.
  - Equivalent fluid pressure (no provision for internal drainage): 85 lbs per sq ft per ft depth.
- Unclassified fill alternative
  - Total unit weight (γ) for unclassified backfill: 130 lbs per cu ft
  - Angle of internal friction (ϕ) for unclassified backfill: 20°
  - Equivalent fluid pressure (fully drained): 65 lbs per sq ft per ft depth.
  - Equivalent fluid pressure (no provision for internal drainage): 95 lbs per sq ft per ft depth.

Existing Lower Retaining Walls. For the existing lower retaining walls at the west bridge end of the Rodney Parham Bridge, active earth pressures will be mobilized by the existing wall backfill, the future upper wall surcharge, as well as the anticipated traffic / vehicular surcharge. As requested by the Engineer, unfactored lateral pressures, i.e., EH for existing wall backfill, ES for future wall surcharge, and LS for vehicular surcharge, were evaluated at Sta 1123+00 and Sta 1123+95.83.

Lateral earth pressure distribution profiles, i.e., lateral pressure (EH, ES, or LS) vs. depth (z) curves, have been developed for use in evaluating the existing lower retaining wall. The calculated pressure distribution curves are included in Attachment 23. It should be noted that these lateral earth pressures are unfactored and no load factors have been applied. Appropriate load factors must be utilized in evaluating the existing retaining walls. In addition, no reduction in the soil or traffic surcharge has been incorporated in the analyses.

Noise Barrier Walls

As noted, the project also includes three (3) noise barrier walls: NB2, NB3, and NB4. It is understood that the walls will be constructed of proprietary light-weight sound walls with wall heights ranging from 4 to 21 feet. It is also understood that the walls will be supported on either shallow foundations or drilled shaft foundations, depending on the wall locations. Axial foundation loads are expected to be minimal and lateral loads include a maximum shear of 6.4 kips and 64.5 kip-ft maximum overturning moment.

The noise barrier walls will be located on the north side of the highway alignment, between about I-630 Sta 1112+30, just east of Rock Creek, to I-630 Sta 1171+20, just east of the Blue Bird Drive on ramp. Given the total length of the noise barrier walls, the alignment extends through areas of varying subsurface conditions. Based on the results of the borings and the available cross section plans of the walls, two (2) generalized subsurface conditions have been developed.

- Case A: The overburden soils in this portion of the noise barrier wall alignments are relatively deep. The soil conditions include embankment fill, primarily firm to very stiff silty clay and shale fragment blend, and natural firm to very stiff silty clay.
- Case B: In these areas, the overburden soils are relatively thin. The soil conditions typically consist of less than about 5 ft of overburden soils underlain by low hardness to moderately hard weathered shale.

As noted, the walls may be supported on either footing or drilled shaft foundations, depending on the specific wall locations. The foundation types anticipated for the noise barrier walls are summarized in the table below.

Table 18: Noise Barrier Wall Foundation Recommendation Summary

Wall	Segment, I-630 Sta	Foundation Soil Case	Foundation Type
NB2	1112+30 to 1134+29 (complete wall)	A	Shallow
NB3	1132+00 to 1143+40	A	Shallow
NB3	1143+40 to 1145+00	A	Drilled Shaft
NB3	1145+00 to 1148+50	B	Drilled Shaft
NB4	1154+70 to 1162+60	B	Drilled Shaft
NB4	1154+70 to 1161+00	A	Drilled Shaft
NB4	1161+00 to 1171+20	A	Shallow

Noise barrier wall foundation recommendations are summarized below.

- Case A Shallow Foundations
  - Bearing stratum: stiff silty clay and shale fragment blend embankment fill or natural stiff to very stiff silty clay
  - Minimum footing dimension: 36 in.
  - Minimum footing depth: 24 in. below lowest adjacent grade.
  - Maximum nominal bearing pressure: 7700 lbs sq ft
  - Resistance factor for bearing (φ_b): 0.50
  - Nominal sliding resistance: 0.33
  - Resistance factor for sliding (φ_τ): 0.85

- Nominal passive resistance (in excess of 18 in. below lowest adjacent grade: 500 lbs per sq ft
- Resistance factor for passive (φ_{cp}): 0.50

- Case B Shallow Foundations – not anticipated
- Case A Drilled Shafts
  - Bearing stratum: stiff to very stiff silty clay and shale fragment blend embankment fill or natural stiff to very stiff silty clay
  - Minimum shaft diameter: 18 in.
  - Maximum nominal skin resistance: 750 lbs sq ft
  - Resistance factor (φ_{stat}) for compression: 0.45
  - Resistance factor (φ_{up}) for uplift: 0.35
- Case B Drilled Shafts
  - Bearing stratum: moderately hard weathered shale
  - Minimum shaft diameter: 18 in.
  - Maximum nominal skin resistance: 3250 lbs sq ft
  - Resistance factor (φ_{stat}) for compression: 0.60
  - Resistance factor (φ_{up}) for uplift: 0.40

Lateral Load Response. To evaluate lateral load response of drilled shaft foundations, lateral load analyses were performed using the computer program LPILE[4]. For the purposes of the analyses, both Case A and Case B were evaluated for 18- and 24-in.-diameter drilled shafts. The shaft weight was utilized for the compression reaction. The shear and moment reactions provided by the Engineer were assumed to be applied at the ground line.

Results of the lateral load analyses are summarized in Attachment 24. Sketches showing the soil models used in the analyses and graphical plots of pile head deflection versus depth and bending moment versus depth are also provided in Attachment 24.

Site Grading and Earthwork Considerations

Site preparation will begin with clearing and grubbing the trees or underbrush (if any) in the wall alignment areas and stripping the organic-containing surface soils. Tree stumps should 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

---

4 LPILE Plus, Version 8.03; Lymon C. Reese and Shin Tower Wang; Ensoft, 2015.

stripping required on hillsides and in the areas of higher terrain. In general, the stripping depth is estimated to be about 6 to 12 in. in open 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, and other excavations or low areas resulting from subgrade preparation are properly backfilled with compacted fill. Based on the results of the borings and test pits, the potential for undercut is generally considered to be low in the retaining wall alignments. However, as-built undercut requirements must be field verified by the Engineer or by the Department.

Suitability of the retaining wall bearing strata must be field verified by the Engineer or Department at the time of construction. For the MSE walls which require the higher bearing value, any undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7) or seal concrete (AHTD Standard Specifications Section 802, seal concrete). For MSE walls utilizing the lower bearing value, undercuts should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate. For the MSE walls, undercuts should extend at least 5 ft outside the reinforced zone to the extent possible. Undercuts of the concrete wall footings should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom. Subgrade and bearing stratum preparation for the new barrier wall bearing in sand should include tamping or vibrating the sand at the subgrade and bearing stratum elevation to provide a densified surface.

The on-site embankment fill contains occasional cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone fragments. Where cobbles or boulders are encountered at plan footing elevations, these large rock fragments should be removed and the cavities should be properly backfilled. Undercuts required to develop suitable bearing should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate.

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 must be specifically approved by the Engineer.

Subgrade preparation and mass undercuts for embankments 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.

Fill and backfill may consist of unclassified borrow free of organics and other deleterious materials as per AHTD Standard Specifications Subsection 210.06. Granular soils must be protected from erosion with a minimum 18-in.-thick armor of clayey soil. The on-site silty clay and weathered shale are typically suitable for this use.

Subgrade preparation should comply with AHTD Standard Specifications, Section 212. Embankments should be constructed in accordance with AHTD criteria (AHTD Standard Specifications, Section 210). Fill and backfill should be placed in nominal 6- to 8-in.-thick loose lifts. All fill and backfill must be placed in horizontal lifts. Thinner lifts may be required for retaining wall backfill. The in-place density and water content should be determined for each lift and should be tested to verify compliance with the specified density and water content prior to placement of subsequent lifts. Fill placement against existing slope should be benched to facilitate horizontal fill placements.

CONSTRUCTION CONSIDERATIONS

Seepage

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 all work is completed.

Groundwater was locally encountered at 15-ft depth (El 307±) at the Rock Creek Bridge locations and at 7.5- to 9-ft depth (El 308± to El 306±) at the Rodney Parham Bridge location (June through September 2014). In addition, shallow perched water was locally encountered in the on-site fill and in granular soils at shallower depths. Groundwater levels will vary with seasonal precipitation, surface infiltration, and stream level of nearby creeks and waterways.

Seepage into excavations and cuts can typically be controlled by ditching or sump-and-pump methods. If seepage into excavations becomes a problem, backfill should consist of clean crushed stone meeting the requirements of AASHTO M43 #57 (AHTD Select Granular Fill), stone backfill (AHTD Standard Specifications Section 207), or clean aggregate (AHTD Standard Specifications Subsections 403.01 and 403.02 Class 3 mineral aggregate) to an elevation above the inflow of seepage. In areas of seepage infiltration, the granular fill should be fully encapsulated by a filter fabric complying with AHTD Standard Specifications Subsection 625.02, Type 2 and vented to positive discharge. 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.

Rock Excavation

Rock excavation methods could be required for some site grading cuts or for excavations. In addition, some buried boulders or large concrete debris fragments could be encountered during grading or excavations for walls. Rock excavation could be required for hard sandstone and more resistant weathered shale units encountered in wall or foundation excavations. Some overbreak of excavations advanced into the sandstone and weathered shale should be anticipated. Any overbreak or overexcavation of foundations should be backfilled as discussed in the appropriate sections of this report.

Footings

All wall footing excavations and any wall undercuts should be observed by the Engineer or Department to verify suitable bearing and adequate undercut. Concrete should be placed in conventional footing excavations expeditiously following final clean up and approval to limit changes in foundation conditions. For MSE Walls, backfill should be placed promptly after approval of the undercut. Footing excavations should be clean and dry at the time of concrete placement. Where foundation excavations will be left open for extended periods, the bearing

stratum should be protected with a thin layer of seal concrete (AHTD Standard Specifications Section 802.04, Seal Concrete).

Drilled Shafts

Groundwater could be encountered in drilled shaft excavations. Limited seepage into drilled shaft excavations can probably be controlled by close coordination of drilling, cleanup and concrete placement. We recommend that casing be on site in the event it is needed to control seepage and/or caving into shaft excavations. Drilled shaft excavations should essentially be dry at the time of concrete placement. Where more than about 3 in. of water is present in shaft excavations, the excavation should be dewatered prior to concrete placement. Where shaft excavations cannot be dewatered, final cleanup should be performed with a "muck bucket" or similar tools. Underwater concrete placement should be performed with a concrete pump fitted with a rigid end extension.

All drilled shaft excavations should be observed by the Engineer or Department to verify suitable bearing and adequate penetration. Drilled shafts for noise barrier walls will be advanced through the overburden soils into the weathered shale bearing stratum. The more resistant shale and sandstone units could require the use of rock coring tools in order to obtain the required penetration. The potential for hard rock drilling is considered low, but should be anticipated.

CLOSURE

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

The following attachments are included and complete this submittal.

Attachment 1	Relevant Existing Retaining Wall Drawings
Attachment 2	Wall Locations
Attachment 3	Wall Layouts
Attachment 4	Wall Sections
Attachment 5	Subsurface Exploration – Wall AA
Attachment 6	Subsurface Exploration – Bikeway Roundabout at Rock Creek
Attachment 7	Subsurface Exploration – Rodney Parham
Attachment 8	Subsurface Exploration – Hughes Street
Attachment 9	Subsurface Exploration – Noise Barrier Walls
Attachment 10	Summary of Retaining Wall Recommendations
Attachment 11	Soil Nail Wall Special Provision
Attachment 12	Soil Nail Wall Conceptual Drawings
Attachment 13	Results of Stability Analyses – Wall AA
Attachment 14	Results of Stability Analyses – Wall BB
Attachment 15	Results of Stability Analyses – Wall CC
Attachment 16	Results of Stability Analyses – Sta 1123+00
Attachment 17	Results of Stability Analyses – Sta 1123+95.83
Attachment 18	Results of Stability Analyses – Sta 1129+00
Attachment 19	Results of Stability Analyses – Wall EE-2
Attachment 20	Results of Stability Analyses – Sta 1148+00
Attachment 21	Results of Stability Analyses – Sta 1154+25
Attachment 22	Results of Stability Analyses – Sta 1168+00
Attachment 23	Lateral Pressure Distribution Charts – Existing Walls
Attachment 24	Noise Barrier Wall Lateral Load Analyses Results

* * * * *

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

Sincerely,

GRUBBS, HOSKYN,
BARTON &WYATT, INC.

Ben J. Davis, E.I.
Staff Engineer

Mark E. Wyatt, P.E.
President

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 7791
MARK E. WYATT

DGG/BJD/MEW:jw

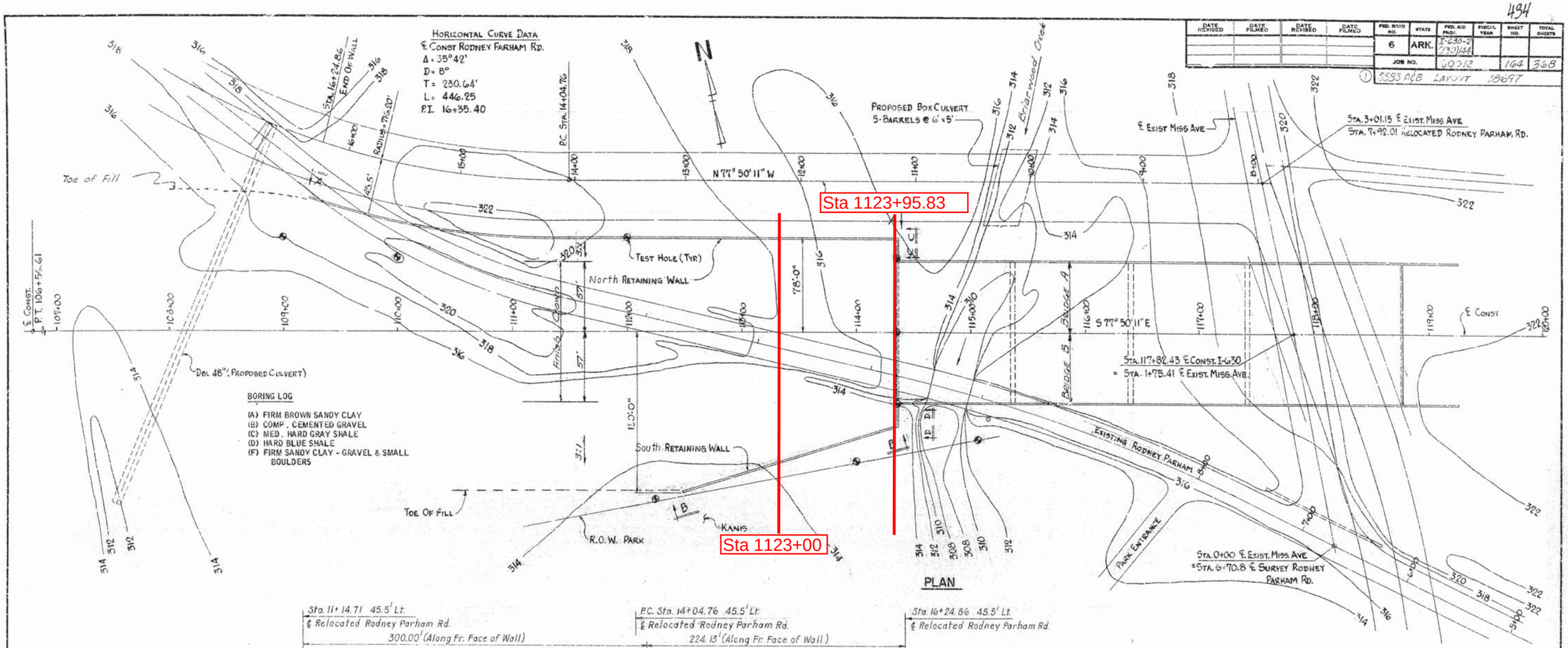
Copies Submitted: Bridgefarmer & Associates, Inc.
Attn: Mr. Shahriar Azad, P.E. (2+electronic)
Attn: Mr. Stephen Smiley, P.E. (1-electronic)

ATTACHMENT 1

494

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD NO.	STATE	FED. AID PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
				6	ARK.	I-630-2 (30)44			
				JOB NO.		60212		164	368

① 5583 A&B LAYOUT 18697



GENERAL NOTES:

BENCH MARK - NAIL IN SIDE 16" GUM 29' LT. STATION 113+42 (CENTERLINE ORIGINAL SURVEY) ELEVATION 316.47.

ALL PILING SHALL BE HP10X42 AND SHALL BE DRIVEN WITH AN APPROVED AIR, STEAM, OR DIESEL HAMMER WITH A MINIMUM ENERGY OF 10,000 FOOT POUNDS PER BLOW TO A MINIMUM CAPACITY OF 55 TONS PER PILE AND INTO THE MATERIAL DESIGNATED AS VERY HARD BLUE SHALE OR THE BORING LOGS. LENGTHS OF PILING SHOWN ARE FOR ESTIMATING QUANTITIES ONLY. ORDER LENGTHS SHOWN; CUT-OFF OR BUILD-UP, IF NECESSARY, TO BE PAID FOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL CONCRETE SHALL BE POURED IN THE DRY.

FOR DETAILS OF RETAINING WALLS, SEE DWG. NO. 18698 - 18713.

SPECIFICATIONS: ARKANSAS STATE HIGHWAY COMMISSION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, EDITION OF 1972, AND APPLICABLE SPECIAL PROVISIONS.

DESIGN SPECIFICATIONS: AASHTO 1973

LOADS: EARTH PRESSURE EQUIVALENT FLUID PRESSURE = 36 LBS. PER CU. FT.
WEIGHT OF EARTH = 120 LBS. PER CU. FT.
SURCHARGE = 2 FT.

UNIT STRESSES: CLASS S CONCRETE (N=10) 1,200 PSI
REINFORCING STEEL 20,000 PSI

LAYOUT OF RETAINING WALL
MISSISSIPPI AVENUE
I-430 — UNIVERSITY AVE.
PULASKI COUNTY
ROUTE I-630 SEC. 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: D.S. DATE: 12-14-71
TRACED BY: DATE:
CHECKED BY: WJS DATE: 12-20-71
SCALE: 1" = 40'-0"

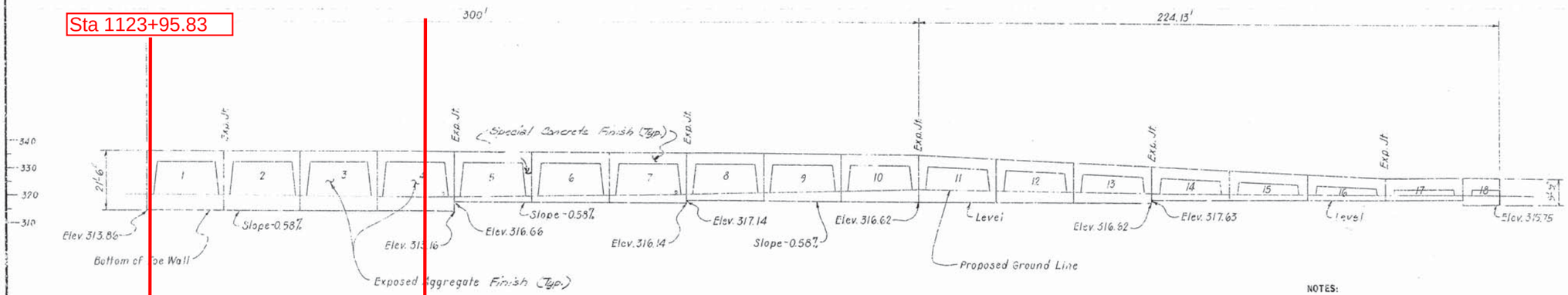
BRIDGE ENGINEER

BRIDGE NO. 5583 A&B DRAWING NO. 18697

1435

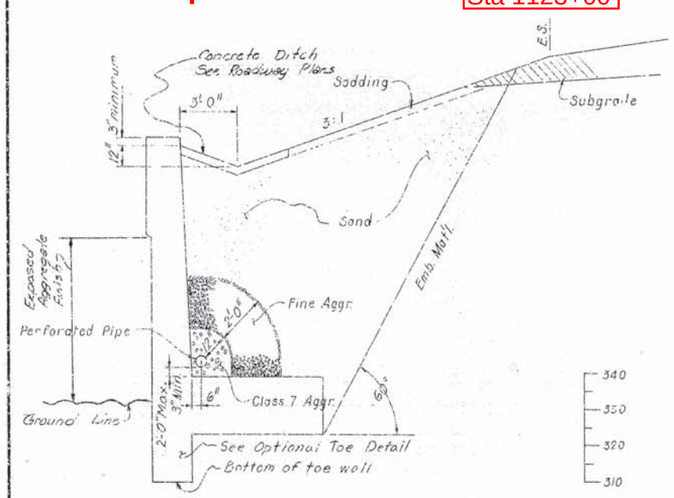
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.	I-630-2 (130)/44		
				JOB NO.		60012	165	368

(1) 5583 A&B TREATMENT 18698



NORTH RETAINING WALL

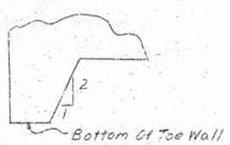
Sta 1123+00



TYPICAL BACKFILL SECTION

N.T.S.

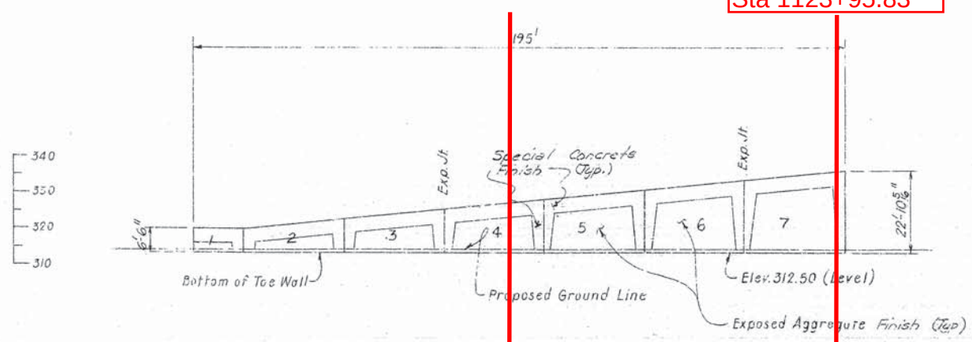
See SP JOB 6876 - "6 Inch. Corrugated Metal Drain Pipe" for Backfill Material and Construction Method.



OPTIONAL TOE DETAIL

N.T.S.

Sta 1123+95.83



SOUTH RETAINING WALL

Sta 1123+00

NOTES:

THE EXPOSED AGGREGATE FINISH SHALL BE OBTAINED BY EITHER BUSH HAMMERING OR SAND BLASTING. NO DIRECT PAYMENT SHALL BE MADE FOR BUSH HAMMERING OR SAND BLASTING, BUT THIS ITEM SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS OTHER BID ITEMS. THE AMOUNT OF AGGREGATE EXPOSED SHALL BE APPROXIMATELY 60% OF SURFACE AREA OR AS APPROVED BY THE ENGINEER.

UNLESS OTHERWISE DIRECTED BY THE ENGINEER, FORMS FOR THE EXPOSED AGGREGATE SURFACES SHALL BE REMOVED 12 TO 15 HOURS AFTER CONCRETE PLACEMENT AND SAND BLASTING OR BUSH HAMMERING TO BE ACCOMPLISHED IMMEDIATELY THEREAFTER. CURING OPERATIONS SHALL BE CONTINUED AFTER THIS IS ACCOMPLISHED.

SMOOTH SURFACES AROUND EXPOSED AGGREGATE SURFACES SHALL BE PROTECTED DURING SAND BLASTING OR BUSH HAMMERING OPERATIONS.

AGGREGATE TO BE EXPOSED SHALL CONSIST OF CRUSHED STONE OR GRAVEL AND SHALL BE OBTAINED FROM ONE SOURCE SO THAT A UNIFORM COLOR WILL BE OBTAINED FOR ALL EXPOSED AGGREGATE SURFACES.

NOTES: ALL CONCRETE TO BE CLASS S AND TO BE POURED IN THE DRY.

ALL EXPOSED CORNERS TO BE CHAMFERED 3/4".

REINFORCING STEEL TO BE ASTM A615, GRADE 40. SHOP LISTS AND BENDING DIAGRAMS ARE TO BE SUBMITTED AND APPROVAL SECURED BEFORE FABRICATION IS BEGUN. SEE LAYOUT FOR PILE DATA AND GENERAL NOTES.

ARCHITECTURAL TREATMENT FOR
NORTH & SOUTH RETAINING WALLS
MISSISSIPPI AVE. OVERPASS
I-430 – UNIVERSITY AVE.
PULASKI COUNTY
ROUTE I-630 SEC. 21

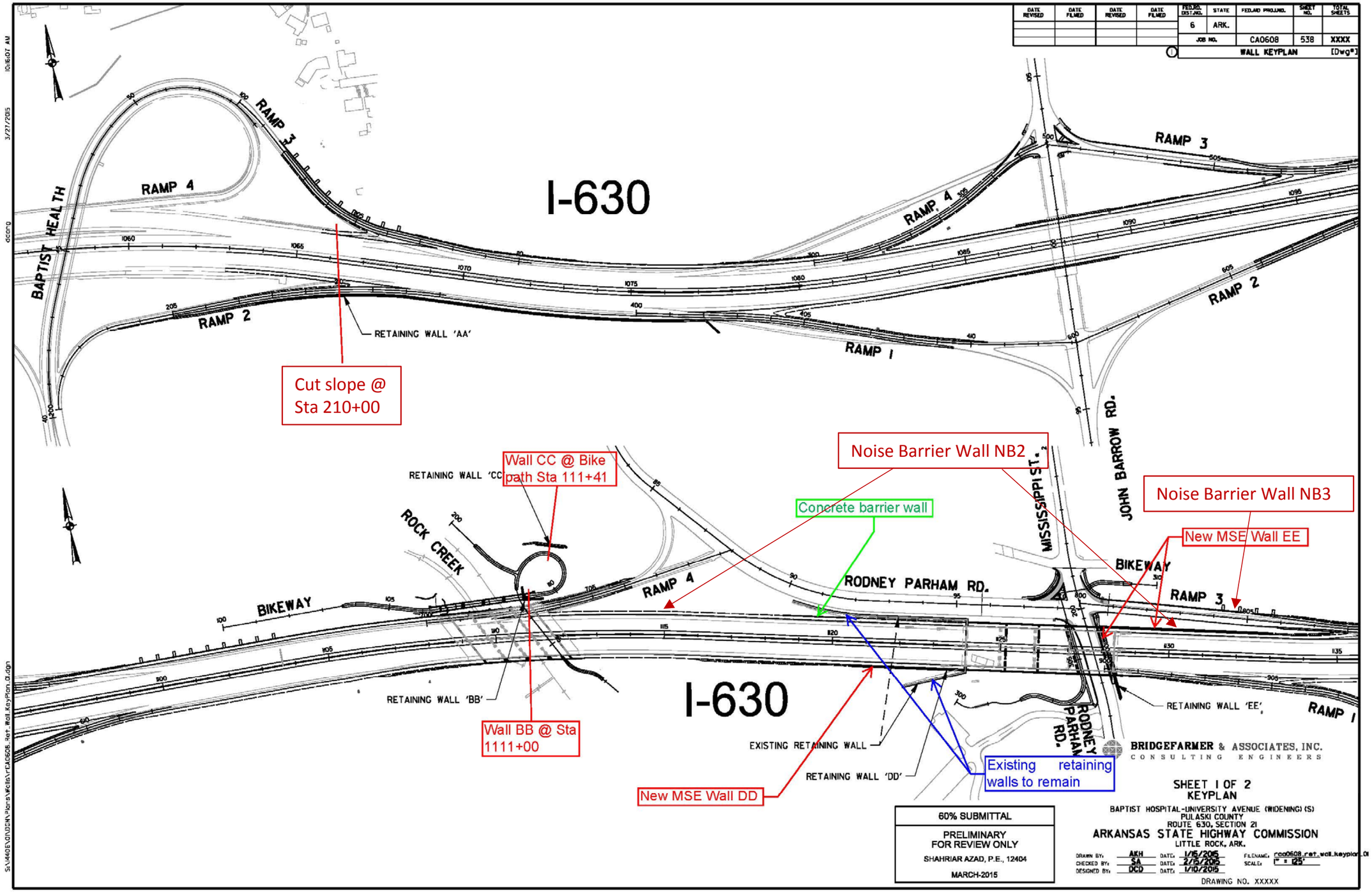
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: A. May DATE: 2-11-74
CHECKED BY: C.P.B. DATE: 4-4-74
DESIGNED BY: DATE:
SCALE: 1" = 20'

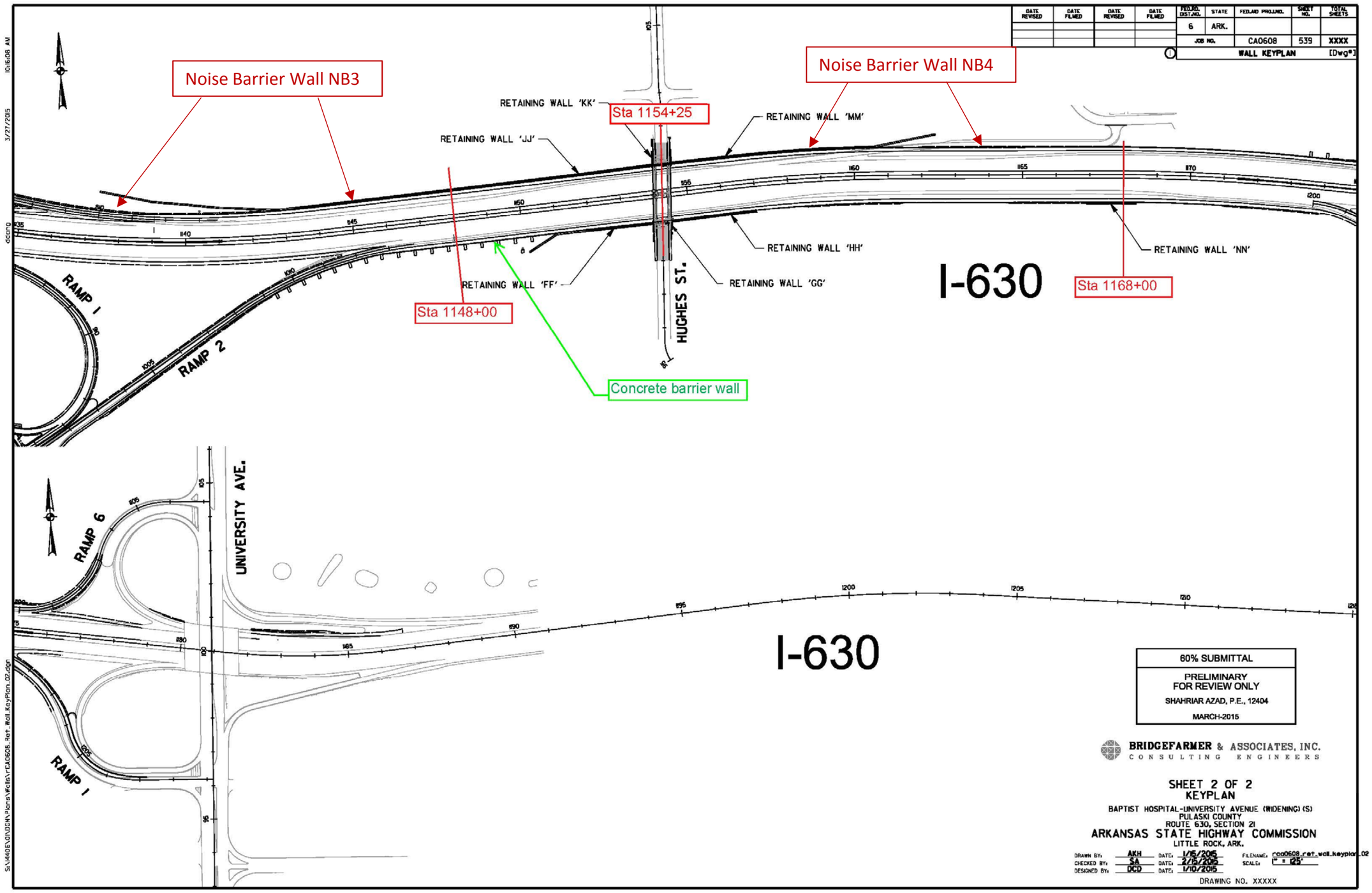
Vernal Pinkerton
BRIDGE ENGINEER

BRIDGE NO. 5583 A & B DRAWING NO. 18698

ATTACHMENT 2


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.
CA0608
538
XXXX
WALL KEYPLAN
[Dwg*]
I-630
RAMP 3
RAMP 4
RAMP 2
RAMP 1
BAPTIST HEALTH
RETAINING WALL 'AA'
Cut slope @ Sta 210+00
Wall CC @ Bike path Sta 111+41
RETAINING WALL 'CC'
ROCK CREEK
BIKEWAY
RETAINING WALL 'BB'
Wall BB @ Sta 1111+00
Noise Barrier Wall NB2
Concrete barrier wall
RODNEY PARHAM RD.
MISSISSIPPI ST.
JOHN BARROW RD.
Noise Barrier Wall NB3
New MSE Wall EE
RETAINING WALL 'EE'
EXISTING RETAINING WALL
RETAINING WALL 'DD'
New MSE Wall DD
Existing retaining walls to remain
BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
SHEET 1 OF 2
KEYPLAN
BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.
60% SUBMITTAL
PRELIMINARY FOR REVIEW ONLY
SHAHRIAR AZAD, P.E., 12404
MARCH-2015
DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_rst_wall_keyplan_01
SCALE: 1" = 125'
DRAWING NO. XXXXX

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.		CA0608	539	XXXX
				WALL KEYPLAN				[Dwg#]



60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 2
KEYPLAN

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

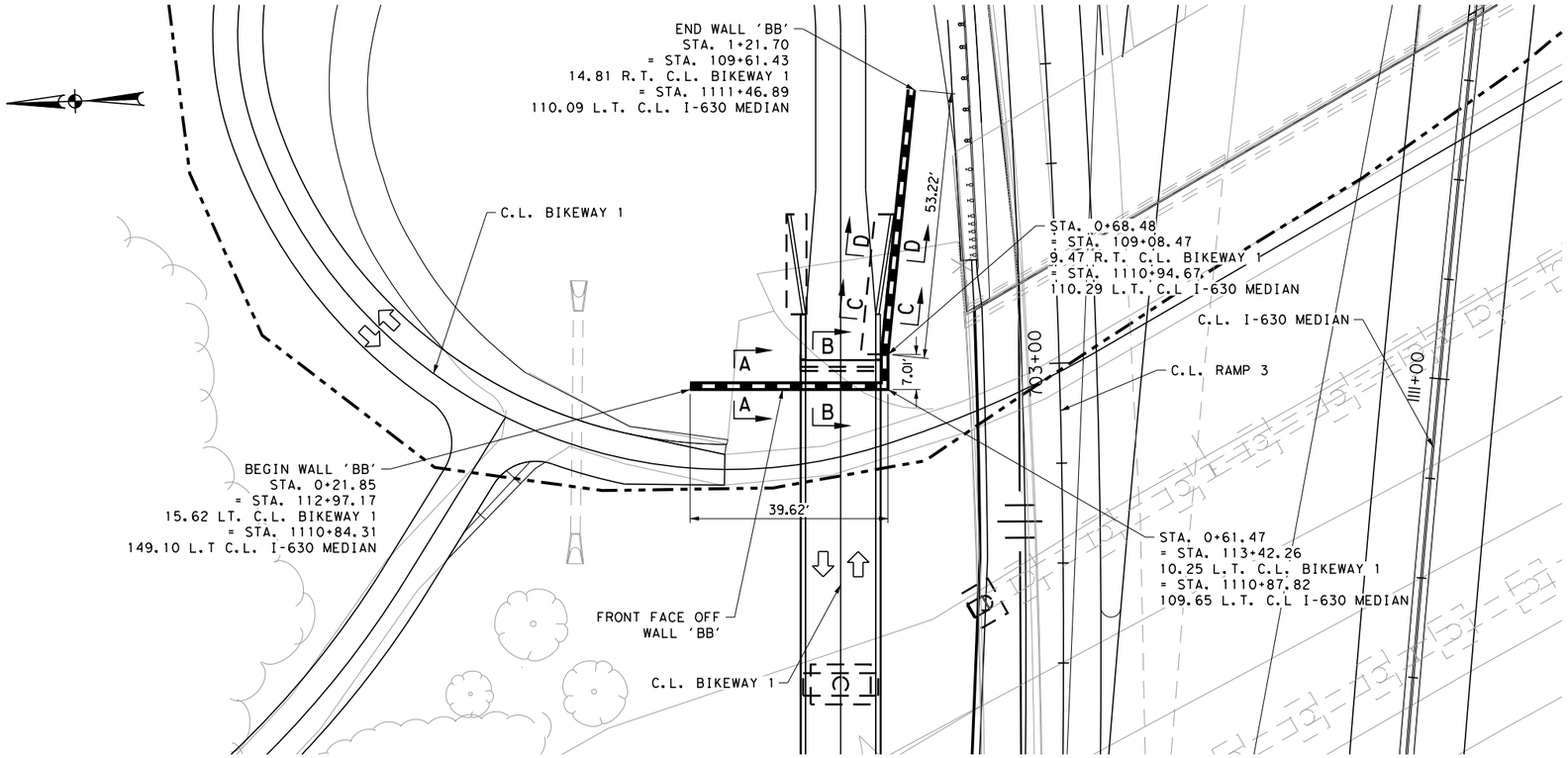
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	ca0608_ret_wall_keyplan_02
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	1" = 125'
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

ATTACHMENT 3

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.		CA0608	545	XXXX
				1	P&P RET. WALL 'BB'			[Dwg#]



PLAN

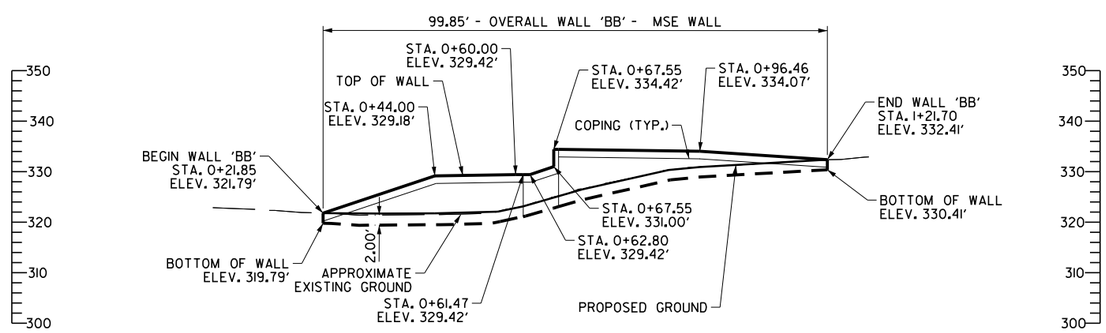
SCALE 1"=15'

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. BIKEWAY 1. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+21.85	321.79	321.79	319.79
0+46.85	329.22	321.81	319.53
0+71.85	334.37	326.11	324.03
0+96.85	334.04	330.97	328.97
1+21.70	332.41	332.41	330.41

```
* Alignment name: RW*BB
* Alignment description:
*
                                    STATION        NORTHING        EASTING
Element: Linear
          POB (          )          0+00.00     2069665.9515    1202877.4256
           PI (          )          0+61.47     2069604.5210    1202875.3595
  Tangential Direction:        S 1°55'34.5" W
     Tangential Length:                61.47

Element: Linear
           PI (          )          0+61.47     2069604.5210    1202875.3595
           PI (          )          0+68.48     2069604.2854    1202882.3655
  Tangential Direction:        S 88°04'25.5" E
     Tangential Length:                 7.01

Element: Linear
           PI (          )          0+68.48     2069604.2854    1202882.3655
          POE (          )          1+29.91     2069596.0637    1202943.2509
  Tangential Direction:        S 82°18'34.4" E
     Tangential Length:                61.44
```



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'BB'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_bb_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\4406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_BB_01.dgn
ddang 3/27/2015 10:6:09 AM

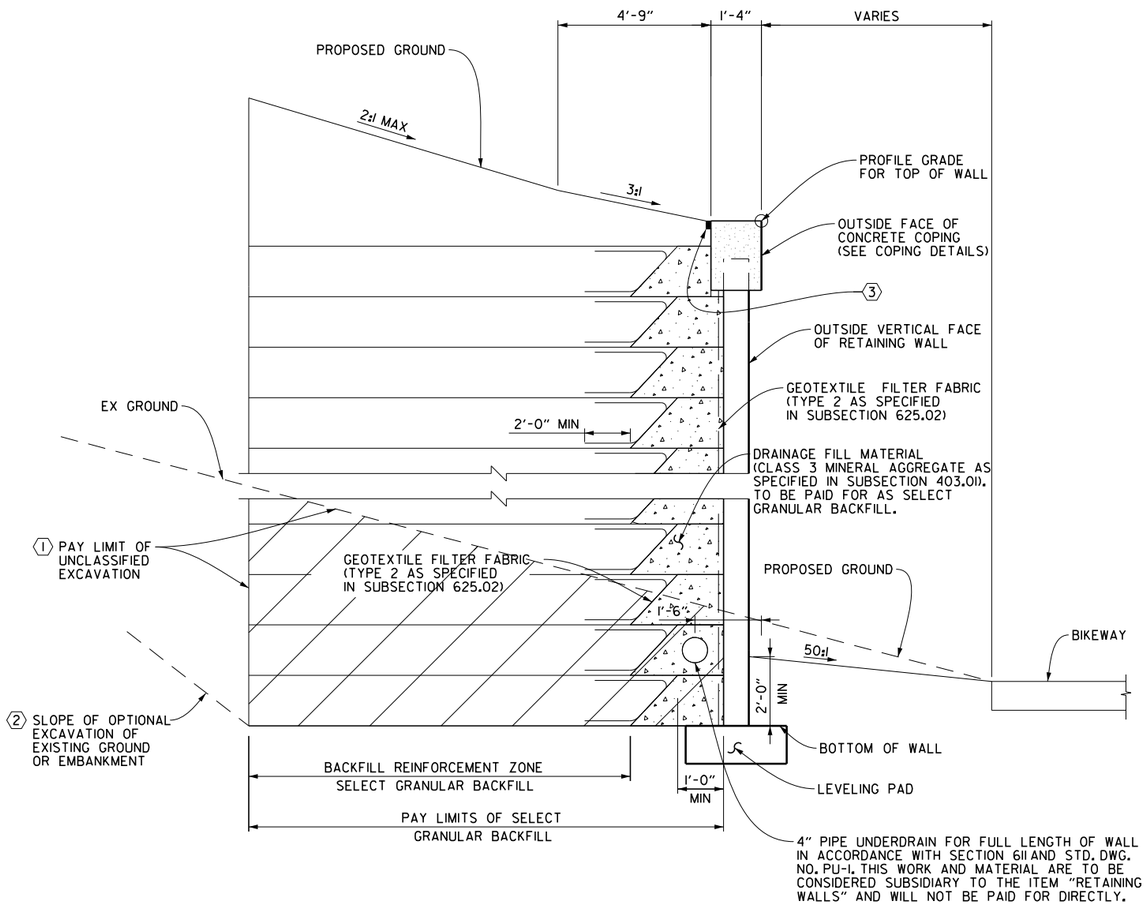
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0608	546	XXXX

1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

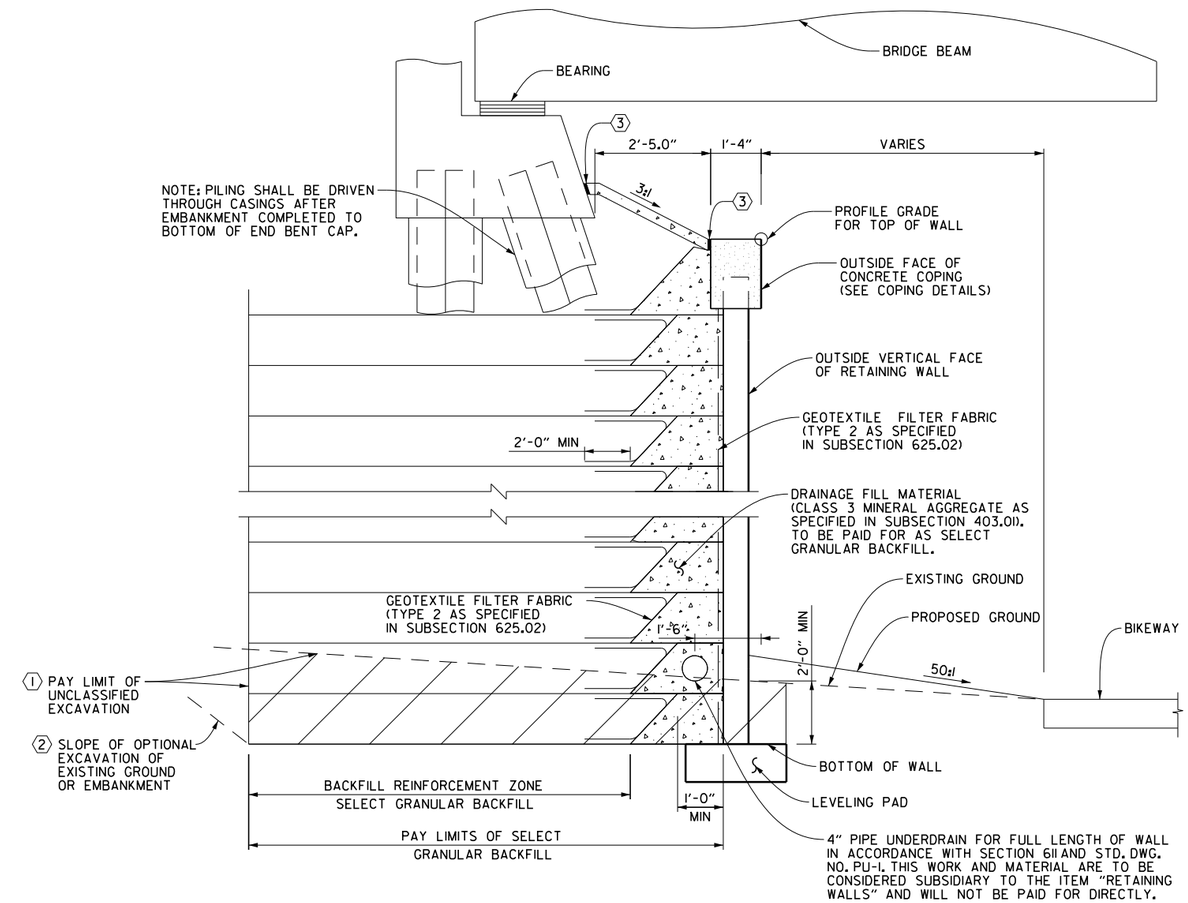
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)



SECTION A-A

FROM STA. 0+21.85 TO STA. 0+44.00
N.T.S.



SECTION B-B

FROM STA. 0+44.00 TO STA. 0+61.47
N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SHEET 1 OF 2
SECTIONS OF RETAINING WALL 'BB'
BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_bb_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

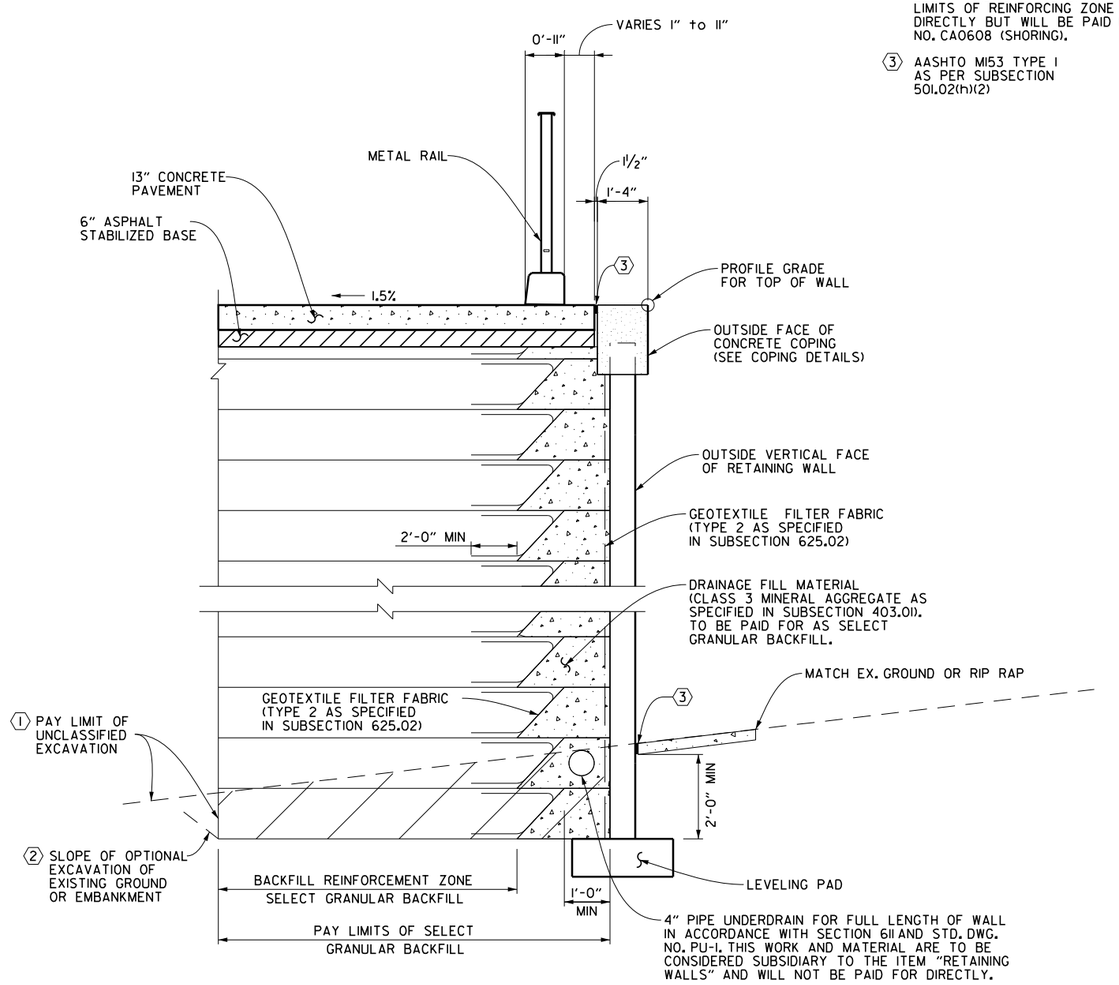
DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_BB_01.dgn
ddang 3/27/2015 10:16:10 AM

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.		CA0608	547	XXXX

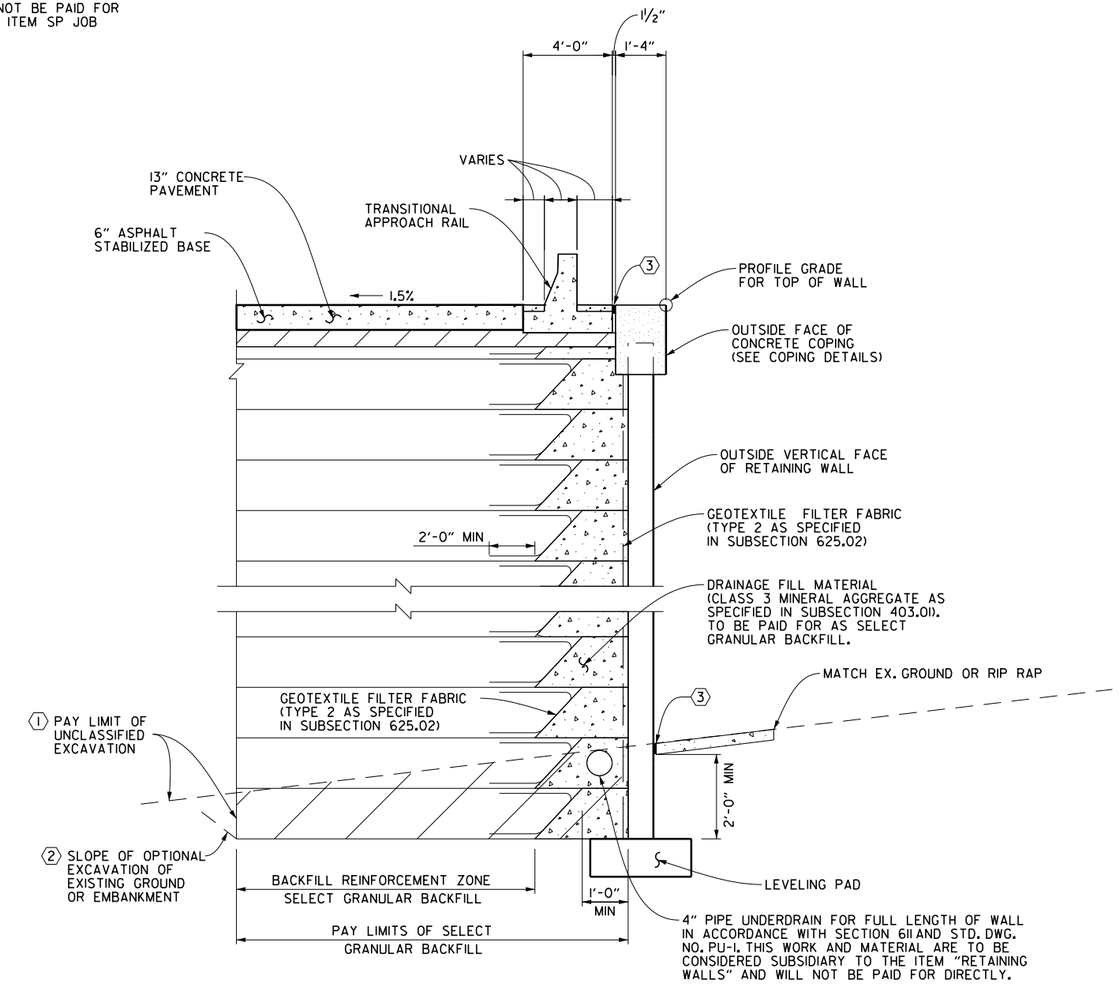
1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).
3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)



SECTION C-C

FROM STA. 0+67.55 TO STA. 0+76.35
N.T.S.



SECTION D-D

FROM STA. 0+76.35 TO STA. 0+96.46
N.T.S.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 2
SECTIONS OF RETAINING WALL 'BB'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

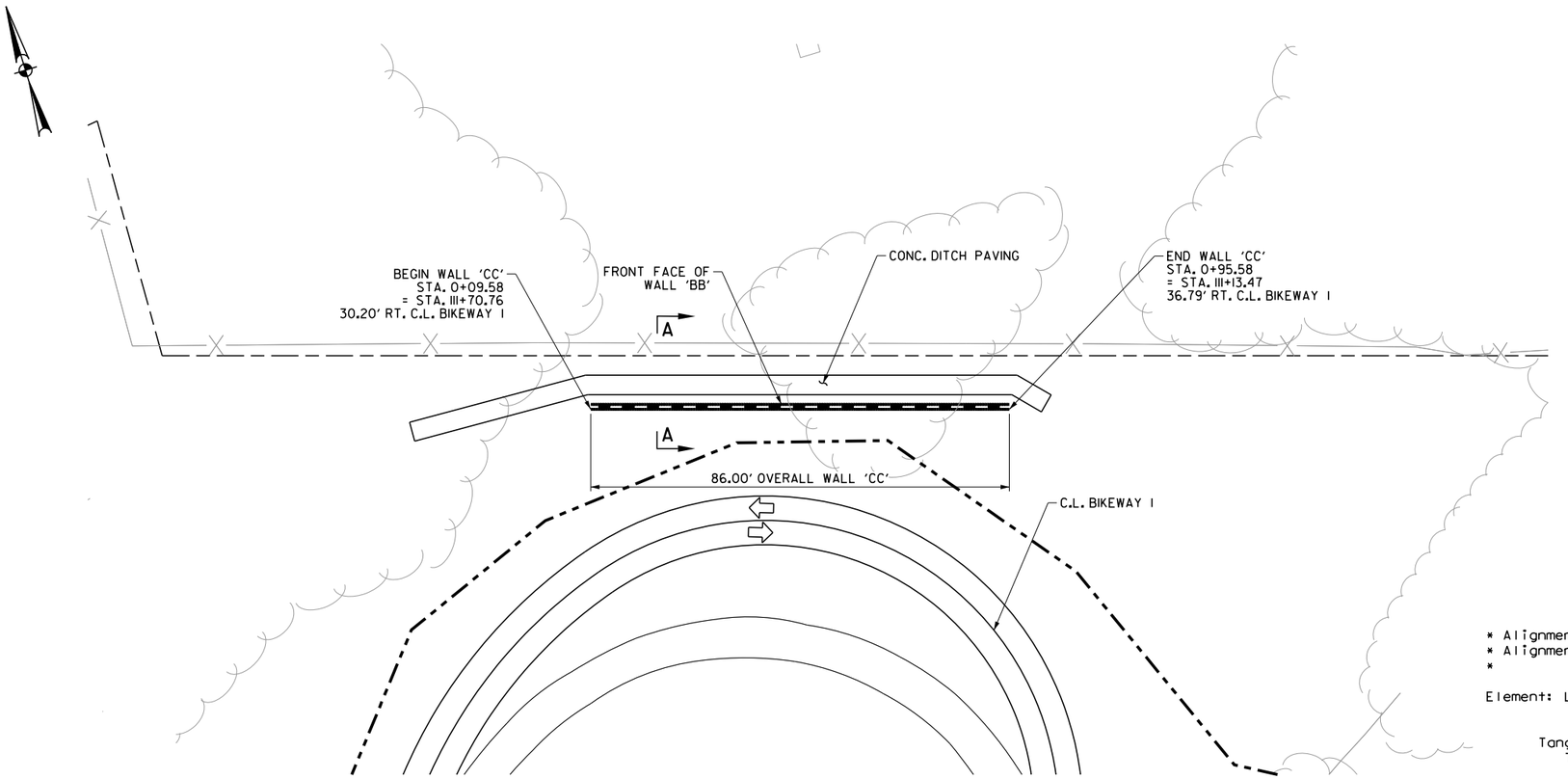
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections.bb_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_BB_02.dgn
ddang 3/27/2015 10:16:10 AM

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.		CA0608	548	XXXX

1 P&P RET. WALL 'CC' [Dwg#]



PLAN

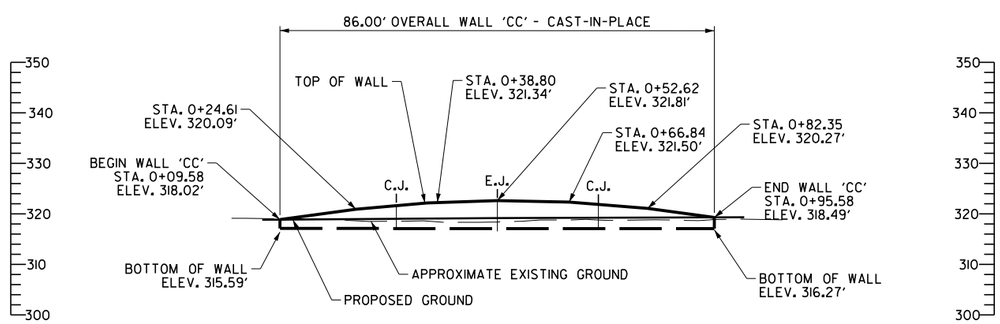
SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+09.58	318.02	318.02	316.27
0+34.58	320.97	318.22	316.27
0+59.58	321.66	318.38	316.27
0+84.58	319.97	318.46	316.27
0+95.58	318.49	318.49	316.27

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. BIKEWAY 1. OFFSETS ARE MEASURED TO INSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "CAST-IN-PLACE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO AHTD STD. DRAWING SI-2.

```
* Alignment name: RW*CC
* Alignment description: CIP Wall
*
                                          STATION          NORTHING          EASTING
Element: Linear
          POB (          )               0+00.00      2069764.6336      1202929.7491
          POE (          )               1+10.34      2069732.3573      1203035.2678
     Tangential Direction:          S 72°59'31.5" E
        Tangential Length:                  110.34
```



C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'CC'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

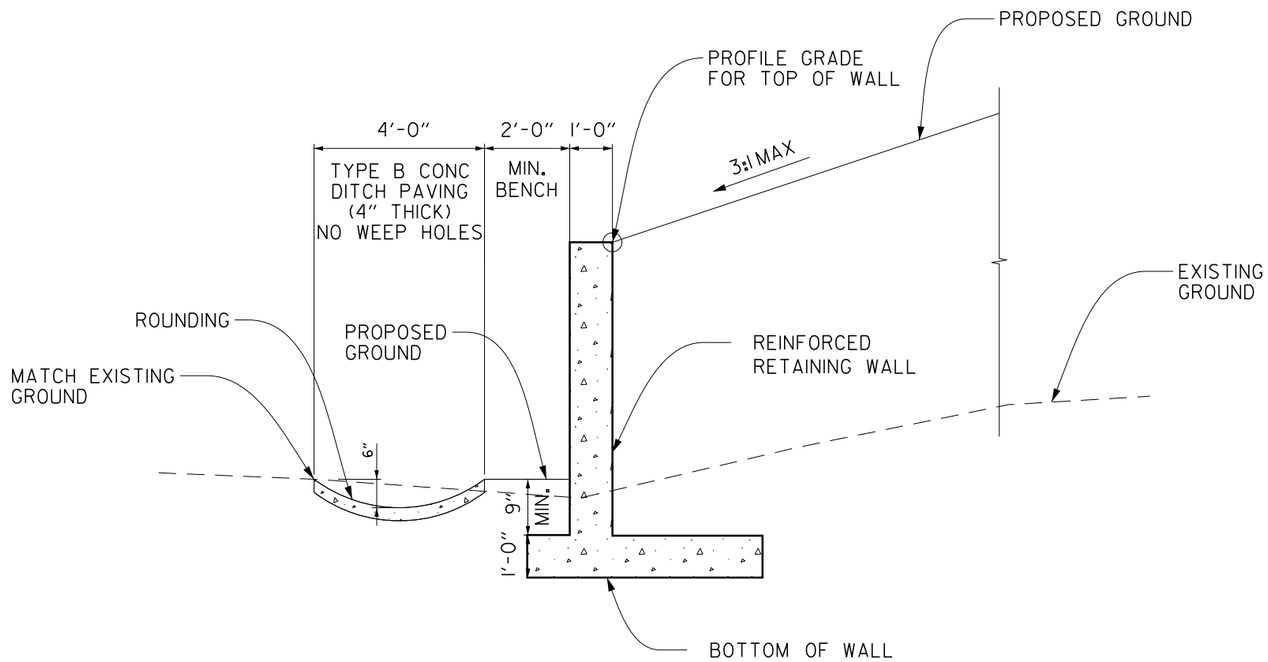
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_cc_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\4406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_P&P_CC_01.dgn
ddang 3/27/2015 10:16:11 AM

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.		CA0608	575	XXXX

1 SECTIONS OF WALLS [Dwg#]



SECTION A-A

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'CC'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

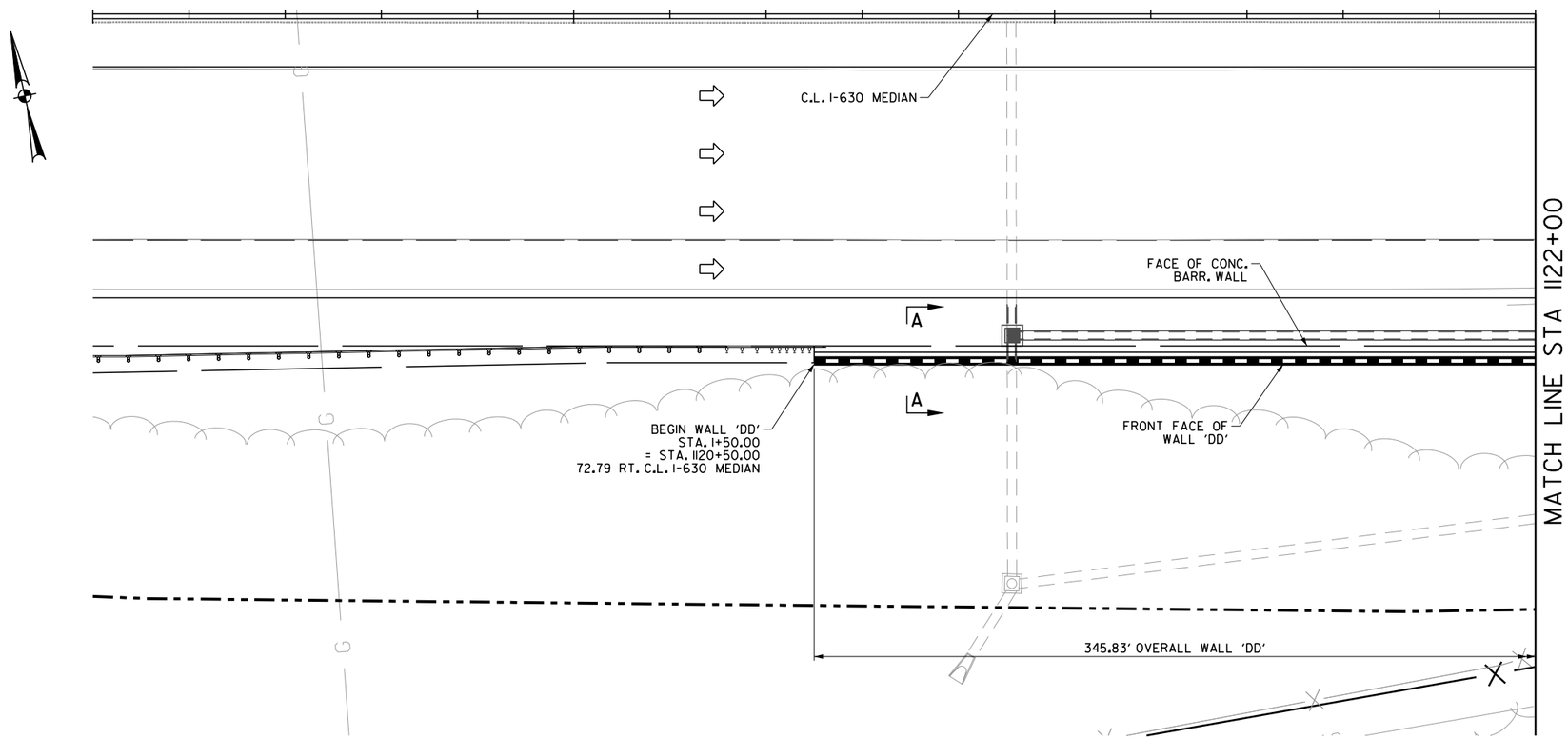
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_ret_wall_sections.nn_
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Sections_CC_01.dgn
ddang 3/27/2015 10:16:12 AM

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.		CA0608	549	XXXX
				1	P&P RET. WALL 'DD'			[Dwg#]



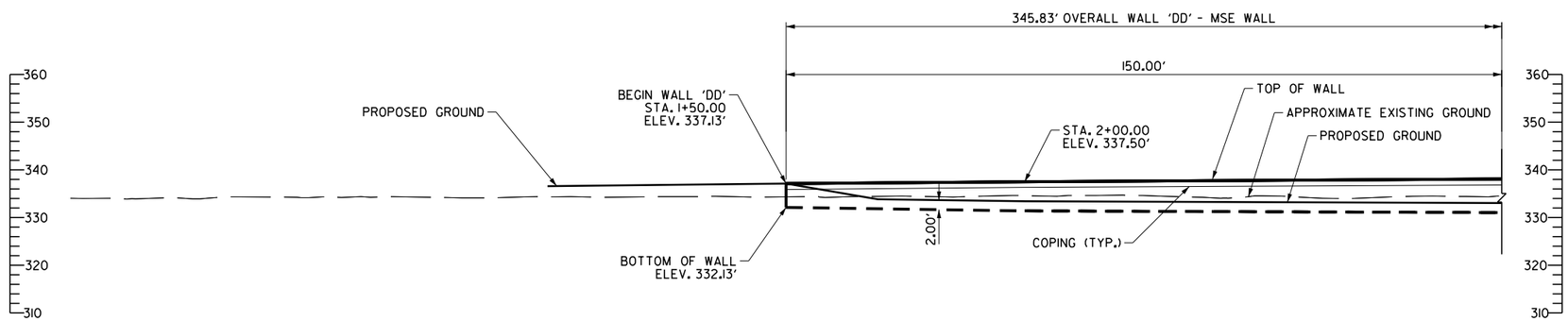
PLAN

SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
1+50.00	337.13	337.13	332.13
1+75.00	337.32	333.77	331.77
2+00.00	337.50	333.40	331.40
2+25.00	337.65	333.31	331.31
2+50.00	337.79	333.22	331.22
2+75.00	337.94	333.13	331.13
3+00.00	338.08	333.04	331.04
3+25.00	338.21	333.04	331.04
3+50.00	338.34	333.04	331.04
3+75.00	338.47	333.04	331.04
4+00.00	338.60	333.04	331.04
4+25.00	338.84	333.54	331.54
4+50.00	339.08	334.04	332.04
4+75.00	339.32	334.54	332.54
4+95.83	339.52	334.96	332.96

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 1 OF 2
LAYOUT OF RETAINING WALL 'DD'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

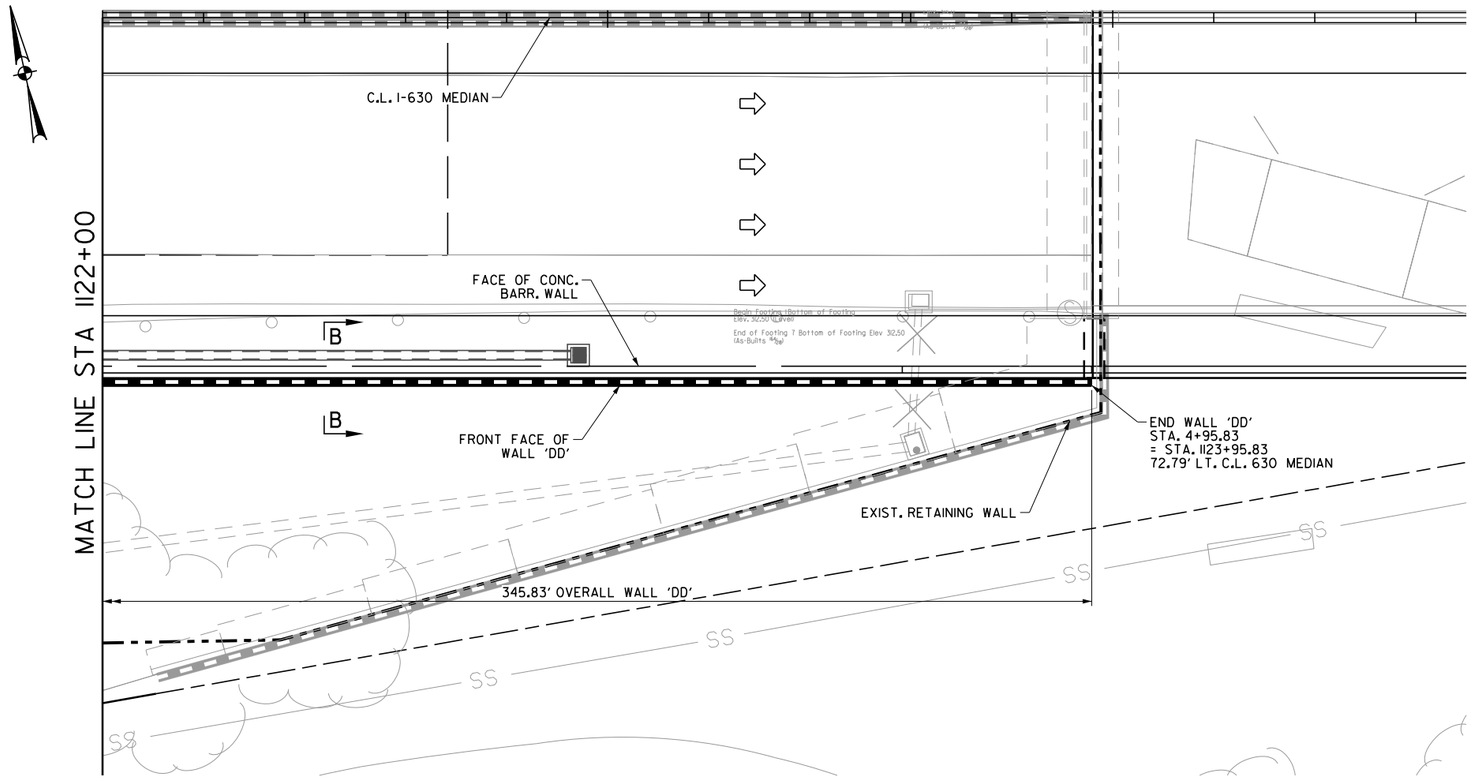
DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_ret_wall_p&p_dd_01
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_DD_01.dgn
ddang 3/27/2015 10:16:13 AM

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.		CA0608	550	XXXX

1 P&P RET. WALL 'DD' [Dwg#]



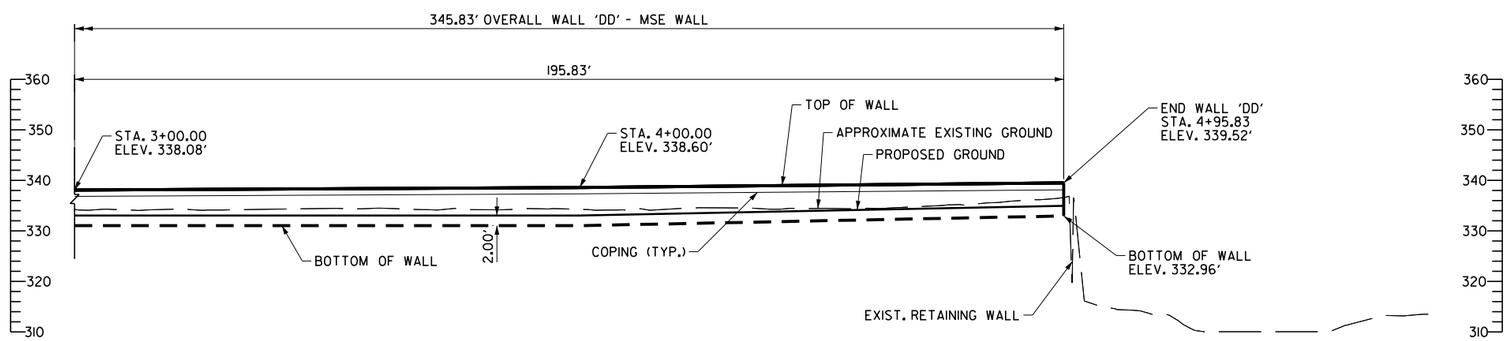
PLAN

SCALE 1"=15'

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.

```
* Alignment name: RW*DD
* Alignment description: MSE Wall
*
                                    STATION          NORTHING          EASTING
Element: Linear
          POB (          )          0+00.00       2069273.9605      1203643.8007
          POE (          )          8+31.71       2069095.5572      1204456.1560
   Tangential Direction:      S 77°36'49.5" E
      Tangential Length:            831.71
```



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 2
LAYOUT OF RETAINING WALL 'DD'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_dd_02
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_DD_02.dgn

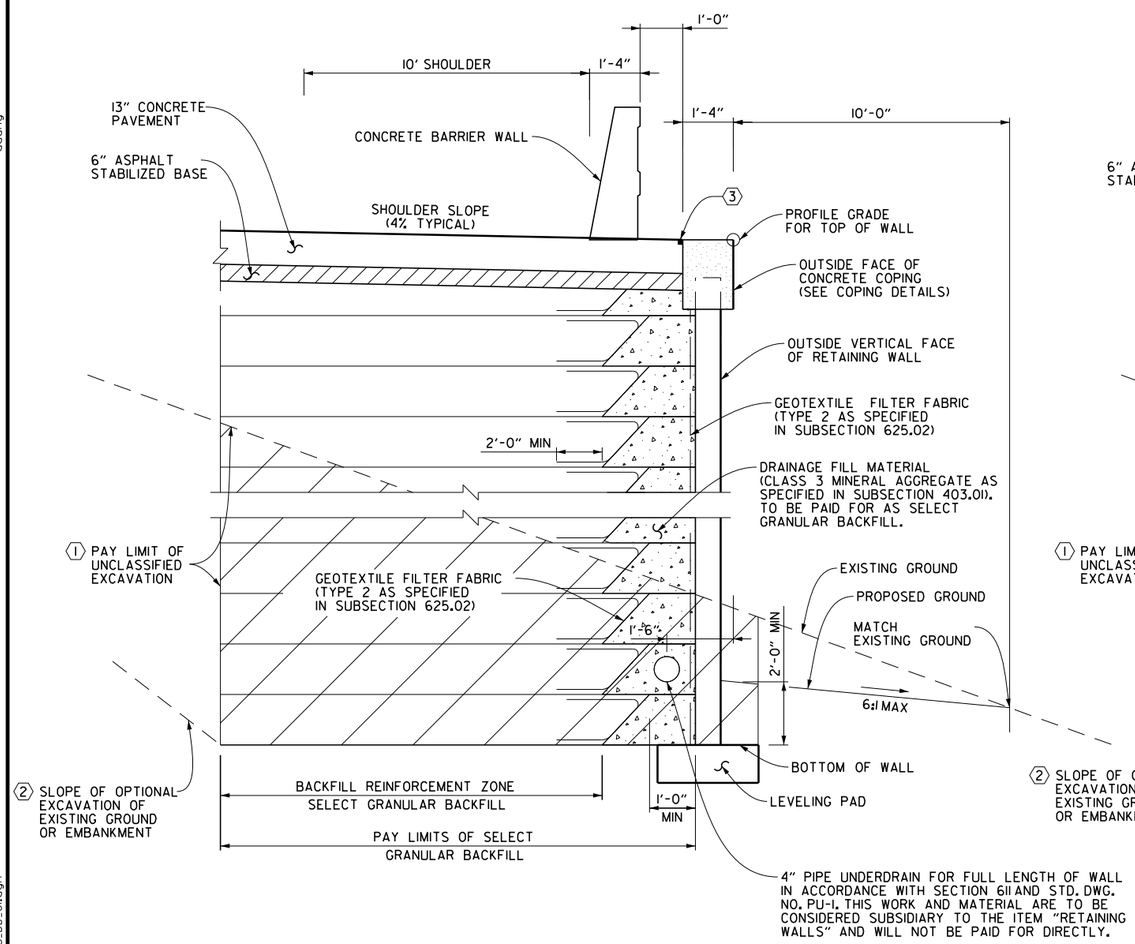
ddang 3/27/2015 10:6:14 AM

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.		CA0608	551	XXXX
				1	SECTIONS OF WALLS			[Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

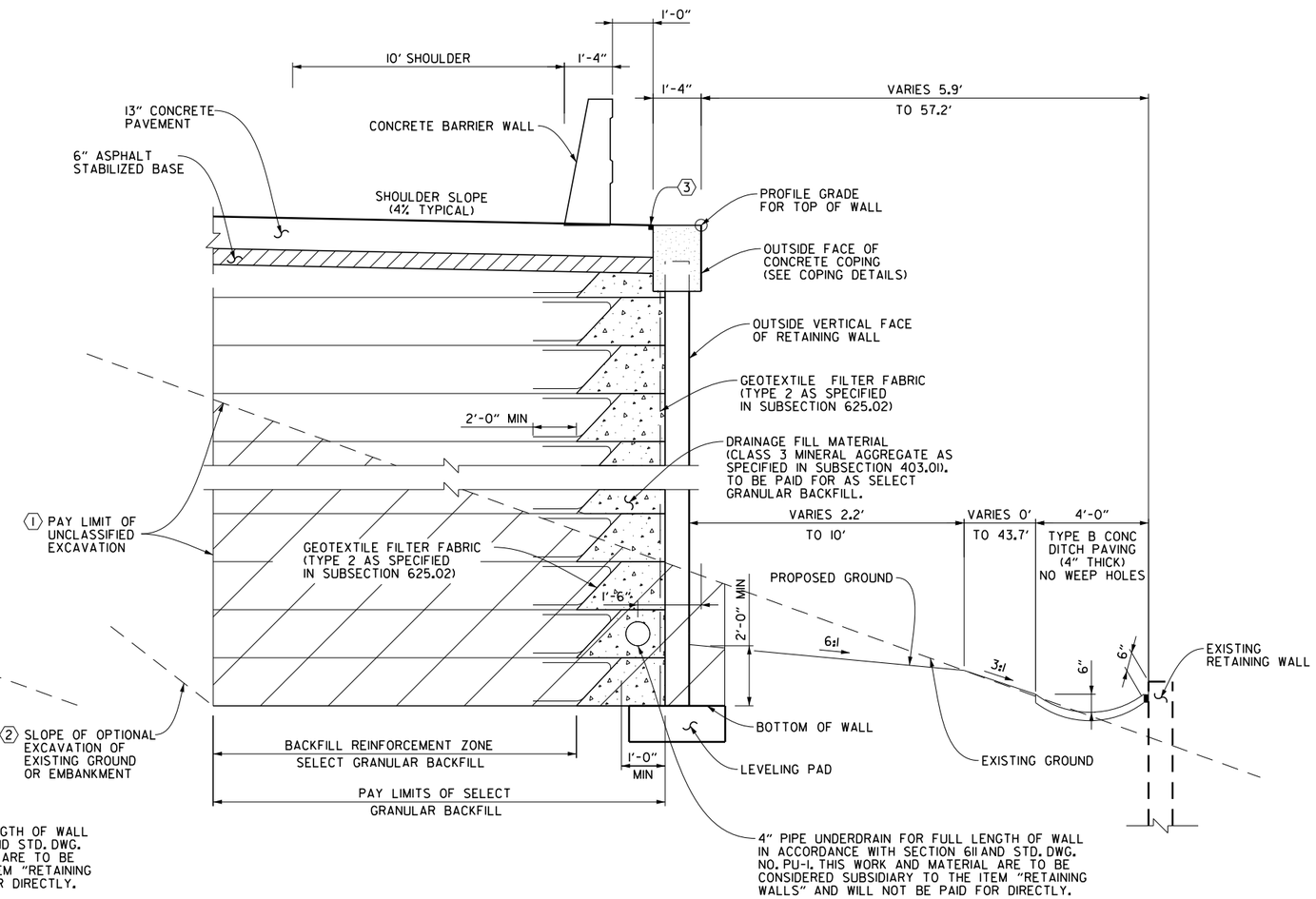
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)



SECTION A-A

FROM STA. 1+50.00 TO STA. 3+10.74
N.T.S.



SECTION B-B

FROM STA. 3+10.74 TO STA. 4+95.83
N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'DD'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

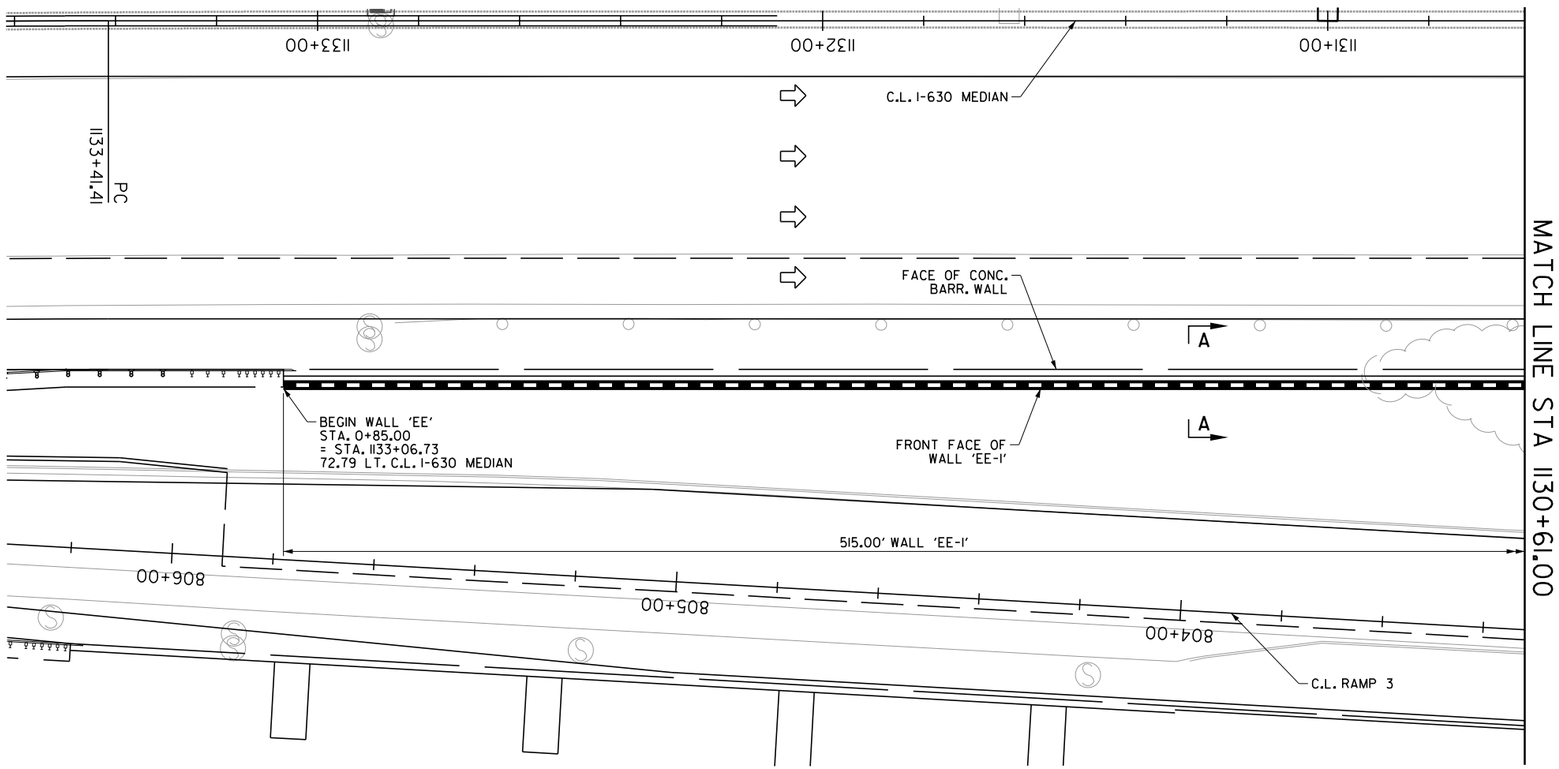
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_dd_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Sections_DD_01.dgn
ddang 3/27/2015 10:6:15 AM

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.		CA0608	552	XXXX

1 P&P RET. WALL 'EE' [Dwg#]



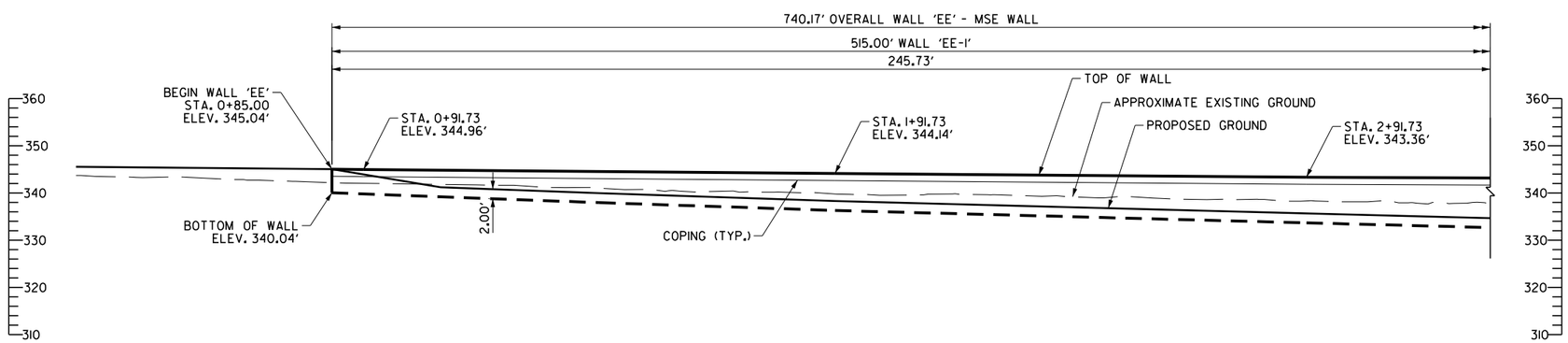
PLAN

SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+85.00	345.04	345.04	340.04
1+10.00	344.81	341.13	339.13
1+35.00	344.61	340.22	338.22
1+60.00	344.40	339.36	337.36
1+85.00	344.20	338.52	336.52
2+10.00	344.00	337.82	335.82
2+35.00	343.80	337.17	335.17
2+60.00	343.61	336.51	334.51
2+85.00	343.41	335.86	333.86
3+10.00	343.28	335.21	333.21
3+35.00	343.17	334.58	332.58
3+60.00	343.06	333.94	331.94
3+85.00	342.95	333.30	331.30
4+10.00	342.77	332.96	330.96
4+35.00	342.55	332.74	330.74
4+60.00	342.34	332.51	330.51
4+85.00	342.13	332.28	330.28
5+10.00	342.00	331.37	329.37
5+35.00	341.91	329.08	327.08
5+60.00	341.81	321.67	319.67
5+85.00	341.72	321.24	319.28
6+10.00	335.98	321.39	319.39
6+35.00	336.47	321.72	319.72
6+60.00	336.96	322.05	320.05
6+85.00	337.26	322.16	320.16
7+10.00	336.98	321.88	319.88
7+35.00	336.70	321.59	319.59
7+60.00	336.33	322.05	320.05
7+85.00	330.47	322.23	320.23
8+10.00	324.62	321.42	319.42
8+25.17	321.06	321.06	319.06

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 1 OF 3
LAYOUT OF RETAINING WALL 'EE'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

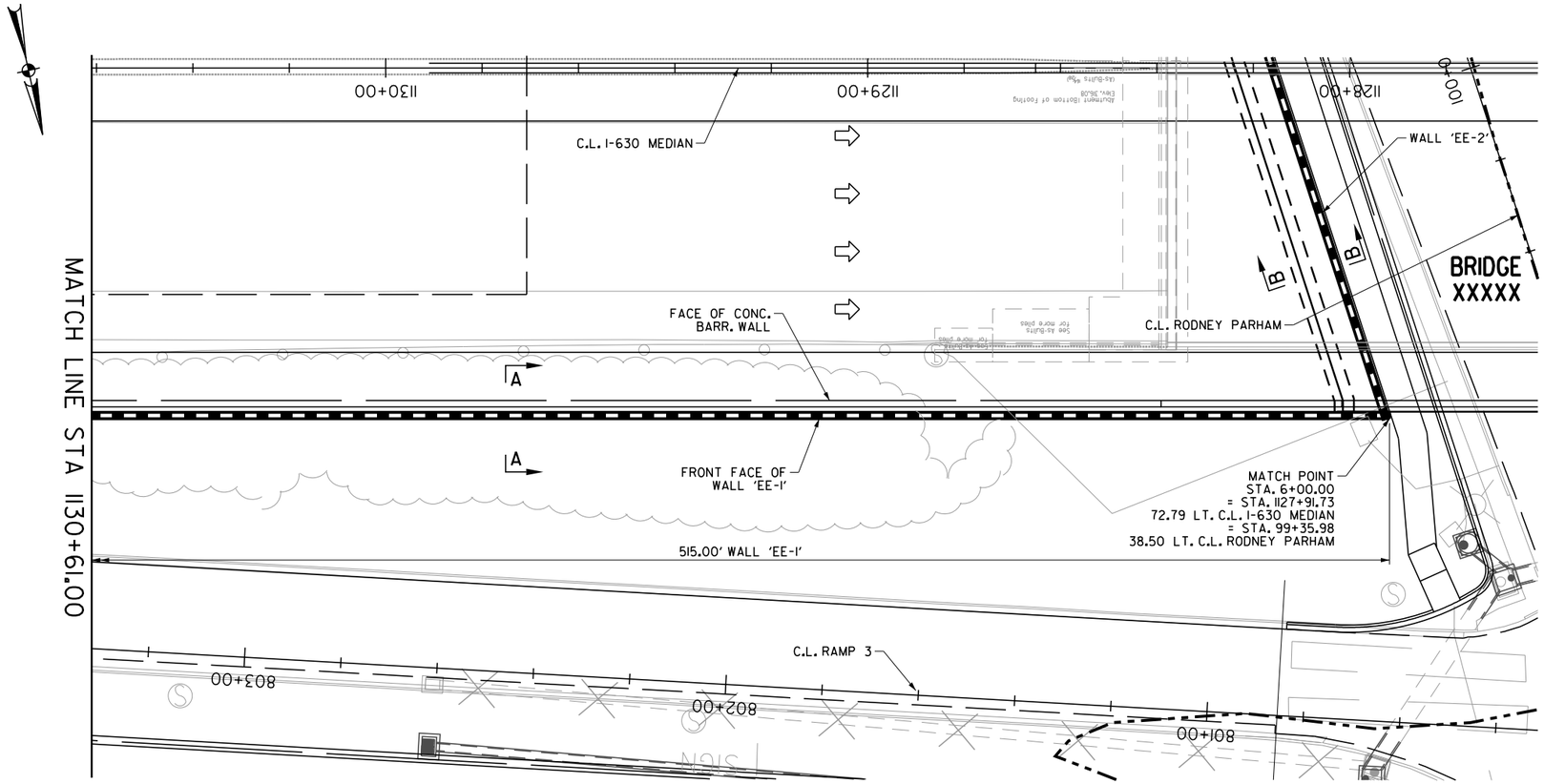
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_ret_wall_p&p_ee_01
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\1406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_P&P_EE_01.dgn
ddang 3/27/2015 10:16:17 AM

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.		CA0608	553	XXXX
				1	P&P RET. WALL 'EE'			[Dwg#]



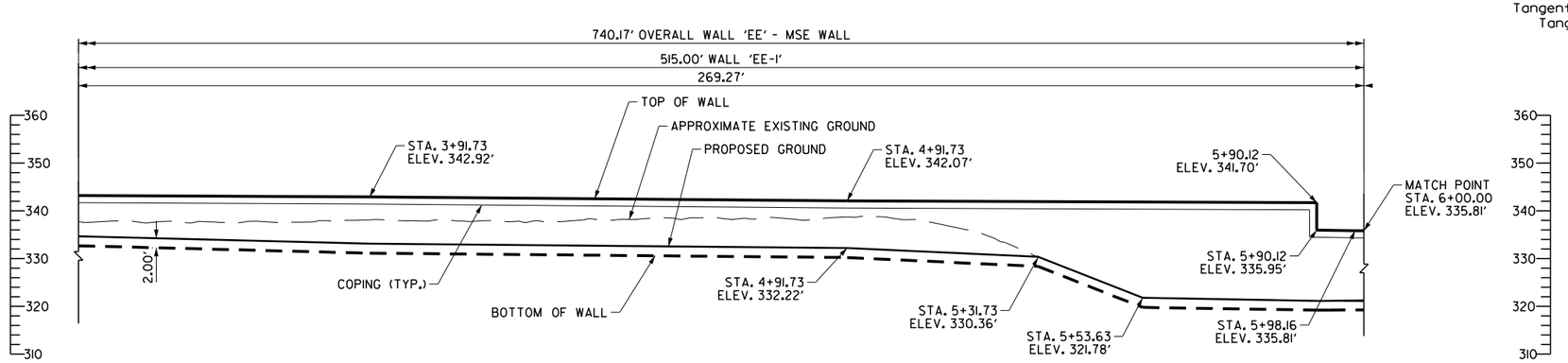
PLAN

SCALE 1"=15'

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN, WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

```
* Alignment name: RW*EE
* Alignment description: MSE Wall
*
                                        STATION          NORTHING          EASTING
Element: Linear
          POB (          )              0+00.00       2069096.1773      1205132.0400
           PI (          )              6+00.00       2069224.8778      1204546.0057
   Tangential Direction:        N 77°36'49.5" W
      Tangential Length:                 600.00

Element: Linear
           PI (          )              6+00.00       2069224.8778      1204546.0057
          POE (          )              8+50.00       2068976.0768      1204570.4612
   Tangential Direction:         S 5°36'49.5" E
      Tangential Length:                 250.00
```



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 3
LAYOUT OF RETAINING WALL 'EE'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

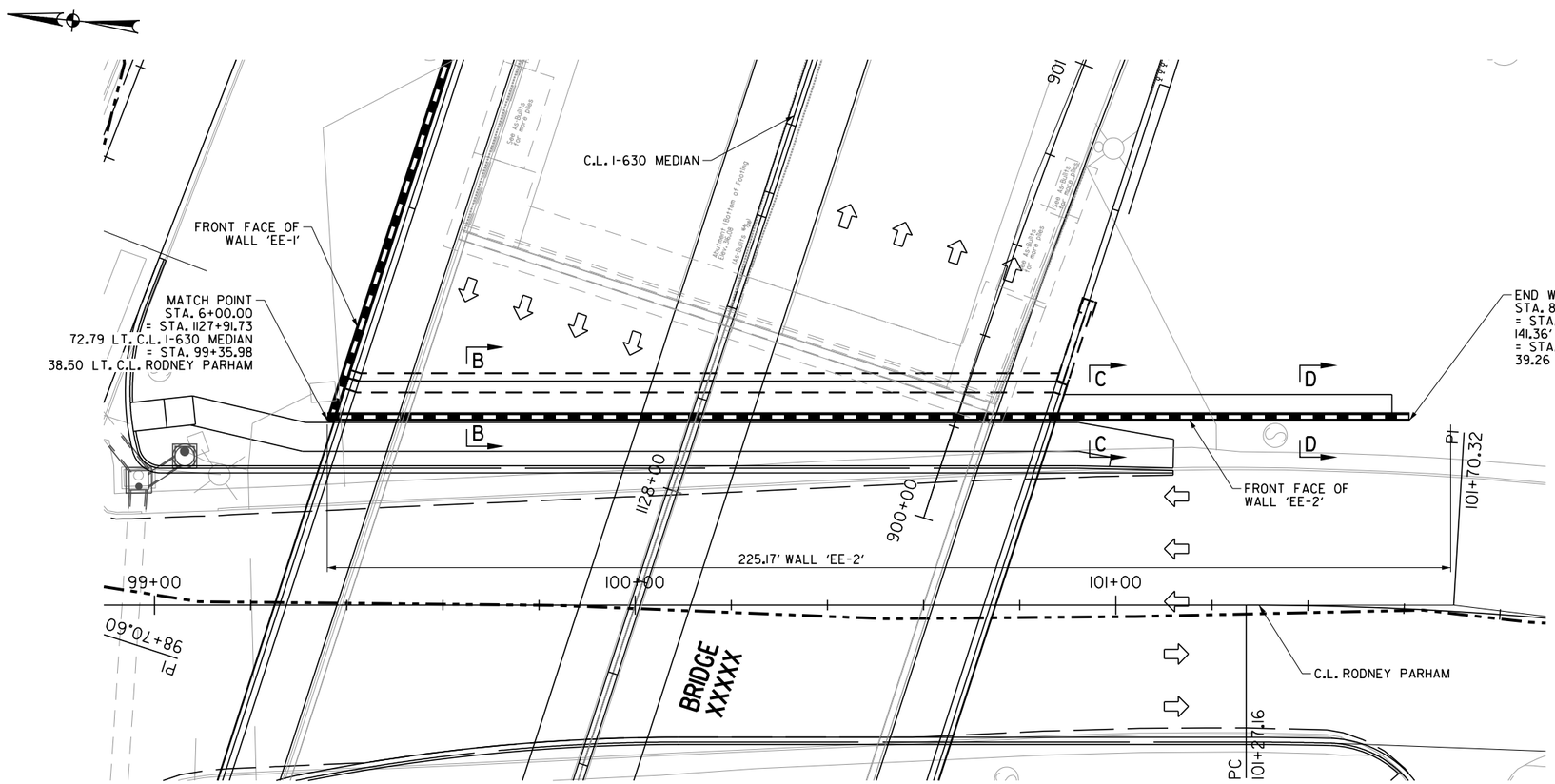
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_ee_02
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_EE_02.dgn

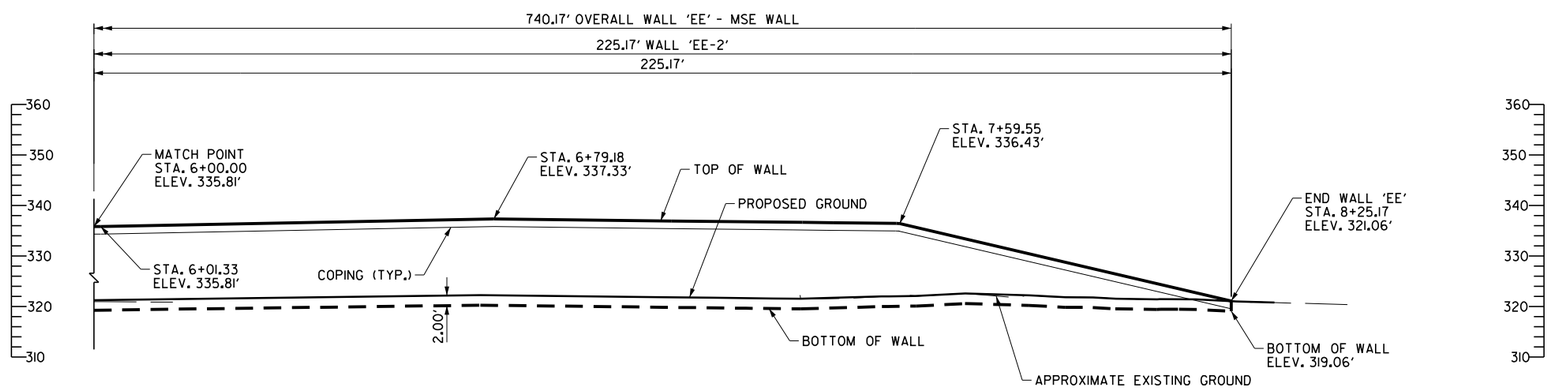
ddang 3/27/2015 10:48 AM

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.		CA0608	554	XXXX
				1	P&P RET. WALL 'EE'			[Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 3 OF 3
LAYOUT OF RETAINING WALL 'EE'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_ee_03
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

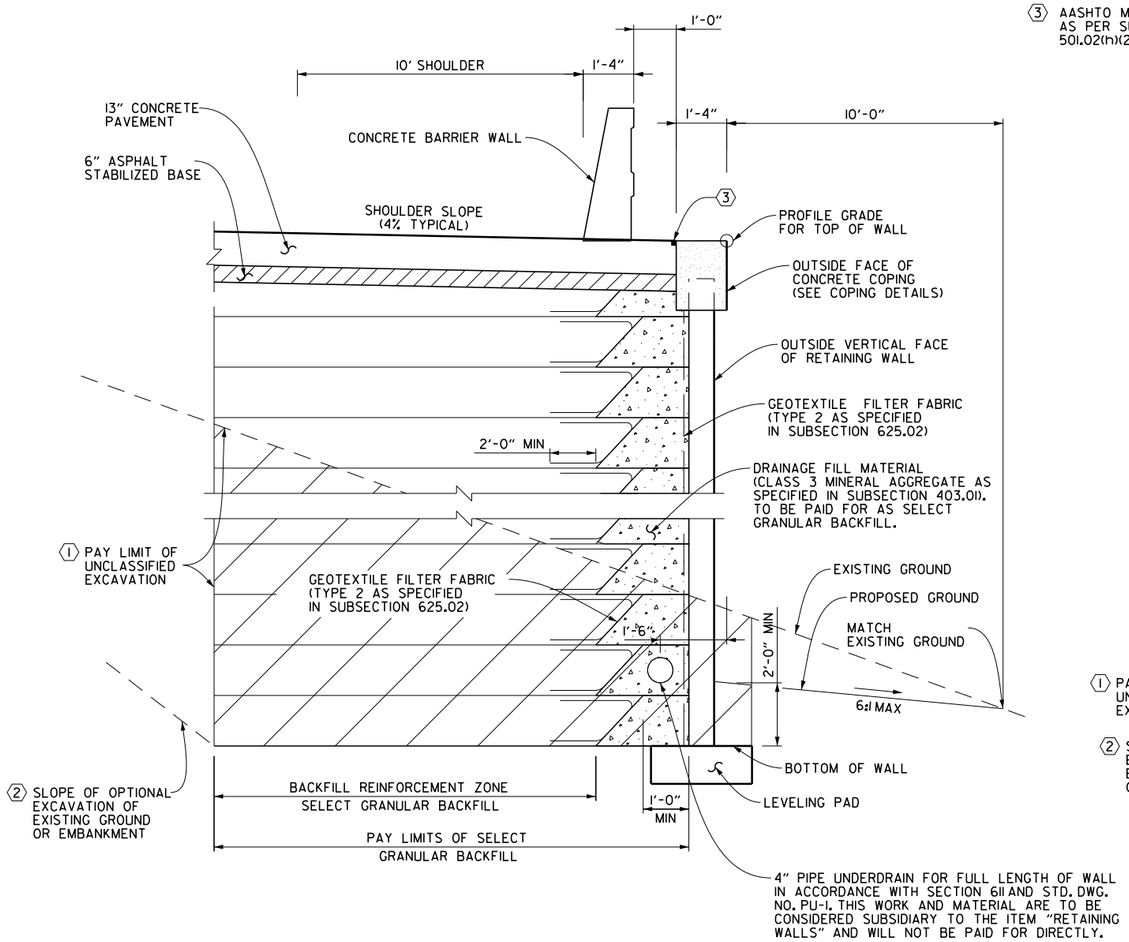
DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_EE_03.dgn
ddang 3/27/2015 10:49 AM

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.		CA0608	555	XXXX

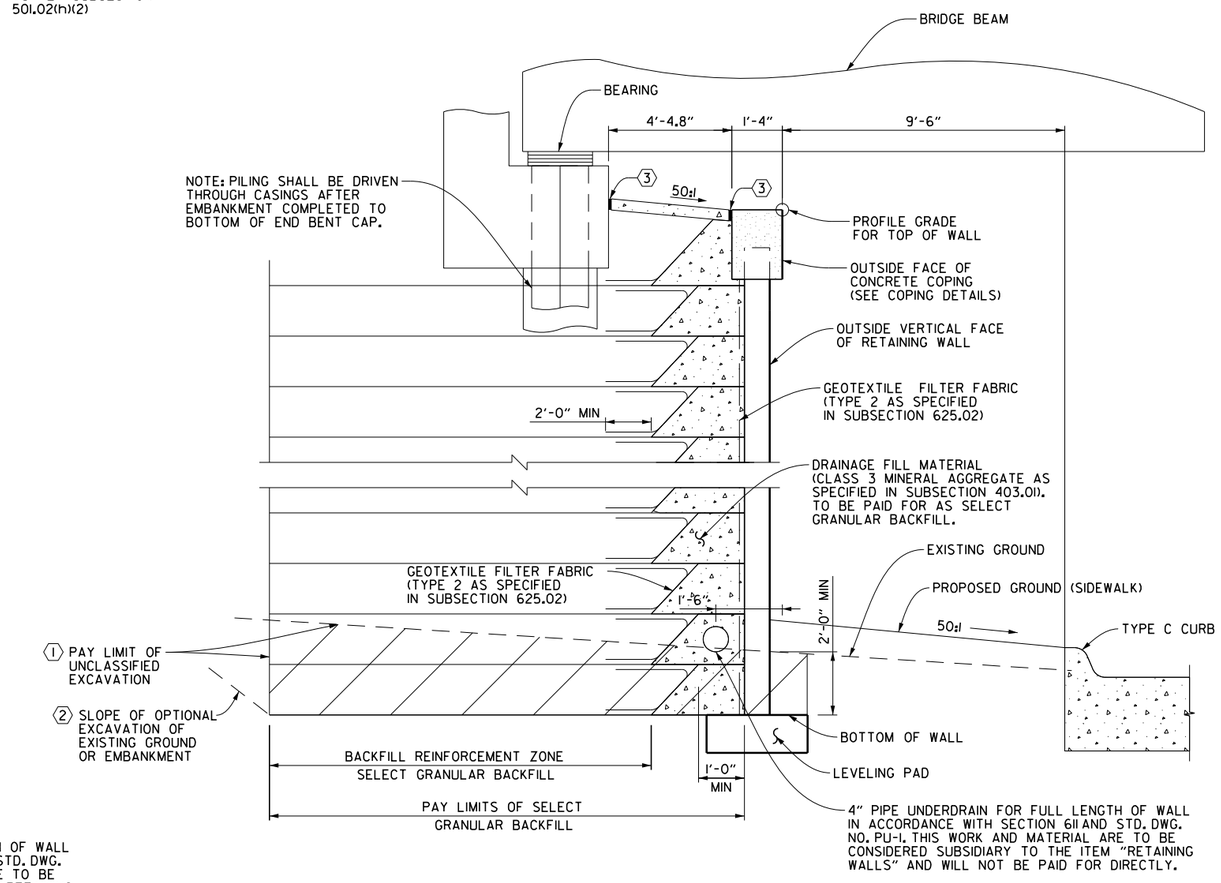
1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).
3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)



SECTION A-A

FROM STA. 0+85.00 TO STA. 6+00.00
N.T.S.



