GEOTECHNICAL REPORT

HENRY COUNTY, TENNESSEE

State Route 54 (U.S. 641)

FROM: RISON STREET

TO: NEAR SMITH ROAD

P. E. NO. 40003-1213-14

GEOTECHNICAL ENGINEERING FILE NO. 4011502

SUBMITTED FEBRUARY 2007

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TABLE OF CONTENTS

Chapter 1: Location and Description of Alignment 1

Chapter 2: Topography and Drainage 1

Chapter 3: Geology of the Area Bounding the Alignment 1

Chapter 4: Drilling and Sampling Techniques 4

Chapter 5: Laboratory Testing 5

Chapter 6: Seismic Considerations 6

Chapter 7: Engineering Analysis 8

Chapter 8: Recommendations 9

Chapter 9: Special Notes and/or Specifications 15

REFERENCES

Appendix I Boring Logs

Appendix II Soil Description Sheet and Laboratory Data

Appendix III Geotechnical Sheets

STATE ROUTE 54 (U. S. 641)

FROM RISON STREET TO NEAR SMITH ROAD

HENRY COUNTY, TENNESSEE

Chapter 1: Location and Description of Alignment

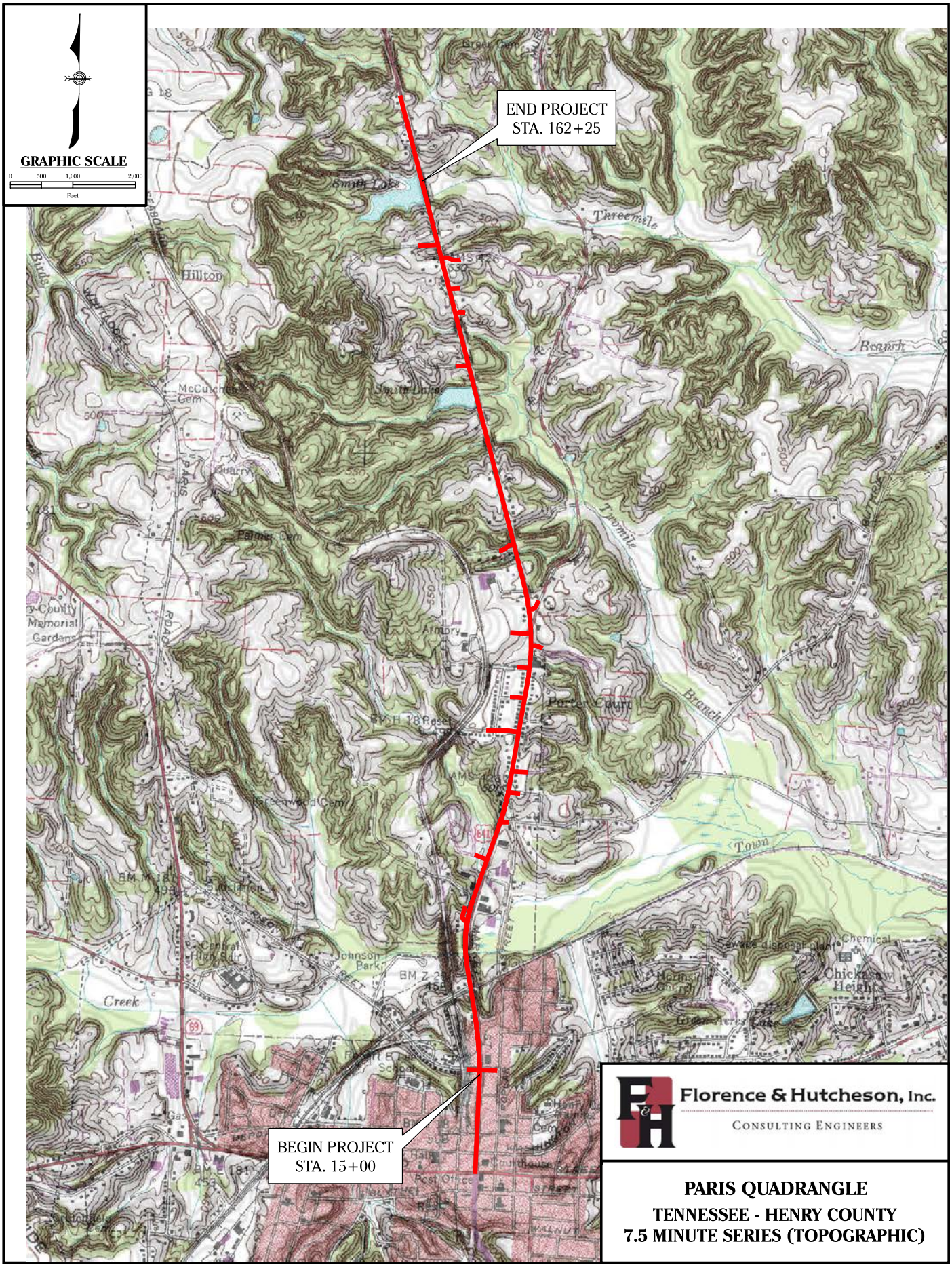
The proposed alignment for S.R. 54 begins just south of Rison Street at station 15+00 and continues along the existing alignment until it ends approximately 0.18 miles north of Smith Road at station 162+25. The total project length is 2.79 miles. The existing alignment will be widened to a new five-lane roadway with a center turn lane. The Site Map on Page 2 indicates the project alignment. The roadway design consultant for the project is Florence and Hutcheson, Inc.

Chapter 2: Topography and Drainage

The proposed project is located along the divide between the West Tennessee Uplands section and West Tennessee Plains section of the Tennessee Coastal Plain. This topographic feature is also recognized as the drainage divide for surface water flowing east into the Tennessee River drainage basin and flowing west into the Mississippi River drainage basin. The proposed alignment passes through rolling terrain with creeks developing relatively wide flat floodplains. Surface water collected along the proposed project corridor flows generally east and south into unnamed tributaries of Threemile Creek, Twomile Creek, Jones Bend Creek and Town Creek. Elevations range from approximately 420 feet in the Town Creek floodplain to approximately 530 feet along the ridge in the central and northern segments of the proposed alignment. The vertical relief along the proposed centerline of the project is approximately 110 feet.

Chapter 3: Geology of the Area Bounding the Alignment

The proposed alignment corridor intercepts formations assigned to the Tertiary (Paleocene, Eocene and Pliocene Series) and Quaternary (Pleistocene and Recent Series) Systems. The Tertiary formations indicated on published geologic mapping include, in ascending order, the Porters Creek Clay, Wilcox Formation and undifferentiated Fluvial deposits. The Fluvial deposits transcend the Pliocene / Pleistocene boundary and combined with Alluvium make up the Quaternary formations encountered. These stratigraphic units dip gently southwest into the Mississippi Embayment at a rate of approximately 23 feet per mile. Published geologic mapping describes Porters Creek Clay as dominantly clay and silt with lenses and partings of very fine to fine grain sand. Thickness of the Porters reportedly varies from 110 feet to



PARIS QUADRANGLE

TENNESSEE - HENRY COUNTY

7.5 MINUTE SERIES (TOPOGRAPHIC)

150 feet. Very fine to coarse grain sand with silt / clay matrix and interbedded sand, silt and clay are reported to comprise the Wilcox Formation. Sediments within the Wilcox are laterally discontinuous and interlensed throughout the reported 50 feet to 130 feet of thickness. Fluvial deposits, where present, are reported to contain fine to very coarse sand with occurrences of silt / clay matrix, lenses of gravel and irregular lenses of clay. Thickness varies from 0 feet to 70 feet. Floodplain alluvium is reported to reach a maximum thickness of 25 feet and composed of sand, silt, clay and scattered gravel.

The proposed alignment intercepts Porters Creek Clay between Station 30+00 to Station 34+00, Station 38+50 to Station 48+00 and Station 50+00 to Station 55+00. The Porters is intercepted within other intervals along the alignment but in the subsurface underlying younger sediments. Wilcox Formation sediments were intercepted between Station 27+00 to Station 30+00, Station 55+00 to Station 60+00, Station 102+00 to Station 108+00, Station 124+00 to Station 133+00, Station 137+00 to Station 140+00 and Station 154+00 to the End of Project. Undifferentiated Fluvial deposits cap the upland ridges throughout the proposed alignment within intervals not specified for other units. Recent (Holocene Series) alluvium is recognized in the Jones Bend Creek / Town Creek floodplain, Station 34+00 to Station 39+00 and tributary floodplain Station 57+00 to Station 59+00.

Examination of recovered samples and the correlative laboratory analysis from alignment borings indicates the Porters Creek Clay to be composed predominately of unconsolidated sandy elastic silt with lenses of silty fine grain sand. The highly plastic material also exhibited relatively high natural moisture contents. The Porters unit will be susceptible to erosion and to expansion when wet therefore erosion control matting is recommended where it is exposed in newly opened cuts and protection from water is recommended when opened for excavations. Up to 66 feet of Porters was intercepted in borings advanced beneath the proposed alignment.

Wilcox Formation sediments recovered during the subsurface investigation are composed of fine to medium grain sand, minor fractions of coarse grain sand and gravel and laminations and interbeds of silt and clay. Laboratory testing indicated the unconsolidated sediments ranged from non-plastic to medium plastic. Due to the unconsolidated and granular nature of these materials erosion is anticipated to be problematic therefore erosion matting is recommended when the formation is exposed in newly opened cuts. Up to 44 feet of Wilcox was intercepted in borings advanced beneath the proposed alignment.

Fluvial deposits, interpreted as remnants of earlier drainage systems, were found to be composed of widely varying fractions of unconsolidated fine to medium grain sand, silt and clay. Minor fractions of coarse grain sand and

gravel were encountered within some borings. Sediments were determined to be generally medium plastic in laboratory testing with occurrences of non-plastic to slightly plastic material also encountered. Erosion is anticipated to be problematic in the slightly plastic and non-plastic units therefore erosion matting is recommended when the formation is exposed in newly opened cuts. Borings intercepted up to 26 feet of Fluvial deposits beneath the proposed alignment.

Alluvium, composed of varying fractions of fine and medium grain sand, silt, clay and minor coarse sand and gravel fractions, was intercepted in limited intervals indicated above. Laboratory testing indicated the unconsolidated sediments ranged from non-plastic to slightly plastic. Natural moisture contents equal to or greater than the liquid limit suggest saturated conditions that must be considered for embankment design and may prove problematic during excavation in this material. Up to 23 feet of alluvium was intercepted in borings advanced beneath the proposed alignment.

Chapter 4: Drilling and Sampling Techniques

Drilling and sampling procedures for the proposed alignment were performed during the period of April 2004 to June 2004. Borings were advanced utilizing a truck-mounted CME 55 drill rig and an atv-mounted CME 550 drill rig. Standardized geotechnical procedures were performed in the borings. Control borings were drilled along the proposed centerline and left and right of centerline with 3¼ inch I.D. hollow stem augers to provide information for the soil profile along the project. Verification borings were drilled in the deepest cuts and embankments to provide strength parameters for the soil. These borings were drilled with 3¼ inch I.D. hollow stem augers with standard penetration tests and shelby tube sampling obtained typically at five foot intervals.

The soil overburden along the proposed alignment is composed of A-2-4, A-4, A-5, A-6 and A-7 groups. Auger refusal was encountered in nine of the borings at depths ranging from 3.0 feet to 44.2 feet with an average refusal depth of 26.4 feet. However, these refusal depths tend to indicate rock will not be encountered above proposed grade for the drilled intervals. The majority of the borings were dry immediately after drilling. When groundwater was encountered during drilling operations, the depth of water below the ground surface ranged from 3.0 feet to 26.0 feet and averaged 12.0 feet. Refer to the boring logs in Appendix I for the actual groundwater depths encountered during drilling operations.

Sixteen (16) pavement cores were also advanced during the period of June 2004 along the existing alignment of U.S. 641. Some of the existing pavement will be salvaged for use with the new proposed template. Individual boring

logs and results of the pavement coring are shown in Appendix I. The average profile of the existing pavement is 11 inches of asphalt over 4 inches of aggregate base.

Chapter 5: Laboratory Testing

All soil specimens were transported to the laboratory of Florence & Hutcheson, Inc., for examination. Soil samples were subjected to laboratory analysis, including the following tests:

- Atterberg Limits — AASHTO T-89 and T-90
- Sieve Analysis — AASHTO T-27 and ASTM D-1140
- Natural Moisture Content — AASHTO T-265
- California Bearing Ratio Test — AASHTO T-193
- Standard Proctor Test — AASHTO T-99
- Unconfined Compression Test — AASHTO T-208

The dominant AASHTO soil classifications for the proposed alignment are A-2-4 (silty sands, poorly graded sands with silt, silty, clayey sands, well-graded sands with silt, silty sands with gravel and poorly graded sands with clay), A-4 (clayey sands, silty clayey sands, sandy lean clays, sandy silty clays, silty sands, silts with sand, sandy silts, lean clays with sand and silts), A-5 (elastic silts, elastic silts with sand, sandy elastic silts, sandy silts, silty sands and silts), A-6 (lean clays with sand, clayey sands, sandy lean clays and lean clays), A-7-5 (elastic silts with sand and sandy elastic silts) and A-7-6 (lean clays). A soils profile is submitted as an attachment to this Geotechnical Report. Soil classifications, standard proctor data and California Bearing Ratio (CBR) test results for this project are included as Appendix II attached to this report.

Table 1 summarizes dry density and optimum moisture values for the bulk samples obtained along the project. The proctor curves are included in Appendix II.

TABLE 1 – SUMMARY OF STANDARD PROCTOR TESTS

Soil Type	*No. of Samples Tested*		*Maximum Dry Density*	*Optimum Moisture*
A-2-4 (SM, SC, SP-SM & SW-SM)	10	Average Range	115.7 101.9 to 123.4	11.9 8.2 to 14.3
A-4 (CL, SC-SM, CL-ML,SC & SM)	6	Average Range	118.7 117.0 to 121.1	12.2 10.5 to 13.3
A-6 (SC & CL)	10	Average Range	115.7 108.3 to 120.4	13.9 11.9 to 16.6
A-7-6 (CL)	1	Average Range	111.1 111.1	17.7 17.7

California Bearing Ratio (CBR) testing was conducted throughout the project. Table 2 summarizes the CBR testing for this project. Individual CBR curves are included in Appendix II.

TABLE 2 – SUMMARY OF CBR TESTS			
Soil Type	*No. of Samples Tested*		*CBR*
A-2-4 (SM, SC, SP-SM & SW-SM)	6	Average Range	31 10 to 50
A-4 (CL, SC-SM, CL-ML, SC, SM & ML)	3	Average Range	11 3 to 18
A-6 (SC & CL)	6	Average Range	9 4 to 15
A-7-6 (CL)	1	Average Range	8 8

Unconfined compression testing was performed on selected specimens from critical section intervals. Table 3 summarizes the unconfined compression testing data. Individual test results are included in Appendix II.

TABLE 3 – SUMMARY OF UNCONFINED COMPRESSION TESTS				
Station & Offset	*Depth*	*Qu (ksf)*	*Unit Strain (%)*	*Dry Density (PCF)*
85+00 @ 89’ Rt.	10.0’ to 10.5’	2.77	2.4	118.7
30+00 @ 125’ Rt.	25.0’ to 25.7’	3.50	2.2	69.2

Chapter 6: Seismic Considerations

Due to its relative proximity to the New Madrid Seismic Zone (NMSZ), Henry County is considered vulnerable to severe ground shaking. The proposed FEE peak bedrock acceleration having a 10% probability of exceedance in 50 years (or mean return period of 475 years) at the project site as determined from the USGS 2002 contour maps is equal to A=0.16g for an earthquake of moment magnitude equal to 7.7. Similarly, the proposed SEE peak bedrock acceleration having a 2% probability of exceedance in 50 years (or mean return period of 2475 years) is equal to A=0.46g for an earthquake of moment magnitude equal to 7.7. The effect of seismic loading at the project site can then be investigated in terms of liquefaction potential of the native soil deposits. Based on the data obtained from the SPT investigation, a Soil Class D is recommended.

In general, the liquefaction potential of a soil is a function of two factors: the magnitude and duration of the strong ground motion and the susceptibility of the soil to liquefaction as expressed by the existing soil conditions. A suitable combination of in-situ conditions and earthquake-induced motion will result in the development of soil liquefaction. In order to be susceptible to liquefaction, potentially liquefiable soils must be saturated or nearly saturated. Groundwater level measurements during drilling operations indicated the presence of ground water at depths of 3 feet to

26 feet from the ground surface. Potential future saturation of the soil material at shallower depths is also considered by assuming the groundwater table may fluctuate seasonally. Soils encountered in the project area are indicated as A-2-4, A-4, A-5, A-6, A-7-5, and A-7-6 materials per the AASHTO Classification. These soils were generally intercepted in a loose to very dense condition, as indicated by the SPT blow counts (2 to 100+). Their plasticity ranges from non-plastic to low (PI=0-10) for the A-2-4, A-4, and A-5 materials, from low to medium (PI=11-20) for the A-6 materials, and from medium to high (PI=18-30) for the A-7-5 and A-7-6 materials.

For evaluating the liquefaction potential of low plasticity silts and clays, guidelines vary among available sources. Liquefaction of soils with fines up to 90% and clay content up to 18% has been reported in published literature. In addition, the Chinese criteria, as modified for the US Standards (Perlea, Koester and Prakash, 1999), report that a soil is liquefiable if the plasticity index is less than or equal to 13 and the clay content is less than 20%, and the water content is greater than 0.87 times the liquid limit. To this end, the A-2-4, A-4, and A-5 soil materials characterized by a low plasticity (PI<13), are considered potentially liquefiable despite their large fines content (silt + clay = 5% to 92%). On the other hand, the A-6, A-7-5, and A-7-6 soil materials characterized by a moderate to high plasticity (PI>13) and a high fines content (silt + clay = 43% to 94%), are considered to have a low potential for liquefaction.

For the A-2-4, A-4, and A-5 soil materials that meet the liquefaction-susceptibility criteria, their liquefaction potential is further investigated with respect to the level of ground shaking that is expected for the project area. The liquefaction resistance of the soil as expressed by the cyclic resistance ratio (CRR) is compared to the cyclic shear stress generated by the design earthquake as expressed by the cyclic stress ratio (CSR). Liquefaction resistance is estimated using the SPT-based empirical curves proposed by NCEER Workshop (Youd et al., 2001). The curves are based on a large database of field investigations of soils that did or did not liquefy during past earthquakes. The SPT blow count is used as a representative index for the liquefaction resistance of the soil. The CSR as calculated from the Seed and Idriss (1971) simplified procedure at different locations along the project alignment is utilized. For the surficial layers of the A-2-4 and A-4 soil materials that were encountered in the project area to a maximum depth that ranges from 8 to 28 feet, liquefaction resistance is lower than the earthquake loading. This indicates a potential for liquefaction within a zone from approximately elevation 486 feet to elevation 400 feet.

Based on the results of the liquefaction assessment along the project, roadway embankments will likely encounter liquefiable conditions during a seismic event. As a result of soil liquefaction, slope instability followed by soil deformations and settlements are likely to occur within the project area. Settlements caused by earthquake motion are

anticipated to be relatively small. In the liquefiable zone, settlements occur due to the re-consolidation of the soil after the dissipation of the earthquake-induced excess pore pressures. These settlements, using the procedures proposed by Tokimatsu and Seed (1987), are estimated to be on the order of 1 inch to 5 inches. The lower value accounts for those areas where a maximum of 8 feet of liquefiable layer is estimated and the higher value accounts for those areas where a maximum of 28 feet of liquefiable layer is estimated. These potential earthquake settlements are in addition to the estimated settlements due to static conditions (see Chapter 7). Because of the generally flat ground surface at the project site, and the high fines content in the soil, earthquake-induced lateral ground movements are expected to be relatively small. Maximum permanent displacements are estimated, using the procedures proposed by Youd et al. (2002), to be on the order of 1 inch to 2 inches.

Chapter 7: Engineering Analysis

Slope stability analysis was performed for the critical cut sections and embankment sections throughout the project. A minimum safety factor of 1.3 was utilized to determine the final design slopes. Unless specifically addressed in other portions of the report, soil slopes of 3H:1V or flatter are acceptable for this project. The soil strength parameters were selected based on the results of the standard penetration testing, soil classification and engineering judgment. Each critical design section is included within the soil sheets. Table 4 summarizes the results of the slope stability analyses.

TABLE 4 - SUMMARY OF SLOPE STABILITY ANALYSES

STATION	CUT/FILL	SHORT TERM FACTOR OF SAFETY	LONG TERM FACTOR OF SAFETY
27+00	Fill	1.5	2.2
30+00	Fill	1.9	2.7
34+50	Fill	1.7	2.4
38+50	Fill	3.5	2.5
85+00	Fill	3.0	3.1
95+00	Fill	2.7	2.2
114+00	Cut	4.8	3.2
119+50	Fill	2.8	2.4
137+00	Fill	1.8	2.7
160+00	Fill	2.7	2.2

Subsurface conditions indicate potential settlement for new embankment construction within the analyzed areas (stability sections) could range from 1inch to 6 inches. Cohesive soils, even with numerous amounts of sandy and gravelly materials, will likely create longer consolidation periods, but it is anticipated that the majority of settlement will

likely dissipate during the proposed construction schedule. The settlement may take up to 90 days to achieve using standard road construction practices.

Soil deformation is anticipated during the analyzed seismic event, as discussed in this report. Mitigation measures could be utilized to reduce or eliminate the potential effects of seismic events on this project, depending on the level of acceptable risk deemed appropriate by TDOT for this project. However, these measures will increase the project construction cost significantly. The effects of soil liquefaction in terms of horizontal / vertical deformations, as discussed in this report, are provided to assist TDOT with the decision on whether to use mitigation measures to prevent/reduce liquefaction or allow the horizontal / vertical deformation to occur during an earthquake event. Seismic deformations due to liquefaction may be mitigated by densification, drainage, reinforcement, deep mixing, replacement and other methods. These techniques may be designed to fully, or partially eliminate the liquefaction potential depending on the amount of deformation and risk that is deemed appropriate for this project. In our opinion, the seismic risk associated with this project is tolerable. Although damage to the roadway will occur, it is likely that they will remain serviceable after a seismic event.

Chapter 8: Recommendations

For pavement design purposes, we recommend a CBR value of 3 for untreated soil. A soil shrinkage factor of 15% is recommended for the subject project. The previously summarized soil values were utilized to design embankment slopes, cut slopes and evaluate these designs for stability. The critical design section sheets are included as a part of this Geotechnical Report. The following is a summary of recommendations for the project.

Beginning of Job to Station 23+50

This section of roadway consists of embankments that extend to heights of 3 feet. No design cross sections were analyzed for this interval. The soil encountered consisted of lean clay and was penetrated to a maximum depth of 4.5 feet. Auger refusal was not encountered during this interval. We recommend soil embankment slopes of 3H:1V or flatter for this interval.

Station 24+00 to Station 42+50

This section of roadway consists of embankments that extend to heights of 35 feet. Four design cross sections were analyzed at Station 27+00, Station 30+00, Station 34+50 and Station 38+50. The soils encountered consisted of silts with sand, elastic silts, sandy silts, sandy elastic silts, elastic silts with sand, silty sands and clayey sands. These

soils were penetrated to a maximum depth of 80.3 feet. A potential for liquefaction of the silts and sands was indicated for this interval, in a zone from approximately elevation 450 feet to elevation 400 feet. The silts and sands produced "N" values ranging from 2 to 100+ BPF and averaged 61 BPF. Auger refusal was not encountered within the interval. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. In addition, the existing bridge over the abandoned L&N Railroad at Station 29+50 will be removed. The embankment that will be required to achieve the proposed grade through the interval of the abandoned bridge will be approximately 28 feet in height. From Station 29+00 to Station 30+00 the lower portion of the embankment will be constructed using Graded Solid Rock to elevation 464.5. Due to Right-of-Way constraints, a retaining wall is proposed from Station 24+50 to Station 30+25 at 40 feet right of centerline. Refer the Geotechnical Report for Wall No. 1 for additional information. This embankment will require "benching" as the fill is placed on all slopes of 4H:1V or steeper to help reduce the likelihood of a slope failure between the existing groundline and the new embankment material. This benching shall be utilized on both the side slopes and the existing abutment slopes of the existing bridge, as shown on the attached Special Detail. The short term and long term factors of safety for the design section at Station 27+00 were 1.5 and 2.2, respectively. The short term and long term factors of safety for the design section at Station 30+00 were 1.9 and 2.7, respectively. The short term and long term factors of safety for the design section at Station 34+50 were 1.7 and 2.4, respectively. The short term and long term factors of safety for the design section at Station 38+50 were 3.5 and 2.5, respectively. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 25+00 to Station 40+00, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities. A second retaining wall begins at Station 42+50. Refer the next interval for more information regarding Retaining Wall No. 2.

A possible sinkhole has been identified at 70 feet left of Station 28+40. During construction this possible sinkhole will need to be excavated and further evaluated as to whether a treatment is required. At this time a Sinkhole Treatment 2, Inactive is recommended.

Station 43+00 to Station 83+50

This section of roadway consists of cuts that extend to depths of 6 feet and embankments that extend to heights

of 10 feet. No design cross sections were analyzed for this interval. The soils encountered consisted of silty sands, clayey sands, lean clays with sand, sands with silt, sandy lean clays and elastic silts with sand. These soils were penetrated to a maximum depth of 17.6 feet. Auger refusal was encountered within the interval. We recommend soil slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. In order to achieve the desired grade and reduce Right-of-Way impacts a retaining wall is proposed from Station 42+50 to Station 45+45 at 42 feet left of centerline. Refer to the Geotechnical Report for Retaining Wall No. 2 for additional information.

Station 84+00 to Station 96+50

This section of roadway consists of embankments that extend to heights of 19 feet. Two design cross sections were analyzed at Station 85+00 and Station 95+00. The soils encountered consisted of lean clays with sand, silty sands, lean clays, clayey sands and sands with silt. These soils were penetrated to a maximum depth of 40.1 feet. A potential for liquefaction of the clays and sands was indicated for this interval, in a zone from approximately elevation 486 feet to elevation 456 feet. Auger refusal was encountered within the interval. The clays and sands produced "N" values ranging from 3 to 100+ BPF and averaged 33 BPF. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. The short term and long term factors of safety for the design section at Station 85+00 were 3.0 and 3.1, respectively. The short term and long term factors of safety for the design section at Station 95+00 were 2.7 and 2.2, respectively. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 84+50 to Station 85+50 and from approximate Station 94+50 to Station 96+00, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 97+00 to Station 100+50

This section of roadway consists of cuts that extend to depths of 6 feet. No design cross sections were analyzed for this interval. The soil encountered consisted of sand with silt and was penetrated to a maximum depth of 5 feet. Auger refusal was not encountered within the interval. We recommend soil cut slopes of 3H:1V or flatter for this

interval.

Station 101+00 to Station 106+00

This section of roadway consists of embankments that extend to heights of 22 feet. A design cross section was to be analyzed at Station 104+00; however, access for drilling operations was denied by the property owners between Station 101+00 and Station 104+00. The soil encountered where drilling was performed consisted of silty sand and was penetrated to a maximum depth of 5 feet. Auger refusal was not encountered within the interval. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 103+00 to Station 105+50, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 106+50 to Station 117+00

This section of roadway consists of cuts that extend to depths of 12 feet. A design cross section was analyzed at Station 114+00. The soils encountered consisted of lean clays, silty sands, silty sands with gravel and sands with silt. These soils were penetrated to a maximum depth of 32.0 feet. Auger refusal was not encountered within the interval. The clays and sands produced "N" values ranging from 26 to 59 BPF and averaged 39 BPF. We recommend soil cut slopes of 3H:1V or flatter for this interval. The short term and long term factors of safety for the design section at Station 114+00 were 4.8 and 3.2, respectively.

