



Report of:

**ROCK CUT SLOPES  
Portsmouth Bypass  
Project SCI-823-6.81  
Phase 1 – Stage I  
Scioto County, Ohio**

**DLZ Ohio, Inc.**  
6121 Huntley Road  
Columbus, OH 43229  
Phone: (614) 888-0040  
Fax: (614) 436-0161

DLZ Job No. 0121-3070.03  
PID 19415

**November 29, 2006**



Prepared for:  
**TransSystems Corporation**  
5747 Perimeter Drive, Suite 240  
Dublin, Ohio 43017



**Ohio Department of Transportation**  
District 9  
650 Eastern Avenue  
Chillicothe, Ohio 45601

Prepared by:



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**1.0 INTRODUCTION**

This report presents the methodologies and findings of the cut slope design performed by DLZ Ohio, Inc. (DLZ) for the Phase 1 portion of the SCI-823-6.81 Portsmouth Bypass project. The project is located in Scioto County, Ohio. The Phase 1 portion of the project begins at Station 352+00 and ends at Station 537+50. The proposed alignment extends in a northeasterly direction for approximately 3.5 miles from approximately 0.5 mile south of the existing Shumway Hollow Road (TR 234) and approximately 0.25 mile southwest of the County Airport to the existing Lucasville Minford Road (CR 28). The proposed alignment is illustrated on the general location map in Appendix A.

Based on the site plans included in Appendix A, rock cut slope design was required in certain areas of the proposed mainline alignment between Station 415+00 and Station 530+00. In considering the rock cut slopes, the mainline section was divided into five cut sections, namely, Rock Cuts #11 through #15. In addition, rock cut slope design was also necessary along the relocated Shumway Hollow Road (TR234), Ramp T234D, Ramp 728A, and Ramp 728D. The areas requiring rock cut slope design and their corresponding station ranges are shown in the following table. The stationing given for the rock cuts are approximate and are based on available borehole information.

<b>Rock Cut</b>	<b>Station Range</b>
Shumway Hollow Road	10+91 – 26+50
Ramp T234D	385+00 – 387+00
11	415+00 – 434+00
12	449+50 – 458+00
13	479+00 – 483 +00
14	497+00 – 504+00
15*	507+00 – 530+00

\*Rock cut #15 includes Ramp 728A (Station 518+53.48 to Station 528+00) and Ramp 728D (Station 518+51.62 to Station 527+00).

A subsurface exploration program was conducted for the proposed alignment. The purpose of the subsurface exploration was to: 1) determine the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide information to assist in designing the cut slopes, roadway embankments and pavements.

This report pertains to the rock cut slope design only. The findings of the roadway embankment and pavement evaluation are presented in separate documents. Note that information specific to soil cut slopes is also present in their respective roadway embankment reports.

The geotechnical engineer has planned and supervised the performance of the geotechnical engineering services, has considered the findings, and has prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are made as to the professional advice included in this report.

## **2.0 PHYSICAL SETTING**

The project is located in the Shawnee-Mississippian Plateau of the unglaciated portion of the Appalachian Plateau Physiographic Region. This area is not highly developed and contains limited secondary roadways. The area is characterized by rough, steep, broken, and severely dissected topography. The natural slopes are generally very steep, rising abruptly from the valley bottoms. The maximum topographic relief along project centerline is on the order of 275 feet and occurs between a high point at approximate Station 523+70 (approximate elevation 890 feet) and a low point near Station 353+80 (approximate elevation 615 feet). The maximum vertical relief along the proposed finished grade is approximately 130 feet, with the highest point at approximate Station 352+00 (elevation 645 feet) and the lowest point near Station 519+30 (elevation 775 feet).

## **3.0 GEOLOGICAL CONSIDERATIONS**

### **3.1 Site Geology**

The lithology of the project area is primarily composed of Pennsylvanian and Upper Mississippian age rocks including shale, siltstone, and sandstone.

The Pennsylvanian age rocks in the project area are in the Pottsville Group and mapped as the Pennsylvanian Breathitt Formation according to the bedrock geology maps prepared by the Ohio Department of Natural Resources' Division of Geologic Survey (ODNR-DGS). The Breathitt Formation is found as thin bands generally following the topographic contours of the higher ridgelines. Due to the regional dips, this rock formation generally exists above elevations between 760 and 850 feet in the project area. The Breathitt Formation consists of conglomerate, coal, shale, thin limestone, sandstone, and ironstone. Generally, shale and sandstone are the dominant lithologies with occasional thin, bony coal beds or blossoms.

The predominant marker beds found with the Breathitt Formation are the Harrison Ore, located immediately above the Mississippian age Maxville Limestone, the Sciotoville Clay, the Sharon Ore, and the Anthony Coal. Of these members, the Harrison Ore is the only marker bed that is relatively continuous within the project area.

The Upper Mississippian age rocks from the Waverly Series, Logan, and Cuyahoga Formations generally exist below the Pennsylvanian age Breathitt Formation. However,

the Maxville Limestone, overlying the Logan Formation, marks the contact with the Breathitt Formation. The Maxville Limestone consists of isolated, discontinuous pockets of limestone. The discontinuous nature is due to an erosional unconformity at the upper surface. Where the Maxville Limestone is absent, the Logan Formation marks the upper contact with the Breathitt Formation.

The Logan Formation varies in thickness in part due to the erosional unconformity at its upper boundary and consists primarily of gray to brown fine-grained sandstone, siltstone, and sandy shale. However, the Logan Formation is characterized by the dominance of sandstone. Three members of the Logan are identified within the project area, namely, the Byer Sandstone, the Allensville Conglomerate, and the Vinton Sandstone. Occasional iron bearing zones, identified as ironstones and ferric bands, are present within the Logan Formation, but are usually thin, isolated, and nodular. Generally, the Vinton member is a fine-grained sandstone which can be finely interbedded with sandy shale and often contains zones of fossils and ironstone concretions. The Allensville member is a fine-grained sandstone which can be finely interbedded with sandy shale with small pebbles beds (1 to 2 inches) throughout. This member is not easily distinguishable from the Byer member and is often missing within the sequence. The Byer member is generally a fine-grained sandstone which can be finely interbedded with sandy shale or massive sandstone.

The Logan Formation is the dominant rock stratum found within the project area with the exception of the Pennsylvanian Breathitt Formation capping the higher ridgelines in some areas.

Soils found within the study corridor can be divided into three groups; residual and colluvial soils derived from weathering of underlying rock and downslope transport; lacustrine and outwash deposits of glacial origin; and recent alluvial deposits. The residual and colluvial soils are found along the ridge tops and hillsides; glacial soils are typically found within the major stream valley and their tributaries; and recent alluvial deposits are found along and within stream channels and valleys.

Within the project area, residual and colluvial soils are generally thin to moderately deep, covering moderate to very steep slopes. Residual and colluvial soils on the hillsides are prone to landslides.

The two types of glacial soils encountered within the study corridor are lacustrine deposits and glacial outwash deposits. The lacustrine soils are commonly known as the 'Minford Silts' or the Minford Complex. The Minford Complex soils are generally found between elevations of 650 to 780 feet. The thickness of the Minford Complex soils varies considerably throughout the project area, partially due to the nature of original deposition and geological changes since the time of formation. When present, these materials lie on or near bedrock. The Minford Complex soils have no regular succession but typically sands and sandy silts are found near the bedrock and fine laminated silts and clays are found at the higher levels of the sequence. Occasionally the Minford Complex contains sandstone cobbles and boulders or chert and quartz pebbles in the lower parts of

the sequence. These cobbles, boulders and pebbles within the sequence are believed to be of local origin. The glacial deposits are late Wisconsinan in age and consist of sand and gravel deposits with small isolated peat deposits. Generally, these deposits are saturated at shallow depths with high recharge rates.

Alluvial soils, to some extent, are found along all of the creeks and rivers within the project area. Generally alluvial deposits range from silty clay to coarse sand. Where bedrock is shallow, alluvial deposits may contain coarse sand, gravel, and cobbles.

### **3.2 Landslide Susceptibility**

The dominant rock type along the proposed alignment is sandstone of the Mississippian aged Logan Formation. Siltstone and shale are commonly found interbedded with the sandstone. These siltstones and shales generally weather to clay with low shear strength over time. The steeper slopes are prone to gradual movement known as soil creep. The low shear strength of the residual and colluvial soils combined with the steep topography makes some of the hillsides within the proposed limits of construction prone to shallow surficial landslides and soil creep. Generally these conditions are easily corrected by removal of the unstable slope materials. No deep-seated landslides were observed along the proposed Phase 1 alignment.

In the steep terrain of Scioto County, soil creep is common. Areas of slope instability were first identified using survey data and aerial photography and then verified during the fieldwork. Four areas showed recent signs of significant instability near or within the proposed limits of construction. All slope instability appeared to be relatively shallow soil creep and contained within the overburden, though one of these areas showed signs of a past massive landslide. These areas of slope instability are shown on the field notes and proposed centerline in Appendix A of the *Report of Geology and Field Reconnaissance for Project SCI-823-6.81, Phase I-Stage I, dated November 29, 2006*.

#### **Station 352+00 to Station 356+00**

The aerial photography showed hummocky terrain from Station 352+00 continuing to Station 356+00. This area exhibited signs of recent instability. This is most likely due to erosion and shallow soil creep along the steep drainage channels of intermittent streams in the area.

#### **Station 423+00 to Station 425+00**

The area from Station 423+00 to Station 425+00 exhibited signs of recent instability. This is most likely due to erosion and saturation of the steep, nearly 1H:1V slopes along steep intermittent stream channels during heavy rainfall events. The soil creep in this area appeared to be relatively massive. However, in this area, the current profile indicates the alignment will be in a deep rock cut section and the unstable soils will be removed.



### **Station 432+00 to Station 442+00**

Another area to exhibit signs of soil creep is the steep slope from the Station 432+00 to Station 442+00. This is most likely erosion from logging activities and the toes of these slopes being eroded by the intermittent streams that flow through the valley. The recent activity appears to be shallow soil creep and not a deep active landslide.

### **Station 482+00 to Station 484+25**

Another area to exhibit signs of instability is the steep, nearly 1H:1V slope from the Station 482+00 to Station 484+25. This is most likely due to the toe of the slope being eroded by Long Run. In the past there appears to have been a massive landslide in this location. However, the recent activity appears to be shallow soil creep and not a deep active landslide.

## **3.3 Mining Activities**

Scioto County has been mined extensively for a variety of materials including sand and gravel, sandstone, clay, and coal. However, neither large sand and gravel operations nor large clay pit were reported within the project area.

Strip and drift mining for coal are common within the Pennsylvanian rocks along the far eastern portion of the county in Bloom, Vernon, and Green Townships outside of the project area. Coal seams do not appear in significant enough thickness or quality within the study corridor to have warranted extensive mining. Small-scale local coal mining operations are suspected to have occurred historically within the Pennsylvanian Breathitt Formation found in the project area.

Quarries are found throughout Scioto County for mining dimension blocks of sandstone and limestone for aggregate or flux. However, the sandstones of the Mississippian Logan Formation, the dominant rock in the study corridor, are unsuitable for dimension stone. Consequently, quarries for sandstone or limestone were not reported or observed within the project area.

Iron deposits are found throughout the region and were reported to have been locally mined within Scioto County. The extent of ore mining within the project area is unknown, but estimated to be very small.

## **3.4 Seismic Considerations**

Compared to seismically active areas of the United States (California or Alaska), Ohio has relatively few earthquakes. The most frequent and damaging earthquakes in the state of Ohio originated from the City of Anna, Shelby County, in the vicinity of western Ohio. During the last 100 years this area has experienced more than 30 earthquakes with the decade of the 1930's being the most active period. Among these 30 earthquakes, only 23 events were recorded, including the most severe shock ever recorded in Ohio. This severe earthquake, occurred on March 9, 1937, had a reported intensity of VIII on the modified Mercalli scale (5.4 on the Richter scale) and was felt over an area of 150,000

square miles. Considerable damage to windows and walls and extensive cracking of masonry occurred in several large buildings in Anna and nearby communities.

Earthquakes were also reported in northeastern, southeastern, and other western portions of Ohio. One earthquake, measured between 4.0 and 4.9 on the Richter scale, reportedly centered near Portsmouth, Ohio in 1901. Lesser magnitude quakes have been recorded in southern Ohio, outside of Scioto County. These earthquakes were of minor intensity (<3.9 magnitude), causing little or no damage.

This project is located in excess of 200 miles away from the City of Anna and any of the above-mentioned areas of historical earthquakes. It is estimated that the levels of seismic acceleration from any of the previous earthquake locations would be small and that the effect of seismic loadings, if any, due to the potential earthquakes from these areas can be considered minimal on the design of rock cut slope design.

### **3.5 Existing Cut Slope Features in the Region**

Existing rock cut slopes are located along the CSX Railroad line, existing roadways, and in locations of the project area. The field observations of the rock cut slopes within the project area are presented in the following paragraphs.

A large cut exists in the northwestern portion of the proposed Portsmouth Bypass corridor on Fairground Road behind M&J Welding, a moderately-sized industrial facility. The base of the cut is at an approximate elevation of 620 feet. The property behind and adjacent to the M&J Welding main building appears to be in the preliminary stages of development for an industrial park. The approximately lower two-thirds of the hillside behind the building is composed of the Portsmouth Shale member of the Cuyahoga Formation while the remaining one-third is composed of sandstone of the Logan Formation. The cut directly behind the building appears to be entirely within the Portsmouth Shale at approximately 1.5H:1V to 2H:1V slope. It is uncertain whether the cut was made for original construction of the building or to mitigate a landslide that might have developed after the building was constructed since the cut appears to be recent. The shale exposed in the cut shows evidence of moderate erosion and softening and appears to be weathering quickly to clay. Road construction leading to a residence on the ridge top has exposed shale in the ditches that has become soft and plastic upon exposure. A prominent cut in the sandstone of the Logan Formation is present along the residential driveway at an approximate elevation of 820 feet. The sandstone exposed in this location is cut nearly vertical. Two prominent joint sets were observed in the rock cut, both nearly vertical with one trending approximately east-west and the other trending approximately north-south. The cut appears to be performing well; however, it is suspected that the cut might have been recently constructed.

Large road cuts are present east and west of State Route 140, near the intersection of US 52. The cut to the west of State Route 140 is heavily vegetated with little rock exposure while the cut located east of State Route 140 is a sparsely vegetated slope consisting of mixed material ranging from shale to sandstone in thin to medium beds at an approximate

roadway elevation of 560 feet. The rock strata in this cut belong to the Mississippian aged Logan Formation. The cut is approximately 1,500 feet long and 150 feet high, with a slope of approximately 1H:1V with a total vertical height of approximately 150 feet. A 20-foot wide horizontal bench is cut approximately 100 feet above SCI-CR503 and US 52 (Service Road Y on 1961 SCI-52-25.62 plans) and the other 20-foot wide horizontal bench at the base of the cut. At the time of the field observation, the slope appears to be performing well with minor amounts of rock fall at the base. However, the bench at the base of the cut appears to have been recently cleaned.

A large rock cut is also present along State Route 335 between Swauger Valley Road and the CSXT Rail Bridge over the Little Scioto River. The cut is on the north side of the road at an approximate roadway elevation of 660 feet. The exposed rock is a hard sandstone that is pitted and black in appearance overlying a medium hard siltstone layer which is just above the road elevation at the east end of the cut. The sandstone is jointed and is believed to be the Byer Member of the Logan Formation. The major joint set is trending east-west, parallel with the cut face. The cut appears to be sloped at approximately 1/2H:1V. Overall, the cut appears stable producing only occasional rockfall. At some locations the rock face appears to slough off in large sheets probably due to freeze thaw action within the joints over time. At the intersection of Swauger Valley Road and State Route 335 the west face has been recently cut back with a high cut at an approximate roadway elevation of 530 feet. The cut appears to be over 100 feet high consisting primarily of sandstone. A weak zone approximately 20 feet thick is evident about 40 feet above the base of the cut. The cut appears to be approximately 1/2H:1V to 1/3H:1V with a bench approximately 40 to 50 feet wide at the base of the cut. Several large blocks of rock were present on the bench at the time of the field observation and were likely rock fall.

Along State Route 335, south of Wheelers Mill Road, a small cut can be seen on the western side of the roadway around a bend at an approximate roadway elevation of 560 feet. This cut is a mixed slope of interbedded sandstone, siltstone and minor shale with a 1/2H:1V slope. The slope appears to be performing poorly with large amounts of sloughed rock accumulating at the base of the cut.

Along State Route 139 between Minford and Clarktown, two rock cuts can be seen along the north side of the roadway at an approximate roadway elevation of 640 feet. These rock cuts are at approximate mile markers 9.8 and 9.9 and are approximately 10 to 20 feet high with near vertical slopes in massive sandstone of the Logan Formation. The cuts appear to be old with minimal or no recent maintenance. However, the cuts appear to be performing well with very minimal rock fall along the base of the cuts.

#### **4.0 FIELD EXPLORATION**

DLZ personnel conducted an initial field reconnaissance and reviews of published data in February 2002. The results were compiled in a report titled *Phase I Subsurface Investigation, Portsmouth Bypass Transportation Study, Geotechnical Literature Review and Field Reconnaissance, SCI-823-0.00*, dated February 25, 2002.

A preliminary geotechnical investigation was performed by DLZ Ohio, Inc. as part of the Portsmouth Bypass Transportation Study. A total of twenty-one borings were drilled throughout the study corridor to develop preliminary geotechnical information to aid in the selection of feasible alternative alignments. A summary of the preliminary geotechnical investigation was presented in DLZ Ohio, Inc.'s report titled *Phase I-Stage II Subsurface Investigation, Portsmouth Bypass Transportation Study, Preliminary Boring Program, SCI-823-0.00*, dated June 21, 2002.

Using the information collected during the geotechnical overview and the Phase I-Stage II subsurface investigation, and upon review of preliminary plans, profiles and cross-sections, DLZ prepared a boring plan for geotechnical exploration. Upon review and approval of the boring plan by ODOT Office of Geotechnical Engineering (OGE) personnel, DLZ personnel performed the subsurface exploration between the dates of April 28, 2004 and September 1, 2006. The subsurface exploration consisted of drilling 530 mainline roadway borings, R-15 through R-2676, using both truck-mounted and ATV-mounted, rotary-type drill rigs. Drilling efforts included auger borings, sample borings, and rock core borings. The borings were generally spaced 300 to 600 feet apart and were advanced to depths between 15 and 230 feet. The borings generally were drilled a minimum of 10 feet below the anticipated finished grade of the roadway.

## **5.0 DESIGN PROCEDURE FOR CUT SLOPE RECOMMENDATIONS**

On January 13, 2006, ODOT issued the Geotechnical Bulletin GB-3 "Rock Cut Slope & Catchment Design" to provide guidance on the design of rock cut slopes, rockfall catchment, and rockfall controls. Since the design of rock cut slopes for the Phase 1 of the Portsmouth Bypass project began long before the issuance of the GB-3, the generally accepted geotechnical engineering practice was used, which does not strictly adhere to the GB-3 requirements.

Note that information specific to soil cuts are presented in their respective roadway embankment report.

In general, the approach to the design of cut slopes generally consisted of four phases. The details of each of the design phases are discussed in the following sections.

### **5.1 Existing Data Evaluation**

The first phase involved evaluations of available geologic data, which included surface mapping, gathering of data and information available from USGS, ODNR, and other relevant resources, and field reconnaissance. A summary of the existing data evaluation is presented in Section 3 of the report.

### **5.2 Field Investigation and Laboratory Testing**

The second phase involved subsurface exploration, which included soil and rock sampling and laboratory testing of selected samples. Geotechnical information including, but not limited to, soil strength, rock structure, rock hardness, degree of weathering, and

rock fabric were developed by visual descriptions of soil and rock cores, and hand penetration tests of soil samples. Slake durability tests (ASTM D4644) and point load strength index tests (ASTM D5731) were also performed on selected rock cores. Note that a factor of 21 was applied to the point load test result of a rock core to determine the equivalent uniaxial compressive strength of the rock core. According to a study, titled *Using the Point Load Test to Determine the Uniaxial Compressive Strength of Coal Measure Rock*, performed by Mr. John Rusnak of the Peabody Group for the National Institute for Occupational Safety and Health, the conversion factor of 21 worked well for a variety of rock types and geographic regions.

### **5.3 Slope Evaluation, Design, and Layout**

The third phase was to determine the cut slope configuration based on the information gathered from the first two phases of the design procedure. In designing the rock cut slope configurations, significant consideration was given to the point load strength, rock quality designation (RQD) values, rock structure and hardness, degree of weathering, and slake durability test, if available.

Cut slope benches were provided according to the following guidelines:

1. Soil overburden benches: Slopes in the soil overburden zone (where the zone is over 10 feet thick) typically had a slope of 2H:1V. At the interface between soil overburden and bedrock, a 10-foot wide bench was provided. If the overburden zone was less than 10 feet thick or the natural slope was 1H:1V or steeper, rounding of the top of the cut to blend into the natural slope was considered.
2. Geotechnical benches: These benches, generally 10-foot wide, were placed at locations where a competent lithologic rock overlies an incompetent/weathered rock. The slope of these benches longitudinally followed the base of the competent rock with an outslope having positive drainage at a maximum grade of 10%, with a minimum grade of 3%. Note that geotechnical benching must be field adjusted during construction to follow any changes in bedding surface.
3. Construction benches: For slopes steeper than 1H:1V, 5-foot wide horizontal construction benches were placed at a maximum of 30-foot vertical intervals of a rock cut slope where no geotechnical benches were required.

Note that variations in the actual construction bench widths are expected. Bench widths may need to be modified to maintain a temporary working bench, accommodate relief in the existing sloping face and overburden thickness, and minimize the amount of water flow across the cut slope face.

### **5.4 Quantitative Analysis of Rock Cut Slopes**

The fourth phase was to evaluate the failure potential of the cut slope configuration using the Colorado Rockfall Simulation Program (CSRFP), Version 4.0. This program uses

slope and rock geometry and material properties to calculate falling rock bounce height, velocity and travel distance. Results of the CSRP analyses were used to verify the appropriateness of the cut slope configuration, break in slope angles, and catchment ditch geometry. Based on the CSRP analysis, barriers were recommended in some areas to provide the necessary rockfall mitigation measure. Given the existing site conditions and the results of the preliminary CSRP analyses, it appears that a minimum slope height of 70 feet is necessary for any falling rock to reach beyond the catchment ditch. Consequently, the CSRP analysis was performed only for the cut slopes 70 feet or higher.

## **6.0 SUBSURFACE CONDITIONS**

The following sections present the generalized subsurface conditions encountered by the borings. For more detailed information, refer to the Rock Cut Boring Location Plans in Appendix A and the Boring Logs presented in Appendix B. Laboratory test results including the slake durability indices and uniaxial compressive strengths are shown on the Boring Logs and also included in Appendix B.

The overburden encountered in the borings primarily consisted of varying thicknesses of cohesive soils including Sandy Silt (A-4a), Silt (A-4b), Silt and Clay (A-6a), Silty Clay (A-6b), and Clay (A-7-6). Occasionally, granular materials consisting of Coarse and Fine Sand (A-3a), Gravel with Sand (A-1-b) and Gravel with Sand and Silt (A-2-4), and Gravel with Sand, Silt and Clay (A-2-6) were also encountered.

Bedrock encountered in the borings correlates well with the available geologic references. The cores obtained consisted primarily of sandstone and occasionally shale, siltstone, and clayshale with varying degrees of weathering and different number of fractures. During the rock coring operation, some water was lost into the voids in the rock. The final water levels in the borings varied widely at the completion of rock coring.

Based on the site plans provided, rock cut slope is only required in certain areas of the proposed alignment between Station 415+00 and Station 530+00. In considering the rock cut slopes, these areas were divided into five cut sections, namely Rock Cuts #11 through #15, as shown in the table in Section 1.0 of this report. In addition, rock cut slope was also necessary along the relocated Shumway Hollow Road (TR234), Ramp T234D, Ramp 728A, and Ramp 728D. The sections that follow present the generalized subsurface conditions encountered by the borings within the anticipated rock cut sections, which was used to construct the rock cut profiles for the sections.

### **6.1 Rock Cut for Shumway Hollow Road (Station 10+91 to Station 26+50) and TR234 Ramp D (Station 385+00 to Station 387+00)**

The subsurface conditions generally consisted of less than 12 inches of topsoil underlain by soils including Clay (A-7-6), Silt and Clay (A-6a), Sandy Silt (A-4a), Silt (A-4b) and Silty Clay (A-6b). Occasionally, granular materials consisting of Coarse and Fine Sand (A-3a), Gravel with Sand (A-1-b) and Gravel with Sand and Silt (A-2-4) were also

encountered in the lower depths of the borings. Overburden thickness generally ranged from less than 5 feet to 35 feet.

Below the topsoil and overburden, a layer of severely weathered rock was encountered in most of the borings, ranging in thickness between 1.5 and 10 feet. The severely weathered rock consisted of sandstone and siltstone and generally was similar to the type of intact bedrock encountered immediately below it. The competent bedrock generally consisted of sandstone, which was often interbedded with siltstone.

Bedrock was confirmed by coring in all borings. Bedrock primarily consisted of medium hard to hard, very fine to fine-grained sandstone interbedded with siltstone. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the rock cores are summarized in the table below.

The borings did not encounter any water seepage or measurable water levels prior to rock coring.

<b>Rock Types</b>	<b>RQD, %</b>	<b>Point Load Strengths*, psi</b>	<b>Equivalent Compressive Strengths*, psi</b>	<b>Uniaxial Compressive Strengths**, psi</b>	<b>SDI, %</b>
Sandstone	12 – 100	298-578	6,258 – 12,138	8,482	95.9
Sandstone and Siltstone interbedded	50-100	NM	NM	9,932-12,337	98-98.7

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

NM = not measured.

## **6.2 Rock Cut #11 (Station 415+00 to Station 434+00)**

Generally, areas between Station 415+00 and Station 434+00 consisted of a veneer of poorly developed topsoil over bedrock or thin soils. The subsurface conditions encountered by the borings generally consisted of less than 6 inches of topsoil underlain by soils including Clay (A-7-6), Silt and Clay (A-6a), Sandy Silt (A-4a), Silt (A-4b) and Silty Clay (A-6b).

Below the topsoil and overburden, a layer of severely weathered rock was encountered in most of the borings, ranging in thickness between 1.5 and 22 feet. The severely weathered rock consisted of sandstone, shale, siltstone, or clayshale and generally was similar to the type of intact bedrock encountered immediately below it.

Bedrock was confirmed by coring in all borings. Bedrock primarily consisted of medium hard to hard, very fine to fine-grained sandstone and soft to medium hard shale.

Occasionally, layers of very soft to soft siltstone, siltshale, and clayshale were also encountered. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the rock cores are summarized in the table below.

Prior to coring, groundwater seepage was noted in a shallow clayshale layer in Boring R-360. Groundwater and seepages were not reported in other boreholes prior to coring. Noted that the water levels at completion, recorded on the boring logs, included the water use for coring.

<b>Rock Types</b>	<b>RQD, %</b>	<b>Point Load Strengths*, psi</b>	<b>Equivalent Compressive Strengths*, psi</b>	<b>Uniaxial Compressive Strengths**, psi</b>	<b>SDI, %</b>
Sandstone	28 – 100	72 – 645	1,512 – 13,545	1,449 – 12,620	90 – 98
Shale	48 – 97	50 – 766	1,050 – 16,086	1,652 – 5,187	20 – 35
Siltstone	85	30	630	339	6
Clayshale	50 – 88	9 – 409	189 – 8,589	8,200	71
Siltshale	63 – 98	NM	NM	NM	NM

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

NM = not measured.

### **6.3 Rock Cut #12 (Station 449+50 to Station 458+00)**

The near surface soil conditions within this rock cut alignment contained thin topsoil layer, typically less than a few inches, followed by highly weathered bedrock or soil. Sandy Silt (A-4a) was the only reported soil type in this area and was likely derived from the underlying sandstone bedrock.

The bedrock encountered by the borings was primarily very fine to fine-grained sandstone. A layer of severely weathered sandstone was mostly encountered in the upper 2 to 7 feet of the bedrock strata. Below the severely weathered layer, the sandstone was mostly medium hard to hard except that layers of soft sandstone, approximately 3 and 8 feet thick, were encountered in Boring R-383 and R-386, respectively. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the sandstone cores are summarized in the table below.

The borings did not encounter any water seepage or measurable water levels prior to rock coring.



<b>Rock Types</b>	<b>RQD, %</b>	<b>Point Load Strengths*, psi</b>	<b>Equivalent Compressive Strengths*, psi</b>	<b>Uniaxial Compressive Strengths**, psi</b>	<b>SDI, %</b>
Sandstone	0 – 100	38 – 661	798 – 13,881	2,102-11,215	73.5-99

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

#### **6.4 Rock Cut #13 (Station 479+00 to Station 483+00)**

The soil conditions reported between Station 449+50 and Station 458+00 were found to vary with depth. The thickness of topsoil on the hilltop was reported to be very thin to non-existent and underlain by highly weathered bedrock. Side hill soil conditions were reportedly better developed with approximately 12 inches of topsoil underlain by several feet of Sandy Silt (A-4a). Boring R-416 reported a soil thickness of approximately 15 feet above the underlying bedrock.

The bedrock encountered by the borings was primarily very fine to fine-grained sandstone. A layer of severely weathered sandstone was mostly encountered in the upper 2 to 3 feet of the bedrock strata. Below the severely weathered layer, the sandstone was mostly medium hard to hard. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the sandstone are summarized in the table below.

Groundwater seepage was noted in boring R-416 at approximately 10 feet below ground surface in the Sandy Silt (A-4a) overburden.

<b>Rock Types</b>	<b>RQD, %</b>	<b>Point Load Strengths*, psi</b>	<b>Equivalent Compressive Strengths*, psi</b>	<b>Uniaxial Compressive Strengths**, psi</b>	<b>SDI, %</b>
Sandstone	72 – 100	NM	NM	4,850-11,804	78-92

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

NM = not measured.

#### **6.5 Rock Cut #14 (Station 497+00 to Station 504+00)**

The subsurface conditions generally consisted of less than 12 inches of topsoil underlain by soils including Sandy Silt (A-4a), and Silt and Clay (A-6a). Overburden thickness ranged from less than 1 foot to approximately 8 feet.

The bedrock encountered by the borings was primarily very fine to fine-grained sandstone. A layer of severely weathered sandstone was mostly encountered in the upper

1.5 to 13 feet of the bedrock strata. Below the severely weathered layer, the sandstone was mostly medium hard to hard. However, layers of soft to medium hard sandstone, approximately 12 and 5.5 feet thick, were encountered below the severely weathered layer in Borings R-432 and R-442, respectively. Note that sandstone was not encountered in Boring R-429 within the depth of boring, 20 feet. Instead, a layer of Breccia/Sandstone/Shale, approximately 14 feet thick was encountered below the overburden in R-429. Bedrock was not encountered in Boring R-430 within the depth of boring, 20 feet. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the sandstone cores are summarized in the table below.

The borings did not encounter any water seepage or measurable water levels prior to rock coring.

<b>Rock Types</b>	<b>RQD, %</b>	<b>Point Load Strengths*, psi</b>	<b>Equivalent Compressive Strengths*, psi</b>	<b>Uniaxial Compressive Strengths**, psi</b>	<b>SDI, %</b>
Sandstone	39 – 100	36 – 1,302	756 – 27,342	3,869–9,802	65-74
Breccia/Sandstone/Shale	0 – 54	NM	NM	NM	NM

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

NM = not measured.

## **6.6 Rock Cut #15 (Station 507+00 to Station 530+00)**

The borings within these stations generally encountered up to 12 inches of topsoil underlain by less than 10 feet of soils consisting of Silt and Clay (A-6a), Clay (A-7-6) and Sandy Silt (A-4a). However, soil layers, between 14 and 50+ feet thick were encountered in Borings R-455, R-459, R-461, R-462, R-463, B-1225, B-1226, B-1229, and B-1230. Overburden within these stations contained lesser amounts of Silt (A-4b), Coarse and Fine Sand (A-3a) and Gravel with Sand, Silt and Clay (A-2-6) comparing to other locations of the proposed alignment.

The bedrock encountered by the borings was primarily very fine to fine-grained sandstone. However, the sandstone was occasionally interbedded with layers of clayshale, shale, claystone, breccia and siltstone. A layer of severely weathered sandstone was mostly encountered in the upper 2 to 5 feet of the bedrock strata. Below the severely weathered layer, the sandstone was mostly medium hard to hard except soft to medium hard sandstone was encountered in Borings R-444, R-445, R-451, R-452, R-454, and R-457. The ranges of Rock Quality Designation (RQD) values, point load strengths, uniaxial compressive strengths, and slake durability indices (SDI) of the rock cores are summarized in the table below.

Most of the borings did not encounter any water seepage prior to rock coring except for Borings B-1225 and B-1230. Measurable water levels were not observed in any of the boring prior to rock coring. However, a measurable water level was reported at the depth of 38.0 feet (elevation 735.1 feet) in Boring B-1225 at the completion of boring. In addition, water levels were observed in Borings R-360 and R-450 at depths of 11.0 feet (elevation 825.1 feet) and 18.1 feet (elevation 868.6 feet), respectively, after the borings were left open overnight.

Rock Types	RQD, %	Point Load Strengths*, psi	Equivalent Compressive Strengths*, psi	Uniaxial Compressive Strengths**, psi	SDI, %
Sandstone	0 – 100	18 - 641	378 – 13,461	5,814-12,009	2-96
Breccia	13 -18	641	13,461	NM	NM
Clayshale	73 –93	68 – 324	1,428 –6,804	229	0
Shale	63 – 90	128	2,688	NM	NM
Claystone	NM	NM	NM	NM	NM
Siltstone	60 –93	NM	NM	NM	86

\*Point Load Strength (psi) times 21 = Equivalent Compressive Strength, psi.

\*\*Uniaxial Compressive Strengths of selected rock cores by ASTM (D7012-04).

NM = not measured.

## 7.0 ROCK EXCAVATION AND CUT SLOPE RECOMMENDATIONS

### 7.1 Rock Excavation Recommendations

The rippability of the bedrock is estimated to be fair to good for the upper 10 to 15 feet due to its weathered condition. Below the upper 10 to 15 feet of weathered material the rippability is estimated to be poor to fair and rock blasting will be required to achieve the roadway template. Blasting efforts should conform to Item 208 of the current CMS. All blasting operations should also be performed in accordance with applicable federal, state, and local laws and regulations.

### 7.2 Cut Slope Recommendations

Cut slope recommendations were based upon visual observations of the rock cores obtained, the presence and angles of joints and/or fractures within the cores, depths to bedrock, point load strengths, uniaxial compressive strengths, laboratory SDI, regional and local lithology, results of the field reconnaissance, and DLZ’s past experiences. In general, DLZ reviewed the cuts in profile and in cross-section to determine the likely positions/elevations for bench locations. Benches were typically placed at lithology breaks where a more durable rock overlays a weaker rock unit. Upon identifying the bench positions, the lift height between benches was evaluated and additional benching used, if considered to be appropriate. The details of the cut slope design procedure are presented in Section 5.0 of this report.

In general, sandstone slope angles are recommended to be cut on 0.5H:1V slopes. Severely weathered sandstone should be cut on 1.5H:1V or flatter slopes. Shales, siltstones, clayshales, breccia, claystones, and siltshales were typically soft, severely weathered and prone to rapid weathering once exposed and were typically recommended to be cut on 2H:1V slopes.

Specific recommended cut slope configurations are included in Appendix B of this report.

### **7.3 Groundwater Considerations**

#### **Shumway Hollow Road (Station 10+90 to Station 26+50) and TR234 Ramp D (Station 385+00 to Station 387+00)**

The borings did not encounter any water seepage or measurable water levels prior to rock coring.

#### **Station 352+00 to Station 415+00**

Most of the borings encountered water seepage but did not have a measurable water level prior to rock coring. Water seepage was encountered at depths between 3.5 and 48.5 feet or at elevations between 619.1 and 687.5 feet. Water levels were only encountered in Borings R-217, R-218, R-220, R-221, and R-328, ranging in depths between 14.4 and 42 feet or in elevations between 643.8 and 650.5 feet, prior to coring rock. Given the areas between Station 352+00 and Station 415+00 are generally in fill sections and the amounts of excavation in these areas are expected to be minimal, it is anticipated that groundwater would not be encountered during the construction. However, groundwater conditions can change with time. The contractor should be prepared to maintain reasonably dry excavations if water from seepage or precipitation enters any excavations.

#### **Station 415+00 to Station 537+50**

Water seepage was encountered at depths between 4.0 and 11.3 feet or at elevations between 687.0 and 824.8 feet in Borings R-360, R-393, and R-416. Water levels were observed in Borings R-360 and R-450 at depths of 11.0 feet (elevation 825.1 feet) and 18.1 feet (elevation 868.6 feet), respectively, after the borings were left open overnight. Although most of the borings did not encounter any water seepage or measurable water levels prior to rock coring, seepage through joints or seams in the type of rock formations encountered by the borings is not uncommon. It is anticipated that any water in the excavations could be removed using common diaphragm pumps or other common dewatering techniques.

## 8.0 COLORADO ROCKFALL SIMULATION PROGRAM (CRSP) ANALYSES

The CRSP requires the input of a number of coefficients concerning the slope geometry, slope material properties, rock material properties and the assumption of rock geometry. In general, the ODOT Geotechnical Bulletin GB-3 “Rock Cut Slope & Catchment Design” was used as a guide for input data and catchment ditch configuration. Input data was also based on field observations and measurements of the existing rock cuts described in Section 3.5 of this report. The number of rocks simulated for the analyses was 500 and the shape of rock was assumed to be discoidal. Note that rounded rocks generally result in greater amounts of rock reaching the roadway since rounded rocks rolling gather a great deal more energy than angular blocks sliding. Based on the observations of the rock cores obtained, it is our opinion that the discoidal rocks can better describe the types of rocks encountered in the borings. The average rock size used in the analyses was a 1-foot tall and 1-foot diameter discoidal rock, while the maximum size used in the analyses was a 1.5-foot tall and 1.5-foot diameter discoidal rock. A summary of the input data for the CRSP analyses is presented in the following table.

**Input Data for End of Construction Conditions**

<b>Rock Type</b>	<b>Rock Thickness</b>	<b>Rock Diameter</b>	<b>Surface Roughness (S.R.)</b>	<b>Tangential Coefficient (Rt)</b>	<b>Normal Coefficient (Rn)</b>	<b>Rock Density</b>
Hard Sandstone and Siltstone	1.5	1.5	0.15	0.85	0.2	155
Shale	1.5	1.5	0.3	0.75	0.18	140
Sandstone with Shale interbeds	1.5	1.5	0.25	0.75	0.18	145
Hard Sandstone and Siltstone	0.75	0.75	0.12	0.85	0.2	155
Shale	0.75	0.75	0.15	0.75	0.18	140
Sandstone with Shale interbeds	0.75	0.75	0.14	0.75	0.18	145

### Input Data for Long-term Conditions

Rock Type	Rock Thickness	Rock Diameter	Surface Roughness (S.R.)	Tangential Coefficient (Rt)	Normal Coefficient (Rn)	Rock Density
Hard Sandstone and Siltstone	1.5	1.5	0.3	0.8	0.18	155
Shale	1.5	1.5	0.5	0.68	0.15	140
Sandstone with Shale interbeds	1.5	1.5	0.6	0.6	0.15	145
Hard Sandstone and Siltstone	0.75	0.75	0.21	0.8	0.18	155
Shale	0.75	0.75	0.3	0.68	0.15	140
Sandstone with Shale interbeds	0.75	0.75	0.28	0.6	0.15	145

Given the existing site conditions and the results of the preliminary CSR analysis, it appears that a minimum slope height of 70 feet is necessary for any falling rock to reach beyond the catchment ditch. Consequently, the CSR analysis was performed only for the cut slope of 70 feet or higher along the proposed alignment. A summary of the CSR analysis results is presented in the following table. The output of the CSR analyses is included in Appendix B.

Rock Cut #	Stations	Left Slope	Right Slope
Shumway Hollow Road	10+90 – 26+50	Not Run, < 70'	Not Run, < 70'
Ramp T234D	385+00 – 387+00	Not Run, < 70'	Not Run, < 70'
11	415+00 – 434+00	Passed*	Passed
12	449+50 – 458+00	Passed	Not Run, < 70'
13	479+00 – 483+00	Failed**	Not Run, soil only
14	497+00 – 504+00	Passed	Passed
15	507+00 – 530+00	Passed	Passed

\*Passed = Greater than or equal to 95% rockfall catchment achieved at analysis point 2.

\*\*Failed = Less than 95% rockfall catchment achieved at analysis point 2.

Based on the results of the CSR analyses, a Type D barrier placed at the edge of the catchment ditch is recommended as a rockfall mitigation measure for the left cut slope area between Station 479+50 and Station 483+00.

## 9.0 ODOT GENERAL EARTHWORK DESIGN CHECKLIST

The ODOT General Earthwork Design Checklist – Centerline Cuts Checklist is included in Appendix C of this report.

## **10.0 CLOSING REMARKS**

We appreciate having the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions concerning this report.

Respectfully submitted,

**DLZ OHIO, INC.**

Eric W. Tse, P.E.  
Senior Geotechnical Engineer

Andrew Jalbrzikowski  
Geologist

Brian E. Mott  
Senior Geologist, P.G.

EWT/vlc

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**APPENDIX A**

Project Location Map  
Project Alignment and Boring Plan



## Project Location Map

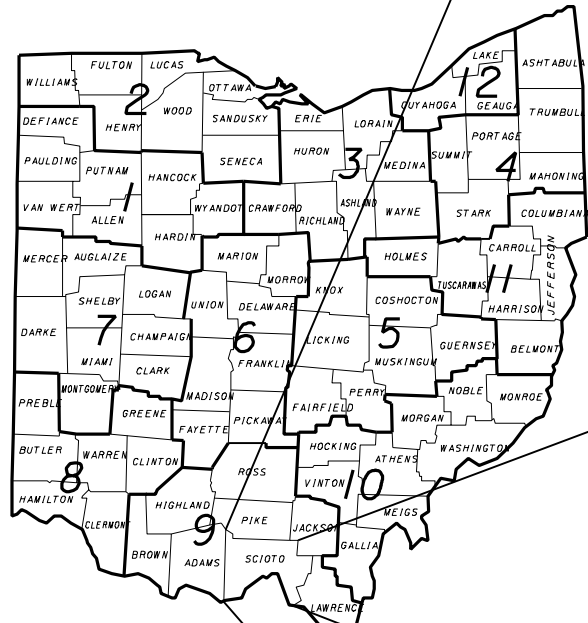
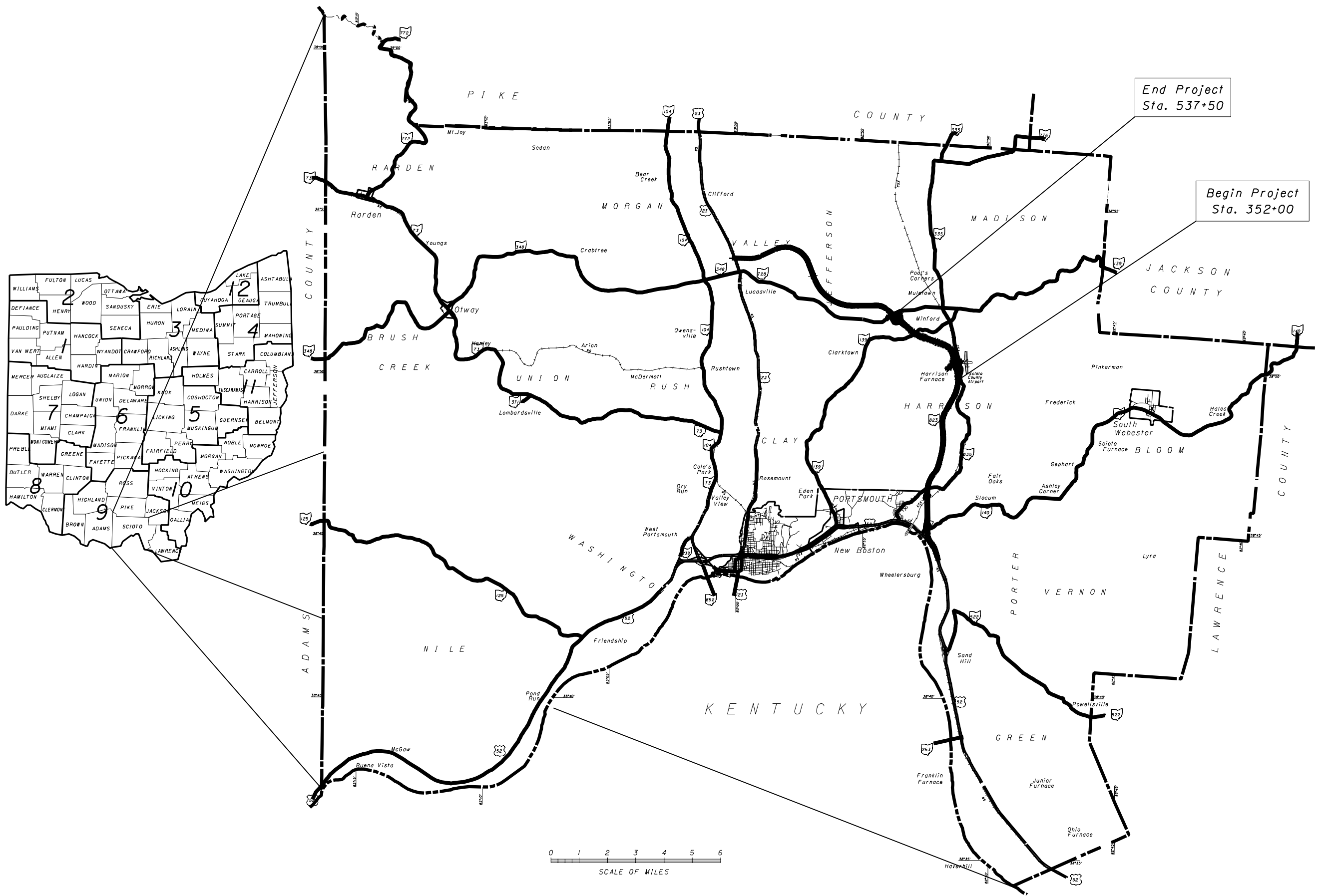
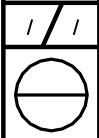


DLZ  
6121 Huntley Road  
Columbus, Ohio  
43229

DRAWN  
AMJ  
CHECKED

# GENERAL LOCATION MAP PORTSMOUTH BYPASS PHASE 1

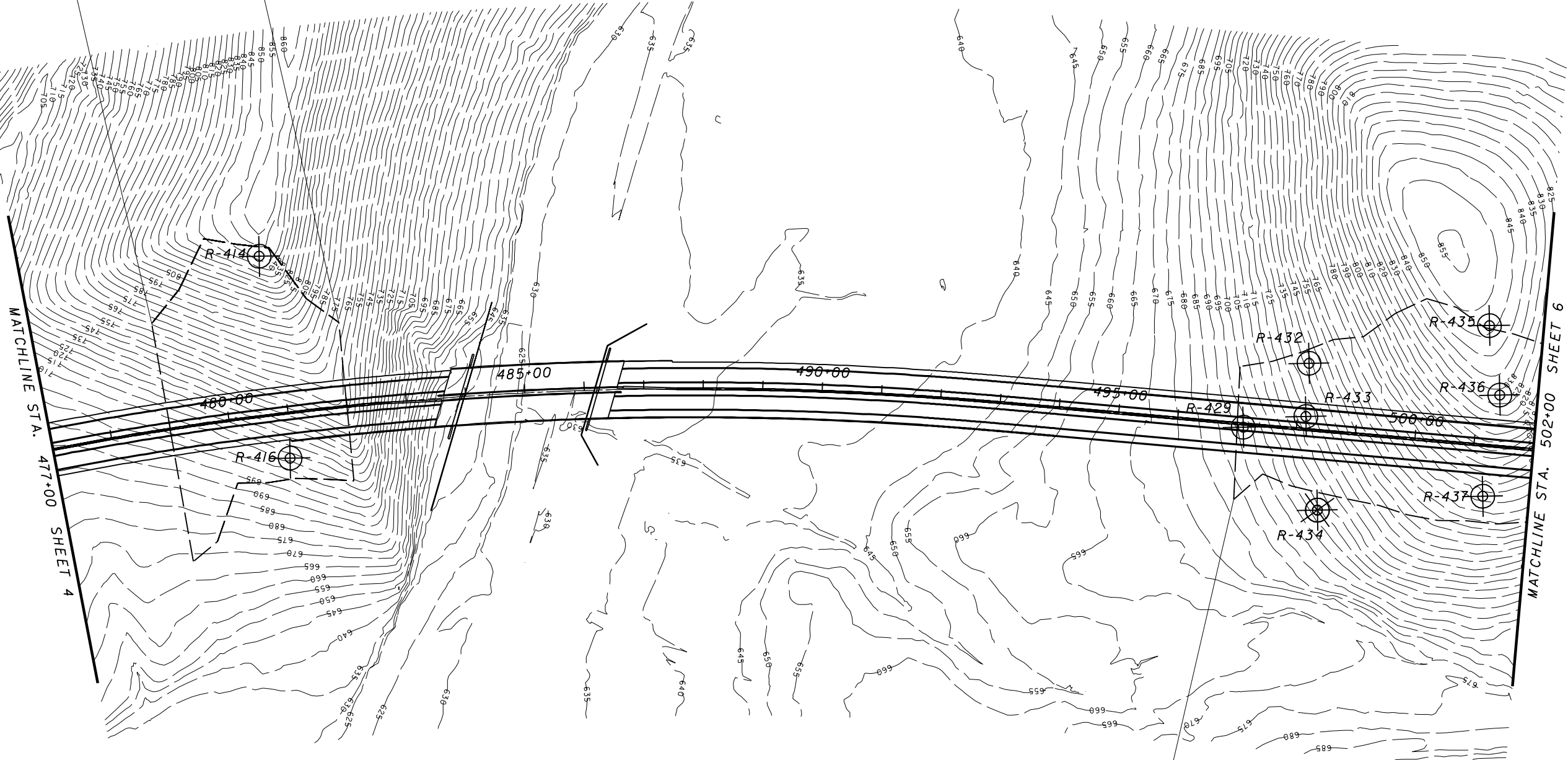
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## Project Alignment and Boring Plan

BEGIN ROCK CUT 13  
STA. 479+00

END ROCK CUT 13  
STA. 483+00



LEGEND

--- - APPROXIMATE ROCK CUT LIMITS

BEGIN ROCK CUT 14  
STA. 497+00

0 50 100 200  
HORIZONTAL SCALE IN FEET

DRAWN RLS  
CHECKED AMJ

ROCK CUT BORING PLAN  
SR 823 STA. 477+00 TO STA. 502+00

SCI-823-6.81

**LEGEND**

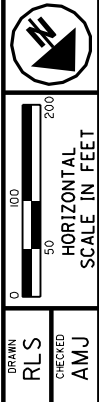
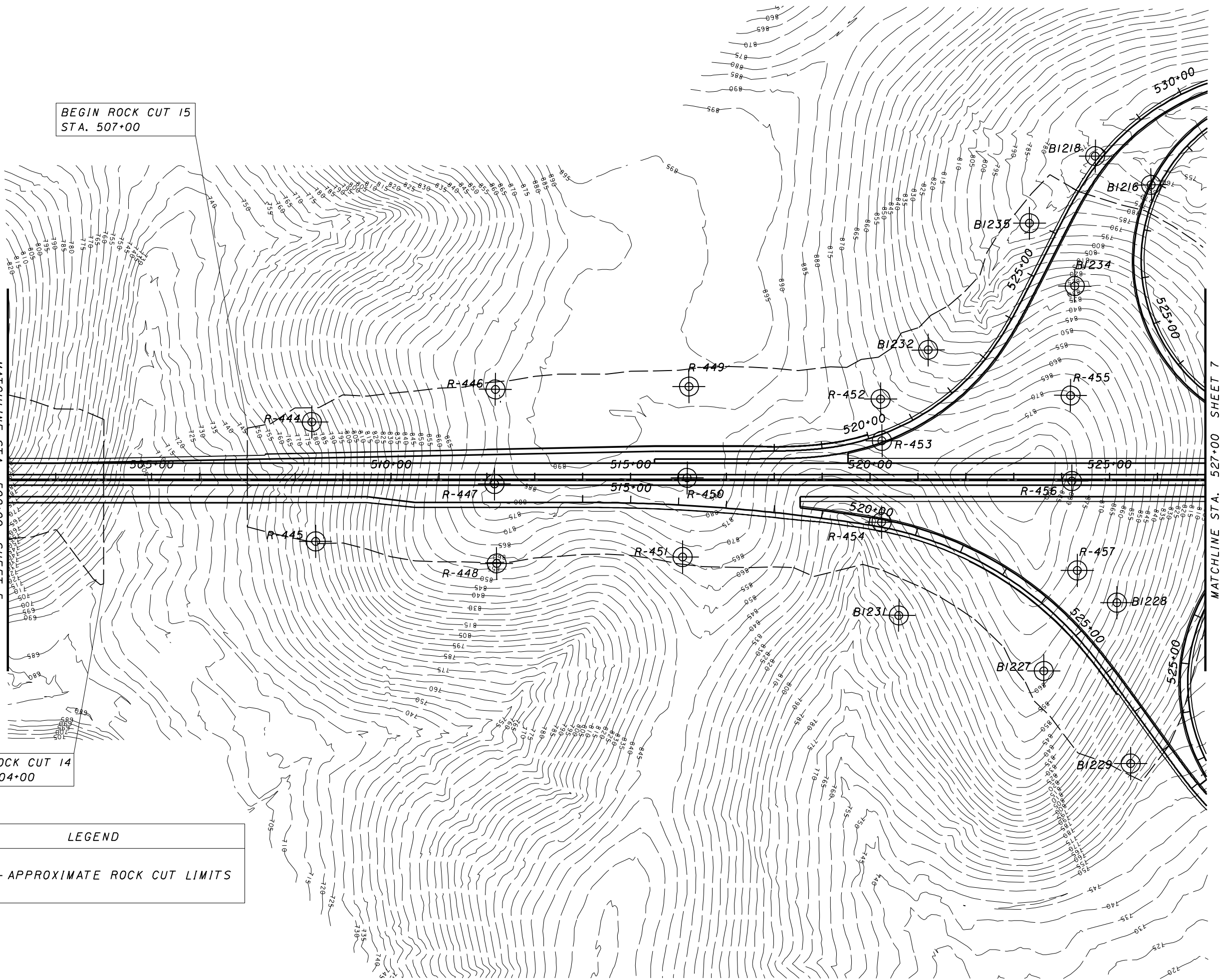
— — — APPROXIMATE ROCK CUT LIMITS

END ROCK CUT 14  
STA. 504+00

BEGIN ROCK CUT 15  
STA. 507+00

MATCHLINE STA. 502+00 SHEET 5

MATCHLINE STA. 527+00 SHEET 7



DRAWN: RLS  
CHECKED: AMJ

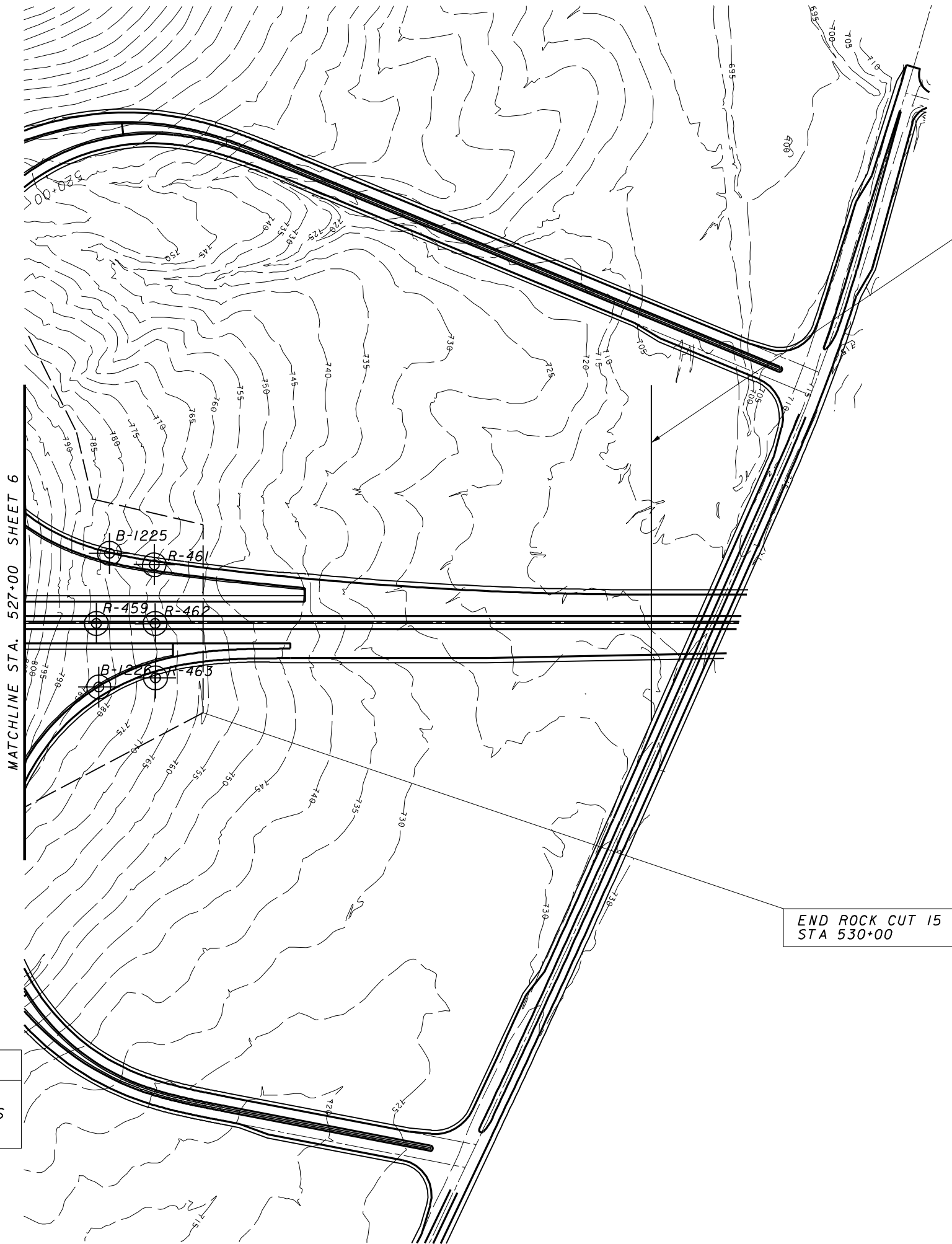
**ROCK CUT BORING PLAN**  
SR 823 STA. 502+00 TO STA. 527+00

SCI-823-6.81



**LEGEND**

—— - APPROXIMATE ROCK CUT LIMITS



STATION 537+50  
END PHASE I

END ROCK CUT 15  
STA 530+00

0 50 100 200  
HORIZONTAL SCALE IN FEET

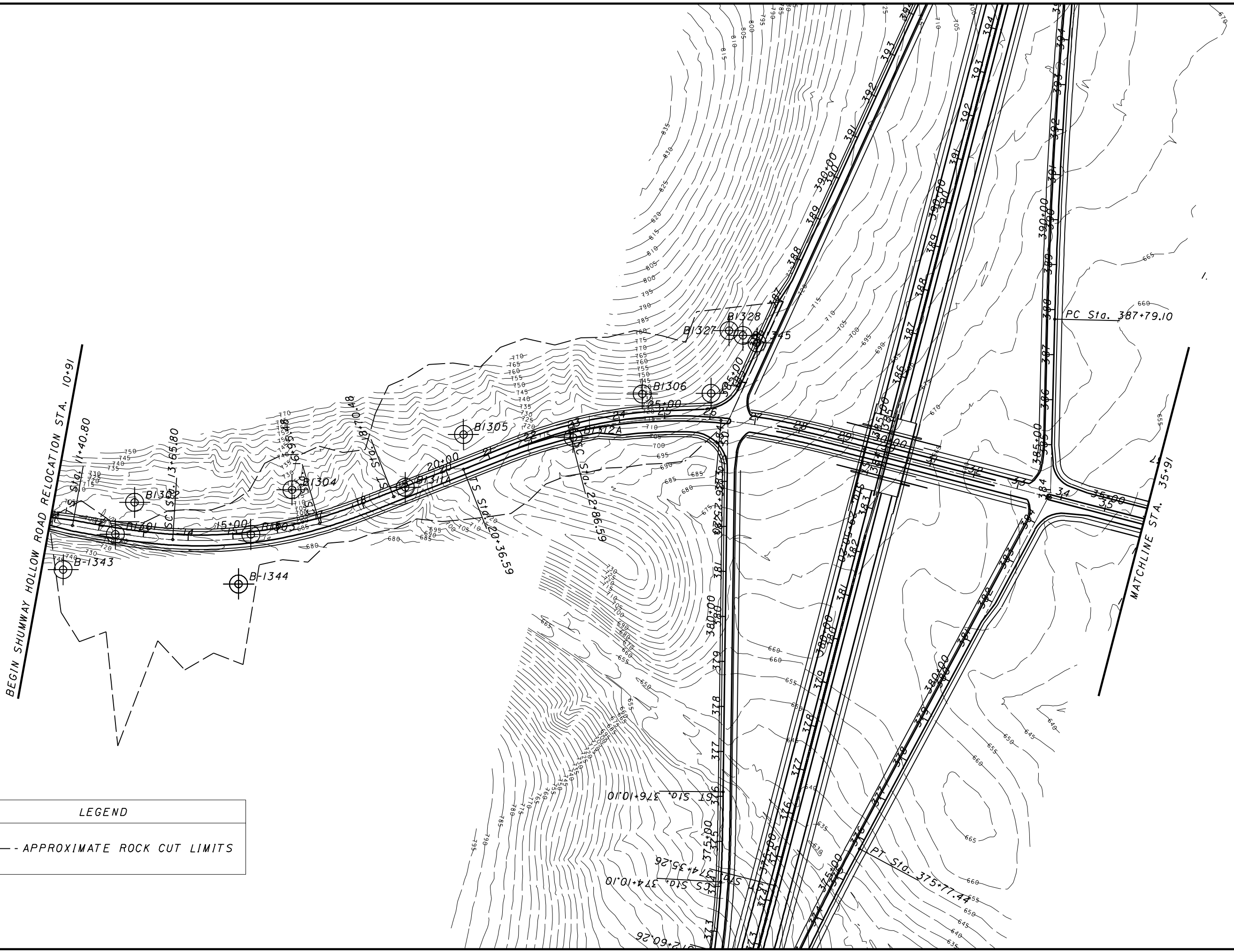
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**ROCK CUT BORING PLAN**  
**SR 823 STA. 527+00 TO STA. 542+00**

**SCI-823-6.81**

LEGEND  
--- APPROXIMATE ROCK CUT LIMITS

BEGIN SHUMWAY HOLLOW ROAD RELOCATION STA. 10+91  
STA. 1+40.80  
SC STA. 13+65.80



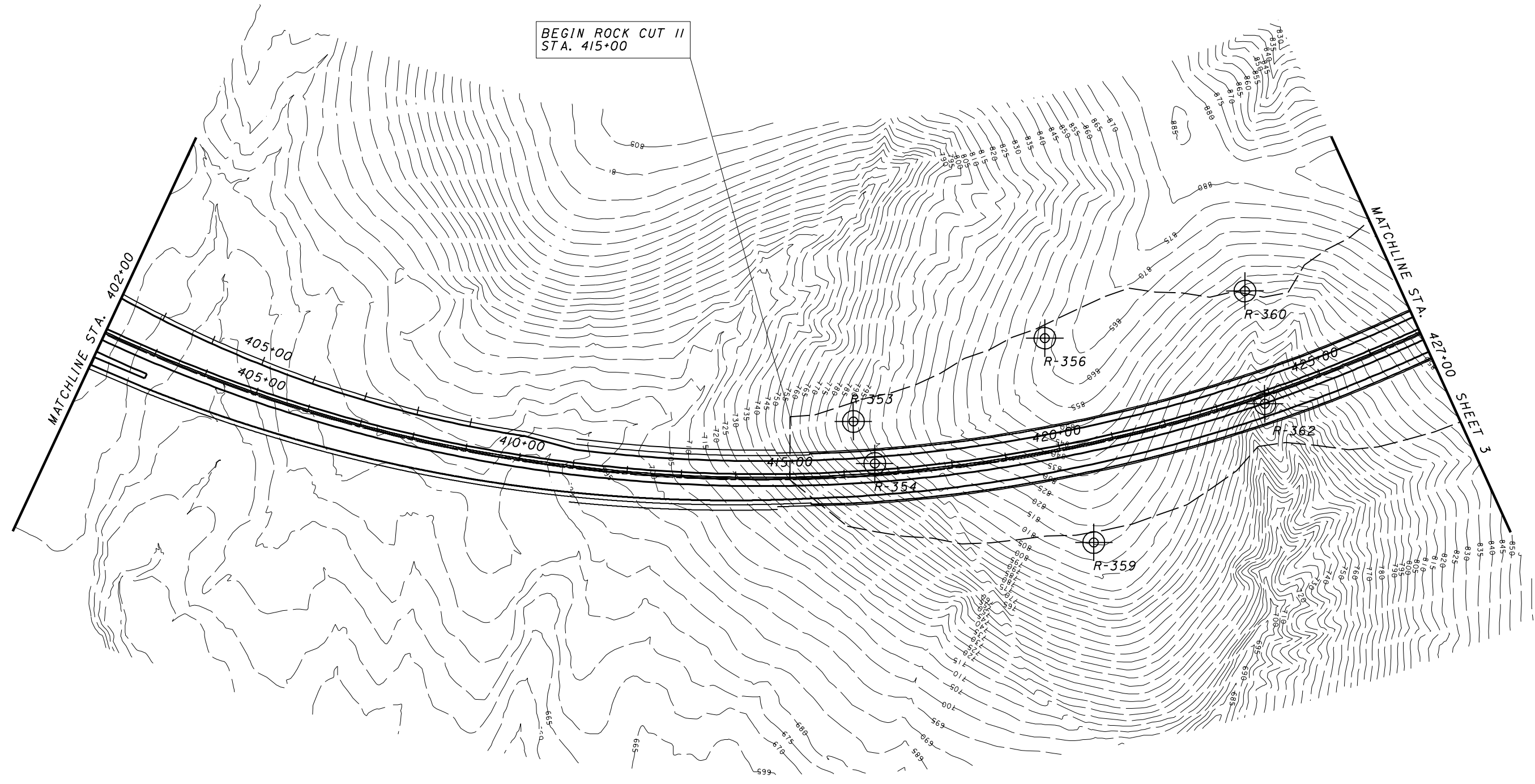
0 50 100 200  
HORIZONTAL SCALE IN FEET

DRAWN RLS  
CHECKED AMJ

ROCK CUT BORING PLAN  
SHUMWAY HOLLOW ROAD AND RAMP D

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BEGIN ROCK CUT II  
STA. 415+00