SECTION B-B

FROM STA. 6+00.00 TO STA. 7+53.21
N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SHEET 1 OF 2
SECTIONS OF RETAINING WALL 'EE'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_ee_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Sections_EE_01.dgn
ddang 3/27/2015 10:19:19 AM

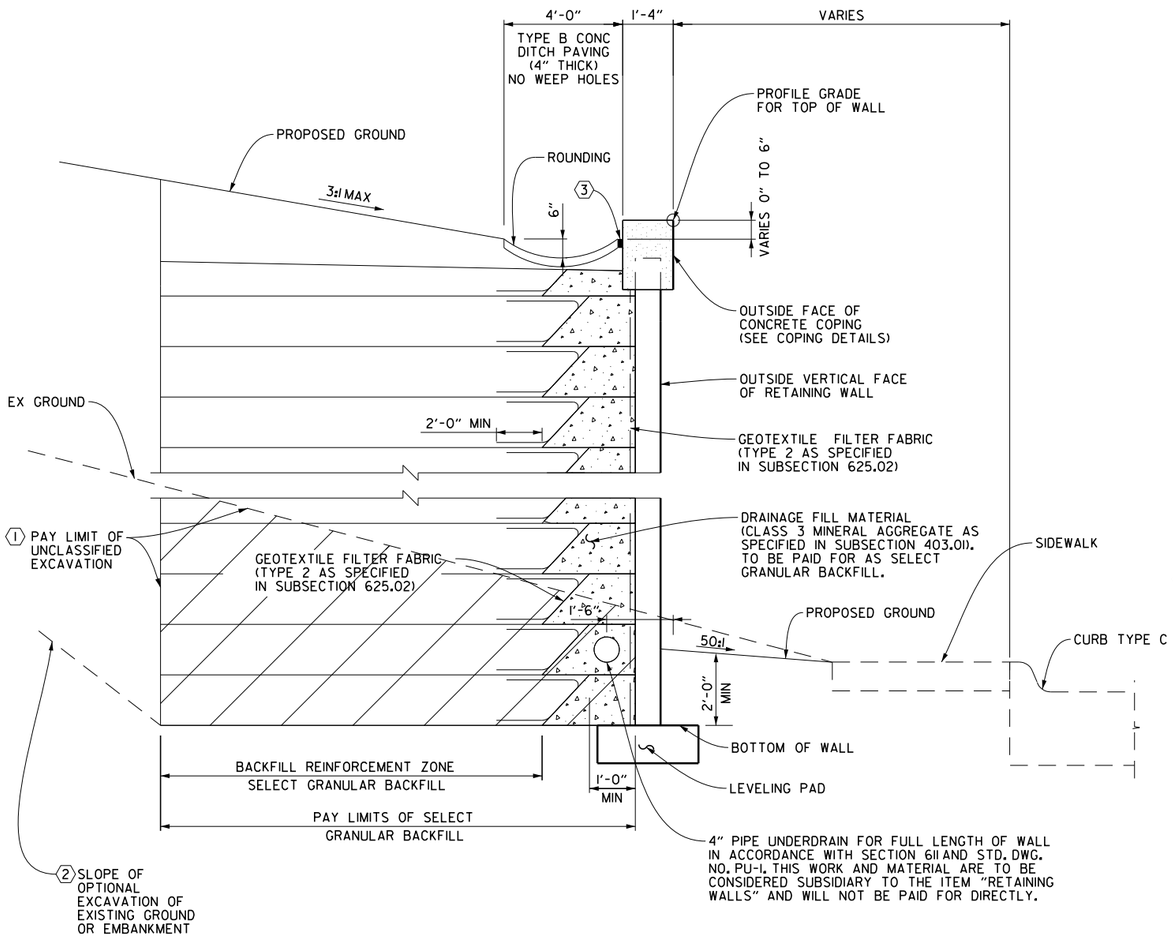
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0608	556	XXXX

1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

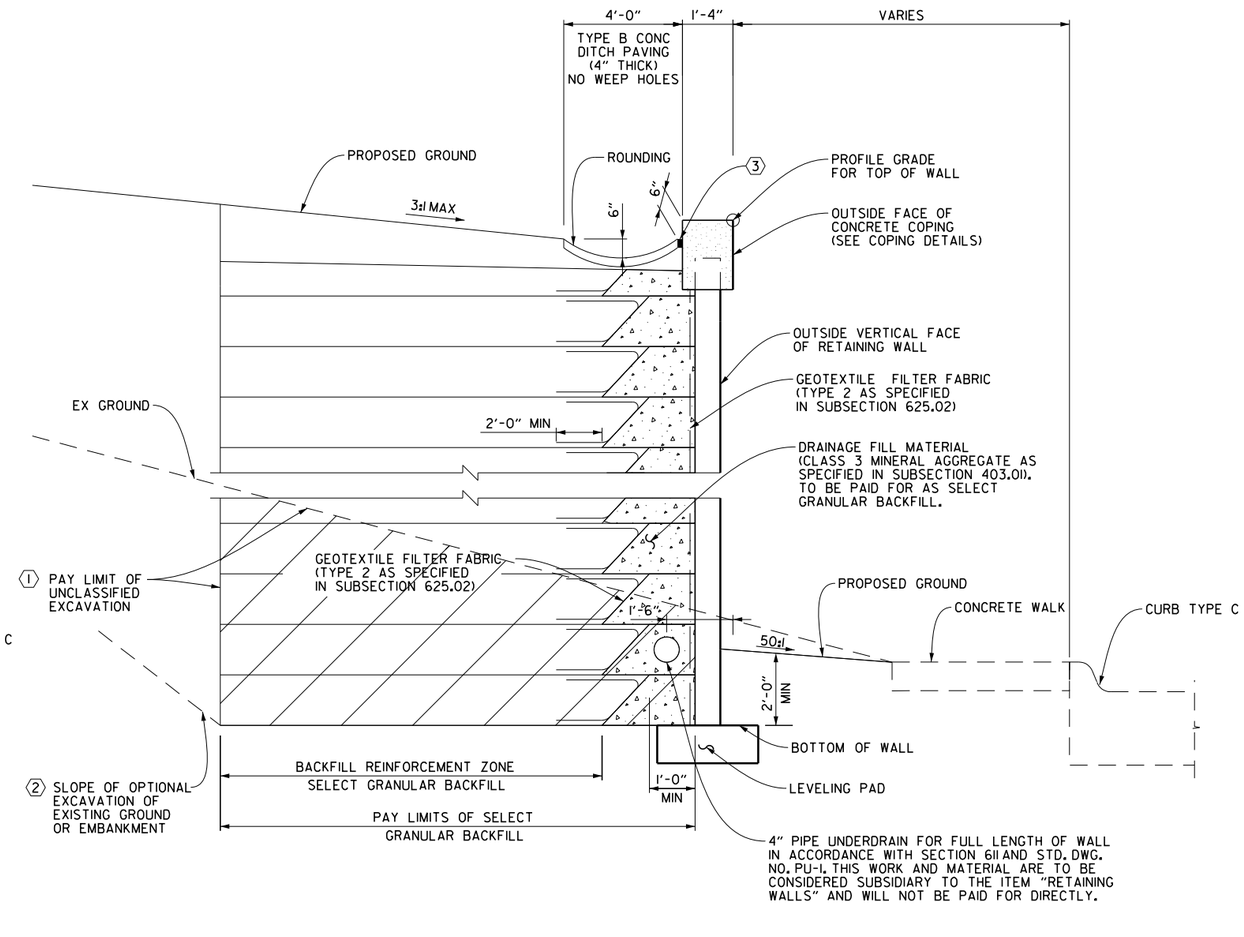
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)



SECTION C-C

FROM STA. 7+53.21 TO STA. 7+59.55
N.T.S.



SECTION D-D

FROM STA. 7+59.55 TO STA. 8+25.17
N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SHEET 2 OF 2
SECTIONS OF RETAINING WALL 'EE'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

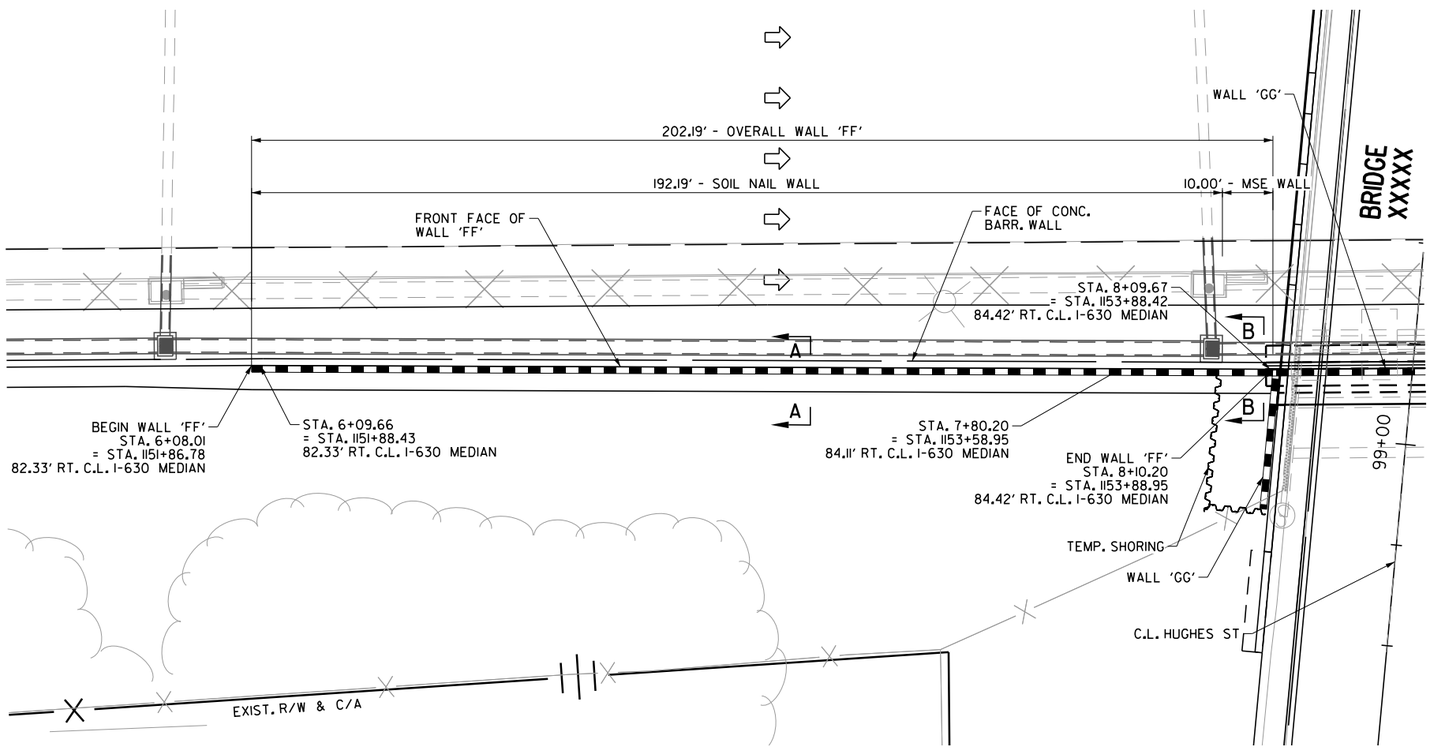
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_ee.d
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\4406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_Sections_EE_02.dgn
ddang 3/27/2015 10:49 AM

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.		CA0608	557	XXXX

1 P&P RET. WALL 'FF' [Dwg#]



PLAN

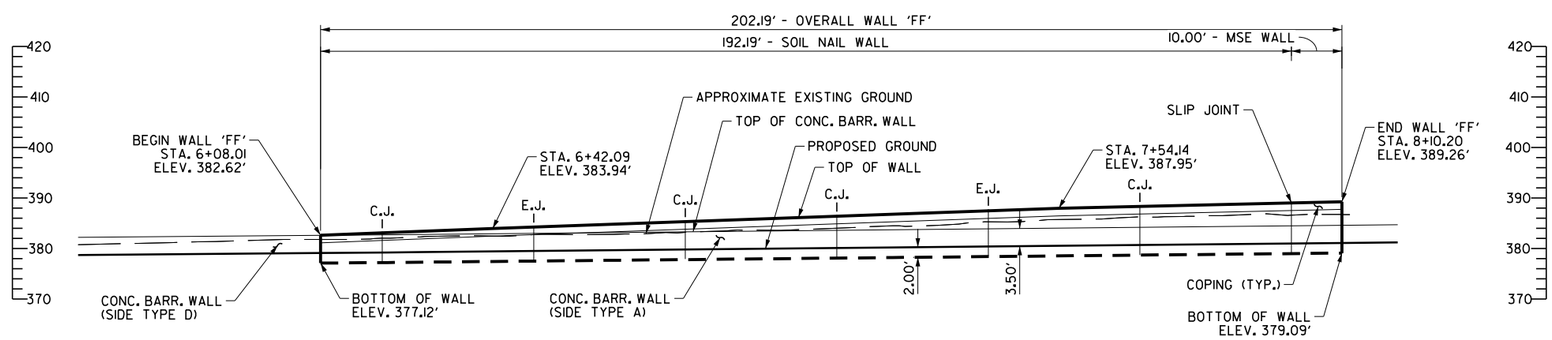
SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
6+08.01	382.62	379.12	377.12
6+33.01	383.59	379.34	377.34
6+58.01	384.51	379.59	377.59
6+83.01	385.41	379.84	377.84
7+08.01	386.30	380.08	378.08
7+33.01	387.20	380.33	378.33
7+58.01	388.04	380.58	378.58
7+83.01	388.62	380.82	378.82
8+08.01	389.21	381.07	379.07
8+10.20	389.26	381.09	379.09

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

```
* Alignment name: RW*FF
* Alignment description: Soil Nail Wall and MSE Wall
*
                                    STATION          NORTHING          EASTING
Element: Linear
          POB (          )          0+00.00     2068883.5469     1206303.0690
           PI (          )          6+09.66     2068923.3871     1206911.4218
  Tangential Direction:      N 86°15'11.3" E
     Tangential Length:              609.66

Element: Linear
           PI (          )          6+09.66     2068923.3871     1206911.4218
           PI (          )          8+09.67     2068934.3779     1207111.1304
  Tangential Direction:      N 86°50'59.8" E
     Tangential Length:              200.01

Element: Linear
           PI (          )          8+09.67     2068934.3779     1207111.1304
          POE (          )          8+11.79     2068934.5170     1207113.2534
  Tangential Direction:      N 86°15'11.3" E
     Tangential Length:                2.13
```



C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'FF'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_ff_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

10:16:21 AM 3/27/2015 ddang

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_FF_01.dgn

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.		CA0608	558	XXXX

(1) SECTIONS OF WALLS [Dwg#]

(1) EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

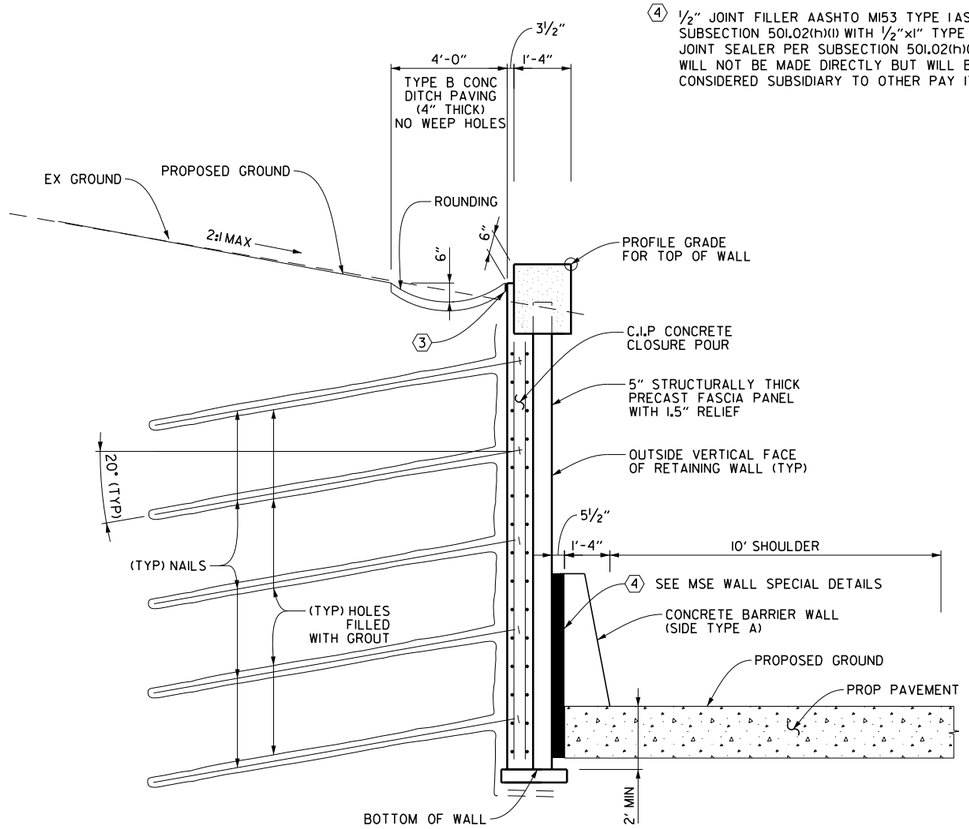
(2) CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

(3) AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

(4) 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

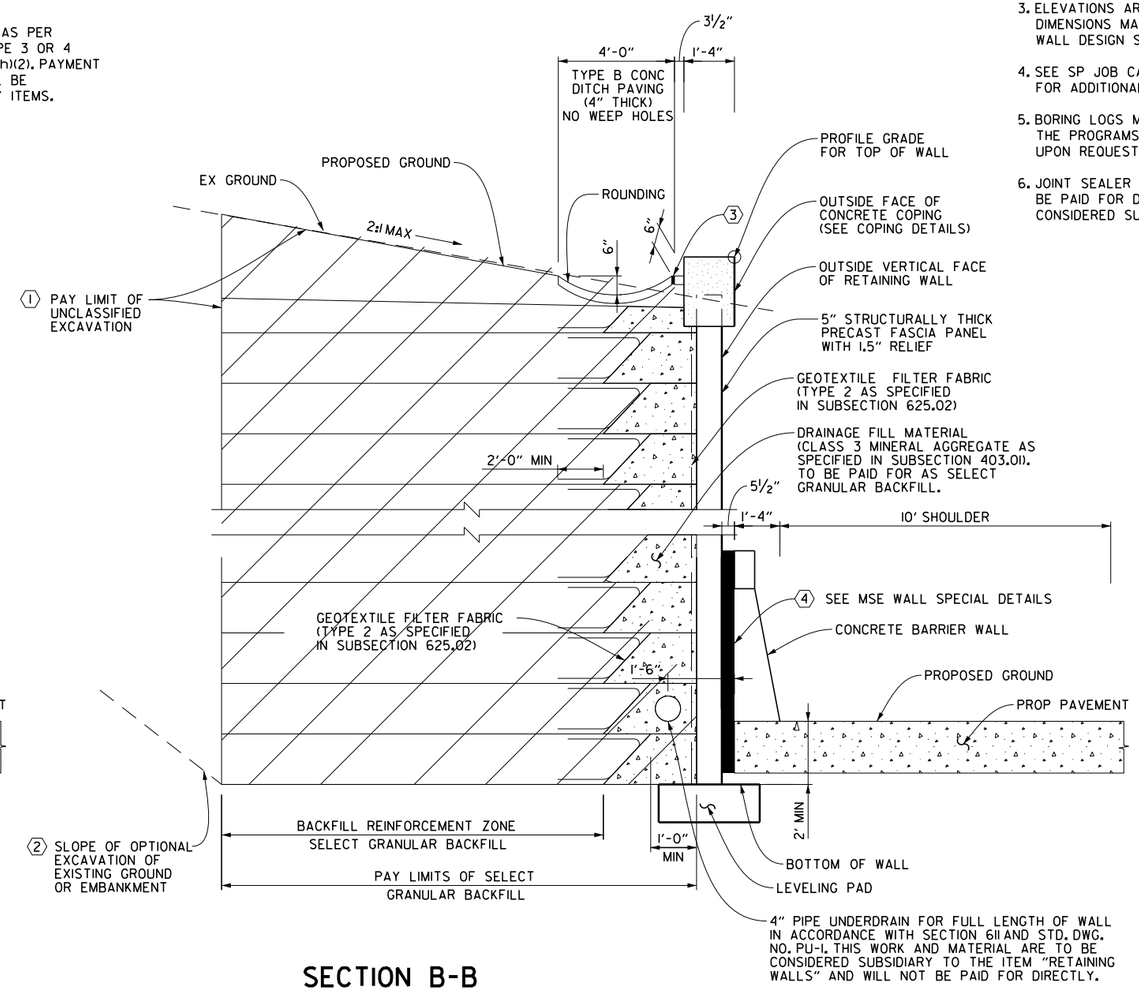
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'FF'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

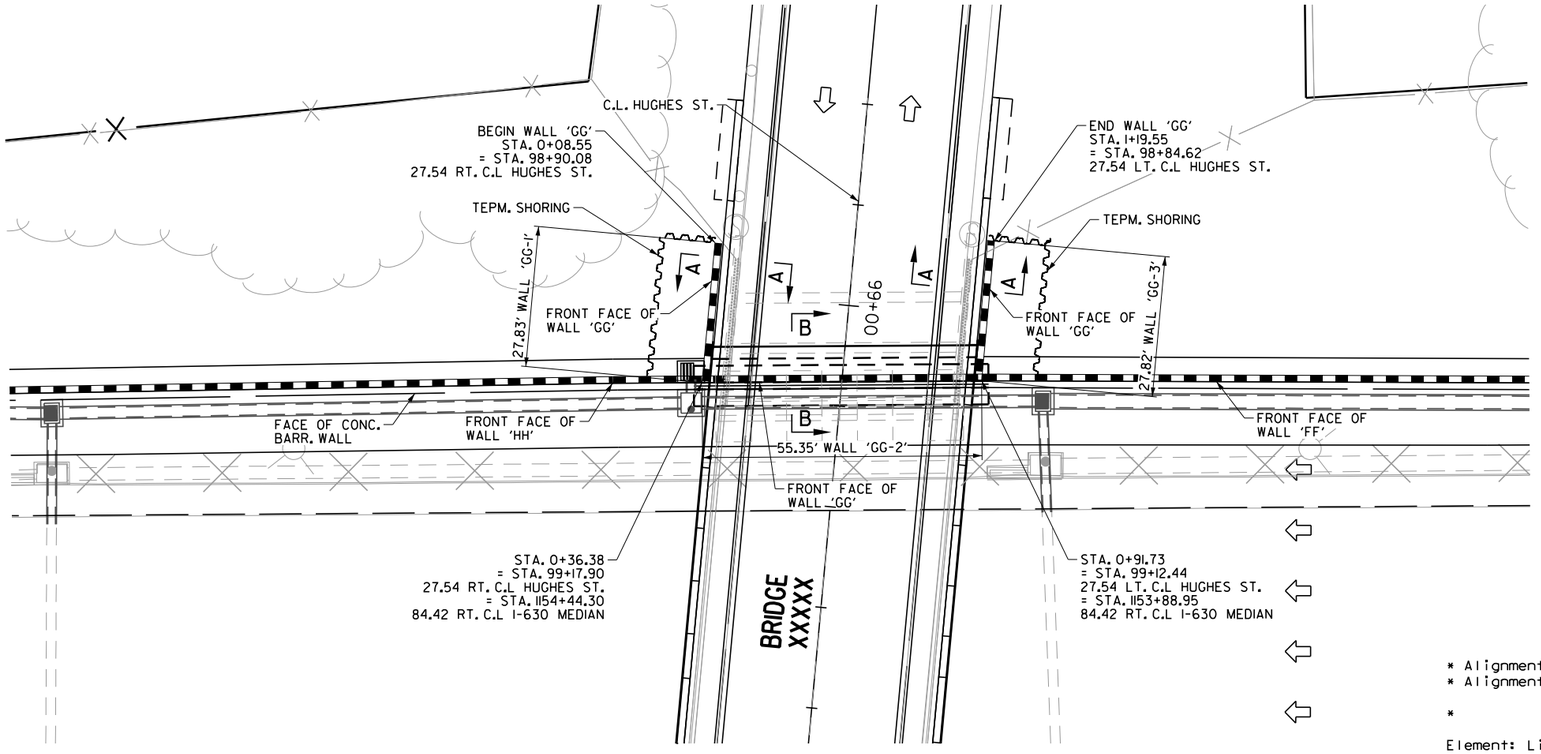
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_ff_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_FF_01.dgn
ddang 3/27/2015 10:16:21 AM

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.		CA0608	559	XXXX

1 P&P RET. WALL 'GG' [Dwg#]



PLAN

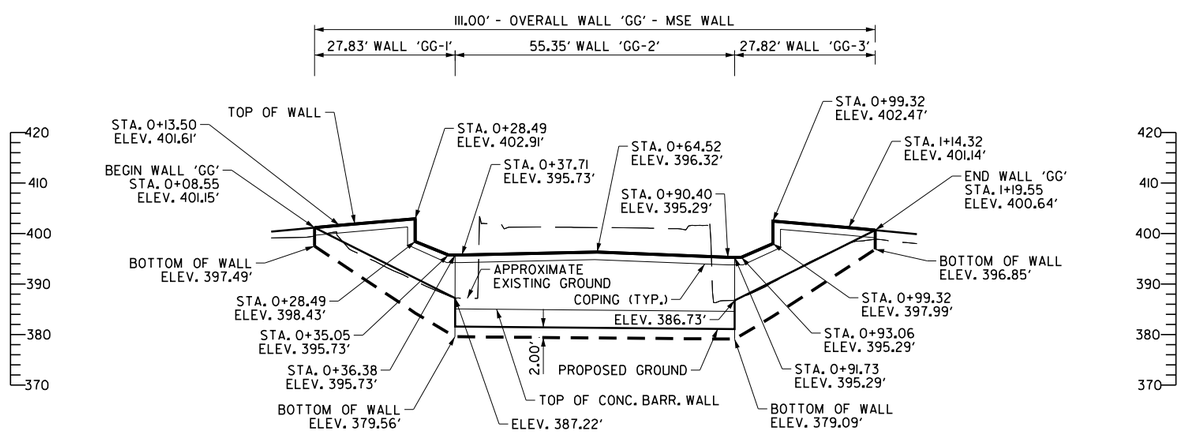
SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+08.55	401.15	401.15	397.49
0+33.55	396.41	388.63	381.25
0+58.55	396.20	381.37	379.37
0+83.55	395.56	381.16	379.16
1+08.55	401.65	395.14	389.65
1+19.55	400.64	400.64	396.85

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. HUGHES ST. OR C.L. I-630 MEDIAN, AS INDICATED. WALL IS CONCENTRIC TO C.L. HUGHES ST. AND C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

```
* Alignment name: RW*GG
* Alignment description: MSE Wall
*
                                    STATION          NORTHING          EASTING
Element: Linear
          POB (          )          0+00.00      2068901.6739      1207165.6759
           PI (          )          0+36.38      2068938.0298      1207166.8945
  Tangential Direction:        N 1°55'11.3" E
     Tangential Length:                36.38

Element: Linear
           PI (          )          0+36.38      2068938.0298      1207166.8945
           PI (          )          0+91.73      2068934.4125      1207111.6591
  Tangential Direction:        S 86°15'11.3" W
     Tangential Length:                55.35

Element: Linear
           PI (          )          0+91.73      2068934.4125      1207111.6591
          POE (          )          1+27.82      2068898.3459      1207110.4501
  Tangential Direction:        S 1°55'11.5" W
     Tangential Length:                36.09
```



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'GG'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_gg.01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\4406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_P&P_GG_01.dgn
ddang 3/27/2015 10:16:23 AM

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.		CA0608	560	XXXX
				①	SECTIONS OF WALLS			[Dwg#]

① EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210. "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

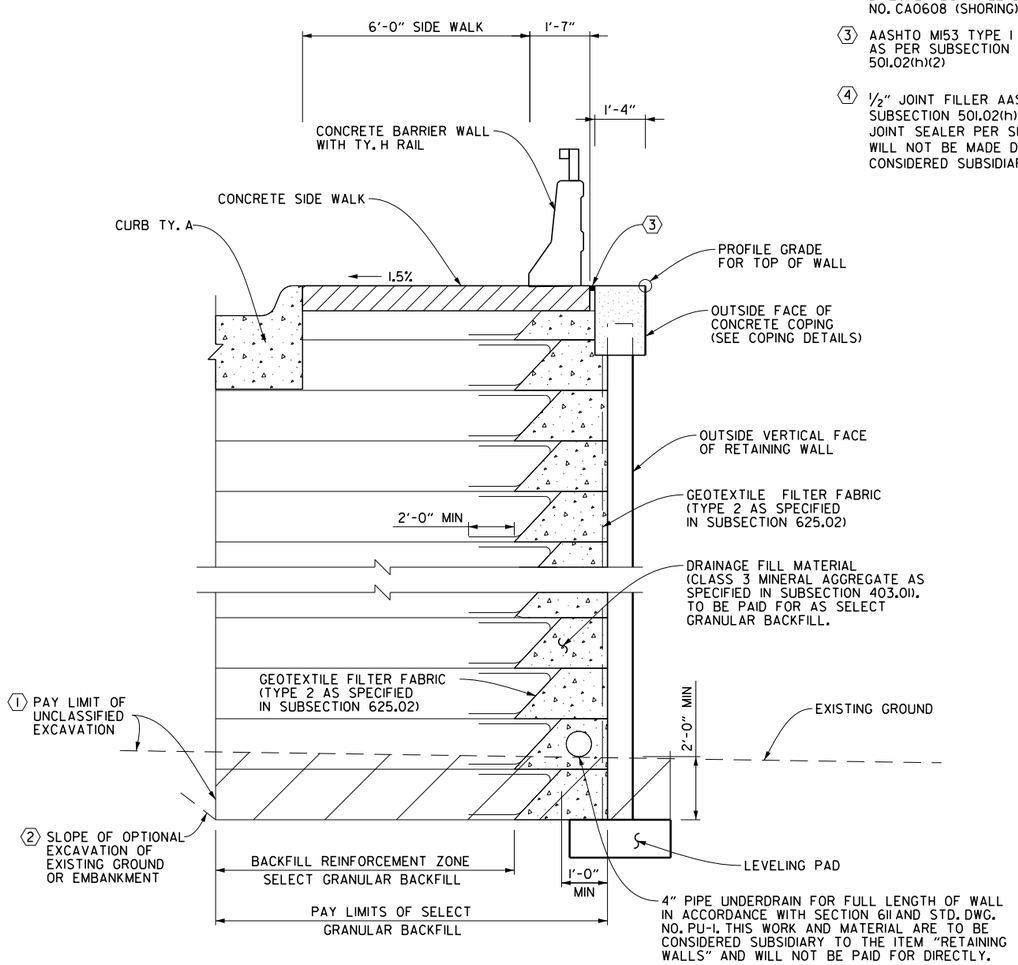
② CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

③ AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

④ 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

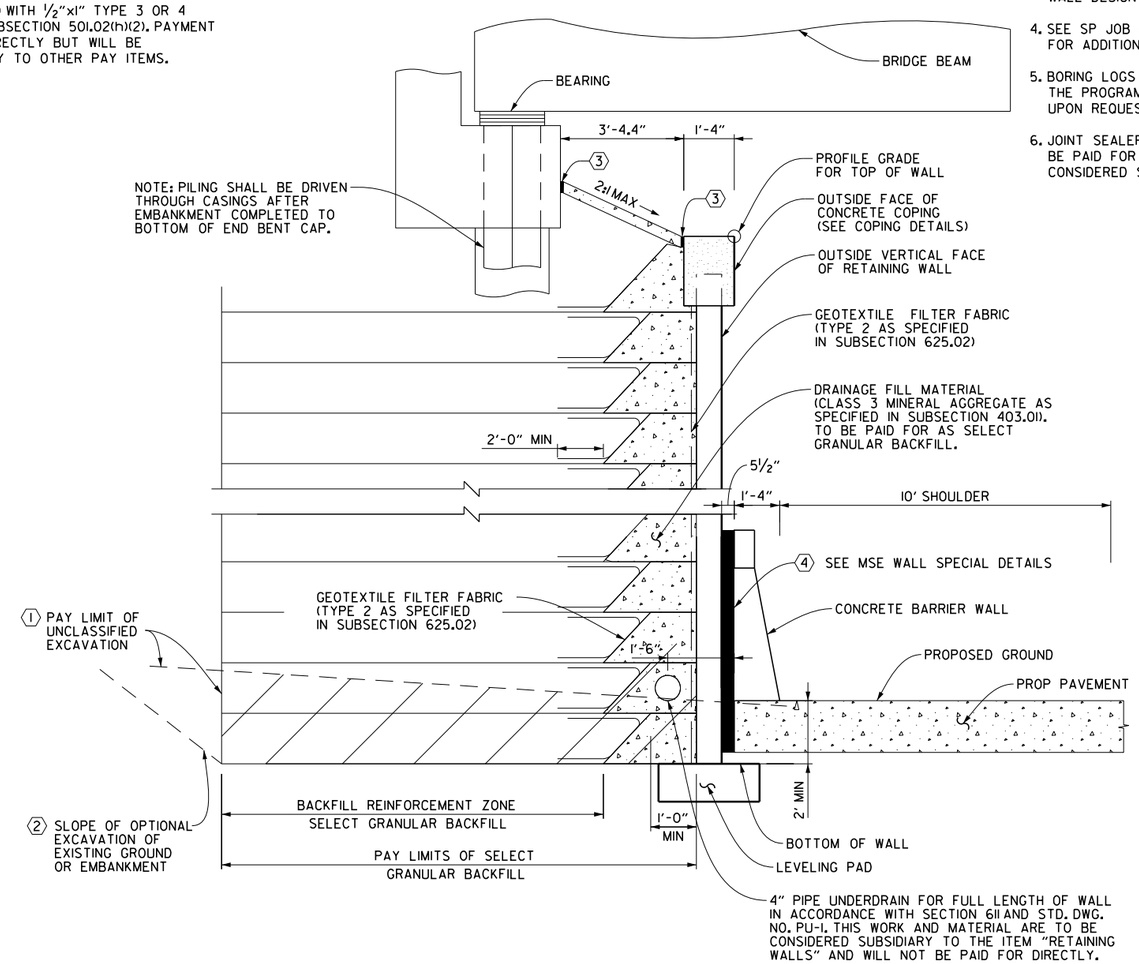
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'GG'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

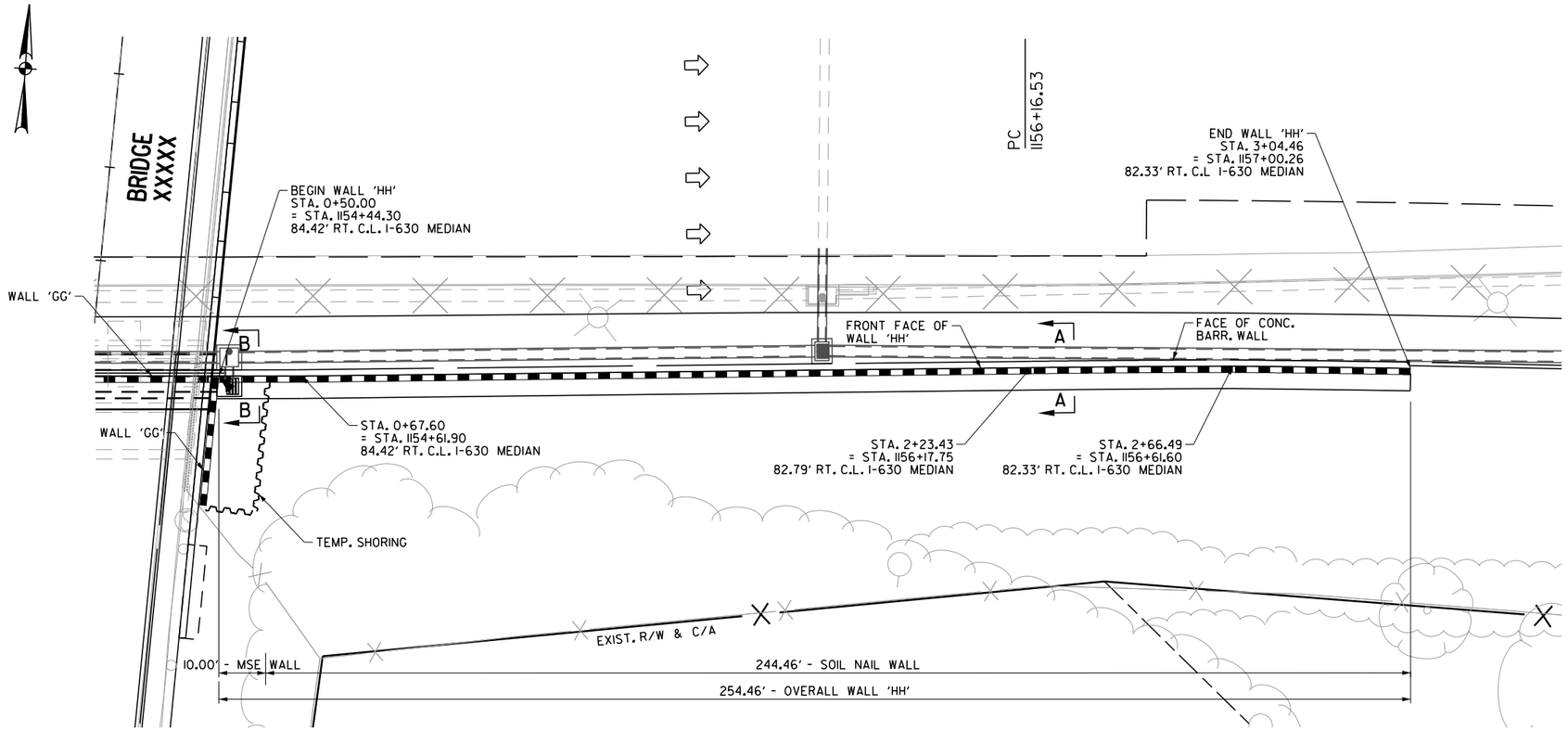
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_gg_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

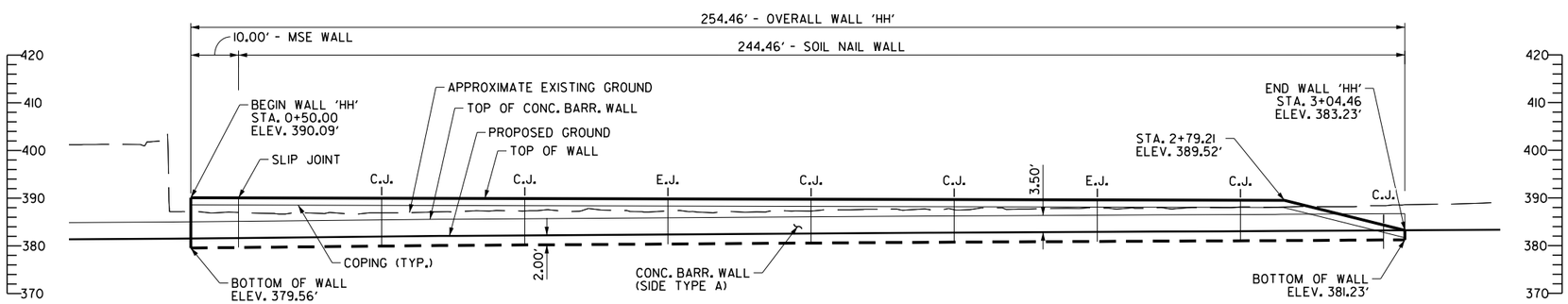
S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_Sections_GG_01.dgn
ddang 3/27/2015 10:16:24 AM

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.		CA0608	561	XXXX
				1	P&P RET. WALL 'HH'			[Dwg#]



PLAN

SCALE 1"=15'



C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

ELEVATION

SCALE 1"=15'

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 1 OF 2
LAYOUT OF RETAINING WALL 'HH'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_hh_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_P&P_HH_01.dgn
ddang 3/27/2015 10:16:25 AM

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.		CA0608	562	XXXX

1 P&P RET. WALL 'HH' [Dwg#]

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+50.00	390.09	381.56	379.56
0+75.00	390.03	381.79	379.79
1+00.00	389.97	382.04	380.04
1+25.00	389.90	382.21	380.21
1+50.00	389.84	382.37	380.37
1+75.00	389.78	382.54	380.54
2+00.00	389.72	382.70	380.70
2+25.00	389.65	382.83	380.83
2+50.00	389.59	382.95	380.95
2+75.00	389.53	383.06	381.06
3+00.00	384.34	383.20	381.20
3+04.46	383.23	383.23	381.23

```
* Alignment name: RW*HH
* Alignment description: Soil Nail Wall

*
                                        STATION          NORTHING          EASTING

Element: Linear
            POB (          )            0+00.00       2068934.7624      1207117.0018
             PI (          )            0+67.60       2068939.1799      1207184.4555
     Tangential Direction:      N 86°15'11.2" E
        Tangential Length:                67.60

Element: Linear
             PI (          )            0+67.60       2068939.1799      1207184.4555
             PC (          )            2+23.43       2068950.9828      1207339.8447
     Tangential Direction:      N 85°39'22.7" E
        Tangential Length:               155.84

Element: Circular
             PC (          )            2+23.43       2068950.9828      1207339.8447
             PI (          )            2+44.96       2068952.6134      1207361.3112
             CC (          )                          2064463.0687      1207680.7335
            PCC (          )            2+66.49       2068954.0385      1207382.7924
                     Radius:             4500.84
                      Delta:          0°32'53.2" Right
  Degree of Curvature(Arc):           1°16'22.8"
                     Length:               43.06
                    Tangent:               21.53
                      Chord:               43.06
          Middle Ordinate:                  0.05
                   External:                0.05
        Tangent Direction:      N 85°39'22.8" E
         Radial Direction:       S 4°20'37.2" E
          Chord Direction:      N 85°55'49.4" E
         Radial Direction:       S 3°47'44.0" E
        Tangent Direction:      N 86°12'16.0" E

Element: Circular
            PCC (          )            2+66.49       2068954.0385      1207382.7924
             PI (          )            5+04.17       2068967.2376      1207620.0998
             CC (          )                          2064459.6561      1207632.7729
             PT (          )            7+41.40       2068955.3730      1207857.4776
                     Radius:             4501.33
                      Delta:          6°02'41.7" Right
  Degree of Curvature(Arc):           1°16'22.3"
                     Length:              474.91
                    Tangent:              237.67
                      Chord:              474.69
          Middle Ordinate:                  6.26
                   External:                6.27
        Tangent Direction:      N 86°48'59.2" E
         Radial Direction:       S 3°11'00.8" E
          Chord Direction:      N 89°50'20.1" E
         Radial Direction:       S 2°51'40.9" W
        Tangent Direction:      S 87°08'19.1" E
```

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 2
LAYOUT OF RETAINING WALL 'HH'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015

FILENAME: rca0608_ret_wall_p&p_hh_02
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_HH_02.dgn
ddang 3/27/2015 10:16:25 AM

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.		CA0608	563	XXXX

1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

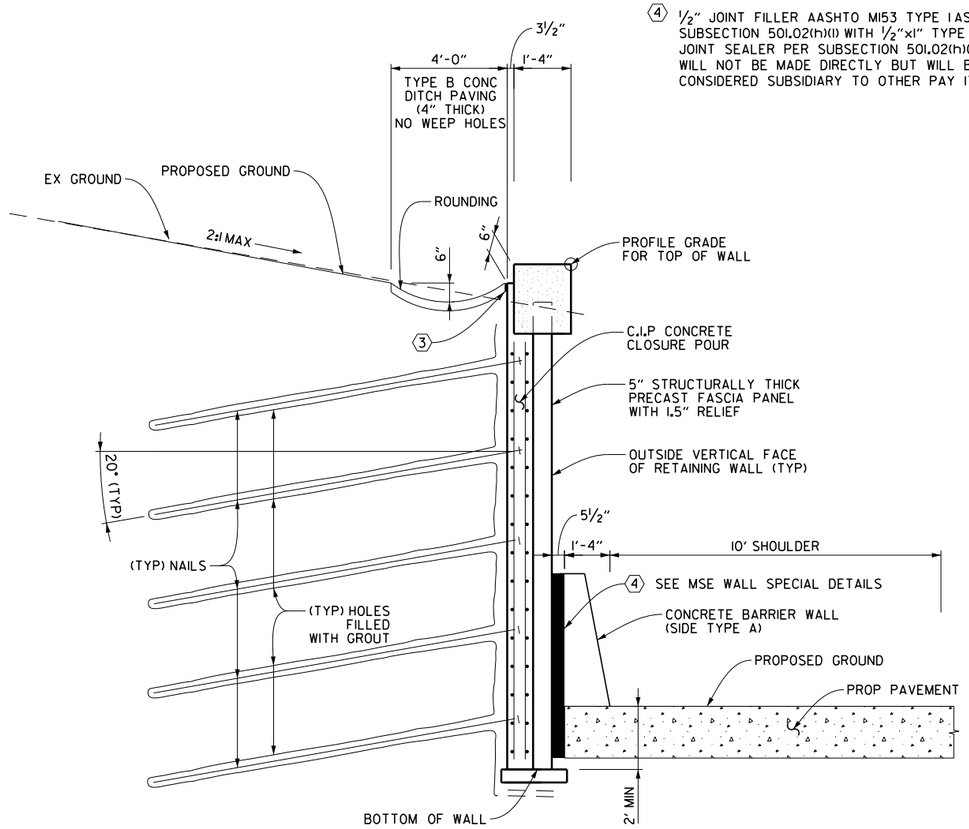
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

4. 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

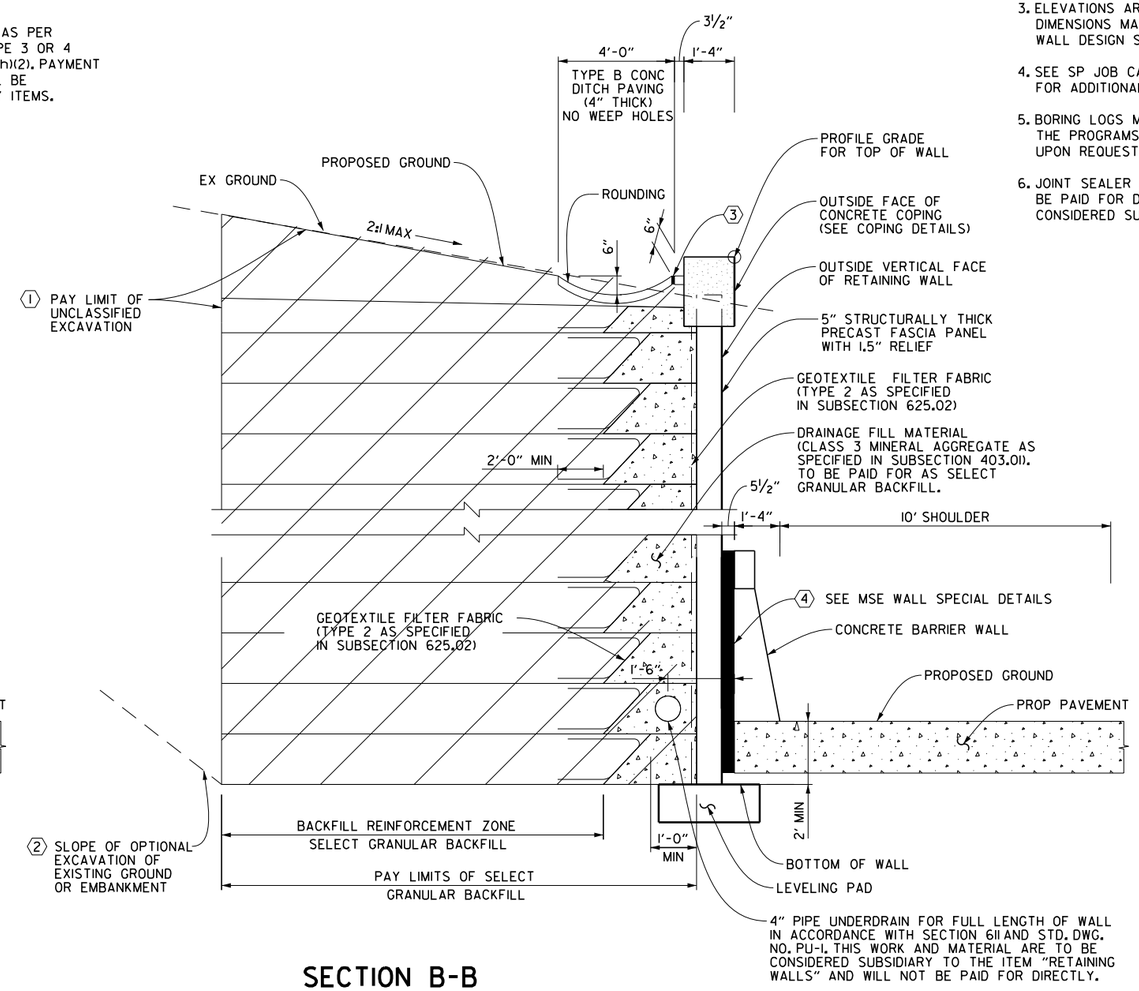
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'HH'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

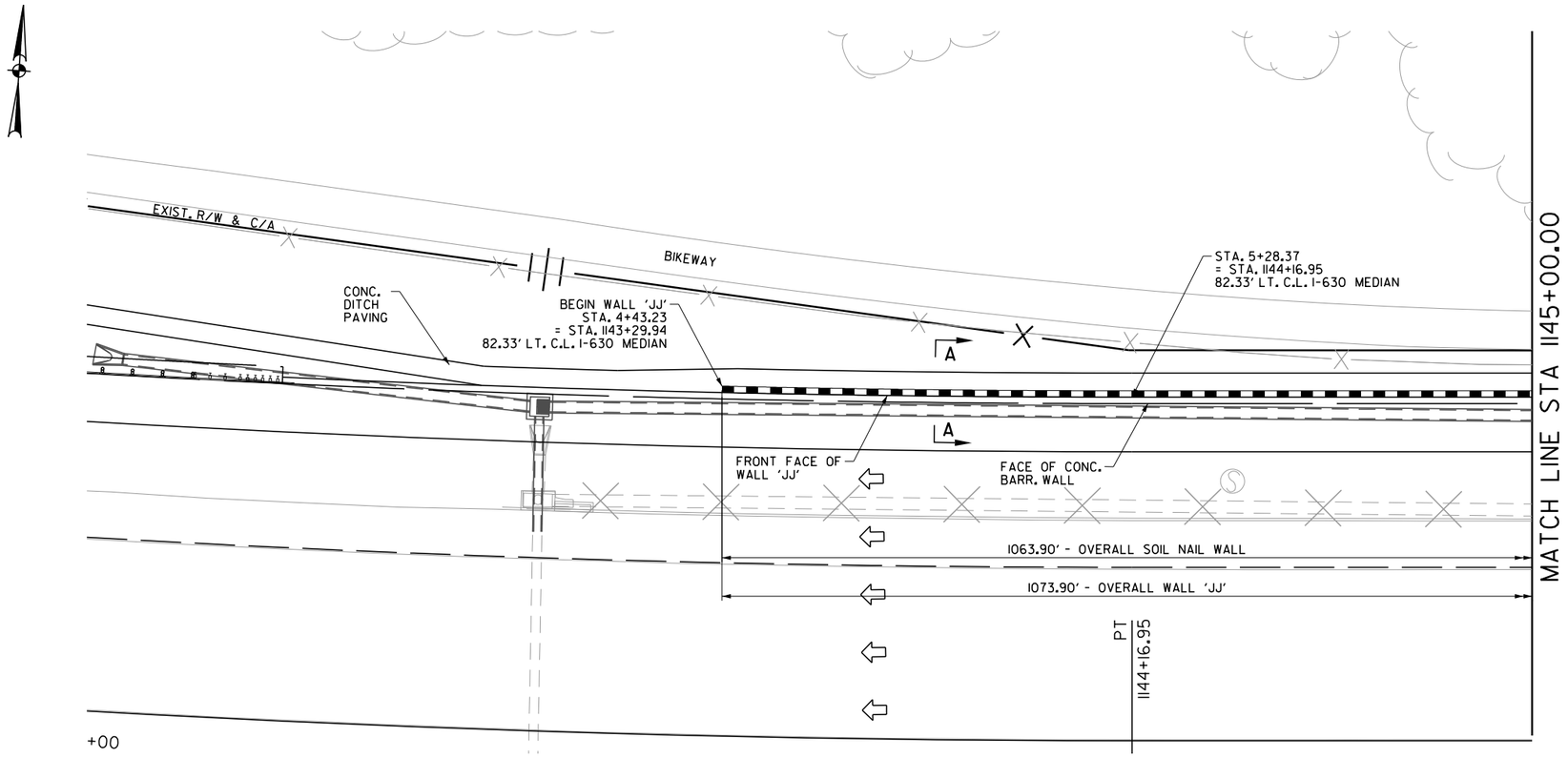
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_hh_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_HH_01.dgn
ddang 3/27/2015 10:16:26 AM

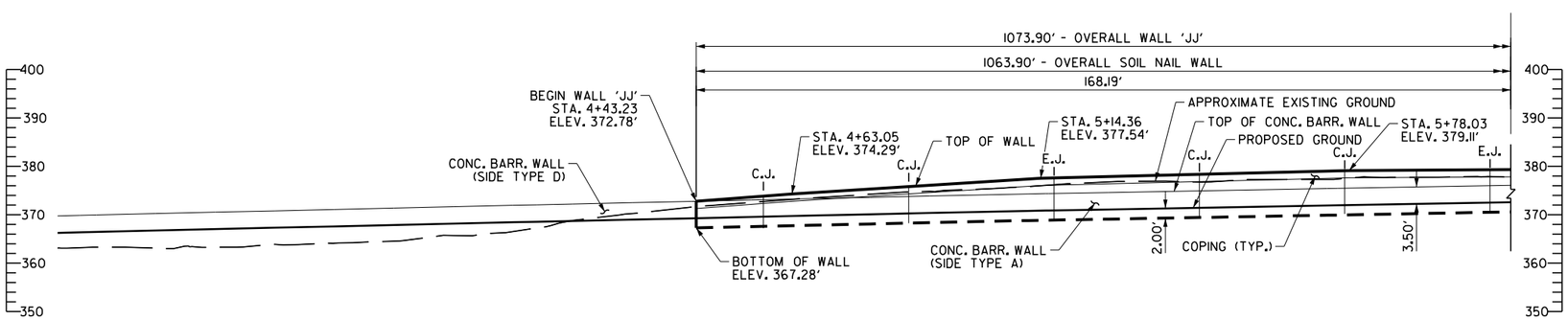
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0608	564	XXXX

1 P&P RET. WALL 'JJ' [Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
4+43.23	372.78	369.28	367.28
4+68.23	374.62	369.84	367.84
4+93.23	376.20	370.39	368.39
5+18.23	377.63	370.91	368.91
5+43.23	378.25	371.36	369.36
5+68.23	378.87	371.81	369.81
5+93.23	379.21	372.26	370.26
6+18.23	379.36	372.69	370.69
6+43.23	379.55	373.04	371.04
6+68.23	379.90	373.35	371.35
6+93.23	380.24	373.67	371.67
7+18.23	380.66	373.95	371.95
7+43.23	381.30	374.15	372.15
7+68.23	381.95	374.35	372.35
7+93.23	382.59	374.56	372.56
8+18.23	383.24	374.77	372.77
8+43.23	383.98	375.01	373.01
8+68.23	384.74	375.26	373.26
8+93.23	385.49	375.50	373.50
9+18.23	385.72	375.74	373.74
9+43.23	385.87	375.99	373.99
9+68.23	386.01	376.23	374.23
9+93.23	386.16	376.48	374.48
10+18.23	386.31	376.73	374.73
10+43.23	386.45	377.00	375.00
10+68.23	386.60	377.26	375.26
10+93.23	386.75	377.53	375.53
11+18.23	386.89	377.79	375.79
11+43.23	386.99	378.02	376.02
11+68.23	387.08	378.24	376.24
11+93.23	387.17	378.47	376.47
12+18.23	387.26	378.70	376.70
12+43.23	387.35	378.94	376.94
12+68.23	387.44	379.18	377.18
12+93.23	387.52	379.42	377.42
13+18.23	387.61	379.65	377.65
13+43.23	387.70	379.89	377.89
13+68.23	387.79	380.13	378.13
13+93.23	387.88	380.37	378.37
14+18.23	387.97	380.61	378.61
14+43.23	388.06	380.83	378.83
14+68.23	388.30	381.05	379.05
14+93.23	388.62	381.28	379.28
15+17.13	388.92	381.48	379.50

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NIAL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 1 OF 4
LAYOUT OF RETAINING WALL 'JJ'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

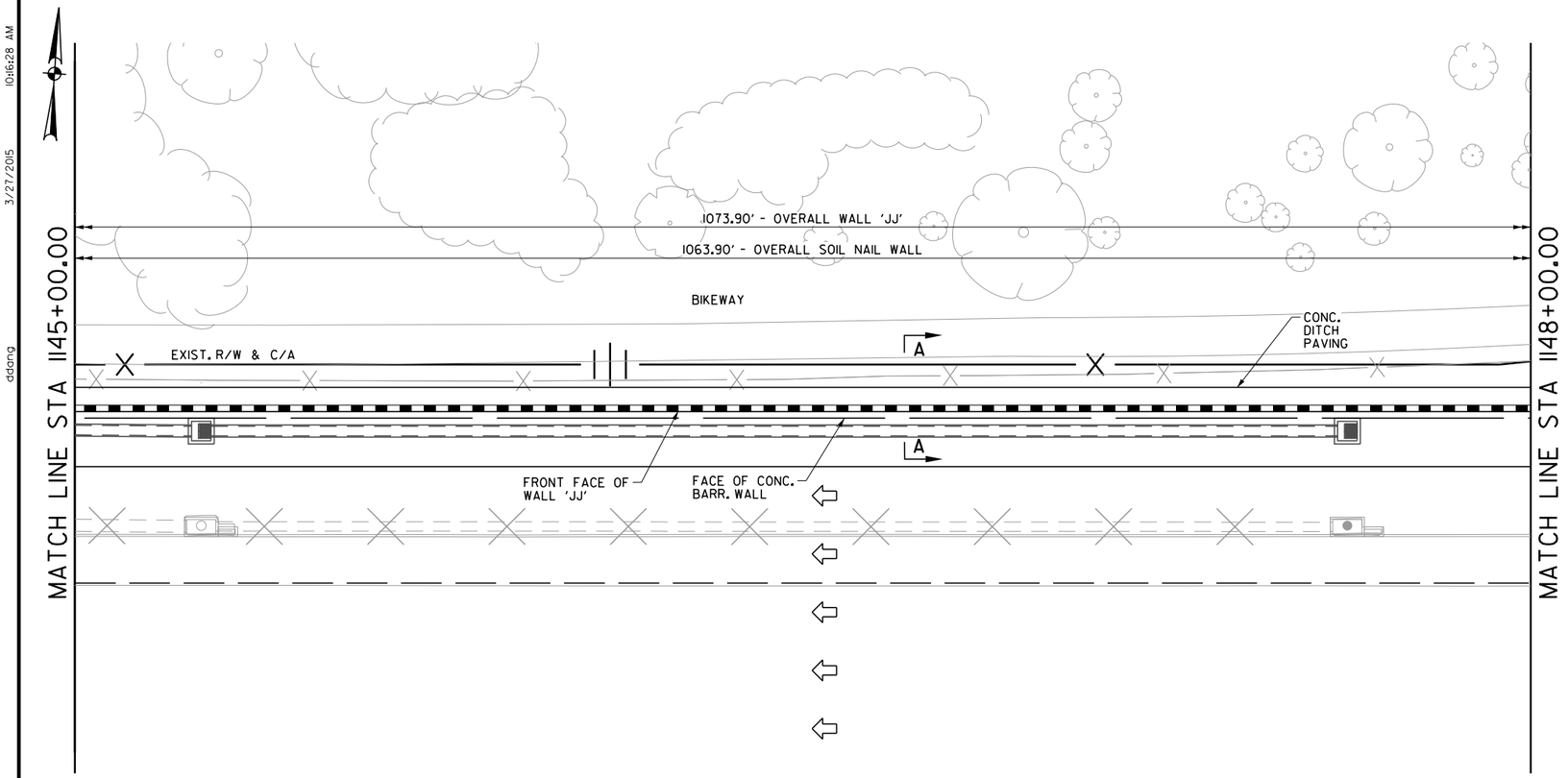
DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_ret_wall_p&p_jj_01
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_JJ_01.dgn
ddang
3/27/2015 10:16:27 AM

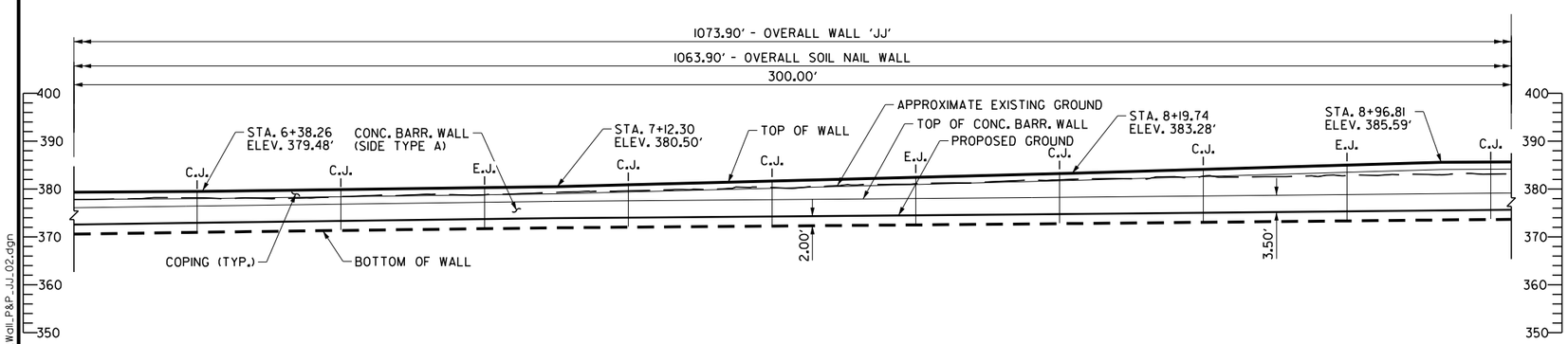
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0608	565	XXXX

1 P&P RET. WALL 'JJ' [Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

```
* Alignment name: RW*JJ
* Alignment description: SOIL NAIL WALL AND MSE WALL
*
                                    STATION          NORTHING          EASTING
Element: Circular
          PC (          )           0+00.00      2069040.0810      1205602.9208
          PI (          )           2+64.63      2069019.9945      1205866.7825
          CC (          )                        2072766.6840      1205886.6091
          PT (          )           5+28.37      2069037.2874      1206130.8420
                Radius:             3737.39
                 Delta:          8°06'00.4" Left
 Degree of Curvature(Arc):        1°31'59.0"
               Length:               528.37
              Tangent:               264.63
                Chord:               527.93
       Middle Ordinate:                9.33
             External:                 9.36
     Tangent Direction:      S 85°38'48.3" E
      Radial Direction:       S 4°21'11.7" W
       Chord Direction:      S 89°41'48.5" E
      Radial Direction:       S 3°44'48.7" E
     Tangent Direction:      N 86°15'11.3" E

Element: Linear
          PT (          )           5+28.37      2069037.2874      1206130.8420
          PI (          )          13+00.21      2069087.7260      1206901.0318
   Tangential Direction:      N 86°15'11.3" E
     Tangential Length:              771.84

Element: Linear
          PI (          )          13+00.21      2069087.7260      1206901.0322
          PI (          )          14+99.84      2069102.8498      1207100.0905
   Tangential Direction:      N 85°39'18.8" E
     Tangential Length:              199.63

Element: Linear
          PI (          )          14+99.84      2069102.8498      1207100.0901
         POE (          )          15+18.60      2069104.0755      1207118.8052
   Tangential Direction:      N 86°15'10.5" E
     Tangential Length:               18.76
```

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN, WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NIAL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 4
LAYOUT OF RETAINING WALL 'JJ'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

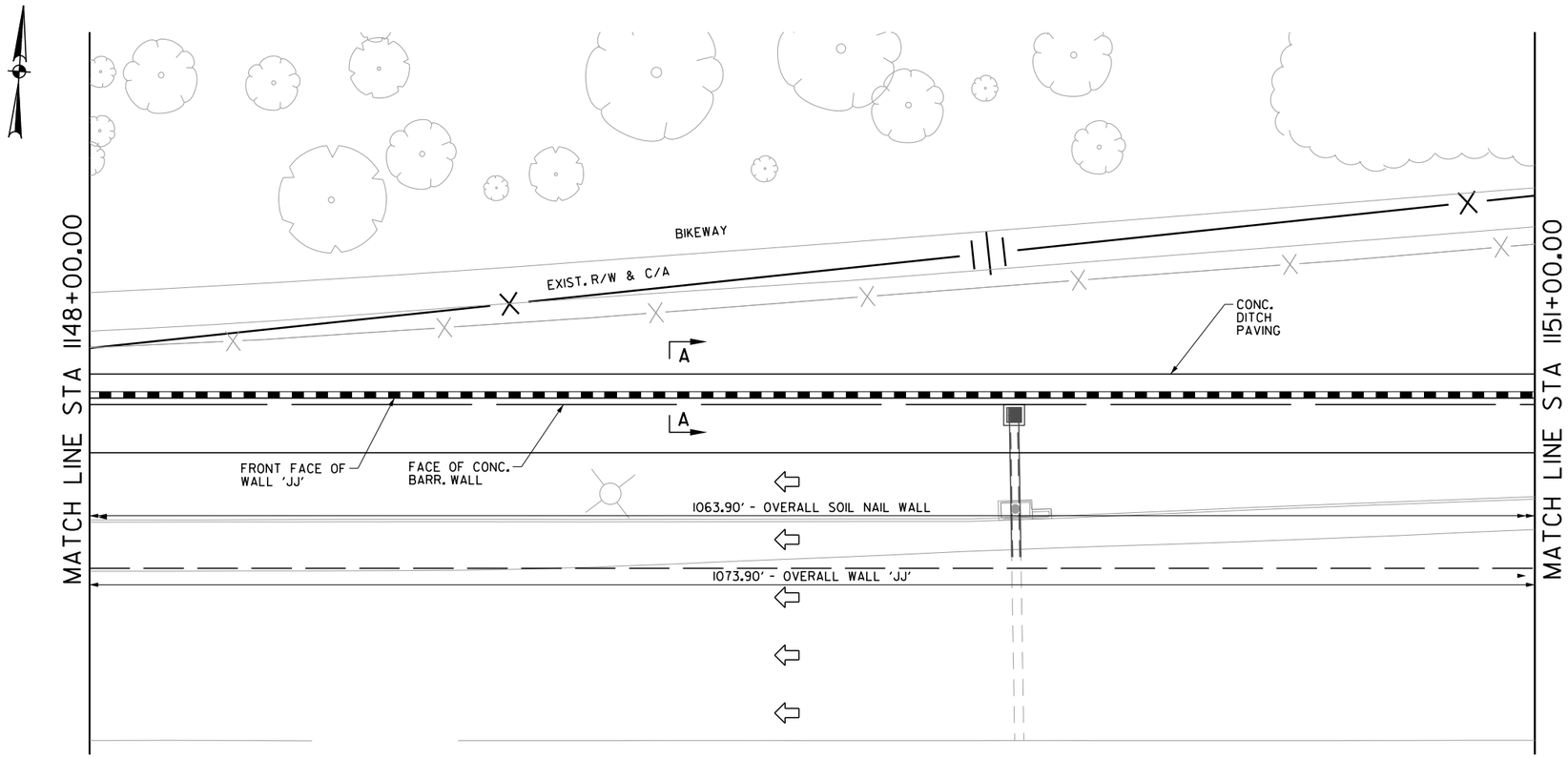
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_jj.02
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

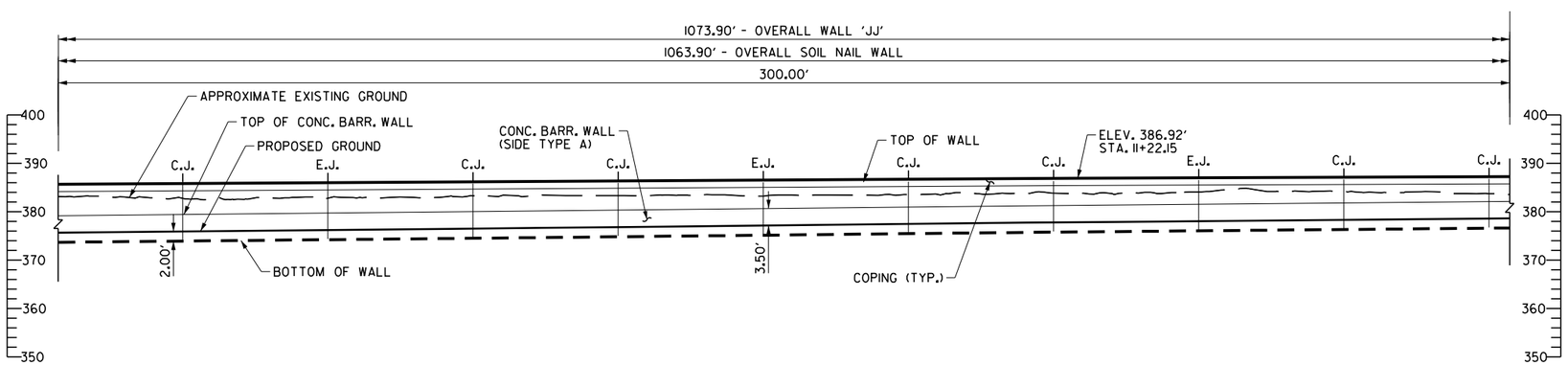
S:\14406\01\DGN\Plans\Walls\rca0608_Ret_Wall_P&P_JJ.02.dgn
ddang 3/27/2015 10:16:28 AM

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.		CA0608	566	XXXX
				1	P&P RET. WALL 'JJ'			[Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 3 OF 4
LAYOUT OF RETAINING WALL 'JJ'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

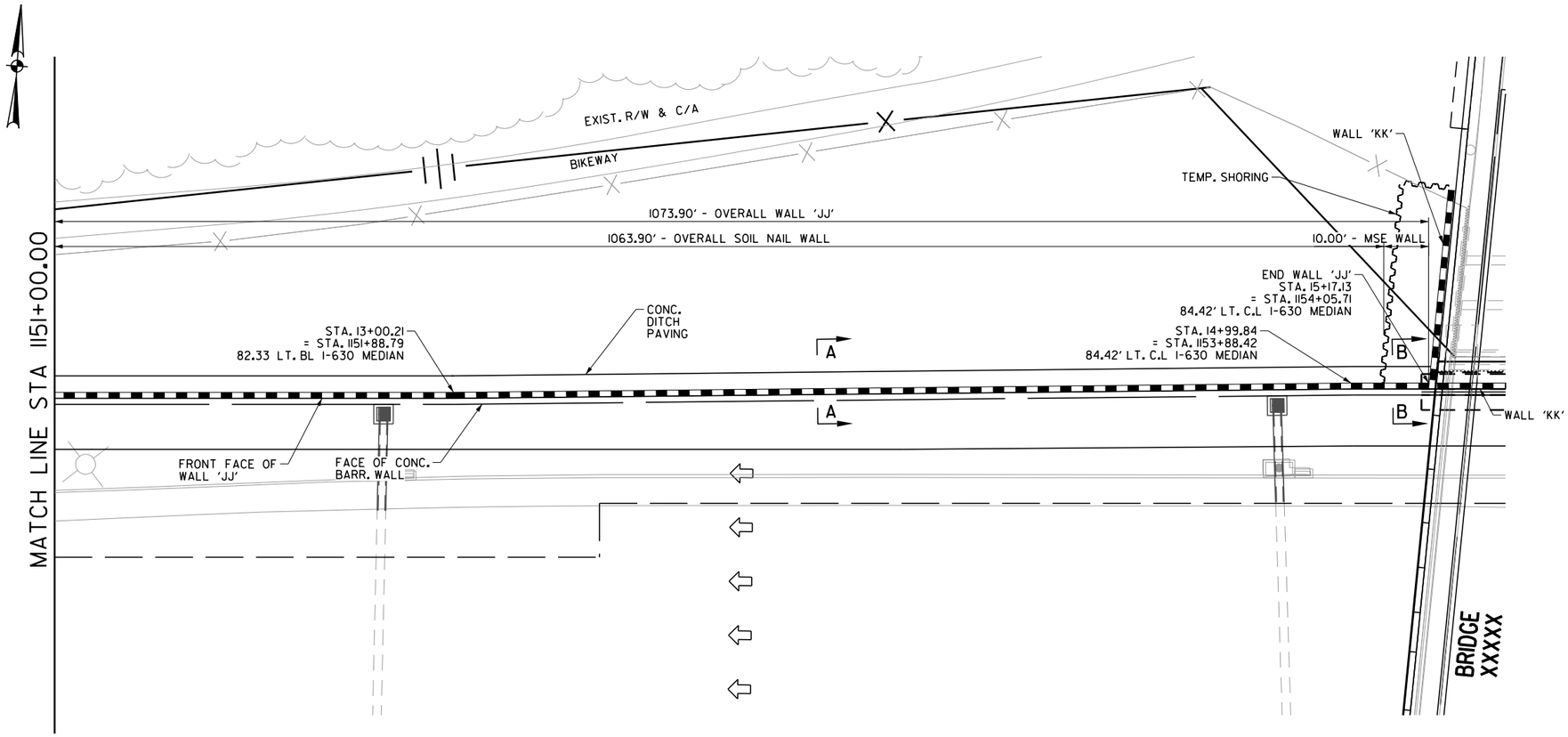
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_jj_03
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

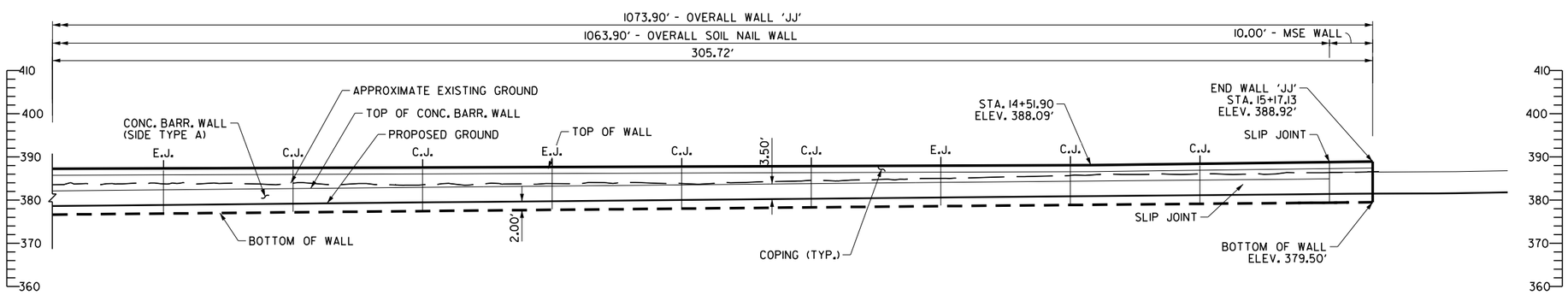
S:\14406\DI\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_JJ_03.dgn
ddang 3/27/2015 10:16:28 AM

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.		CA0608	567	XXXX
				①	P&P RET. WALL 'JJ'			[Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 4 OF 4
LAYOUT OF RETAINING WALL 'JJ'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_jj_04
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_JJ_04.dgn
ddang 3/27/2015 10:16:29 AM

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.		CA0608	568	XXXX
				1	SECTIONS OF WALLS			[Dwg#]

1 EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

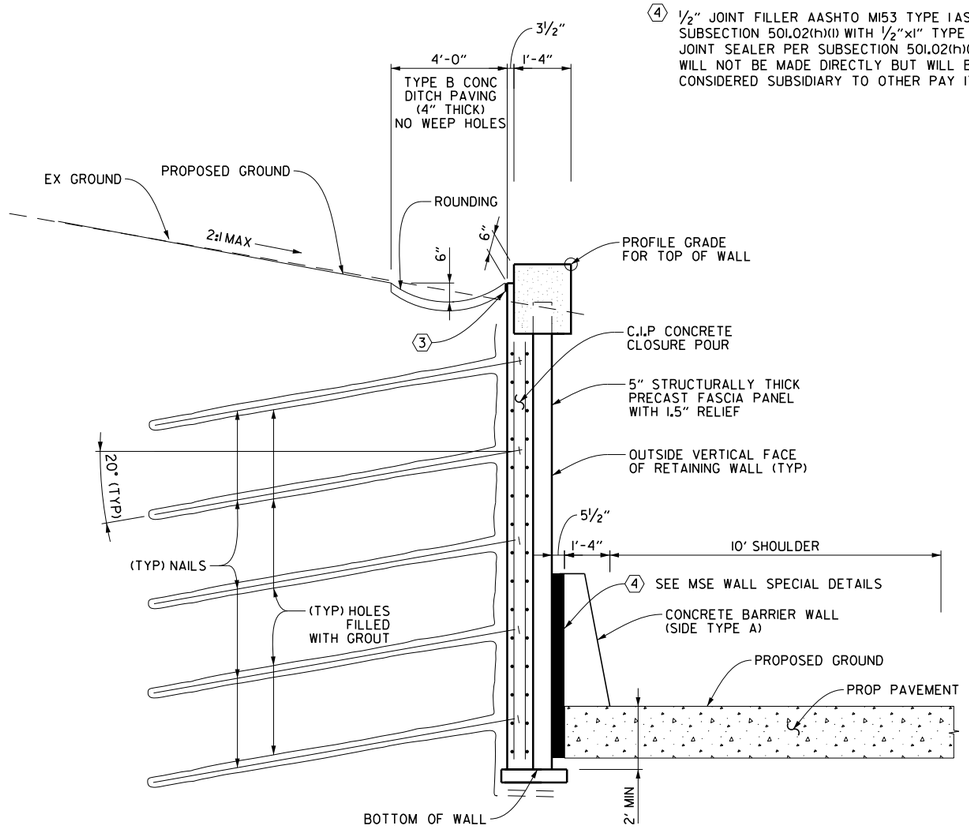
2 CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3 AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

4 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

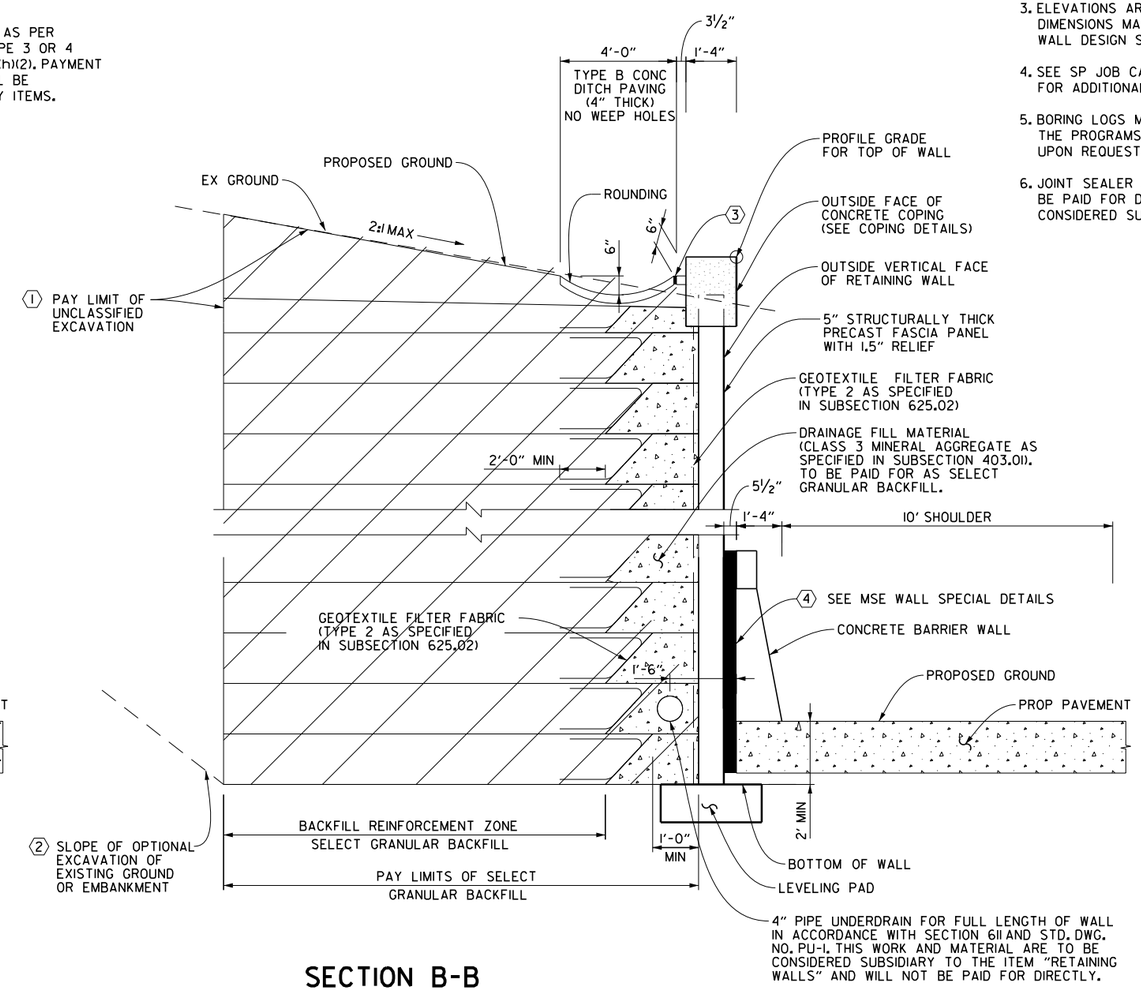
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'JJ'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

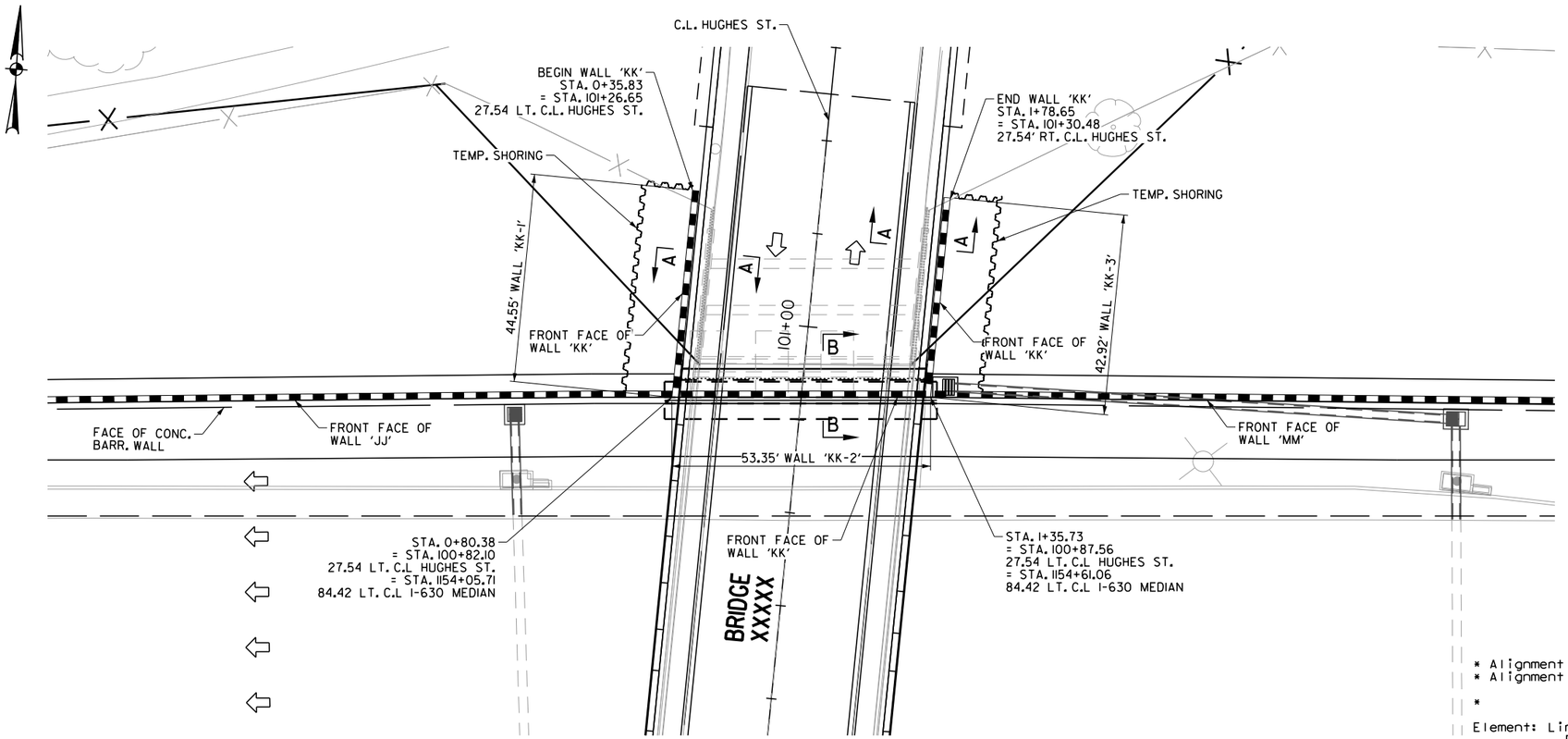
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_JJ.0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_JJ_01.dgn
ddang 3/27/2015 10:16:30 AM

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.		CA0608	569	XXXX
				1	P&P RET. WALL 'KK'			[Dwg#]



PLAN

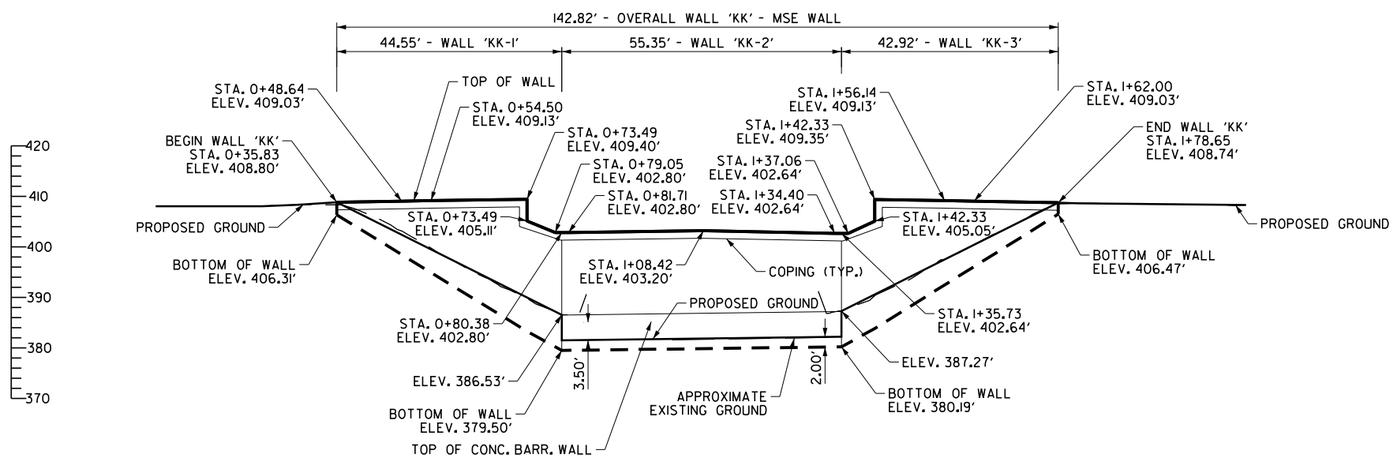
SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+35.83	408.80	408.80	406.31
0+60.83	409.22	396.31	391.00
0+85.83	402.86	381.55	379.55
1+10.83	403.14	381.87	379.87
1+35.83	402.64	387.32	380.25
1+60.83	409.05	399.82	395.35
1+78.65	408.74	408.74	406.47

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. HUGHES ST. OR C.L. I-630 MEDIAN, AS INDICATED. WALL IS CONCENTRIC TO C.L. HUGHES ST. AND C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "MSE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

```
* Alignment name: RW*KK
* Alignment description: MSE WALL
*
                                        STATION          NORTHING          EASTING
Element: Linear
            POB (          )            0+00.00       2069184.3109      1207120.0354
             PI (          )            0+80.38       2069103.9796      1207117.3416
  Tangential Direction:            S 1°55'14.3" W
     Tangential Length:                   80.38

Element: Linear
             PI (          )            0+80.38       2069103.9796      1207117.3416
             PI (          )            1+35.73       2069107.5970      1207172.5783
  Tangential Direction:            N 86°15'11.3" E
     Tangential Length:                   55.36

Element: Linear
             PI (          )            1+35.73       2069107.5970      1207172.5783
            POE (          )            2+15.82       2069187.6390      1207175.2613
  Tangential Direction:            N 1°55'11.3" E
     Tangential Length:                   80.09
```



ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'KK'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_kk_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

10:16:31 AM 3/27/2015 ddang

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_P&P_KK_01.dgn

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.		CA0608	570	XXXX
				1	SECTIONS OF WALLS			[Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210. "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

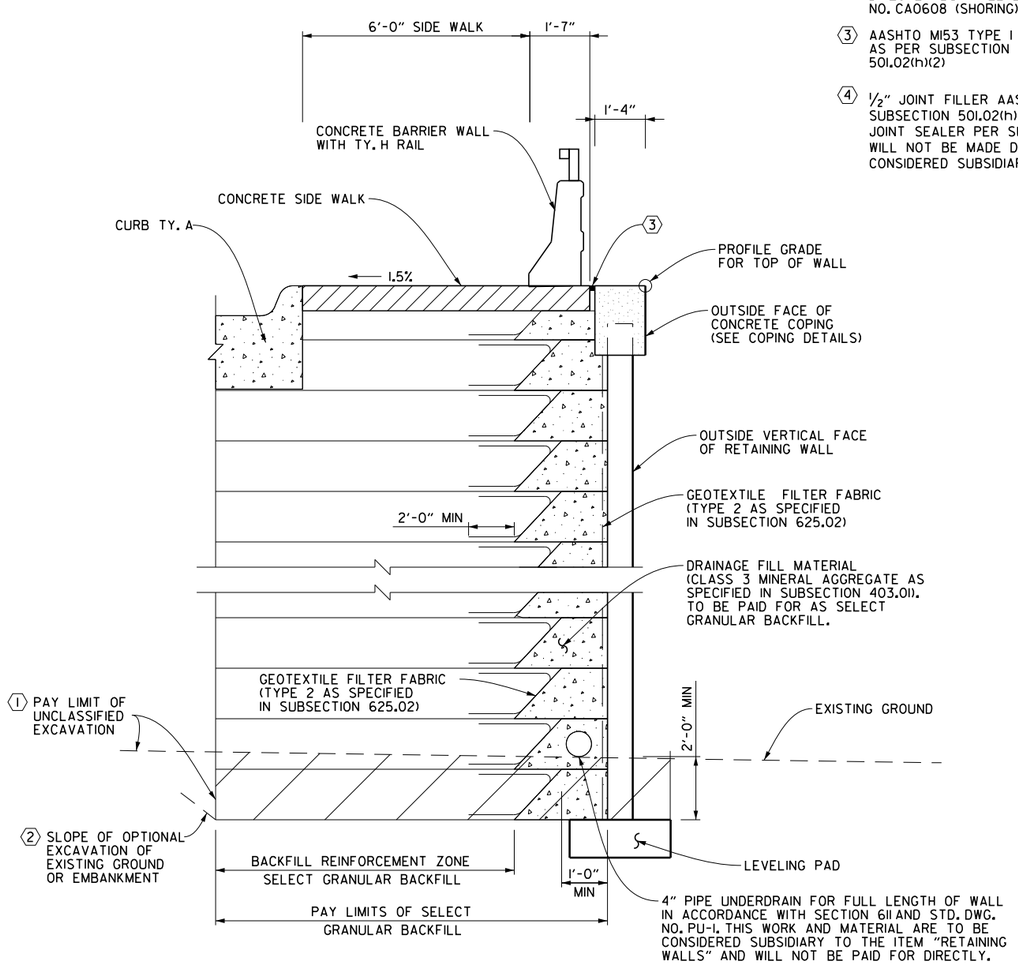
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

4. 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

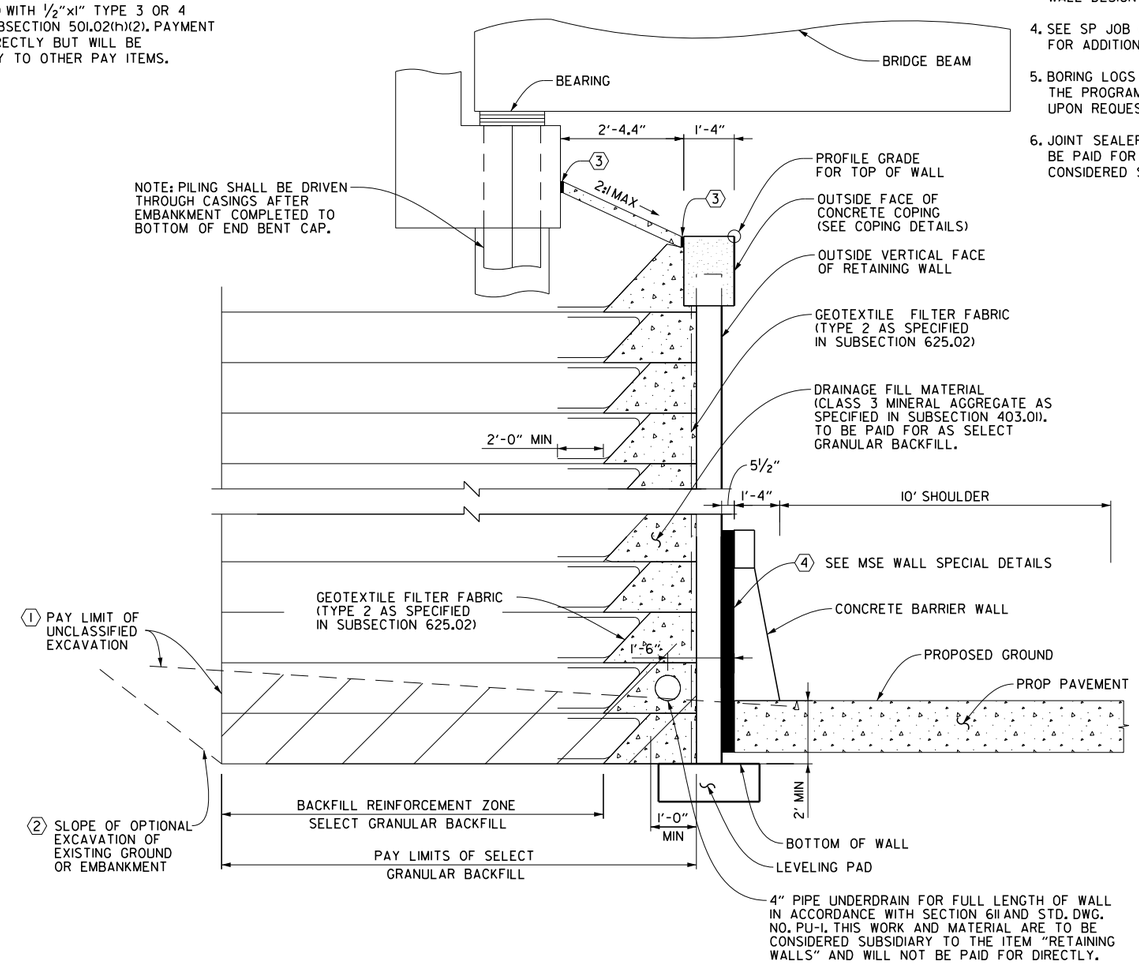
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'KK'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

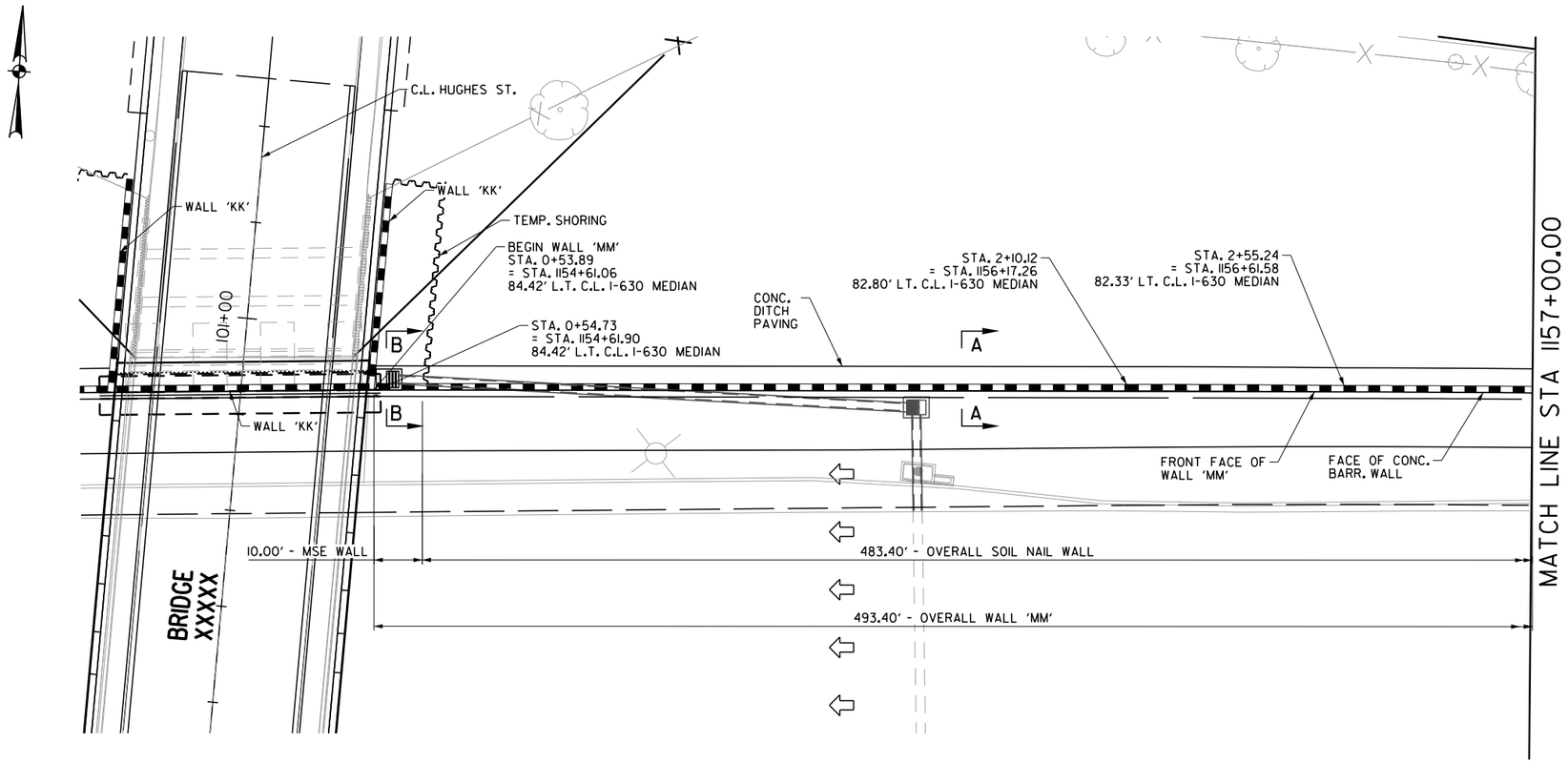
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_kk_
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

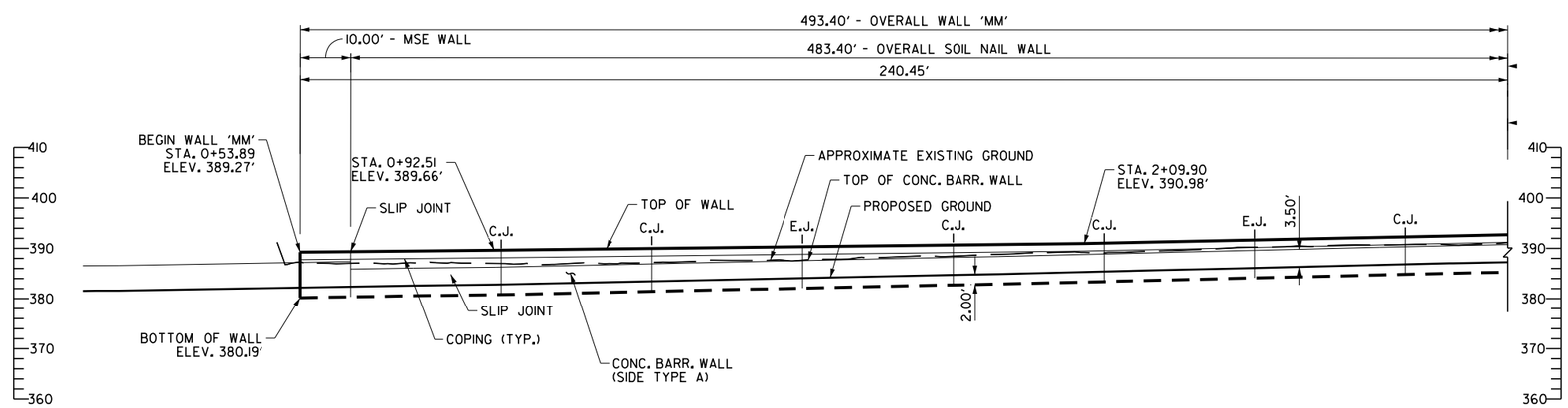
S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret-Wall_Sections_KK_01.dgn
3/27/2015 10:46:32 AM
ddang

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.		CA0608	571	XXXX
				1	P&P RET. WALL 'MM'			[Dwg#]



PLAN

SCALE 1"=15'



ELEVATION

SCALE 1"=15'

C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+53.89	389.27	382.19	380.19
0+78.89	389.52	382.61	380.61
1+03.89	389.79	383.03	381.02
1+28.89	390.07	383.57	381.57
1+53.89	390.35	384.11	382.11
1+78.89	390.63	384.66	382.66
2+03.89	390.92	385.19	383.19
2+28.89	391.38	385.80	383.80
2+53.89	391.91	386.40	384.40
2+78.89	392.44	387.01	385.01
3+03.89	392.96	387.47	385.47
3+28.89	393.49	387.86	385.86
3+53.89	393.79	388.25	386.25
3+78.89	393.99	388.63	386.63
4+03.89	394.20	388.85	386.85
4+28.89	394.14	388.84	386.84
4+53.89	393.93	388.81	386.81
4+78.89	393.52	388.79	386.79
5+03.89	393.09	388.74	386.74
5+28.89	392.53	388.54	386.54
5+47.29	391.89	388.39	386.39

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN, WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 1 OF 2
LAYOUT OF RETAINING WALL 'MM'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

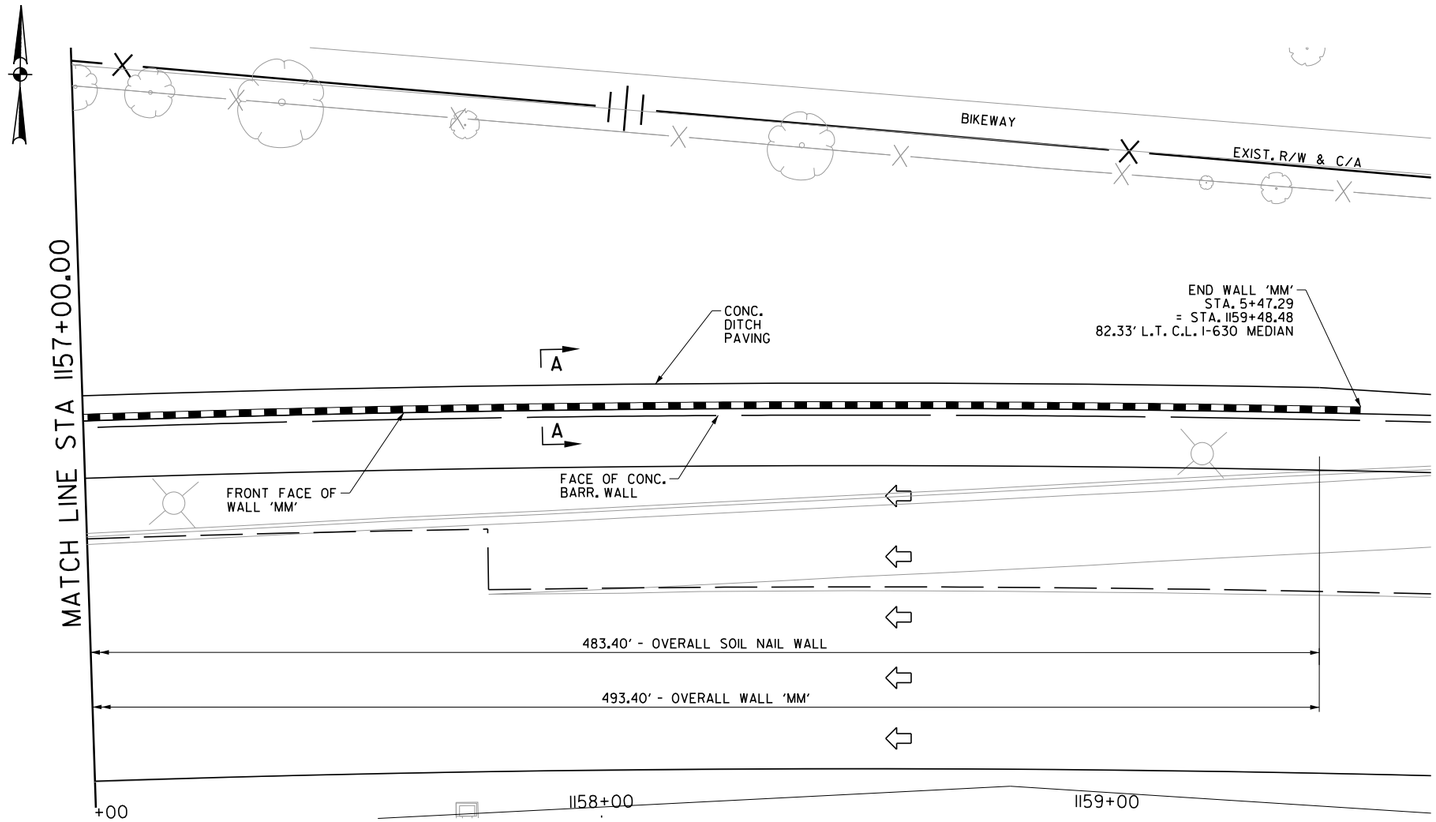
DRAWN BY: AKH DATE: 1/15/2015
CHECKED BY: SA DATE: 2/15/2015
DESIGNED BY: DCD DATE: 1/10/2015
FILENAME: rca0608_ret_wall_p&p_mm_01
SCALE: AS SHOWN

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_MM_01.dgn
ddang 3/27/2015 10:16:33 AM

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.		CA0608	572	XXXX

1 P&P RET. WALL 'MM' [Dwg#]



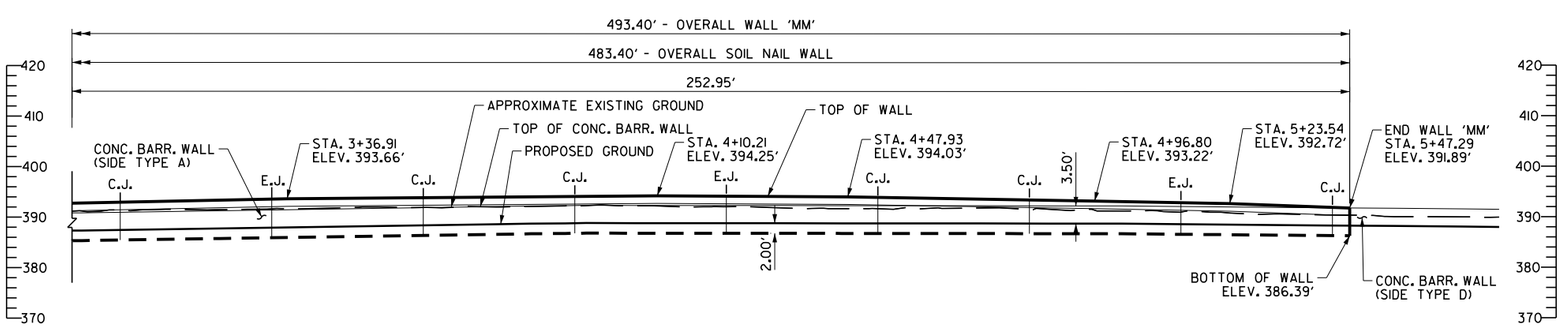
PLAN

SCALE 1"=15'

```
* Alignment name: RW MM
* Alignment description: SOIL NAIL WALL AND MSE WALL
*
                                    STATION          NORTHING          EASTING

Element: Linear
            POB (          )        0+00.00       2069104.0755      1207118.8052
             PI (          )        0+54.73       2069107.6523      1207173.4225
   Tangential Direction:      N 86°15'11.3" E
      Tangential Length:              54.73

Element: Linear
             PI (          )        0+54.73       2069107.6523      1207173.4225
             PC (          )        2+10.12       2069116.1908      1207328.5710
   Tangential Direction:      N 86°50'59.8" E
      Tangential Length:             155.38

Element: Circular
             PC (          )        2+10.12       2069116.1908      1207328.5710
             PI (          )        2+32.68       2069117.4294      1207351.0961
             CC (          )                      2064457.2502      1207584.7512
            PCC (          )        2+55.24       2069118.4501      1207373.6322
                   Radius:            4665.98
                    Delta:        0°33'14.5" Right
 Degree of Curvature(Arc):          1°13'40.6"
                   Length:              45.12
                  Tangent:              22.56
                    Chord:              45.12
          Middle Ordinate:               0.05
                 External:               0.05
      Tangent Direction:      N 86°51'09.6" E
       Radial Direction:       S 3°08'50.4" E
        Chord Direction:      N 87°07'46.8" E
       Radial Direction:       S 2°35'35.9" E
      Tangent Direction:      N 87°24'24.1" E

Element: Circular
            PCC (          )        2+55.24       2069118.4501      1207373.6322
             PI (          )        5+01.61       2069132.1334      1207619.6284
             CC (          )                      2064459.6561      1207632.7729
             PT (          )        7+47.53       2069119.8343      1207865.6977
                   Radius:            4666.00
                    Delta:        6°02'42.4" Right
 Degree of Curvature(Arc):          1°13'40.6"
                   Length:             492.30
                  Tangent:             246.38
                    Chord:             492.07
          Middle Ordinate:               6.49
                 External:               6.50
      Tangent Direction:      N 86°48'58.5" E
       Radial Direction:       S 3°11'01.5" E
        Chord Direction:      N 89°50'19.7" E
       Radial Direction:       S 2°51'40.9" W
      Tangent Direction:      S 87°08'19.1" E
```

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN, WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "SOIL NAIL WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. REFER TO RETAINING WALL DETAIL SHEETS FOR ADDITIONAL INFORMATION.
8. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.