Station 117+50 to Station 121+50

This section of roadway consists of embankments that extend to heights of 23 feet. A design cross section was analyzed at Station 119+50. The soils encountered consisted of silty sands, silty clays and clayey sands. These soils were penetrated to a maximum depth of 44.2 feet. A potential for liquefaction of the sands was indicated for this interval, in a zone from approximately elevation 451feet to elevation 443 feet. Auger refusal was encountered within the interval. The clays and sands produced "N" values ranging from 3 to 100+ BPF and averaged 53 BPF. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as

required per the TDOT Specifications and as modified by the engineer. The short term and long term factors of safety for the design section at Station 119+50 were 2.8 and 2.4, respectively. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 117+00 to Station 121+00, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 122+00 to Station 125+00

This section of roadway consists of cuts that extend to depths of 5 feet. No design cross sections were analyzed for this interval. The soils encountered consisted of silty sands and sands with silt. These soils were penetrated to a maximum depth of 18 feet. Auger refusal was not encountered within the interval. We recommend soil cut slopes of 3H:1V or flatter for this interval.

Station 125+50 to Station 131+00

This section of roadway consists of embankments that extend to heights of 17 feet. No design cross sections were analyzed for this interval. The soil encountered consisted of silty sand and was penetrated to a maximum depth of 5 feet. Auger refusal was not encountered within the interval. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. Smith Lake is located from Station 125+50 to Station 128+50 on the left side of the proposed roadway. To reduce the impact of the proposed embankments a retaining wall is proposed from Station 125+50 to Station 128+50 at 46 feet left of centerline. Refer to the Geotechnical Report for Retaining Wall No. 3 for more information. Furthermore, a 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 126+00 to Station 130+50, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 131+50 to Station 136+00

This section of roadway consists of cuts that extend to depths of 7 feet. No design cross sections were analyzed

for this interval. The soils encountered consisted of silty sands and sands with silt and were penetrated to a maximum depth of 15 feet. Auger refusal was not encountered within the interval. We recommend soil cut slopes of 3H:1V or flatter for this interval.

Station 136+50 to Station 141+00

This section of roadway consists of embankments that extend to heights of 23 feet. A design cross section was analyzed at Station 137+00. The soils encountered consisted of lean clays with sand, silty sands, silts, sands with silt, sandy silty clays, sandy elastic silts and sandy lean clays. These soils were penetrated to a maximum depth of 76.5 feet. A potential for liquefaction of the silts and sands was indicated for this interval, in a zone from approximately elevation 478 feet to elevation 456 feet. Auger refusal was not encountered within the interval. The clays, silts and sands produced "N" values ranging from 4 to 100+ BPF and averaged 59 BPF. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. The short term and long term factors of safety for the design section at Station 137+00 were 1.8 and 2.7, respectively. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 136+50 to Station 140+00, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 141+50 to Station 158+50

This section of roadway consists of cuts that extend to depths of 9 feet and embankments that extend to heights of 10 feet. No design cross sections were analyzed for this interval. The soils encountered consisted of lean clays with sand, sandy lean clays, sandy silty clays, silty sands, clayey sands and lean clays. These soils were penetrated to a maximum depth of 26 feet. Auger refusal was not encountered within the interval. We recommend soil slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer.

Station 159+00 to End of Job

This section of roadway consists of embankments that extend to heights of 12 feet. A design cross section was

analyzed at Station 160+00. The soils encountered consisted of silty sands and sands with silt and were penetrated to a maximum depth of 31.1 feet. A potential for liquefaction of the sands was indicated for this interval, in a zone from approximately elevation 473 feet to elevation 455 feet. Auger refusal was encountered within the interval. The sands produced "N" values ranging from 7 to 100+ BPF and averaged 42 BPF. We recommend soil embankment slopes of 3H:1V or flatter for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer. Smith Lake is located from Station 159+00 to Station 162+25 on the left side of the proposed roadway. A retaining wall is proposed from Station 158+60 to Station 160+00 at 28 feet left of centerline. Refer to the Geotechnical Report for Wall No. 4 for additional information regarding the retaining wall. The short term and long term factors of safety for the design section at Station 160+00 were 1.4 and 1.5, respectively. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment from approximate Station 159+00 to Station 160+50, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Logan Road

This section of roadway consists of embankments that extend to heights of 27 feet. We recommend soil embankment slopes of 3H:1V or flatter be utilized for this interval. We further recommend the embankment be continuously benched over areas where the natural groundline is steeper than 4H:1V, measured at right angles to the roadway, as required per the TDOT Specifications and as modified by the engineer.

Chapter 9: Special Notes and/or Specifications

The following construction notes should be included within the construction plans:

1. The natural moisture contents of the overburden soils at the time of drilling were typically near or above the upper limit of the 95% compaction moisture range. Drying, handling, and manipulation of the soils is likely to be required in order to get the proper moisture content required to satisfy the compaction requirement.

2. Some of the highly plastic A-7 soils encountered within drilled intervals on this project have relatively low dry densities as determined by the standard proctor test. All material within three feet of the final subgrade elevation in both cut and embankment sections shall have a minimum compacted dry density of 95 PCF or greater. This will require undercutting and refilling when the poor quality soils are encountered at the final subgrade elevation in cut sections. Furthermore, if the earthwork balance for the project is a waste situation, the highly plastic A-7 soils should be the material that is wasted first.

3. Installation of erosion control matting and establishment of vegetation shall be conducted as soon as practical to prevent erosion of the cut and fill slopes.

4. A soil shrinkage factor of 15% has been estimated for this project.

5. A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment in the following intervals, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 25+00 to Station 40+00
Station 84+50 to Station 85+50
Station 94+50 to Station 96+00
Station 103+00 to Station 105+50
Station 117+00 to Station 121+00
Station 126+00 to Station 130+50
Station 136+50 to Station 140+00
Station 159+00 to Station 160+50

6. An existing bridge over an abandoned railroad track will be removed and replaced with embankment materials at approximate Station 29+50. As discussed in Note 5 above, a 3 foot blanket of Select Granular Material underlain with Type IV Geotextile Fabric shall be placed in the lower portion of this new embankment, in accordance with TDOT Specifications and as directed by the Engineer. In addition, embankment benching shall be utilized to help reduce slope instability and to help minimize differential settlement within this interval. This benching shall occur along the existing side slopes, as well as the existing "abutment" slopes as shown on the Special Detail sheet included with this report.

7. The proposed alignment intercepts a large pond at approximate Station 127+00. To minimize the impact of the proposed roadway on the large pond, a retaining wall will be utilized. Once a finalized wall configuration has been determined, the TDOT Geotechnical Section shall be contacted to determine if additional geotechnical input is required.

8. A possible sinkhole feature has been identified at approximately 70 feet left of Station 28+40. Remediation shall in accordance with the TDOT Sinkhole Standard Drawing "Sinkhole Treatment" or as directed by the Engineer.

Station 28+40 @ 70 ft. Lt. – Sinkhole Treatment 2, Inactive

REFERENCES

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Seed, H. B., and Idriss, I. M., 1971. Simplified procedure for evaluating soil liquefaction potential, J. Soil Mechanics And Foundation Division, ASCE, 97(9), 1249-1273.

Tokimatsu, K. and Seed, H. B., (1987). Evaluation of Settlements in Sands due to Earthquake Shaking, *Journal of Geotechnical Engineering*, ASCE Vol. 113, No. 8, pp. 861-878.

Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Jr., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S.S.C., Marcuson, W.F., III, Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R.B., Stokoe, K.H., II. (2001). Liquefaction resistance of soils: Summary report from the 1996 NCEER and 1998 NCEER/NSF workshops on evaluation of liquefaction resistance of soils, *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 127(10), 817-833.

Youd, T. L., Hansen, C. M., and Bartlett, S. F. (2002) "Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement," *J. Geotechnical and Geoenvironmental Engrg*., ASCE, December 2002, pp. 1007-1017.

APPENDIX I

BORING LOGS

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	24+00 24' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	484.5 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	19 ft
Hole Number	B-1	Total Depth	21 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
484.5 ft	0		*Ground Line*					
			Topsoil 0.5'		0.5			
			Dark Brown Lean Clay with Sand	MC-1				Bag & MC
480	5							
			7.0'		7.0			
			Brown Clayey Sand					
475	10							
470	15			MC-2				Bag & MC
465	20		21.0'		21.0			
			Boring Terminated @ 21.0' (Elev. 463.5)					
460	25							
455	30							
450	35							
445	40							
440	45							
435	50							
430	55							
425	60							

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SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 122' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	456.9 ft
Project Type	Roadway	Dated Started	4/14/2004
		Completed	4/15/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-2	Total Depth	60 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
456.9 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
455			Yellowish Beige Lean Clay					
	5							
450				MC-1				MC
	10							
445								
	15		Olive Gray Elastic Silt with Sand (14.0')		14.0			
440								
	20			MC-2				MC
435								
	25		Olive Gray Elastic Silt with Sand (24.0')		24.0			
430								
	30							
425								
	35			MC-3				Bag & MC
420								
	40							
415								
	45		Olive Gray Elastic Silt with Sand (45.0')		45.0			
410								
	50							
405				MC-4				MC
	55							
400								
	60		(60.0')					

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 122' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	456.9 ft
Project Type	Roadway	Dated Started	4/14/2004
		Completed	4/15/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-2	Total Depth	60 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
396.9 ft	60		*Continued from previous page*						
			Boring Terminated @ 60.0' (Elev. 396.9)			60.0			
395									
	65								
390									
	70								
385									
	75								
380									
	80								
375									
	85								
370									
	90								
365									
	95								
360									
	100								
355									
	105								
350									
	110								
345									
	115								
340									
	120								

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SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 110' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	445.9 ft
Project Type	Roadway	Dated Started	4/15/2004
		Completed	4/15/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	4 ft
Hole Number	B-3	Total Depth	80.3 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
445.9 ft	0		*Ground Line*					
445			Topsoil 0.6'					
			Gray Silt with Sand					
440	5			SS-1	5.0 / 6.5	1.0	2-1-1	SPT
			9.3'					
435	10		Gray Silt with Sand					
				SS-2	12.0 / 13.5	1.3	2-2-2	SPT
			14.3'					
430	15		Light Greenish Gray Sandy Silt	SS-3	15.0 / 16.5	1.5	11-15-20	SPT
			18.3'					
425	20		Light Greenish Gray Sandy Silt	SS-4	20.0 / 21.5	1.5	6-10-12	SPT
			23.3'					
420	25		Olive Gray Sandy Silt	SS-5	25.0 / 26.5	1.5	10-17-28	SPT
			28.3'					
415	30		Dark Gray Sandy Silt	SS-6	30.0 / 31.5	1.5	17-34-49	SPT
			33.3'					
410	35		Dark Gray Elastic Silt with Sand	SS-7	35.0 / 36.4	1.4	17-44-50/0.4	SPT
			38.2'					
405	40		Olive Gray Elastic Silt with Sand	SS-8	40.0 / 41.4	1.4	25-42-50/0.4	SPT
			43.2'					
400	45		Olive Gray Elastic Silt with Sand	SS-9	45.0 / 46.4	1.4	19-35-50/0.4	SPT
			48.2'					
395	50		Olive Gray Elastic Silt with Sand	SS-10	50.0 / 51.3	1.3	21-35-50/0.3	SPT
			53.2'					
390	55		Olive Gray Sandy Elastic Silt	SS-11	55.0 / 56.5	1.5	17-31-35	SPT
			58.3'					
	60		Olive Gray Sandy Elastic Silt					

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 110' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	445.9 ft
Project Type	Roadway	Dated Started	4/15/2004
		Completed	4/15/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	4 ft
Hole Number	B-3	Total Depth	80.3 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
385.9 ft	60		*Continued from previous page*						
385					SS-12	60.0 60.9	0.9	40-50/0.4-	SPT
			Olive Gray Sandy Elastic Silt	63.0'					
380	65				SS-13	65.0 65.9	0.9	42-50/0.4-	SPT
			Olive Gray Sandy Elastic Silt	68.0'					
375	70				SS-14	70.0 70.8	0.8	35-50/0.3-	SPT
			Olive Gray Sandy Elastic Silt	73.4'					
370	75				SS-15	75.0 75.8	0.8	41-50/0.3-	SPT
			Olive Gray Sandy Elastic Silt	77.9'					
365	80		Boring Terminated @ 80.3' (Elev. 365.6)	80.3'	SS-16	80.0 80.3	0.3	50/0.3--	SPT
360	85								
355	90								
350	95								
345	100								
340	105								
335	110								
330	115								
	120								

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SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 160' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	444 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/17/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-4	Total Depth	65.9 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
444.0 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Gray & Tan Silt with Sand					
440	5			SS-1	5.0–6.5	1.0	9-16-22	SPT
435	10		Gray Elastic Silt (9.3')					
				SS-2	12.0–13.5	1.5	9-23-37	SPT
430	15		Dark Gray Elastic Silt (14.3')	SS-3	15.0–15.9	0.9	23-50/0.4-	SPT
425	20		Dark Gray Elastic Silt (18.0')	SS-4	20.0–21.4	1.4	23-44-50/0.4	SPT
420	25		Olive Gray & White Elastic Silt with Sand (23.2')	SS-5	25.0–26.4	1.4	20-37-50/0.4	SPT
415	30		Olive Gray Elastic Silt with Sand (28.2')	SS-6	30.0–31.5	1.5	14-19-36	SPT
410	35		Dark Gray Elastic Silt with Sand (33.3')	SS-7	35.0–36.4	1.4	21-44-50/0.4	SPT
405	40		Dark Gray Elastic Silt with Sand (38.2')	SS-8	40.0–41.5	1.5	21-32-40	SPT
400	45		Dark Gray Elastic Silt with Sand (43.3')	SS-9	45.0–46.4	1.4	27-41-50/0.4	SPT
395	50		Dark Gray Elastic Silt with Sand (48.2')	SS-10	50.0–50.9	0.9	43-50/0.4-	SPT
390	55		Dark Gray Sandy Elastic Silt (53.0')	SS-11	55.0–55.4	0.4	50/0.4--	SPT
385	60		Olive Gray Sandy Elastic Silt (57.7')					

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	27+00 160' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	444 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/17/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-4	Total Depth	65.9 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
384.0 ft	60		*Continued from previous page*						
					SS-12	60.0 60.9	0.9	49-50/0.4-	SPT
				63.0'					
380	65		Olive Gray Sandy Elastic Silt						
				65.9'	SS-13	65.0 65.9	0.9	43-50/0.4-	SPT
			Boring Terminated @ 65.9' (Elev. 378.1)						
375	70								
370	75								
365	80								
360	85								
355	90								
350	95								
345	100								
340	105								
335	110								
330	115								
325	120								

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SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+00 30' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	465.3 ft
Project Type	Roadway	Dated Started	4/5/2004
		Completed	4/6/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	25 ft
Hole Number	B-5	Total Depth	65.9 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
465.3 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Light Brown Sandy Silt					
460	5			SS-1	5.0 / 6.5	1.0	4-4-4	SPT
			(9.3')					
455	10		Greenish Gray & Tan Sandy Silt					
				SS-2	12.0 / 13.5	1.5	4-5-5	SPT
			(14.3')					
450	15		Tan & White Sandy Silt	SS-3	15.0 / 16.5	1.0	6-8-11	SPT
			(18.3')					
445	20		Greenish Gray Sandy Silt	SS-4	20.0 / 21.5	1.0	4-8-12	SPT
			(23.3')					
440	25		Dark Greenish Gray Silty Sand	SS-5	25.0 / 26.5	1.5	5-8-12	SPT
			(28.3')					
435	30		Dark Greenish Gray & Brown Silty Sand	SS-6	30.0 / 31.5	1.5	7-8-15	SPT
			(33.3')					
430	35		Dark Greenish Gray Silty Sand	SS-7	35.0 / 36.5	1.5	7-8-13	SPT
			(38.3')					
425	40		Dark Greenish Gray Silty Sand	SS-8	40.0 / 41.5	1.5	7-10-15	SPT
			(43.3')					
420	45		Dark Gray Sandy Elastic Silt	SS-9	45.0 / 46.5	1.5	6-11-21	SPT
			(48.3')					
415	50		Dark Greenish Gray Silty Sand	SS-10	50.0 / 51.5	1.5	8-13-23	SPT
			(53.3')					
410	55		Dark Greenish Gray Sandy Elastic Silt	SS-11	55.0 / 56.5	1.5	14-18-27	SPT
			(58.3')					
	60		Olive Gray Sandy Elastic Silt					

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+00 30' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	465.3 ft
Project Type	Roadway	Dated Started	4/5/2004
		Completed	4/6/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	25 ft
Hole Number	B-5	Total Depth	65.9 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
405.3 ft	60		*Continued from previous page*						
					SS-12	60.0 61.5	1.5	18-27-40	SPT
				63.3'					
			Dark Gray Sandy Elastic Silt						
	65			65.9'	SS-13	65.0 65.9	0.9	39-50/0.4-	SPT
			Boring Terminated @ 65.9' (Elev. 399.4)						
405									
400									
395	70								
390	75								
385	80								
380	85								
375	90								
370	95								
365	100								
360	105								
355	110								
350	115								
	120								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+00 67' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	468.1 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-5A	Total Depth	18 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
468.1 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
465			Beige & Copper Silty, Clayey Sand		MC-1				MC
	5		Brown Clayey Sand	4.0'		4.0			
460					MC-2				MC
	10								
455			Beige Silty Sand	12.5'		12.5			
	15				MC-3				MC
450			Boring Terminated @ 18.0' (Elev. 450.1)	18.0'		18.0			
	20								
445									
	25								
440									
	30								
435									
	35								
430									
	40								
425									
	45								
420									
	50								
415									
	55								
410									
	60								

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+00 125' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	448.8 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/7/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	26 ft
Hole Number	B-6	Total Depth	66.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
448.8 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Light Gray, Light Tan & Black Sandy Silt					
445	5			SS-1	5.0 / 6.5	1.0	5-5-7	SPT
440	10		Brown & Copper Sandy Silt (9.3')					
435				SS-2	12.0 / 13.5	0.1	1-3-4	SPT
	15		Dark Brown & Dark Gray Sandy Silt (14.3')	SS-3	15.0 / 16.5	1.5	2-2-2	SPT
430	20		Copper Sandy Silt (18.3')	SS-4	20.0 / 21.5	1.5	2-2-3	SPT
425	25		Dark Gray, Gray & Orange Elastic Silt with Sand (23.3')	ST-2	25.0 / 26.3	0.7		ST
420	30		Olive Gray Sandy Elastic Silt (27.9')	SS-5	30.0 / 31.5	1.5	12-23-44	SPT
415	35		Olive Gray Sandy Elastic Silt (33.3')	SS-6	35.0 / 36.5	1.5	8-18-24	SPT
410	40		Olive Gray Sandy Elastic Silt (38.3')	SS-7	40.0 / 41.4	1.5	8-30-50/0.4	SPT
405	45		Olive Gray Sandy Elastic Silt (43.2')	SS-8	45.0 / 46.5	1.5	18-27-39	SPT
400	50		Olive Gray Sandy Elastic Silt (48.3')	SS-9	50.0 / 51.5	1.5	10-28-34	SPT
395	55		Olive Gray Sandy Elastic Silt (53.3')	SS-10	55.0 / 56.5	1.5	10-30-41	SPT
390	60		Olive Gray Sandy Elastic Silt (58.3')					

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+00 125' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	448.8 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/7/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	26 ft
Hole Number	B-6	Total Depth	66.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
388.8 ft	60		*Continued from previous page*						
					SS-11	60.0 61.5	1.5	14-29-44	SPT
385	65		Olive Gray Sandy Elastic Silt	63.3'					
					SS-12	65.0 66.5	1.5	10-14-26	SPT
			Boring Terminated @ 66.5' (Elev. 382.3)	66.5'					
380	70								
375	75								
370	80								
365	85								
360	90								
355	95								
350	100								
345	105								
340	110								
335	115								
330	120								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	34+50 90' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	426 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/18/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	15 ft
Hole Number	B-8	Total Depth	70.8 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
426.0 ft	0		*Ground Line*					
425			Topsoil 0.6'					
			Beige Silty Sand					
420	5			SS-1	5.0 / 6.5	1.0	2-1-3	SPT
			8.3'					
			Gray Silty Sand					
415	10			SS-2	10.0 / 11.5	1.5	2-2-1	SPT
			13.3'					
			Beige Sandy Silt					
410 ▽	15			SS-3	15.0 / 16.5	1.5	3-4-4	SPT
			18.3'					
			Olive Gray Sandy Silt					
405	20			SS-4	20.0 / 21.5	1.5	2-2-4	SPT
			23.3'					
			Gray & Dark Gray Silty Sand					
400	25			ST-1	25.0 / 27.0	0.2		ST
			27.6'					
			Dark Gray Sandy Silt					
395	30			SS-5	30.0 / 31.5	1.5	9-25-46	SPT
			33.3'					
			Dark Gray Sandy Silt					
390	35			SS-6	35.0 / 36.5	1.5	9-17-26	SPT
			38.3'					
			Olive Gray Sandy Silt					
385	40			SS-7	40.0 / 41.5	1.5	9-16-43	SPT
			43.3'					
			Olive Gray Sandy Silt					
380	45			SS-8	45.0 / 46.3	1.3	20-37-50/0.3	SPT
			48.2'					
			Olive Gray Sandy Silt					
375	50			SS-9	50.0 / 51.3	1.3	17-43-50/0.3	SPT
			53.2'					
			Olive Gray Sandy Silt					
370	55			SS-10	55.0 / 55.9	0.9	25-50/0.4-	SPT
			58.0'					
			Olive Gray Sandy Silt					
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	34+50 90' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	426 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/18/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	15 ft
Hole Number	B-8	Total Depth	70.8 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
366.0 ft	60		*Continued from previous page*						
365					SS-11	60.0 60.9	0.9	29-50/0.4-	SPT
			Olive Gray Sandy Silt	63.0'					
360	65				SS-12	65.0 65.9	0.9	37-50/0.4-	SPT
			Olive Gray Sandy Silt	68.0'					
355	70			70.8'	SS-13	70.0 70.8	0.8	39-50/0.3-	SPT
			Boring Terminated @ 70.8' (Elev. 355.2)						
350	75								
345	80								
340	85								
335	90								
330	95								
325	100								
320	105								
315	110								
310	115								
	120								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	34+50 146' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	425.9 ft
Project Type	Roadway	Dated Started	4/18/2004
		Completed	4/19/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	15 ft
Hole Number	B-9	Total Depth	71.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
425.9 ft	0		*Ground Line*					
425			Topsoil 0.6'					
			Beige Sandy Silt					
420	5			SS-1	5.0 / 6.5	1.0	2-1-1	SPT
			8.3' Gray, Tan & Copper Sandy Silt					
415	10			SS-2	10.0 / 11.5	1.5	5-7-12	SPT
			13.3' Beige Sandy Silt					
410	15			SS-3	15.0 / 16.5	1.5	3-9-6	SPT
405	20		20.8' Dark Gray Silty Sand	ST-1	20.0 / 22.0	0.0		ST
400	25			SS-4	25.0 / 26.5	1.5	3-4-6	SPT
			28.3' Olive Gray Sandy Elastic Silt					
395	30			SS-5	30.0 / 31.5	1.5	12-26-47	SPT
			33.3' Olive Gray Sandy Elastic Silt					
390	35			SS-6	35.0 / 36.5	1.5	12-48-24	SPT
			38.3' Dark Gray Sandy Elastic Silt					
385	40			SS-7	40.0 / 41.5	1.5	14-34-49	SPT
			43.3' Olive Gray Sandy Elastic Silt					
380	45			SS-8	45.0 / 46.5	1.5	17-43-44	SPT
			48.3' Olive Gray Sandy Elastic Silt					
375	50			SS-9	50.0 / 50.9	0.9	34-50/0.4-	SPT
			53.0' Olive Gray Sandy Elastic Silt					
370	55			SS-10	55.0 / 56.4	1.4	17-24-50/0.3	SPT
			58.2' Olive Gray Sandy Elastic Silt					
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	34+50 146' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	425.9 ft
Project Type	Roadway	Dated Started	4/18/2004
		Completed	4/19/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	15 ft
Hole Number	B-9	Total Depth	71.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
365.9 ft	60		*Continued from previous page*					
365				SS-11	60.0 61.5	1.5	14-27-41	SPT
			63.3' Olive Gray Sandy Elastic Silt					
360	65			SS-12	65.0 66.5	1.5	16-28-41	SPT
			68.3' Olive Gray Sandy Elastic Silt					
355	70			SS-13	70.0 71.5	1.5	22-36-44	SPT
			71.5' Boring Terminated @ 71.5' (Elev. 354.4)					
350	75							
345	80							
340	85							
335	90							
330	95							
325	100							
320	105							
315	110							
310	115							
	120							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	38+65 70' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	428.8 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	16 ft
Hole Number	B-11	Total Depth	26.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
428.8 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Copper Silty Sand					
425	5			SS-1	5.0 / 6.5	0.5	2-2-2	SPT
			Olive Gray Silty Sand (8.3')					
420	10			SS-2	10.0 / 11.5	0.0	2-1-1	SPT
			Light Gray & Copper Silty, Clayey Sand (13.3')					
415	15			SS-3	15.0 / 16.5	1.5	2-3-2	SPT
			Gray & Tan Silty, Clayey Sand (18.3')					
410	20			SS-4	20.0 / 21.5	1.5	3-6-6	SPT
			Gray & Tan Silty, Clayey Sand (23.3')					
405	25			SS-5	25.0 / 26.5	1.5	4-7-8	SPT
			Boring Terminated @ 26.5' (Elev. 402.3) (26.5')					
400	30							
395	35							
390	40							
385	45							
380	50							
375	55							
370	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	41+00 52' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	430.6 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	4 ft
Hole Number	B-12	Total Depth	8 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Lithology Depth	Lithology Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
430.6 ft	0		*Ground Line*					
430			Asphalt & Road Base (1.4')		1.4			
			Dark Brown & Tan Silty, Clayey Sand (8.0')	MC-1				Bag & MC
425	5							
			Boring Terminated @ 8.0' (Elev. 422.6)		8.0			
420	10							
415	15							
410	20							
405	25							
400	30							
395	35							
390	40							
385	45							
380	50							
375	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	45+00 46' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	433 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-13	Total Depth	3 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
433.0 ft	0		*Ground Line*					
			Asphalt & Road Base 1.1'		1.1			
430			Yellowish Orange Silty Sand 3.0'	MC-1	3.0			MC
			Boring Terminated @ 3.0' (Elev. 430.0)					
	5							
425								
	10							
420								
	15							
415								
	20							
410								
	25							
405								
	30							
400								
	35							
395								
	40							
390								
	45							
385								
	50							
380								
	55							
375								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	49+00 46' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	435.2 ft
Project Type	Roadway	Dated Started	4/5/2004
		Completed	4/5/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-14	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
435.2 ft	0		*Ground Line*					
			Gravel 0.5'		0.5			
			Brown Silty Sand	MC-1				Bag & MC
430	5		5.0'		5.0			
			Boring Terminated @ 5.0' (Elev. 430.2)					
425	10							
420	15							
415	20							
410	25							
405	30							
400	35							
395	40							
390	45							
385	50							
380	55							
	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**53+00 61' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**434.2 ft**
Project Type	**Roadway**	Dated Started	**4/19/2004**
		Completed	**4/19/2004**
Driller	**Murray**	Logged by	**Grady**
		Depth to Water: Immediate	**4 ft**
Hole Number	**B-15**	Total Depth	**12 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
434.2 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Brown Clayey Sand	MC-1				MC
430	5		6.0'		6.0			
			Beige Silty, Clayey Sand	MC-2				MC
425	10		12.0'		12.0			
			Boring Terminated @ 12.0' (Elev. 422.2)					
420	15							
415	20							
410	25							
405	30							
400	35							
395	40							
390	45							
385	50							
380	55							
375	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	60+00 46' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	480.4 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-17	Total Depth	6 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
480.4 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Dark Tan Poorly Graded Sand with Silt	MC-1				MC
			6.0'		6.0			
			Boring Terminated @ 6.0' (Elev. 474.4)					