MATCHLINE STA. 402+00

MATCHLINE STA. 427+00  
SHEET 3

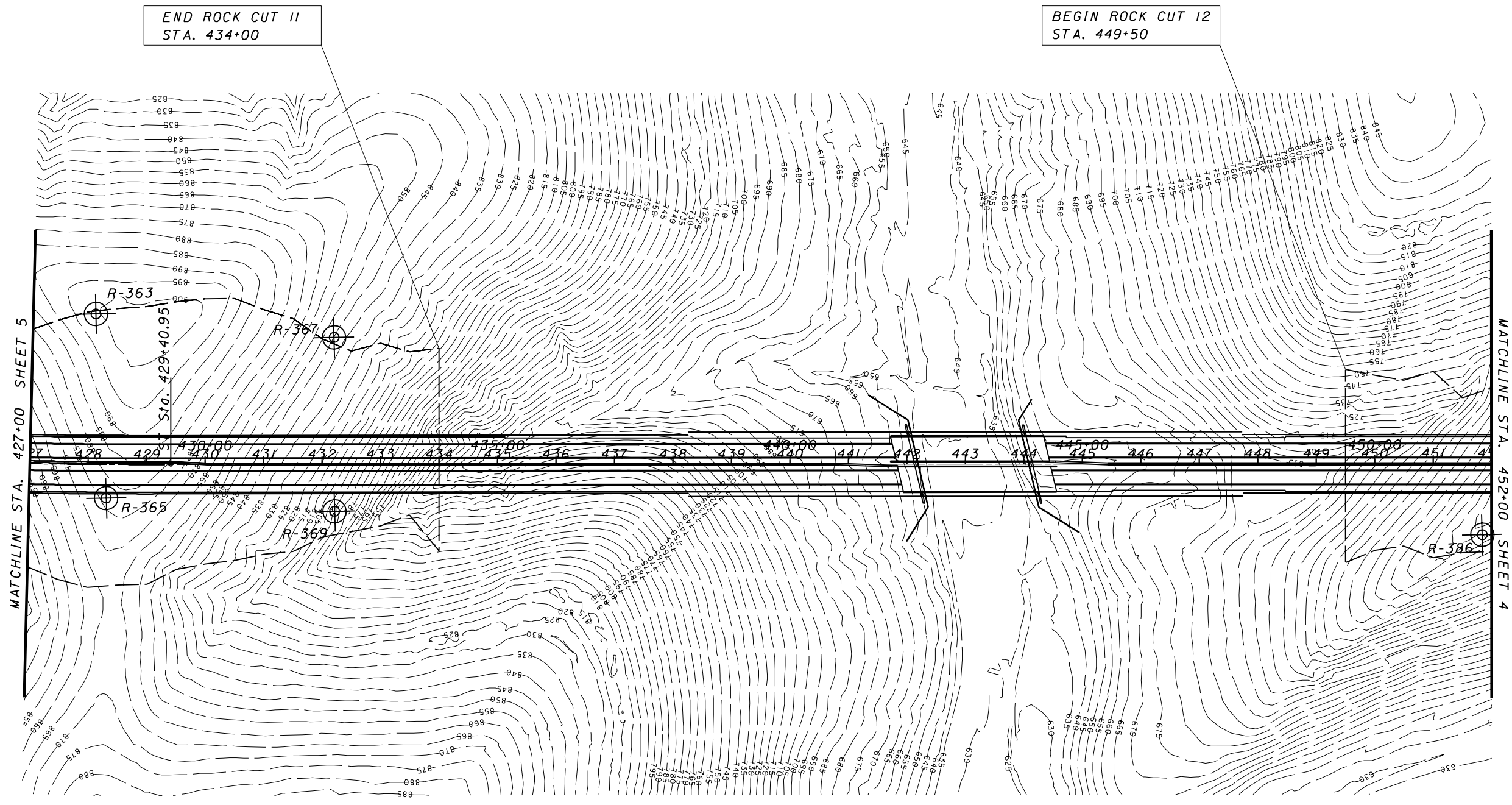
LEGEND	
---	APPROXIMATE ROCK CUT LIMITS

HORIZONTAL SCALE IN FEET
DRAWN RLS
CHECKED AMJ

**ROCK CUT BORING PLAN**  
**SR 823 STA. 402+00 TO STA. 427+00**

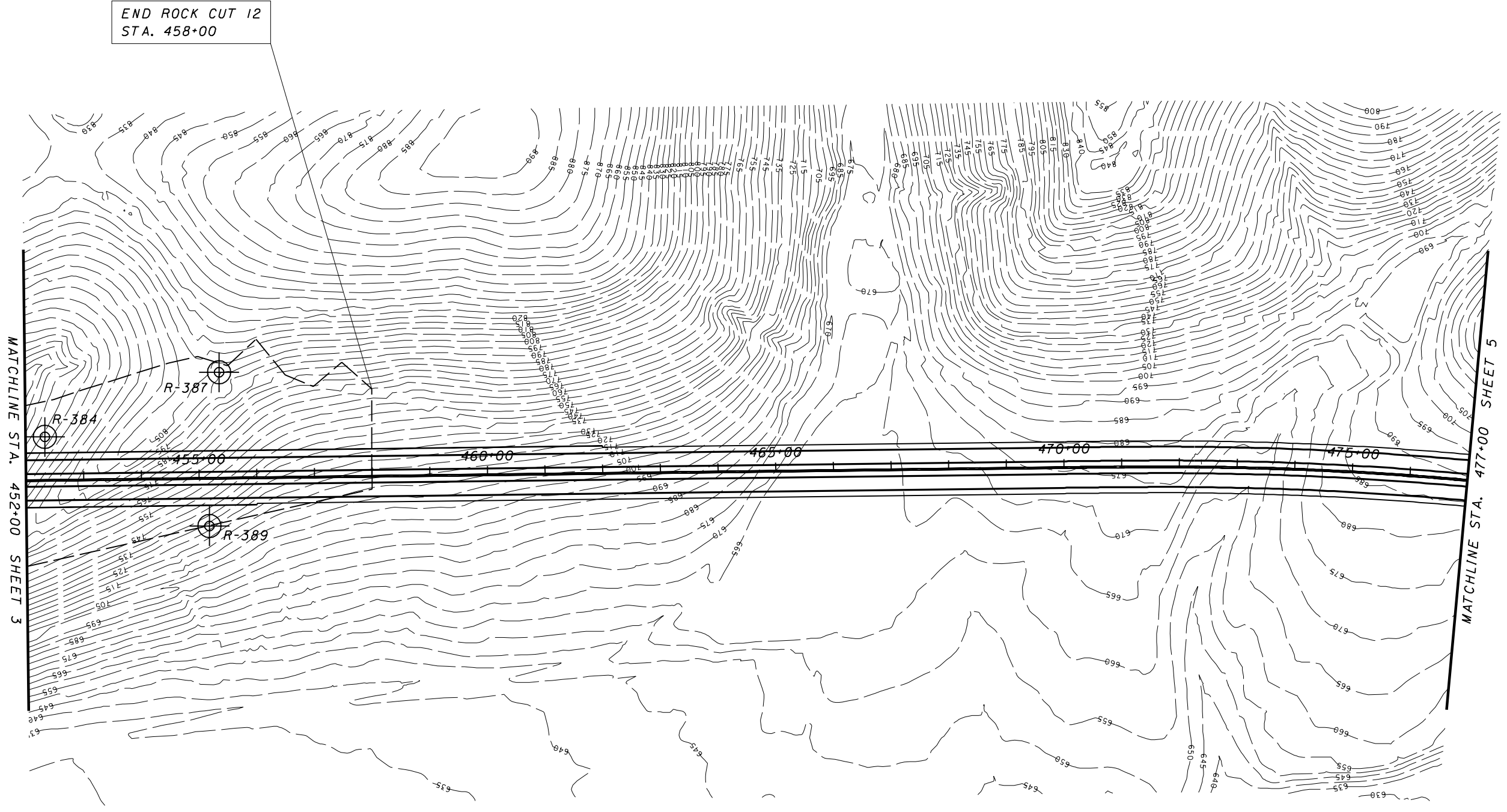
**SCI-823-6.81**





LEGEND

—— - APPROXIMATE ROCK CUT LIMITS



LEGEND

--- - APPROXIMATE ROCK CUT LIMITS



DRAWN	RLS
CHECKED	AMJ

**ROCK CUT BORING PLAN**  
**SR 823 STA. 452+00 TO STA. 477+00**

SCI-823-6.81



## **APPENDIX B**

Boring Logs

Results of Slake Durability Index and Uniaxial Compressive Tests

Cut Slope Cross Sections

Colorado Rock Fall Simulation Analysis

## Boring Logs

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-353 Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL Date Drilled: 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
0.2	792.9 792.7																						
		50/3	3			1	Topsoil - 2" Severely weathered light brown SANDSTONE.																
		50/2	2			2																	
5 5.5	787.4						Medium hard light brown, reddish brown, and gray SANDSTONE; very fine to fine grained, highly weathered, thinly bedded to thickly bedded, broken with rust stained and clay filled fractures, contains occasional argillaceous beds.  @ 6.6'-7.1', high angle rust stained fracture.																
10		Core 90"	Rec 90"		RQD 51%	R-1																	
15 16.3	776.6						Medium hard light gray and dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured to unfractured.  @ 17.7', low angle clay filled fracture.																
20		Core 120"	Rec 120"		RQD 99%	R-2																	
25 30																							
		Core 120"	Rec 120"		RQD 100%	R-3																	

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-353**

Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL

Date Drilled: 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
30	762.9																			
							Medium hard light gray and dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured to unfractured.													
							@ 35.0', low angle clay filled fracture.													
							@ 36.8', low angle clay filled fracture.													
		Core 120"	Rec 120"	RQD 99%	R-4															
							@ 40.8', low angle clay filled fracture.													
							@ 42.9'-43.0', broken. @ 43.0'-43.2', high angle fracture.													
		Core 120"	Rec 120"	RQD 98%	R-5															
		Core 120"	Rec 120"	RQD 100%	R-6															
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-353**

Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL

Date Drilled: 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
60	732.9																		
65																			
70		Core 120"	Rec 120"	RQD 94%	R-7		@ 69.3'-69.5', high angle fracture. @ 70.4'-70.5', high angle fracture. @ 71.1',71.6',72.6', low angle clay filled fractures; contains argillaceous laminations. @ 72.6'-75.4', turbidity bedding.												
75		Core 84"	Rec 84"	RQD 100%	R-8		@ 74.2'-74.6', fine to medium grained. @ 75.4'-75.9', fine to medium grained.												
80.0	712.9						Bottom of Boring - 80.0'												
85																			
90																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-354**

Location: Sta. 416+57.7, 23.1 ft. LT of SR 823 CL

Date Drilled: 7/27/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	792.3						Topsoil - 3" Severely weathered light brown SANDSTONE.													
0.3	792.0	50/4	4	1																50+
		50/5	5	2															50+	
5	786.8						Medium hard brown and light gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, highly fractured with typically low angle rust stained to clean fractures. @ 8.8'-9.0', high angle clay filled fracture.													
5.5		Core 84"	Rec 71"	RQD 52%	R-1															
10																				
13.4	778.9						@ 12.9'-13.0', high angle rust stained fracture. Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured. @ 14.8'-15.9', brown. @ 15.2'-15.5', broken with low angle fracture. @ 14.8'-15.9', brown, broken with low angle fracture.  @ 20.0', brown with a low angle fracture. @ 20.7'-30.0', brown with a low angle fracture.  @ 24.4'-24.6', brown with a low angle fracture.													
15		Core 120"	Rec 120"	RQD 96%	R-2															
20																				
25		Core 120"	Rec 120"	RQD 100%	R-3															
30																				



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-354**

Location: Sta. 416+57.7, 23.1 ft. LT of SR 823 CL

Date Drilled: 7/27/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40											
30	762.3						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, thinly bedded to massive, slightly fractured to unfractured.  @ 34.3', low angle clay filled fracture.																		
		Core 120"	Rec 120"	RQD 98%	R-4																				
		Core 120"	Rec 120"	RQD 100%	R-5																				
		Core 30"	Rec 20"	RQD 67%	R-6																				
55.0	737.3						Bottom of Boring - 55.0'																		
60																									

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-356**

Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL

Date Drilled: 7/23/04 to 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	857.6																			
0.3	857.3						Topsoil - 4"/3" soil removed before drilling													
		3 5	3	18		1	4.5+													
		8 9		18		2	4.5+													
5		10																		
		4 10		18		3	4.5+													
		15																		
8.0	849.6						Soft gray SHALE; highly weathered.													
		24 31		18		4														
		38																		
		30 35		18		5														
		48																		
		32 50/4				6														
15																				
15.5	842.1						Soft brown and gray SHALE; highly weathered, arenaceous, micaceous, thinly laminated to thinly bedded, broken (contains numerous healed fractures); contains few arenaceous laminations.													
		Core 60"	Rec 57"		RQD 60%	R-1	*50													
20																				
		Core 120"	Rec 102"		RQD 48%	R-2	*116	@ 24.0', gray. @ 24.9'-27.0', qu = 1,886 psi; SDI = 21.9%.  @ 27.0'-29.0', SILTSTONE lens.												
25																				
29.0	828.6						Medium hard gray SANDSTONE; highly weathered.													
30																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-356**

Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL

Date Drilled: 7/23/04 to 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30	827.6						<p>DESCRIPTION</p> <p>Medium hard gray SANDSTONE; highly weathered, micaceous, very thinly bedded to thinly bedded, very broken, contains numerous healed fractures, contains few to moderate argillaceous laminations.</p>										
35		Core 120"	Rec 90"	RQD 55%	R-3	*193											
40							<p>@ 41.9'-43.0', 45° dip on beds.</p> <p>Medium hard brown SANDSTONE; fine to medium grained, moderately weathered, micaceous, argillaceous, carbonaceous, broken; contains moderate argillaceous laminations.</p>										
43.2	814.4	Core 120"	Rec 120"	RQD 42%	R-4												
44.5	813.1						<p>Soft to medium hard SHALE, decomposed to highly weathered, carbonaceous, arenaceous, highly fractured.</p>										
45																	
50							<p>@ 54.5'-55.5' core loss, possible void</p> <p>@ 54.0', dark gray, slightly carbonaceous, highly weathered.</p>										
55		Core 120"	Rec 109"	RQD 46%	R-5	*269											
59.5	798.1						<p>@ 56.1'-57.0' ferric SANDSTONE lens</p> <p>@ 56.4'-57.0', qu = 1,449 psi.</p> <p>@ 58.2'-58.9', brecciated layer.</p> <p>@ 58.9'-59.5', Ferric band.</p>										

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-356**

Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL

Date Drilled: 7/23/04 to 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40									
60	797.6						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured; contains few argillaceous laminations.																
65		Core 120"	Rec 120"	RQD 95%	R-6	*457																	
75		Core 120"	Rec 120"	RQD 90%	R-7	*520																	
85		Core 120"	Rec 120"	RQD 99%	R-8	*445																	

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-356**

Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL

Date Drilled: 7/23/04 to 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
90	767.6						<p>Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured; contains few argillaceous laminations.</p> <p>@ 98.0', pyritic.</p> <p>@ 107.0', low angle fracture with argillaceous zone.</p> <p>@ 113.9'-115.0', high angle partially clay filled fracture.</p> <p>@ 118.2', low angle fracture with clay seam.</p>											
95		Core 120"	Rec 120"	RQD 100%	R-9	*430												
105		Core 120"	Rec 120"	RQD 95%	R10	*645												
115		Core 120"	Rec 120"	RQD 97%	R11	*587												
120																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-356**

Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL

Date Drilled: 7/23/04 to 7/28/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
120	737.6						DESCRIPTION													
125		Core 120"	Rec 120"	RQD 100%	R12	*547		Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured.												
130																				
131.4	726.2																			
135		Core 120"	Rec 120"	RQD 72%	R13	*527	Medium hard to hard gray and dark gray SANDSTONE ; very fine to fine grained, moderately weathered, argillaceous, micaceous, laminated to medium bedded, moderately fractured; contains moderate to abundant argillaceous laminations, friable.													
139.5	718.1						@ 138.0'-139.5', qu = 11,462 psi (primarily sandstone), SDI = 89.5%.													
140		Core 60"	Rec 60"	RQD 92%	R14	*500	Hard gray SANDSTONE, very fine to fine grained, slightly to moderately weathered, argillaceous, thickly bedded, slightly fractured to unfractured.													
144.5	713.1						Bottom of Boring - 144.5'													
150																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-359**

Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL

Date Drilled: 7/27/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 4.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	815.9																			
		8 13 14	18			1	4.5+													
		9 15 17	18			2	4.5+													
5.5	810.4																			
		31 50/3	9			3														
7.0	808.9						Severely weathered gray SILTSTONE.													
		Core 72"	Rec 72"	RQD 85%	R-1	*30	Very soft grayish brown SILTSTONE; decomposed to highly weathered, slightly arenaceous, thinly laminated to thinly bedded, highly fractures with low angle clay filled fractures. @ 10.0'-10.2' ironstone band @ 11.0'-12.4', qu = 339 psi, SDI = 5.9%.													
							@ 14.4'-14.8', ferric zone, possible filled fractures.													
14.8	801.1						Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to moderately weathered, massively bedded, argillaceous, micaceous, slightly pyritic, slightly to moderately fractured; contains few argillaceous laminations. @ 17.9', low angle clay filled fracture. @ 19.5', low angle clay filled fracture. @ 23.6', low angle clay filled fracture. @ 26.7'-26.8', high angle fracture.													
		Core 120"	Rec 120"	RQD 89%	R-2	*214														
		Core 120"	Rec 120"	RQD 99%	R-3	*380														
30																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]





Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-359**

Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL

Date Drilled: 7/27/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 4.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
60	755.9																		
65																			
		Core 120"	Rec 120"	RQD 100%	R-7	*509	Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to moderately weathered, massively bedded, argillaceous, micaceous, slightly pyritic, slightly fractured to unfractured; contains few argillaceous laminations. @ 64.2'-64.7', qu = 11,633 psi.												
70																			
75																			
		Core 120"	Rec 120"	RQD 100%	R-8	*416													
80																			
85							@ 92.2'-92.3', ferric band.												
		Core 120"	Rec 120"	RQD 98%	R-9	*481													
90																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-359**

Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL

Date Drilled: 7/27/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 4.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●					
90	725.9																		
90.7	725.2						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, thinly bedded to massive.												
94.3	721.6	Core 24"	Rec 24"	RQD 100%	R10	*62	Medium hard gray SHALE; slightly weathered, thinly laminated to thinly bedded, contains occasional siltstone interbeds. @ 92.0', 92.3', low angle clay filled fractures.												
95.0	720.9						Hard gray SANDSTONE; fine to medium grained, moderately weathered, thinly bedded.  Bottom of Boring - 95.0'												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-360**

Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL

Date Drilled: 7/22/04 to 7/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7' Water level at completion: None (Prior to coring) 11.0' (at the start of 7/23/04) 9.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
0	836.1						No Topsoil/1.4' soil removed before drilling Very stiff brown and gray SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp.														
		10 11 12	18			1		2.25													
		9 13 15	18			2		2.5	27	13	--	16	26	18							
5	830.6							Very stiff brown and gray SILT (A-4b); some clay; little fine to coarse sand; damp.													
		9 11 11	18			3			2.25	2	3	--	15	58	22						
8.0	828.1								Hard brown CLAY (A-7-6); damp.												
		11 12 16	9			4	4.5+														
10	825.6						Severely weathered dark brown CLAYSHALE.														
		20 28 33	18			5															
		24 40 50/5	17			6															
15	820.6						Very soft to soft brown and gray CLAYSHALE; highly weathered to decomposed, micaceous, thinly laminated to thinly bedded, moderately fractured .														
		Core 90"	Rec 90"	RQD 86%	R-1	*17															
22.4	813.7						Soft black SHALE; moderately to highly weathered, carbonaceous, arenaceous, thinly laminated to thinly bedded, fractured; contains few arenaceous laminations, very fissile. @ 25.0', 25.6', 25.9', low angle weathered fracture.  @ 25.9'-26.4', high angle fracture.														
		Core 120"	Rec 120"	RQD 75%	R-2	*53															
29.0	807.1							Medium hard gray SHALE; moderately to highly weathered.													
30																					

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-360** Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL Date Drilled: 7/22/04 to 7/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7' Water level at completion: None (Prior to coring) 11.0' (at the start of 7/23/04) 9.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
30	806.1																		
32.8	803.3						Medium hard gray SHALE; moderately to highly weathered, micaceous, thinly laminated to thinly bedded. @ 32.3', contains small arenaceous clasts.												
34.5	801.6						Hard gray very fine grained SANDSTONE; moderately weathered, micaceous, very thinly bedded to thinly bedded, (gradational change). @ 33.7'-34.7', contains ferric zones.												
35						RQD 98%	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, thinly bedded to thickly bedded, (gradational change), slightly fractured to unfractured. @ 35.0'-35.5', qu = 11,937 psi. @ 38.1', pyritic.												
40		Core 120"	Rec 120"			R-3	*194												
45																			
50		Core 120"	Rec 120"			R-4	*549												
55																			
60		Core 120"	Rec 120"			R-5	*506	@ 58.0'-58.2', very hard ferric band.											



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-360 Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL Date Drilled: 7/22/04 to 7/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7' Water level at completion: None (Prior to coring) 11.0' (at the start of 7/23/04) 9.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
90	746.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, thinly bedded to thickly bedded, (gradational change), slightly fractured to unfractured.  @ 104.4'-113.6', contains rust stained bands.  @ 106.9'-108.8', qu = 12,620 psi, SDI = 98.3%.  @ 112.7'-103.0', 110.2'-113.0', friable zone. @ 113.6'-113.8', medium hard, medium to coarse grained, poorly cemented.  Hard gray and light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, very thinly bedded to medium bedded.													
		Core 120"	Rec 120"	RQD 100%	R-9	*553														
		Core 120"	Rec 120"	RQD 100%	R10	*449														
		Core 120"	Rec 120"	RQD 100%	R11	*503														
113.8	722.3																			
115																				
120																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.			Project: SCI-823-0.00				Job No. 0121-3070.03													
LOG OF: Boring R-360			Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL				Date Drilled: 7/22/04 to 7/23/04													
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7' Water level at completion: None (Prior to coring) 11.0' (at the start of 7/23/04) 9.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
120	716.1						DESCRIPTION  Hard gray and light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, very thinly bedded to medium bedded.  @ 125.9', slightly pyritic.													
125		Core 84"	Rec 84"	RQD 100%	R12	*479														
130.0	706.1						Bottom of Boring - 130.0'													
135																				
140																				
145																				
150																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-362**

Location: Sta. 423+86.0, 12.1 ft. RT of SR 823 CL

Date Drilled: 7/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 5.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	784.2						No Topsoil												
5		5 7 9	18			1	Medium dense to dense brown SANDY SILT (A-4a), little gravel; damp.												
		9 9	18			2													
		12 15 19	17			3													
8.0	776.2						Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.												
		12 15 17	15			4	2.5												
		19 21 24	13			5	4.5+												
		10 10 10	18			6	4.5+												
		9 10 11	18			7	3.5												
		10 12 14	18			8	3.0												
20.0	764.2	Core 36"	Rec 33"	RQD 89%	R-1		Medium hard to hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, thinly bedded to thickly bedded, slightly fractured. @ 20.4'-20.5', broken zone with high angle fracture.												
							@ 24.1'-24.5', qu = 8,803 psi.												
		Core 120"	Rec 120"	RQD 92%	R-2		@ 27.1',27.3',27.4', 27.5, low angle clay filled fractures.												
30																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-362** Location: Sta. 423+86.0, 12.1 ft. RT of SR 823 CL Date Drilled: 7/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 5.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	10	20	30	40			
30	754.2						Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, thin bedded to thickly bedded, slightly fractured to unfractured. @ 32.7', low angle clay filled fracture.													
35																				
40																				
45.0	739.2						Bottom of Boring - 45.0'													
50																				
55																				
60																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04 to 7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.2	899.6																		
	899.4	6		1		4.5+	Topsoil - 2"												
		7					Hard brown SILT AND CLAY (A-6a), trace gravel; damp.												
		9	17																
3.0	896.6						Soft brown and gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous.												
		5		2															
		11																	
		20	18																
5																			
		17																	
		11		3															
		20	18																
10																			
		25																	
		48		4															
		40	18																
		8																	
		27		5															
		35	18																
13.0	886.6						Soft black SHALE; fine grained, moderately weathered, carbonaceous; contains coal stringers.												
		13				6A													
		39				6B													
		45	18				Soft gray CLAYSHALE; moderately weathered, sulfur stains.												
14.5	885.1																		
		22																	
		33				7													
		38	16																
18.0	881.6						Soft gray SHALE; fine grained, moderately weathered.												
		37																	
		38		8															
		40	13																
20																			
		25																	
		50/4	10	9															
		37																	
		38																	
		50/4	18	10															
25.0	874.6						Soft dark gray SHALE; highly weathered, carbonaceous, micaceous, arenaceous, laminated to thinly bedded, highly fractured.												
		Core 60"	Rec 56"		RQD 70%	R-1													
							@ 28.4'-29.4', SDI = 34.6%												
							@ 28.7'-30.0', qu = 1,652 psi, SDI = 20.1%.												
30																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04 to 7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
30	869.6						Soft to medium hard dark gray SHALE; highly weathered, carbonaceous, micaceous, laminated to thinly bedded, slightly fractured; contains few arenaceous laminations and dust.  @ 40.0', arenaceous.  Medium hard gray and dark gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded; contains turbidity beds, moderately fractured to unfractured.													
35		Core 120"	Rec 120"	RQD 75%	R-2															
45		Core 120"	Rec 120"	RQD 97%	R-3															
47.2	852.4																			
55		Core 120"	Rec 120"	RQD 98%	R-4															
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04 to 7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
60	839.6						Hard gray and dark gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, laminated to thinly bedded, turbidity bedded with carbonaceous stringers. @ 60.2'-63.3', fine to medium grained.  Medium hard dark gray SILTSHALE; moderately weathered, arenaceous, carbonaceous, laminated to thinly bedded, highly to moderately fractured; contains arenaceous laminations and dust. @ 63.3'-64.7', 65.0'-66.8', highly fractured to broken with high angle fractures.  @ 75.3'-76.9', fine to coarse grained ferric layers. @ 76.1'-76.4', carbonaceous shale layers  Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to thickly bedded. @ 76.9'-77.5', rust stained.													
63.3	836.3																			
65		Core 120"	Rec 116"	RQD 63%	R-5															
70																				
75		Core 120"	Rec 119"	RQD 98%	R-6															
76.9	822.7																			
80																				
85		Core 120"	Rec 118"	RQD 98%	R-7															
90																				



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04 to 7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
120	779.6																			
125		Core 120"	Rec 118"	RQD 98%	R11		Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded.													
							@ 125.0'-125.4', qu = 11,597 psi.													
130							@ 128.7'-129.2', pitted and rust stained. @ 129.3', low angle clay filled fracture.													
135		Core 120"	Rec 118"	RQD 98%	R12															
140																				
145		Core 120"	Rec 116"	RQD 96%	R13															
150																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04 to 7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
150	749.6						DESCRIPTION Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured.  @ 153.8'-154.3', three high angle fractures.           @ 169.7'-173.5', turbidity bedding with rust stained bands.											
155		Core 120"	Rec 120"	RQD 98%	R14													
160																		
165		Core 120"	Rec 120"	RQD 100%	R15													
170																		
173.5	726.1						DESCRIPTION Medium hard to hard gray and dark gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, massive, slightly fractured to unfractured. @ 173.5'-174.0', thinly bedded to thickly bedded. @ 175.4'-176.8', qu = 12,551 psi, SDI = 98.0%.											
175		Core 120"	Rec 120"	RQD 93%	R16													
180																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-363**

Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL

Date Drilled: 7/20/04

to

7/22/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 62.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		PL  -----  LL			
180	719.6						DESCRIPTION  Medium hard to hard gray and dark gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, massive, slightly fractured to unfractured. .  @ 184.6', pyritic.												
185		Core 120"	Rec 120"	RQD 96%	R17														
190																			
195		Core 120"	Rec 120"	RQD 100%	R18														
200.0	699.6																		
							Bottom of Boring - 200.0'												
205																			
210																			



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-365**

Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL

Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)		
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●	Blows per foot - ○	
0	875.5															
0-1		5 8 10	18			1	4.5+									
1-2		8 13 27	18			2	4.5+	34	7	--	6	17	36	●		
2-3		8 15 28	18			3	4.5+									
3-4	867.5	14 19 31	18			4	Severely weathered brown and gray SHALE, interbedded with SANDSTONE.									
4-5		10 17 24	18			5										
5-6		16 20 28	18			6	@ 6.0', gray.									
6-7		16 50/5	11			7										
7-17.5	858.0	Core 66"	Rec 66"	RQD 89%	R-1		Soft black SHALE; moderately to highly weathered, arenaceous, carbonaceous, thinly laminated to thinly bedded, slightly fractured; contains few arenaceous laminations. @ 18.4'-18.8', qu = 1,677 psi. @ 18.9'-20.0', SDI = 30.8%.									
17.5-27.7	847.8	Core 120"	Rec 120"	RQD 98%	R-2		Medium hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, contains moderate									
27.7-30																

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-365**

Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL

Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10    20    30    40						
30	845.5						argillaceous laminations. @ 29.2'-30.2', SDI = 59.5%. Medium hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, laminated to medium bedded, contains few to moderate argillaceous laminations. @ 35.2', high angle highly weathered fracture. @ 36.9', becomes laminated to thin bedded, contains occasional coal or carbonaceous laminae/stringer. @ 40.8',41.6', high angle highly weathered fracture.													
35				Core 120"	Rec 114"	RQD 88%		R-3												
40																				
42.8	832.7						Soft to medium hard black SHALE; highly to moderately weathered, arenaceous, micaceous, carbonaceous, laminated to thinly bedded, contains thin arenaceous laminations. @ 46.1'-47.3', qu = 5,197 psi, SDI = 32.4%. @ 53.5'-54.1', decomposed to highly weathered. @ 56.0'-56.2', rust stained band.													
45				Core 120"	Rec 120"	RQD 98%		R-4												
50																				
55																				
56.2	819.3						Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, slightly argillaceous, massively bedded, slightly fractured to unfractured.													
60				Core 120"	Rec 120"	RQD 53%		R-5												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-365**

Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL

Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
60	815.5						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, massively bedded, slightly fractured to unfractured.													
		Core 120"	Rec 120"	RQD 98%	R-6															
		Core 120"	Rec 120"	RQD 100%	R-7															
		Core 120"	Rec 120"	RQD 100%	R-8															



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-365**

Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL

Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10    20    30    40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
120	755.5																						
		Core 120"	Rec 120"	RQD 99%	R12		Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, slightly fractured to unfractured, massively bedded.																
125																							
130							@ 129.0', low angle fractures.																
135																							
140		Core 120"	Rec 120"	RQD 100%	R13																		
145							@ 148.4', low angle fracture.																
150		Core 120"	Rec 120"	RQD 100%	R14		@ 148.8'-150.8', medium hard, fine to medium grained, poorly cemented.																

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-365**

Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL

Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10    20    30    40											
150	725.5						Hard light gray SANDSTONE; fine to fine grained, slightly weathered, micaceous, slightly argillaceous, massively bedded.  @ 151.1', low angle fracture.																		
155		Core 84"	Rec 84"	RQD 100%	R15																				
160.0	715.5						Bottom of Boring - 160.0'																		
165																									
170																									
175																									
180																									

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-367**

Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL

Date Drilled: 7/28/04 to 7/29/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 46.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.2	845.8																		
0.2	845.6						Topsoil - 2"												
		3					Hard brown and gray SILT (A-4b), little to some clay; little fine to coarse sand, trace gravel; damp.												
		4						4.5+											
		5	18																
5		13					4.25												
		14																	
		15	18																
		12					4.5+												
		14																	
		15	18																
		4					4.5+												
		8																	
		12																	
10																			
10.5	835.3						Severely weathered gray and brown CLAYSHALE.												
		12																	
		50/5	9																
		20																	
		50/4	10																
15.0	830.8						Medium hard brown CLAYSHALE; highly weathered to decomposed, laminated, broken to highly fractured with low angle rust stained fractures. @ 15.4'-15.6', high angle fractures.												
		Core 60"	Rec 60"			RQD 50%													
20																			
25							@ 21.5'-21.8', rust stained beds. @ 22.5'-24.0', qu = 8,200 psi, SDI = 71.0%.												
		Core 120"	Rec 120"			RQD 88%													
30							@ 29.1'-30.5', sandstone seam.												

FILE: 0121-3070-03 [ 11/22/2006 4:52 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-367**

Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL

Date Drilled: 7/28/04 to 7/29/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 46.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
30	815.8																			
30.5	815.3						Hard gray SHALE; decomposed to highly weathered, thinly laminated to laminated, moderately to highly fractured; contains few arenaceous laminations.													
35		Core 120"	Rec 120"	RQD 71%	R-3	*766														
37.5	808.3						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, moderately to slightly fractured.  @ 41.2'-42.5', qu = 11,791 psi, SDI = 98.4%.  @ 48.8', argillaceous clast evident.													
40																				
45		Core 120"	Rec 112"	RQD 78%	R-4	*494														
50																				
55		Core 120"	Rec 120"	RQD 100%	R-5	*411														
60																				



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-367**

Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL

Date Drilled: 7/28/04 to 7/29/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 46.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ──────────── LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
60	785.8						<p>Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, slightly fractured to unfractured.</p>        <p>@ 81.6'-81.8', brown and rust stained. @ 82.2'-82.4', brown, rust stained, pitted and fossiliferous.</p>    <p>@ 88.8', argillaceous clast and few argillaceous laminations.</p>								
65		Core 120"	Rec 120"	RQD 100%	R-6	*455									
70															
75		Core 120"	Rec 120"	RQD 100%	R-7	*527									
80															
85		Core 120"	Rec 120"	RQD 100%	R-8	*514									
90															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-367**

Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL

Date Drilled: 7/28/04 to 7/29/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 46.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
90	755.8																		
95		Core 120"	Rec 120"	RQD 100%	R-9	*415	Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, contains occasional siltstone beds. @ 90.4'-90.7', rust stained band. @ 90.7', low angle clay coated fracture.												
							@ 97.5', low angle clay coated fracture.												
100							@ 99.1', very thin clay seam.												
105		Core 120"	Rec 120"	RQD 100%	R10	*441	Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, contains occasional siltstone beds. @ 107.0'-107.2', contains moderate argillaceous laminations. @ 107.6', low angle fracture.												
110							@ 109.6', 109.8', very thin clay seam.												
							@ 112.0', very thin clay seam.												
114.0	731.8																		
115		Core 120"	Rec 120"	RQD 83%	R11	*465	Medium hard to hard dark gray and gray SANDSTONE; very fine to fine grained, moderately weathered to highly weathered, laminated to thin bedded, argillaceous, micaceous, highly fractured; contains moderate to abundant argillaceous laminations, fissile. @ 117.5'-118.1', medium grained, poorly cemented. @ 117.5'-119.4', qu = 7,637 psi, SDI = 92.2%.												
120																			

FILE: 0121-3070-03 [ 11/22/2006 4:52 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-367**

Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL

Date Drilled: 7/28/04 to 7/29/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 46.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
120	725.8						<p>DESCRIPTION</p> <p>Medium hard to hard dark gray and gray SANDSTONE; very fine to fine grained, moderately weathered to highly weathered, laminated to thin bedded, argillaceous, micaceous, pyritic, moderately fractured to slightly fractured; contains few argillaceous laminations.</p> <p>@ 126.2', very thin clay seam.</p> <p>@ 118.1'-127.8', contains turbidity bedded zones.</p>										
125		Core 120"	Rec 120"	RQD 88%	R12	*584											
130																	
135		Core 120"	Rec 120"	RQD 100%	R13	*388											
140							<p>@ 135.9', slightly pyritic.</p>										
		Core 60"	Rec 60"	RQD 100%	R14	*478											
145.0	700.8						Bottom of Boring - 145.0'										
150																	

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-369**

Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL

Date Drilled: 8/2/04 to 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 8.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0.2	805.9						Topsoil-3" Medium dense gray SILT (A-4b), trace fine to coarse sand; contains roots; dry to damp.								
	805.7	6 24 50/3	15		1										
4.5	801.4							Medium hard brown and gray SANDSTONE; moderately to highly weathered, slightly argillaceous, micaceous, highly fractured. @ 4.8'-4.9', filled fractures with rootlets. @ 5.5'-5.9', broken. @ 7.2'-7.3', 7.5'-7.6', 10.0'- 10.1', high angle fractures.  @ 13.7'-13.9', 14.1'-14.4', high angle fractures, rust stains. @ 15.0'-15.3', broken zone, rust stained.							
5															
		Core 102"	Rec 102"	RQD 52%	R-1	*331									
15.3	790.6						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, moderately to slightly fractured. @ 18.1', low angle moderately rust stained fractures. @ 19.1', low angle rust stained fractures.  @ 23.8', low angle fractures.  @ 27.0', occasional pyrite nodules.								
15															
		Core 120"	Rec 120"	RQD 90%	R-2	*348									
25															
		Core 120"	Rec 120"	RQD 100%	R-3	*517									
30															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-369**

Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL

Date Drilled: 8/2/04 to 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 8.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
30	775.9																				
35																					
40		Core 120"	Rec 120"	RQD 97%	R-4	*530															
45																					
50		Core 120"	Rec 120"	RQD 100%	R-5	*513															
55																					
60		Core 120"	Rec 120"	RQD 100%	R-6	*430															

Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, slightly fractured to unfractured.

@ 41.0' low angle fractures

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-369**

Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL

Date Drilled: 8/2/04 to 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 8.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
60	745.9						<p>DESCRIPTION</p> <p>Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, slightly fractured to unfractured. @ 60.6'-61.0', qu = 7,165 psi.</p>													
67.5	738.4	Core 120"	Rec 120"	RQD 96%	R-7	*439		<p>Medium hard gray SANDSTONE; highly to moderately weathered, micaceous, laminated to thinly bedded; contains few argillaceous laminations, friable. @ 68.7',71.5',71.8', low angle clay-filled fractures.</p> <p>@ 72.1'-73.2', slightly weathered, poorly cemented.</p>												
73.2	732.7	Core 120"	Rec 120"	RQD 100%	R-8	*426		<p>Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, massive. @ 73.2'-74.3', rust stained, contains few argillaceous laminations.</p>												
85		Core 120"	Rec 120"	RQD 100%	R-9	*703														
90																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-369** Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL Date Drilled: 8/2/04 to 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 8.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
90	715.9						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, massively bedded, slightly fractured to unfractured.													
		Core 24"	Rec 24"	RQD 100%	R10	*547														
95.0	710.9						Bottom of Boring - 95.0'													
100																				
105																				
110																				
115																				
120																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-384**

Location: Sta. 452+33.5, 74.6 ft. LT of SR 823 CL

Date Drilled: 8/9/04 to 8/10/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	760.5																			
-0.4	760.1						Topsoil - 5"													
		36 20 27	18			1	Severely weathered brown SANDSTONE, argillaceous.													
		23 25 29	18			2														
5		26 50/2	8			3														
-7.0	753.5						Medium hard to hard brown SANDSTONE; very fine to fine grained, decomposed to highly weathered, broken, argillaceous, contains thin clay seams.													
10		Core 72"	Rec 60"	RQD 36%		R-1	@ 14.2', fractured. @ 10.4'-12.5', qu = 2,102 psi, SDI = 73.9%. @ 14.5'-14.7', 16.0'-16.5', broken decomposed zones.													
15							@ 16.8'-17.4', high angle fractures. @ 17.2'-17.4', decomposed zone. @ 17.9', low angle fracture.													
20		Core 120"	Rec 120"	RQD 63%		R-2	@ 18.0'-22.0', contains moderate to abundant argillaceous laminations, decomposed to highly weathered. @ 22.1'-22.7', medium to coarse grained, poorly cemented.													
-22.7	737.8						Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, contains thin clay seams.													
25							@ 24.1', 24.3', 26.3', 27.8', low angle fractures. @ 25.3', slightly weathered to moderately weathered. @ 25.5'-27.0', qu = 9,350 psi, SDI = 93.2%.													
30		Core 120"	Rec 114"	RQD 90%		R-3														

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]



Client: **TranSystems, Inc.** Project: **SCI-823-0.00** Job No. **0121-3070.03**

**LOG OF: Boring R-384** Location: **Sta. 452+33.5, 74.6 ft. LT of SR 823 CL** Date Drilled: **8/9/04** to **8/10/04**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay												
30	730.5						Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, contains thin clay seams. @ 30.8'-31.5', broken zone. @ 30.9'-31.6', broken with core loss. @ 33.9', 35.2', 36.5', 38.0', low angle fractures.  @ 34.6', pyritic.																		
35																									
40																									
45							@ 46.1'-48.0', qu = 11,063 psi, SDI = 98.0%.  @ 48.9', low angle fractures.																		
50																									
55																									
60																									

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-384**

Location: Sta. 452+33.5, 74.6 ft. LT of SR 823 CL

Date Drilled: 8/9/04 to 8/10/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
60	700.5						Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, pyritic, slightly argillaceous, laminated to medium bedded.  @ 63.0'-63.6', high angle healed fractures.											
		Core 120"	Rec 120"	RQD 100%	R-7													
		Core 24"	Rec 24"	RQD 100%	R-8													
75.0	685.5						Bottom of Boring - 75.0'											
80																		
85																		
90																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-386**

Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL

Date Drilled: 8/10/04 to 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 42.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	774.5						No topsoil/Drilled on old road cut Medium dense brown SANDY SILT (A-4a); contains sandstone fragments; dry.												
		2 4	7 14			1													
3.0	771.5						Soft brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, micaceous, (has soil like appearance), contains moderate to abundant argillaceous laminations.												
5		Core 72"	Rec 32"	RQD 0%	R-1														
9.0	765.5						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, contains moderate to abundant argillaceous laminations.												
10		Core 24"	Rec 22"	RQD 0%	R-2														
		Core 36"	Rec 27"	RQD 14%	R-3														
15							@ 14.4', brown and gray, highly weathered to moderately weathered.												
		Core 120"	Rec 116"	RQD 47%	R-4														
25							@ 29.6', gray.												
		Core 120"	Rec 120"	RQD 58%	R-5														
29.6	744.9																		

<i>Client:</i> TranSystems, Inc.	<i>Project:</i> SCI-823-0.00	<i>Job No.</i> 0121-3070.03
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**LOG OF: Boring R-386**      *Location:* Sta. 451+83.9, 122.1 ft. RT of SR 823 CL      *Date Drilled:* 8/10/04      to      8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 42.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)								
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40								
744.5							DESCRIPTION  Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, broken to highly fractured, contains abundant to moderate argillaceous laminations.  @ 38.0'-38.4', qu = 5,780 psi. @ 39.0'-40.5', SDI = 92.7%.  @ 42.7', pyritic.															
30																						
35																						
40		Core 120"	Rec 119"	RQD 63%	R-6																	
45																						
50		Core 120"	Rec 120"	RQD 60%	R-7																	
55																						
60		Core 120"	Rec 120"	RQD 54%	R-8																	

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-386**

Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL

Date Drilled: 8/10/04

to 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 42.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
60	714.5						DESCRIPTION  Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaceous, broken to highly fractured, contains abundant to moderate argillaceous laminations.  @ 67.5', moderate to few argillaceous laminations.  @ 78.4', occasional calcareous layers.													
65																				
70		Core 120"	Rec 119"	RQD 59%	R-9															
75																				
80		Core 120"	Rec 116"	RQD 55%	R10															
85																				
90		Core 120"	Rec 118"	RQD 80%	R11															

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-386 Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL Date Drilled: 8/10/04 to 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 42.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
90	684.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaeous, contains abundant to moderate argillaceous laminations. @ 92.5'-93.9', qu = 8,768 psi, SDI = 91.8%.												
95		Core 72"	Rec 72"	RQD 75%	R12														
100.0	674.5						Bottom of Boring - 100.0'												
105																			
110																			
115																			
120																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-387**

Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL

Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 23.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	800.7																			
0.3	800.4						Topsoil - 4"/16" soil removed before drilling													
		43 24 50/4	3			1	Severely weathered light brown SANDSTONE.													
		50/4	3			2														
5																				
6.0	794.7						Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, very thinly bedded to medium bedded, broken to highly fractured, contains abundant to moderate argillaceous laminations.													
		Core 60"	Rec 60"			RQD 53%														
10																				
							@ 12.0', brown and gray, moderately to highly fractured.													
15							@ 14.6'-20.0', qu = 8,449 psi, SDI = 87.0%.													
		Core 120"	Rec 120"			RQD 72%														
20																				
							@ 20.7', gray, broken.													
25							@ 22.3', 23.0', interbedded with shale.													
		Core 120"	Rec 120"			RQD 24%														
30																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.					Project: SCI-823-0.00					Job No. 0121-3070.03					
LOG OF: Boring R-387			Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL					Date Drilled: 8/11/04							
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 23.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ┌──────────────────┐ LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
30	770.7														
		Core 120"	Rec 120"	RQD 51%	R-4		Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, very thinly bedded to medium bedded, broken to highly fractured.								
35							@ 38.0', 38.3', interbedded with shale.								
40							@ 41.5'-43.2', 47.5'-49.1', contains moderate argillaceous laminations.								
45		Core 120"	Rec 120"	RQD 61%	R-5		@ 44.3'-45.3', qu = 8,852 psi, SDI = 97.3%.								
50							@ 51.5'-51.6', 52.9'-53.5', 54.4'-58.0', abundant argillaceous laminations.								
55		Core 120"	Rec 120"	RQD 48%	R-6										
58.0	742.7						Medium hard gray SANDSTONE; fine to coarse grained, moderately weathered, poorly cemented.								
58.8	741.9														
60															



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-387**

Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL

Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 23.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10    20    30    40					
60	740.7																		
		Core 120"	Rec 116"	RQD 69%	R-7		Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderate to few fractures, contains calcareous layers. @ 62.2'-63.4', qu = 9,395 psi, SDI = 96.9%.												
							@ 67.2'-67.7', high angle fracture with pyrite.												
							@ 73.5', pyritic.												
		Core 120"	Rec 118"	RQD 67%	R-8														
							@ 84.0', 86.9', 87.5', 88.9', low angle fractures.												
		Core 120"	Rec 120"	RQD 66%	R-9														
90																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-387**

Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL

Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 23.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
90	710.7						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderately fractured, contains thin clay seams, and calcareous layers.  @ 92.4', 96.5', 97.9', 98.1', 99.0', low angle fractures.          @ 110.0', moderately to slightly weathered.    @ 114.7'-115.1', qu = 9,618 psi. @ 116.0'-117.5', SDI = 70.6%.													
95		Core 120"	Rec 116"	RQD 86%	R10															
105		Core 120"	Rec 120"	RQD 82%	R11															
115		Core 120"	Rec 120"	RQD 86%	R12															
120																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-387** Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 23.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL $\leftarrow$ $\rightarrow$ LL Blows per foot - ○ 10    20    30    40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
120	680.7						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thin bedded to medium bedded, moderately fractured, contains few argillaceous laminations and calcareous layers.								
		Core 120"	Rec 119"	RQD 93%	R13										
131.0	669.7						Bottom of Boring - 131.0'								
135															
140															
145															
150															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-389**

Location: Sta. 455+17.0, 83.3 ft. RT of SR 823 CL

Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
0	727.4																		
0.3	727.1						Topsoil - 3"/2.1' soil removed before drilling												
		9 17 34	18			1	Severely weathered brown SANDSTONE, argillaceous.												51
		24 33 36	18			2													69
5		50/2	2			3													50+
7.0	720.4						Medium hard gray and brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, thinly bedded to massive, highly fractured, typical fracture is low angle rust stained. @ 8.0'-9.5', SDI = 93.3%. @ 10.5'-10.9', qu = 6,641 psi.												
10		Core 72"	Rec 66"	RQD 33%	R-1	*227													
15																			
18.3	709.1	Core 120"	Rec 120"	RQD 82%	R-2	*484	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to massive, slightly fractured to unfractured. @ 20.0', low angle clay filled fracture. @ 21.1', low angle clay filled fracture.												
20																			
25																			
30		Core 120"	Rec 120"	RQD 100%	R-3	*487													

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-389**

Location: Sta. 455+17.0, 83.3 ft. RT of SR 823 CL

Date Drilled: 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 8.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
30	697.4						<p>@ 29.7'-31.2', <math>q_u = 11,215</math> psi, SDI = 98.8%. Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to massive, slightly fractured to unfractured.</p> <p>@ 43.0'-50.0', contains friable bands of very fine sandstone.</p> <p>@ 44.6', low angle clay filled fracture. @ 44.7'-44.8', high angle clay filled fracture.</p>														
35																					
40																					
45																					
50.0	677.4																				
55																					
60																					

Bottom of Boring - 50.0'

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-414** Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40		
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
0	846.9						No topsoil Severely weathered brown SANDSTONE.									
		16 50/4	10			1										
3.0	843.9						Medium hard to hard brown SANDSTONE; fine grained, moderately weathered, micaceous, slightly argillaceous, thinly bedded to medium bedded, contains small argillaceous clasts, broken to moderately fractured.									
		Core 120"	Rec 120"			RQD 83%	@ 4.9', 5.9', clay filled fractures. @ 8.0'-9.7', qu = 6,016 psi, SDI = 91.6%.									
						R-1	@ 6.8'-7.1', interbedded shale.									
		Core 120"	Rec 120"			RQD 80%	@ 15.0', brown and gray. @ 7.4'-25.0', highly fractured. @ 16.3', high angle clay filled fractures. @ 19.9'-20.1', interbedded shale.									
						R-2										
		Core 120"	Rec 120"			RQD 90%	@ 24.6', thin clay seam.									
						R-3										

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-414**

Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL

Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
30.0	816.9 816.9						<p>Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, moderately to slightly fractured. @ 31.0', 32.7', high angle rust stained fractures. @ 31.4', low angle fracture.</p> <p>@ 36.1', 36.3', low angle highly weathered fractures. @ 36.3'-37.3', qu = 7,797 psi. @ 37.5'-38.0', qu = 7,698 psi.</p> <p>@ 47.1'-47.3', 47.5'-47.8', high angle highly weathered fractures with calcite on face.</p> <p>@ 59.0', 59.2', interbedded shale.</p>													
35																				
40																				
45																				
50																				
55																				
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-414**

Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL

Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
60	786.9						DESCRIPTION													
60-66.9								Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.												
66.9-75.5		Core 120"	Rec 120"	RQD 100%	R-7			@ 66.9', slightly pyritic.												
75.5-82.8	771.4						Hard brown fine grained SANDSTONE, moderately weathered, slightly argillaceous, thinly to thickly bedded, highly fractured to moderately fractured.													
82.8-87.5		Core 120"	Rec 116"	RQD 72%	R-8		@ 78.8'-79.6', broken zone. @ 79.9'- 79.4', lost recovery, fracture suspected.													
87.5-90	764.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured. @ 89.2'-95.5', moderate to few argillaceous laminations.													
		Core 120"	Rec 120"	RQD 100%	R-9	*203	@ 87.5'-88.8', SDI = 78.3%.													

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-414**

Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL

Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ───┬─── LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
90	756.9						DESCRIPTION  Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.          @ 109.5'-110.9', contains few argillaceous laminations, large concentration of pyrite.          @ 119.0', pyritic inclusion.														
		Core 120"	Rec 120"	RQD 100%	R10																
		Core 120"	Rec 120"	RQD 100%	R11																
		Core 120"	Rec 120"	RQD 98%	R12																

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-414**

Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL

Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Blows per foot - ○ 10 20 30 40						
120	726.9																			
							Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured. @ 120.5'-121.6', $qu = 11,804$ psi.													
							@ 126.0'-138.5', pyritic inclusions.													
		Core 120"	Rec 120"		RQD 97%	R13														
		Core 120"	Rec 120"		RQD 100%	R14	@ 129.7'-130.0', broken with interbedded shale.													
		Core 120"	Rec 120"		RQD 100%	R15														
150																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-414**

Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL

Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○				
150	696.9						DESCRIPTION  Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.  @ 158.4'-158.5', high angle fracture.           @ 170.5'-170.7', shale and clay filled fractures.													
				Core 120"	Rec 120"	RQD 100%		R16												
				Core 120"	Rec 120"	RQD 99%		R17												
173.0	673.9																			
							Bottom of Boring - 173.0'													

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-416**

Location: Sta. 480+94.2, 75.9 ft. RT of SR 823 CL

Date Drilled: 8/10/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 10.0' Water level at completion: None (prior to coring) 19.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	712.5						Topsoil - 12" Dense to very dense brown SANDY SILT (A-4a), trace gravel, trace clay; contains sandstone fragments; damp. @ 1.0'-2.5', medium dense.												
-1.0	711.5	4				1													
		6 10	18																
		11 21				2													
5		20	18																
		16 23				3													
		28	18																
		6 13				4													
10		18	18																
		6 14				5													
		22	18																
		15 35				6													
-15.0	697.5	53	18				Severely weathered brown SANDSTONE argillaceous, micaceous.												
		8				7													
-17.0	695.5	50/3	6				Medium hard to hard brown SANDSTONE; very fine to fine grained, broken to moderately fractured, moderately weathered, micaceous, argillaceous.  @ 21.0', high angle fracture. @ 20.5'-21.0', qu = 4,850 psi. @ 21.4', gray and brown.  @ 21.5', high angle fracture. @ 22.4', highly weathered, fractured. @ 24.4', slightly to moderately weathered.  @ 23.4', rust stained fractured.  @ 29.1'-29.5', qu = 9,339 psi.												
20		Core 120"	Rec 120"			RQD 83%													
						R-1													
25																			
30																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-416**

Location: Sta. 480+94.2, 75.9 ft. RT of SR 823 CL

Date Drilled: 8/10/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 10.0' Water level at completion: None (prior to coring) 19.4' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40				
30	682.5			RQD 100%	R-2		Medium hard to hard brown SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous.  @ 30.8'-35.5', abundant to moderate argillaceous laminations.  @ 36.5'-37.4', moderate to few laminations.  @ 41.3'-41.6', 42.3'-42.9', few argillaceous laminations.  @ 44.0', 44.2', low angle fractures.  @ 44.7', 45.2', few argillaceous laminations.											
35																		
40				RQD 98%	R-3													
45																		
50				RQD 100%	R-4													
50.5	662.0						Bottom of Boring - 50.5'											
55																		
60																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

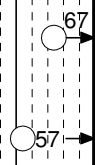
Job No. 0121-3070.03

**LOG OF: Boring R-429**

Location: Sta. 497+10.8, 5.6 ft. RT of SR 823 CL

Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.3' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○						
0	691.8																			
-0.5	691.3						Topsoil - 6"/1.9' soil removed before drilling													
		15 27 40	18			1	Very dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.													
		15 27 30	18			2														
5																				
6.0	685.8						Soft brown BRECCIA/SANDSTONE/ SHALE, fine to medium grained, decomposed, broken.													
10		Core 84"	Rec 45"	RQD 54%	R-1															
15		Core 84"	Rec 68"	RQD 0%	R-2		@ 18.5'-18.6', 19.7'-19.8', hard SANDSTONE, possible cobbles or boulders.													
20.0	671.8						Bottom of Boring - 20.0'													
25																				
30																				



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-430**

Location: Sta. 497+01.4, 86.8 ft. RT of SR 823 CL

Date Drilled: 7/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0	685.5																
		5 6 10	18			3.0	No topsoil/12" soil removed before drilling Very stiff brown and red SANDY SILT (A-4a), little to some gravel; damp.										
		20 24 30	18			4.0											
5	680.0						Very stiff to hard brown and red SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; contains sandstone fragments; damp.										
		7 10 17	18			4.5+											
		7 10 15	18			4.5+											
		9 10 12	18			3.75											
10							Medium stiff brown and gray SANDY SILT (A-4a), trace clay; moist.										
		6 10 11	18			2.75											
		4 5 5	18			0.5											
15	670.0						Bottom of Boring - 20.0'										
		4 5 8	18			0.75											
20.0	665.5																
25																	
30																	

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-432**

Location: Sta. 498+11.4, 111.1 ft. LT of SR 823 CL

Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 4.9' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
0	738.4																			
0.6	737.8						Topsoil - 7"/2.1' soil removed before drilling													
		14 14 17	18			1	Dense brown SANDY SILT (A-4a), little gravel; contains sandstone fragments; damp.													
4.5	733.9	14 17 50/3	18			1	Severely weathered brown SANDSTONE.													
6.0	732.4						Soft to medium hard light brown SANDSTONE, argillaceous, highly weathered to decomposed, broken, contains numerous clay coated and rust stained low angle fractures, broken. @ 6.4'-6.8', high-angle clay filled fracture. @ 9.3'-9.8', high-angle clay filled fracture. @ 8.7'-10.3', qu = 5,466 psi, SDI = 73.6%. @ 10.2'-11.6', high-angle clay filled fracture.  @ 12.4'-12.7', high-angle healed fracture. @ 13.0'-13.5', very argillaceous. @ 13.0'-13.5', 14.0'-15.1', 16.5'-16.6', 17.3'-17.4', decomposed broken zones. @ 14.6'-17.8', partially clay filled near vertical fracture.													
10		Core 84"	Rec 84"	RQD 40%	R-1	*36														
18.0	720.4	Core 120"	Rec 116"	RQD 48%	R-2	*162	Hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to medium bedded, contains turbidity bedding, moderately to slightly fractured. @ 18.0'-18.6', brown and gray interbedded. @ 18.2' and 18.4', low angle fracture containing argillaceous laminations. @ 18.9', low angle fracture with rust staining.  @ 24.5' and 28.7', low angle highly weathered fracture containing argillaceous laminations.  @ 26.5'-27.0', qu = 8,267 psi.													
25		Core 120"	Rec 120"	RQD 100%	R-3	*414														
30																				



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-432 Location: Sta. 498+11.4, 111.1 ft. LT of SR 823 CL Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 4.9' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40												
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay													
30	708.4						<p><b>DESCRIPTION</b></p> <p>Hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to medium bedded, contains turbidity bedding, moderately to slightly fractured.                      @ 30.1', 30.5', low angle fracture containing argillaceous lamination.                      @ 33.4'-34.9', rust stained, near vertical fracture.                       @ 35.5'-36.0', iron inclusions.</p>																			
35		Core 84"	Rec 84"	RQD 77%	R-4	*320																				
40.0	698.4							Bottom of Boring - 40.0'																		
45																										
50																										
55																										
60																										

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-433**

Location: Sta. 498+14.4, 21.4 ft. LT of SR 823 CL

Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 10.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0	725.9						Topsoil - 6"/1.9' soil removed before drilling											
-0.5	725.4	15 23 17	18			1		Dense to very dense brown and gray SANDY SILT (A-4a), trace gravel; damp.										
-4.0	721.9	23 37 50/2	14			2	Severely weathered brown SANDSTONE											
-6.0	719.9						Medium hard light brown SANDSTONE, fine to medium grained, argillaceous, highly weathered to decomposed, broken; contains numerous silty clay filled, rust stained, low angled fractures. @ 7.4'-7.6', high angle rust stained fracture. @ 8.2'-8.5', decomposed and very argillaceous.											
-10		Core 84"	Rec 84"	RQD 75%	R-1	*112	@ 11.6', low angle fracture. @ 12.0', 12.1', rust stained low angle fracture. @ 12.2'-12.4', brown and gray.											
-12.4	713.5						Medium hard to hard gray SANDSTONE, very fine to fine grained, laminated to thin bedded, moderately weathered, contains very small argillaceous clasts, highly fractured. @ 13.3', very thin decomposed argillaceous zone. @ 13.7', 13.9' and 14.0', near horizontal rust stained fractures. @ 15.5'-16.7', contains contains soft to medium hard brown argillaceous interbeds, highly weathered to decomposed.											
-15		Core 120"	Rec 120"	RQD 73%	R-2	*512	@ 21.6', 22.1', 22.3' and 22.5', near horizontal rust stained fractures. @ 22.2'-22.5', high angle partially healed fracture with rust staining. @ 22.7' and 23.8', horizontal partially clay filled fractures.											
-20																		
-25.0	700.9	Core 24"	Rec 24"	RQD 92%	R-3	*387	Bottom of Boring - 25.0'											
-30																		

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-434**

Location: Sta. 498+47.1, 133.5 ft. RT of SR 823 CL

Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 7.9' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	709.3																		
-0.4	708.9						Topsoil - 5"/1.4' soil removed before drilling												
		7	18				Medium dense reddish brown SANDY SILT (A-4a), little gravel; contains sandstone fragments; damp.												
-3.0	706.3						Severely weathered brown SANDSTONE.												
		17	16																
		35																	
5		50/4																	
6.0	703.3						Medium hard light brown and brown SANDSTONE, fine to medium grained, argillaceous, highly weathered, broken. @ 6.3', 6.5', 8.0', horizontal fractures. @ 6.7'-7.7', 8.2'-8.9', broken with clay layers, decomposed. @ 9.1', 10.0', and 10.3', partially clay filled low angle fracture.  @ 11.0'-11.2', high angle, clay filled fracture. @ 11.9', low angle clay filled fracture. @ 12.3'-13.3', broken with clay layers. @ 13.6 becomes grayish brown. @ 14.6'-14.9', partially healed rust stained high angle fracture.												
10		Core 84"	Rec 84"	RQD 39%	R-1	*193													
15.9	693.4						Medium hard to hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to laminated, contains very small argillaceous clast. @ 16.3'-16.6' and 17.8'-18.0', rust stained horizontal fracture. @ 18.5'-18.7', partially healed rust stained high angle fracture.												
		Core 84"	Rec 84"	RQD 71%	R-2	*90													
20.0	689.3						Bottom of Boring - 20.0'												
25																			
30																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-435**

Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL

Date Drilled: 7/15/04 to 7/19/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (lost water circulation)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
0.1	847.7																			
	847.6						Topsoil - 1"													
		5				1	Soft to medium hard brown SANDSTONE; decomposed, argillaceous.													
		22	15	18																
		22	50/3	8		2														
5																				
		41	50/2	1		3														
		50/5		4		4	@ 8.0', light brown.													
10		50/4		4		5														
13.0	834.7	Core 12"	Rec 12"	RQD 67%	R-1	*181	Medium hard gray SANDSTONE, fine grained, thin to thick bedded, moderately to highly weathered, moderately fractured, contains occasional small argillaceous clasts, contains weathered rust stained zones.  @ 16.0'-16.1', high-angle fracture. @ 17.1'-17.6', qu = 5,833 psi.													
15																				
20		Core 120"	Rec 120"	RQD 87%	R-2	*240	@ 19.7', 0.1-ft. ironstone band, contains argillaceous laminations. @ 20.8', high angle clay filled fracture.													
21.9	825.8																			
25							Medium hard to hard gray SANDSTONE, very fine to fine grained, medium to thick bedded, moderately weathered, high to slightly fractured, contains occasional small argillaceous clasts. @ 25.2'-25.4' & 26.4'-27.0', high angle clean fracture. @ 26.2', low angle fracture, contains argillaceous laminations.													
30		Core 120"	Rec 120"	RQD 90%	R-3	*308	@ 29.7', low angle fracture.													

Client: TranSystems, Inc.			Project: SCI-823-0.00				Job No. 0121-3070.03															
LOG OF: Boring R-435			Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL				Date Drilled: 7/15/04 to 7/19/04															
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (lost water circulation)	GRADATION														
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay									
							STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10    20    30    40															
30	817.7																					
35							Medium hard to hard gray SANDSTONE, very fine to fine grained, medium to thick bedded, moderately weathered, high to slightly fractured, contains occasional small argillaceous clasts. @ 30.0'-30.8', brown highly weathered with turbidite beds, rust stained zone. @ 30.2'-30.4', horizontal infilled rust stained fracture. @ 36.1', horizontal spotty clay filled fracture. @ 36.8', contains fossils with pyrite.															
40		Core 120"	Rec 120"	RQD 89%	R-4	*366	@ 39.6'-39.9', qu = 9,802 psi.															
45							@ 44.0'-44.2', hard light gray calcareous zone, vuggy, pyritic, moderately weathered. @ 46.6'-51.1', brownish gray bed.															
50		Core 120"	Rec 120"	RQD 98%	R-5	*433	@ 51.4' and 51.6', low angle smooth clean fracture, contains argillaceous laminations.															
55							@ 55.8'-60.4', brownish gray. @ 56.6', low angle fracture.															
60		Core 120"	Rec 120"	RQD 95%	R-6	*413	@ 59.4'-60.0', high angle fracture.															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-435**

Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL

Date Drilled: 7/15/04 to 7/19/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (lost water circulation)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	10	20	30	40
60	787.7						<p>Medium hard to hard gray SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered.</p> <p>@ 65.0', argillaceous siltstone laminae, trace fossils become evident.                      @ 65.3'-66.0', brown.                      @ 65.4'-66.0', rust stained zone.                      @ 66.0', argillaceous coating at bedding contact.                      @ 66.5', low angle highly weathered fracture.                      @ 66.5' to 72.4' and 72.8 to 74.2, light brown in color.</p> <p>@ 73.9', low angle fracture with argillaceous laminae.                      @ 74.0'-94.0', lost water circulation.</p> <p>@ 78.1'-79.3', high angle rust stained fracture.                      @ 79.9'-86.5', contains moderate to abundant argillaceous laminae.                      @ 80.9'-82.3', very broken.                      @ 84.0'-86.5', very broken.</p> <p>@ 86.5'-90.3', contains few argillaceous interbeds.                      @ 86.5'-87.6', SDI = 65.1%.                      @ 87.6'-88.0', qu = 5,862 psi.                      @ 89.0', very small pyrite crystals.                      @ 89.0'-91.5', calcareous layer.</p>										
65						*288											
70		Core 120"	Rec 120"	RQD 100%	R-7												
75																	
80		Core 120"	Rec 117"	RQD 63%	R-8	*367											
85																	
90		Core 120"	Rec 120"	RQD 74%	R-9	*288											

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-435 Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL Date Drilled: 7/15/04 to 7/19/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (lost water circulation)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
90	757.7																		
							Medium hard to hard gray SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered, slightly fractured to unfractured. @ 92.1', 1/2" pyrite crystals (clasts).												
95							@ 96.5'-98.7', contains limestone layers.												
100		Core 120"	Rec 120"	RQD 100%	R10	*483													
105																			
110		Core 120"	Rec 120"	RQD 98%	R11	*482	@ 108.4'-108.5', argillaceous laminations. @ 110.0'-120.0', lost water circulation. @ 112.0'-114.5', light brown rust stained zone. @ 113.5'-114.5', near vertical rust stained fracture.												
115																			
120		Core 120"	Rec 120"	RQD 98%	R12	*481													

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-435 Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL Date Drilled: 7/15/04 to 7/19/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (lost water circulation)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40				
120	727.7						MEDIUM HARD TO HARD GRAY AND LIGHT BROWN SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered, slightly fractured to unfractured.  @ 124.1'-124.2', contains argillaceous laminations.  @ 128.8'-128.9', contains argillaceous laminations.											
125																		
		Core 72"	Rec 71"	RQD 94%	R13	*385												
130.0	717.7						Bottom of Boring - 130.0'											
135																		
140																		
145																		
150																		



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-436**

Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL

Date Drilled: 7/13/04 to 7/14/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 55.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
0	827.2						Topsoil - 4"/12" soil removed before drilling Soft to medium hard brown SANDSTONE; decomposed.							
0.3	826.9	50/5	4	1										
		50/5	2	2										50+
6.0	821.2						Medium hard brown SANDSTONE, very fine to fine grained, thickly bedded, highly weathered, broken. @ 6.0'-7.0', very broken with low angle fractures and rust staining. @ 8.7', 9.2' & 9.6', low angle rust stained and filled fractures. @ 10.0', high angle clay filled fracture. @ 10.9', low angle partially clay filled fracture. @ 11.6'-12.1', very broken with clay seams.  @ 12.9', low angle partially clay filled fracture. @ 13.3', low angle clean smooth fracture. @ 13.6', becomes brown and gray. @ 14.6', low angle fracture with highly weathered to decomposed zone. @ 14.9'-15.6', highly broken with low angle and high angle fractures with rust staining. @ 16.2'-16.7', high angle clean rough fracture. @ 17.5', low angle clay filled fracture. @ 19.6', low angle rust stained fracture.  @ 27.5', low angle rust stained clay coated fracture.  @ 29.3', low angle fracture.							
		Core 48"	Rec 45"	RQD 52%	R-1	*47								
		Core 120"	Rec 120"	RQD 76%	R-2	*180								
		Core 120"	Rec 120"	RQD 76%	R-3	*295								
30														

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-436**

Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL

Date Drilled: 7/13/04 to 7/14/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 55.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
30	797.2																		
35		Core 120"	Rec 120"	RQD 95%	R-4	*249	Medium hard brown and gray SANDSTONE, very fine to fine grained, thin to thickly bedded, moderately weathered, contains turbidite beds, laminated to massive. @ 31.3'-32.2', high angle clay coated rough fracture.												
40							@ 41.7' to 41.8', argillaceous zone. @ 42.8' to 42.9', argillaceous zone.												
45		Core 120"	Rec 120"	RQD 98%	R-5	*384	@ 45.0', 45.1' & 45.5', low angle clay coated fracture with rust staining. @ 45.3', rust stained, low angle fracture. @ 45.3'-45.4', argillaceous zone. @ 46.3'-46.4', argillaceous zone. @ 46.7', low angle fracture with rust staining. @ 48.4'-48.5', argillaceous zone. @ 48.5', low angle fracture with rust staining. @ 49.7', low angle fracture with rust staining.												
50																			
55		Core 120"	Rec 120"	RQD 97%	R-6	*269	@ 56.5' and 56.9', argillaceous laminations. @ 58.3', thin argillaceous laminations.												
60																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-436**

Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL

Date Drilled: 7/13/04

to 7/14/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 55.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
60	767.2																		
65		Core 120"	Rec 118"	RQD 85%	R-7	*348													
70							@ 69.7', pyritic.												
75		Core 120"	Rec 120"	RQD 93%	R-8	*330	@ 72.8', pyritic. @ 73.6', 73.7', 73.9', and 74. 4', low angle fracture.												
80							@ 77.6-78.7, limestone layer. @ 78.7', low angle fracture.												
85		Core 120"	Rec 120"	RQD 98%	R-9	*334													
90																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-436**

Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL

Date Drilled: 7/13/04

to 7/14/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 55.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
90	737.2						Medium hard to hard gray SANDSTONE, very fine to fine grained, pyritic, moderately weathered. @ 90.0', thin argillaceous seam. @ 91.1'-91.5', qu = 9,394 psi. @ 92.8' to 93.2', brown in color. @ 93.2', rust stained fracture. @ 93.8', fracture with thin argillaceous seam.													
95		Core 120"	Rec 120"	RQD 100%	R10	*404														
100							@ 103.0', thin argillaceous laminae. @ 104.2', fracture with argillaceous infilling.													
105		Core 120"	Rec 120"	RQD 98%	R11	*371														
110.0	717.2						Bottom of Boring - 110.0'													
115																				
120																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-437**

Location: Sta. 501+22.1, 86.1 ft. RT of SR 823 CL

Date Drilled: 7/12/04 to 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.8' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	771.8						No topsoil/1.5' soil removed before drilling Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; contains sandstone fragments; damp.													
		5	5	18		1														
		12	9	16		2		2.5												
		2	6	18		3		3.5												
8.0	763.8					4		Soft to medium hard brown SANDSTONE; very fine to fine grained, decomposed to highly weathered, argillaceous.												
		31	50/4	10		5														
		25	46	11		6														
		18	50/3	7		7														
		50/3		2			@ 16.6', rust stained, low angle fracture. @ 17.2'-17.3', rust stained, high angle fracture.													
17.4	754.4					R-1	Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, thinly bedded to medium bedded, moderately fractured. @ 19.9'-20.4', light brown colored. @ 20.4', pyritic. @ 21.3', moderately weathered. @ 21.3'-24.8', light brown colored. @ 21.8'-22.0', 22.1'-22.6', 23.4', 24.1', high angle rust stained fractures.													
		Core 42"	Rec 42"	RQD 79%		*278														
						R-2	@ 28.7'-30.0', contains few argillaceous laminations.													
		Core 120"	Rec 118"	RQD 78%		*902														
30																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-437**

Location: Sta. 501+22.1, 86.1 ft. RT of SR 823 CL

Date Drilled: 7/12/04

to 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.8' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
30	741.8																		
35		Core 120"	Rec 118"	RQD 75%	R-3	*1143	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, thinly bedded to medium bedded, moderately fractured, contains few argillaceous laminations. @ 31.1', 31.3', 31.4', 31.9', 32.8', low angle rust stained fracture.  @ 35.8'-37.2', near vertical fracture with iron filling. @ 36.5', 36.8', 40.6', 41.1', contains argillaceous laminae  @ 38.3'-38.9', near vertical fracture with iron filling.												
39.2	732.6																		
40							Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thinly bedded to medium bedded, slightly fractured, contains turbidite beds, slightly fractured.  @ 42.4', contains argillaceous lamination. @ 43.0', 47.1', 49.1', contains argillaceous laminae.												
45		Core 120"	Rec 120"	RQD 97%	R-4	*1262	@ 45.5'-45.7', contains argillaceous laminae. @ 45.9'-46.5', qu = 9,741 psi. @ 46.5'-46.8', argillaceous laminae.  @ 48.9' and 49.1', filled fracture. @ 49.1'-49.2', low angle fracture with argillaceous lamination. @ 50.0'-51.8', contains few argillaceous laminae.												
50																			
55		Core 120"	Rec 120"	RQD 100%	R-5	*1038	@ 53.6'-53.7', argillaceous laminations.  @ 58.6', argillaceous laminations.												
60.0	711.8						Bottom of Boring - 60.0'												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-444**

Location: Sta. 508+34.4, 121.0 ft. LT of SR 823 CL

Date Drilled: 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 5.7' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	782.4																			
0.7	781.7	8					Topsoil - 8"/2.0' soil removed													
		12 15	18			1	Medium dense reddish brown SANDY SILT (A-4a), little gravel; damp.													
3.0	779.4						Severely weathered brown SANDSTONE.													
		20 24 28	18			2														
5																				
		26 50/5	11			3														
7.0	775.4						Soft to medium hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thickly bedded, broken.  @ 10.8'-11.8', vertical fracture.													
		Core 72"	Rec 72"	RQD 38%	R-1	*18														
14.2	768.2						Medium hard gray CLAY SHALE interbedded with SANDSTONE, highly weathered, moderately fractured, laminated to thinly bedded.													
		Core 120"	Rec 120"	RQD 93%	R-2	*324														
20.3	762.1						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, thinly bedded to thickly bedded, high to moderately fractured. @ 20.0', 2 low angle clay filled fractures. @ 21.6' and 22.3', low angle clay filled fracture. @ 23.2'-23.5', high angle partially healed fracture with calcite. @ 24.4', low angle fracture. @ 24.6', pyritic with occasional fossils.													
		Core 120"	Rec 120"	RQD 87%	R-3	*523	@ 27.9', 28.4', low angle fracture.													
30																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-444**

Location: Sta. 508+34.4, 121.0 ft. LT of SR 823 CL

Date Drilled: 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 5.7' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30	752.4						DESCRIPTION  Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, thinly bedded to thickly bedded, high to moderately fractured. @ 32.0'-32.5', high angle fracture.										
35		Core 84"	Rec 84"	RQD 100%	R-4	*563											
40.0	742.4						Bottom of Boring - 40.0'										
45																	
50																	
55																	
60																	



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-445**

Location: Sta. 508+42.3, 128.2 ft. RT of SR 823 CL

Date Drilled: 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.9' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	779.8																		
0.3	779.5						Topsoil - 4"/1.1' soil removed before drilling												
		7 12	18			1	Medium dense brown SANDY SILT (A-4a), little gravel; damp.												
3.0	776.8	50/3	3			2	Severely weathered brown SANDSTONE.												
6.0	773.8						Soft brown and gray SANDSTONE; fine to medium grained, highly weathered to decomposed, argillaceous, micaceous, laminated to thickly bedded, broken. @ 7.8', thin clay seam. @ 8.8' and 9.8', thin clay seam with rock fragments.												
10		Core 84"	Rec 84"		RQD 88%	R-1	*167	@ 10.4' and 11.9', clay seam with rock fragments, very fine to medium grained interbedded sandstone.											
12.0	767.8						Soft gray and brown CLAY SHALE; decomposed to highly weathered, arenaceous, micaceous, laminated to thinly bedded, broken.												
15		Core 120"	Rec 120"		RQD 79%	R-2	*68												
19.2	760.6						Medium hard brown and gray SANDSTONE; very fine to fine grained, moderately to highly weathered, pyritic, thinly bedded to medium bedded, broken to highly fractured, contains thin argillaceous beds, contains turbidite beds. @ 21.5', gray. @ 21.7'-22.3', argillaceous. @ 23.5', iron stained low angle fracture. @ 24.6', clay filled fracture. @ 25.0'-27.8', pyritic inclusions. @ 26.0', 26.2', 26.6' and 27.3', low angle clay filled fractures.												
25		Core 120"	Rec 113"		RQD 88%	R-3	*201												
30							@ 29.0'-30.8', brown, very broken with core loss.												