C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 2
LAYOUT OF RETAINING WALL 'MM'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_mm_02
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\4406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_MM_02.dgn
ddang 3/27/2015 10:46:34 AM

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.		CA0608	573	XXXX

1 SECTIONS OF WALLS [Dwg#]

1. EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

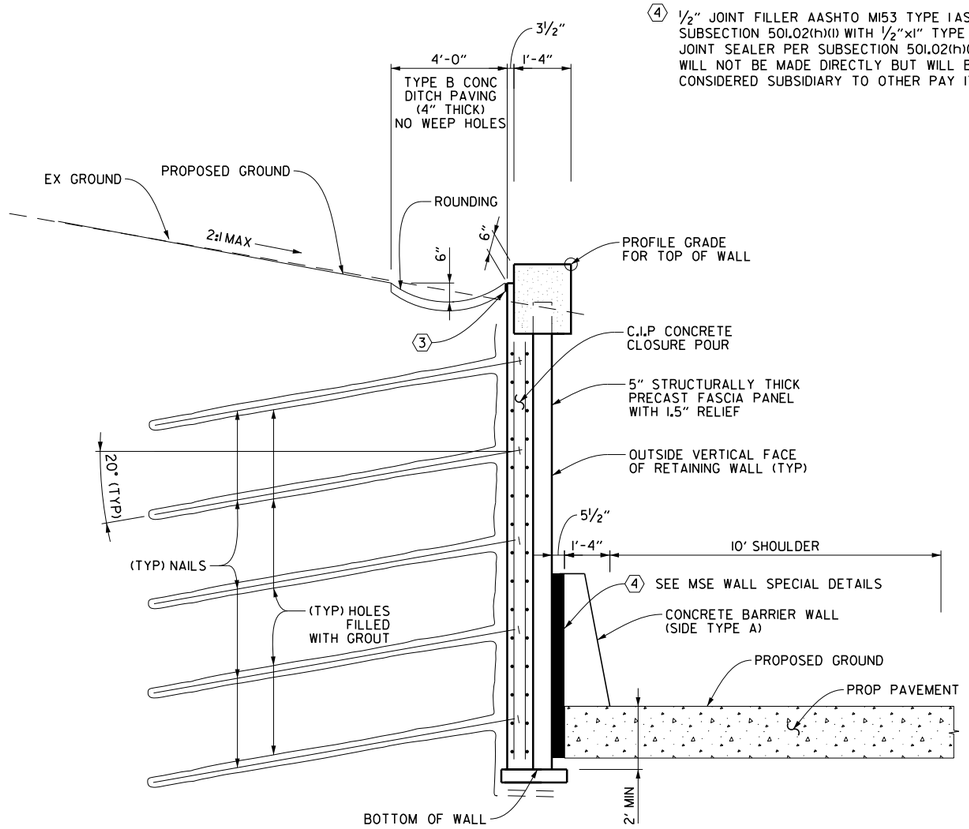
2. CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3. AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

4. 1/2" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH 1/2"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

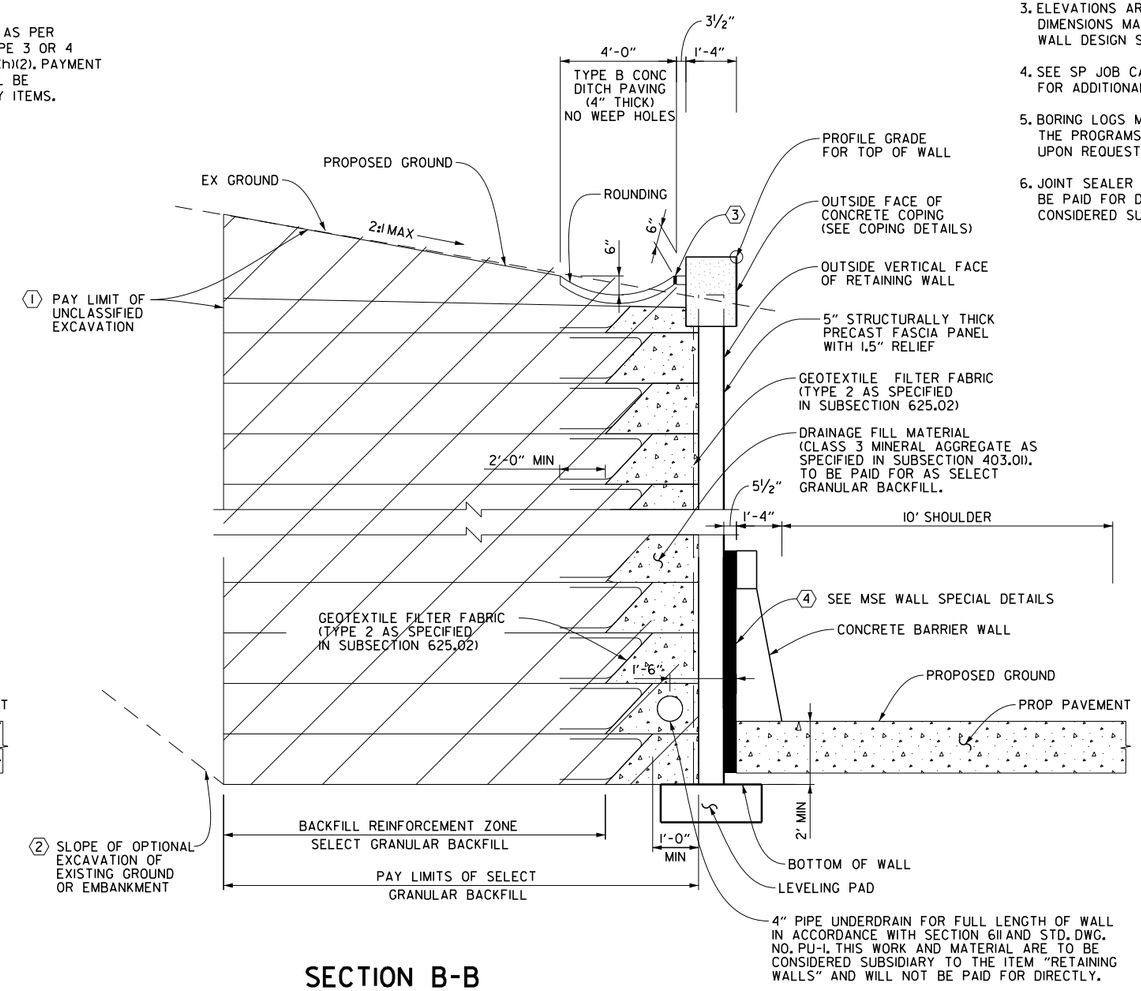
GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'MM'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

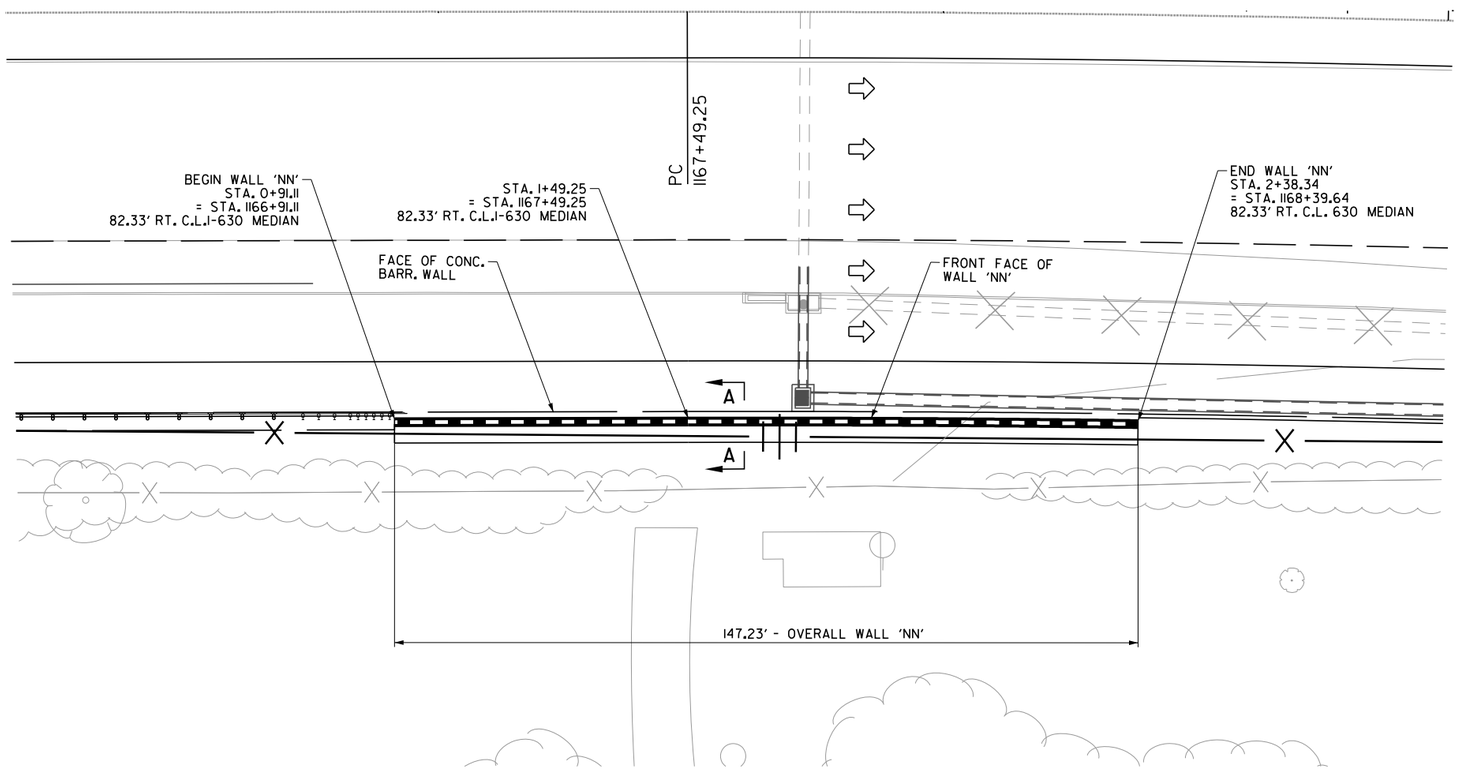
DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_mm_
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\rCA0608_Ret_Wall_Sections_MM_01.dgn
ddang 3/27/2015 10:16:35 AM

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.		CA0608	574	XXXX

1 P&P RET. WALL 'NN' [Dwg#]



PLAN

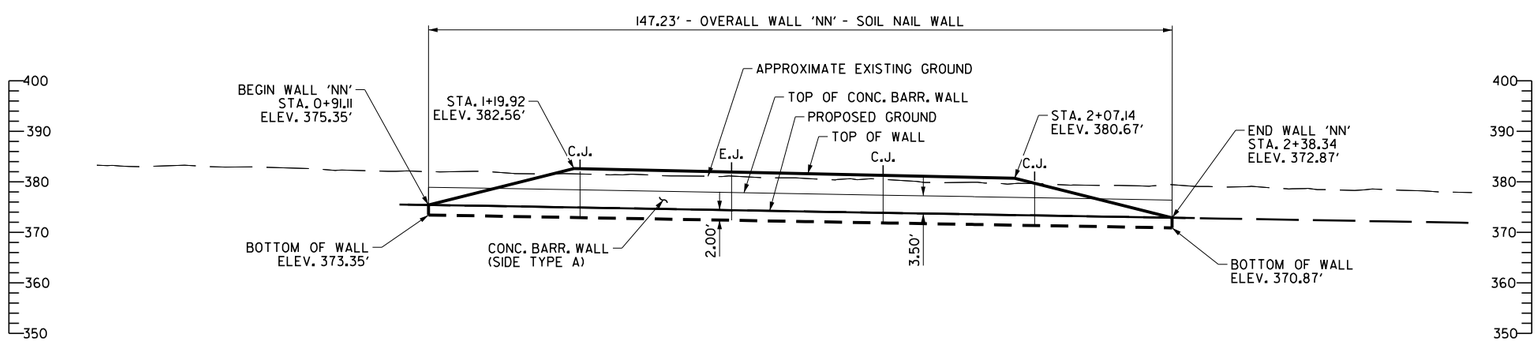
SCALE 1"=15'

STATION ALONG WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.	BOTTOM OF WALL ELEV.
0+91.11	375.35	375.35	373.35
1+16.11	381.61	374.94	372.94
1+41.11	382.10	374.51	372.51
1+66.11	381.56	374.09	372.09
1+91.11	381.01	373.66	371.66
2+16.11	378.42	373.24	371.24
2+38.34	372.87	372.87	370.87

NOTES:

1. STATIONS AND OFFSETS ARE MEASURED FROM C.L. I-630 MEDIAN, AS INDICATED. WALL IS CONCENTRIC TO C.L. I-630 MEDIAN. OFFSETS ARE MEASURED TO OUTSIDE VERTICAL FACE OF RETAINING WALL.
2. SEE ROADWAY PLANS FOR ADDITIONAL ROADWAY HORIZONTAL ALIGNMENT DATA.
3. UNDERDRAIN PIPE INFORMATION IS SHOWN FOR CONTRACTOR'S INFORMATION. THE ACTUAL LOCATION OF THE UNDERDRAIN PIPE SHALL BE DETERMINED BY THE CONTRACTOR INCLUDING CONNECTION TO A DRAINAGE SYSTEM.
4. SEE DRAINAGE PLANS FOR ADDITIONAL DRAINAGE INFORMATION.
5. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL AS DESCRIBED IN SP JOB CA0608 "CAST-IN-PLACE WALL."
6. BORING LOGS MAY BE OBTAINED FROM THE CONSTRUCTION CONTRACT PROCUREMENT SECTION OF THE PROGRAM MANAGEMENT DIVISION UPON REQUEST.
7. ASHLAR STONE FORMLINERS WILL BE SPECIFIED FOR THE WALL PANELS VISIBLE FROM I-630 AND LOCAL STREETS. COLOR SCHEMES TO MATCH THE BIG ROCK INTERCHANGE.

```
* Alignment name: RW NN
* Alignment description:
*
                                        STATION          NORTHING          EASTING
Element: Linear
            POB (          )            0+00.00       2068932.6692      1208311.7193
             PC (          )            1+49.25       2068925.2187      1208460.7825
   Tangential Direction:          S 87°08'19.1" E
      Tangential Length:                149.25

Element: Circular
             PC (          )            1+49.25       2068925.2187      1208460.7825
             PI (          )            2+23.48       2068921.5131      1208534.9207
             CC (          )                          2063290.0086      1208179.1237
             PT (          )            2+97.70       2068915.8584      1208608.9357
                 Radius:                5642.24
                  Delta:            1°30'27.0" Right
 Degree of Curvature(Arc):           1°00'55.7"
                 Length:                 148.45
                Tangent:                 74.23
                  Chord:                148.45
         Middle Ordinate:                 0.49
               External:                  0.49
      Tangent Direction:          S 87°08'19.1" E
       Radial Direction:           S 2°51'40.9" W
       Chord Direction:           S 86°23'05.5" E
       Radial Direction:           S 4°22'08.0" W
      Tangent Direction:          S 85°37'52.0" E
```



C.J. AND E.J. - TYPICAL CONSTRUCTION JOINT AND EXPANSION JOINT LOCATIONS. LOCATIONS CAN BE ALTERED BY THE CONTRACTOR. LOCATIONS OF THE CONSTRUCTION JOINTS AND\OR EXPANSION JOINT NEED TO BE SHOWN IN THE WORKING DRAWINGS FOR ENGINEER'S APPROVAL.

ELEVATION

SCALE 1"=15'

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

LAYOUT OF RETAINING WALL 'NN'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_nn_01
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

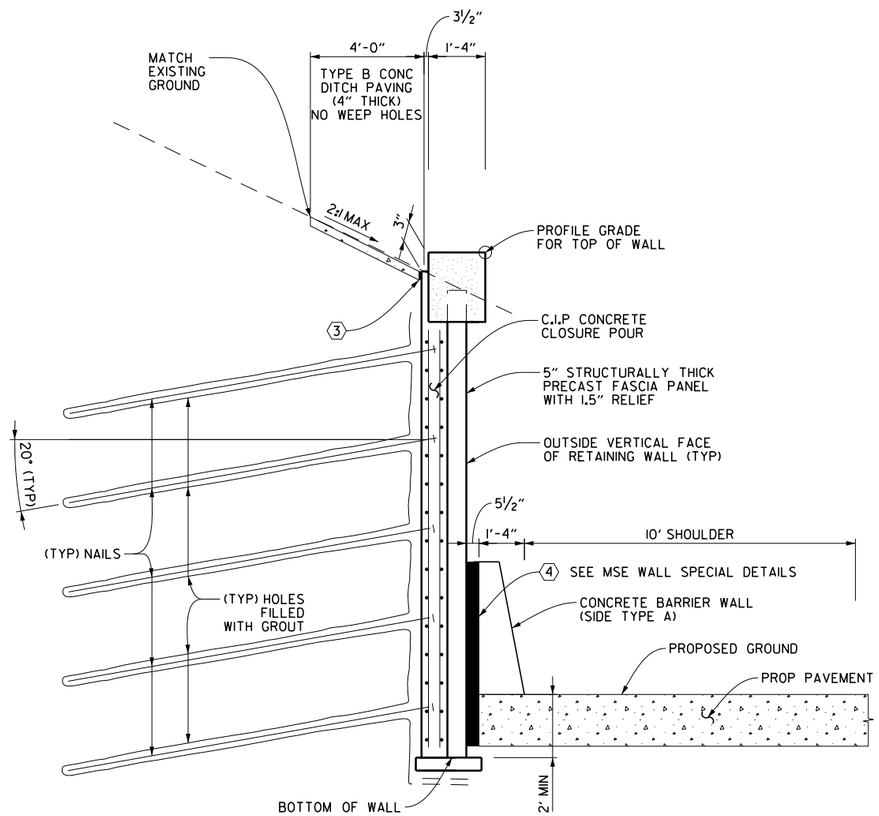
S:\14406\DI\DGN\Plans\Walls\r-CA0608_Ret_Wall_P&P_NN_01.dgn

3/27/2015 10:46:39 AM

ddang

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.		CA0608	575	XXXX

1 SECTIONS OF WALLS [Dwg#]



SECTION A-A

N.T.S.

GENERAL NOTES:

1. DESIGN SPECIFICATIONS: ALLOWABLE STRESS (ASD) METHOD, ALSO KNOWN AS SERVICE LOAD METHOD (SLD), AS OUTLINED IN FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. 7.
2. SEISMIC PERFORMANCE ZONE: I
3. ELEVATIONS ARE APPROXIMATE. WALL DIMENSIONS MAY VARY DEPENDING ON WALL DESIGN SELECTED.
4. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.
5. BORING LOGS MAY BE OBTAINED FROM THE PROGRAMS AND CONTRACTS DIVISION UPON REQUEST.
6. JOINT SEALER AND JOINT FILLER WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

1 EXCAVATION REQUIRED FOR AREA OF REINFORCING ZONE WILL BE PAID FOR UNDER THE PAY ITEM 210, "UNCLASSIFIED EXCAVATION". SEE SP JOB NO. CA0608 "RETAINING WALLS" FOR ADDITIONAL INFORMATION.

2 CONTRACTOR HAS THE OPTION OF USING A CUT SLOPE AND/OR SHORING TO MAINTAIN STABILITY OF CUT. ANY EXCAVATION AND SUBSEQUENT BACKFILL BELOW THE EXISTING GROUND LINE AND BEYOND THE LIMITS OF REINFORCING ZONE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE PAID UNDER ITEM SP JOB NO. CA0608 (SHORING).

3 AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(2)

4 ½" JOINT FILLER AASHTO M153 TYPE I AS PER SUBSECTION 501.02(h)(1) WITH ½"x1" TYPE 3 OR 4 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

SECTIONS OF RETAINING WALL 'NN'

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_sections_nn_0
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

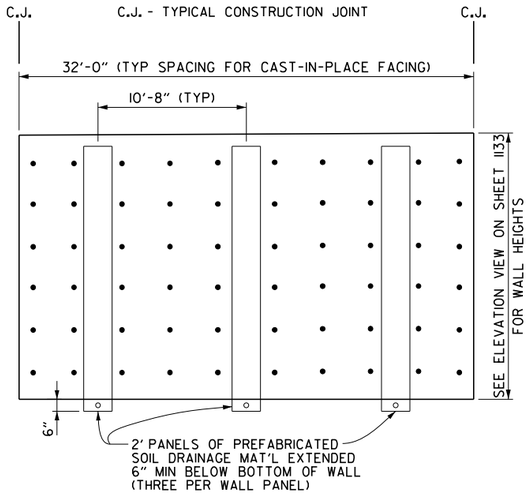
DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Sections_NN_01.dgn

ddang 3/27/2015 10:16:39 AM

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.		CA0608	345	XXXX

1 DETAILS OF SOIL NAIL WALLS [Dwg#]

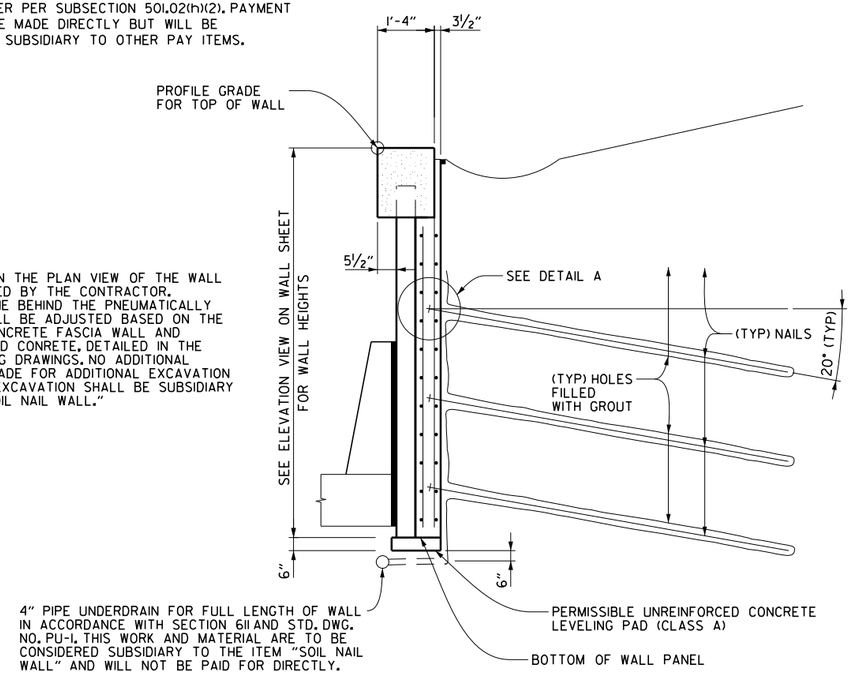


TYPICAL PANEL

N.T.S.

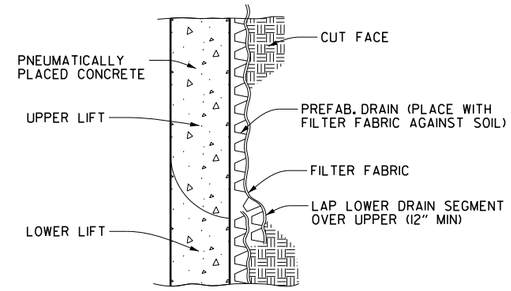
1 ½" JOINT FILLER AASHTO M153 TYPE IAS PER SUBSECTION 501.02(h)(1) WITH ½"x1" TYPE 3, 4, OR 6 JOINT SEALER PER SUBSECTION 501.02(h)(2). PAYMENT WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER PAY ITEMS.

THE OFFSET SHOWN ON THE PLAN VIEW OF THE WALL SHALL NOT BE ALTERED BY THE CONTRACTOR. THE VERTICAL CUT LINE BEHIND THE PNEUMATICALLY PLACED CONRETE SHALL BE ADJUSTED BASED ON THE THICKNESS OF THE CONCRETE FASCIA WALL AND PNEUMATICALLY PLACED CONRETE, DETAILED IN THE CONTRACTOR'S WORKING DRAWINGS. NO ADDITIONAL PAYMENT SHALL BE MADE FOR ADDITIONAL EXCAVATION AND ALL ADDITIONAL EXCAVATION SHALL BE SUBSIDIARY TO THE PAY ITEM "SOIL NAIL WALL."



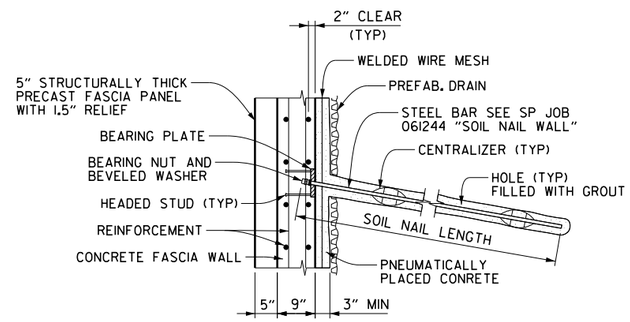
TYPICAL SECTION THROUGH WALL

N.T.S.



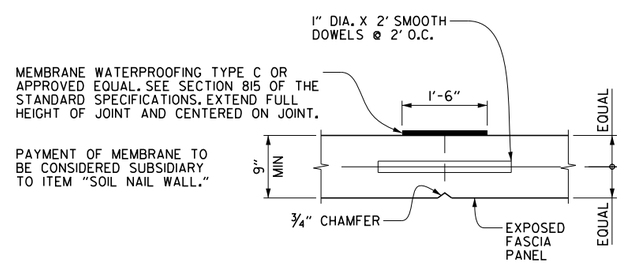
PREFABRICATED DRAINAGE MATERIAL

N.T.S.



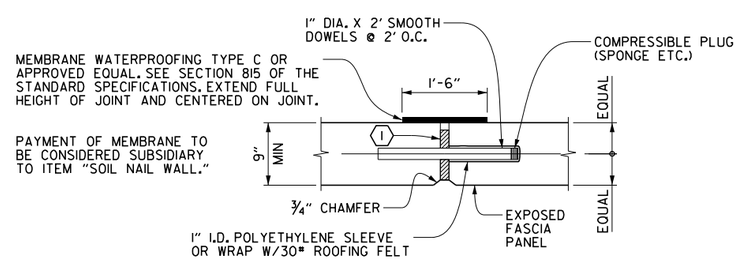
DETAIL A

N.T.S.



TYPICAL CONSTRUCTION JOINT DETAIL

N.T.S.



EXPANSION JOINT DETAIL

N.T.S.

GENERAL NOTES:

THE DETAILS SHOWN ON THIS PLAN ARE FOR CONTRACTOR'S GUIDANCE ONLY AND SHALL BE NO WAY CONSTRUED AS THE DETAILED DESIGN. THE CONTRACTOR SHALL SUBMIT DETAILED WORKING DRAWINGS FOR APPROVAL INCLUDING THE DETAILS FOR CAST-IN-PLACE OR PRE-CAST FACING PANELS ALONG WITH THE DRAINAGE SYSTEM BEHIND THE WALL, UNDERDRAIN SYSTEMS AND ALL OTHER DETAILS AS DESCRIBED IN THE SP JOB CA0608 "SOIL NAIL WALL."

ALL CONCRETE SHALL BE CLASS S WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH, f'c = 3,500 PSI, UNLESS OTHERWISE NOTED.

ALL REINFORCING STEEL SHALL BE GRADE 60 AND SHALL CONFORM TO AASHTO M31 OR M53.

CHAMFER ALL EXPOSED CORNERS 3#4".

EXPANSION JOINTS SHALL BE LOCATED AT 92' CENTERS (MAX).

SOIL NAIL TEST ANCHORS WILL BE REQUIRED.

THE LOCATION OF THE TEST ANCHORS SHALL BE APPROVED BY THE ENGINEER. THE TEST ANCHORS MAY BE USED AS PRODUCTION NAILS, PROVIDED THEY DEVELOP THE REQUIRED TEST LOAD AND ARE EPOXY COATED. IF WIDELY VARYING SOIL CONDITIONS ARE ENCOUNTERED, THE ENGINEER MAY REQUIRE UP TO TWO ADDITIONAL TEST ANCHORS PER WALL. TEST ANCHORS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "SOIL NAIL WALL."

DRAINAGE SYSTEM SHALL CONSIST OF 2' PANELS OF PREFABRICATED SOIL DRAINAGE MATS EMPTYING INTO 4" UNDERDRAIN PIPES. PNEUMATICALLY PLACED CONCRETE SHALL BE PLACED OVER THE DRAINS, WITH THE DRAINAGE MATS PLACED AGAINST THE SOIL. THE DRAINAGE SYSTEM WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "SOIL NAIL WALL."

THE PRICE BID PER SQUARE FOOT SHALL INCLUDE ALL CONCRETE, REINFORCING STEEL, PNEUMATICALLY PLACED CONCRETE, EXPANSION AND CONSTRUCTION JOINTS, DRAINAGE MATERIAL, DRILLING, NAIL REINFORCEMENT, GROUT, TEST NAILS, AND ANY OTHER MATERIALS NECESSARY TO COMPLETE THE WALL.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING SURFACE WATER OR RAINWATER FROM DAMAGING THE RETAINING WALLS DURING CONSTRUCTION. THIS SHALL INCLUDE SHAPING THE BACKFILL TO PREVENT WATER FROM PONDING OR FLOWING ON THE BACKFILL OR AGAINST THE WALL FACE. ANY DAMAGE OR MOVEMENT CAUSED BY EROSION, SLOUGHING, OR SATURATION OF THE RETAINING WALL OR EMBANKMENT BACKFILL SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

SEE SP JOB CA0608 "SOIL NAIL WALL" FOR EXCAVATION AND TESTING PROCEDURE.

WHEN ALL ROWS OF NAILS HAVE BEEN PLACED, THE PERMANENT CONCRETE FASCIA WALL SHALL BE COMPLETED.

THE PERMANENT CONCRETE FASCIA WALL SHALL BE INSTALLED WITHIN 45 WORKING DAYS AFTER TESTING AND ACCEPTANCE OF THE SOIL NAILS. THE SOIL NAIL RETAINING WALL SHALL BE ACCEPTED BASED ON QUALITY CONTROL AND ACCEPTANCE SAMPLING AND TESTING RESULTS. SEE SP JOB CA0608 "SOIL NAIL WALL" FOR ADDITIONAL INFORMATION.

60% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

DETAILS OF SOIL NAIL WALLS

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_p&p_details_s
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

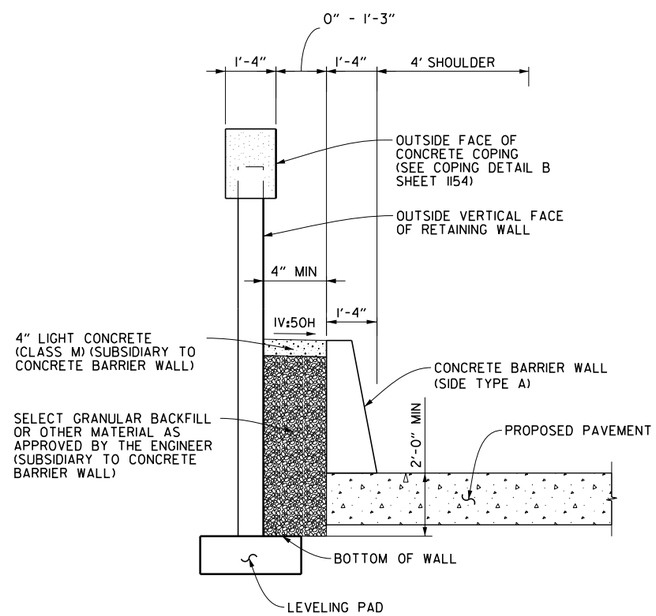
S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Details_Soil_Nail.dgn

3/27/2015 10:16:39 AM

ddang

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.		CA0608	576	XXXX

1 DETAILS OF MSE WALLS [Dwg#]



SPECIAL DETAIL

N.T.S.

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MARCH-2015

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SPECIAL DETAILS OF MSE WALLS

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	1/15/2015	FILENAME:	rca0608_ret_wall_special_detail
CHECKED BY:	SA	DATE:	2/15/2015	SCALE:	AS SHOWN
DESIGNED BY:	DCD	DATE:	1/10/2015		

DRAWING NO. XXXXX

S:\14406\01\DGN\Plans\Walls\r-CA0608_Ret_Wall_Special_Details_MSE.dgn

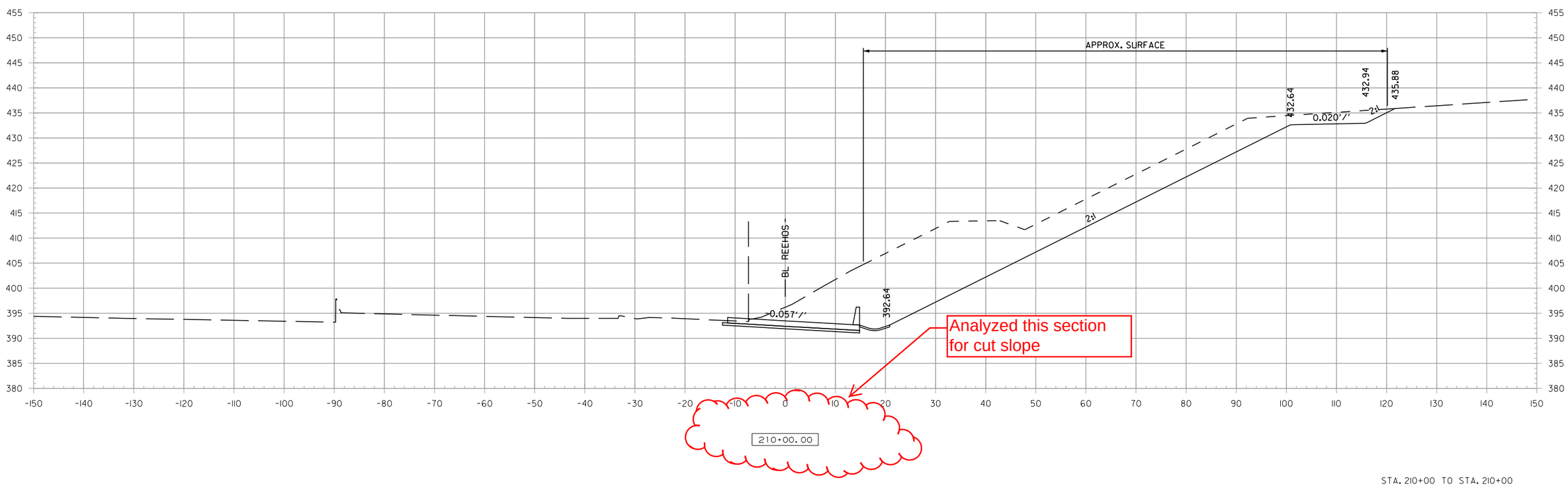
3/27/2015 10:16:39 AM

ddang

ATTACHMENT 4

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608		40

② CROSS SECTIONS I-630



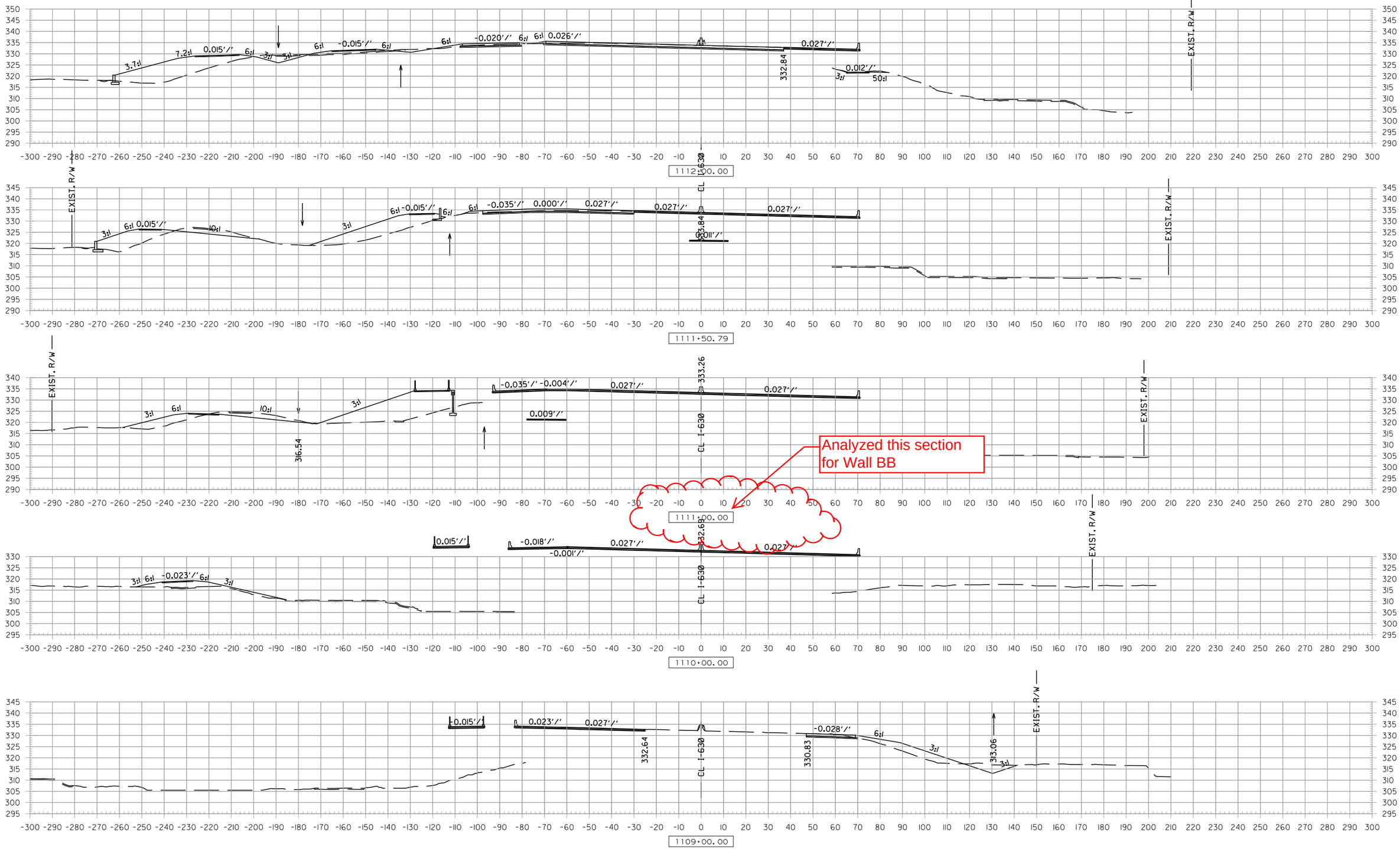
STA. 210+00 TO STA. 210+00

4/15/2015 3:20:41 PM

S:\14406\01\DGN\Personal\MJB\XS WORK\14406_XS_HOS_RockCut.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	17	46

② CROSS SECTIONS I-630



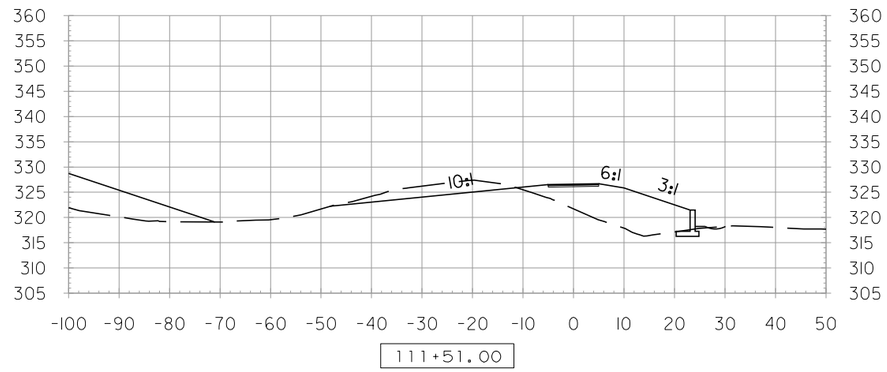
STA. 1109+00 TO STA. 1111+51

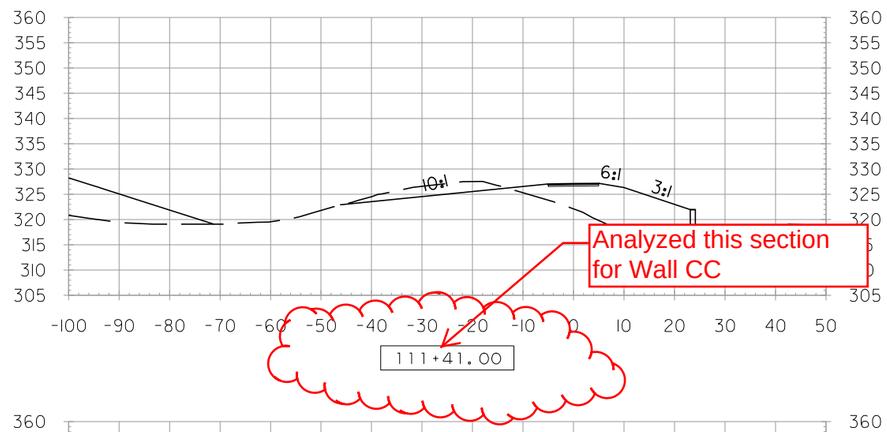
4/15/2015 1:47:14 PM

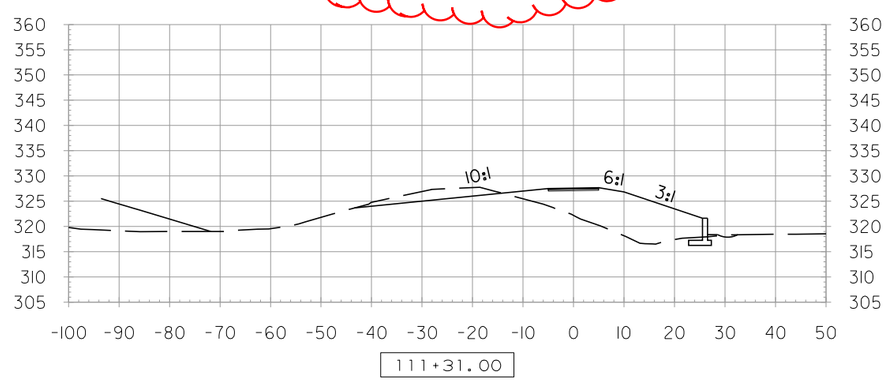
S:\14406\01\DGN\Reference\STATIC\14406_XS30_30_Sc.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608		46

2 CROSS SECTIONS SUP







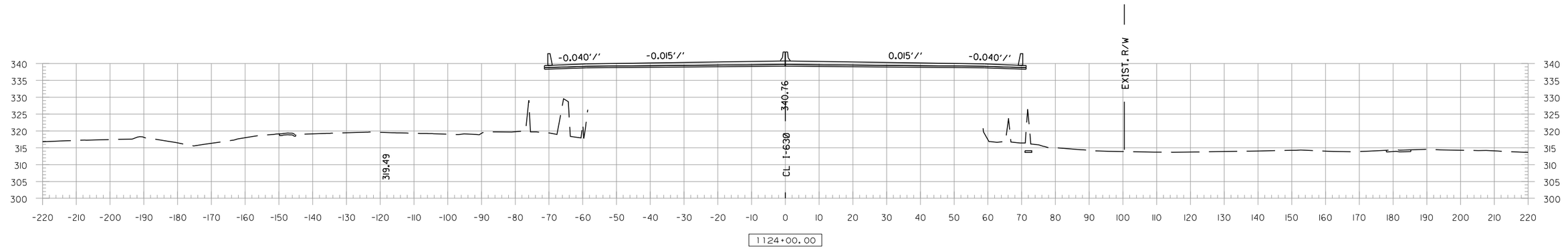
STA. 111+31 TO STA. 111+51

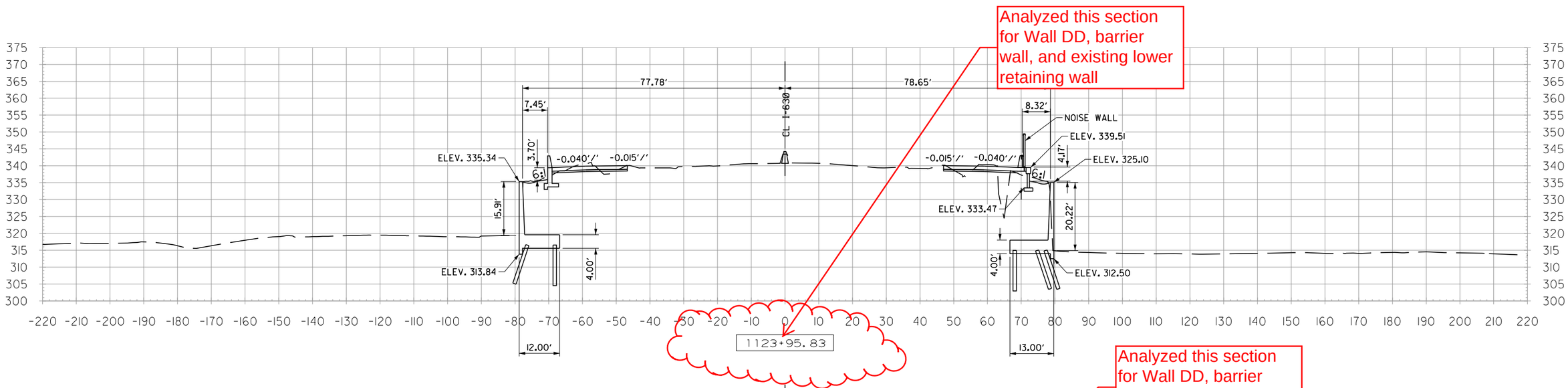
4/15/2015 1:53:16 PM

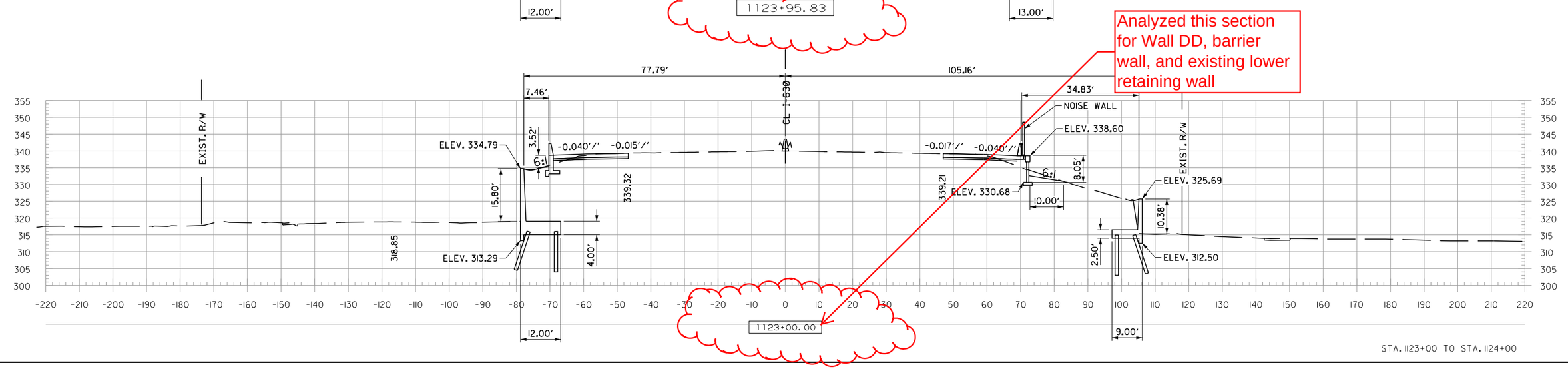
S:\14406\01\DGN\Reference\STATIC\14406_XS30_30_Sc.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	21	46

2 CROSS SECTIONS I-630







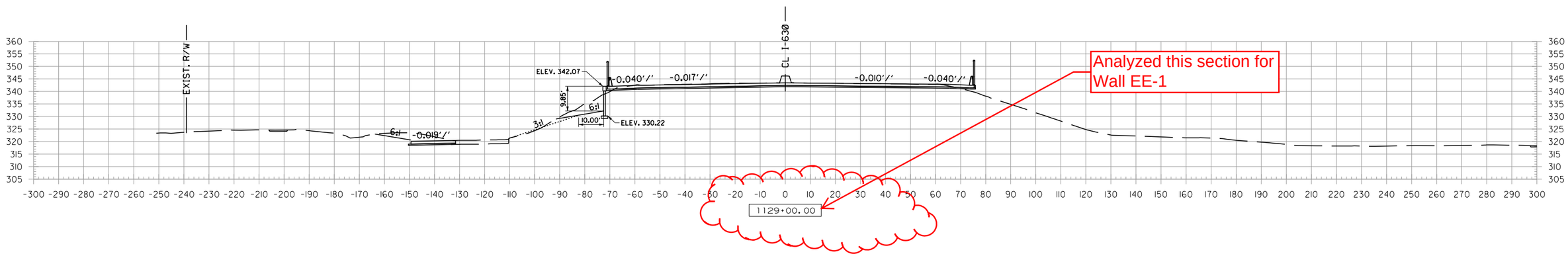
STA. 1123+00 TO STA. 1124+00

2/20/2015 1:04:22 PM

S:\14406\01\DGN\Personal\DCD\14406_XS30_30_Sc\14406_XS30_30_Sc.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	19	46

2 CROSS SECTIONS I-630



STA. 1129+00 TO STA. 1132+00

2/20/2015 1:12:58 PM

S:\14406\01\DGN\Personal\DCD\14406_XS30_30_Sc\14406_XS30_30_Sc.dgn

For R/W Data, See Roadway Plans

Use Type Special 11, Type Special 12 & Type Special 13 Approach Gutters with Type Special 8 & Type Special 9 Approach Slabs at End of Bridge.

60% SUBMITTAL

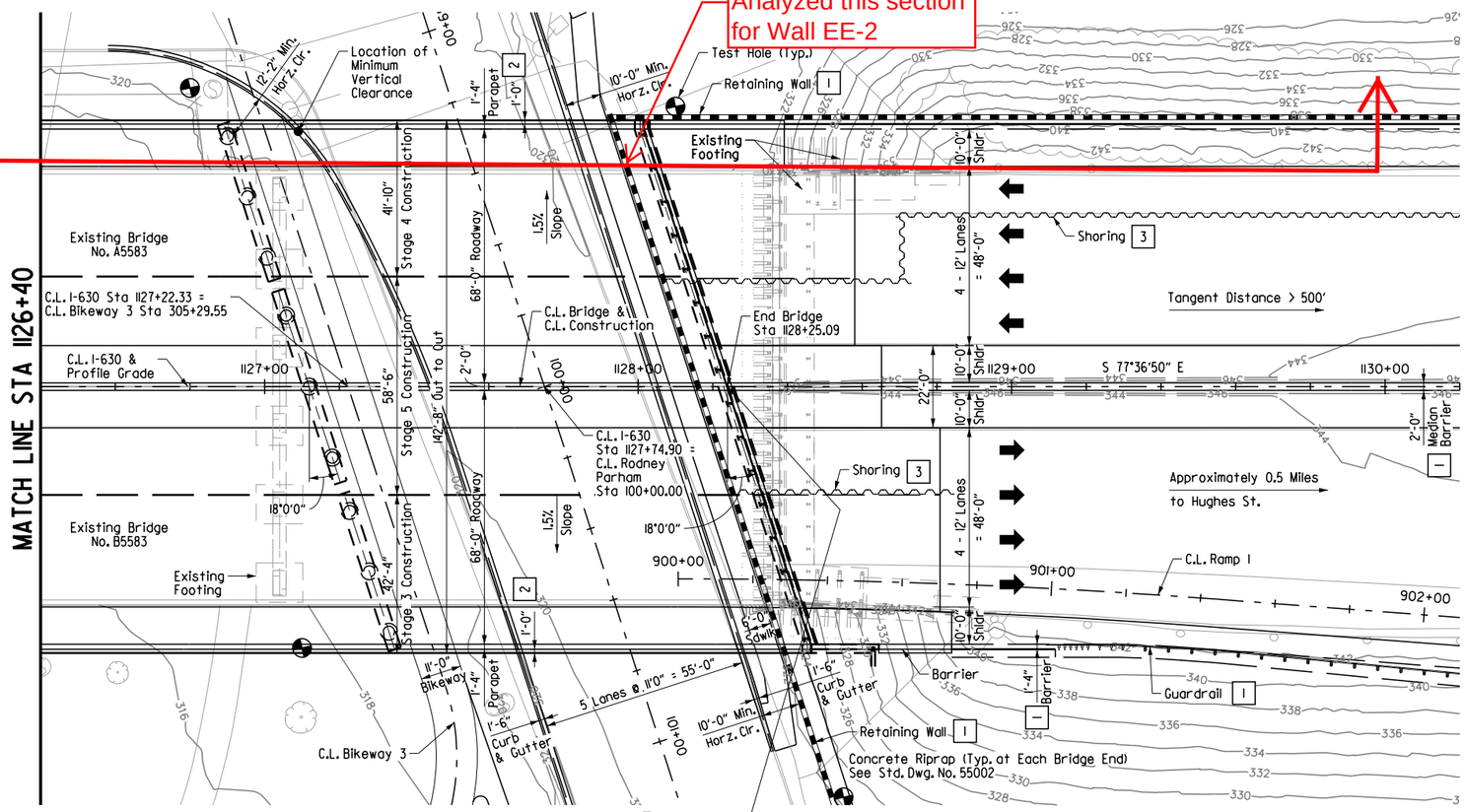
PRELIMINARY
FOR REVIEW ONLY

STEPHEN T. SMILEY, P.E., 13072

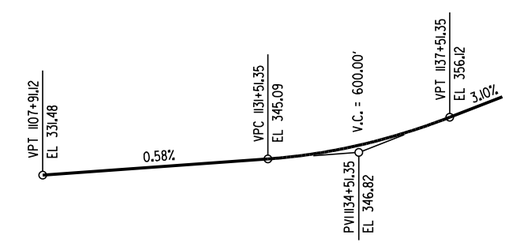
MARCH-2015

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.		CA0608	482	XXXX

1 [Brdg#] BRIDGE LAYOUT [Dwg#]



PLAN



VERTICAL CURVE DATA

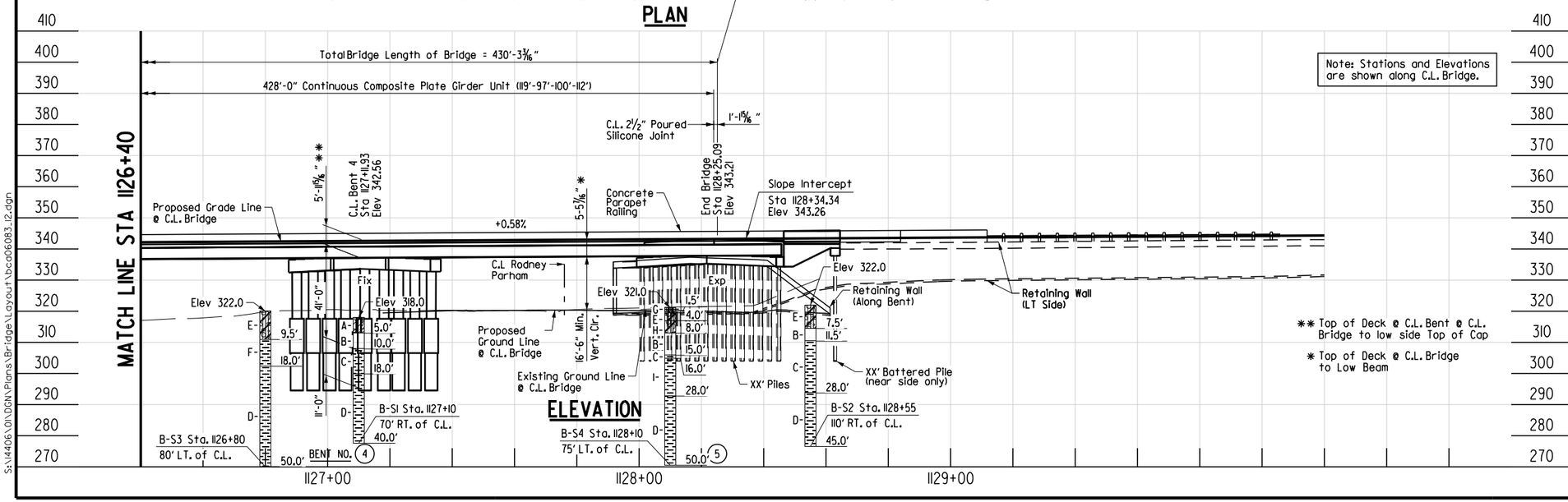
(Along Profile Grade)

1 See Rdwy Plans

2 Bridge has been configured with a 1'-0" slab projection beyond the parapet to accommodate the noise wall if warranted.

3 Shoring will be required during construction. See SP Job CA0608 "Shoring".

Note:
The proposed bridge is positioned to maximize re-use of Existing Abutment 1 and to minimize interference with the existing substructure. The Contractor shall verify the location of the existing substructure before constructing the new substructure. Any adjustments necessary to fit the proposed bridge shall be submitted to the Engineer for approval.



ELEVATION

Note: Stations and Elevations are shown along C.L. Bridge.

** Top of Deck @ C.L. Bent @ C.L. Bridge to low side Top of Cap

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

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS

SHEET 2 OF 5
LAYOUT OF I-630 BRIDGE
OVER RODNEY PARHAM

BAPTIST HOSPITAL-UNIVERSITY AVENUE (WIDENING) (S)
PULASKI COUNTY
ROUTE 630, SECTION 21

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY:	AKH	DATE:	4/25/2014	FILENAME:	bca06083_12
CHECKED BY:	MT	DATE:	4/30/2014	SCALE:	1" = 20'
DESIGNED BY:	STS	DATE:	4/21/2014		

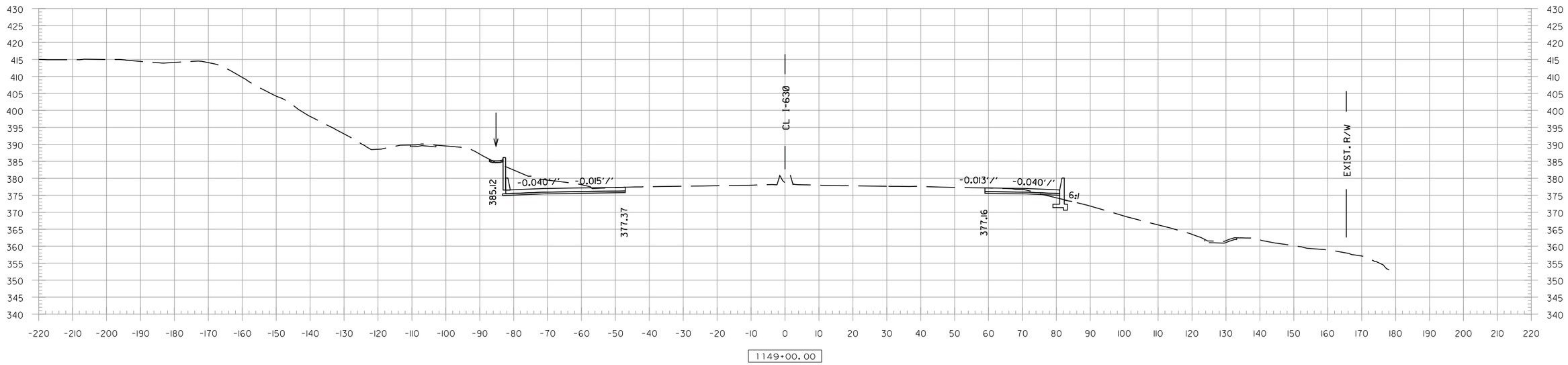
BRIDGE NO. [Brdg#] DRAWING NO. XXXXX

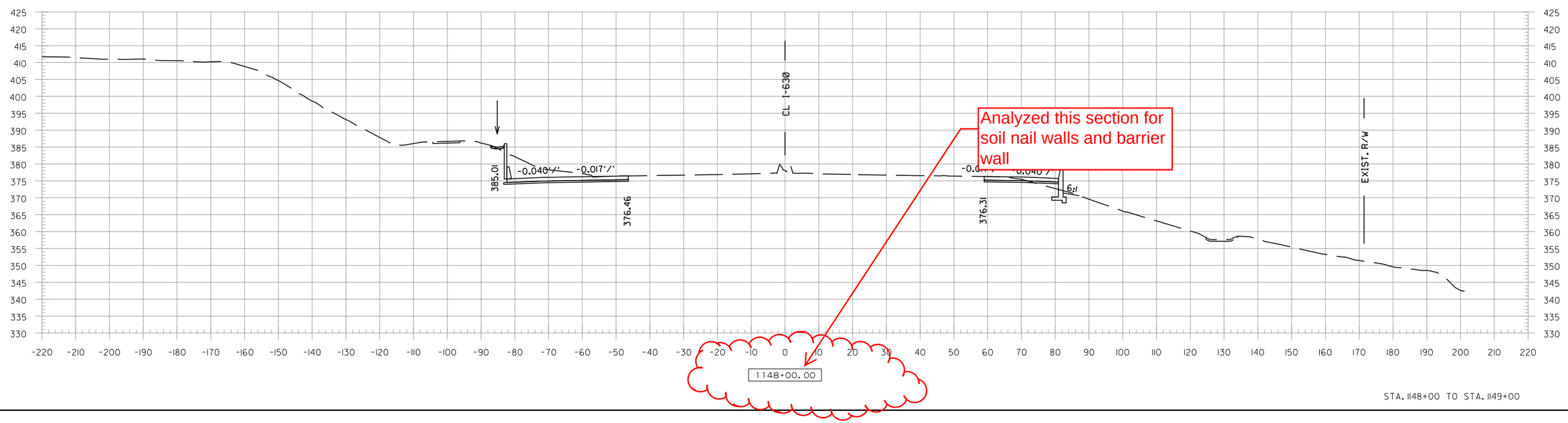
9:08:37 AM 4/21/2015 jHarrell

S:\14406\01\DGN\Plans\Bridge\Layout\bca06083_12.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	31	46

2 CROSS SECTIONS I-630





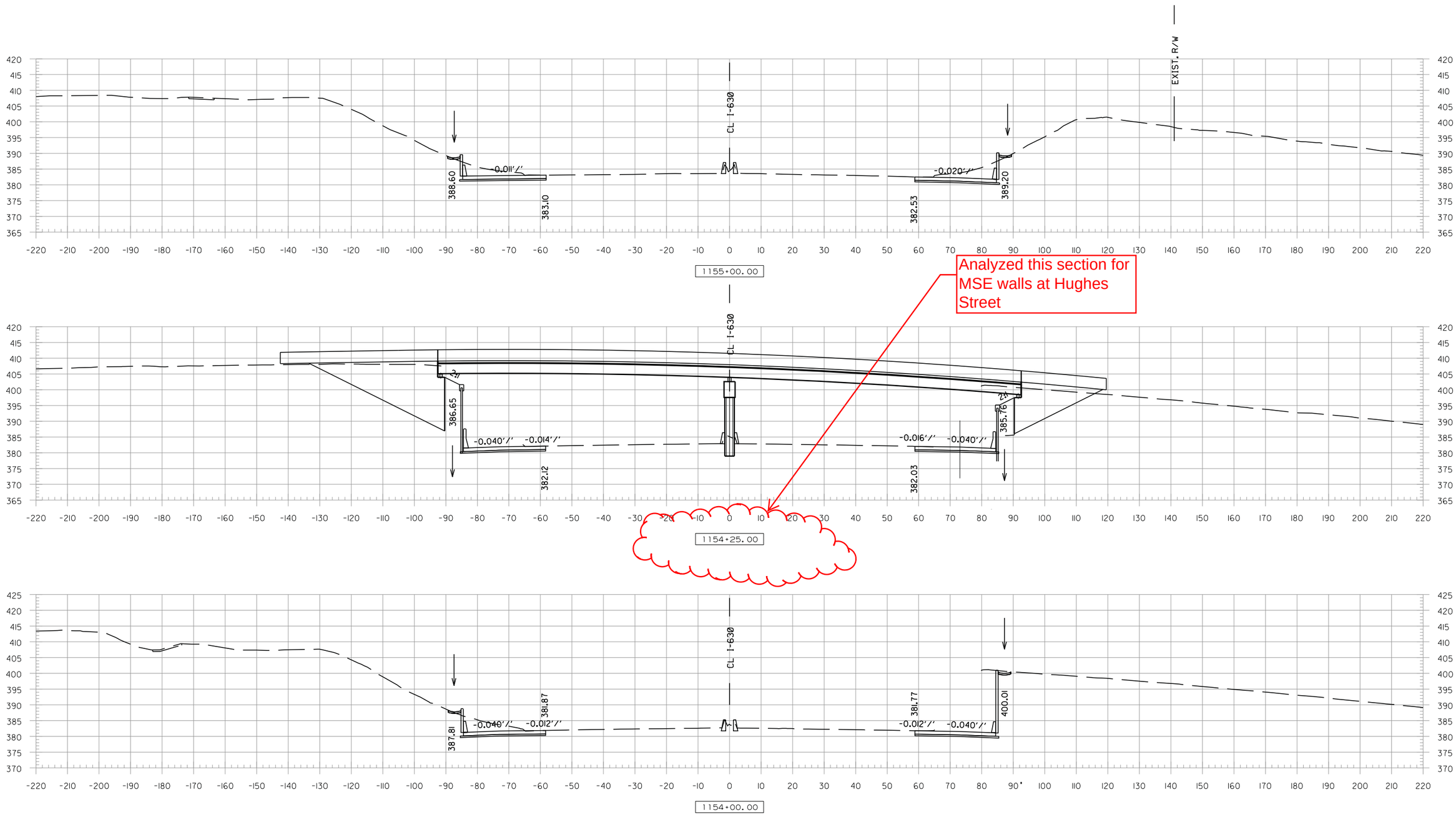
STA. 1148+00 TO STA. 1149+00

12/10/2014 3:53:13 PM

S:\14406\01\DGN\Reference\STATIC\14406_XS30_30_Sc.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	34	46

② CROSS SECTIONS I-630



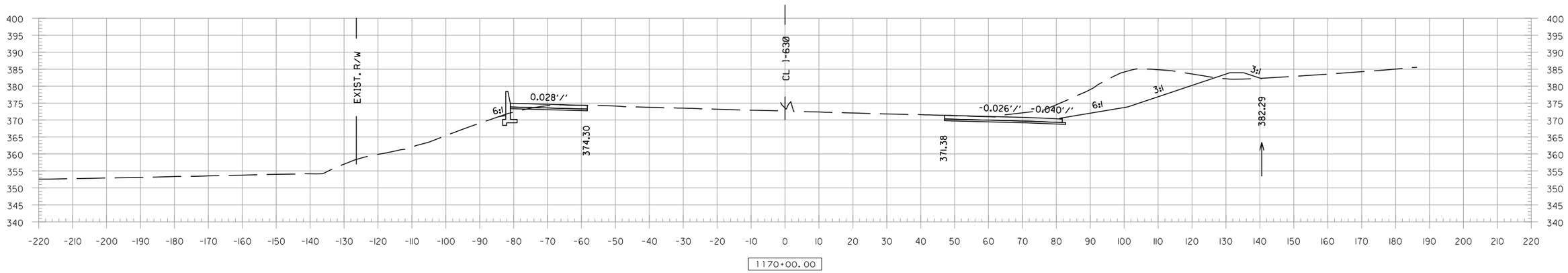
STA. 1154+00 TO STA. 1155+00

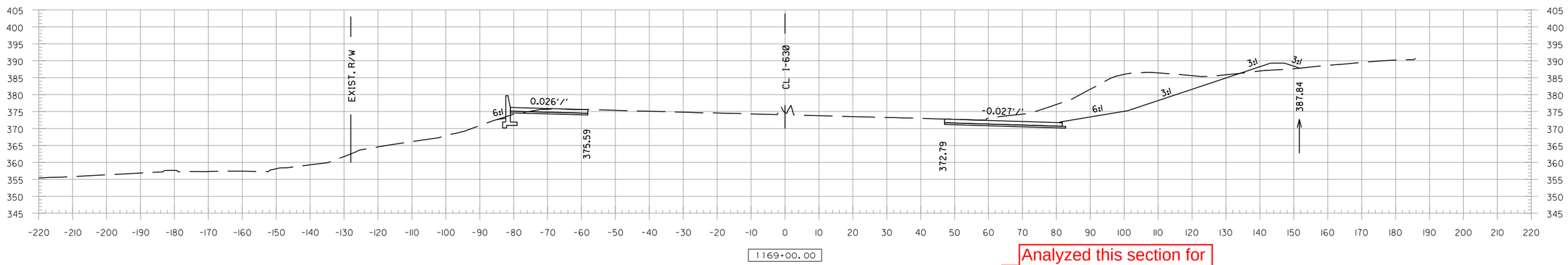
12/10/2014 3:53:13 PM

S:\14406\DI\DGN\Reference\STATIC\14406_XS30_30_Sc.dgn

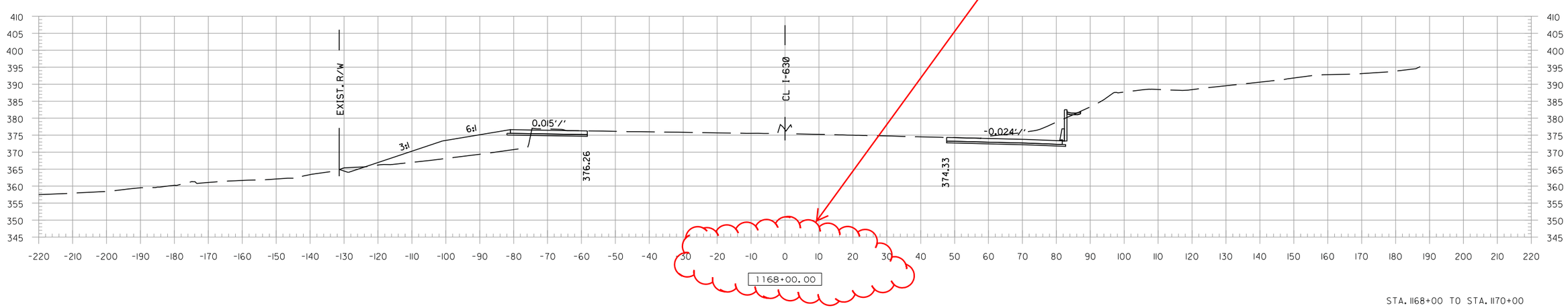
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				X	ARK.			
				JOB NO.		CA0608	39	46

2 CROSS SECTIONS I-630





Analyzed this section for soil nail walls

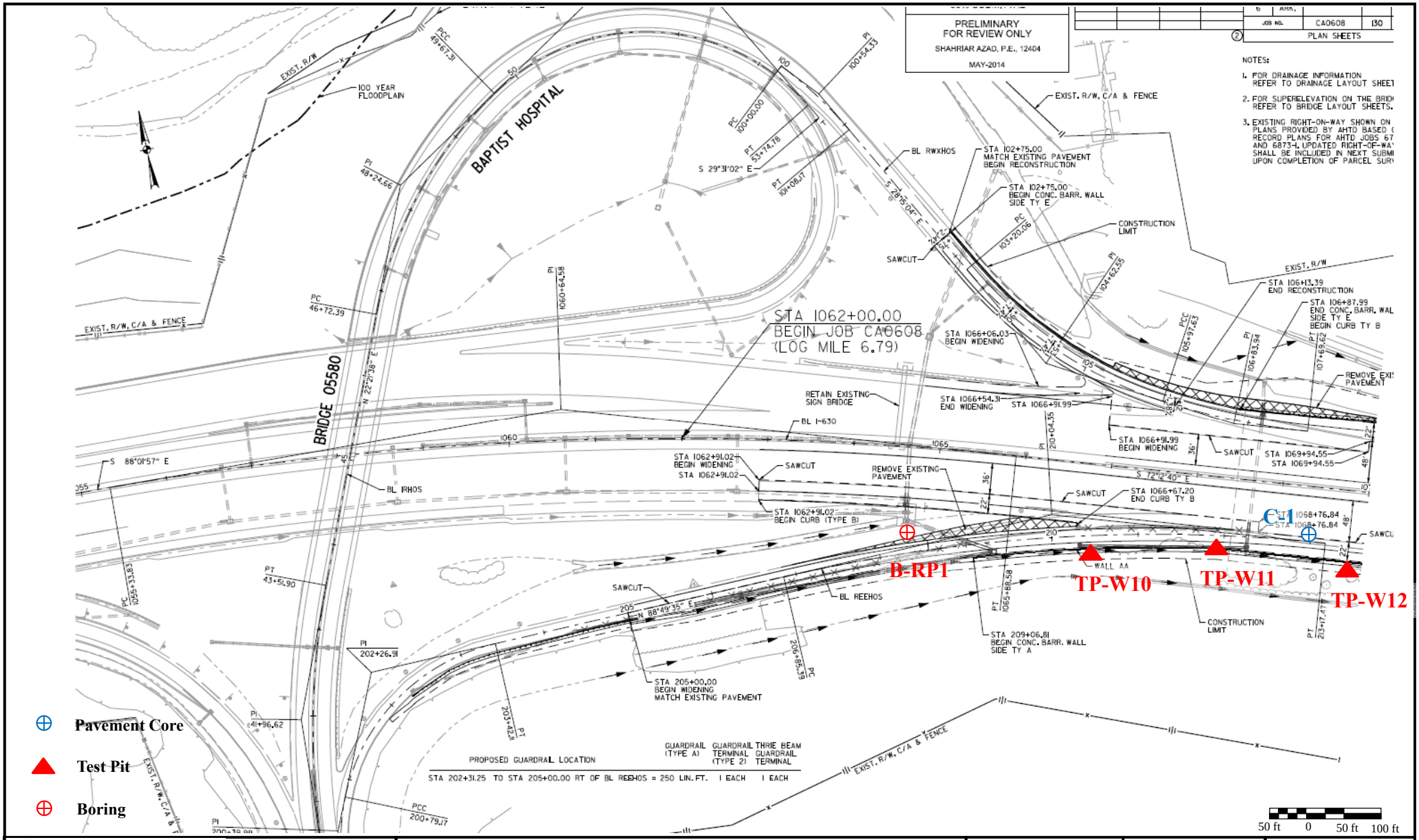


STA. 1168+00 TO STA. 1170+00

12/10/2014 3:53:14 PM

S:\14406\01\DGN\Reference\STATIC\14406_XS30_30_Sc.dgn

ATTACHMENT 5

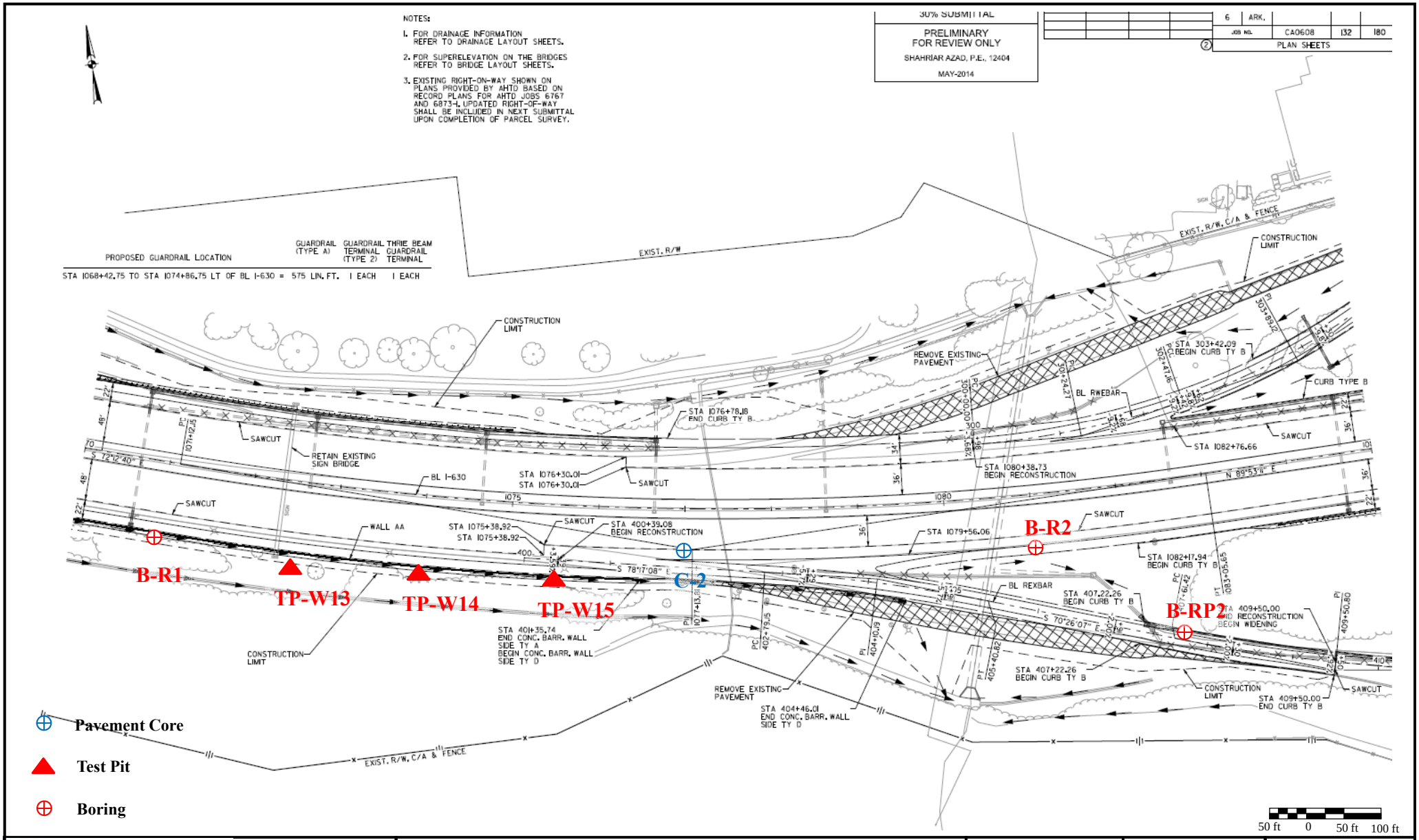


Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

PLAN of BORINGS, TEST PITS and PAVEMENT CORES

Job No. CA0608 Baptist Hospital – University Ave. (Widening) (S)
Interstate I-630 – Little Rock, Pulaski Co. Arkansas

Scale: As Shown	Job No. 14-030	PLATE 1a



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

PLAN of BORINGS, TEST PITS and PAVEMENT CORES

Job No. CA0608 Baptist Hospital – University Ave. (Widening) (S)
Interstate I-630 – Little Rock, Pulaski Co., Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1b**

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

LOG OF MAPPED FACE NO. W10

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Mapping Cut Face

LOCATION: Sta 1066+80, 120 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 410±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Brown fine sandy silt w/trace organics				
			Low hardness to moderately hard reddish tan, gray and dark gray moderately weathered shale w/medium close sandstone partings, dip = 75±° N				
5							
10							
15			NOTE: Logged from cut face.				
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-8-14

DEPTH TO WATER
IN BORING: N/A

DATE: 9/8/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF MAPPED FACE NO. W11

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Mapping Cut Face

LOCATION: Sta 1068+20, 105 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 408±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Brown fine sandy silt w/trace organics				
			Low hardness to moderately hard reddish tan, gray and dark gray moderately weathered shale w/medium close sandstone partings, dip = ±80° N				
5							
10							
15			NOTE: Logged from cut face.				
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-8-14

DEPTH TO WATER
IN BORING: N/A

DATE: 9/8/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF MAPPED FACE NO. W12

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Mapping Cut Face

LOCATION: Sta 1069+80, 100 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 405±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Brown fine sandy silt w/trace organics				
5 10			Low hardness to moderately hard reddish tan, gray and dark gray modertely weathered shale w/medium close sandstone partings, dip = ±75° N, strike = ±30° E				
15 20 25			NOTE: Logged from cut face.				

COMPLETION DEPTH: 12.5 ft
DATE: 9-8-14

DEPTH TO WATER IN BORING: N/A

DATE: 9/8/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF TEST PIT NO. W13

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Backhoe

LOCATION: Sta 1072+40, 80 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 394±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT (10 20 30) / WATER CONTENT (40 50 60) / LIQUID LIMIT (70)	- No. 200 %
			Loose tan fine sandy silt w/trace organics, dry (fill)				
1			Very stiff reddish tan silty clay w/some shale fragments, dry (fill)				78
2			Low hardness to moderately hard reddish tan, gray and dark gray moderately weathered shale w/medium close sandstone partings, dip = ±75° N				
3							
4			NOTE: Practical refusal at 3 ft				
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 9-9-14

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 9/9/2014

LTPNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF TEST PIT NO. W14

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Backhoe

LOCATION: Sta 1073+80, 80 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 393±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff tan silty clay w/some shale fragments, dry (fill)				
1			Low hardness to moderately hard red, reddish tan, gray and dark gray moderately weathered shale w/medium close sandstone partings, dip = ±80° N				
2							
3			NOTE: Practical refusal at 2 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.0 ft
DATE: 9-9-14

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 9/9/2014

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

LOG OF TEST PIT NO. W15

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Backhoe

LOCATION: Sta 1075+30, 80 ft Rt - Wall AA

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 392±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Loose tan fine sandy silt w/trace organics and shale fragments, dry (fill)				
1			Low hardness to moderately hard reddish tan, gray and dark gray moderately weathered shale w/medium close sandstone partings, dip = ±75° N				
2							
3			NOTE: Practical refusal at 2.5 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 9-9-14

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 9/9/2014

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

LOG OF BORING NO. R1

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1071+00, 75 ft Rt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 394±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff to very stiff tan and brown silty clay and shale fragments, dry (fill)	28			45
			Low hardness to moderately hard reddish tan and brown weathered shale w/ferrous stains, approx dip ~ 70°	50/5"			
				50/7"			
5							
			Moderately hard dark gray and brown weathered shale	50/7"			
			- gray and dark gray below 8.5 ft	50/4"			
10							
			- water at 12 ft				
				50/4"			
15							
			- harder below 16 ft				
			- auger refusal in shale at 17 ft				
20							
25							

COMPLETION DEPTH: 17.0 ft
DATE: 6-23-14

DEPTH TO WATER IN BORING: 12 ft

DATE: 6/23/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. R2

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1081+00, 70 ft Rt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 378±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff gray, reddish tan and tan silty clay and shale fragments (fill)	30			26
			- dry to 2 ft - stiff below 2.5 ft	21			
5				21			
			- tan and reddish tan below 6 ft	23			
				24			
10							
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-23-14

DEPTH TO WATER
IN BORING: Dry

DATE: 6/23/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C1

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1072+10, 50 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 392±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 7 inches: Cement Treated Base				
			6 inches: Crushed Stone Base				
			Low hardness to moderately hard tan and dark gray highly weathered shale w/silty clay laminations and ferrous stains and nodules, apparent dip ~ 80°	50/8"			
				50/5"			
5			Moderately hard tan and dark gray weathered shale				
				50/4"			
10							
15							
20							
25							

COMPLETION DEPTH: 6.5 ft
DATE: 9-20-14

DEPTH TO WATER IN BORING: Dry

DATE: 9/20/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C2

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1077+00, 40 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 388±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8.25 inches: Portland Cement Concrete, 1.5 inches: Slurry Seal				
			6 inches: Crushed Stone Base				
			Stiff tan and brown silty clay w/shale fragments (fill)	22			43
				14			
5			Stiff reddish tan and tan silty clay w/shale fragments	16			
10							
15							
20							
25							

COMPLETION DEPTH: 6.5 ft
DATE: 9-20-14

DEPTH TO WATER IN BORING: Dry

DATE: 9/20/2014

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

LOG OF BORING NO. RP2

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 408+00, 15 ft Lt - Ramp

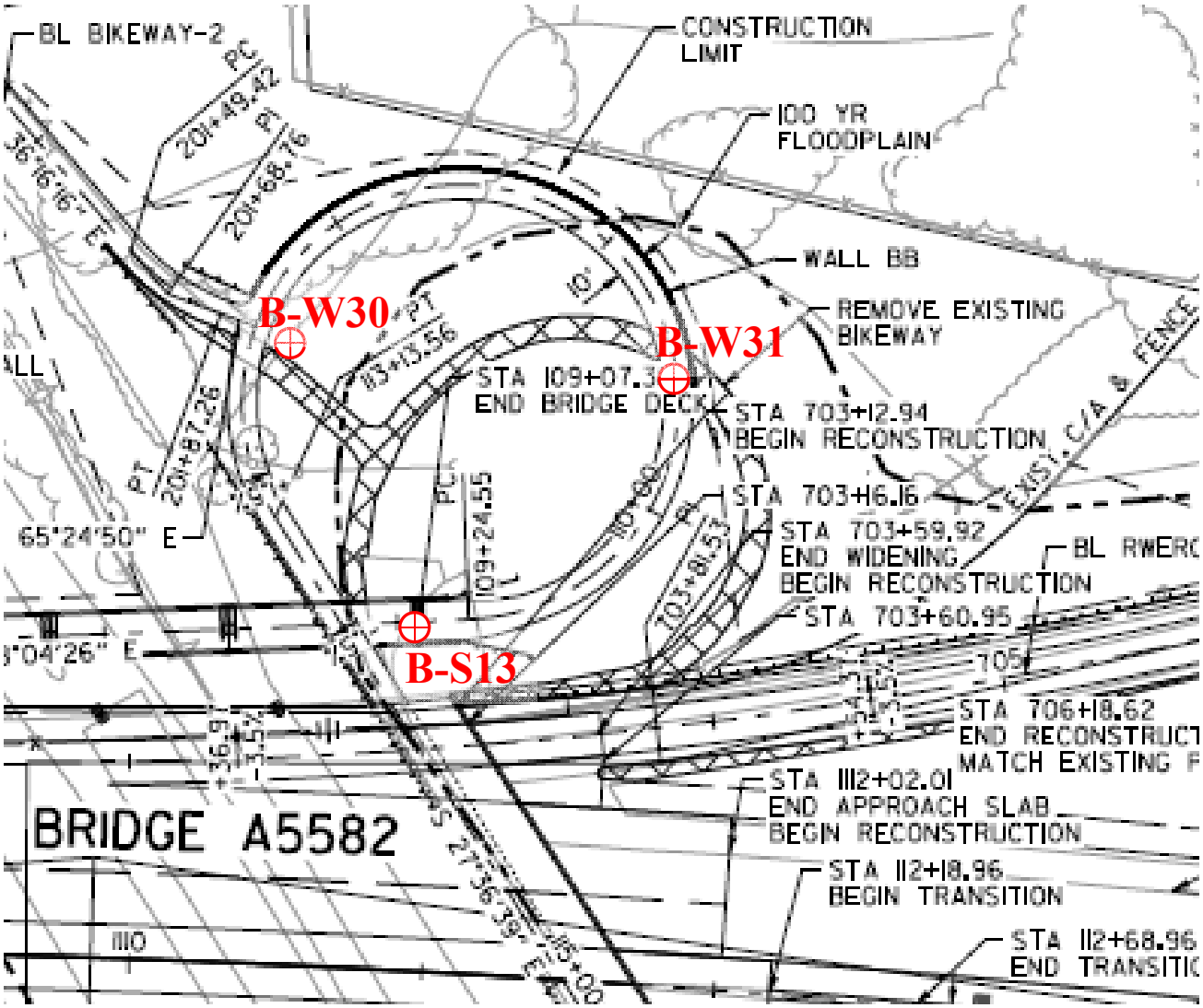
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 391±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			Firm reddish brown, brown and tan silty clay and shale fragments (fill)	7			39
			Low hardness red, tan and gray highly weathered shale w/occasional silty clay seams	33			
5			- low hardness to moderately hard below 4 ft	50/8"			
				50			
			Moderately hard tan and dark gray weathered shale	50/4"			
10							
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-24-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/24/2014

ATTACHMENT 6



N

30 ft 0 30 ft 60 ft

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

PLAN OF BORINGS

Rock Creek Walls

Job No. CA0608 Baptist Hospital - Fair Park Blvd. (Widening) (S)

Interstate I-630 – Little Rock, Arkansas

Scale: As Shown

Job No. 14-030

Plate 1

14-030

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

LOG OF BORING NO. S13

CA0608: I-630 over Rock Creek
Little Rock, Arkansas

TYPE: Auger to 8 ft /Wash

LOCATION: Sta 109+05, 5 ft Rt

SURF. EL: 323±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %	% Recovery	% RQD
	Stiff brown silty clay w/shale and sandstone fragments (fill)	58/6"				
		19				
5	- reddish brown below 4 ft	25				
	- tan fine sandy clay w some sandstone fragments below 6 ft	17		39		
10	Dense brown and tan sandy fine to coarse gravel w/some cobbles	25/0"				
15	Moderately hard tan and dark gray weathered shale w/medium close sandstone partings and seams	50/2"				
		25/0"				
20	Moderately hard to hard dark gray shale w/medium close sandstone partings and seams - no recovery on core run at 21 to 26 ft				0	0
25	- no recovery on core run at 26 to 31 ft				0	0
30		25/0"				
		25/0"				
35						
		25/0"				
40						
		25/0"				
45						
		25/0"				
50						
		25/0"				
55						
		25/0"				
60						

COHESION, TON/SQ FT: 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

COMPLETION DEPTH: 60.0 ft
DATE: 8-21-14

DEPTH TO WATER IN BORING: Dry to 8 ft

DATE: 8/21/2014

RECRQDN200-2 14-030_I-630 OVER ROCK.GPJ 4-20-15

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

LOG OF BORING NO. W30

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 112+40, 10 ft Lt - Wall BB

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 317±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			2 inches: Asphalt Concrete				
			Stiff tan and dark gray silty clay w/shale fragments and some sandstone fragments (fill)	21			
			- with some fine to coarse gravel below 2 ft	50/9"			
5			- very stiff, reddish tan fine sandy clay with some sandstone fragments below 4 ft	30			67
			- with more shale and sandstone fragments below 6 ft	27			
				50/9"			
10			Moderately hard tan and dark gray weathered shale				
				50/2"			
15							
			Moderately hard dark gray shale w/sandstone partings	25/0"			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 8-21-14

DEPTH TO WATER IN BORING: Dry

DATE: 8/21/2014

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

LOG OF BORING NO. W31

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 110+50, CL - Wall BB

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 328±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Firm to stiff reddish brown silty clay w/shale fragments (fill) - with some crushed stone to 2 ft	10			
			- with sandstone cobbles at 2.5 ft	50/8"			36
5			- red, gray and reddish tan below 4 ft	9			
			- stiff to very stiff below 6 ft - with quartz cobbles at 7 ft	28			
10			- reddish brown fine sandy clay with ferrous stains and nodules below 8 ft	14			83
15			- very stiff, reddish brown, yellow and brown with some sandstone and quartz fragments below 12 ft	36			
20			Low hardness to moderately hard tan and dark gray weathered shale - water at 18.5 ft	50/7"			
				50/4"			
25							

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

DEPTH TO WATER IN BORING: 18.5 ft

DATE: 8/14/2014

ATTACHMENT 7

30% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

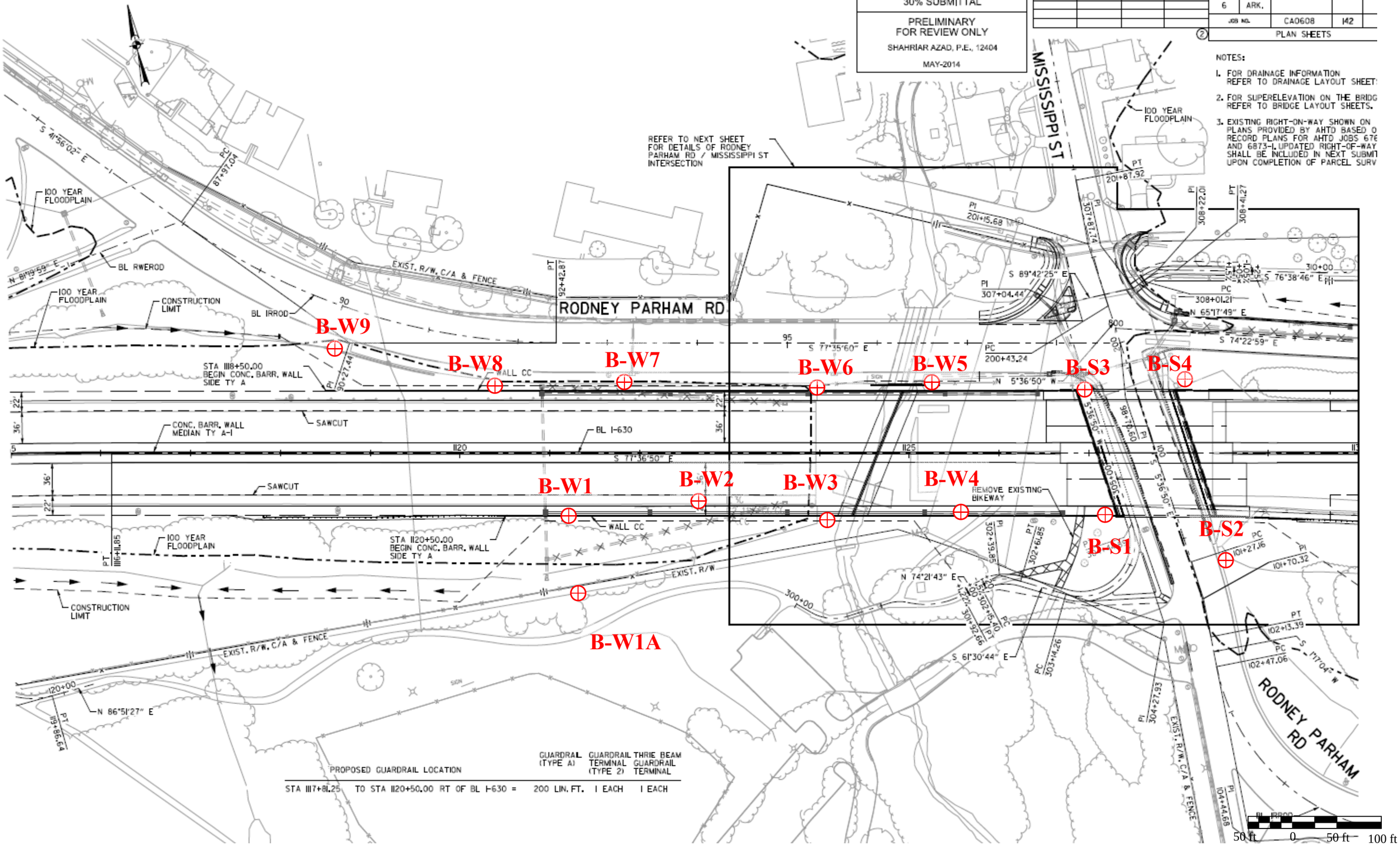
SHAHRIAR AZAD, P.E., 12404

MAY-2014

REVISED	FILMED	REVISED	FILMED	DISTRICT			NO.
				6	ARK.		
				JOB NO.	CA0608	142	
				②	PLAN SHEETS		

NOTES:

1. FOR DRAINAGE INFORMATION REFER TO DRAINAGE LAYOUT SHEETS
2. FOR SUPERELEVATION ON THE BRIDG REFER TO BRIDGE LAYOUT SHEETS.
3. EXISTING RIGHT-ON-WAY SHOWN ON PLANS PROVIDED BY AHTD BASED O RECORD PLANS FOR AHTD JOBS 676 AND 6873-1. UPDATED RIGHT-OF-WAY SHALL BE INCLUDED IN NEXT SUBMIT UPON COMPLETION OF PARCEL SURV



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

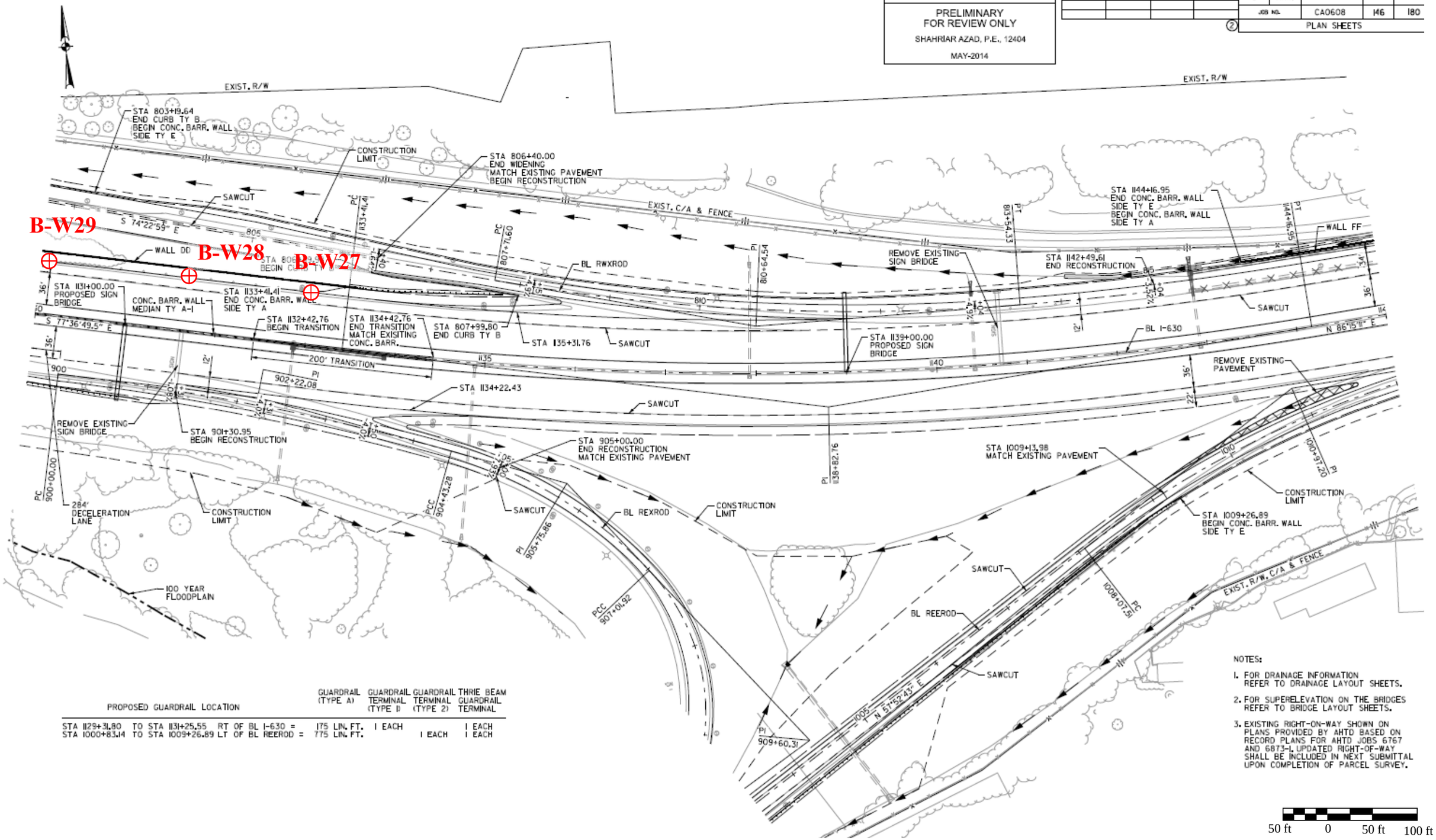
PLAN OF BORINGS, TEST PITS AND PAVEMENT CORES

PROJECT: Job No. CA0608 Baptist Hospital – University Avenue (Widening) (S)
Interstate I-630 – Little Rock, Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1a**

30% SUBMITTAL
PRELIMINARY FOR REVIEW ONLY SHAHRIAR AZAD, P.E., 12404 MAY-2014

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	DIST. NO.	STATE	FEDERAL PROJECT	NO.	SHEETS
				6	ARK.			
				JOB NO.		CA0608	146	180
				②	PLAN SHEETS			



PROPOSED GUARDRAIL LOCATION	GUARDRAIL (TYPE A)	GUARDRAIL TERMINAL (TYPE 1)	GUARDRAIL TERMINAL (TYPE 2)	THRIE BEAM GUARDRAIL TERMINAL
STA 1129+31.80 TO STA 1131+25.55 RT OF BL I-630 =	175 LIN. FT.	1 EACH		1 EACH
STA 1000+83.14 TO STA 1009+26.89 LT OF BL REEROD =	775 LIN. FT.		1 EACH	1 EACH

NOTES:

1. FOR DRAINAGE INFORMATION REFER TO DRAINAGE LAYOUT SHEETS.
2. FOR SUPERELEVATION ON THE BRIDGES REFER TO BRIDGE LAYOUT SHEETS.
3. EXISTING RIGHT-ON-WAY SHOWN ON PLANS PROVIDED BY AHTD BASED ON RECORD PLANS FOR AHTD JOBS 6767 AND 6873-1. UPDATED RIGHT-OF-WAY SHALL BE INCLUDED IN NEXT SUBMITTAL UPON COMPLETION OF PARCEL SURVEY.