480 475 470 465 460 455 450 445 440 435 430 425

0 5 10 15 20 25 30 35 40 45 50 55 60

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	64+00 42' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	506.8 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/17/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-18	Total Depth	16 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
506.8 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
505			Brown Sandy Lean Clay					
	5			MC-1				MC
500								
			9.0'		9.0			
	10		Orange Poorly Graded Sand with Silt					
495				MC-2				MC
	15		16.0'		16.0			
490			Boring Terminated @ 16.0' (Elev. 490.8)					
	20							
485								
	25							
480								
	30							
475								
	35							
470								
	40							
465								
	45							
460								
	50							
455								
	55							
450								
	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	68+00 45' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	501.4 ft
Project Type	Roadway	Dated Started	4/16/2004
		Completed	4/16/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-19	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
501.4 ft	0		*Ground Line*					
500			Topsoil 0.6'		0.6			
			Light Brown Silty, Clayey Sand	MC-1				MC
	5		5.0'		5.0			
495			Boring Terminated @ 5.0' (Elev. 496.4)					
	10							
490								
	15							
485								
	20							
480								
	25							
475								
	30							
470								
	35							
465								
	40							
460								
	45							
455								
	50							
450								
	55							
445								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	71+00 88' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	484.9 ft
Project Type	Roadway	Dated Started	4/20/2004
		Completed	4/20/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	6 ft
Hole Number	B-20	Total Depth	17.6 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
484.9 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
			Tan Elastic Silt with Sand		MC-1				Bag & MC
480	5			6.0'		6.0			
			Gray Elastic Silt with Sand						
475	10				MC-2				MC
470	15			17.6'		17.6			
			Boring Terminated @ 17.6' (Elev. 467.3)						
465	20								
460	25								
455	30								
450	35								
445	40								
440	45								
435	50								
430	55								
425	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	79+00 42' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	505.7 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-22	Total Depth	12 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Lithology Depth	Lithology Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
505.7 ft	0		*Ground Line*					
505			Topsoil 0.6'		0.6			
			Dark Brown Lean Clay with Sand					
500	5			MC-1				MC
495	10		12.0'					
			Boring Terminated @ 12.0 (Elev. 493.7)		12.0			
490	15							
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	83+00 23' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	494.9 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-23	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
494.9 ft	0		*Ground Line*					
			Gravel 0.5'		0.5			
			Brown Silty, Clayey Sand	MC-1				Bag & MC
490	5		5.0'		5.0			
			Boring Terminated @ 5.0' (Elev. 489.9)					
485	10							
480	15							
475	20							
470	25							
465	30							
460	35							
455	40							
450	45							
445	50							
440	55							
435	60							

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	85+00 89' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	478.9 ft
Project Type	Roadway	Dated Started	4/8/2004
		Completed	4/8/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	7 ft
Hole Number	B-24	Total Depth	16.7 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
478.9 ft	0		*Ground Line*						
			Topsoil	0.6'					
			Dark Brown & Black Lean Clay with Sand						
475	5				SS-1	5.0 / 6.5	1.0	2-3-4	SPT
▽ 470				8.3'					
	10		Gray & Tan Silty Sand		ST-1	10.0 / 12.0	0.5		ST
465				13.5'					
	15		Greenish Gray & Yellowish Orange Silty Sand		SS-2	15.0 / 16.1	1.1	5-11-50/0.1	SPT
				16.1'					
			Boring Terminated @ 16.7' (Elev. 462.2)						
460	20								
455	25								
450	30								
445	35								
440	40								
435	45								
430	50								
425	55								
420	60								

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**88+00 42' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**503.8 ft**
Project Type	**Roadway**	Dated Started	**4/6/2004**
		Completed	**4/6/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-25**	Total Depth	**13 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
503.8 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Dark Tan Lean Clay with Sand					
500	5							
				MC-1				MC
495	10							
			13.0'		13.0			
490	15		Boring Terminated @ 13.0' (Elev. 490.8)					
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
445	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**92+00 100' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**501.2 ft**
Project Type	**Roadway**	Dated Started	**4/8/2004**
		Completed	**4/8/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-26**	Total Depth	**17 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
501.2 ft	0		*Ground Line*					
500			Topsoil 0.6'		0.6			
			Copper Lean Clay					
495	5			MC-1				Bag & MC
490	10		12.0'		12.0			
			Dark Tan Clayey Sand					
485	15			MC-2				Bag & MC
			17.0'		17.0			
			Boring Terminated @ 17.0' (Elev. 484.2)					
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	95+00 60' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	486.5 ft
Project Type	Roadway	Dated Started	5/4/2004
		Completed	5/5/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	23 ft
Hole Number	B-27	Total Depth	40.1 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
486.5 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Reddish Brown Silty, Clayey Sand	SS-1	3.0 / 4.5	1.5	5-6-7	SPT
			Light Brown Silty, Clayey Sand (6.3')	SS-2	8.0 / 9.5	1.5	5-10-8	SPT
			Violet & Yellow Silty Sand (11.3')	SS-3	13.0 / 14.5	1.5	3-7-11	SPT
			Light Gray Silty Sand (16.3')	SS-4	18.0 / 19.5	1.5	5-10-15	SPT
			Light Gray Silty Sand (21.3')	SS-5	23.0 / 24.5	1.5	1-5-9	SPT
			Light Gray Silty Sand (26.3')	SS-6	28.0 / 29.5	1.5	2-3-21	SPT
			Light Tan Poorly Graded Sand with Silt (31.3')	SS-7	33.0 / 34.5	1.5	20-28-36	SPT
			Light Tan Poorly Graded Sand with Silt (36.3')	SS-8	38.0 / 39.5	0.8	47-50/0.3-	SPT
			Boring Terminated @ 40.1' (Elev. 446.4) (40.1')					

Elevations: 485, 480, 475, 470, 465, 460, 455, 450, 445, 440, 435, 430

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**95+00 107' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**484.2 ft**
Project Type	**Roadway**	Dated Started	**4/29/2004**
		Completed	**4/30/2004**
Driller	**Woodard**	Logged by	**Murray**
		Depth to Water: Immediate	**20 ft**
Hole Number	**B-28**	Total Depth	**37.2 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
484.2 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Dark Tan Silty, Clayey Sand					
480	5			SS-1	5.0 / 6.5	1.5	4-5-6	SPT
			(8.3')					
475	10		Tan Silty, Clayey Sand	SS-2	10.0 / 11.5	1.5	4-8-8	SPT
			(13.3')					
470	15		Tan & Beige Silty Sand	SS-3	15.0 / 16.5	1.5	4-8-13	SPT
			(18.3')					
465	20		Light Beige Silty Sand	SS-4	20.0 / 21.5	1.5	2-2-3	SPT
			(23.3')					
460	25		White Silty Sand	SS-5	25.0 / 26.5	1.5	2-1-2	SPT
			(28.3')					
455	30		Light Tan Poorly Graded Sand with Silt	SS-6	30.0 / 31.5	1.5	5-26-45	SPT
			(33.3')					
450	35		Brown & Dark Yellowish Orange Poorly Graded Sand with Silt	SS-7	35.0 / 36.5	1.5	13-28-45	SPT
			(37.2')					
445	40		Boring Terminated @ 37.2' (Elev. 447.0)					
440	45							
435	50							
430	55							
425	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	106+00 51' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	490.3 ft
Project Type	Roadway	Dated Started	4/16/2004
		Completed	4/16/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-35	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
490.3 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Tan Silty Sand	MC-1				MC
485	5		5.0'		5.0			
			Boring Terminated @ 5.0' (Elev. 485.3)					
480	10							
475	15							
470	20							
465	25							
460	30							
455	35							
450	40							
445	45							
440	50							
435	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	109+00 48' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	501 ft
Project Type	Roadway	Dated Started	4/15/2004
		Completed	4/15/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-36	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
501.0 ft	0		*Ground Line*					
500			Topsoil 0.6'		0.6			
			Brown Lean Clay	MC-1				MC
495	5		8.0'		8.0			
			Orange Silty Sand	MC-2				MC
490	10							
485	15		15.0' Boring Terminated @ 15.0' (Elev. 486.0)		15.0			
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**111+00 48' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**518.2 ft**
Project Type	**Roadway**	Dated Started	**4/8/2004**
		Completed	**4/8/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-37**	Total Depth	**25 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
518.2 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Dark Brown Lean Clay					
515	5							
				MC-1				Bag & MC
510	10							
505			13.0'		13.0			
	15		Brown Silty Sand					
500								
	20			MC-2				Bag & MC
495								
	25		25.0'		25.0			
			Boring Terminated @ 25.0' (Elev. 493.2)					
490	30							
485	35							
480	40							
475	45							
470	50							
465	55							
460	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**114+00 96' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**527.2 ft**
Project Type	**Roadway**	Dated Started	**4/18/2004**
		Completed	**4/18/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-38**	Total Depth	**32 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
527.2 ft	0		*Ground Line*					
			Topsoil (0.6')					
525			Dark Tan, Tan & Yellow Silty Sand with Gravel					
	5			SS-1	5.0 / 6.5	1.5	6-13-16	SPT
520			(8.3')					
	10		Dark Tan Silty Sand	SS-2	10.0 / 11.5	1.5	9-10-16	SPT
515			(13.3')					
	15		Tan Silty Sand	SS-3	15.0 / 16.5	1.5	11-11-15	SPT
510			(18.3')					
	20		Tan & Yellow Poorly Graded Sand with Silt	SS-4	20.0 / 21.5	1.5	18-25-30	SPT
505			(23.3')					
	25		Tan & Yellow Poorly Graded Sand with Silt	SS-5	25.0 / 26.5	1.5	14-23-36	SPT
500			(28.3')					
	30		Yellow & Tan Poorly Graded Sand with Silt	SS-6	30.0 / 31.5	1.5	12-18-20	SPT
495			(32.0')					
			Boring Terminated @ 32.0' (Elev. 495.2)					
490	35							
485	40							
480	45							
475	50							
470	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**114+00 48' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**519 ft**
Project Type	**Roadway**	Dated Started	**4/17/2004**
		Completed	**4/17/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-39**	Total Depth	**19 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
519.0 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Orange Lean Clay					
515	5			MC-1				MC
			8.0'		8.0			
510	10		Dark Tan Silty Sand					
				MC-2				MC
505	15		14.5'		14.5			
			Light Brown & Beige Silty Sand					
				MC-3				Bag & MC
500	20		19.0' Boring Terminated @ 19.0' (Elev. 500.0)		19.0			
495	25							
490	30							
485	35							
480	40							
475	45							
470	50							
465	55							
460	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**115+88 67' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**516.8 ft**
Project Type	**Roadway**	Dated Started	**4/15/2004**
		Completed	**4/15/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-40**	Total Depth	**15 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
516.8 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
515			Light Brown Lean Clay	MC-1				MC
	5							
510			Dark Tan Silty Sand 6.5'		6.5			
	10			MC-2				MC
505								
	15		Boring Terminated @ 15.0 (Elev. 501.8) 15.0'		15.0			
500								
	20							
495								
	25							
490								
	30							
485								
	35							
480								
	40							
475								
	45							
470								
	50							
465								
	55							
460								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	118+60 105' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	477.7 ft
Project Type	Roadway	Dated Started	5/5/2004
		Completed	5/5/2004
Driller	Woodard	Logged by	Murray
		Depth to Water: Immediate	
Hole Number	B-41	Total Depth	44.2 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
477.7 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
475			Dark Tan Silty Sand					
	5							
470								
	10							
465								
	15							
460								
	20							
455				MC-1				MC
	25							
450								
	30							
445								
	35							
440								
	40							
435								
	45		44.2' Boring Terminated @ 44.2' (Elev. 433.5)		44.2			
430								
	50							
425								
	55							
420								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
Longitude			
County	**Henry**	Location	**119+55 88' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**450.9 ft**
Project Type	**Roadway**	Dated Started	**4/29/2004**
Completed	**4/29/2004**		
Driller	**Woodard**	Logged by	**Murray**
Depth to Water: Immediate	**10 ft**		
Hole Number	**B-42**	Total Depth	**26.8 ft**
Depth to Water		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
450.9 ft	0		*Ground Line*					
450			Topsoil 0.6'					
			Gray Silty Sand					
445	5			SS-1	5.0 / 6.5	1.5	2-5-9	SPT
			8.3' Yellowish Tan Silty Sand					
440	10			SS-2	10.0 / 11.5	1.5	4-9-12	SPT
			13.3' Dark Brown & Tan Silty Sand					
435	15			SS-3	15.0 / 16.5	1.5	10-30-46	SPT
			18.3' Brown & Light Tan Poorly Graded Sand with Clay					
430	20			SS-4	20.0 / 21.5	1.5	9-16-22	SPT
			23.3' Yellowish Orange Poorly Graded Sand with Clay					
425	25			SS-5	25.0 / 26.1	1.1	5-19-50/0.1	SPT
			26.8' Boring Terminated @ 26.8' (Elev. 424.1)					
420	30							
415	35							
410	40							
405	45							
400	50							
395	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**119+45 131' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**459.2 ft**
Project Type	**Roadway**	Dated Started	**4/29/2004**
		Completed	**4/29/2004**
Driller	**Woodard**	Logged by	**Murray**
		Depth to Water: Immediate	**5 ft**
Hole Number	**B-43**	Total Depth	**20.5 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
459.2 ft	0		*Ground Line*						
			Topsoil	0.6'					
			Dark Gray Silty Sand						
455	5				SS-1	5.0 / 6.5	1.5	4-11-13	SPT
				8.3'					
450	10		Black Silty, Clayey Sand		SS-2	10.0 / 11.5	1.5	1-1-2	SPT
				13.3'					
445	15		Yellowish Orange Silty Sand		SS-3	15.0 / 16.4	1.4	19-40-50/0.4	SPT
440	20			20.4'	SS-4	20.0 / 20.4	0.4	50/0.4--	SPT
			Boring Terminated @ 20.4' (Elev. 438.8)						
435	25								
430	30								
425	35								
420	40								
415	45								
410	50								
405	55								
400	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	122+00 38' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	479.1 ft
Project Type	Roadway	Dated Started	4/18/2004
		Completed	4/18/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-44	Total Depth	18 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
479.1 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Yellowish Brown Silty Sand					
475	5							
470	10			MC-1				Bag & MC
465	15							
			18.0'		18.0			
460	20		Boring Terminated @ 18.0' (Elev. 461.1)					
455	25							
450	30							
445	35							
440	40							
435	45							
430	50							
425	55							
420	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	125+00 49' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	474.7 ft
Project Type	Roadway	Dated Started	4/14/2004
		Completed	4/14/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-45	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
474.7 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Tan & Brown Well-Graded Sand with Silt	MC-1				Bag & MC
470	5		5.0'		5.0			
			Boring Terminated @ 5.0' (Elev. 469.7)					
465	10							
460	15							
455	20							
450	25							
445	30							
440	35							
435	40							
430	45							
425	50							
420	55							
415	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	128+00 54' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	478.1 ft
Project Type	Roadway	Dated Started	4/19/2004
		Completed	4/19/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-46	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
478.1 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
475			Copper & Beige Silty Sand		MC-1				MC
	5			5.0'		5.0			
			Boring Terminated @ 5.0' (Elev. 473.1)						
470	10								
465	15								
460	20								
455	25								
450	30								
445	35								
440	40								
435	45								
430	50								
425	55								
420	60								

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	134+00 48' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	499.4 ft
Project Type	Roadway	Dated Started	4/18/2004
		Completed	4/18/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-48	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
499.4 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Reddish Brown Silty Sand					
495	5			MC-1				Bag & MC
			8.0'		8.0			
490	10		Gray & Light Tan Poorly Graded Sand with Silt					
				MC-2				Bag & MC
485	15		15.0'		15.0			
			Boring Terminated @ 15.0' (Elev. 484.4)					
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
440	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	137+00 77' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	491.6 ft
Project Type	Roadway	Dated Started	4/18/2004
		Completed	4/18/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-49	Total Depth	18 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
491.6 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
490			Light Brown Lean Clay with Sand	MC-1				MC
	5							
485			Tan & Brown Silty Sand (6.0')		6.0			
	10							
480				MC-2				MC
	15							
475								
			Boring Terminated @ 18.0' (Elev. 473.6) (18.0')		18.0			
	20							
470								
	25							
465								
	30							
460								
	35							
455								
	40							
450								
	45							
445								
	50							
440								
	55							
435								
	60							

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SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	137+05 87' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	463.9 ft
Project Type	Roadway	Dated Started	4/28/2004
		Completed	4/29/2004
Driller	Woodard	Logged by	Murray
		Depth to Water: Immediate	10 ft
Hole Number	B-50	Total Depth	76.3 ft
		Depth to Water	15 ft
		Date Measured	4/30/2004

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
463.9 ft	0		*Ground Line*					
			Topsoil (0.6')					
			Light Olive Gray Silt					
460	5			SS-1	5.0 / 6.5	1.5	3-4-4	SPT
			(8.3')					
455	10		Dark Yellowish Orange & Reddish Well-Graded Sand with Silt	SS-2	10.0 / 11.5	1.5	9-16-16	SPT
			(13.3')					
450	15		Beige Well-Graded Sand with Silt	SS-3	15.0 / 16.5	1.5	12-25-32	SPT
			(18.3')					
445	20		Brown, White & Yellowish Orange Sandy Silty Clay	SS-4	20.0 / 21.5	1.5	21-14-24	SPT
			(23.3')					
440	25		Brown, Light Gray & Yellowish Orange Sandy Silty Clay	SS-5	25.0 / 26.4	1.4	21-35-50/0.4	SPT
			(28.2')					
435	30		Dark Yellowish Orange Sandy Silty Clay	SS-6	30.0 / 31.5	1.5	12-25-30	SPT
			(33.3')					
430	35		Dark Gray Sandy Elastic Silt	SS-7	35.0 / 36.5	1.5	4-5-6	SPT
			(38.3')					
425	40		Black Sandy Elastic Silt	SS-8	40.0 / 41.5	1.5	6-10-19	SPT
			(43.3')					
420	45		Black Silty Sand	SS-9	45.0 / 46.3	1.3	16-42-50/0.3	SPT
			(48.2')					
415	50		Black Silty Sand	SS-10	50.0 / 50.9	0.9	26-50/0.4-	SPT
			(53.0')					
410	55		Black Silty Sand	SS-11	55.0 / 56.3	1.3	19-44-50/0.3	SPT
			(58.2')					
405	60		Dark Olive Gray Silty Sand					

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	137+05 87' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	463.9 ft
Project Type	Roadway	Dated Started	4/28/2004
		Completed	4/29/2004
Driller	Woodard	Logged by	Murray
		Depth to Water: Immediate	10 ft
Hole Number	B-50	Total Depth	76.3 ft
		Depth to Water	15 ft
		Date Measured	4/30/2004

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
403.9 ft	60		*Continued from previous page*						
					SS-12	60.0 61.0	1.0	25-50-	SPT
				63.0'					
400	65		Black Silt						
					SS-13	65.0 66.5	1.5	7-11-14	SPT
				68.3'					
395	70		Olive Gray Silt						
					SS-14	70.0 71.5	1.5	5-11-15	SPT
				73.3'					
390	75		Black Silty Sand						
				76.3'	SS-15	75.0 76.3	1.3	16-39-50/0.3	SPT
			Boring Terminated @ 76.3' (Elev. 387.6)						
385	80								
380	85								
375	90								
370	95								
365	100								
360	105								
355	110								
350	115								
345	120								

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	137+05 120' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	477.3 ft
Project Type	Roadway	Dated Started	4/27/2004
		Completed	4/28/2004
Driller	Woodard	Logged by	Murray
		Depth to Water: Immediate	15 ft
Hole Number	B-51	Total Depth	76.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
477.3 ft	0		*Ground Line*					
			Topsoil (0.6')					
475			Dark Gray & Brown Silt					
	5			SS-1	5.0 / 6.5	1.5	1-1-5	SPT
470			(8.3')					
	10		Black Sandy Lean Clay	SS-2	10.0 / 11.5	1.5	2-3-1	SPT
465			(13.3')					
▽	15		Dark Yellowish Orange Well-Graded Sand with Silt	SS-3	15.0 / 16.5	1.5	16-25-25	SPT
460			(18.3')					
	20		Light Brown Well-Graded Sand with Silt	SS-4	20.0 / 21.5	1.5	25-35-36	SPT
455			(23.3')					
	25		Brown & Light Gray Well-Graded Sand with Silt	SS-5	25.0 / 26.3	1.3	12-40-50/0.3	SPT
450			(28.3')					
	30		Light Gray & Brown Well-Graded Sand with Silt	SS-6	30.0 / 30.3	0.3	50/0.3--	SPT
445			(32.7')					
	35		Black Sandy Elastic Silt	SS-7	35.0 / 36.5	1.5	2-4-4	SPT
440			(38.3')					
	40		Black & Light Copper Sandy Elastic Silt	SS-8	40.0 / 41.5	1.5	8-14-22	SPT
435			(43.3')					
	45		Black & Dark Olive Gray Sandy Elastic Silt	SS-9	45.0 / 46.5	1.5	12-28-46	SPT
430			(48.3')					
	50		Black Sandy Elastic Silt	SS-10	50.0 / 51.5	1.5	21-32-42	SPT
425			(53.3')					
	55		Black & Dark Olive Gray Silty Sand	SS-11	55.0 / 56.5	1.5	13-21-44	SPT
420			(58.3')					
	60		Black & Dark Gray Silty Sand					

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	137+05 120' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	477.3 ft
Project Type	Roadway	Dated Started	4/27/2004
		Completed	4/28/2004
Driller	Woodard	Logged by	Murray
		Depth to Water: Immediate	15 ft
Hole Number	B-51	Total Depth	76.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
417.3 ft	60		*Continued from previous page*						
					SS-12	60.0 61.4	1.4	25-34-50/0.4	SPT
415				63.2'					
	65		Black Silty Sand						
					SS-13	65.0 66.5	1.5	13-18-23	SPT
410				68.3'					
	70		Black & Dark Olive Gray Silty Sand						
					SS-14	70.0 71.3	1.3	25-35-50/0.2	SPT
405				73.2'					
	75		Black Silty Sand						
					SS-15	75.0 76.5	1.5	12-25-30	SPT
400				76.5'					
			Boring Terminated @ 76.5' (Elev. 400.8)						
	80								
395									
	85								
390									
	90								
385									
	95								
380									
	100								
375									
	105								
370									
	110								
365									
	115								
360									
	120								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**140+00 88' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**495.5 ft**
Project Type	**Roadway**	Dated Started	**4/15/2004**
		Completed	**4/15/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-52**	Total Depth	**21 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
495.5 ft	0		*Ground Line*					
495			Topsoil 0.6'		0.6			
			Dark Beige Silty Sand	MC-1				Bag & MC
490	5		6.0'		6.0			
			Yellowish Orange Silty Sand					
485	10							
				MC-2				Bag & MC
480	15							
475	20		21.0'		21.0			
			Boring Terminated @ 21.0' (Elev. 474.5)					
470	25							
465	30							
460	35							
455	40							
450	45							
445	50							
440	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	142+77 51' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	522.8 ft
Project Type	Roadway	Dated Started	4/14/2004
		Completed	4/15/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-53	Total Depth	18 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
522.8 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
520	5		Dark Beige Lean Clay with Sand	MC-1				Bag & MC
			(6.5')		6.5			
515	10		Brown & Beige Sandy Lean Clay	MC-2				Bag & MC
			(12.0')		12.0			
510	15		Grayish Brown Sandy Silty Clay	MC-3				Bag & MC
			(18.0')		18.0			
505	20		Boring Terminated @ 18.0' (Elev. 504.8)					
500	25							
495	30							
490	35							
485	40							
480	45							
475	50							
470	55							
465	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**146+00 48' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**525.6 ft**
Project Type	**Roadway**	Dated Started	**4/16/2004**
		Completed	**4/16/2004**
Driller	**Kennedy**	Logged by	**Grady**
		Depth to Water: Immediate	
Hole Number	**B-54**	Total Depth	**13 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Lithology Depth	Lithology Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
525.6 ft	0		*Ground Line*					
525			Topsoil 0.6'		0.6			
			Brown & Beige Sandy Lean Clay	MC-1				MC
520	5		6.0'		6.0			
			Dark Orange Silty Sand	MC-2				MC
515	10		13.0'		13.0			
			Boring Terminated @ 13.0' (Elev. 512.6)					
510	15							
505	20							
500	25							
495	30							
490	35							
485	40							
480	45							
475	50							
470	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	149+00 48' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	534.5 ft
Project Type	Roadway	Dated Started	4/15/2004
		Completed	4/15/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-55	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
534.5 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
			Light Brown Clayey Sand						
530	5				MC-1				Bag & MC
525	10			9.5'		9.5			
			Dark Tan Silty Sand						
					MC-2				Bag & MC
520	15			15.0'		15.0			
			Boring Terminated @ 15.0' (Elev. 519.5)						
515	20								
510	25								
505	30								
500	35								
495	40								
490	45								
485	50								
480	55								
475	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**153+00 58' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**533 ft**
Project Type	**Roadway**	Dated Started	**4/16/2004**
		Completed	**4/16/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-56**	Total Depth	**26 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
533.0 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
530			Dark Beige Lean Clay					
	5			MC-1				Bag & MC
525								
	10							
520			Reddish Brown Clayey Sand (12.0')		12.0			
	15							
515				MC-2				Bag & MC
	20							
510								
	25							
505			Boring Terminated @ 26.0' (Elev. 507.0) (26.0')		26.0			
	30							
500								
	35							
495								
	40							
490								
	45							
485								
	50							
480								
	55							
475								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	155+00 50' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	521.6 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/17/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-57	Total Depth	24 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
521.6 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
520			Dark Orange Lean Clay					
	5							
515				MC-1				MC
	10							
510								
			(13.5')		13.5			
	15		Dark Orange Silty Sand					
505								
	20			MC-2				MC
500								
			(24.0')		24.0			
	25		Boring Terminated @ 24.0' (Elev. 497.6)					
495								
	30							
490								
	35							
485								
	40							
480								
	45							
475								
	50							
470								
	55							
465								
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	158+00 42' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	504.8 ft
Project Type	Roadway	Dated Started	4/14/2004
		Completed	4/14/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-58	Total Depth	12 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
504.8 ft	0		*Ground Line*					
			Topsoil 0.6'		0.6			
			Pinkish Yellow Silty, Clayey Sand					
500	5			MC-1				Bag & MC
			8.0'		8.0			
			Yellowish Beige Silty Sand					
495	10			MC-2				Bag & MC
			12.0'		12.0			
			Boring Terminated @ 12.0' (Elev. 492.8)					
490	15							
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
445	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
Longitude			
County	**Henry**	Location	**160+00 55' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**472.8 ft**
Project Type	**Roadway**	Dated Started	**5/5/2004**
Completed	**5/6/2004**		
Driller	**Woodard**	Logged by	**Murray**
Depth to Water: Immediate	**15 ft**		
Hole Number	**B-59**	Total Depth	**31.1 ft**
Depth to Water		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
472.8 ft	0		*Ground Line*					
			Topsoil (0.6')					
470			Gray Silty Sand					
	5			SS-1	5.0 / 6.5	1.5	1-1-10	SPT
465			(8.3')					
	10		Blue-Gray Silty Sand	SS-2	10.0 / 11.5	1.5	1-3-4	SPT
460			(13.3')					
▽	15		Beige-Gray Silty Sand	SS-3	15.0 / 16.5	1.5	4-3-3	SPT
455			(18.3')					
	20		Yellowish Beige & Tan Poorly Graded Sand with Silt	SS-4	20.0 / 21.5	1.5	5-16-24	SPT
450			(23.3')					
	25		Light Brown Poorly Graded Sand with Silt	SS-5	25.0 / 26.5	1.1	5-43-44	SPT
445			(28.3')					
	30		Beige Poorly Graded Sand with Silt	SS-6	30.0 / 30.7	0.7	9-50/0.2-	SPT
			(31.1') Boring Terminated @ 31.1' (Elev. 441.7)					
440								
	35							
435								
	40							
430								
	45							
425								
	50							
420								
	55							
415								
	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+50 32' Rt. - Sproul Heights Rd.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	430.4 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	5 ft
Hole Number	B-61	Total Depth	10 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
430.4 ft	0		*Ground Line*					
			Road Base 1.0'		1.0			
			Dark Brown Silty, Clayey Sand	MC-1				MC
425	5		5.0'		5.0			
			Dark Brown Lean Clay	MC-2				MC
420	10		10.0'		10.0			
			Boring Terminated @ 10.0' (Elev. 420.4)					
415	15							
410	20							
405	25							
400	30							
395	35							
390	40							
385	45							
380	50							
375	55							
	60							

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+00 18' Lt. - Sproul Heights Rd. Tie-In
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	428.1 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	6.3 ft
Hole Number	B-62	Total Depth	12 ft
		Depth to Water	
		Date Measured	