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-445 Location: Sta. 508+42.3, 128.2 ft. RT of SR 823 CL Date Drilled: 7/13/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.9' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
30	749.8																	
35.0	744.8	Core 24"	Rec 24"	RQD 100%	R-4	*210	Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, thinly bedded to medium bedded, contains thin argillaceous beds.											
							Bottom of Boring - 35.0'											
40																		
45																		
50																		
55																		
60																		

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-446 Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 7/7/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40								
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay									
0	883.8																					
1.5	882.3	7 44 36	18	1		4.5+	No topsoil Hard brown SANDY SILT (A-4a); contains roots; damp. Soft light gray and brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, broken.														80	
5.0	878.8	34 37 50/2	14	2			Medium hard light gray and brown SANDSTONE; fine to coarse grained medium bedded, highly fractured. @ 5.5', low angle fracture.															50+
10		Core 96"	Rec 96"	RQD 84%	R-1	*211	@ 8.3'-9.6', qu = 7,920 psi, SDI = 96.1%. @ 9.6', low angle clean rough fracture. @ 10.3'-10.5', high angle clay filled fracture. @ 12.0'-12.2', high angle rust stained fracture. @ 12.3'-13.0', high angle partially healed rust stained fracture. @ 14.0', low angle clay filled fracture. @ 14.2', low angle rust stained fracture. @ 14.8'-16.6', gray slightly carbonaceous.															
16.6	867.2	Core 120"	Rec 120"	RQD 63%	R-2	*128	@ 16.2'-17.3', qu = 2,428 psi, SDI = 28.5%. Soft black SHALE; moderately weathered, carbonaceous, laminated to thinly bedded, broken, contains ironstone nodules. @ 18.9'-19.2', ironstone nodule.															
20	864.6						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to medium bedded, broken to highly fractured. @ 19.7', 19.8', 20.3', low angle clay filled fracture. @ 21.0', 21.5', 22.1', low angle clay filled fracture. @ 22.7', 23.0', low angle clay filled fracture. @ 25.0', fine to coarse grained bed.															
25		Core 120"	Rec 120"	RQD 77%	R-3	*216	@ 28.7'-30.0', highly argillaceous zone.															
30																						

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-446**

Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL

Date Drilled: 7/7/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
30	853.8																			
							Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to medium bedded, broken to highly fractured.													
36.0	847.8																			
38.4	845.4	Core 120"	Rec 120"	RQD 97%	R-4	*378	Medium hard gray SANDSTONE; medium to coarse grained, highly weathered, micaceous, contains gravel and cobble sized particles, poorly cemented.													
40							Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, slightly to moderately fractured, contains turbidite beds. @ 39.1', low angle fracture. @ 40.0',40.6', low angle fracture. @ 42.7'-43.2', pyritic zone. @ 43.1', high angle black shale laminae. @ 43.0', massive bedding with turbidites. @ 45.5'-46.1', pyritic zone.													
45																				
50		Core 120"	Rec 120"	RQD 100%	R-5	*442	@ 49.5'-50.5', qu = 11,286 psi. @ 49.5'-50.9', pyritic zone.													
55																				
60		Core 120"	Rec 120"	RQD 100%	R-6	*413														

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-446**

Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL

Date Drilled: 7/7/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
60	823.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thin bedded to massive, moderately fractured to unfractured, contains turbidite beds. @ 62.3'-62.7', qu = 10,371 psi.  @ 76.0', low angle smooth fracture.  @ 80.5'-81.7', qu = 11,660 psi.  @ 85.9'-86.4', high angle fracture.												
		Core 120"	Rec 120"	RQD 100%	R-7	*422													
		Core 120"	Rec 120"	RQD 100%	R-8	*387													
		Core 120"	Rec 120"	RQD 96%	R-9	*497													

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-446**

Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL

Date Drilled: 7/7/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
90	793.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds.  @ 98.2'-99.3', qu = 10,699 psi.  @ 100.4', low angle clay filled fracture.								
		Core 120"	Rec 120"	RQD 100%	R10	*567									
		Core 120"	Rec 120"	RQD 100%	R11	*563									
		Core 120"	Rec 120"	RQD 95%	R12	*333									

<i>Client:</i> TranSystems, Inc.				<i>Project:</i> SCI-823-0.00				<i>Job No.</i> 0121-3070.03										
<b>LOG OF: Boring R-446</b>				<i>Location:</i> Sta. 512+17.7, 189.3 ft. LT of SR 823 CL				<i>Date Drilled:</i> 7/7/04										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
120	763.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds. @ 122.6', pyritic.											
		Core 24"	Rec 24"	RQD 100%	R13	348												
125.0	758.8						Bottom of Boring - 125.0'											
130																		
135																		
140																		
145																		
150																		

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-447**

Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL

Date Drilled: 7/2/04 to 7/6/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
0	881.2																				
0.4	880.8						Topsoil - 5"														
		3					Loose brown SANDY SILT (A-4a); contains rootlet and roots; damp.														
		3	18			1															
3.0	878.2						Severely weathered brown SANDSTONE, argillaceous, micaceous.														
		50/3	3			2															
5.0	876.2						Medium hard brown and reddish brown SANDSTONE; fine to medium grained, highly weathered, micaceous, massive, broken. @ 6.6' to 7.8', very broken with clay seams and core loss. @ 8.5', low angle clean fracture.  @ 11.3', 11.9', low angle clean fracture. @ 12.6', 45° clean fracture. @ 12.6', low angle clean fracture. @ 13.2', low angle clay coated fracture. @ 14.5', low angle clean fracture.														
		Core 96"	Rec 90"			RQD 78%															
10																					
15																					
16.0	865.2						Soft to medium hard dark gray CLAY SHALE; highly weathered, arenaceous, laminated to very thinly bedded, broken to moderately fractured. @ 17.0'-18.0', SDI = 0.0%. @ 18.1'-18.5', qu = 229 psi. @ 19.0', low angle clay coated fracture. @ 19.3', low angle rust stained fracture. @ 19.9' to 20.2', high angle clean fracture. @ 21.9', low angle rust stained fracture. @ 22.2' to 22.8', very broken.  @ 23.7' to 25.5', broken.														
		Core 120"	Rec 120"			RQD 73%															
20																					
25																					
25.5	855.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured.														
		Core 120"	Rec 120"			RQD 87%															
30																					



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-447**

Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL

Date Drilled: 7/2/04 to 7/6/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
30	851.2																				
							Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, massive, unfractured to slightly fractured. @ 32.3', near horizontal smooth fracture.														
35																					
		Core 120"	Rec 120"	RQD 100%	R-4		@ 40.0', near horizontal fracture.														
40							@ 43.3', brown and gray, moderately to highly weathered.														
							@ 44.6' to 46.6', high angle partially healed rust stained fracture.														
45							@ 47.5' to 48.2', high angle partially healed rust stained fracture.														
		Core 120"	Rec 120"	RQD 48%	R-5		@ 50.1' to 50.5', high angle partially healed rust stained fracture. @ 50.5' to 53.0', broken zone. @ 52.5' to 58.4', high angle partially healed rust stained fracture.														
50																					
		Core 120"	Rec 120"	RQD 48%	R-6		@ 58.9' to 59.6', high angle partially healed rust stained fracture.														
55																					
60																					

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-447 Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/2/04 to 7/6/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40		
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
60	821.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, massive, unfractured to slightly fractured. @ 61.7' to 66.6', high angle partially healed rust stained fracture.  @ 67.0', gray slightly to moderately weathered.  @ 69.2', 69.5', low angle rust stained and partially clay filled fracture.  @ 74.9', low angle rust stained and partially clay filled fracture.									
65																
70		Core 120"	Rec 120"	RQD 66%	R-7											
75		Core 120"	Rec 120"	RQD 100%	R-8											
80																
85		Core 120"	Rec 120"	RQD 100%	R-9											
90																

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-447** Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/2/04 to 7/6/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
90	791.2																			
		Core 120"	Rec 120"	RQD 97%	R10		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, massive, unfractured to slightly fractured.													
95																				
100							@ 98.9', 99.0', 99.9', low angle partially clay filled fracture. contains dark gray siltstone laminae.													
105																				
110		Core 120"	Rec 120"	RQD 100%	R11															
112.0	769.2																			
115							Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured, contains few to moderate argillaceous laminations..													
120		Core 120"	Rec 120"	RQD 100%	R12															

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-447 Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/2/04 to 7/6/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
119.9	761.2 761.3						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, pyritic, argillaceous, medium bedded to massive, unfractured to slightly fractured. @ 120.9', pyritic.																
				Core 24"	Rec 24"	RQD 100%		R13															
125.0	756.2						Bottom of Boring - 125.0'																
130																							
135																							
140																							
145																							
150																							

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-448 Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL Date Drilled: 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0	857.5														
		7 9 21	18			1	4.5+	No topsoil Hard brown and gray SANDY SILT (A-4a); contains sandstone fragments; contains roots; damp.							
-3.0	854.5					2		Soft to medium hard light gray SANDSTONE, decomposed.							
		32 50/5	11												
-5.0	852.5							Medium hard brown and gray SANDSTONE, fine grained, highly weathered, argillaceous, highly fractured to broken.							
		Core 96"	Rec 96"	RQD 46%	R-1		*196								
-14.2	843.3							Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured. @ 14.5', contains small argillaceous clasts.							
		Core 120"	Rec 120"	RQD 99%	R-2		*204								
								@ 23.2', low angle rust stained fracture.							
		Core 120"	Rec 120"	RQD 98%	R-3		*260								
30															

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

LOG OF: Boring R-448

Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL

Date Drilled: 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)															
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ─────────────────── LL Blows per foot - ○ 10    20    30    40															
30	827.5																												
							<p>Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured.</p> <p>@ 30.5'-32.2', <math>q_u = 5,814</math> psi, SDI = 95.7%.</p>																						
35																													
		Core 120"	Rec 120"	RQD 100%	R-4	*262																							
40							@ 41.7', near horizontal fracture.																						
45																													
		Core 120"	Rec 120"	RQD 100%	R-5	*260																							
50																													
55							@ 54.8' to 54.9', argillaceous zone with horizontal fracture. @ 54.9' to 56.5', high angle rust stained partially healed fracture. @ 56.7', low angle fracture. @ 57.5' to 58.3', high angle rust stained fracture. @ 57.5' to 57.6', argillaceous zone with low angle fracture. @ 58.8', low angle clay coated fracture.																						
		Core 120"	Rec 120"	RQD 80%	R-6	*326																							
60																													

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-448**

Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL

Date Drilled: 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
60	797.5						Hard to medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured.  @ 64.6', low angle smooth fracture. @ 64.6' to 71.1', iron stained.  @ 74.1' to 75.4' and 76.7' to 85.1', iron stains. @ 74.5', argillaceous zone with low angle fracture.  @ 76.2', occasional fossils. @ 76.8', low angle fracture.  @ 89.4' to 96.0', argillaceous interbedding. @ 85.3' to 86.0', rust stains, high angle fracture. @ 84.6' to 84.9', argillaceous zone, broken. @ 89.4' to 95.5', contains moderate to abundant argillaceous laminations. @ 89.7', low angle CLAY coated fracture. @ 88.9' to 89.4', high angle fracture. @ 83.2' to 84.3', very broken with low and high angle fractures and highly weathered. @ 81.9'-82.3', qu = 6,999 psi. @ 82.9' to 83.2', high angle clean rough fracture. @ 89.8' to 90.5', pyritic.													
				Core 120"	Rec 120"	RQD 100%		R-7	*331											
				Core 120"	Rec 120"	RQD 100%		R-8	*317											
				Core 120"	Rec 120"	RQD 65%		R-9	*323											

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-448

Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL

Date Drilled: 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○					
90	767.5																				
95																					
96.5-97.5		Core 120"	Rec 120"	RQD 92%	R10	*291															
105																					
108.1-108.4		Core 120"	Rec 120"	RQD 87%	R11	*295															
113.4-113.8																					
117.0		Core 120"	Rec 120"	RQD 100%	R12	*623															



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-448**

Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL

Date Drilled: 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●						
								DESCRIPTION				PL ————— LL Blows per foot - ○								
												10    20    30    40								
120	737.5																			
		Core 24"	Rec 24"	RQD 100%	R13	*482	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, contains occasional argillaceous laminations, slightly fractured.													
125.0	732.5																			
							Bottom of Boring - 125.0'													
130																				
135																				
140																				
145																				
150																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-449**

Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL

Date Drilled: 7/1/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	891.3																		
		3																	
		4	7	18		1	4.0												
		7	9	18		2	4.5												
5																			
		7																	
6.8	884.5	25		17		3	4.5+												
		50/5																	
8.6	882.7																		
10		Core 60"	Rec 60"		RQD 93%	R-1	*258												
15																			
18.0	873.3	Core 120"	Rec 120"		RQD 81%	R-2	*112												
20																			
23.1	868.2																		
24.7	866.6																		
26.0	865.3																		
		Core 120"	Rec 120"		RQD 91%	R-3	*359												
30																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

LOG OF: Boring R-449

Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL

Date Drilled: 7/1/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL		Blows per foot - ○ 10 20 30 40	
30.0	861.3																
31.8	859.5						Medium hard gray CLAYSTONE; highly weathered to decomposed, slightly arenaceous. @ 31.3' to 31.8', carbonaceous with coal stringer. Hard gray SANDSTONE; very fine to fine grained, highly weathered, slightly argillaceous, thinly bedded to medium bedded, contains coal stringers, slightly to highly fractured. @ 33.9' to 34.2', fine to coarse grained. @ 35.6' to 36.6', fine to coarse grained, fossiliferous. @ 37.1' to 37.3', iron stains.  @ 39.2', slickensides fracture. @ 40.5' to 41.5', medium-grained, turbidity beds.   @ 44.1' to 45.0', fine to medium grained with coal blossoms, poorly cemented. @ 45.5' to 46.0', fine to medium grained, carbonaceous, pyritic inclusion, poorly cemented. @ 46.9' to 47.3', fine to medium grained, carbonaceous, poorly cemented. Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.										
47.3	844.0																
		Core 120"	Rec 120"	RQD 96%	R-4	*468											
		Core 120"	Rec 120"	RQD 100%	R-5	*140											
		Core 120"	Rec 120"	RQD 100%	R-6	*460											
60																	

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

## LOG OF: Boring R-449

Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL

Date Drilled: 7/1/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10    20    30    40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
60	831.3																	
		Core 120"	Rec 120"	RQD 100%	R-7	*417	Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.											
65																		
		Core 120"	Rec 120"	RQD 100%	R-8	*500												
70																		
75																		
		Core 120"	Rec 120"	RQD 100%	R-9	*575												
80																		
85																		
90																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-449**

Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL

Date Drilled: 7/1/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
90	801.3						Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.  @ 109.0' to 114.0', crossbedded.												
		Core 120"	Rec 120"	RQD 100%	R10	*524													
		Core 120"	Rec 120"	RQD 100%	R11	*433													
		Core 84"	Rec 84"	RQD 100%	R12	*560													
120.0	771.3						Bottom of Boring - 120.0'												

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-450**

Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL

Date Drilled: 6/29/04 to 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 18.1' (morning of 6/30/04) 22.2' (at completion, includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	886.7						No topsoil												
		10 20 22	15			1	Hard light brown SILT AND CLAY (A-6a), trace organics; damp.											○	
3.4	883.3						Medium hard brown and light gray SANDSTONE; fine to medium grained, highly weathered, broken, contains numerous low angle rust stained and clay filled fractures.												
5																			
10				Core 115"	Rec 115"	RQD 63%	@ 8.9' to 9.9', high angle partially rust healed fracture with clay infilling. @ 10.0' to 10.6', high angle clean fracture. @ 10.7', light brown and light gray, moderately weathered poorly cemented.												
15							@ 14.7' to 15.0', high angle rust stained.												
17.0	869.7						@ 16.6', low angle highly weathered rust stained fracture.												
				Core 120"	Rec 120"	RQD 90%	Soft to medium hard dark gray and black SHALE; moderately to highly weathered, carbonaceous, moderately to highly fractured.												
20																			
20.5	866.2						Soft gray SHALE; highly weathered to decomposed, thinly laminated, arenaceous, moderately to highly fractured.												
23.6	863.1																		
				Core 120"	Rec 120"	RQD 91%	Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, broken to moderately fractured, argillaceous, contains moderate argillaceous laminations. @ 23.7' to 28.0' highly argillaceous zones. @ 24.1', 25.0', 25.2', low angle fractures. @ 25.5' to 25.8', ferric. @ 26.8', 27.4', 27.5', low angle fractures. @ 27.9', 29.2', 32.7', low angle fractures.												
25																			
30																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-450 Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6/29/04 to 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 18.1' (morning of 6/30/04) 22.2' (at completion, includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
30	856.7						<p>Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, contains few argillaceous laminations, broken to moderately fractured.</p> <p>@ 33.0' and 39.1', low angle fractures. @ 33.4', 35.4', 39.2', low angle fractures.</p> <p>@ 39.1' to 39.2' contains breccia/conglomerate interbed. @ 39.5' to 41.1' contains conglomerate interbed. @ 39.7', 41.3', 42.6', low angle fractures. @ 40.1' to 40.6' loss zone.</p> <p>@ 42.6' to 42.9', ferric band.</p> <p>@ 46.2', dark gray and light gray argillaceous interbeds. @ 46.0', 46.5', 47.4', low angle fracture.</p>													
35																				
40		Core 120"	Rec 115"	RQD 86%	R-4															
45																				
47.8	838.9	Core 120"	Rec 120"	RQD 98%	R-5		<p>Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.</p> <p>@ 56.1', low angle fracture. @ 57.4' to 57.7', high angle fractures.</p>													
50																				
55		Core 120"	Rec 120"	RQD 95%	R-6															
60																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-450 Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6/29/04 to 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 18.1' (morning of 6/30/04) 22.2' (at completion, includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
60.0	826.7						<p>Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.</p> <p>@ 67.0 to 67.3', high angle fractures. @ 67.8', high angle partially healed highly weathered fracture.</p> <p>@ 72.1' to 75.4', broken with core loss, contains multiple high angle fractures.</p> <p>@ 76.1' to 78.1', broken with core loss, contains multiple high angle fractures; possible drilling induced breakage.</p> <p>@ 81.8' pyrite nodules.</p>													
	826.7																			
65																				
70																				
75																				
80																				
85																				
90																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-450 Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6/29/04 to 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 18.1' (morning of 6/30/04) 22.2' (at completion, includes drilling water)	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
90.0	796.7						Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.  @ 113.0', contains few argillaceous laminations. @ 113.3', dark gray SANDSTONE laminae evident.  @ 117.4' to 118.1', contains moderate argillaceous laminations. @ 118.1' to 118.5', low angle fracture with abundant argillaceous laminations.														
	796.7																				
95																					
		Core 120"	Rec 120"	RQD 100%	R10																
100																					
		Core 120"	Rec 120"	RQD 100%	R11																
105																					
		Core 84"	Rec 84"	RQD 93%	R12																
110																					
115																					
120.0	766.7						Bottom of Boring - 120.0'														

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-451**

Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL

Date Drilled: 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	866.4																			
0.3	866.1						Topsoil - 4"													
		6				2.0	Stiff to very stiff reddish brown SANDY SILT (A-4a), little sandstone fragments; damp													
		9 13	18			1														
3.0	863.4					4.5+	Hard reddish brown SILT AND CLAY (A-6a), little fine to coarse sand; damp													
		13 17	18			2														
5						4.5+	@ 6.0', decomposed shale, trace fine to coarse sand.													
		11 11	18			3														
		17 31				4	@ 8.5', red, brown and gray, trace gravel.													
10		45	15			4.5+														
10.5	855.9						Soft brown SHALE; highly weathered, thinly bedded, broken.													
		50/4	4			5														
11.7	854.7	Core 15"	Rec 15"		RQD 53%	R-1	Soft to medium hard light brown SANDSTONE; fine to medium grained, highly weathered, thinly bedded to massive, broken.													
							@ 15.5'-16.6', SDI = 2.3%.													
15																				
		Core 120"	Rec 120"		RQD 68%	R-2	*187													
20							@ 21', IRONSTONE inclusion.													
22.5	843.9						Medium hard gray SANDSTONE; fine to medium grained, moderately to highly weathered, carbonaceous, pyritic, thinly bedded to medium bedded, broken to moderately fractured, contains moderate argillaceous laminations.													
25																				
		Core 120"	Rec 120"		RQD 78%	R-3	*295													
							@ 28.0'-29.0', qu = 9,850 psi, SDI = 95.6%.													
30																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-451**

Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL

Date Drilled: 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
30	836.4						MEDIUM HARD GRAY SANDSTONE; fine to medium grained, moderately to highly weathered, pyritic, thinly bedded to medium bedded, contains moderate coal laminae.  MEDIUM HARD LIGHT GRAY AND GRAY SANDSTONE; fine to coarse grained, moderately weathered, thinly bedded to medium bedded, contains argillaceous clasts, moderately fractured. @ 33.6' low angle fracture.  MEDIUM HARD LIGHT GRAY AND GRAY BRECCIA; highly weathered, poorly cemented.  HARD GRAY SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured.  @ 46.4'-46.8', high angle fracture.  @ 49.5', low angle fracture.  @ 53.7', low angle fracture.												
33.5	832.9																		
39.1	827.3	Core 120"	Rec 120"	RQD 98%	R-4	*512													
40.8	825.6																		
45																			
50		Core 120"	Rec 120"	RQD 100%	R-5	*532													
55																			
60		Core 120"	Rec 120"	RQD 100%	R-6	*564													

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-451**

Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL

Date Drilled: 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
60	806.4																		
							Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured to unfractured.												
							@ 66.5', pyritic.												
		Core 120"	Rec 120"	RQD 100%	R-7	*508													
		Core 120"	Rec 120"	RQD 100%	R-8	*522													
							@ 83.0', argillaceous beds with turbidity bedding and argillaceous clasts.												
							@ 86.6'-87.3' argillaceous interbeds.												
		Core 120"	Rec 120"	RQD 100%	R-9	*557	@ 88.5'-88.8', argillaceous interbeds.												
90																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-451**

Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL

Date Drilled: 6/30/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
90.0	776.4 776.4						Hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, pyritic, thinly bedded to thickly bedded, contains turbidite bedding with argillaceous beds, slightly fractured.										
		Core 24"	Rec 24"	RQD 100%	R10	*447											
95.0	771.4						Bottom of Boring - 95.0'										
100																	
105																	
110																	
115																	
120																	

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-452**

Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL

Date Drilled: 6/24/04 to 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	866.7																		
0.3	866.4						Topsoil - 3"/6" soil removed before drilling												
		2 4 5	18			1.75	Stiff to very stiff brown SANDY SILT (A-4a), some clay, trace gravel; damp.												
		6 13 14	12			3.0													
5	861.2						Hard light brown CLAY (A-7-6), trace fine to coarse sand; damp.	0	1	--	7	47	45						
		2 7 8	16			4.5+													
8.0	858.7						Severely weathered brown and gray SANDSTONE.	0	0	--	9	65	26						
		10 26 50/5	17																
		24 50/4	8																
13.0	853.7						Soft to medium hard brown and gray SANDSTONE; fine to coarse grained, highly weathered, broken.												
15.0	851.7	Core 48"	Rec 42"	RQD 13%	R-1		Soft to medium hard brown and gray BRECCIA; highly weathered, arenaceous, broken, poorly cemented.												
17.0	849.7						Soft to medium hard brown and gray SANDSTONE; fine to coarse grained, highly weathered, broken.												
20		Core 60"	Rec 30"	RQD 0%	R-2		@ 22.0'-22.7', contains rust stains.												
22.5	844.2						Soft to medium hard gray SANDSTONE interbedded with SILTSHALE and CLAYSHALE; very fine to fine grained, highly weathered to decomposed, broken.												
		Core 60"	Rec 52"	RQD 13%	R-3	*641													
28.5	838.2						Soft to medium hard gray BRECCIA; highly weathered,												
		Core	Rec	RQD	R-4	*641													
30																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-452 Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/24/04 to 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
30	836.7	60"	55"	18%			broken, poorly cemented.													
31.3	835.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, moderately to slightly fractured.													
35		Core 60"	Rec 60"	RQD 100%	R-5	*511	@ 34.1',35.9',36.9', low angle fractures.													
							@ 37.0',40.7',42.4', low angle fractures.													
40		Core 60"	Rec 60"	RQD 100%	R-6	*511														
							@ 43.2',45.0',47.0', low angle fractures.													
45		Core 60"	Rec 60"	RQD 100%	R-7	*468														
50		Core 60"	Rec 60"	RQD 100%	R-8	*468														
55		Core 60"	Rec 60"	RQD 100%	R-9	*486														
							@ 56.8', low angle clean fracture.													
							@ 57.0'-57.2', pitted surface, moderately weathered.													
60		Core	Rec	RQD	R10	*486														

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-452 Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/24/04 to 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40							
60	806.7	60"	58"	97%			Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, moderately to slightly fractured. @ 62.6', low angle fractures. @ 62.9', low angle partially clay coated fracture.        @ 76.0', contains turbidite beds with SILTSHALE laminae.														
65		Core 60"	Rec 60"	RQD 100%	R11	*355															
70		Core 60"	Rec 60"	RQD 100%	R12	*355															
75		Core 60"	Rec 59"	RQD 98%	R13	*514															
80		Core 60"	Rec 58.5"	RQD 98%	R14	*355															
85		Core 60"	Rec 60"	RQD 97%	R15	*304															
90		Core	Rec	RQD	R16	*304															



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-452 Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/24/04 to 7/8/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
90	776.7	60"	60"	97%			Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, contains turbidite beds with SILTSHALE laminae, moderate to slightly fractured.													
		Core 36"	Rec 36"	RQD 100%	R17															
95.0	771.7						Bottom of Boring - 95.0'													
100																				
105																				
110																				
115																				
120																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-453**

Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL

Date Drilled: 6/21/04 to 6/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	872.5						4.5+												
0.3	872.2							Topsoil - 4"											
		4						Loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp.											
3.0	869.5	4	18					Hard brown and gray CLAY (A-7-6), trace fine to coarse sand; damp.											
5		3	7																
5.5	867.0						Severely weathered brown and gray CLAYSHALE.												
		11																	
		25																	
		37	15																
9.0	863.5	22					Severely weathered brown SANDSTONE.												
		50/3	9																
10																			
		50/4	3																
13.0	859.5						Medium hard brown SANDSTONE; fine to coarse grained, moderately weathered, argillaceous, thinly bedded to medium bedded, highly fractured.												
		Core 24"	Rec 24"				@ 13.2', 13.6', low angle rust filled fracture.												
15							@ 15.0'-15.4', high angle rust stained fracture.												
							@ 15.6', 16.5', low angle fracture.												
							@ 17.5', low angle severely weathered fracture.												
							@ 18.5', low angle severely weathered fracture.												
19.2	853.3						Medium hard brown and gray BRECCIA; highly weathered, broken.												
		Core 120"	Rec 110"				Soft to medium hard gray SILTSTONE; highly weathered, broken to highly fractured, argillaceous.												
20.2	852.3																		
23.7	848.8						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, laminated to moderately bedded, highly fractured.												
							@ 23.7'-25.0', contains abundant argillaceous laminae.												
							@ 25.6'-26.3', high angle rust stained fracture.												
25																			
		Core 120"	Rec 120"																
30																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-453 Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6/21/04 to 6/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40			
30	842.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thick bedded.  @ 35.2',37.9',38.2', low angle fractures.  @ 39.3',39.8',40.4', low angle fractures.  @ 40.8'-42.0', occasional carbonaceous laminae, coal blossom and calcareous cobble or layer. @ 41.4',42.2',42.5', low angle fractures. @ 42.7',43.0',43.5', low angle fractures.										
35																	
40		Core 120"	Rec 120"	RQD 91%	R-4												
45																	
45.8	826.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, medium bedded to massively bedded.  @ 48.2', 49.5', 53.0', 53.3', low angle fractures.										
50		Core 120"	Rec 119"	RQD 91%	R-5												
55																	
60		Core 120"	Rec 119"	RQD 99%	R-6		@ 57.7'-58.3', high angle fracture with calcite on face.										

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-453** Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6/21/04 to 6/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
60.0	812.5 812.5						<p>Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded.</p> <p>@ 66.5',67.5',68.6', low angle highly weathered fracture.</p> <p>@ 76.5',80.5',81.3', low angle fractures.</p> <p>@ 82.5',82.6',83.0', low angle fractures. @ 83.4',84.3', low angle fractures.</p> <p>@ 85.1'-86.3', broken zone, high angle fracture.</p>													
65																				
70		Core 120"	Rec 120"	RQD 100%	R-7															
75																				
80		Core 120"	Rec 117"	RQD 97%	R-8															
85																				
90		Core 120"	Rec 119"	RQD 84%	R-9															

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-453**

Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL

Date Drilled: 6/21/04 to 6/23/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
90	782.5						MEDIUM HARD GRAY SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded. @ 90.1', 92.4', 92.8', low angle fractures.  @ 93.8', 94.2', low angle fractures. @ 94.4'-97.6, high angle fracture.											
95.0	777.5	Core 60"	Rec 59"	RQD 60%	R10			MEDIUM HARD GRAY SILTSTONE; moderately weathered, micaceous, laminated to thinly bedded. @ 95.6'-97.6', high angle fracture. @ 97.7', low angle fracture. @ 97.8'-105.0', contains abundant argillaceous laminae. @ 98.3'-99.3', high angle fracture.										
100		Core 60"	Rec 60"	RQD 93%	R11			@ 103.5'-104.5', SDI = 85.9%.										
105.0	767.5						Bottom of Boring - 105.0'											
110																		
115																		
120																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-454**

Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL

Date Drilled: 7/8/04 to 7/9/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 44.3' (Includes drilling water) 50.2' (10 minutes after completion)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	841.3																		
-0.4	840.9																		
		3 5 7 16				1													
3.0	838.3					2	4.5+												
		2 10 12 18				2													
5.5	835.8					3													
		26 49 50/4 14				3													
8.0	833.3																		
		Core 36"	Rec 36"	RQD 86%	R-1	*348													
		Core 60"	Rec 60"	RQD 50%	R-2	*348													
		Core 60"	Rec 60"	RQD 95%	R-3	*503													
21.1	820.2																		
		Core 60"	Rec 60"	RQD 33%	R-4	*503													
		Core 60"	Rec 60"	RQD 18%	R-5	*419													

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-454**

Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL

Date Drilled: 7/8/04 to 7/9/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 44.3' (Includes drilling water) 50.2' (10 minutes after completion)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
30	811.3						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately to highly weathered, thinly bedded to medium bedded, broken, contains clay seams. @ 31.0'-32.0', SDI = 94.6%. @ 32.2'-32.3', limestone bed fossiliferous., @ 32.9'-35.3', qu = 12,009 psi, SDI = 94.2%.  @ 36.0'-37.0', abundant argillaceous interbeds.  @ 37.8'-37.2', abundant argillaceous interbeds.  @ 39.2'-40.3', SDI = 89.7%. @ 40.0', occassional fossil evident. @ 41.0'-45.0', abundant argillaceous interbeds.													
		Core 60"	Rec 60"	RQD 37%	R-6	*419														
35																				
		Core 60"	Rec 60"	RQD 0%	R-7															
40																				
		Core 60"	Rec 60"	RQD 0%	R-8															
45																				
45.7	795.6																			
		Core 60"	Rec 60"	RQD 0%	R-9	*321	Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, thinly bedded to medium bedded, broken, contains clay seams. @ 47.5'-51.0', abundant argillaceous interbeds, broken.													
50																				
		Core 60"	Rec 60"	RQD 38%	R10	*321														
55																				
		Core 60"	Rec 54"	RQD 0%	R11	*214	@ 59.5'-59.8', abundant argillaceous interbeds													
60																				

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.			Project: SCI-823-0.00				Job No. 0121-3070.03												
<b>LOG OF: Boring R-454</b>			Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL				Date Drilled: 7/8/04 to 7/9/04												
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 44.3' (Includes drilling water) 50.2' (10 minutes after completion)	GRADATION											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40					
60.0	781.3						Medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, thinly bedded to medium bedded, broken, contains clay seams. @ 60.7'-63.9', little shale interbeds.  @ 64.3'-64.9', 65.4'-66.4', abundant argillaceous interbeds.												
	781.3	Core 60"	Rec 59"	RQD 32%	R12	*214													
65		Core 48"	Rec 48"	RQD 0%	R13														
70.0	771.3	Bottom of Boring - 70.0'																	
75																			
80																			
85																			
90																			



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-455**

Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL

Date Drilled: 6/17/04 to 6/18/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
0	871.2																				
0.3	870.9						Topsoil - 4"														
		2					Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.														
		2	4	16		1		4.0													
		6						Medium hard brown and gray BRECCIA; medium to coarse grained, highly weathered, contains gravel, cobble and boulder sized particles. Medium hard gray SANDSTONE; decomposed, argillaceous, thinly bedded to medium bedded. @ 16.3', gradational change begins.													
		8	10	18		2			4.5+												
5		5							Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, carbonaceous, argillaceous, thinly bedded to medium bedded. @ 22.5'-24.1', SDI = 73.9%.												
		12	24	18		3				4.5+											
		8	10	14	18	4	4.5+														
		15	18	24	18	5	4.5+														
		50/3		2		6															
15.0	856.2						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, carbonaceous, argillaceous, thinly bedded to medium bedded. @ 22.5'-24.1', SDI = 73.9%.														
15.5	855.7	Core 60"	Rec 56"	RQD 73%	R-1	*237															
20							@ 25.0'-25.9', Breccia zone, highly weathered to decomposed, broken. @ 26.2'-27.2', high-angle fracture.  @ 28.7'-29.0', low-angle fracture with clay infilling.														
20.4	850.8																				
		Core 120"	Rec 114"	RQD 76%	R-2	*297															
25																					
30																					

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

LOG OF: Boring R-455

Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL

Date Drilled: 6/17/04 to 6/18/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
30	841.2						<p>DESCRIPTION</p> <p>Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to massive, slightly fractured. @ 30.8', 38.3', low-angle fracture.</p>											
35		Core 120"	Rec 100"	RQD 82%	R-3	*381												
40																		
45		Core 120"	Rec 119"	RQD 78%	R-4	*428												
50																		
55		Core 120"	Rec 118"	RQD 97%	R-5	*340	<p>@ 53.7', 55.3', 56.0', low-angle fractures.</p> <p>@ 56.2', 57.7', low-angle fractures.</p>											
60																		

**LOG OF: Boring R-455** Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 6/17/04 to 6/18/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ────┬─── LL Blows per foot - ○ 10 20 30 40																							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay																								
60	811.2																																				
		Core 120"	Rec 113"	RQD 78%	R-6	*447																															
		Core 120"	Rec 120"	RQD 100%	R-7	*345																															
							@ 71.3', low angle smooth fracture.																														
		Core 120"	Rec 120"	RQD 90%	R-8	*373																															
							@ 76.3', low angle fracture.																														
							@ 77.8', low angle smooth fracture.																														
							@ 79.7', low angle fracture.																														
							@ 82.2', low angle fracture.																														
							@ 82.4', low angle highly weathered fracture.																														
							@ 82.8', low angle highly weathered fracture.																														
							@ 83.9'-84.0', highly weathered, thinly laminated, broken.																														
							@ 85.5'-85.6', low angle fracture.																														
							@ 85.9'-86.1', highly weathered, broken.																														
							@ 88.5'-88.6', low angle fracture.																														
							@ 88.7'-88.9', broken.																														

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-455** Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 6/17/04 to 6/18/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
90.0	781.2																
90.0 - 91.2	781.2	Core 60"	Rec 60"	RQD 100%	R-9	*349	Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to medium bedded, argillaceous, micaceous, slightly fractured, contains argillaceous laminae. @ 90.0'-91.2', SDI = 57.5%. @ 92.5', plant fossils evident. @ 93.0', pyritic.										
95																	
97.5 - 99.5		Core 120"	Rec 110"	RQD 78%	R-10	*198	@ 97.5', very fine grained SANDSTONE interbeds, highly weathered, abundant argillaceous interbeds. @ 98.5'-99.5', SDI = 66.8%.										
105.0	766.2						Bottom of Boring - 105.0'										
110																	
115																	
120																	

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-456**

Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL

Date Drilled: 6/9/04 to 6/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	882.4																			
0.3	882.1						Topsoil - 3"													
		1				0.25	Soft brown SANDY SILT (A-4a), trace clay; moist.													
		1	12																	
		2																		
3.0	879.4						Medium dense brown COARSE AND FINE SAND (A-3a); contains sandstone fragments; damp.													
		5																		
		7																		
		10	14			2														
		3																		
		6																		
		4	16			3														
8.0	874.4						Hard black CLAY (A-7-6); dry to damp.													
		8																		
		10																		
		12	18			4														
10.5	871.9						Severely weathered gray SANDSTONE argillaceous.													
		12																		
		18																		
		30	18			5														
		50/4	4			6														
15.0	867.4						Medium hard to hard gray SANDSTONE, fine to coarse grained, micaceous, moderately weathered, medium to massive beds, slightly fractured .													
		Core 60"	Rec 60"			RQD 97%														
						R-1														
20							@ 19.4'-20.2', argillaceous.													
21.1	861.3						Medium hard to hard brown and gray SANDSTONE, fine to coarse grained, highly weathered, broken to highly fractured, poorly cemented.													
		Core 60"	Rec 59"			RQD 72%														
						R-2														
							@ 22.1'-22.5', breccia layer.													
							@ 24.7', leached limestone layer and breccia.													
25.0	857.4						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, moderately weathered, highly fractured.													
		Core 120"	Rec 120"			RQD 100%														
						R-3														
30																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-456**

Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL

Date Drilled: 6/9/04 to 6/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○						
30	852.4						<p>Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered(see previous description).                      @ 31.2'- 33.4', contains moderate argillaceous laminations.                       @ 36.7', 37.2', 37.8', 38.5', 39.1', low angle clean fractures.                       @ 40.2', 42.0', 43.1', 44.6', low angle clean fractures.                       @ 47.0', low angle fracture.                       @ 48.7', 50.2', low angle clean fractures.                       @ 54.5', low angle fracture.                       @ 56.2', low angle fracture.                      @ 56.8', 57.3', low angle clean fractures.                      @ 58.1', 58.8', 62.8', low angle clean fractures.</p>													
35																				
40		Core 120"	Rec 119"	RQD 99%	R-4															
45																				
50		Core 120"	Rec 120"	RQD 100%	R-5															
55																				
60		Core 120"	Rec 119"	RQD 98%	R-6															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-456**

Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL

Date Drilled: 6/9/04 to 6/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
60	822.4						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered (see previous).  @ 67.6', 67.7', low angle clean fractures.  @ 70.4'-70.6', leached limestone layer. @ 70.5', low angle clean fracture.  @ 72.7', low angle clean fracture.  @ 74.6', low angle fracture.          @ 88.1', argillaceous laminations, low angle fracture.														
65																					
70		Core 120"	Rec 116"	RQD 95%	R-7																
75																					
80		Core 120"	Rec 120"	RQD 100%	R-8																
85																					
90		Core 120"	Rec 119"	RQD 97%	R-9																

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.		Project: SCI-823-0.00				Job No. 0121-3070.03												
LOG OF: Boring R-456		Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL				Date Drilled: 6/9/04 to 6/11/04												
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
90	792.4						<p>Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered.</p> <p>@ 91.6', low angle clean fracture. @ 92.1'-92.2', argillaceous laminations. @ 93.1', low angle clean fracture.</p> <p>@ 95.4'-95.7', high angle healed fracture. @ 96.1', 96.2', 96.6', 96.7', low angle clean fractures.</p> <p>@ 98.0', low angle clean fracture, argillaceous lamination. @ 99.1', argillaceous lamination. @ 99.4', low angle clean fracture. @ 101.2'-101.4', contains numerous argillaceous laminations, broken.</p> <p>@ 103.4', argillaceous laminations, low angle clean fracture.</p> <p>@ 105.5'-110.6', pyritic, contains moderate argillaceous lamination.</p> <p>@ 110.7', pyritic.</p>											
95																		
100		Core 120"	Rec 120"	RQD 88%	R10													
105																		
110		Core 120"	Rec 116"	RQD 87%	R11													
115.0	767.4						Bottom of Boring - 115.0'											
120																		

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc.			Project: SCI-823-0.00					Job No. 0121-3070.03										
LOG OF: Boring R-457			Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL					Date Drilled: 6/11/04 to 6/17/04										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0	871.2																	
0.4	870.8						Topsoil - 5"/6" soil removed before drilling											
		2 4 8 18				1	Very dense brown SANDY SILT (A-4a); damp.											
5		16 26 38 18				2												
		38 50/5 12				3												
8.0	863.2						Soft to medium hard light brown and brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, thinly bedded to medium bedded.											
10		Core 36"	Rec 26"	RQD 17%	R-1													
15		Core 120"	Rec 120"	RQD 31%	R-2	*183												
19.5	851.7						Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, moderately weathered, highly fractured, fractures contain slickensides. @ 20.8' to 21.1', breccia zone. @ 22.5' to 23.2', ferric. @ 23.6' to 29.2', contains coal stringers.											
20																		
25		Core 120"	Rec 116"	RQD 86%	R-3	*547												
30							@ 28.8' to 29.0', ferric.											

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.			Project: SCI-823-0.00			Job No. 0121-3070.03													
LOG OF: Boring R-457		Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL			Date Drilled: 6/11/04 to 6/17/04														
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
30	841.2																		
34.0	837.2						Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, micaceous, moderately weathered, unfractured to slightly fractured, contains few to moderate argillaceous laminations, fissile. @ 33.2' to 33.5', conglomerate/breccia zone. @ 33.5' to 34.0', high angle fracture. @ 33.9', high-angle, rust stained fracture.												
35		Core 120"	Rec 119"	RQD 93%	R-4	*372	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured. @ 34.6', low angle fracture. @ 38.9', low angle fracture.												
45		Core 120"	Rec 118"	RQD 98%	R-5	*393													
55		Core 120"	Rec 118"	RQD 98%	R-6	*452	@ 51.6' low angle fracture.  @ 53.8', 53.9', 54.1', low angle fractures.  @ 57.4', 57.7', 88.8', low angle fractures.												
60																			

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-457** Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6/11/04 to 6/17/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
60	811.2																
							Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured. @ 62.7', low angle fracture.										
65		Core 120"	Rec 120"	RQD 100%	R-7	*418	@ 65.2', low angle fracture.  @ 67.7', 72.5', 80.2', 80.6', low angle fractures.										
75		Core 120"	Rec 120"	RQD 100%	R-8	*365	@ 73.2' to 73.5', broken.										
80							@ 80.1' to 80.2', 80.5', 80.6', argillaceous laminations. @ 81.5', 83.6', low angle fracture.										
85		Core 120"	Rec 116"	RQD 91%	R-9	*434	@ 84.4' to 84.6', high angle fracture @ 85.5' to 90.4', brown, moderate to highly weathered. @ 86.6' to 87.7', 88.0' to 88.4', 88.5 to 89.1', high angle fractures.										
90																	

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring R-457** Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6/11/04 to 6/17/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
90	781.2														
95		Core 120"	Rec 104"	RQD 78%	R10	*399	Medium hard gray SANDSTONE, very fine to fine grained, slightly weathered, thinly laminated to medium bedded, argillaceous, pyritic, slightly fractured, contains few to moderate argillaceous laminae.  @ 94.5' to 101.0', contains moderate argillaceous laminae.  @ 96.2', pyritic.								
100															
105		Core 60"	Rec 59"	RQD 99%	R11	*309	@ 102.0' to 106.0', contains few argillaceous laminae.								
106.0	765.2	Bottom of Boring - 106.0'													
110															
115															
120															

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring R-459 Location: Sta. 528+20.4, 1.4 ft. RT of SR 823 CL Date Drilled: 6/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL --- LL Blows per foot - ○							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
0.3	783.8						Topsoil - 4"														
	783.5						Very stiff to hard brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.       @ 13.5'-20.0', medium stiff to stiff, gray.	0	1	--	6	50	43			53					
		1 3	12		1	1.5															
		2 4	18		2	2.5			0	0	--	1	51	48			58				
5		4 5	18		3	2.5															
		4 5	18		4	4.5+			0	0	--	0	47	53			57				
		2 4	18		5	2.25															
		1 2	18		6	1.25															
15		1 2	18		7	0.75															
		1 2	18		8	1.25															
20.0	763.8	2	18				Bottom of Boring - 20.0'														
25																					
30																					

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-461**

Location: Sta. 529+17.9, 97.4 ft. LT of SR 823 CL

Date Drilled: 6/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	767.3																		
-0.4	766.9						Topsoil - 4"												
1		3	4	15		1	2.0		0	0	--	1	52	47					54
2		2	4	16		2	1.75		0	0	--	0	51	49					56
3		2	3	18		3	3.0												
4		2	4	18		4	4.5+	@ 8.5'-10.0', hard.											
5		3	5	18		5	3.0		0	0	--	0	48	52					59
6		3	4	18		6	2.5												
7		4	4	18		7	2.0	@ 16.0', brown and gray.											
8		3	3	18		8	2.5												
9		3	3	18		9	1.0												
10		2	2	18		10	1.0												
11		2	3	18		11	1.5												
12		2	3	18		12	1.0												
30.0	737.3							Bottom of Boring - 30.0'											

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-462**

Location: Sta. 529+19.5, 2.0 ft. RT of SR 823 CL

Date Drilled: 6/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0	769.1																	
0.3	768.8						Topsoil - 3"											
2		2				2.25	Stiff to very stiff brown CLAY (A-7-6); damp to moist.											
3		2	18		1													
4		2				3.5		0	0	--	0	69	31					
5		4	16		2													
6		2				2.5												
7		3	18		3													
8		2				2.0												
9		2	18		4													
10		2				2.75		0	0	--	0	48	52					
11		3	18		5													
12		1				2.5												
13		4	18		6													
14		2				1.0												
15		3	18		7													
16		2				1.25												
17		3	18		8													
18		2				3.0	@ 21.0', brown and gray.											
19		3	18		9													
20		2				4.5+	@ 23.5'-25.0', hard.											
21		3	18		10													
22		3				1.0												
23		4	18		11													
24		3				1.5												
25		4	18		12													
26		2																
27		3	18															
28		3																
29		3	18															
30.0	739.1	3					Bottom of Boring - 30.0'											

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring R-463**

Location: Sta. 529+20.1, 93.2 ft. RT of SR 823 CL

Date Drilled: 6/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40												
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay													
0.3	770.6																									
	770.3						Topsoil - 3"																			
0.3 - 1.5		2 3 4	18			1	4.5+	Very stiff to hard moltted brown and light gray CLAY (A-7-6), trace to little fine to coarse sand, trace gravel; damp to moist.																		
1.5 - 3.0		4 7 9	18			2	4.5+		8	4	--	12	48	28												
3.0 - 4.5		7 7 6	18			3	4.0																			
4.5 - 6.0		3 4 5	18			4	2.25		0	0	--	0	48	52												
6.0 - 7.5		4 4 5	18			5	2.0																			
7.5 - 9.0		3 3 5	18			6	2.0																			
9.0 - 10.5		3 4 5	18			7	2.0																			
10.5 - 12.0		2 3 3	18			8	1.25	@ 18.5'-22.5, stiff, gray.																		
12.0 - 13.5		3 4 6	18			9	1.5																			
13.5 - 15.0		1 2 3	18			10	2.0																			
15.0 - 16.5		1 2 3	18			11	0.5	@ 26.0'-30.0, medium stiff, moist.																		
16.5 - 18.0		2 3 4	18			12	0.5																			
18.0 - 20.0																										
20.0 - 22.5																										
22.5 - 25.0																										
25.0 - 27.5																										
27.5 - 30.0	740.6																									
								Bottom of Boring - 30.0'																		



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1225**

Location: Sta. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL

Date Drilled: 07/27/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 39.0' Water level at completion: 38.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0	780.1																	
-0.4	779.7	2					Topsoil - 5"											
-1.5	778.6	2 7 8		1		3.0	Very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains roots, slight petroleum odor; damp.											
		4 5 15		2		3.75												
		6 6 8 13		3		4.5+	Very stiff to hard mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; contains occasional silt lenses; damp. @ 1.5'-3.0', contains roots. @ 3.0'-10.0', brown.											
5		2 5 7 18		4		4.0												
		2 4 7 16		5		4.5+												
		3 4 6 18		6		3.25												
10		3 4 5 18		7		2.5	@ 11.0', becomes gray.											
		2 2 4 18		8		2.0												
15		1 3 4 18		9		2.0												
		1 2 4 18		10		1.5	@ 18.5'-30.0', medium stiff to stiff.											
20		1 2 4 18		11		1.25												
		1 2 2 18		12		1.5												
25		1 2 2 18		13		1.25												
		1 1 2 18		14		0.5												
30																		

FILE: 0121-3070-03 [ 11/22/2006 4:47 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1225**

Location: Sta. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL

Date Drilled: 07/27/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 39.0' Water level at completion: 38.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
30	750.1						Very stiff brown CLAY (A-7-6), moist.													
35		0 1 3	18	15		3.25														
38.5	741.6	5 16 18	12	16				Severely weathered gray SANDSTONE, contains interbedded shale; moist to wet.												
40																				
44.0	736.1	50/4	4	17			Bottom of Boring - 44.0'													
45																				
50																				
55																				
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1226**

Location: Sta. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL

Date Drilled: 8/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40							
				Drive	Press / Core			DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay						
0	784.3																				
0.6	783.7						Topsoil - 7"														
		8				4.5+	Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.	1	3	--	20	49	27								
		9	12	1																	
		5				2.75		2	7	--	23	47	21								
5		10	15	2																	
		12																			
		4				4.0	Stiff mottled light brown and gray CLAY (A-7-6), trace silt; damp to moist. @ 12.0'-12.5', sandy silt seam.	3													
		6	18	3																	
		2				3.0		4	5												
10.0	774.3	3			P-1	2.25															
		6	18	5		3.75		0	0	--	0	10	90							63	
		2				1.75		2	7	--	22	45	24								
15		2	13	6				0	0	--	0	10	90								
		4																			
16.0	768.3	1				1.0	Stiff gray CLAY (A-7-6), trace silt; damp to moist. @ 22.0'-23.5', sandy silt seam.	7													
		1	18	7					0	0	--	0	14	86							58
		2				1.0															
20		1	18	8																	
		2				1.0															
		2	18	9		1.0															
		2				1.0															
		2	18	10	P-2	2.25		9	4	--	21	44	22								
25		1	18	11		1.0															
		2				1.25															
		2	18	12		1.25															
30		3	18	12																	
		3																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1226**

Location: Sta. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL

Date Drilled: 8/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
30	754.3						Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.													
		1 3	4	18		13		1.0												
35																				
		3 3	4	18		14		1.25												
40																				
		2 4	4	18		15	1.5													
45																				
		2 3	4	18		16	1.5													
50.0	734.3							Bottom of Boring - 50.0'												
55																				
60																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1229**

Location: Sta. 527+83.2, 70.7 ft. RT of SR 728 Ramp A BL

Date Drilled: 8/10/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
0.3	778.6																			
	778.3	13 15	7	12		1	4.5+	Topsoil - 4"												
		8 21		12		2	4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains rock fragments and rust stains; damp.												
5																				
6.0	772.6	7 21		10		3		Severely weathered brown and gray SILTSTONE, arenaceous, occasional rust stains.												
		5 20		9		4														
10		10 50/5		9		5														
		50/3		3		6														
15																				
16.5	762.1	Core 60"	Rec 60"	RQD 70%	R-1	*217		Medium hard gray SANDSTONE ; very fine to fine grained, moderately weathered, argillaceous, micaceous, pyritic, moderately fractured, few to moderate argillaceous laminae.												
20																				
		Core 120"	Rec 120"	RQD 37%	R-2	*320		@ 21.8'-21.9', 24.8'-25.1', high angle rust stained fractures. @ 22.2'-23.7', moderate to abundant argillaceous laminations. @ 23.7'-24.4', brown rust staining. @ 24.7'-24.8', broken zone. @ 24.8'-25.0', calcareous zone.												
25																				
30																				

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1229**

Location: Sta. 527+83.2, 70.7 ft. RT of SR 728 Ramp A BL

Date Drilled: 8/10/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ──── LL Blows per foot - ○														
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	10	20	30	40											
30	748.6																											
31.5	747.1						Medium hard gray SANDSTONE.																					
							Bottom of Boring - 31.5'																					
35																												
40																												
45																												
50																												
55																												
60																												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1230**

Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL

Date Drilled: 8/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 27.0' Water level at completion: 17.0' (inside hollowstem augers)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0.3	775.6																			
	775.3						Topsoil - 4"													
		9					Medium dense brown SANDY SILT (A-4a), little to some fine to coarse sand, little to some gravel; damp.													
		8	6	1		--														
		10					Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.													
5		8	6	2		--		25	11	--	23	41								
6.0	769.6	5					Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.													
		13	12	3		--		1	2	--	11	62	24							
8.5	767.1	5					Very stiff to hard brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp.													
		7	6	4		--														
10		5					4.5+													
		15	8	5		4.5+														
15		5					4.5+													
		10	18	6		4.5+														
		5					3.25													
		10	8	7		3.25		2	5	--	13	47	33							
18.5	757.1	4					3.75													
		9	18	8		3.75		35	7	--	16	42								
20		7					3.0													
		10	13	9		3.0														
		4					3.25													
		15	14	10		3.25														
25		39					Very dense light brown GRAVEL WITH SAND AND SILT (A-2-4); wet.													
	749.6	50/3	6	11		--		45	11	--	9	35								
28.5	747.1	50/4					Hard brown SILT AND CLAY (A-6a), trace gravel, some fine													
		4		12		--														
30																				

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring B-1230 Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Date Drilled: 8/02/05

Table with columns: Depth (ft), Elev. (ft), Blows per 6", Recovery (in), Sample No., Hand Penetrometer (tsf) / Point-Load Strength (psi), WATER OBSERVATIONS, DESCRIPTION, GRADATION (% Aggregate, C. Sand, M. Sand, F. Sand, Silt, Clay), STANDARD PENETRATION (N), Natural Moisture Content, % (PL, LL), Blows per foot.

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1231**

Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL

Date Drilled: 09/01/05

to 09/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.7 (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○						
0	837.4																			
0.3	837.1						Topsoil - 4"													
		4 8 20	14			1	4.0 Very stiff brown and gray SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.													
		17 50/5	9			2	3.0													
5																				
6.0	831.4	50/3	3			3	Severely weathered brown and gray SANDSTONE, argillaceous.													
		50/3	3			4														
10.0	827.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, massively bedded, slightly fractured. @ 11.8'-12.0', high angle fracture. @ 12.0'-12.5', broken zone. @ 12.1'-12.4', 13.8'-14.1', 14.8'-15.0', 15.2'-15.6', iron stained. @ 13.8', low angle fracture.													
15		Core 120"	Rec 120"	RQD 87%	R-1	*366														
20																				
25		Core 120"	Rec 120"	RQD 100%	R-2	*384														
30																				

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring B-1231 Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL Date Drilled: 09/01/05 to 09/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.7 (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ─────────────────── LL Blows per foot - ○ 10 20 30 40									
30	807.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured.																
35		Core 120"	Rec 120"	RQD 100%	R-3	*485																	
40																							
45		Core 120"	Rec 117"	RQD 98%	R-4	*415																	
50																							
55		Core 120"	Rec 120"	RQD 100%	R-5	*415																	
60																							

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1231**

Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL Date Drilled: 09/01/05 to 09/02/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.7 (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ─────────── LL Blows per foot - ○				
60	777.4																	
65		Core 120"	Rec 120"	RQD 100%	R-6	*354	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to very thickly bedded, slightly fractured.											
70							@ 67.5'-70.0', moderate argillaceous laminations; laminated to thinly bedded.											
75		Core 120"	Rec 120"	RQD 100%	R-7	*495	@ 70.0'-85.0', pyritic, laminated to thinly bedded.											
80																		
85.0	752.4	Core 60"	Rec 60"	RQD 100%	R-8	*386	@ 75.3' to 75.4', rust stained.											
85.0							Bottom of Boring - 85.0'											
90																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1232**

Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL

Date Drilled: 8/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	829.1																			
0.3	828.8						Topsoil - 4"													
		2 3				3.5	Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp. @ 1.0'-2.5', contains roots. @ 3.5'-4.0', gray clay seam.													
			2	10																
4.0	825.1	13 15				0.75	Medium stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.													
5			13	8																
6.0	823.1	11 37					Severely weathered brown SILTSTONE, arenaceous.													
		11 50/5		10																
10																				
11.0	818.1	50/4		4			Severely weathered gray SANDSTONE, argillaceous.													
		25 50/2		5																
15.0	814.1						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to thinly bedded, slightly fractured. @ 16.3'-16.4', low angle iron stained fracture.													
		Core 60"	Rec 60"		RQD 83%	R-1	*368													
20							@ 20.6'-21.0', broken zone. @ 21.0'-21.5', rust stained, contains argillaceous laminations. @ 21.5'-21.6', argillaceous band. @ 23.0', argillaceous lamination.													
		Core 60"	Rec 60"		RQD 65%	R-2	--													
25							@ 25.6'-25.7', 34.3'-34.4', argillaceous laminations. @ 26.1', 26.4', 26.5', 26.7', 27.1', 31.0', 33.0', 33.1', 33.2', 33.9', 34.3', 34.5'; low angle fractures. @ 26.4'-26.5', 26.7'-28.2', argillaceous laminations.													
		Core 120"	Rec 120"		RQD 86%	R-3														
30																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1232**

Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL

Date Drilled: 8/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
30	799.1					*378	<p>DESCRIPTION</p> <p>Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to thinly bedded, slightly fractured.</p> <p>@ 33.0'-33.1', 33.9'-34.3', 34.5', 41.5', argillaceous laminations.</p> <p>@ 35.0'-51.9', moderately weathered, moderately fractured.</p> <p>@ 35.8', 36.7', low angle fractures.</p> <p>@ 39.5'-39.9', rust staining.</p> <p>@ 48.0'-48.1', high angle fracture.</p> <p>@ 49.2'-49.3', shale layer.</p> <p>Soft gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thinly laminated, highly fractured.</p> <p>@ 52.4'-53.2', calcareous layer.</p>												
35																			
40		Core 120"	Rec 120"	RQD 84%	R-4	*373													
45																			
50		Core 120"	Rec 120"	RQD 73%	R-5	*356													
51.9	777.2																		
55																			
60		Core 120"	Rec 120"	RQD 76%	R-6														

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

**Client:** TranSystems, Inc. **Project:** SCI-823-0.00 **Job No.** 0121-3070.03

**LOG OF: Boring B-1232** Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL Date Drilled: 8/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○			
60	769.1																		
61.8	767.3					*124/741	Soft gray SHALE interbedded with SANDSTONE.												
65							Soft to medium hard gray SANDSTONE; fine to very fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, massively bedded, moderately to highly fractured. @ 62.2'-62.3', argillaceous bands. @ 62.3'-62.7', calcareous.												
70		Core 120"	Rec 120"	RQD 83%	R-7	*463													
75																			
80		Core 120"	Rec 120"	RQD 83%	R-8	*401													
85.0	744.1						Bottom of Boring - 85.0'												
90																			

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1233**

Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL

Date Drilled: 8/08/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○			
0	803.7																		
0.3	803.4						Topsoil - 4"												
		5 9	5 12			1	3.5	3	3	--	12	61	21						
		17 30	40 12			2	4.5+	2	19	--	13	66							
5																			
6.0	797.7	6 50/3	8			3	--												
		13 50/3	9			4	--												
10		9 50/4	3			5	--												
13.5	790.2	50/3	3			6	0.75	4	8	--	15	73							
15.0	788.7						Medium stiff light brown SILT (A-4b), some fine to coarse sand, trace gravel; contains clayey seams; damp.												
		Core 90"	Rec 90"	RQD 39%	R-1	*89	Soft to medium hard brownish gray SANDSTONE; fine to very fine grained, highly weathered, argillaceous, thin to medium bedded, highly fractured to broken.												
20							@ 19.6', becomes gray.												
23.0	780.7	Core 60"	Rec 58"	RQD 70%	R-2	*456	Soft to medium hard gray SANDSTONE interbedded with SHALE; decomposed to highly weathered, micaceous, pyritic, thinly laminated to medium bedded, broken to moderately fractured.												
25																			
30		Core 60"	Rec 60"	RQD 55%	R-3	*338													

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1233**

Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL

Date Drilled: 8/08/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40							
30	773.7																				
33.4	770.3	Core 60"	Rec 57"	RQD 60%	R-4	*318	Soft to medium hard gray SANDSTONE interbedded with SHALE. @ 31.7', 34.4', 34.6', low angle fractures.														
35							Medium hard to hard gray SANDSTONE; very fine to fined grained, slightly to moderately weathered, argillaceous, laminated to medium bedded, slightly to moderately fractured. @ 33.7', 33.8', 34.0'-34.3', calcareous layers. @ 34.0'-34.6', high angle fractures.														
36.5	767.2	Core 60"	Rec 58"	RQD 83%	R-5	*207	Hard to very hard gray SANDSTONE interbedded with few SHALE layers; very fine grained, slightly weathered, argillaceous, medium bedded, slightly to moderately fractured. @ 37.6', 37.7', 40.8', low angle fractures. @ 37.6', 40.2' to 40.8', calcareous layers. @ 41.2'-41.5.', high angle fracture.														
45		Core 60"	Rec 60"	RQD 35%	R-6	*839	@ 43.8'-44.0', 44.1'-44.2', 44.4'-45.0', 46.4', calcareous zones. @ 44.2'-44.9', broken zone.														
50		Core 60"	Rec 60"	RQD 63%	R-7	*187	@ 47.5', 47.8', 49.3', 50.2', 50.7', low angle fractures.														
55		Core 120"	Rec 120"	RQD 61%	R-8	*223	@ 52.6', 54.7', 59.2', low angle fractures.  @ 57.5'-58.0', 58.4'-58.7', high angle fractures.														
60																					

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc.	Project: SCI-823-0.00	Job No. 0121-3070.03
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<b>LOG OF: Boring B-1233</b>	Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL	Date Drilled: 8/08/05
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Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
DESCRIPTION																			
60	743.7																		
							Medium hard gray SANDSTONE; fine to very fine grained, moderately to slightly weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured to unfractured, contains few argillaceous laminations. @ 63.4', 67.2', low angle fractures.												
65																			
		Core 120"	Rec 120"	RQD 67%	R-9	*452													
70																			
							@ 71.5'-91.5', contains moderately argillaceous laminations, thinly bedded, contains rust stains. @ 72.8', 80.4', low angle fractures.												
75																			
		Core 120"	Rec 120"	RQD 78%	R-10	*424													
80																			
							@ 81.8', 83.2', 87.2', 90.2', 90.3', low angle fractures.												
85																			
		Core 120"	Rec 112"	RQD 74%	R-11	*625													
90																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1233**

Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL

Date Drilled: 8/08/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○			
90	713.7																		
91.5	712.2						Medium hard gray SANDSTONE.												
							Bottom of Boring - 91.5'												
95																			
100																			
105																			
110																			
115																			
120																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1234**

Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL

Date Drilled: 8/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40			
0	828.2						No topsoil Hard light brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0	2	--	4	68	26				
1.5		11		1	4.5+												
2.5		15		7	16												
3.5	824.7	8		2	--	Decomposed brown SANDSTONE											
5		18		10	--												
6.5		50/4		3	--												
8		31		9	--												
9.5		50/3		4	--												
10	818.2	27		1	--												
10		50/2				Hard brown SANDSTONE ; very fine to fine grained, highly weathered, argillaceous, laminated to thickly bedded, highly to moderately fractured. @ 12.6'-12.9', high angle fracture. @ 13.6'-14.3', 19.7'-21. 3', 27.3'-28.4', gray, contains moderate to abundant argillaceous laminations. @ 15.3'-15.5', broken, decomposed zone.											
15		Core 120"	Rec 118"	RQD 39%	R-1												*199
20						@ 22.0', 23.5', 23.9', 27.3', 28.9', 29.0', 29.8', low angle fractures. @ 23.4'-23.8', high angle fracture.											
25		Core 120"	Rec 119"	RQD 39%	R-2												*317
30																	@ 29.4'-29.8', high angle fractures.