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

PLAN OF BORINGS, TEST PITS AND PAVEMENT CORES

PROJECT: Job No. CA0608 Baptist Hospital – University Avenue (Widening) (S)
Interstate I-630 – Little Rock, Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1b**

14-030

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

LOG OF BORING NO. S1

CA0608: I-630 over Rodney Parham Road
Little Rock, Arkansas

TYPE: Auger to 5 ft /Wash

LOCATION: Sta 1127+10, 70 ft Rt

SURF. EL: 318±

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %	% Recovery	% RQD
			Very stiff brown clayey silt, sandy w/crushed stone and some sandstone cobbles (fill)	27					
				28			22		
5				50/2"					
			Moderately hard to hard reddish tan and tan weathered fine-grained sandstone w/fine sandy clay seams	30/0"					
10			Moderately hard tan and dark gray weathered shale						
15				50/8"					
20			Moderately hard to hard dark gray shale and carbonaceous shale w/medium close sandstone partings and quartz veins, dip near verticle	50/2"					
				25/0"					
25				25/0"					
30			- high angle shear at 30.5 - 31.2 ft - with medium close sandstone inclusions at 31.5 and 33 - 34 ft			q_u = 740 psi, TUW = 163 pcf		100	77
35			- with mudstone seam at 34.2 - 34.3 ft - quartz vein at 36.1 ft - with close sandstone inclusions and partings below 38 ft			q_u = 950 psi, TUW = 166 pcf q_u = 1260 psi, TUW = 166 pcf		93	75
40			- with mudstone inclusions below 38 ft						
45									

COMPLETION DEPTH: 40.0 ft
DATE: 7-11-14

DEPTH TO WATER
IN BORING: Dry to 11 ft

DATE: 7/11/2014

RECRQDN200-2 14-030_I-630 OVER RODNEY PARHAM.GPJ 4-22-15

14-030

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

LOG OF BORING NO. S2

CA0608: I-630 over Rodney Parham Road
Little Rock, Arkansas

TYPE: Auger to 7.5 ft /Wash

LOCATION: Sta 1128+55, 110 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 322±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %	% Recovery	% RQD
			Stiff brown silty clay w/some shale fragments (fill)	16			73		
			- very stiff with quartz fragments below 2 ft	38					
5			- with numerous sandstone and shale fragments below 4 ft	50/10"					
				35					
			- auger refusal on sandstone at 7.5 ft	50/1"					
10			Moderately hard to hard tan and gray weathered fine-grained sandstone w/fine sandy clay seams						
			Moderately hard tan, gray and dark gray weathered shale	50/6"					
15									
				50/2"					
20									
				50/1"					
25									
			Moderately hard to hard dark gray shale w/medium close sandstone partings, dip ±80°	25/0"					
30									
				25/0"					
35						q_u = 1190 psi, TUW = 167 pcf q_u = 940 psi, TUW = 168 pcf		88	88
			- with very close sandstone partings below 37 ft - sandstone inclusions at 38 ft						
40			- high angle shear at 40 ft						
			- high angle shear at 41.6 ft			q_u = 1130 psi, TUW = 168 pcf q_u = 750 psi, TUW = 169 pcf		85	85
45									

COMPLETION DEPTH: 45.0 ft
DATE: 7-10-14

DEPTH TO WATER
IN BORING: Dry to 7.5 ft

DATE: 7/10/2014

RECRQDN200-2 14-030_I-630 OVER RODNEY PARHAM.GPJ 4-22-15

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

LOG OF BORING NO. S3

CA0608: I-630 over Rodney Parham Road
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 1126+80, 80 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 320±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Loose reddish brown silt w/sandstone fragments to cobble size (fill)	21			33
				10			
5			Stiff tan, reddish tan and gray silty clay w/shale fragments (fill) - very stiff with sandstone fragments below 4 ft	50/6"			
				50/10"			
10			Low hardness tan and gray highly weathered shale w/silty clay seams	31			
			- moderately hard below 13 ft	50/3"			
15							
20			Moderately hard dark gray shale w/medium close sandstone partings and seams	50/2"			
				30/0"			
25			- with close quartz veins from 24 to 26 ft				
				30/0"			
30							
				30/0"			
35							
				30/0"			
40							
				30/0"			
45			- with close quartz veins below 45 ft				
				30/0"			
50							

COMPLETION DEPTH: 50.0 ft
DATE: 8-18-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 8/18/2014

LGBNEW 14-030_I-630 OVER RODNEY PARHAM.GPJ 4-22-15

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

LOG OF BORING NO. S4

CA0608: I-630 over Rodney Parham Road
Little Rock, Arkansas

TYPE: Auger to 7 ft /Wash

LOCATION: Sta 1128+10, 75 ft Lt

SURF. EL: 321±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	Dense brown fine sandy silt w/sandstone and quartz fragments	50/7"		
	Firm to stiff reddish brown silty clay w/sandstone fragments and clayey silt pockets (fill)	23		64
5		33		49
	Very stiff reddish tan and tan silty clay w/shale fragments and occasional sandstone fragments	46		
	Moderately hard brown weathered fine-grained sandstone w/silty clay seams and quartz veins	25/0"		
10		25/0"		
15	Low hardness light brown weathered shale			
	Moderately hard dark gray shale, slightly weathered	50/4"		
20				
25		50/3"		
30	Moderately hard to hard dark gray shale	25/0"		
35	- with very close sandstone seams from 33.5 - 34 ft	25/0"		
40		25/0"		
45		25/0"		
50		25/0"		

COHESION, TON/SQ FT: 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

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

DEPTH TO WATER IN BORING: Dry to 7 ft

DATE: 8/14/2014

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

LOG OF BORING NO. W1

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1121+20, 70 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 338±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff tan silty clay w/some crushed stone and trace organics, very dry (fill)	50/10"			
				50/8"			28
5			Stiff brown and gray silty clay w/some shale fragments (fill)	18			
				10			
10				13			36
15				13			
20			- with cobbles and boulders below below 18 ft	25/0"			
			- water at 22 ft Firm reddish tan and gray fine sandy clay, silty w/ferrous stains and nodules, moist				
25				8			73
				25/0"			
			- auger refusal at 28 ft				
30							

COMPLETION DEPTH: 28.0 ft
DATE: 9-6-14

DEPTH TO WATER IN BORING: 22 ft

DATE: 9/6/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W1A

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1121+30, 155 ft Rt

SURF. EL: 315±

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown and tan clayey silt w/sandstone fragments and cobbles (fill)	37			93
			Very stiff tan and reddish tan silty clay, dry	22			
			Stiff gray and tan clayey silt w/ferrous nodules and stains	29			
5			Very stiff gray, reddish tan and tan clayey fine sand w/sandstone and quartz fragments	50/10"			34
			Moderately hard tan and dark gray weathered shale, apparent dip ~ 25°	50/9"			
10			Moderately hard dark gray shale, slightly weathered, carbonaceous				
			- water at 13 ft	50/8"			
15							
20				50/4"			
25							

COMPLETION DEPTH: 20.0 ft
DATE: 9-17-14

DEPTH TO WATER IN BORING: 13 ft

DATE: 9/17/2014

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

LOG OF BORING NO. W2

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 1122+50, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 338±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			9.5 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 5.5 inches: Cement Treated Base 8 inches: Crushed Stone Base				
			Stiff to very stiff gray, tan and reddish brown silty clay and shale fragments (fill)	24			35
5				25/0"			
				25/0"			
10			- predominately silty clay below 9 ft - stiff at 9 to 13 ft	18			
			- very stiff below 13 ft				
15				26			
20				25			
25				25/0"			
			Very stiff tan and gray silty clay, sandy				
30				50/10"			80
			Low hardness to moderately hard gray highly weathered shale w/silty clay seams				
35				50/8'			
			- gray and dark gray, less weathered below 36 ft				
40			Moderately hard dark gray shale	25/0"			
45							

COMPLETION DEPTH: 43.0 ft
DATE: 12-6-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 12/6/2014

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

LOG OF BORING NO. W3

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1124+10, 75 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 315±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown and tan clayey silt w/sandstone fragments, dry (fill)	50/7"			
			Stiff tan silty clay w/ferrous nodules and stains	11			76
5			Very stiff tan and gray fine sandy clay w/ferrous nodules and sandstone fragments	35			50
			Medium dense tan clayey fine sand w/some fine to coarse gravel				
			Medium dense gray and tan clayey fine to coarse gravel - water at 7.5 ft	21			32
10			Low hardness to moderately hard tan and dark gray weathered shale	50/6"			
			Moderately hard dark gray shale	25/0"			
15							
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 9-17-14

DEPTH TO WATER IN BORING: 7.5 ft

DATE: 9/17/2014

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

LOG OF BORING NO. W4

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1125+55, 70 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 315±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff dark brown silty clay w/some sandstone fragments and some crushed limestone, dry (fill)	23			49
				14			
5			Very stiff tan and brown fine sandy clay, silty w/fine to coarse gravel and crushed stone (fill)	27			24
				29			
10			- water at 9 ft	25			
			Moderately hard brown and dark gray weathered shale				
15				50/8"			
				50/4"			
20			NOTE: Water at 6.8 ft at 1 hour.				
25							

COMPLETION DEPTH: 19.0 ft
DATE: 7-7-14

DEPTH TO WATER IN BORING: 9 ft

DATE: 7/7/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W5

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1125+25, 90 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 320±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			Stiff brown silty clay w/shale and quartz fragments (fill)	50/9"			
			- with fewer quartz fragments below 2 ft	17			
5			- very stiff from 4 to 6 ft	30			60
			- stiff with quartz and sandstone fragments below 6 ft	11			
10			- brown, moist below 8 ft	17			
			Moderately hard red, tan and dark gray highly weathered shale	50/7"			
15							
			Moderately hard tan and dark gray weathered shale	50/2"			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 6-24-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/24/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W6

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1124+00, 80 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 320±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Medium dense brown fine sandy silt w/some organics	11			
			Very stiff reddish brown and brown silty clay w/some shale and sandstone fragments (fill)	30			
5			- stiff with occasional silt pockets from 4 - 6 ft	18			
			- firm, light brown silty clay with trace organics and fine quartz fragments from 6 to 8 ft	7			75
10			- very stiff with more shale fragments below 8 ft	50/10"			
			Moderately hard reddish tan and dark gray weathered shale	50/2"			
			- auger refusal at 12 ft				
15							
20							
25							

COMPLETION DEPTH: 12.0 ft
DATE: 6-24-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/24/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W7

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1121+90, 82 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 320±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			3 inches: Portland Cement Concrete 4 inches: Crushed Stone Base				
			Stiff reddish brown silty clay w/shale and sandstone fragments (fill) - stiff to very stiff below 2 ft	15			
				25			56
5				50/8"			
				50			23
10				50			
			Low hardness tan, reddish tan and dark gray highly weathered shale w/occasional silty clay seams - water at 14 ft	50			
15							
			Moderately hard tan and dark gray weathered shale	30/0"			
20							
			NOTE: Water at 8.2 ft at 3.5 hours after completion.				
25							

COMPLETION DEPTH: 20.0 ft
DATE: 8-19-14

DEPTH TO WATER IN BORING: 14 ft

DATE: 8/19/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W8

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1120+40, 90 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 320±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			2 inches: Portland Cement Concrete				
			4 inches: Crushed Stone Base	30			
			Very stiff reddish brown silty clay w/crushed stone (fill) - reddish brown with shale and sandstone fragments and silt pockets below 2 ft	50/9"			
5				34		-NON-PLASTIC-	18
				34			
				50/9"			
10			Moderately hard tan and dark gray highly weathered shale w/occasional silty clay seams				
			- water at 13.5 ft	50/4"			
15							
			Moderately hard to hard tan and dark gray weathered shale	30/0"			
20							
			NOTE: Water at 10.2 ft at 30 minutes after completion.				
25							

COMPLETION DEPTH: 20.0 ft
DATE: 8-19-14

DEPTH TO WATER IN BORING: 13.5 ft

DATE: 8/19/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W9

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1118+60, 125 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 321±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics				
			Stiff reddish tan and brown silty clay and shale fragments (fill) - with some quartz fragments below 2 ft	14			
				18			33
			- firm below 4 ft				
5				8			
			- with some fine sandy clay pockets below 6 ft	9			
			Low hardness reddish tan and light gray highly weathered shale w/silty clay seams	19			
10							
			Low hardness to moderately hard gray and tan highly weathered shale	50/9"			
15							
			Moderately hard tan and dark gray weathered shale	50/3"			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 6-25-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/25/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-22-15

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

LOG OF BORING NO. W27

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1133+10, 62 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 346±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Moderately hard reddish tan and dark gray weathered shale w/occasional sandstone partings and seams	50/8"			
				25/0"			
				25/0"			
5				25/0"			
			- auger refusal at 7 ft in sandstone				
10							
15							
20							
25							

COMPLETION DEPTH: 7.0 ft
DATE: 8-19-14

DEPTH TO WATER
IN BORING: Dry

DATE: 8/19/2014

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

LOG OF BORING NO. W28

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 1131+60, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 344±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			9 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 3 inches: Cement Treated Base 6 inches: Crushed Stone Base				
			Stiff gray, tan and reddish brown silty clay w/some shale fragments and crushed sandstone (fill)	11			
5			- with fine sandy clay pockets at 5 to 7 ft	15			54
			- firm at 5 to 9 ft	8			
			- stiff below 9 ft	9			
10				18			
15				11			
20				18			
			Friable tan and reddish brown weathered fine-grained sandstone w/interbedded shale layers and silty clay seams				
25				28			
30			- moderately hard to hard, well cemented below 28 ft	30/0"			
35				25/0"			
			Moderately hard to hard dark gray shale w/medium close sandstone partings and seams	25/0"			
40							

COMPLETION DEPTH: 40.0 ft
DATE: 12-6-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 12/6/2014

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

LOG OF BORING NO. W29

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger to 4 ft /Wash

LOCATION: Sta 1130+10, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 344±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			9 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 5.25 inches: Cement Treated Base 7 inches: Crushed Stone Base				
			Stiff to very stiff gray, tan and reddish brown silty clay and shale fragments and fine to coarse gravel (fill) - firm at 6 to 8 ft	35			
5				25/0"			17
				8			
10				44			
15				55			
20				38			
25			Moderately hard to hard tan and reddish brown weathered fine-grained sandstone w/interbedded shale layers and silty clay seams	25/0"			
30				50/7"			
35			Very stiff reddish tan and tan silty clay and shale fragments (completely weathered shale)	38			38
40			Moderately hard dark gray shale	25/0"			

COMPLETION DEPTH: 40.0 ft
DATE: 12-6-14

DEPTH TO WATER
IN BORING: Dry to 4 ft

DATE: 12/6/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 10-31-16

ATTACHMENT 8

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.		CA0608	260	362

(2) PLAN - STA. 1145+00 TO STA. 1160+00

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

DECEMBER-2014

STA. 1151+88.79 - STA. 1156+61.22 C.L. I-630 MEDIAN - IN PLACE
473 LIN. FT. MEDIAN BARRIER
REMOVE

PROPOSED CHAIN LINK FENCE

STA.	STA.	SIDE	LIN. FT.	16' GATE
1153+57	1154+13	LT.	56'	1 EACH
1153+22	1153+87	RT.	67'	1 EACH
1154+65	1155+36	LT.	73'	1 EACH
1154+39	1154+66	RT.	37'	1 EACH
1156+33	1160+00	RT.	360'	

REMOVAL AND DISPOSAL OF GUARDRAIL

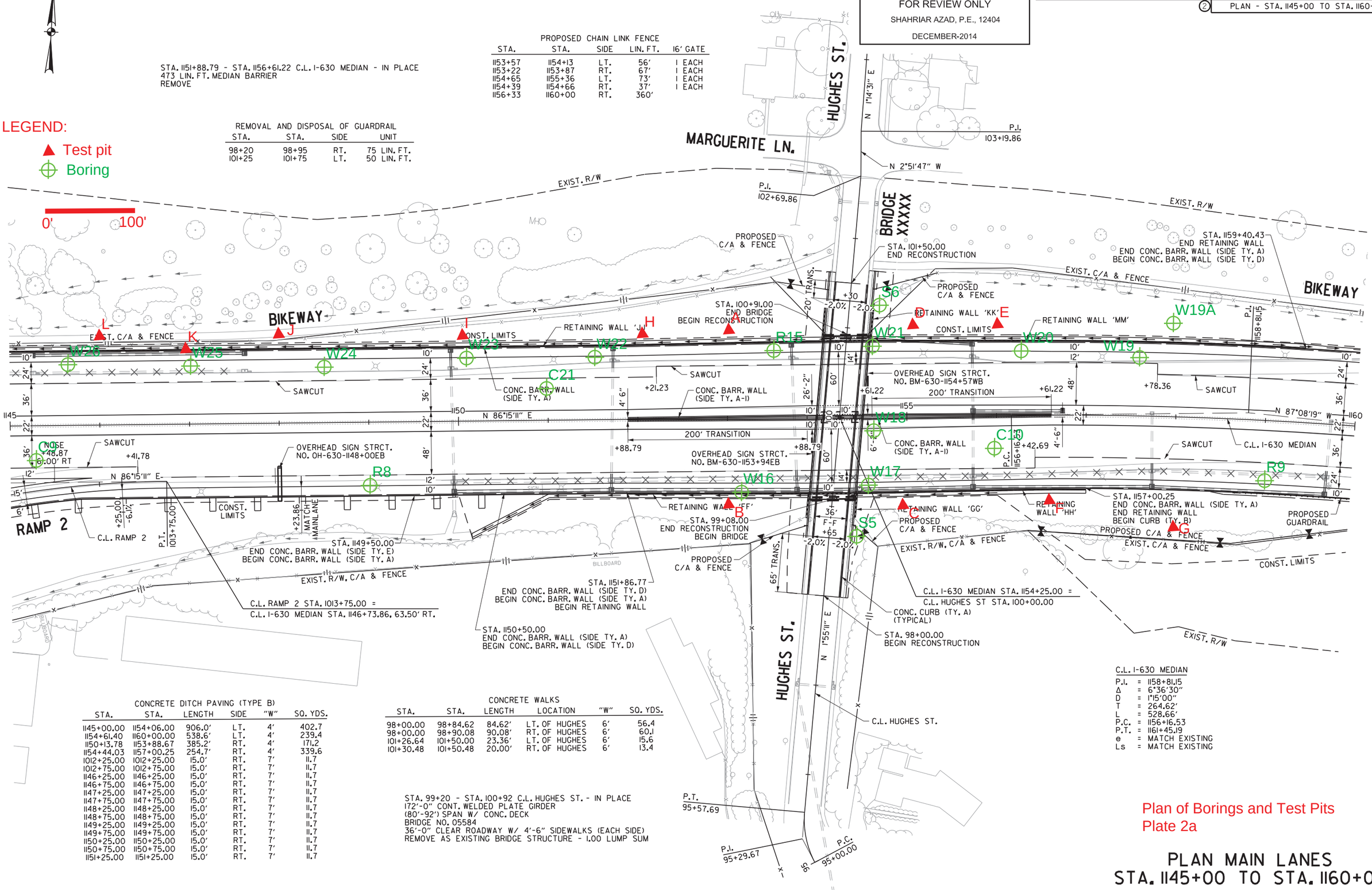
STA.	STA.	SIDE	UNIT
98+20	98+95	RT.	75 LIN. FT.
101+25	101+75	LT.	50 LIN. FT.

LEGEND:

▲ Test pit

⊕ Boring

0' 100'



C.L. I-630 MEDIAN

P.I.	=	1158+81.15
Δ	=	6°36'30"
D	=	1°15'00"
T	=	264.62'
L	=	528.66'
P.C.	=	1156+16.53
P.T.	=	1161+45.19
e	=	MATCH EXISTING
Ls	=	MATCH EXISTING

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
1145+00.00	1154+06.00	906.0'	LT.	4'	402.7
1154+61.40	1160+00.00	538.6'	LT.	4'	239.4
1150+13.78	1153+88.67	385.2'	RT.	4'	171.2
1154+44.03	1157+00.25	254.7'	RT.	4'	339.6
1012+25.00	1012+25.00	15.0'	RT.	7'	11.7
1012+75.00	1012+75.00	15.0'	RT.	7'	11.7
1146+25.00	1146+25.00	15.0'	RT.	7'	11.7
1146+75.00	1146+75.00	15.0'	RT.	7'	11.7
1147+25.00	1147+25.00	15.0'	RT.	7'	11.7
1147+75.00	1147+75.00	15.0'	RT.	7'	11.7
1148+25.00	1148+25.00	15.0'	RT.	7'	11.7
1148+75.00	1148+75.00	15.0'	RT.	7'	11.7
1149+25.00	1149+25.00	15.0'	RT.	7'	11.7
1149+75.00	1149+75.00	15.0'	RT.	7'	11.7
1150+25.00	1150+25.00	15.0'	RT.	7'	11.7
1150+75.00	1150+75.00	15.0'	RT.	7'	11.7
1151+25.00	1151+25.00	15.0'	RT.	7'	11.7

CONCRETE WALKS

STA.	STA.	LENGTH	LOCATION	"W"	SQ. YDS.
98+00.00	98+84.62	84.62'	LT. OF HUGHES	6'	56.4
98+00.00	98+90.08	90.08'	RT. OF HUGHES	6'	60.1
101+26.64	101+50.00	23.36'	LT. OF HUGHES	6'	15.6
101+30.48	101+50.48	20.00'	RT. OF HUGHES	6'	13.4

STA. 99+20 - STA. 100+92 C.L. HUGHES ST. - IN PLACE
172'-0" CONT. WELDED PLATE GIRDER
(80'-92') SPAN W/ CONC. DECK
BRIDGE NO. 05584
36'-0" CLEAR ROADWAY W/ 4'-6" SIDEWALKS (EACH SIDE)
REMOVE AS EXISTING BRIDGE STRUCTURE - 1.00 LUMP SUM

Plan of Borings and Test Pits
Plate 2a

PLAN MAIN LANES
STA. 1145+00 TO STA. 1160+00

5:55:01 PM 12/10/2014 tbooth

S:\4406\01\DGN\Plans\Plan-Profile\rCA0608_PP_07A.dgn

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.		CA0608	262	362

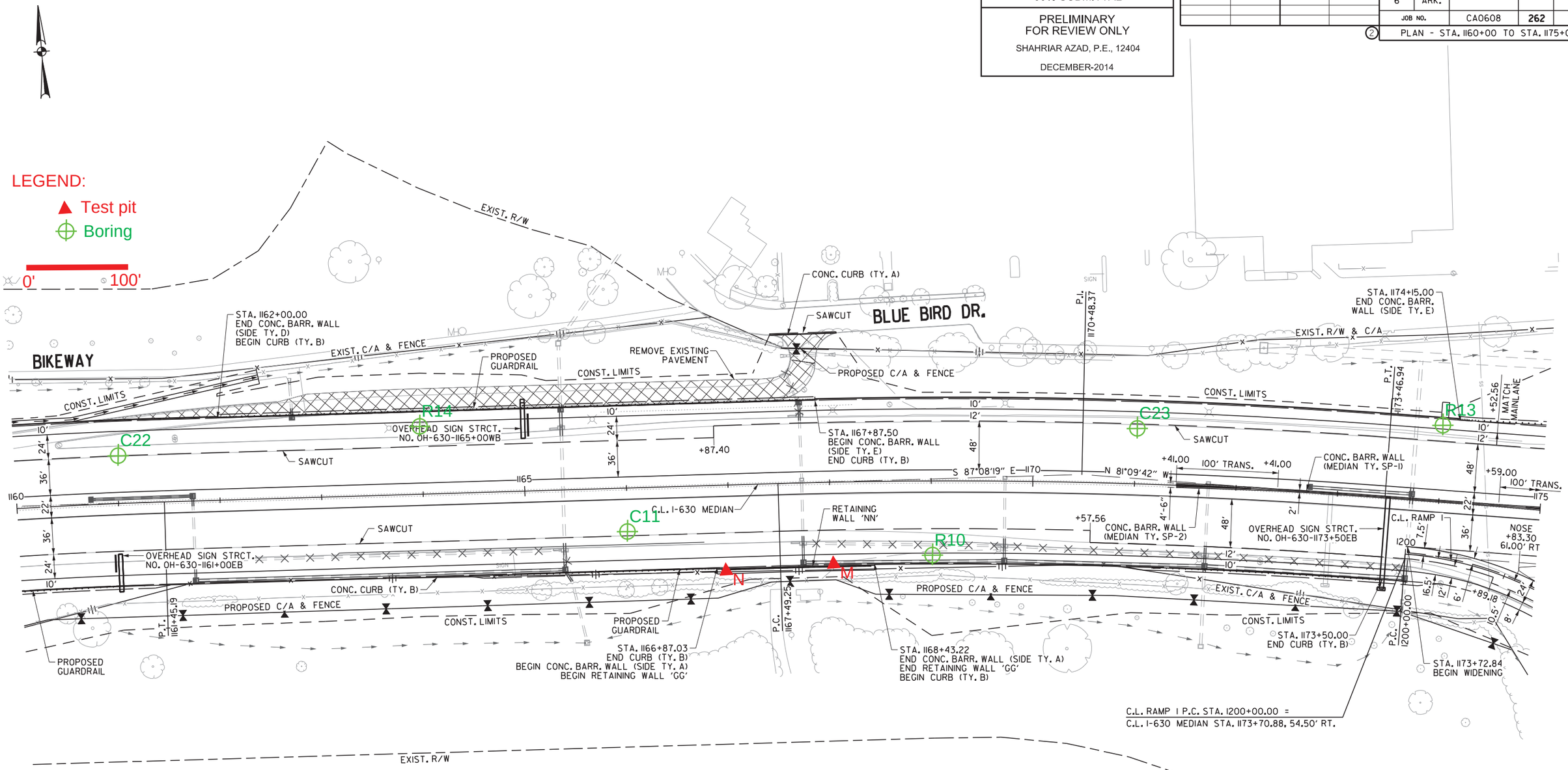
(2) PLAN - STA. 1160+00 TO STA. 1175+00

60% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

DECEMBER-2014



STA. 1172+94 C.L. I-630 MEDIAN
IN PLACE - OVERHEAD SIGN STRUCTURE
REMOVE

PROPOSED GUARDRAIL LOCATION			GUARDRAIL (TYPE A)	GUARDRAIL TERMINAL (TYPE 1)	GUARDRAIL TERMINAL (TYPE 2)	THRIE BEAM GUARDRAIL TERMINAL
STA. 1158+75.00	TO STA. 1161+25.00	RT. OF C.L. I-630 MED. =	200 LIN. FT.	1 EACH	1 EACH	
STA. 1162+00.00	TO STA. 1167+87.50	LT. OF C.L. I-630 MED. =	550 LIN. FT.			2 EACH
STA. 1164+68.28	TO STA. 1166+87.03	RT. OF C.L. I-630 MED. =	150 LIN. FT.		1 EACH	1 EACH
STA. 1171+25.00	TO STA. 1173+75.00	RT. OF C.L. I-630 MED. =	200 LIN. FT.	1 EACH	1 EACH	
STA. 1174+15.00	TO STA. 1175+58.75	LT. OF C.L. I-630 MED. =	75 LIN. FT.		1 EACH	1 EACH

STA. 1172+41.00 - STA. 1175+59.00 C.L. I-630 MEDIAN - IN PLACE
318 LIN. FT. MEDIAN BARRIER
REMOVE

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
1160+00.00	1162+41.00	241.0'	LT.	4'	107.1
1166+87.03	1168+43.22	156.2'	RT.	4'	69.5
1173+50.00	1173+50.00	15.0'	LT.	7'	11.7
1174+00.00	1174+00.00	15.0'	LT.	7'	11.7

PROPOSED CHAIN LINK FENCE

STA.	STA.	SIDE	LIN. FT.	16' GATE
1160+00	1174+85	RT.	56'	1 EACH
1167+55	1168+00	LT.	1480'	

C.L. I-630 MEDIAN

P.I. = 1170+48.37
Δ = 5°58'37"
D = 1°00'00"
T = 299.12'
L = 597.69'
P.C. = 1167+49.25
P.T. = 1173+46.94
e = MATCH EXISTING
Ls = MATCH EXISTING

C.L. RAMP I

P.I. = 1202+32.07
Δ = 68°23'34"
D = 16°46'34"
T = 232.07'
L = 407.68'
P.C. = 1100+00.00
P.T. = 1204+07.68
e = MATCH EXISTING
Ls = MATCH EXISTING

Plan of Borings and Test Pits
Plate 2b

PLAN MAIN LANES
STA. 1160+00 TO STA. 1175+00

5:55:34 PM 12/10/2014 tbooth

S:\14406\01\DGN\Plans\Plan-Profile\rCA0608_PP_08A.dgn

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

LOG OF BORING NO. S5

CA0608: Hughes Street over I-630
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 98+70, 30 ft Rt

SURF. EL: 398±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	Medium dense brown fine sandy silt w/organics and sandstone fragments (fill)	24 33		48
	Very stiff reddish tan and tan silty clay w/sandstone and shale fragments and some cobbles (fill)	50/6"		
5	Very stiff reddish tan and tan silty clay w/sandstone fragments	38		
	Low hardness to moderately hard gray, tan and maroon highly weathered shale w/silty clay laminations and ferrous stains - low hardness, gray and tan with more silty clay seams below 6 ft	50/4"		
10	Moderately hard gray and tan weathered shale w/ferrous stains - gray, tan and maroon below 10 ft	50/5"		
15				
	- moderately hard to hard below 18 ft	25/0"		
20				
		25/0"		
25				
	Hard gray fine-grained sandstone w/very close quartz veins			
	Moderately hard to hard gray and tan weathered shale - with interbedded sandstone seams below 29 ft			
30				
35	- with fewer sandstone seams below 36 ft			
40				

COHESION, TON/SQ FT: 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

COMPLETION DEPTH: 65.0 ft
DATE: 7-8-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 7/8/2014

LGBNEW 14-030_HUGHES OVER I-630.GPJ 4-20-15

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

LOG OF BORING NO. S5

CA0608: Hughes Street over I-630
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 98+70, 30 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			- with very close sandstone seams and quartz veins below 46 ft				
50							
			Moderately hard dark gray shale w/very close, very thin fine-grained sandstone partings				
55							
60							
65							
70							
75							
80							
85							

COMPLETION DEPTH: 65.0 ft
DATE: 7-8-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 7/8/2014

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

LOG OF BORING NO. S6

CA0608: Hughes Street over I-630
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 101+50, 35 ft Rt

SURF. EL: 408±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
	Medium dense brown fine sandy silt w/fine to coarse gravel and organics	11			
	Low hardness reddish tan, gray and tan highly weathered shale w/silty clay seams and ferrous stains, approx dip ~ 70° NE	35			
5		50/11"			
	Low hardness to moderately hard tan, gray and reddish tan weathered shale w/ferrous stains, approx dip ~ 70° NE	50/8"			
	- moderately hard below 6 ft	50/9"			
10	- auger refusal at 8.5 ft				
		50/6"			
15	- maroon, gray and tan below 15 ft				
		50/5"			
20					
		50/4"			
25					
		50/4"			
30					
35		50/4"			
	- with very close, very thin sandstone partings below 38 ft	50/1"			
40					
		25/0"			

COMPLETION DEPTH: 80.0 ft
DATE: 6-30-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 6/30/2014

LGBNEW 14-030_HUGHES OVER I-630.GPJ 4-20-15

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

LOG OF BORING NO. S6

CA0608: Hughes Street over I-630
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Sta 101+50, 35 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (continued)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
50				25/0"			
55				25/0"			
60			- with more sandstone partings below 62 ft	25/0"			
65							
70			Moderately hard dark gray shale w/close sandstone partings and seams				
75							
80							
85							

COMPLETION DEPTH: 80.0 ft
DATE: 6-30-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 6/30/2014

LGBNEW 14-030_HUGHES OVER I-630.GPJ 4-20-15

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

LOG OF BORING NO. S18

CA0608: Hughes Street over I-630
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 99+85, 40 ft Rt

SURF. EL: 383±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	14 inches: Asphalt Concrete			
	6 inches: Crushed Stone Base			
	Very stiff reddish tan silty clay w/some shale and sandstone fragments (fill)	41		29
5		50/8"		
	Moderately hard reddish tan and gray highly weathered shale w/medium close sandstone seams and partings and close silty clay laminations and seams	50/6"		
10		50/9"		
15		50/9"		
20	- tan, gray and dark gray below 20 ft	50/7"		
25		50/6"		
30		50/5"		
35	Moderately hard tan and dark gray moderately weathered shale	50/3"		
40	Moderately hard to hard dark gray slightly weathered shale	25/0"		
45		25/0"		
50		25/0"		
55		25/0"		

COHESION, TON/SQ FT: 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

COMPLETION DEPTH: 55.0 ft
DATE: 9-6-14

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 9/6/2014

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

LOG OF BORING NO. W16

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1153+10, 85 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 384±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown silt w/roots				
			Stiff tan silty clay w/shale seams	14			
			Moderately hard gray and tan weathered shale w/ferrous stains				
				50/6"			
				50/3"			
5							
				50/5"			
				50/5"			
10							
				30/0"			
			- auger refusal in hard sandstone at 13 ft				
15							
20							
25							

COMPLETION DEPTH: 13.0 ft
DATE: 7-14-14

DEPTH TO WATER IN BORING: Dry

DATE: 7/14/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF BORING NO. W17

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1154+65, 75 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 384±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very loose dark brown fine sandy silt	13			
			Stiff tan silty clay and shale fragments (fill)				
			Low hardness gray and tan highly weathered shale w/silty clay seams and layers and ferrous stains	26			
5				25			
			Low hardness to moderately hard gray and tan weathered shale w/ferrous stains	50/11"			
			- moderately hard below 8 ft - water at 8.5 ft	50/4"			
10							
			- auger refusal in sandstone at 12 ft				
15							
20							
25							

COMPLETION DEPTH: 12.0 ft
DATE: 7-14-14

DEPTH TO WATER IN BORING: 8.5 ft

DATE: 7/14/2014

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

LOG OF BORING NO. W19

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1157+70, 65 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 385±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			4 inches: Very loose dark brown silt w/roots and organics				
			Stiff gray and tan silty clay w/shale seams and ferrous stains	13			
				14			93
			Low hardness to moderately hard tan and maroon highly weathered shale w/silty clay seams	50/10"			
5				30/3"			
			- with sandstone seam at 6.5 ft - auger refusal in sandstone at 7 ft				
10							
15							
20							
25							

COMPLETION DEPTH: 7.0 ft
DATE: 7-14-14

DEPTH TO WATER IN BORING: Dry

DATE: 7/14/2014

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

LOG OF BORING NO. W19A

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger to 11 ft /Wash

LOCATION: Sta 1158+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 408±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff gray, reddish tan, brown and tan silty clay w/some shale fragments (fill)	10			
			Moderately hard gray, reddish tan and tan weathered shale w/occasional silty clay seams, steeply bedded	50/6"			
5				50/7"			
			- less silty clay seams below 6 ft	50/7"			
10				50/9"			
			- less weathered, reddish tan and dark brown below 11 ft				
15				50/6"			
20				50/4"			
25				50/2"			
			- reddish tan and tan below 27 ft				
30				50/5"			

COMPLETION DEPTH: 30.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN BORING: Dry to 11 ft

DATE: 3/18/2015

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF BORING NO. W20

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1156+20, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 386±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Dark brown silty clay w/organics				
			Firm tan silty clay w/shale seams and ferrous stains	8			
			Low hardness gray and tan highly weathered shale w/silty clay seams and ferrous stains	50			
			- moderately hard below 4 ft				
5				50/9"			
				50/6"			
				50/7"			
10							
			- water at 13.5 ft	50/5"			
15			- gray and maroon below 15 ft				
				50/5"			
20			NOTE: Water at 6.8 ft at 24 hours.				
25							

COMPLETION DEPTH: 19.0 ft
DATE: 7-15-14

DEPTH TO WATER IN BORING: 13.5 ft

DATE: 7/15/2014

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

LOG OF BORING NO. W21

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1154+60, 80 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 385±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown silty clay w/crushed stone and some organics (fill)	24			
			Moderately hard tan and gray highly weathered shale w/occasional silty clay seams and sandstone partings	50/6"			
				50/6"			
5			- with weathered sandstone seams below 6 ft	50/2"			
			- auger refusal in shale at 8.5 ft				
10							
15							
20							
25							

COMPLETION DEPTH: 8.5 ft
DATE: 8-18-14

DEPTH TO WATER IN BORING: Dry

DATE: 8/18/2014

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

LOG OF BORING NO. W22

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1151+60, 70 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 379±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Moderately hard reddish tan and gray weathered shale	50/8"			
			- weathered fine-grained sandstone layer at 2 ft	25/0"			
			- auger refusal in shale at 3 ft				
5							
10							
15							
20							
25							

COMPLETION DEPTH: 3.0 ft
DATE: 8-18-14

DEPTH TO WATER
IN BORING: Dry

DATE: 8/18/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF BORING NO. W23

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1150+10, 65 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 379±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown silty clay w/some organics, dry	26			
			Moderately hard tan and gray weathered shale w/occasional sandstone partings	50/8"			
				50/6"			
5				50/4"			
				25/0"			
10			- auger refusal in shale at 11 ft				
15							
20							
25							

COMPLETION DEPTH: 11.0 ft
DATE: 8-18-14

DEPTH TO WATER
IN BORING: Dry

DATE: 8/18/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF BORING NO. W24

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1148+60, 58 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 377±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff tan silty clay w/some organics	43			
			Moderately hard tan, reddish tan and gray highly weathered shale	50/9"			
5				50/6"			
				50/6"			
			- with occasional sandstone partings and seams below 8 ft - auger refusal in shale at 9 ft	50/3"			
10							
15							
20							
25							

COMPLETION DEPTH: 9.0 ft
DATE: 8-18-14

DEPTH TO WATER
IN BORING: Dry

DATE: 8/18/2014

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

LOG OF BORING NO. W25

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1147+10, 57 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 375±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown silty clay w/some organics	21			
			Low hardness reddish tan and gray highly weathered shale - moderately hard below 3 ft	20			
				25/0"			
5				50/5"			
				50/6"			
				25/0"			
10			- auger refusal in shale at 10 ft				
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 8-18-14

DEPTH TO WATER
IN BORING: Dry

DATE: 8/18/2014

LGBNEW 14-030_RETAINING WALLS_I-630.GPJ 4-20-15

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

LOG OF BORING NO. W26

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1145+60, 58 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 375±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown silty clay w/some organics, dry	50/9"			
			Moderately hard to hard tan and gray weathered shale	25/0"			
				25/0"			
5				25/0"			
				25/0"			
			- auger refusal in shale at 9 ft				
10							
15							
20							
25							

COMPLETION DEPTH: 9.0 ft
DATE: 8-19-14

DEPTH TO WATER IN BORING: Dry

DATE: 8/19/2014

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

LOG OF BORING NO. R8

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1149+00, 70 ft Rt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 377±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			12 inches: Crushed Stone Base	42			
			Firm gray, brown and reddish brown silty clay and shale fragments (fill)	7			35
5			- moist with some sandstone fragments below 4 ft	8			
			Low hardness red, reddish tan and gray highly weathered shale w/silty clay seams and layers	18			
10			Moderately hard reddish tan, tan and gray weathered shale w/ferrous stains and silty clay laminations	50/10"			
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-23-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/23/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. R9

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1159+00, 65 ft Rt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 379±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			Stiff reddish tan silty clay and shale fragments (fill)	16			47
			Low hardness gray, reddish tan and tan highly weathered shale - moderately hard below 4 ft	41			
5				50/10"			
				50/6"			
			Moderately hard gray and tan weathered shale	50/4"			
10							
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-23-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/23/2014

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

LOG OF BORING NO. R10

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1169+00, 75 ft Rt - Roadway

SURF. EL: 373±

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)	17			
			12 inches: Crushed Stone Base (fill)				
			Stiff reddish tan, gray and tan silty clay and shale fragments (fill)	22			43
			- firm below 4 ft	7			
5			Moderately hard reddish tan, gray and maroon highly weathered shale w/clay laminations and ferrous stains	50/9"			
			Moderately hard maroon and tan weathered shale	50/5"			
10							
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-23-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/23/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. R13

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1174+00, 75 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 367±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			10 inches: Crushed Stone Base	27			
			Stiff gray, tan and reddish tan silty clay and shale fragments (fill)				
				16			37
5				24			
				17			
				18			
10							
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-30-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/30/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. R14

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1164+00, 65 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 383±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			Stiff brown and reddish brown silty clay and shale fragments (fill) - with some crushed stone to 1.5 ft	20			24
				13			
5			- firm, gray, tan and reddish tan at 4 to 8 ft	8			
				8			
			- stiff below 8 ft				
10				16			
15							
20							
25							

COMPLETION DEPTH: 10.0 ft
DATE: 6-30-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/30/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. R15

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1153+60, 75 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 387±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff reddish tan silty clay w/some shale and sandstone fragments (fill)	24			45
			Low hardness to moderately hard tan and gray highly weathered shale	50/9"			
5				43			
				50/7"			
				25/0"			
			- auger refusal in shale at 9 ft				
10							
15							
20							
25							

COMPLETION DEPTH: 9.0 ft
DATE: 8-18-14

DEPTH TO WATER IN BORING: Dry

DATE: 8/18/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C9

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1145+30, 40 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 375±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			7.5 inches: Portland Cement Concrete, 0.5 inches: Slurry Seal, 8.25 inches: Cement Treated Base				
			6 inches: Crushed Stone Base				
			Stiff maroon, gray and tan silty clay w/sandstone and shale fragments (fill)	14			
			- soft at 4 to 6 ft				
5				6			
			- firm below 6 ft	9			
10							
15							
20							
25							

COMPLETION DEPTH: 7.5 ft
DATE: 10-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 10/7/2014

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

LOG OF BORING NO. C10

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1156+00, 40 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 384±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			7.75 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 5.75 inches: Cement Treated Base				
			6 inches: Crushed Stone Base				
			Very stiff gray and tan silty clay and shale fragments and occasional sandstone fragments	50			34
5			Low hardness gray and tan highly weathered shale w/silty clay seams and occasional sandstone seams	50			
			- low hardness to moderately hard below 6 ft	50/10"			
10							
15							
20							
25							

COMPLETION DEPTH: 7.5 ft
DATE: 10-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 10/7/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C11

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1166+00, 40 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 387±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 5.75 inches: Cement Treated Base				
			6 inches: Crushed Stone Base				
			Firm reddish tan and tan silty clay w/sandstone and shale fragments	8			43
5			Moderately hard gray and tan highly weathered shale w/silty clay seams, occasional sandstone seams and ferrous stains	50/6"			
				50/6"			
10							
15							
20							
25							

COMPLETION DEPTH: 7.5 ft
DATE: 10-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 10/7/2014

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

LOG OF BORING NO. C21

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1151+00, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 380±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8.5 inches: Portland Cement Concrete, 0.25 inches: Slurry Seal, 6.25 inches: Portland Cement Concrete Base				
			7 inches: Crushed Stone Base				
			Moderately hard brown weathered shale - auger refusal in shale at 2.3 ft				
5							
10							
15							
20							
25							

COMPLETION DEPTH: 2.3 ft
DATE: 9-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 9/7/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C22

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1161+00, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 386±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8 inches: Portland Cement Concrete, 1 inch: Slurry Seal, 5 inches: Portland Cement Concrete Base				
			6 inches: Crushed Stone Base				
			Low hardness dark gray and tan highly weathered shale w/silty clay laminations and seams and ferrous stains	24			
5			- moderately hard below 4 ft	50/9"			
				50/6"			
10							
15							
20							
25							

COMPLETION DEPTH: 6.7 ft
DATE: 9-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 9/7/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF BORING NO. C23

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Core/Auger

LOCATION: Approx Sta 1171+00, 50 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 372±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			8 inches: Portland Cement Concrete, 0.75 inches: Slurry Seal, 6.5 inches: Portland Cement Concrete Base				
			6 inches: Crushed Stone Base				
			Firm brown and tan silty clay w/shale fragments (fill)	8			39
			- soft at 4 to 6 ft				
5				5			
			- stiff with more shale fragments below 6 ft	16			
10							
15							
20							
25							

COMPLETION DEPTH: 7.5 ft
DATE: 9-7-14

DEPTH TO WATER IN BORING: Dry

DATE: 9/7/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 4-20-15

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

LOG OF TEST PIT NO. A

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1153+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 393±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan and brown silty clay w/shale and sandstone fragments (fill) - with some organics to 0.5 ft				
1			Low hardness gray, reddish tan, dark gray and maroon highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±75° N				
2							
			- excavator refusal at 2.5 ft				
3							
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. B

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1153+00, 90 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 387±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Soft brownish clayey silt, sandy w/trace organics				
1			Low hardness tan, gray and reddish tan highly weathered shale w/occasional silty clay seams and layers, near vertical bedding				
2							
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

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

LOG OF TEST PIT NO. C

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1155+00, 100 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 395±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Soft tan, gray and brown silty clay w/shale fragments (fill)				
1			Low hardness maroon, gray, tan, dark gray and reddish tan highly weathered shale w/occasional silty clay seams and layers, near vertical bedding				
2							
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. D

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1155+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 394±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
1			Stiff tan, gray and brown silty clay w/shale and sandstone fragments (fill) - with some organics to 0.5 ft				
2			Low hardness tan, maroon, reddish tan and gray highly weathered shale w/some silty clay seams and occasional sandstone partings and seams, near vertical bedding				
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. E

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1156+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 395±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan, gray and reddish tan silty clay w/shale and sandstone fragments (fill) - with some organics to 0.5 ft				
1			Low hardness tan, maroon, reddish tan, gray and dark gray highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±75° N				
2							
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. F

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1156+50, 100 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 395±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown silty clay w/shale and sandstone fragments (fill)				
1			Low hardness tan, maroon, gray and reddish tan highly weathered shale w/occasional silty clay seams, apparent dip = ± 80° N				
2							
			- excavator refusal at 2.5 ft				
3							
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

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

LOG OF TEST PIT NO. G

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1158+00, 120 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 407±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan, gray and brown silty clay w/shale fragments (fill)				
1							
2							
3			Low hardness tan, gray, maroon and reddish tan highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±75° N				
4			- excavator refusal at 4 ft				
5							
6							
7							
8							
9							

COMPLETION DEPTH: 4.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. H

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1152+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 393±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
1			Stiff gray, tan and brown silty clay w/shale and sandstone fragments (fill)				
2			Low hardness reddish tan, dark gray and tan highly weathered shale w/occasional silty clay seams and layers, near vertical bedding				
3							
			- excavator refusal at 3.5 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. I

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 393±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff gray, tan and brown silty clay w/shale and sandstone fragments (fill) - with some organics to 0.5 ft				
1			Low hardness gray, dark gray and reddish tan highly weathered shale w/silty clay seams and layers, near vertical bedding				
2			- with occasional sandstone partings and seams below 2 ft				
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. J

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1148+00, 80 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 386±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff reddish tan and brown silty clay w/shale and sandstone fragments (fill)				
1			Low hardness gray, dark gray and reddish tan highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±70° N				
2							
3			- excavator refusal at 3 ft				
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 3.0 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. K

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1147+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 383±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Loose brown fine sandy silt w/some organics				
1			Low hardness maroon, gray, tan and reddish tan highly weathered shale w/occasional silty clay seams and layers, near vertical bedding				
2							
			- excavator refusal at 2.5 ft				
3							
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

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

LOG OF TEST PIT NO. L

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1146+00, 100 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 380±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown silty clay w/shale fragments (fill)				
1			Low hardness maroon, reddish tan and gray highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±70° N				
2							
			- excavator refusal at 2.5 ft				
3							
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. M

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1168+00, 80 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 379±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan and brown silty clay w/shale fragments				
1			Low hardness tan, reddish tan, gray and maroon highly weathered shale w/occasional silty clay seams and layers, apparent dip = ±80° N				
2							
			- excavator refusal at 2.5 ft				
3							
4							
5							
6							
7							
8							
9							

COMPLETION DEPTH: 2.5 ft
DATE: 3-18-15

DEPTH TO WATER IN TEST PIT: Dry

DATE: 3/18/2015

LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

LOG OF TEST PIT NO. N

CA0608: Retaining Walls - I-630 Widening
Little Rock, Arkansas

TYPE: Track Excavator

LOCATION: Approx Sta 1167+00, 80 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 382±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan, dark gray, reddish tan and reddish brown silty clay w/some shale and sandstone fragments (fill)				
1							
2							
3			Low hardness tan, gray and reddish tan highly weathered shale w/occasional silty clay seams, near vertical bedding				
4							
			- excavator refusal at 4.5 ft				
5							
6							
7							
8							
9							

COMPLETION DEPTH: 4.5 ft
DATE: 3-18-15

DEPTH TO WATER
IN TEST PIT: Dry

DATE: 3/18/2015

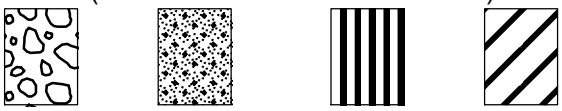
LTPNEW 14-030_RETAINING WALLS_TEST PITS.GPJ 4-20-15

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

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)

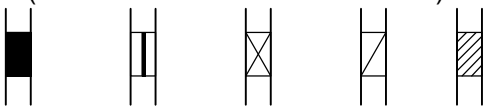


Gravel Sand Silt Clay

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 (I) 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.

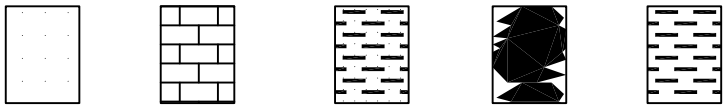
Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

KEY 3-14-12

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

BORING LOG TERMS – ROCK

ROCK TYPES
(SHOWN IN SYMBOLS COLUMN)



Sandstone Limestone Siltstone Coal Shale

Joint Characteristics –

Spacing	
Very Close	0.75 to 2.5 in.
Close	2.5 to 8 in.
Moderately Close	8 to 24 in.
Wide	2 to 6 ft
Very Wide	More than 6 ft

Bedding Characteristics –

Very Thin	0.75 to 2.5 in.
Thin	2.5 to 8 in.
Medium	8 to 24 in.
Thick	2 to 6 ft
Massive	More than 6 ft

Lithologic Characteristics –

Clayey
Shaly
Calcareous (limy)
Siliceous
Sandy (Arenaceous)
Silty
Plastic Seams

Parting – Less than 1/16 inch
Seam – 1/16 to 1/2 inch
Layer – 1/2 to 12 inches
Stratum – Greater than 12 inches

Hardness–

Soft (S) – Reserved for plastic material alone.

Friable (F) – Easily crumbled by hand, pulverized or reduced to powder and is too soft to be cut with a pocket knife.

Low Hardness (LH) – Can be gouged deeply or carved with a pocket knife.

Moderately Hard (MH) – Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.

Hard (H) – Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.

Very hard (VH) – Cannot be scratched with a pocket knife. Knife steel marks left on surface.

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

Degree of Weathering –

Fresh – No visible signs of decomposition or discoloration. Rings under hammer impact.

Slighty Weathered – Slight discoloration inwards from open fractures, otherwise similar to fresh.

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.

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

Completely Weathered – Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.

Residual Soil – Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Solution and Void Conditions –

Solid, contains no voids
Vuggy (pitted)
Vesicular (igneous)
Porous
Cavities
Cavernous

Swelling Properties –

Nonswelling
Swelling

Slaking Properties –

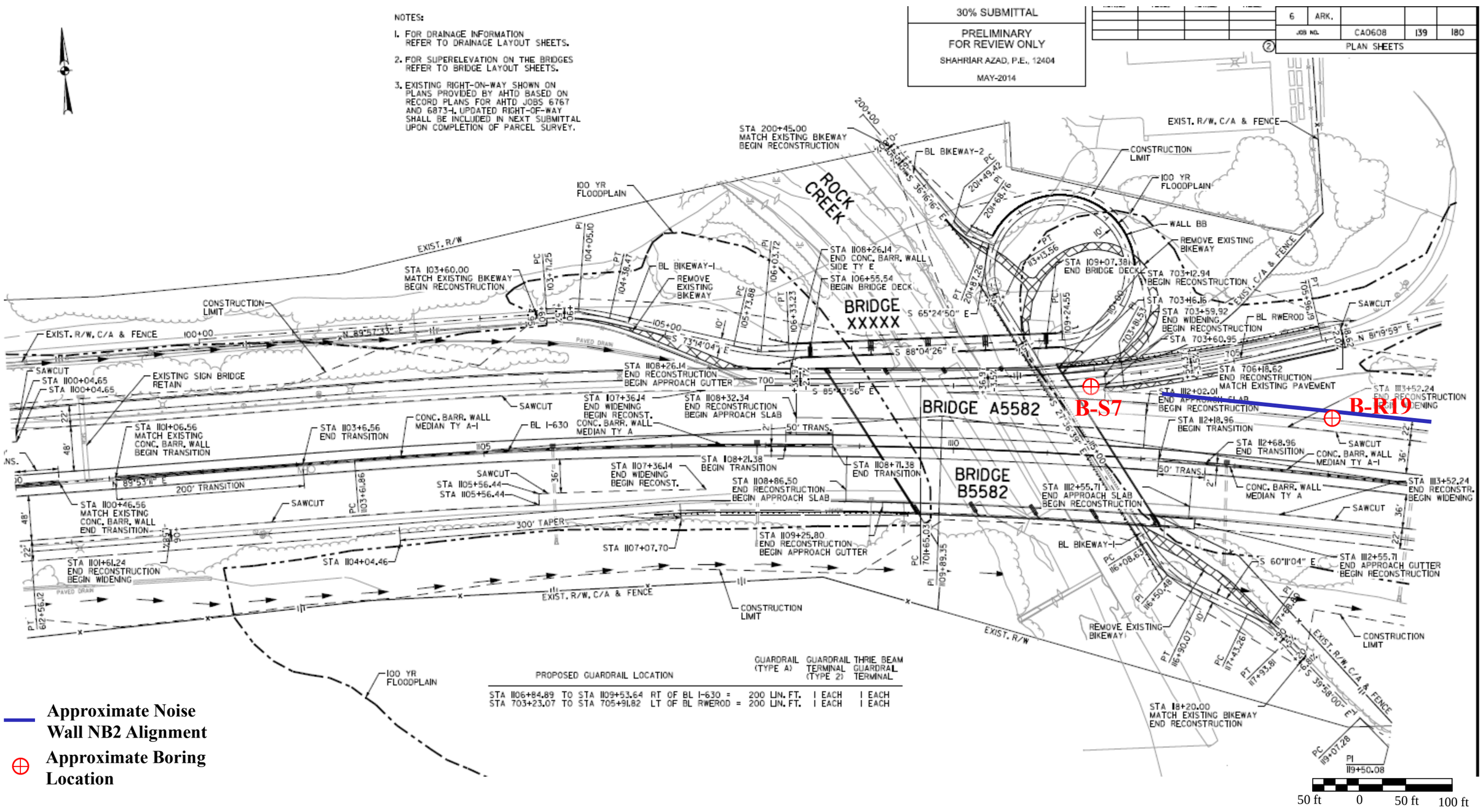
Nonslaking
Slakes slowly on exposure
Slakes readily on exposure

Rock Quality Designation (RQD) –

RQD (Percent)	Diagnostic Description
Greater than 90	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
Less than 25	Very Poor

KEYROCK FHWA 3-2-12

ATTACHMENT 9



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

Plan of Borings
AHTD CA0608 Interstate I-630 Noise Walls
Little Rock, Arkansas

Scale: As Shown | Job No. 14-030 | PLATE 1A

30% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

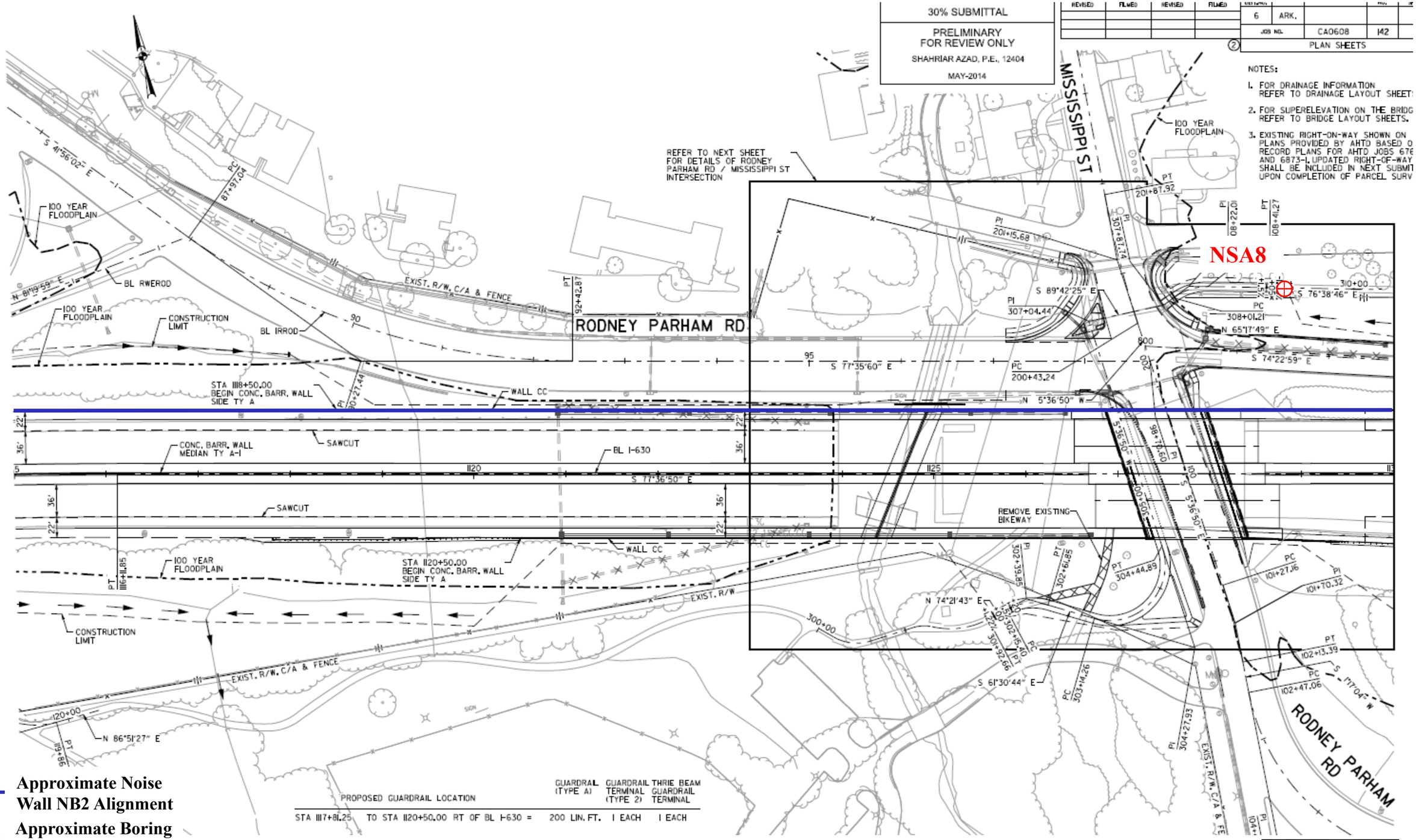
SHAHRIAR AZAD, P.E., 12404

MAY-2014

REVISED	FILMED	REVISED	FILMED	DISTRICT			NO.	
				6	ARK.			
				JOB NO.	CA0608	142		
				②	PLAN SHEETS			

NOTES:

1. FOR DRAINAGE INFORMATION REFER TO DRAINAGE LAYOUT SHEETS
2. FOR SUPERELEVATION ON THE BRIDG REFER TO BRIDGE LAYOUT SHEETS.
3. EXISTING RIGHT-ON-WAY SHOWN ON PLANS PROVIDED BY AHTD BASED O RECORD PLANS FOR AHTD JOBS 676 AND 6873-1. UPDATED RIGHT-OF-WAY SHALL BE INCLUDED IN NEXT SUBMIT UPON COMPLETION OF PARCEL SURV



Approximate Noise Wall NB2 Alignment

Approximate Boring Location

Grubbs, Hoskyn, Barton & Wyatt, INC. CONSULTING ENGINEERS	**Plan of Borings** AHTD CA0608 Interstate I-630 Noise Walls Little Rock, Arkansas	Scale: As Shown	Job No. 14-030	PLATE 1B

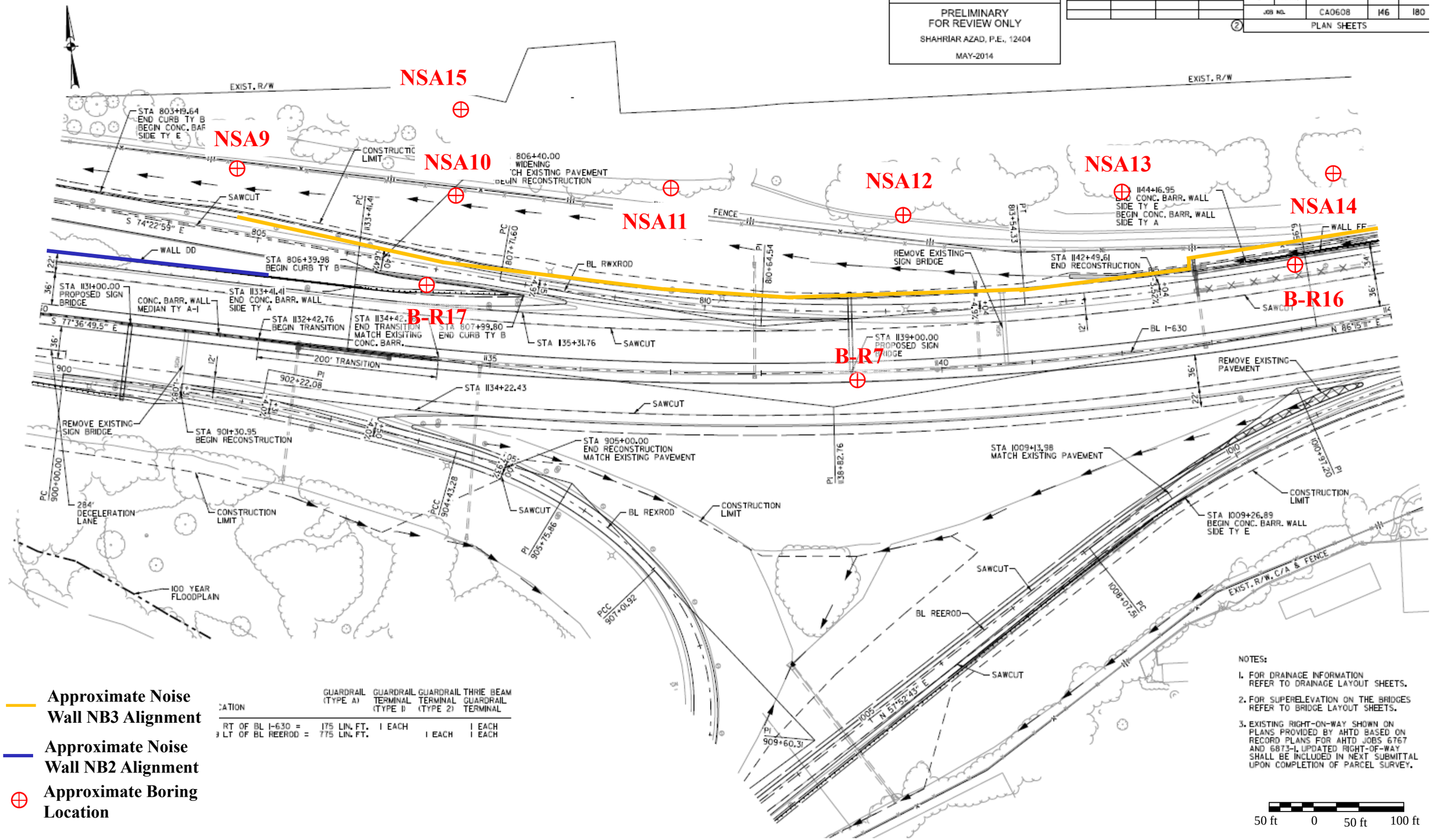
30% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MAY-2014

DISTRICT NO.	STATE	FEDERAL PROJECT	NO.	SHEETS
6	ARK.			
JOB NO.		CA0608	146	180
PLAN SHEETS				



CATION	GUARDRAIL (TYPE A)	GUARDRAIL TERMINAL (TYPE 1)	GUARDRAIL TERMINAL (TYPE 2)	THRIE BEAM GUARDRAIL TERMINAL
RT OF BL I-630 =	175 LIN. FT.	1 EACH		1 EACH
LT OF BL REEROD =	775 LIN. FT.		1 EACH	1 EACH

NOTES:

1. FOR DRAINAGE INFORMATION REFER TO DRAINAGE LAYOUT SHEETS.
2. FOR SUPERELEVATION ON THE BRIDGES REFER TO BRIDGE LAYOUT SHEETS.
3. EXISTING RIGHT-ON-WAY SHOWN ON PLANS PROVIDED BY AHTD BASED ON RECORD PLANS FOR AHTD JOBS 6767 AND 6873-1. UPDATED RIGHT-OF-WAY SHALL BE INCLUDED IN NEXT SUBMITTAL UPON COMPLETION OF PARCEL SURVEY.

50 ft 0 50 ft 100 ft

Approximate Noise Wall NB3 Alignment

Approximate Noise Wall NB2 Alignment

Approximate Boring Location

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

Plan of Borings

AHTD CA0608 Interstate I-630 Noise Walls
Little Rock, Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1C**

NOTES:

1. FOR DRAINAGE INFORMATION REFER TO DRAINAGE LAYOUT SHEETS.
2. FOR SUPERELEVATION ON THE BRIDGES REFER TO BRIDGE LAYOUT SHEETS.
3. EXISTING RIGHT-ON-WAY SHOWN ON PLANS PROVIDED BY AHTD BASED ON RECORD PLANS FOR AHTD JOBS 6767 AND 6873-H. UPDATED RIGHT-OF-WAY SHALL BE INCLUDED IN NEXT SUBMITTAL UPON COMPLETION OF PARCEL SURVEY.

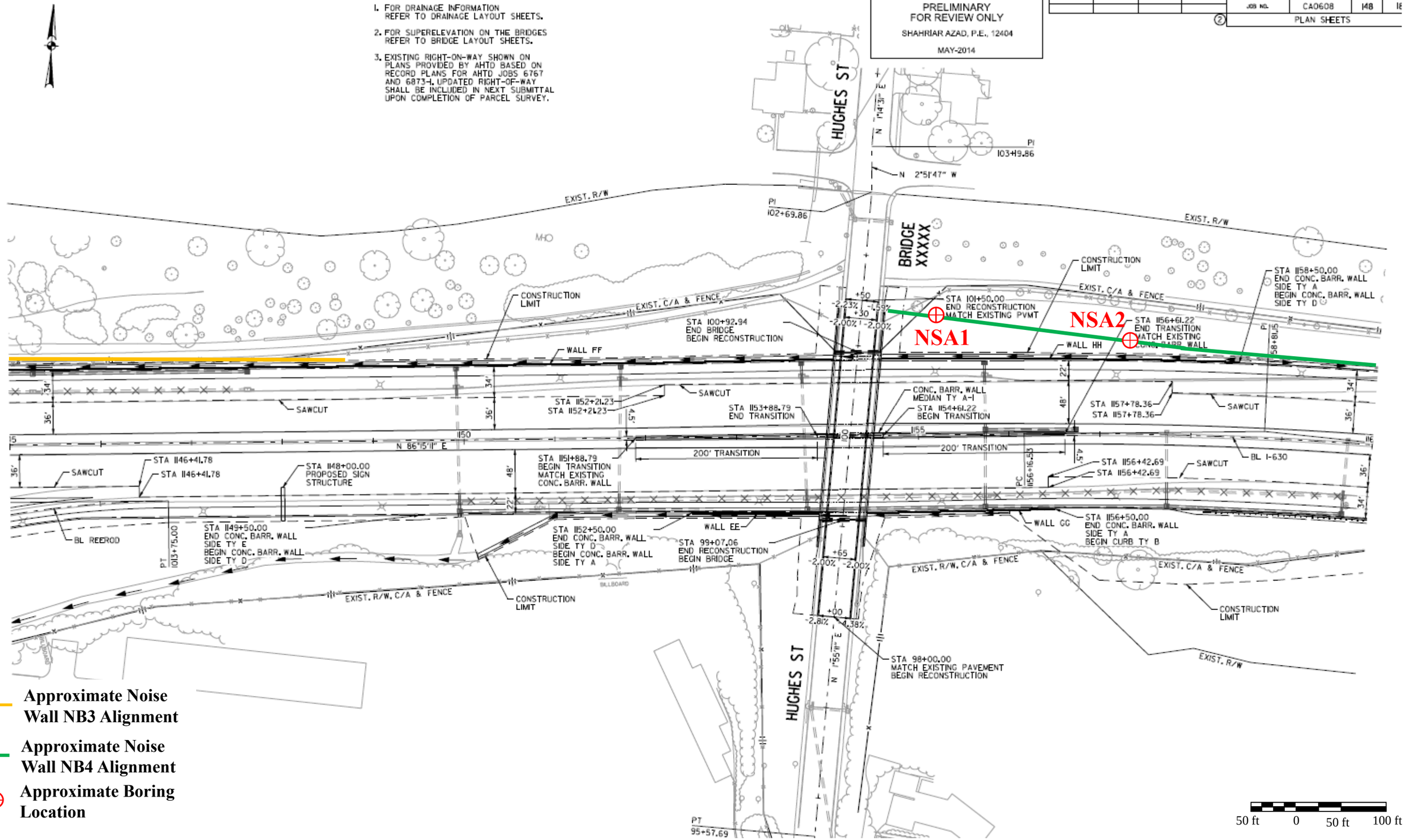
30% SUBMITTAL

PRELIMINARY FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

MAY-2014

REVISED	FILMED	REVISED	FILMED	DISTRICT	STATE	FEDERAL PROJECT	NO.	SHE
				6	ARK.			
				JOB NO.		CA0608	148	18
				②	PLAN SHEETS			



Approximate Noise Wall NB3 Alignment

Approximate Noise Wall NB4 Alignment

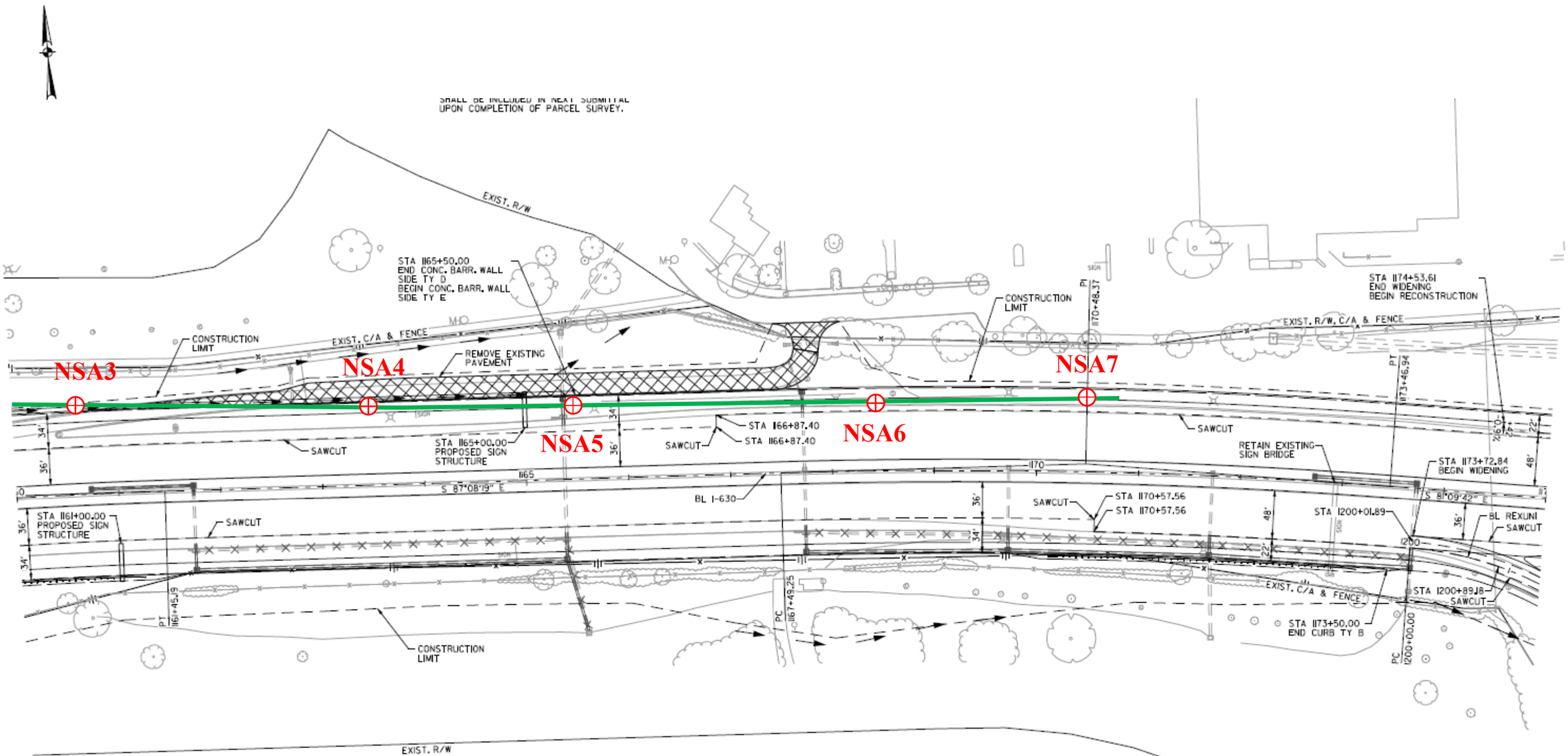
Approximate Boring Location

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

Plan of Borings

AHTD CA0608 Interstate I-630 Noise Walls
Little Rock, Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1D**



Approximate Noise Wall NB4 Alignment

Approximate Boring Location

PROPOSED GUARDRAIL LOCATION	GUARDRAIL (TYPE A)	GUARDRAIL TERMINAL (TYPE 1)	GUARDRAIL TERMINAL (TYPE 2)
STA 1158+22.00 TO STA 1161+22.00 RT OF BL I-630 =	250 LIN. FT.	1 EACH	1 EACH
STA 1170+15.00 TO STA 1173+15.00 RT OF BL I-630 =	250 LIN. FT.	1 EACH	1 EACH

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

Plan of Borings

AHTD CA0608 Interstate I-630 Noise Walls
Little Rock, Arkansas

Scale: As Shown | **Job No. 14-030** | **PLATE 1E**

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

LOG OF BORING NO. NSA1

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger

LOCATION: Wall NB4 Sta 0+37

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 405±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff tan silty clay w/some sandstone fragments (fill)	20			
			Low hardness tan, gray and maroon highly weathered shale w/some ferrous stains	50/11"			
			- moderately hard below 4 ft	50/7"			
5				50/7"			
				50/7"			
10							
				50/7"			
15							
			- auger refusal at 17 ft				
20							
25							

COMPLETION DEPTH: 17.0 ft
DATE: 9-13-16

DEPTH TO WATER
IN BORING: Dry to 17 ft

DATE: 9/13/2016

LGBNEW 14-030_NOISE BARRIER NB4.GPJ 10-31-16

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

LOG OF BORING NO. NSA2

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger

LOCATION: Wall NB4 Sta 2+75

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 398±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Medium dense brown silt w/occasional rootlets (fill)	19			
			Moderately hard reddish tan and gray weathered shale	50/5"			31
5				50/3"			
			- dark stains at 6.5 ft	50/3"			
				50/3"			
10							
			- reddish tan below 14 ft	50/5"			
15							
			- auger refusal at 18 ft				
20							
25							

COMPLETION DEPTH: 18.0 ft
DATE: 9-16-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/19/2016

LGBNEW 14-030_NOISE BARRIER NB4.GPJ 10-31-16

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

LOG OF BORING NO. NSA3

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger

LOCATION: Wall NB4 Sta 6+00

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 390±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff maroon, brown, gray and reddish tan silty clay w/some sandstone and shale fragments (fill)	11			
			- firm to stiff at 2.5 ft	10			
			Moderately hard gray and reddish tan highly weathered shale				
5				50/10"			
				50/7"			
				50/6"			
10							
			- less weathered below 13 ft	50/4"			
15							
20				50/3"			
25							

COMPLETION DEPTH: 20.0 ft
DATE: 9-16-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/19/2016

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

LOG OF BORING NO. NSA4

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger to 9 ft /Wash

LOCATION: Wall NB4 Sta 8+90

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 384±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Medium dense brown silt w/some sandstone and shale fragments (fill)	19		-NON-PLASTIC-	46
			- loose below 2.5 ft	9			
5			- stiff gray, reddish tan and maroon silty clay at 4.5 ft	12			
				14			39
				50/5"			
10			Moderately hard brown weathered fine-grained sandstone				
			Moderately hard maroon and tan highly weathered shale w/ferrous stains				
15				50/8"			
			- less weathered below 19 ft	50/3"			
20							
25				50/2"			

COMPLETION DEPTH: 25.0 ft
DATE: 9-16-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/19/2016

LGBNEW 14-030_NOISE BARRIER NB4.GPJ 10-31-16

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

LOG OF BORING NO. NSA5

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger to 17 ft /Wash

LOCATION: Wall NB4 Sta 11+00

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 379±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Medium dense brown silt w/occasional organics and sandstone fragments (fill)	20			
			- firm tan and maroon silty clay below 2.5 ft	9			
5			- stiff below 4.5 ft	12			34
			- very soft to soft below 6.5 ft	4			
10			- soft below 9 ft	6			
15			Low hardness gray, maroon and brown highly weathered shale w/silty clay seams and layers	17			
			Moderately hard brown weathered fine-grained sandstone w/ferrous stains				
20			Moderately hard brown and maroon highly weathered shale w/occasional clay laminations and ferrous stains	50/6"			
25				50/7"			
30				50/3"			

COMPLETION DEPTH: 30.0 ft
DATE: 9-16-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/19/2016

LGBNEW 14-030_NOISE BARRIER NB4.GPJ 10-31-16

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

LOG OF BORING NO. NSA6

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger to 10 ft /Wash

LOCATION: Wall NB4 Sta 13+95

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 372±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Dense tan silt w/occasional asphalt debris (fill)	50/9"			
			- loose tan and gray sandy fine to coarse gravel below 2.5 ft	9		-NON-PLASTIC-	13
5			- firm brown silty clay w/occasional sandstone fragments below 4.5 ft	9			42
			- very loose to loose brown and tan sandy fine gravel below 6.5 ft	4			
10			Moderately hard tan and brown weathered shale w/interbedded sandstone seams and layers	50/3"			
15			Moderately hard to hard gray fine-grained sandstone w/interbedded weathered shale seams and layers	50/0"			
				30/0"			
20			Moderatedly hard tan and brown weathered shale w/interbedded sandstone seams and layers				
25							
30							

COMPLETION DEPTH: 30.0 ft
DATE: 9-14-16

DEPTH TO WATER
IN BORING: Dry to 10 ft

DATE: 9/14/2016

LGBNEW 14-030_NOISE BARRIER NB4.GPJ 10-31-16

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

LOG OF BORING NO. NSA7

CA0608: I-630 Noise Wall NB4
Little Rock, Arkansas

TYPE: Auger

LOCATION: Wall NB4 Sta 15+93

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 372±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Dense brown silt w/some shale and rock fragments (fill)	50/3"			
			- stiff tan silty clay w/some shale fragments below 2.5 ft	11			
5			- firm below 4.5 ft	8			32
			- stiff below 6.5 ft	15			
10				11			
15			- very stiff below 14 ft - occasional organics below 14 ft	28			
				34			
20			- gray, tan and maroon below 19 ft	32			
			Moderately hard gray and tan weathered shale w/sandstone seams and layers	50/3"			
25							
30							

COMPLETION DEPTH: 28.5 ft
DATE: 9-14-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/14/2016

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

LOG OF BORING NO. NSA8

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1128+65, 180 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 323±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown and reddish brown silty clay w/occasional rootlets (fill)	18			
			- with shale and sandstone fragments below 2 ft	15			35
5				24			
			Very stiff gray, dark gray, red and reddish tan silty clay w/occasional sandstone and shale fragments	36			38
10				43			
			Low hardness gray and tan highly weathered shale w/ferrous stains in bedding planes	45			
15			- moderately hard below 17 ft				
20			Moderately hard dark gray shale	50/5"			
			- moderately hard to hard below 22 ft	25/0"			
25							
30				25/0"			

COMPLETION DEPTH: 30.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: 16 ft

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. NSA9

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1132+10, 180 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 326±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Firm to stiff reddish brown silty clay (fill)	10			
			- with sandstone fragments below 2 ft	11			
5				50/8"			
				50/8"			
			Very stiff to hard brown and reddish tan fine sandy clay w/sandstone fragments	50/9"			
10							
15				50/9"			
			Moderately hard dark gray and brownish gray weathered shale				
20				50/7"			
			- dark gray below 20 ft				
			Moderately hard to hard dark gray shale	50/3"			
25							
30				25/0"			

COMPLETION DEPTH: 30.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: 24 ft

DATE: 9/23/2016

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

LOG OF BORING NO. NSA10

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1134+50, 180 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 327±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Firm reddish brown silty clay (fill)	8			
			- stiff, gray, reddish tan and red below 2 ft	12			85
5				12			
				14			
10				17			
			Moderately hard brownish gray and gray weathered shale				
15				50/6"			
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/23/2016

14-030

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

LOG OF BORING NO. NSA11

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1137, 190 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 338±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff tan silty clay, dry (possible fill)	25			74
			- with ferrous nodules below 2 ft	32			
5			- reddish tan below 5 ft	23			
				28			
			Low hardness gray and reddish tan highly weathered shale w/ferrous stains in bedding planes	40			
10							
			- moderately hard, less weathered below 13 ft	50/9"			
15							
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. NSA12

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1139+50, 185 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 349±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown silty clay w/shale fragments, dry (fill)	21			
				17			50
5				28			
				14			
			Low hardness brown and maroon highly weathered shale w/silty clay seams and layers	33			
10							
				40			
15							
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. NSA13

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1142, 170 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 370±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff to very stiff reddish tan and tan silty clay w/numerous sandstone fragments, dry (possible fill)	24			
				23			
5				50/7"			
			Low hardness to moderately hard maroon, brown and light gray highly weathered shale, very steeply bedded w/silty clay laminations and seams - moderately hard below 8.5 ft	50/10"			
10				50/7"			
15				50/7"			
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. NSA14

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1144+25, 190 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 384±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown silty clay (fill)	26			
			Very stiff red and tan clay	26			91
5			Moderately hard reddish brown and gray highly weathered shale	50/10"			
				50/9"			
			- tan, reddish tan and gray, less weathered below 8 ft	50/7"			
10							
15				50/5"			
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER
IN BORING: Dry

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. NSA15

CA0608: I-630 Noise Wall NB3/Berm B
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1134+50, 290 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 329±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Very stiff brown fine sandy clay, dry	25			
			- with sandstone fragments below 2 ft	50/11"			
5			Moderately hard brownish gray and gray weathered shale w/ferrous stains in bedding planes	50/9"			
				50/10"			
				50/7"			
10			- less weathered below 12 ft				
15				50/6"			
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 9-23-16

DEPTH TO WATER IN BORING: Dry

DATE: 9/23/2016

LGBNEW 14-030_NSA LOGS.GPJ 10-31-16

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

LOG OF BORING NO. S7

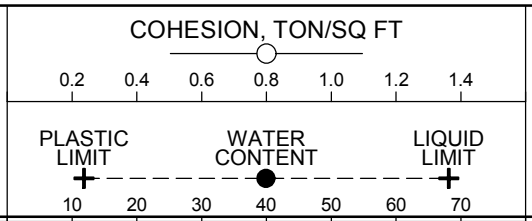
CA0608: I-630 over Rock Creek
Little Rock, Arkansas

TYPE: Auger to 20 ft /Wash

LOCATION: Sta 1111+15, 95 ft Lt

SURF. EL: 332±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	- No. 200 %
	3 inches: Asphalt Concrete	10	41
	Stiff brown silty clay and shale fragments (fill)	11	
5	- with sandstone fragments below 4.5 ft	20	
		16	
10	- tan and gray with glass debris below 9 ft	21	
15	- with more shale fragments below 14 ft	19	23
20	Medium dense gray and tan clayey fine sand w/sandstone fragments (completely weathered sandstone)	14	
25	Moderately hard tan and gray weathered fine-grained sandstone w/clayey fine sand seams and ferrous stains	50/3"	
30	Moderately hard to hard dark gray shale	30/0"	
35		30/0"	
40	- with medium close sandstone seams below 40 ft		
45		30/0"	
50		30/0"	
55		30/0"	
60		30/0"	
65		30/0"	
70			



COMPLETION DEPTH: 70.0 ft
DATE: 8-22-14

DEPTH TO WATER IN BORING: Dry to 20 ft

DATE: 8/22/2014

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

LOG OF BORING NO. R7

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1139+00, 55 ft Rt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 362±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			12 inches: Crushed Stone Base	22			
			Firm gray, reddish brown and brown silty clay w/shale fragments (fill)				
				8			51
			- stiff below 4 ft				
5				19			
				18			
				12			
10							
15							

COMPLETION DEPTH: 10.0 ft
DATE: 6-23-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/23/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 10-14-14

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

LOG OF BORING NO. R16

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1144+00, 55 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 372±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Stiff brown and tan silty clay w/shale and sandstone fragments (fill)	12			49
			- with more shale fragments below 2 ft	50/7"			
			Low hardness to moderately hard grayish tan and tan highly weathered shale w/silty clay laminations and ferrous stains, approx dip ~ 75°	50/8"			
5				50/6"			
			Moderately hard dark gray and tan weathered shale w/ferrous stains, approx dip ~ 75°	50/3"			
10							
				50/4"			
			- auger refusal in shale at 14 ft				
15							
20							
25							

COMPLETION DEPTH: 14.0 ft
DATE: 7-1-14

DEPTH TO WATER IN BORING: Dry

DATE: 7/1/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 10-14-14

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

LOG OF BORING NO. R17

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1134+00, 65 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 346±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			Medium dense brown fine sandy silt w/some organics (fill)				
			Stiff reddish brown and reddish tan silty clay w/shale fragments	14			
				18			56
			- firm to stiff, reddish tan and dark gray from 4 to 6 ft				
5				10			
			- stiff below 6 ft				
				19			
				18			
10							
15							

COMPLETION DEPTH: 10.0 ft
DATE: 6-30-14

DEPTH TO WATER IN BORING: Dry

DATE: 6/30/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 10-14-14

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

LOG OF BORING NO. R19

CA0608: I-630 Widening
Little Rock, Arkansas

TYPE: Auger

LOCATION: Sta 1114+00, 55 ft Lt - Roadway

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURF. EL: 336±	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (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)	- No. 200 %
			6 inches: Brown fine sandy silt w/some organics (fill)				
			10 inches: Crushed Stone Base	23			
			Stiff gray, tan and brown silty clay and shale fragments (fill)				
				12			28
5				13			
				16			
			- red and reddish tan below 8 ft				
				23			
10							
15							

COMPLETION DEPTH: 10.0 ft
DATE: 6-30-14

DEPTH TO WATER
IN BORING: Dry

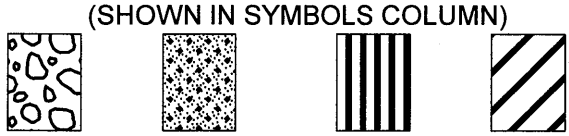
DATE: 6/30/2014

LGBNEW 14-030_I-630_WIDENING.GPJ 10-14-14

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

SYMBOLS AND TERMS USED ON BORING LOGS

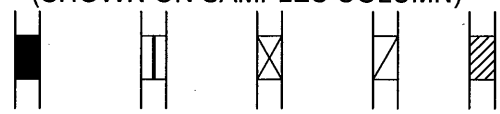
SOIL TYPES
(SHOWN IN SYMBOLS COLUMN)



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 (I) 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.

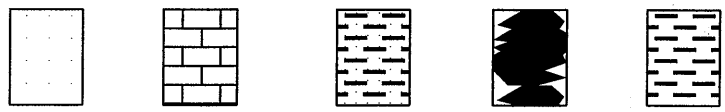
Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

KEY 7-28-11

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

BORING LOG TERMS – ROCK

ROCK TYPES
(SHOWN IN SYMBOLS COLUMN)



Sandstone | Limestone | Siltstone | Coal | Shale

Joint Characteristics – Spacing

- Very Wide
- Wide
- Moderately Close
- Close
- Very Close

Bedding Characteristics –

- Very Thin
- Thin
- Medium
- Thick
- Massive

Lithologic Characteristics –

- Clayey
- Shaly
- Calcareous (limy)
- Siliceous
- Sandy
- Silty
- Plastic Seams

Seam – 1/6 to 1/2 inch
Layer – 1/2 to 12 inches
Stratum – Greater than 12 inches

Hardness and Degree of Cementation –

	Approximate Range of Uniaxial Compressive Strength (psi)
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
Very hard – Hand held specimen breaks with hammer end of pick under more than one blow	13,900 – 28,000
Extremely Hard – Many blows with hammer required to break intact specimen	More than 28,000

Poorly Cemented

Cemented

Texture –

- Dense
- Fine
- Medium
- Coarse

Structure –

- Bedding
  - Flat
  - Gently Dipping
  - Steeply Dipping
- Fractures, scattered
  - Open
  - Cemented or Tight
- Fractures, closely spaced
  - Open
  - Cemented or Tight
- Brecciated (Sheared and Fragmented)
  - Open
  - Cemented or Tight
- Joints
- Faulted
- Slickensides

Degree of Weathering –

Fresh – No visible signs of decomposition or discoloration. Rings under hammer impact.

Slighty Weathered – Slight discoloration inwards from open fractures, otherwise similar to fresh.

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.

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.

Completely Weathered – Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.

Residual Soil – Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Solution and Void Conditions –

- Solid, contains no voids
- Vuggy (pitted)
- Vesicular (igneous)
- Porous
- Cavities
- Cavernous

Swelling Properties –

- Nonswelling
- Swelling

Slaking Properties –

- Nonslaking
- Slakes slowly on exposure
- Slakes readily on exposure

Rock Quality Designation (RQD) –

RQD (Percent)	Diagnostic Description
Greater than 90	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
Less than 25	Very Poor

KEYROCK 5-22-07

ATTACHMENT 10

Summary of Recommendations for CA0608 Retaining Walls

PROJECT: AHTD JOB CA0608 - I-630 over Rodney Parham Road
LOCATION: Little Rock, Pulasi County, Arkansas
GHBW JOB NO.: 14-030

Project Facet	Location	Wall Type	Wall Length, ft	Approx Wall Height, ft	Relevant Borings or Test Pits	Recommended nominal unit bearing resistance, psf	Recommended resistance factor (φ_b)	Recommended factored unit bearing resistance, psf	Estimated reinforcing strap length, ft	Anticipated undercut requirements, ft	Bearing Stratum
Wall AA	South side of Ramp 2 of I-630 Exit 7	Soil Nail	1344	6 to 18	RP1, W10, W11, W12, W13, W14, W15	18,000	0.65	11,700	NA	minimal - weathered shale bearing stratum	competent weathered shale
Wall BB	South side of bikeway roundabout, east of Rock Creek	MSE	100	2 to 11	S13, W30, W31	6000	0.65	3,900	0.7H: 5-8	minimal	compacted embankment fill
Wall CC	North side of bikeway roundabout, east of Rock Creek	Cantilevered	86	2 to 6	W30, W31	6000	0.5	3,000	NA	minimal	compacted embankment fill
Wall DD	South upper wingwall at west abutment of Rodney Parham	MSE	346	5 to 7	W1, W2, W3	6250	0.65	4,063	0.7H: 5	minimal	compacted embankment fill
Wall EE	North wingwall (Wall EE-1) at east abutment of Rodney Parham	MSE	±590	5 to 23	W5, W6, W7, W8, S2, S4	6250	0.65	4,063	0.7H: 5-16	minimal	compacted embankment fill
Wall EE	Abutment wall (Wall EE-2) at east abutment of Rodney Parham	MSE	±150	23	S2, S4	7,400	0.65	4,810	0.7H: 16	competent sandstone or weathered shale @ ±El 314 - ±El 312, estimated 4 to 6 ft below plan grade	compacted undercut backfill
Wall FF	South side of I-630, west of Hughes Street	Soil nail wall	±192	6 to 10	W16, B, S5	18,000	0.5	9,000	NA	minimal - weathered shale bearing stratum	competent weathered shale
Wall FF	South side of I-630, west of Hughes Street	MSE	±10	10	W16, B, S5	18,000	0.65	11,700	0.7H: 7	minimal - weathered shale bearing stratum	competent weathered shale
Wall GG	South abutment of Hughes Street	MSE	±55	16	W17, S5	18,000	0.65	11,700	0.7H: 11.5	minimal - weathered shale bearing stratum	competent weathered shale
Wall GG	South abutment of Hughes Street	MSE	±56	4 to 16	W17, S5	6250	0.65	4,063	0.7H: 5-11.5	minimal	compacted embankment fill
Wall HH	South side of I-630, east of Hughes Street	Soil nail wall	±244	2 to 11	W17, C, F, S5	18,000	0.5	9,000	NA	minimal - weathered shale bearing stratum	competent weathered shale
Wall HH	South side of I-630, east of Hughes Street	MSE	±10	11	F, G	18,000	0.65	11,700	0.7H: 8	minimal - weathered shale bearing stratum	competent weathered shale
Wall JJ	North side of I-630, west of Hughes Street	Soil nail wall	±1064	6 to 13	R15, W22, W23, W24, W25, W26, A, H, I, J, K, L	18,000	0.5	9,000	NA	minimal - weathered shale bearing stratum	competent weathered shale

Project Facet	Location	Wall Type	Wall Length, ft	Approx Wall Height, ft	Relevant Borings or Test Pits	Recommended nominal unit bearing resistance, psf	Recommended resistance factor (φ_b)	Recommended factored unit bearing resistance, psf	Estimated reinforcing strap length, ft	Anticipated undercut requirements, ft	Bearing Stratum
Wall JJ	North side of I-630, west of Hughes Street	MSE	±10	13	R15, W22, W23, W24, W25, W26, A, H, I, J, K, L	18,000	0.65	11,700	0.7H: 9.5	minimal - weathered shale bearing stratum	competent weathered shale
Wall KK	North abutment of Hughes Street	MSE	±55	23	R15, W21, D, S6	18,000	0.65	11,700	0.7H: 16.5	minimal - weathered shale bearing stratum	competent weathered shale
Wall KK	North abutment of Hughes Street	MSE	143	2 to 23	R15, W21, D, S6	6250	0.65	4,063	0.7H: 5-16.5	minimal	compacted embankment fill
Wall MM	North side of I-630, east of Hughes Street	Soil nail wall	±483	6 to 9	W19, W19A, W20, D, E	18,000	0.65	11,700	NA	minimal - weathered shale bearing stratum	competent weathered shale
Wall MM	North side of I-630, east of Hughes Street	MSE	±10	6 to 9	W21, D	18,000	0.65	11,700	0.7H: 6.5	minimal - weathered shale bearing stratum	competent weathered shale
Wall NN	South side of I-630, 1000 ft east of Hughes Street	Soil nail wall	147	2 to 9	N, M, R10	18,000	0.5	9,000	NA	minimal - weathered shale bearing stratum	competent weathered shale

Notes: 1. Strap length is an estimate only. The Designer must select the length for use in final design.

2. The suitability of the MSE wall bearing stratum must be field verified by the Engineer or Department at the time of construction. The on-site fill contains variable amounts of cobble- (i.e., 3 in. to 12 in.) to boulder-sized (i.e., larger than 12 in.) sandstone fragments. Where cobbles or boulders are encountered at plan footing elevations, these large rock fragments should be removed and the cavities should be properly backfilled.

3. Undercuts required to develop suitable bearing should be backfilled with crushed stone aggregate base (AHTD Standard Specifications Section 303, Class 7), selected material (AHTD Standard Specifications Section 302, SM-1), or an approved alternate. Undercuts should extend at least 5 ft outside the reinforced zone to the extent possible.

ATTACHMENT 11

SOIL NAIL WALL

ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT

SPECIAL PROVISION

JOB NO. CA0608

SOIL NAIL WALL

DESCRIPTION: This work consists of designing and constructing permanent soil nail retaining walls at the locations and elevations as shown on the plans. The Contractor shall furnish all labor, plans, drawings, design calculations and all other material and equipment required to design and construct the soil nail wall as shown on the plans and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The work shall include excavating in staged lifts in accordance with the approved Contractor's plan; detailing the drilling of the soil nail drill holes to the diameter and length required to develop the specified capacity; grouting the nails; providing and installing the specified drainage features; providing and installing bearing plates, washers, nuts, and other required miscellaneous materials; and constructing the Pneumatically Placed Concrete (Shotcrete) temporary facing, if included in the plans, and constructing the final structural facing.

PREQUALIFICATION OF SOIL NAIL WALL CONTRACTOR: The Contractor or subcontractor responsible for the work covered under this provision, the Soil nail wall contactor, must have a minimum of five (5) years experience in soil nail installation including at least five (5) projects similar in nature and scope to this project and shall provide satisfactory evidence of experience. A brief description of each project including the location, start and completion dates, and a reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, affiliation with the project, and current phone number. Also, the Engineer responsible for designing the soil nail wall must have a minimum of five (5) years experience in soil nail design including at least five (5) projects similar in nature and scope to this project and shall provide satisfactory evidence of experience. The Engineer must be licensed in the state of Arkansas as Professional Engineer.

In addition, the onsite supervisors for both the soil nail and shotcrete installation, drill rig operators, shotcrete nozzle operators and testing supervisors assigned to this project by the Soil nail wall contactor must have experience in that position on a minimum of three (3) projects within the last three (3) years which are similar in nature to this project. The personnel list shall contain a summary of each individual's experience and contain enough information for the Engineer to assess the individual's qualifications. Requirements for technician certification and laboratory qualifications need to be satisfied according to the Department's Manual of Field Sampling and Testing Procedures.

SOIL NAIL WALL

This information shall be submitted 60 calendar days prior to start of any soil nail construction, and the Engineer shall approve or reject the Soil nail wall contactor and personnel list within 15 calendar days of receipt of the complete submittal. All costs associated with incomplete or unacceptable submittals shall be borne by the Contractor, and no adjustment in Contract Time shall result. Any changes to previously approved subcontractors or personnel must be in writing and shall include the required information for verification of qualifications. The Engineer may suspend work if the Contractor utilizes non-approved personnel in the listed positions. All costs associated with the uses of non-approved personnel shall be borne by the Contractor, and no adjustment in Contract Time shall result from the suspension.

SOIL NAIL WALL DESIGN REQUIREMENTS

Design the soil nail walls including the final structural facing using the Allowable Stress Design (ASD) method, also known as Service Load Method (SLD), as outlined in FHWA Geotechnical Engineering Circular No. 7 “Soil Nail Walls”. Provide minimum recommended factor of safety as listed in section 5.9 and Class I corrosion protection requirements according to the Appendix C of the circular. Also list or show the design shear strength parameters, seismic design coefficient, type of wall facing, easements, and right-of-ways on the working drawings.

SUBMITTALS:

A. The Contractor is responsible for providing the necessary geotechnical investigation if available geotechnical information is not adequate for design. The investigation shall provide sampling and testing information for design requirements.

B. The Contractor is responsible for providing the necessary survey and alignment control during the excavation for each lift, locating drill holes and verifying limits of wall installation. Contractor shall submit complete design calculations and working drawings to the Engineer for review and approval at least 60 calendar days before starting soil nail work. Include all details, dimensions, quantities, ground profiles and cross-sections necessary to construct the wall. Verify the limits of the wall and ground survey data before preparing the drawings. The drawings and calculations shall be signed and sealed by a Professional Engineer registered in the State of Arkansas. The submittal shall include the following:

1. The start date and proposed detailed wall construction sequence.
2. Soil/rock design shear strength parameters and external surcharge loads used in the design.
3. Corrosion protections.
4. Drilling and grouting methods and equipment, including the drill hole diameter, soil nail length, proposed to meet the performance requirements specified herein and any variation of these along the wall alignment. Include casing methods if their use is anticipated.
5. Nail grout mix design, including compressive strength test results (per AASHTO T106/ASTM C109) supplied by a qualified independent testing lab

verifying the specified minimum 3-day and 28-day grout compressive strengths. Previous test results for the same grout mix completed within one year of the start of grouting may be submitted for verification of the required compressive strengths.

6. Nail grout placement procedures and equipment.
7. Soil nail testing methods and equipment setup.
8. Identification number and certified calibration records for each test jack and pressure gauge and load cell to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, the device identification number, and the calibration test results and shall be certified for an accuracy of at least 2 percent of the applied certification loads by a qualified independent testing laboratory within 90 days prior to submittal.
9. Design calculations, detail drawings and quantities for final structural facing.
10. Manufacturer Certificates of Compliance for the soil nail ultimate strength, nail bar steel, nuts, bolts, washers, Portland cement, centralizers, bearing plates, epoxy coating, encapsulation and any other materials used in the soil nail wall.
11. Description of proposed equipment for mixing and applying shotcrete. Include the manufacturer instructions, recommendations, literature, performance, and test data.
12. Proposed shotcrete mix design with mix proportions.
13. Representative samples of shotcrete material, if requested by the Engineer.
14. Results of all shotcrete preconstruction testing.
15. Proposed method for applying and curing shotcrete.
16. Other information necessary to verify compliance with ACI 506.2 for shotcrete installation
17. Certification that shotcrete conforms to the standards specified herein.
18. Fiber samples, if used, with supplier or manufacturer recommendations for use.

C. The Engineer shall approve or reject the Contractor's working drawings within 30 working days after the submission. Approval of the Construction Plan does not relieve the Contractor of his responsibility for the successful completion of the work.

PRE-CONSTRUCTION MEETING: A pre-construction meeting shall be scheduled by the Engineer to be held after receipt of the complete soil nail working drawings and Soil nail wall contactor, the soil nail design engineer qualification submittals. The Engineer; the Contractor, including their Superintendent; the Soil nail wall contactor, including the listed onsite supervisor; and the engineer who designed the soil nails shall attend. Attendance is mandatory. All other parties to be involved with the design, fabrication, construction, stressing, or testing the soil nail components may be represented. The meeting will be conducted to clarify the requirements of the work, to coordinate the construction schedule and activities, and to identify the contractual relationships and the delineation of responsibilities amongst the parties involved.

FINAL SUBMITTAL: Within 30 days after completion of work covered by these provisions; the Contractor shall submit revised as-built drawings and information documenting all changes to the soil nails during construction. The revised soil nail

schedule shall include the as-built soil nail length. All design calculations, material test results, material certifications, not previously submitted shall also be included.

MATERIALS: Materials used shall conform to designated specifications and be within their manufacturers' design range of use for this application. All materials should be from QPL list or are subject to acceptance/verification testing per the Manual of Field Sampling and Testing Procedures. Materials delivered to the site shall be new and without defect and shall be handled and stored in accordance with their manufacturers' recommendations and in a manner that no damage to the components due to movement or exposure to the elements occurs. Unacceptable, defective, or damaged materials shall be removed from the site and replaced with new at no additional cost to the Department.

A. Soil Nails

1. Nail Solid Bar. AASHTO M31/ASTM A615, Grade 420 (60) or 520 (75), ASTM A 722 for Grade 1035 (150). Deformed bar, continuous without splices or welds, new, straight, undamaged, bare, or epoxy-coated, or encapsulated as shown on the working drawings. Threaded, a minimum of 150 mm (6 in.) on the wall anchorage end, to allow proper attachment of bearing plate and nut. Threading may be continuous spiral deformed ribbing provided by the bar deformations (continuous thread bars) or may be cut into a reinforcing bar. If threads are cut into a reinforcing bar, provide the next-larger bar number designation from that is shown on the working drawings, at no additional cost. The use of self-drilling nail bars (also known as hollow, self-grouting or pressure- grouted nail bars) will not be allowed.
2. Bar Coupler. Bar couplers shall develop the full ultimate tensile strength of the bar as certified by the manufacturer.
3. Fusion Bonded Epoxy Coating. AASHTO M284, ASTM A 775. Minimum 0.4 mm (0.016 in.) thickness electrostatically applied. Bend test requirements are waived. Coating at the wall anchorage end of epoxy-coated bars may be omitted over the length provided for threading the nut against the bearing plate.
4. Encapsulation. Minimum 1-mm (0.04-in.) thick, corrugated, HDPE tube conforming to AASHTO M252 or corrugated PVC tube conforming to ASTM D1784, Class 13464-B.

B. Soil Nail Appurtenances

1. Centralizer. Manufactured from Schedule 40 PVC pipe or tube, steel, or other material not detrimental to the nail steel (wood shall not be used); securely attached to the nail bar; sized to position the nail bar within 25 mm (1 in.) of the center of the drill hole; sized to allow tremie pipe insertion to the bottom of the drill hole; and sized to allow grout to freely flow up the drill hole.
2. Nail Grout. Neat cement or sand/cement mixture with a minimum 3-day compressive strength of 10.5 MPa (1,500 psi) and a minimum 28-day compressive strength of 21 MPa (3000 psi), per AASHTO T106/ASTM C109.
3. Fine Aggregate shall conform to the applicable requirements of Subsection 802.02b of the Standard Specifications for Highway Construction..

4. Portland Cement. Shall conform to the applicable requirements of Subsection 802.02a of the Standard Specifications for Highway Construction.
5. Admixtures. Shall conform the applicable requirements of Subsection 802.02e of the Standard Specifications for Highway Construction. Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to review and acceptance by the Engineer. Accelerators are not permitted. Expansive admixtures may only be used in grout used for filling sealed encapsulations. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations.
6. Film Protection. Polyethylene film per ASTM C171-03.

C. Bearing Plates, Nuts, and Welded Stud Shear Connectors.
1. Bearing Plates. AASHTO M270/ASTM 709 Grade 36 Minimum.
2. Nuts. ASTM A563, grade B, hexagonal, fitted with beveled washer or spherical seat to provide uniform bearing.
3. Shear Connectors. Subsection 807.08 of the Standard Specifications.

D. Welded Wire Fabric. AASHTO M55/ASTM A185 or A497.

F. Geocomposite Sheet Drain. Refer to the Department's Qualified Product List (QPL) for approved drainage systems or approved equal.

G. Underdrain and Perforated Pipe. Design according to Standard Specification Section 611 and Standard drawing no. PU-1.

H. Shotcrete. Submit for approval, all materials, methods, and control procedures for this work according to this special provision.

A. Use standard specification items for the following:
1. Air-entraining admixture (wet mix only)
2. Chemical admixtures (wet mix only)
3. Concrete coloring agents
4. Curing material
5. Hydraulic cement
6. Pozzolans
7. Reinforcing steel

B. Shotcrete Aggregate

Fine aggregate shall conform to the applicable sections of Standard Specification Section 802.02(b).

I. Reinforcing Steel. Submit all order lists and bending diagrams, fabricate reinforcing steel, ship and protect material, place, fasten, and splice reinforcing steel according to Standard Specification Section 804.

J. Structural Concrete. Design concrete mixture, store, handle, batch, and mix material and deliver concrete, provide quality control, and construct concrete facing according to Standard Specification Section 802. Use class "S" concrete for concrete facing with a 28 day compressive strength of 3500 psi.

SOIL NAIL WALL

STORAGE AND HANDLING

Store and handle soil nail bars in a manner to avoid damage or corrosion. Replace bars exhibiting abrasions, cuts, welds, weld splatter, corrosion, or pitting. Repair or replace any bars exhibiting damage to encapsulation or epoxy coating. Repaired epoxy coating areas shall have a minimum 0.012-in. thick coating.

EXCAVATION

A. The height of exposed unsupported final excavation face cut shall not exceed the vertical nail spacing plus the required reinforcing lap or the short-term stand-up height of the ground, whichever is less. Complete excavation to the final wall excavation line and apply shotcrete in the same work shift, unless otherwise approved by the Engineer. Application of the shotcrete may be delayed up to 24 hours if the contractor can demonstrate that the delay will not adversely affect the excavation face stability.

B. Excavation of the next-lower lift shall not proceed until nail installation, reinforced shotcrete placement, attachment of bearing plates and nuts, and nail testing have been completed and accepted in the current lift. Nail grout and shotcrete shall have cured for at least 72 hours or attained at least their specified 3-day compressive strength before excavating the next underlying lift.

NAIL INSTALLATION

A. Provide nail length and drill hole diameter necessary to develop the load capacity to satisfy the acceptance criteria for the design load required, but not less than the lengths shown in the working drawings. Drill holes for the soil nails at the locations, elevations, orientations, and lengths shown on the working drawings. Select drilling equipment and methods suitable for the ground conditions and in accordance with the approved installation methods submitted by the Contractor. The use of drilling muds or other fluids to remove cuttings will not be allowed. If caving ground is encountered, use approved cased drilling methods to support the sides of the drill holes. Provide nail bars as shown in the working drawings. Provide centralizers sized to position the bar within 1 in. of the center of the drill hole. Position centralizers as shown on the Plans so that their maximum center-to-center spacing does not exceed 8 ft. Also locate centralizers within 1.5 ft from the top and bottom of the drill hole.

GROUTING

A. Grout the drill hole after installation of the nail bar and within 2 hours of completion of drilling. Inject the grout at the lowest point of each drill hole through a grout tube or casing. Keep the outlet end of the conduit delivering grout below the surface of the grout as the conduit is withdrawn to prevent the creation of voids. Completely fill the drill hole in one continuous operation. Cold joints in the grout column are not allowed except at the top of the test bond length of proof tested production nails.

B. Test nail grout according to AASHTO T106/ASTM C109 at a frequency of one test per mix design and a minimum of one test for every 50 cy of grout placed. Provide grout cube test results to the Engineer within 24 hours of testing. Grout testing shall be conducted by a lab already preapproved by Materials division for conducting these types of testing.

NAIL TESTING

A. Perform both verification and proof testing of designated test nails. Perform verification tests on sacrificial test nails at locations shown on the working drawings. Perform proof tests on production nails at locations selected by the Engineer. Testing of any nail shall not be performed until the nail grout and shotcrete facing have cured for at least 72 hours or attained at least their specified 3-day compressive strength.

B. Testing equipment shall include 2 dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The testing setup and equipment shall need to be preapproved thru the submittal process. The pressure gauge shall be graduated in 75 psi increments or less. Measure the nail head movement with a minimum of 2 dial gauges capable of measuring to 0.001 in.

VERIFICATION TESTING OF SACRIFICIAL NAILS

A. Perform verification testing prior to installation of production nails to confirm the appropriateness of the Contractor's drilling and installation methods, and verify the required nail pullout resistance.

B. Verification test nails shall have both bonded and unbonded lengths. Along the unbonded length, the nail bar is not grouted. The unbonded length of the test nails shall be at least 3 ft. The bonded length of the soil nail during verification tests, LBVT, shall be at least 10 ft but not longer than a maximum length, LBVT max, such that the nail load does not exceed 90 percent of the nail bar tensile allowable load during the verification test. Therefore, the following requirements shall be met:

$$L_{BVT} \leq \begin{cases} 10\text{ft} \\ L_{BVTmax} \end{cases}$$

The length $L_{BVT\ max}$ is defined as:

$$L_{BVT\ max} = \frac{C_{RT} * A_t * f_Y}{Q_{ALL} * FS_{Tver}}$$

where,

C_{RT} = Reduction coefficient. Use C_{RT} = 0.9 for Grade 60 and 75 bars.

If Grade 150 bars are allowed in the job, use C_{RT} =0.8.;

A_t = Nail bar cross-sectional area;

f_Y = Nail bar yield tensile strength;

Q_{ALL} = Allowable pullout resistance per unit length ($Q_{ALL} = Q_u/FS_P$), as specified in working drawings; and

SOIL NAIL WALL

FS_{Tver} = Factor of safety against tensile failure during verification tests (use 2.5 or, preferably, 3).

The maximum bonded length shall be preferably based on production nail maximum bar grade. Provide larger bar sizes, if required, to meet the 10-ft minimum test bonded length requirement at no additional cost.

The Design Test Load (DTL) shall be determined as follows:

DTL = LBVT * QALL

DTL shall be calculated based on as-built bonded lengths

C. Perform verification tests by incrementally loading the verification test nails to failure or a maximum test load of 300 percent of the DTL in accordance with the following loading schedule. Record the soil nail movements at each load increment.

Load	Hold Time
0.05 DTL max.(AL)	1 minute
0.25 DTL	10 minutes
0.50 DTL	10 minutes
0.75 DTL	10 minutes
1.00 DTL	10 minutes
1.25 DTL	10 minutes
1.50 DTL (Creep Test)	60 minutes
1.75 DTL	10 minutes
2.00 DTL	10 minutes
2.50 DTL	10 minutes max.
3.0 DTL or Failure	10 minutes max.
0.05 DTL max. (AL)	1 minute (record permanent set)

Verification of Test Loading Schedule

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the DTL. Dial gauges should be set to “zero” after the alignment load has been applied. Following application of the maximum load (3.0 DTL) reduce the load to the alignment load (0.05 DTL maximum) and record the permanent set.

D. Hold each load increment for at least 10 minutes. Monitor the verification test nail for creep at the 1.50 DTL load increment. Measure and record nail movements during the creep portion of the test in increments of 1 minute, 2, 3, 5, 6, 10, 20, 30, 50, and 60 minutes. Maintain the load during the creep test within 2 percent of the intended load by use of the load cell.