Lithology				Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
Elev.	Depth	Symbol	Description						
428.1 ft	0		*Ground Line*						
			Road Base	1.5'		1.5			
425			Copper Silty, Clayey Sand						
	5								
▽ 420					MC-1				MC
	10								
				12.0'		12.0			
415			Boring Terminated @ 12.0' (Elev. 416.1)						
	15								
410									
	20								
405									
	25								
400									
	30								
395									
	35								
390									
	40								
385									
	45								
380									
	50								
375									
	55								
370									
	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+00 24' Rt. - Terrace Woods Entrance
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	436.4 ft
Project Type	Roadway	Dated Started	4/5/2004
		Completed	4/5/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	3 ft
Hole Number	B-63	Total Depth	5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
436.4 ft	0		*Ground Line*						
435			Topsoil	0.5'		0.5			
			Dark Brown Silty, Clayey Sand	3.0'	MC-1	3.0			MC
	5		Brown Silty, Clayey Sand	5.0'	MC-2	5.0			MC
430			Boring Terminated @ 5.0' (Elev. 431.4)						
	10								
425									
	15								
420									
	20								
415									
	25								
410									
	30								
405									
	35								
400									
	40								
395									
	45								
390									
	50								
385									
	55								
380									
	60								

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TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	31+00 26' Rt. - Guthrie Road
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	469.9 ft
Project Type	Roadway	Dated Started	4/6/2004
		Completed	4/6/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-64	Total Depth	11 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
469.9 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
			Copper Clayey Sand						
465	5				MC-1				MC
460	10								
				11.0'		11.0			
			Boring Terminated @ 11.0' (Elev. 458.9)						
455	15								
450	20								
445	25								
440	30								
435	35								
430	40								
425	45								
420	50								
415	55								
410	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**31+00 21' Lt. - Mimosa Drive**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**500.8 ft**
Project Type	**Roadway**	Dated Started	**4/6/2004**
		Completed	**4/6/2004**
Driller	**Woodard**	Logged by	**Woodard**
		Depth to Water: Immediate	
Hole Number	**B-65**	Total Depth	**16 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
500.8 ft	0		*Ground Line*					
500			Topsoil 0.6'		0.6			
			Reddish Brown Clayey Sand					
495	5			MC-1				Bag & MC
490	10		12.0'		12.0			
			Light Brown & Beige Sandy Lean Clay	MC-2				Bag & MC
485	15		16.0'		16.0			
			Boring Terminated @ 16.0' (Elev. 484.8)					
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	31+00 10' Rt. - Cook Street
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	501.1 ft
Project Type	Roadway	Dated Started	4/17/2004
		Completed	4/17/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-66	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Lithology Depth	Lithology Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
501.1 ft	0		*Ground Line*					
500			Topsoil 1.0'		1.0			
			Brown Lean Clay with Sand					
495	5			MC-1				Bag & MC
490	10		9.5' Dark Orange Clayey Sand		9.5			
				MC-2				Bag & MC
485	15		15.0' Boring Terminated @ 15.0' (Elev. 486.1)		15.0			
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+00 21' Rt. - Cedar Street
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	508.1 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-67	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
508.1 ft	0		*Ground Line*						
			Topsoil	0.8'		0.8			
505	5		Dark Brown Silty, Clayey Sand		MC-1				MC
				7.0'		7.0			
500	10		Reddish Brown Clayey Sand		MC-2				MC
495	15			15.0'		15.0			
			Boring Terminated @ 15.0' (Elev. 493.1)						
490	20								
485	25								
480	30								
475	35								
470	40								
465	45								
460	50								
455	55								
450	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+00 22' Lt. - Elm Street
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	505.2 ft
Project Type	Roadway	Dated Started	4/8/2004
		Completed	4/8/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-68	Total Depth	14 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
505.2 ft	0		*Ground Line*					
			Topsoil 0.8'		0.8			
			Dark Brown Lean Clay with Sand					
500	5							
				MC-1				MC
495	10							
			14.0'		14.0			
490	15		Boring Terminated @ 14.0' (Elev. 491.2)					
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+50 25' Lt. - Allison Street
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	503.3 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-69	Total Depth	14 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
503.3 ft	0		*Ground Line*					
			Topsoil (0.6')		0.6			
500	5		Brown Clayey Sand	MC-1				MC
			Dark Yellowish Orange Silty, Clayey Sand (6.5')	MC-2	6.5			MC
495	10		Dark Brown Sandy Lean Clay (9.5')	MC-3	9.5			MC
490	15		Boring Terminated @ 14.0' (Elev. 489.3) (14.0')		14.0			
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
445	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	30+50 51' Rt. - Trailer Park Entrance
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	482.9 ft
Project Type	Roadway	Dated Started	4/7/2004
		Completed	4/7/2004
Driller	Murray	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-70	Total Depth	18 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
482.9 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
480			Dark Brown Sandy Lean Clay		MC-1				MC
	5			5.0'		5.0			
			Tan Silty, Clayey Sand						
475									
	10				MC-2				MC
470									
				14.0'		14.0			
	15		Dark Tan Clayey Sand		MC-3				MC
465				18.0'		18.0			
			Boring Terminated @ 18.0' (Elev. 464.9)						
	20								
460									
	25								
455									
	30								
450									
	35								
445									
	40								
440									
	45								
435									
	50								
430									
	55								
425									
	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	29+50 41' Lt. - Smith Heights Road
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	491.1 ft
Project Type	Roadway	Dated Started	4/16/2004
		Completed	4/16/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-75	Total Depth	15 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
491.1 ft	0		*Ground Line*					
490			Topsoil 0.6'		0.6			
			Light Brown Silty Sand					
485	5							
				MC-1				Bag & MC
480	10							
475	15		15.0' Boring Terminated @ 15.0' (Elev. 476.1)		15.0			
470	20							
465	25							
460	30							
455	35							
450	40							
445	45							
440	50							
435	55							
	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	31+00 31' Rt. - Lorena Lane
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	507.9 ft
Project Type	Roadway	Dated Started	4/16/2004
		Completed	4/16/2004
Driller	Kennedy	Logged by	Grady
		Depth to Water: Immediate	
Hole Number	B-77	Total Depth	12 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
507.9 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
505	5		Yellowish Brown Sandy Lean Clay		MC-1				MC
				6.0'		6.0			
500	10		Reddish Brown Silty Sand		MC-2				MC
				12.0'		12.0			
495	15		Boring Terminated @ 12.0' (Elev. 495.9)						
490	20								
485	25								
480	30								
475	35								
470	40								
465	45								
460	50								
455	55								
450	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	31+00 36' Lt. - Tanglewood Lane
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	526.6 ft
Project Type	Roadway	Dated Started	4/16/2004
		Completed	4/16/2004
Driller	Woodard	Logged by	Woodard
		Depth to Water: Immediate	
Hole Number	B-78	Total Depth	8 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
526.6 ft	0		*Ground Line*						
			Topsoil	0.6'		0.6			
525			Reddish Brown Sandy Lean Clay						
	5				MC-1				Bag & MC
520				8.0'		8.0			
			Boring Terminated @ 8.0' (Elev. 518.6)						
	10								
515									
	15								
510									
	20								
505									
	25								
500									
	30								
495									
	35								
490									
	40								
485									
	45								
480									
	50								
475									
	55								
470									
	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**16+50 15' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**502.9 ft**
Project Type	**Roadway**	Dated Started	**6/1/2004**
		Completed	**6/1/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 1**	Total Depth	**1 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
502.9 ft	0		*Ground Line*					
			Asphalt 0.6'	PC-1	0.0 / 0.6			Core
			Aggregate Base 1.0'					
			Boring Terminated @ 1.0' (Elev. 501.9)					
500	5							
495	10							
490	15							
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
445	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**22+00 15' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**496.8 ft**
Project Type	**Roadway**	Dated Started	**6/3/2004**
		Completed	**6/3/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 2**	Total Depth	**4.5 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
496.8 ft	0		*Ground Line*			0.0			
			Asphalt	0.8'	PC-1	0.8			Core
495			Aggregate Base	1.1'	MC-1				MC & Bag
			Brown Lean Clay	4.5'					
	5		Boring Terminated @ 4.5' (Elev. 492.3)			4.5			
490									
	10								
485									
	15								
480									
	20								
475									
	25								
470									
	30								
465									
	35								
460									
	40								
455									
	45								
450									
	50								
445									
	55								
440									
	60								

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	32+00 30' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	469.1 ft
Project Type	Roadway	Dated Started	6/1/2004
		Completed	6/1/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 3	Total Depth	1.2 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
469.1 ft	0		*Ground Line*					
			Asphalt 0.9'	PC-1	0.0 0.9			Core
			Aggregate Base 1.2'					
			Boring Terminated @ 1.2' (Elev. 467.9)					
465	5							
460	10							
455	15							
450	20							
445	25							
440	30							
435	35							
430	40							
425	45							
420	50							
415	55							
410	60							

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	36+50 CL
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	446.7 ft
Project Type	Roadway	Dated Started	6/3/2004
		Completed	6/3/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 4	Total Depth	1 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
446.7 ft	0		*Ground Line*					
			Asphalt 0.7'	PC-1	0.0 / 0.7			Core
445			Aggregate Base 1.0'					
			Boring Terminated @ 1.0' (Elev. 445.7)					
	5							
440								
	10							
435								
	15							
430								
	20							
425								
	25							
420								
	30							
415								
	35							
410								
	40							
405								
	45							
400								
	50							
395								
	55							
390								
	60							

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	44+00 9' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	433.7 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 5	Total Depth	1.4 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)		Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
433.7 ft	0		*Ground Line*						
			Asphalt	1.1'	PC-1	0.0 1.1			Core
			Aggregate Base	1.4'					
			Boring Terminated @ 1.4' (Elev. 432.3)						
430	5								
425	10								
420	15								
415	20								
410	25								
405	30								
400	35								
395	40								
390	45								
385	50								
380	55								
375	60								

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**51+50 5' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**437.5 ft**
Project Type	**Roadway**	Dated Started	**6/3/2004**
		Completed	**6/3/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 6**	Total Depth	**1.4 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
437.5 ft	0		*Ground Line*						
			Asphalt	1.1'	PC-1	0.0 1.1			Core
			Aggregate Base	1.4'					
			Boring Terminated @ 1.4' (Elev. 436.1)						
435	5								
430	10								
425	15								
420	20								
415	25								
410	30								
405	35								
400	40								
395	45								
390	50								
385	55								
380	60								

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	57+50 CL
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	464.2 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 7	Total Depth	4 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)		Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
464.2 ft	0		*Ground Line*						
			Asphalt	0.9'	PC-1	0.0 / 0.9			Core
			Aggregate Base	1.2'	MC-1	1.2			MC & Bag
			Light Brown Lean Clay with Sand and some Rock Fragments	4.0'		4.0			
			Boring Terminated @ 4.0' (Elev. 460.2)						
460	5								
455	10								
450	15								
445	20								
440	25								
435	30								
430	35								
425	40								
420	45								
415	50								
410	55								
405	60								

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	70+00 25' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	500.4 ft
Project Type	Roadway	Dated Started	6/3/2004
		Completed	6/3/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 8	Total Depth	1.5 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Lithology Depth	Lithology Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
500.4 ft	0		*Ground Line*					
500			Asphalt 1.1'	PC-1	0.0 1.1			Core
			Aggregate Base 1.5'					
			Boring Terminated @ 1.5' (Elev. 498.9)					
495	5							
490	10							
485	15							
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	90+00 15' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	504.7 ft
Project Type	Roadway	Dated Started	6/3/2004
		Completed	6/3/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 9	Total Depth	1.2 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
504.7 ft	0		*Ground Line*					
			Asphalt 0.8'	PC-1	0.0 / 0.8			Core
			Aggregate Base 1.2'					
			Boring Terminated @ 1.2' (Elev. 50.3.5)					
500	5							
495	10							
490	15							
485	20							
480	25							
475	30							
470	35							
465	40							
460	45							
455	50							
450	55							
445	60							

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CONSULTING ENGINEERS

TDOT

SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**100+00 8' Rt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**491.2 ft**
Project Type	**Roadway**	Dated Started	**6/2/2004**
		Completed	**6/2/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 10**	Total Depth	**5 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
491.2 ft	0		*Ground Line*					
490			Asphalt 1.0'	PC-1	0.0 1.0			Core
			Aggregate Base 1.3'		1.3			
			Orange & Brown, Well-Graded Sand with Silt 5.0'	MC-1				MC & Bag
	5		Boring Terminated @ 5.0' (Elev. 486.2)		5.0			
485								
	10							
480								
	15							
475								
	20							
470								
	25							
465								
	30							
460								
	35							
455								
	40							
450								
	45							
445								
	50							
440								
	55							
435								
	60							

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**108+00 8' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**501.4 ft**
Project Type	**Roadway**	Dated Started	**6/2/2004**
		Completed	**6/3/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 11**	Total Depth	**1.3 ft**
		Depth to Water	
		Date Measured	

Lithology									
Elev.	Depth	Symbol	Description	Overburden / Rock Core	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
501.4 ft	0		*Ground Line*						
500			Asphalt	0.9'	PC-1	0.0 0.9			Core
			Aggregate Base	1.3'					
			Boring Terminated @ 1.3' (Elev. 500.1)						
495	5								
490	10								
485	15								
480	20								
475	25								
470	30								
465	35								
460	40								
455	45								
450	50								
445	55								
	60								

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	117+00 6' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	500.9 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 12	Total Depth	1.3 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
500.9 ft	0		*Ground Line*		0.0			
500			Asphalt 0.8'	PC-1	0.8			Core
			Aggregate Base 1.3'					
			Boring Terminated @ 1.3' (Elev. 499.6)					
495	5							
490	10							
485	15							
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
	60							

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	126+00 10' Lt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	475.4 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 13	Total Depth	1.1 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
475.4 ft	0		*Ground Line*		0.0			
475			Asphalt 0.7'	PC-1	0.7			Core
			Aggregate Base 1.1'					
			Boring Terminated @ 1.1' (Elev. 474.3)					
470	5							
465	10							
460	15							
455	20							
450	25							
445	30							
440	35							
435	40							
430	45							
425	50							
420	55							
	60							

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	136+00 7' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	499.2 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 14	Total Depth	1.4 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
499.2 ft	0		*Ground Line*					
			Asphalt 1.0'	PC-1	0.0 1.0			Core
			Aggregate Base 1.4'					
			Boring Terminated @ 1.4' (Elev. 497.8)					
495	5							
490	10							
485	15							
480	20							
475	25							
470	30							
465	35							
460	40							
455	45							
450	50							
445	55							
440	60							

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	**Tennessee**	Latitude	
		Longitude	
County	**Henry**	Location	**147+00 7' Lt.**
Project Name	**SR-54 (US 641) from Rison St. to near Smith Rd.**	Surface Elevation	**526 ft**
Project Type	**Roadway**	Dated Started	**6/2/2004**
		Completed	**6/2/2004**
Driller	**Grady**	Logged by	**Carver**
		Depth to Water: Immediate	
Hole Number	**PVMT 15**	Total Depth	**4.5 ft**
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)		Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
526.0 ft	0		*Ground Line*						
525			Asphalt	1.0'	PC-1	0.0 1.0			Core MC & Bag
			Aggregate Base	1.4'	MC-1	1.0 1.4			
			Orange & Brown Silty Sand with some Rock Fragments	4.5'					
520	5		Boring Terminated @ 4.5' (Elev. 521.5)						
515	10								
510	15								
505	20								
500	25								
495	30								
490	35								
485	40								
480	45								
475	50								
470	55								
	60								

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CONSULTING ENGINEERS

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SUBSURFACE INVESTIGATION

BORING LOG

Sheet No. 1 of 1

State	Tennessee	Latitude	
		Longitude	
County	Henry	Location	154+00 7' Rt.
Project Name	SR-54 (US 641) from Rison St. to near Smith Rd.	Surface Elevation	521.2 ft
Project Type	Roadway	Dated Started	6/2/2004
		Completed	6/2/2004
Driller	Grady	Logged by	Carver
		Depth to Water: Immediate	
Hole Number	PVMT 16	Total Depth	1.1 ft
		Depth to Water	
		Date Measured	

Lithology Elev.	Depth	Symbol	Description (Overburden / Rock Core)	Sample No. / Core No.	Depth / Run	Rec. (ft.) / Rec (ft.)	Blows / Rec. (%)	Type / RQD (%)
521.2 ft	0		*Ground Line*					
520			Asphalt 0.8'	PC-1	0.0 / 0.8			Core
			Aggregate Base 1.1'					
			Boring Terminated @ 1.1' (Elev. 520.1)					
515	5							
510	10							
505	15							
500	20							
495	25							
490	30							
485	35							
480	40							
475	45							
470	50							
465	55							
	60							

APPENDIX II

SOIL DESCRIPTION SHEET WITH LABORATORY DATA

Soil Description Sheet

County: Henry **Proj. No:** 40003-1213-14
Book **GES File No.** 4011502

Project: State Route 54 (US 641) from Rison Street to near Smith Road

Shaded Area is where the Natural Moisture > Optimum Moisture

Sample Data

Sample No.	Description	Density	Opt Moist	Moisture Range	In-situ Moist	PL	LL	AASHTO Class	USCS Class
1	Lean Clay with Sand				19.4	14	29	A-6(9)	CL
2	Clayey Sand				13.6	12	20	A-4(0)	SC
3	Silty Sand				8.4	NP	NP	A-2-4(0)	SM
6	Poorly Graded Sand with Silt				12.0	NP	NP	A-2-4(0)	SP-SM
7	Silty, Clayey Sand				17.2	13	19	A-4(0)	SC-SM
8	Silty, Clayey Sand				11.4	13	20	A-2-4(0)	SC-SM
9	Sandy Lean Clay	117.0	12.5	10.6-16.5	19.1	16	25	A-4(4)	CL
10	Clayey Sand	120.3	12.5	10.8-15.0	14.8	12	27	A-6(3)	SC
11	Lean Clay				25.8	22	33	A-6(11)	CL
12	Clayey Sand				16.3	12	21	A-4(1)	SC
14	Silty Sand	118.8	14.0	11.1-15.7	20.4	NP	NP	A-2-4(0)	SM
15	Well-Graded Sand with Silt				9.8	NP	NP	A-2-4(0)	SW-SM

Sample No.	Description	Density	Opt Moist	Moisture Range	In-situ Moist	PL	LL	AASHTO Class	USCS Class
17	Silty Sand	120.6	11.6	9.3-14.5	17.1	17	18	A-2-4(0)	SM
18	Elastic Silt with Sand				44.2	41	66	A-7-5(22)	MH
20	Sandy Lean Clay	117.6	13.8	11.0-16.7	12.6	12	28	A-6(5)	CL
22	Clayey Sand	118.0	13.3	9.7-16.1	22.8	15	25	A-4(2)	SC
24	Silty Sand				17.7	21	21	A-2-4(0)	SM
25	Silty Sand				13.3	NP	NP	A-2-4(0)	SM
27	Sandy Lean Clay	116.9	13.0	10.3-16.6	19.6	13	30	A-6(9)	CL
30	Lean Clay with Sand	114.1	14.4	10.7-18.4	18.1	17	31	A-6(10)	CL
31	Clayey Sand	112.1	11.5	8.7-14.5	14.4	12	22	A-4(1)	SC
33	Silty Sand	114.4	13.4	8.0-14.9	15.0	NP	NP	A-2-4(0)	SM
35	Silty Sand	112.2	10.5	2.7-12.8	11.4	13	17	A-2-4(0)	SM
36	Clayey Sand				15.3	14	22	A-2-4(0)	SC

CBR Data

Sample No.	Description	Density	Opt. Moist	Moisture Range	In-situ Moist	LL	PI	AASHTO Class	USCS Class	CBR
4	Clayey Sand	119.7	12.3	10.0-15.3	14.8	26	13	A-6(2)	SC	10
5	Sandy Lean Clay	120.4	11.9	8.3-16.4	14.8	28	13	A-6(6)	CL	4
13	Lean Clay	111.1	15.8	13.1-19.1	21.2	30	11	A-6(8)	CL	15
16	Silty, Clayey Sand	119.2	12.7	10.1-15.4	16.4	22	6	A-4(0)	SC-SM	13
19	Lean Clay with Sand	113.7	13.8	10.2-17.6	11.5	29	12	A-6(8)	CL	5
21	Sandy Silty Clay	118.3	12.4	10.2-17.6	8.9	22	7	A-4(1)	CL-ML	3

Sample No.	Description	Density	Opt. Moist	Moisture Range	In-situ Moist	LL	PI	AASHTO Class	USCS Class	CBR
23	Silty Sand	116.8	10.9	7.2-12.4	11.2	NP	NP	A-2-4(0)	SM	50
26	Silty Sand	118.6	10.5	8.0-14.3	15.9	18	2	A-4(0)	SM	18
28	Lean Clay	108.3	16.6	11.5-20.0	23.1	34	14	A-6(13)	CL	10
29	Clayey Sand	118.7	13.0	10.5-15.5	15.6	24	8	A-2-4(0)	SC	10
32	Silty Sand	123.4	10.7	7.9-13.3	5.4	19	NP	A-2-4(0)	SM	36
34	Poorly Graded Sand with Silt	101.9	14.3	1.6-18.4	8.4	NP	NP	A-2-4(0)	SP-SM	41
79	Lean Clay with Sand	114.5	15.0	11.9-17.6	18.7	37	20	A-6(14)	CL	9
80	Well-Graded Sand with Silt	109.2	8.2	3.4-18.4	6.4	NP	NP	A-2-4(0)	SW-SM	36
81	Silty Sand	121.4	12.0	9.5-14.5	10.7	20	3	A-2-4(0)	SM	15
82	Lean Clay	111.1	17.7	11.6-18.3	20.9	43	25	A-7-6(23)	CL	8

Spoons/Tubes Data

Sample No.	Station & Offset	Depth	Description	In situ Moist	LL	PI	AASHTO Class	USCS Class
37	27+00 @ 110’ Rt.	5.0’-13.5’	Silt with Sand	28.7	23	1	A-4(0)	ML
38	27+00 @ 160’ Rt.	12.0’-15.9’	Elastic Silt	53.2	76	NP	A-5(12)	MH
39	27+00 @ 110’ Rt.	15.0’-31.5’	Sandy Silt	40.1	49	4	A-5(5)	ML
40	27+00 @ 160’ Rt.	25.0’-50.9’	Elastic Silt with Sand	46.3	64	2	A-5(8)	MH
41	27+00 @ 110’ Rt.	55.0’-80.3’	Sandy Elastic Silt	56.2	81	1	A-5(9)	MH
42	30+00 @ 125’ Rt.	5.0’-16.5’	Sandy Silt	21.2	25	3	A-4(0)	ML
43	30+00 @ 30’ Rt.	12.0’-21.5’	Sandy Silt	28.4	27	1	A-4(0)	ML
44	30+00 @ 125’ Rt.	25.0’-25.7’	Elastic Silt with Sand	51.4	71	30	A-7-5(25)	MH

Sample No.	Station & Offset	Depth	Description	In situ Moist	LL	PI	AASHTO Class	USCS Class
45	30+00 @ 30’ Rt.	25.0’-41.5’	Silty Sand	29.3	NP	NP	A-2-4(0)	SM
46	30+00 @ 125’ Rt.	30.0’-46.5’	Sandy Elastic Silt	57.6	80	5	A-5(5)	MH
47	30+00 @ 125’ Rt.	50.0’-66.5’	Sandy Elastic Silt	69.9	79	1	A-5(4)	MH
48	34+50 @ 90’ Lt.	5.0’-11.5’	Silty Sand	24.4	NP	NP	A-4(0)	SM
49	34+50 @ 146’ Lt.	5.0’-16.5’	Sandy Silt	22.4	18	3	A-4(0)	ML
50	34+50 @ 90’ Lt.	25.0’-25.2’	Silty Sand	24.7	NP	NP	A-2-4(0)	SM
51	34+50 @ 90’ Lt.	30.0’-70.8’	Sandy Silt	54.3	NP	NP	A-4(0)	ML
52	34+50 @ 146’ Lt.	30.0’-71.5’	Sandy Elastic Silt	61.5	88	1	A-5(5)	MH
53	38+65 @ 70’ Rt.	5.0’-11.5’	Silty Sand	24.8	17	4	A-2-4(0)	SM
54	38+65 @ 70’ Rt.	15.0’-26.5’	Silty, Clayey Sand	18.6	18	5	A-4(0)	SC-SM
55	85+00 @ 89’ Rt.	5.0’-6.5’	Lean Clay with Sand	22.9	26	9	A-4(5)	CL
56	85+00 @ 89’ Rt.	10.0’-10.5’	Silty Sand	14.9	19	4	A-4(0)	SM
57	85+00 @ 89’ Rt.	15.0’-16.1’	Silty Sand	18.1	NP	NP	A-2-4(0)	SM
58	95+00 @ 60’ Rt.	3.0’-9.5’	Silty, Clayey Sand	13.1	18	5	A-2-4(0)	SC-SM
59	95+00 @ 107’ Rt.	5.0’-11.5’	Silty, Clayey Sand	15.0	21	7	A-4(0)	SC-SM
60	95+00 @ 60’ Rt.	13.0’-29.5’	Silty Sand	23.1	19	2	A-2-4(0)	SM
61	95+00 @ 60’ Rt.	33.0’-39.5’	Poorly Graded Sand with Silt	20.7	NP	NP	A-2-4(0)	SP-SM
62	114+00 @ 96’ Lt.	5.0’-6.5’	Silty Sand with Gravel	12.5			A-2-4(0)	SM
63	114+00 @ 96’ Lt.	10.0’-16.5’	Silty Sand	15.9	NP	NP	A-2-4(0)	SM
64	114+00 @ 96’ Lt.	20.0’-31.5’	Poorly Graded Sand with Silt	10.7	NP	NP	A-2-4(0)	SP-SM
65	119+55 @ 88’ Rt.	5.0’-6.5’	Silty Sand	21.3	NP	NP	A-4(0)	SM
66	119+55 @ 88’ Rt.	10.0’-16.5’	Silty Sand	20.2	NP	NP	A-2-4(0)	SM
67	119+45 @ 131’ Lt.	10.0’-11.5’	Silty, Clayey Sand	32.9	23	5	A-4(0)	SC-SM

Sample No.	Station & Offset	Depth	Description	In situ Moist	LL	PI	AASHTO Class	USCS Class
68	119+45 @ 131’ Lt.	15.0’-16.4’	Silty Sand	18.6	18	3	A-2-4(0)	SM
69	119+55 @ 88’ Rt.	20.0’-26.1’	Poorly Graded Sand with Clay	18.7	28	10	A-2-4(0)	SP-SC
70	137+05 @ 87’ Rt.	5.0’-6.5’	Silt	29.2	22	2	A-4(0)	ML
71	137+05 @ 120’ Rt.	10.0’-11.5’	Sandy Lean Clay	40.7	29	9	A-4(4)	CL
72	137+05 @ 120’ Rt.	15.0’-30.3’	Well-Graded Sand with Silt	19.0	NP	NP	A-2-4(0)	SW-SM
73	137+05 @ 87’ Rt.	20.0’-31.5’	Sandy Silty Clay	22.1	19	6	A-4(0)	CL-ML
74	137+05 @ 120’ Rt.	35.0’-51.5’	Sandy Elastic Silt	48.3	57	18	A-7-5(11)	MH
75	137+05 @ 87’ Rt.	45.0’-61.0’	Silty Sand	55.1	74	NP	A-5(0)	SM
76	137+05 @ 87’ Rt.	65.0’-71.5’	Silt	36.5	44	4	A-5(7)	ML
77	160+00 @ 55’ Rt.	5.0’-16.5’	Silty Sand	22.7	15	1	A-4(0)	SM
78	160+00 @ 55’ Rt.	20.0’-30.7’	Poorly Graded Sand with Silt	26.2	NP	NP	A-2-4(0)	SP-SM

APPENDIX III

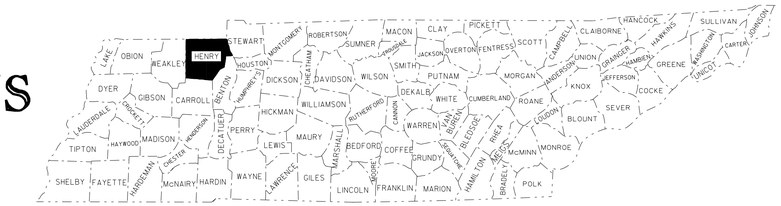
GEOTECHNICAL SHEETS

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

GEOTECHNICAL OPERATIONS SECTION



GEOLOGICAL SYMBOLS

STATE ROUTE 54 (US 641)
HENRY COUNTY, TENNESSEE

- Rockline Soundings
- Disturbed Sample Boring
- Undisturbed Sample Boring
- Undisturbed Sample Boring & Rock Core
- Rock Core
- Slope Inclinometer Installation typical applications:
- OW — Observation Well
- Approximate Footing Elevation
- (Date) — Water Elevation
- VS (psf) — Field Vane Shear Strength
- N — Penetration Resistance
- Qu (psf) — Unconfined Compressive Strength
- UU (psf) — Unconsolidated Undrained Triaxial Strength
- w% — Moisture Content
- RQD — Rock Quality Designation
- REC — Core Recovery
- ϕ — Angle of Internal Friction (Total Stress)
- $\bar{\phi}$ — Angle of Internal Friction (Effective Stress)
- c (psf) — Cohesion (Total Stress)
- $\bar{c}$ (psf) — Cohesion (Effective Stress)
- γ (pcf) — Total Unit Weight
- R — Refusal
- NR — Refusal Not Encountered
- (HA) — Hand Auger
- (2) — Sample Number

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
(PASSING #40) LL	6 MX		N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				

* PI OF A-7-5 <(LL-30); PI OF A-7-6 >(LL-30)

ADDITIONAL ROCK SYMBOLS

SYMBOL	SHALE	LIMESTONE	DOLOMITE	WEATHERED SHALE	EXISTING ROADWAY FILL	SELECT GRANULAR MATERIAL	WEATHERED LIMESTONE	GRADED SOLID ROCK

NOTICE REGARDING AVAILABILITY OF GEOTECHNICAL INFORMATION

ON MOST TDOT PROJECTS A GEOTECHNICAL INVESTIGATION AND REPORT IS ACCOMPLISHED AS PART OF THE PROJECT DESIGN PROCESS. THE WORK MAY VARY FROM ONE SAMPLE TAKEN FROM THE GROUND SURFACE TO CONDUCTING HUNDREDS OF SOIL BORINGS AND ROCK CORES DEPENDING ON THE SIZE AND COMPLEXITY OF THE PROJECT. THIS WORK MAY HAVE BEEN ACCOMPLISHED BY TDOT FORCES OR BY A GEOTECHNICAL CONSULTANT. THIS WORK IS USED BY THE ROADWAY AND STRUCTURAL DESIGNERS IN PREPARATION OF PLANS FOR A PROJECT.