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1234**

Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL

Date Drilled: 8/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
30	798.2						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, highly fractured to moderately fractured, laminated to thickly bedded. @ 30.7', 33.3'-33.6', 36.9'- 37.3', high angle fractures.  @ 34.2'-35.1', decomposed.  @ 35.7'-36.0', 37.5'-38.1', broken zone.  @ 38.1'-38.8', 43.1'-47.5', gray, contains moderate argillaceous laminations.							
35		Core 120"	Rec 119"	RQD 23%	R-3	*232								
45		Core 120"	Rec 117"	RQD 39%	R-4	*256	@ 46.4'-46.6', high angle fractures.  Soft to hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, moderately weathered, micaceous, laminated to medium bedded, highly to moderately fractured. @ 49.2'-49.6', calcareous layer. @ 50.5', 50.9', 51.6', 56.9', 57.0', low angle fractures.  @ 52.5'-55.8', broken shale layer.							
47.5	780.7													
55		Core 120"	Rec 118"	RQD 35%	R-5	*293	Medium hard to hard gray SANDSTONE.							
58.5	769.7													
60														

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1234**

Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL

Date Drilled: 8/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
60	768.2																		
65		Core 120"	Rec 120"	RQD 85%	R-6	*362	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, slightly fractured, massively bedded. @ 60.7', 64.0', 65.6', 66.0', 66.2', low angle fractures. @ 58.8'-59.5', 65.6'-66.3' calcareous layers.												
70							@ 70.0'-70.6', argillaceous laminations.												
75		Core 120"	Rec 120"	RQD 75%	R-7	287													
80																			
85		Core 120"	Rec 120"	RQD 81%	R-8	*254	@ 82.9', 83.9', 88.3', 88.5', low angle fractures. @ 83.7'-83.9', argillaceous zone.												
90							@ 88.3'-88.5', broken, argillaceous.												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1234**

Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL

Date Drilled: 8/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
90	738.2																		
95		Core 120"	Rec 120"	RQD 99%	R-9	*347	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, slightly fractured, massively bedded. @ 91.1', 91.2', 93.2', 93.3', 97.2', 99.5', argillaceous laminations with potential fractures.												
100.0	728.2						Bottom of Boring - 100.0'												
105																			
110																			
115																			
120																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1235**

Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL

Date Drilled: 9/29/05

to 9/30/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 4.1'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
0	786.7						DESCRIPTION  Topsoil - 5" / 6" soil removed before drilling  Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.  Severely weathered brown and gray SANDSTONE, argillaceous.  Soft reddish brown SANDSTONE; very fine to fine grained, decomposed, broken, contains rock fragments.  Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, pyritic, massively bedded, highly fractured to broken. Note: fractures along the bedding planes are infilled with silty clay and sandstone fragments with trace pyrite inclusions.  @ 26.0'-27.0', broken zone infilled with silty clay and sandstone fragments. @ 27.0', slightly fractured.							
-0.4	786.3													
		5												
		7				1		--						
		9												
		11												
		16				2		4.5+						
		17												
5														
6.0	780.7													
		19				3								
		31												
		45												
		19				4								
		24												
10		44												
		19				5								
		44												
		50/4				16								
		50/5				5								
		5				6								
15.0	771.7													
		Core 12"	Rec 2"		RQD 0%	R-1	--							
17.7	769.0													
		Core 120"	Rec 120"		RQD 85%	R-2	*266							
20														
25														
30														

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1235** Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL Date Drilled: 9/29/05 to 9/30/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 4.1'	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
30.0	756.7 756.7																		
		Core 120"	Rec 116"	RQD 97%	R-3	*282	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, massively bedded, unfractured to slightly fractured.												
35							@ 34.5'-34.6', silty clay seam with sandstone fragments (medium to coarse and size).												
40		Core 120"	Rec 120"	RQD 100%	R-4	*531													
45																			
50		Core 120"	Rec 120"	RQD 100%	R-5	*478													
55							@ 54.5', 1/2" zone of clay and sandstone fragments.												
60																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1235**

Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL

Date Drilled: 9/29/05

to 9/30/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 4.1'	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40						
60	726.7	Core 120"	Rec 120"	RQD 100%	R-6	*427	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, massively bedded, unfractured to slightly fractured.													
65		Core 48"	Rec 48"	RQD 100%	R-7	*628														
70.0	716.7						Bottom of Boring - 70.0'													
75																				
80																				
85																				
90																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1301**

Location: Sta. 12+37.8, 2.4 ft. RT of Rel. Shumway Hollow CL Date Drilled: 1/26/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: Not reported Water level at completion: 6.5' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	699.5																			
0.3	699.2	11					Asphalt Concrete Pavement - 3"													
		10				4.5+	Hard brown SILT (A-4b), some fine to coarse sand, trace gravel; damp.	2	14	--	14	51	19							
2.5	697.0	8	18			4.5+	Hard brown SANDY SILT (A-4a), "and" fine to coarse sand, trace gravel; contains sandstone fragments; damp.	9	28	--	13	31	19							
		6																		
4.5	695.0	9	20				Severely weathered brown SANDSTONE fragments.													
		10																		
5.5	694.0	23	9				Hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, highly fractured to broken.													
		50/3					@ 7.1', 9.1', 9.4', low angle fractures. @ 6.6'-7.5', 7.6'-7.7', 8.0'-8.7', broken zones.													
		Core 60"	Rec 47"		RQD 12%	R-1	*412													
10																				
10.5	689.0						Bottom of Boring - 10.5'													
15																				
20																				
25																				
30																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1302** Location: Sta. 12+70.7, 73.6 ft. LT of Rel Shumway Hollow CL Date Drilled: 10/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 31.4' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10    20    30    40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.1	704.2																		
	704.1						Topsoil - 1"												
		8 5 6	15	1		3.0	Very stiff brown SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.												
		9 8 9	16	2		4.0	@ 3.5'-5.0', contains rust stains.												
5																			
6.0	698.2	13				3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains rock fragments; damp.												
7.0	697.2	15 50/5	17	3A 3B			Severely weathered brown and gray SANDSTONE fragments.												
		50/2	2	4															
10.0	694.2						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, massively bedded, slightly to moderately fractured. @ 10.0'-10.7', broken and discolored; moderately to highly weathered. @ 12.5'-12.6', argillaceous bands.												
		Core 78"	Rec 78"	RQD 74%	R-1	*553													
15																			
		Core 120"	Rec 120"	RQD 100%	R-2	*513													
20																			
25																			
30																			

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1303**

Location: Sta. 15+40.1, 6.5 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/05/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 4.6' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.2	687.5	4																	
	687.3	5																	
		7																	
		8	20	1		--		18	17	--	19	35	11	●					
		14				--		20	18	--	14	35	13	●					
		18	18	2		--													
		20	18			--													
5		5				--													
		6				--													
		31		3		--													
6.0	681.5	50/5	23			--													
		50/4	2	4		--													
7.0	680.5					--													
						--													
10		Core 96"	Rec 96"		RQD 66%	R-1	*386												
15.0	672.5																		
20																			
25																			
30																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1304**

Location: Sta. 16+53.4, 87.9 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/05/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 12.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.3	720.5																		
	720.2						Topsoil - 4"												
		13 15 16	18			4.5+	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; contains rock fragments; damp.												
5		12 18 20	18			4.5+													
		10 23 28	18			4.5+													
10		22 28 36	18			4.5+													
		12 23 26	18			3.5													
15		13 20 34	18			4.5													
		28 50/3	9			4.5													
18.5	702.0	45 50/3	2				Gray SANDSTONE fragments												
20		50/2	2																
22.0	698.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, medium bedded to thickly bedded, highly fractured, fractures along bedding planes with infilling of clayey silt.												
25		Core 108"	Rec 108"	RQD 66%	R-1	*400	@ 25.8'-26.5', discoloration and highly fractured.												
30							@ 29.0', becomes slightly fractured.												

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1304**

Location: Sta. 16+53.4, 87.9 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/05/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 12.5' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
30	690.5																						
		Core 120"	Rec 120"	RQD 96%	R-2	*459																	
		Core 48"	Rec 48"	RQD 100%	R-3	*434	@ 42.3', high angle fracture.																
45.0	675.5	Bottom of Boring - 45.0'																					
50																							
55																							
60																							

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1305**

Location: Sta. 20+64.9, 72.0 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/06/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 4.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N)		
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●	Blows per foot - ○	
0	735.0															
0.3	734.7						Topsoil - 4"									
		10 13 14	18			1	4.5+									
		11 16 23	18			2	4.5+									
5																
6.0	729.0	11 13 18	14			3	4.5+	2	13	--	22	26	37			
		9 11 16	18			4	4.0									
10																
11.0	724.0	8 12 15	18			5	3.0									
		8 10 8	18			6	3.25									
13.5	721.5															
15																
16.0	719.0	6 11 16	18			7	--									
		12 12 20	18			8	--	2	13	--	46	21	18			
20																
		5 14 31	18			9	4.0									
		16 23 29	18			10	4.25									
25																
		10 15 44	18			11	4.5+									
		21 30 35	18			12	4.5+									
30																

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]



Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1305** Location: Sta. 20+64.9, 72.0 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/06/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 4.2' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40		
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
30.0	705.0						Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains rock fragments; damp.									
35.0	705.0	50/5	5	13		4.5+										65
37.5	697.5						Hard gray SANDSTONE; fine grained, slightly to moderately weathered, micaceous, medium bedded to thinly bedded, moderately fractured, few argillaceous laminations. @ 37.9', 38.1', 38.2', 38.4', 38.7', 38.8', 39.1', 41.3', 41.7', 43.2', 44.1', 50.2', and 50.3', low angle fractures. @ 38.0' to 38.9', 43.6' to 45.1', highly weathered, rust stained.  @ 47.0', 48.0', 48.1', 50.2', 50.3', low angle fractures.  @ 51.6'-51.7', contains medium grained sand. @ 51.7', pyritic.									
40.0		Core 108"	Rec 108"	RQD 84%	R-1	*329										
45.0																
50.0		Core 102"	Rec 102"	RQD 96%	R-2	*302										
55.0	680.0						Bottom of Boring - 55.0'									
60.0																

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1306**

Location: Sta. 24+54.9, 58.5 ft. LT of Rel. Shumway Hollow CL Date Drilled: 10/06/2005 to 10/07/2005

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 19.8' (Includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
0	734.0																						
0.3	733.7						Topsoil - 4" / 12" soil removed before drilling																
2.0	732.0	28 26 45	18			1	4.5+ Hard brown SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.																
5		25 42 50/5	17			2	Grayish brown SANDSTONE fragments with brown SANDY SILT (A-4a).																
		25 50/4	9			3																	
9.0	725.0	50/3	3			4																	
10							Hard to very hard gray and brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, medium bedded, moderately fractured. @ 9.5', 12.8', low angle, iron stained fractures. @ 11.5'-11.7', 14.4'-15.3', 15.7'-16.1', high angle, iron stained fractures.																
16.1	717.9																						
20							Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, laminated to medium bedded, highly fractured, contains few to moderate argillaceous laminations. @ 16.8'-16.9', 19.0'-19.2', high angle fractures.																
25							@ 21.8'-30.0', contains abundant argillaceous laminations. @ 23.0'-23.1', 23.2'-23.5', high angle fractures. @ 23.7'-24.7', 26.9'-27.6', very hard, whitish gray, fine to coarse grained, calcareous.																
30							@ 27.9', 28.0', 28.3', 28.4', 28.7', 29.1', 29.5', 29.7', low angle fractures.																

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1311A**

Location: Sta. 19+01.9, 9.9 ft. LT of Rel. Shumway Hollow CL Date Drilled: 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 4.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	718.1																			
0.3	717.8	1				4.5+	Topsoil - 3"													
2.0	716.1	4	13			--	Hard brown SILT AND CLAY (A-6a), trace fine sand; contains organic material; damp.													
4.0	714.1	2	18			2.0	Medium dense brown SANDY SILT (A-4a), trace to little clay; damp.													
5		4	20			2.0	@ 3.5'; encountered organic debris.	0	0	--	17	52	31							
		4	24			2.0	Stiff to very stiff mottled brown and gray SILT AND CLAY (A-6a) (Varved, very thin alternating silt/sand/clay layers), little fine sand; damp to moist.													
10		3	18			2.0														
11.0	707.1	3	18			2.0	Stiff brown SILT AND CLAY (A-6a), trace fine sand; damp.													
13.5	704.6	7	18			4.0	Medium dense brown SILT (A-4b), some clay, trace fine sand; contains sandstone fragments; damp.	0	1	--	9	59	31							
15		12	13			--														
		21	24			--														
		6	16			4.5+	@ 18.5'-20.0', Encountered organic material.													
20		10	11			--														
21.0	697.1	40	6			--	Very dense brown GRAVEL WITH SAND (A-1-b); contains sandstone fragments; damp.													
		50/3				--														
		50/3				--														
24.0	694.1						Hard yellowish brown SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, highly fractured to moderately fractured, exhibits cross bedding.													
25																				
28.0	690.1						Medium hard to hard gray SANDSTONE; fine to very fine grained, argillaceous, micaceous, massive, moderately													
30		Core 120"	Rec 117"																	
						RQD 64%														
						R-1														

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1311A**

Location: Sta. 19+01.9, 9.9 ft. LT of Rel. Shumway Hollow CL Date Drilled: 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 4.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
30	688.1						fractured, contains clay filled fractures. @ 29.2' -29.3', 31.0'-31.2', 32.7'-32.8', 33.8'-34.0', 31.4'-31.8', shaley zones. @ 32.0', low angle fractures.  @ 33.6'-33.8', possible core loss.  Bottom of Boring - 34.0'													
34.0	684.1																			
35																				
40																				
45																				
50																				
55																				
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1312A**

Location: Sta. 22+91.1, 12.3 ft. RT of Rel. Shumway Hollow CL Date Drilled: 07/20/06 to 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 6.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	714.0																			
0.3	713.7						Topsoil - 4"													
		8 11 20	15			1	Medium dense to dense brown SILT (A-4b), little gravel, trace clay; contains decomposed sandstone fragments; damp. @ 3.0', little clay.													
		17 28 36	16			2		5	13	--	15	52	15							
5		9 21 24	17			3														
		4 13 12	14			4	@ 8.0'; medium dense, reddish-brown, damp-moist.													
10		10 7 11	5			5	@ 10.5'; little to some clay.													
13.0	701.0																			
		4 5 12	15			6	Very stiff mottled light brown and gray CLAY (A-7-6), trace fine sand; damp.	0	0	--	1	37	62							
15		6 15 31	18			7	@ 16.5'; little gravel, encountered 0.3" gray silt seams.													
18.0	696.0																			
		9 14 14	16			8	Medium dense to dense mottled light brown and gray SILT (A-4b), little fine sand, little clay, little gravel; damp.	2	6	--	9	64	19							
20							@ 20.5'; trace fine to coarse sand, trace gravel.													
21.5	692.5	27 50/3	9			9A 9B	Brown decomposed SANDSTONE.													
23.5	690.5	50/0	0			10	Hard to very hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, siliceous, argillaceous, massive, moderately to highly fractured. @ 25.4'-26.7', possible core loss or broken zone. @ 26.7'-33.7', slightly fractured. @ 27.4', gray. @ 30.0', low angle fracture.													
25																				
30		Core 120"	Rec 105"			RQD 47%														

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1312A** Location: Sta. 22+91.1, 12.3 ft. RT of Rel. Shumway Hollow CL Date Drilled: 07/20/06 to 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 6.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
30	684.0																			
33.7	680.3						Hard to very hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, siliceous, argillaceous, massive, moderately to highly fractured.													
							Bottom of Boring - 33.7'													
35																				
40																				
45																				
50																				
55																				
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1322**

Location: Sta. 393+99.8, 9.4 ft. LT of TR 234 Ramp D BL

Date Drilled: 08/22/05 to 08/23/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 25.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0	718.4																		
-1.0	717.4	12 16 17	6	1		--	Topsoil - 12"												
-3.0	715.4	4 5 7	9	2		3.0	Hard brown SANDY SILT (A-4a), little fine to coarse sand, trace gravel; contains rootlets; damp.												
5		2 3 5	12	3		2.75	Stiff to very stiff brown and gray CLAY (A-7-6), trace to little fine sand; moist.												
10					P-1	2.5		0	0	--	1	17	82						54
15		2 4 5	18	5		2.0													
15		2 4 5	18	6		1.75													
15		3 4 6	18	7		1.5		0	0	--	0	11	89						61
-18.5	699.9				P-2	2.25	Very stiff brown ELASTIC CLAY (A-7-5); damp to moist.	0	0	--	0	10	90						56
-21.0	697.4	3 3 4	18	9		0.5	Medium stiff to stiff gray CLAY (A-7-6), trace fine sand; moist.	0	0	--	0	8	92						52
25		2 3 4	18	10		1.25													
25		3 4 5	18	11		1.25													
30					P-3	2.0		0	0	--	0	6	94						63

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1312A**

Location: Sta. 22+91.1, 12.3 ft. RT of Rel. Shumway Hollow CL Date Drilled: 07/20/06 to 07/21/06

to 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 6.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ─────────── LL Blows per foot - ○ 10 20 30 40									
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay										
0.3	714.0																						
	713.7						Topsoil - 4"																
		8 11 20	15		1	--	Medium dense to dense brown SILT (A-4b), little gravel, trace clay; contains decomposed sandstone fragments; damp. @ 3.0', little clay.																
		17 28 36	16		2	--		5	13	--	15	52	15										
5		9 21 24	17		3	--																	
		4 13 12	14		4	--	@ 8.0'; medium dense, reddish-brown, damp-moist.																
10		10 7 11	5		5	--	@ 10.5'; little to some clay.																
13.0	701.0																						
		4 5 12	15		6	3.25	Very stiff mottled light brown and gray CLAY (A-7-6), trace fine sand; damp.	0	0	--	1	37	62										
15		6 15 31	18		7	4.0	@ 16.5'; little gravel, encountered 0.3" gray silt seams.																
18.0	696.0																						
		9 14 14	16		8	--	Medium dense to dense mottled light brown and gray SILT (A-4b), little fine sand, little clay, little gravel; damp. @ 20.5'; trace fine to coarse sand, trace gravel.	2	6	--	9	65	19										
21.5	692.5	27 50/3	9		9A 9B	--	Brown decomposed SANDSTONE.																
23.5	690.5	50/0	0		10		Hard to very hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, siliceous, argillaceous, massive, moderately to highly fractured. @ 25.4'-26.7', possible core loss or broken zone. @ 26.7'-33.7', slightly fractured. @ 27.4', gray. @ 30.0', low angle fracture.																
25																							
30		Core 120"	Rec 105"			RQD 47%																	

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1312A** Location: Sta. 22+91.1, 12.3 ft. RT of Rel. Shumway Hollow CL Date Drilled: 07/20/06 to 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 6.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●		Blows per foot - ○									
														PL ————— LL 10 20 30 40											
30	684.0						Hard to very hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, siliceous, argillaceous, massive, moderately to highly fractured.																		
33.7	680.3							Bottom of Boring - 33.7'																	
35																									
40																									
45																									
50																									
55																									
60																									

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1314A** Location: Sta. 34+98.1, 11.4 ft. RT of Rel. Shumway Hollow CL Date Drilled: 07/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40										
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay											
0	651.5																							
-0.8	650.7	1 3			1	2.0	Topsoil - 9"																	
-2.0	649.5	4 3	18		1		Stiff to very stiff brown SILT AND CLAY (A-6a), little fine sand; damp to moist.	0	2	--	14	53	31											
-4.0	647.5	3 4 5	24		2	1.0	Medium stiff to stiff mottled brown and gray SANDY SILT (A-4a), some fine sand; moist.	1	1	--	29	42	27											
-5.0		6 9 9			3	--	Medium dense brown COARSE AND FINE SAND (A-3a), trace to little silt, trace clay; damp to moist.																	
-6.0	645.5		22				Bottom of Boring - 6.0'																	
10																								
15																								
20																								
25																								
30																								

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1322**

Location: Sta. 393+99.8, 9.4 ft. LT of TR 234 Ramp D BL

Date Drilled: 08/22/05

to 08/23/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 25.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
30	688.4						Stiff gray CLAY (A-7-6), trace fine sand; moist.												
35		2 4 5	18	13		1.0													
40		4 6 9	18	14		1.5													
45		4 5 6	18	15		2.0													
50		4 6 7	18	16		1.0													
55		7 10 12	18	17		4.5+		@ 53.5'-55.0', hard, contains interbedded seams of shale fragments; damp.											
57.0	661.4							Very soft brown SILTY CLAY (A-6b), trace fine sand; moist to wet.											
60		3 4 6	18	18		<0.25													

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1322**

Location: Sta. 393+99.8, 9.4 ft. LT of TR 234 Ramp D BL

Date Drilled: 08/22/05

to

08/23/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 25.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40								
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay									
60.0	658.4						Hard brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; contains rock fragments; damp.															
	658.4	16 50/6	18	19		--																50+
67.0	651.4							Severely weathered SHALE (driller's description)														
70.0	648.4						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured.															
72.0	646.4	Core 24"	Rec 20"	RQD 54%	R-1	*350		Bottom of Boring - 72.0'														
75																						
80																						
85																						
90																						

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1323**

Location: Sta. 391+91.7, 74.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/18/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 29.5'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40								
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay									
0	714.6																					
0.6	714.0						Topsoil - 7"															
		8 13 15	6	1		--	Hard brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains occasional rust stains; damp. @ 1.0'-2.5', contains roots.															
		8 12 14	11	2		4.5+																
		4 5 8	8	3		4.25																
8.5	706.1	3 7 9	11	4		4.5	Very stiff to hard brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.															
		2 4 7	12	5		3.5																
								P-1					0	0	--	0	15	85			55	
		4 5 7	18	7		3.0																
		4 5 6	18	8		3.75	Very stiff gray ELASTIC CLAY (A-7-5); moist.						0	0	--	1	7	92			57	
20.0	694.6								P-2					0	0	--	0	6	94			61
		2 5 9	18	10		1.5	Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.						0	0	--	1	16	83			55	
		3 4 5	18	11		1.5								0	0	--	0	4	96			60
		3 4 6	18	12		1.25																
30																						

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1323**

Location: Sta. 391+91.7, 74.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/18/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 29.5'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○							
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay								
30	684.6						Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.														
					P-3																
		2				14		1.75													
35		3		5	18																
		4		5	7	18		1.25													
40																					
44.0	670.6	16		7	18	16	4.5+														
45					8			Hard gray SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; damp.													
47.0	667.6							Stiff gray CLAY (A-7-6), little fine sand; moist.													
		5		7	9	18	1.0														
50																					
		7		4	8	18	1.75														
55																					
57.0	657.6							Dense brown FINE SAND (A-3); damp.													
		10		17	21	10															
60																					

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1323**

Location: Sta. 391+91.7, 74.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/18/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 29.5'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
60.0	654.6 654.6						Hard brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; contains rock fragments; damp.													
65		10 47 50/4	10			20		--												97
68.5	646.1	32 50/3	9			21		Gray SANDSTONE and SHALE fragments.												50+
74.0	640.6	50/2	1			22	Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, micaceous, massively bedded, unfractured, slightly to moderately weathered. @ 76.8', silt lens.													50+
75		Core 66"	Rec 65"	RQD 99%	R-1	*489														
79.5	635.1						Bottom of Boring - 79.5'													
80																				
85																				
90																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1324**

Location: Sta. 390+07.1, 74.5 ft. LT of TR 234 Ramp D BL

Date Drilled: 09/08/05

to 09/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported (hole collapsed at 30.0')	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
DESCRIPTION																			
0	734.5						Topsoil - 3"												
0.3	734.2						Very stiff to hard brown SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; damp.												
		7	11	12		1		4.5+											
		18	32	30		12	3.75												
5							Hard brown SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.												
6.0	728.5	13	27	31		3		4.5+											
		14	13	9		18	4.5+												
		26	25	24		18	--												
		9	20	33		18	--												
15		13	19	29		18	--												
		17	18	35		18	--												
20		15	17	32		18	4.5												
		50	5				4.5+												
25							Severely weathered gray SHALE, arenaceous.												
26.0	708.5	50	4			11													
		48	50	3		9													
30																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1324**

Location: Sta. 390+07.1, 74.5 ft. LT of TR 234 Ramp D BL

Date Drilled: 09/08/05

to 09/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported (hole collapsed at 30.0')	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay												
30.0	704.5 704.5						Gray SANDSTONE fragments.																		
		50/4	4			13																			
35.0	699.5							Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, slightly pyritic, massive, unfractured to slightly fractured. @ 36.7', 39.9', 41.7', 44.1', low angle fractures.																	
40		Core 120"	Rec 118.5"	RQD 87%	R-1	*366	@ 42.5'-42.6', 44.6'-50.0', moderately to highly weathered; broken.																		
45																									
50		Core 120"	Rec 116.5"	RQD 88%	R-2	*337																			
55																									
60		Core 120"	Rec 116.5"	RQD 84%	R-3																				

50+

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1324** Location: Sta. 390+07.1, 74.5 ft. LT of TR 234 Ramp D BL Date Drilled: 09/08/05 to 09/09/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported (hole collapsed at 30.0')	GRADATION						STANDARD PENETRATION (N)				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●				
DESCRIPTION														PL	LL	Blows per foot - ○		
														10	20	30	40	
60	674.5					*329	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, slightly pyritic, massive, unfractured to slightly fractured.											
65.0	669.5						Bottom of Boring - 65.0'											
70																		
75																		
80																		
85																		
90																		

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1325**

Location: Sta. 389+95.6, 10.9 ft. LT of TR 234 Ramp D BL

Date Drilled: 08/16/05

to 08/17/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 23.3' (includes drilling water, hole collapsed at 59.3')	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40			
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30	697.8						Medium stiff to stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.  @ 33.5'-35.0', contains few interbedded silt seams.										
35		4 4 5	18	13		1.5			0	0	--	1	26	73			
40							@ 43.5'-44.5', silt and clay (A-6a) seam.										
45		20 24 18	16	15		0.75											
50		7 7 14	18	16		2.0	Hard brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; moist.										
52.0	675.8																
55		39 44 50/5	10	17			Gray SANDSTONE fragments, argillaceous.										
58.5	669.3	22 23 20	18	18													
60																	

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1325** Location: Sta. 389+95.6, 10.9 ft. LT of TR 234 Ramp D BL Date Drilled: 08/16/05 to 08/17/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 23.3' (includes drilling water, hole collapsed at 59.3')	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
60	667.8																		
64.5	663.3	50/4	4	19															
65		Core 60"	Rec 60"	RQD 78%	R-1	*193													50+
69.5	658.3																		
70																			
75																			
80																			
85																			
90																			

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1326**

Location: Sta. 387+86.2, 110.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/31/05

to 09/01/05

Depth (ft)	Elev. (ft)	Blows per 6" Recovery (in)		Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 60.0' Water level at completion: 23.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ─────────── LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0	711.7																	
-1.0	710.7	1				1	2.5											
		2	5	12		2	--											
5		5	6	7	4	2												
-6.0	705.7	3				3	3.75											
		4	6	9		3												
		3	4	5	9	4	3.75											
10		3	3	15	14	5	2.75											
		3	4	7	16	6	2.75											
15						P-1												
		3	4	6	18	8	1.75											
20		2	3	5	18	9	1.75											
		4	5	7	18	10	1.75											
25						P-2	2.0											
		3	3	5	18	12	1.75											
30								0	0	--	0	5	95					

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

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Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1326**

Location: Sta. 387+86.2, 110.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/31/05

to 09/01/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 60.0' Water level at completion: 23.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
30	681.7																		
35		9 6 7 18			13	2.0													
40					P-3														
45		3 4 5 18			15	1.75	@ 43.5'-45.0', little fine to coarse sand, contains interbedded sand seams.												
50		3 4 5 18			16	1.5													
52.0	659.7																		
55		7 14 12 12			17														
60		9 11 21 10			18														
							Medium dense to dense brown FINE SAND (A-3), trace gravel; contains few pieces of silty clay; damp to moist.												



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1326**

Location: Sta. 387+86.2, 110.0 ft. RT of TR 234 Ramp D BL

Date Drilled: 08/31/05

to 09/01/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 60.0' Water level at completion: 23.0'	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40				
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
60	651.7						Medium dense to dense brown FINE SAND (A-3); damp.											
63.5	648.2	2	11	43	18	19		Severely weathered gray SANDSTONE with very dense gray SANDY SILT (A-4a); damp.										
65																		
69.0	642.7	50/2	2			20	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured.											
70		Core 60"	Rec 60"	RQD 91%	R-1	*336												
74.0	637.7						Bottom of Boring - 74.0'											
75																		
80																		
85																		
90																		

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1327**

Location: Sta. 385+91.55, 81.48 ft. LT of TR 823 Ramp D BL Date Drilled: 10/10/2005 to 10/11/2005

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0	735.5						Topsoil - 4" / 2.6' soil removed before drilling Hard brown SANDY SILT (A-4a), some gravel, little fine to coarse sand; contains sandstone fragments; damp.								
0.3	735.2	6				1		--							
		12 25	18												
		50/5	5			2	--							50+	
5															
6.0	729.5						Medium hard to hard brown and gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, massively bedded, highly fractured. @ 6.6' to 7.4', lost recovery likely due to fracture. @ 6.0'-6.6', 7.4'-7.9', 8.9'- 9.1', 11.3'-11.5', broken. @ 10.3', low angle fracture. @ 11.7', 13.6', 16.4', low angle fractures.								
		Core 60"	Rec 51"	RQD 58%	R-1	*227									
15							Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured.  @ 21.9'-41.0', lost water return during drilling. @ 22.0'-22.4', iron stained high angle fracture.								
16.7	718.8	Core 120"	Rec 120"	RQD 95%	R-2	*540									
25							@ 21.9'-41.0', lost water return during drilling. @ 22.0'-22.4', iron stained high angle fracture.								
		Core 120"	Rec 120"	RQD 95%	R-3	*505									
30															

Client: TranSystems, Inc.		Project: SCI-823-0.00			Job No. 0121-3070.03				
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<b>LOG OF: Boring B-1327</b>	Location: Sta. 385+91.55, 81.48 ft. LT of TR 823 Ramp D BL					Date Drilled: 10/10/2005		to 10/11/2005		
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Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / *Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring)	GRADATION						STANDARD PENETRATION (N)																											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○																											
30	705.5																																								
							<p>Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured.</p> <p>@ 32.7',33.0',33.9',34.1',34.8', low angle fractures in argillaceous laminations.</p>																																		
35		Core 120"	Rec 120"	RQD 69%	R-4	*384	<p>@ 35.1' to 35.3', broken zones with argillaceous laminations.</p> <p>@ 35.5', calcareous.</p> <p>@ 35.8'-37.3', broken to highly fractured, contains moderate argillaceous laminations, highly weathered to decomposed.</p> <p>@ 37.3'-38.4', very hard, whitish gray.</p> <p>@ 38.4'-40.7', very thin bedded to laminated, highly fractured, contains moderate to abundant argillaceous laminations.</p>																																		
40							<p>@ 40.7',40.9', thin, whitish gray, fine to coarse sandstone beds.</p>																																		
40.7	694.8						<p>Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured.</p> <p>@ 41.4'-41.5', whitish gray, fine to coarse sandstone bed.</p>																																		
45		Core 120"	Rec 120"	RQD 100%	R-5	*569	<p>@ 50.5', becomes pyritic.</p>																																		
50																																									
55		Core 108"	Rec 108"	RQD 100%	R-6	*798	<p>@ 58.5'-58.6', calcareous.</p>																																		
60.0	675.5						<p>Bottom of Boring - 60.0'</p>																																		

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1328**

Location: Sta. 385+92.3, 13.3 ft. LT of TR 234 Ramp D BL

Date Drilled: 08/16/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 29.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	718.1																			
-0.5	717.6						Topsoil - 6"													
		6 8 11	11		1	4.5+	Hard brown SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.													
		12 16 17	16.5		2	4.5+														
5		7 12 15	18		3	4.5+														
-8.5	709.6	1					Very stiff brown CLAY (A-7-6), trace fine sand; contains little gray mottling; damp to moist.													
10		3 5	14.5		4	2.75														
								P-1	2.0	0	0	--	1	3	96					66
15		2 4 4	19		6															
-16.0	702.1						Stiff to very stiff brown ELASTIC CLAY (A-7-5), trace fine sand; moist.													
								P-2	2.0	0	0	--	1	12	87					69
-18.5	699.6	14 15 24	16		8	2.75	Very stiff to hard brown CLAY (A-7-6), trace fine sand; damp to moist.													
20		14 8 8	15		9	4.5+														
-23.5	694.6	12 17 25	8		10	3.0	Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; contains rock fragments; damp.													
25		18 25 30	18		11	4.5+														
		28 50/5	16		12	4.5+														55
30																			50+	

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

LOG OF: Boring B-1328 Location: Sta. 385+92.3, 13.3 ft. LT of TR 234 Ramp D BL Date Drilled: 08/16/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 29.0' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)										
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ●			PL	Blows per foot - ○						
30.0	688.1																							
34.5	683.6	32	10	13																				
35		50/2																						
		Core 66"	Rec 64"	RQD 34%	R-1	*285																		
40.0	678.1						@ 35.0'-35.5', 36.0'-36.3', broken zones. @ 35.5'-35.8', high angle fracture. @ 39.7'-40.0', high angle fracture with rust staining. Bottom of Boring - 40.0'																	
45																								
50																								
55																								
60																								

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1343**

Location: Sta. 11+38.3, 100.0 ft. Rt of Rel. Shumway Hollow

Date Drilled: 09/25/06

to 09/26/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	754.8																			
0.7	754.1	4					Topsoil - 8"													
		4	8	10		1	Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4); damp.													
		13				2														
5		19	9	15																
6.0	748.8	50/0		0		3	Medium hard brown SANDSTONE; fine to medium grained, slightly weathered, very thinly bedded, moderately fractured.													
10		Core 90"	Rec 85"			RQD 60%	@ 9.3'-11.0', qu = 8,482 psi, SDI = 95.9%.													
11.5	743.3						Medium hard gray and brown SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, very thinly bedded, slightly fractured.													
15																				
20		Core 120"	Rec 120"			RQD 89%	@ 17.5' - 18.0', iron inclusion. @ 18.5'-20.0', qu = 12,337 psi, SDI = 98.3%.													
25																				
30		Core 120"	Rec 120"			RQD 96%														

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03

**LOG OF: Boring B-1343** Location: Sta. 11+38.3, 100.0 ft. Rt of Rel. Shumway Hollow Date Drilled: 09/25/06 to 09/26/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ———— LL Blows per foot - ○ 10 20 30 40					
30	724.8																		
							Medium hard gray SILTSTONE interbedded with SANDSTONE; fine grained, slightly weathered, very thinly bedded, slightly fractured. @ 32.8' - 33.0', clay seam.												
35																			
		Core 120"	Rec 120"	RQD 100%	R-4		@ 38.0'-39.7', qu = 12,078 psi, SDI = 98.7%.												
40																			
45																			
		Core 120"	Rec 120"	RQD 100%	R-5														
50																			
55							@ 56.6' - 57.5', vertical fracture.												
		Core 120"	Rec 120"	RQD 50%	R-6		@ 58.5'-59.9', qu = 10,818 psi, SDI = 98.0%.												
60																			

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1343**

Location: Sta. 11+38.3, 100.0 ft. Rt of Rel. Shumway Hollow

Date Drilled: 09/25/06

to 09/26/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.7' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
60	694.8						<p>DESCRIPTION</p> <p>Medium hard gray SILTSTONE interbedded with SANDSTONE; fine grained, slightly weathered, very thinly bedded, slightly fractured. @ 61.8' - 62.0', clay seam.</p> <p>@ 62.5'-62.9', 65.6'-65.9'; calcareous gray SANDSTONE; coarse grained.</p> <p>Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, unweathered, laminated, unfractured. @ 68.9'-70.4', qu = 11,691 psi, SDI = 98.3%.</p> <p>@ 76.7'-78.3', qu = 9,932 psi, SDI = 98.7%.</p>													
65																				
68.7	686.1	Core 120"	Rec 120"	RQD 83%	R-7															
70																				
75																				
80		Core 120"	Rec 120"	RQD 100%	R-8															
85.0	669.8	Core 18"	Rec 15"	RQD 83%	R-9															
							Bottom of Boring - 85.0'													
90																				

FILE: 0121-3070-03 [ 11/29/2006 2:17 PM ]



Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1344**

Location: Sta. 15+03.9, 100.0 ft. RT of Rel. Shumway Hollow CL Date Drilled: 09/20/06 to 09/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: Not reported Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ 10 20 30 40						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0	732.8						Medium dense to dense brown GRAVEL WITH SAND AND SILT (A-2-4); damp.													
		4 12 15	10			1														
		8 9 16	15			2														
5		20 14 19	12			3														
8.5	724.3	50/3	3			4	Severely weathered gray SANDSTONE.													
10							Medium hard brown and gray SANDSTONE; very fine grained, highly weathered to decomposed, laminated to thin bedded, moderately to highly fractured. @ 11.1', low angle fracture.  @ 14.5'-24.1', slightly weathered, micaceous.  @ 23.5'-23.7', high angle fracture. @ 24.1'-25.0', slightly weathered, argillaceous.													
10.7	722.1	Core 60"	Rec 52"	RQD 42%	R-1															
15		Core 60"	Rec 59"	RQD 93%	R-2															
20		Core 60"	Rec 60"	RQD 93%	R-3															
25.0	707.8	Core 60"	Rec 60"	RQD 95%	R-4		Hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, slightly weathered, laminated to medium bedded, moderately fractured.													
30																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring B-1344**

Location: Sta. 15+03.9, 100.0 ft. RT of Rel. Shumway Hollow CL Date Drilled: 09/20/06 to 09/21/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: Not reported Water level at completion: Not reported	GRADATION						STANDARD PENETRATION (N)						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40						
30	702.8						<p>DESCRIPTION</p> <p>Hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, slightly weathered, laminated to medium bedded, moderately fractured. @ 31.9'-32.7', near vertical fracture.</p> <p>@ 40.6'-40.8', high angle fracture. @ 40.8', thin clay seam.</p> <p>Medium hard gray SILTSTONE; slightly weathered, laminated to thinly bedded, highly fractured. @ 42.4'-42.9', decomposed and broken zone.</p> <p>Medium hard gray SANDSTONE interbedded with SILTSTONE; very fine grained, slightly weathered, laminated to thinly bedded, moderately fractured. @ 42.9'-43.8', 45.9'-46.1', 46.6'-46.8', light gray calcareous SANDSTONE; coarse grained.</p> <p>Medium hard to hard gray SANDSTONE; very fine grained, slightly weathered, micaceous, laminated to medium bedded, moderately fractured. @ 47.4', 47.9'-48.0', 48.6'-50.0', light gray calcareous SANDSTONE; coarse grained.</p> <p>Bottom of Boring - 55.0'</p>													
		Core 60"	Rec 60"	RQD 85%	R-5															
35		Core 60"	Rec 60"	RQD 100%	R-6															
40.8	692.0																			
42.9	689.9	Core 60"	Rec 60"	RQD 88%	R-7															
45																				
46.8	686.0	Core 60"	Rec 60"	RQD 68%	R-8															
50		Core 60"	Rec 58"	RQD 87%	R-9															
55.0	677.8																			
60																				

FILE: 0121-3070-03 [ 11/24/2006 3:13 PM ]

Client: TranSystems, Inc.

Project: SCI-823-0.00

Job No. 0121-3070.03

**LOG OF: Boring C-47**

Location: Sta. 25+99.3, 58.2 ft. LT of Rel. Shumway Hollow CL Date Drilled: 08/25/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 5.9' (includes drilling water)	GRADATION						STANDARD PENETRATION (N)					
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 10 20 30 40					
0	718.0																		
0.8	717.2	15 15 19	12	1		4.5+	Topsoil - 9" Hard brown SANDY SILT (A-4a), some fine to coarse sand, some gravel; damp.	24	14	--	10	39	13	●	H				
3.0	715.0	24 23 27	6	2		-	Soft brown SILTSTONE; highly weathered to decomposed												
5		9 16 21	10	3		-													
10.1	707.9	45 42 50/3	13	4		-	Medium hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, thinly bedded, highly fractured. @ 11.0'-11.1', coarse grained.  @ 14.8', becomes gray.												
		Core 60"	Rec 60"		RQD 68%	R-1													
15.0	703.0						Bottom of Boring - 15.0'												
20																			
25																			
30																			

FILE: 0121-3070-03 [ 11/27/2006 1:48 PM ]

## Results of Slake Durability Index and Uniaxial Compressive Tests

## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/17/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-356	2	25.0'-25.4'	1.962	1.966	1.994	1.972	4.089	4.088	4.086	4.088	2.073	0.0072228	492.36	150.28	5,760	<b>1,886</b>
			1.967	1.973	1.971											
R-356	5	56.4'-57.0'	1.892	1.889	1.922	1.901	4.012	4.010	4.011	4.011	2.110	0.0065827	382.80	128.20	4,110	<b>1,449</b>
			1.895	1.887	1.919											
R-356	13	138.0'-138.5'	1.954	1.961	1.953	1.957	4.011	4.010	4.009	4.010	2.050	0.0069734	470.51	148.75	34,460	<b>11,462</b>
			1.954	1.963	1.954											
R-360	3	35.0'-35.5'	1.983	1.984	1.984	1.983	4.751	4.751	4.752	4.751	2.396	0.0084908	568.95	147.73	36,880	<b>11,937</b>
			1.985	1.982	1.982											
R-360	10	106.9'-107.3'	1.985	1.985	1.984	1.985	4.282	4.278	4.280	4.280	2.156	0.0076627	498.70	143.48	39,060	<b>12,620</b>
			1.985	1.985	1.987											
R-363	1	28.7'-29.1'	1.935	1.959	1.952	1.948	3.726	3.719	3.719	3.721	1.911	0.0064131	422.51	145.25	4,950	<b>1,652</b>
			1.941	1.952	1.947											
R-363	11	125.0'-125.4'	1.989	1.990	1.988	1.989	4.434	4.433	4.430	4.432	2.228	0.0079674	514.81	142.45	36,040	<b>11,597</b>
			1.990	1.990	1.988											



Engineers \* Architects \* Scientists

6121 Huntley Road \* Columbus, Ohio \* 43229-1003 \* Phone: (614) 888-0576 \* Fax (614) 888-6415

## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/19/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-359	1	12.0'-12.4'	1.999	1.993	1.995	1.995	4.040	4.032	4.025	4.032	2.021	0.0072897	445.88	134.85	1,060	<b>339</b>
			1.995	1.994	1.993											
R-359	7	64.2'-64.7'	1.983	1.982	1.981	1.983	4.149	4.145	4.155	4.150	2.093	0.0074094	496.19	147.64	35,910	<b>11,633</b>
			1.983	1.983	1.983											
R-362	2	24.1'-24.5'	1.984	1.983	1.980	1.982	3.864	3.876	3.864	3.868	1.951	0.0069053	459.91	146.83	27,250	<b>8,803</b>
			1.983	1.983	1.981											
R-365	1	18.4'-18.8'	1.972	1.980	1.977	1.977	4.501	4.501	4.500	4.501	2.276	0.0079929	517.25	142.67	5,150	<b>1,677</b>
			1.983	1.976	1.975											
R-365	4	46.1'-46.5'	1.971	1.971	1.973	1.971	4.382	4.384	4.382	4.383	2.223	0.0077362	553.23	157.66	15,860	<b>5,197</b>
			1.970	1.970	1.972											
R-369	6	60.6'-61.0'	1.987	1.985	1.987	1.986	4.073	4.071	4.072	4.072	2.050	0.0072976	481.76	145.54	22,200	<b>7,165</b>
			1.984	1.987	1.987											
R-373	2	15.5'-15.9'	1.923	1.922	1.920	1.919	3.987	3.986	3.987	3.987	2.077	0.0066708	429.19	141.84	28,550	<b>9,869</b>
			1.917	1.918	1.915											



Engineers \* Architects \* Scientists

6121 Huntley Road \* Columbus, Ohio \* 43229-1003 \* Phone: (614) 888-0576 \* Fax (614) 888-6415

## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/17/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-363	16	176.2'-176.8'	1.991	1.992	1.991	1.990	4.512	4.511	4.511	4.511	2.267	0.0081189	540.71	146.83	39,050	<b>12,551</b>
			1.989	1.990	1.989											
R-367	2	22.5'-22.9'	1.929	1.948	1.959	1.946	4.415	4.412	4.413	4.413	2.268	0.0075901	530.68	154.14	24,380	<b>8,200</b>
			1.935	1.950	1.953											
R-367	4	42.1'-42.5'	1.958	1.955	1.957	1.957	4.753	4.754	4.755	4.754	2.429	0.0082701	532.45	141.94	35,460	<b>11,791</b>
			1.958	1.957	1.956											
R-367	11	118.9'-119.4'	1.963	1.960	1.960	1.959	4.302	4.305	4.306	4.304	2.197	0.0075044	509.67	149.73	23,020	<b>7,637</b>
			1.957	1.957	1.957											
R-370	1	11.5'-11.9'	1.978	1.980	1.981	1.980	4.305	4.306	4.307	4.306	2.175	0.0076666	498.64	143.39	19,220	<b>6,244</b>
			1.980	1.980	1.979											
R-370	4	34.2'-34.7'	1.981	1.983	1.982	1.981	4.349	4.348	4.347	4.348	2.194	0.0077544	540.35	153.63	33,330	<b>10,810</b>
			1.979	1.981	1.982											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/19/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-373	3	31.2'-31.6'	1.955	1.953	1.956	1.955	4.295	4.288	4.291	4.291	2.196	0.0074474	472.84	139.97	32,280	<b>10,759</b>
			1.952	1.953	1.958											
R-376	2	16.6'-17.1'	2.002	2.001	2.013	2.010	4.585	4.585	4.582	4.584	2.281	0.0084122	514.79	134.91	1,220	<b>385</b>
			2.006	2.011	2.026											
R-376	5	47.4'-48.0'	1.992	1.968	1.972	1.986	4.223	4.219	4.225	4.222	2.126	0.0075658	503.39	146.69	23,710	<b>7,654</b>
			1.996	1.990	1.998											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/11/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-384	1	10.4'-11.0'	1.968	1.974	1.960	1.969	4.326	4.324	4.326	4.325	2.197	0.0076182	474.23	137.24	6,400	<b>2,102</b>
			1.971	1.972	1.969											
R-384	3	25.5'-26.3'	1.978	1.979	1.981	1.979	4.301	4.300	4.301	4.301	2.173	0.0076545	532.67	153.42	28,770	<b>9,350</b>
			1.979	1.978	1.981											
R-384	5	46.1'-46.7'	1.979	1.981	1.979	1.979	4.296	4.301	4.297	4.298	2.171	0.0076497	512.02	147.56	34,040	<b>11,063</b>
			1.976	1.979	1.982											
R-386	6	38.0'-38.4'	1.952	1.953	1.966	1.959	4.231	4.230	4.231	4.231	2.160	0.0073747	502.58	150.24	17,420	<b>5,780</b>
			1.951	1.964	1.967											
R-386	11	92.5'-93.0'	1.975	1.966	1.981	1.973	4.490	4.490	4.490	4.490	2.276	0.0079418	561.34	155.83	26,810	<b>8,768</b>
			1.976	1.966	1.975											
R-387	2	14.6'-15.1'	1.942	1.968	1.975	1.962	4.687	4.690	4.689	4.689	2.390	0.0081982	562.69	151.32	25,540	<b>8,449</b>
			1.94	1.973	1.973											
R-387	5	44.9'-45.3'	1.944	1.943	1.941	1.942	4.784	4.789	4.788	4.787	2.465	0.0082045	485.21	130.38	26,230	<b>8,852</b>
			1.942	1.943	1.941											



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# Unconfined Compression of Rock Core Specimens

(ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 1/11/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-387	7	62.2'-62.5'	1.976	1.975	1.977	1.976	4.664	4.664	4.663	4.664	2.360	0.0082726	585.10	155.93	28,810	<b>9,395</b>
			1.975	1.976	1.977											
R-387	11	114.7'-115.1'	1.973	1.976	1.976	1.975	4.708	4.708	4.707	4.708	2.383	0.0083436	593.37	156.79	29,470	<b>9,618</b>
			1.973	1.975	1.978											
R-389	1	10.5'-10.9'	1.983	1.982	1.980	1.982	4.789	4.789	4.786	4.788	2.416	0.0085405	549.91	141.95	20,480	<b>6,641</b>
			1.98	1.981	1.983											
R-389	3	29.7'-30.0'	1.984	1.983	1.982	1.984	4.638	4.638	4.637	4.638	2.338	0.0082905	572.14	152.15	34,660	<b>11,215</b>
			1.984	1.984	1.985											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 11/8/04**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-394	2	24.5'-25.1'	1.983	1.981	1.980	1.981	4.816	4.821	4.820	4.819	2.432	0.0085944	566.12	145.22	24,210	<b>7,852</b>
			1.980	1.980	1.984											
R-394	3	33.8'-34.3'	1.983	1.982	1.983	1.983	4.942	4.944	4.943	4.943	2.493	0.0088304	587.26	146.62	23,520	<b>7,616</b>
			1.983	1.983	1.984											
R-414	1	8.0'-8.5'	1.977	1.980	1.979	1.979	4.622	4.617	4.626	4.622	2.336	0.0082203	549.19	147.29	18,500	<b>6,016</b>
			1.979	1.977	1.980											
R-414	4	37.5'-38.0'	1.983	1.986	1.980	1.983	4.867	4.865	4.868	4.867	2.454	0.0086955	556.98	141.22	23,780	<b>7,698</b>
			1.982	1.984	1.984											
R-414	9	87.0'-87.5'	1.980	1.980	1.981	1.980	4.404	4.401	4.403	4.403	2.224	0.0078387	504.06	141.77	25,400	<b>8,252</b>
			1.979	1.978	1.980											
R-416	1	20.5'-21.0'	1.977	1.974	1.978	1.977	4.530	4.525	4.530	4.528	2.291	0.0080366	541.31	148.49	14,880	<b>4,850</b>
			1.979	1.975	1.976											
R-416	2	29.1'-29.5'	1.973	1.974	1.975	1.971	4.050	4.053	4.053	4.052	2.056	0.0071525	511.01	157.51	28,500	<b>9,339</b>
			1.958	1.971	1.976											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 10/12/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-414	4	36.3'-37.3'	1.978	1.981	1.983	1.981	4.427	4.425	4.436	4.429	2.236	0.0078928	516.78	144.35	24,020	<b>7,797</b>
			1.982	1.978	1.981											
R-414	12	120.5'-121.6'	1.983	1.982	1.983	1.983	4.612	4.621	4.612	4.615	2.327	0.008243	546.86	146.26	36,450	<b>11,804</b>
			1.984	1.982	1.983											
R-437	4	45.9'-46.5'	2.009	2.001	2.012	2.011	4.261	4.257	4.254	4.257	2.117	0.0078192	508.42	143.35	30,930	<b>9,741</b>
			2.011	2.009	2.022											
R-446	5	49.5'-50.5'	1.981	1.982	1.981	1.981	5.131	5.114	4.789	5.011	2.529	0.0089359	571.00	140.88	34,790	<b>11,286</b>
			1.981	1.981	1.981											
R-446	8	80.5'-81.7'	1.981	1.982	1.982	1.982	4.890	4.889	4.909	4.896	2.470	0.0087361	582.92	147.10	35,970	<b>11,660</b>
			1.982	1.982	1.982											
R-446	10	98.2'-99.3'	1.982	1.982	1.983	1.982	5.147	5.154	5.157	5.153	2.599	0.0091987	582.92	139.71	33,020	<b>10,699</b>
			1.981	1.983	1.983											
R-451	3	28.0'-28.7'	1.983	1.983	1.983	1.983	5.246	5.244	5.234	5.241	2.644	0.0093602	641.00	150.98	30,410	<b>9,850</b>
			1.982	1.982	1.983											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 11/8/04**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-432	1	9.9'-10.3'	1.963	1.970	1.967	1.967	3.982	3.984	3.996	3.987	2.027	0.0070086	434.89	136.80	16,610	<b>5,466</b>
			1.97	1.964	1.968											
R-432	3	26.5'-27.0'	1.974	1.973	1.973	1.973	4.906	4.914	4.900	4.907	2.487	0.0086787	609.90	154.93	25,280	<b>8,267</b>
			1.972	1.973	1.974											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 9/16/2004**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-435	2	17.1'-17.6'	1.984	1.986	1.985	1.986	4.468	4.470	4.477	4.472	2.252	0.0080085	500.41	137.76	18,060	<b>5,833</b>
			1.987	1.985	1.986											
R-435	4	39.6'-39.9'	1.986	1.987	1.986	1.987	4.860	4.867	4.865	4.864	2.449	0.0087199	576.86	145.85	30,380	<b>9,802</b>
			1.987	1.986	1.987											
R-435	9	87.6'-88.0'	1.982	1.978	1.982	1.981	4.552	4.553	4.555	4.553	2.299	0.0081138	577.08	156.80	18,060	<b>5,862</b>
			1.983	1.978	1.980											
R-435	4	39.6'-39.9'	1.986	1.987	1.986	1.987	4.860	4.867	4.865	4.864	2.449	0.0087199	576.86	145.85	30,380	<b>9,802</b>
			1.987	1.986	1.987											
R-436	7	61.5'-61.9'	1.978	1.983	1.983	1.981	4.525	4.535	4.559	4.540	2.292	0.0080894	591.92	161.32	11,920	<b>3,869</b>
			1.981	1.979	1.979											
R-436	10	91.1'-91.5'	1.986	1.987	1.985	1.986	4.810	4.814	4.812	4.812	2.423	0.0086253	584.17	149.31	29,110	<b>9,394</b>
			1.987	1.987	1.986											
R-446	1	8.3'-8.7'	1.972	1.976	1.975	1.974	4.743	4.744	4.761	4.749	2.406	0.0084047	496.74	130.30	24,230	<b>7,920</b>
			1.974	1.968	1.977											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 9/16/2004**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-446	2	16.4'-16.7'	1.965	1.921	1.984	1.965	4.084	4.134	4.086	4.101	2.088	0.0071919	501.47	153.72	7,360	<b>2,428</b>
			1.989	1.977	1.952											
R-446	6	62.3'-62.7'	1.981	1.979	1.979	1.978	4.917	4.904	4.925	4.915	2.485	0.0087397	581.93	146.80	31,880	<b>10,371</b>
			1.978	1.977	1.976											
R-447	2	18.1'-18.5'	2.000	1.997	2.005	2.002	4.456	4.494	4.464	4.471	2.233	0.0081429	497.54	134.71	720	<b>229</b>
			2.003	2.002	2.006											
R-448	2	30.5'-30.9'	1.973	1.977	1.975	1.977	4.989	4.968	4.998	4.985	2.522	0.0088486	586.39	146.10	17,840	<b>5,814</b>
			1.979	1.975	1.981											
R-448	8	81.9'-82.3'	1.978	1.979	1.977	1.978	5.013	5.008	5.014	5.012	2.533	0.0089094	555.53	137.47	21,510	<b>6,999</b>
			1.978	1.978	1.979											
R-448	10	97.1'-97.5'	1.978	1.981	1.979	1.979	4.733	4.720	4.711	4.721	2.386	0.0084018	608.00	159.54	24,750	<b>8,045</b>
			1.980	1.979	1.978											



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**Unconfined Compression of Rock Core Specimens**  
(ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 10/20/2004**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-455	2	22.7'-23.1'	1.968	1.967	1.964	1.966	4.598	4.600	4.583	4.594	2.337	0.0080662	561.17	153.38	24,210	<b>7,975</b>
			1.966	1.964	1.967											
R-455	9	90.4'-90.9'	1.971	1.974	1.974	1.973	3.685	3.684	3.680	3.683	1.866	0.0065155	459.21	155.38	31,020	<b>10,056</b>
			1.974	1.975	1.972											
R-454	6	33.9'-34.3'	1.959	1.958	1.955	1.956	4.042	4.036	4.037	4.038	2.065	0.0070155	494.87	155.51	30540	<b>10,169</b>
			1.952	1.953	1.956											



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# Unconfined Compression of Rock Core Specimens

(ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 3/25/05**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
TR-29	7	61.8'-62.4'	1.985	1.984	1.986	1.985	4.540	4.547	4.542	4.543	2.289	0.0081322	562.00	152.36	43,190	<b>13,956</b>
TR-30	1	5.8'-6.4'	1.977	1.977	1.975	1.976	4.677	4.682	4.681	4.680	2.368	0.0083044	540.88	143.59	16,690	<b>5,441</b>
TR-31	1	6.3'-6.7'	1.983	1.983	1.981	1.982	4.348	4.344	4.351	4.348	2.193	0.0077616	520.58	147.87	3,870	<b>1,254</b>
			1.917	1.918	1.915											



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## Unconfined Compression of Rock Core Specimens (ASTM D-2938)

**DLZ Project No.: 0121-3070.03**

**Client: TranSystems**

**Project Name: SCI-823-0.00**

**Date: 11/04/06**

Boring	Run	Depth (ft.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>(ave)</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>(ave)</sub>	L/D	Volume (ft <sup>3</sup> )	Mass (Gram)	Unit Wt.(pcf)	Load (lbs)	Strength (psi)
R-1343	1	9.3'-9.7'	1.985	1.976	1.978	1.979	4.355	4.360	4.358	4.358	2.202	0.0077507	488.57	139.0	26,080	<b>8,482</b>
			1.982	1.977	1.974											
R-1343	2	18.5'-18.9'	1.984	1.985	1.985	1.984	4.535	4.531	4.534	4.533	2.286	0.0081026	553.21	150.5	38,120	<b>12,337</b>
			1.981	1.983	1.983											
R-1343	4	38.0'-38.5'	1.988	1.987	1.989	1.988	4.530	4.537	4.528	4.532	2.280	0.0081323	544.78	147.7	37,470	<b>12,078</b>
			1.988	1.987	1.986											
R-1343	6	59.5'-59.9'	1.988	1.988	1.986	1.987	4.405	4.407	4.404	4.405	2.218	0.0078977	526.16	146.9	33,530	<b>10,818</b>
			1.985	1.986	1.986											
R-1343	7	70.1'-70.4'	1.988	1.987	1.987	1.987	4.627	4.625	4.627	4.626	2.328	0.0082994	580.50	154.2	36,260	<b>11,691</b>
			1.988	1.987	1.986											
R-1343	8	77.8'-78.3'	1.987	1.984	1.980	1.985	4.655	4.660	4.637	4.651	2.343	0.0083207	555.47	147.2	30,720	<b>9,932</b>
			1.986	1.986	1.984											



Engineers \* Architects \* Scientists

6121 Huntley Road \* Columbus, Ohio \* 43229-1003 \* Phone: (614) 888-0576 \* Fax (614) 888-6415

# Slake Durability Test Data

## (ASTM D-4644)

DLZ Project Name: SCI-823-0.00  
 DLZ Project Number: 0121-3070.03  
 Client: TranSystems  
 Date: 1/12/05

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-384	1	10.5'-12.5'	1.6	73.9	26.1	II	22.3	72.1
R-384	3	25.5'-27.0'	0.8	93.2	6.8	I	21.8	71.2
R-384	5	46.5'-48.0'	1.3	98.0	2.0	I	22.2	72.0
R-386	6	39.0'-40.5'	0.9	92.7	7.3	I	21.4	70.5
R-386	11	92.9'-93.9'	3.0	91.8	8.2	I	22.1	71.8
R-387	2	15.0'-20.0'	0.7	87.0	13.0	II	22.2	72.0
R-387	5	44.3'-45.3'	4.9	97.3	2.7	I	22.5	72.5
R-387	7	62.4'-63.4'	2.1	96.9	3.1	I	21.4	70.5
R-387	12	116.0'-117.5'	1.1	70.6	29.4	II	21.8	71.2
R-389	1	8.0'-9.5'	1.0	93.3	6.7	I	22.3	72.1



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Phone (614) 888-0040 \* Fax (614) 888-6415

# Slake Durability Test Data

(ASTM D-4644)

DLZ Project Name: SCI-823-0.00  
DLZ Project Number: 0121-3070.03  
Client: TranSystems  
Date: 1/12/05

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-389	3	30.0'-31.2'	2.6	98.8	1.2	I	21.5	70.7



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# Slake Durability Test Data

## (ASTM D-4644)

DLZ Project Name: SCI-823-0.00  
 DLZ Project Number: 0121-3070.03  
 Client: TranSystems  
 Date: 1/17/05

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-356	2	24.9'-27.0'	1.2	21.9	78.1	III	22.2	72.0
R-356	13	138.0'-139.5'	0.2	89.5	10.5	I	21.7	71.1
R-360	10	106.9'-108.8'	3.8	98.3	1.7	I	22.3	72.1
R-363	1	28.7'-30.0'	3.5	20.1	79.9	III	22.1	71.8
R-363	16	175.4'-176.2'	3.3	98.0	2.0	I	21.6	70.9
R-367	2	22.5'-24.0'	0.7	71.0	29.0	II	22.2	72.0
R-367	4	41.2'-42.5'	2.8	98.4	1.6	I	21.8	71.2
R-367	11	117.5'-119.0'	0.4	92.2	7.8	II	22.0	71.6
R-370	1	11.5'-13.0'	1.2	95.4	4.6	I	22.4	72.3
R-370	4	34.2'-35.5'	0.5	95.2	4.8	I	21.8	71.2



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# Slake Durability Test Data

## (ASTM D-4644)

DLZ Project Name: SCI-823-0.00  
 DLZ Project Number: 0121-3070.03  
 Client: TranSystems  
 Date: 1/19/05

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-359	1	11.0'-12.3'	1.5	5.9	94.1	III	22.0	71.6
R-365	1	18.9'-20.0'	2.6	30.8	69.2	III	22.3	72.1
R-365	4	46.5'-47.3'	2.3	32.4	67.6	III	22.5	72.5
R-376	2	12.1'-13.4'	2.7	92.8	7.2	I	21.8	71.2
R-376	2	17.1'-18.5'	1.4	23.3	76.7	III	21.8	71.2
R-376	5	49.3'-50.3'	5.4	92.2	7.8	I	22.1	71.8



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 Phone (614) 888-0040 \* Fax (614) 888-6415

# Slake Durability Test Data

## (ASTM D-4644)

**DLZ Project Name: SCI-823-0.00**  
**DLZ Project Number: 0121-3070.03**  
**Client: TranSystems**  
**Date: 11/8/04**

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-414	1	8.5'-9.7'	1.3	91.6	8.4	I	22.1	71.8
R-414	9	87.5'-88.8'	1.0	78.3	21.7	II	21.9	71.4
R-432	1	8.7'-9.9'	1.3	73.6	26.4	I	21.9	71.4



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 Phone (614) 888-0040 \* Fax (614) 888-6415

# Slake Durability Test Data

## (ASTM D-4644)

DLZ Project Name: SCI-823-0.00  
 DLZ Project Number: 0121-3070.03  
 Client: TranSystems  
 Date: 9/27/04

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
R-435	9	86.5'-87.6'	1.7	65.1	34.9	III	21.8	71.2
R-436	7	61.9'-63.0'	1.5	67.5	32.5	II	22.0	71.6
R-446	1	8.7'-9.6'	7.8	96.1	3.9	I	21.9	71.4
R-446	2	16.2'-17.3'	2.8	28.5	71.5	III	22.2	72.0
R-447	2	17.0'-18.0'	2.7	0.0	100	III	21.7	71.1
R-448	2	30.9'-32.2'	4.0	95.7	4.3	I	22.2	72.0
R-448	10	96.5'-97.2'	1.9	62.6	37.4	III	21.7	71.1



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Phone (614) 888-0040 \* Fax (614) 888-6415



# Slake Durability Test Data

## (ASTM D-4644)

**DLZ Project Name: SCI-823-0.00**  
**DLZ Project Number: 0121-3070.03**  
**Client: TranSystems**  
**Date: 11/04/06**

Boring	Run	Depth	Moisture Content (%)	Slake Durability Index	Loss	Type	Water Temp (°C)	Water Temp (°F)
B-1343	1	9.7'-11.0'	3.2	95.9	4.1	I	22.2	72.0
B-1343	2	18.9'-20.0'	3.6	98.3	1.7	I	21.9	71.4
B-1343	4	38.5'-39.7'	4.1	98.7	1.3	I	22.0	71.6
B-1343	6	58.5'-59.5'	1.9	98.0	2.0	I	21.9	71.4
B-1343	7	68.9'-70.1'	1.9	98.3	1.7	I	22.2	72.0
B-1343	8	76.7'-77.8'	2.4	98.7	1.3	I	21.8	71.2

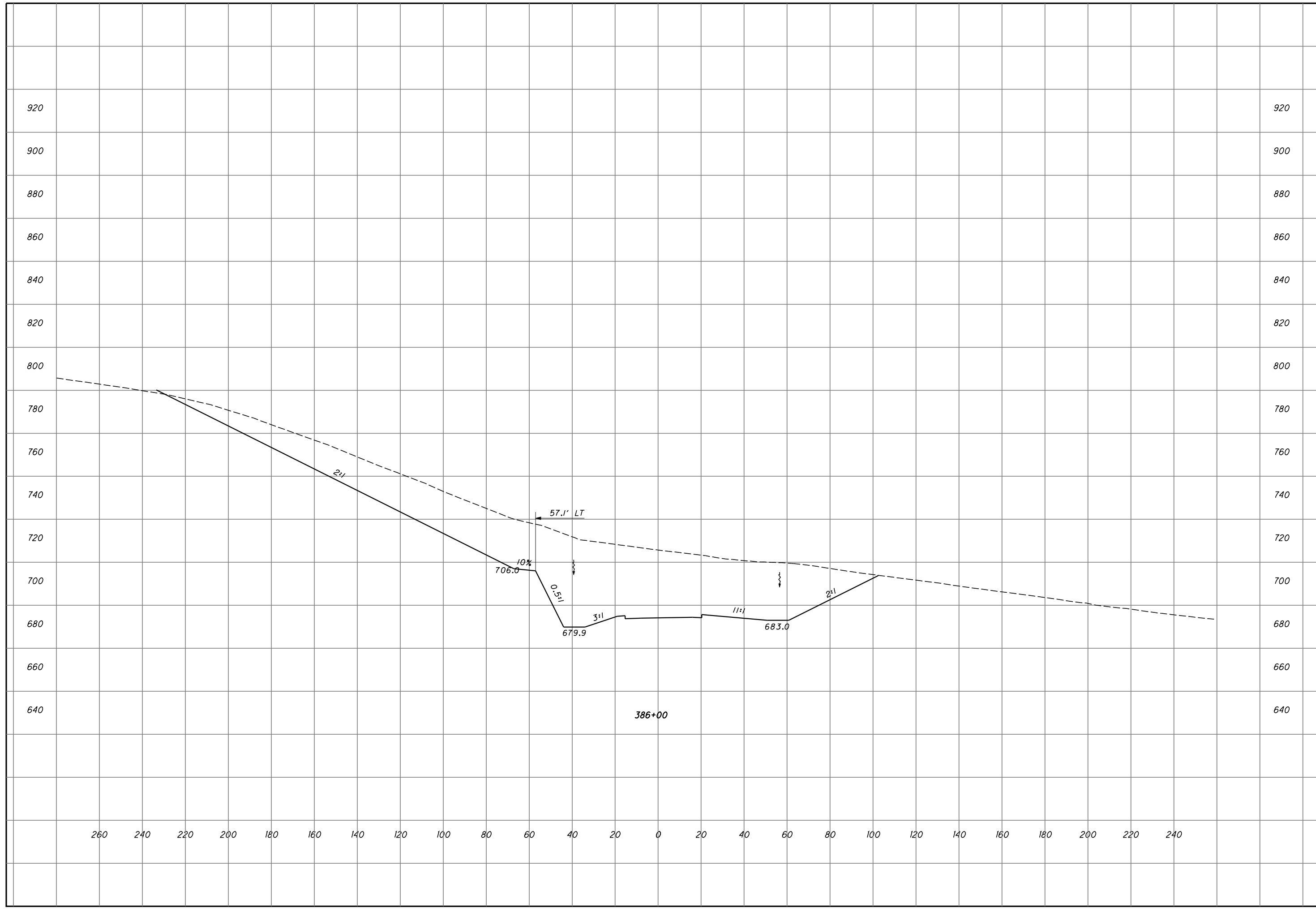


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 Phone (614) 888-0040 \* Fax (614) 888-6415

## Cut Slope Cross Sections

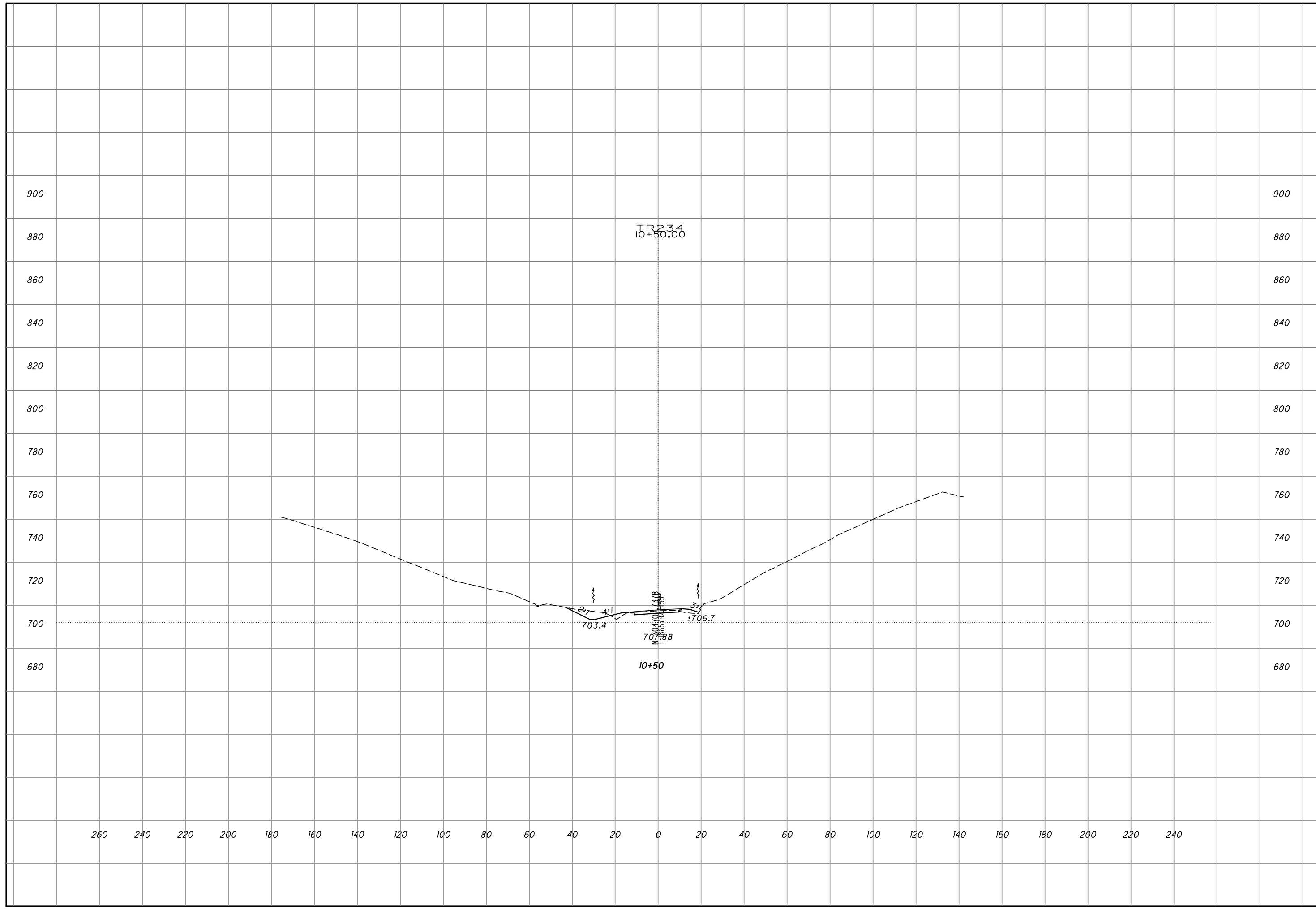
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CROSS SECTION - TR234 RAMP D - STA 386+00