SOIL NAIL WALL

PROOF TESTING OF PRODUCTION NAILS

A. Perform successful proof testing on 5 percent of the production soil nails in each nail row or a minimum of 1 per row. The Engineer shall determine the locations and number of proof tests prior to nail installation in each row. Production proof test nails shall have both bonded and temporary unbonded lengths. The temporary unbonded length of the test nail shall be at least 3 ft. The bonded length of the soil nail during proof production tests, LBPT, shall be the least of 10 ft and a maximum length, LBPT max, such that the nail load does not exceed 90 percent of an allowable value of the nail bar tensile load during the proof production test. Therefore, the following requirements shall be met:

$$L_{BPT} \leq \begin{cases} 3\text{m (10ft)} \\ L_{BPTmax} \end{cases}$$

The length $L_{BPT\ max}$ is defined as:

$$L_{BPT\ max} = \frac{C_R * A_t * f_Y}{Q_{ALL} * FS_{Tproof}}$$

C_{RT} = Reduction coefficient. Use 0.9 for Grade 60 and 75 bars.
If Grade 150 bars are allowed in the job, use C_{RT} =0.8;
A_t = Nail bar cross-sectional area;
f_Y = Nail bar yield tensile strength;
Q_{ALL} = Allowable pullout resistance per unit length ($Q_{ALL} = Q_u/FS_P$), as specified in working drawings; and
FS_{Tproof} = Factor of safety against tensile failure during proof production tests (use 1.5.

The maximum bonded length shall be based on production nail maximum bar grade. Production proof test nails shorter than 12 ft in length may be constructed with less than the minimum 10-ft bond length.

The Design Test Load (DTL) shall be determined as follows:
$DTL = L_{BPT} * Q_{ALL}$
DTL shall be calculated based on as-built bonded lengths.

B. Perform proof tests by incrementally loading the proof test nail to 150 percent of the DTL in accordance with the following loading schedule. Record the soil nail movements at each load increment.

SOIL NAIL WALL

Proof Test Loading Schedule.

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the DTL. Dial gauges should be set to "zero" after the alignment load has been applied.

C. The creep period shall start as soon as the maximum test load (1.50 DTL) is applied and the nail movement shall be measured and recorded at 1 minute, 2, 3, 5, 6, and 10 minutes. Where the nail movement between 1 minute and 10 minutes exceeds 0.04 in., maintain the maximum test load for an additional 50 minutes and record movements at 20 minutes, 30, 50, and 60 minutes. Maintain all load increments within 5 percent of the intended load.

TEST NAIL ACCEPTANCE CRITERIA

A. A test nail shall be considered acceptable when all of the following criteria are met:

1. For verification tests, the total creep movement is less than 0.08 in. between the 6- and 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
2. For proof tests, the total creep movement is less than 0.04 in. during the 10-minute readings or the total creep movement is less than 2 mm 0.08 in. during the 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period
3. For verification and proof tests, the total measured movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the test nail unbonded length.
4. A pullout failure does not occur at 3.0 DTL under verification testing and 1.5 DTL test load under proof testing. Pullout failure is defined as the inability to further increase the test load while there is continued pullout movement of the test nail. Record the pullout failure load as part of the test data.

B. Maintaining stability of the temporary unbonded test length for subsequent grouting is the Contractor's responsibility. If the unbonded test length of production proof test nails cannot be satisfactorily grouted subsequent to testing; the proof test nail shall become sacrificial and shall be replaced with an additional production nail installed at no additional cost to the owner.

Load	Hold Time
0.05 DTL max. (AL)	Until Movement Stabilizes
0.25 DTL	Until Movement Stabilizes
0.50 DTL	Until Movement Stabilizes
0.75 DTL	Until Movement Stabilizes
1.00 DTL	Until Movement Stabilizes
1.25 DTL	Until Movement Stabilizes
1.50 DTL (Max. Test Load)	Creep Test (see below)

SOIL NAIL WALL

TEST NAIL REJECTION

If a test nail does not satisfy the acceptance criterion:

1 For verification test nails, the Engineer will evaluate the results of each verification test. Installation methods that do not satisfy the nail testing requirements shall be rejected. The Contractor shall propose alternative methods and install replacement verification test nails. Replacement test nails shall be installed and tested at no additional cost.

2 For proof test nails, the Engineer may require the Contractor to replace some or all of the installed production nails between a failed proof test nail and the adjacent passing proof test nail. Alternatively, the Engineer may require the installation and testing of additional proof test nails to verify that adjacent previously installed production nails have sufficient load carrying capacity. Installation and testing of additional proof test nails or installation of additional or modified nails as a result of proof test nail failure(s) will be at no additional cost.

WALL DRAINAGE NETWORK

Install and secure all elements of the wall drainage network as shown on the working drawings. The drainage network shall consist of installing geocomposite drain strips, PVC connection pipes, and wall footing drains as shown in the working drawing drawings.

Exclusive of the wall footing drains, all elements of the drainage network shall be installed prior to shotcreting.

1. Geocomposite Drain Strips. Install geocomposite drain strips centered between the columns of nails as shown on the Plans. The drain strips shall be at least 24 in. wide and placed with the geotextile side against the ground. Secure the strips to the excavation face and prevent shotcrete from contaminating the geotextile. Drain strips will be vertically continuous. Make splices with a 12 in. minimum overlap such that the flow of water is not impeded. Install drain plate and connector pipe at base of each strip. Repair damage to the geocomposite drain strip, which may interrupt the flow of water.

2. Footing Drains. Install footing drains at the bottom of each wall as shown on the working drawings. The drainage geotextile shall envelope the footing drain aggregate and pipe and conform to the dimensions of the trench. Overlap the drainage geotextile on top of the drainage aggregate as shown on the Plans. Replace or repair damaged or defective drainage geotextile.

SOIL NAIL WALL

SHOTCRETE FACING

A. Provide construction shotcrete facing in accordance with this special provision. Where shotcrete is used to complete the top ungrouted zone of the nail drill hole near the face, position the nozzle into the mouth of the drill hole to completely fill the void

1 Final Face Finish. Shotcrete finish shall be either an undisturbed gun finish as applied from the nozzle or a rod, broom, wood float, rubber float, steel trowel or rough screeded finish as shown on the working drawings.

2 Attachment of Nail Head Bearing Plate and Nut. Attach a bearing plate, washers, and nut to each nail head as shown on the working drawings. While the shotcrete construction facing is still plastic and before its initial set, uniformly seat the plate on the shotcrete by hand-wrench tightening the nut. Where uniform contact between the plate and the shotcrete cannot be provided, set the plate in a bed of grout. After grout has set for 24 hours, hand-wrench tighten the nut. Ensure bearing plates with headed studs are located within the tolerances shown on the working drawings.

3 Shotcrete Facing Tolerances. Construction tolerances for the shotcrete facing from plan location and plan dimensions are as follows:

Horizontal location of welded wire mesh; reinforcing bars, and headed studs:	0.4 in.
Location of headed studs on bearing plate:	¼ in.
Spacing between reinforcing bars:	1 in.
Reinforcing lap, from specified dimension:	1 in.
Complete thickness of shotcrete:	
If troweled or screeded:	0.6 in.
If left as shot:	1.2 in.
Planeness of finish face surface-gap under 3-m (10-ft) straightedge:	
If troweled or screeded:	0.6 in.
If left as shot:	1.2 in.
Nail head bearing plate deviation from parallel to wall face:	10 degrees

SHOTCRETE REINFORCING FIBERS

A. Contractor may elect to use reinforcing deformed steel or fibrillated polypropylene fibers conforming to ASTM C 1116. The use of reinforcing fibers shall be pre-approved by the Engineer.

SHOTCRETE CONSTRUCTION

GENERAL

A. Conform to the following:

1. ACI 506R Guide to Shotcrete.
2. ACI 506.1 State of the Art Report on Fiber Reinforced Shotcrete.
3. ACI 506.2 Specifications for Proportioning Application of Shotcrete.

4. AASHTO C 311 Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Concrete.
5. Requirements for technician certification and laboratory qualifications are contained in the Department's Manual of Field Sampling and Testing Procedures.

SHOTCRETE EQUIPMENT

A. Water Supply System. For dry mix, provide a water storage tank at the job site. Provide a positive displacement pump with a regulating valve that is accurately controlled to provide water in the pressures and volumes recommended by the delivery machine manufacturer.
B. Mixing. Use equipment capable of handling and applying shotcrete containing the specified maximum size aggregate and admixtures. Provide an air hose and blowpipe to clear dust and rebound during shotcrete application.
C. Air Supply System. Use an air supply system capable of supplying the delivery machine and hose with air at the pressures and volumes recommended by the machine manufacturer. Do not use air supply systems that deliver oil-contaminated air or are incapable of maintaining constant pressure.
D. Delivery Machine. Use a delivery machine capable of supplying material to the delivery hose at a uniform rate. The ejection from the nozzle must adhere to the treated surface with minimum rebound and maximum density when the nozzle is held in the range of 3 to 6 ft from the target surface.

SHOTCRETE COMPOSITION (SHOTCRETE MIX DESIGN)

A. Design and produce shotcrete mixtures conforming to Table 1 for the type of shotcrete specified. Use the amount of water required to produce shotcrete of suitable strength, consistency, quality, and uniformity with the minimum amount of rebound. Use the same material types and sources as submitted with the mix design in the field trials and production work.
1. Fibers. If fibers are required, add them to the mix in the proportions recommended by the manufacturer.
2. Hydration stabilizing admixtures. Hydration stabilizing admixtures may be used to extend the allowable delivery time for shotcrete. Dosage is based on the time needed to delay the initial set of the shotcrete for delivery and discharge on the job. Design shall include discharge time limit in the dosage submittal. Dosage required to stabilize shotcrete shall be determined using job site material and field trial mixtures. The extended-set admixture shall control the hydration of all cement minerals and gypsum. The maximum allowable design discharge time is 3.50 hours.
3. If a hydration-stabilizing admixture is approved for use in the concrete mix, concrete shall be delivered and placed within the approved design discharge time limit. An approved and compatible hydration activator may be used at the discharge site to insure proper placement and testing.
4. Dosage and type of extended-set admixture shall be included with proposed mix design. When requested, the admixture manufacturer shall provide the service of a qualified person to assist in establishing the proper dose of extended-set admixture and

make dosage adjustments required to meet changing job site conditions

Table 1: Composition of Shotcrete

Type of Shotcrete Process	Minimum Cement Content		Maximum W/C(1) Ratio	Air Content Range (%)	Minimum 28-Day Compressive Strength(3)	
	(kg/m3)	(lb/cy3)			(MPa)	(psi)
Wet	325	550	0.55	NA	28	150
Dry	325	550	0.50	NA	28	150
Wet (w/EA)(2)	325	550	0.45	5 min	28	150
Dry (w/EA)	325	550	0.45	5 min.	28	150

Notes:
(1) W/C = Water/Cement (by weight).
(2) EA = Entrained Air.
(3) According to AASHTO T 22.

SHOTCRETE PRECONSTRUCTION TESTING

Conduct preconstruction shotcrete field trials before starting shotcrete production. Allow the Engineer the opportunity to witness all phases of the preconstruction testing.

1. Field Trials: Construct wood forms at least 6-in. thick by 3 ft by 3 ft in size. Have each proposed nozzle operator make test panels on two vertical wood forms. Cure the test panels according to AASHTO T 23, without immersing the panels.

2. Coring: Drill six 3-in. diameter cores from each test panel according to AASHTO T 24. Trim the ends of the cores according to AASHTO T 24 to make cylinders at least 3-in. long.

3. Compressive Strength Testing: Soak the cylinders in water for 40 hours immediately before testing. Test three cylinders from each test panel three days after field trial and test the remaining three cylinders 28 days after the field trial. Perform tests according to AASHTO T 22. All specified strength requirements shall be satisfied before the shotcrete mix design will be considered for acceptance.

4. Mix Design Acceptance: The Engineer will accept or reject the shotcrete mix design based on the results of the preconstruction field trials and testing. Before approving any changes to a previously accepted mix design, the Engineer may require additional preconstruction testing at no additional cost to the agency.

SOIL NAIL WALL

SURFACE PREPARATION AND APPLICATION OF SHOTCRETE

A. Surface Preparation - Clean loose material, mud, rebound, and other foreign matter from all surfaces to receive shotcrete. Remove curing compound on previously placed shotcrete surfaces by sandblasting. Install approved depth gages to indicate the thickness of the shotcrete layers. Install depth gages on 6-ft centers longitudinally and transversely with no less than two gauges per increment of surface area to receive the shotcrete. Moisten all surfaces.

B. Weather Limitations - Place shotcrete when the ambient temperature is 41ºF(5ºC) or higher. Do not perform shotcrete operations during high winds and heavy rains.

C. Shotcrete Application
1. Do not apply shotcrete to frozen surfaces.
2. Use acceptable nozzle operators who have fabricated acceptable test panels.
3. Apply shotcrete within 45 minutes of adding cement to the mixture. Apply shotcrete at a mix temperature between 50ºF (10ºC) and 86ºF (30ºC).
4. Direct the shotcrete at right angles to the receiving surface except when shooting ground reinforcing bars. Apply shotcrete in a circular fashion to build up the required layer thickness. Apply shotcrete in a steady uninterrupted flow. If the flow becomes intermittent, direct the flow away from the work area until it becomes steady.
5. Make the surface of each shotcrete layer uniform and free of sags, drips, or runs.
6. Limit the layer thickness of each shotcrete application to 2 in. Thicker applications may be approved if the contractor can demonstrate that no sloughing or sagging is occurring. If additional thickness is required, broom or scarify the applied surface and allow the layer to harden. Dampen the surface before applying an additional layer.
7. Remove laitance, loose material, and rebound. Promptly remove rebound from the work area.
8. Taper construction joints to a thin edge over a distance of at least 1 ft. Wet the joint surface before placing additional shotcrete on the joint. Do not use square construction joint.

D. Production Summary - Prepare and submit a summary of shotcrete production application for each shift. Furnish the summary to the Engineer within 24 hours. Include the following information in the report:
1. Quantity and location of shotcrete applied including sketches.
2. Observations of success or problems of equipment operation, application, final product conditions, and any other relevant issues during production and application.
3. Description of placement equipment.
4. Batch number(s) if applicable.

SHOTCRETE QUALITY CONTROL RECORDS

A. Submit field quality control test reports within two working days of performing the tests. Include the following information in the reports:
1. Sample identification including mix design and test panel number and orientation.

2. Date and time of sample preparation including name of persons preparing samples, curing conditions and sample dimensions.
3. Date, time, and type of test.
4. Complete test results including load and deformation data during testing, sketch of sample before and after testing, and any unusual occurrences observed.
5. Names and signature of person performing the test.
6. Location of steel reinforcement, if used, covered by shotcrete.
7. Name of nozzle operator

Material or Product	Property or Characteristic	Category	Test Methods or Specifications	Frequency(4)	Sampling Point
	Air content	–	AASHTO T 152	1 per load(1)	Truck, mixer or agitator(2)
Shotcrete	Unit mass	–	AASHTO T 121	1 per load(1)	Truck, mixer or agitator(2)
	Compressive strength	II	AASHTO T 22	1 set per 33 cy, but not less than 1 set each day (3)	Production test panels(3)

SHOTCRETE PROTECTION AND CURING

A. Protect and cure the surface according to Standard Specification Section 802. Clear curing compound shall be used as an interim cure for intermediate shotcrete surfaces. Apply curing compound to the final exposed shotcrete surface according to Standard Specification Section 802.17. Protect and maintain shotcrete at a temperature above 41ºF (5ºC) until shotcrete has achieved a minimum strength of 750 psi.

SHOTCRETE ACCEPTANCE

A. Material for concrete will be evaluated by visual inspection of the work, conformance testing and by certification for materials manufactured off-site. Compressive strength will be evaluated by conformance testing using Table 1 for specification limits. See Table 2 for minimum sampling and testing requirements and acceptance quality category.

Table 2: Sampling and Testing of Shotcrete.

Material or Product	Property or Characteristic	Category	Test Methods or Specifications	Frequency(4)	Sampling Point
	Air content	–	AASHTO T 152	1 per load(1)	Truck, mixer or agitator(2)
Shotcrete	Unit mass	–	AASHTO T 121	1 per load(1)	Truck, mixer or agitator(2)
	Compressive strength	II	AASHTO T 22	1 set per 33 cy, but not less than 1 set each day (3)	Production test panels(3)

Notes:
(1) When continuous mixing is used sample every 10 cy.

(2) Sample according to AASHTO T 141.
(3) Prepare production test panels according to procedures listed in section shotcrete preconstruction testing. Obtain two 3-in. diameter core specimens from each panel according to AASHTO T 24. A single compressive strength test result is the average result from two 3-in. diameter core specimens from the same test panel tested according to AASHTO T 22 at 28 days.
(4) Engineer shall conduct verification testing at a rate of one (1) per four (4) performed by the Contractor or a minimum of one (1) per job.

BACKFILLING BEHIND WALL FACING UPPER CANTILEVER

A. Compact backfill within 3 ft behind the wall facing upper cantilever using light mechanical tampers.

B. Backfill shall be relatively free draining granular material meeting the minimum requirements of Selected Material Class SM-1 in Section 302 of the Standard Specifications for Highway Construction, edition 2003.

ACCEPTANCE

Material for the soil nail retaining wall will be accepted based on the manufacturer production certification and from quality control and acceptance sampling and testing results as well as verification testing results. Construction of the soil nail retaining wall will be accepted based on conformance with the plans, specifications and this special provision.

METHOD OF MEASUREMENT: Soil nail walls will be measured by the square foot of front surface area between two foot below the proposed ground at the face of the wall and the top of the wall.

BASIS OF PAYMENT: Soil nail walls completed, accepted and measured as provided above will be paid for at the contract unit price bid per square foot, which price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including design, preparing working drawings, testing, all concrete, reinforcing steel, pneumatically placed concrete (shotcrete), expansion and construction joints, wall drainage materials, drilling, nail reinforcement, grout, test nails, geotechnical investigation, pipe underdrains; for performing mix designs and quality control and acceptance sampling and testing; and for doing all the work involved in installing the soil nails, design and installing the final facing wall complete in place, as shown on the working drawings and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

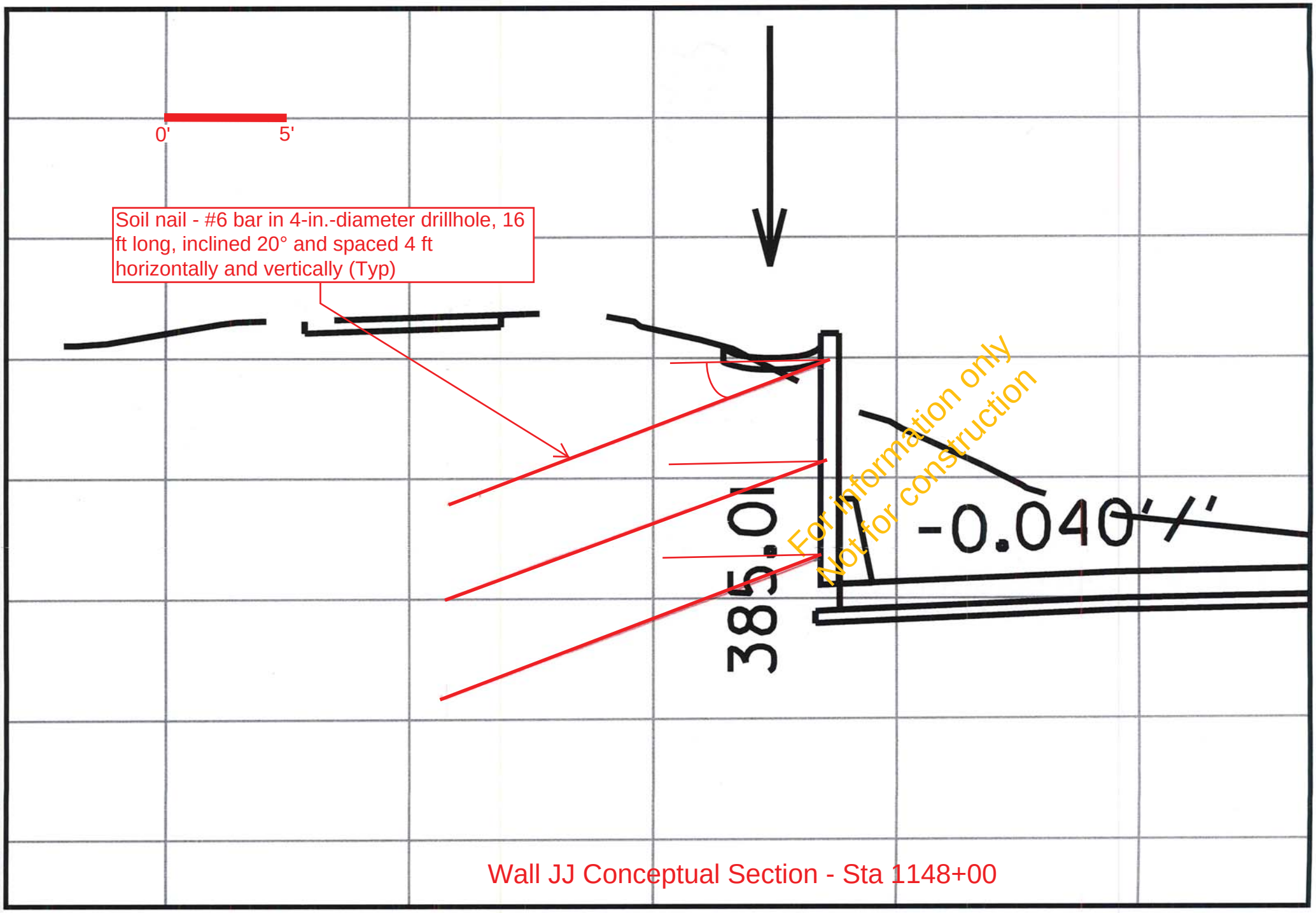
The Contractor shall comply with applicable Federal, State, and local laws governing safety in accordance with Subsection 107.01(b) in any and all excavation and/or shoring operations. Contractor has the option of using a cut slope and/or shoring to maintain stability of the cut. Any shoring, and/or additional excavation, and subsequent backfill beyond the vertical cut line behind the pneumatically placed concrete will not be paid separately.

SOIL NAIL WALL

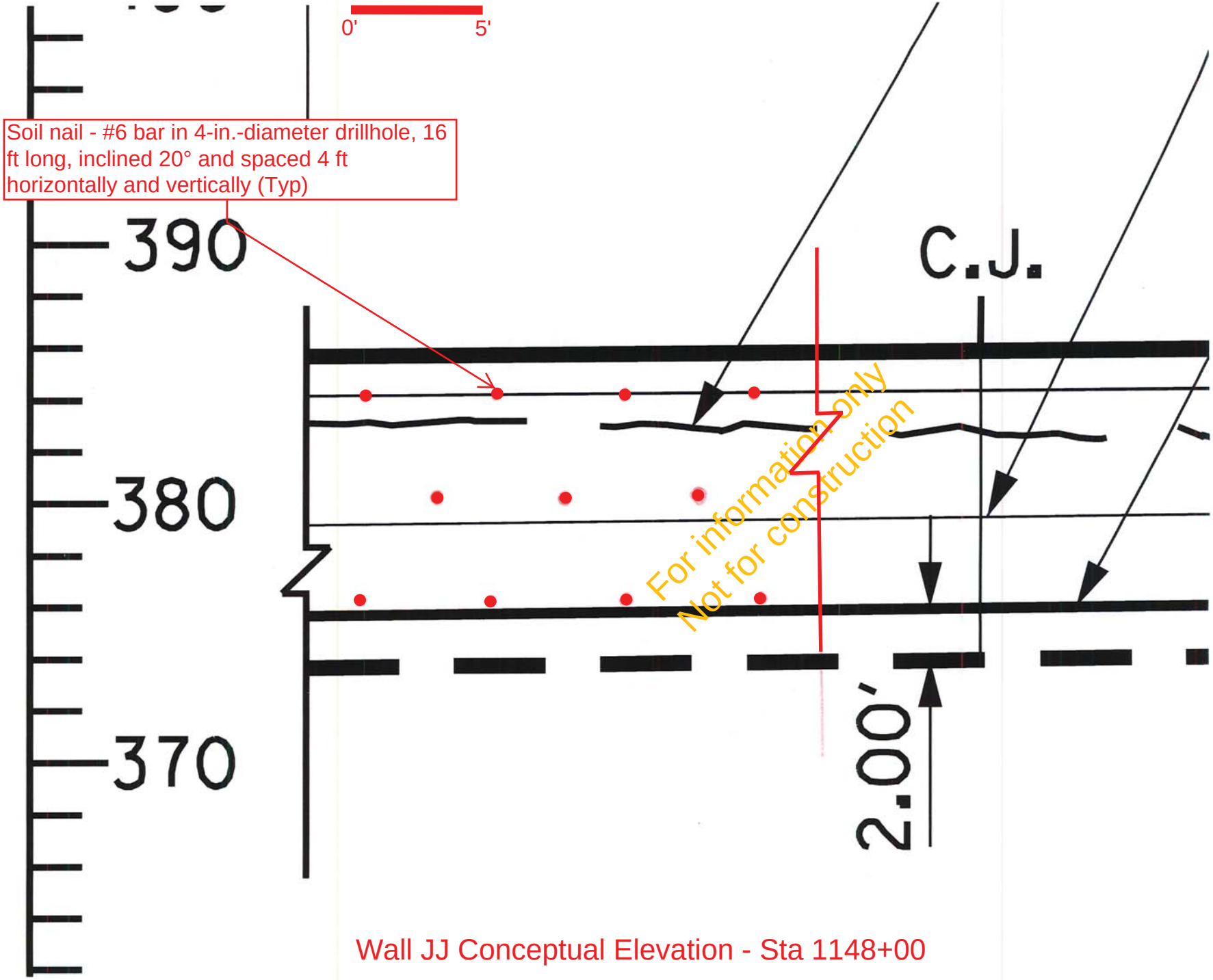
Payment will be made under:

Pay Item	**Pay Unit**
Soil Nail Wall	Square Foot

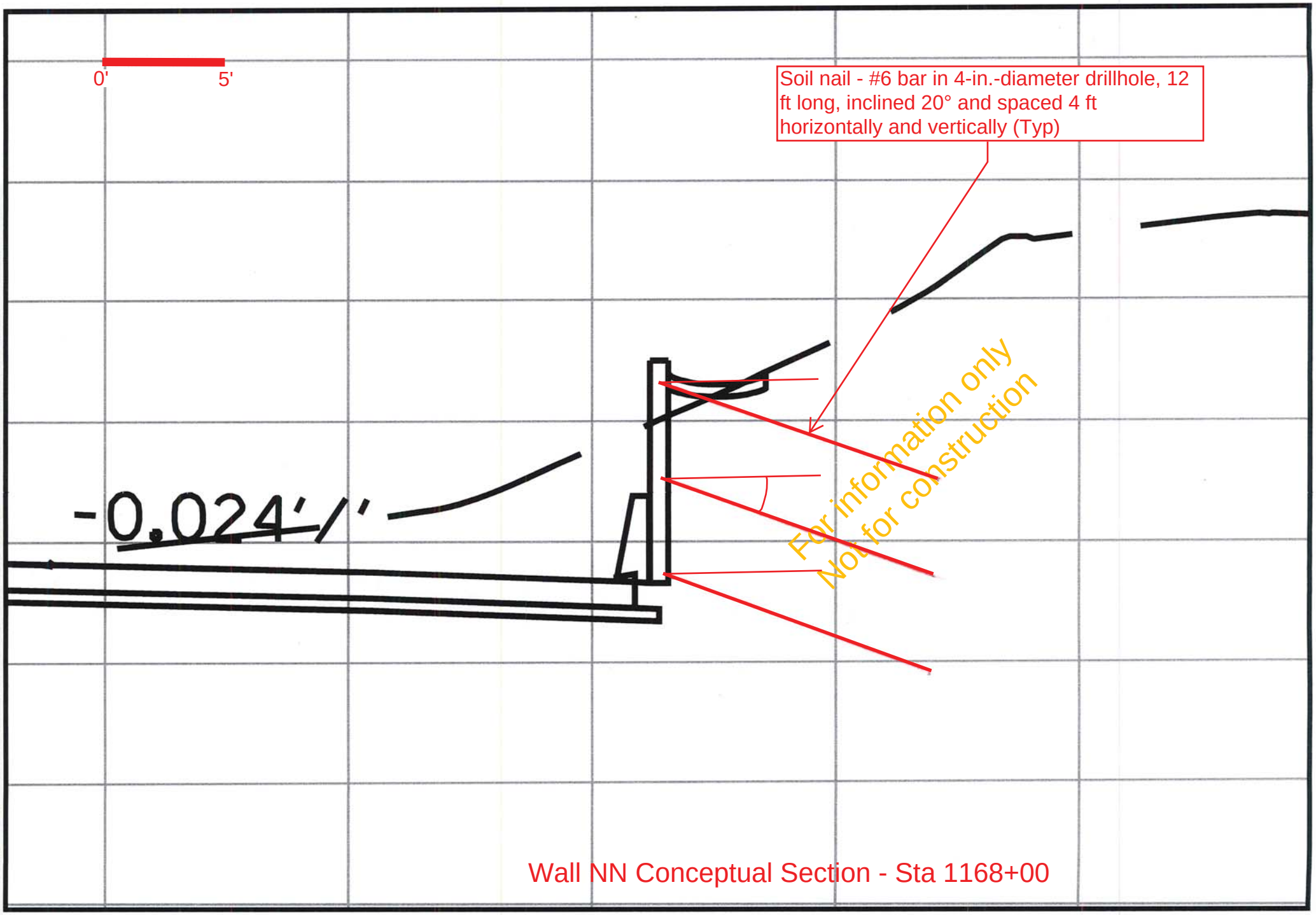
ATTACHMENT 12



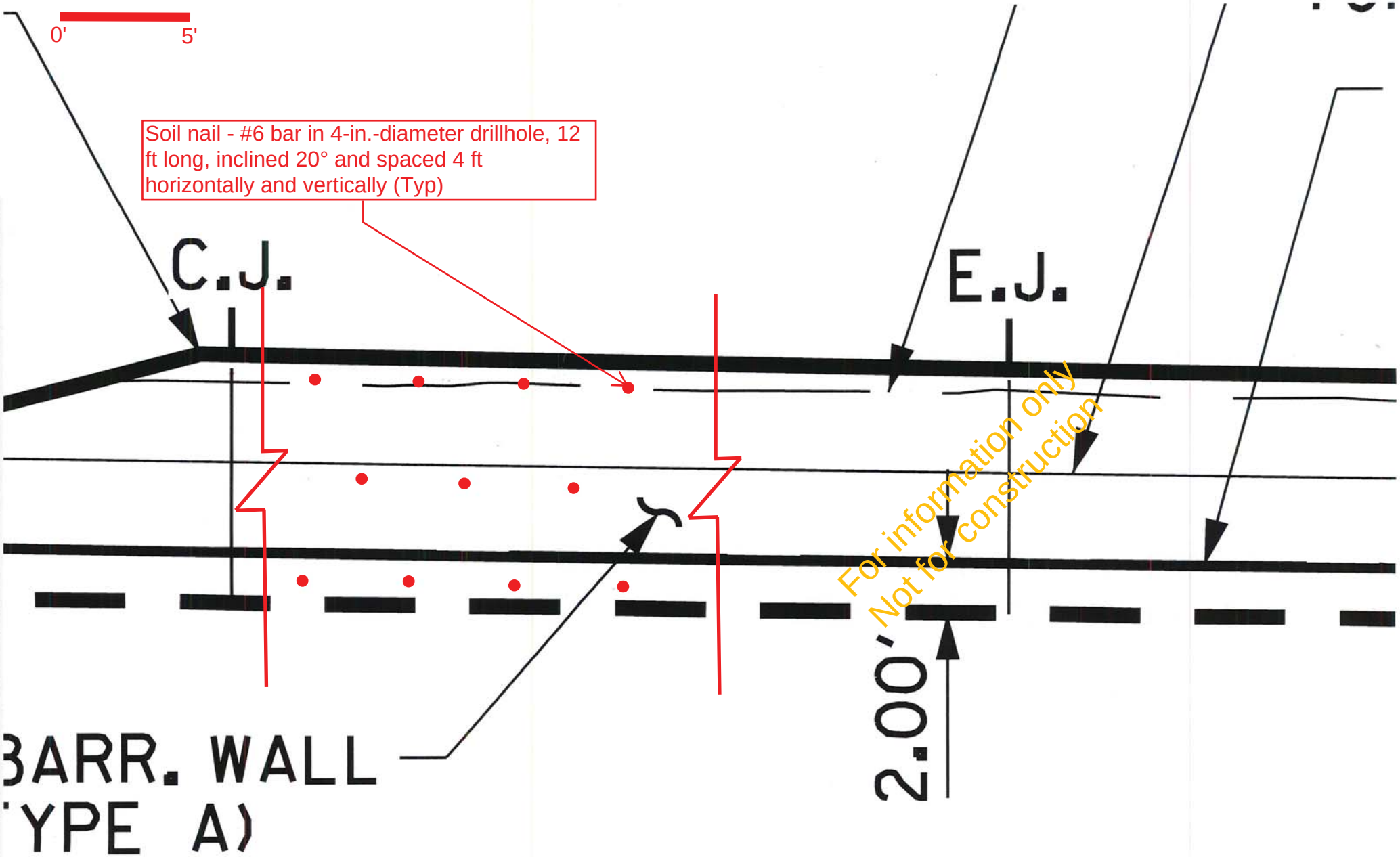
Wall JJ Conceptual Section - Sta 1148+00



Wall JJ Conceptual Elevation - Sta 1148+00



Wall NN Conceptual Section - Sta 1168+00

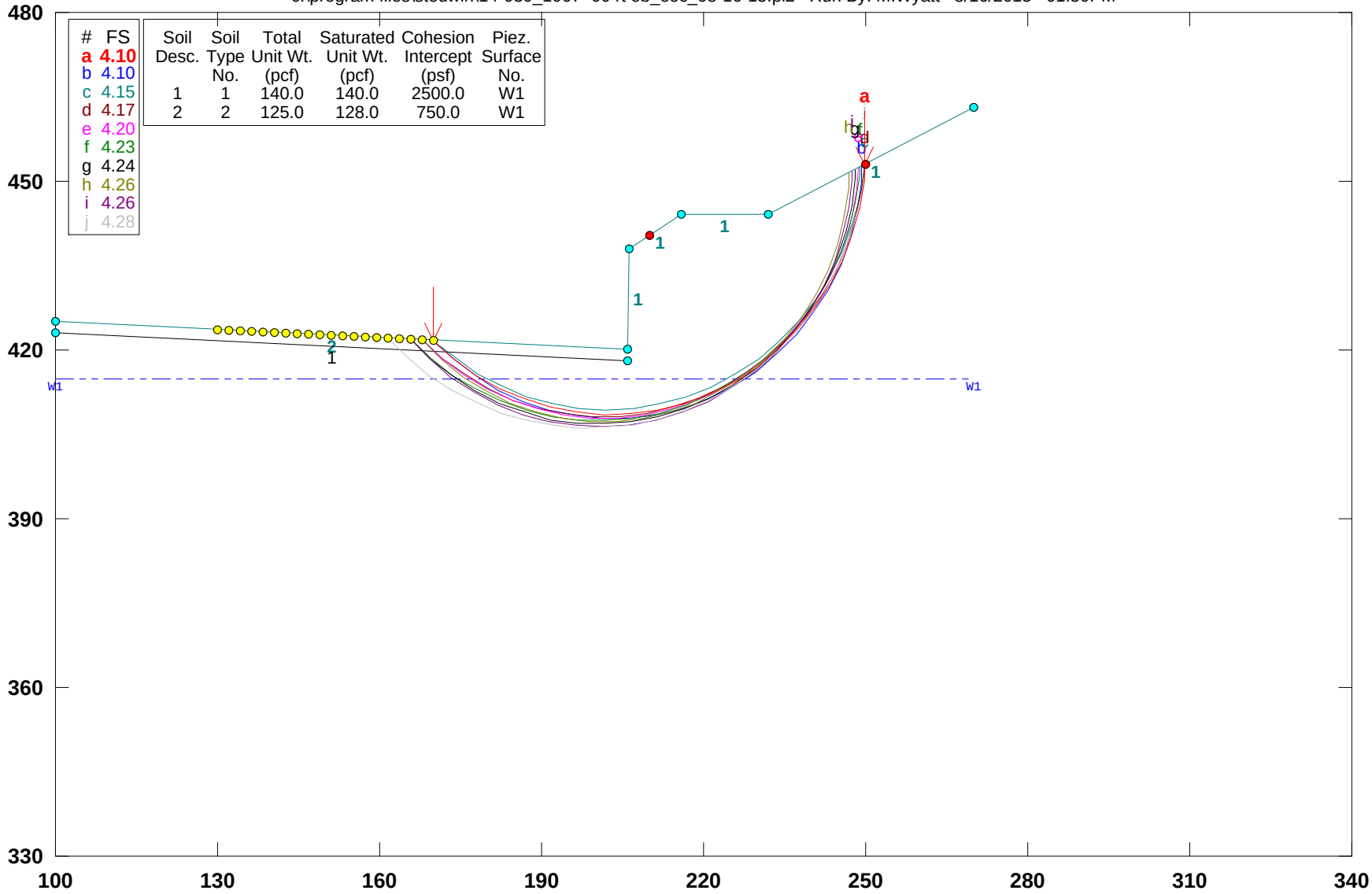


Wall NN Conceptual Elevation - Sta 1168+00

ATTACHMENT 13

CA0608 Wall AA, Sta 1067+50 Rt EOC Condition

c:\program files\stedwin\14-030_1067+00 rt ob_eoc_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 01:50PM



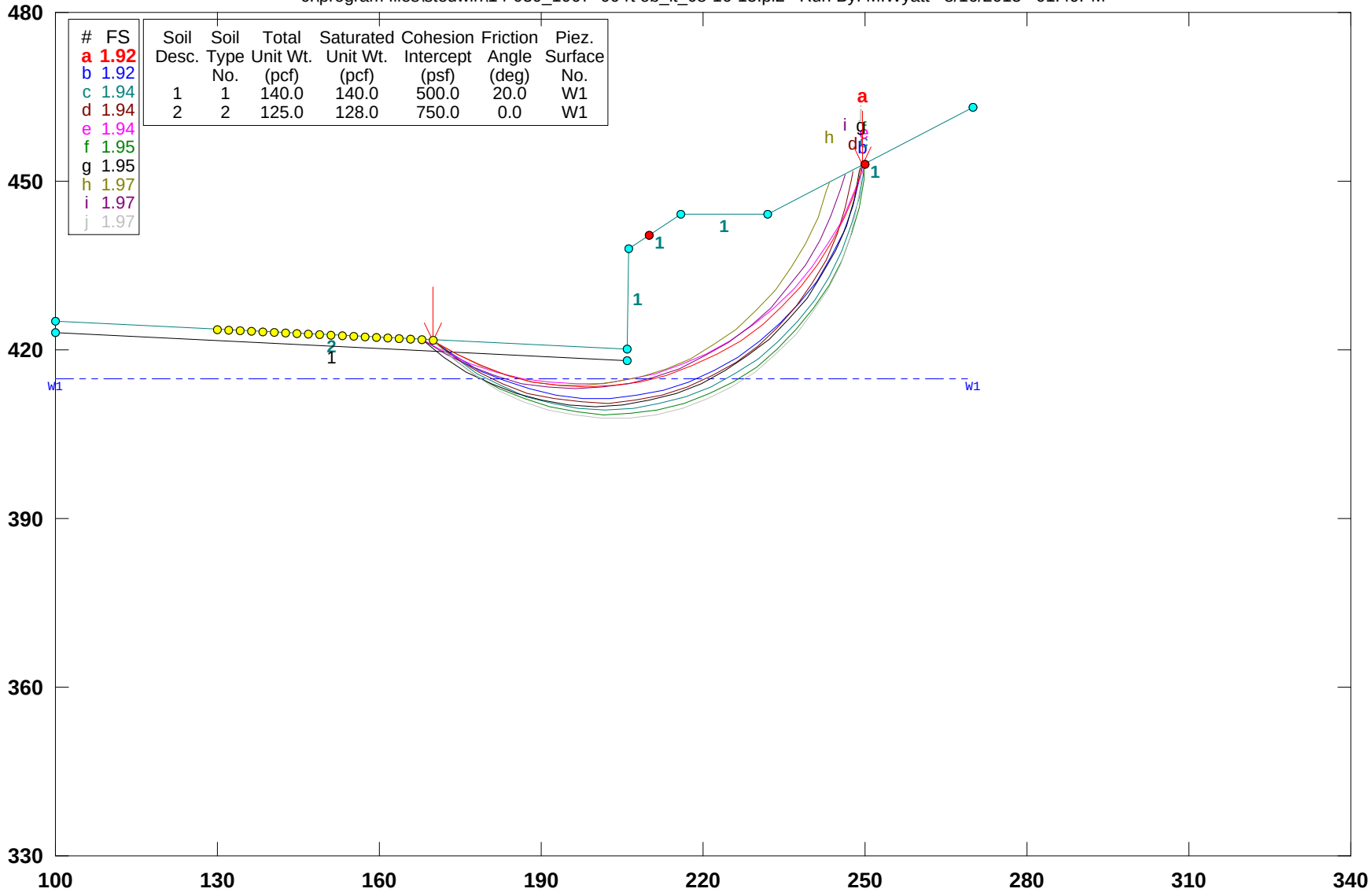
PCSTABL5M/si FSmin=4.10

Safety Factors Are Calculated By The Modified Bishop Method

STED

CA0608 Wall AA, Sta 1067+50 Rt Long Term Condition

c:\program files\stedwin\14-030_1067+00 rt ob_lt_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 01:49PM



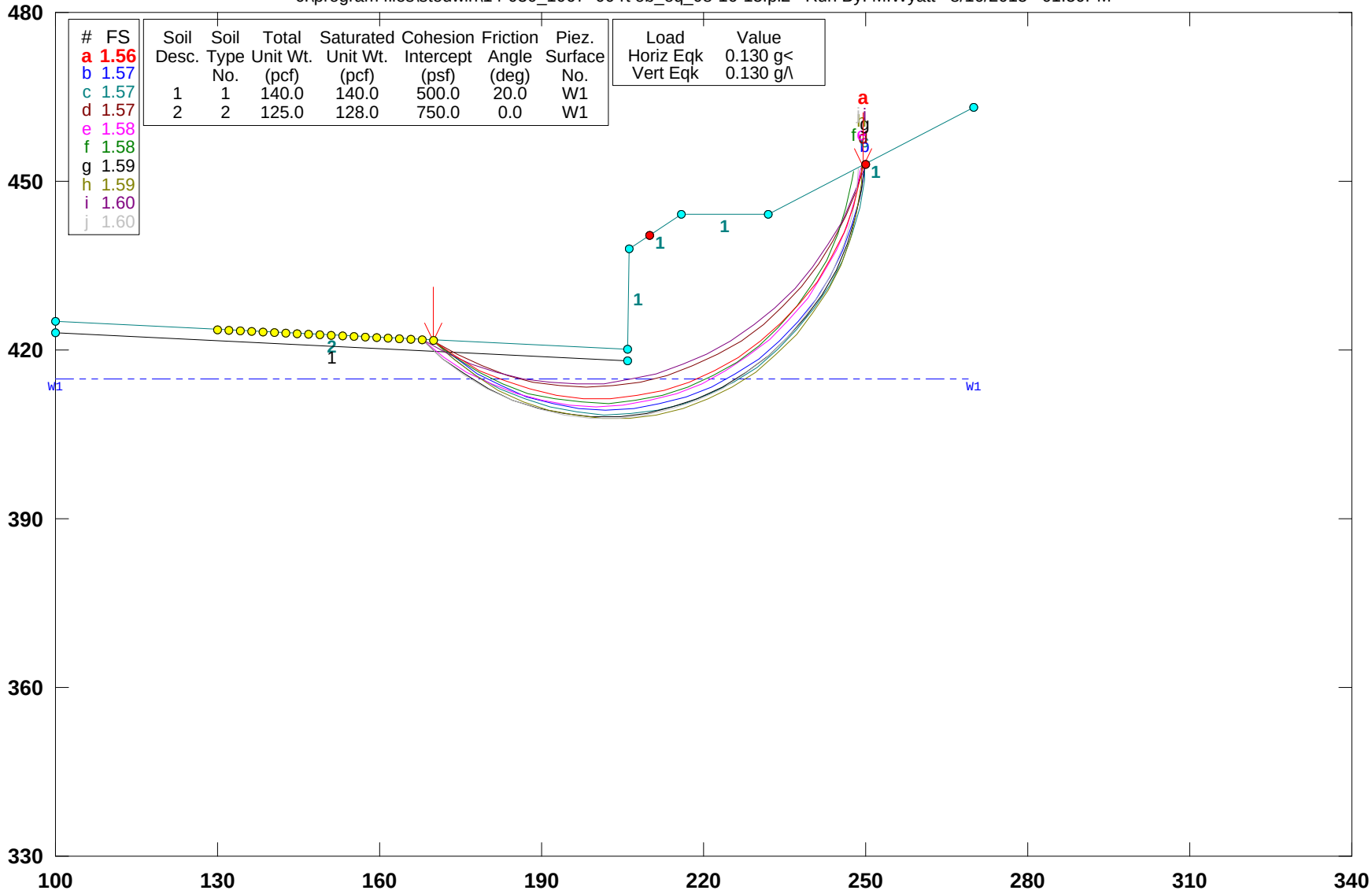
PCSTABL5M/si FSmin=1.92

Safety Factors Are Calculated By The Modified Bishop Method

STED

CA0608 Wall AA, Sta 1067+50 Rt Seismic Condition (A=0.13g)

c:\program files\stedwin\14-030_1067+00 rt ob_eq_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 01:50PM



#	FS
a	1.56
b	1.57
c	1.57
d	1.57
e	1.58
f	1.58
g	1.59
h	1.59
i	1.60
j	1.60

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	140.0	140.0	500.0	20.0	W1
2	2	125.0	128.0	750.0	0.0	W1

Load	Value
Horiz Eqk	0.130 g<
Vert Eqk	0.130 g/\

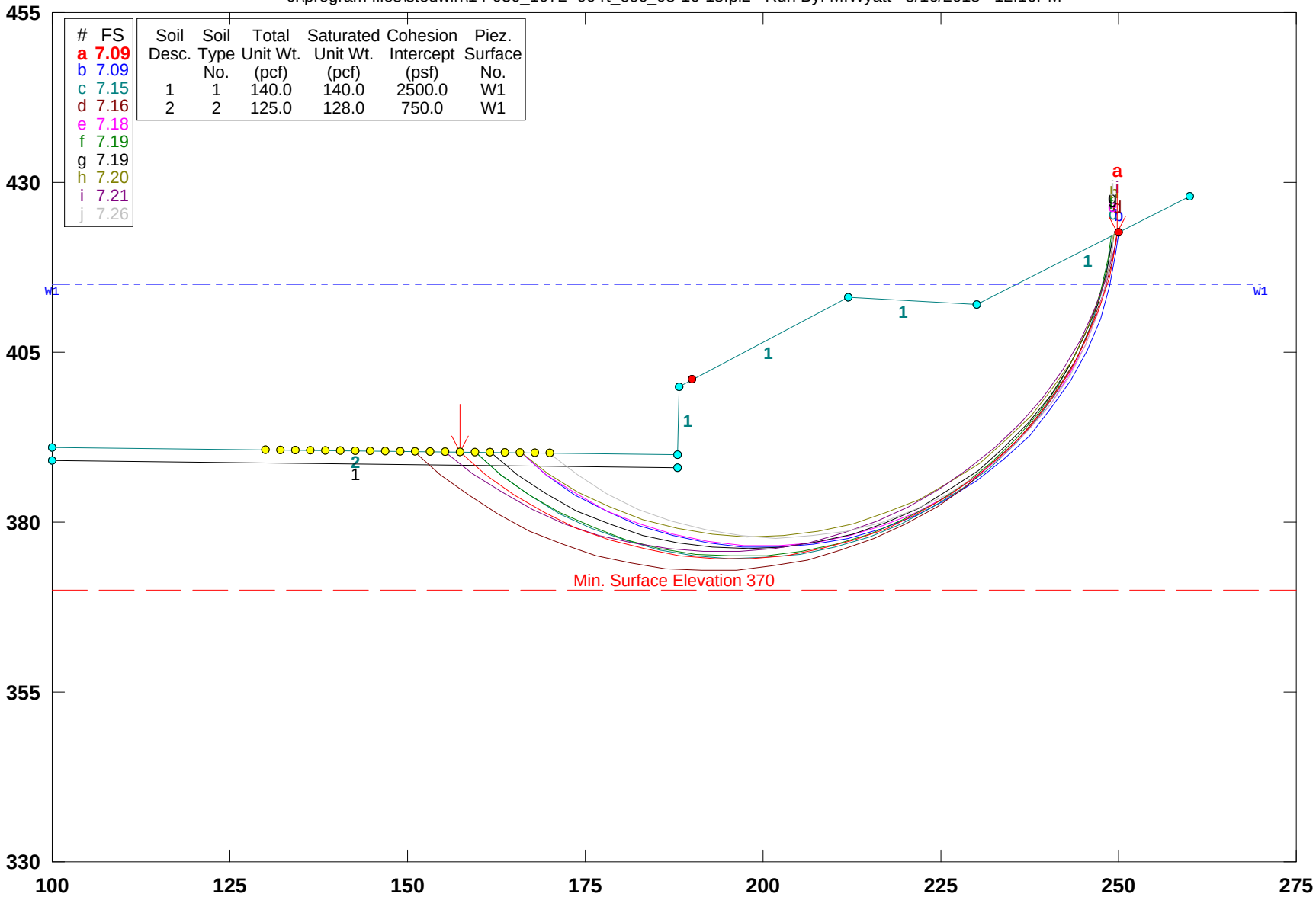
PCSTABL5M/si FSmin=1.56

Safety Factors Are Calculated By The Modified Bishop Method

STED

CA0608 Wall AA, Sta 1072+00 Rt End of Construction Condition

c:\program files\stedwin\14-030_1072+00 rt_eoc_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 12:16PM



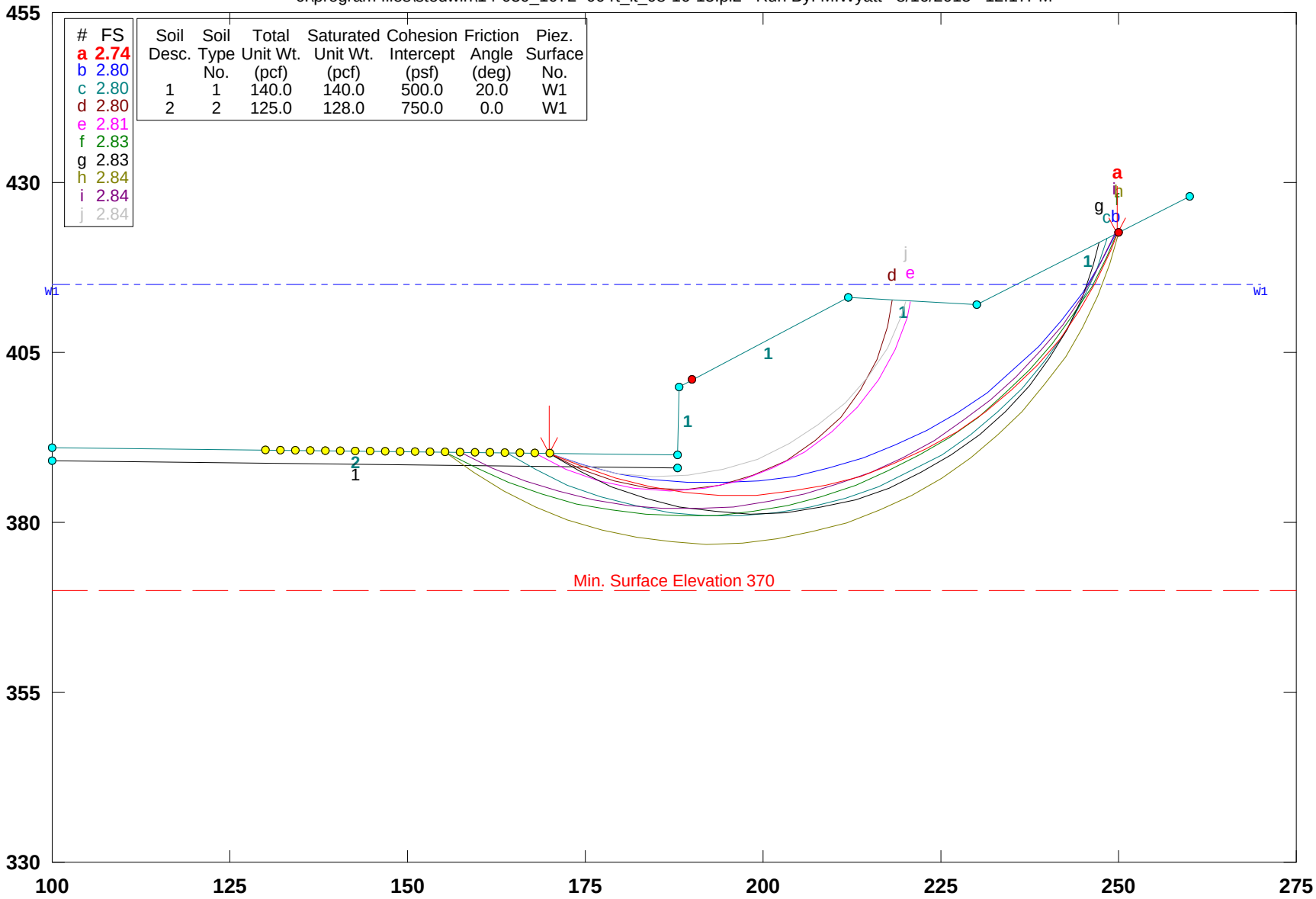
PCSTABL5M/si FSmin=7.09

Safety Factors Are Calculated By The Modified Bishop Method

STED

CA0608 Wall AA, Sta 1072+00 Rt Long Term Condition

c:\program files\stedwin\14-030_1072+00 rt_lt_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 12:17PM



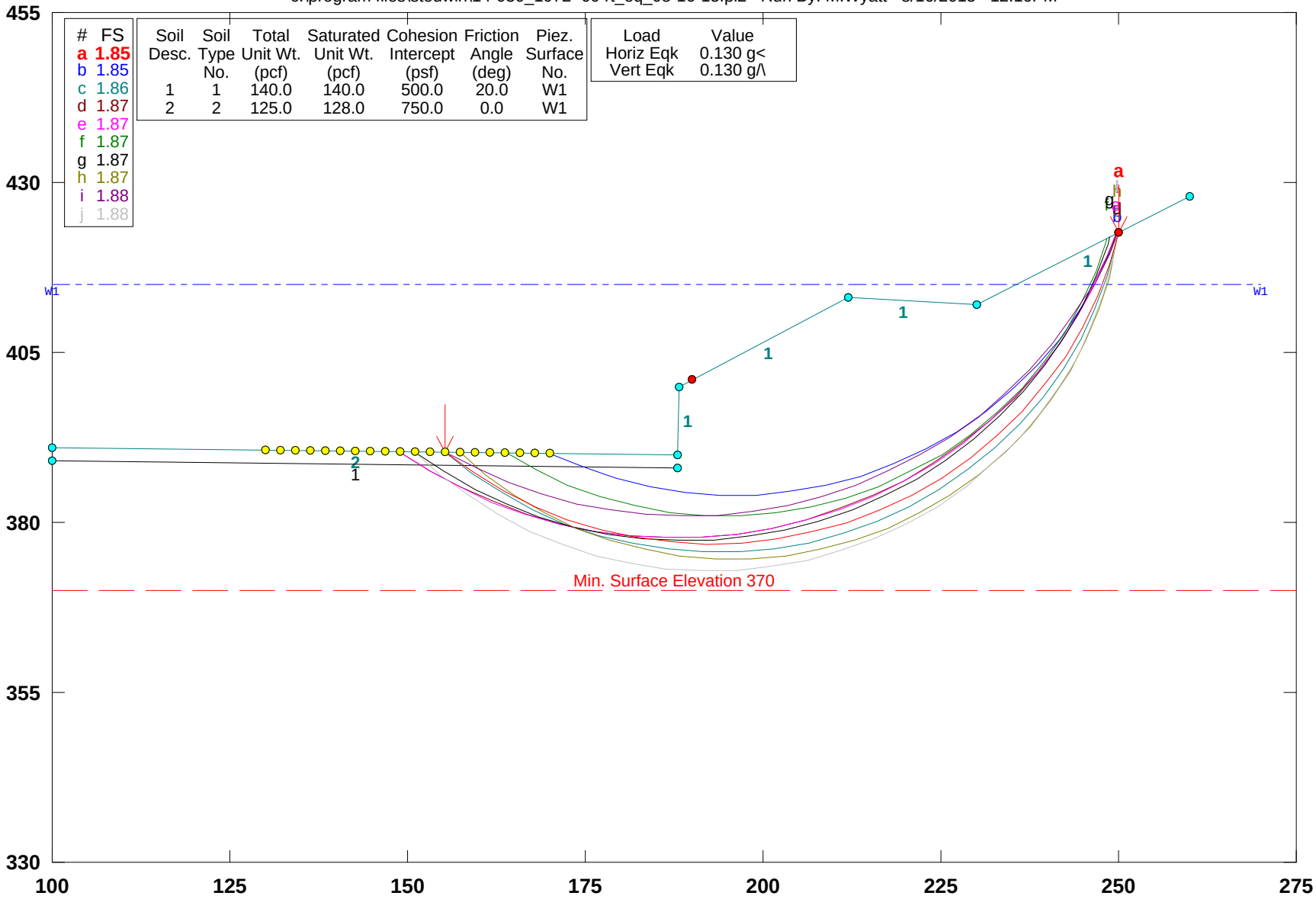
PCSTABL5M/si FSmin=2.74

Safety Factors Are Calculated By The Modified Bishop Method

STED

CA0608 Wall AA, Sta 1072+00 Rt Seismic Condition (A=0.13g)

c:\program files\stedwin\14-030_1072+00 rt_eq_08-16-15.pl2 Run By: M.Wyatt 8/16/2015 12:16PM

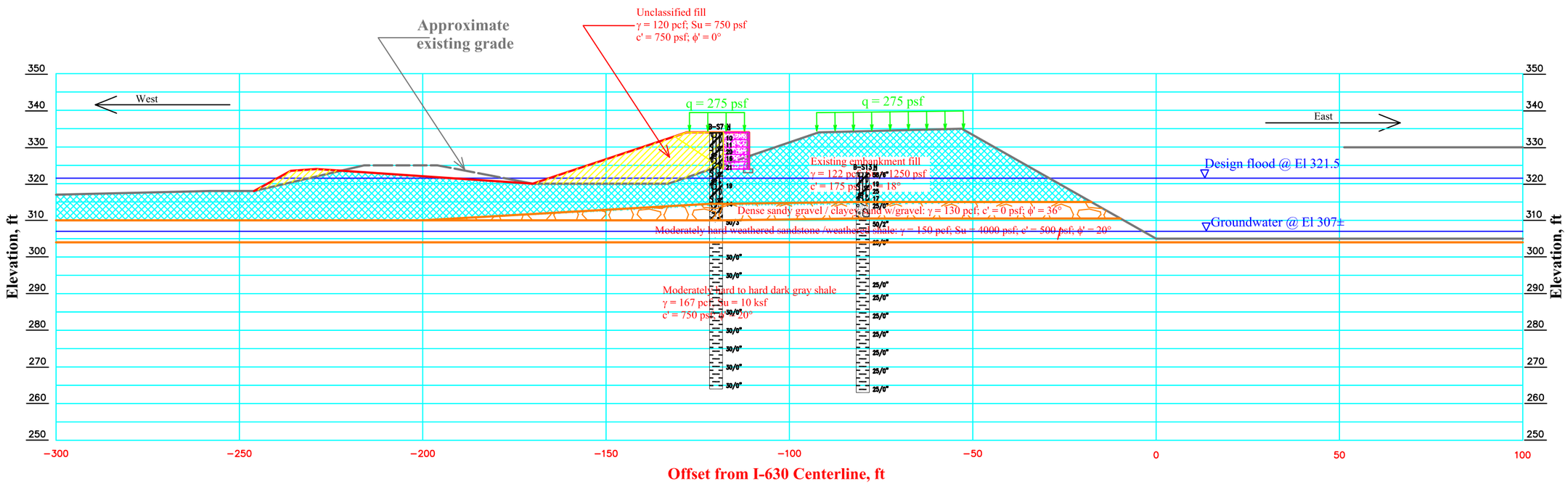


PCSTABL5M/si FSmin=1.85

Safety Factors Are Calculated By The Modified Bishop Method

STED

ATTACHMENT 14



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

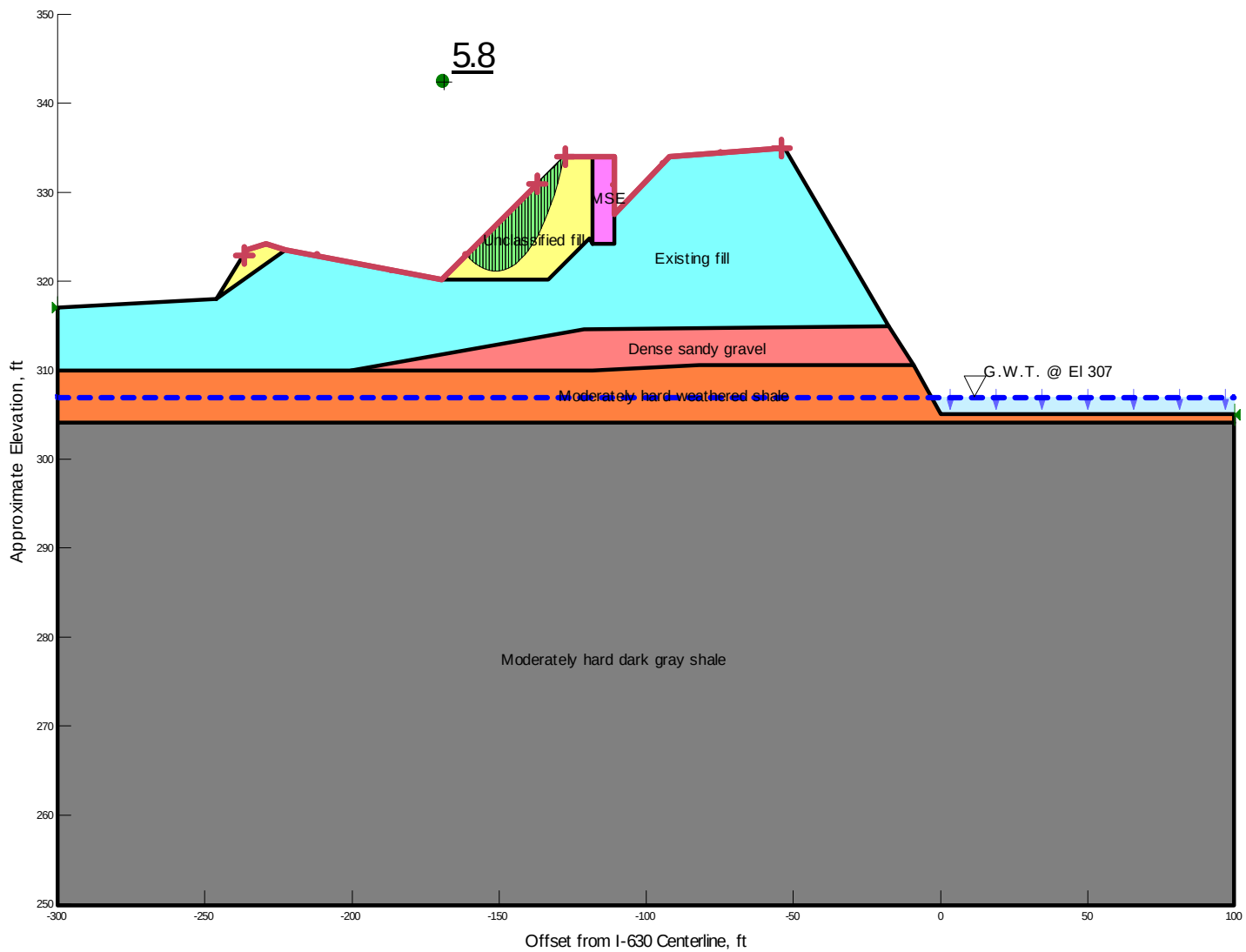
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Wall BB @ Sta 1111+00
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 16, 2015	Plate

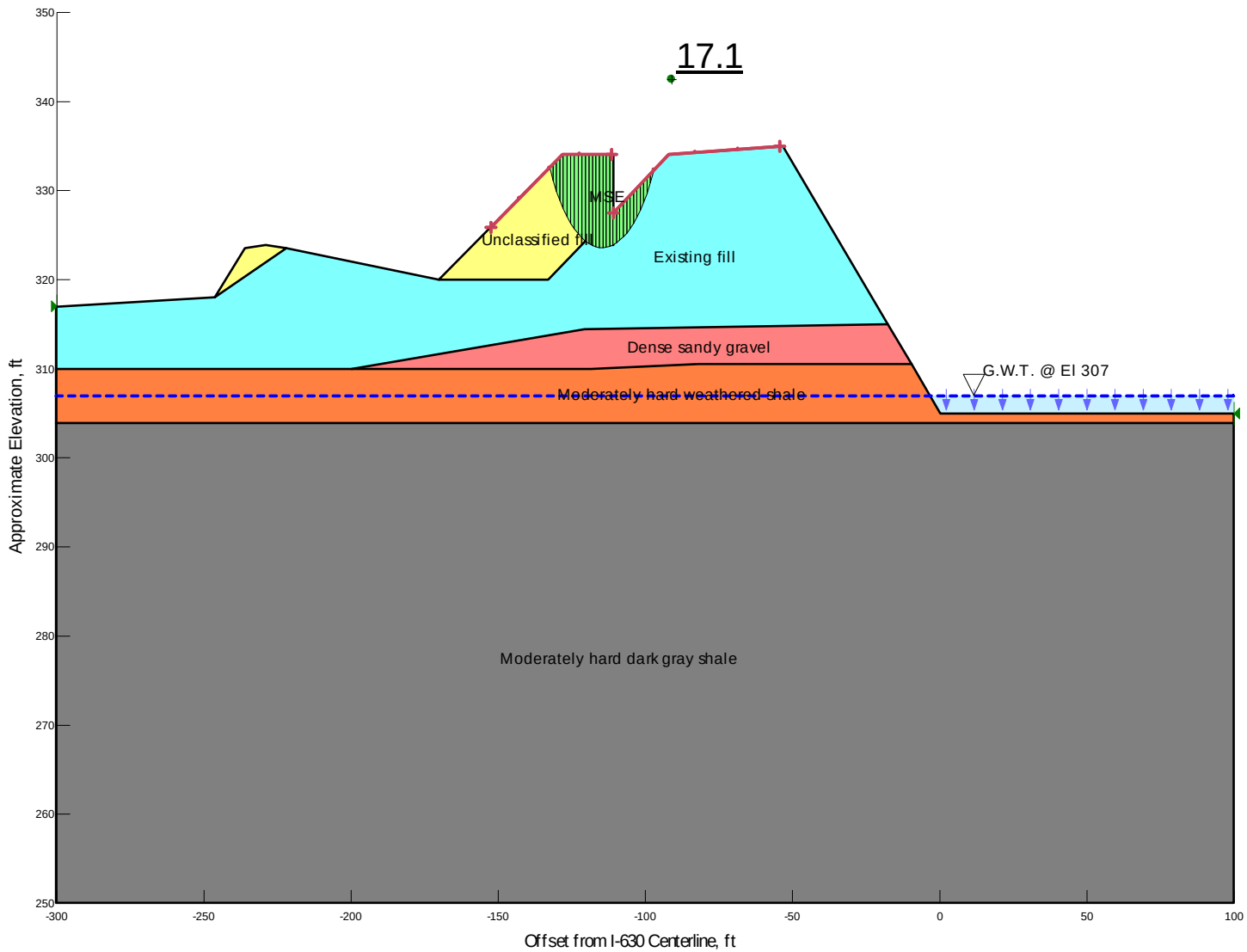
Results of Stability Analyses
Retaining Wall BB
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Embankment Side	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left - slope)	End of Construction	Groundwater @ El 307±	5.8
South (right – Wall BB)			17.1
North (left - slope)	Long Term	Groundwater @ El 307±	3.1
South (right – Wall BB)			6.2
North (left - slope)		Design flood @ El 320.5±	2.8
South (right – Wall BB)			6.2
North (left - slope)	Seismic (k_h = 1.0A_S = 0.13)	Groundwater @ El 307±	1.8
South (right – Wall BB)			3.7
North (left - slope)	Rapid drawdown	Drawdown from El 320.5± to ground surface	2.8
South (right – Wall BB)			6.2



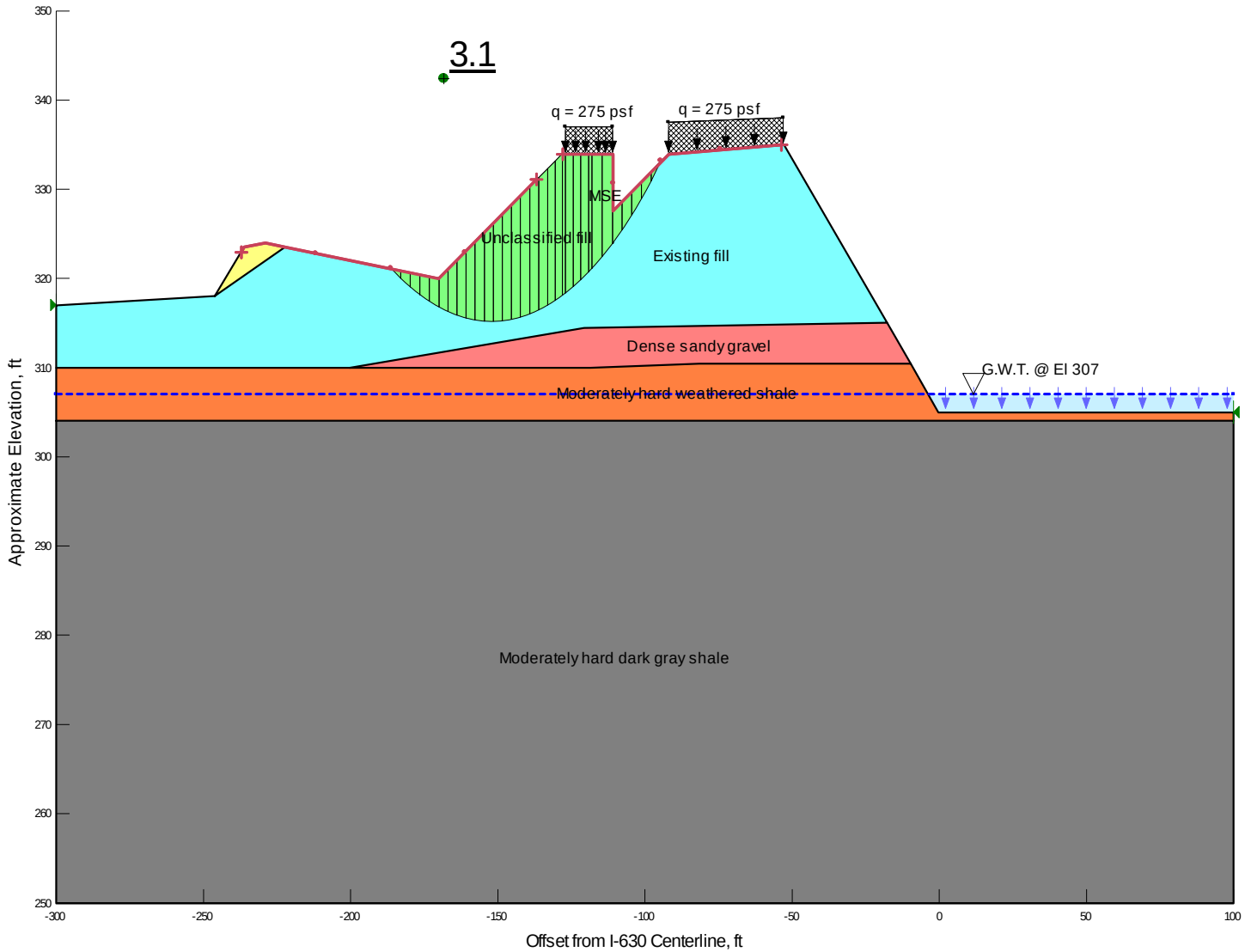
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
Embankment Slope @ North Side

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



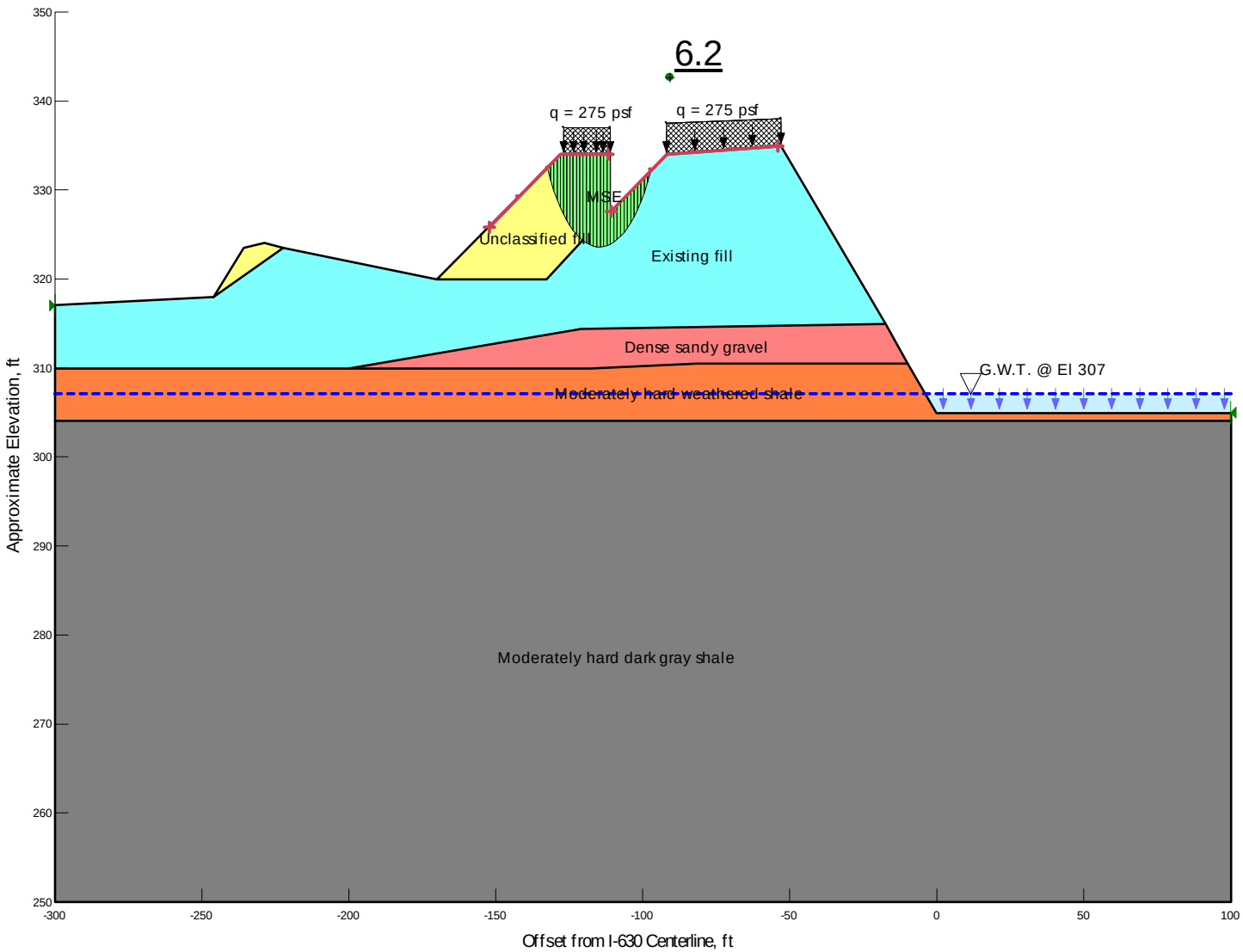
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
MSE Wall BB

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



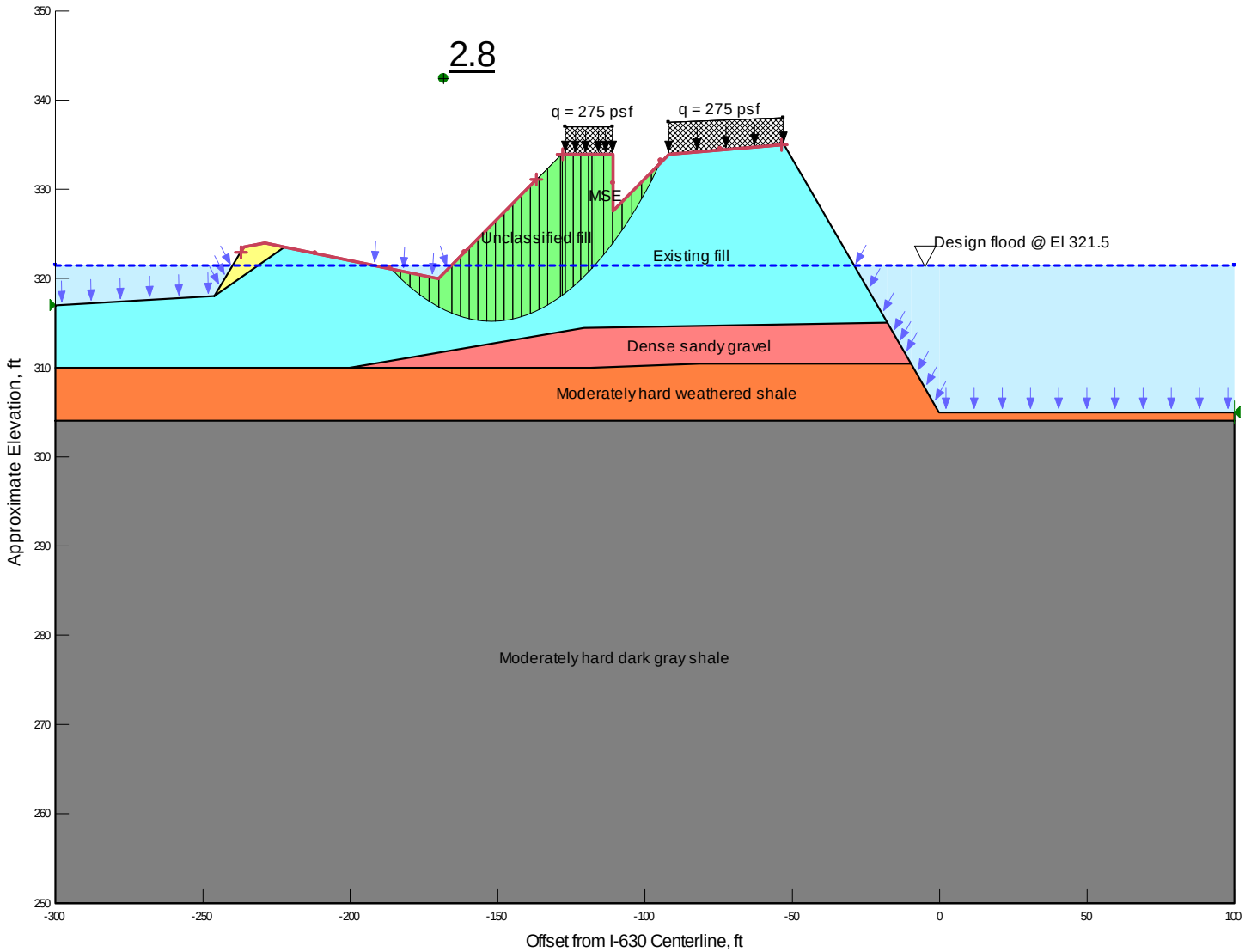
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
Embankment Slope @ North Side

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



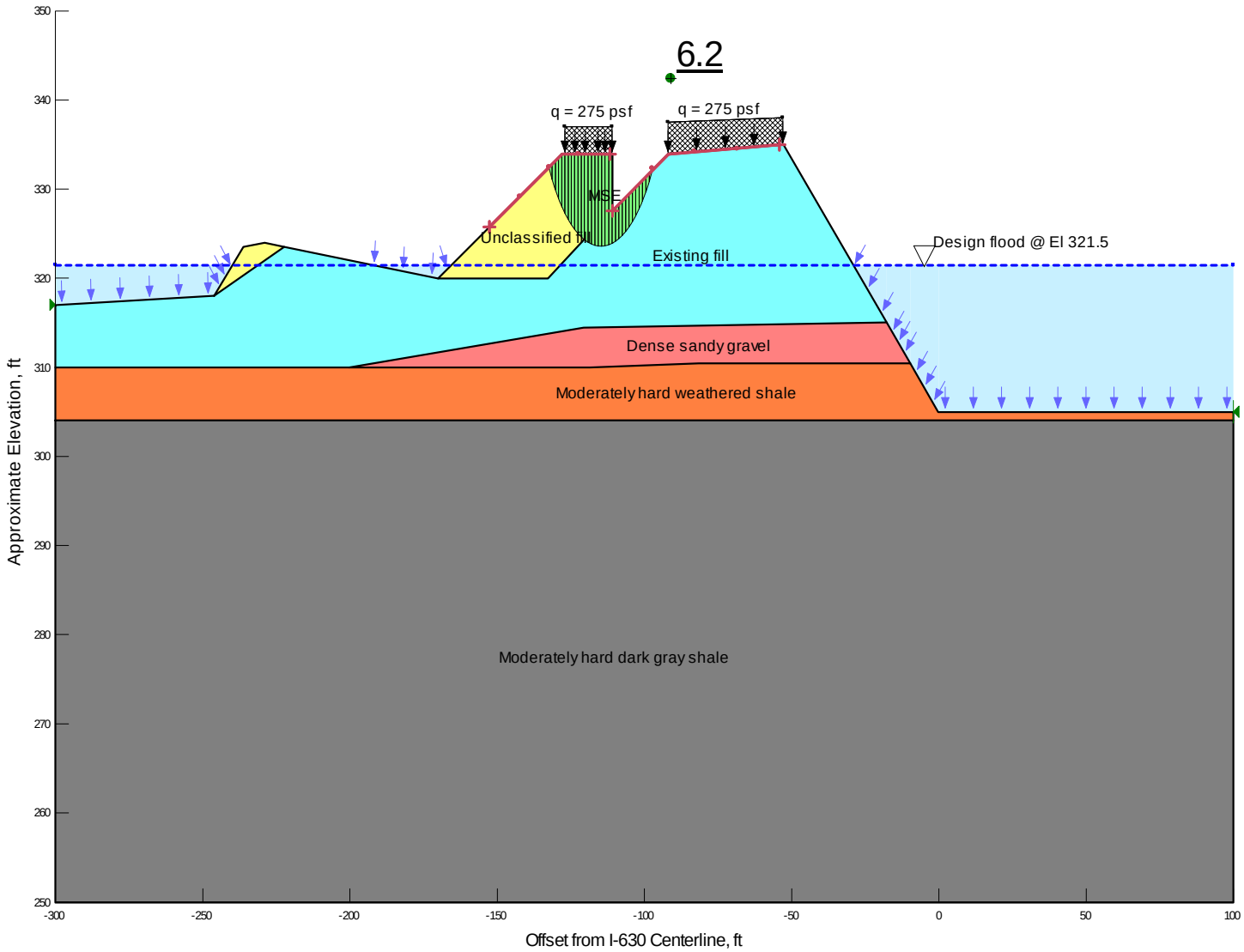
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
MSE Wall BB

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



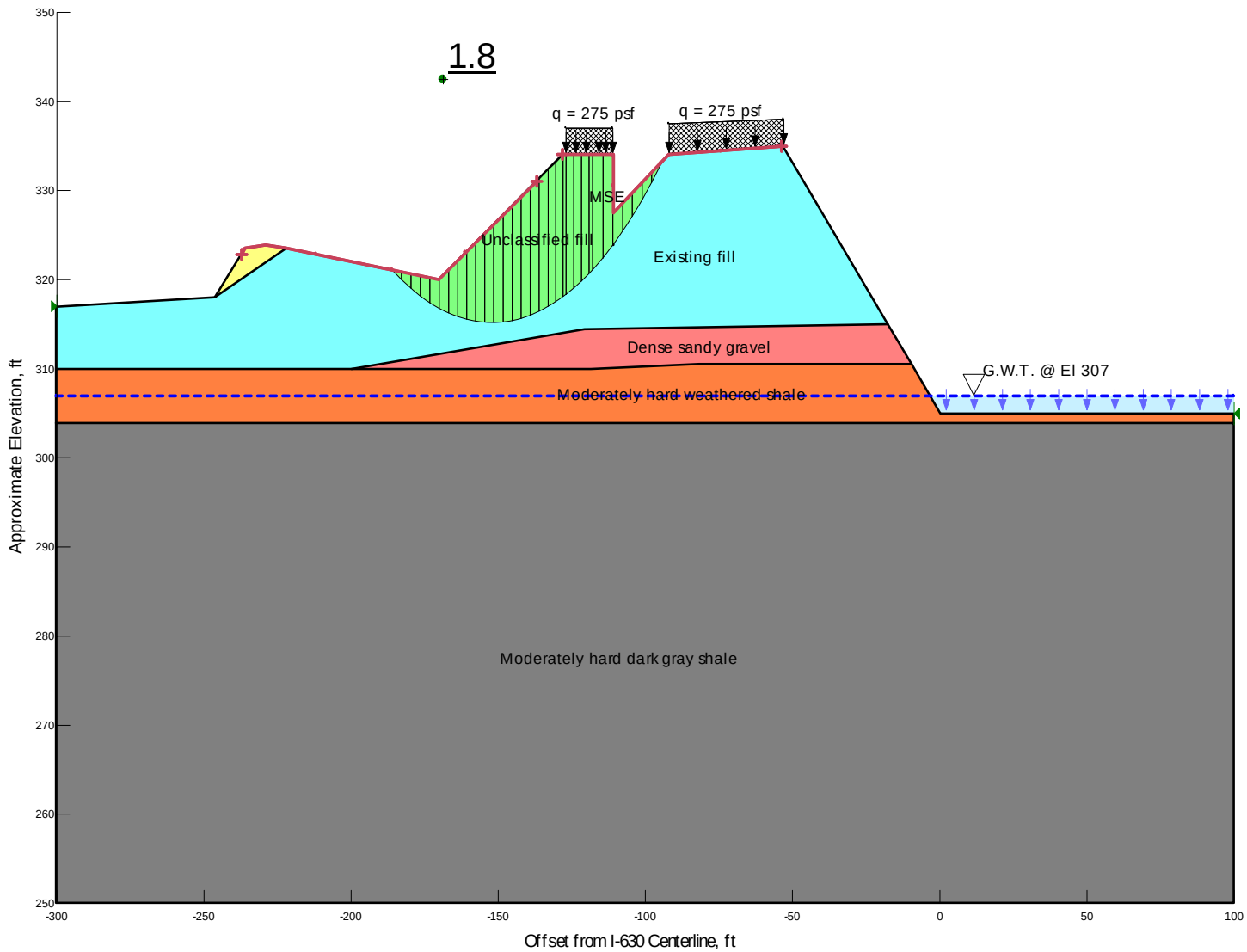
Results of Stability Analyses – Long Term Condition
Design Flood @ El 321.5±
Embankment Slope @ North Side

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



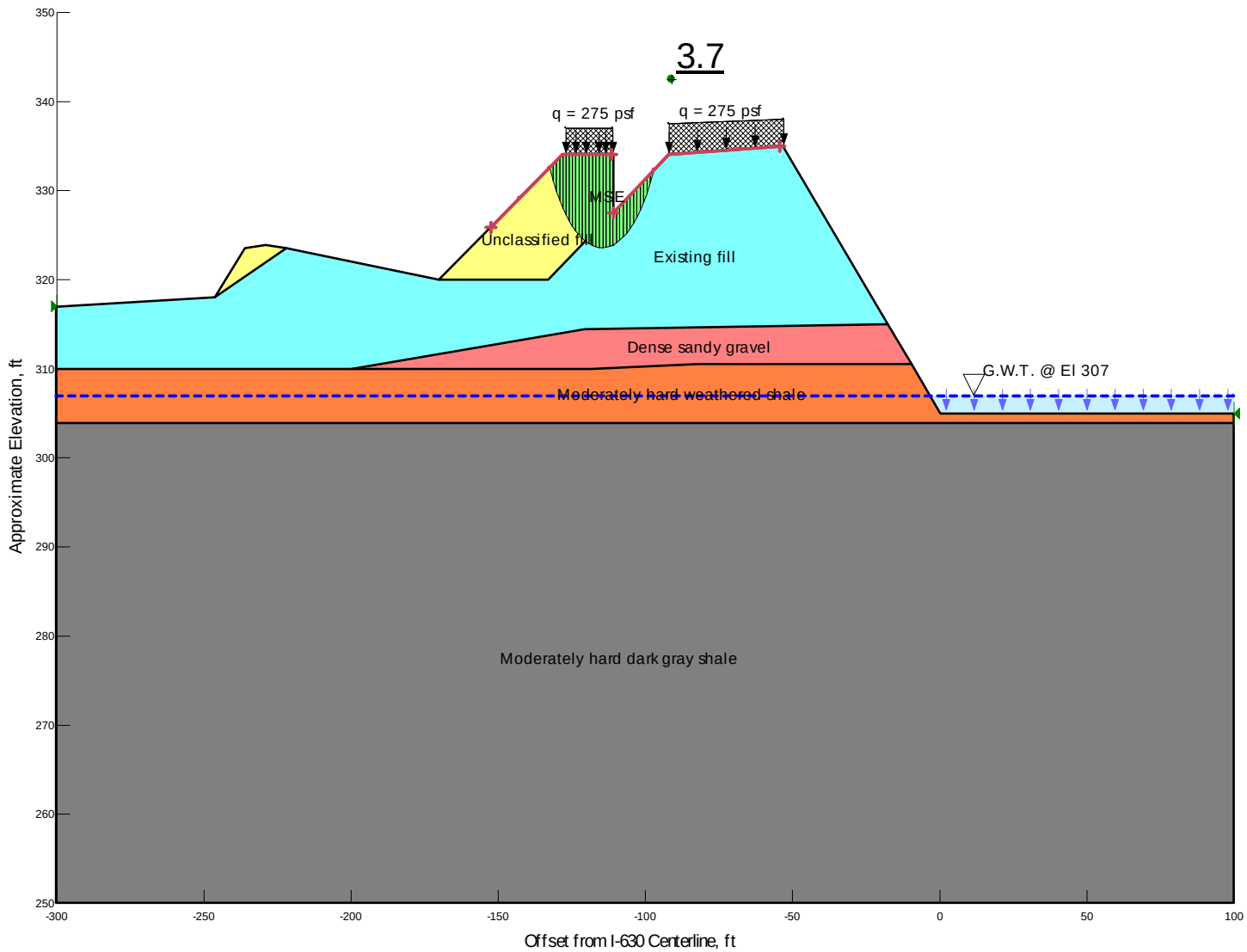
Results of Stability Analyses – Long Term Condition
Design Flood @ El 321.5±
MSE Wall BB

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



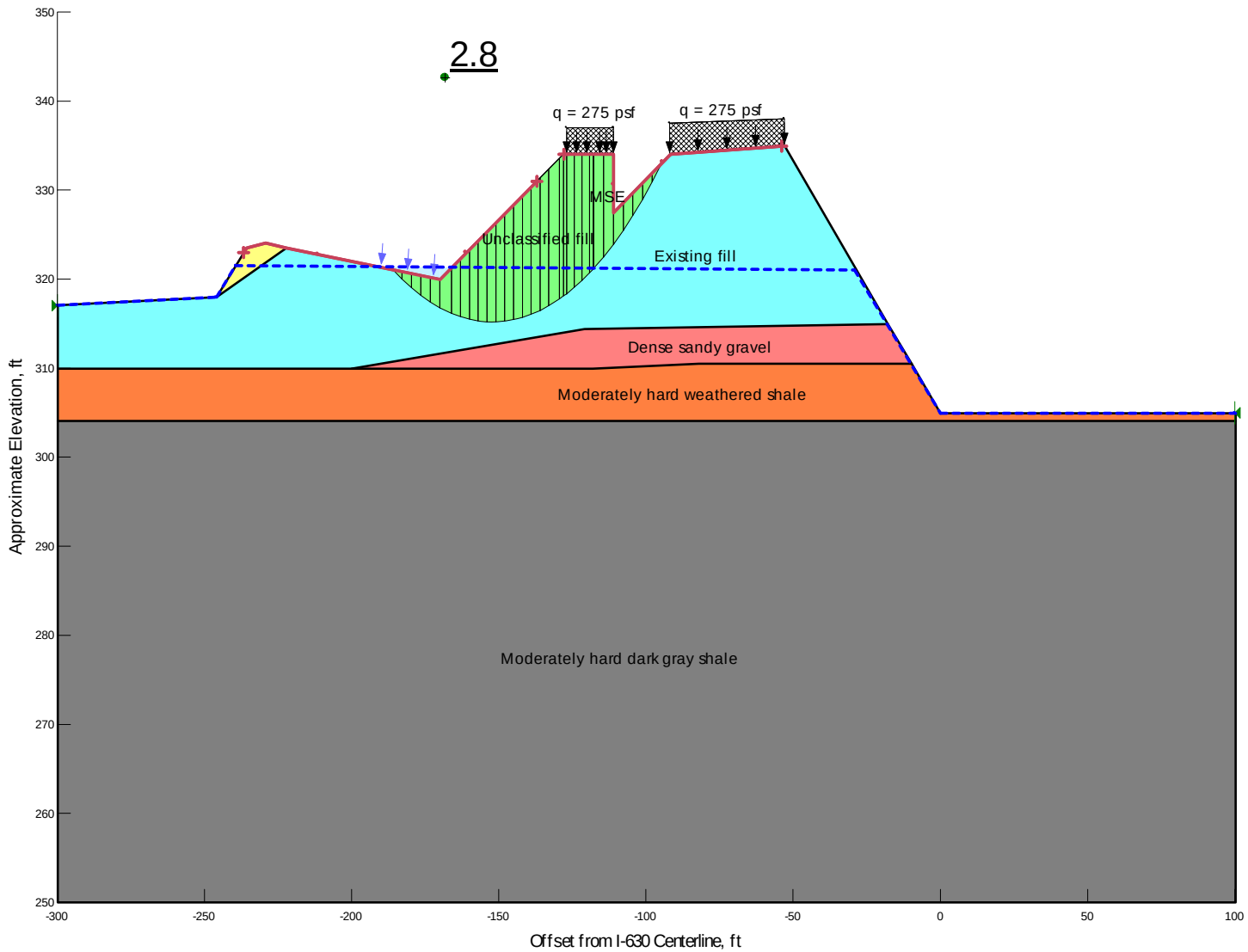
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
Embankment Slope @ North Side

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



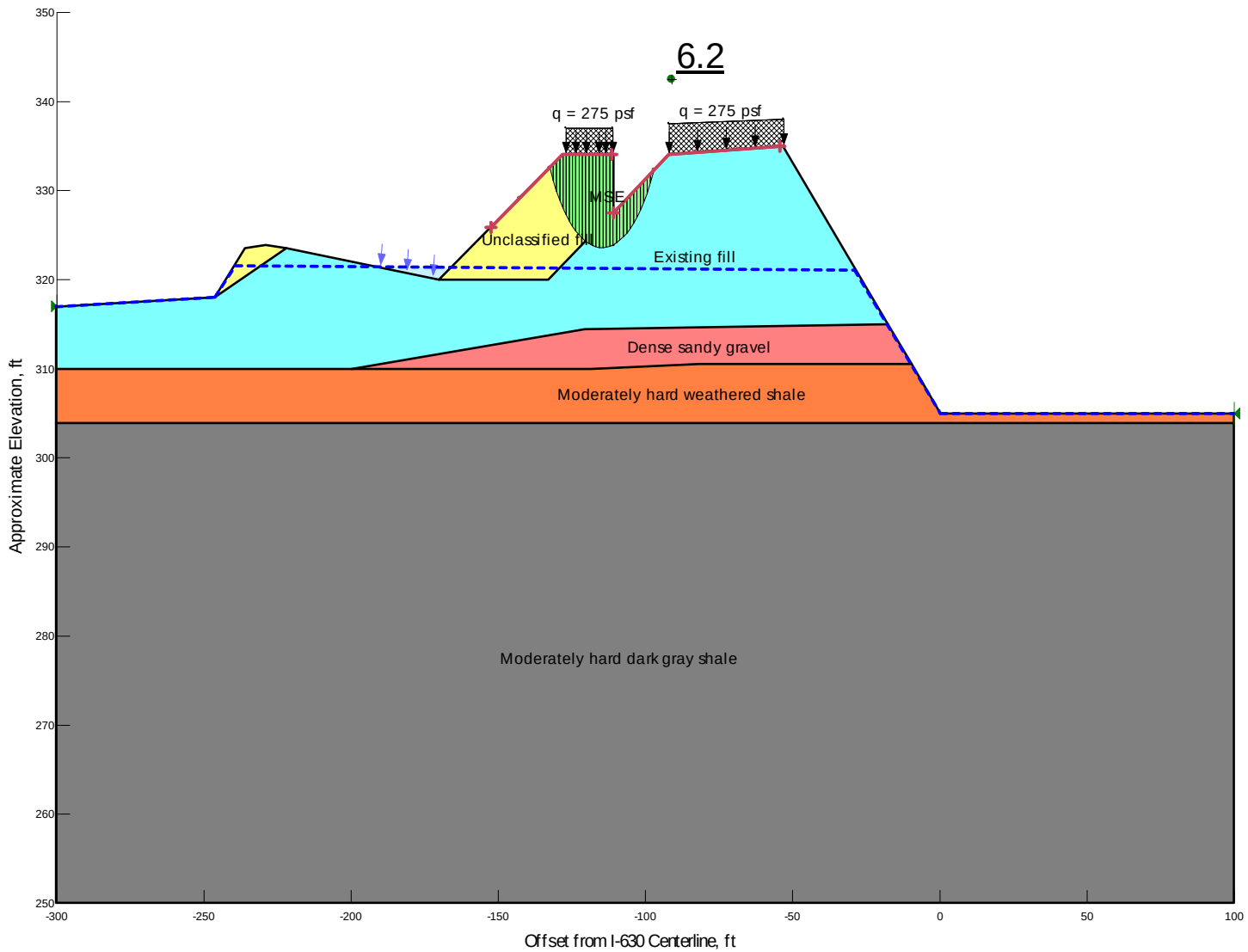
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
MSE Wall BB

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



Results of Stability Analyses – Long Term Condition
Rapid Drawdown from El 321.5± to Ground Surface
Embankment Slope @ North Side

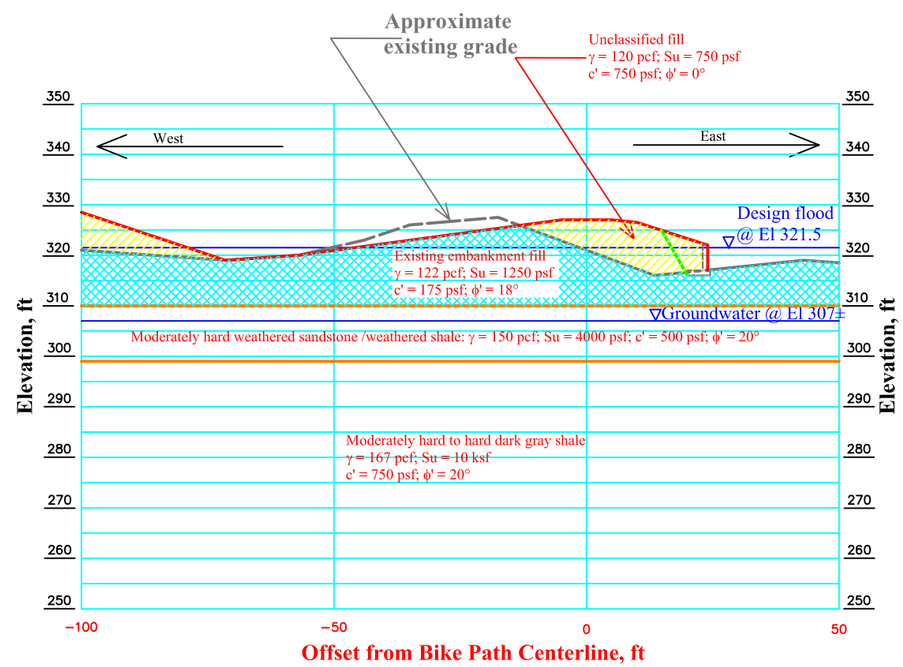
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Rapid Drawdown Condition
Rapid Drawdown from El 321.5± to Ground Surface
MSE Wall BB

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

ATTACHMENT 15



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

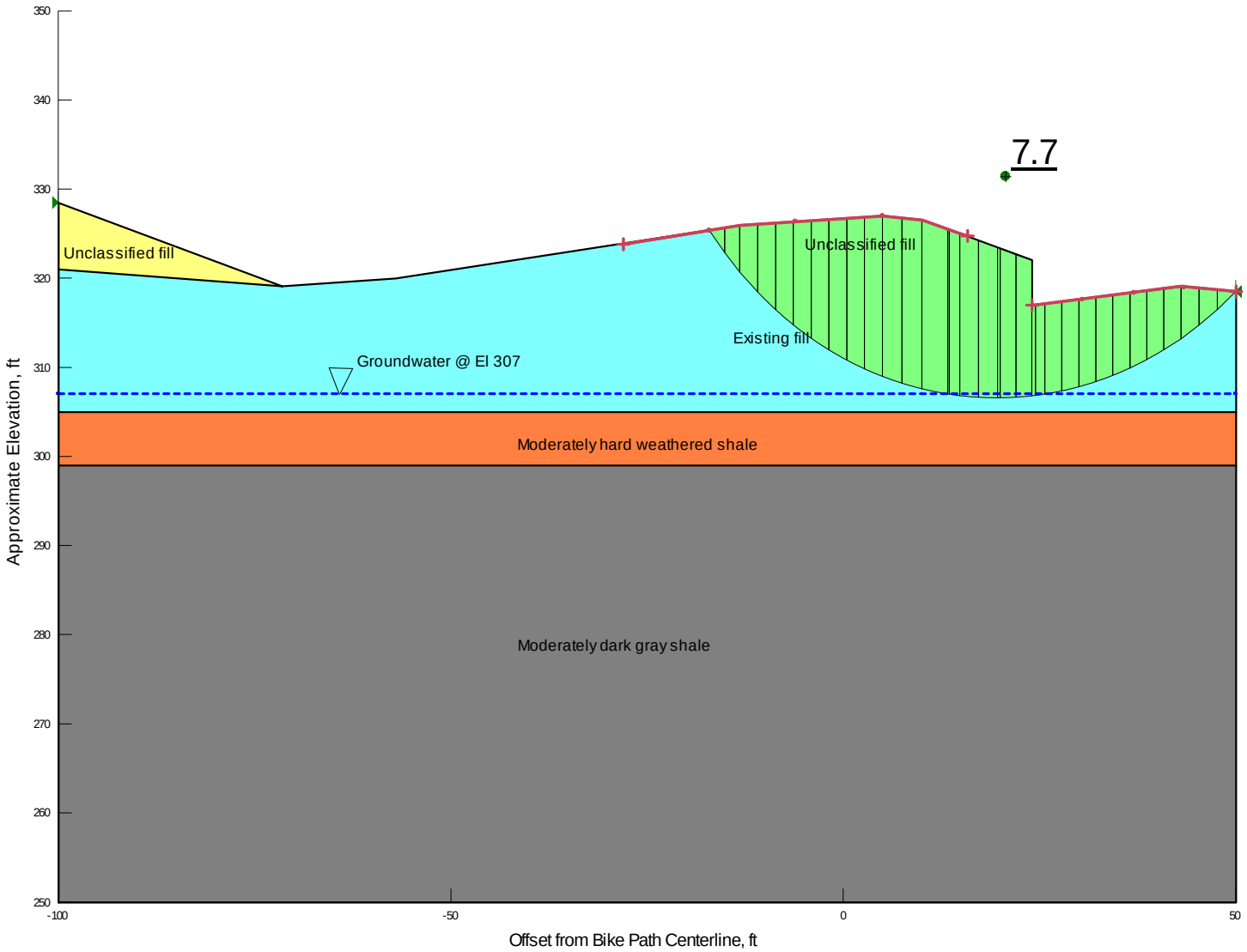
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Wall CC @ Sta 111+41
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 16, 2015	Plate

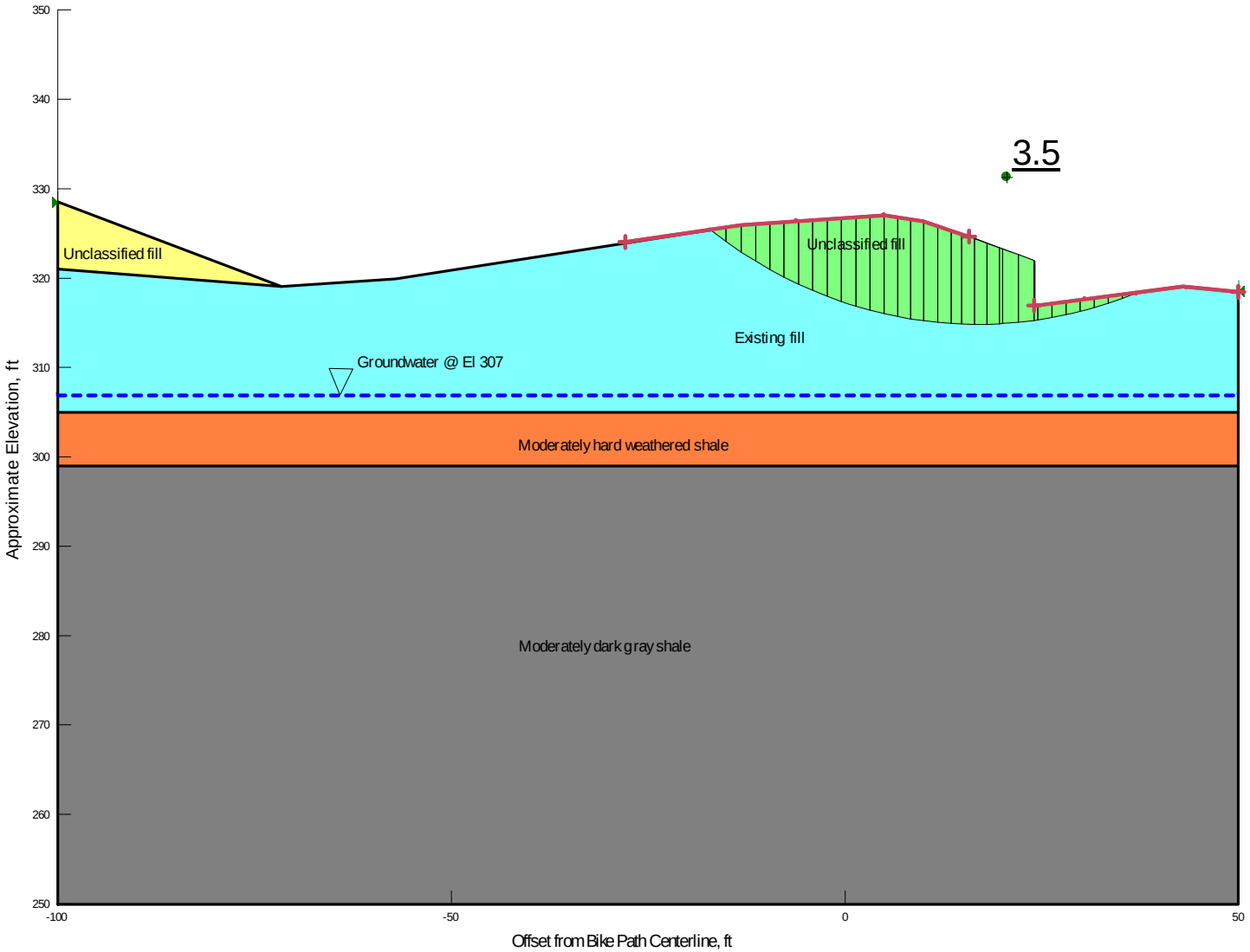
Results of Stability Analyses
Retaining Wall CC
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
End of Construction	Groundwater @ El 307±	7.7
Long Term	Groundwater @ El 307±	3.5
	Design flood @ El 320.5±	3.2
Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	2.0
Rapid drawdown	Drawdown from El 320.5± to ground surface	2.6