BOTH FACTUAL AND INTERPRETIVE GEOTECHNICAL INFORMATION MAY BE PROVIDED BY MEANS OF SOILS PLAN AND PROFILE SHEETS ALONG WITH SPECIAL CROSS-SECTIONS DEPICTING GEOTECHNICAL INFORMATION AND RECOMMENDATIONS USED BY THE ROADWAY DESIGNER TO PRODUCE FINAL CONSTRUCTION CROSS-SECTIONS AND TO ESTIMATE GRADING QUANTITIES. IN ADDITION, GEOTECHNICAL INFORMATION, BOTH FACTUAL AND INTERPRETIVE IS SHOWN ON FOUNDATION DATA SHEETS FOR BRIDGES TO BE CONSTRUCTED AND ON RETAINING WALL CONCEPTUAL SHEETS FOR RETAINING WALLS TO BE CONSTRUCTED ON A PROJECT.

THE ACTUAL GEOTECHNICAL REPORT AND DETAILED BORING RECORDS AND LABORATORY TEST DATA ARE TYPICALLY NOT INCLUDED AS DOCUMENTS IN THE CONTRACT PROPOSAL OR RELATED CONTRACT DOCUMENTS. HOWEVER, THIS INFORMATION (FOR PROJECTS FOR WHICH IT WAS OBTAINED) IS AVAILABLE BY REQUEST TO THE CONTRACTOR FOR HIS REVIEW TO BE USED IN CONJUNCTION WITH THE GEOTECHNICAL INFORMATION PROVIDED IN THE CONTRACT PLANS AND CROSS-SECTIONS FOR PREPARATION OF THE CONTRACTOR'S BID AND FOR AIDING THE CONTRACTOR IN PLANNING AND EXECUTING THE WORK. ON SOME PROJECTS, SOIL SAMPLES AND ROCK CORES ARE AVAILABLE FOR EXAMINATION.

EXAMINATION OF THE GEOTECHNICAL INFORMATION IN THE PLANS, DETERMINATION OF AVAILABILITY OF GEOTECHNICAL REPORTS AND RELATED DOCUMENTS AND EXAMINATION OF SUCH AVAILABLE MATERIAL SHALL BE CONSIDERED AS PART OF THE REQUIREMENTS SET FORTH IN ITEM 102.04-EXAMINATION OF THE SITE, THE WORK, THE PLANS AND THE SPECIFICATIONS AND IN ITEM 105-04-COORDINATION OF PLANS AND SPECIFICATIONS.

NOTE

THE FOUNDATION DATA SHEETS ARE FOR DESIGN INFORMATION AND SHOULD NOT BE USED FOR CONSTRUCTION. REFER TO THE DESIGN PROFILE AND CROSS SECTIONS IN THE CONSTRUCTION PLANS FOR THE HORIZONTAL AND VERTICAL ALIGNMENTS TO BE CONSTRUCTED. THE HORIZONTAL AND VERTICAL ALIGNMENTS SHOWN ON THE FOUNDATION DATA SHEETS REFLECT THE GEOMETRY AS OF NOVEMBER, 2006.

CONSTRUCTABILITY FIELD REVIEW

GEOTECHNICAL CONSULTANT FLORENCE & HUTCHESON, INC.
ENGINEER J. SHANNON PROVANCE
P.E. NO. 40003-1213-14
GEOTECHNICAL ENGINEERING FILE NO. 4011502

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31A

GEOTECHNICAL NOTES

1. The natural moisture contents of the overburden soils at the time of drilling were typically near or above the upper limit of the 95% compaction moisture range. Drying, handling, and manipulation of the soils is likely to be required in order to obtain the proper moisture content required to satisfy the compaction requirement.

2. Some of the highly plastic A-7 soils encountered within drilled intervals on this project have relatively low dry densities as determined by the standard proctor test. All material within three feet of the final subgrade elevation in both cut and embankment sections shall have a minimum compacted dry density of 95 PCF or greater. This will require undercutting and refilling when the poor quality soils are encountered at the final subgrade elevation in cut sections. Furthermore, if the earthwork balance for the project is a waste situation, the highly plastic A-7 soils should be the material that is wasted first.

3. Installation of erosion control matting and establishment of vegetation shall be conducted as soon as practical to prevent erosion of the cut and fill slopes.

4 A soil shrinkage factor of 15% has been estimated for this project.

5 A 3 foot blanket of Select Granular Material shall be placed in the lower portions of the embankment in the following intervals, in accordance with TDOT Specifications and as directed by the Engineer. This layer shall be underlain and overlaid with Type IV Geotextile Fabric and will be placed to allow construction to continue across wet areas, to promote drainage of seepage zones, and to provide a working platform for construction activities.

Station 25+00 to Station 40+00
Station 84+50 to Station 85+50
Station 94+50 to Station 96+00
Station 103+00 to Station 105+50
Station 117+00 to Station 121+00
Station 126+00 to Station 130+50
Station 136+50 to Station 140+00
Station 159+00 to Station 160+50

6 An existing bridge over an abandoned railroad track will be removed and replaced with embankment materials at approximate Station 29+50. As discussed in Note 5 above, a 3 foot blanket of Select Granular Material underlain with Type IV Geotextile Fabric shall be placed in the lower portion of this new embankment, in accordance with TDOT Specifications and as directed by the Engineer. In addition, embankment benching shall be utilized to help reduce slope instability and to help minimize differential settlement within this interval. This benching shall occur along the existing side slopes, as well as the existing "abutment" slopes as shown on the Special Detail sheet included with this report.

7 The proposed alignment intercepts a large pond at approximate Station 127+00. To minimize the impact of the proposed roadway on the large pond, a retaining wall will be utilized. Once a finalized wall configuration has been determined, the TDOT Geotechnical Section shall be contacted to determine if additional geotechnical input is required.

8 A possible sinkhole feature has been identified at approximately 70 feet left of Station 28+40. Remediation shall in accordance with the TDOT Sinkhole Standard Drawing "Sinkhole Treatment" or as directed by the Engineer.

Station 28+40 @ 70 ft. Lt. - Sinkhole Treatment 2, Inactive

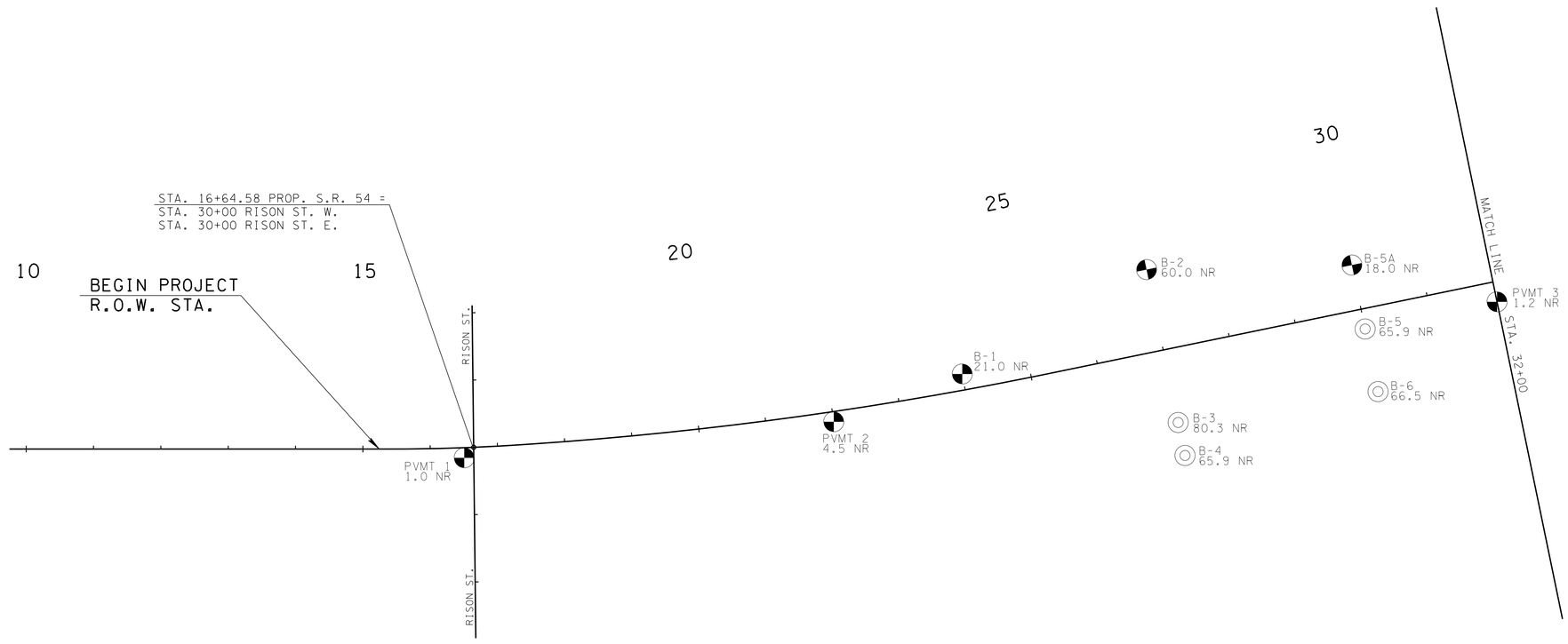
CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

GEOTECHNICAL NOTES

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31B



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING LAYOUT

B.O.P. TO STA. 32+00

SCALE: 1"= 100'

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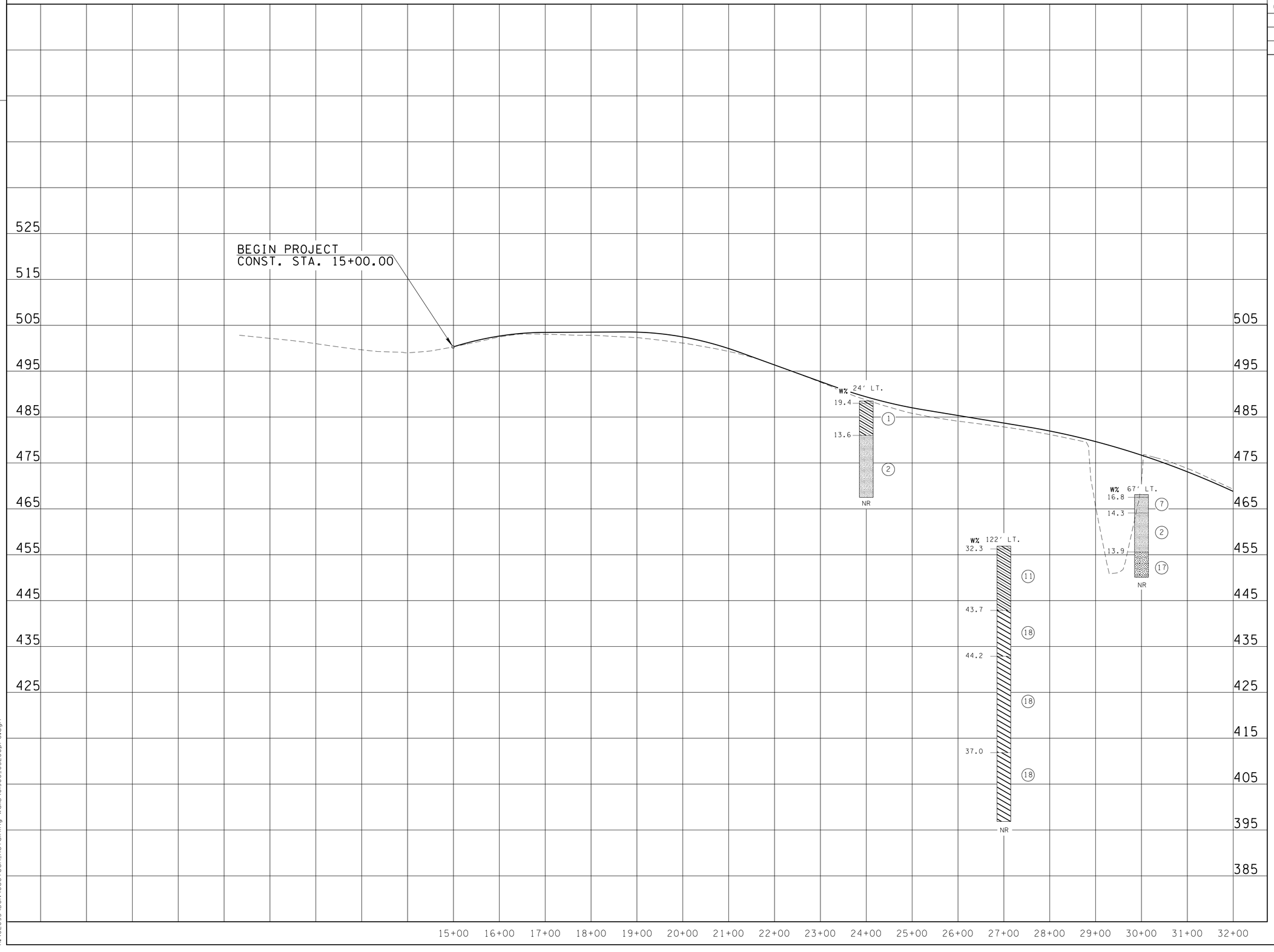
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31C



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL PROFILE

STA.15+00 TO STA.32+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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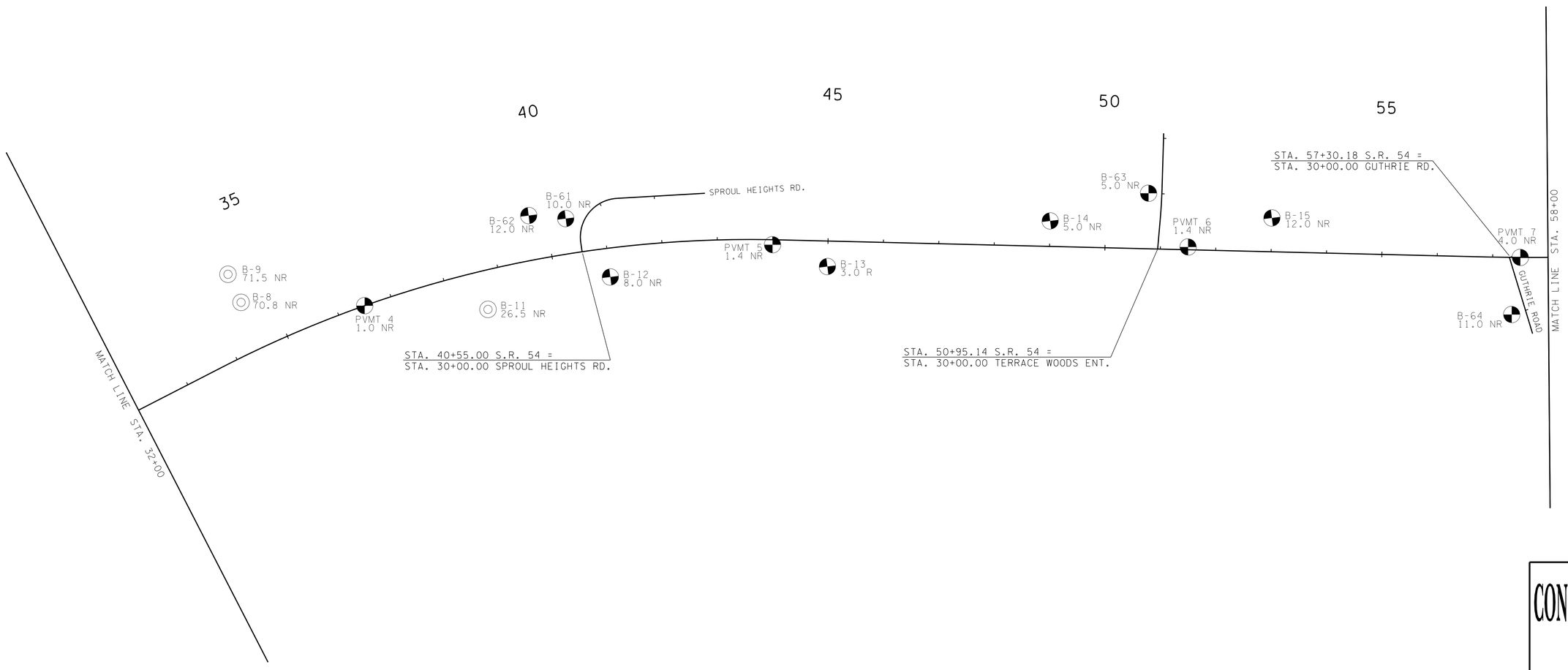
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31D



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING
LAYOUT

STA. 32+00 TO STA. 58+00

SCALE: 1"= 100'

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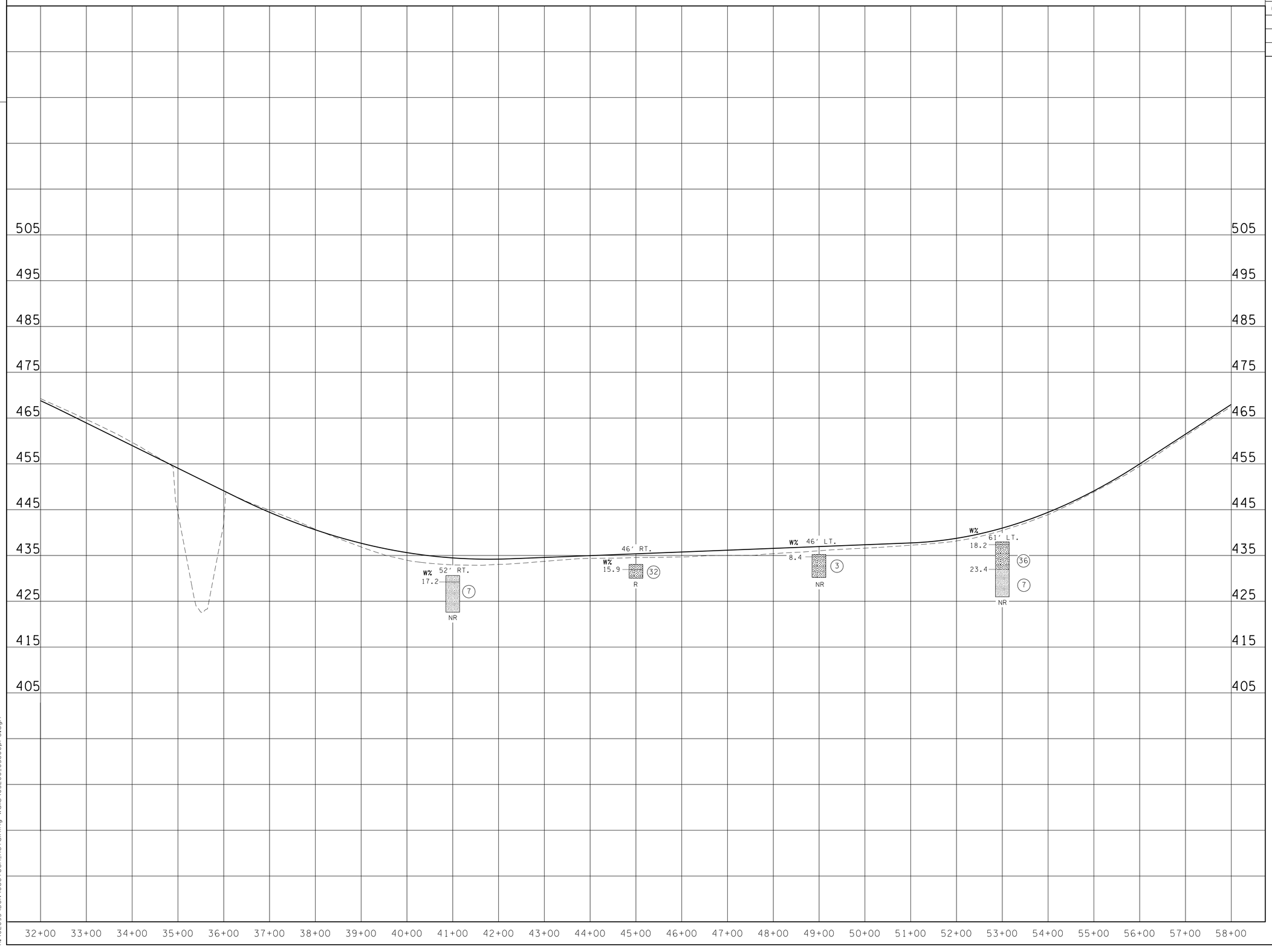
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31E



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL
PROFILE

STA.32+00 TO STA.58+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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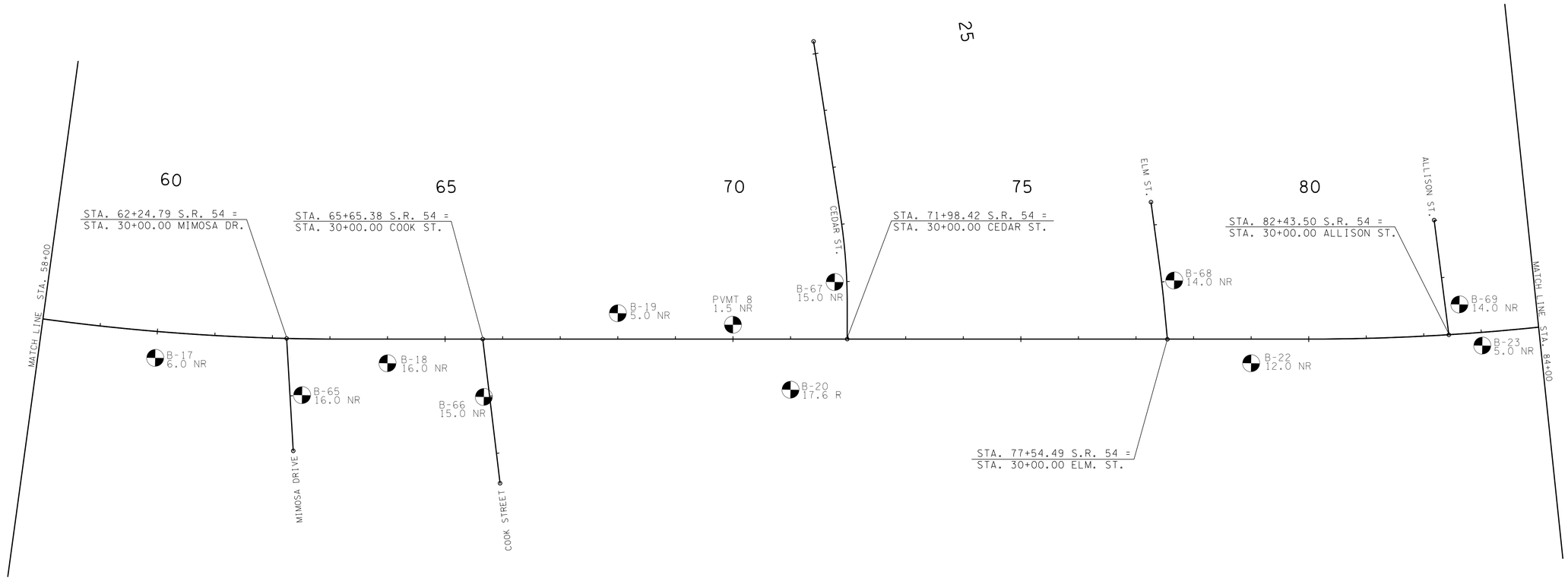
TENNESSEE D.O.T.	DESIGN DIVISION	FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31F



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING LAYOUT

STA. 58+00 TO STA. 84+00

SCALE: 1"= 100'

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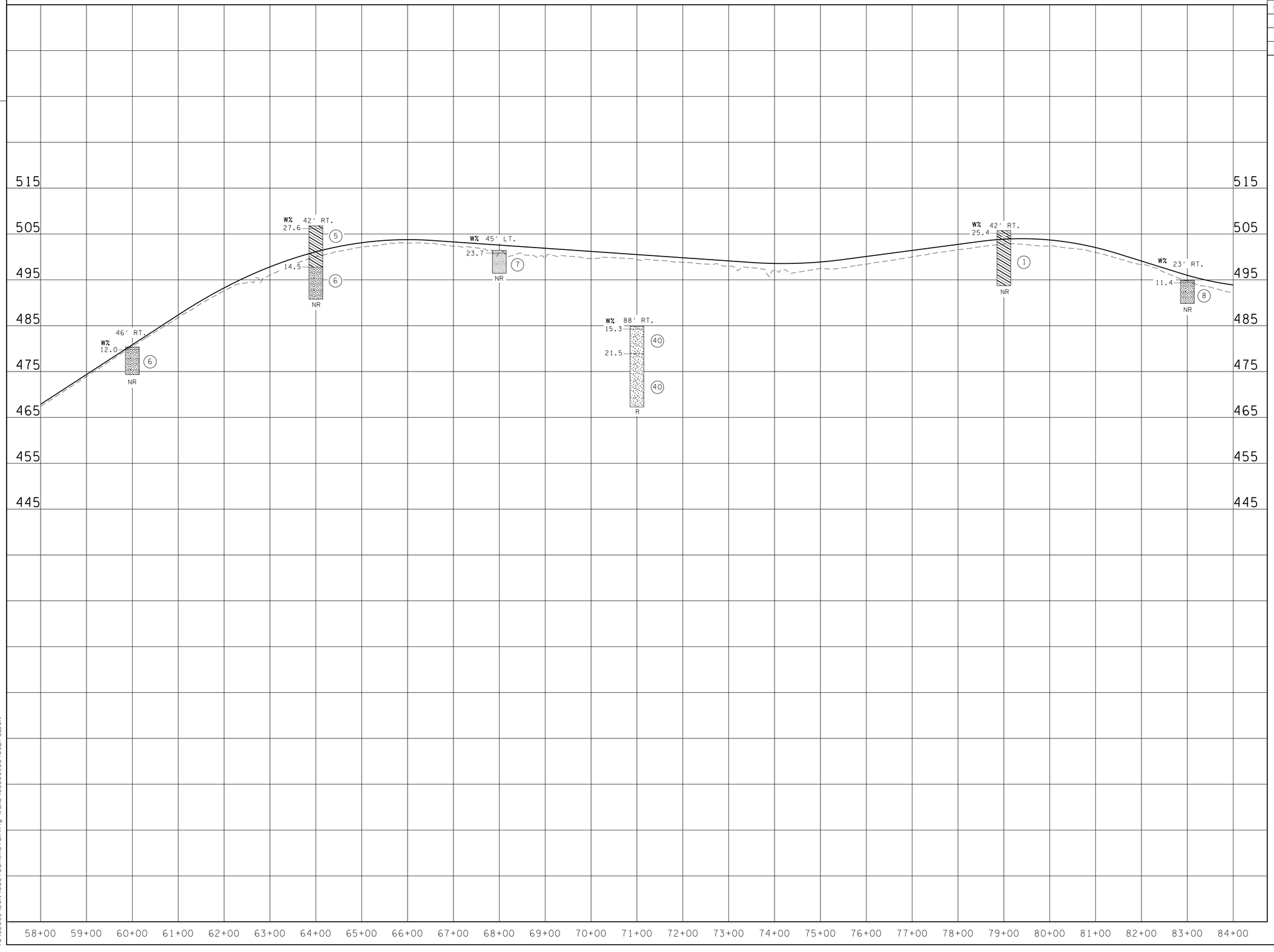
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31G