SCI-823-6.81



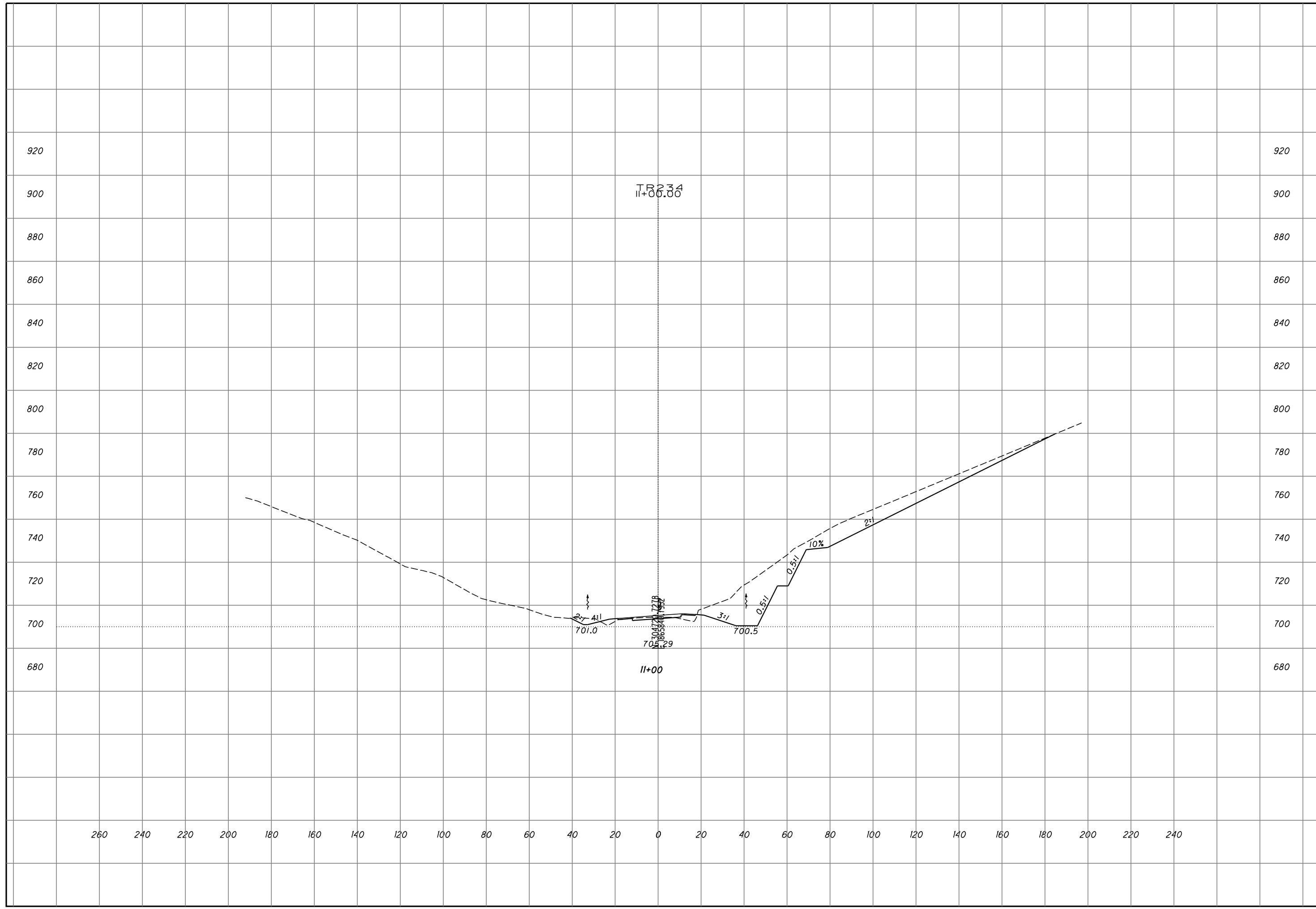
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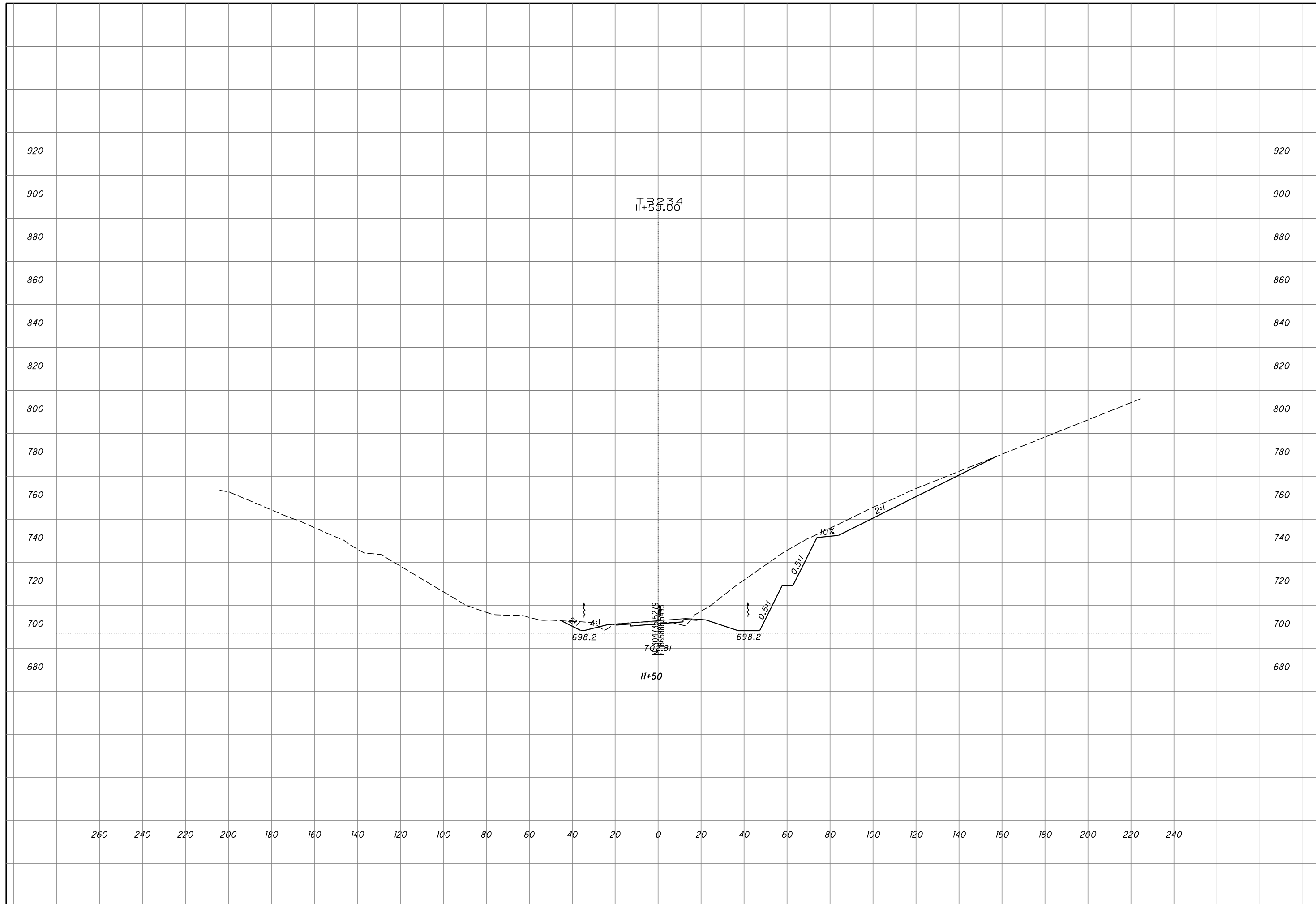
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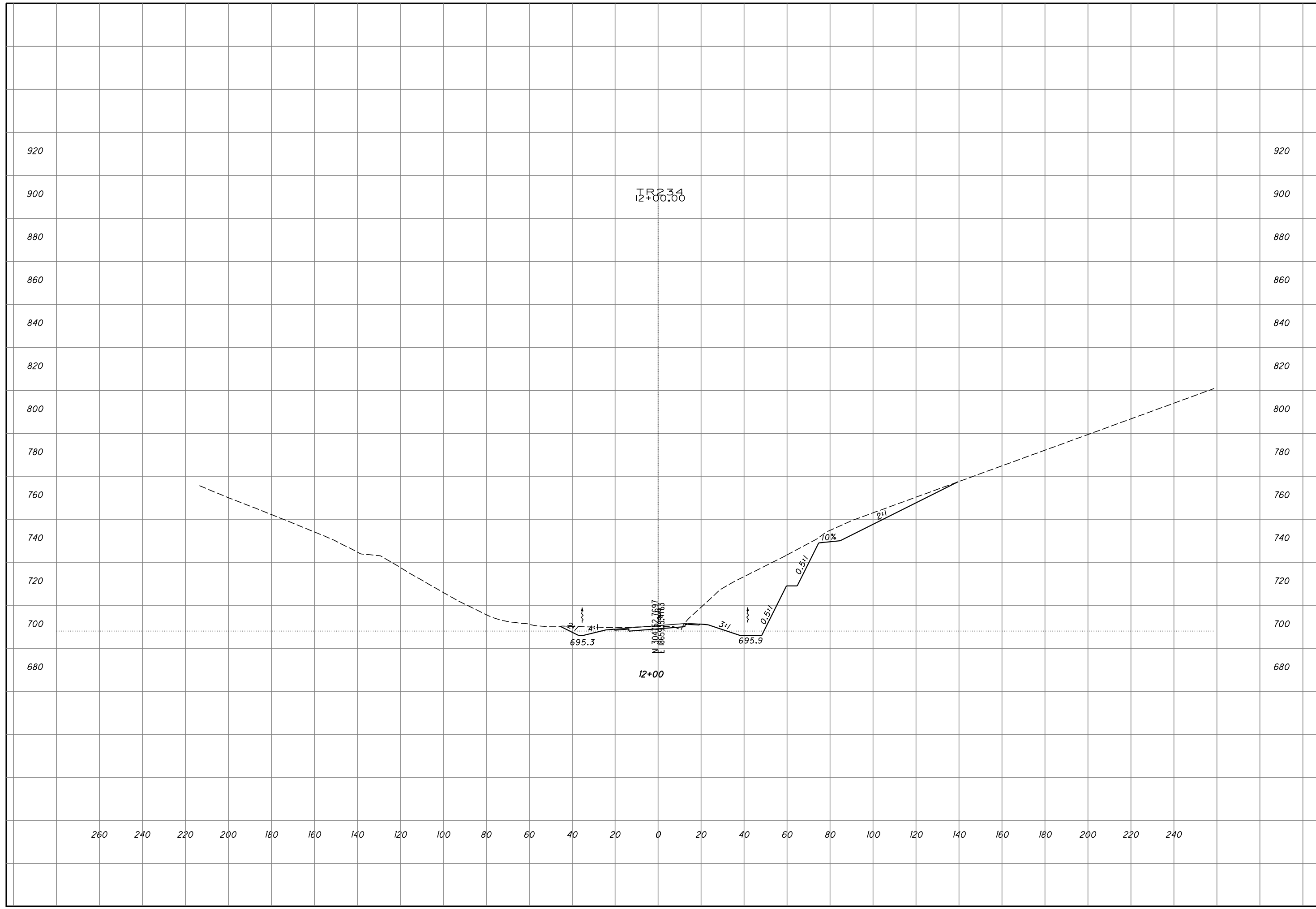
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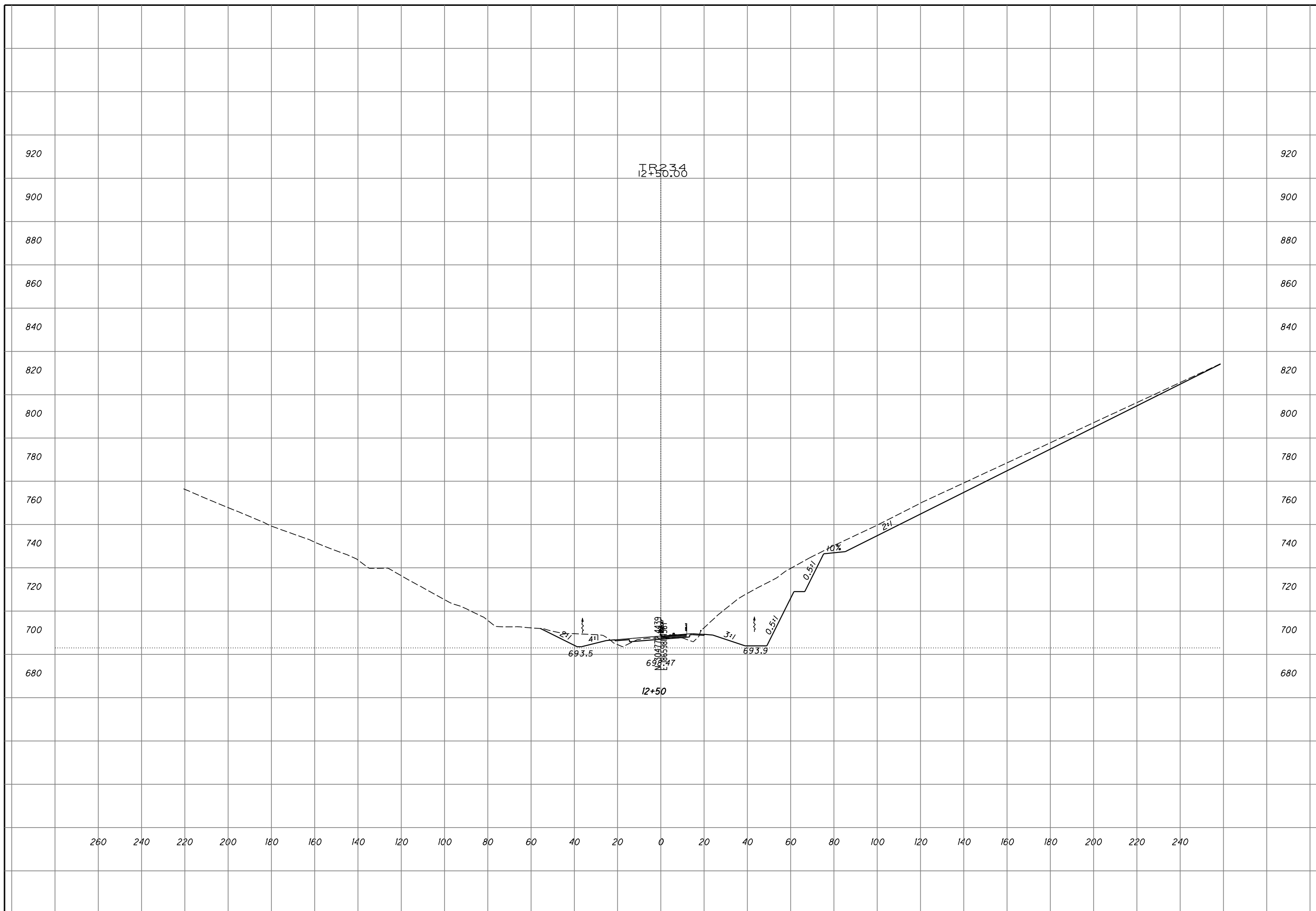
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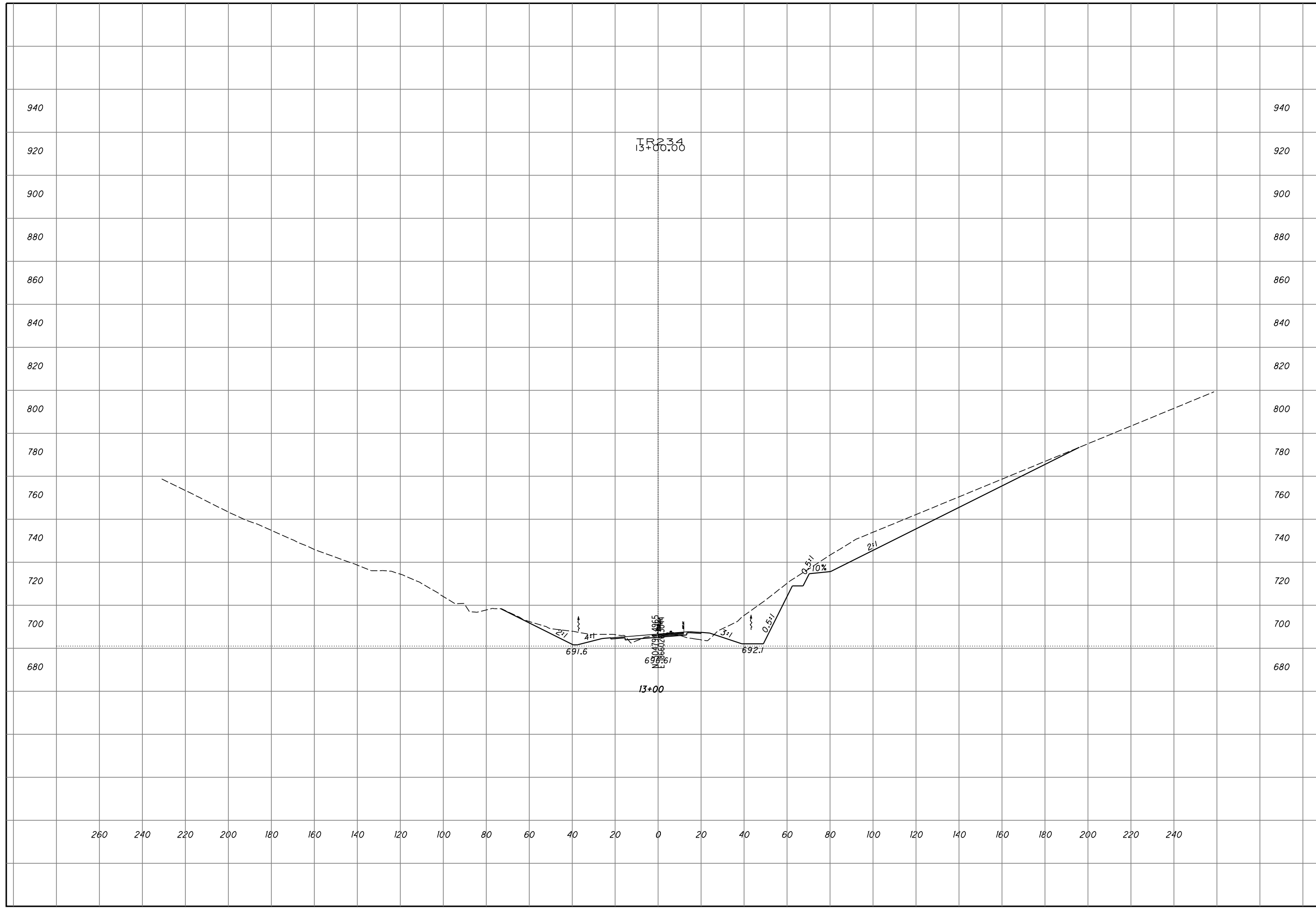


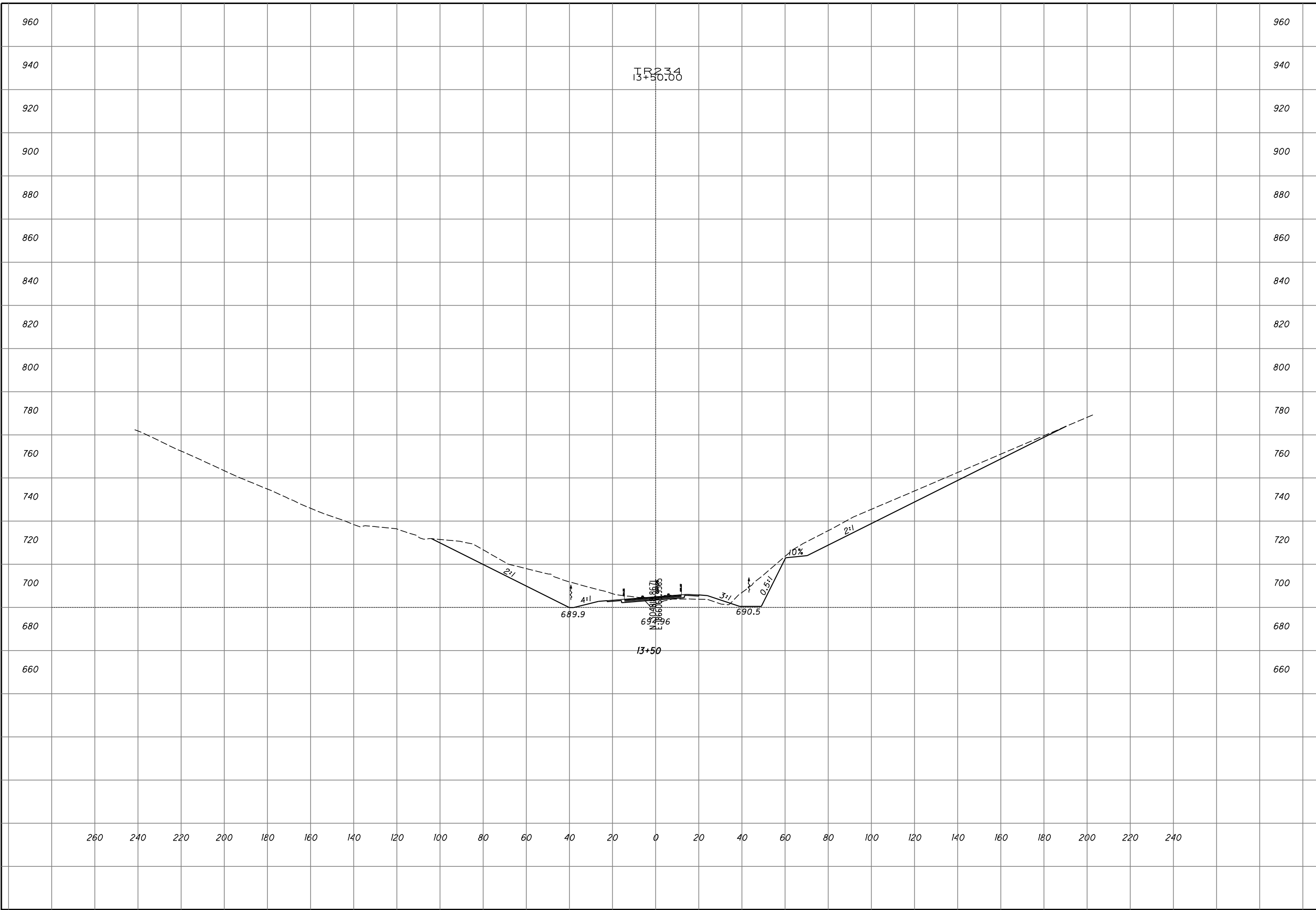
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**SCI-823-6.81**





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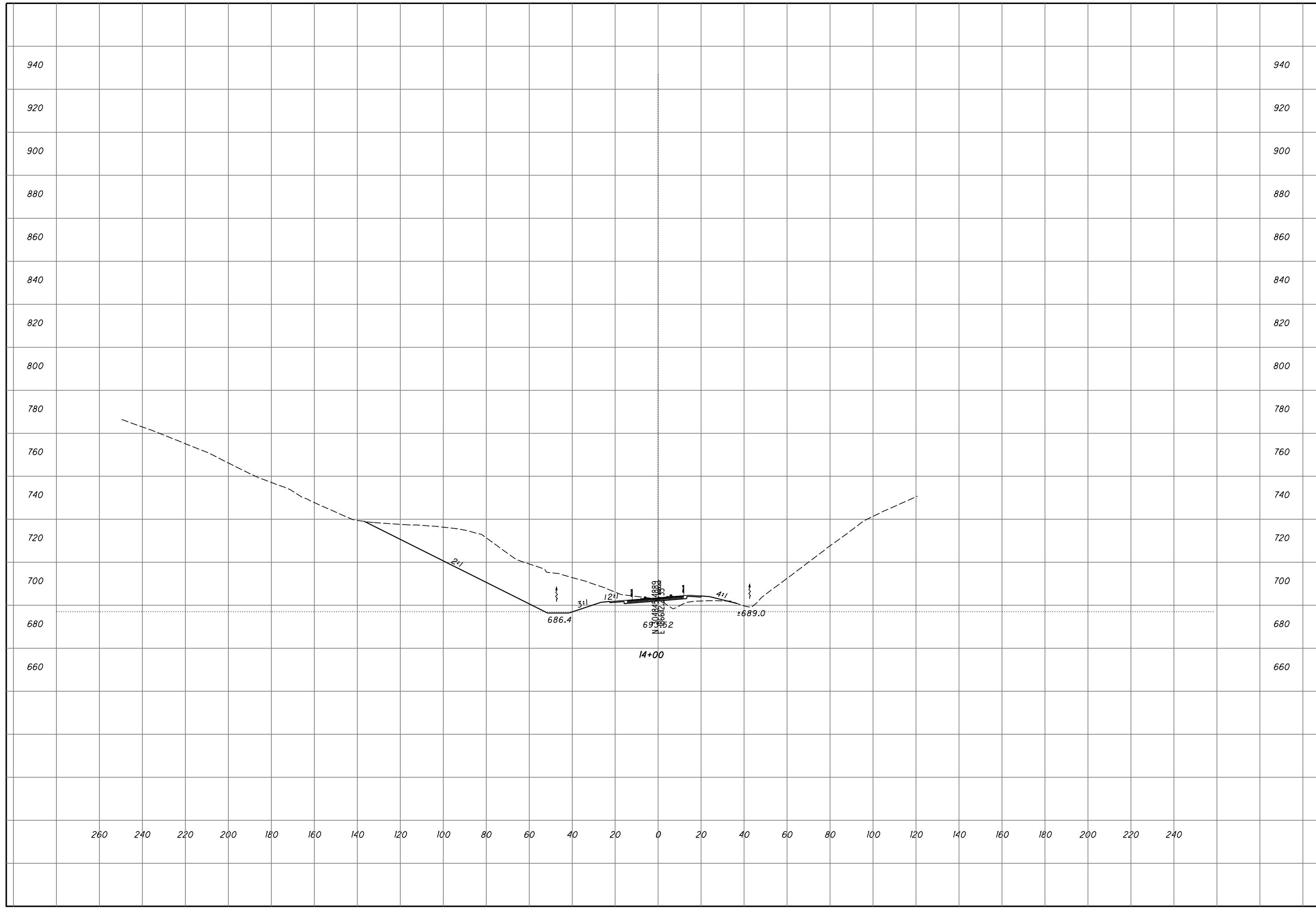
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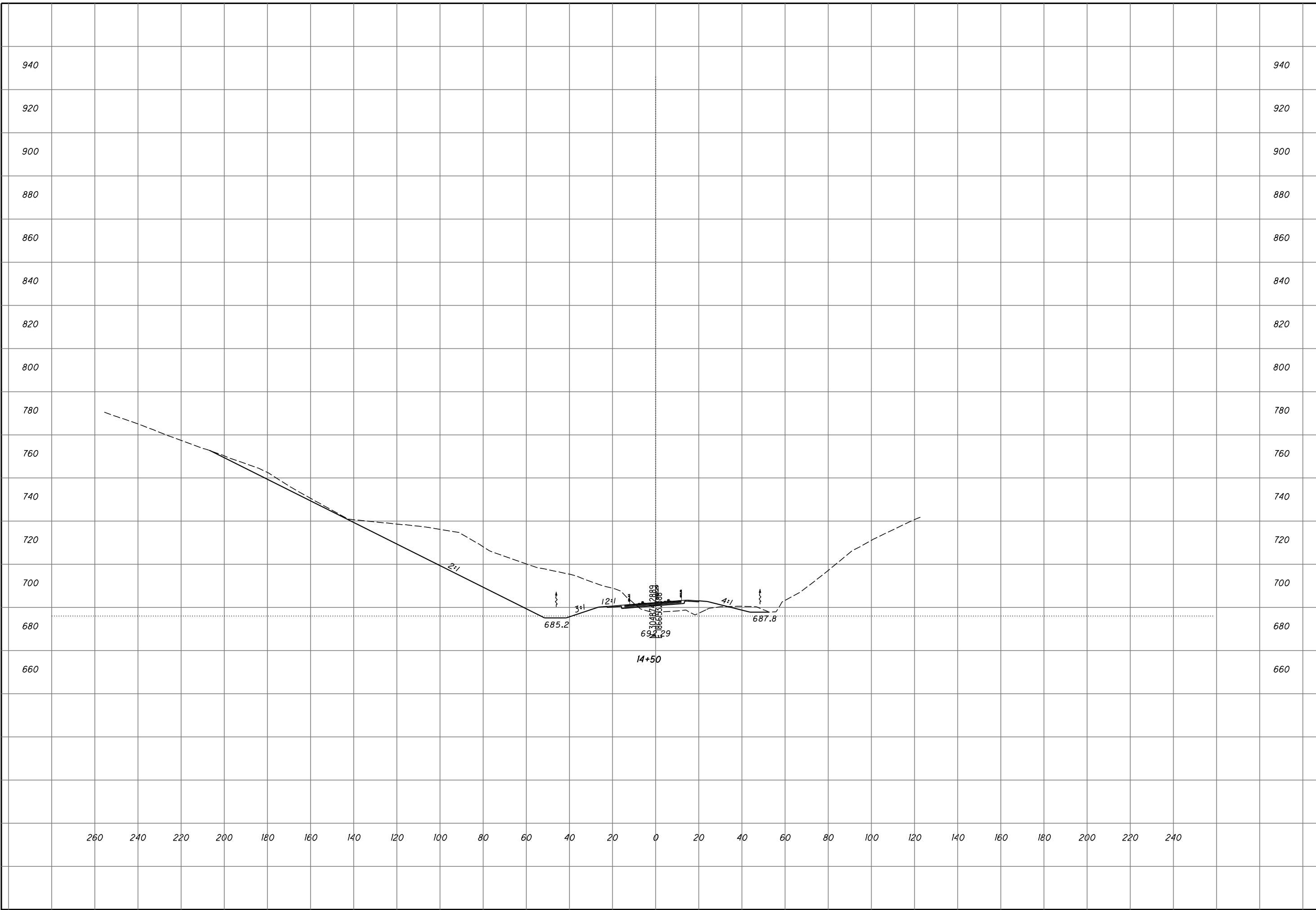
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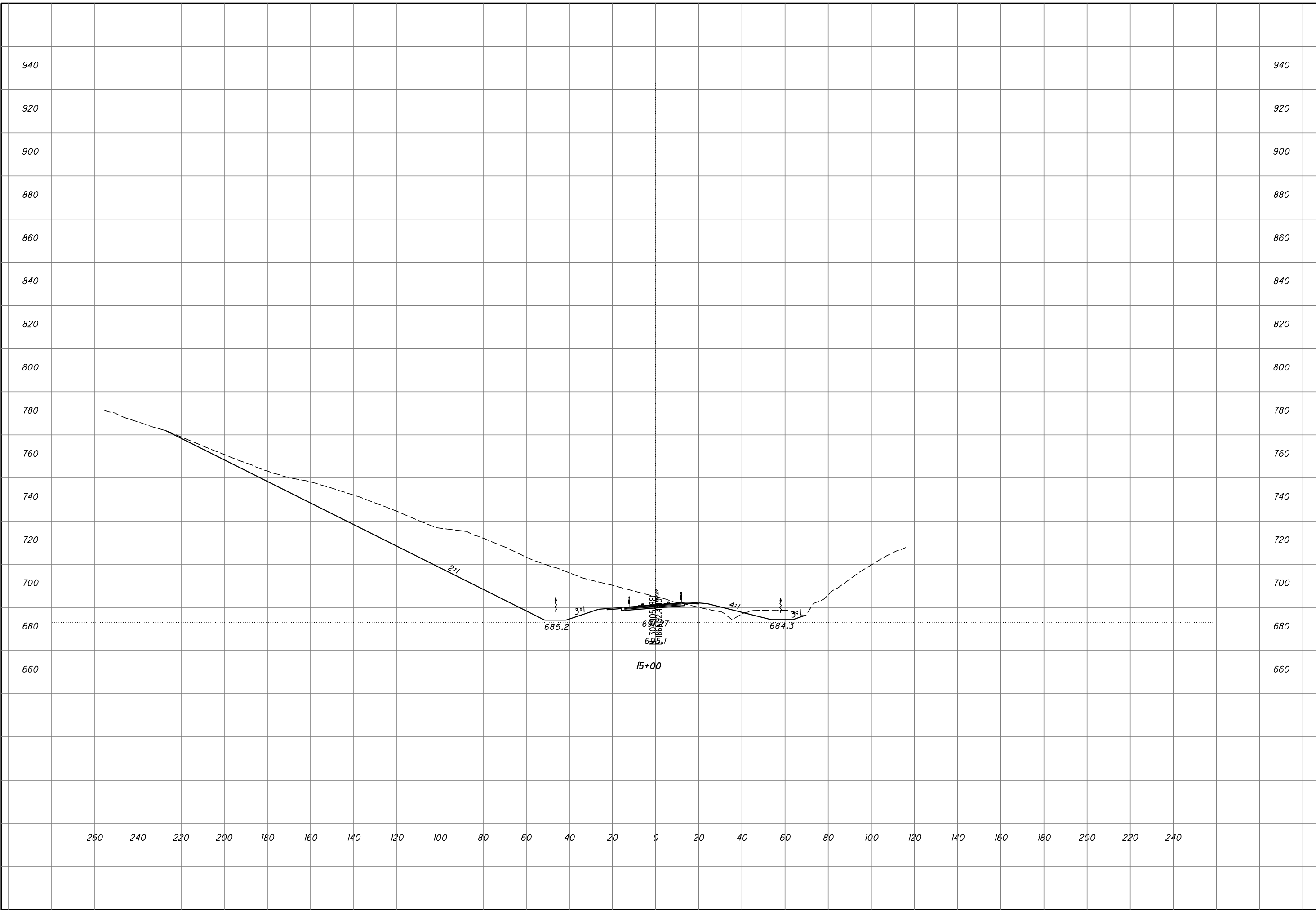
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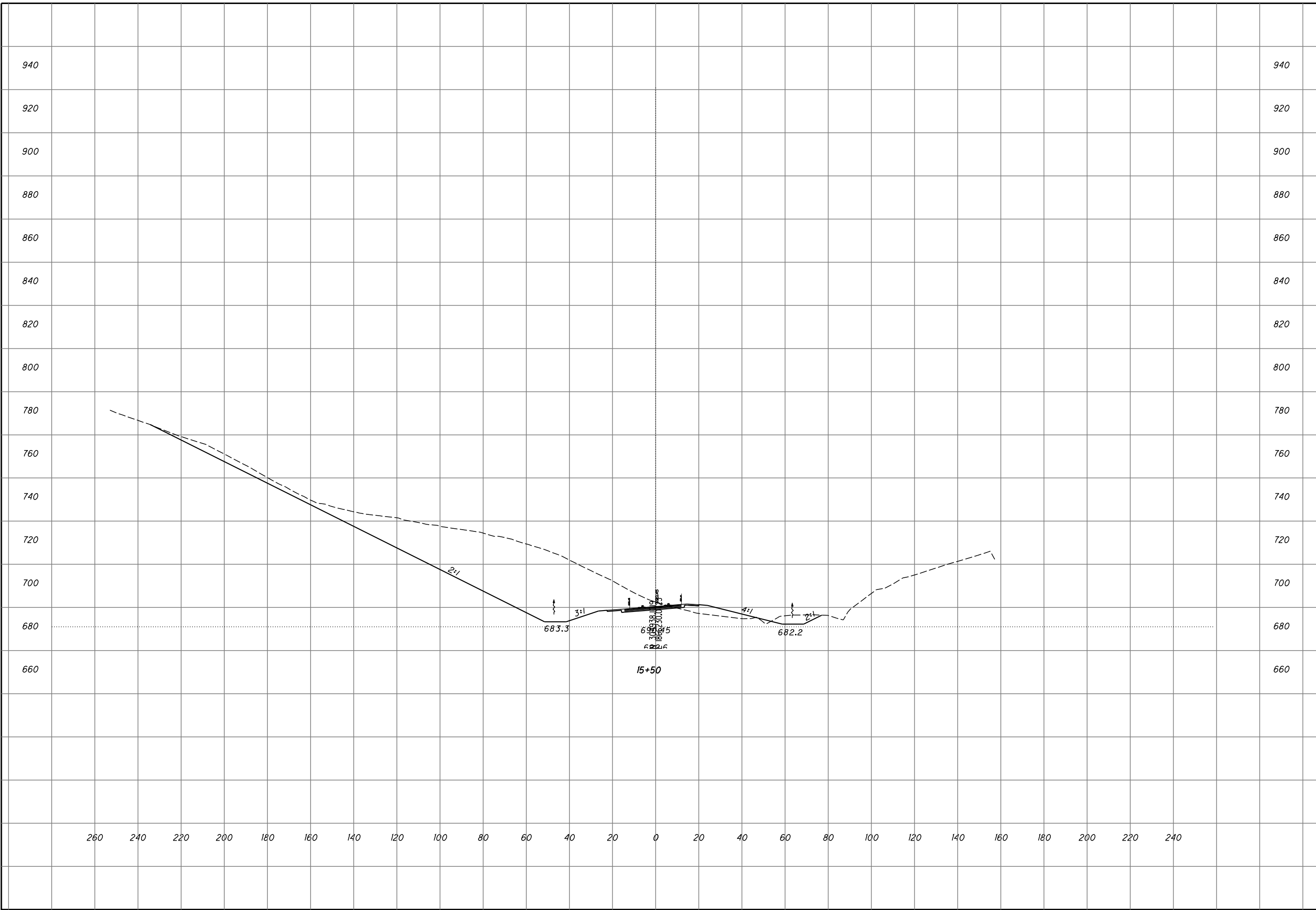
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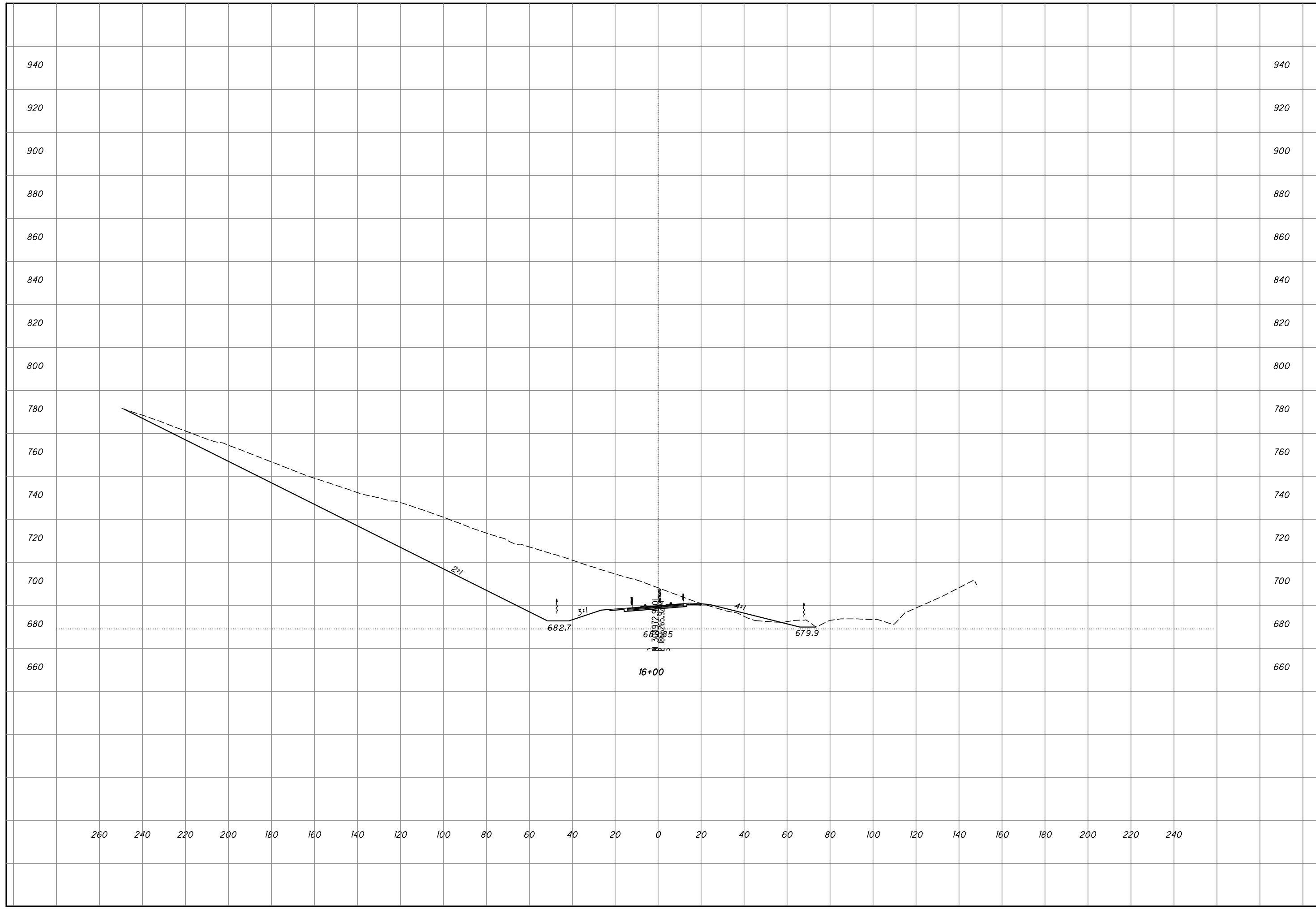
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SCI-823-6.81



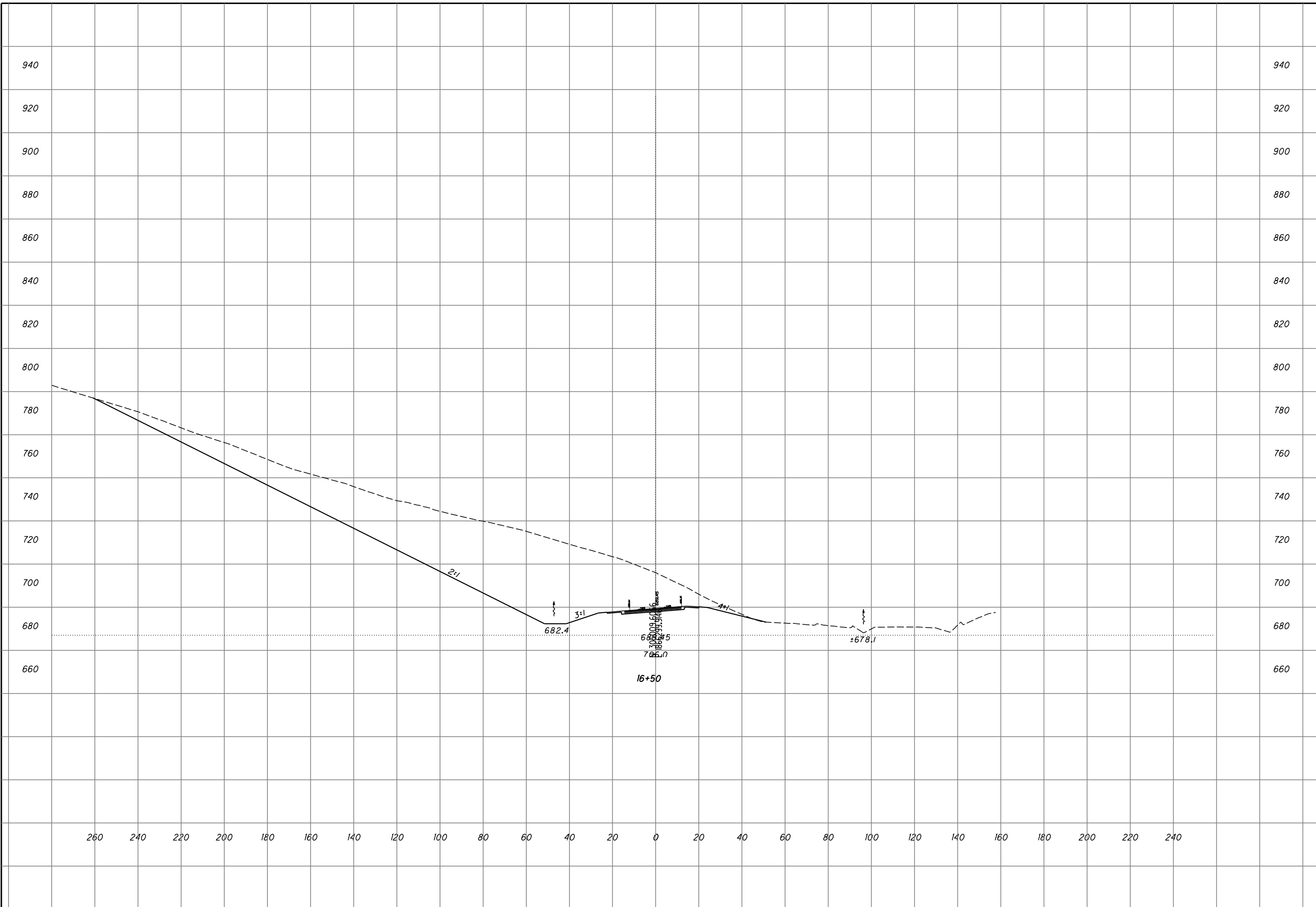
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**SCI-823-6.81**



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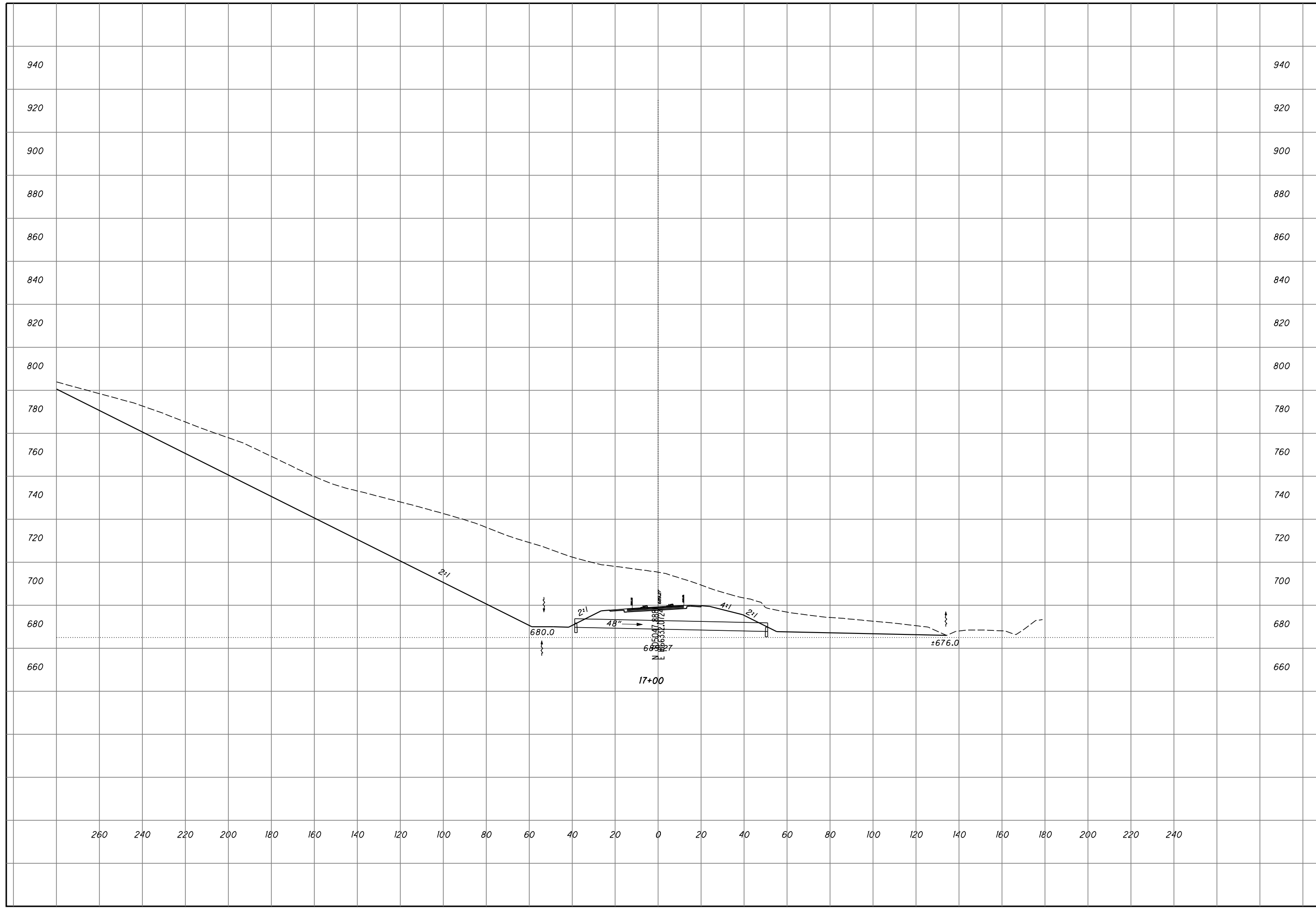
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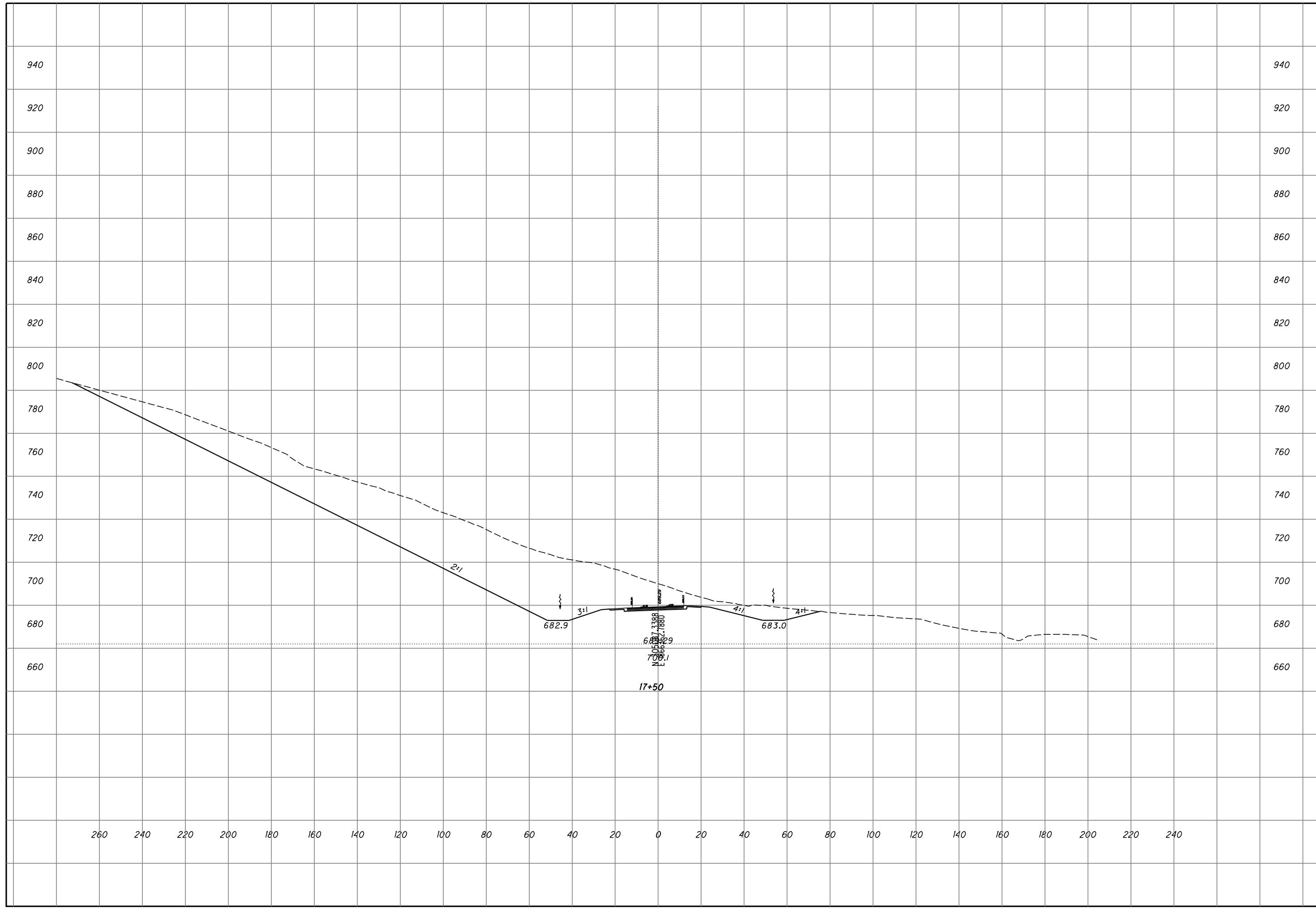
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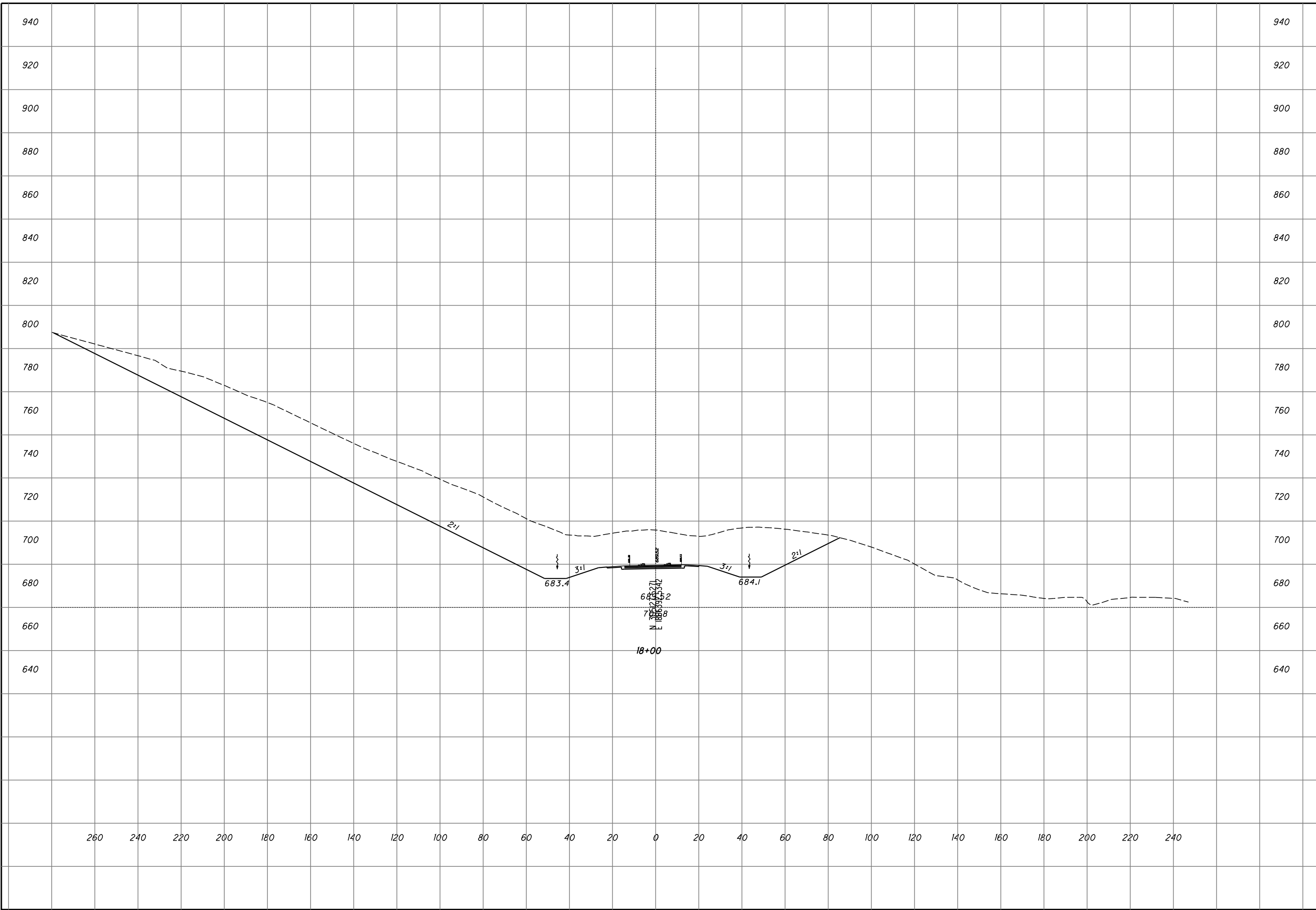
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**ROCK CUT RECCOMENDATIONS  
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**SCI-823-6.81**



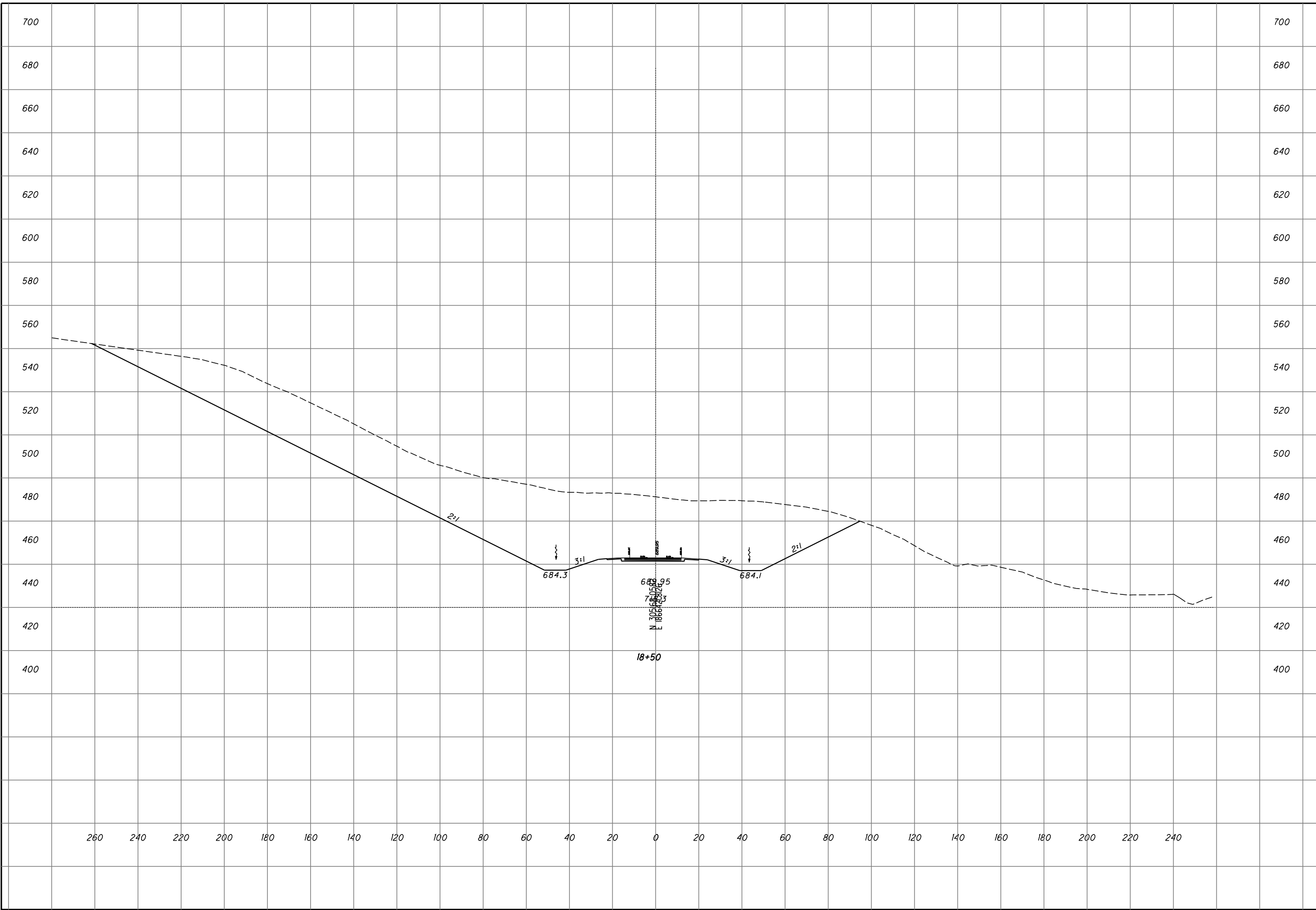


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**SCI-823-6.81**

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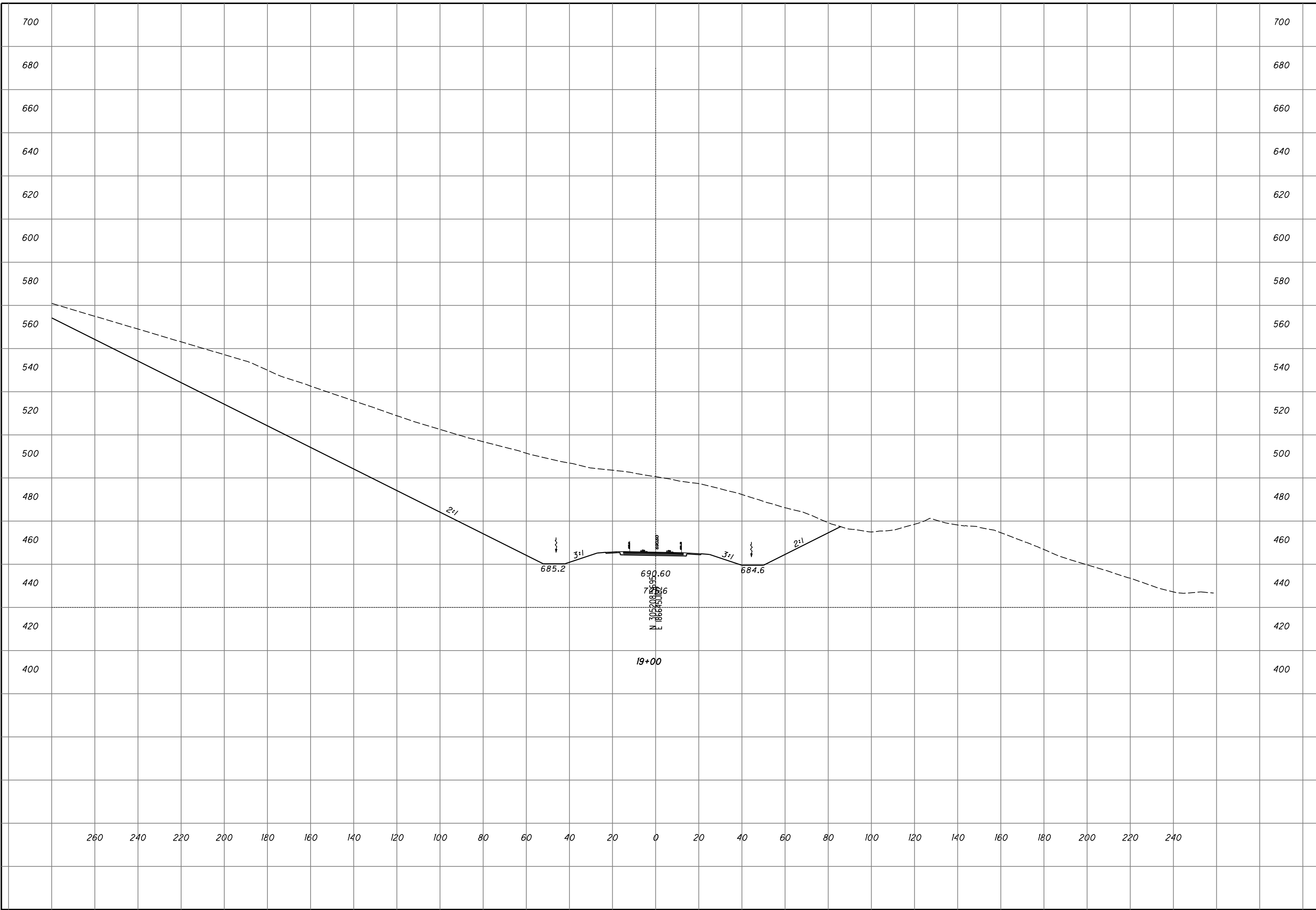


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**SCI-823-6.81**

AMJ  
 CHECKED

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 32

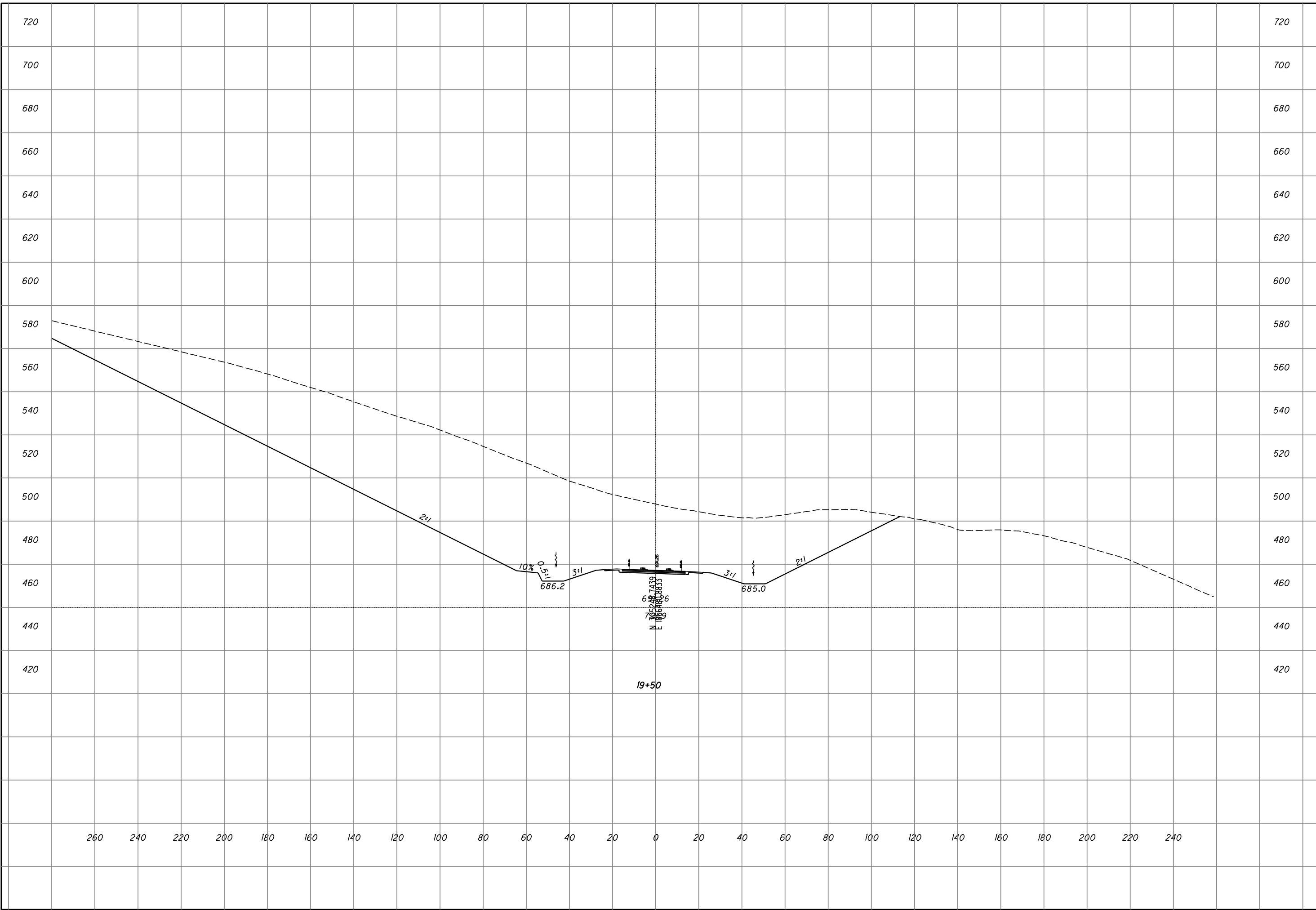


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**ROCK CUT RECCOMENDATIONS  
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**SCI-823-6.81**