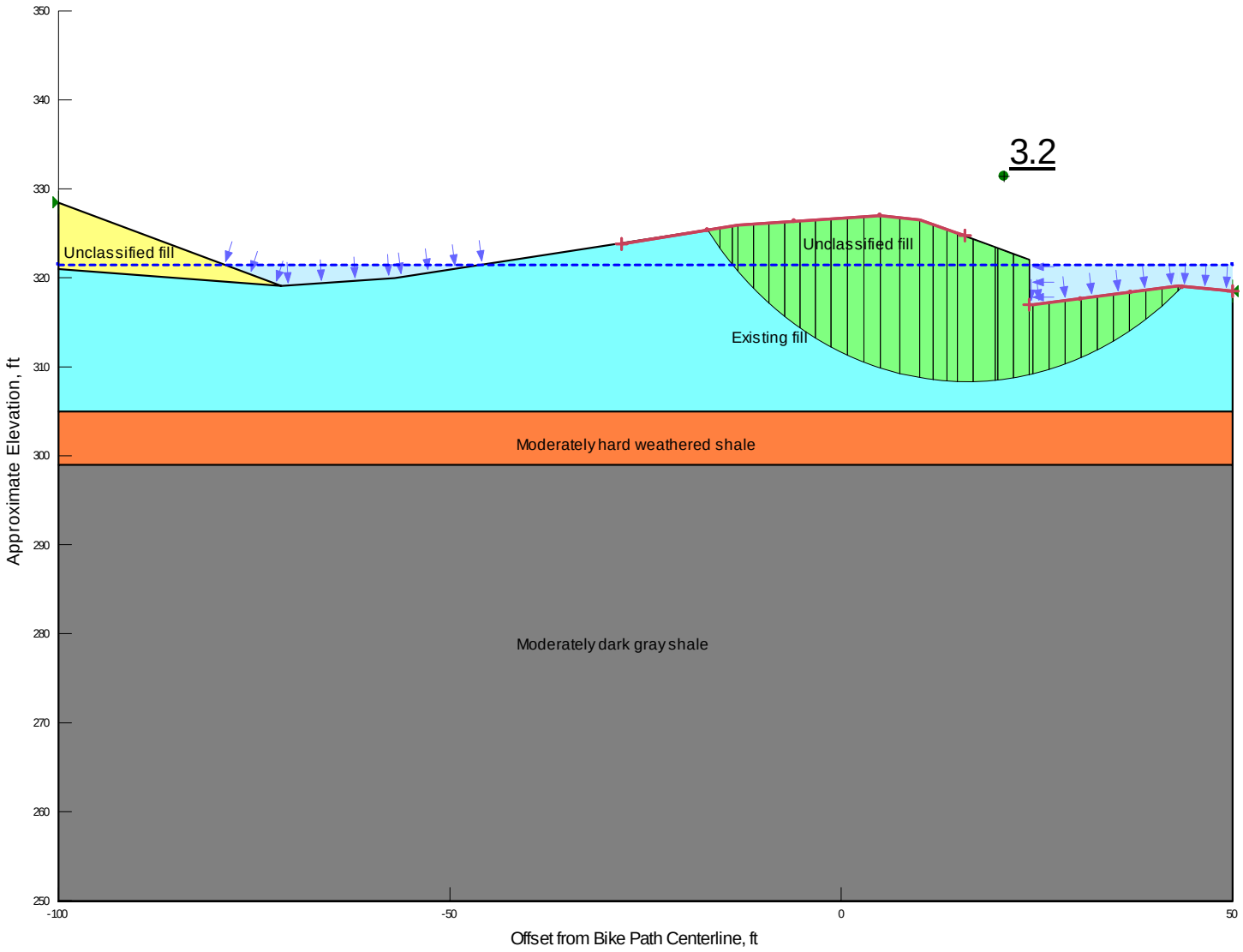
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
Retaining Wall CC

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



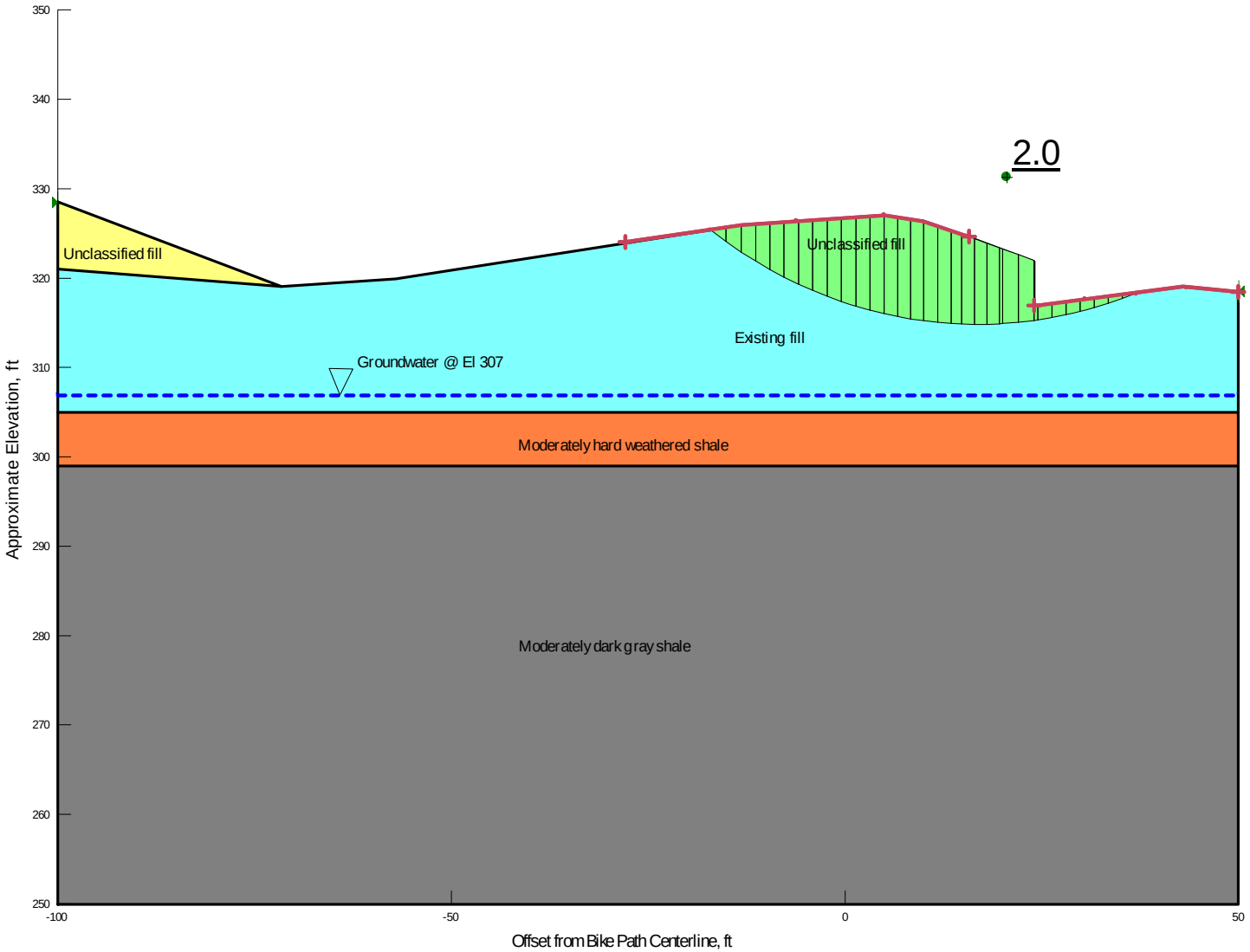
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
Retaining Wall CC

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



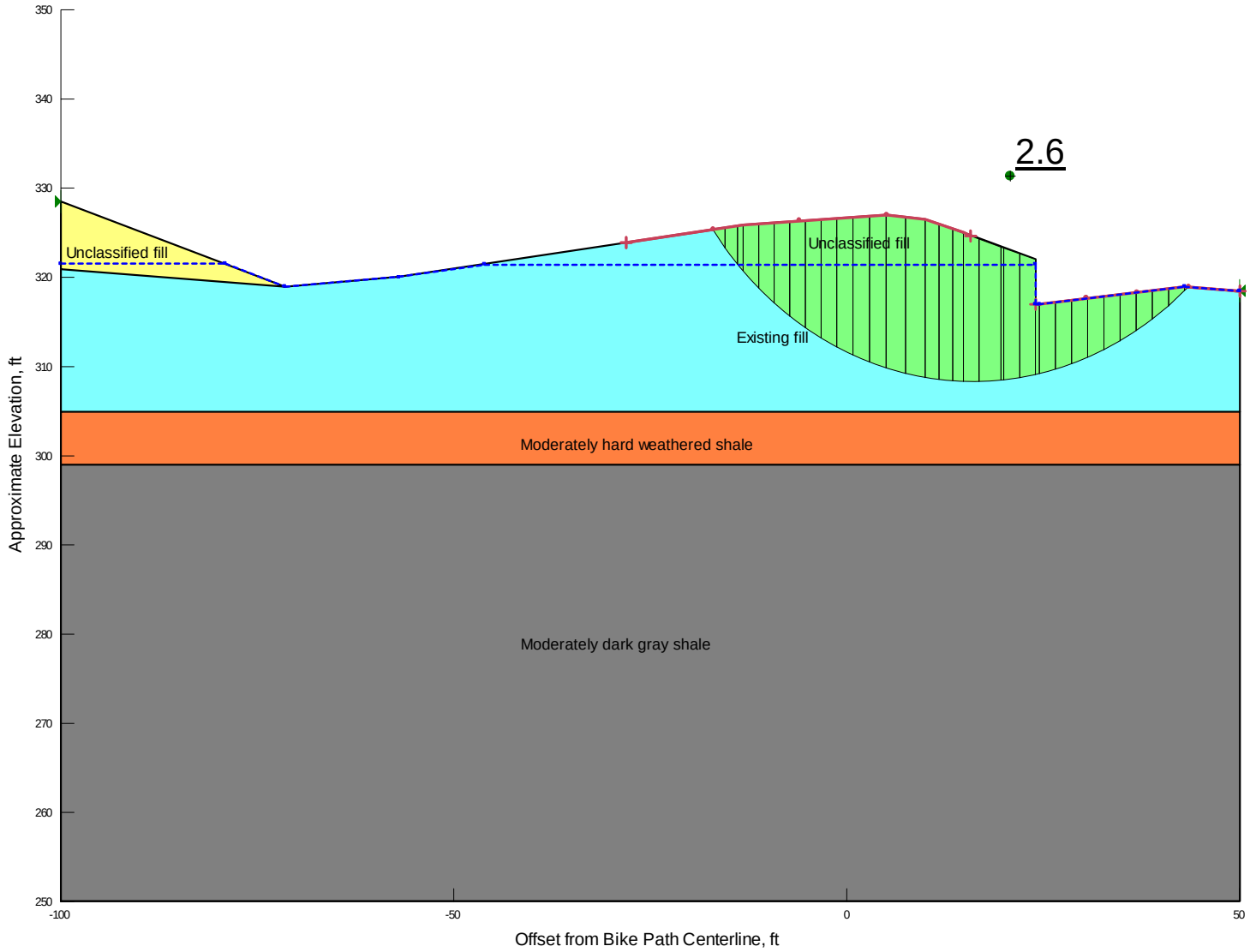
Results of Stability Analyses – Long Term Condition
Design Flood @ El 321.5±
Retaining Wall CC

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



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
Retaining Wall CC

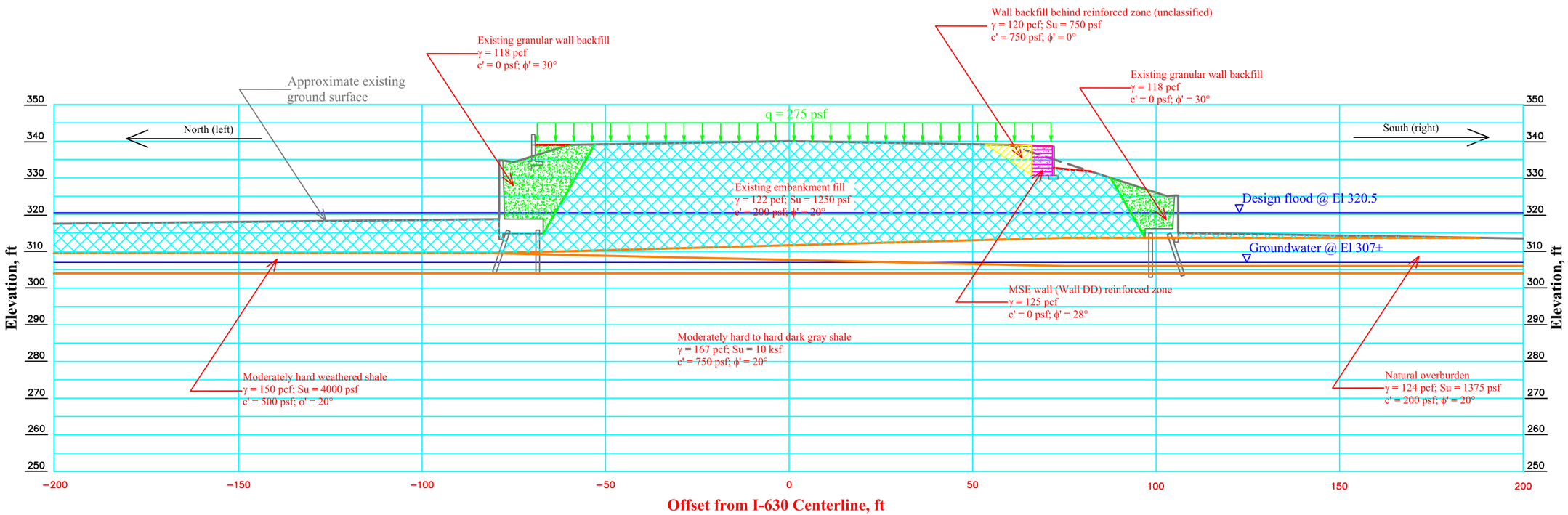
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Rapid Drawdown Condition
Rapid Drawdown from El 321.5± to Ground Surface
Retaining Wall CC

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

ATTACHMENT 16



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

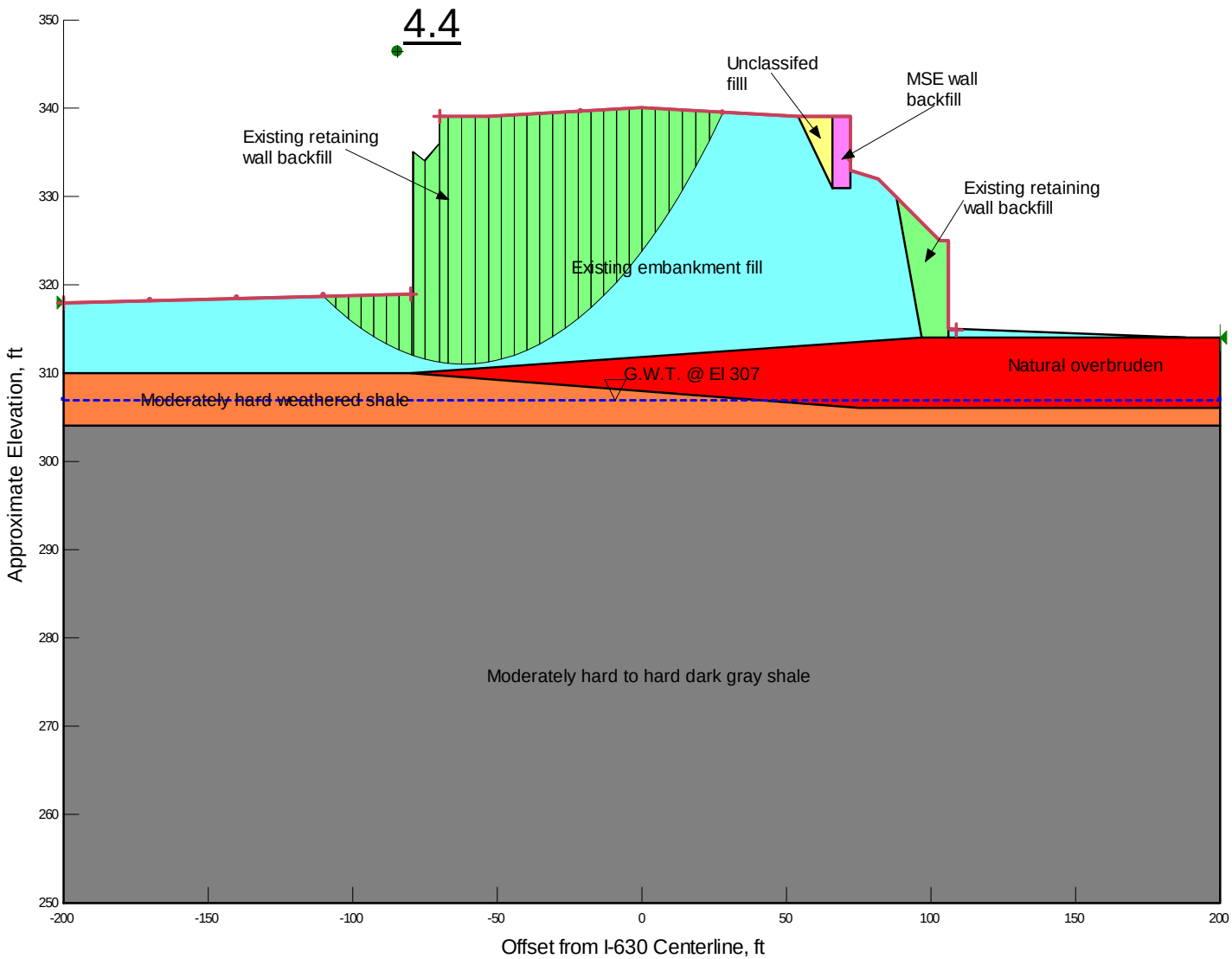
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Sta 1123+00 - Wall DD and Barrier Wall
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
March 31, 2015	Plate

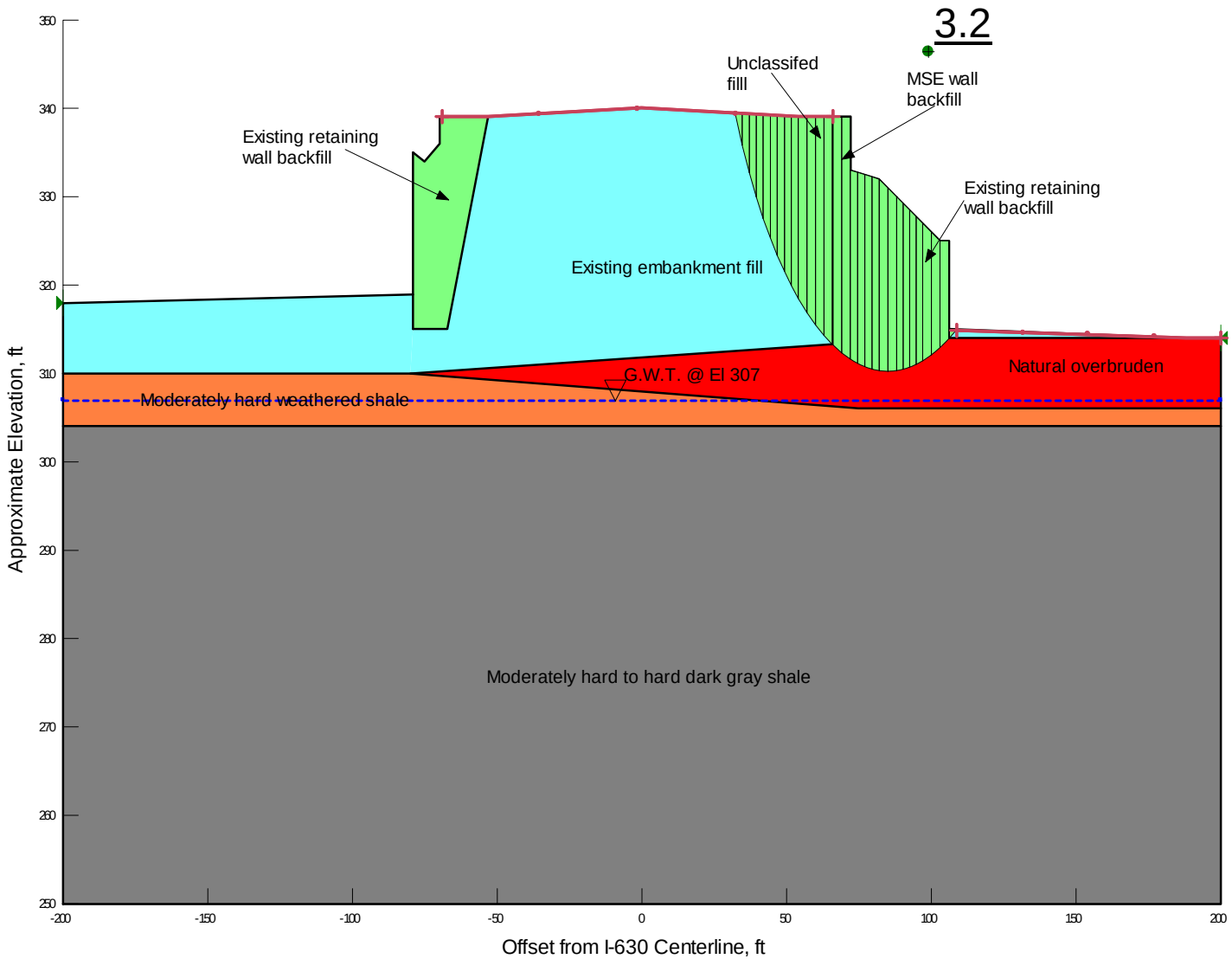
Results of Stability Analyses
Sta 1123+00
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Embankment Side	Failure Mode	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	Deep-seated failure below existing retaining wall	End of Construction	Groundwater @ El 307±	4.4
South (right)				3.2
South (right)	Localized failure below new MSE wall			4.1
North (left)	Deep-seated failure below existing retaining wall	Long Term	Groundwater @ El 307±	1.6
South (right)				1.8
South (right)	Localized failure below new MSE wall			1.9
North (left)	Deep-seated failure below existing retaining wall		Design flood @ El 320.5	1.7
South (right)				1.7
North (left)	Deep-seated failure below existing retaining wall	Seismic (k_h = 1.0A_s = 0.13)	Groundwater @ El 307±	1.2
South (right)				1.3
South (right)	Localized failure below new MSE wall			1.4
North (left)	Deep-seated failure below existing retaining wall	Rapid Drawdown	Drawdown from design flood to embankment toe	1.7
South (right)				1.5



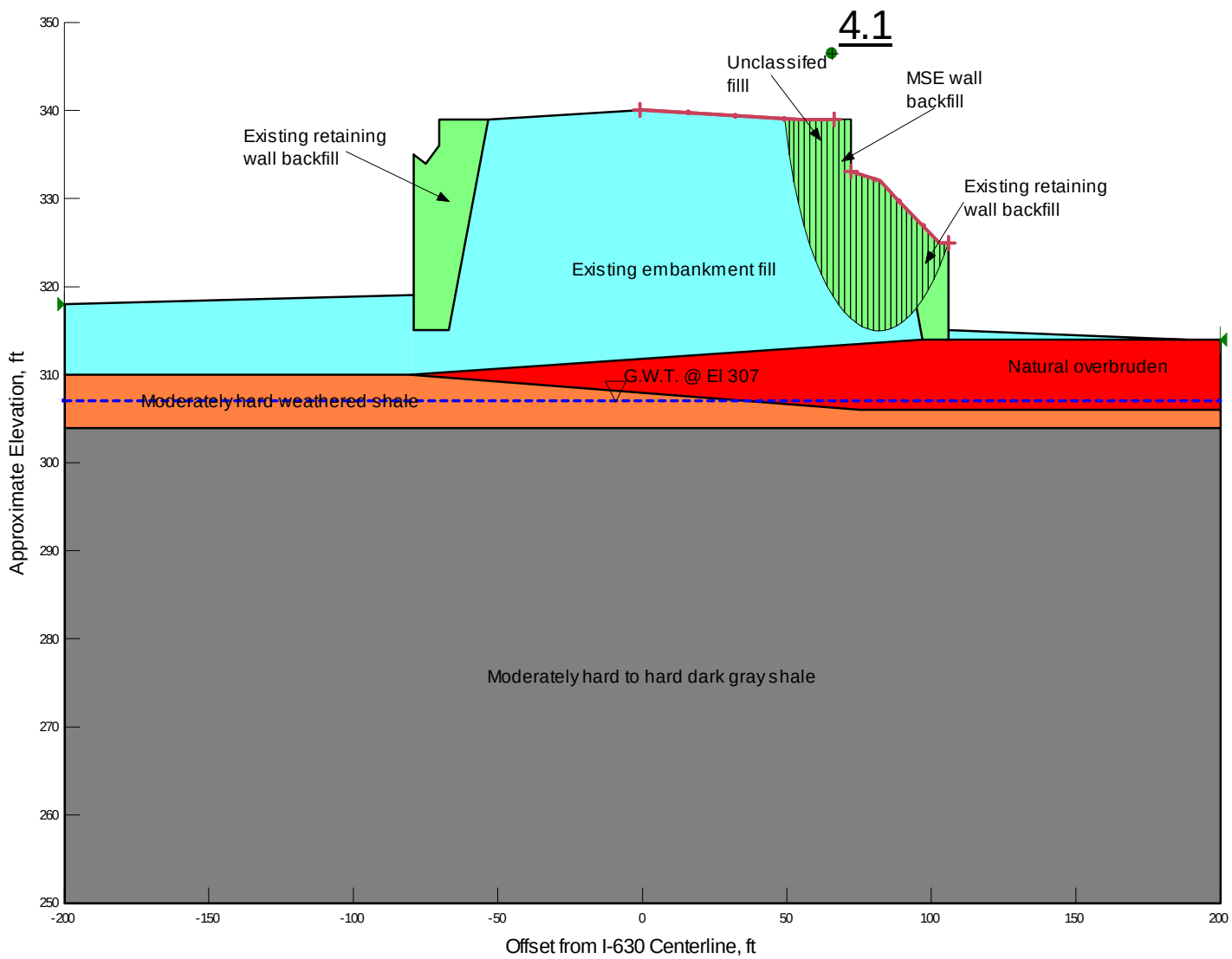
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



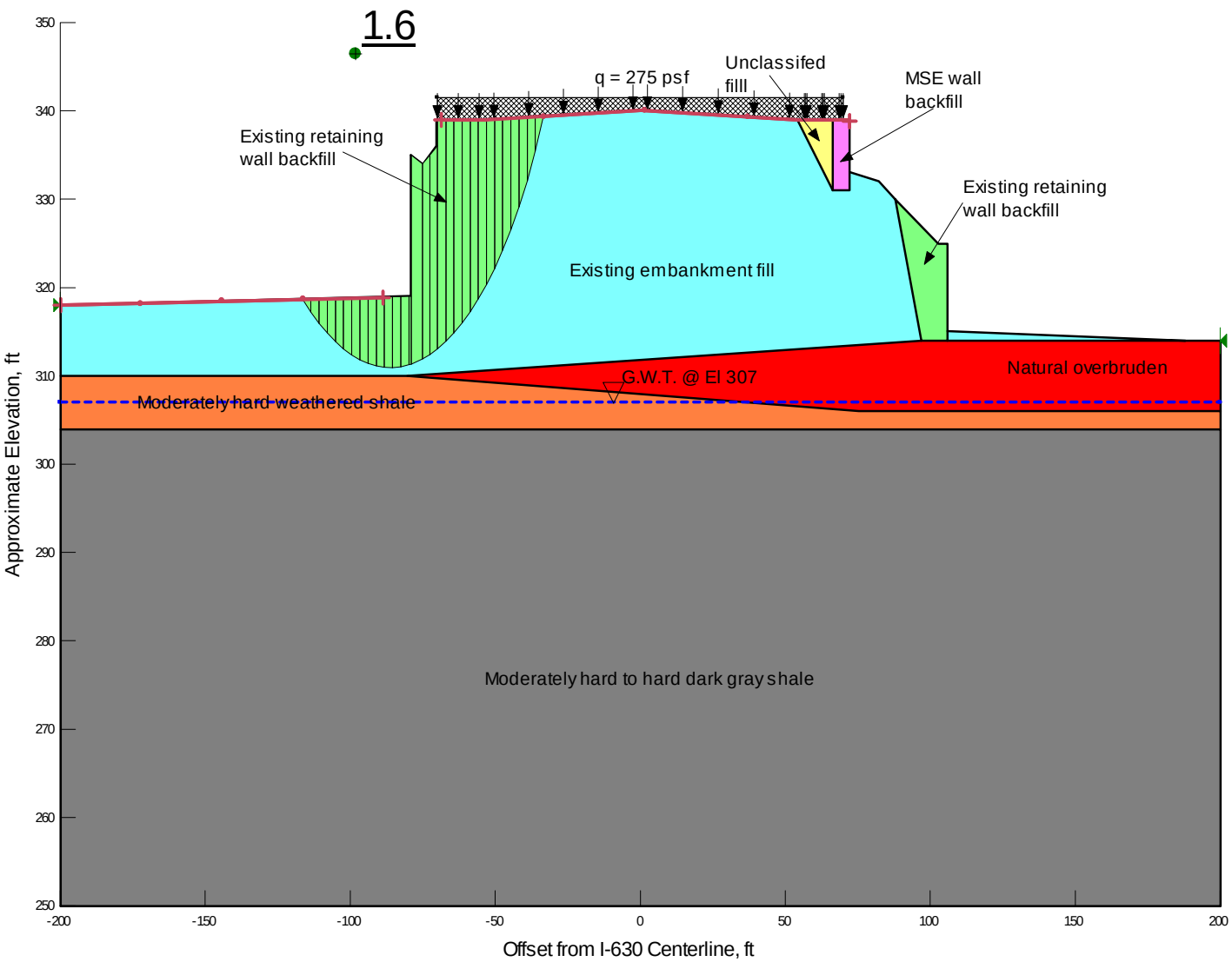
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



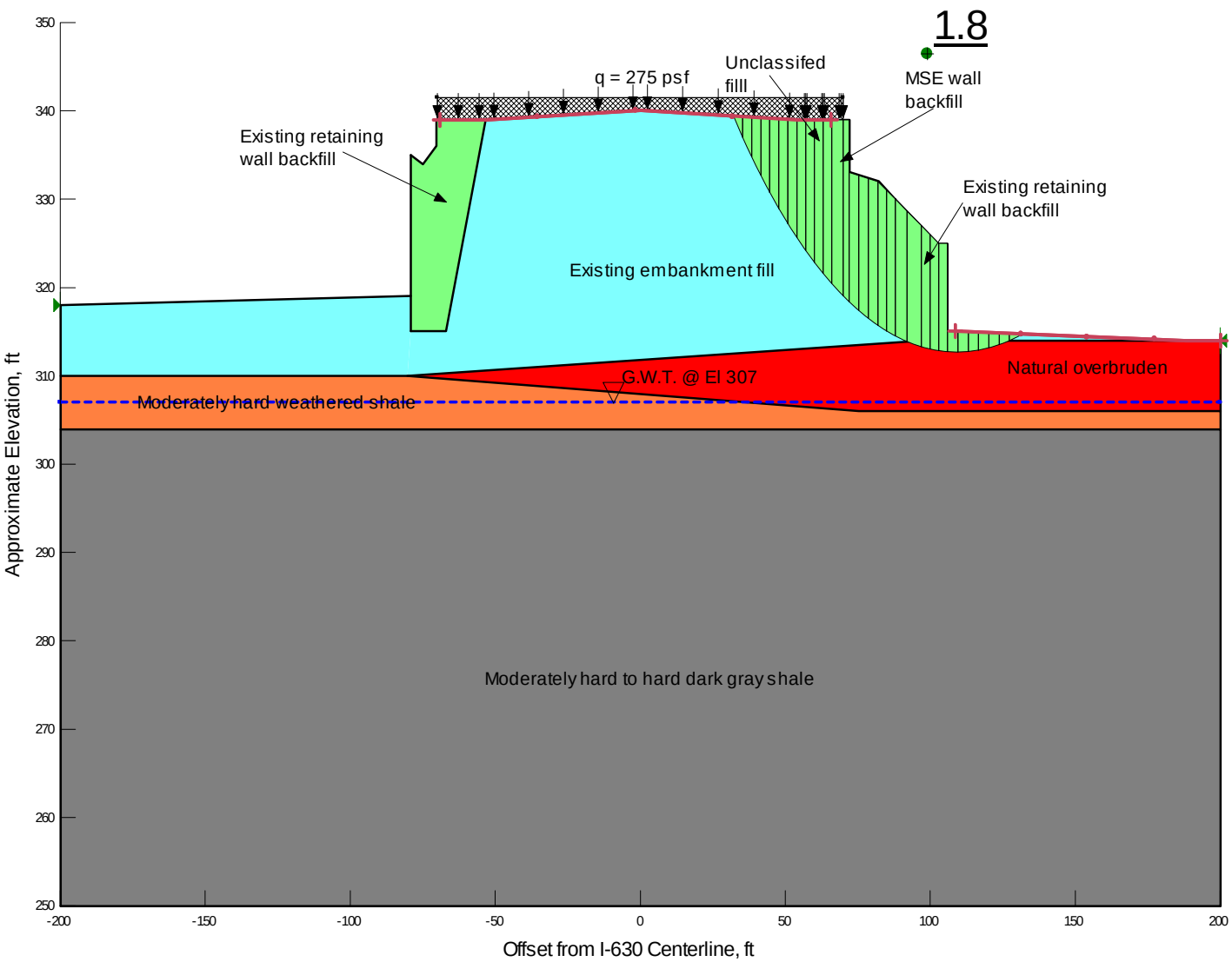
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+00

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



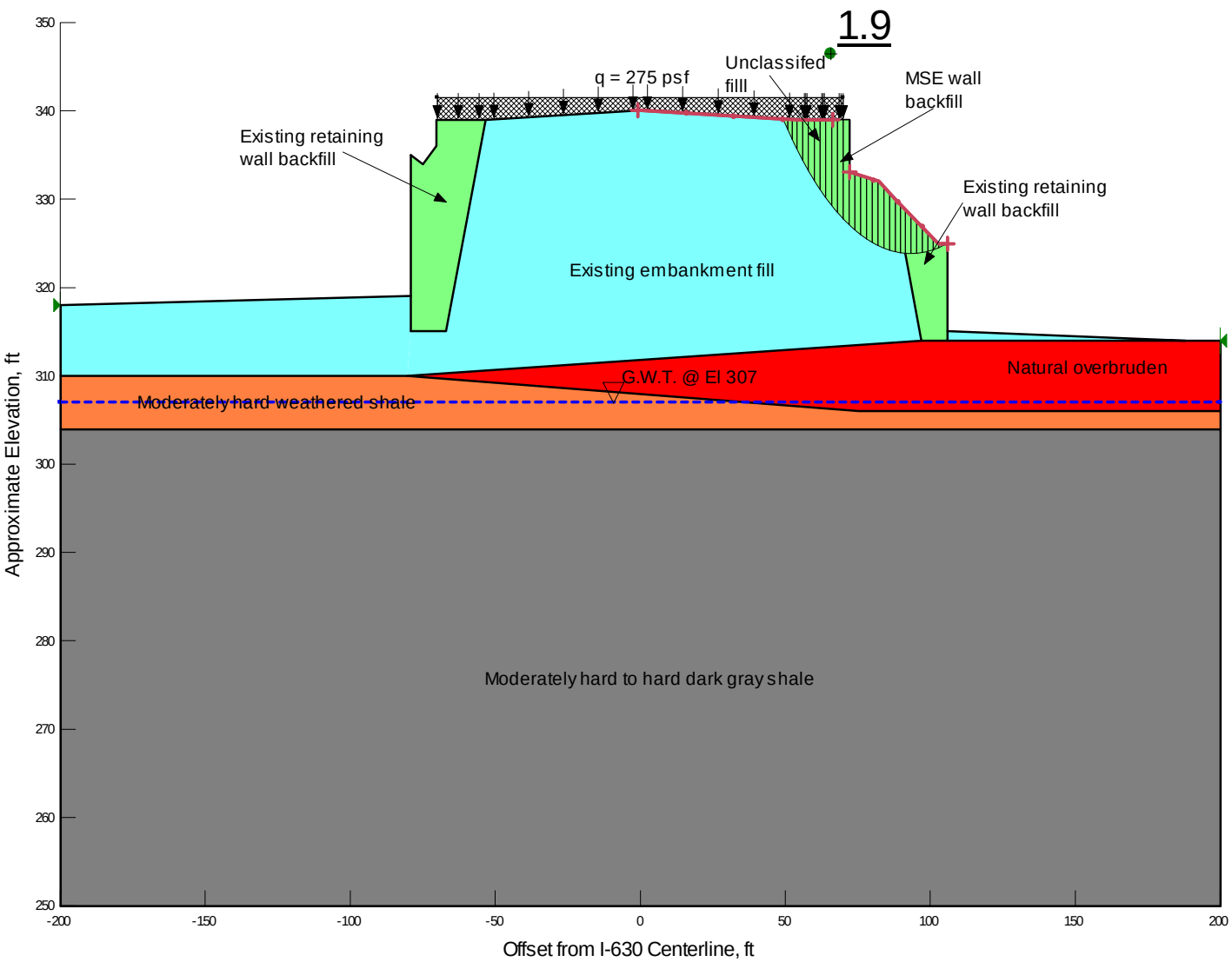
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



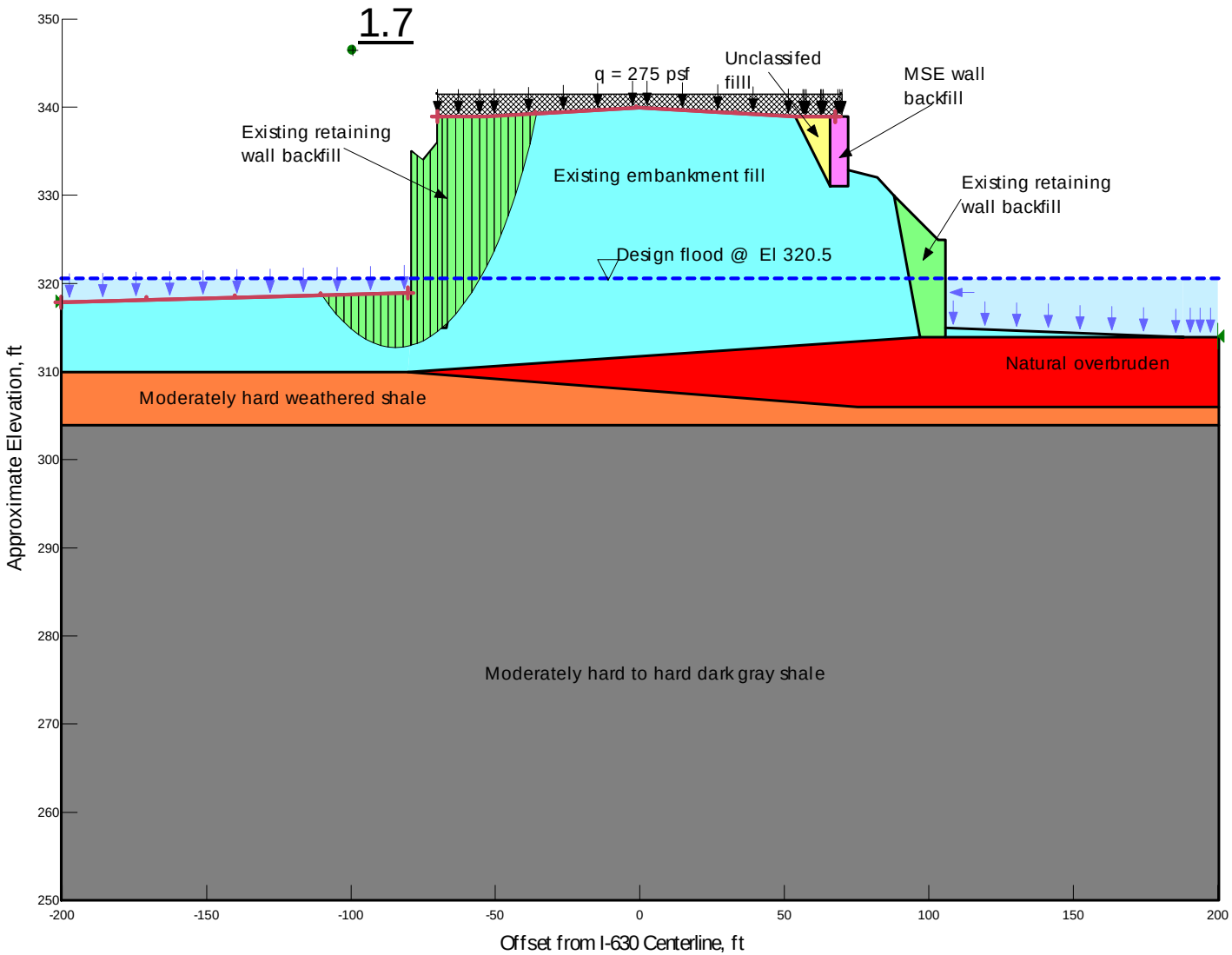
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



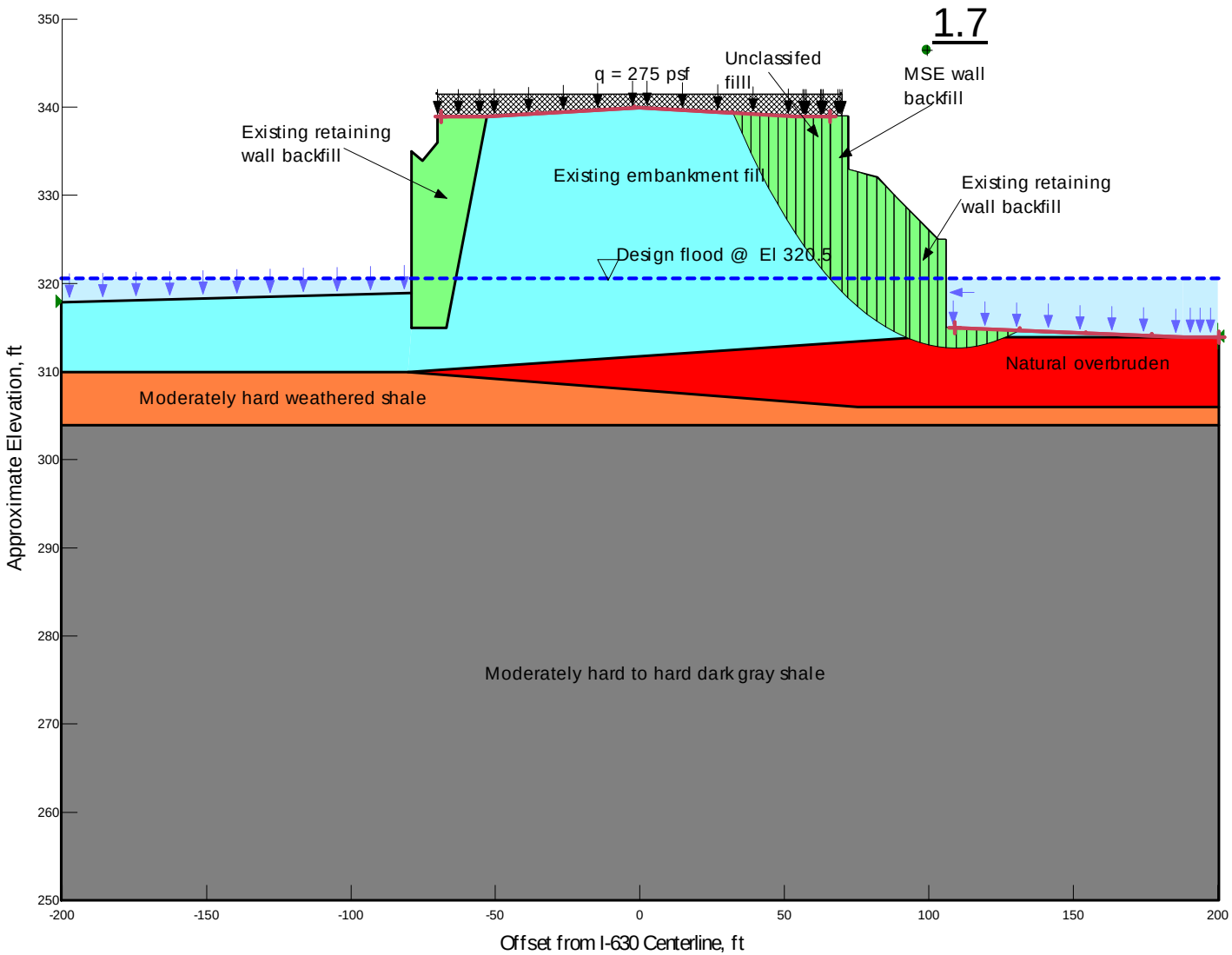
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+00

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



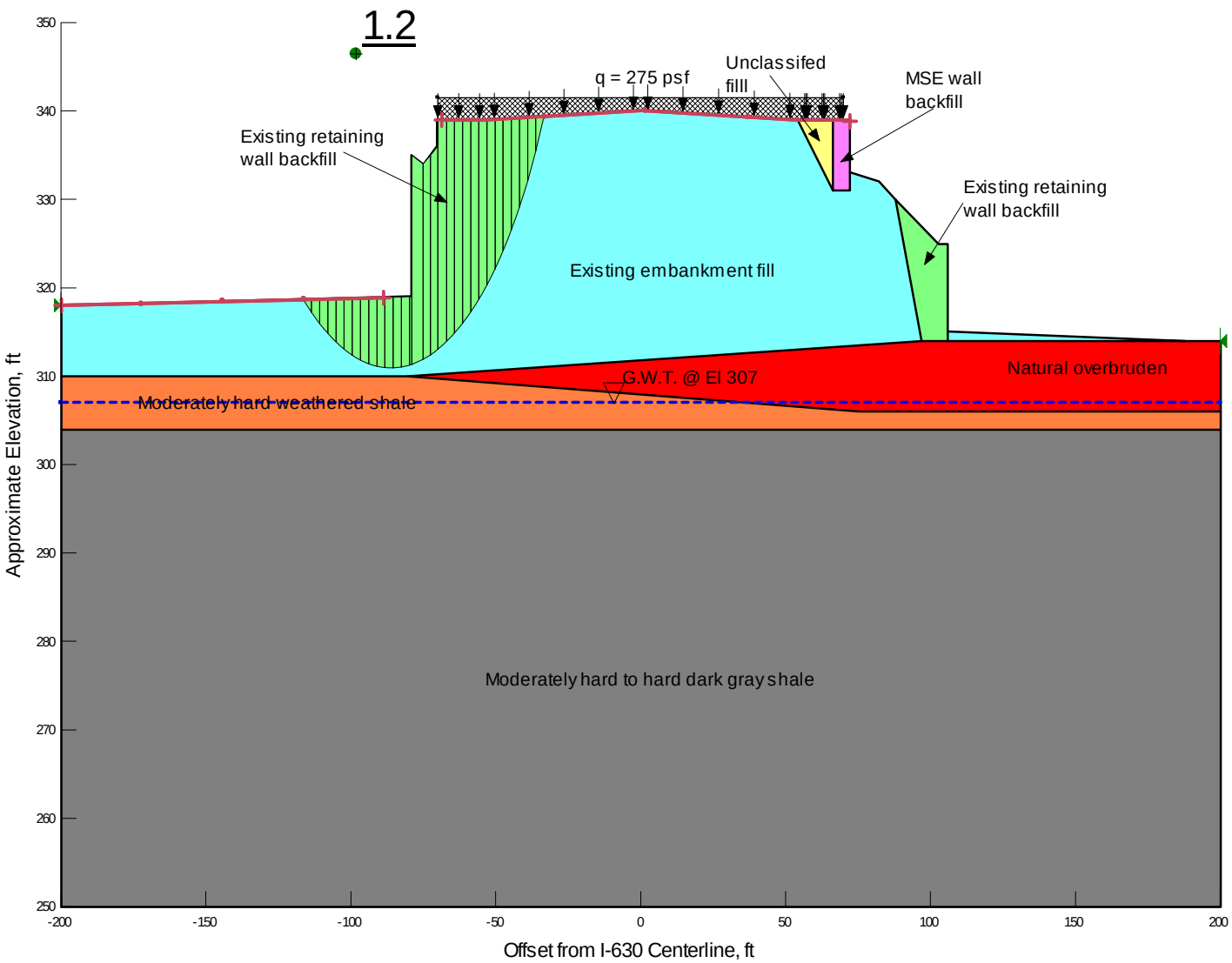
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



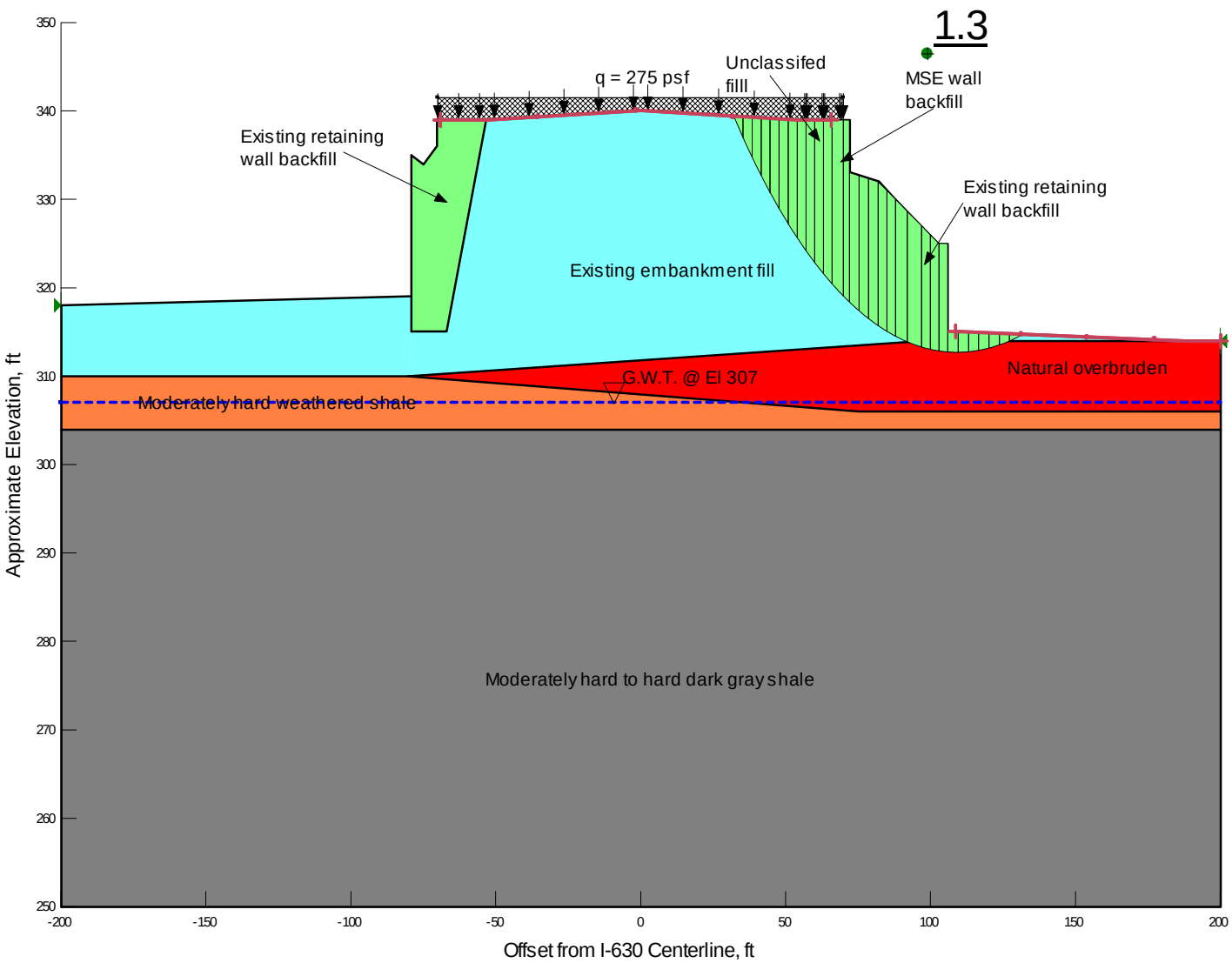
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



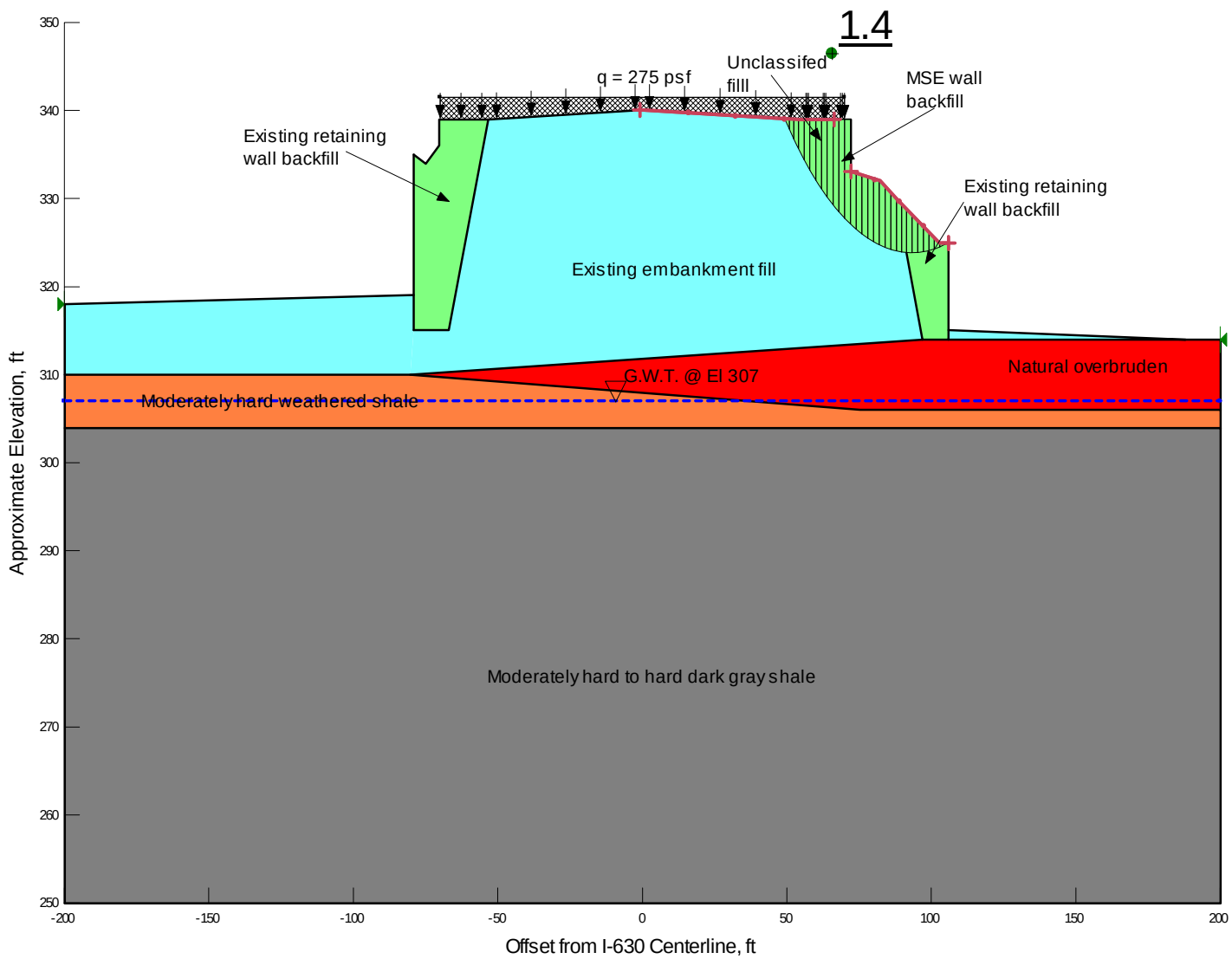
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



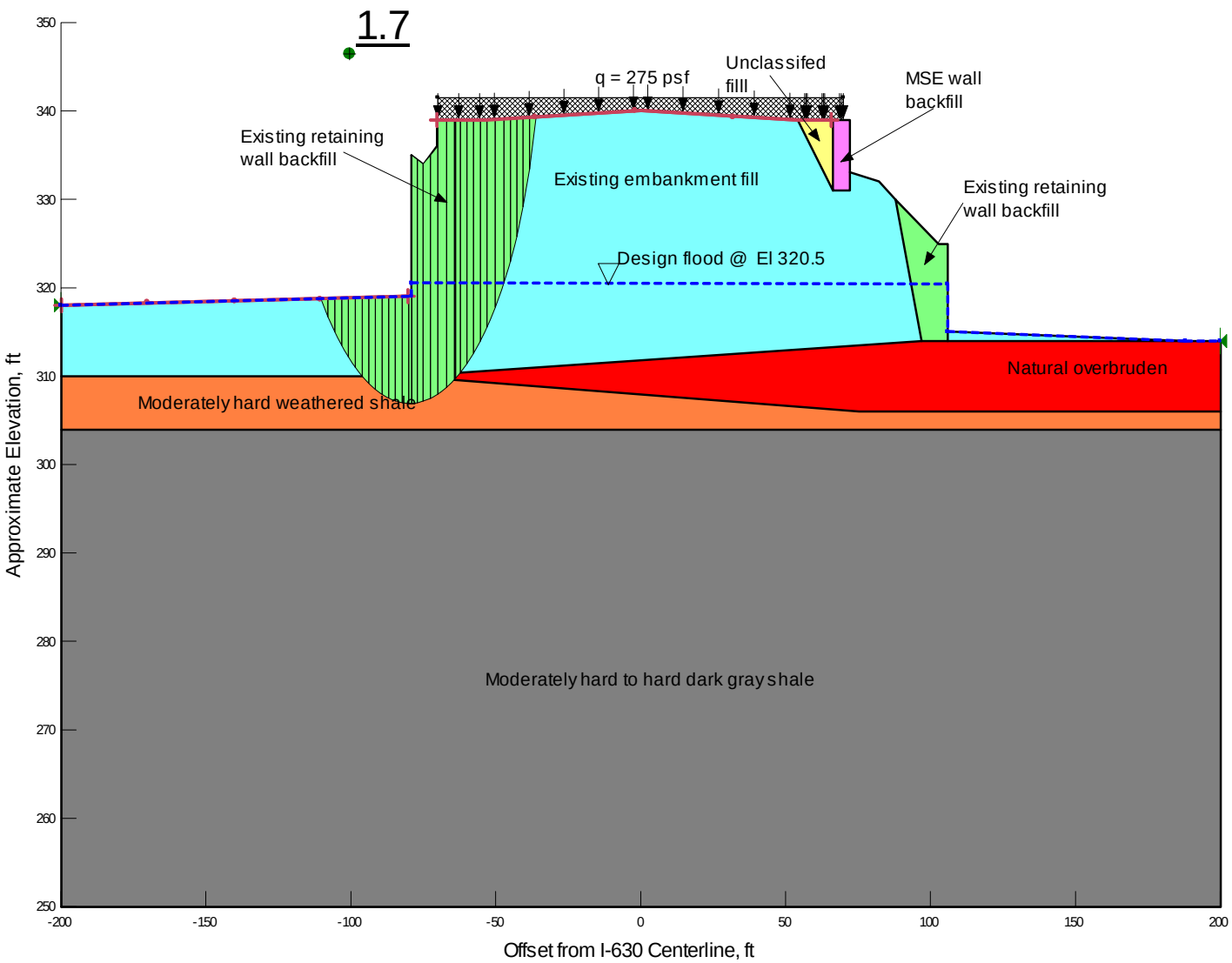
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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



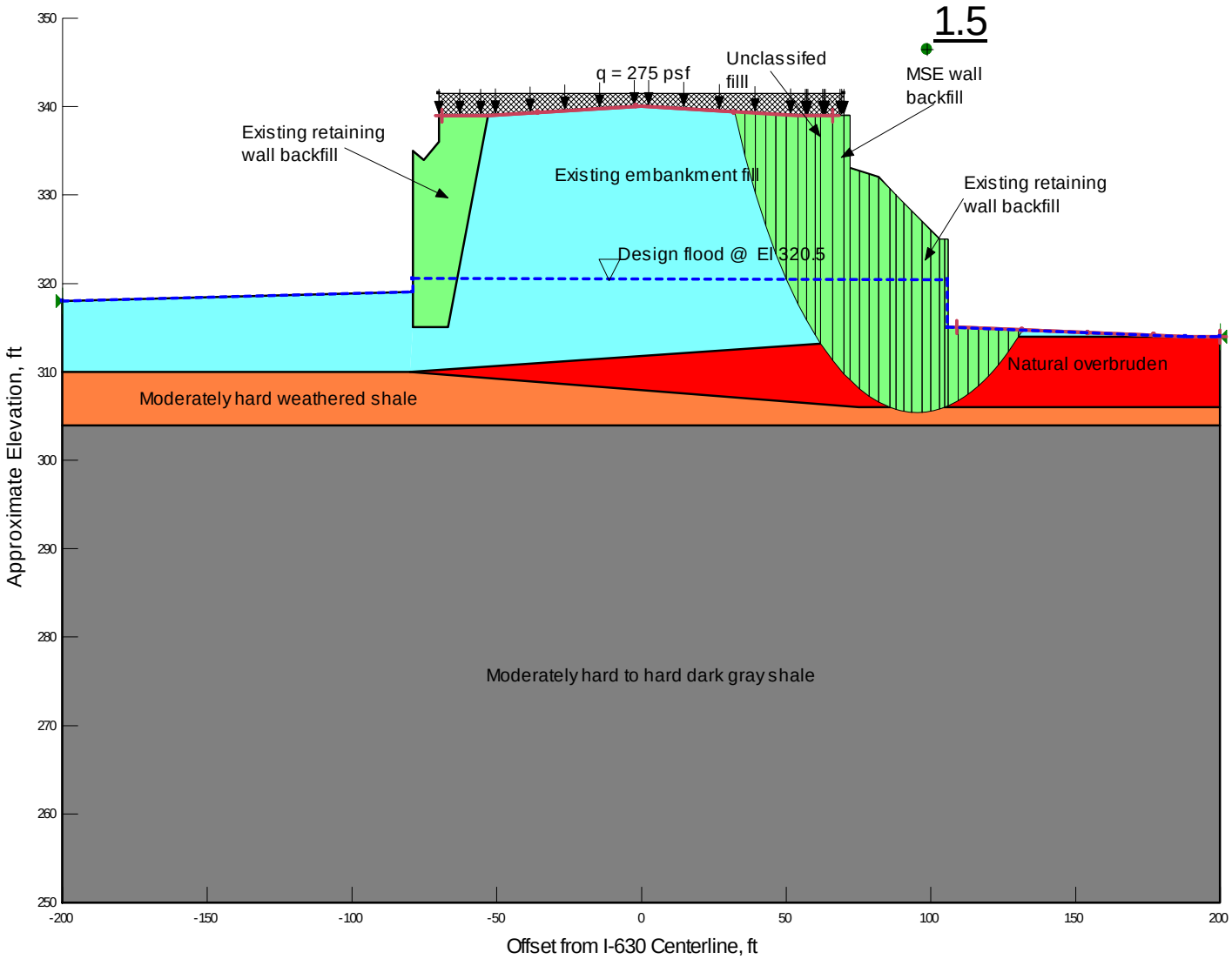
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+00

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



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

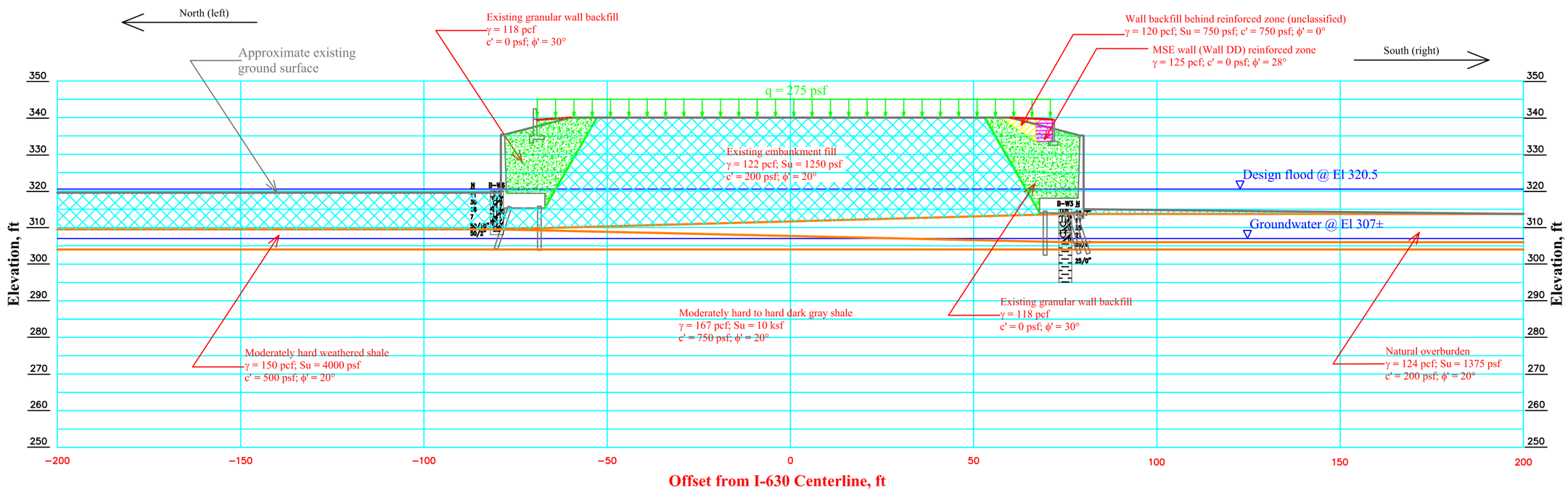
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+00

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

ATTACHMENT 17



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

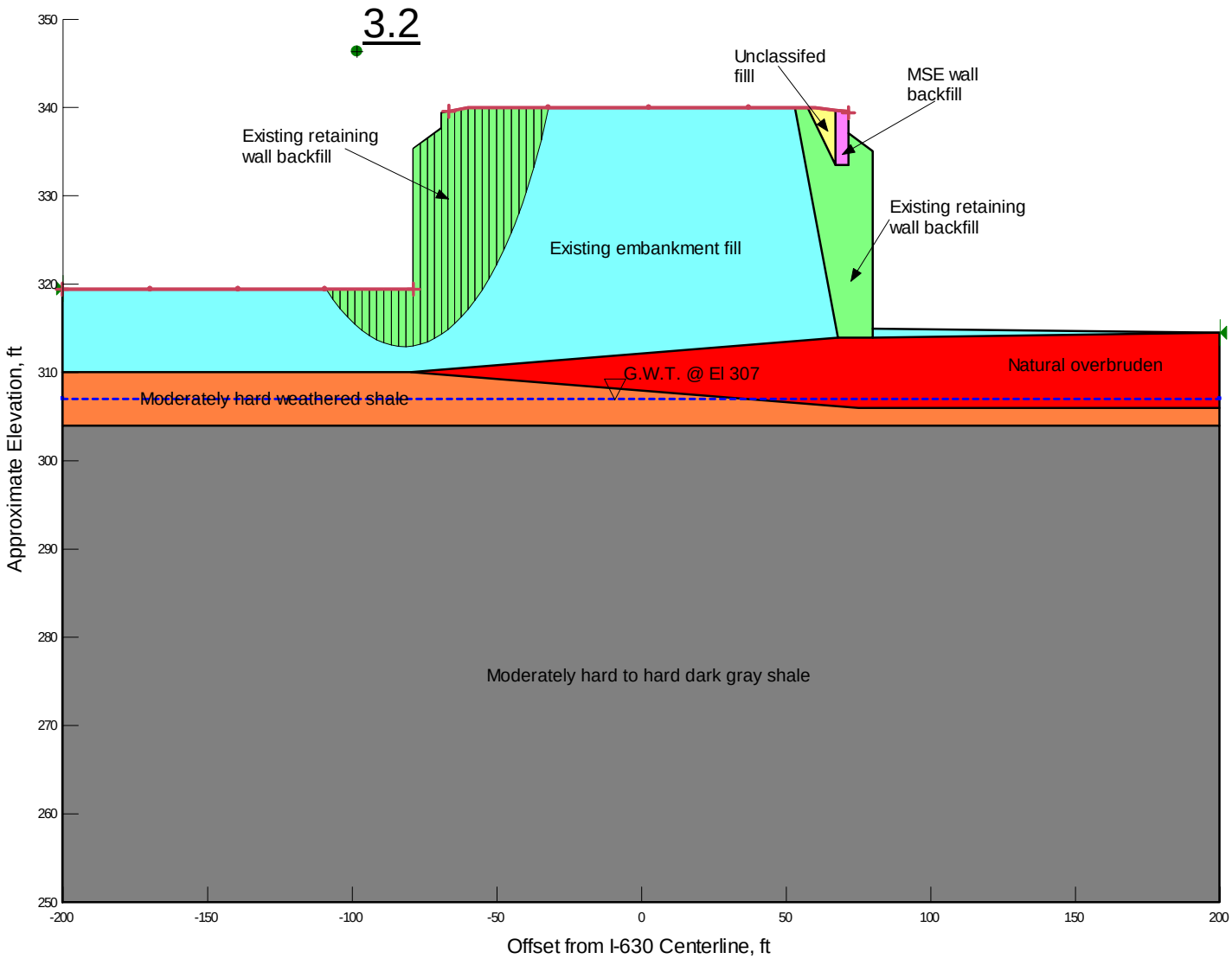
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Sta 1123+95.83 - Wall DD and Barrier Wall
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 1, 2015	Plate

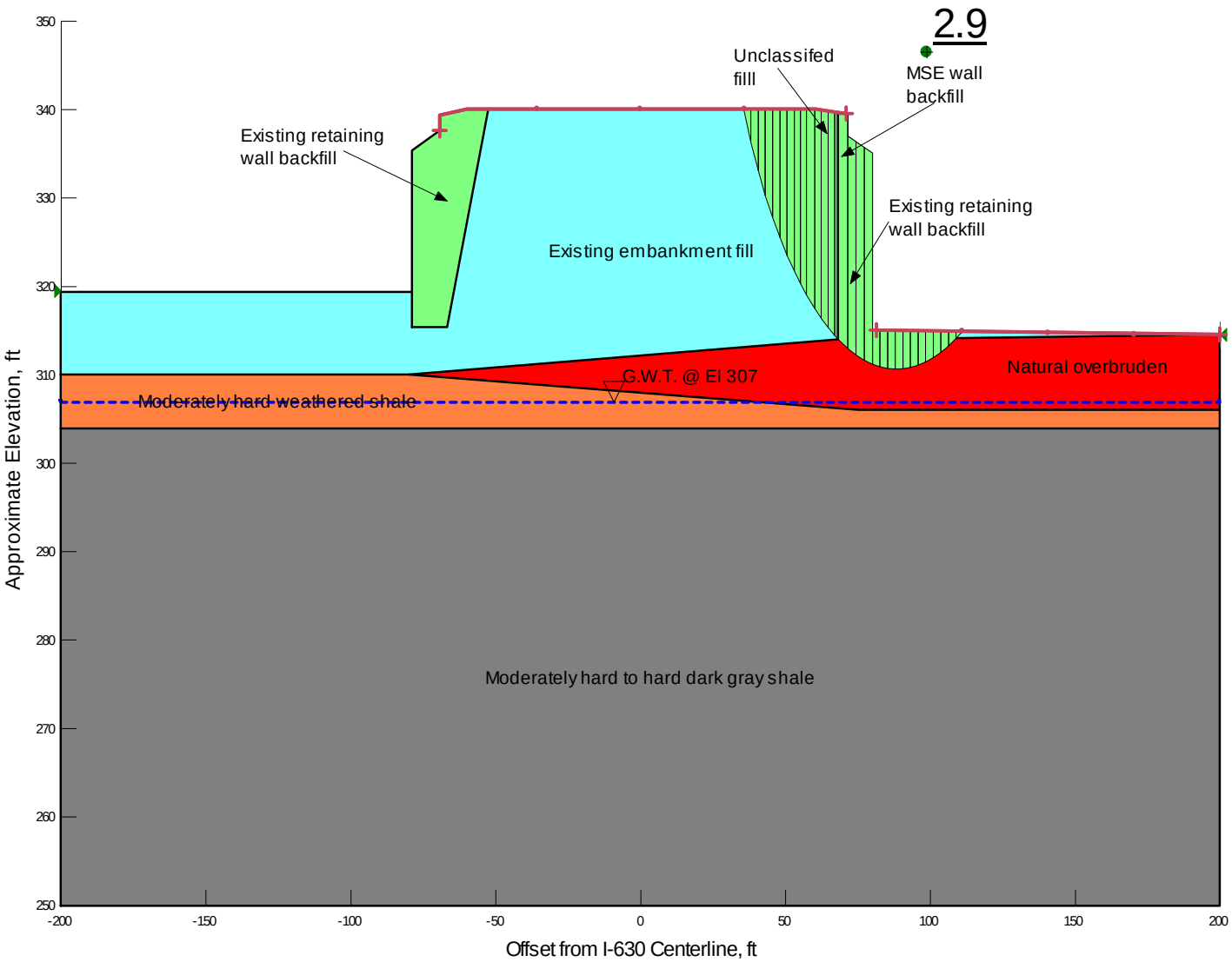
Results of Stability Analyses
Sta 1123+95.83
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Embankment Side	Failure Mode	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	Deep-seated failure below existing retaining wall	End of Construction	Groundwater @ El 307±	3.2
South (right)				2.9
South (right)	Localized failure below new MSE wall			5.7
North (left)	Deep-seated failure below existing retaining wall	Long Term	Groundwater @ El 307±	2.3
South (right)				2.7
South (right)	Localized failure below new MSE wall			3.2
North (left)	Deep-seated failure below existing retaining wall		Design flood @ El 320.5	1.8
South (right)				2.1
North (left)	Deep-seated failure below existing retaining wall	Seismic (k_h = 1.0A_s = 0.13)	Groundwater @ El 307±	1.2
South (right)				1.1
South (right)	Localized failure below new MSE wall			2.3
North (left)	Deep-seated failure below existing retaining wall	Rapid Drawdown	Drawdown from design flood to embankment toe	1.4
South (right)				1.2



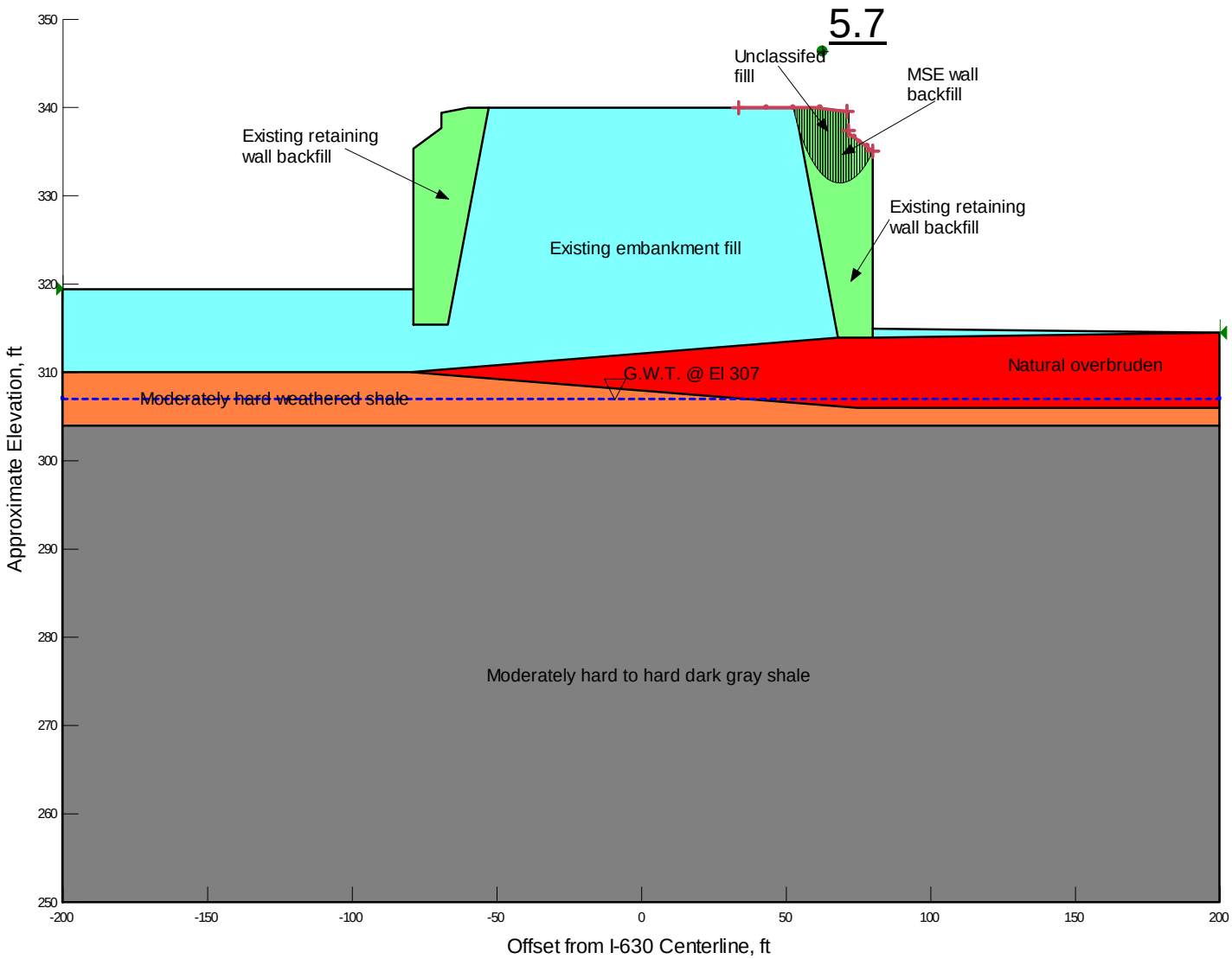
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



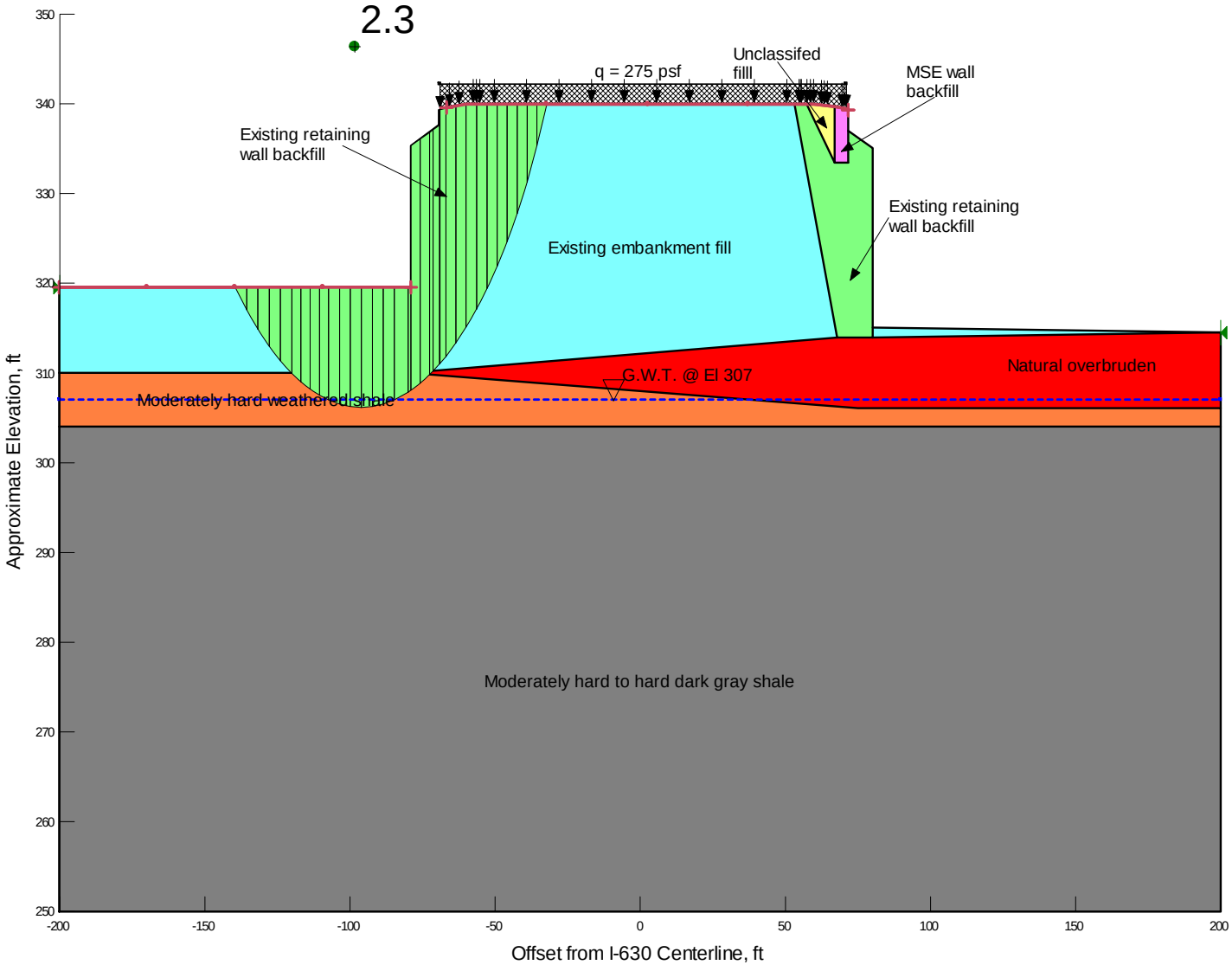
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



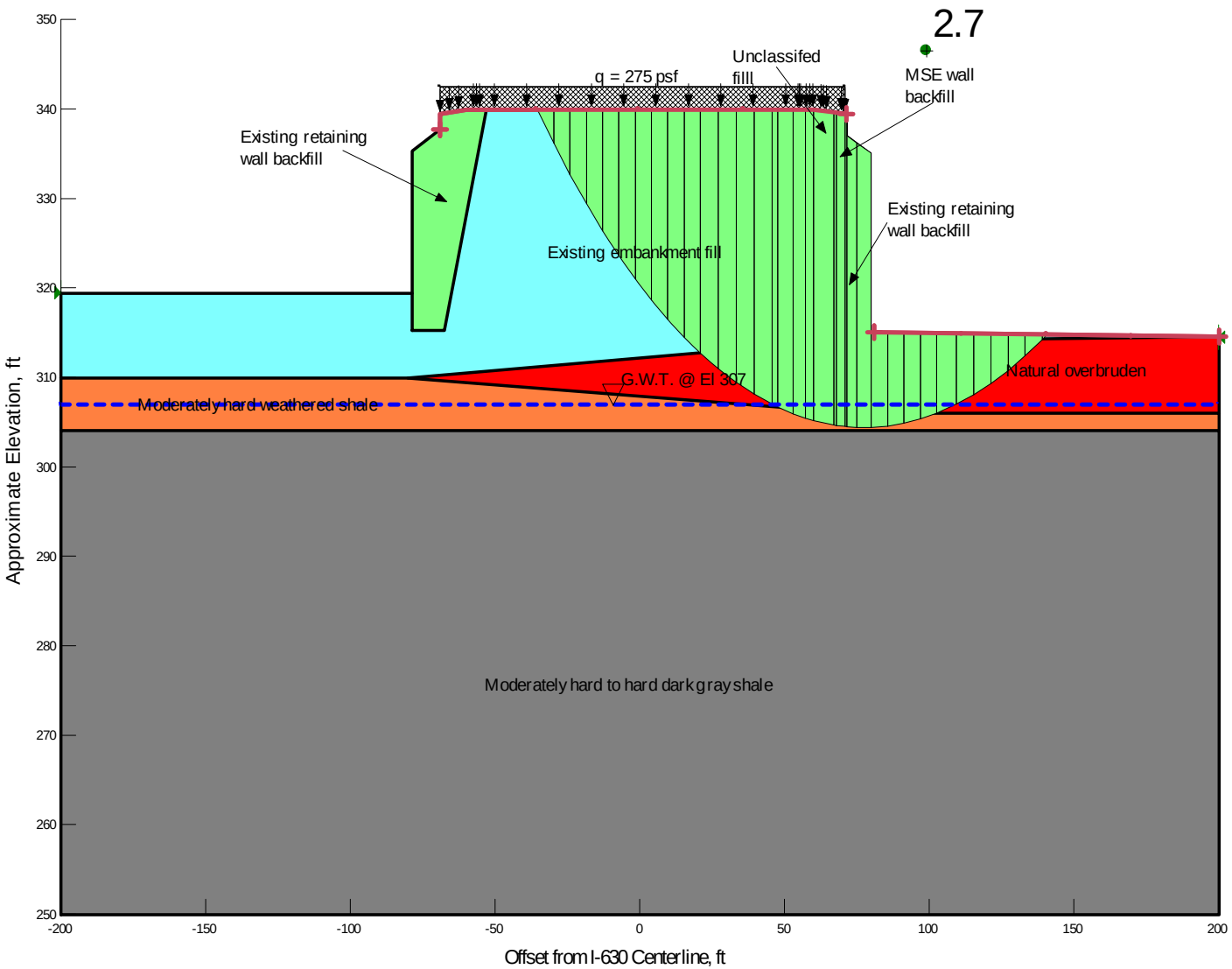
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+95.83

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



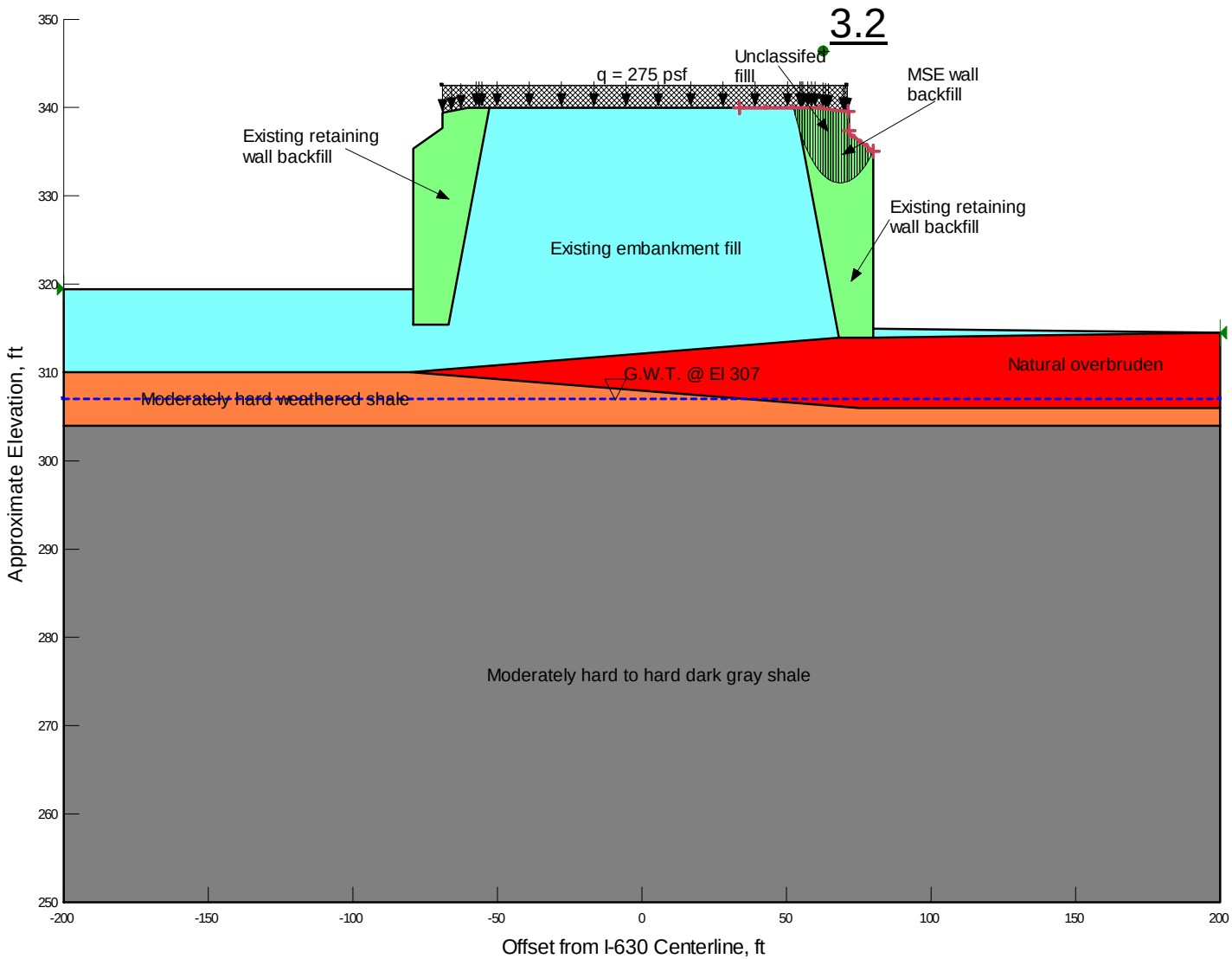
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



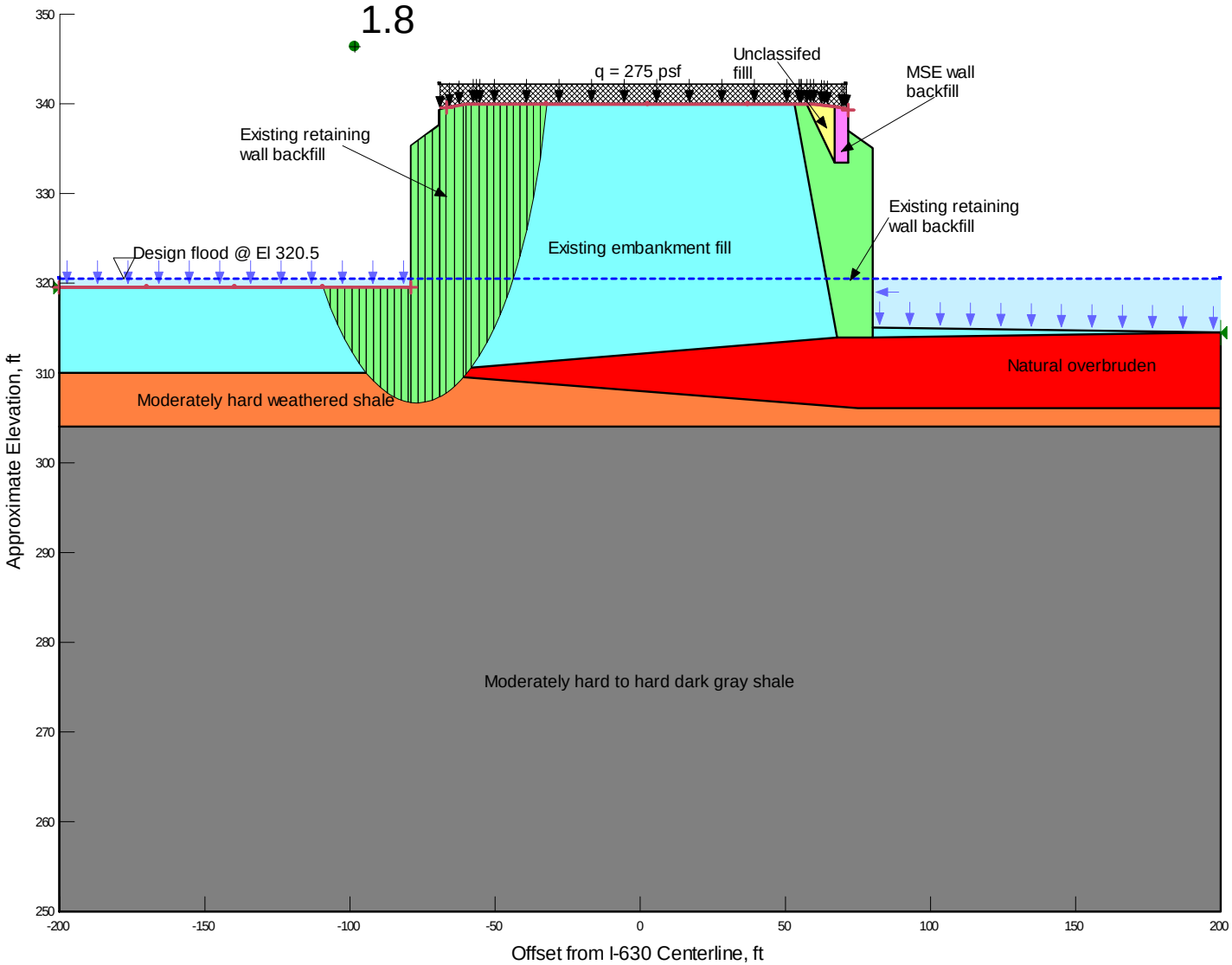
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



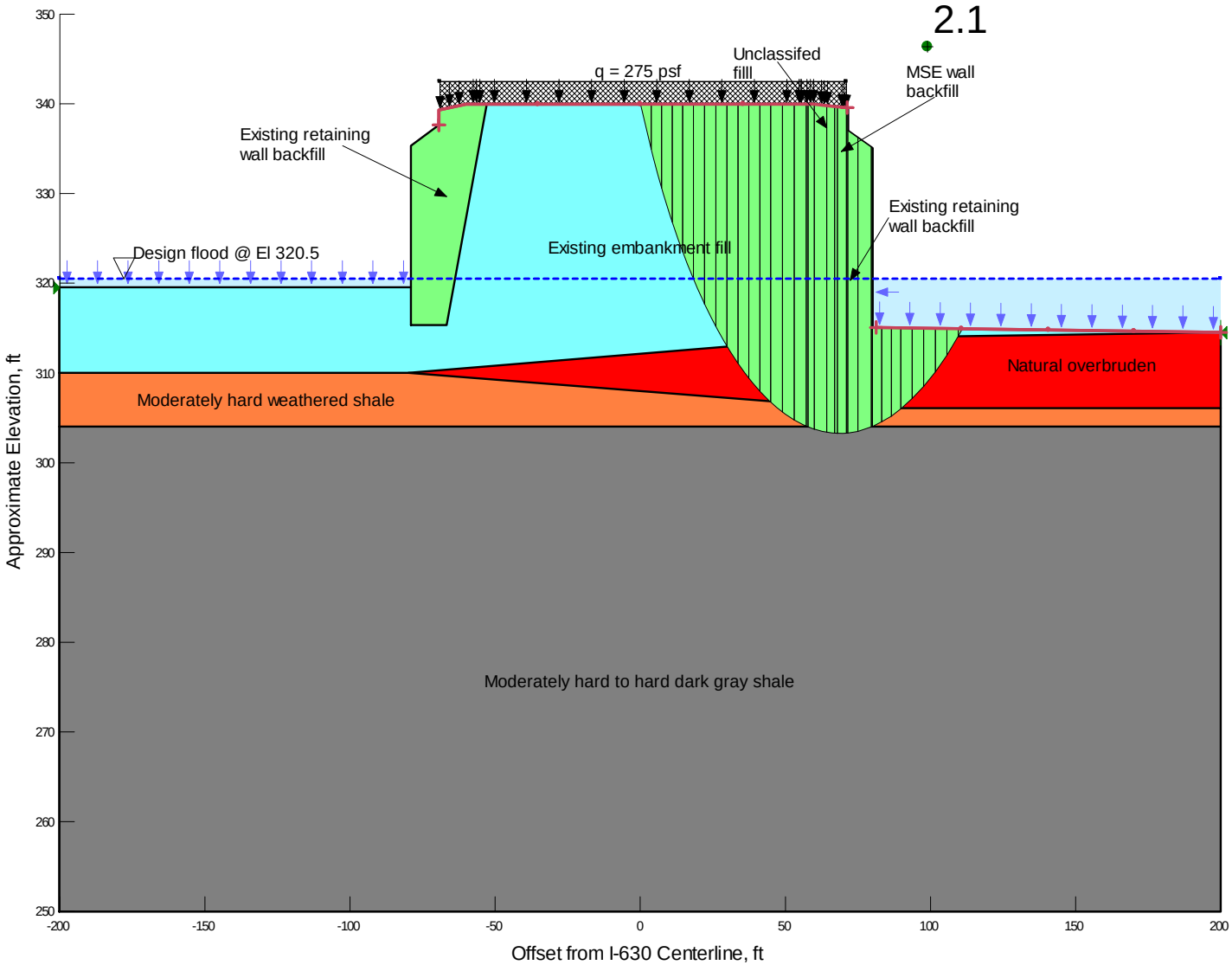
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+95.83

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



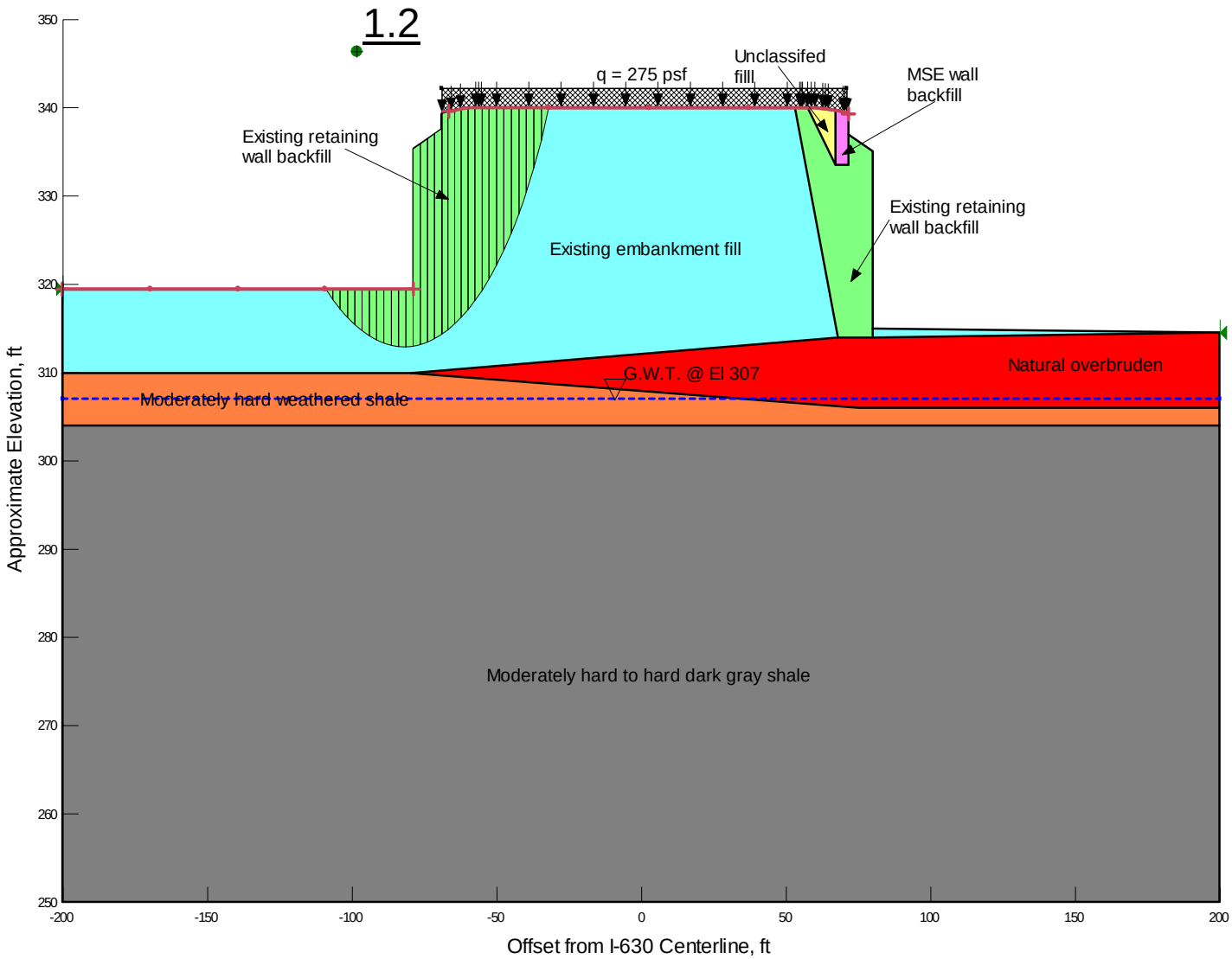
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



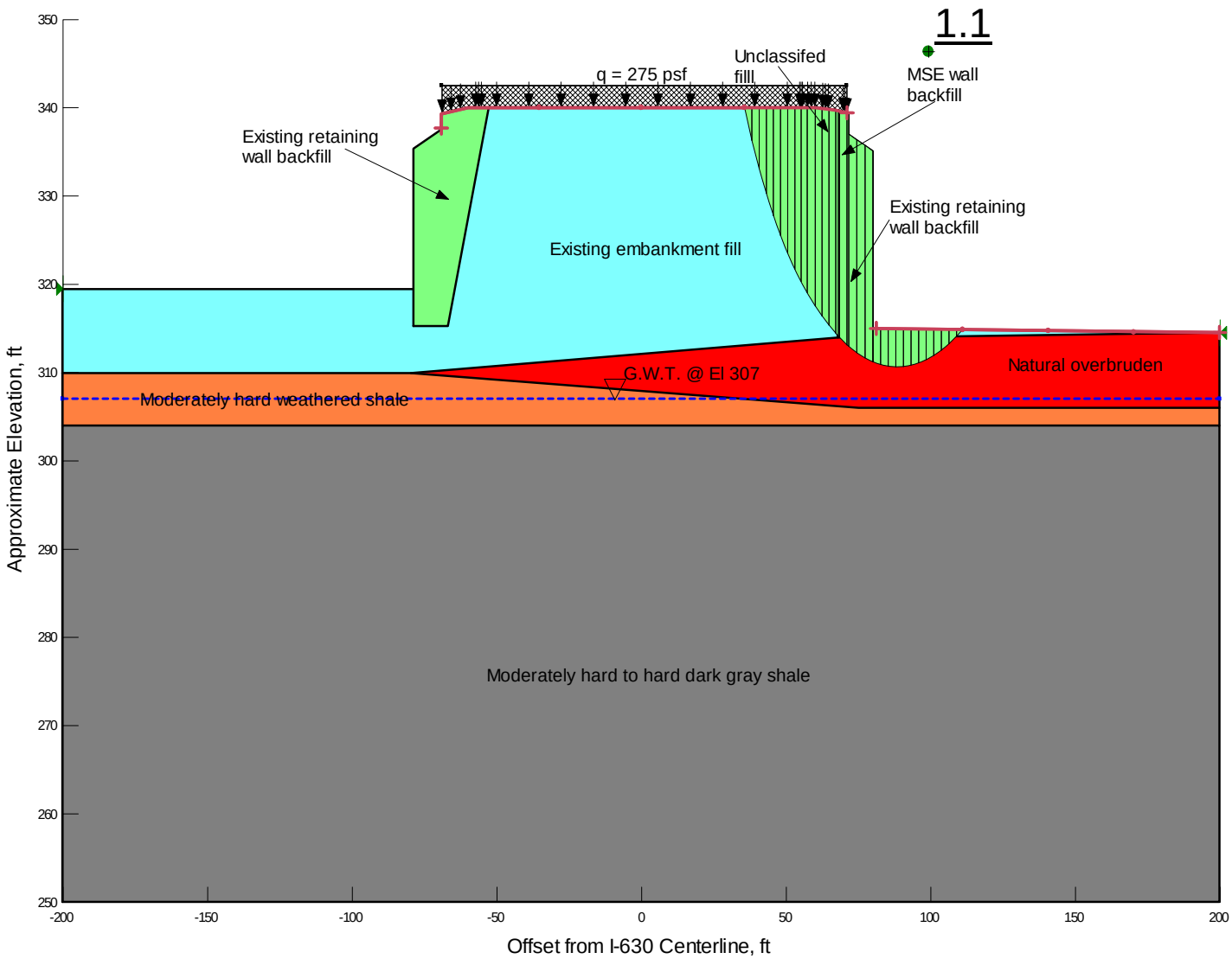
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



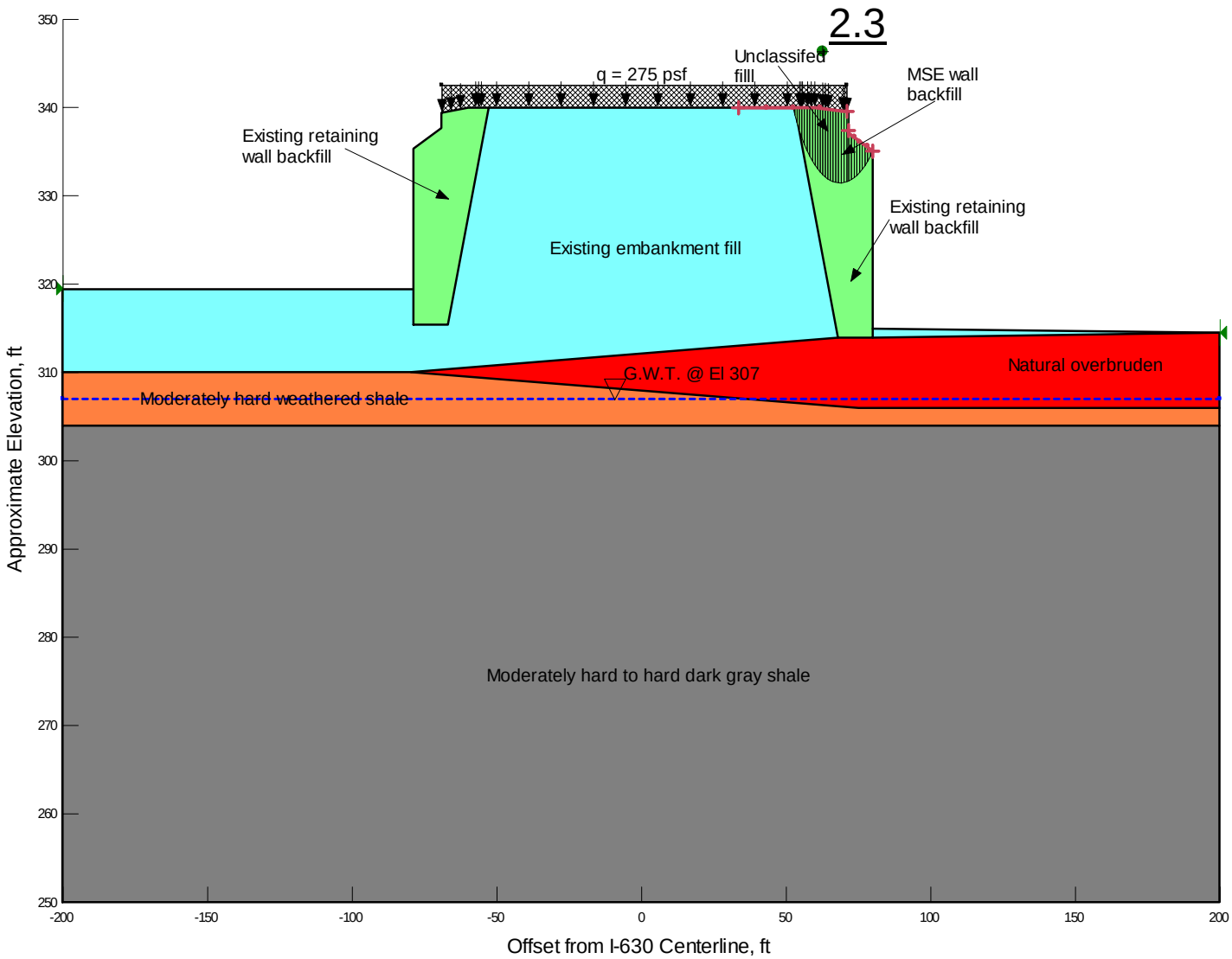
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