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL
PROFILE
STA.58+00 TO STA.84+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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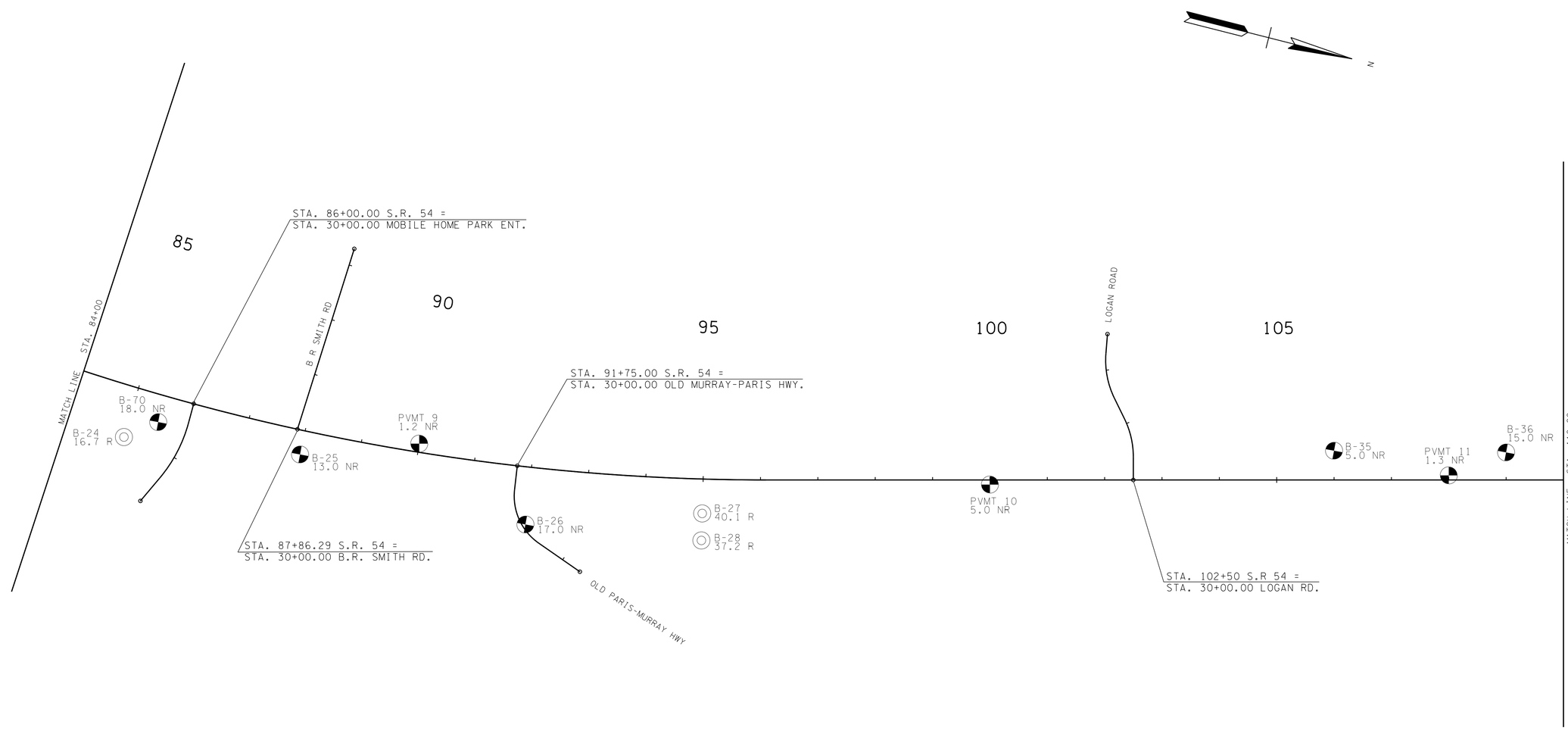
TENNESSEE D.O.T.	DESIGN DIVISION	FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31H



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING LAYOUT

STA. 84+00 TO STA. 110+00

SCALE: 1"= 100'

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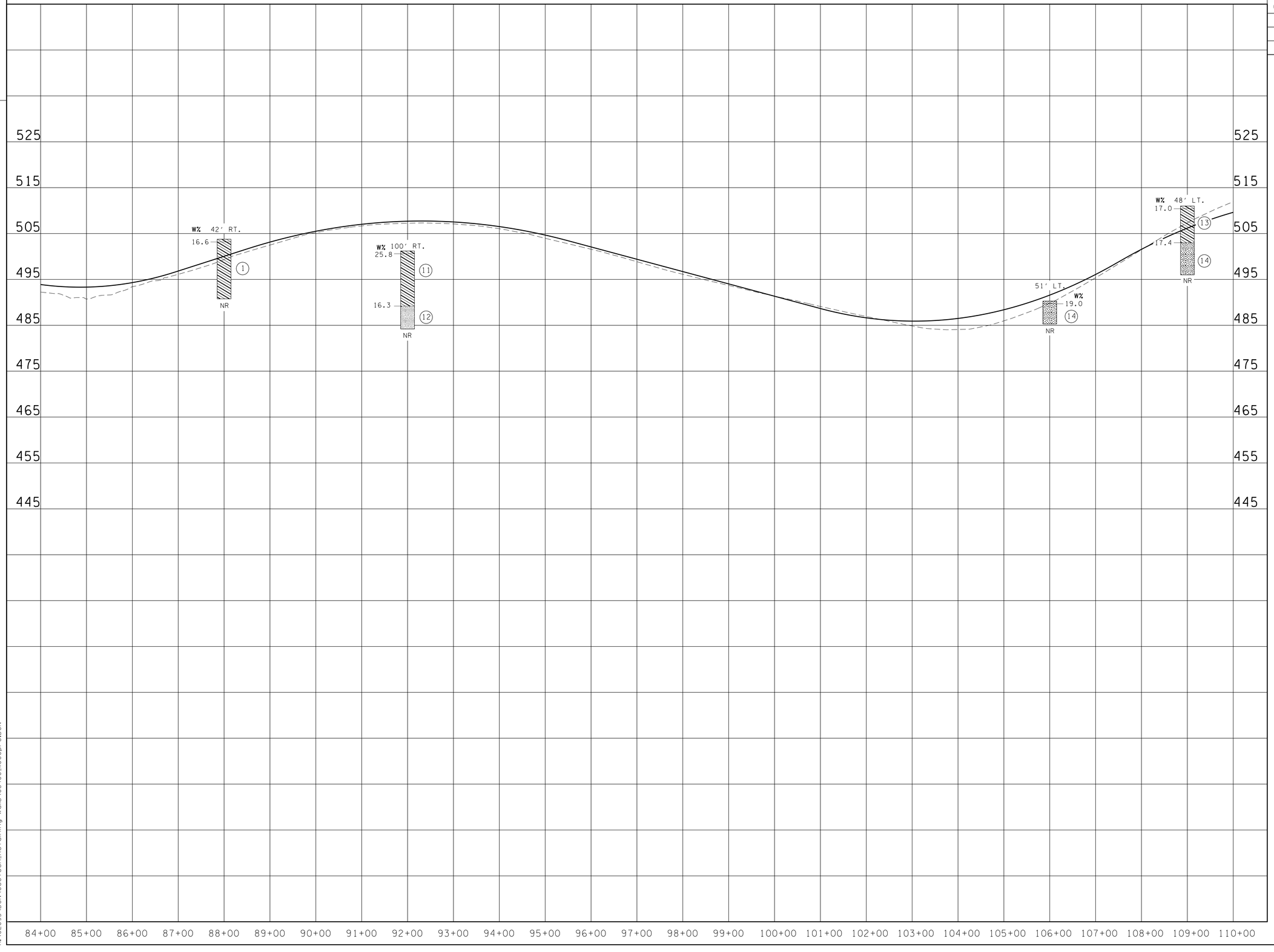
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31 I



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL
PROFILE

STA.84+00 TO STA.110+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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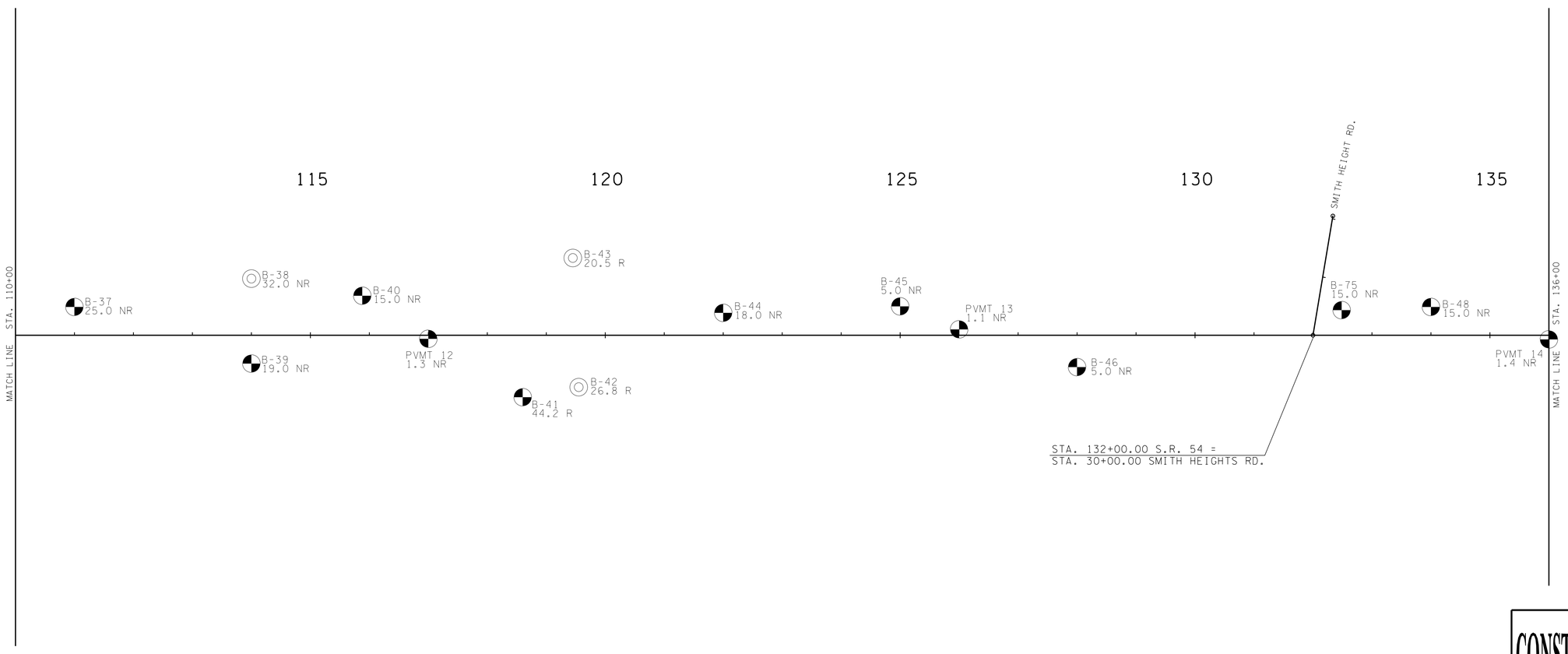
TENNESSEE D.O.T.	DESIGN DIVISION	FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31J



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING LAYOUT

STA.110+00 TO STA. 136+00

SCALE: 1"= 100'

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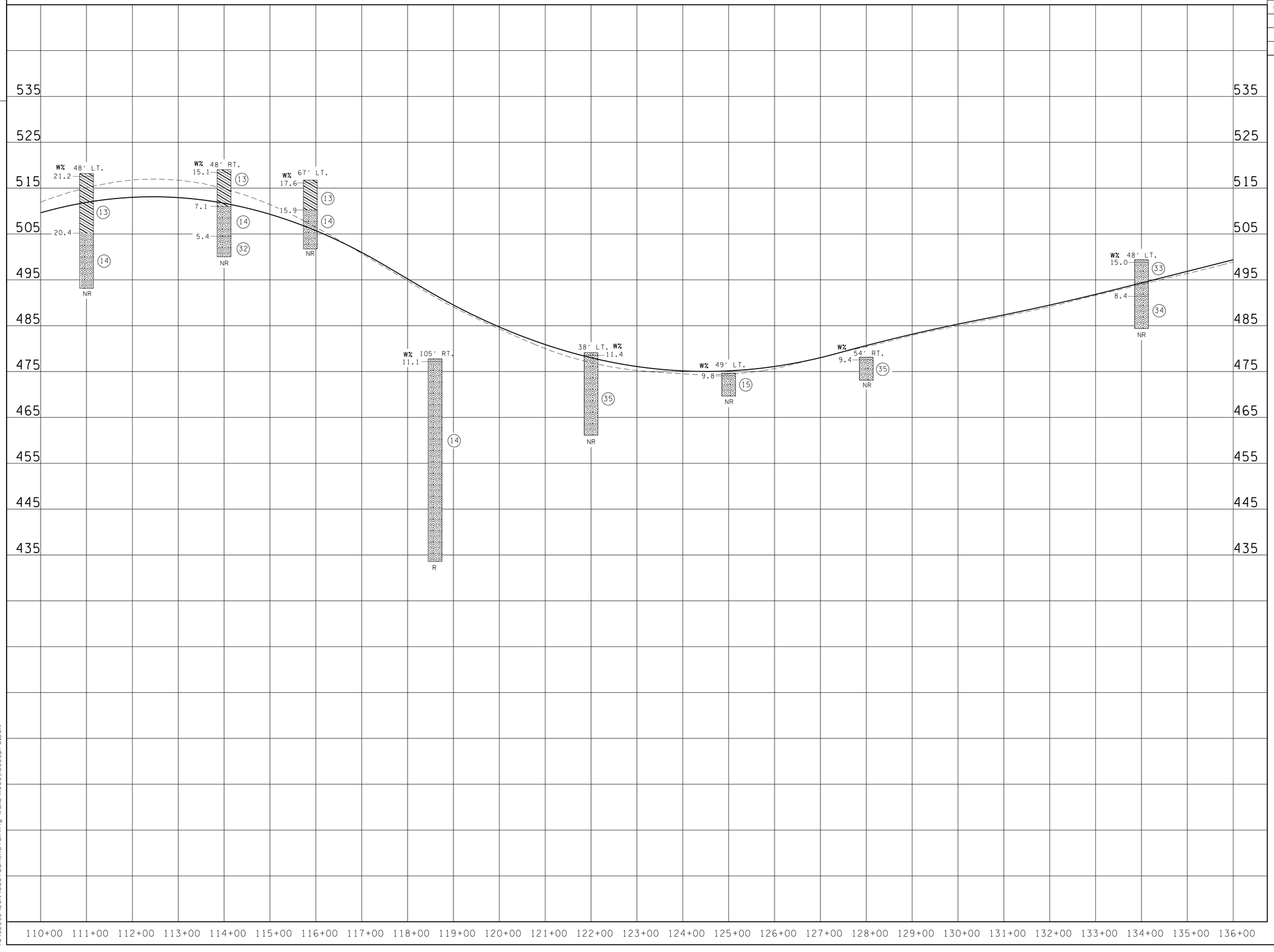
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31K



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL
PROFILE

STA.110+00 TO STA.136+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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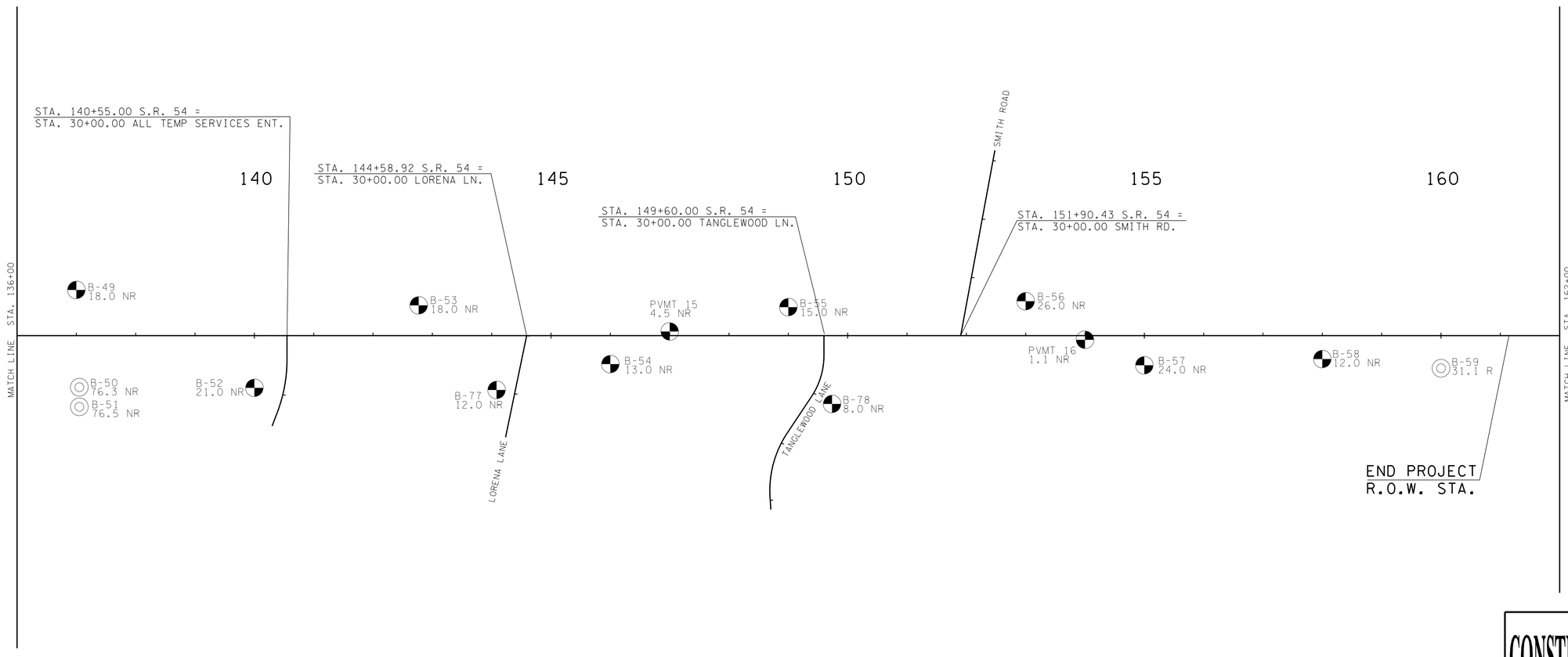
TENNESSEE D.O.T.	DESIGN DIVISION	FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31L



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BORING LAYOUT

STA.136+00 TO STA. 162+00

SCALE: 1"= 100'

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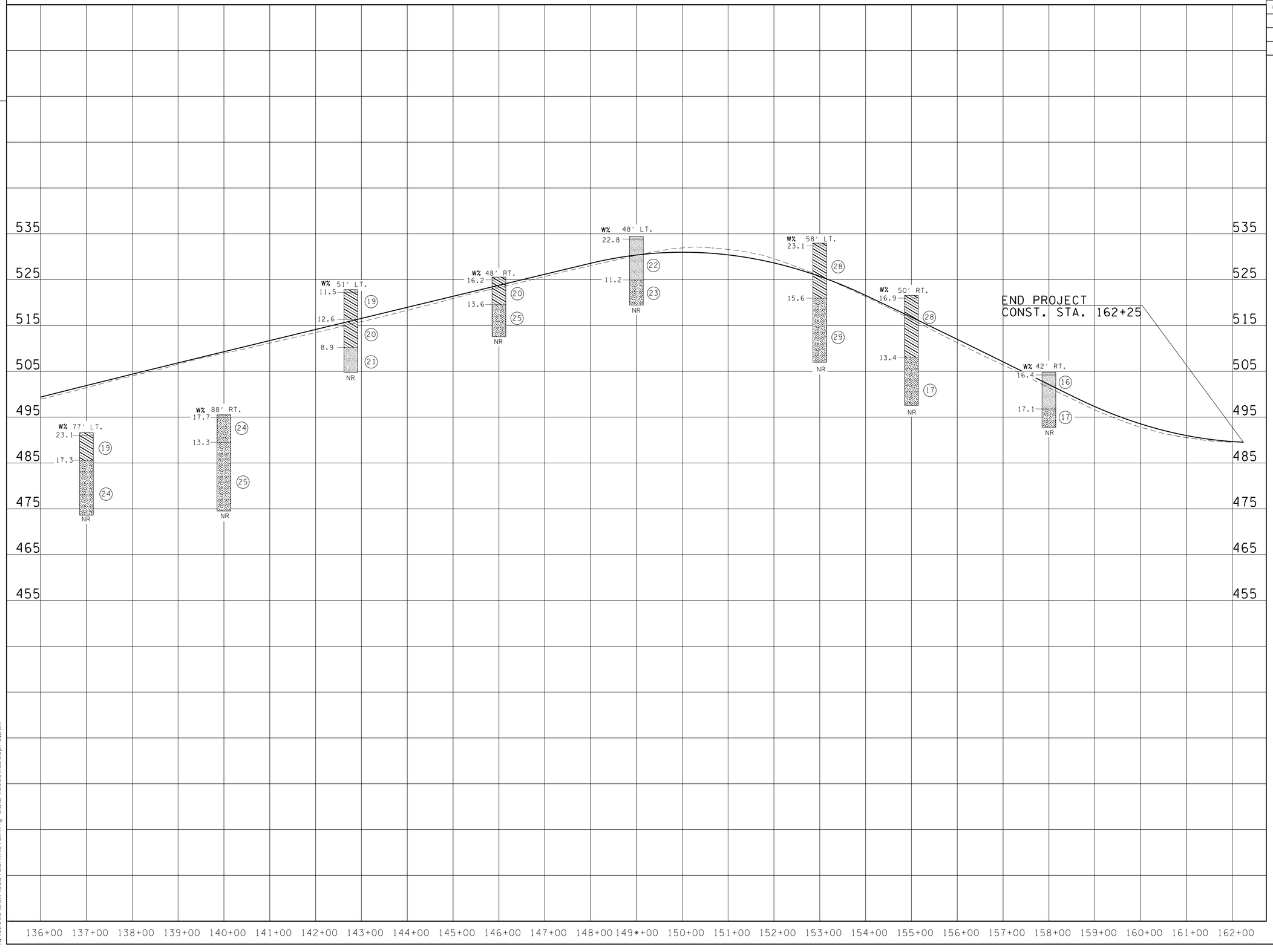
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31M



CONSTRUCTABILITY
FIELD
REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOIL
PROFILE

STA.136+00 TO STA.162+00
SCALE: 1"=100' HORIZ.
1"=10' VERT.

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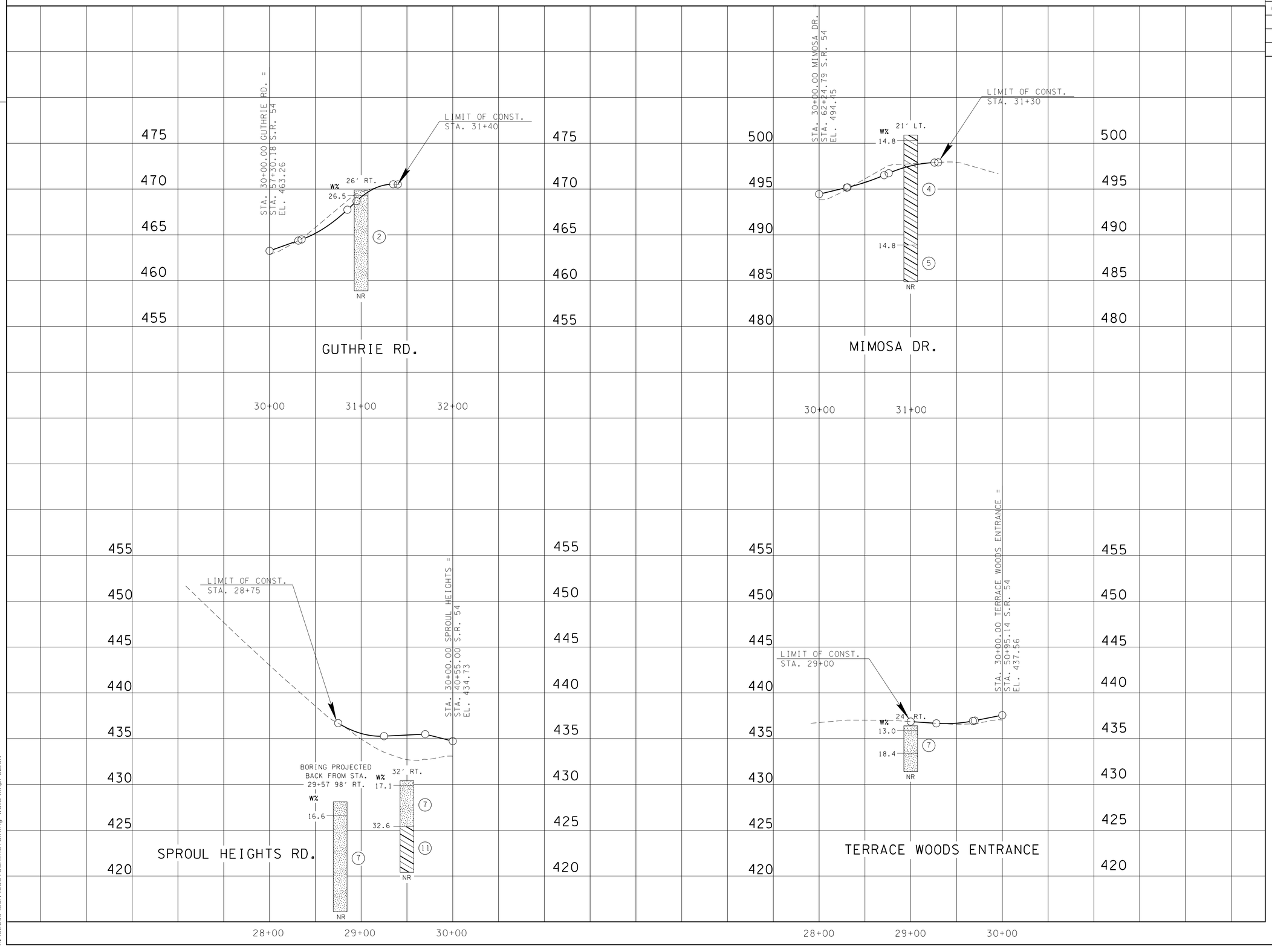
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31N



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROFILE OF SIDE ROADS AND STREETS