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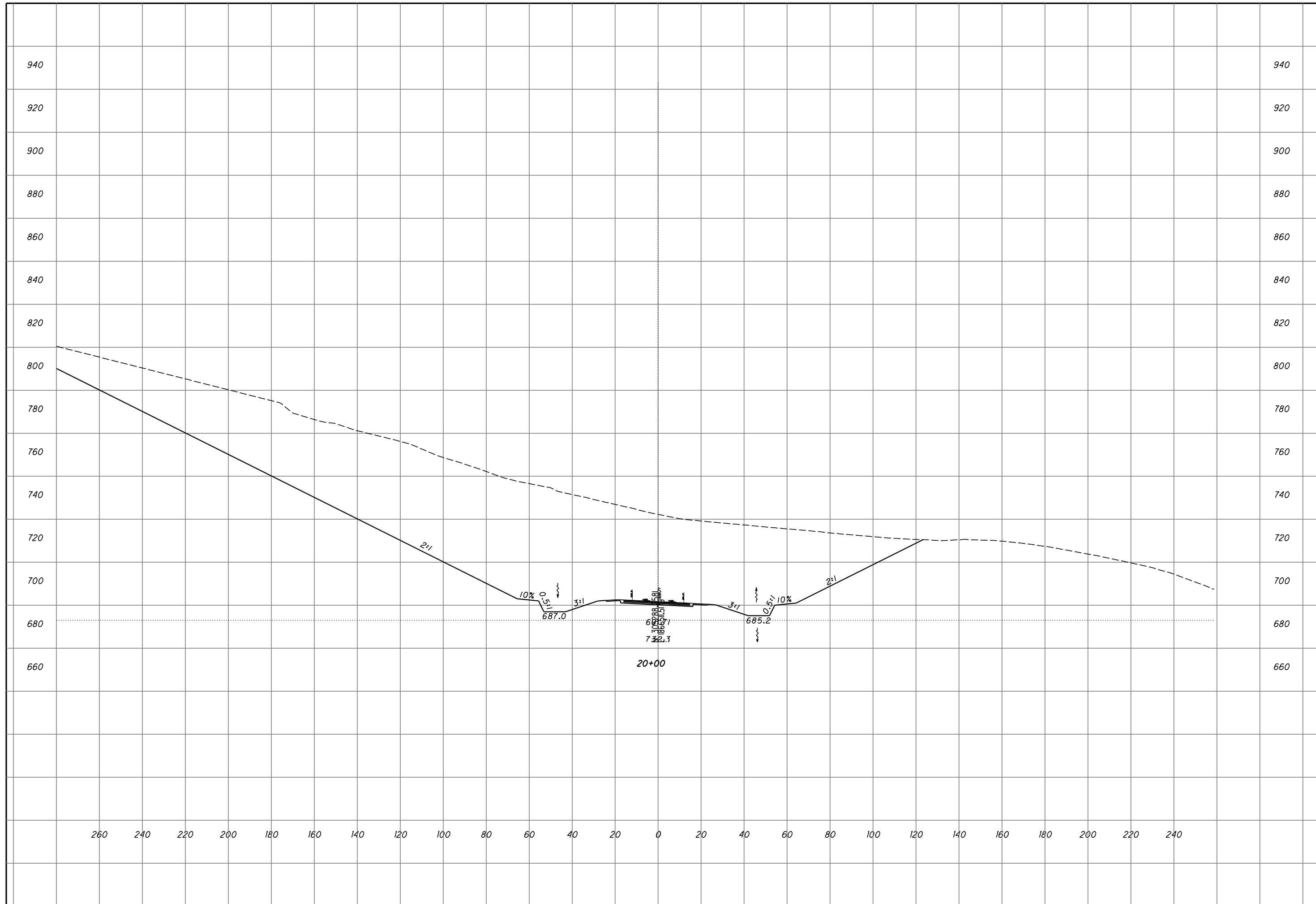
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**SCI-823-6.81**

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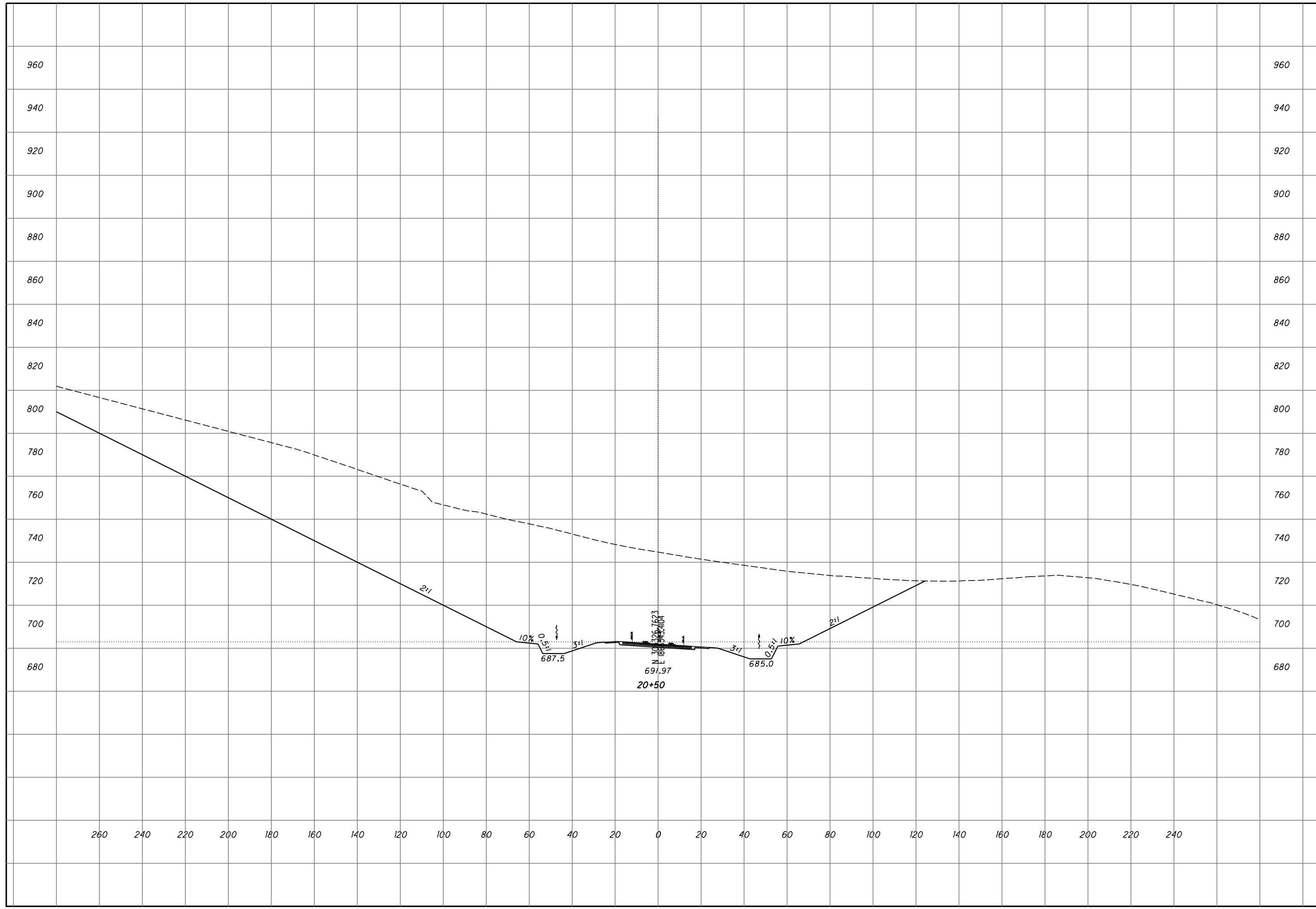
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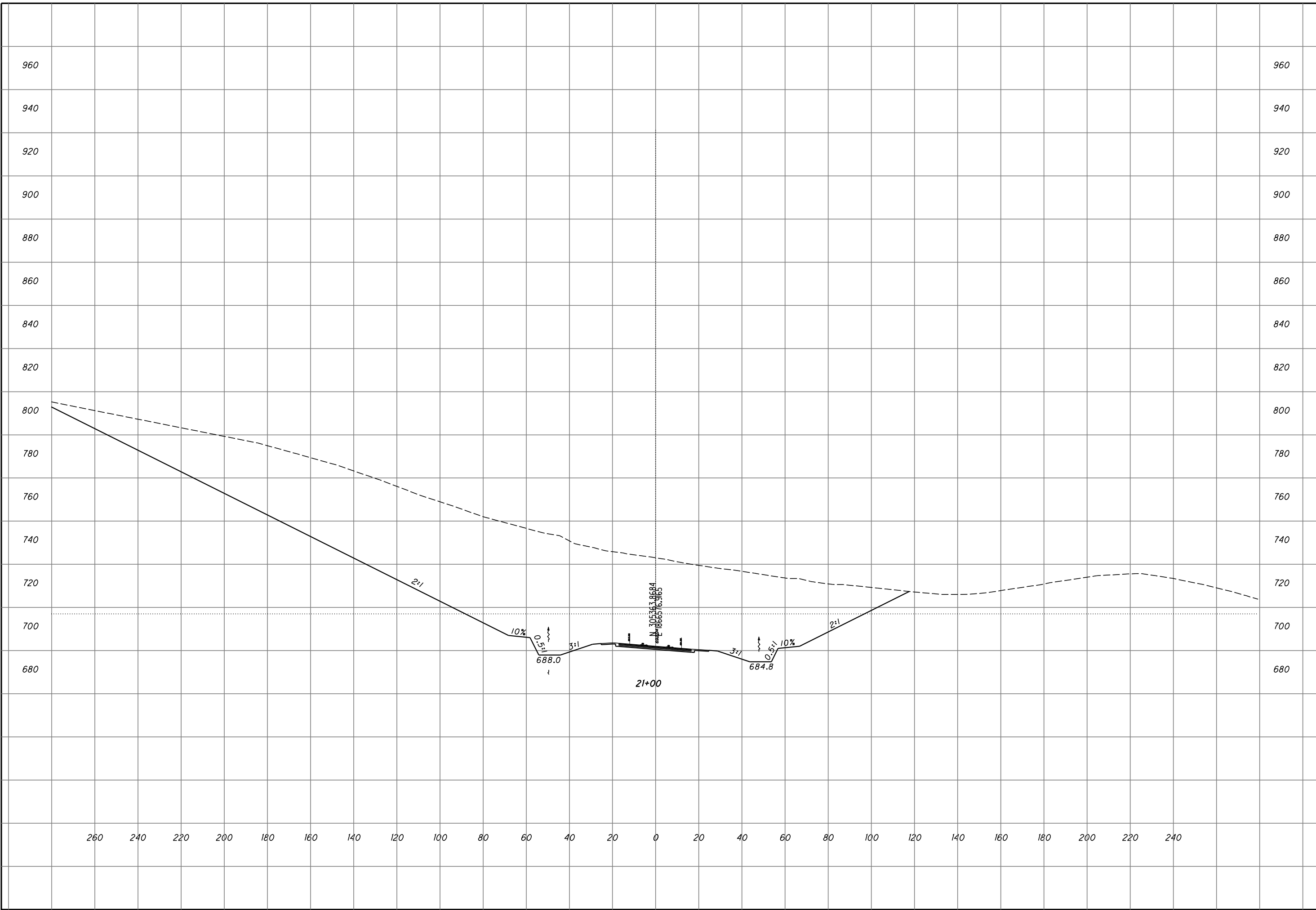
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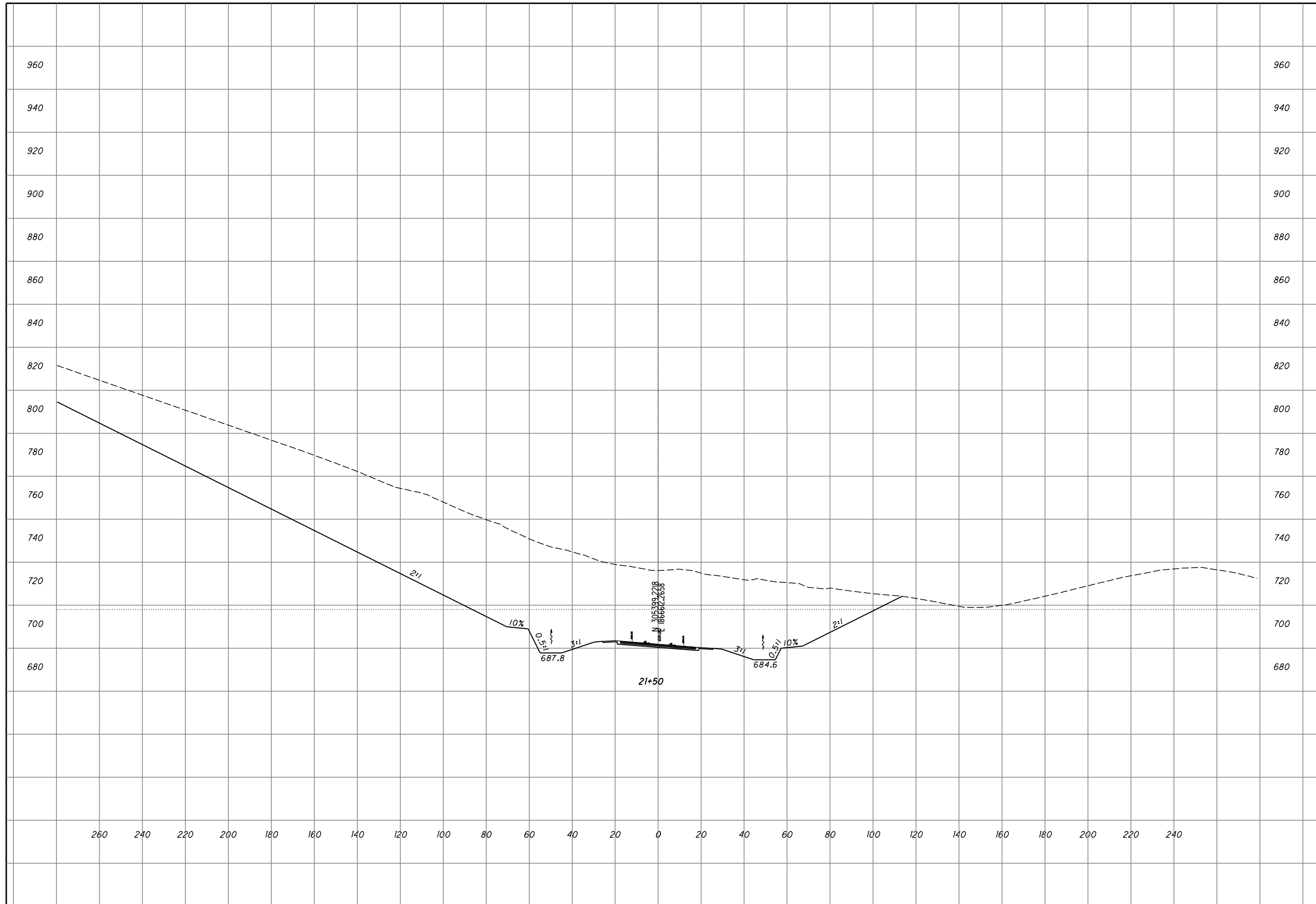
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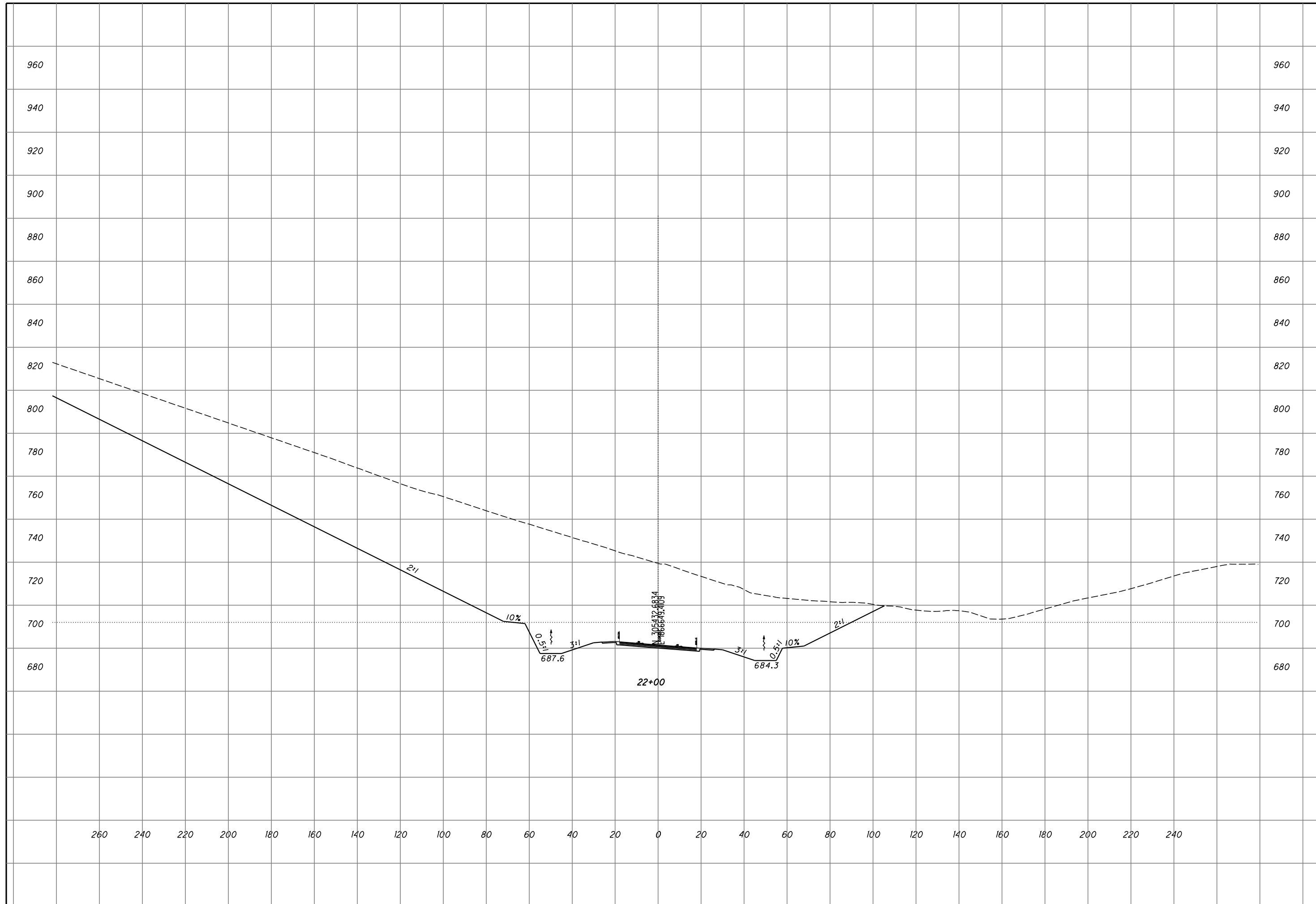
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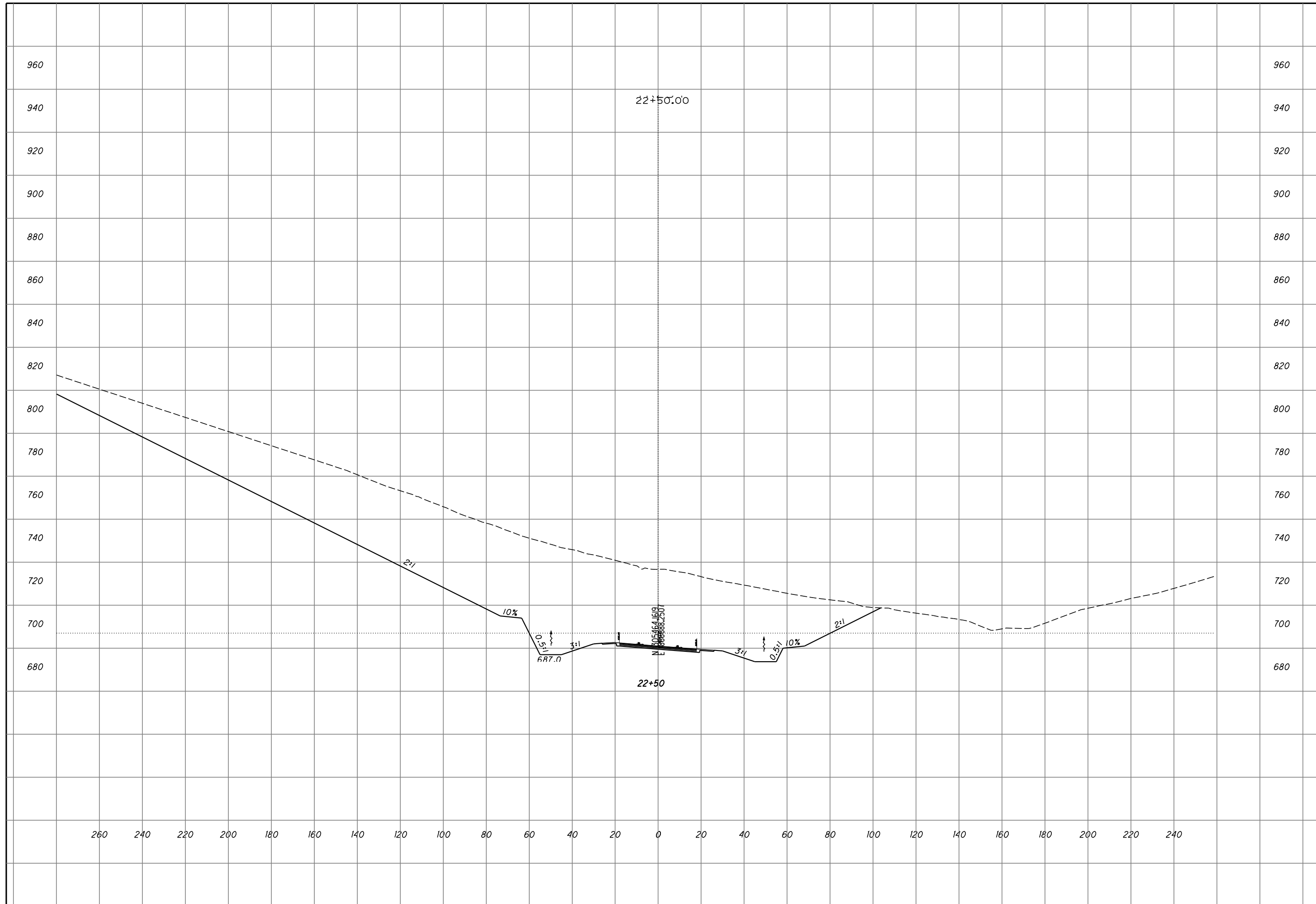
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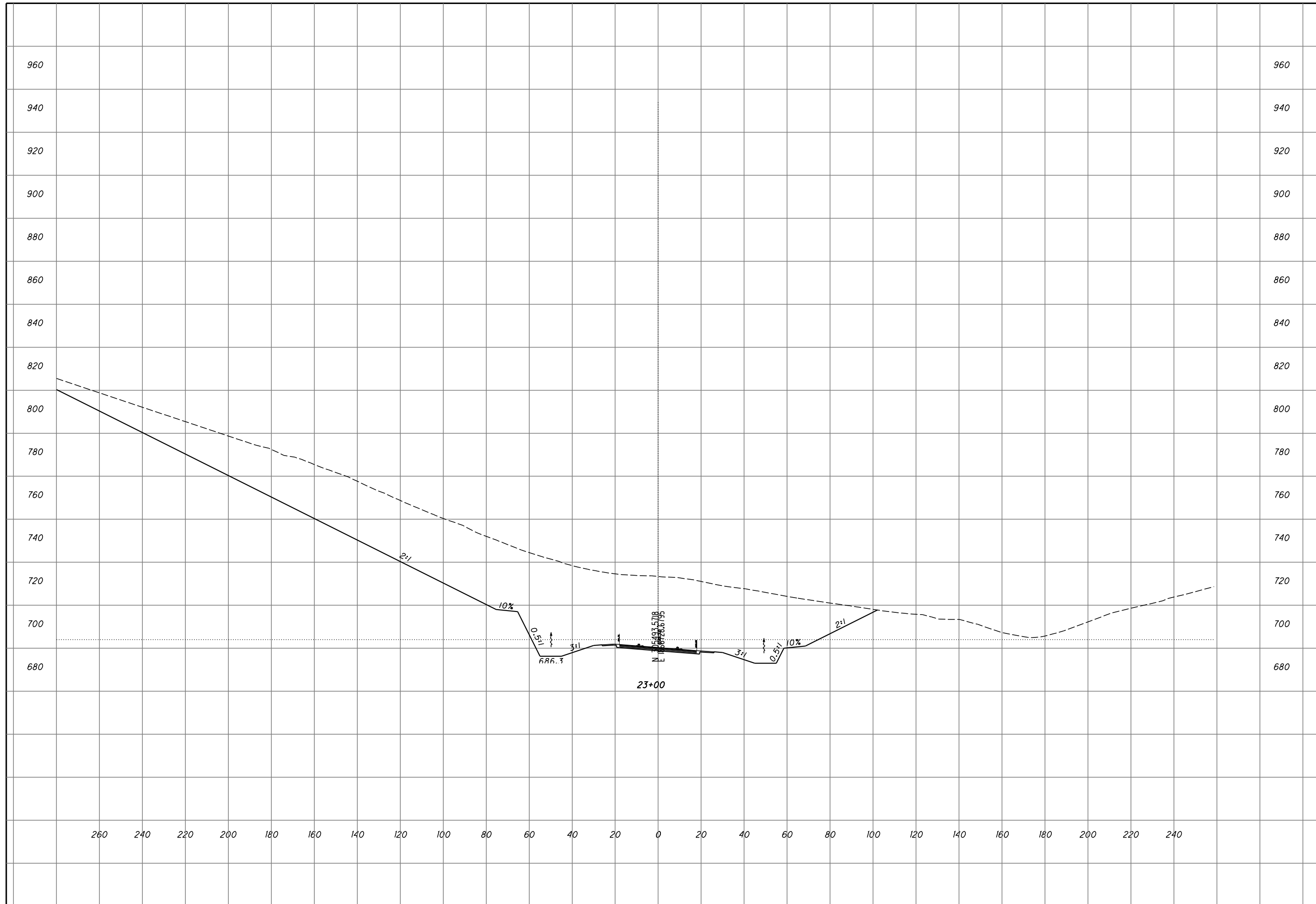
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**SCI-823-6.81**



**ROCK CUT RECCOMENDATIONS  
CROSS SECTION TR234 - STA 23+00**

**SCI-823-6.81**



960

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780

780

760

760

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140

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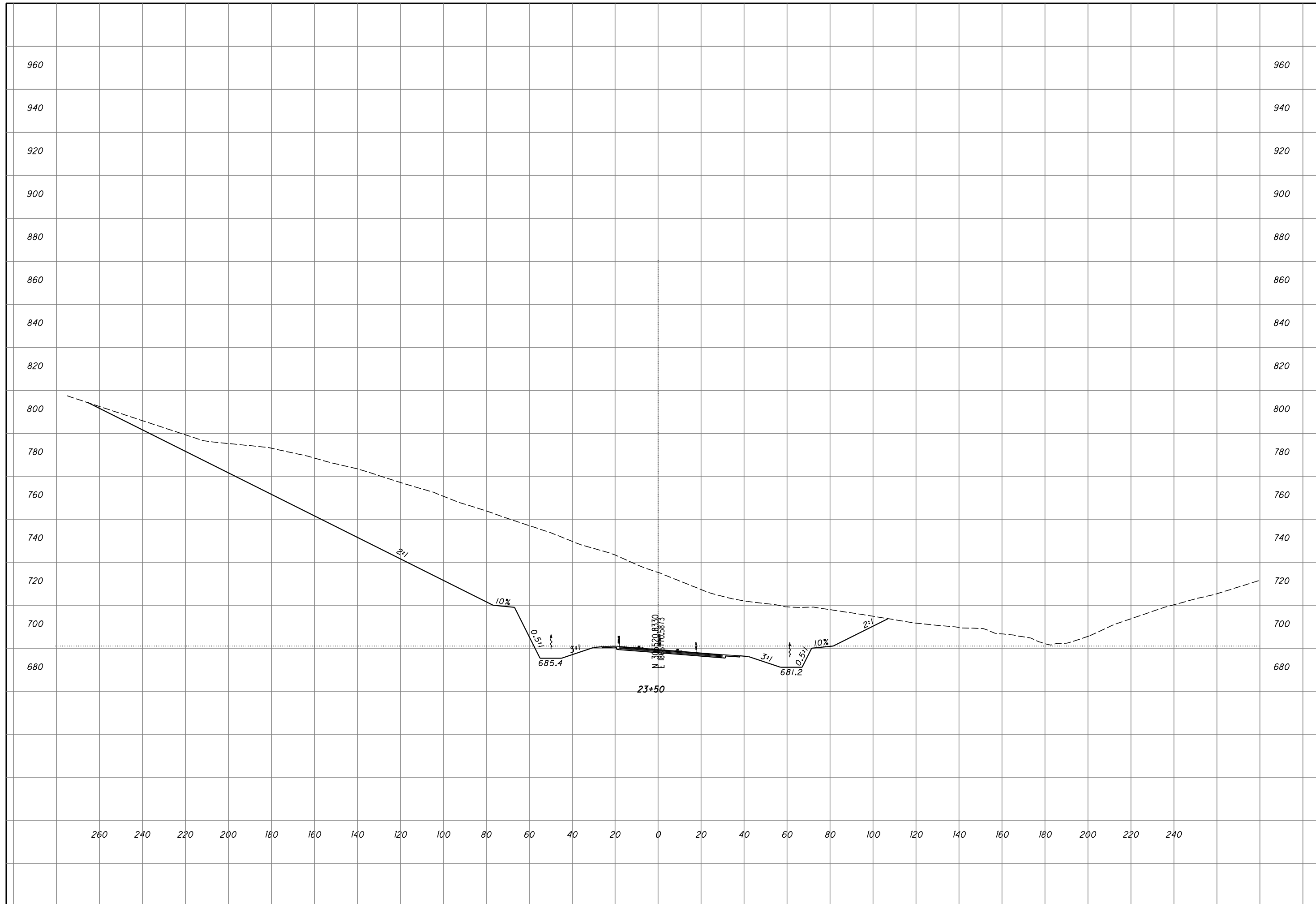
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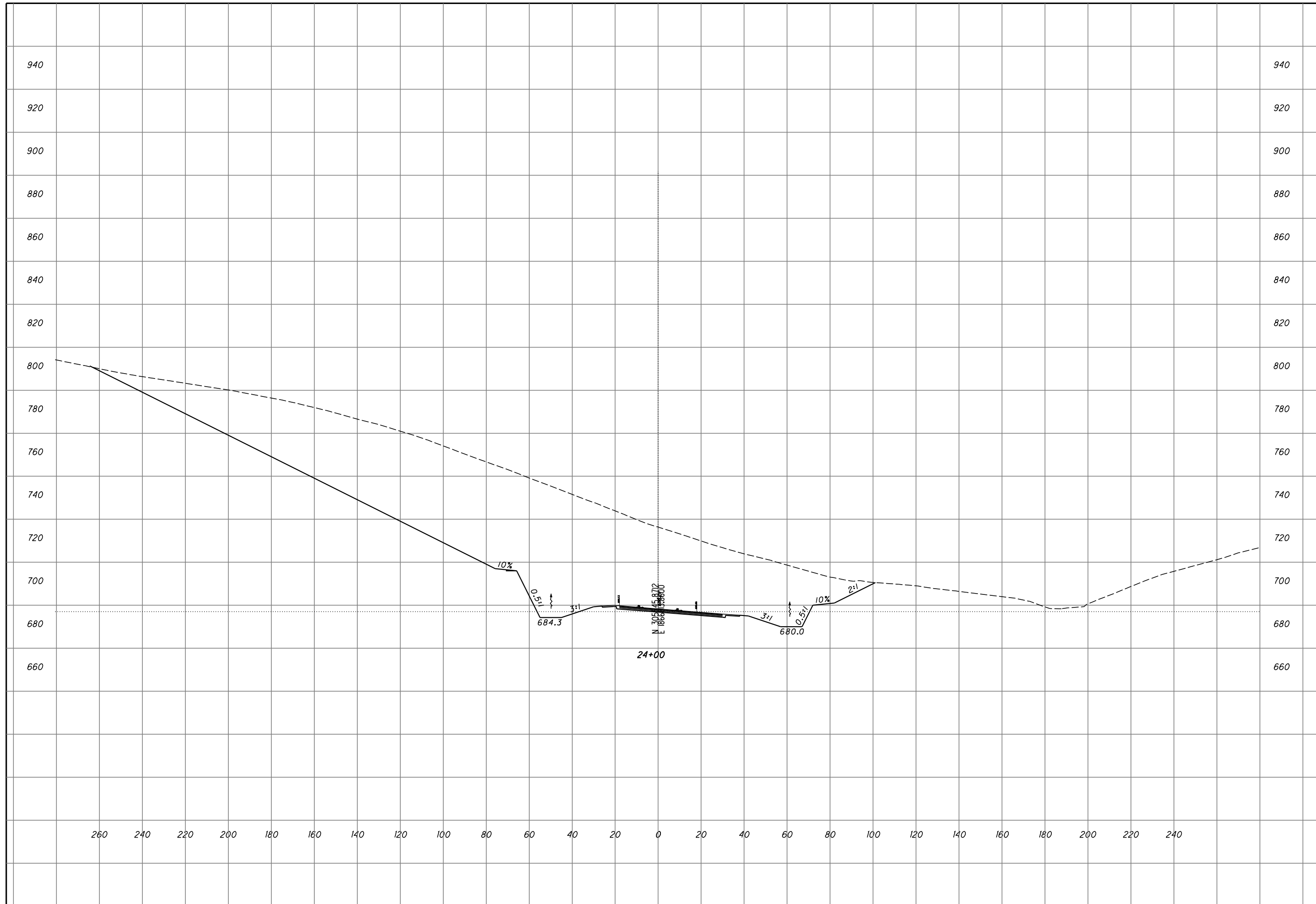
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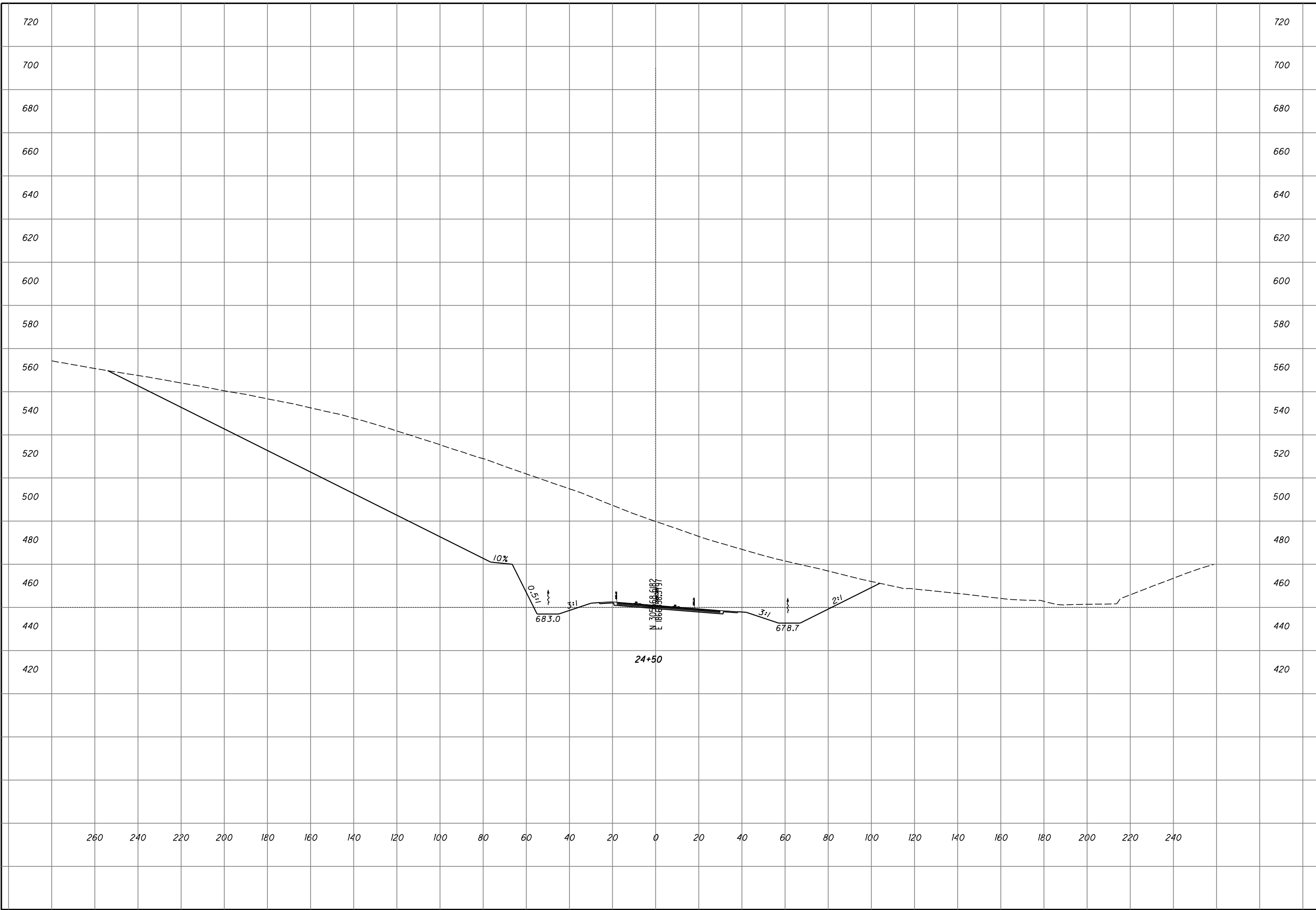
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**ROCK CUT RECCOMENDATIONS  
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**SCI-823-6.81**





**ROCK CUT RECOMMENDATIONS**  
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**SCI-823-6.81**

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 CHECKED

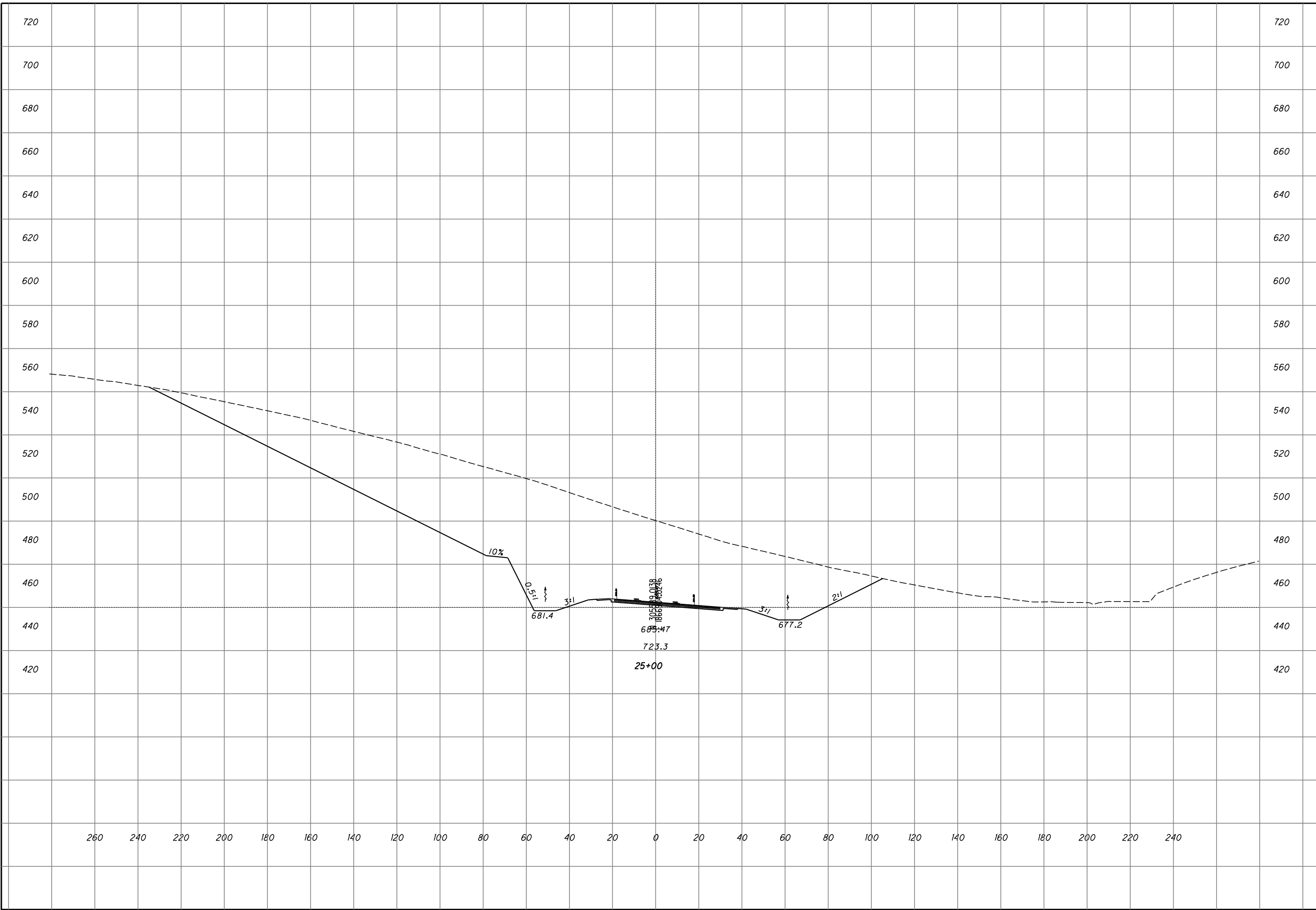
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ROCK CUT RECCOMENDATIONS  
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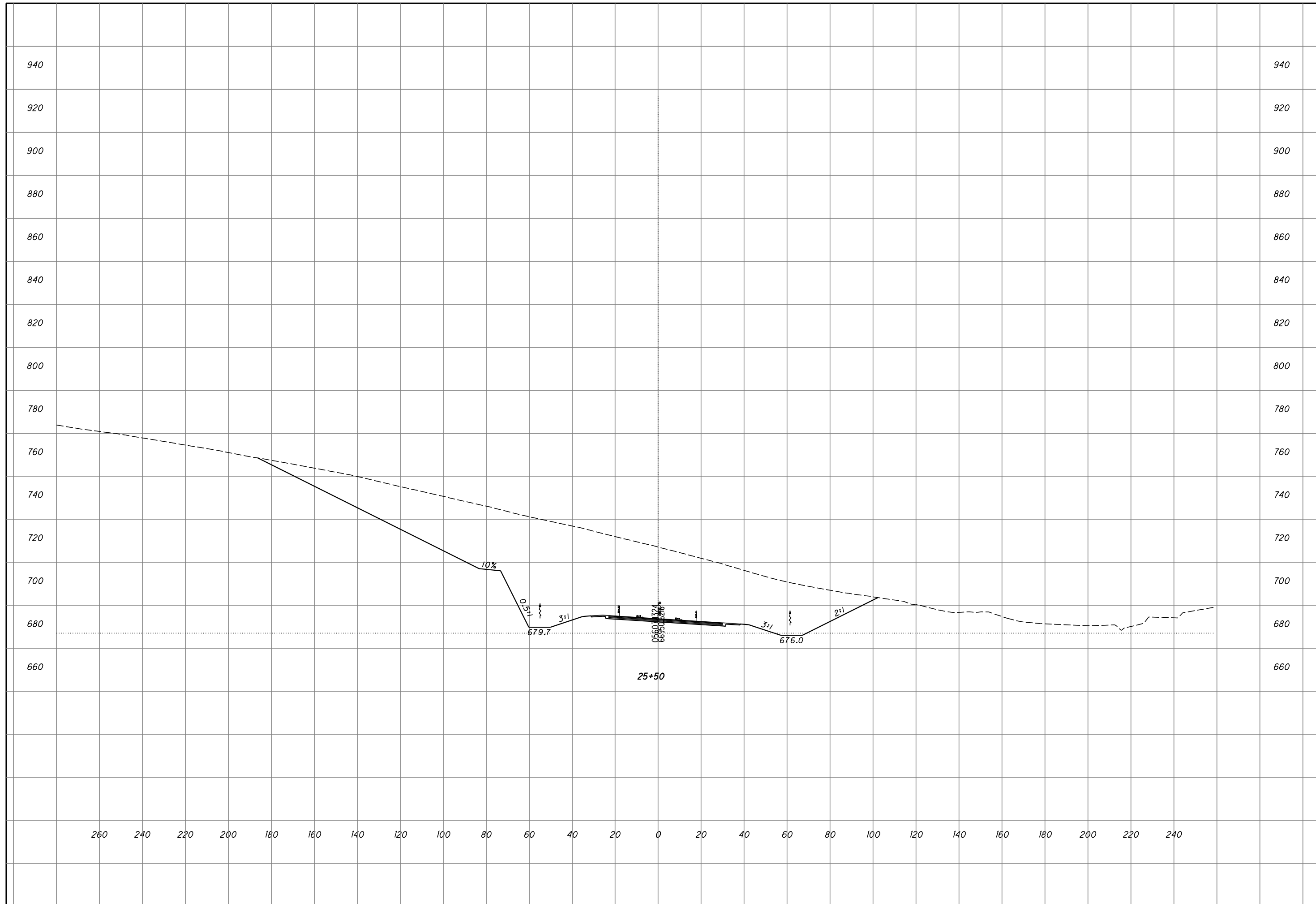
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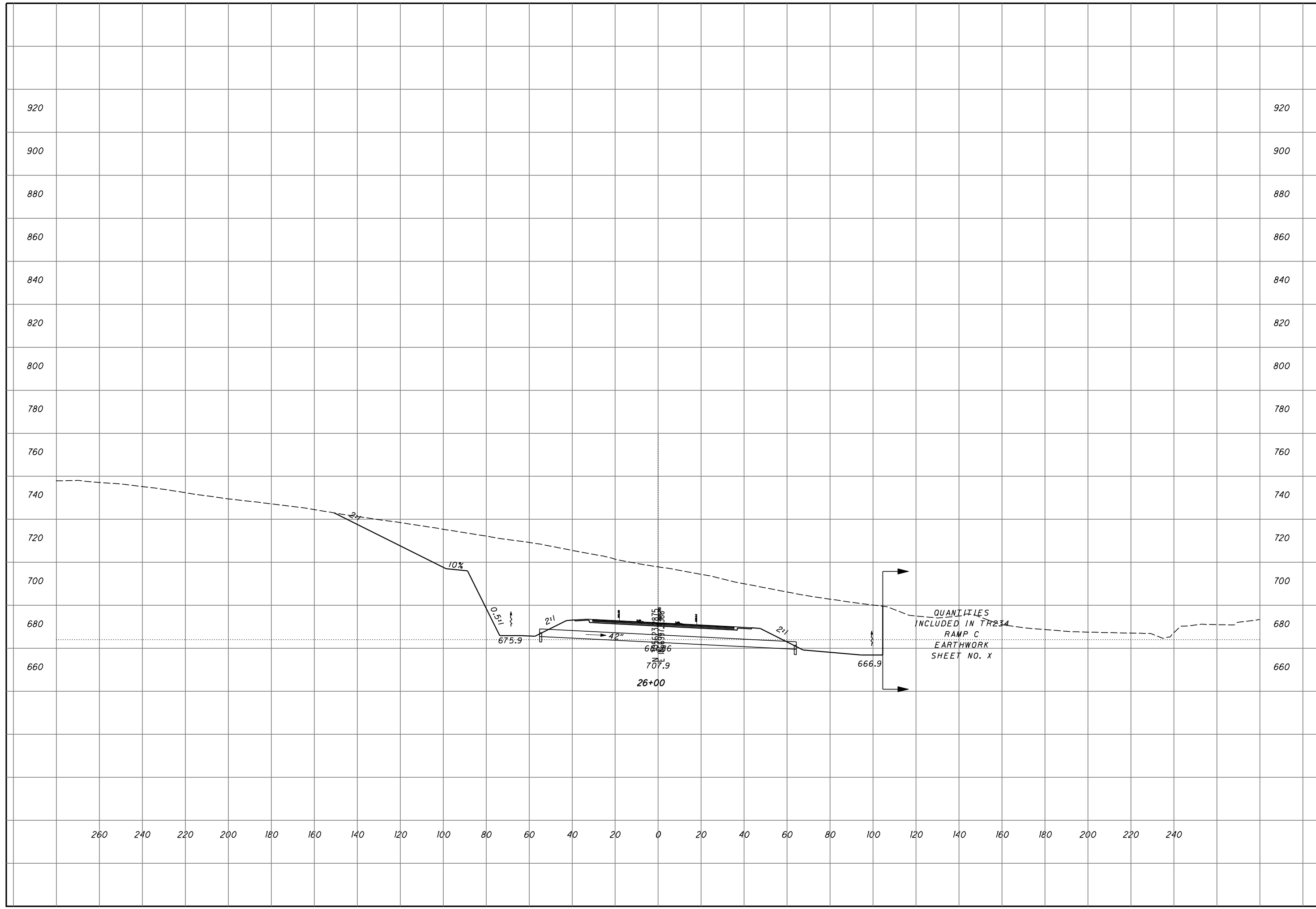
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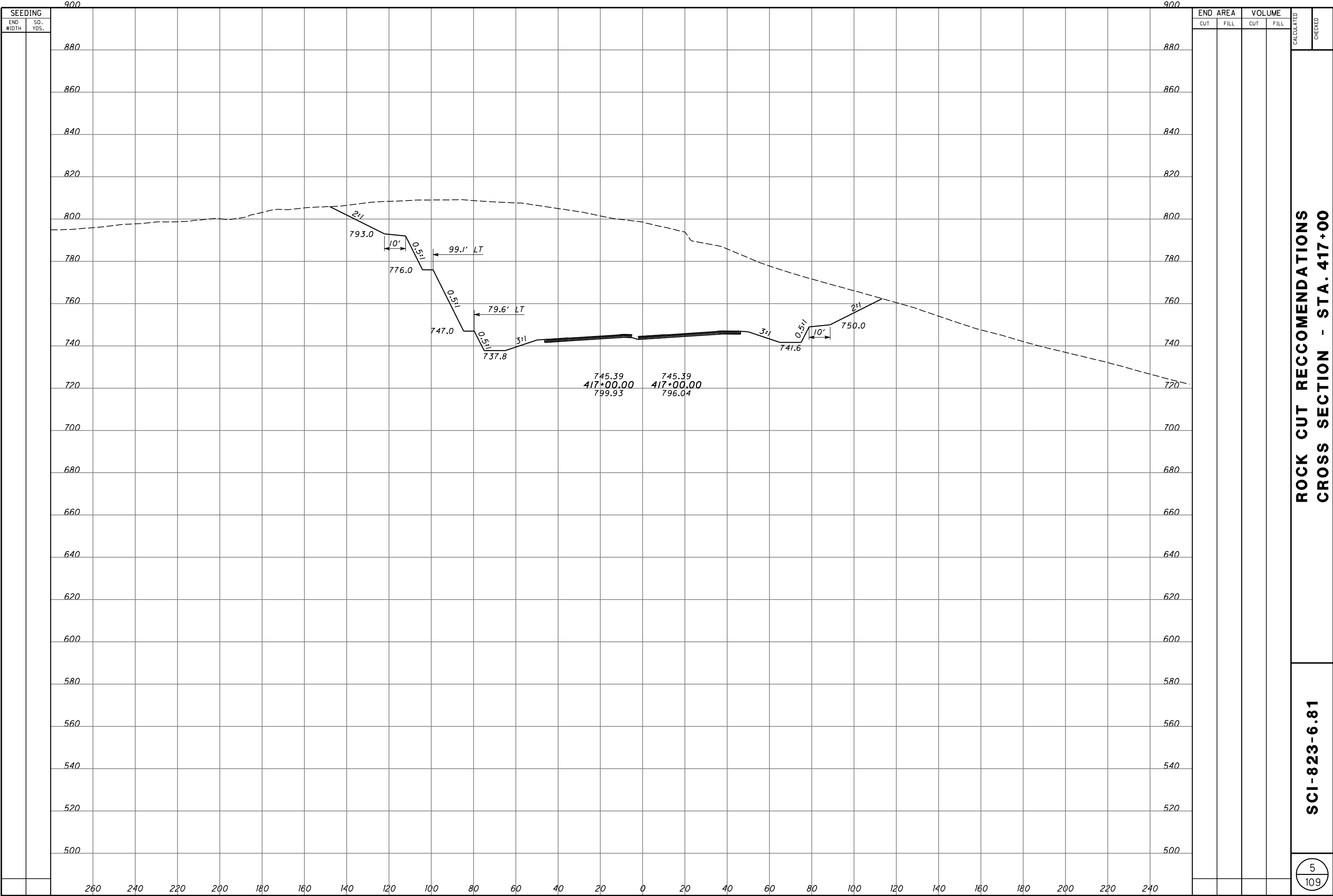
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**ROCK CUT RECCOMENDATIONS  
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**SCI-823-6.81**



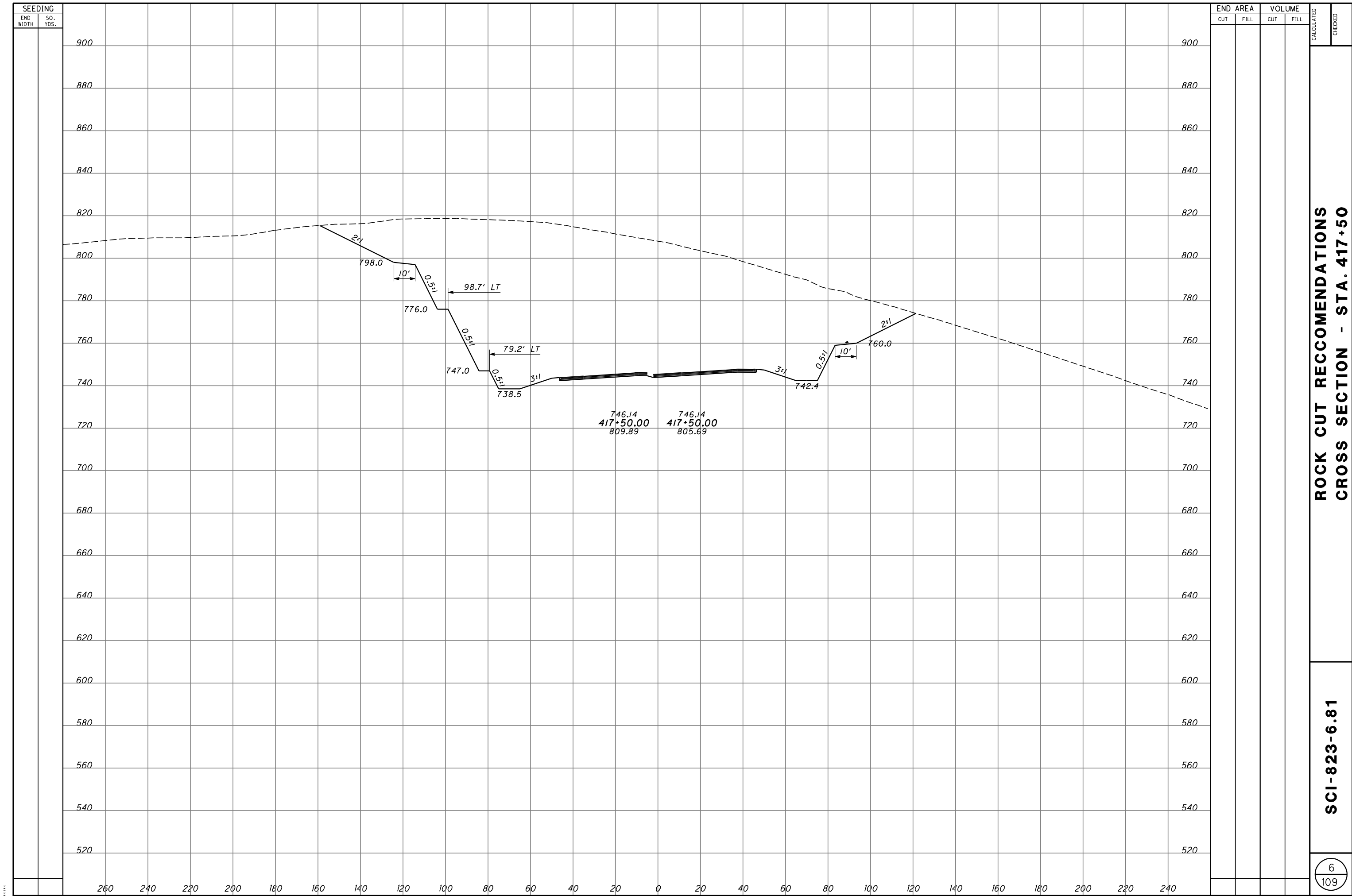


SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 417+00**

**SCI-823-6.81**



SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 417+50**

SCI-823-6.81

6
109

SEEDING

END WIDTH SQ. YDS.

END AREA

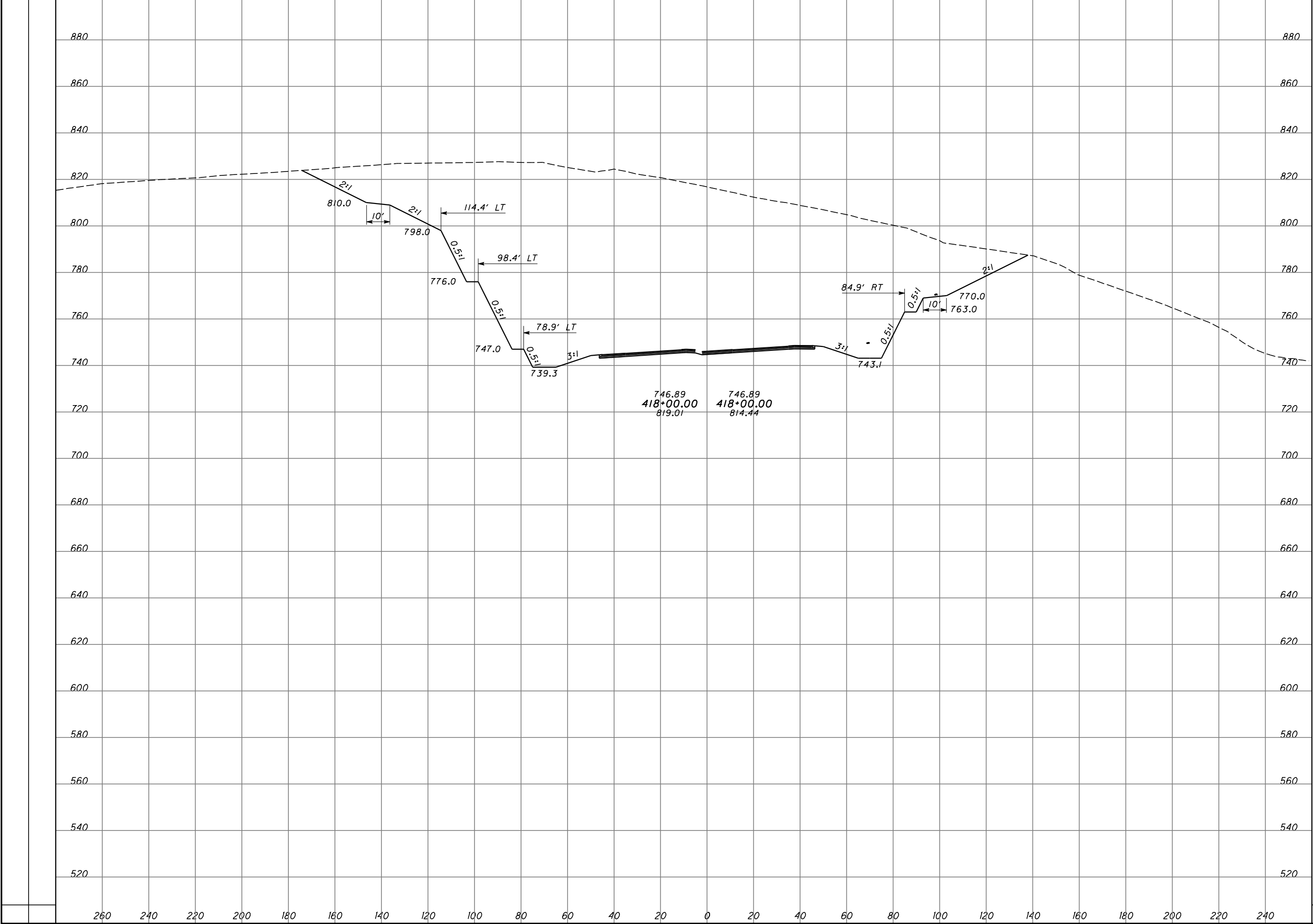
CUT FILL

VOLUME

CUT FILL

CALCULATED

CHECKED



ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 418+00

SCI-823-6.81

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WIDTHSQ.  
YDS.**END AREA**

CUT

FILL

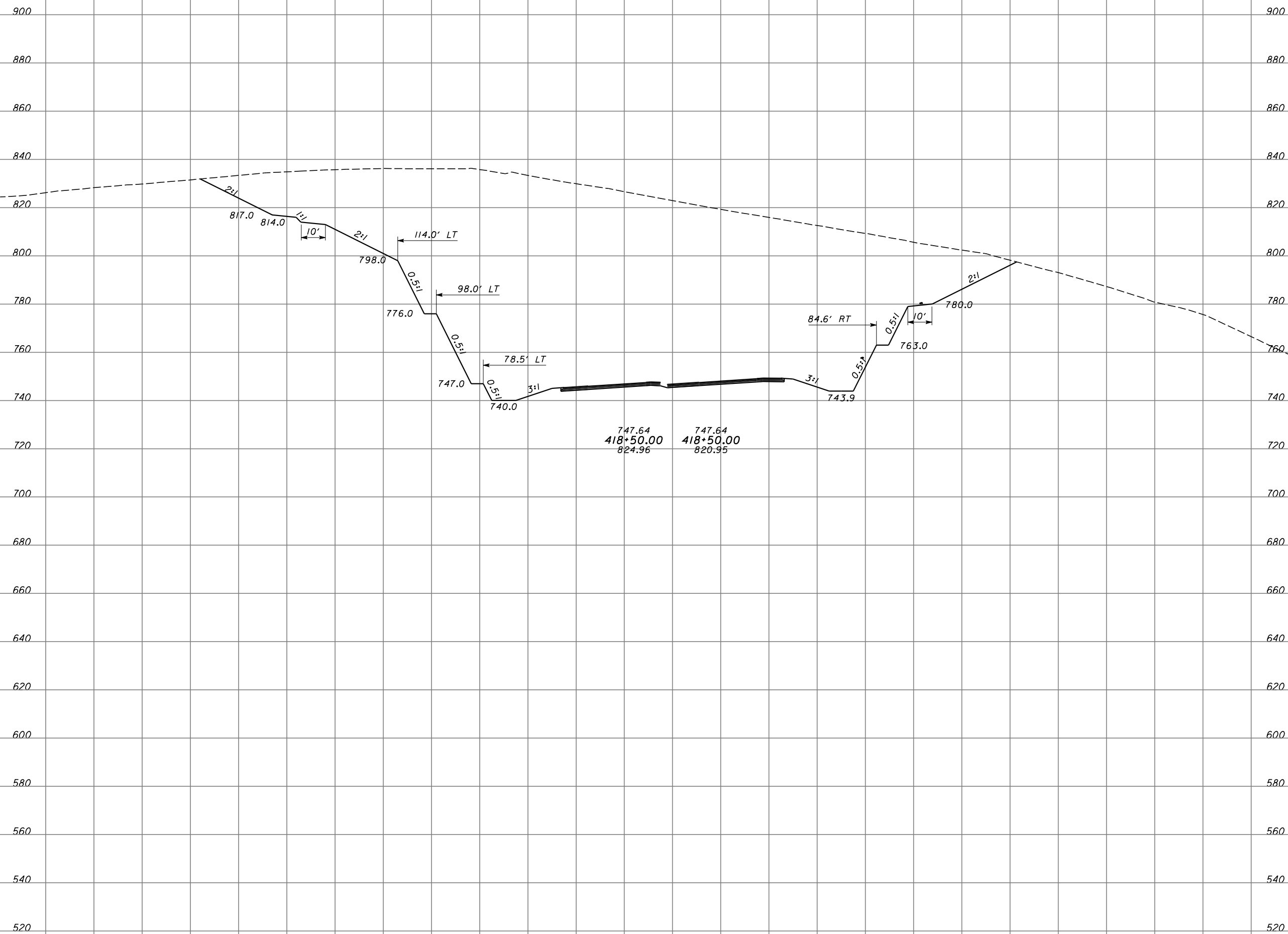
**VOLUME**

CUT

FILL

CALCULATED

CHECKED



747.64  
418+50.00  
824.96      747.64  
418+50.00  
820.95

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 474.64**

**SCI-823-6.81**

260 240 220 200 180 160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 240

SEEDING

END WIDTH

SQ. YDS.