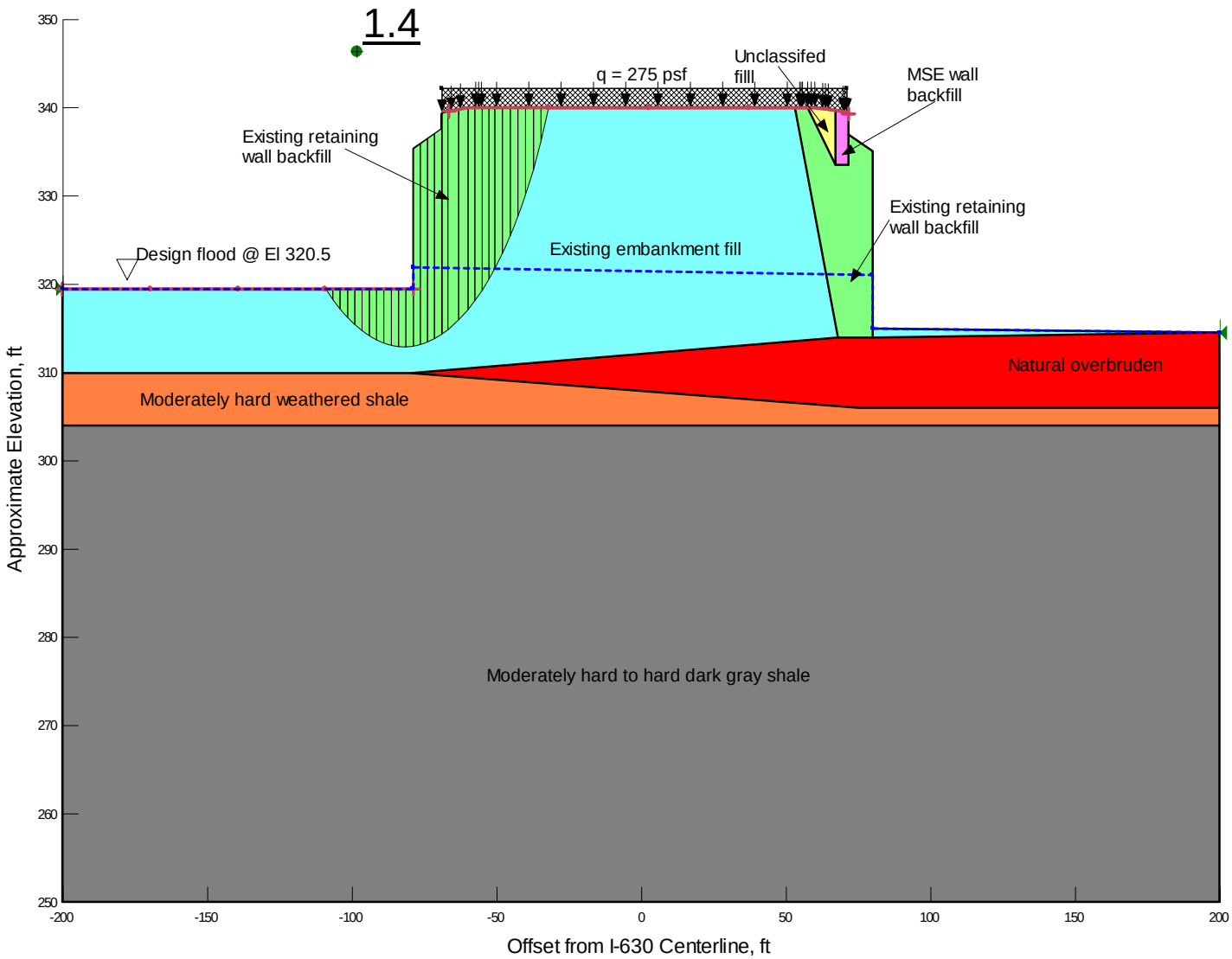
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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



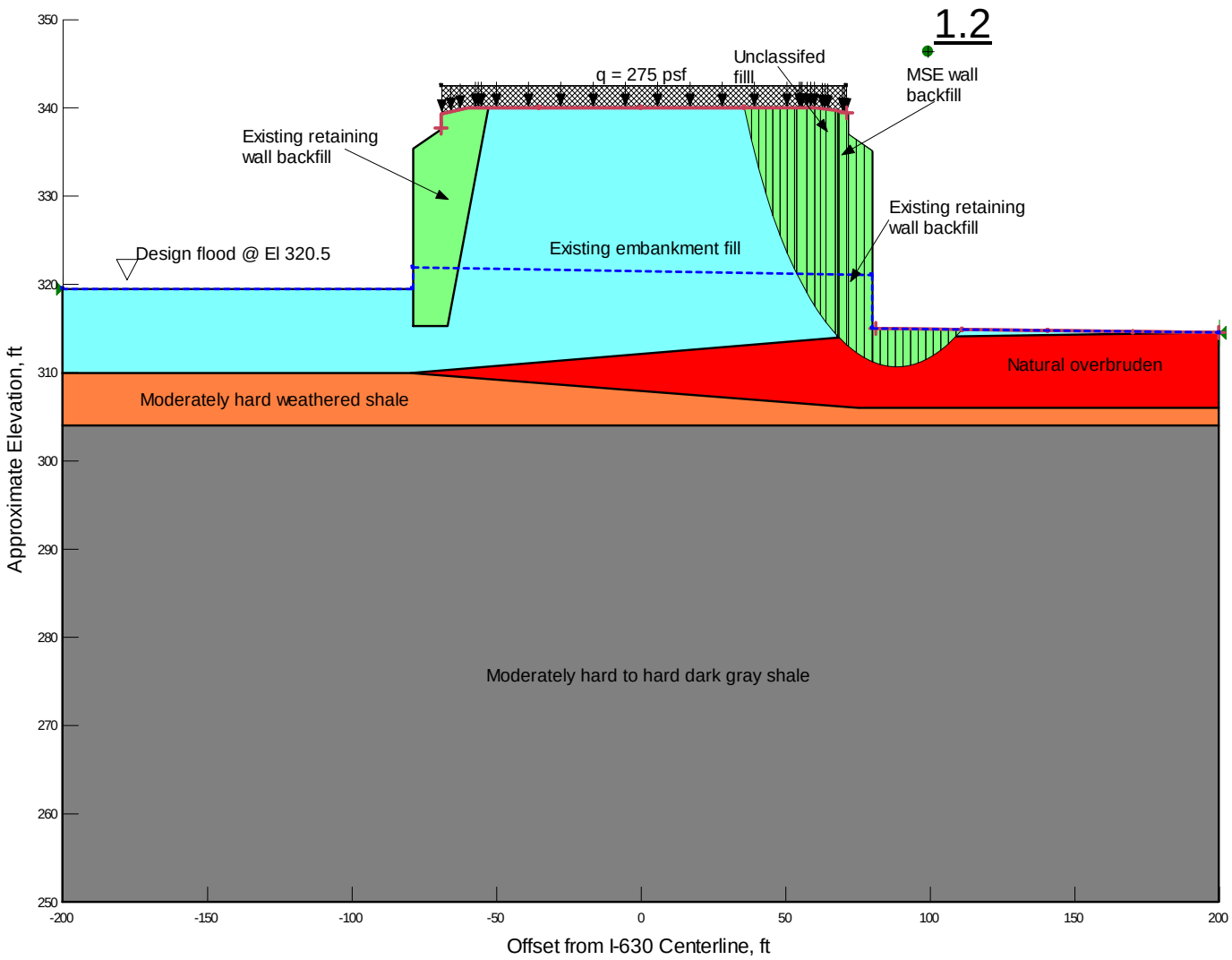
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
South Embankment Side – Localized Failure below New MSE Wall
Sta 1123+95.83

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



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
North Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

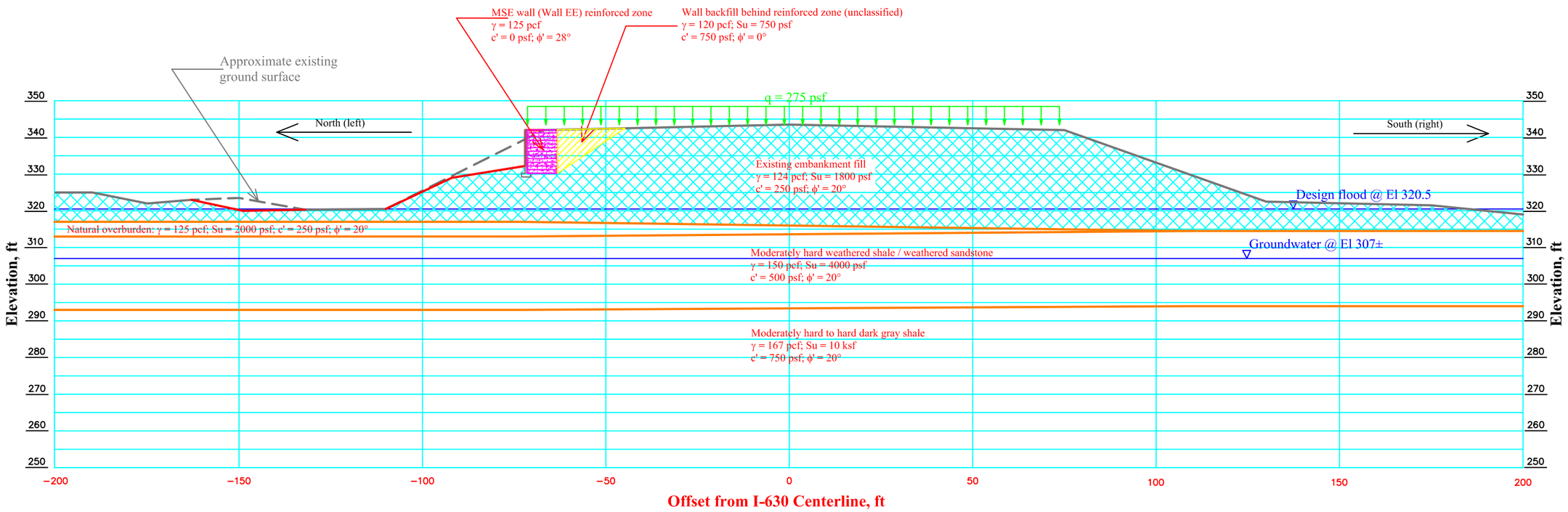
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
South Embankment Side – Deep-Seated Failure below Existing Retaining Wall
Sta 1123+95.83

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

ATTACHMENT 18



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

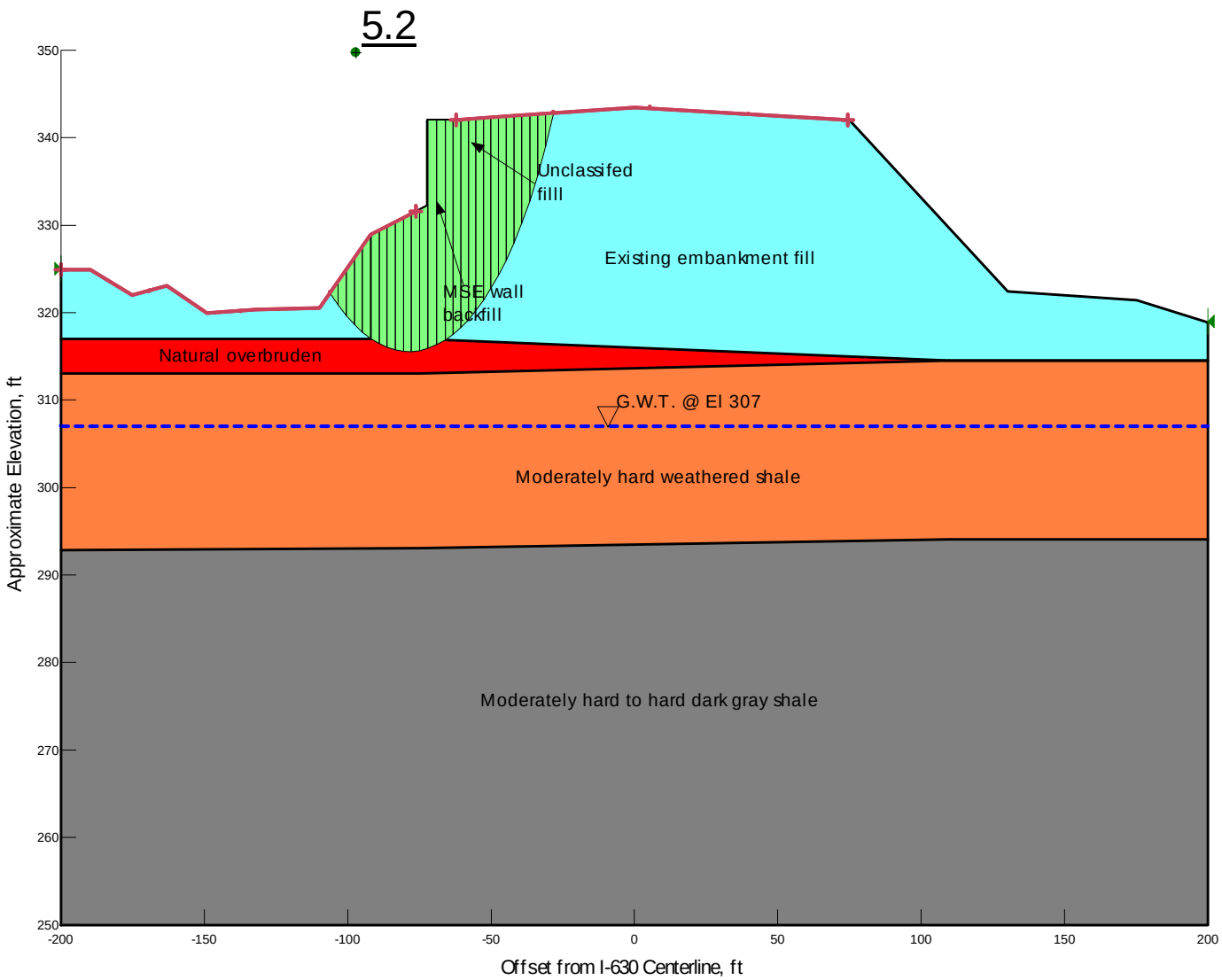
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Sta 1129+00 - Wall EE
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
March 31, 2015	Plate

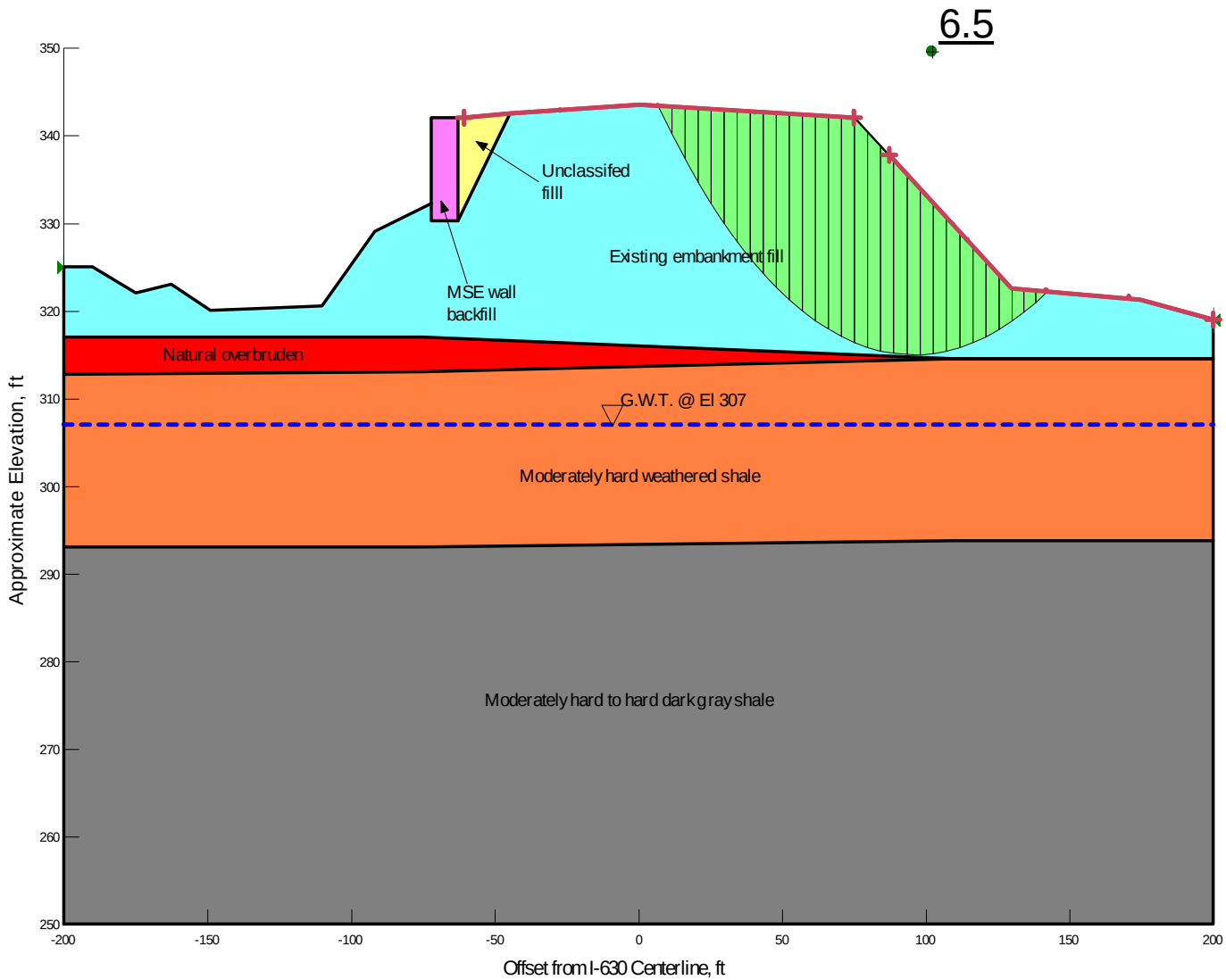
Results of Stability Analyses
MSE Wall EE @ Sta 1129+00
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Embankment Side	Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
North (left)	End of Construction	Groundwater @ El 307±	5.2
South (right)			6.5
North (left)	Long Term	Groundwater @ El 307±	1.9
South (right)			2.2
North (left)		Design flood @ El 320.5	1.9
South (right)			2.1
North (left)	Seismic (k_h = 1.0A_S = 0.13)	Groundwater @ El 307±	1.4
South (right)			1.5
North (left)	Rapid Drawdown	Drawdown from design flood to embankment toe	1.9
South (right)			2.1



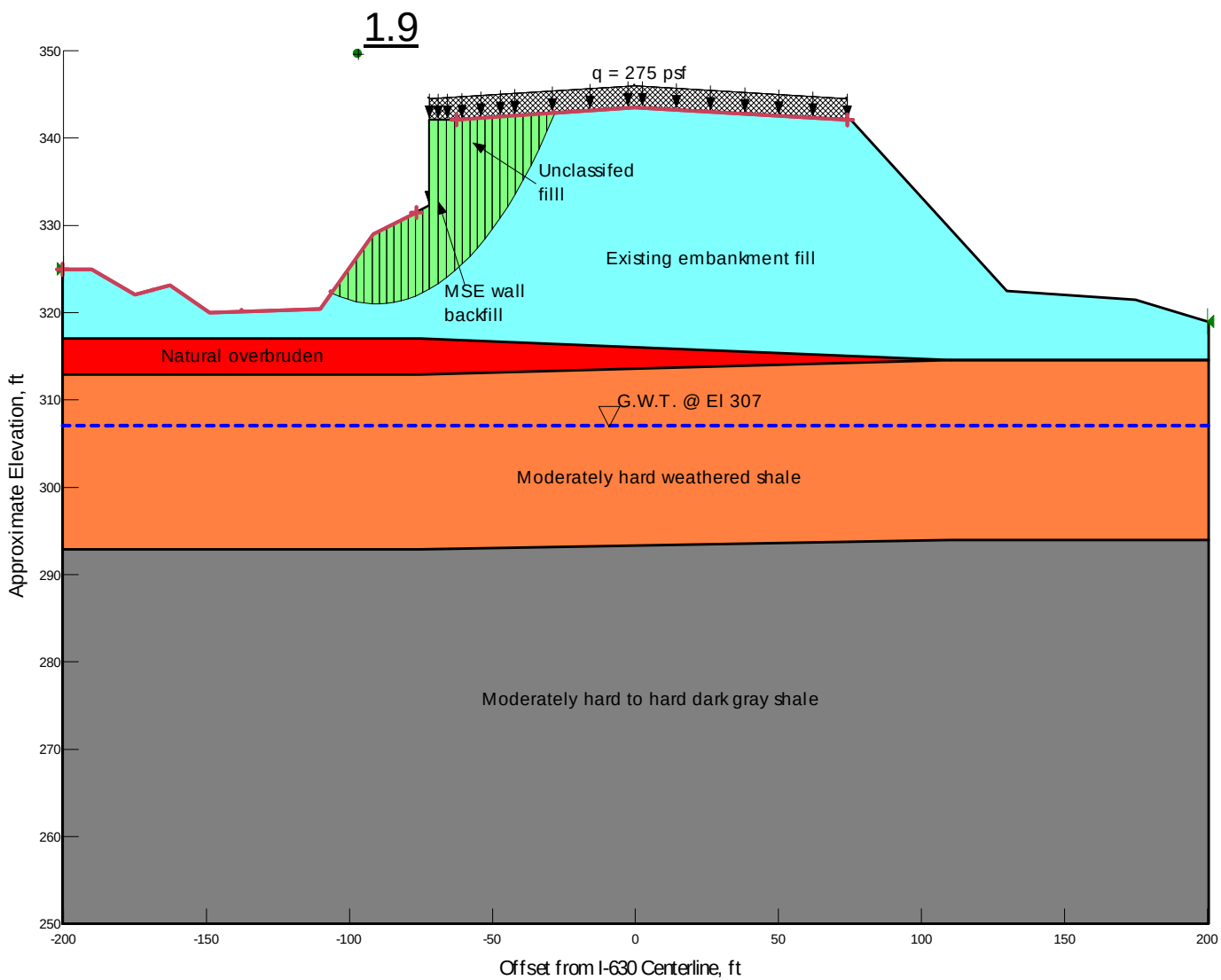
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
North Embankment Side
MSE Wall EE @ Sta 1129+00

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



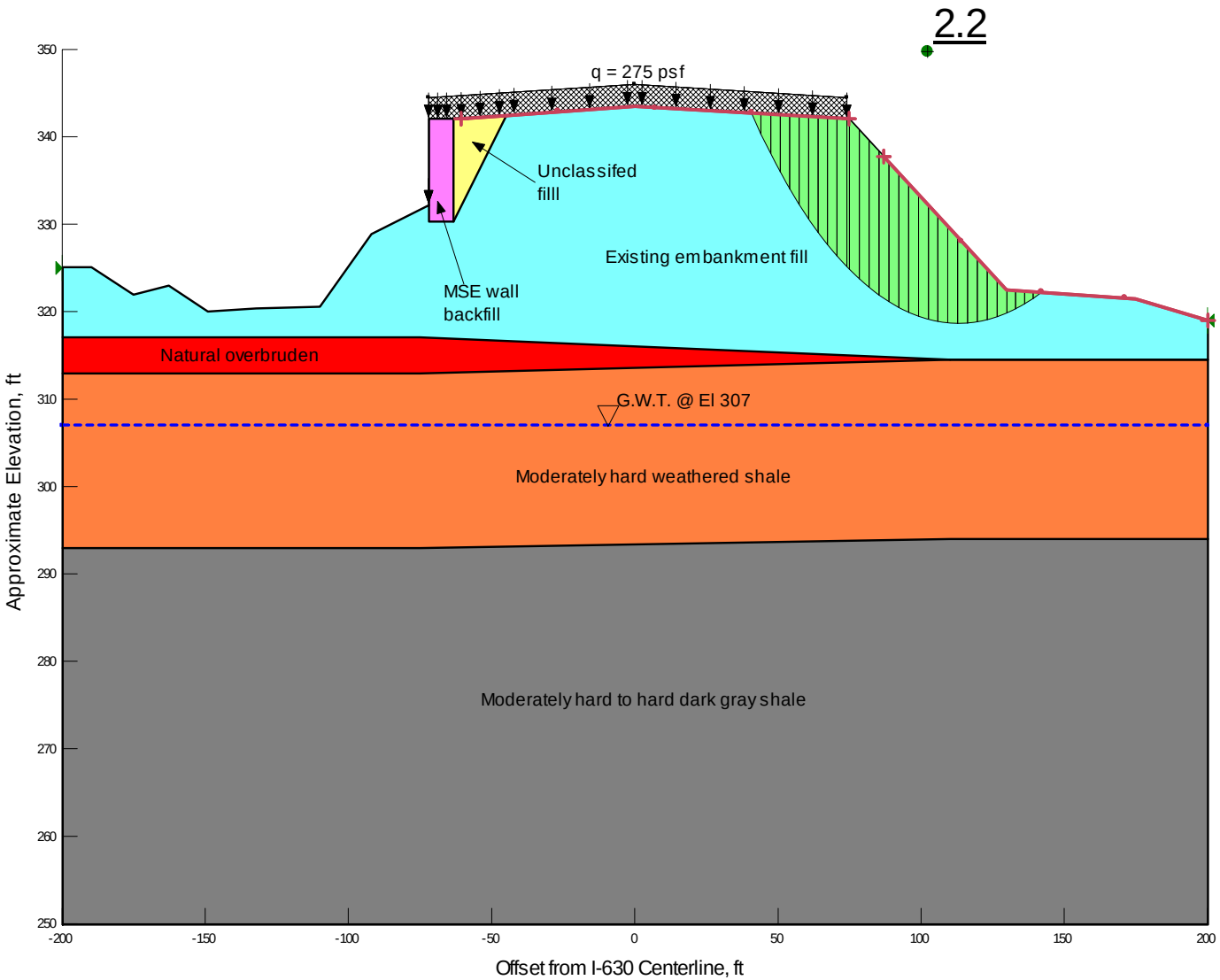
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
South Embankment Side
MSE Wall EE @ Sta 1129+00

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



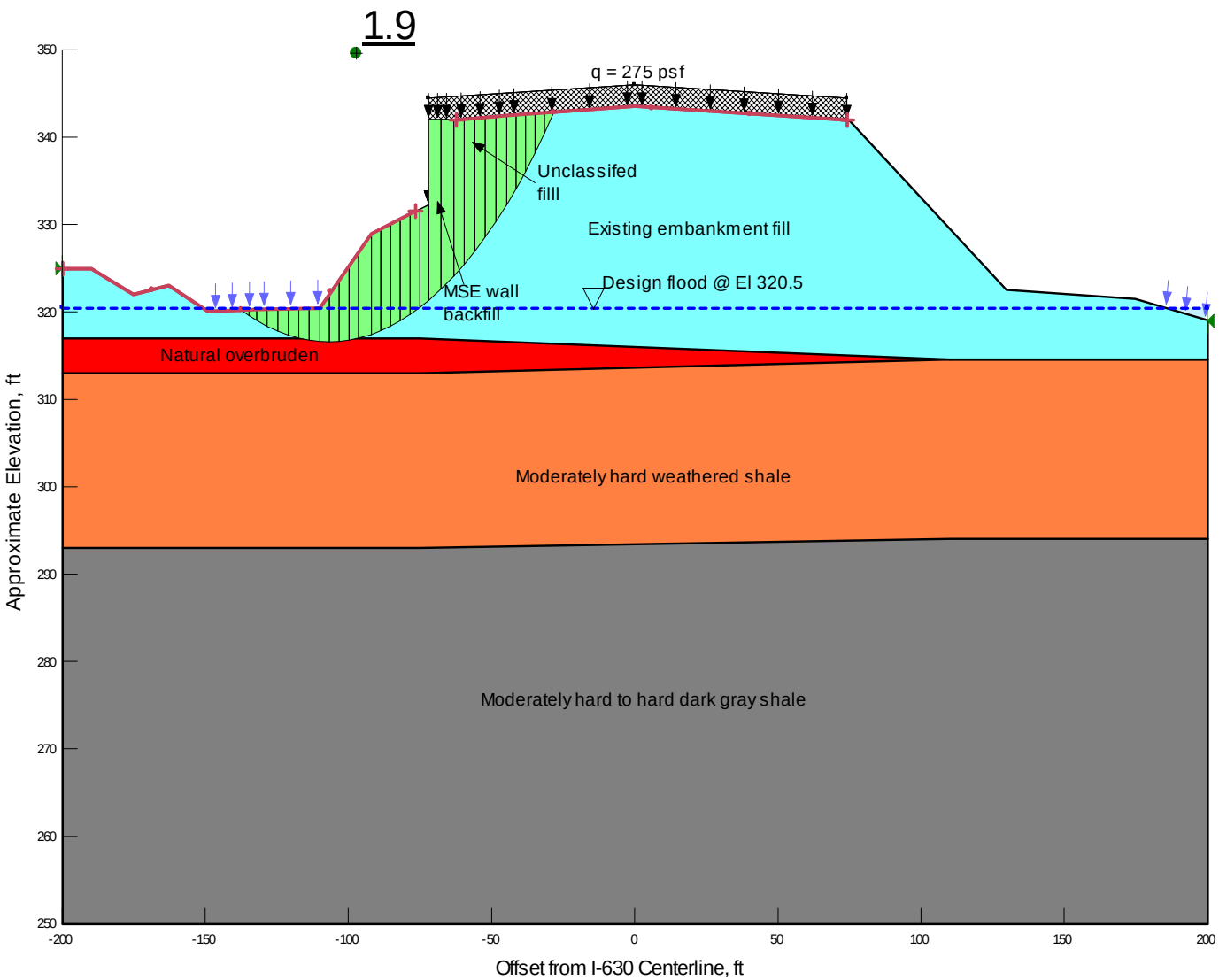
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
North Embankment Side
MSE Wall EE @ Sta 1129+00

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



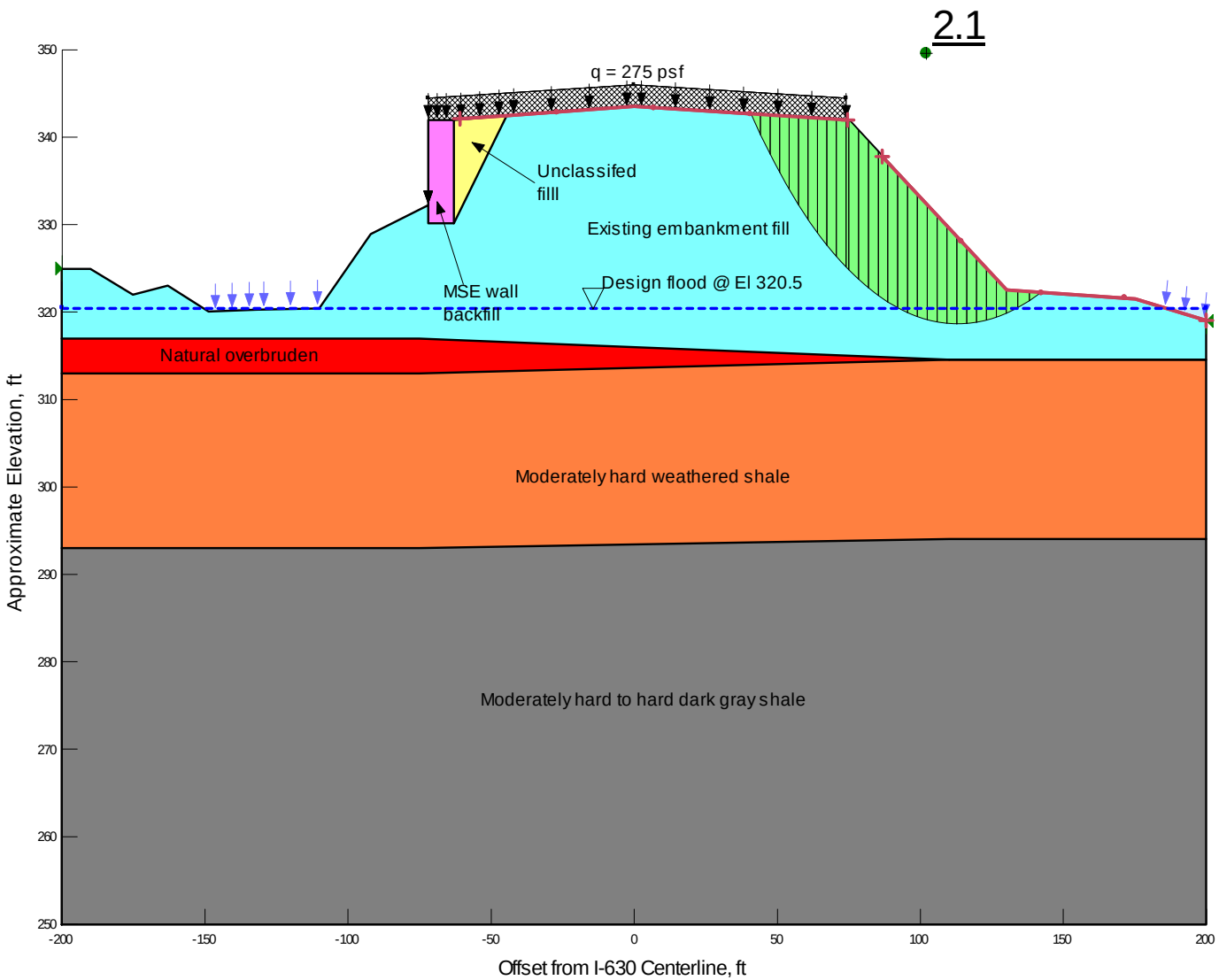
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
South Embankment Side
MSE Wall EE @ Sta 1129+00

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



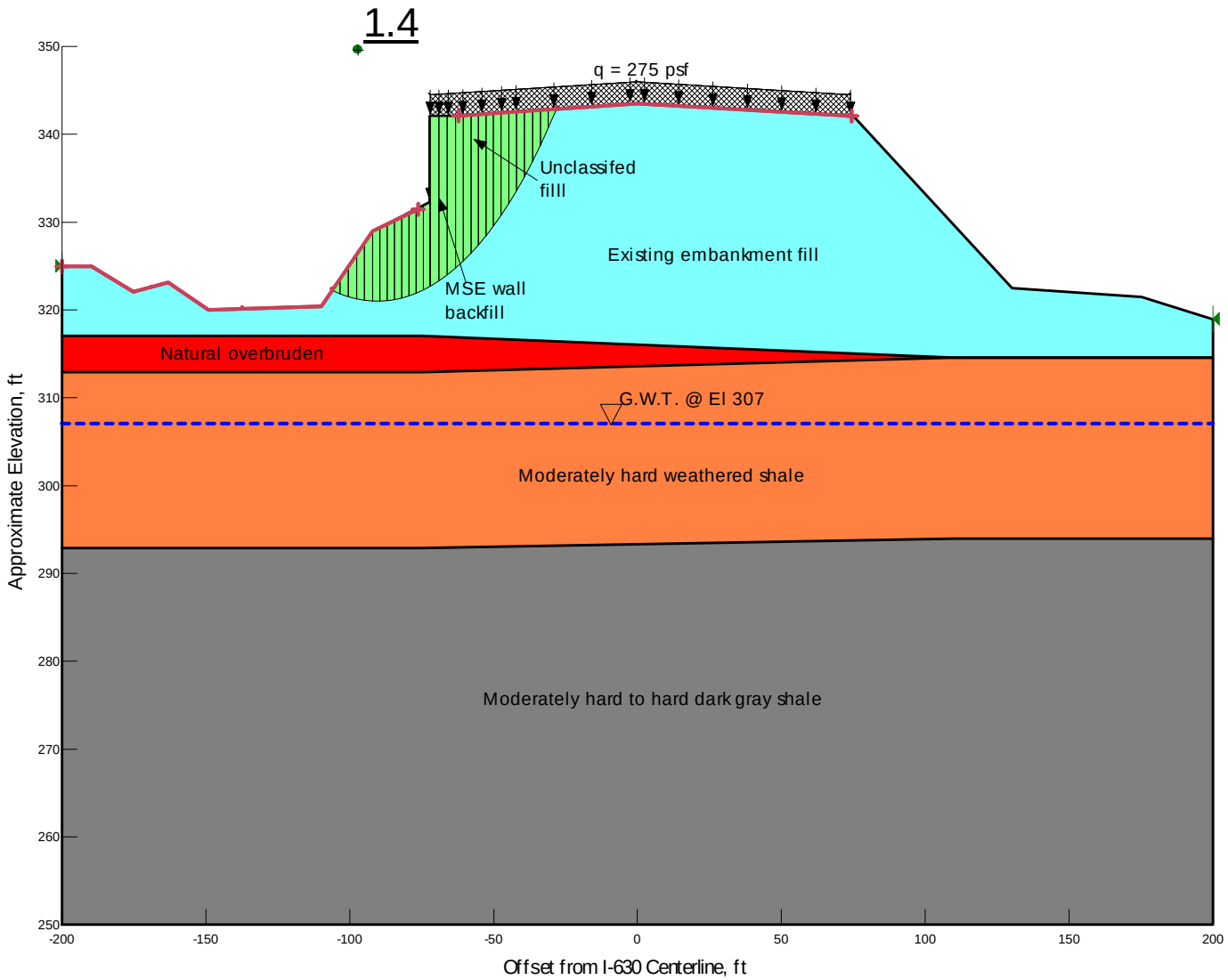
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
North Embankment Side
MSE Wall EE @ Sta 1129+00

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



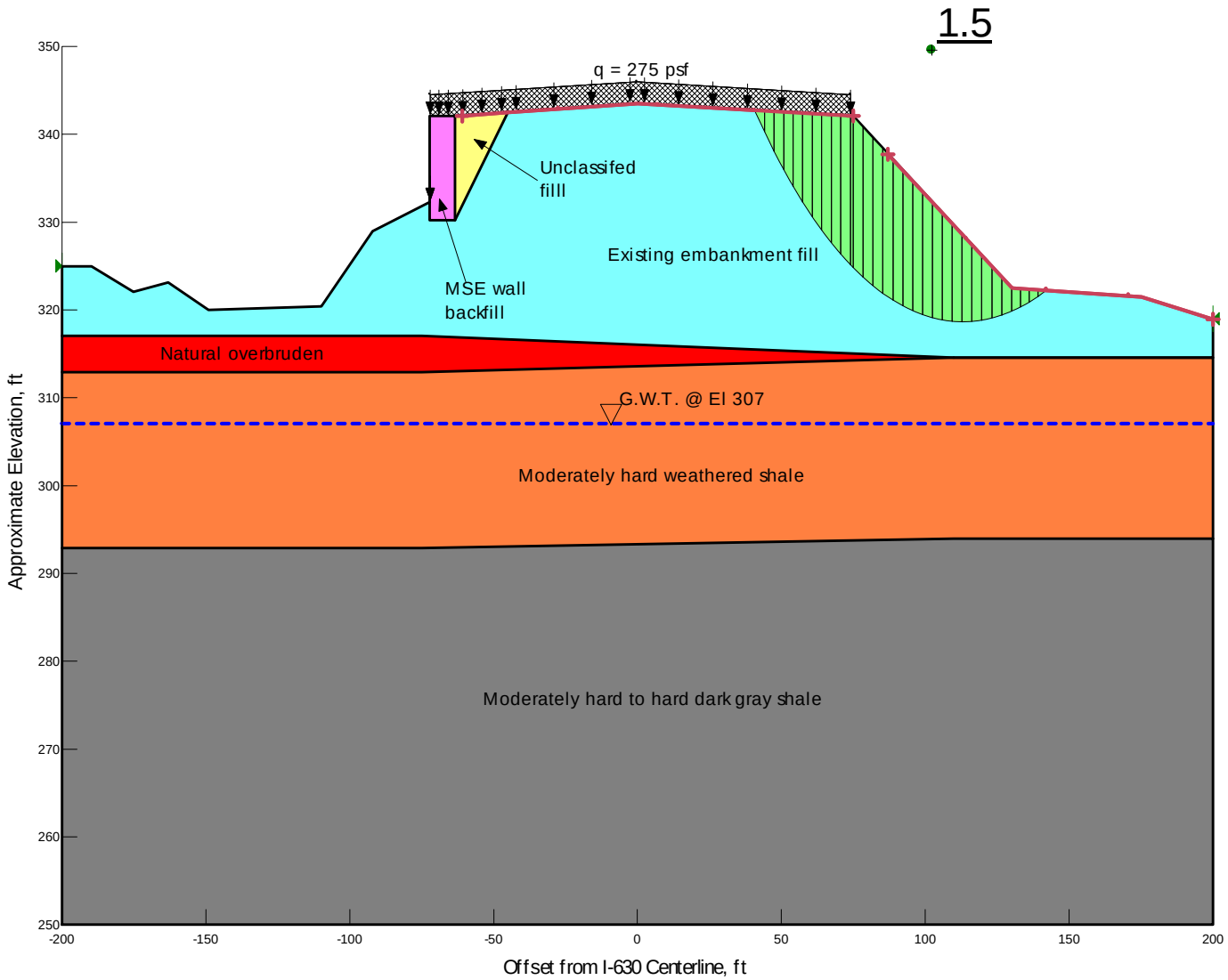
Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
South Embankment Side
MSE Wall EE @ Sta 1129+00

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



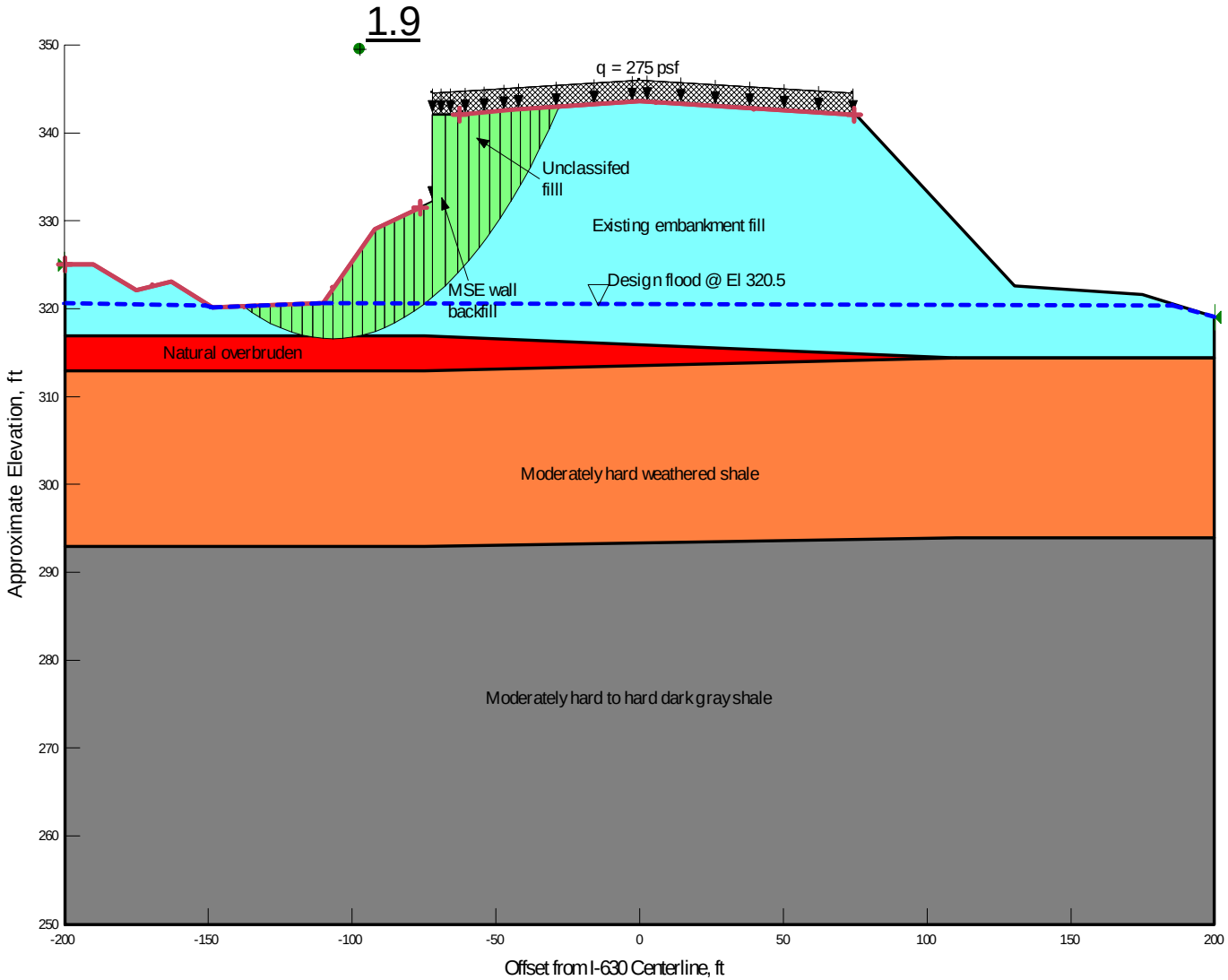
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
North Embankment Side
MSE Wall EE @ Sta 1129+00

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



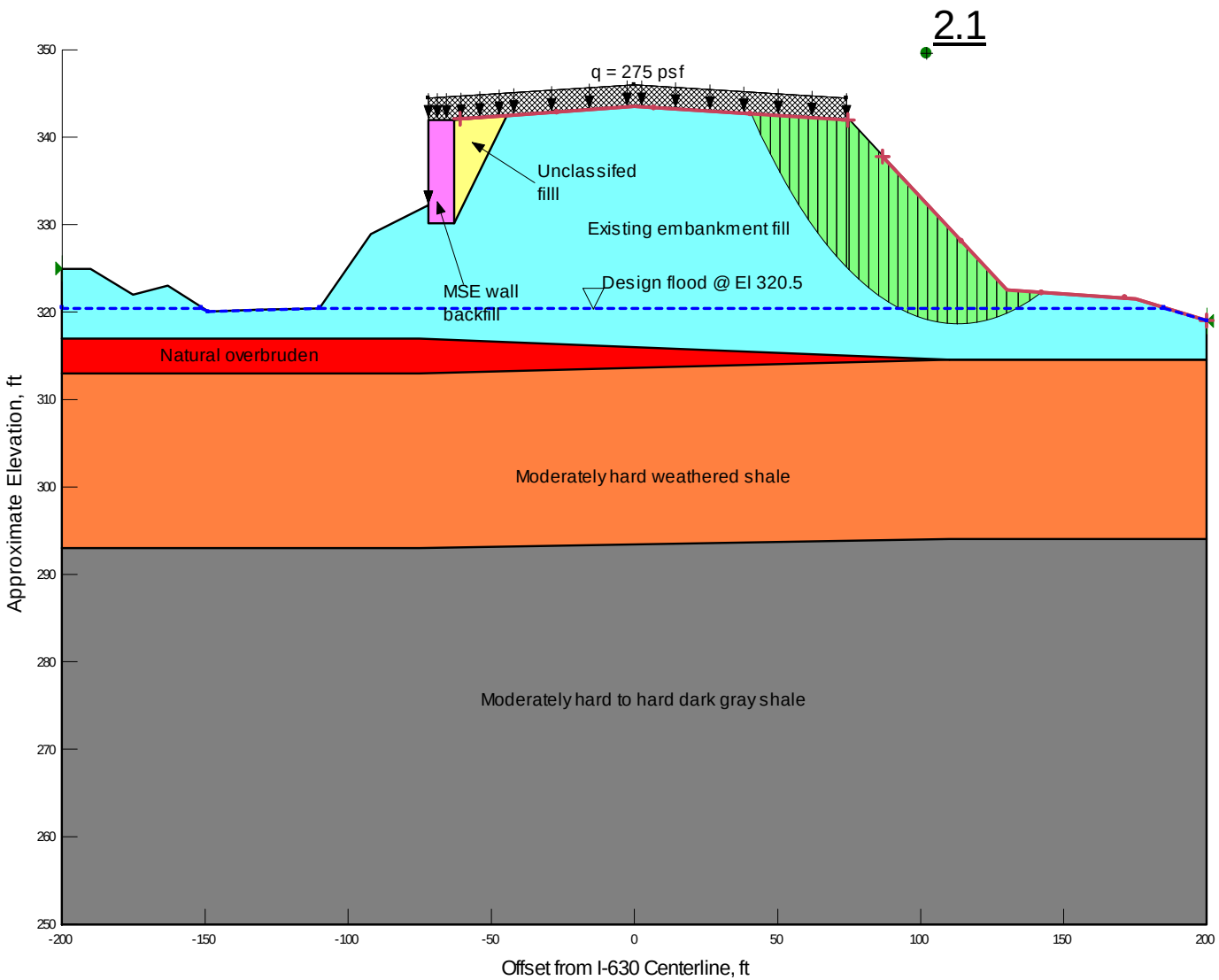
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
South Embankment Side
MSE Wall EE @ Sta 1129+00

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



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
North Embankment Side
MSE Wall EE @ Sta 1129+00

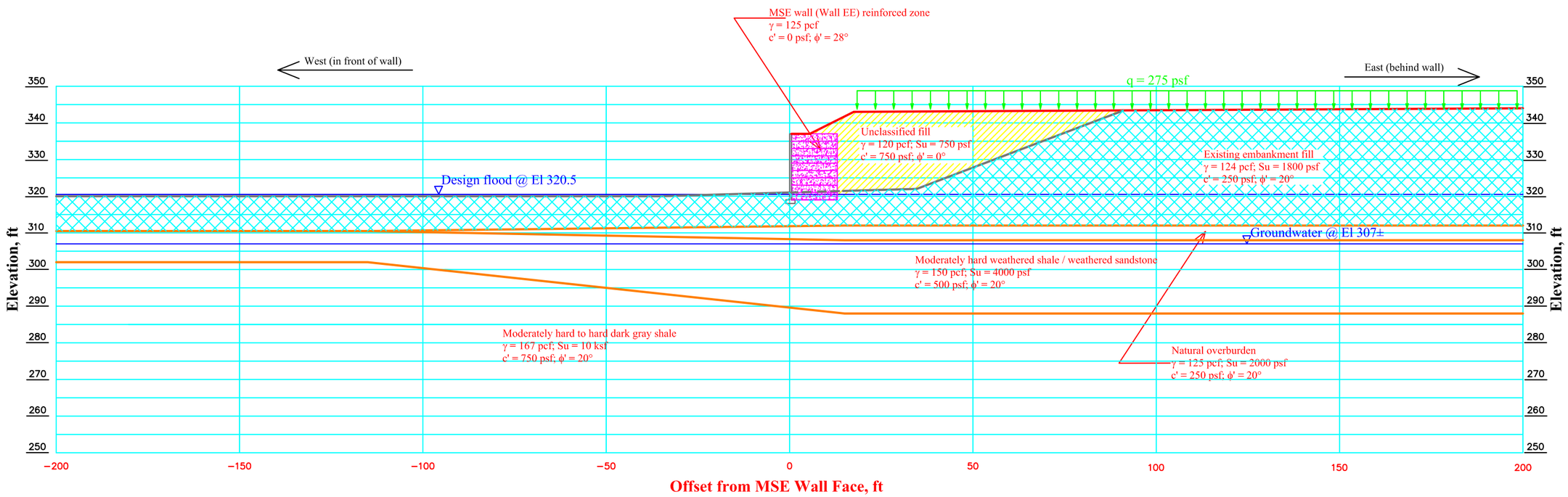
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Rapid Drawdown Condition
Drawdown from Design Flood to Embankment Toe
South Embankment Side
MSE Wall EE @ Sta 1129+00

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

ATTACHMENT 19



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

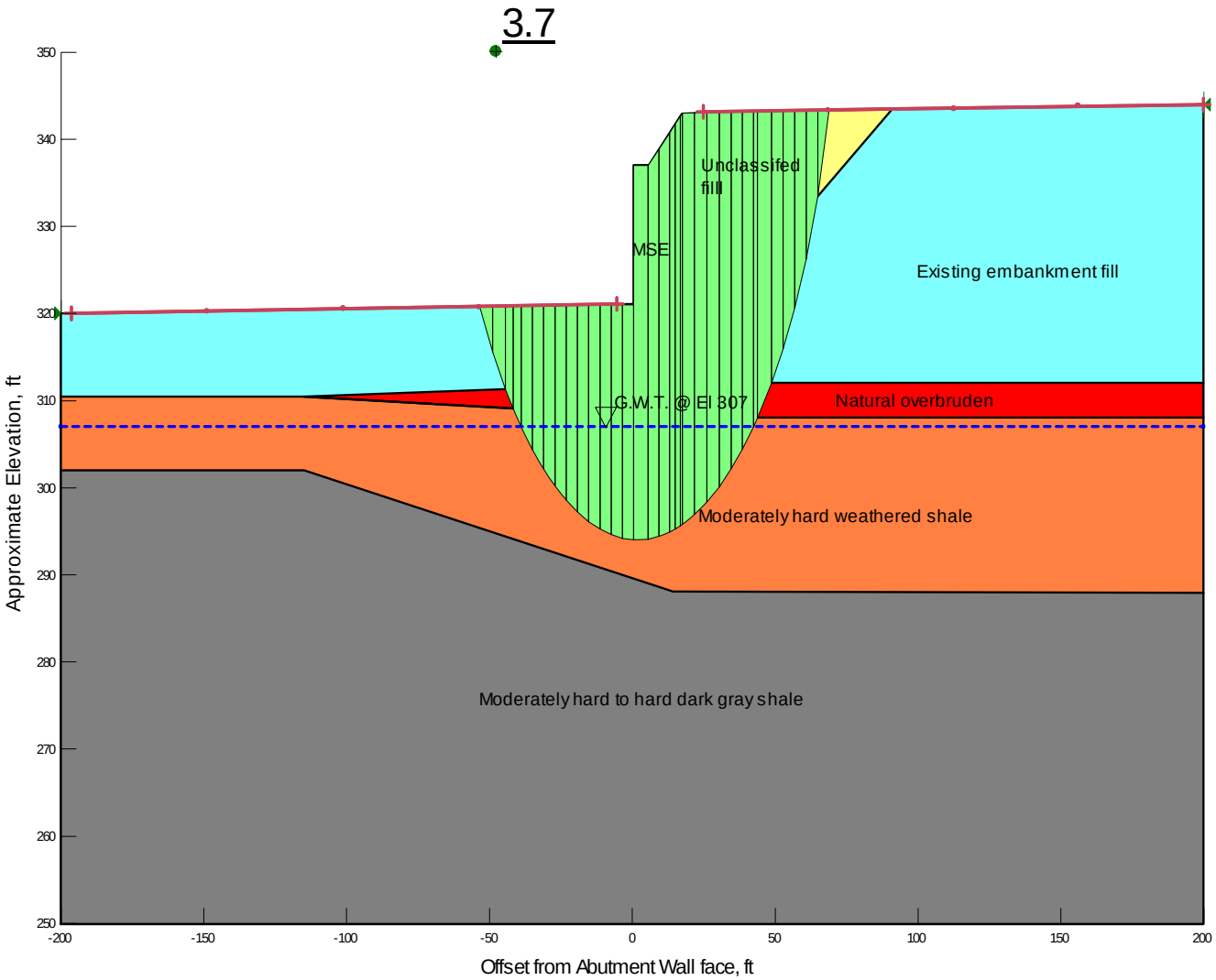
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
East Abutment Wall (Wall EE) - I-630 over Rodney Parham Road
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 1, 2015	Plate

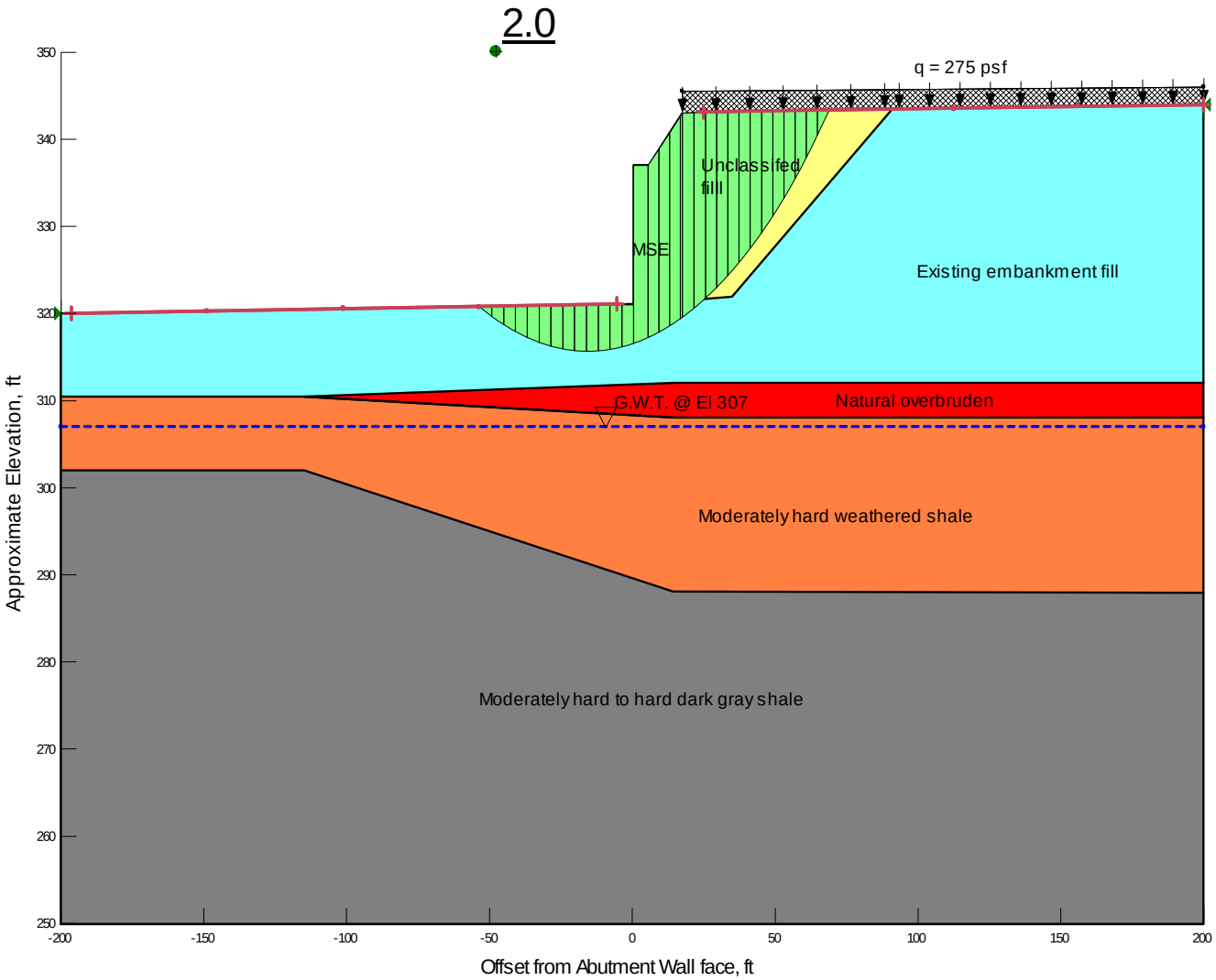
Results of Stability Analyses
East Abutment Wall (MSE Wall EE) – I-630 over Rodney Parham Road
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Design Loading Condition	Design Water Condition	Calculated Minimum Factor of Safety
End of Construction	Groundwater @ El 307±	3.7
Long Term	Groundwater @ El 307±	2.0
	Design flood @ El 320.5	1.9
Seismic ($k_h = 1.0A_S = 0.13$)	Groundwater @ El 307±	1.4



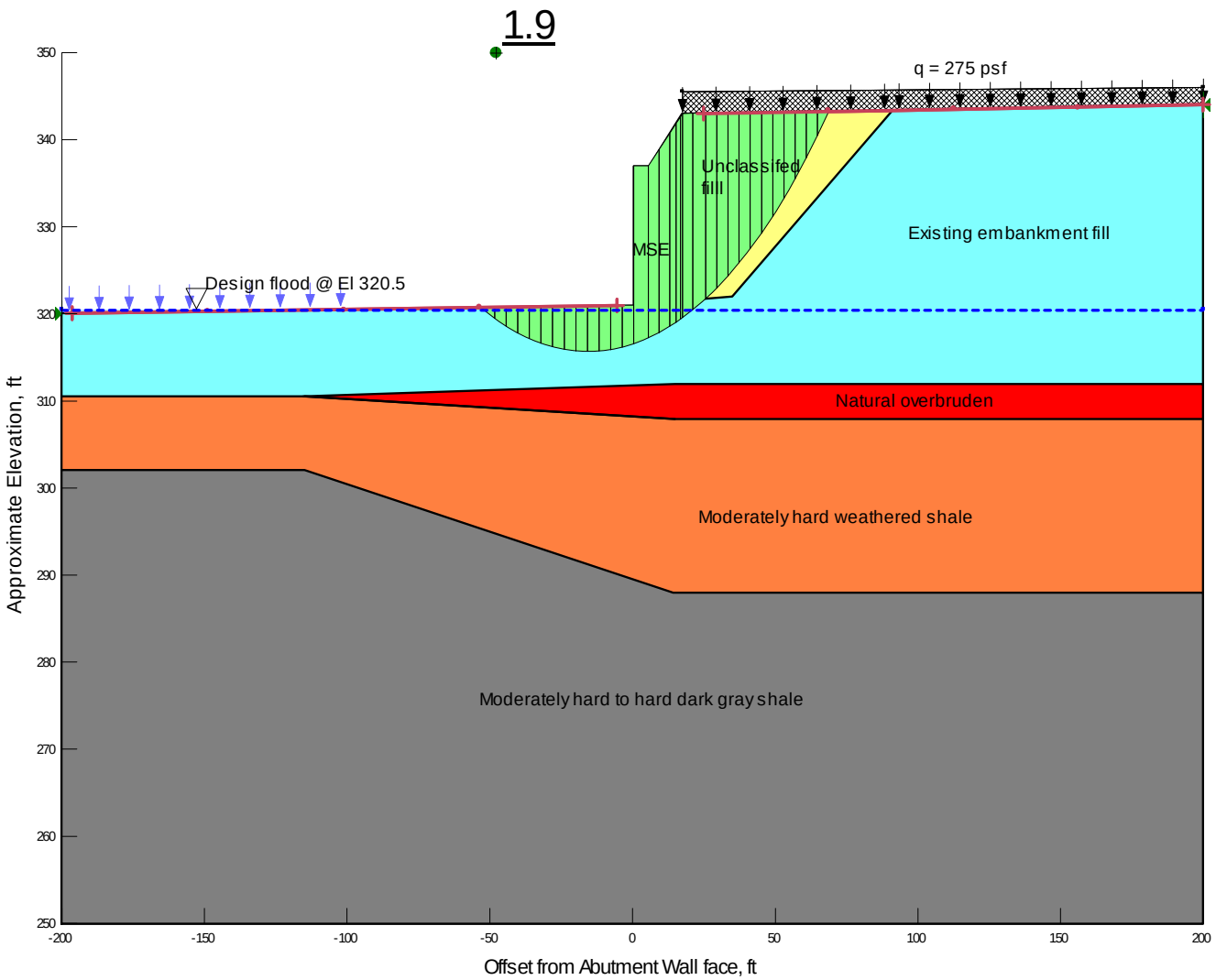
Results of Stability Analyses – End of Construction Condition
Groundwater @ El 307±
East Abutment Wall (MSE Wall EE)
I-630 over Rodney Parham Road

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



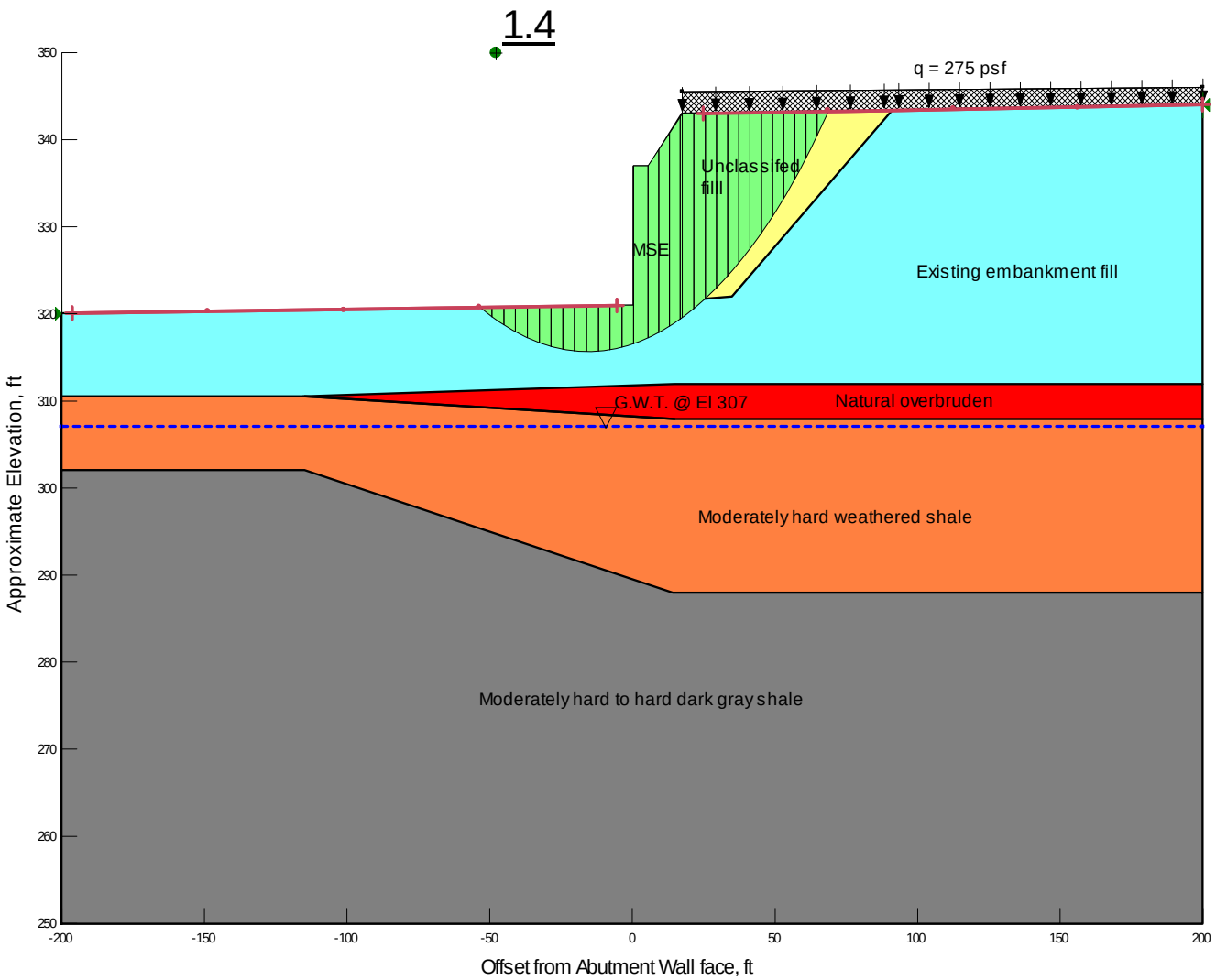
Results of Stability Analyses – Long Term Condition
Groundwater @ El 307±
East Abutment Wall (MSE Wall EE)
I-630 over Rodney Parham Road

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



Results of Stability Analyses – Long Term Condition
Design Flood @ El 320.5
East Abutment Wall (MSE Wall EE)
I-630 over Rodney Parham Road

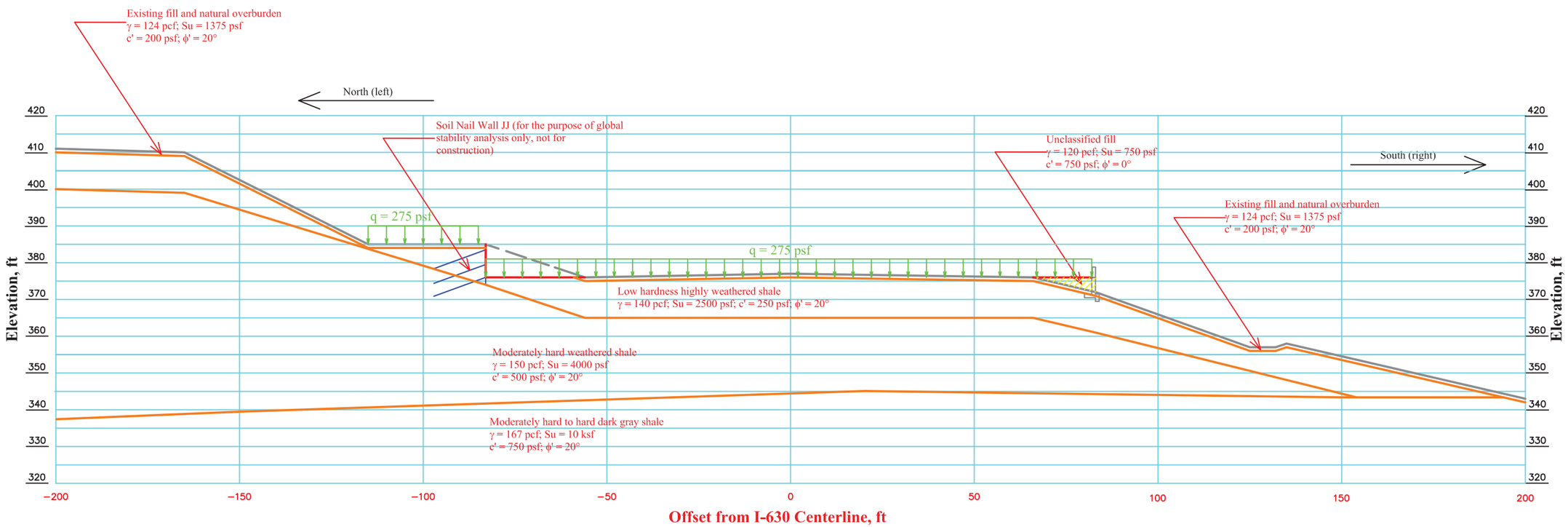
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.13$)
Groundwater @ El 307±
East Abutment Wall (MSE Wall EE)
I-630 over Rodney Parham Road

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

ATTACHMENT 20



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

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

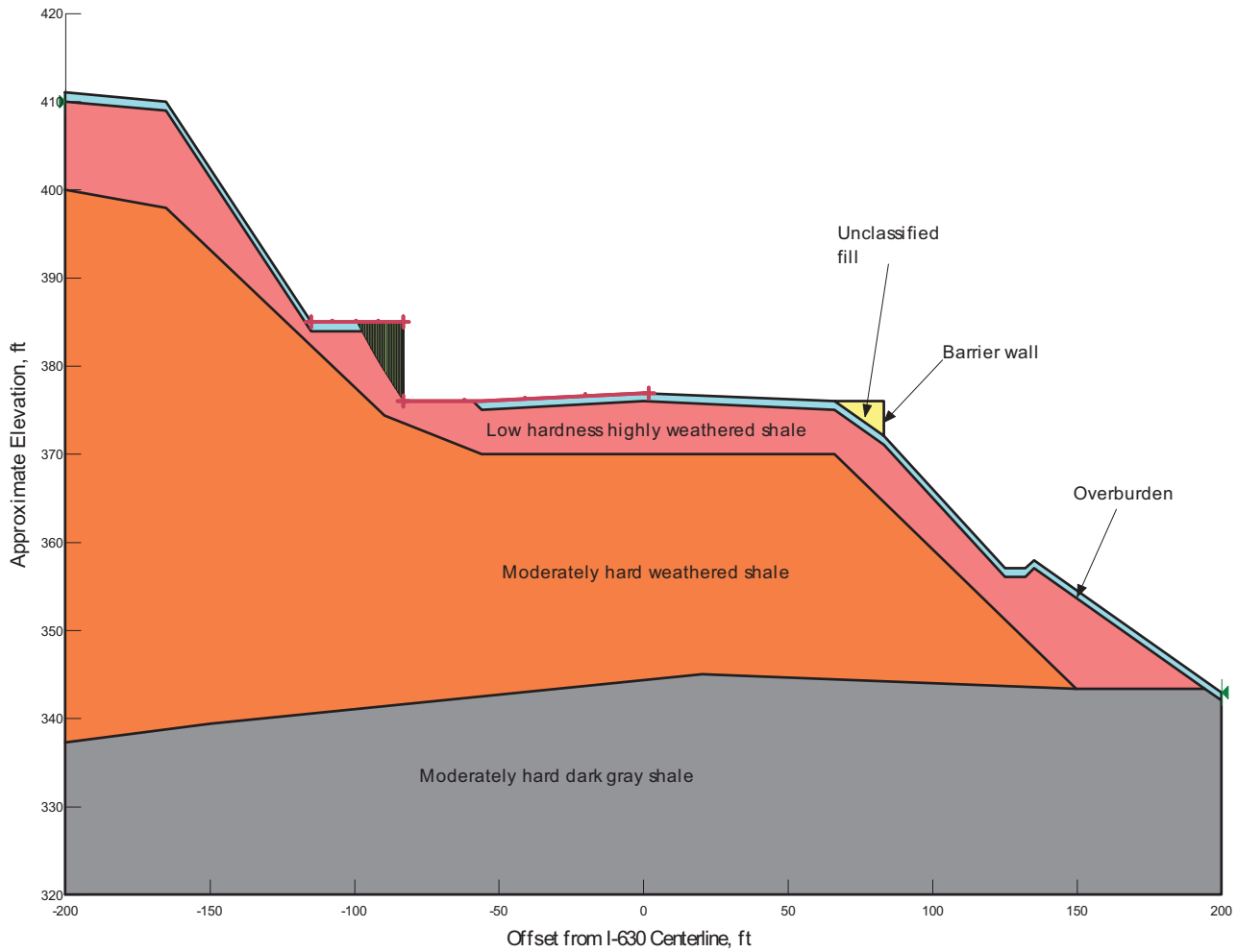
Section and Material Parameters for Stability Analysis
Sta 1148+00 - Soil Nail Wall JJ
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 13, 2015	Plate

Results of Stability Analyses
Sta 1148+00
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Structure	Design Loading Condition	Calculated Minimum Factor of Safety
North	End of Excavation	1.9
Wall JJ @ north side	End of Construction	5.0
Existing upper slope @ north side		6.0
South side		9.4
Wall JJ @ north side	Long Term	2.3
Existing upper slope @ north side		1.7
South side		2.1
Wall JJ @ north side	Seismic ($k_h = 1.0A_S = 0.16$)	1.5
Existing upper slope @ north side		1.3
South side		1.5

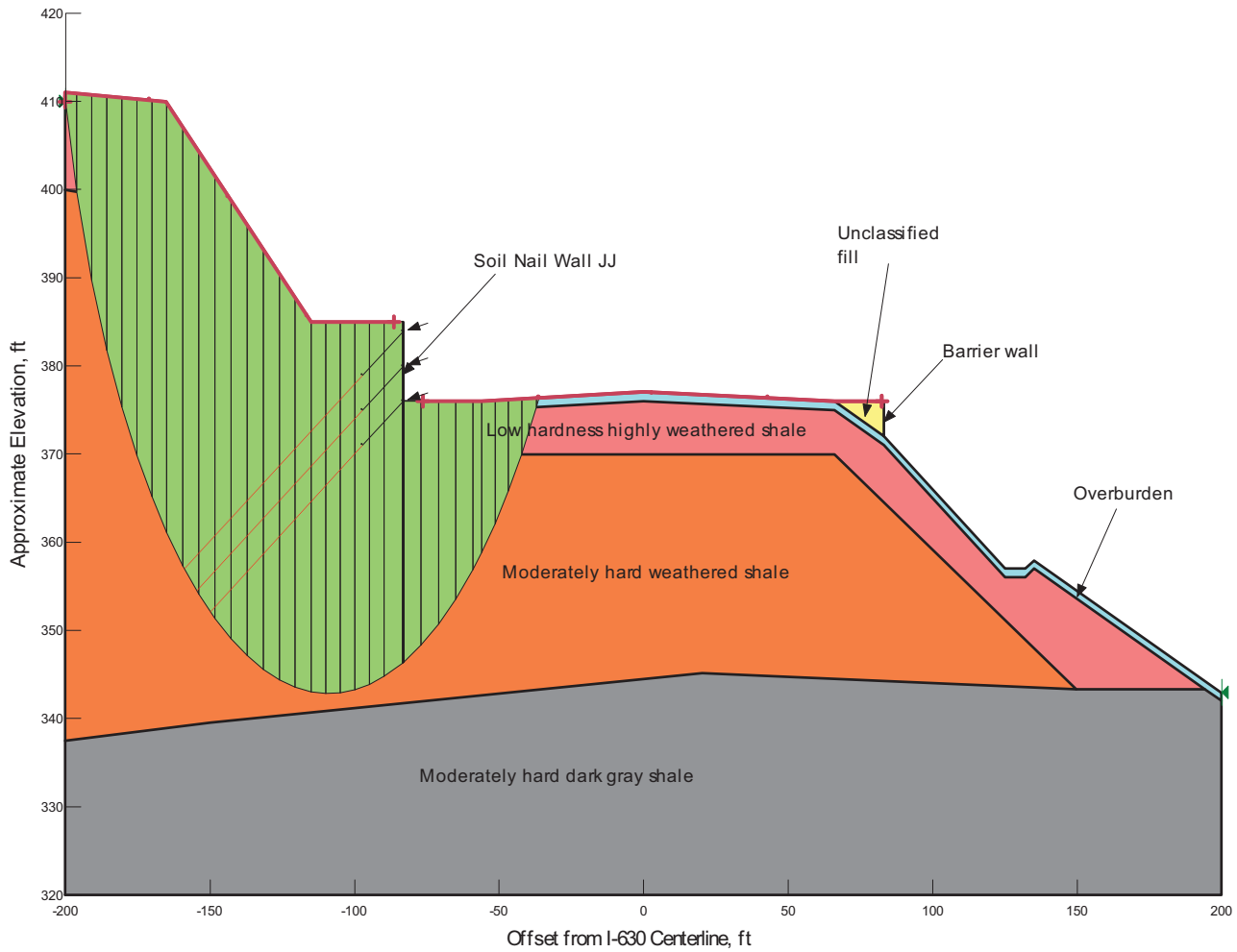
1.9



Results of Stability Analyses – End of Excavation Condition
North Side
Sta 1148+00

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

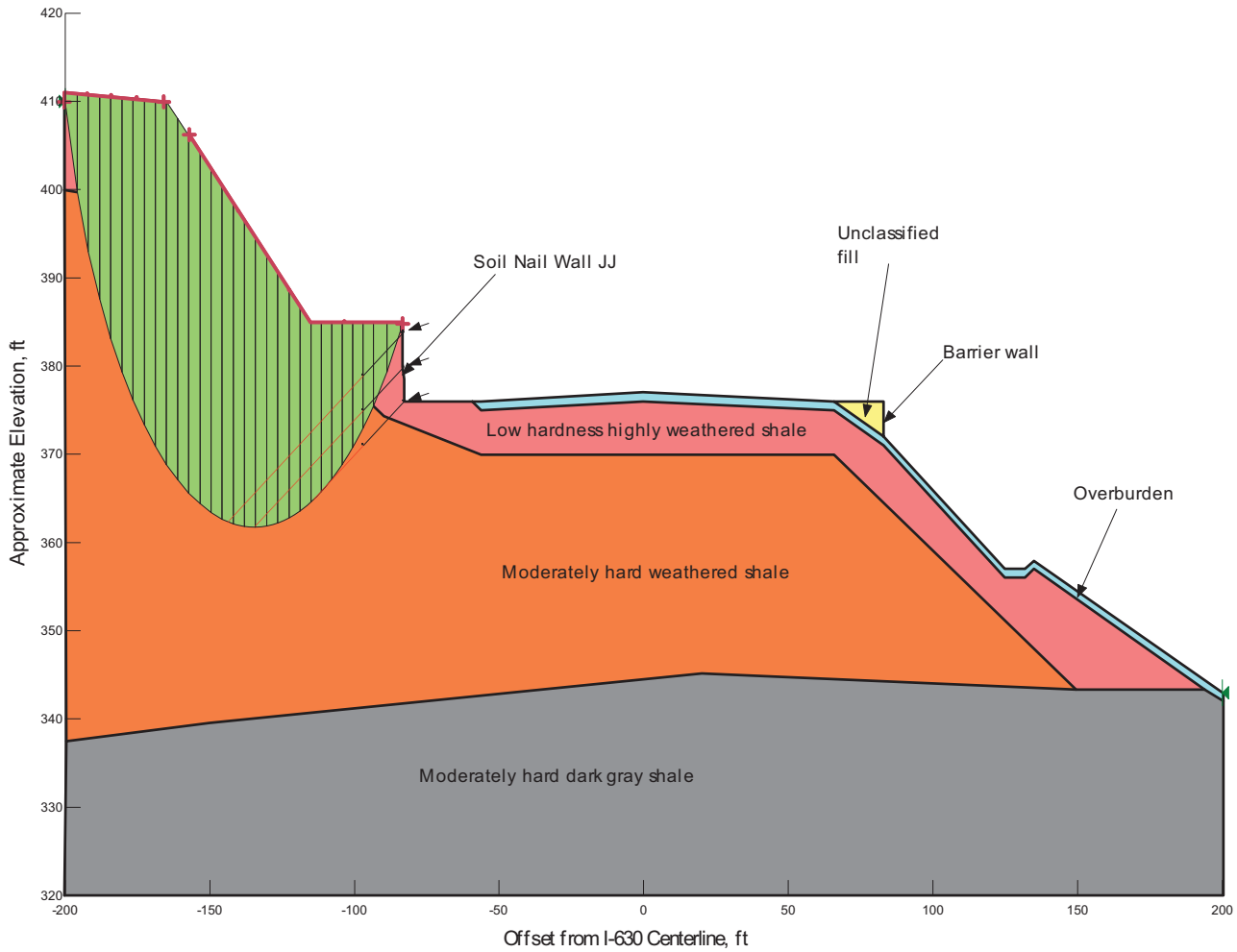
5.0



Results of Stability Analyses – End of Construction Condition
Wall JJ @ North Side
Sta 1148+00

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

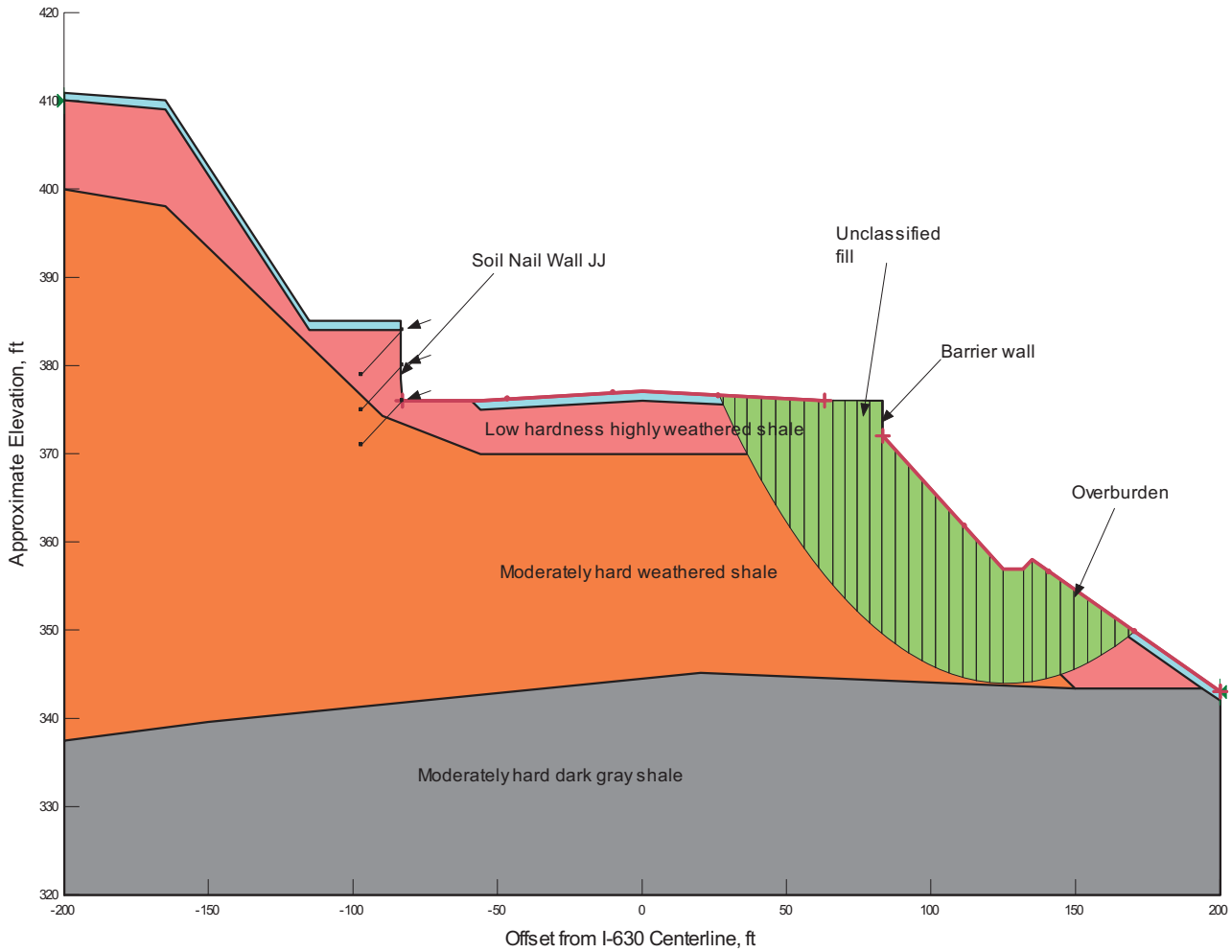
6.0



Results of Stability Analyses – End of Construction Condition
Existing Upper Slope @ North Side
Sta 1148+00

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

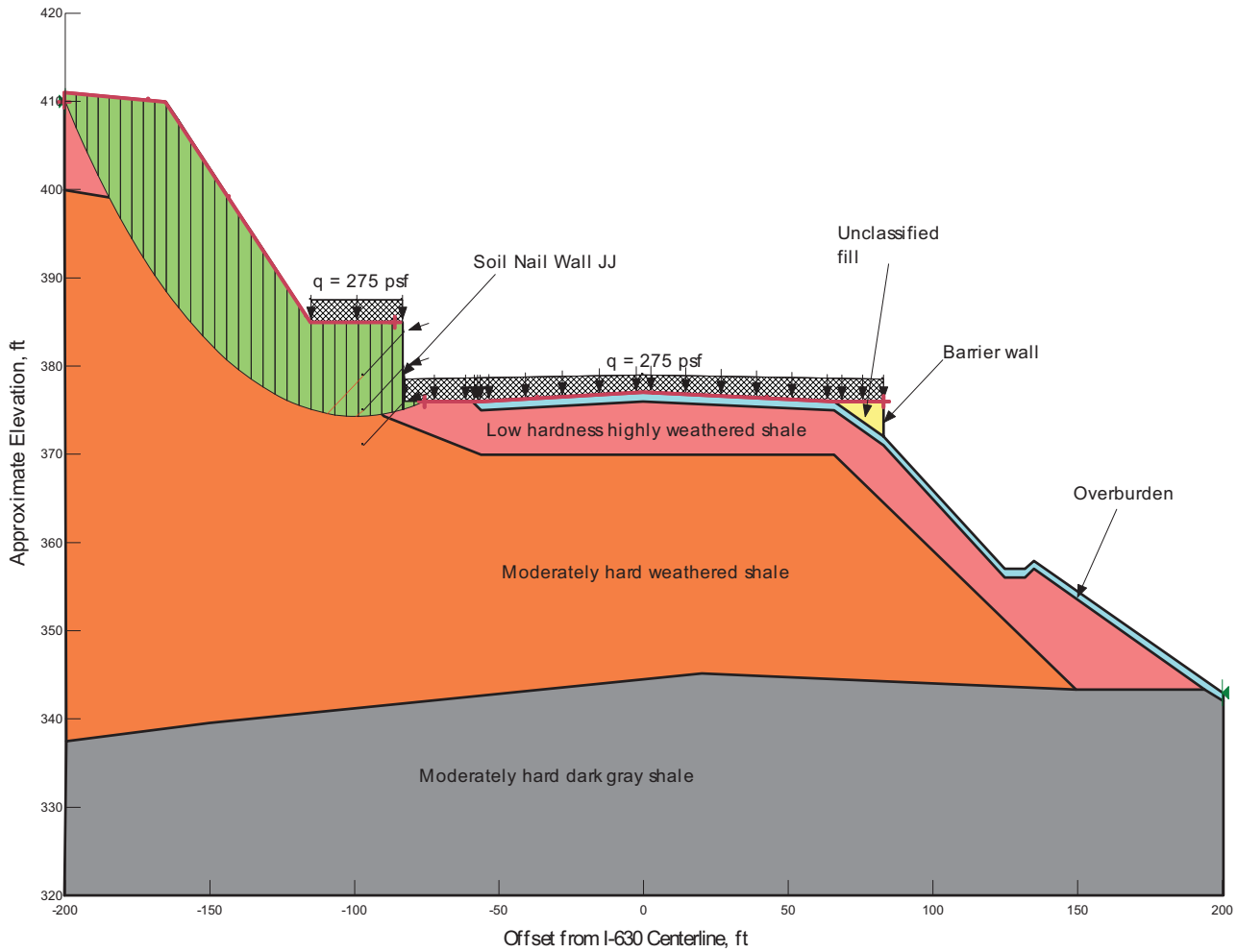
9.4



Results of Stability Analyses – End of Construction Condition
South Side
Sta 1148+00

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

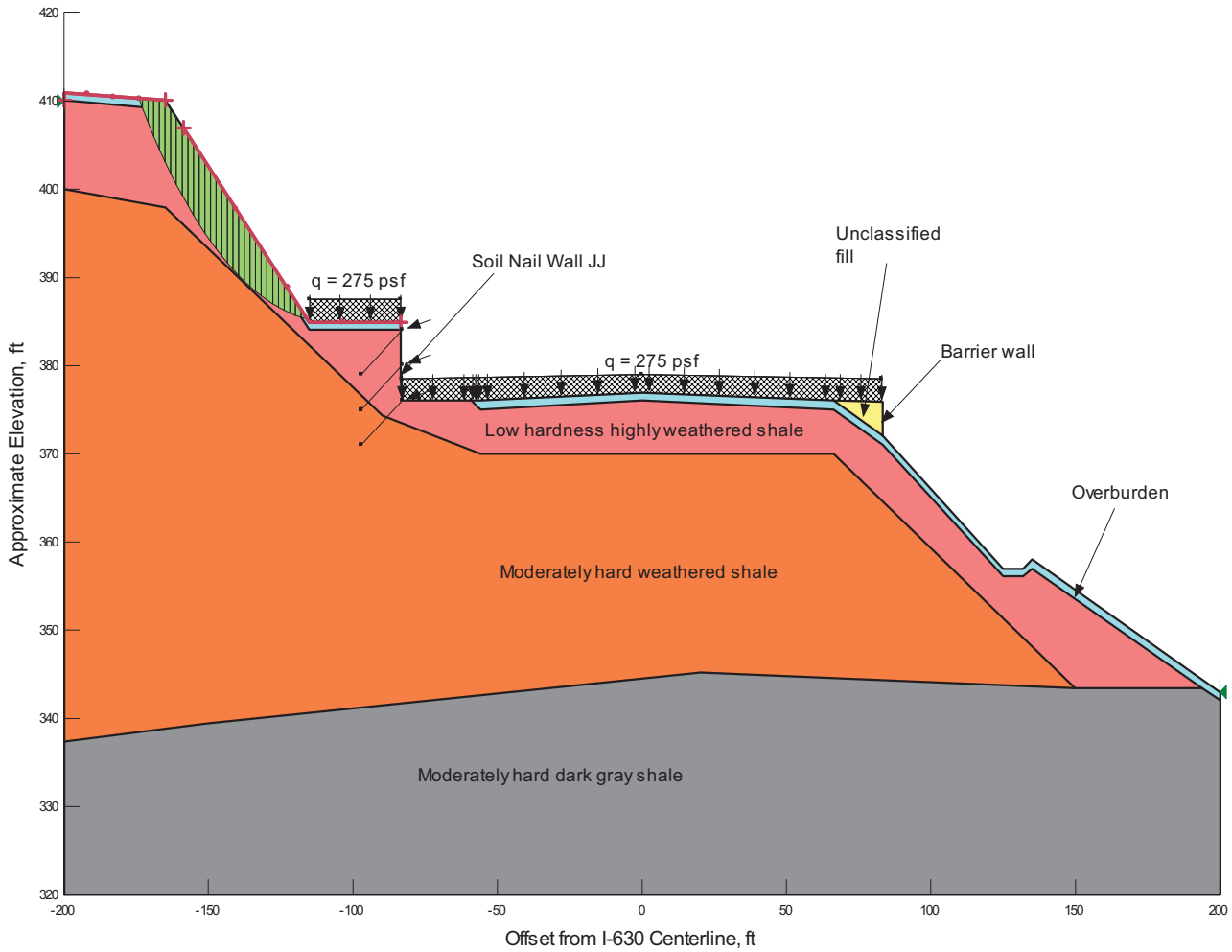
2.3



Results of Stability Analyses – Long Term Condition
Wall JJ @ North Side
Sta 1148+00

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

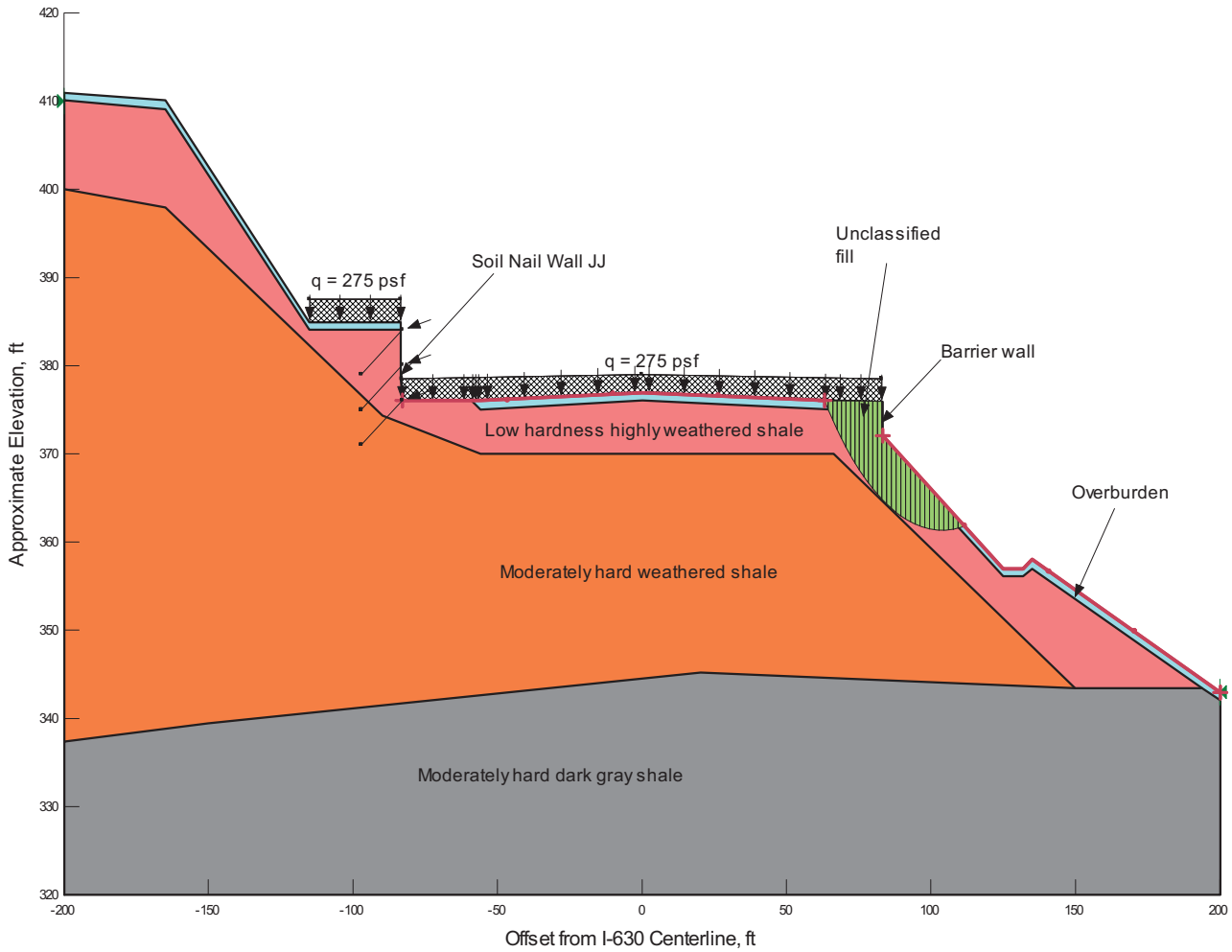
1.7



Results of Stability Analyses – Long Term Condition
Existing Upper Slope @ North Side
Sta 1148+00

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

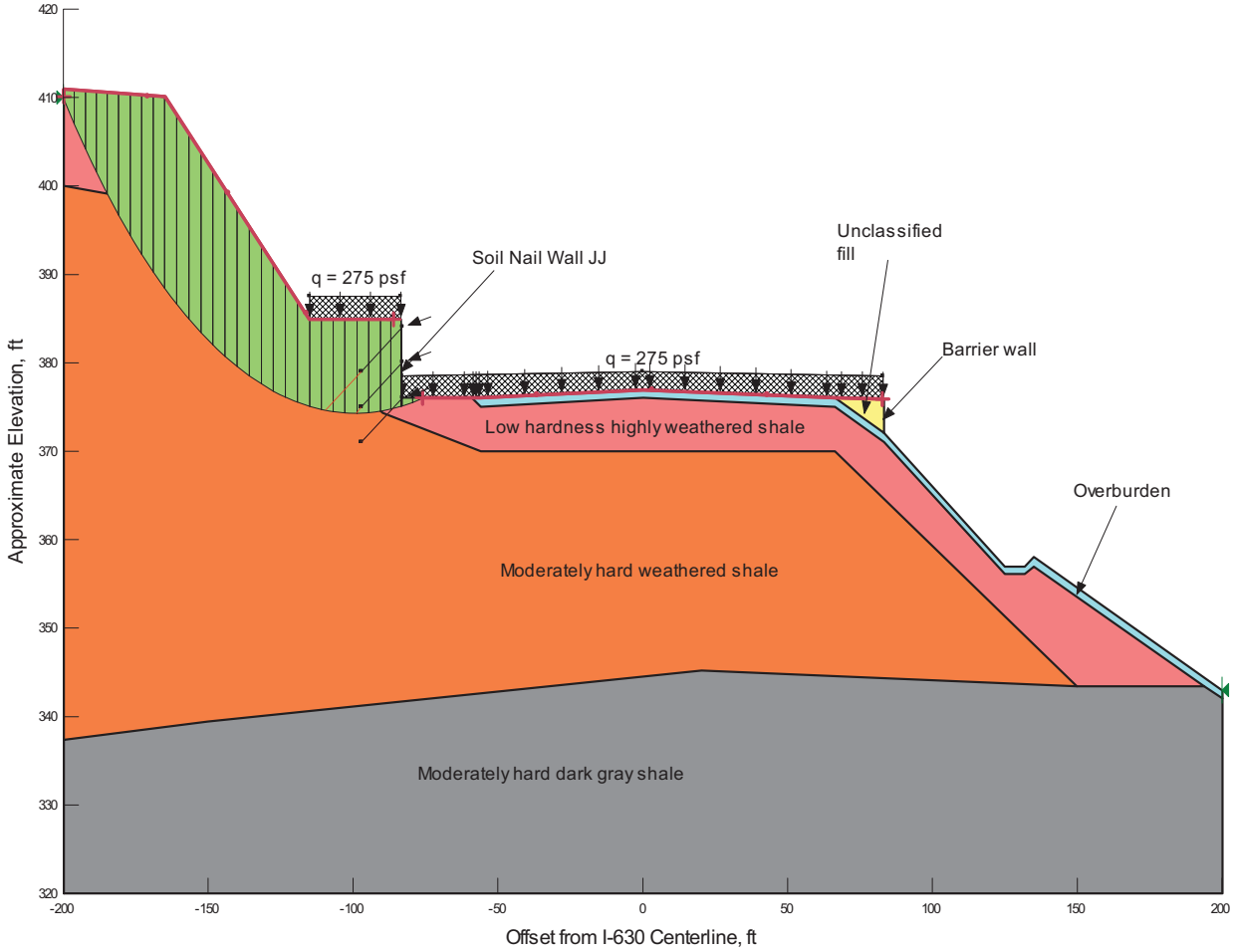
2.1



Results of Stability Analyses – Long Term Condition
South Side
Sta 1148+00

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

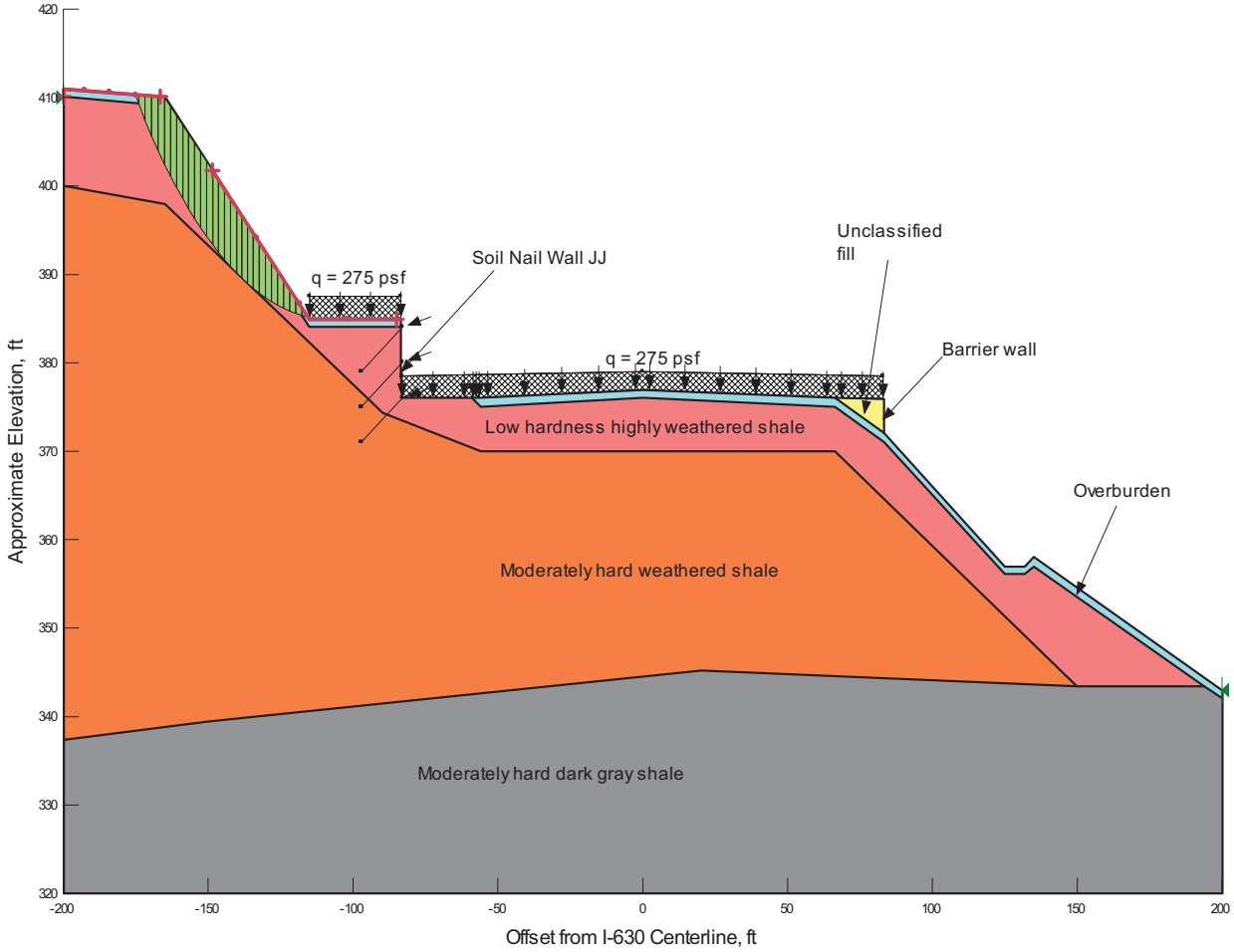
1.5



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
Wall JJ @ North Side
Sta 1148+00

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

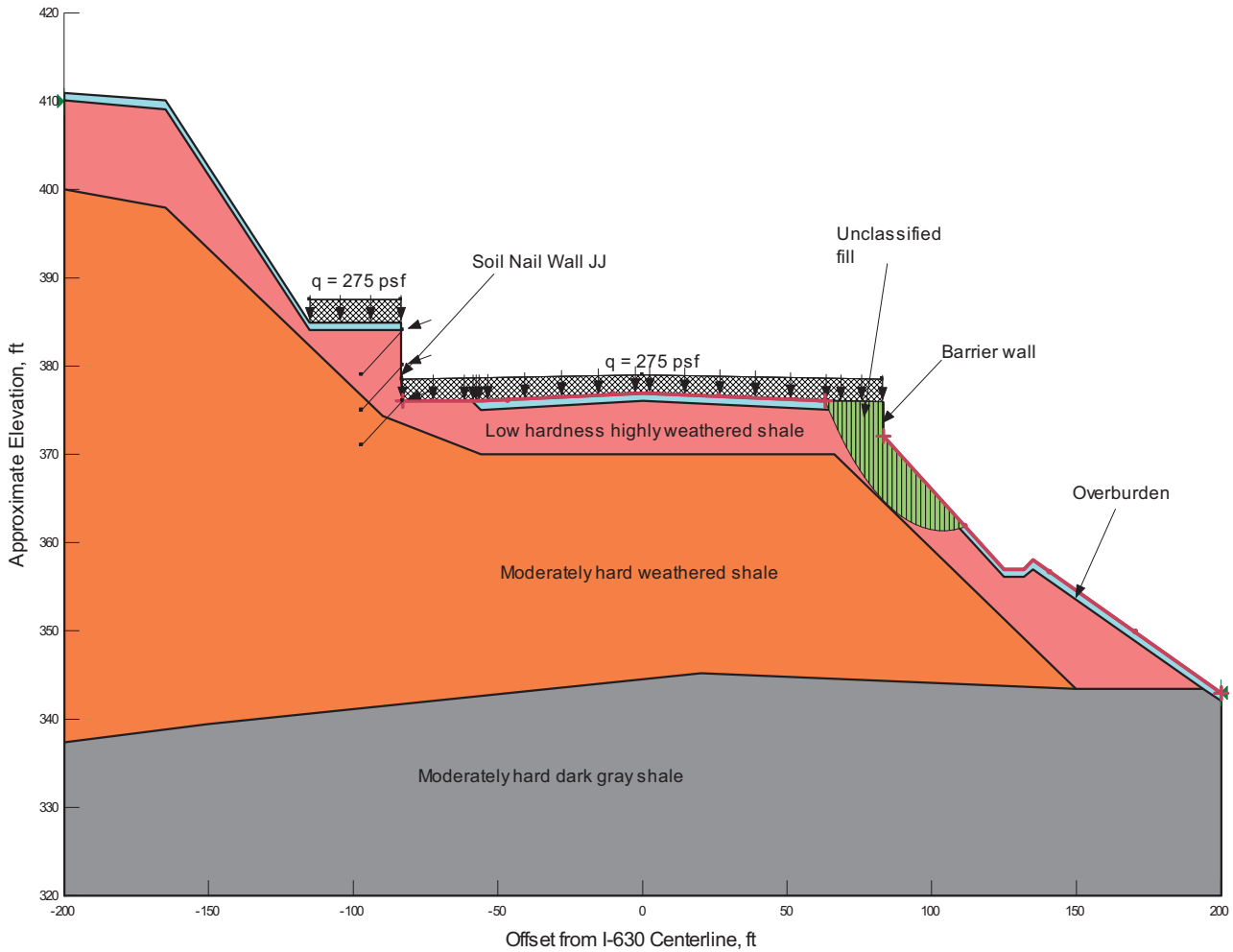
1.3



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
Existing Upper Slope @ North Side
Sta 1148+00