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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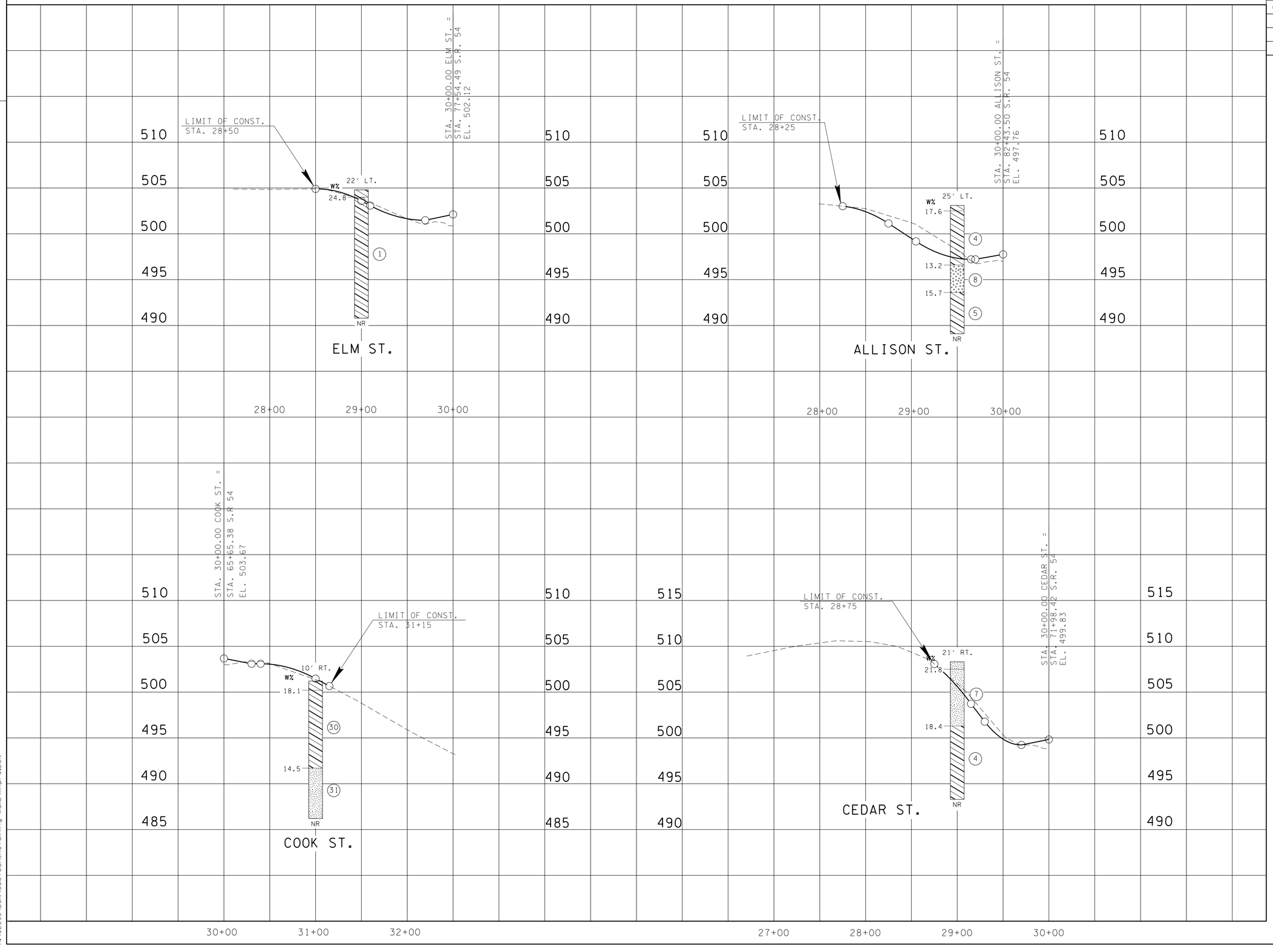
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31 0



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROFILE OF SIDE ROADS AND STREETS

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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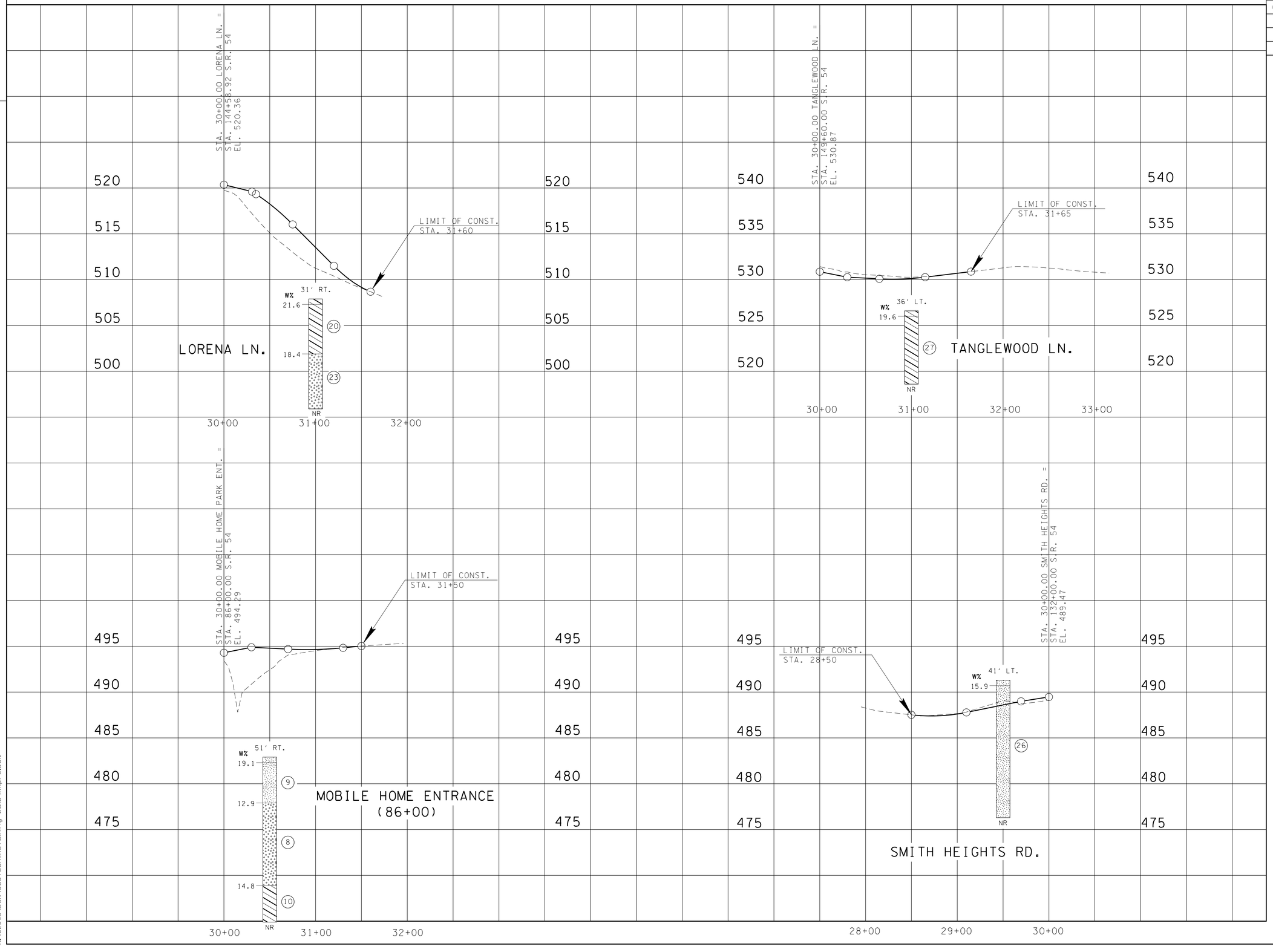
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31P



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROFILE OF SIDE ROADS AND STREETS

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

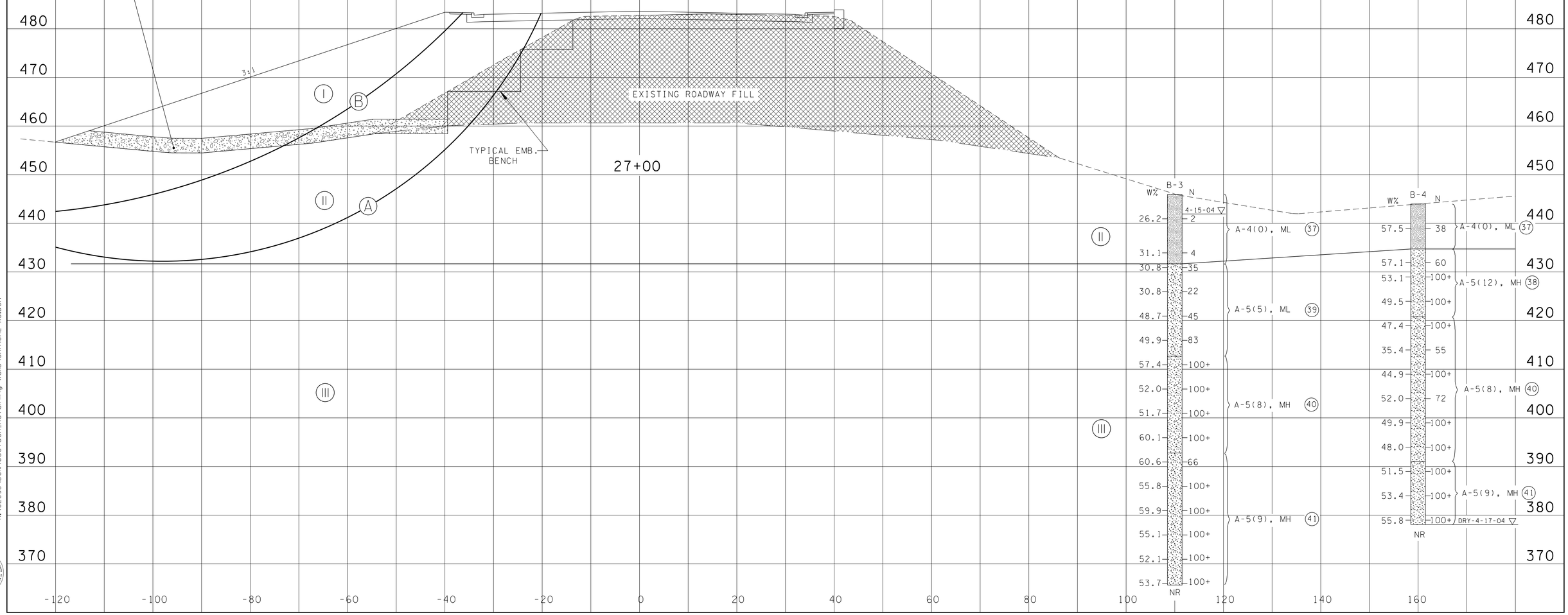
TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	310

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF ϕ= 0° γ=130 PCF	c=900 PSF ϕ= 0° γ=120 PCF	c=1500 PSF ϕ=0° γ=115 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\phi}$=30° γ=130 PCF	$\bar{c}$=100 PSF $\bar{\phi}$=30° γ=120 PCF	$\bar{c}$=250 PSF $\bar{\phi}$=28° γ=115 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	2.2

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 25+00 TO STA. 40+00, IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.



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Survey & Design Division

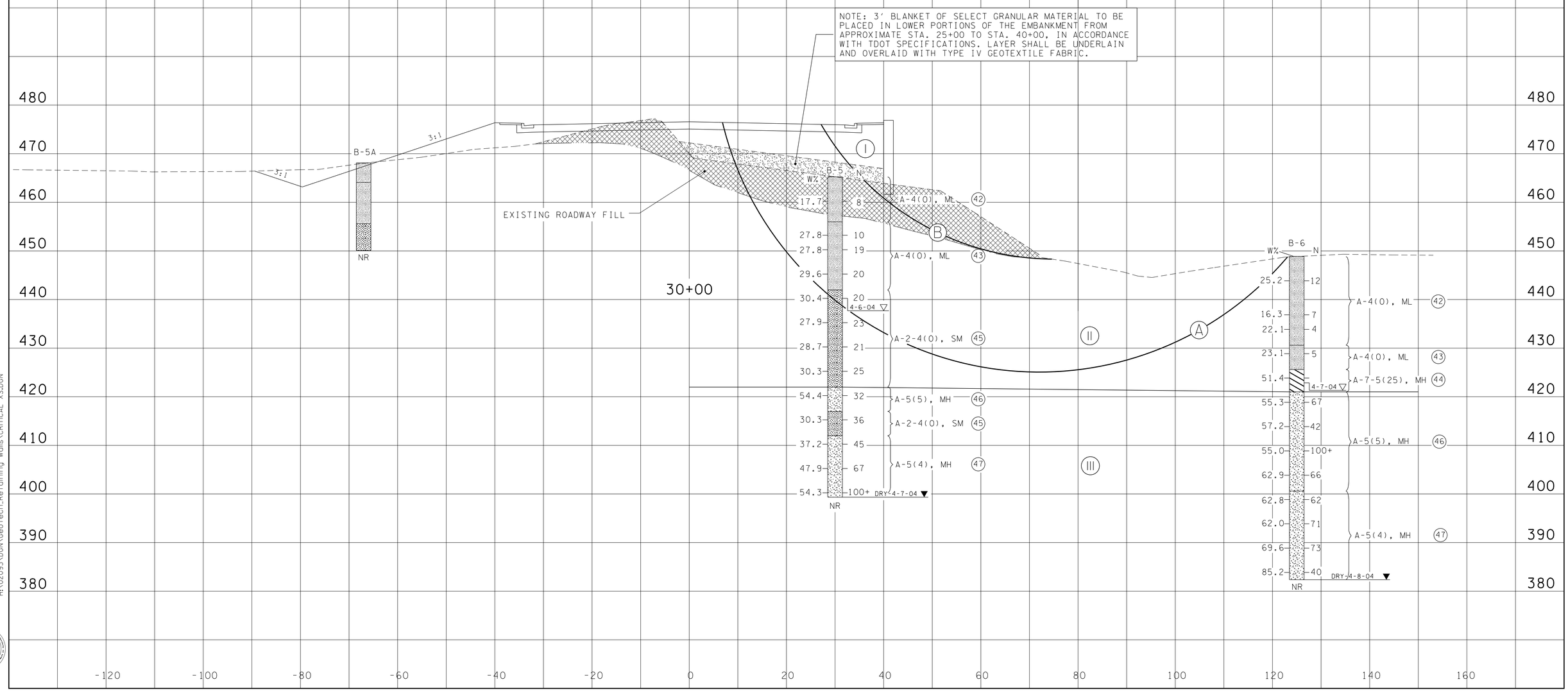
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31R

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=1000 PSF Φ= 0° γ=120 PCF	c=1500 PSF Φ=0° γ=115 PCF
Long Term	c̄=250 PSF φ̄=30° γ=130 PCF	c̄=150 PSF φ̄=30° γ=120 PCF	c̄=250 PSF φ̄=28° γ=115 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.4



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Survey & Design Division

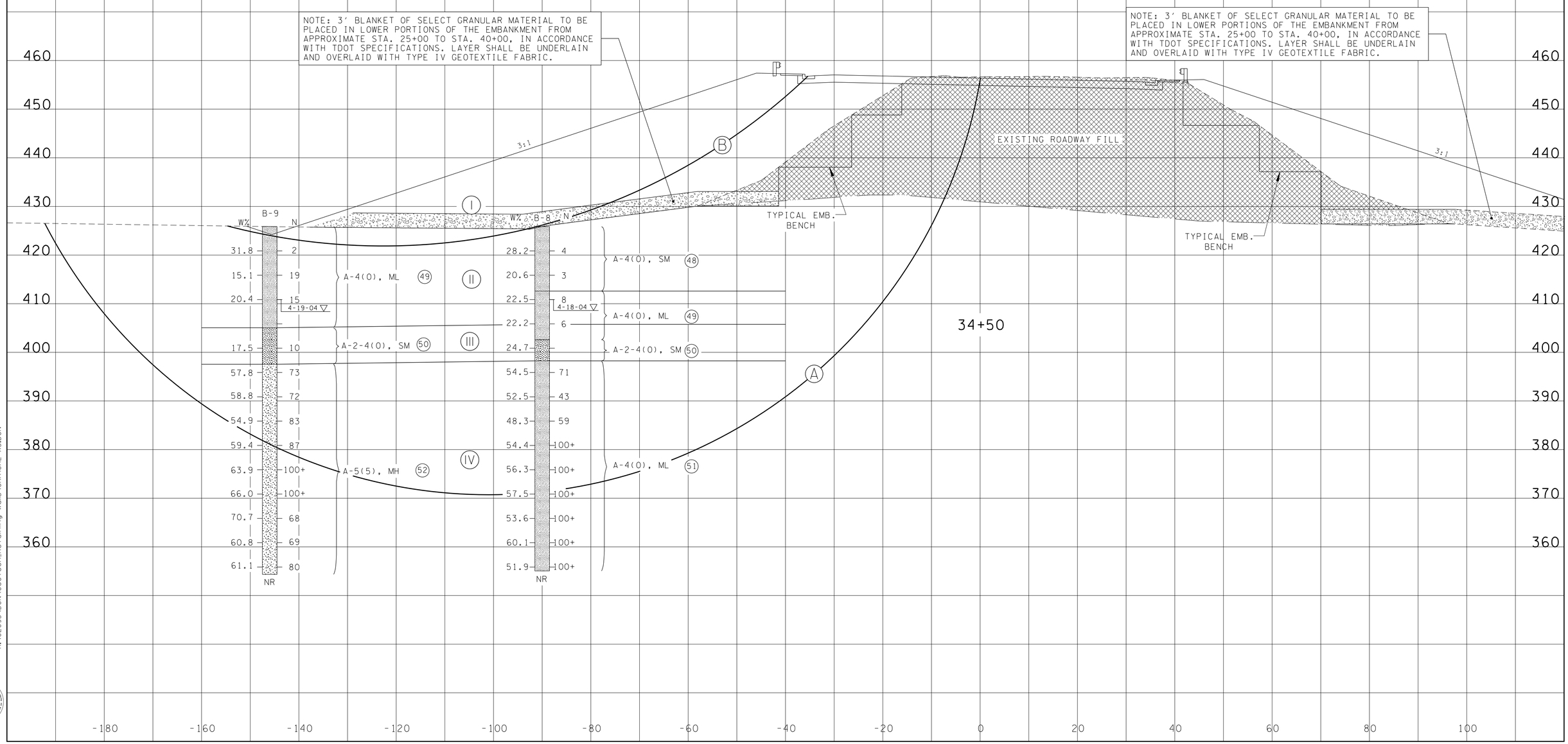
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31S

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS				
SOIL	I	II	III	IV
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=900 PSF Φ= 0° γ=120 PCF	c=40 PSF Φ=28° γ=115 PCF	c=1000 PSF Φ=0° γ=130 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=100 PSF $\bar{\Phi}$=30° γ=120 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=28° γ=115 PCF	$\bar{c}$=200 PSF $\bar{\Phi}$=30° γ=130 PCF

FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	2.4



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Survey & Design Division

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

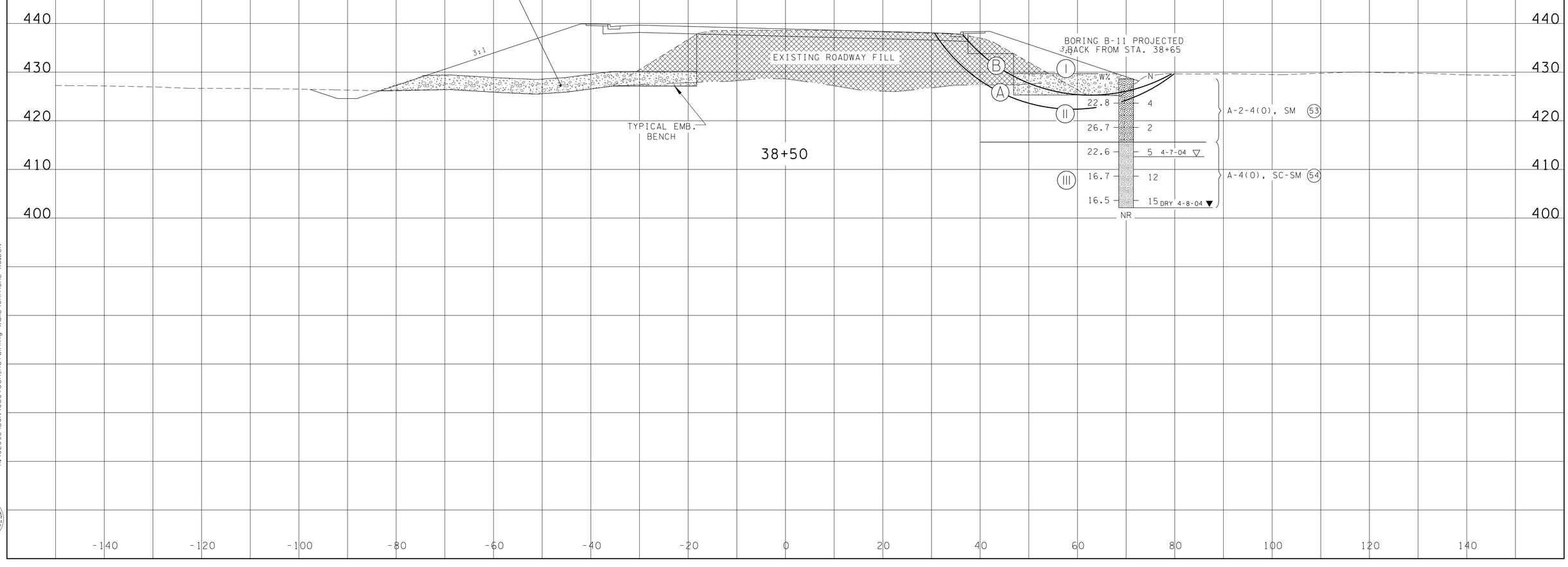
TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31T

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF ϕ= 0° γ=130 PCF	c=40 PSF ϕ=28° γ=120 PCF	c=0 PSF ϕ=30° γ=115 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\phi}$=30° γ=130 PCF	$\bar{c}$=0 PSF $\bar{\phi}$=28° γ=120 PCF	$\bar{c}$=0 PSF $\bar{\phi}$=30° γ=115 PCF

FACTORS OF SAFETY		
Short Term	A	3.5
Long Term	B	2.5

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 25+00 TO STA. 40+00, IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.



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Survey & Design Division

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

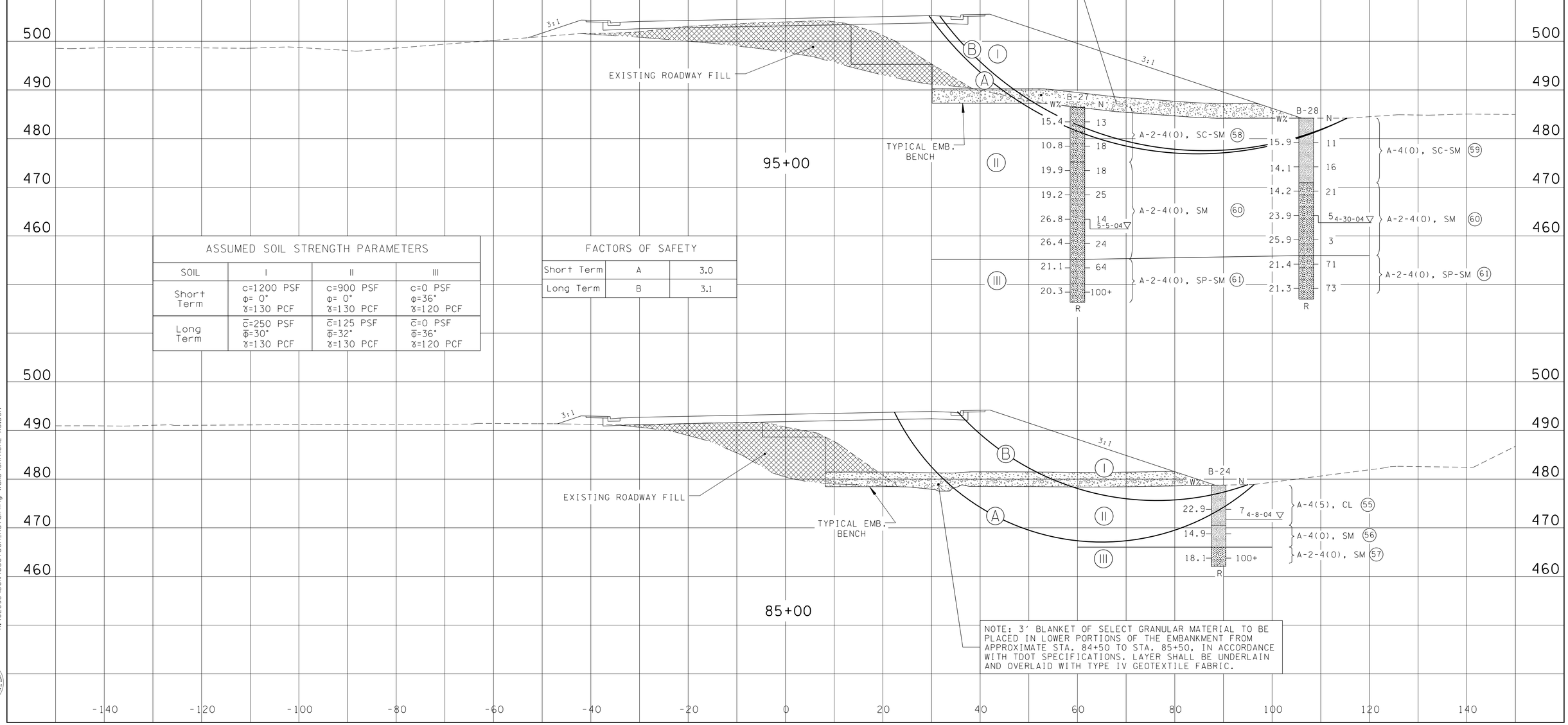
TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31U

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=40 PSF Φ=28° γ=115 PCF	c=0 PSF Φ=34° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=28° γ=115 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=34° γ=120 PCF

FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.2

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 94+50 TO STA. 96+00, IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.



ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=900 PSF Φ= 0° γ=130 PCF	c=0 PSF Φ=36° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=125 PSF $\bar{\Phi}$=32° γ=130 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=36° γ=120 PCF

FACTORS OF SAFETY		
Short Term	A	3.0
Long Term	B	3.1

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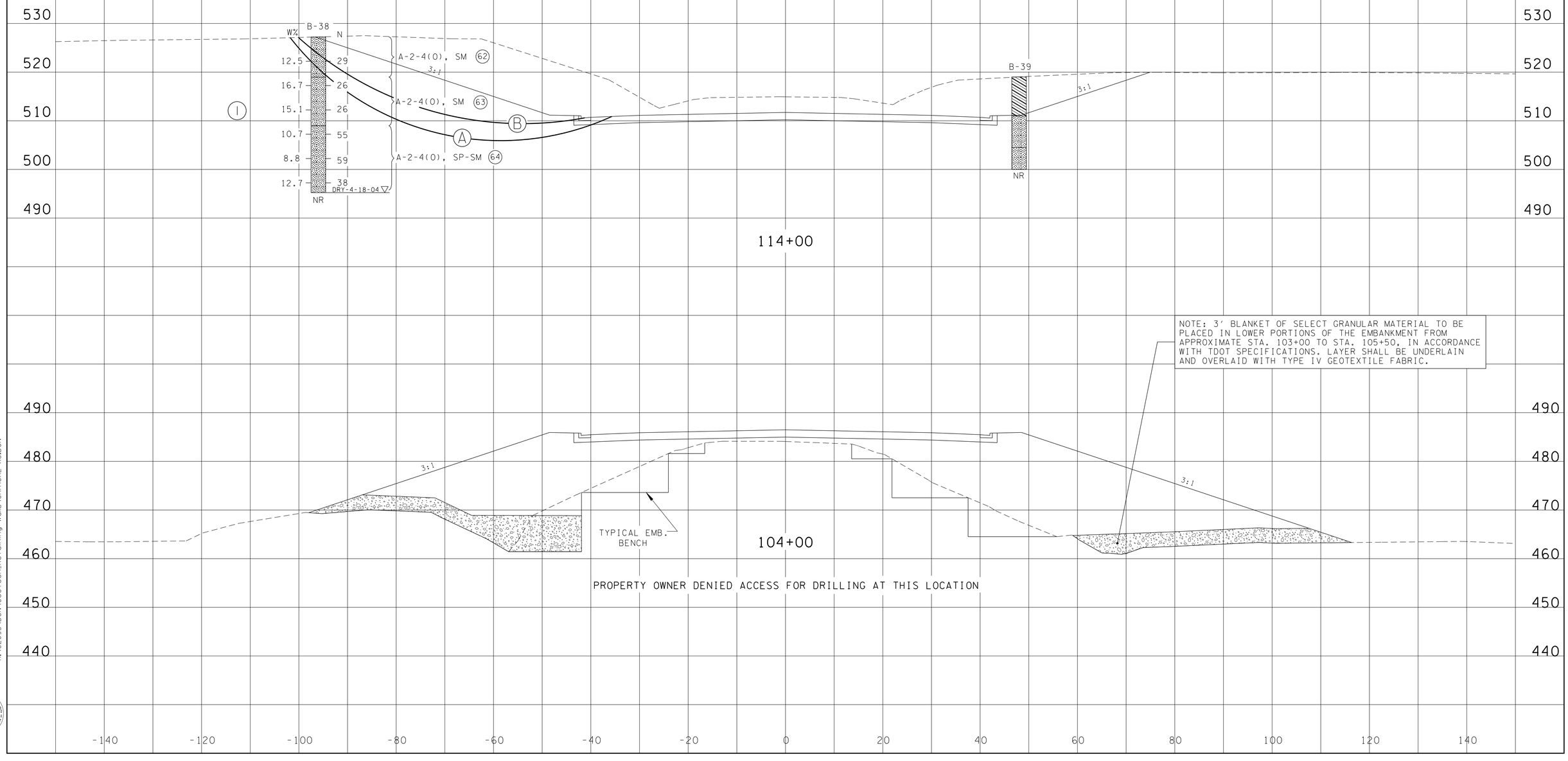
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31V

CONSTRUCTABILITY FIELD REVIEW

ASSUMED SOIL STRENGTH PARAMETERS	
SOIL	I
Short Term	$\bar{c}$=400 PSF $\bar{\Phi}$=30° γ=120 PCF
Long Term	$\bar{c}$=100 PSF $\bar{\Phi}$=30° γ=120 PCF

FACTORS OF SAFETY		
Short Term	A	4.8
Long Term	B	3.2



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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31W

CONSTRUCTABILITY FIELD REVIEW

137+00

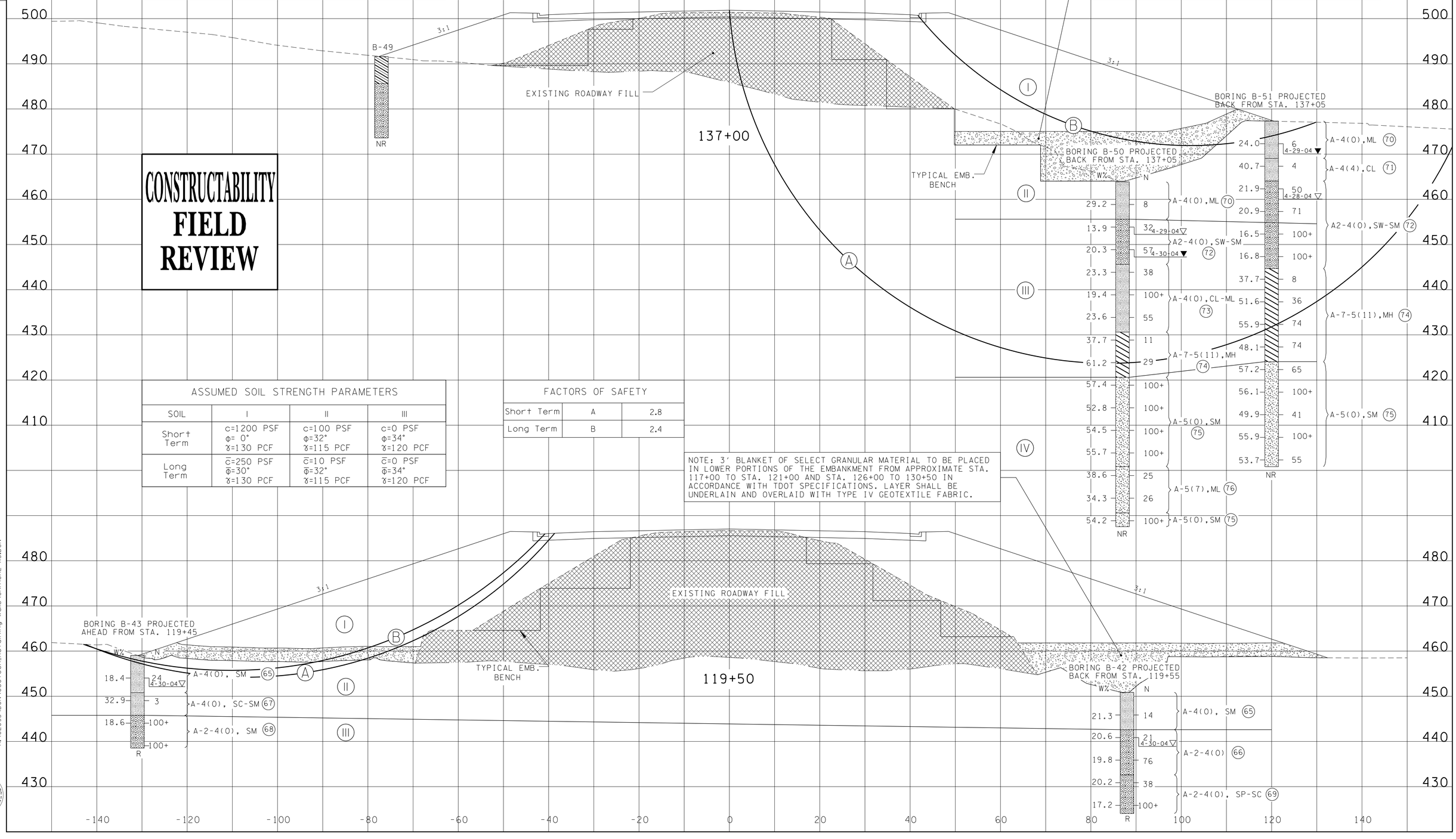
ASSUMED SOIL STRENGTH PARAMETERS

SOIL	I	II	III	IV
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=900 PSF Φ=0° γ=120 PCF	c=1000 PSF Φ=0° γ=120 PCF	c=1400 PSF Φ=0° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=100 PSF $\bar{\Phi}$=30° γ=120 PCF	$\bar{c}$=100 PSF $\bar{\Phi}$=28° γ=120 PCF	$\bar{c}$=200 PSF $\bar{\Phi}$=30° γ=120 PCF

FACTORS OF SAFETY

Short Term	A	1.8
Long Term	B	2.7

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 136+50 TO STA. 140+00, IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.



ASSUMED SOIL STRENGTH PARAMETERS

SOIL	I	II	III
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=100 PSF Φ=32° γ=115 PCF	c=0 PSF Φ=34° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=10 PSF $\bar{\Phi}$=32° γ=115 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=34° γ=120 PCF

FACTORS OF SAFETY

Short Term	A	2.8
Long Term	B	2.4

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 117+00 TO STA. 121+00 AND STA. 126+00 TO 130+50 IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.

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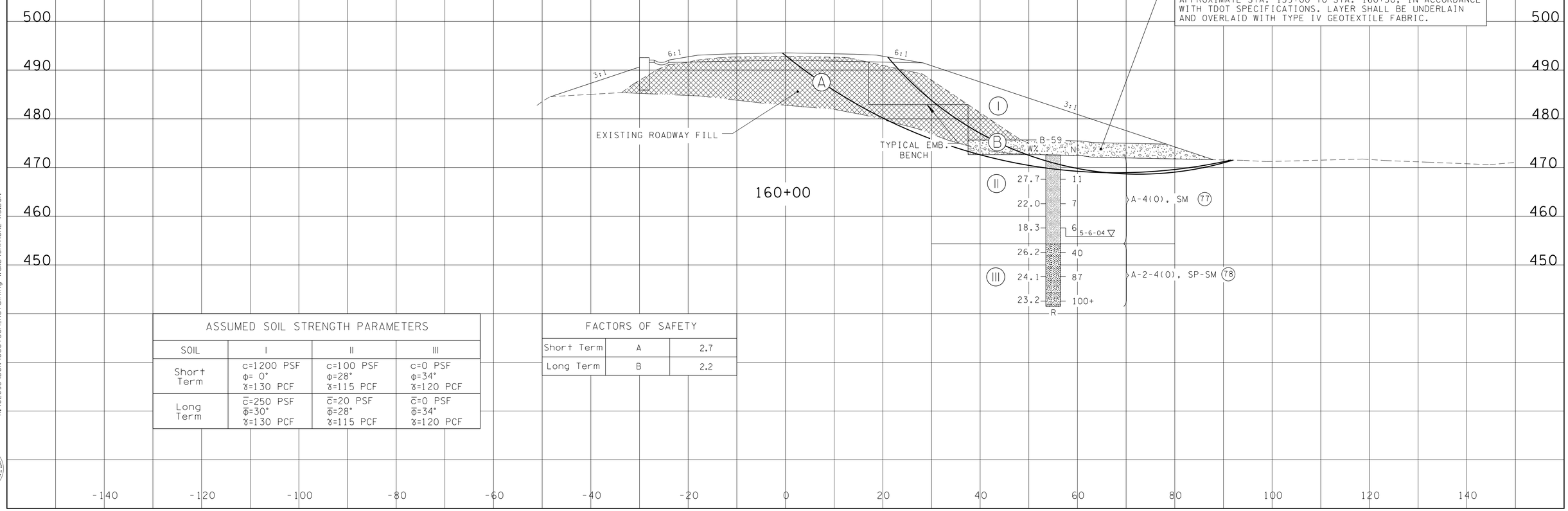
Survey & Design Division

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31X

CONSTRUCTABILITY FIELD REVIEW

NOTE: 3' BLANKET OF SELECT GRANULAR MATERIAL TO BE PLACED IN LOWER PORTIONS OF THE EMBANKMENT FROM APPROXIMATE STA. 159+00 TO STA. 160+50, IN ACCORDANCE WITH TDOT SPECIFICATIONS. LAYER SHALL BE UNDERLAIN AND OVERLAID WITH TYPE IV GEOTEXTILE FABRIC.



ASSUMED SOIL STRENGTH PARAMETERS			
SOIL	I	II	III
Short Term	c=1200 PSF Φ= 0° γ=130 PCF	c=100 PSF Φ=28° γ=115 PCF	c=0 PSF Φ=34° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=30° γ=130 PCF	$\bar{c}$=20 PSF $\bar{\Phi}$=28° γ=115 PCF	$\bar{c}$=0 PSF $\bar{\Phi}$=34° γ=120 PCF

FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.2

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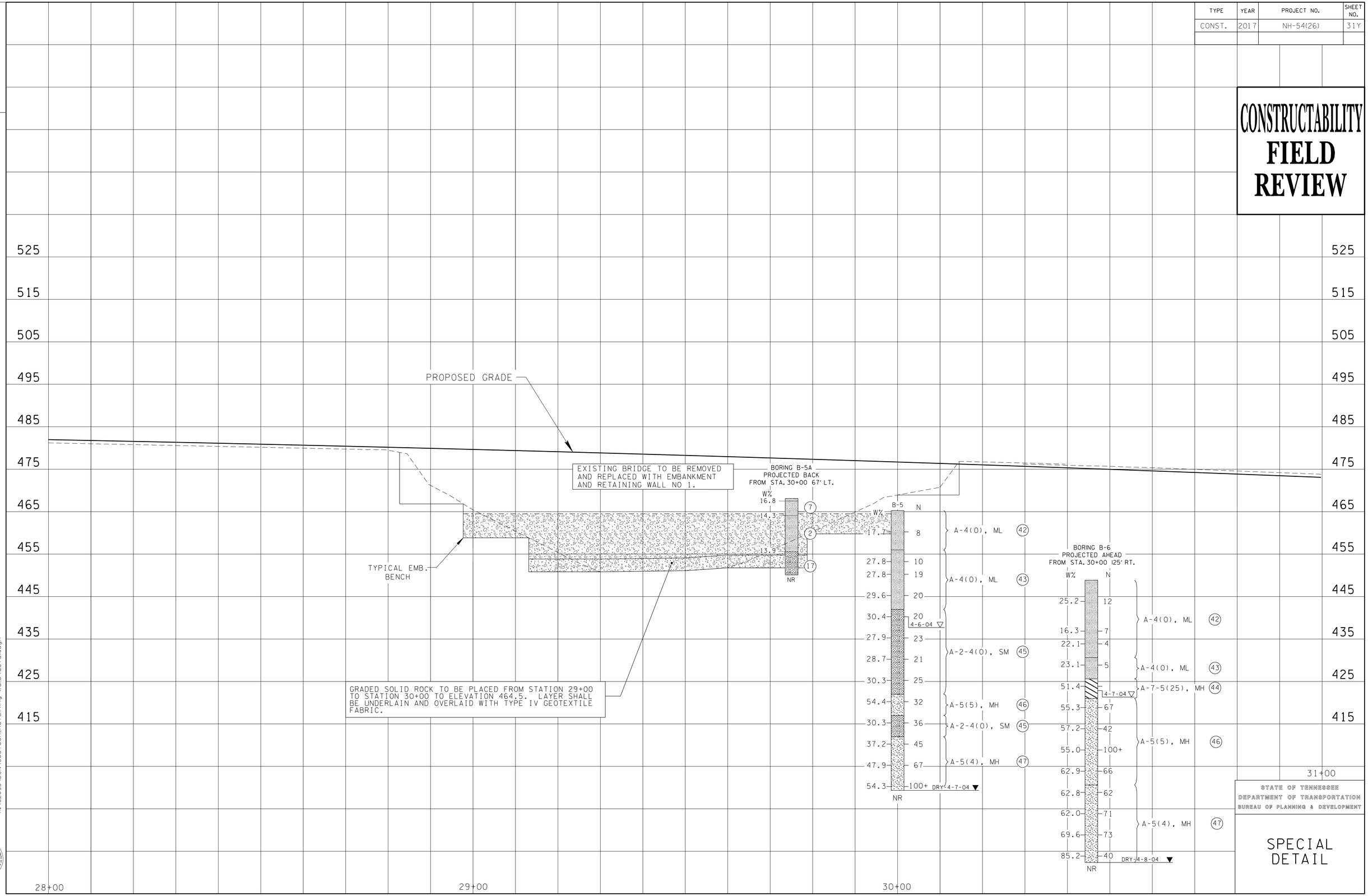
Survey & Design Division

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31Y

CONSTRUCTABILITY FIELD REVIEW



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

SPECIAL DETAIL

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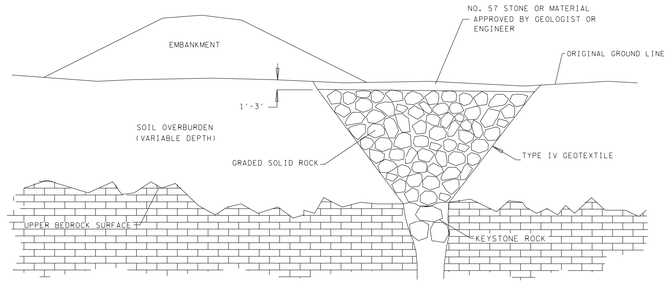
Survey & Design Division

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2017	NH-54(26)	31Z



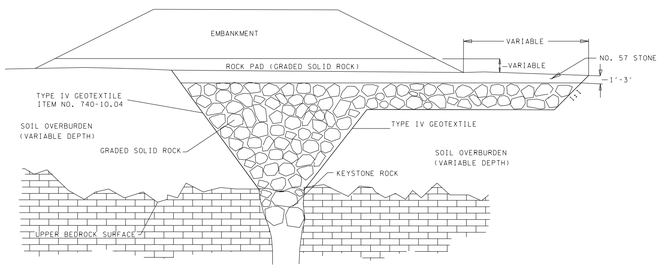
SINKHOLE TREATMENT 1

SINKHOLE TREATMENT 1, ACTIVE

NOTE: AFTER EXCAVATION IS COMPLETE AND ROCK OPENING IS EXPOSED, THE SITE AND TREATMENT METHOD SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS. THE TOP 1-3 FT. OF MATERIAL SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS.

SEQUENCE OF CONSTRUCTION:

1. EXCAVATE SINKHOLE TO DEFINED OPENING IN BEDROCK MAKING SURE TO REMOVE ALL SOIL AND DEBRIS.
2. FIT THE OPENING WITH KEYSTONE ROCK, WHICH SHALL BE OF SUFFICIENT SIZE TO LOCK IN PLACE WITHOUT CREATING AN AIRBLOCK TO SUBSURFACE DRAINAGE.
3. PLACE THE TYPE IV GEOTEXTILE FABRIC ON EXCAVATED SLOPES AND BASE OF SINKHOLE.
4. BACKFILL TO A MAXIMUM OF 1 FT. OF THE SPECIFIED GRADE WITH GRADED SOLID ROCK (CLASSIFICATION 203.02, BORROW EXCAVATION).
5. BACKFILL TO GRADE WITH A MINIMUM OF 1 FT. OF NO.57 STONE ON TOP OF THE GRADED SOLID ROCK AND TYPE IV GEOTEXTILE.



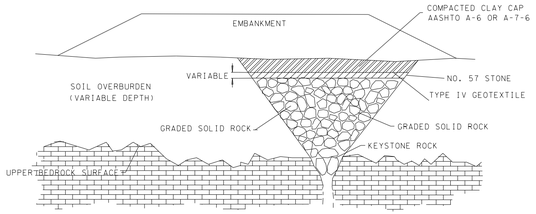
SINKHOLE TREATMENT 1A

SINKHOLE TREATMENT 1A ACTIVE

NOTE: AFTER EXCAVATION IS COMPLETE AND ROCK OPENING IS EXPOSED, THE SITE AND TREATMENT METHOD SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS. THE TOP 1-3 FT. MATERIAL SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS.

SEQUENCE OF CONSTRUCTION:

1. EXCAVATE SINKHOLE TO DEFINED OPENING IN BEDROCK AND EXCAVATE TONGUE DOWN TO THE DEPTH SHOWN MAKING SURE TO REMOVE ALL SOIL AND DEBRIS FROM THESE EXCAVATIONS.
2. FIT THE OPENING WITH KEYSTONE ROCK, WHICH SHALL BE OF SUFFICIENT SIZE TO LOCK IN PLACE WITHOUT CREATING AN AIRBLOCK TO SUBSURFACE DRAINAGE.
3. PLACE THE TYPE IV GEOTEXTILE FABRIC.
4. BACKFILL TO WITHIN 1.5-3 FT.OF THE SPECIFIED GRADE WITH GRADED SOLID ROCK.
5. PLACE THE TYPE IV GEOTEXTILE ON TOP OF GRADED SOLID ROCK.
6. BACKFILL TO GRADE WITH NO. 57 STONE.



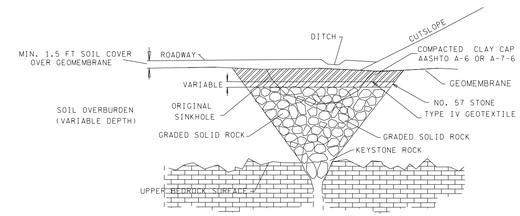
SINKHOLE TREATMENT 2

SINKHOLE TREATMENT 2 AND 2A , INACTIVE

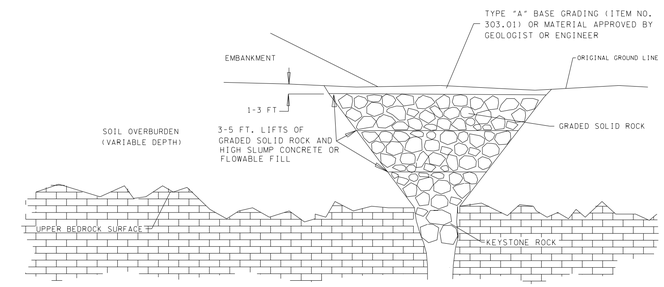
NOTE: AFTER EXCAVATION IS COMPLETE AND ROCK OPENING IS EXPOSED, THE SITE AND TREATMENT METHOD SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS. ANY CHANGE IN THE NO. 57 STONE FILL OR THE CLAY CAP SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS.

SEQUENCE OF CONSTRUCTION:

1. EXCAVATE SINKHOLE TO DEFINED OPENING IN BEDROCK MAKING SURE TO REMOVE ALL SOIL AND DEBRIS.
2. FIT THE OPENING WITH KEYSTONE ROCK, WHICH SHALL BE OF SUFFICIENT SIZE TO LOCK IN PLACE WITHOUT CREATING AN AIRBLOCK TO SUBSURFACE DRAINAGE.
3. BACKFILL WITH GRADED SOLID ROCK (CLASSIFICATION 203.02, BORROW EXCAVATION) UP TO SPECIFIED GRADE.
4. PLACE TYPE IV GEOTEXTILE ON TOP OF GRADAED SOLID ROCK. PLACE NO. 57 STONE ON TOP OF GEOTEXTILE.
5. CONSTRUCT COMPACT CLAY CAP. SOIL SHOULD BE OF TYPE AASHTO A-6 OR A-7-6.
6. PLACE GEOMEMBRANE ON TOP OF SOIL CAP BEFORE CONSTRUCTION OF ANY OVERLYING STRUCTURES OR EMBANKMENTS. THERE SHOULD BE A MINIMUM OF 1.5 FT. OF SOIL PLACED OVER THE MEMBRANE.
7. DITCH SHOULD BE PAVED OR LINED WITH A GEOMEMBRANE.



SINKHOLE TREATMENT 2A



SINKHOLE TREATMENT 4

SINKHOLE TREATMENT 4,INACTIVE

NOTE: AFTER EXCAVATION IS COMPLETE AND ROCK OPENING IS EXPOSED, THE SITE AND TREATMENT METHOD SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS. ANY CHANGE IN THE THE NO.57 STONE FILL SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS.

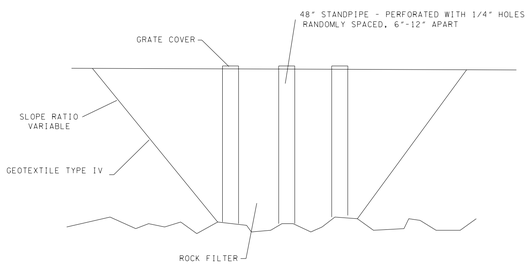
SEQUENCE OF CONSTRUCTION

1. EXCAVATE SINKHOLE TO DEFINED OPENING IN BEDROCK AS DEFINED BY THE ENGINEER OR GEOLOGIST MAKING SURE TO REMOVE ALL SOIL DEBRIS.
2. FIT THE OPENING WITH KEYSTONE ROCK, WHICH SHALL BE OF SUFFICIENT SIZE TO LOCK IN PLACE WITHOUT CREATING AN AIRBLOCK TO SUBSURFACE DRAINAGE.
3. ALTERNATE LAYERS OF GRADED SOLID ROCK (CLASSIFICATION 203.02, BORROW EXCAVATION) (3-5 FT. IN DEPTH) AND HIGH SLUMP CONCRETE (OR FLOWABLE FILL).
   HIGH SLUMP CONCRETE SHALL BE CONCRETE WITH A SLUMP OF 7-9"

   HIGH SLUMP CONCRETE OR FLOWABLE FILL SHALL BE APPLIED AFTER A LAYER OF GRADED SOLID ROCK UNTIL THE CONCRETE (OR FLOWABLE FILL) JUST COVERS THE GRADED ROCK LAYER. THE NEXT LAYER OF GRADED SOLID ROCK SHALL BE PLACED IMMEDIATELY AFTER THE PLACEMENT OF THE CONCRETE (OR FLOWABLE FILL). THE PURPOSE OF THIS IS TO INTERMIX THE MATERIALS. THE WORK SHALL NOT BE INTERRUPTED AFTER THE PLACEMENT OF CONCRETE (OR FLOWABLE FILL) EXCEPT FOR THE TOP LAYER. IF WORK CANNOT BE FINISHED IN A SPECIFIED INTERVAL, WORK MAY BE STOPPED ONLY AFTER A COMPLETE LAYER OF GRADED SOLID ROCK HAS BEEN PLACED.
4. AFTER THE FINAL LAYER OF CONCRETE (OR FLOWABLE FILL) HAS BEEN SET, BACKFILL TO GRADE WITH TYPE "A" BASE GRADING (ITEM NO. 303.01) OR OTHER MATERIAL APPROVED BY THE ENGINEER OR GEOLOGIST.

SPECIFICATIONS FOR GRADED SOLID ROCK

BORROW EXCAVATION (GRADED SOLID ROCK) SHALL CONSIST OF THE REMOVAL AND SATISFACTORY PLACEMENT OF SOUND, NON-DEGRADABLE ROCK WITH A MAXIMUM SIZE OF 1 METER (3 FEET). AT LEAST 50 PERCENT OF THE SHALL BE UNIFORMLY DISTRIBUTED BETWEEN 300 MILLIMETERS (1 FOOT) AND 1 METER (3 FEET) IN DIAMETER AND NO GREATER THAN 10 PERCENT SHALL BE LESS THAN 50 MILLIMETERS (2 INCHES) IN DIAMETER. THE MATERIAL SHALL BE ROUGHLY EQUI-DIMENSIONAL IN SHAPE. THIN, SLABBY MATERIAL WILL NOT BE ACCEPTED. THE CONTRACTOR SHALL BE REQUIRED TO PROCESS THE MATERIAL WITH ACCEPTABLE MECHANICAL SCREENING PROCESS THAT PRODUCES THE REQUIRED GRADATION. WHEN THE MATERIAL IS SUBJECTED TO FIVE ALTERATIONS OF THE SODIOM SULFATE SOUNDNESS TEST (AASHTO T 104), THE WEIGHTED PERCENTAGE OF LOSS SHALL BE NOT MORE THAN 12. THE MATERIAL SHALL BE APPROVED BY THE ENGINEER BEFORE USE.



SINKHOLE TREATMENT 3

SINKHOLE TREATMENT 3, ACTIVE

NOTE: AFTER EXCAVATION IS COMPLETE AND ROCK IS EXPOSED, THE SITE AND TREATMENT METHOD SHALL BE APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEERING SECTION OF THE DIVISION OF MATERIALS AND TESTS.

SEQUENCE OF CONSTRUCTION

1. EXCAVATE SOIL DOWN TO BEDROCK TO LIMITS SPECIFIED BY THE ENGINEER OR GEOLOGIST.
2. LOCATE ALL OPENINGS WITHIN THE PITS, REMOVE ALL LOOSENED MATERIAL. ALL EXCAVATED MATERIALS SHALL BE REMOVED FROM THE BASIN.
3. INSTALL 48" DIAMETER VERTICAL STANDPIPES OVER THE LOCATED OPENINGS. THESE PIPES SHOULD BE PERFOFATED FOR AT LEAST THE LOWER 5 FT. WITHIN 1/4" HOLES SPACES 6-12" APART.
4. PLACE TYPE IV GEOTEXTILE FABRIC AS SHOWN OR AS DIRECTED BY THE ENGINEER OR GEOLOGIST TO PREVENT THE LATERAL INFLOW OF FINES.
5. BACKFILL WITH A ROCK FILTER TO A HEIGHT OF 3.5" BELOW THE TOP OF THE STANDPIPE.

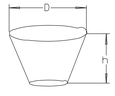
THE ROCK FILTER MATERIAL SHALL CONSIST OF A MIXTURE OF LIMESTONE SHOT ROCK AND CRUSHED STONE TO MEET THE FOLLOWING GRADATION:

SIZE RANGE (ALONG ITS MAXIMUM DIMENSION)	VOLUME
2'-1'	60-40%
1'-6"	40-20%
6"-2"	20-10%
LESS THAN 2"	5-0%

6. THE ROCK FILTER MATERIAL SHALL BE PLACED WITH A CLAMSHELL. NO END DUMPING WILL BE PERMITTED.

EQUATION FOR ESTIMATING SINKHOLE VOLUME, WHERE THE SIDES OF THE SINKHOLE ARE AT 1:1 SLOPES.

$$\text{VOL. } 1{:}1 \approx 0.13D^3 - (0.5D - h)^3$$



CONSTRUCTABILITY FIELD REVIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SINKHOLE STANDARD DRAWINGS

SINKHOLE TREATMENT ILLUSTRATIONS

1,1A,2,2A,3,AND 4

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