END AREA

VOLUME

CUT

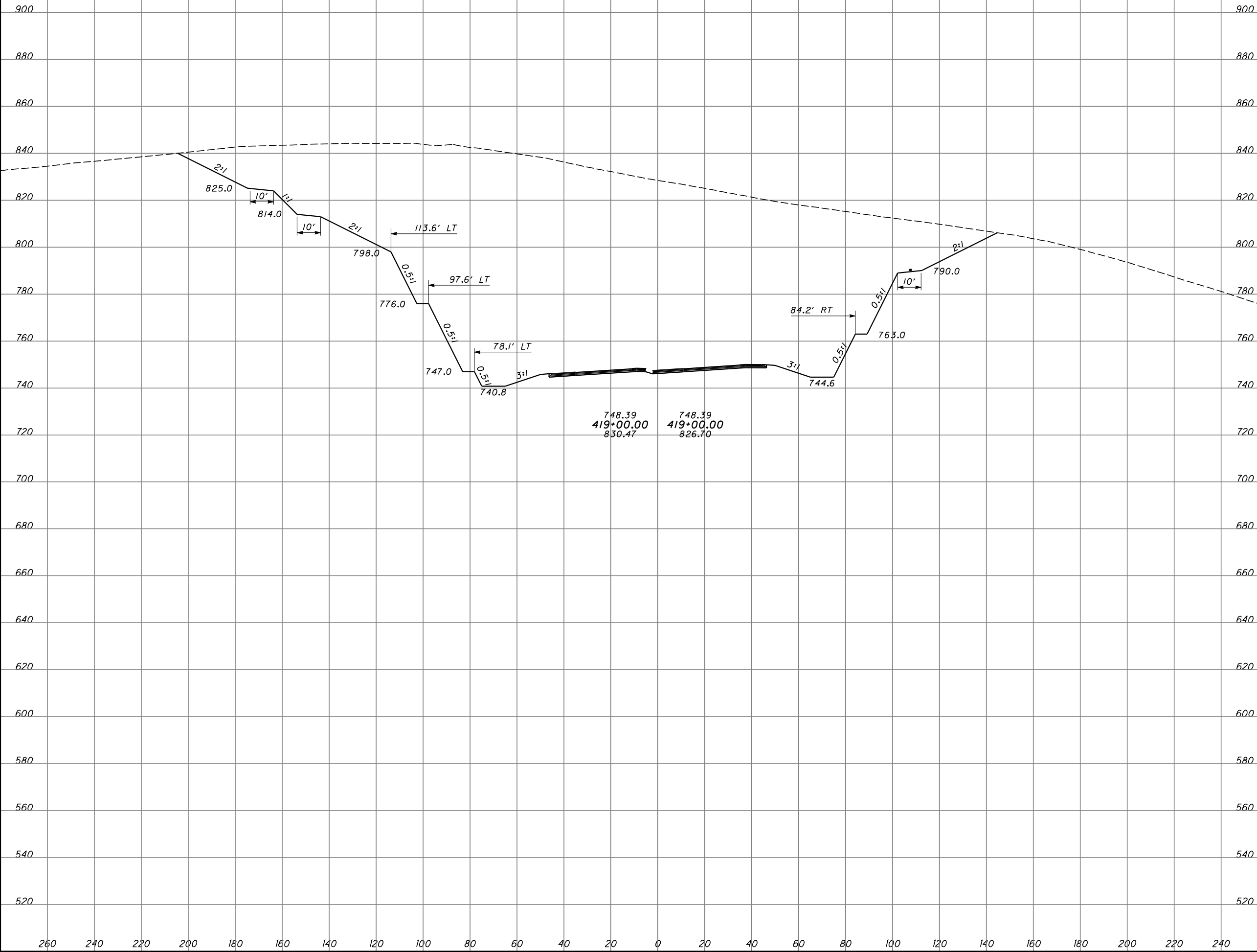
FILL

CUT

FILL

CALCULATED

CHECKED

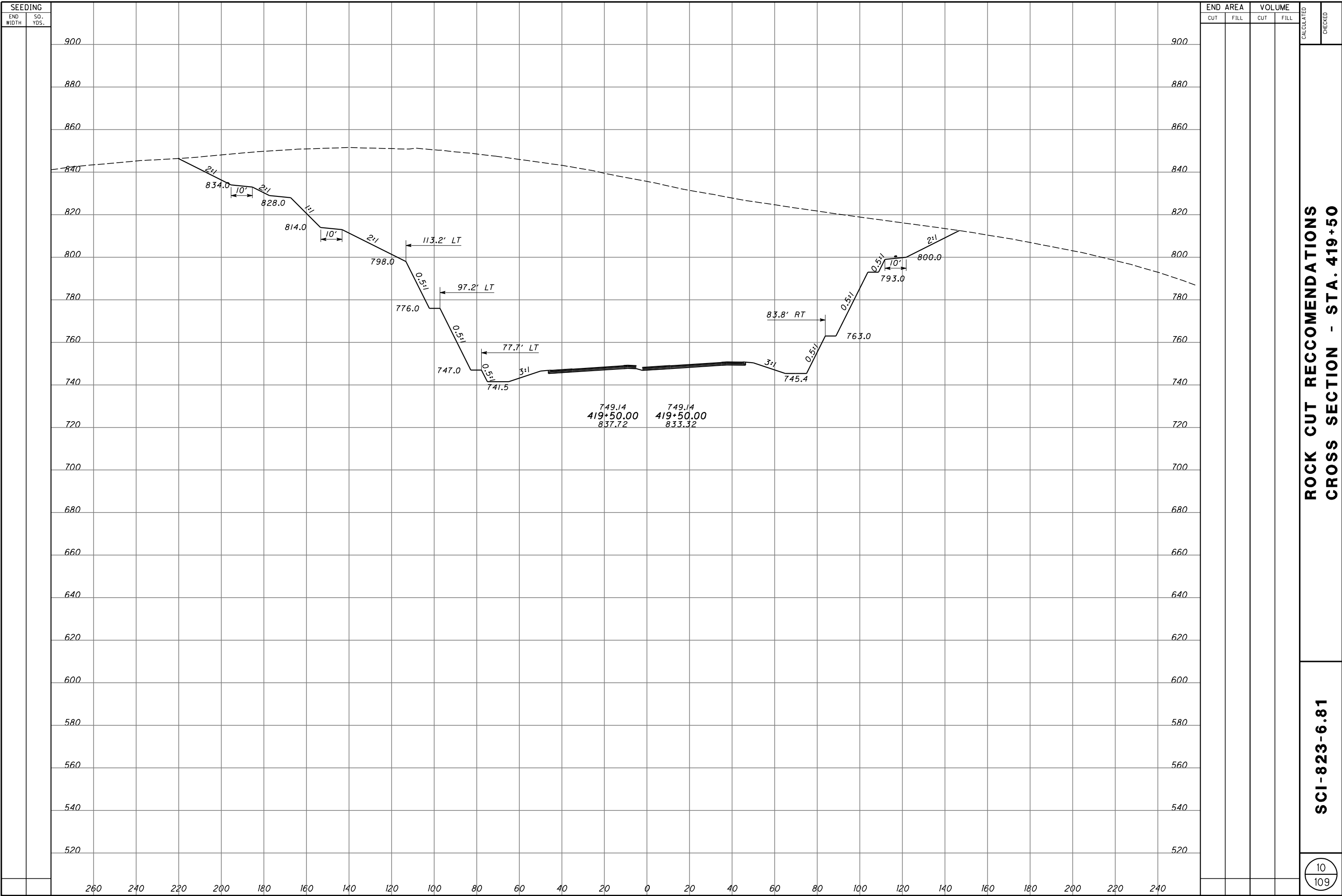


748.39	748.39
419+00.00	419+00.00
830.47	826.70

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 748.39**

**SCI-823-6.81**



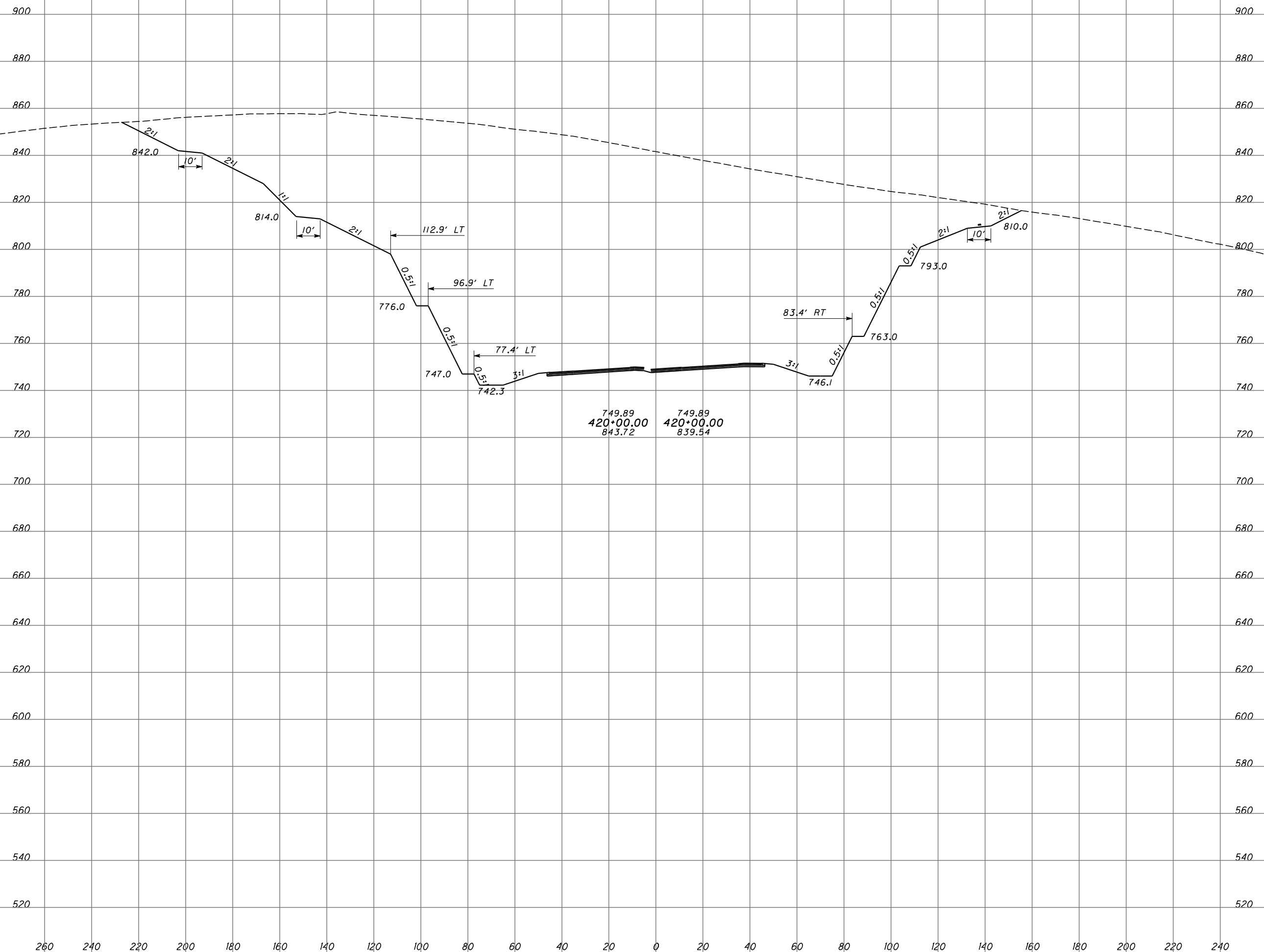


SEEDING

END WIDTH SQ. YDS.

END AREA VOLUME

CUT FILL CUT FILL CALCULATED CHECKED

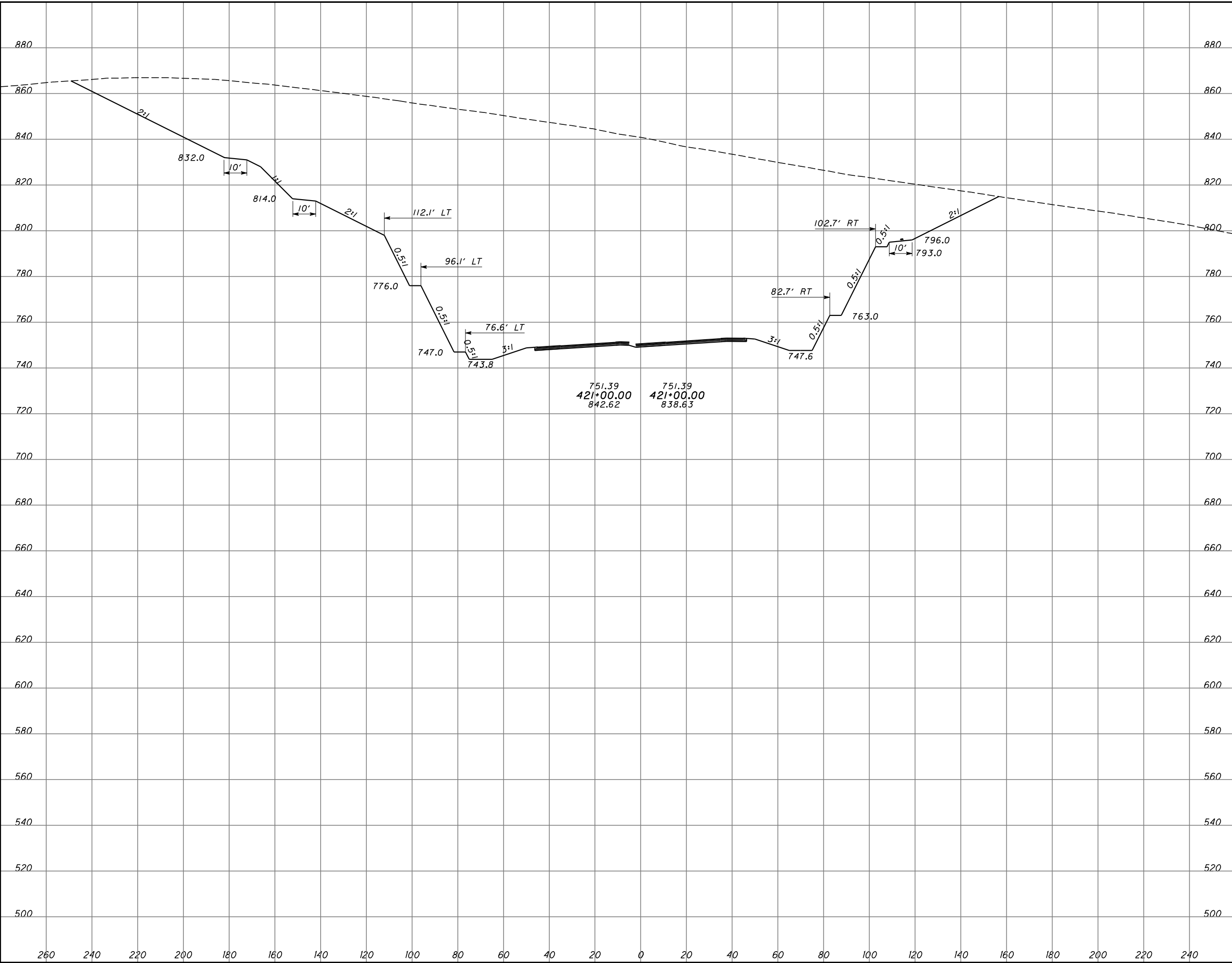


ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 420+00

SCI-823-6.81

SEEDING

END WIDTH	SQ. YDS.



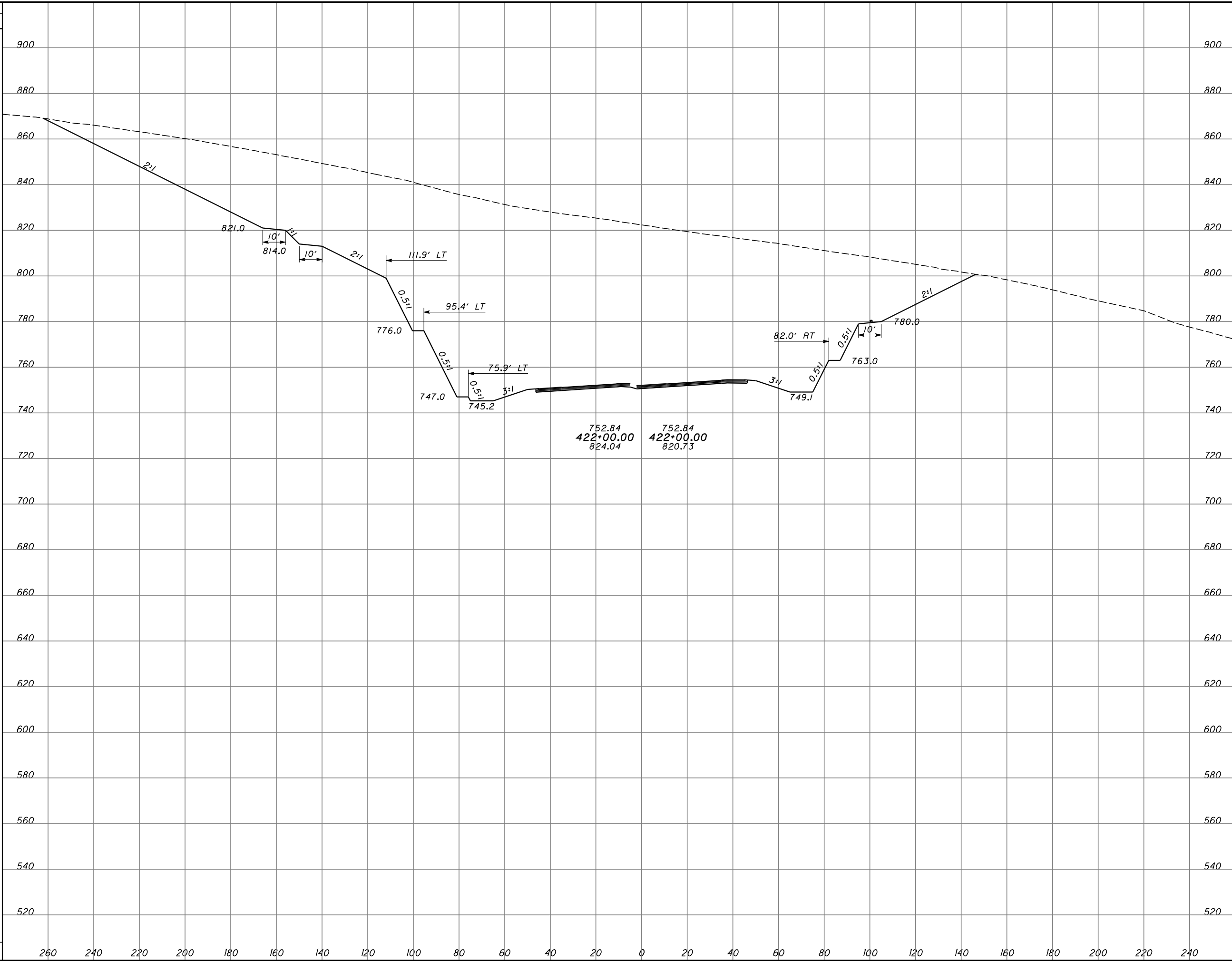
END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 421+00**

**SCI-823-6.81**

**SEEDING**

END WIDTH	SO. YDS.



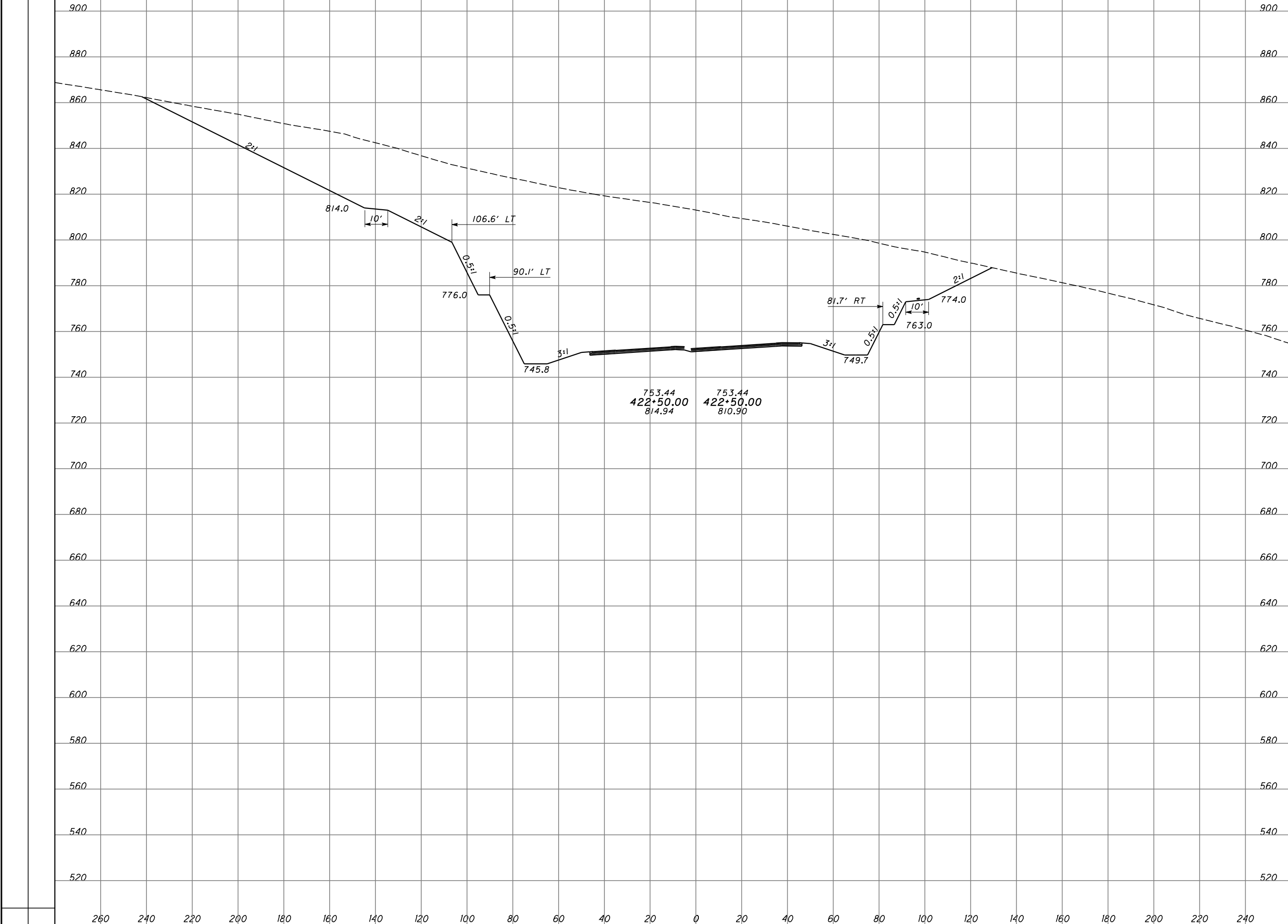
END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 422+00**

**SCI-823-6.81**

SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED



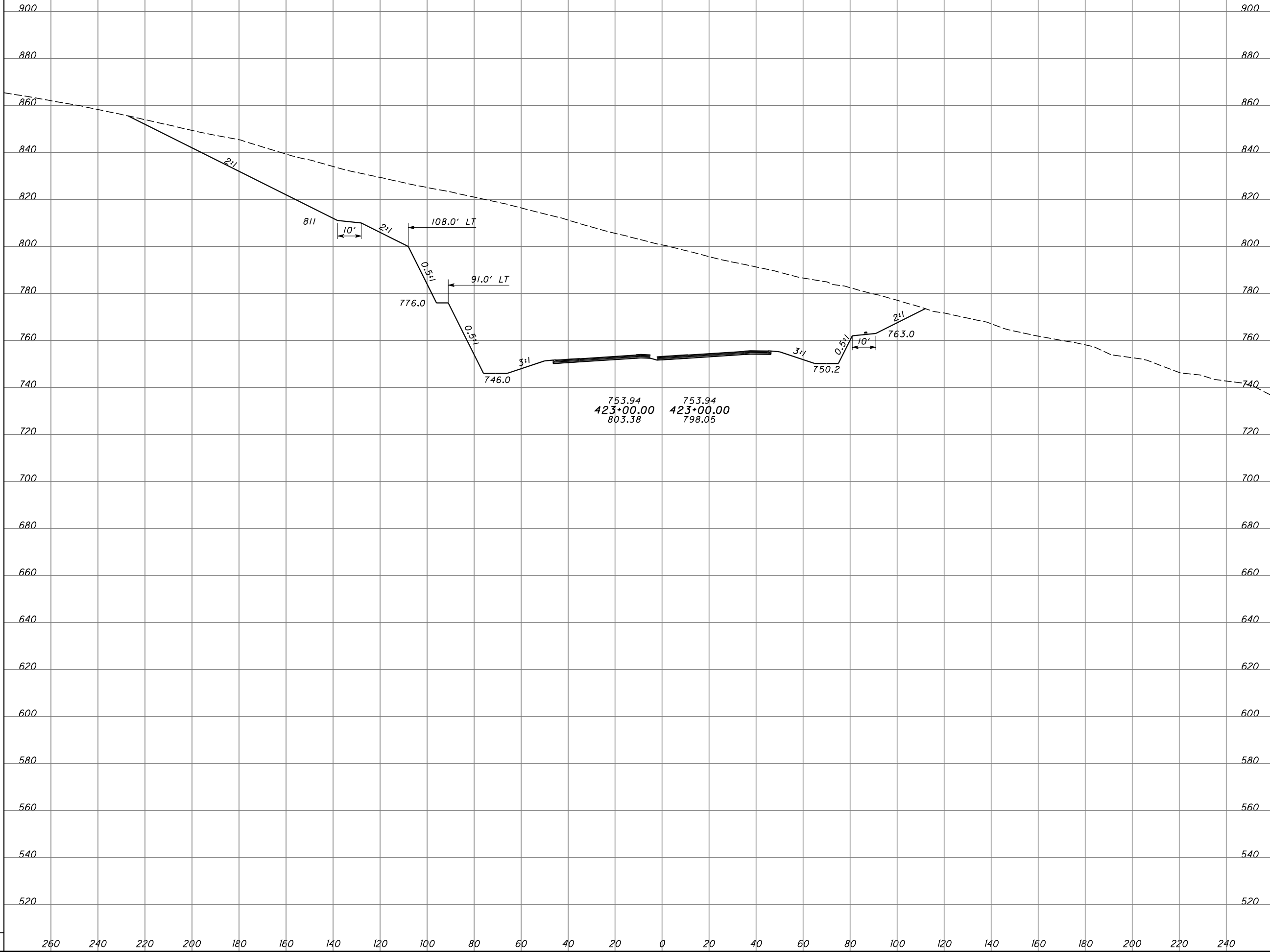
**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 422+50**

**SCI-823-6.81**

SEEDING

END WIDTH	SQ. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 423+00**

**SCI-823-6.81**







SEEDING

END WIDTH  
SQ. YDS.

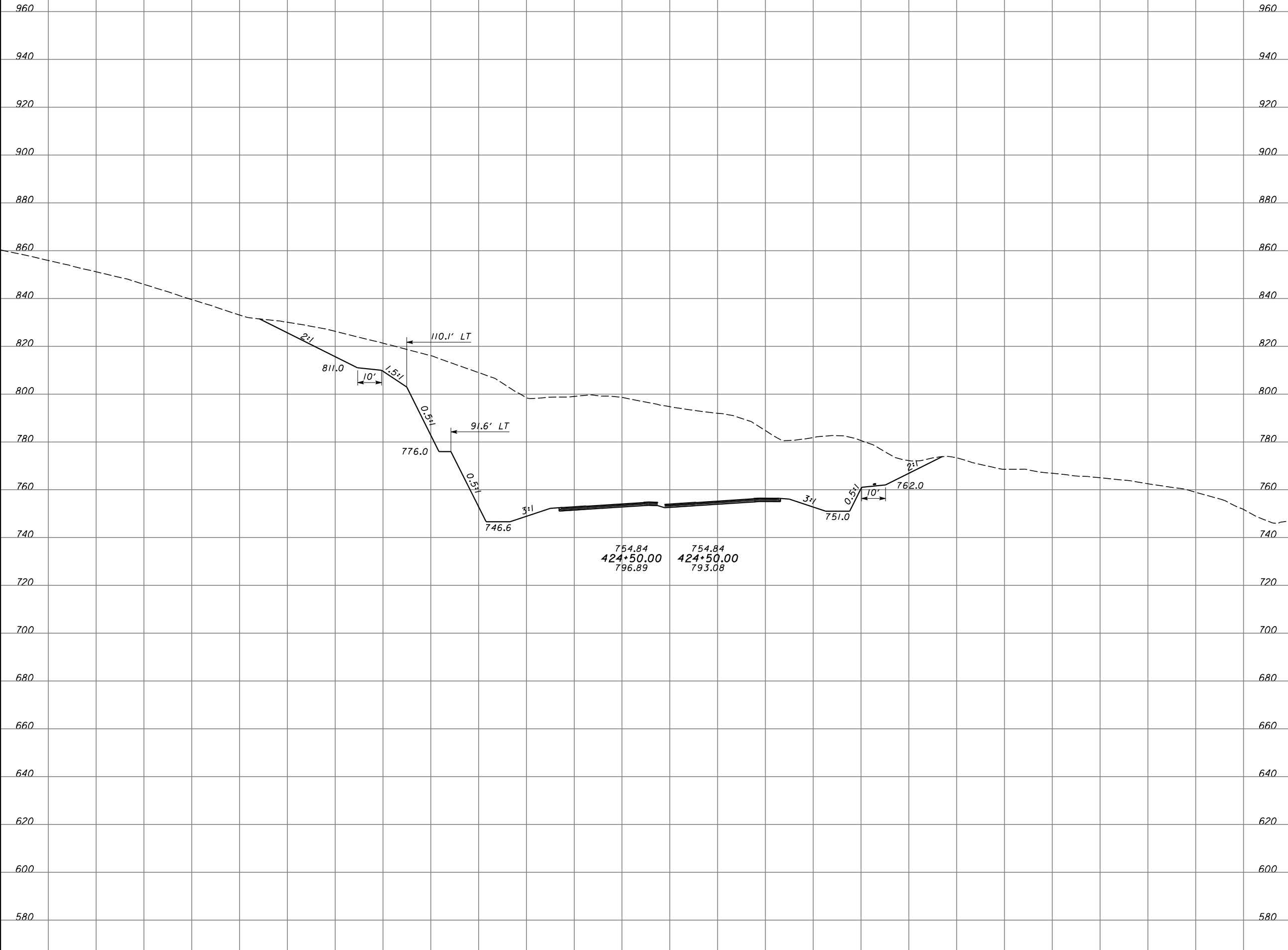
END AREA

CUT FILL

VOLUME

CUT FILL

CALCULATED  
CHECKED



ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 424+50

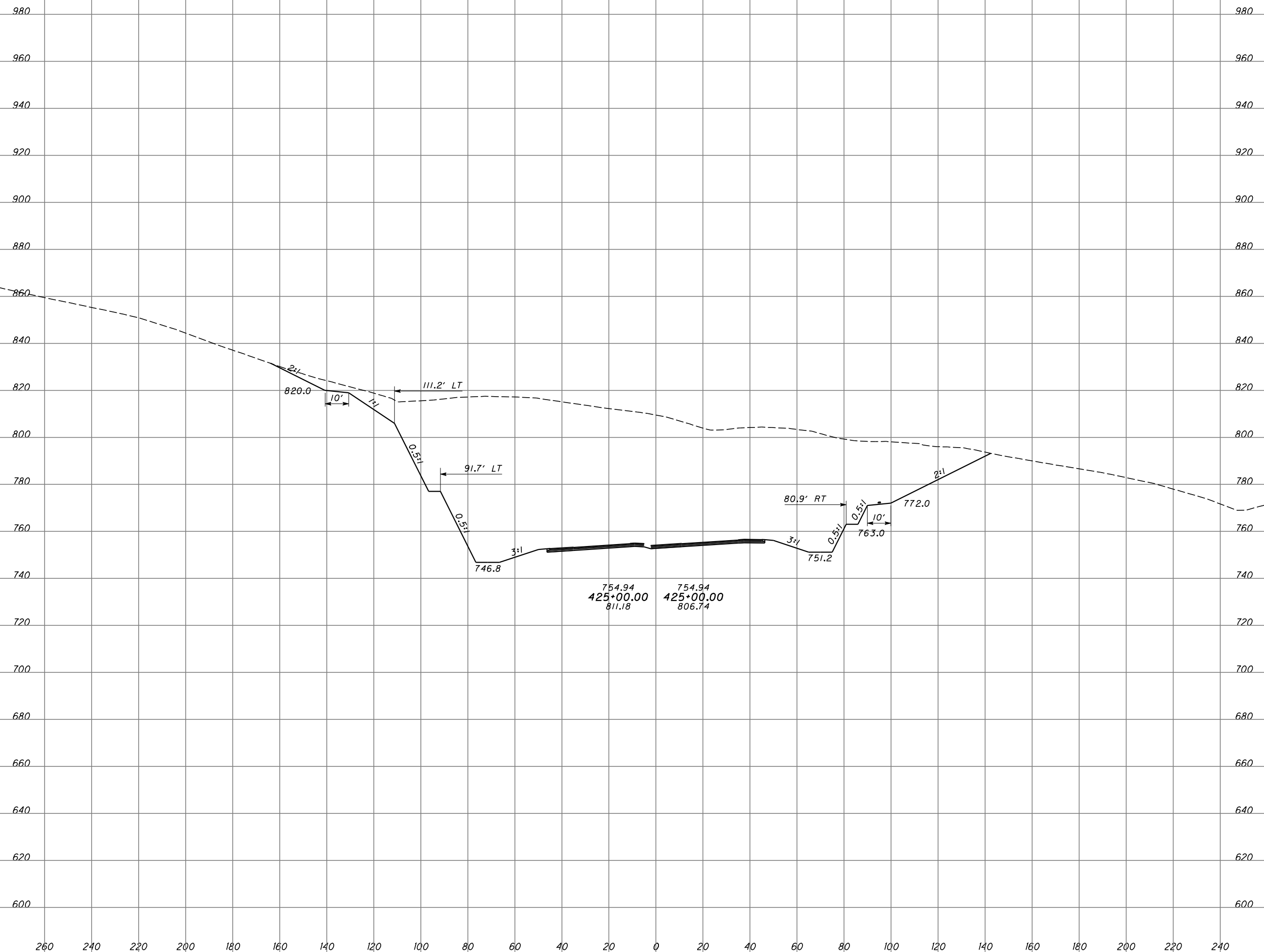
SCI-823-6.81

SEEDING

END WIDTH SQ. YDS.

END AREA VOLUME

CUT FILL CUT FILL CALCULATED CHECKED



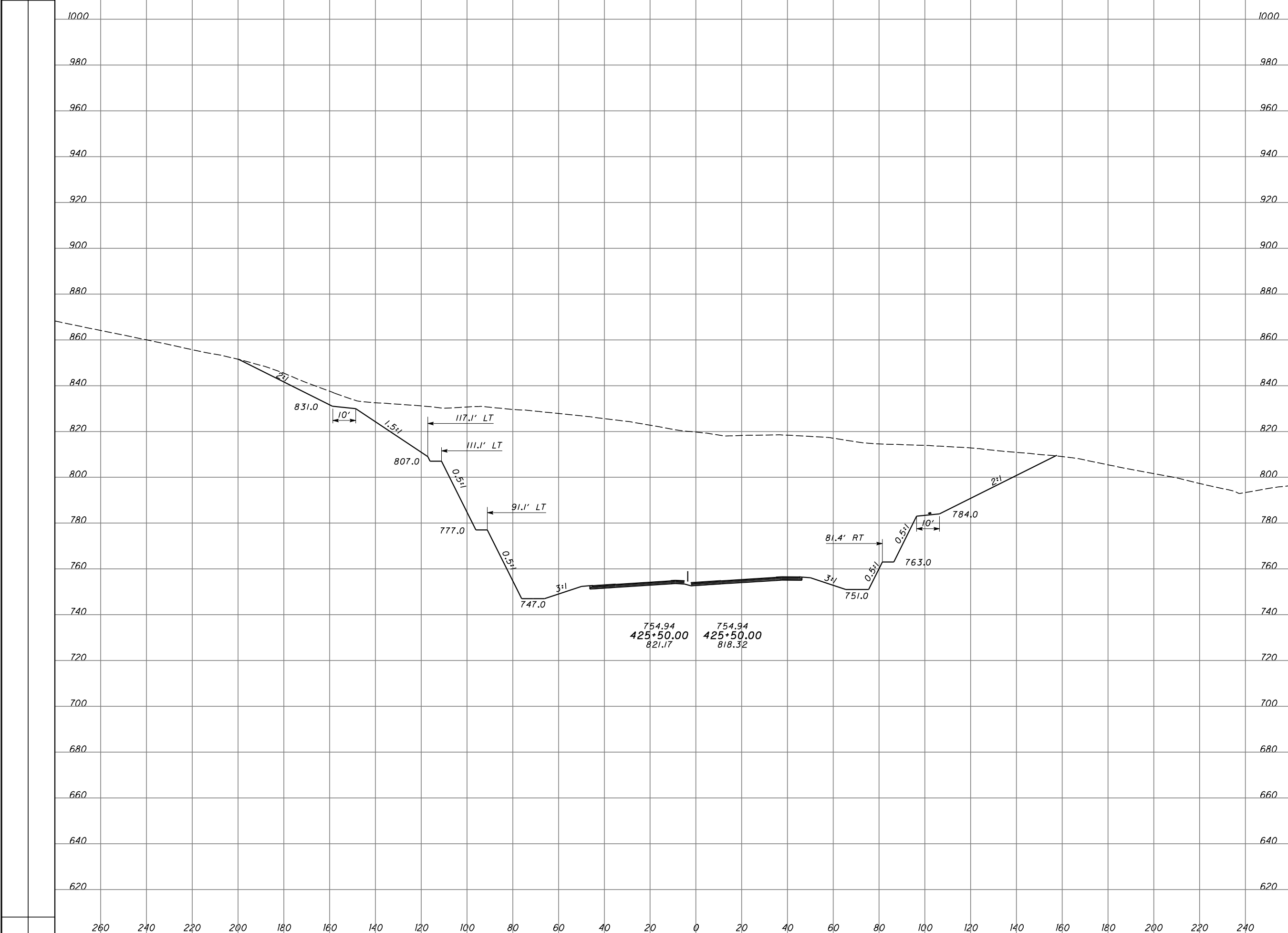
754.94	754.94
425+00.00	425+00.00
811.18	806.74

ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 425+00

SCI-823-6.81

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

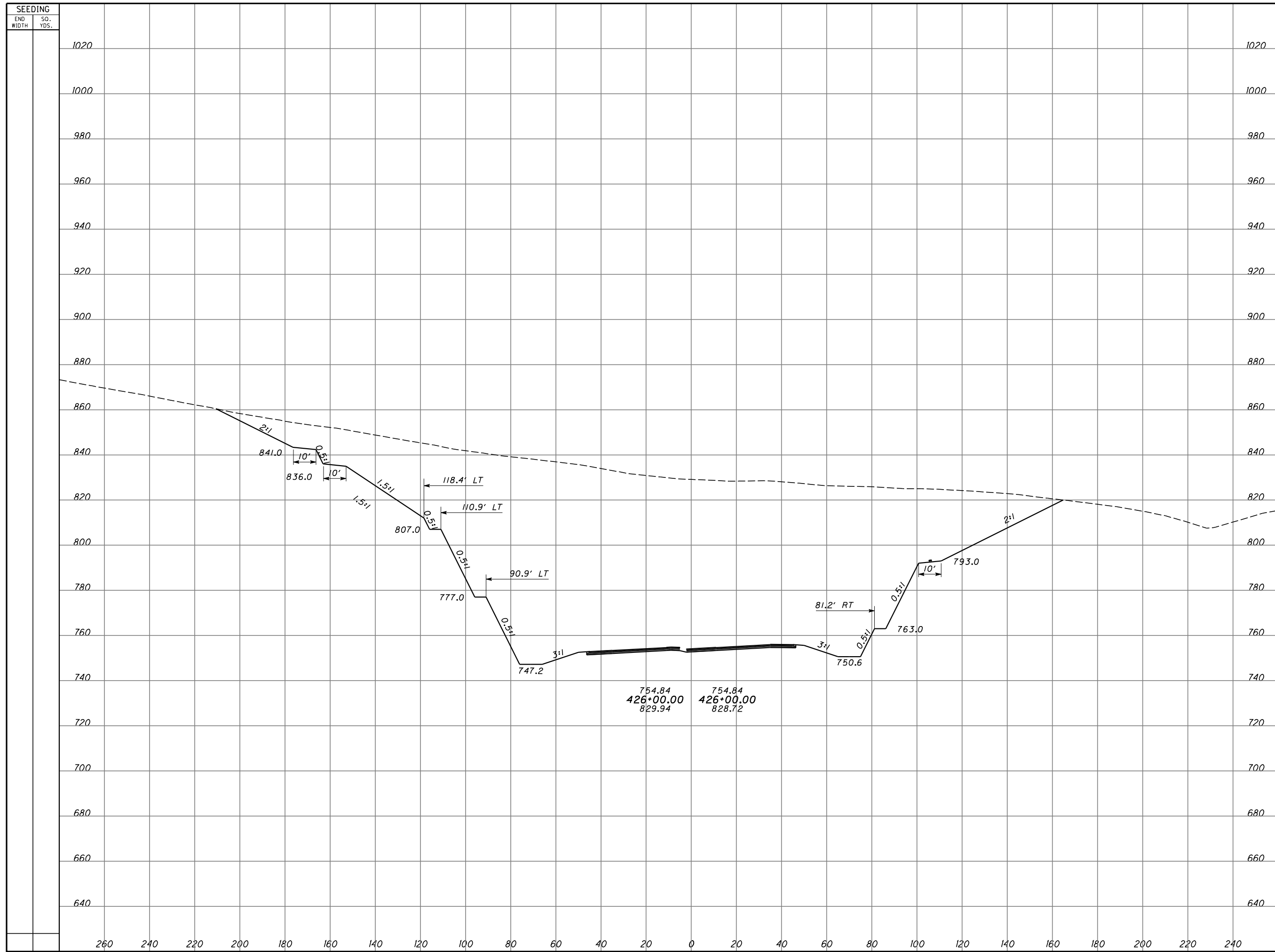


754.94  
 425+50.00  
 821.17

754.94  
 425+50.00  
 818.32

**ROCK CUT RECCOMENDATIONS  
 CROSS SECTION - STA. 425+00**

**SCI-823-6.81**



754.84  
426+00.00  
829.94

754.84  
426+00.00  
828.72

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 426+00**

**SCI-823-6.81**

SEEDING

END WIDTH SQ. YDS.

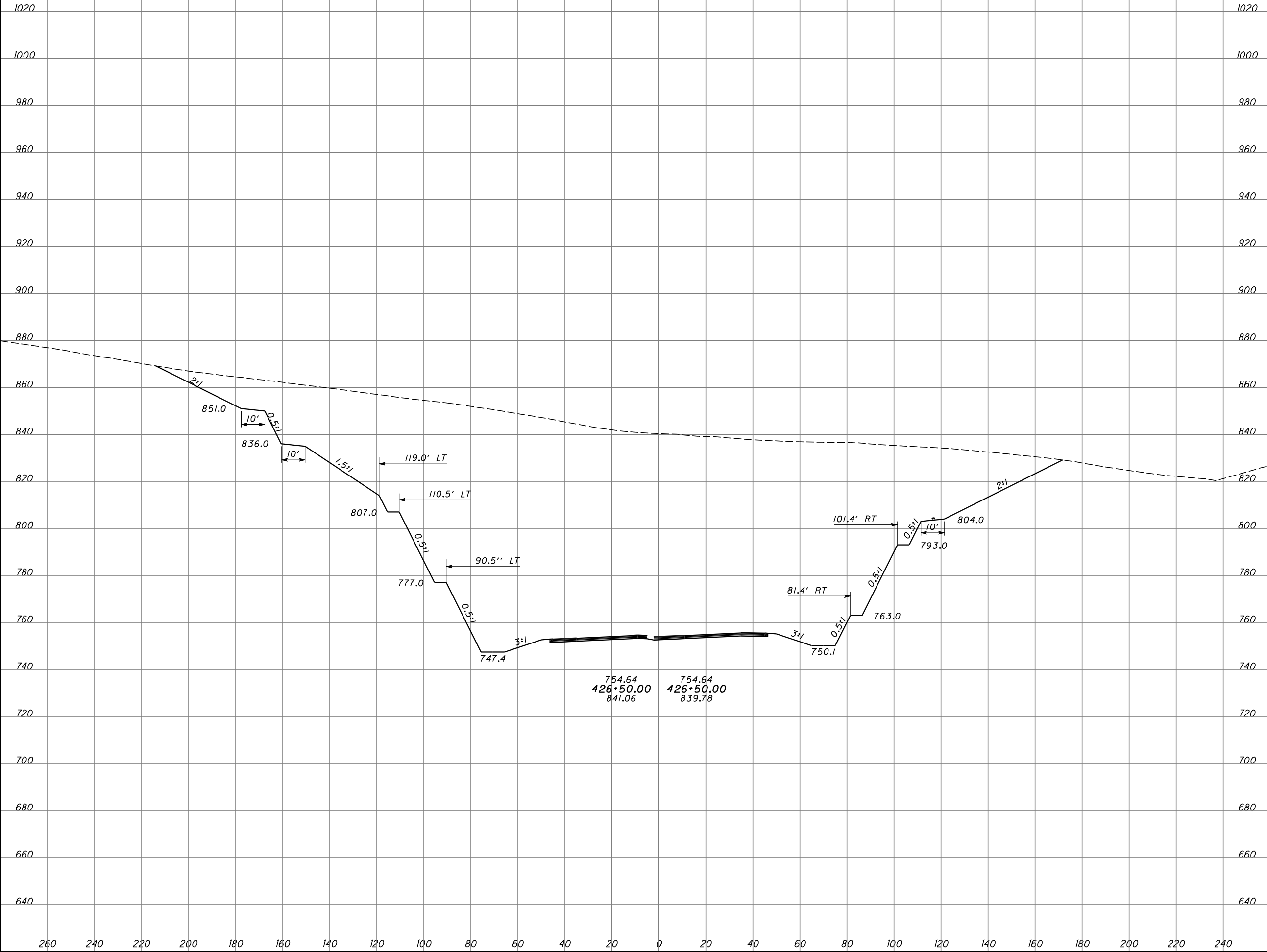
END AREA

VOLUME

CUT FILL

CUT FILL

CALCULATED CHECKED



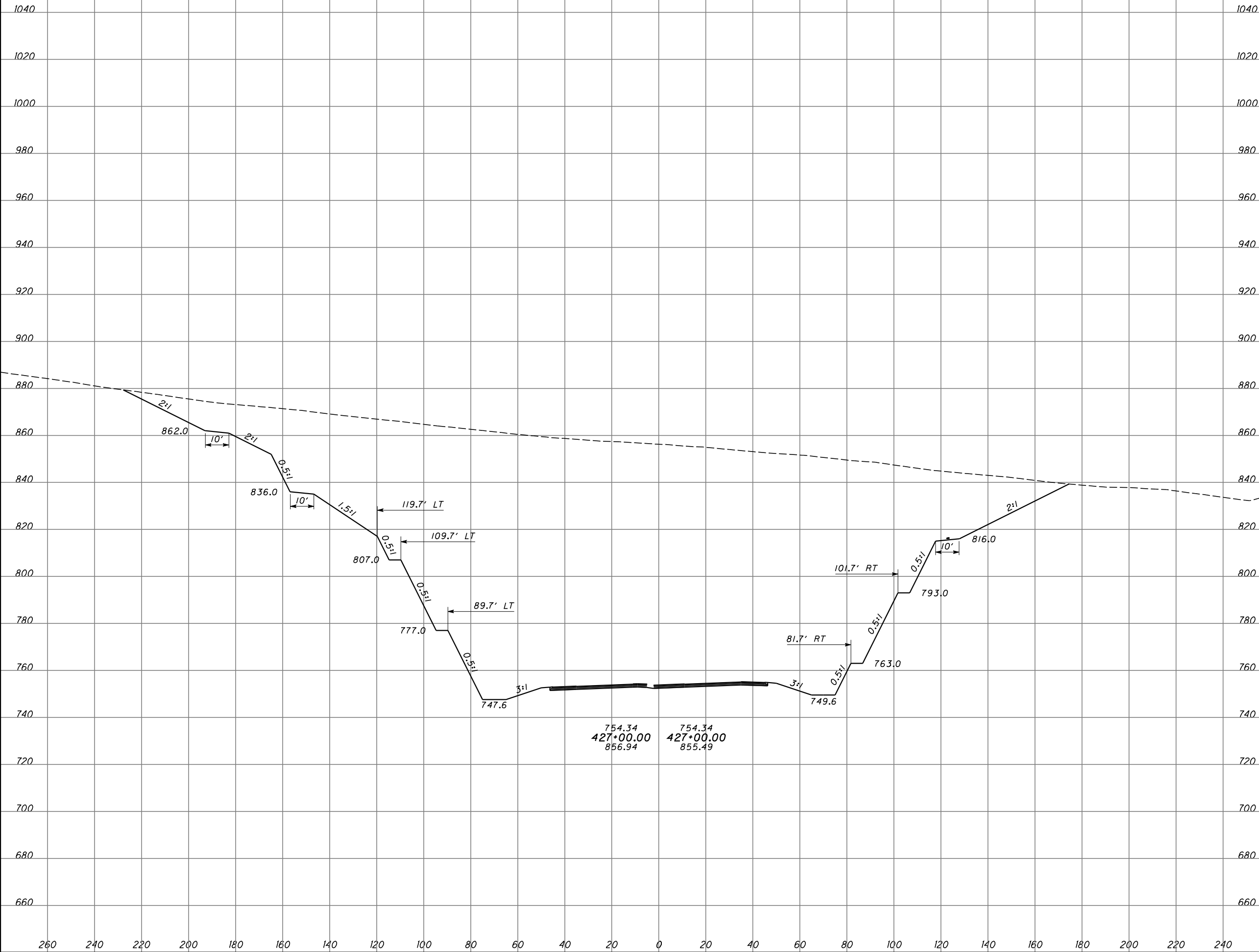
ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 426+50

SCI-823-6.81

**SEEDING**

END WIDTH	SQ. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



754.34	754.34
427+00.00	427+00.00
856.94	855.49

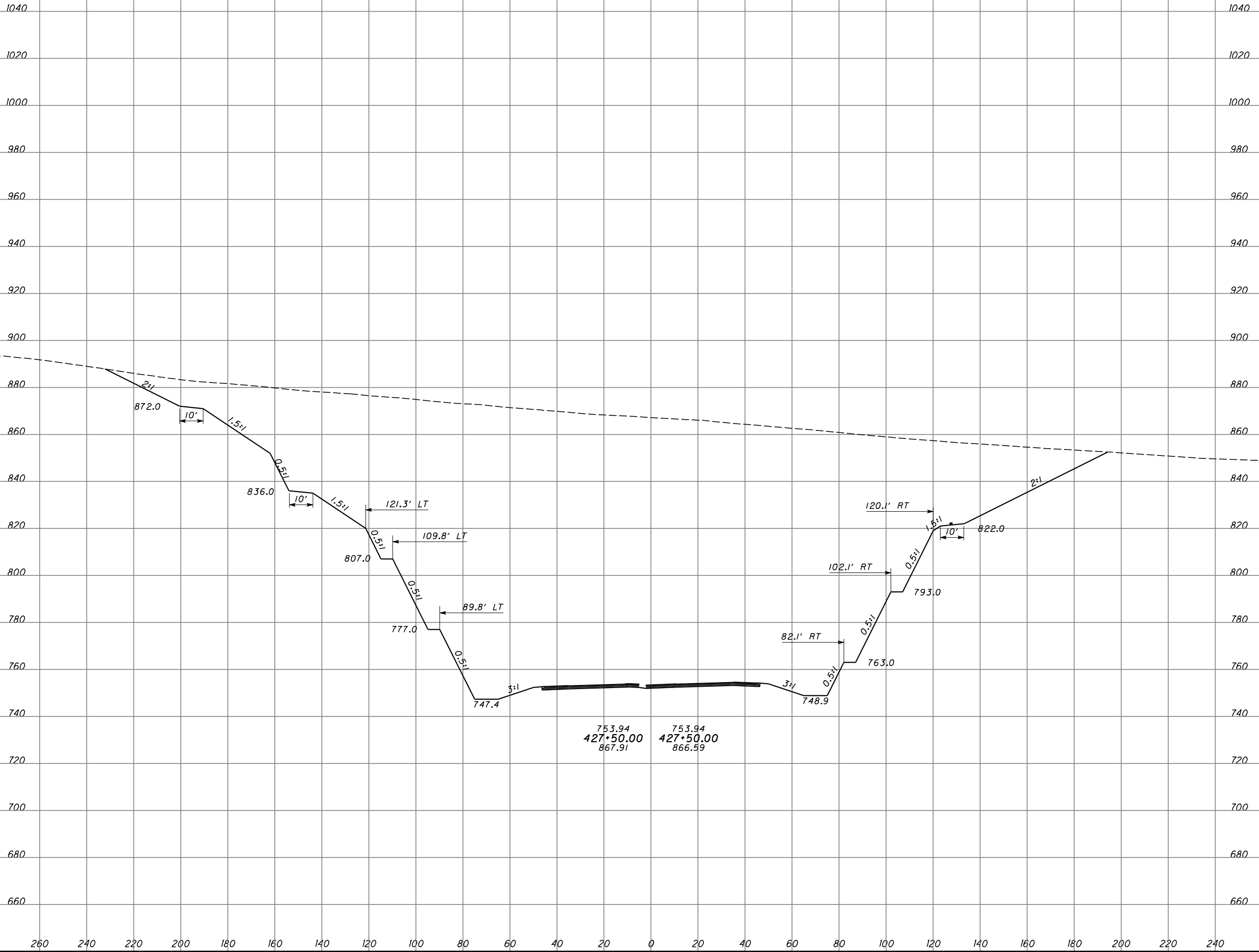
**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 427+00**

**SCI-823-6.81**

25  
109

SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED

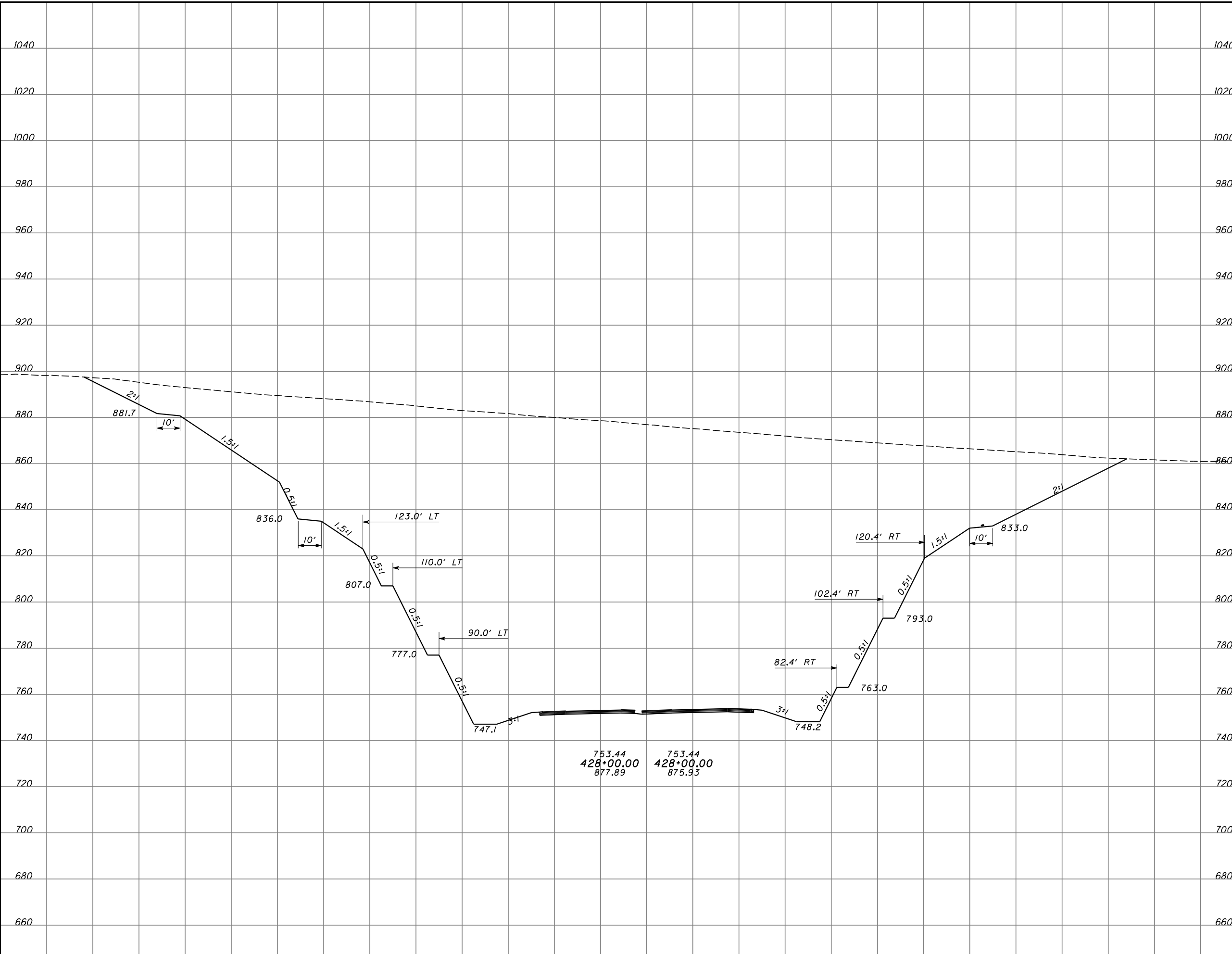


**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 427+50**

**SCI-823-6.81**

SEEDING

END WIDTH	SQ. YDS.
-----------	----------



END AREA

CUT	FILL	VOLUME	CUT	FILL
-----	------	--------	-----	------

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 428+00**

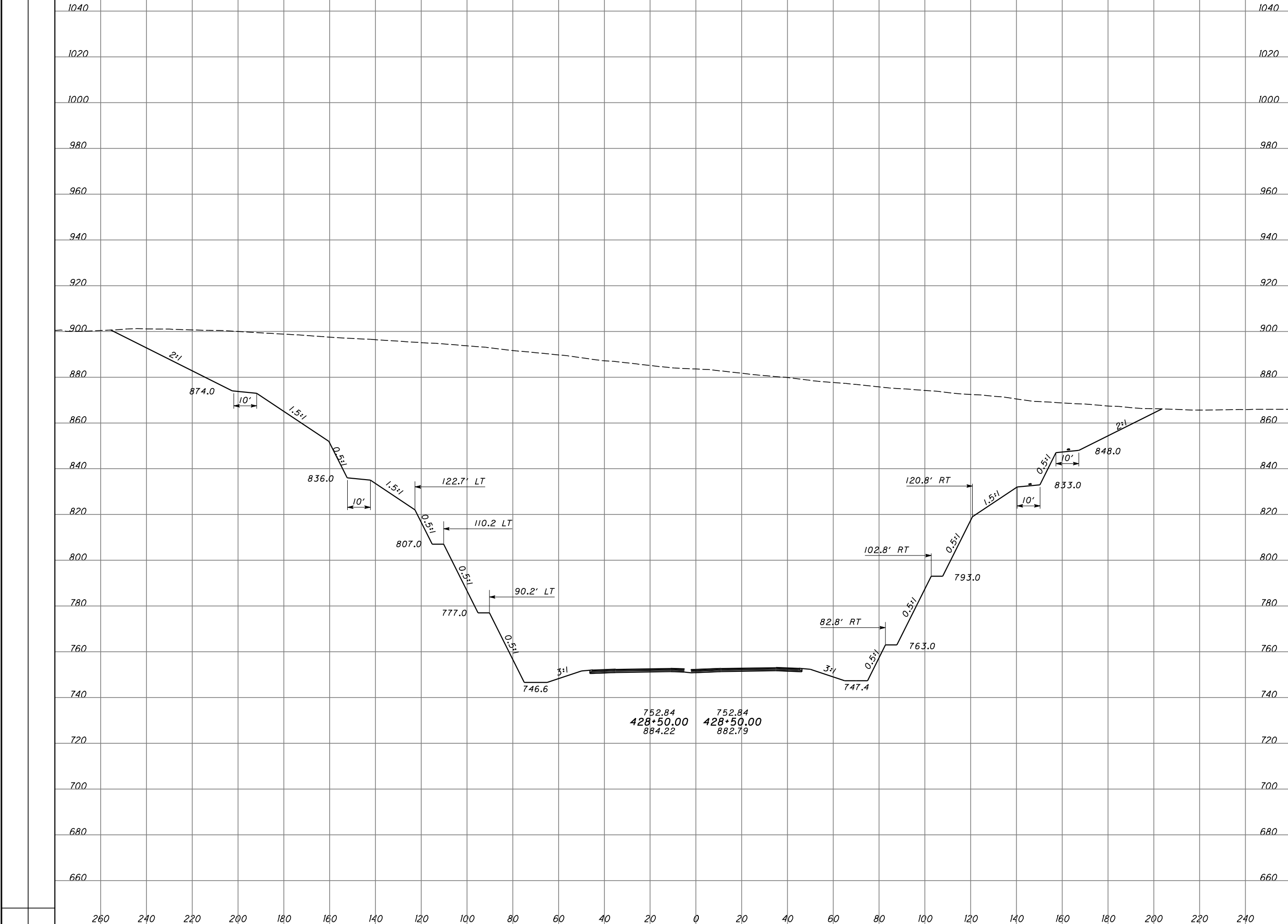
**SCI-823-6.81**

753.44  
428+00.00  
877.89     753.44  
428+00.00  
875.93



SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED

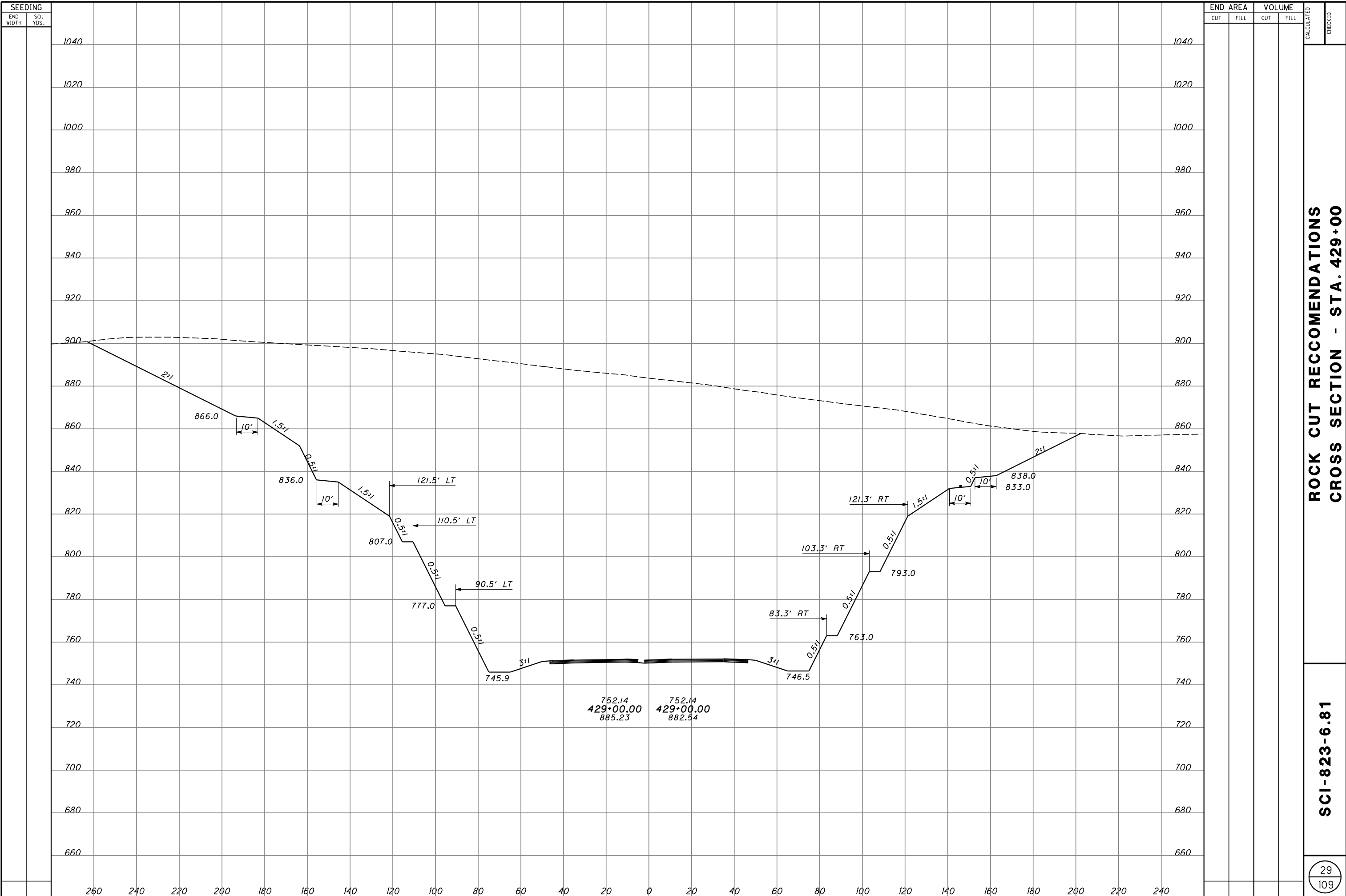


752.84  
428+50.00  
884.22

752.84  
428+50.00  
882.79

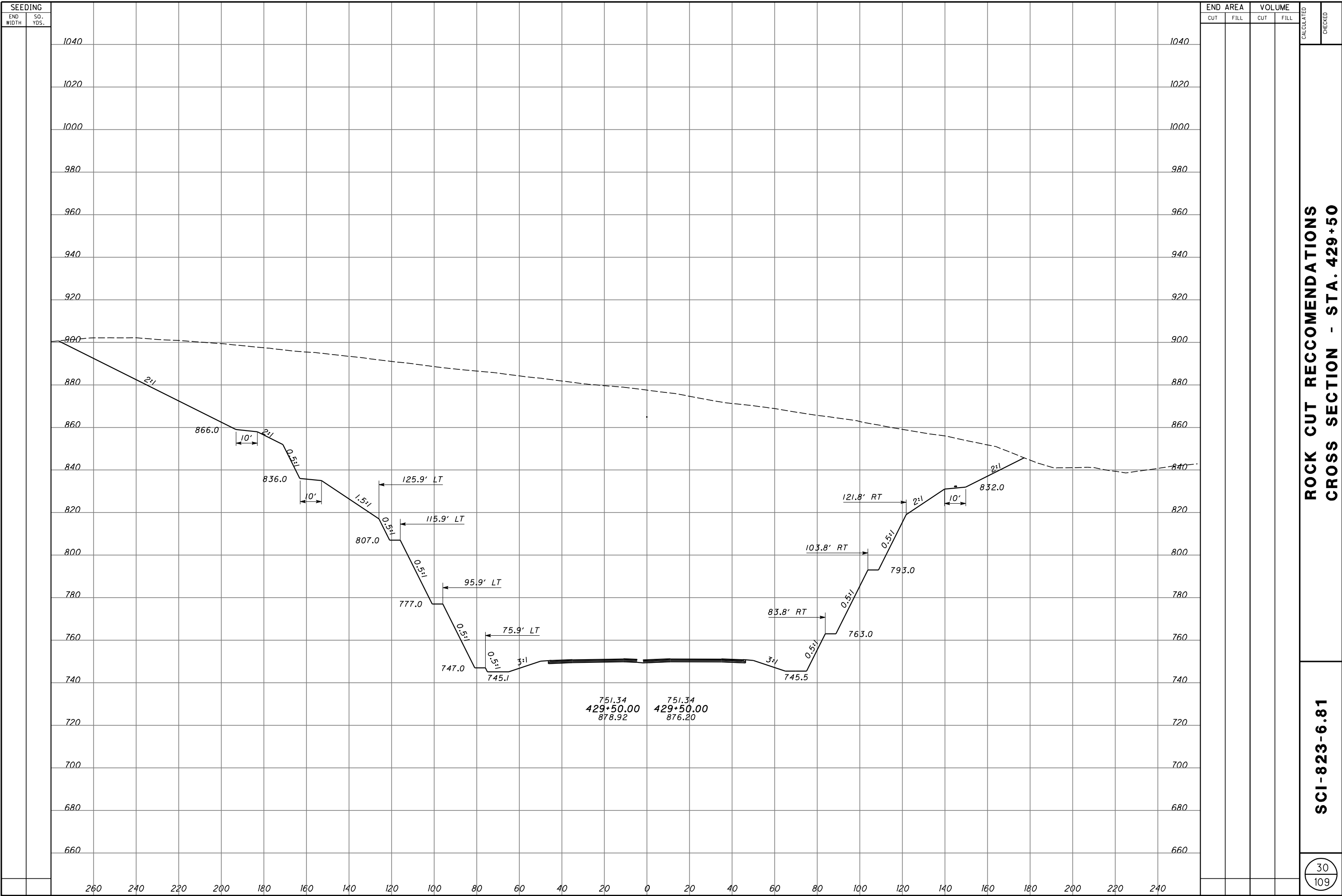
**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 428+50**

**SCI-823-6.81**



**ROCK CUT RECOMMENDATIONS  
 CROSS SECTION - STA. 429+00**

**SCI-823-6.81**

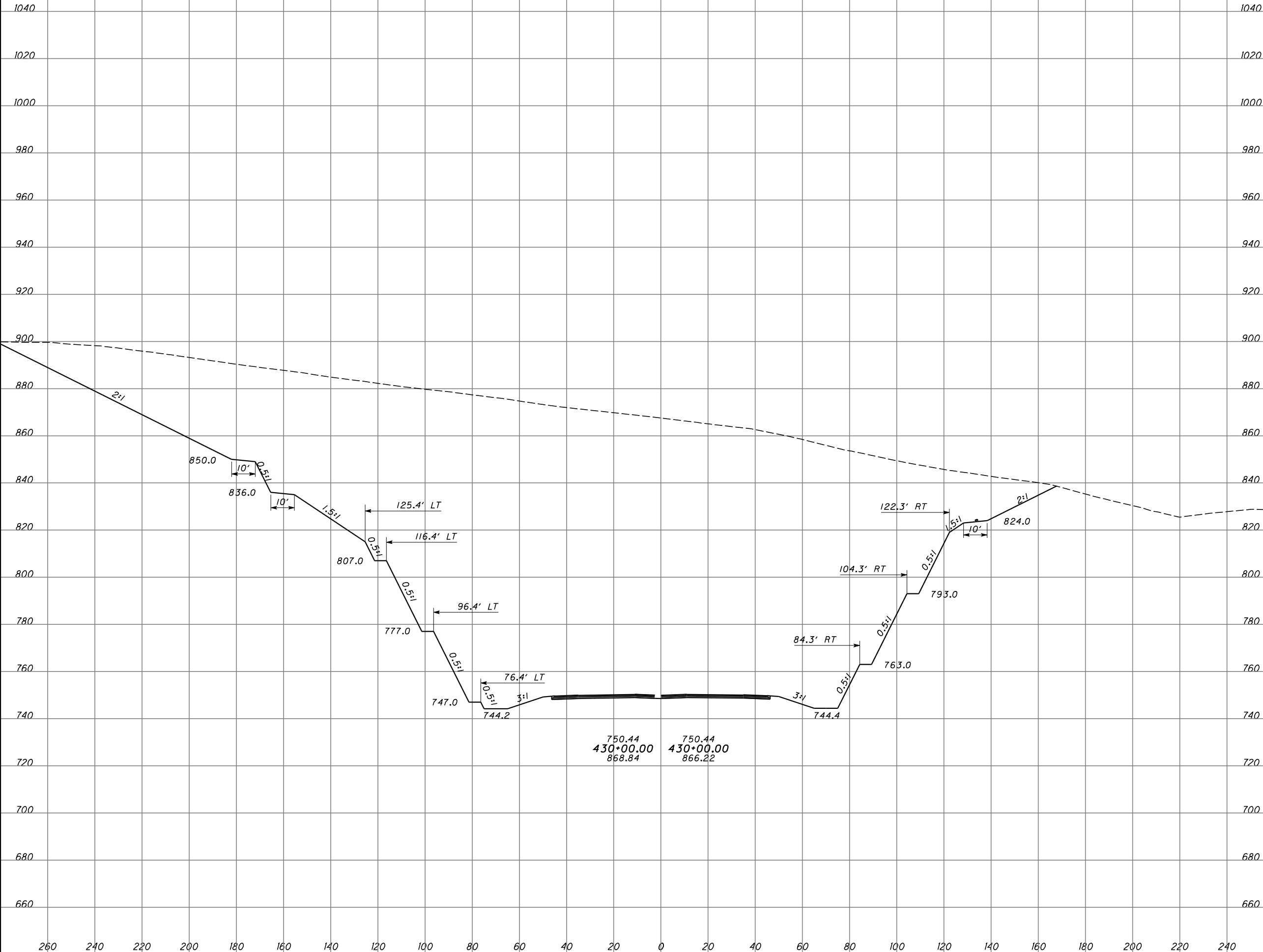


**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 429+50**

**SCI-823-6.81**

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL



750.44  
430+00.00  
868.84

750.44  
430+00.00  
866.22

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 430+00**

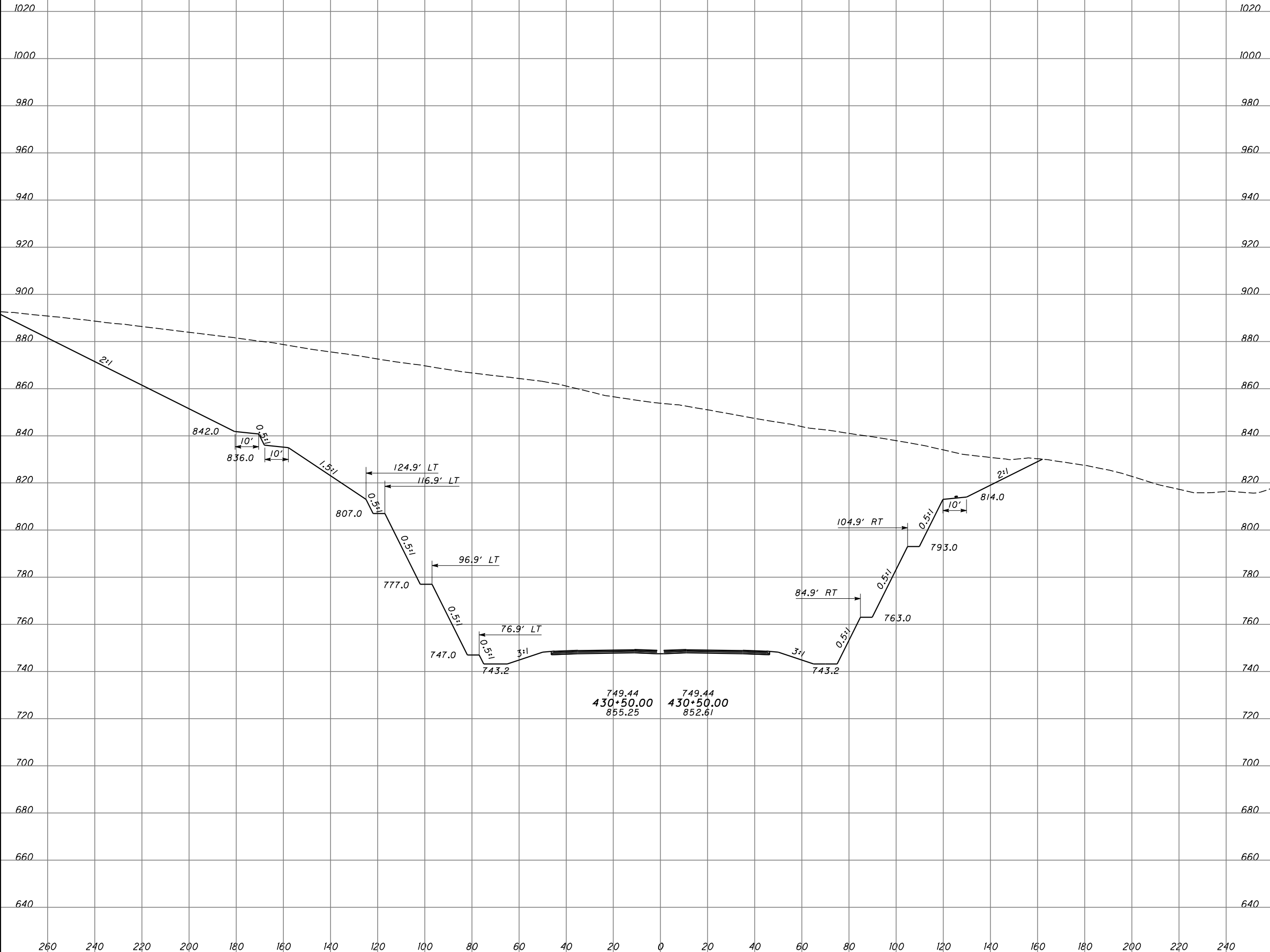
**SCI-823-6.81**

SEEDING

END WIDTH SQ. YDS.