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

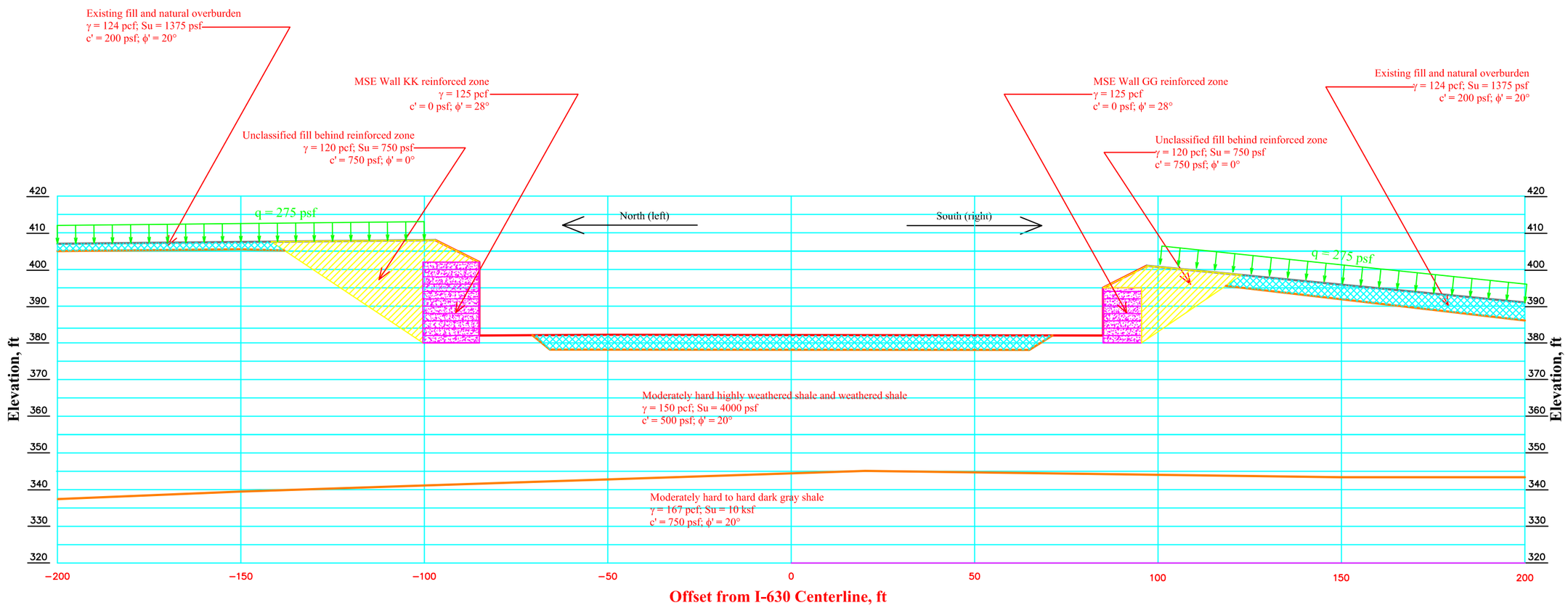
1.5



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
South Side
Sta 1148+00

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

ATTACHMENT 21



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

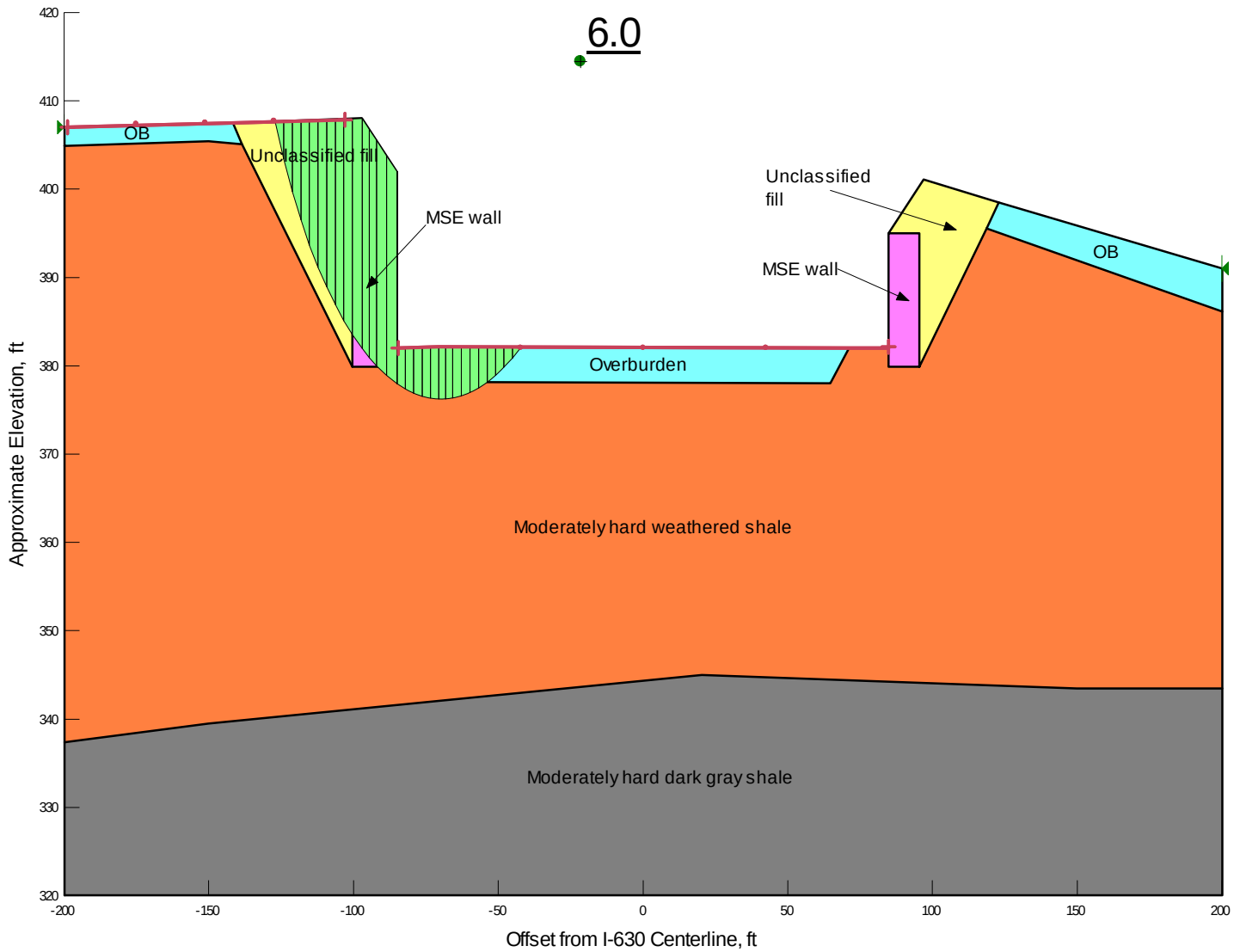
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Sta 1154+25 - MSE Walls GG and KK
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 9, 2015	Plate

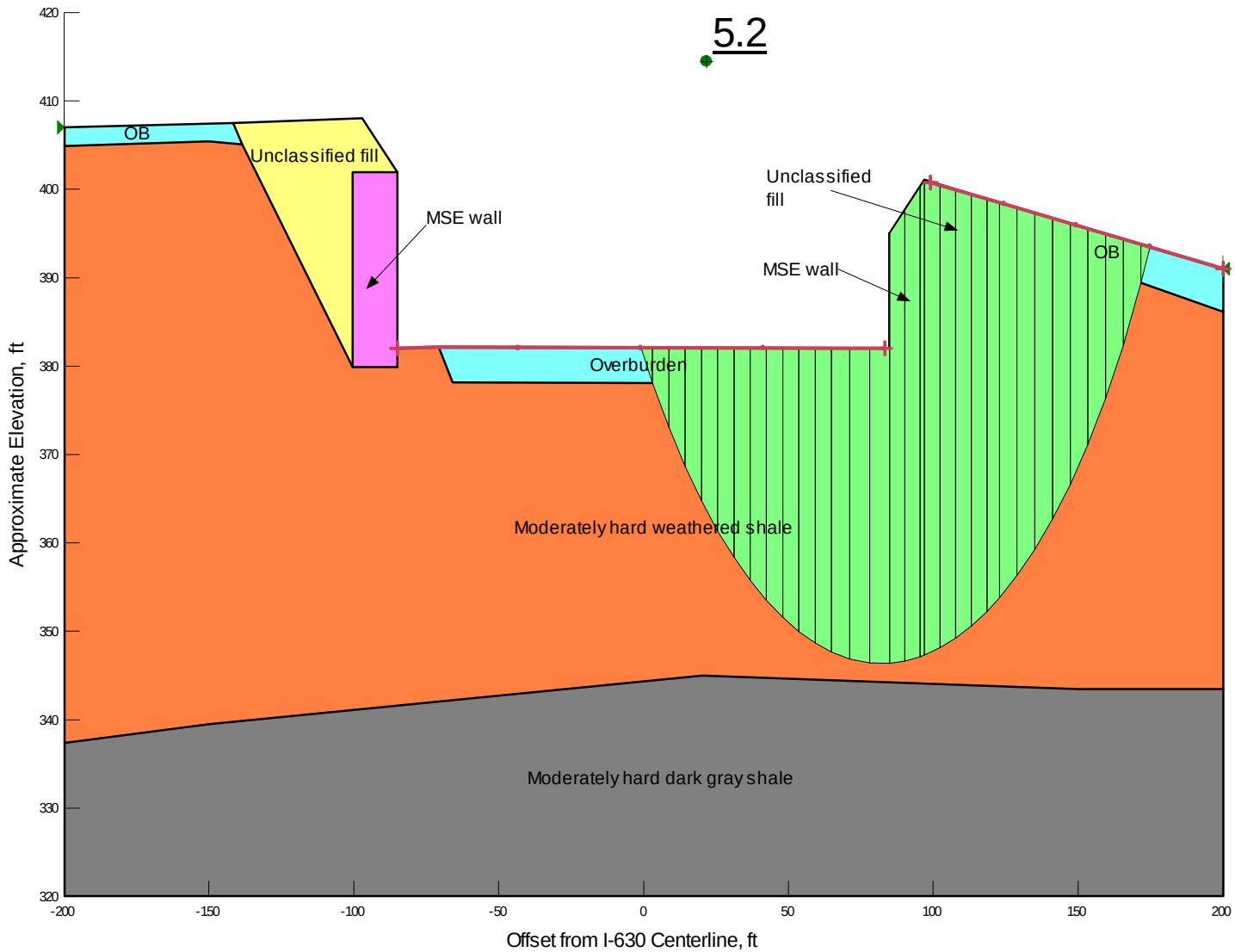
Results of Stability Analyses
Sta 1154+25
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Structure	Design Loading Condition	Calculated Minimum Factor of Safety
KK @ north side	End of Construction	6.0
GG @ south side		5.2
KK @ north side	Long Term	2.0
GG @ south side		2.6
KK @ north side	Seismic ($k_h = 1.0A_S = 0.16$)	1.5
GG @ south side		1.7



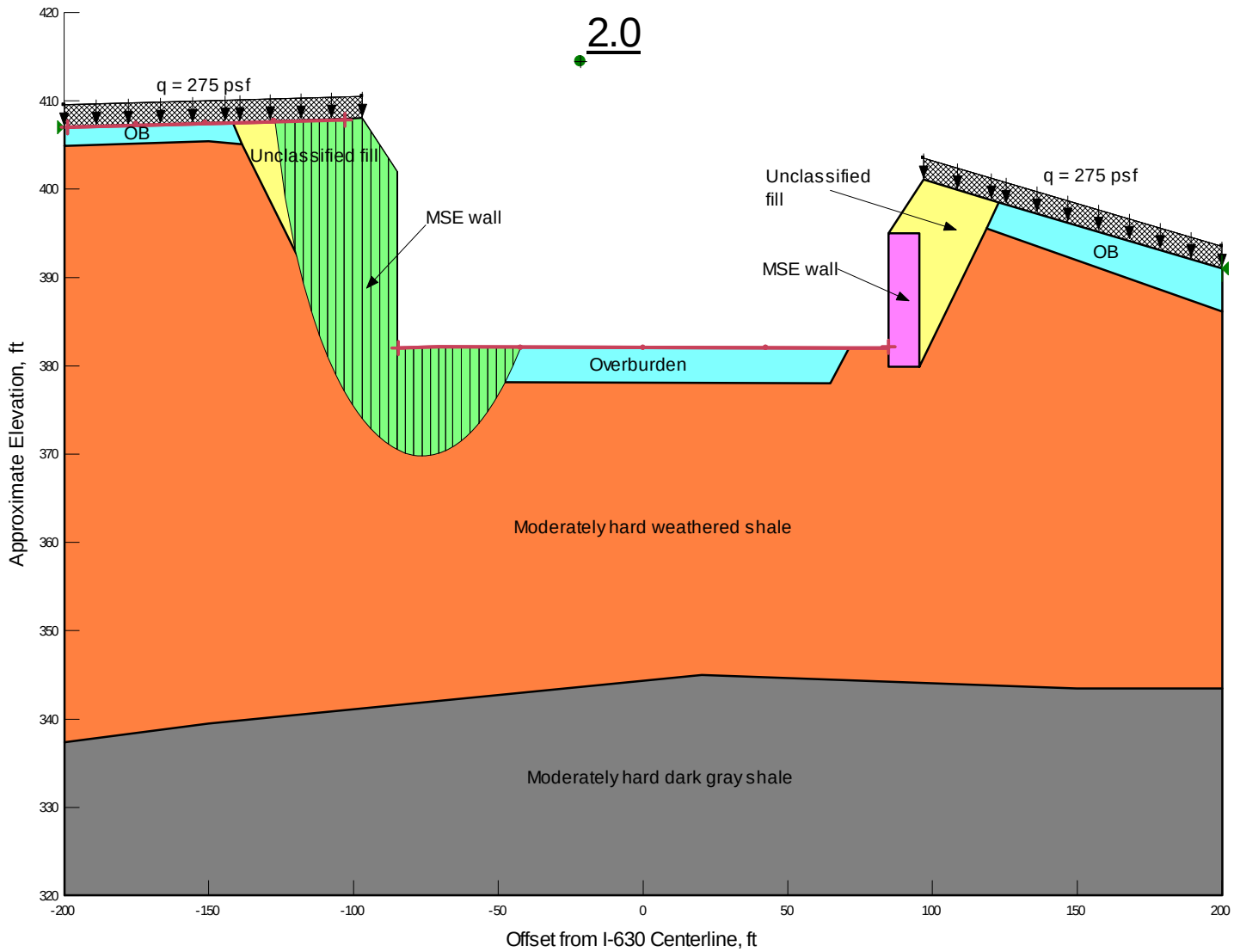
Results of Stability Analyses – End of Construction Condition
MSE Wall KK
Sta 1154+25

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



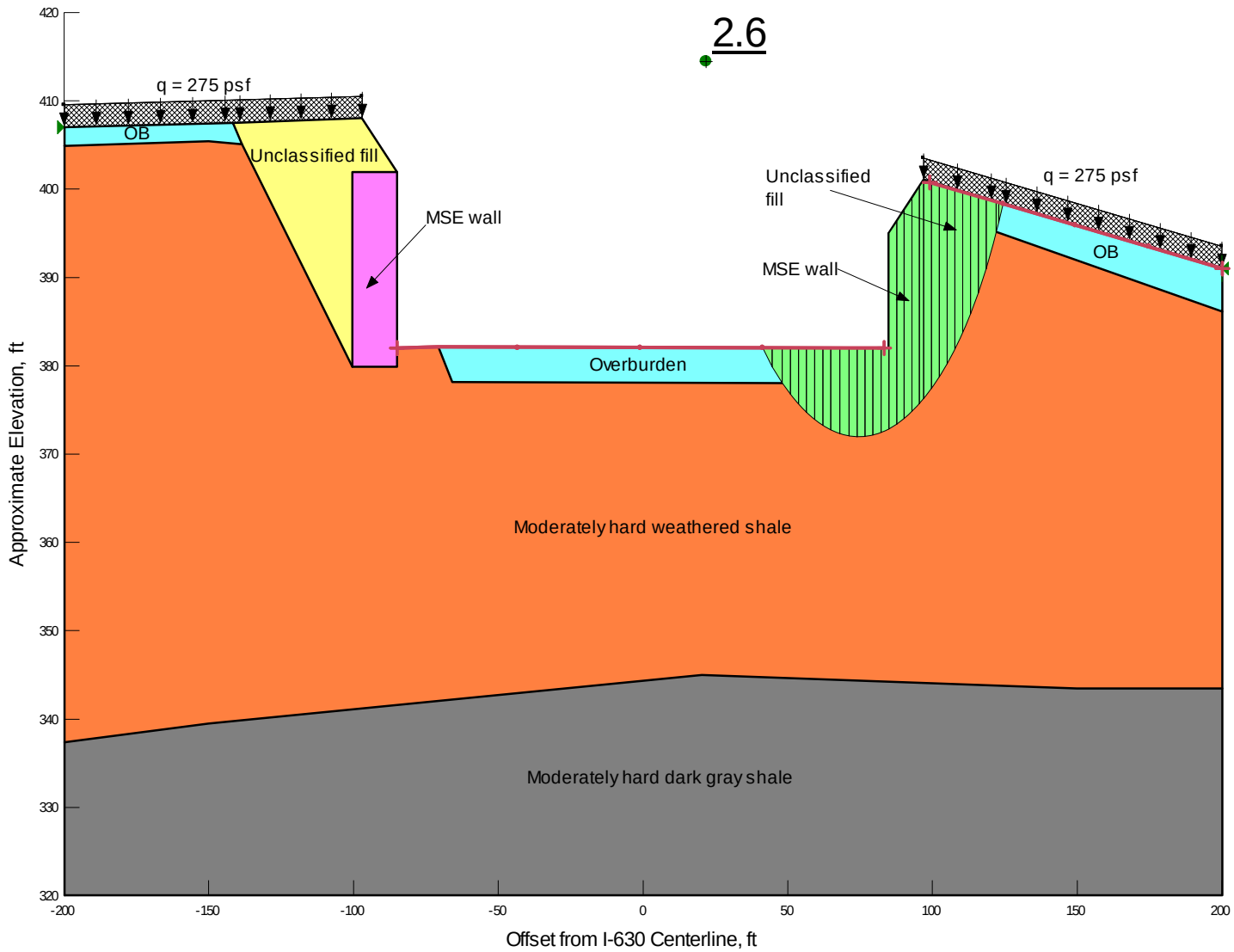
Results of Stability Analyses – End of Construction Condition
MSE Wall GG
Sta 1154+25

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



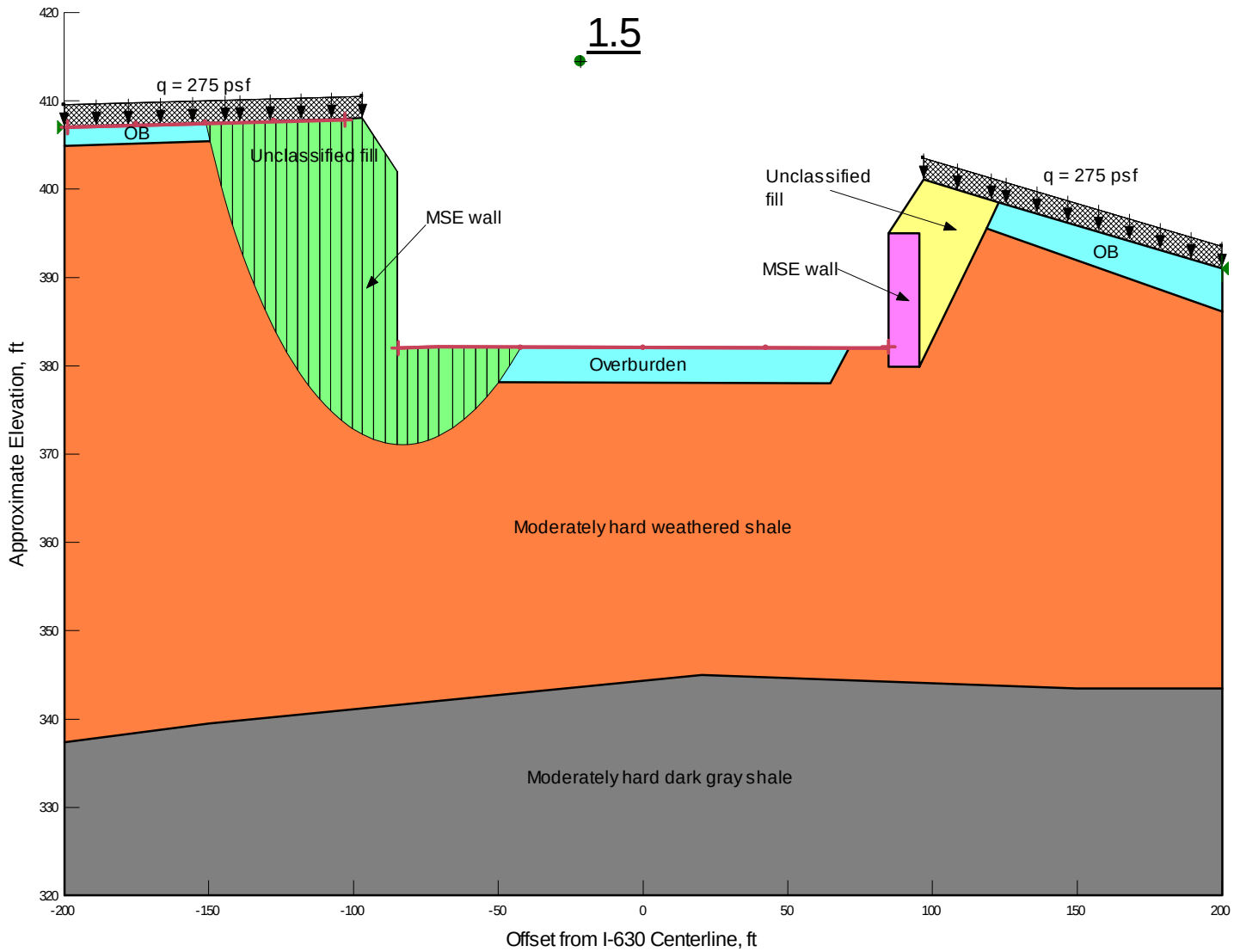
Results of Stability Analyses – Long Term Condition
MSE Wall KK
Sta 1154+25

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



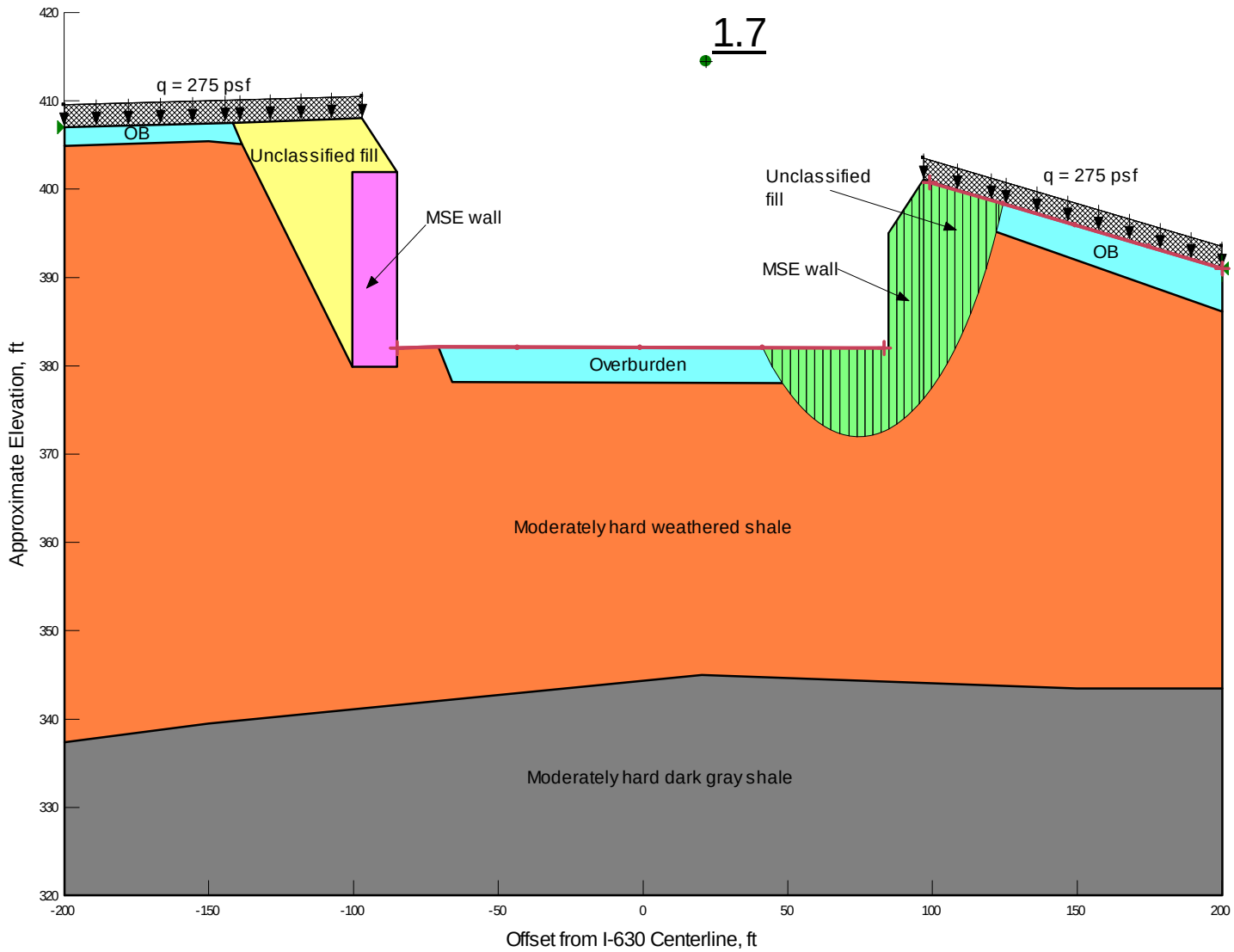
Results of Stability Analyses – Long Term Condition
MSE Wall GG
Sta 1154+25

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



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
MSE Wall KK
Sta 1154+25

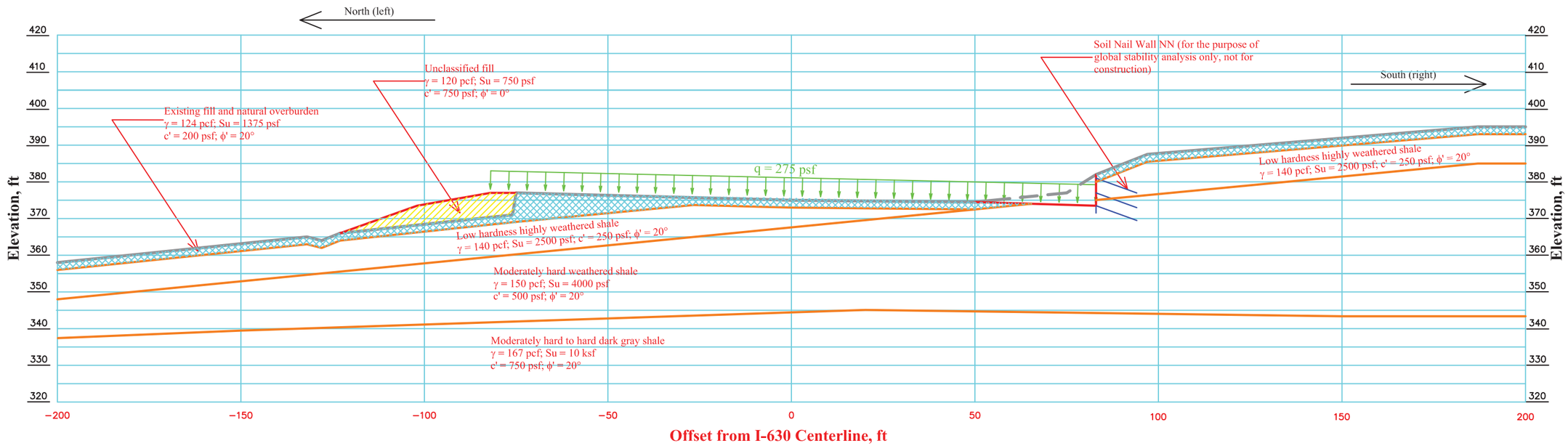
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
MSE Wall GG
Sta 1154+25

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

ATTACHMENT 22



Note: Section developed for the purpose of stability analysis only, not for construction.

15 ft 0 15 30 ft

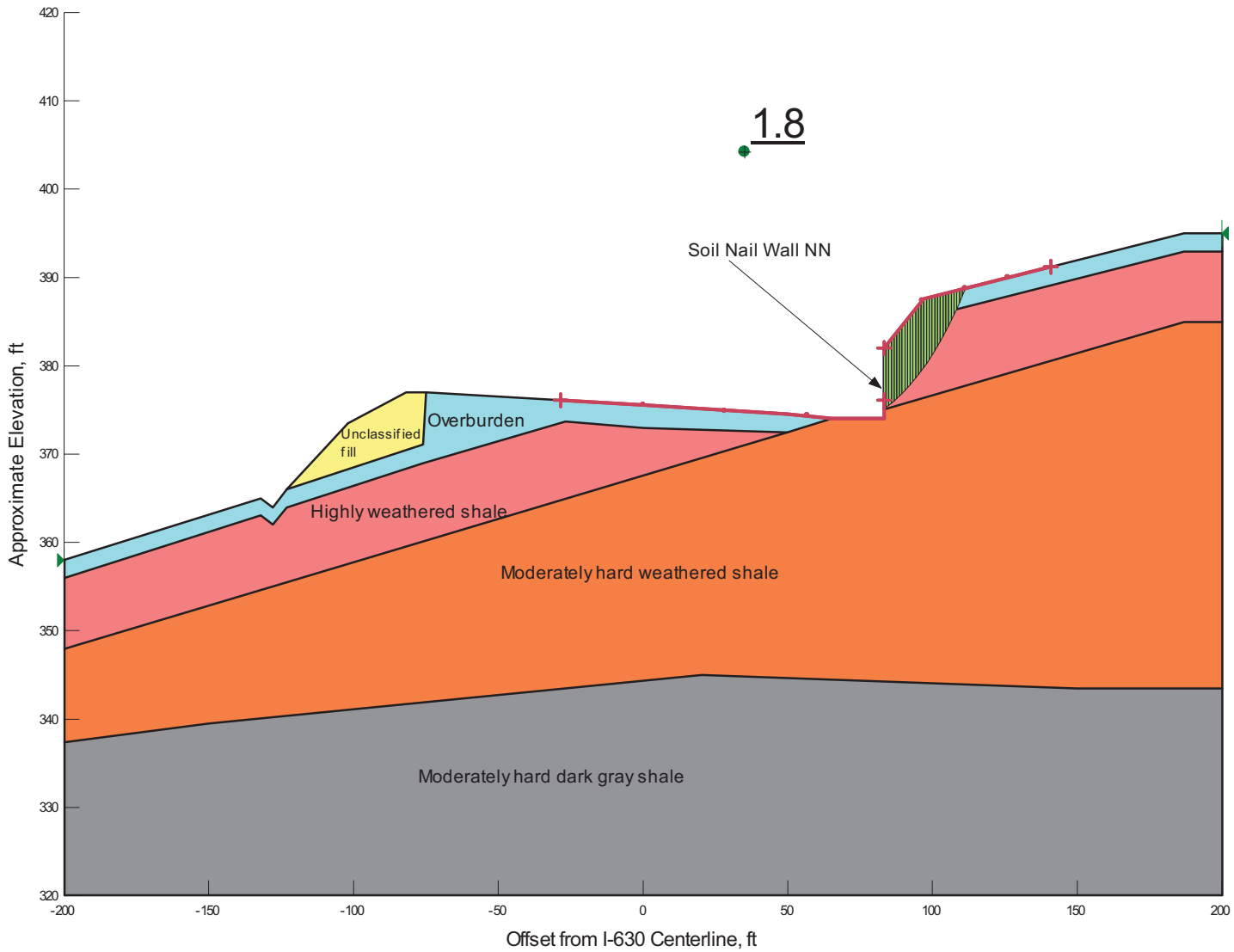
Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

Section and Material Parameters for Stability Analysis
Sta 1168 + 00 - Soil Nail Wall NN
AHTD Job No. CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

GHBW Job No.: 14-030	Scale: As Shown
April 13, 2015	Plate

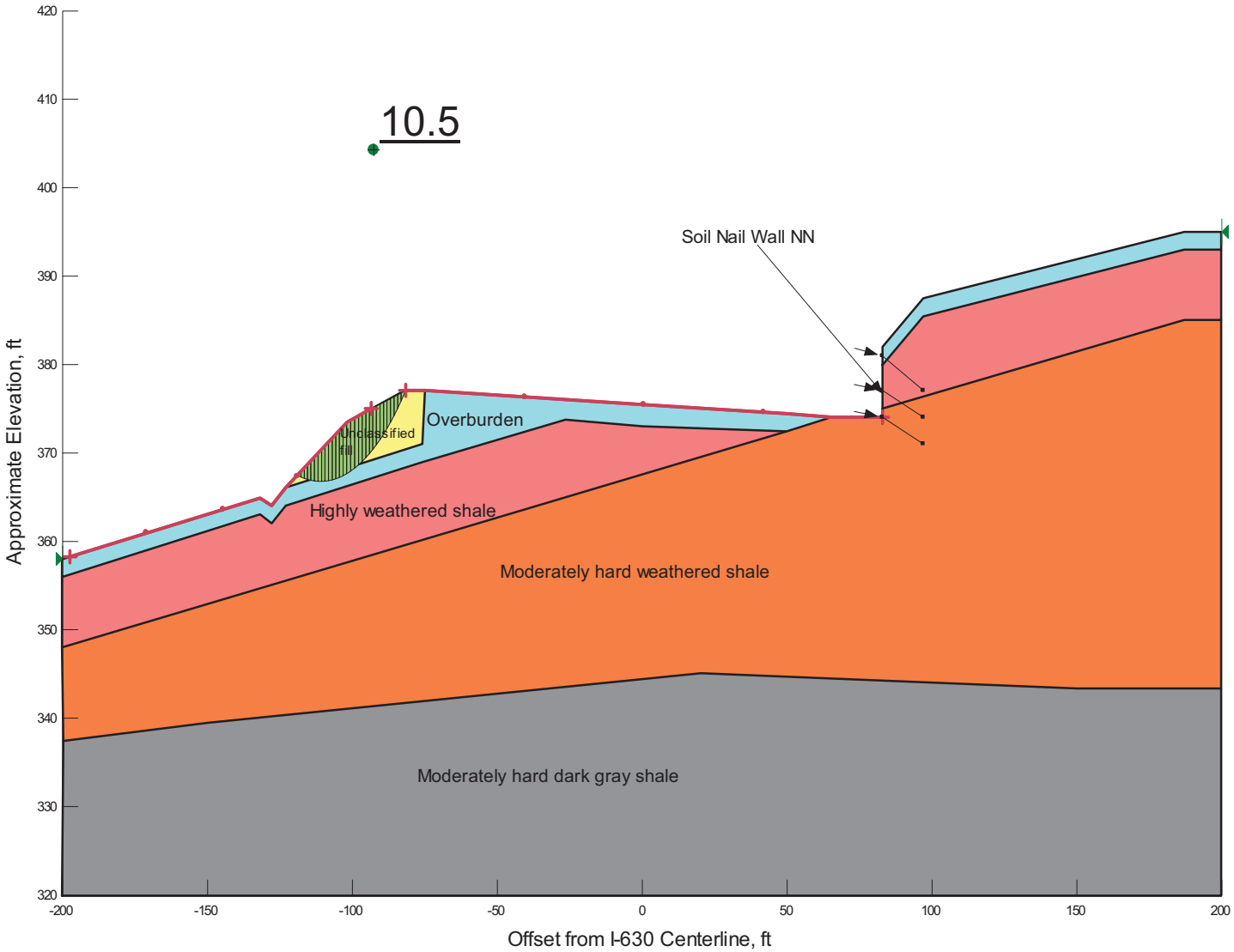
Results of Stability Analyses
Sta 1168+00
AHTD JOB CA0608:Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas

Roadway Side	Design Loading Condition	Calculated Minimum Factor of Safety
South	End of Excavation	1.8
North	End of Construction	10.5
South		10.0
North	Long Term	3.5
South		2.5
North	Seismic ($k_h = 1.0A_S = 0.16$)	2.0
South		1.8



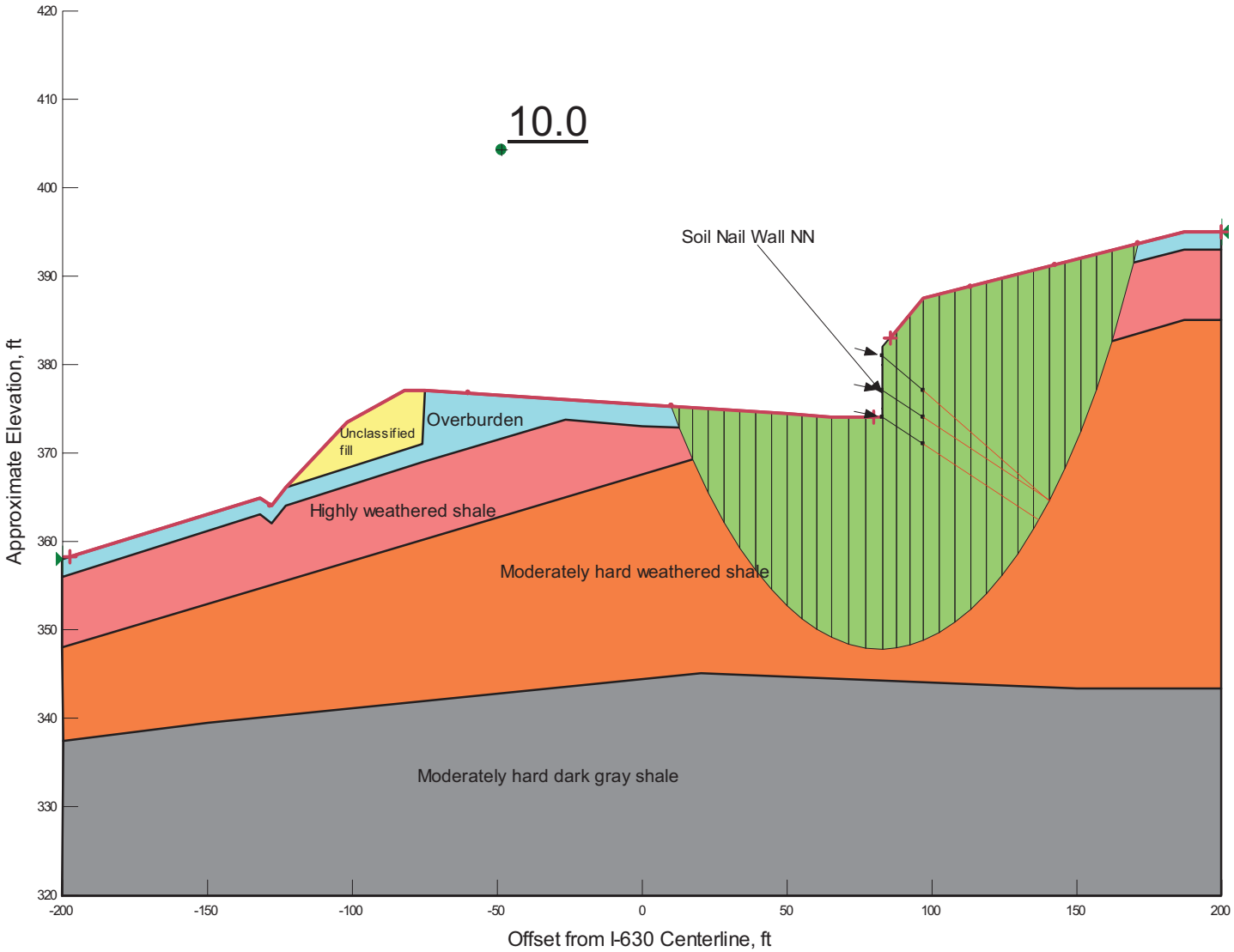
Results of Stability Analyses – End of Excavation Condition
South Side
Sta 1168+00

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



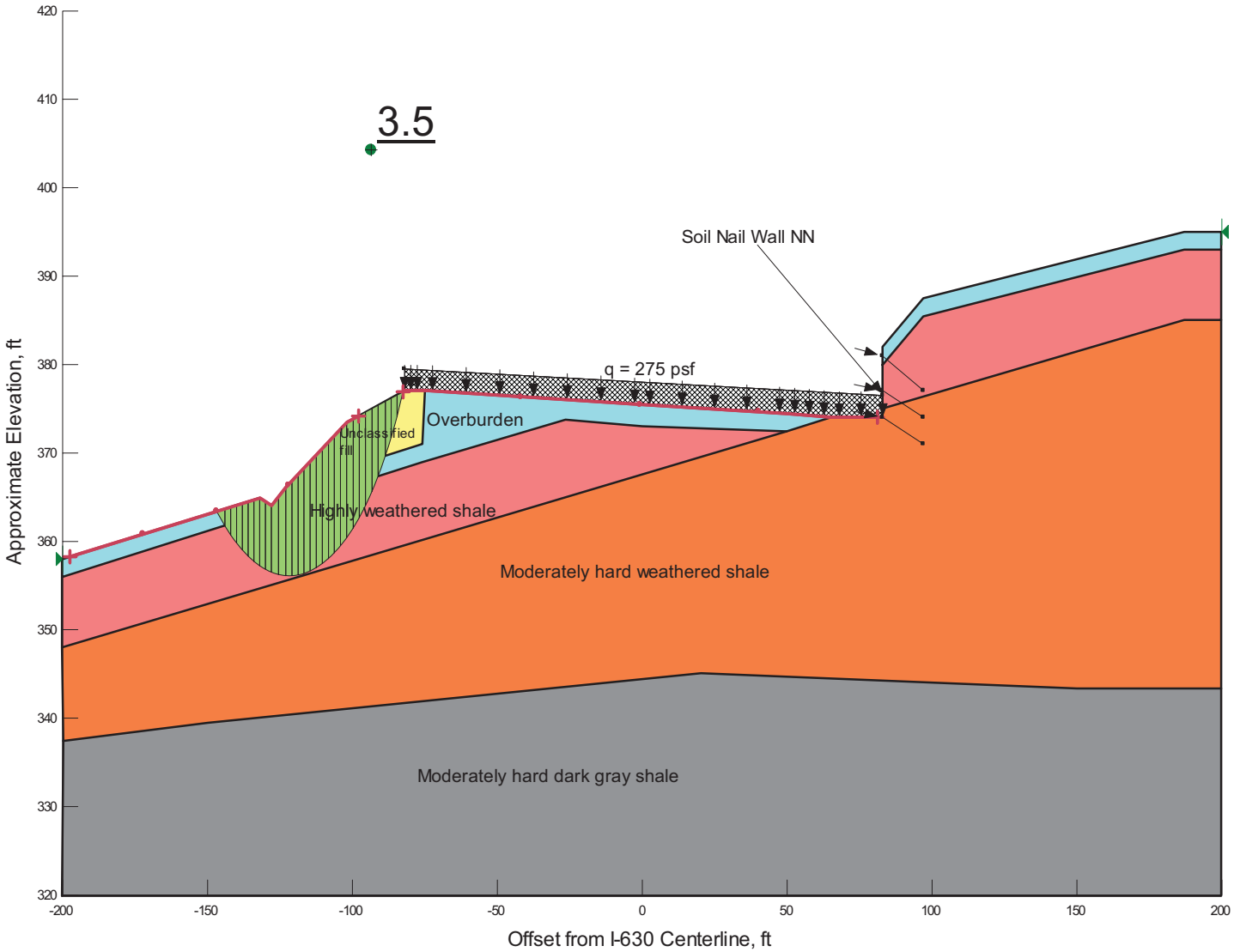
Results of Stability Analyses – End of Construction Condition
North Side
Sta 1168+00

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



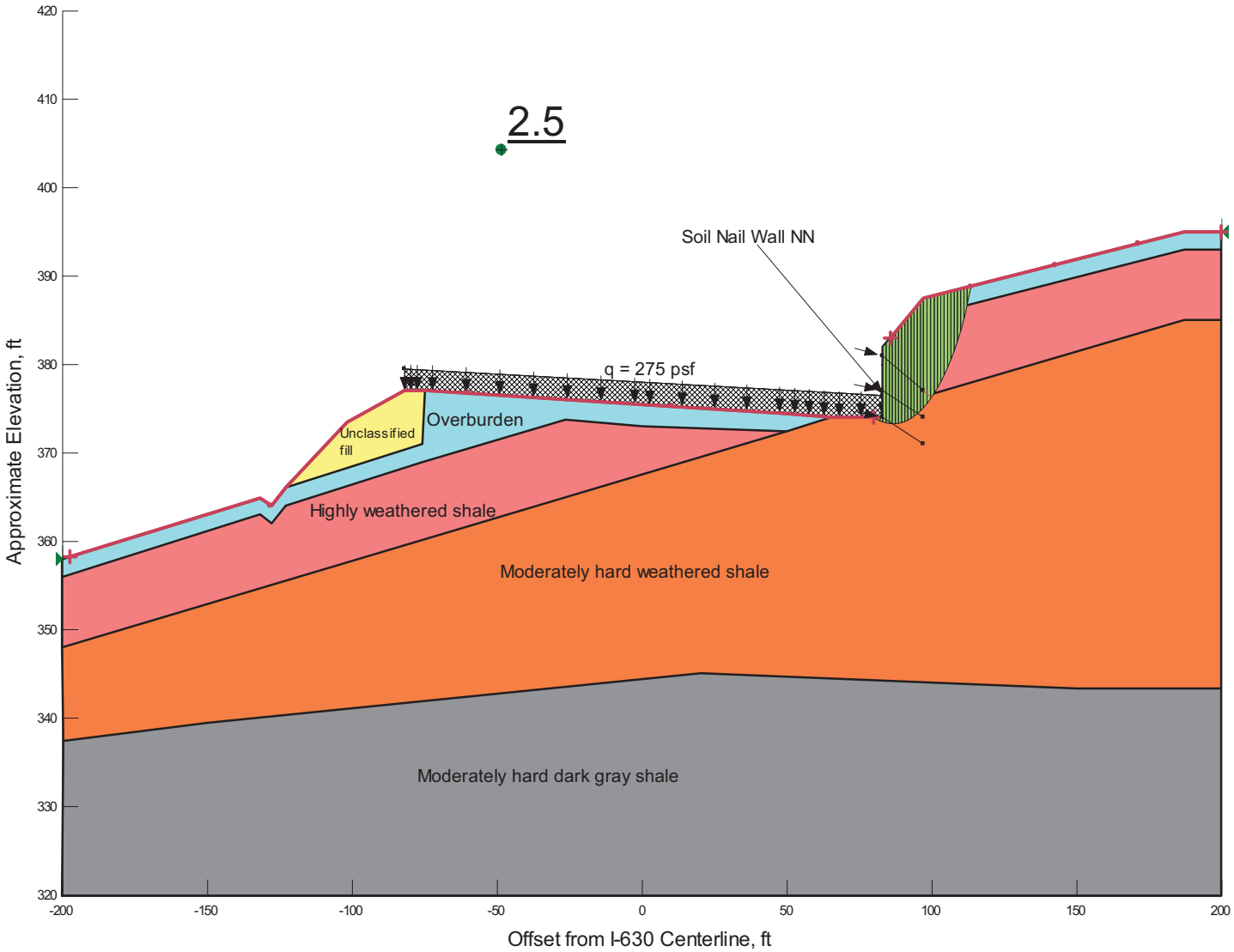
Results of Stability Analyses – End of Construction Condition
South Side
Sta 1168+00

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



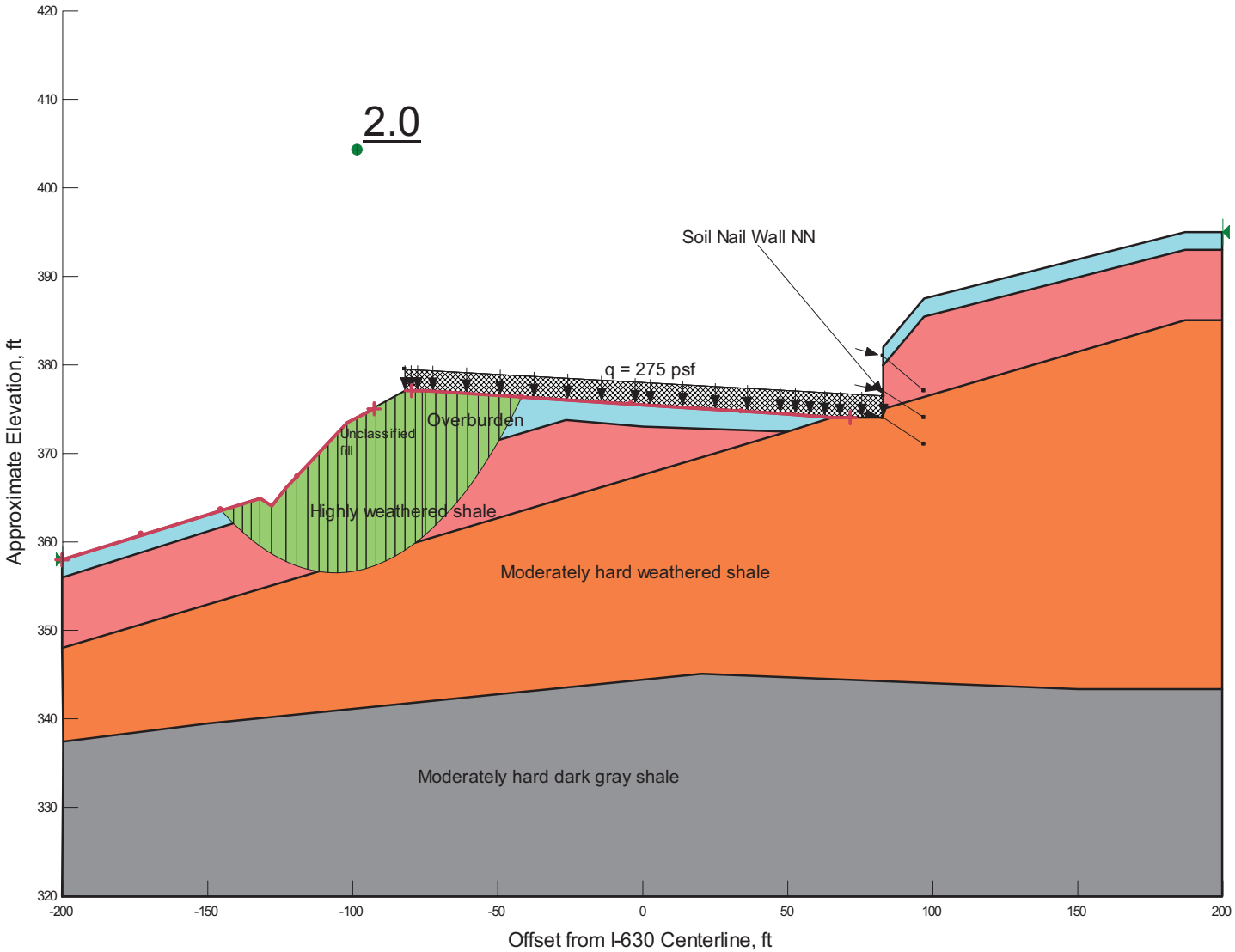
Results of Stability Analyses – Long Term Condition
North Side
Sta 1168+00

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



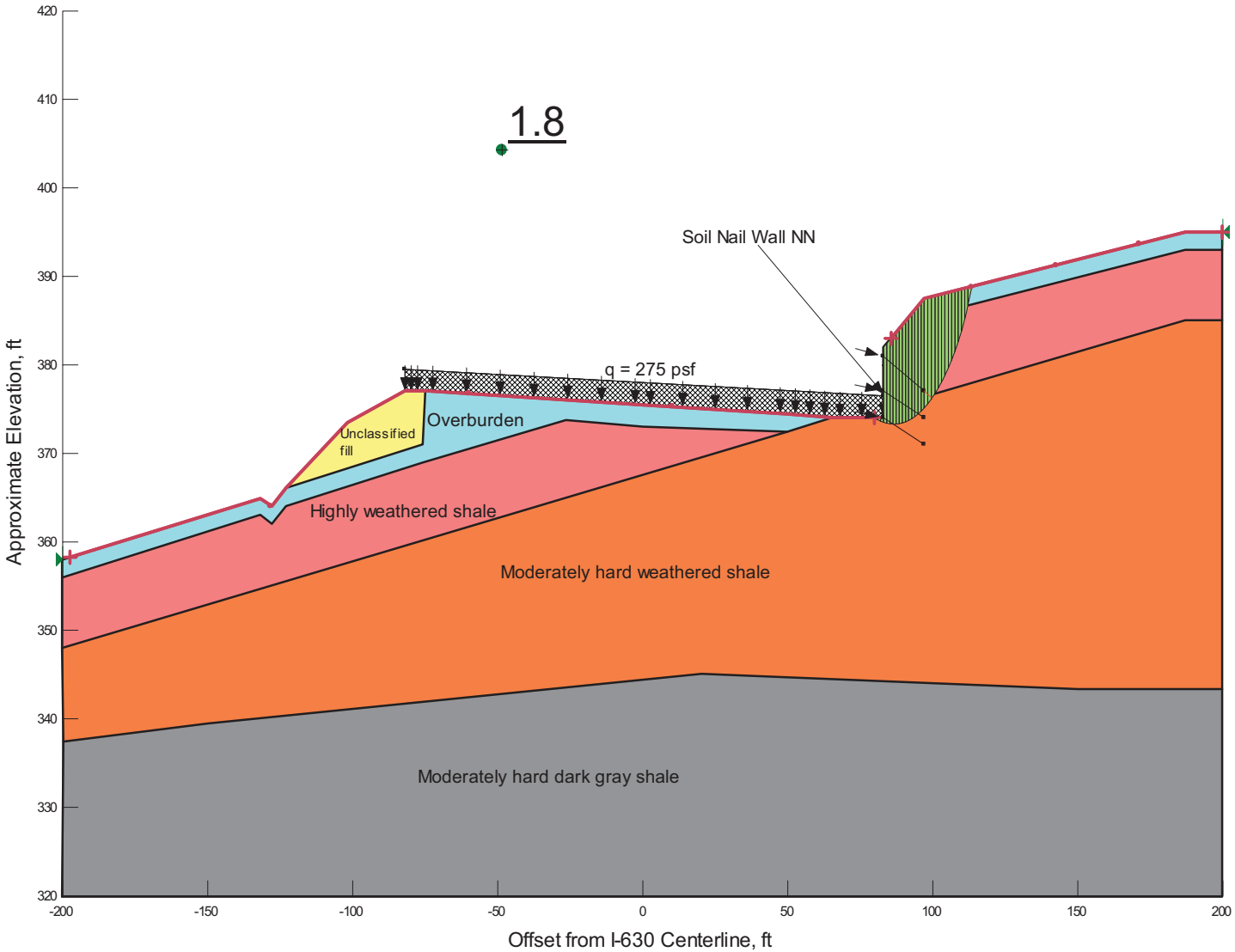
Results of Stability Analyses – Long Term Condition
South Side
Sta 1168+00

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



Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
North Side
Sta 1168+00

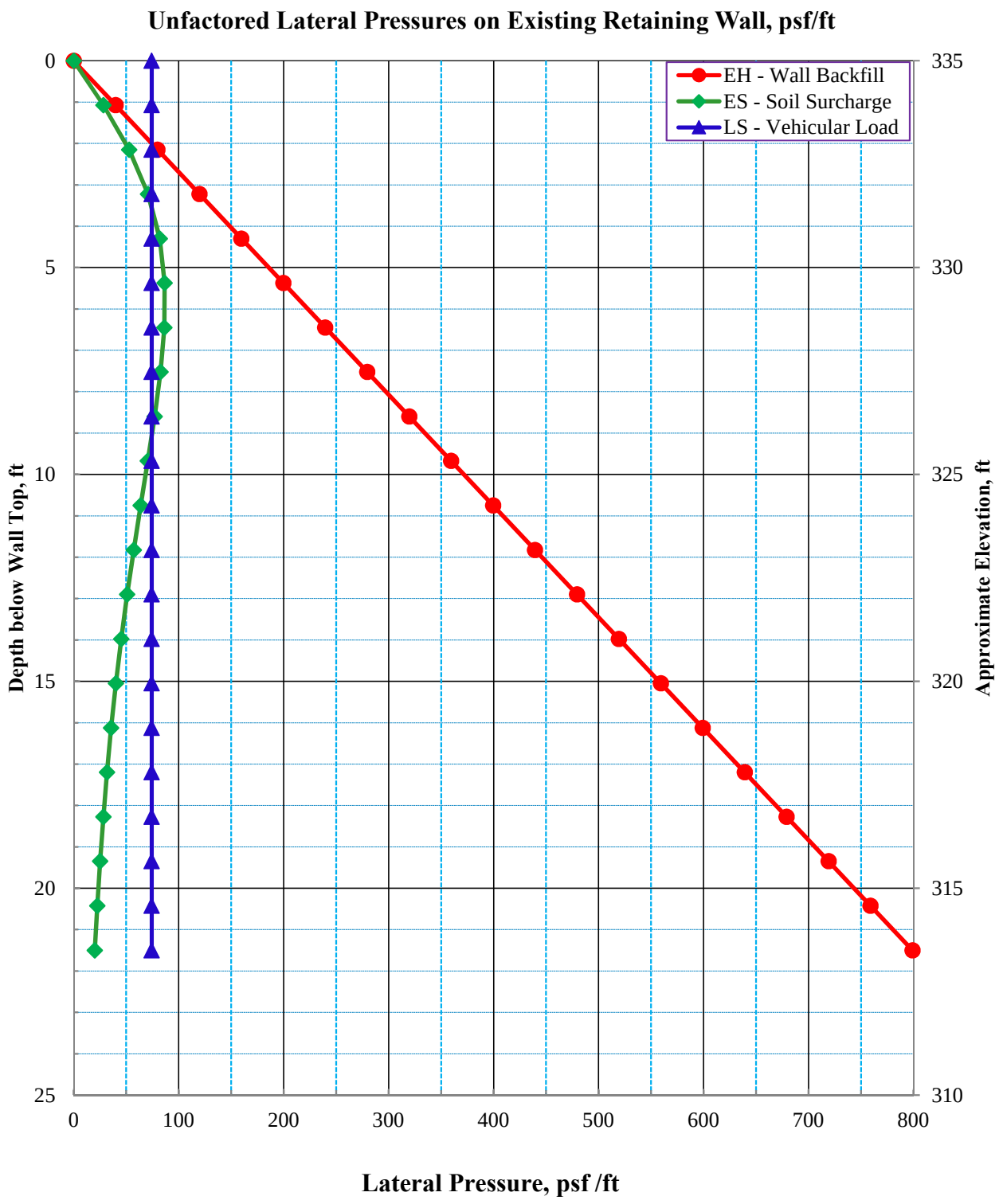
GRUBBS, HOSKYN, BARTON & WYATT, INC.
Consulting Engineers



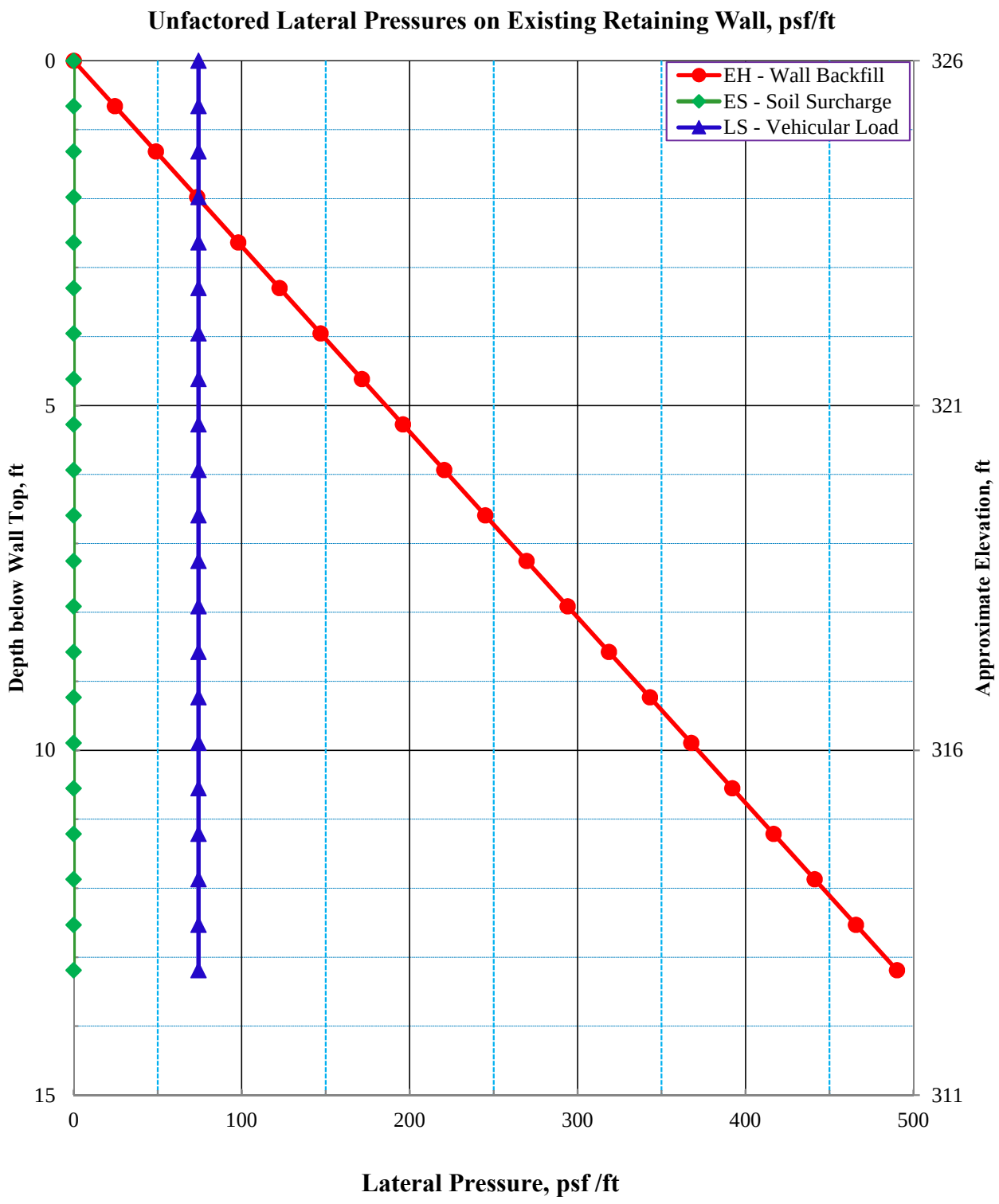
Results of Stability Analyses – Seismic Condition ($k_h = 1.0A_S = 0.16$)
South Side
Sta 1168+00

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

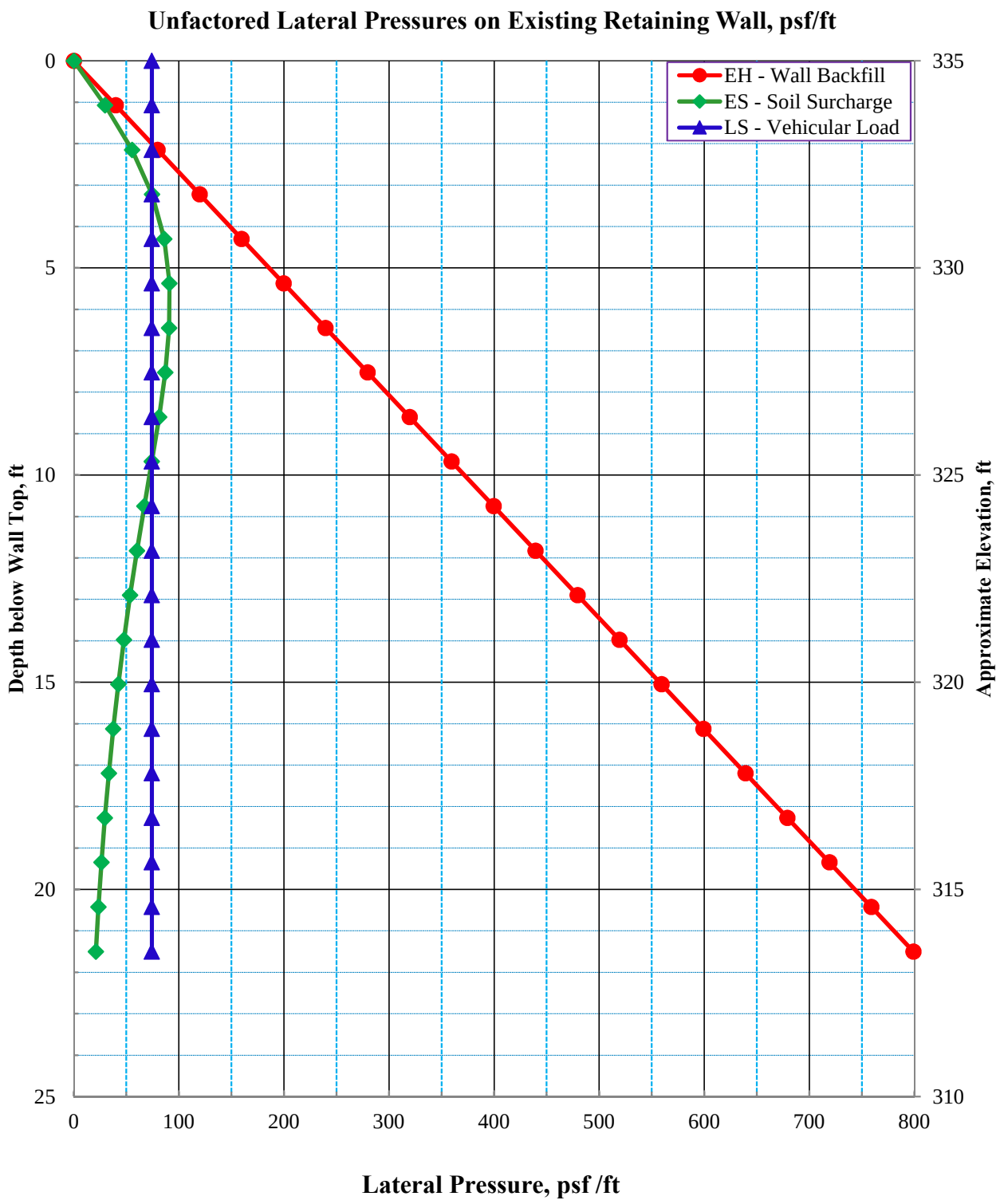
ATTACHMENT 23



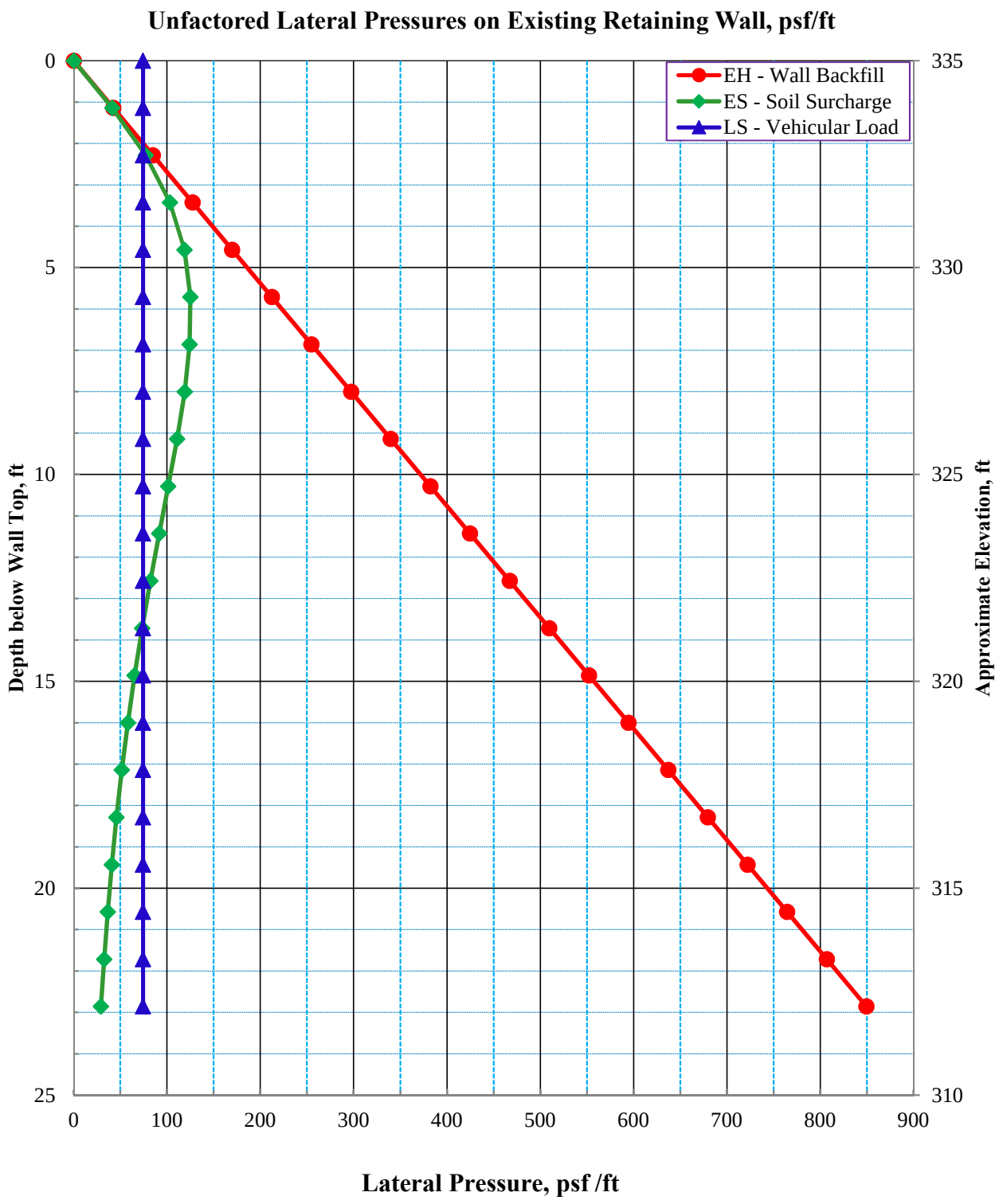
Existing North Retaining Wall @ Sta 1123+00 (Panel 4)
I-630 over Rodney Parham Road
CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas
GHBW Job No. 14-030



Existing South Retaining Wall @ Sta 1123+00 (Panel 4)
I-630 over Rodney Parham Road
CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas
GHBW Job No. 14-030



Existing North Retaining Wall @ Sta 1123+95.83 (Panel 1)
I-630 over Rodney Parham Road
CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas
GHBW Job No. 14-030



Existing South Retaining Wall @ Sta 1123+95.83 (Panel 7)
I-630 over Rodney Parham Road
CA0608: Baptist Hospital-University Avenue (Widening)(S)
Little Rock, Pulaski County, Arkansas
GHBW Job No. 14-030

ATTACHMENT 24

SUMMARY of LATERAL LOAD ANALYSIS RESULTS

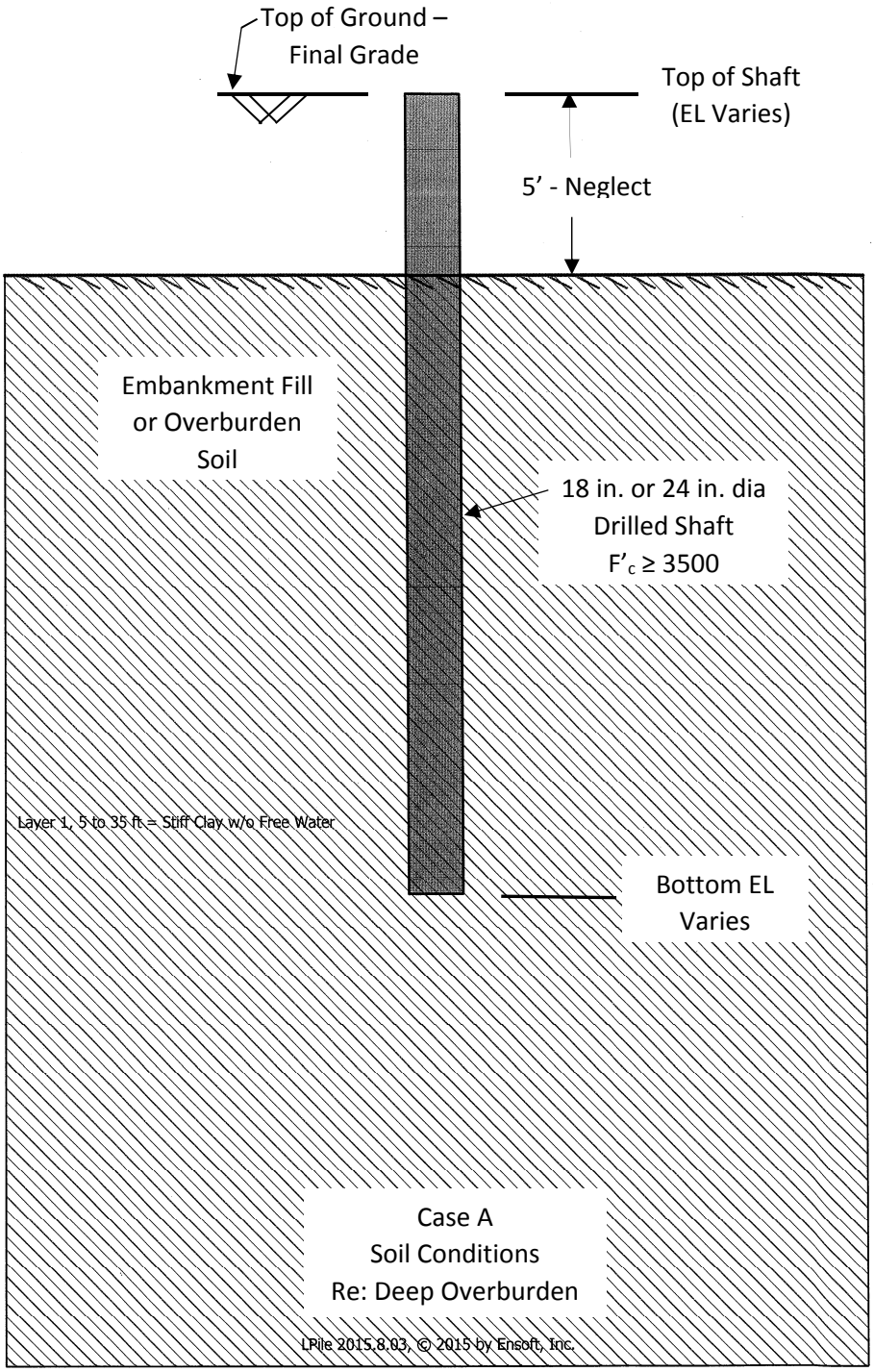
PROJECT: Noise Wall NB4; Job CA0608 Baptist Hospital - Fair Park Blvd. (Widening) (S)

LOCATION: Interstate 630 - Little Rock, Arkansas

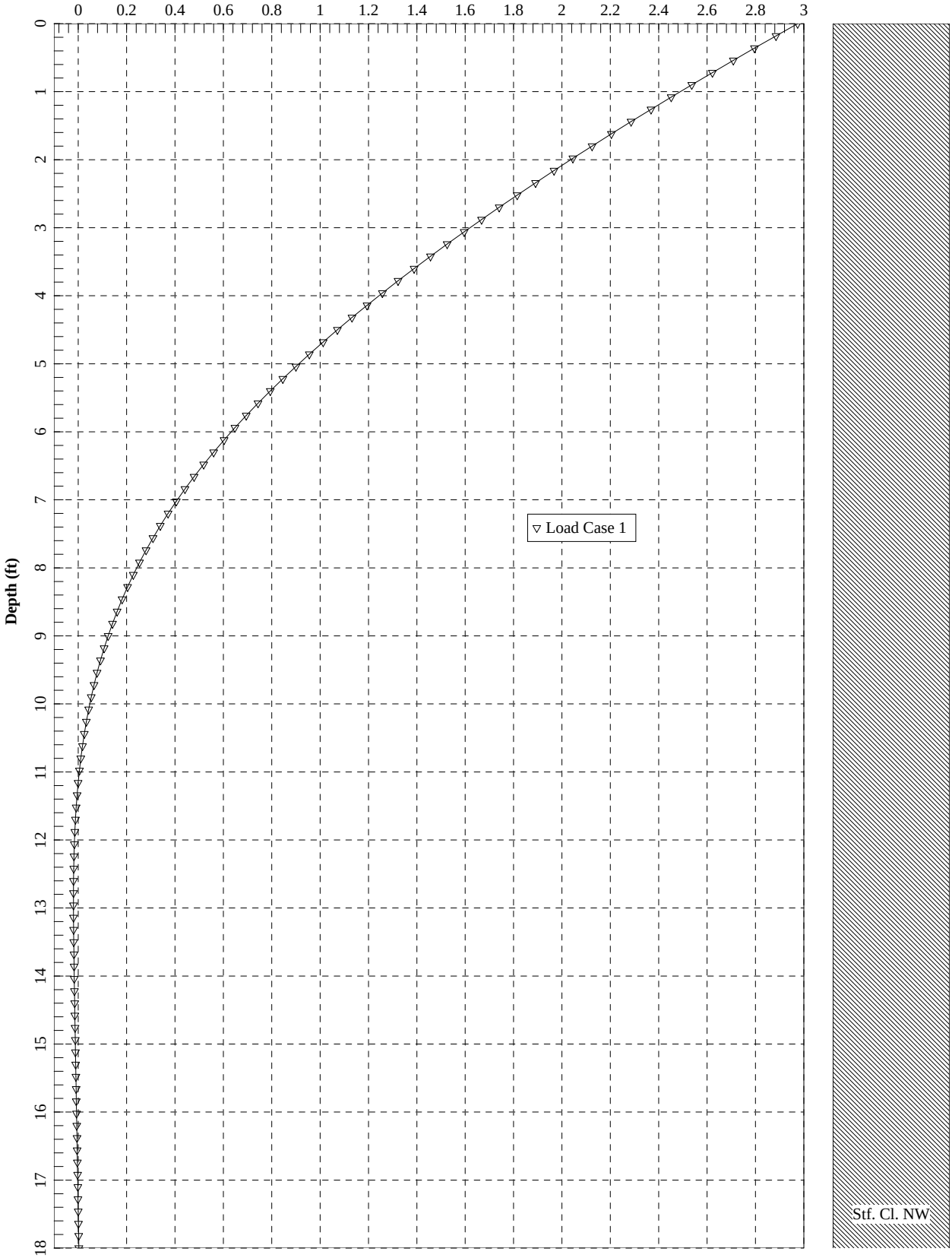
GHBW JOB No.: 14-030

Soil Case	Shaft dia, in.	Shear (kips)	Moment (kip-ft)	Axial (kips)	Min shaft length, ft	Calculated shaft head deflect, in.	Calculated max moment, in.-lbs	Calculated max moment, kip-ft
A	18	6.4	65.8	6.0	18.0	2.97	1,238,678.0	103.2
A	24	6.4	65.8	8.5	18.0	1.05	1,230,442.0	102.5
B	18	6.4	65.8	6.0	13.0	1.36	1,198,240.0	99.9
B	24	6.4	65.8	6.1	13.0	0.48	1,191,041.0	99.3

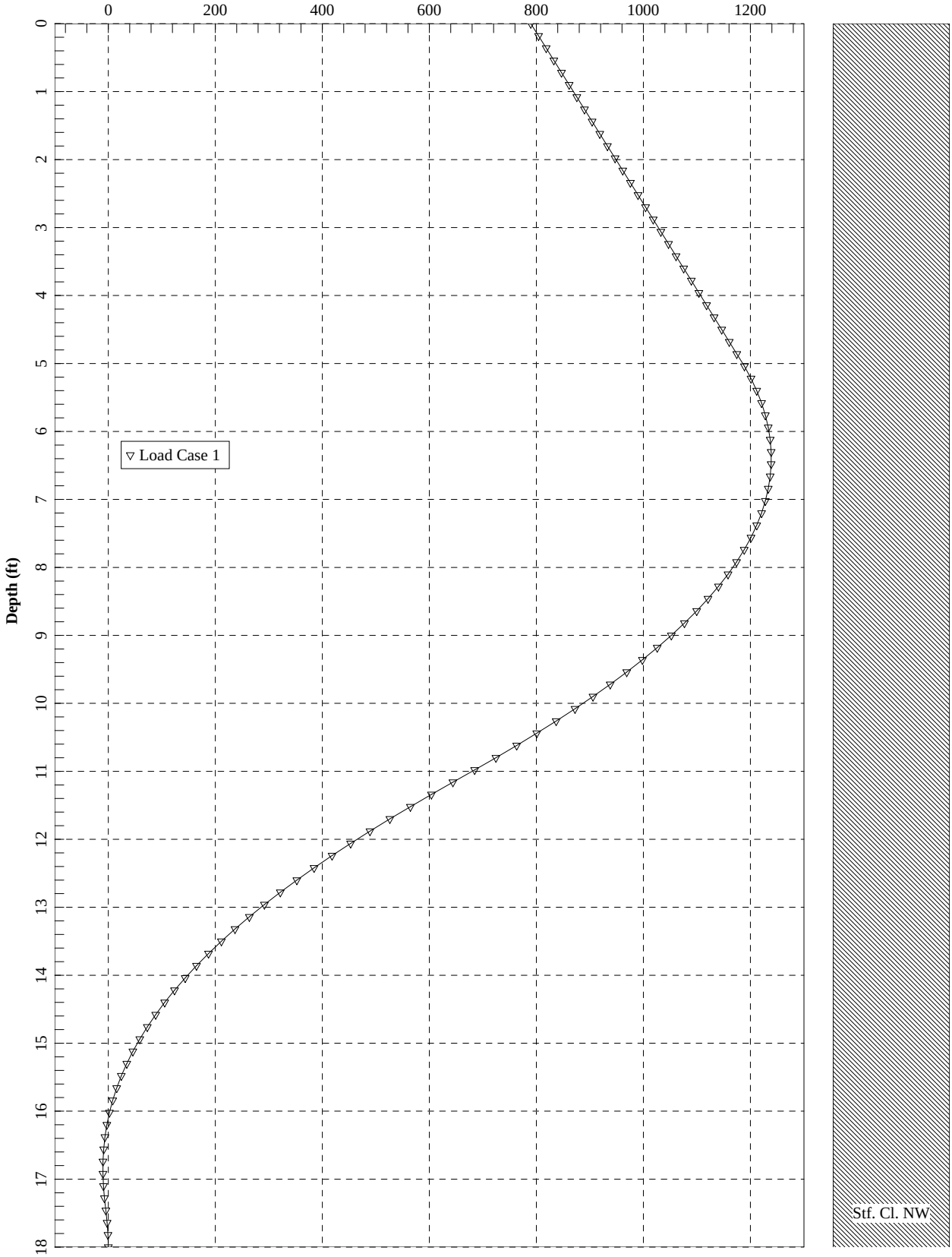
Notes: 1. Loads are per shaft, applied at ground line.
2. Axial load assumed, based on weight of shaft.
3. Minimum shaft length is from final grade.


Top of Ground –
Final Grade
Top of Shaft
(EL Varies)
5' - Neglect
Embankment Fill
or Overburden
Soil
18 in. or 24 in. dia
Drilled Shaft
F'c ≥ 3500
Layer 1, 5 to 35 ft = Stiff Clay w/o Free Water
Bottom EL
Varies
Case A
Soil Conditions
Re: Deep Overburden
LPile 2015.8.03, © 2015 by Ensoft, Inc.

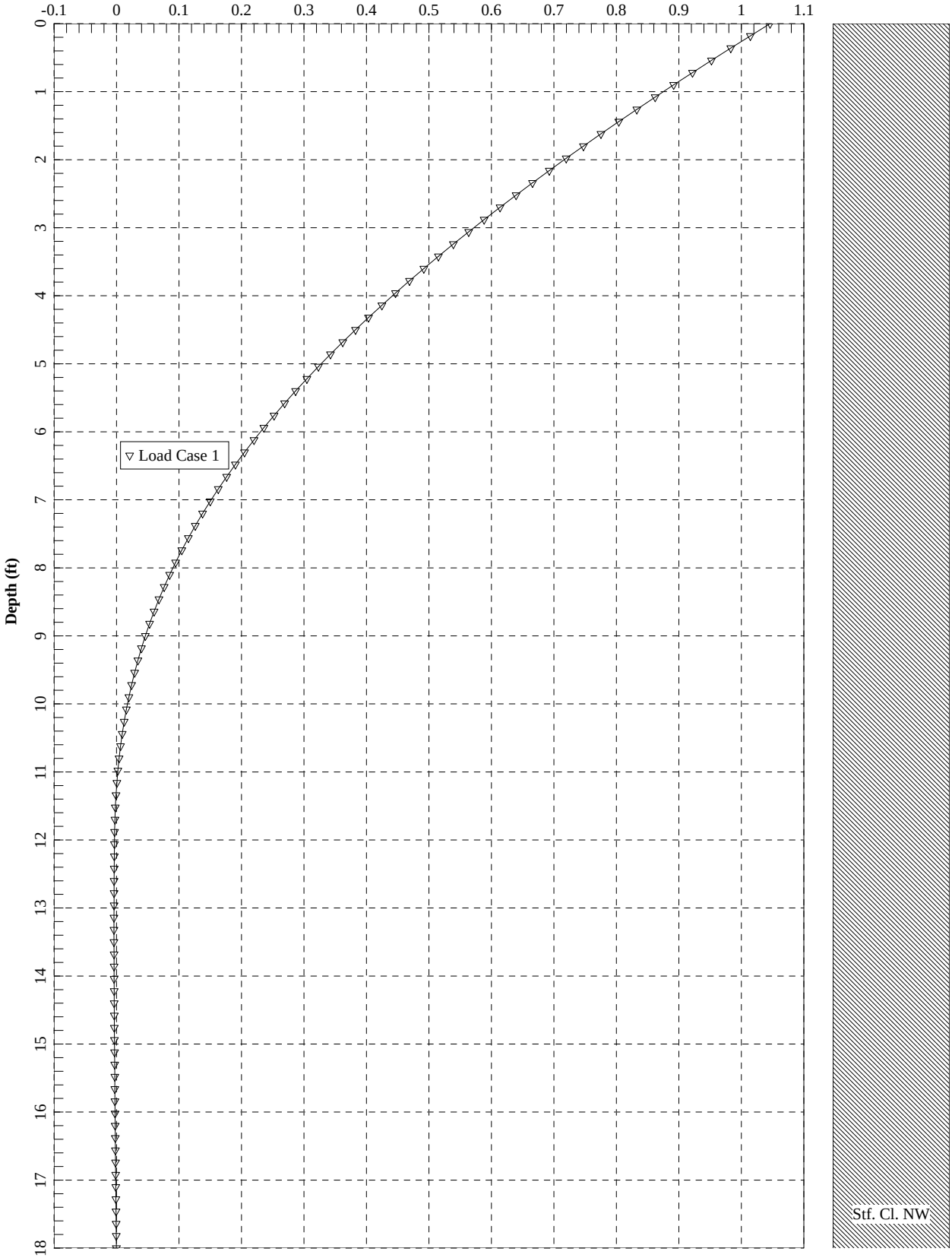
Case A - 18 in. dia Shaft
Lateral Pile Deflection (inches)



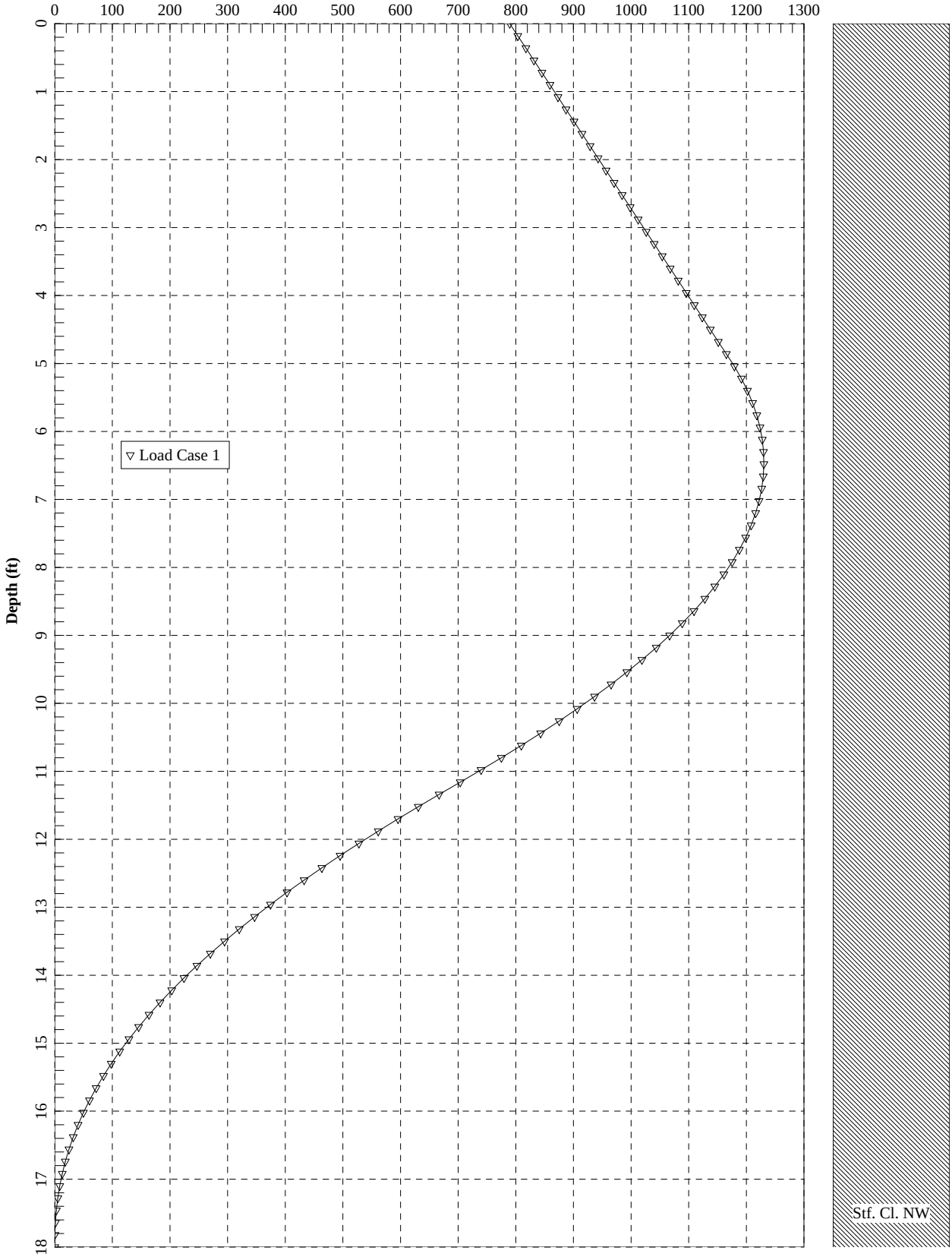
Case A - 18 in. dia Shaft
Bending Moment (in-kips)

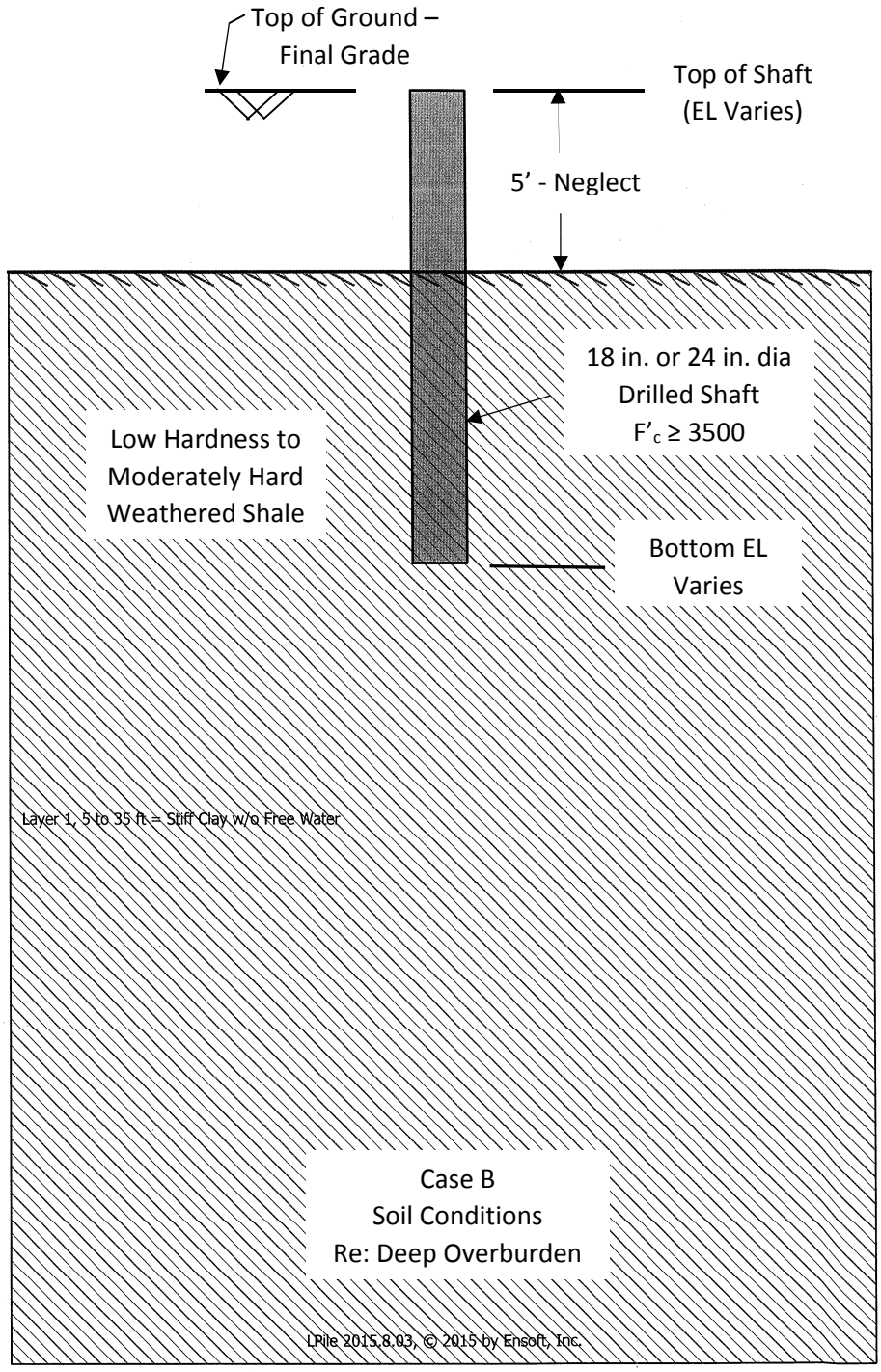


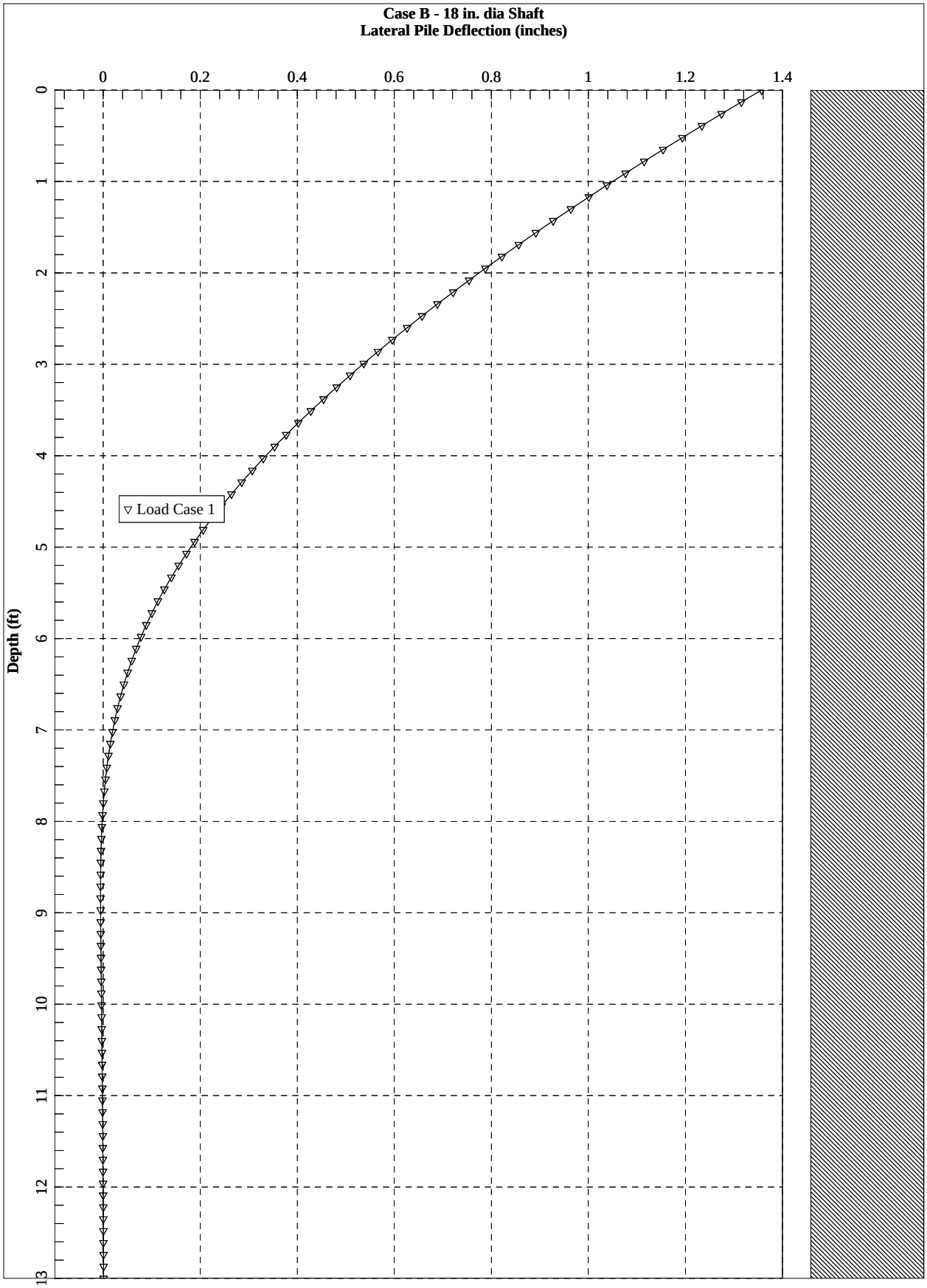
Case A - 24 in. dia Shaft
Lateral Pile Deflection (inches)



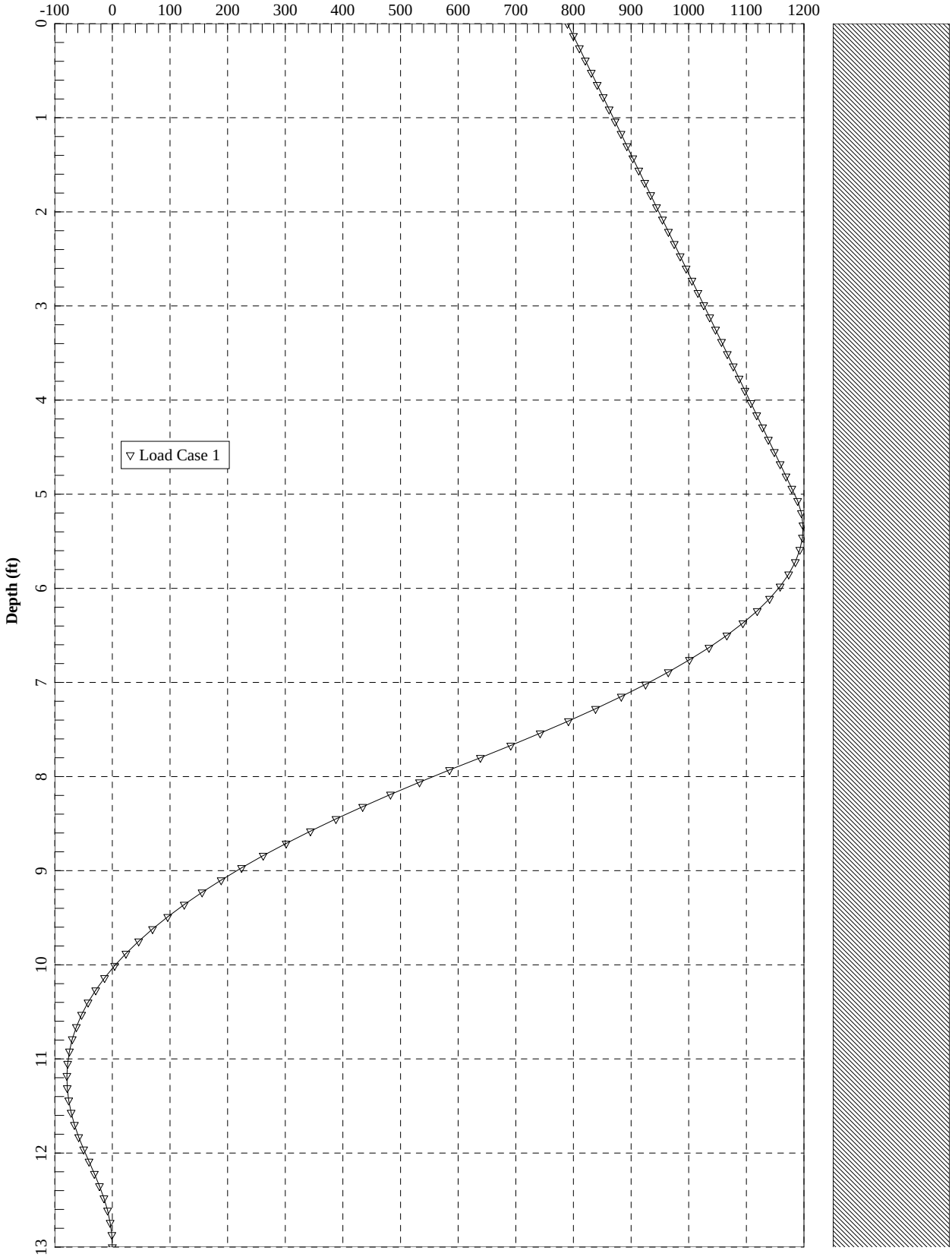
Case A - 24 in. dia Shaft
Bending Moment (in-kips)



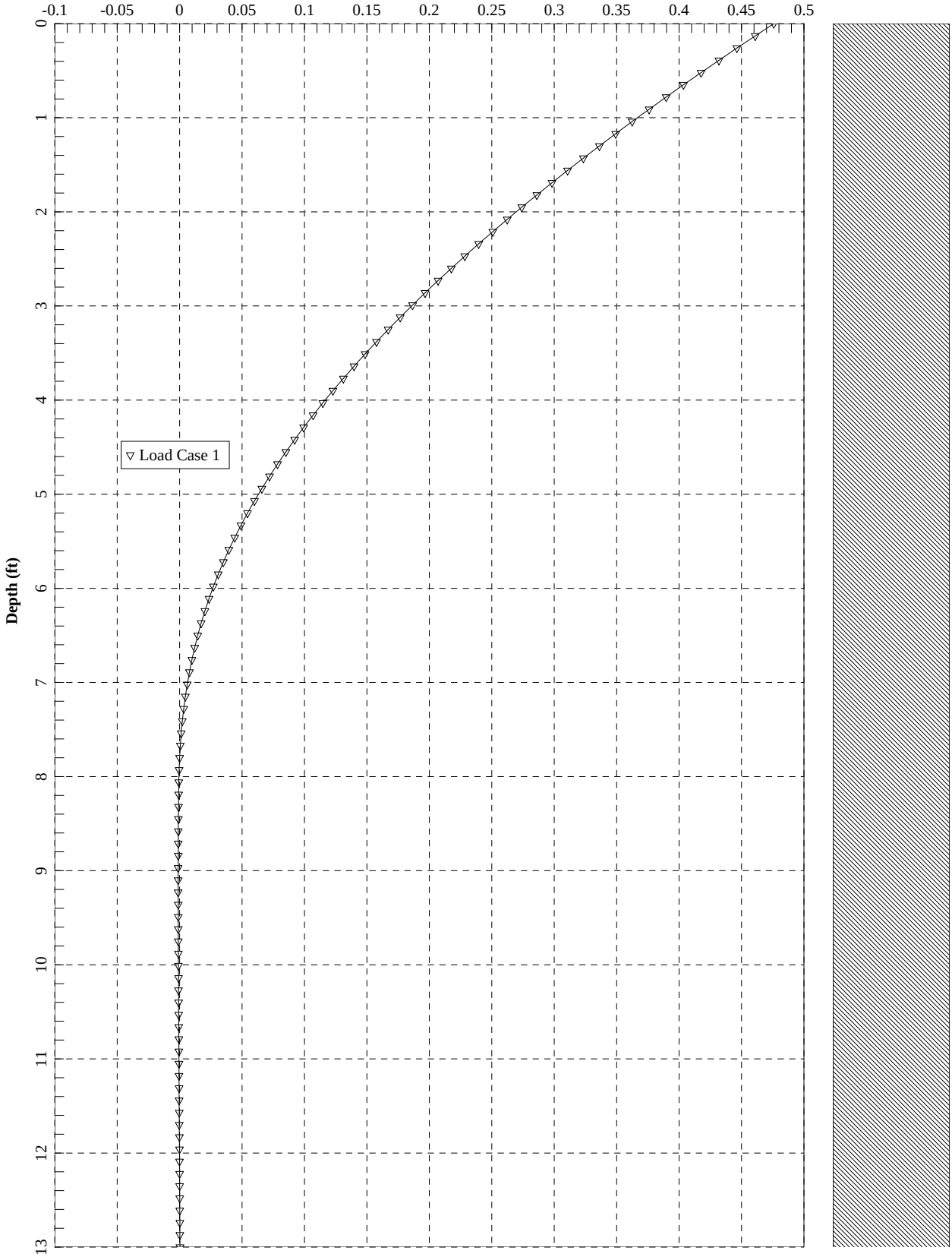

Top of Ground –
Final Grade
Top of Shaft
(EL Varies)
5' - Neglect
18 in. or 24 in. dia
Drilled Shaft
F'c ≥ 3500
Low Hardness to
Moderately Hard
Weathered Shale
Bottom EL
Varies
Layer 1, 5 to 35 ft = Stiff Clay w/o Free Water
Case B
Soil Conditions
Re: Deep Overburden
LPile 2015.8.03, © 2015 by Ensoft, Inc.

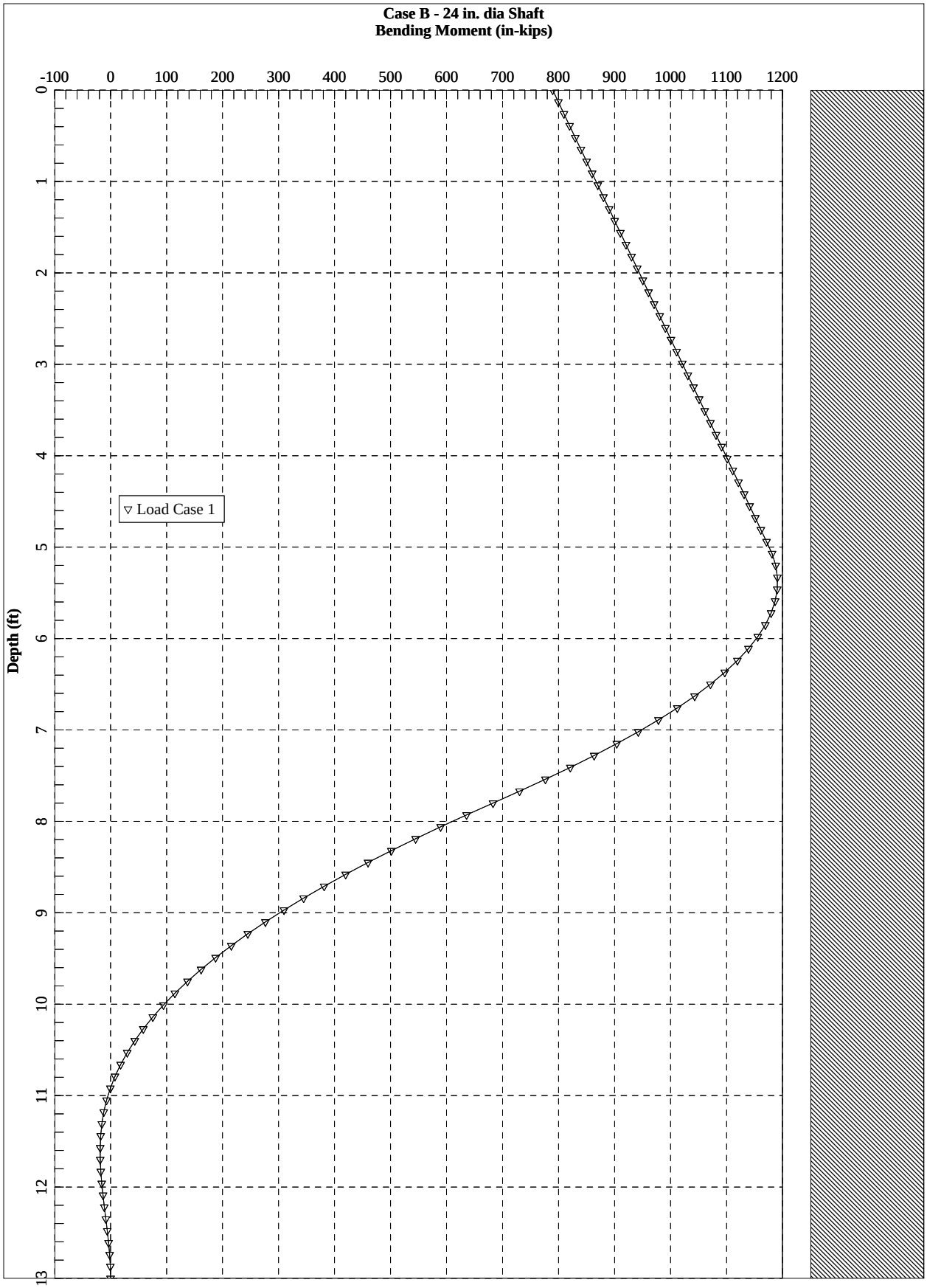

Case B - 18 in. dia Shaft
Lateral Pile Deflection (inches)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Load Case 1

Case B - 18 in. dia Shaft
Bending Moment (in-kips)



Case B - 24 in. dia Shaft
Lateral Pile Deflection (inches)




Case B - 24 in. dia Shaft
Bending Moment (in-kips)
-100
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Load Case 1