END AREA VOLUME

CUT FILL CUT FILL CALCULATED CHECKED



ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 430+50

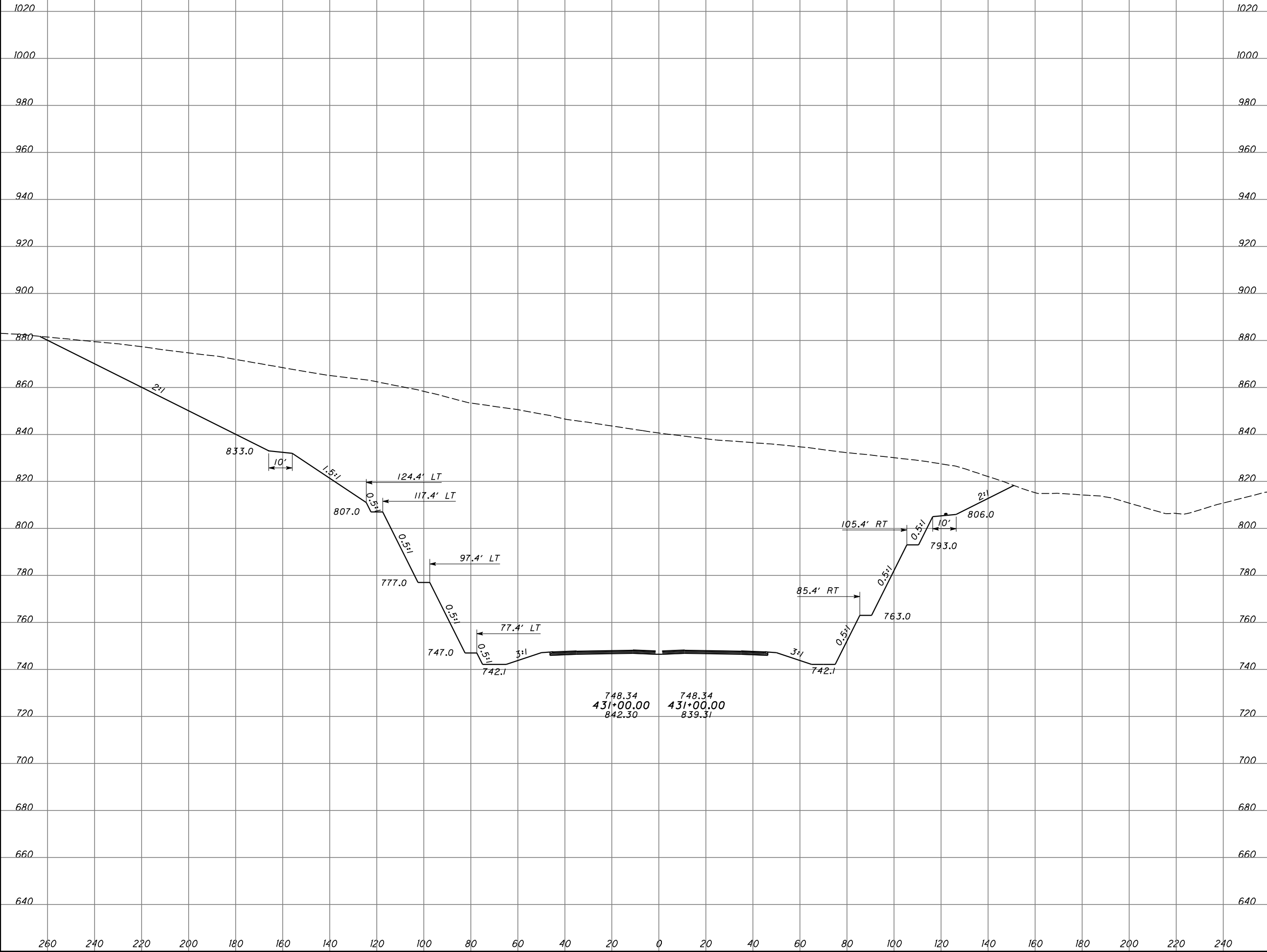
SCI-823-6.81

32  
109

SEEDING

END WIDTH	SQ. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 431+00**

**SCI-823-6.81**



SEEDING

END WIDTH SQ. YDS.

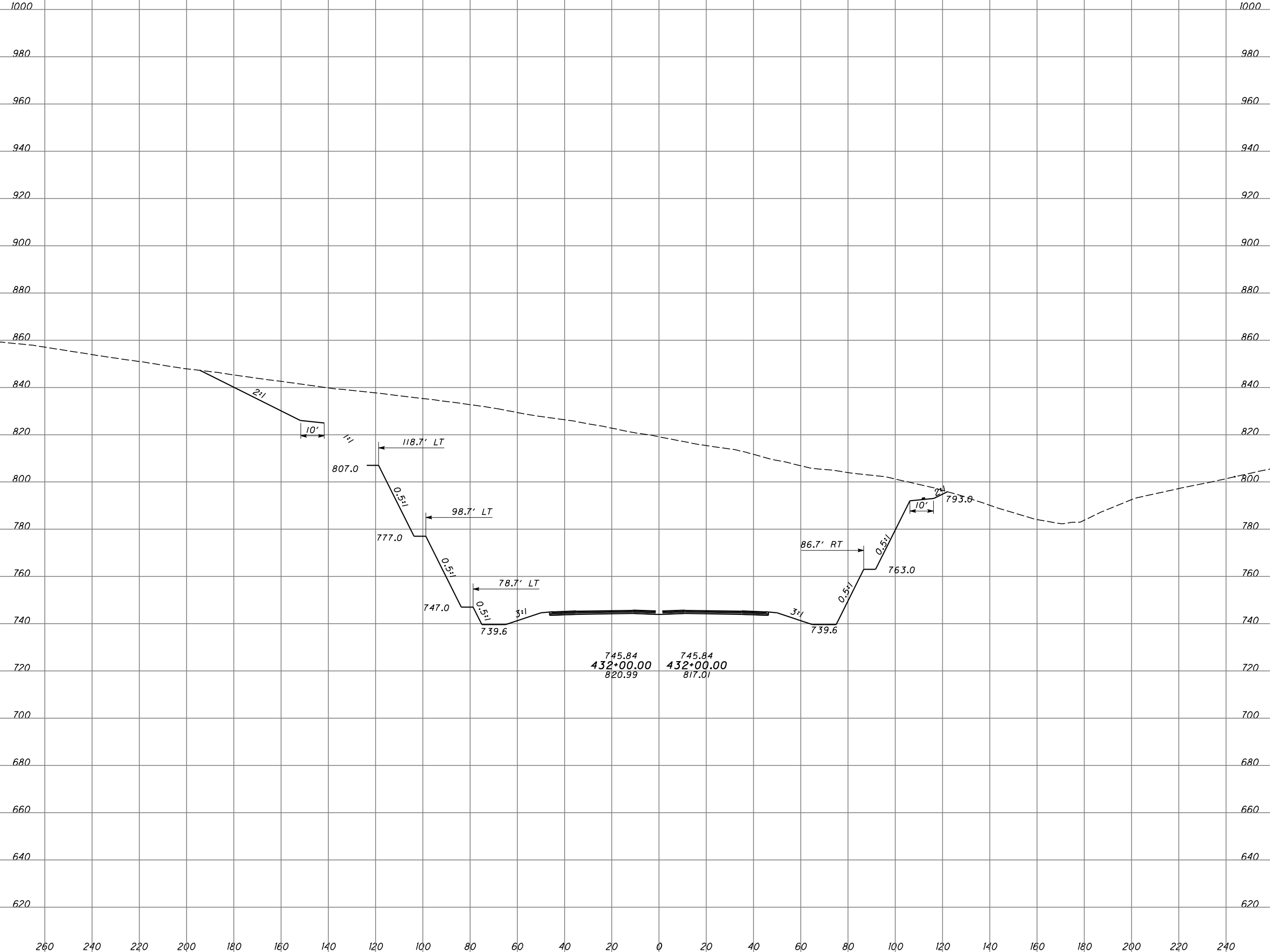
END AREA

CUT FILL

VOLUME

CUT FILL

CALCULATED CHECKED



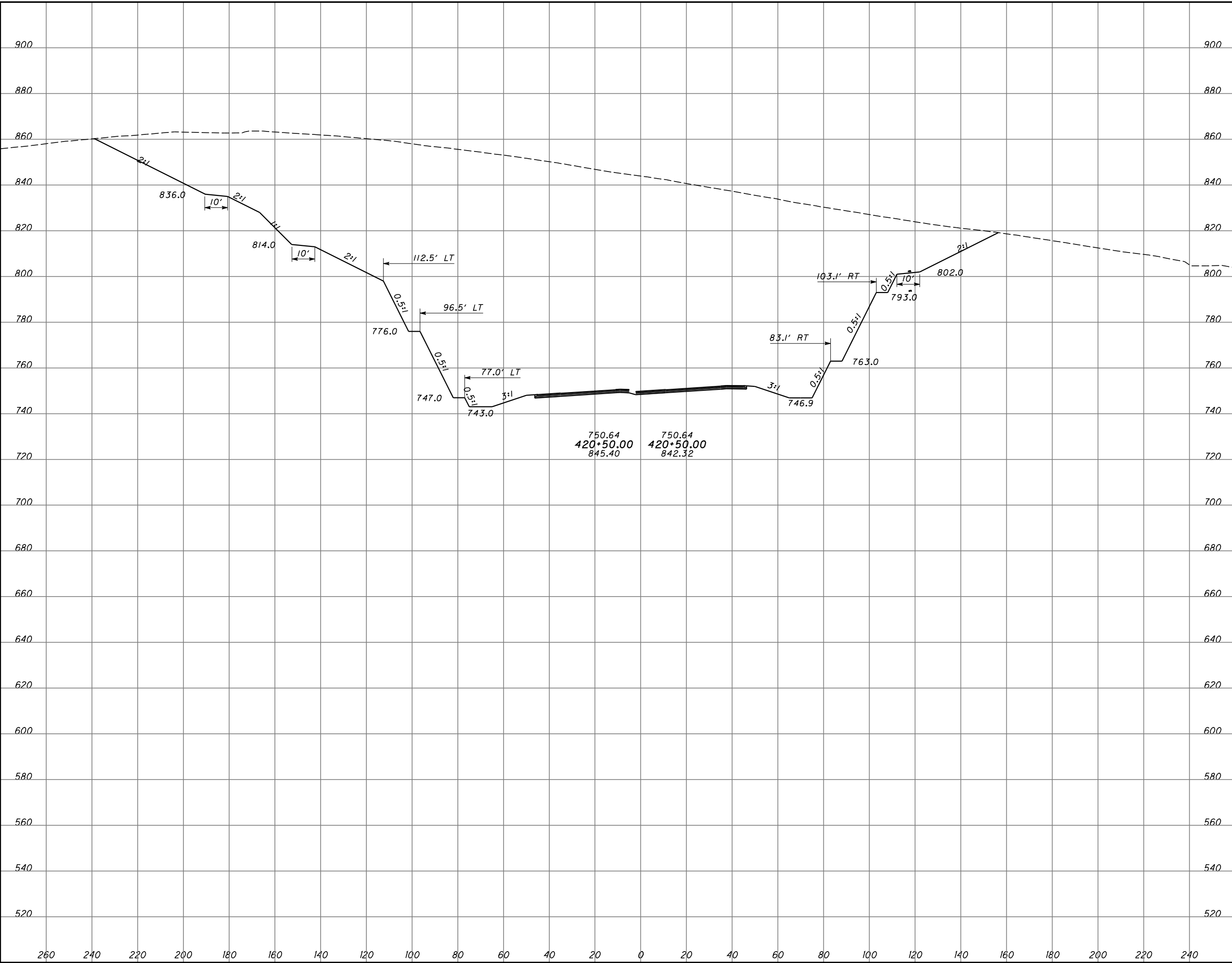
ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 432+00

SCI-823-6.81



SEEDING

END WIDTH	SO. YDS.



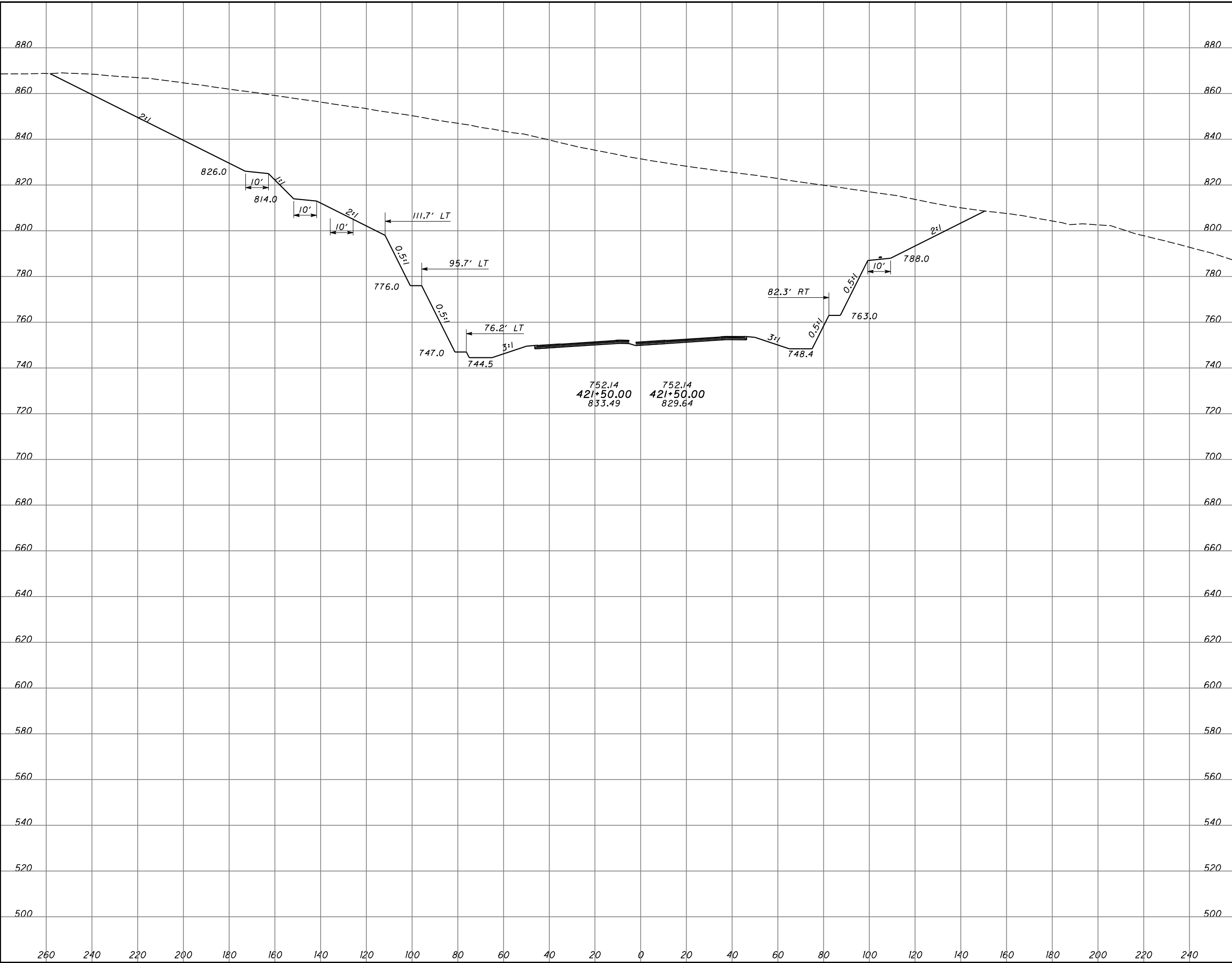
END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 420+50**

**SCI-823-6.81**

SEEDING

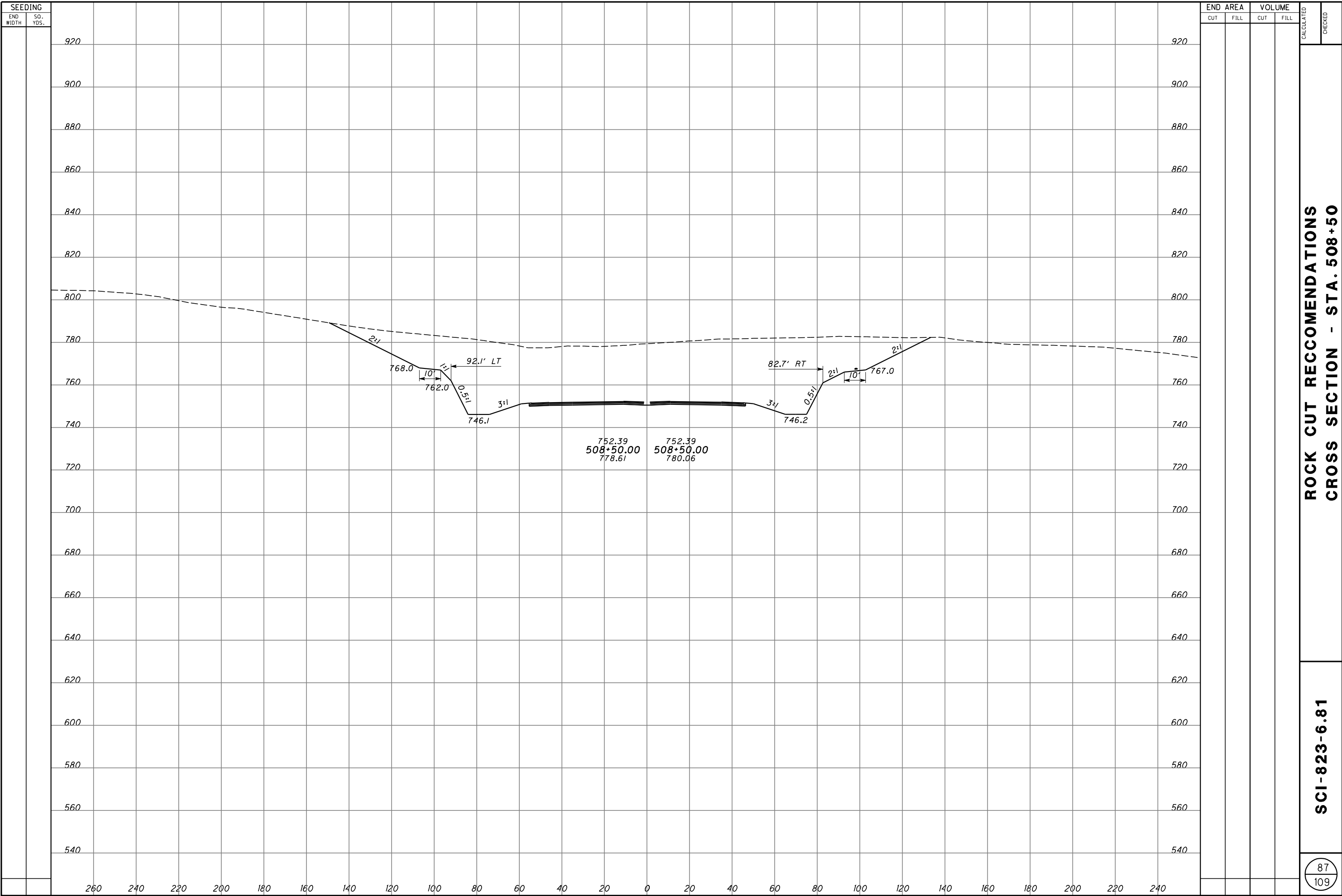
END WIDTH	SQ. YDS.
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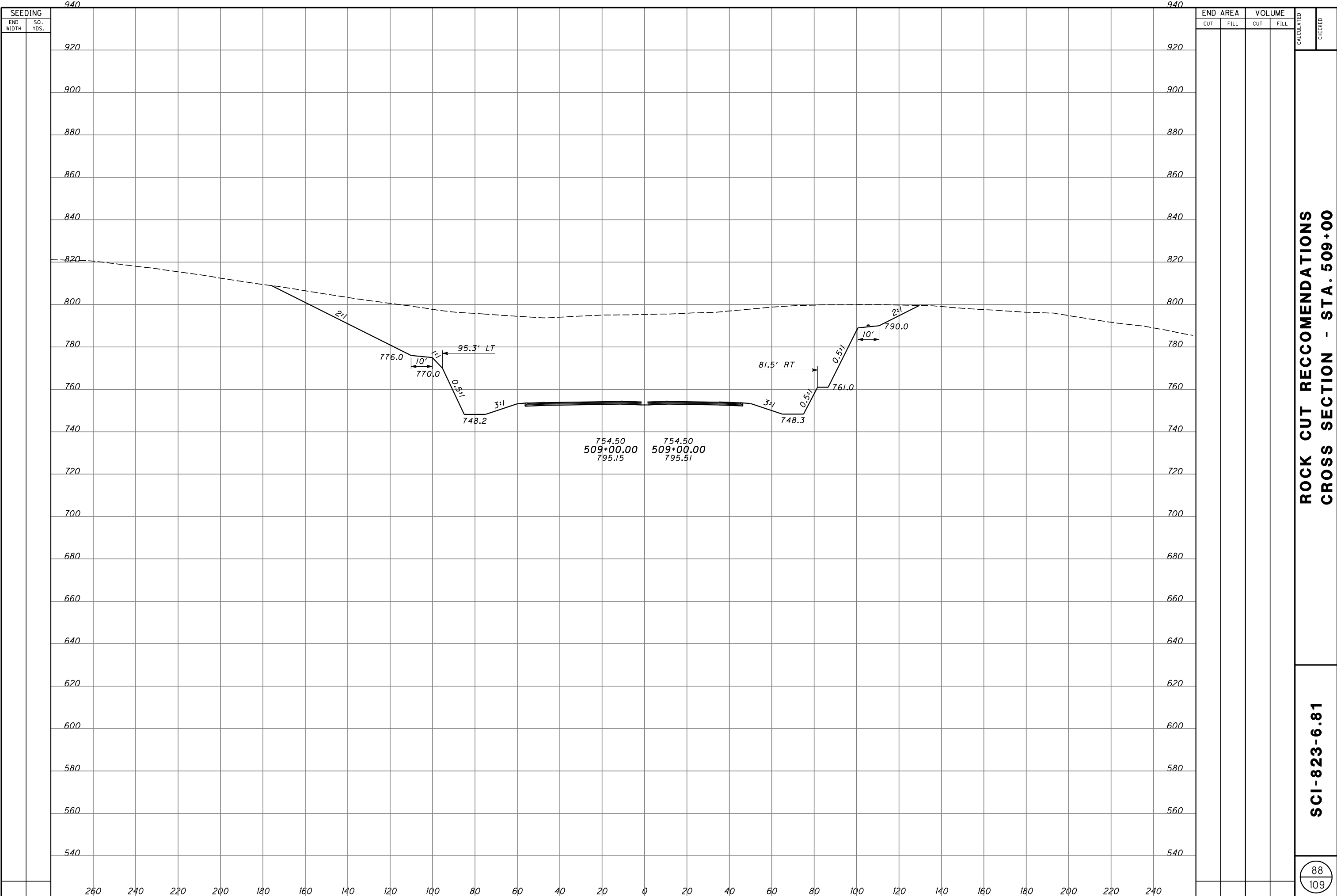


END AREA

CUT	FILL
-----	------

VOLUME	
CUT	FILL
CALCULATED	
CHECKED	
ROCK CUT RECCOMENDATIONS CROSS SECTION - STA. 421+50	





SEEDING	
END WIDTH	SQ. YDS.

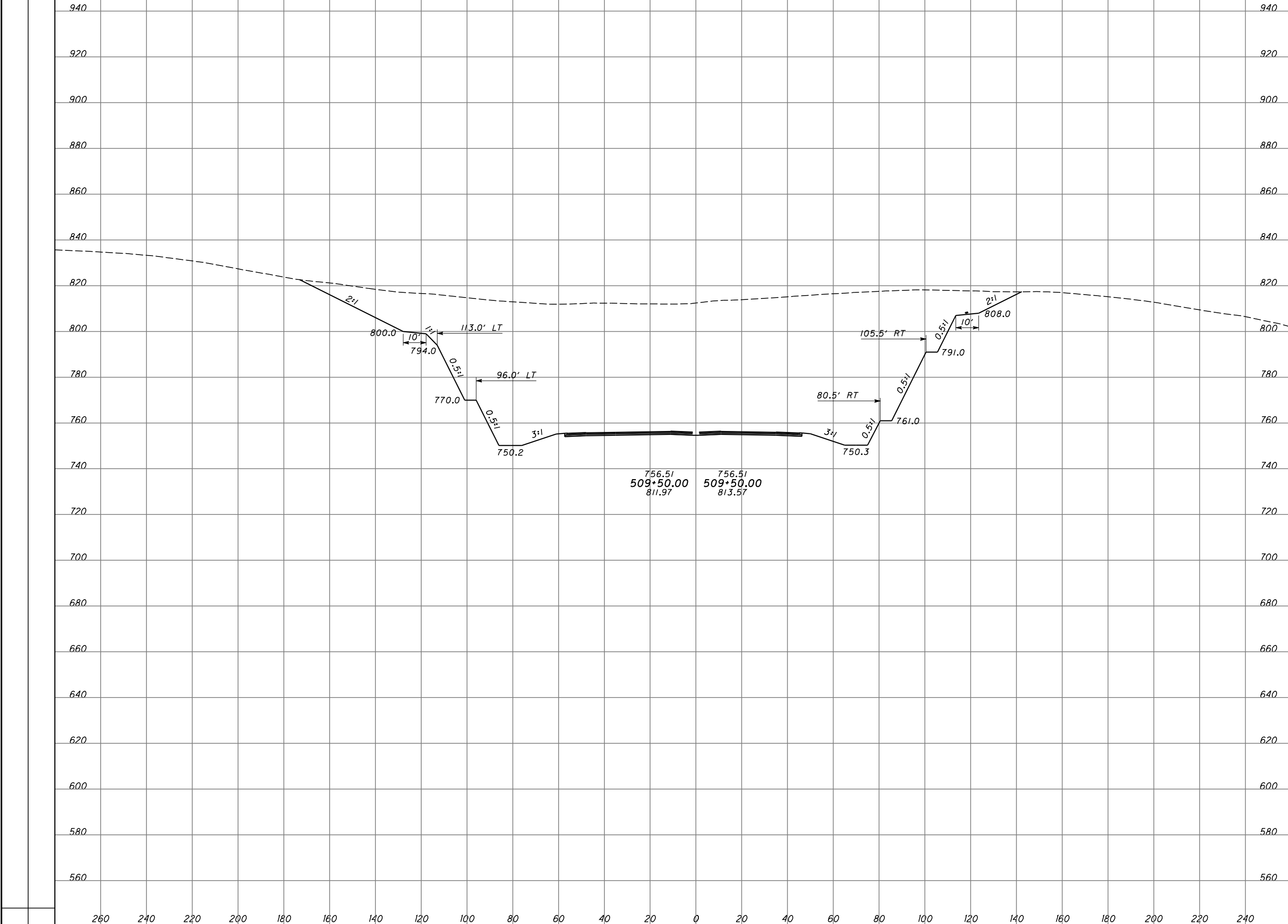
END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 509+00**

**SCI-823-6.81**

SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED



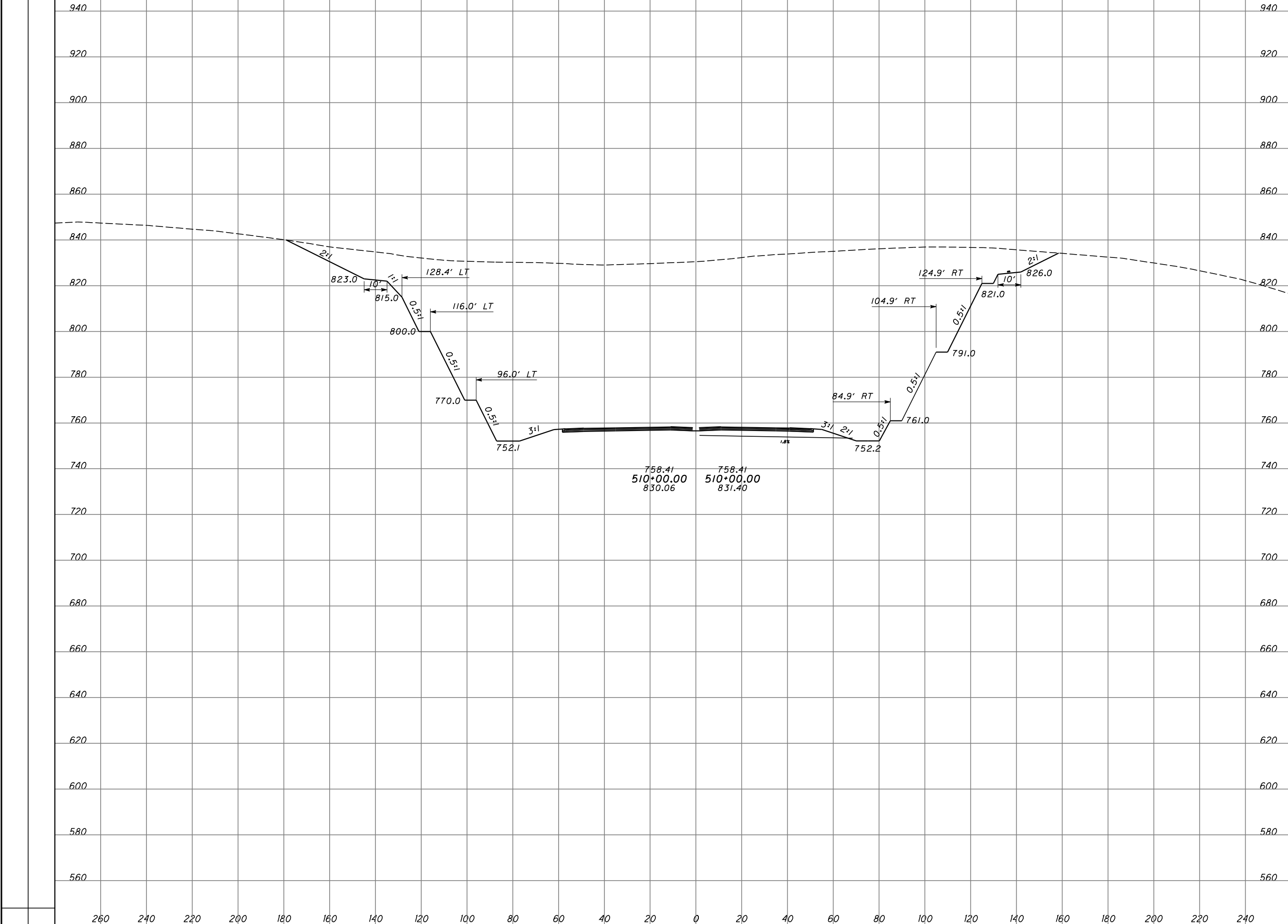
ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 509+50

SCI-823-6.81

89  
109

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 510+00**

**SCI-823-6.81**

90
109



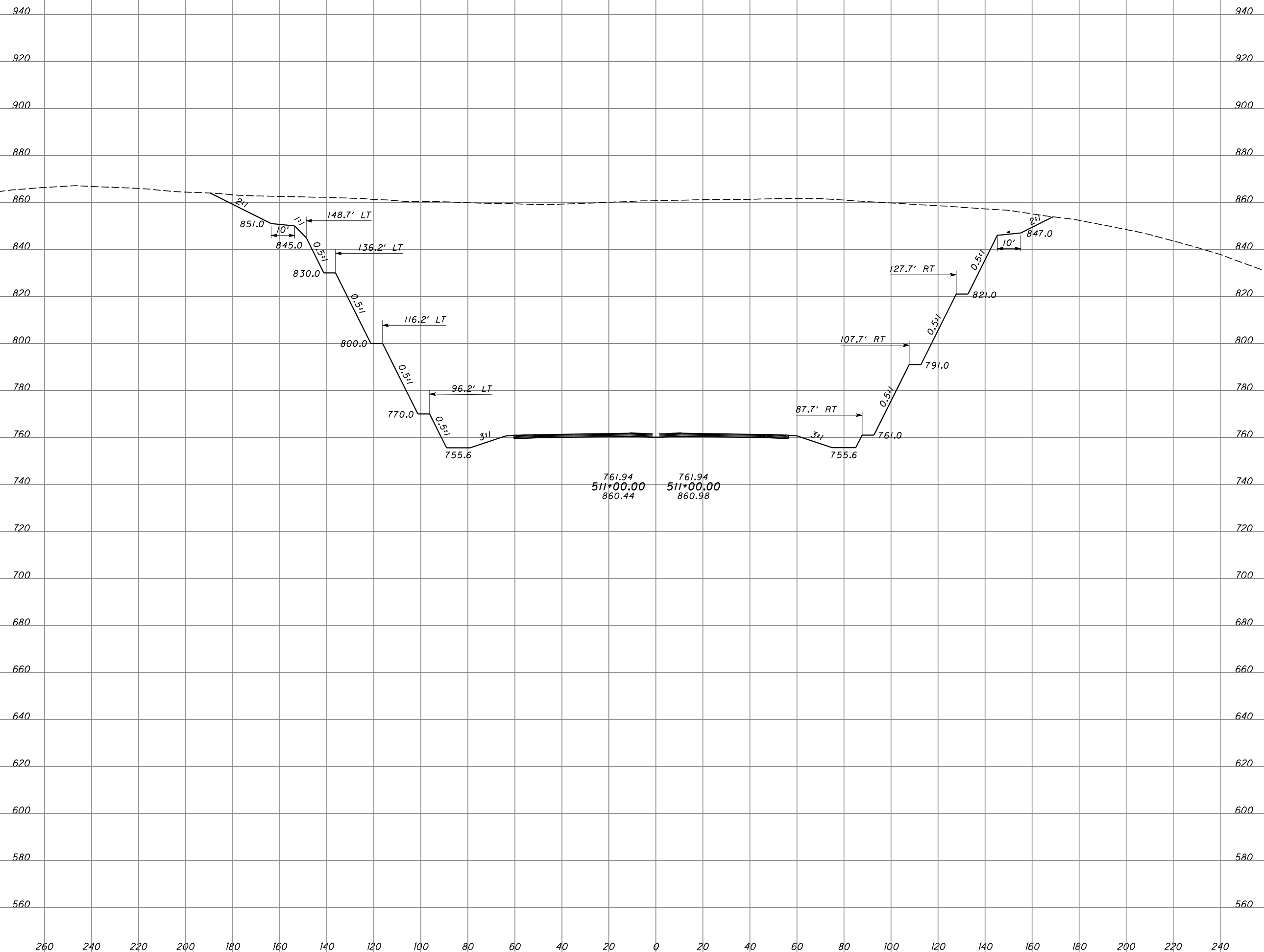
SEEDING

END WIDTH  
SQ. YDS.

END AREA  
CUT FILL

VOLUME  
CUT FILL

CALCULATED  
CHECKED



761.94  
511+00.00  
860.44

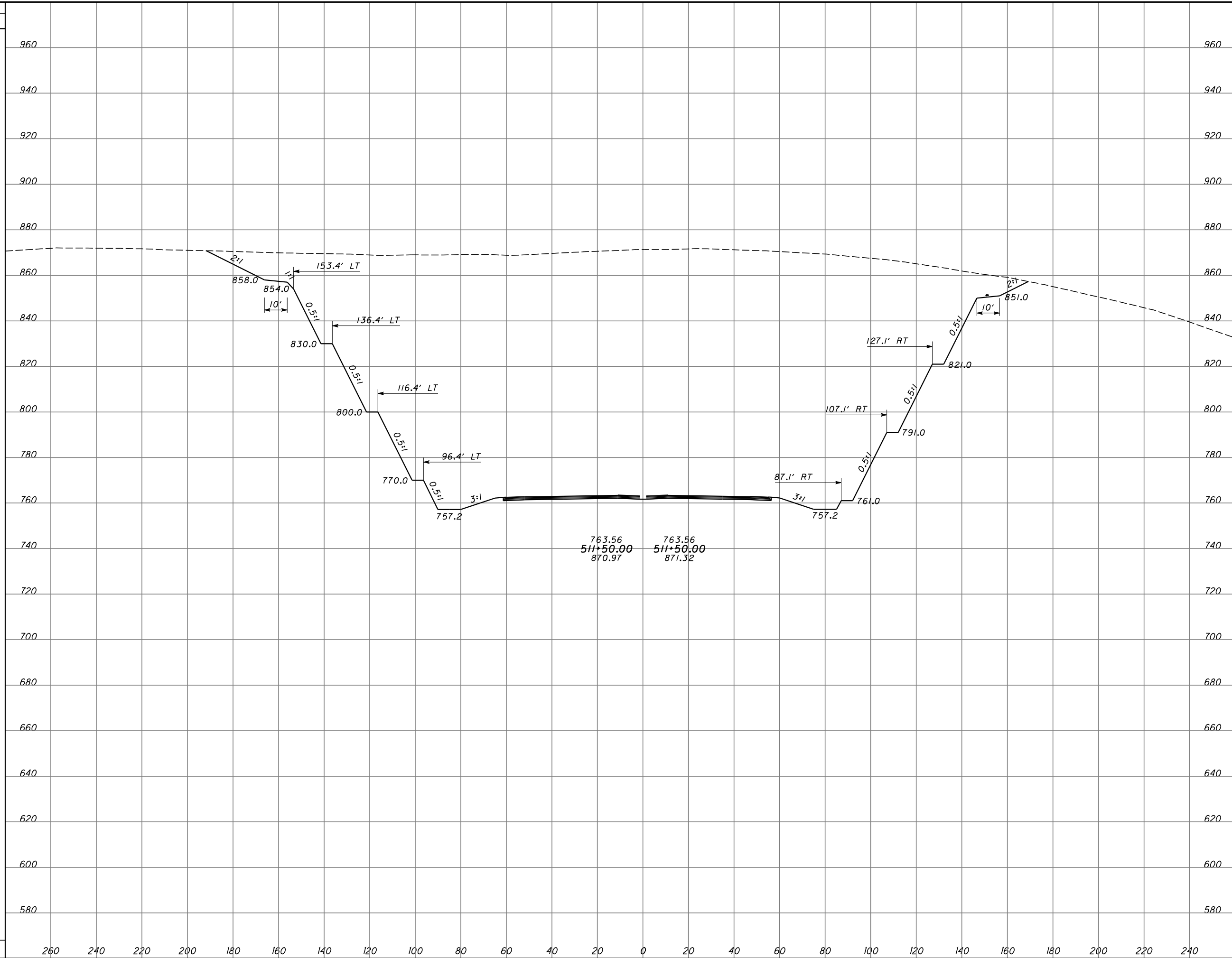
761.94  
511+00.00  
860.98

**ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 511+00**

**SCI-823-6.81**



SEEDING	
END WIDTH	SQ. YDS.



END AREA		VOLUME	
CUT	FILL	CUT	FILL

**ROCK CUT RECOMMENDATIONS**

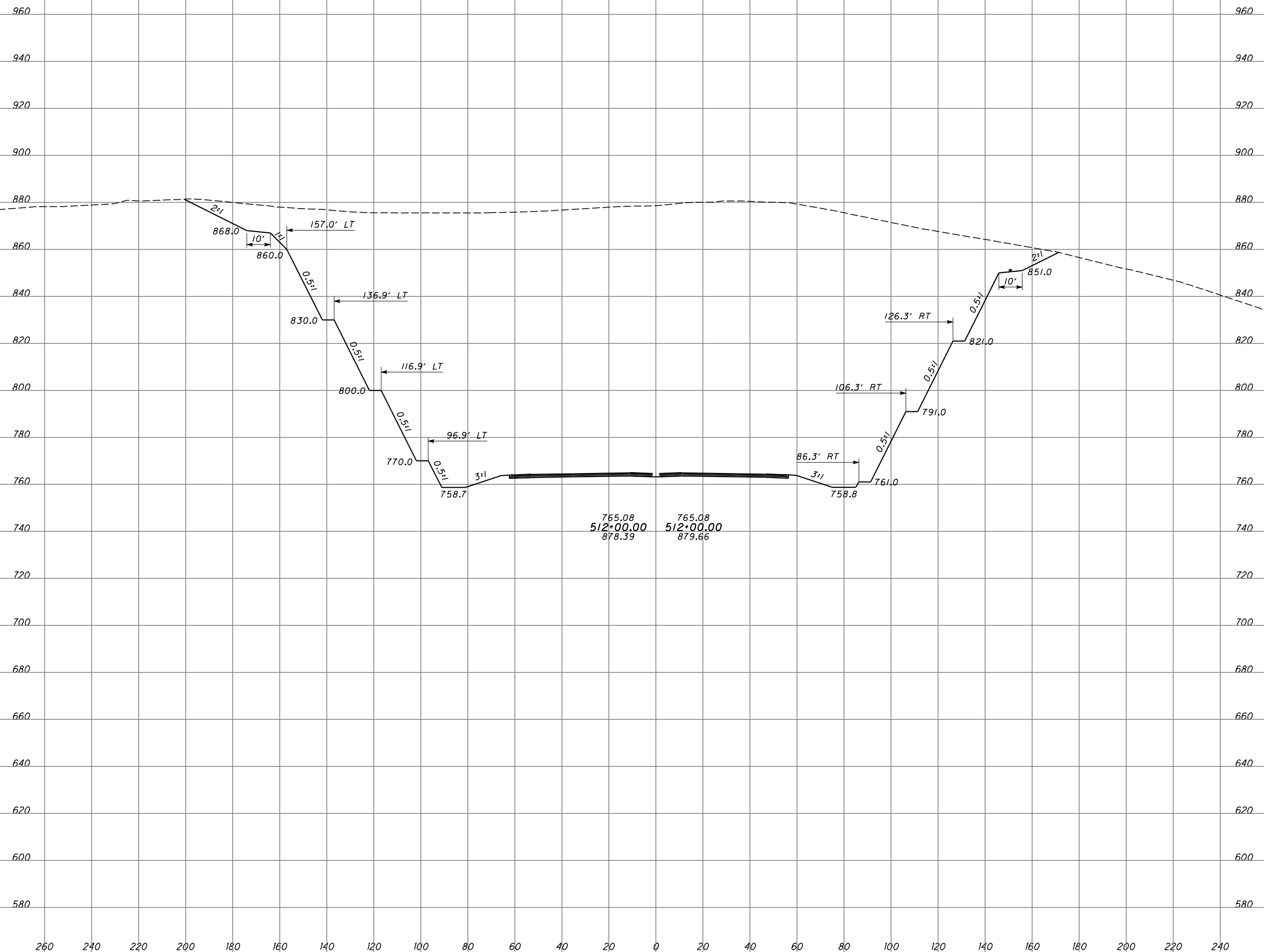
**CROSS SECTION - STA. 511+50**

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**SCI-823-6.81**

SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED



**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 512+00**

**SCI-823-6.81**

SEEDING

END WIDTH	SQ. YDS.

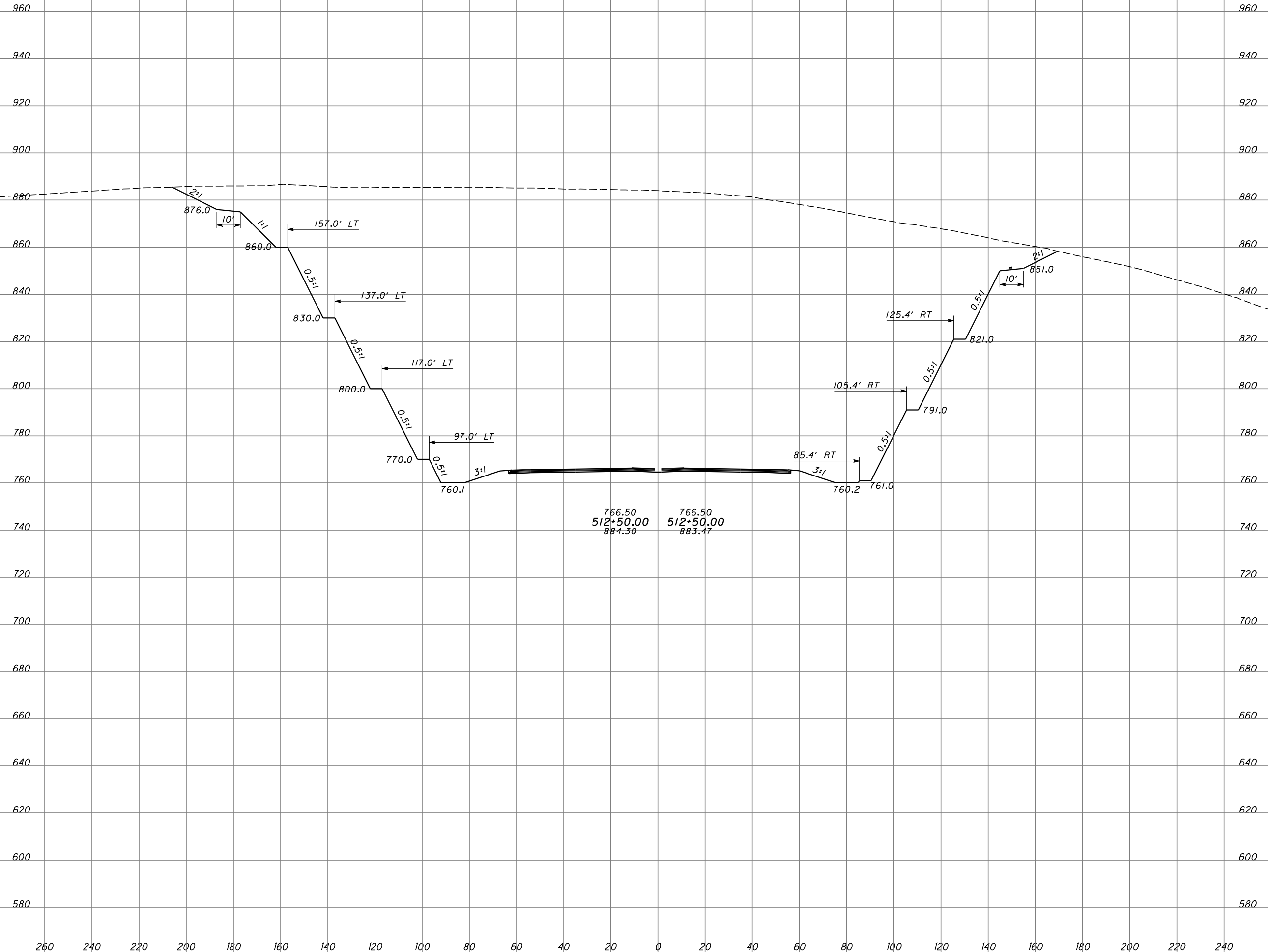
END AREA

CUT	FILL

VOLUME

CUT	FILL

CALCULATED	CHECKED



766.50 766.50  
512+50.00 512+50.00  
884.30 883.47

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 512+50**

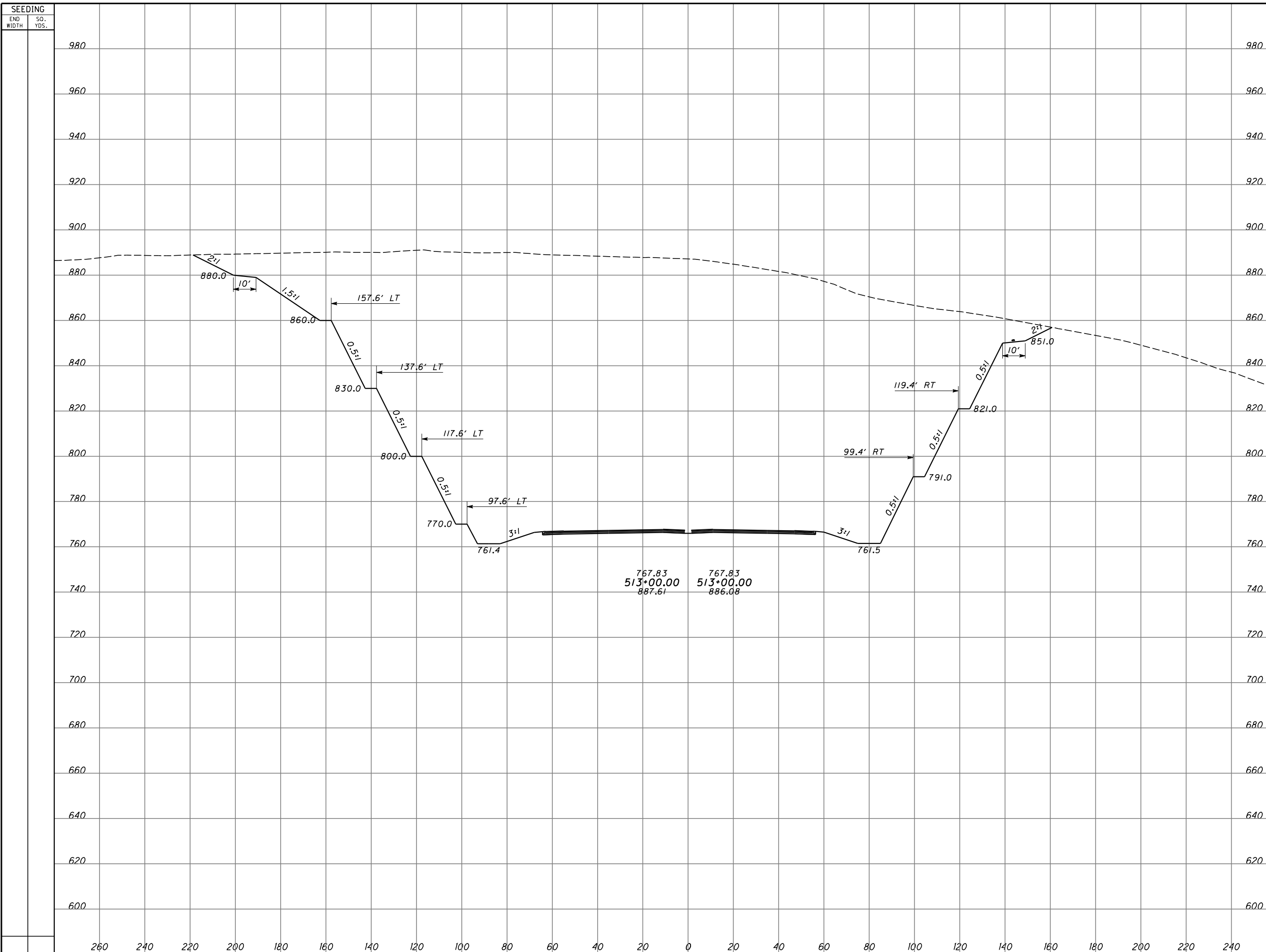
**SCI-823-6.81**

SEEDING

END WIDTH	SQ. YDS.
-----------	----------

END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED	CHECKED
------------	---------

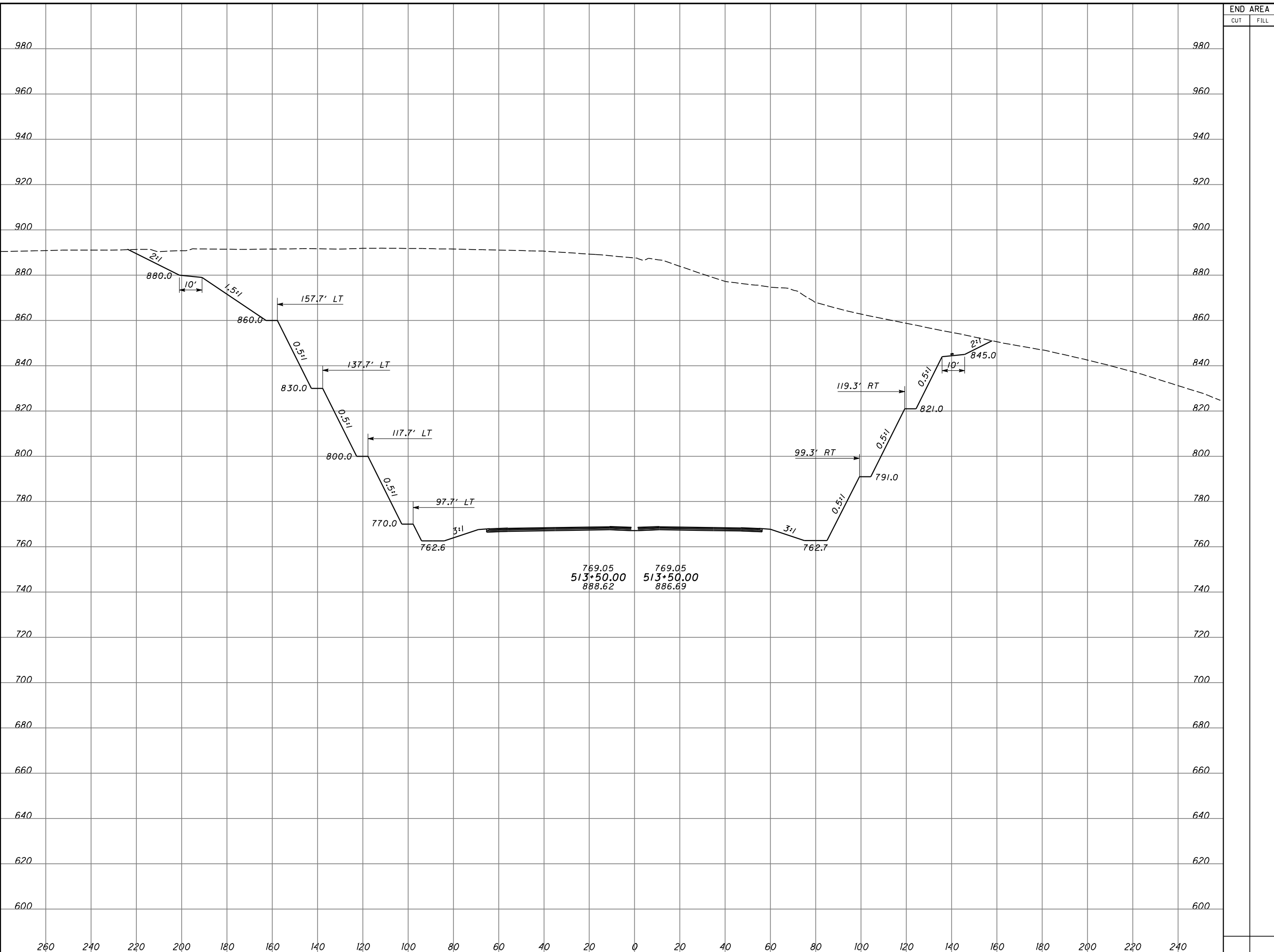


**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 513+00**

**SCI-823-6.81**

96
109

SEEDING	
END WIDTH	SQ. YDS.



END AREA	
CUT	FILL

VOLUME	
CUT	FILL

CALCULATED	CHECKED
------------	---------

**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 513+50**

**SCI-823-6.81**

97  
109

SEEDING

END WIDTH SQ. YDS.

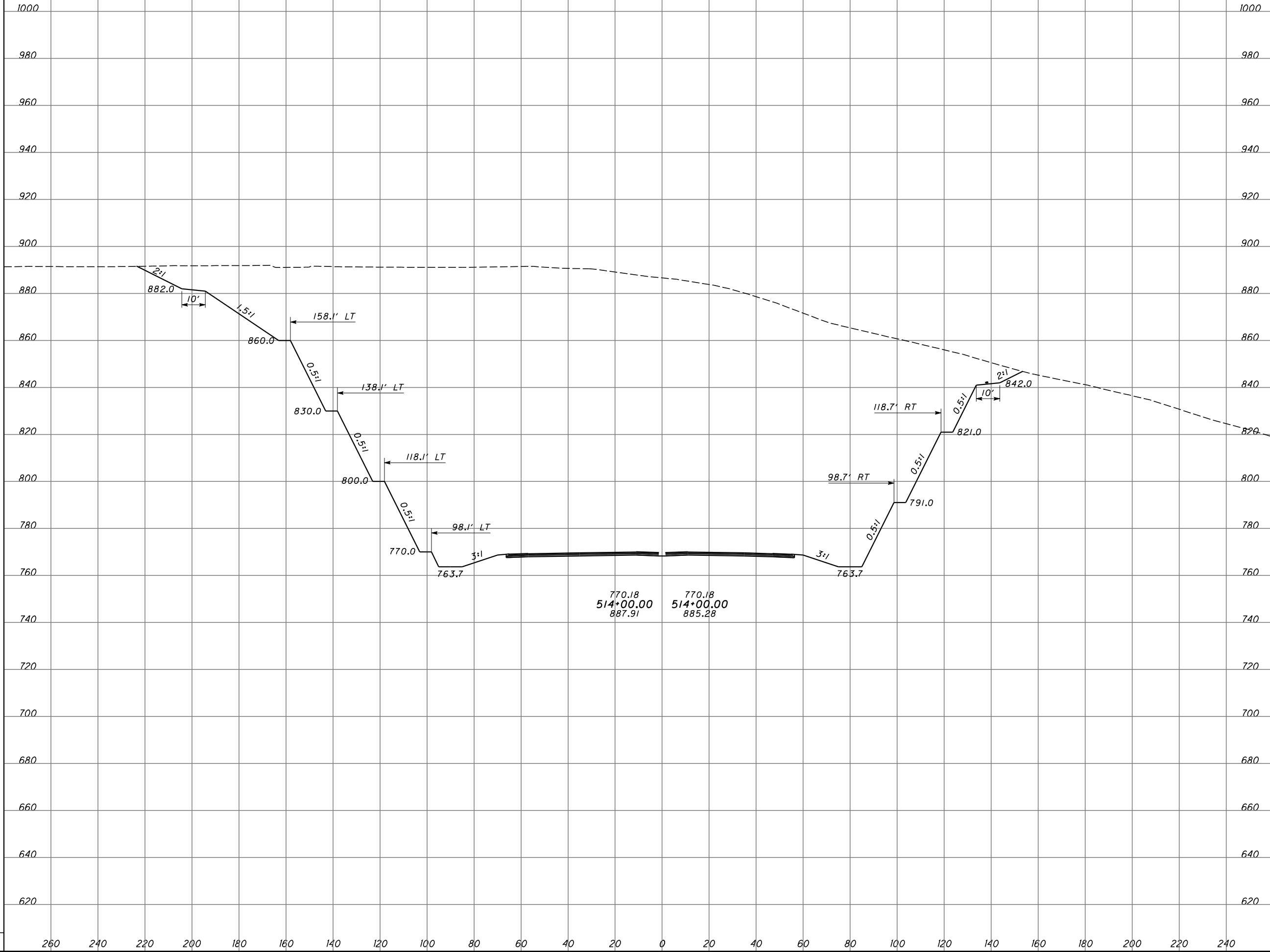
END AREA

VOLUME

CUT FILL

CUT FILL

CALCULATED CHECKED



ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 514+00

SCI-823-6.81

98  
109

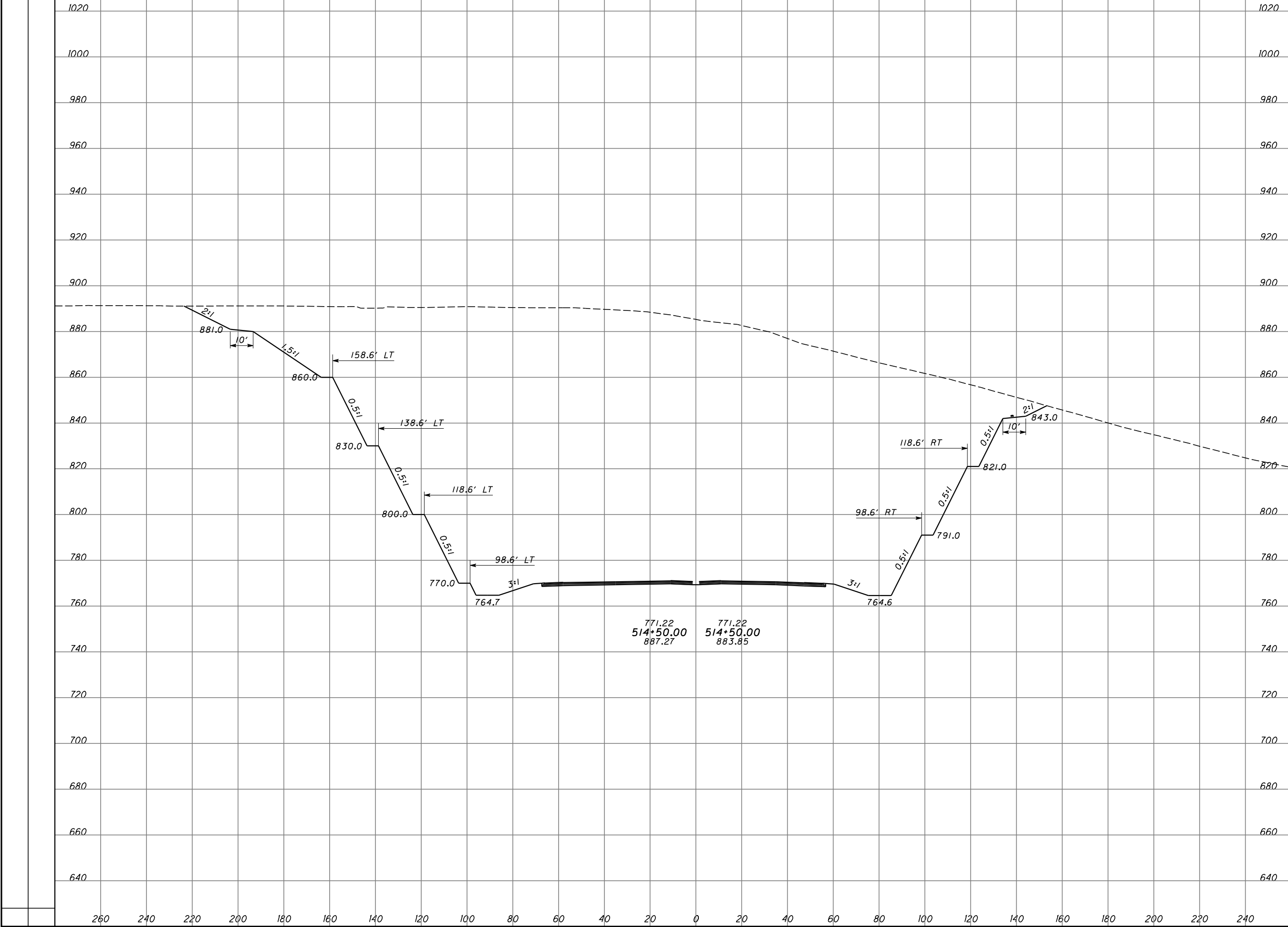
SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL

ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 514+50

SCI-823-6.81

99  
109



771.22 771.22  
514+50.00 514+50.00  
887.27 883.85

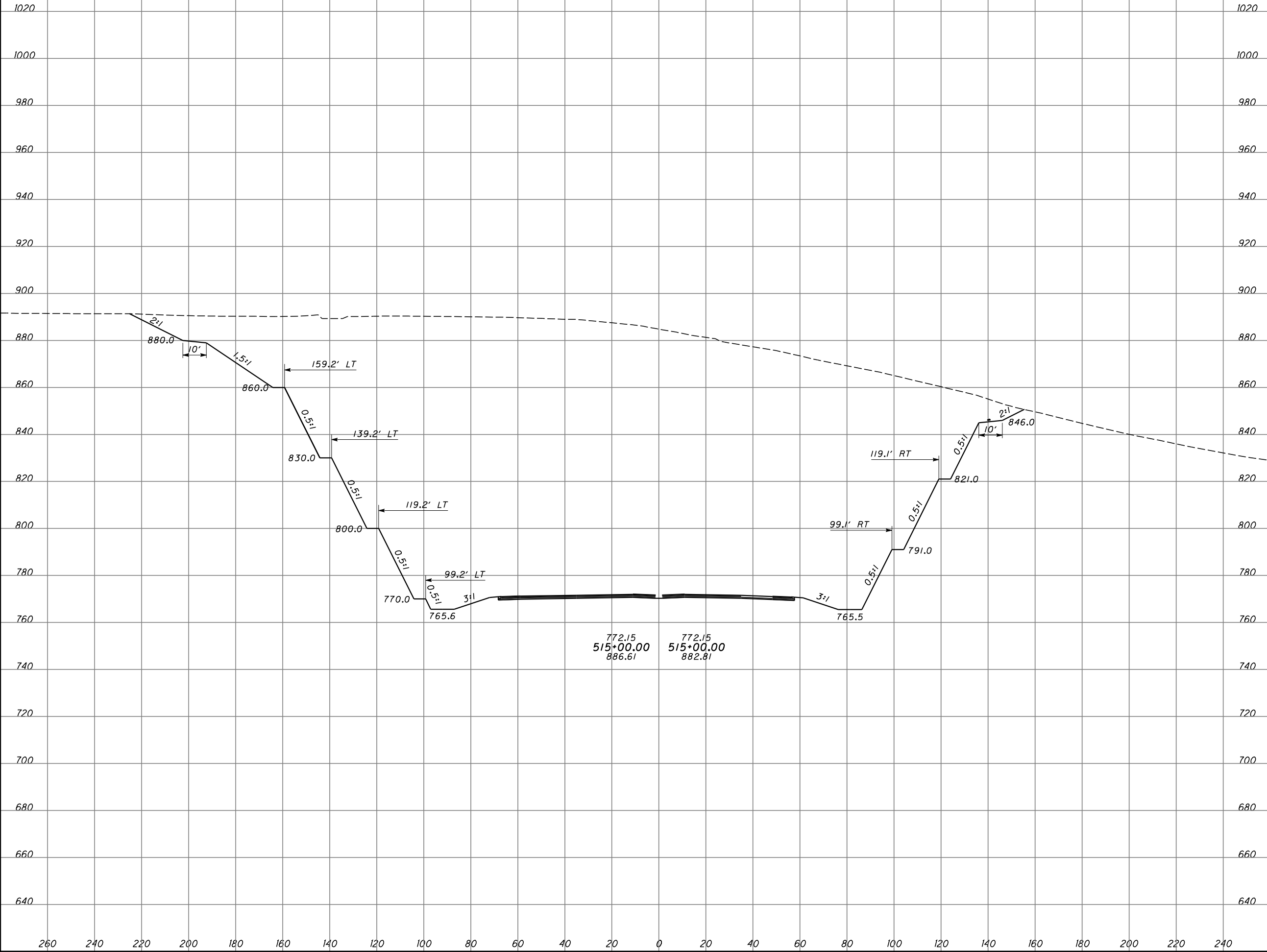
SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL

ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 515+00

SCI-823-6.81

100  
109



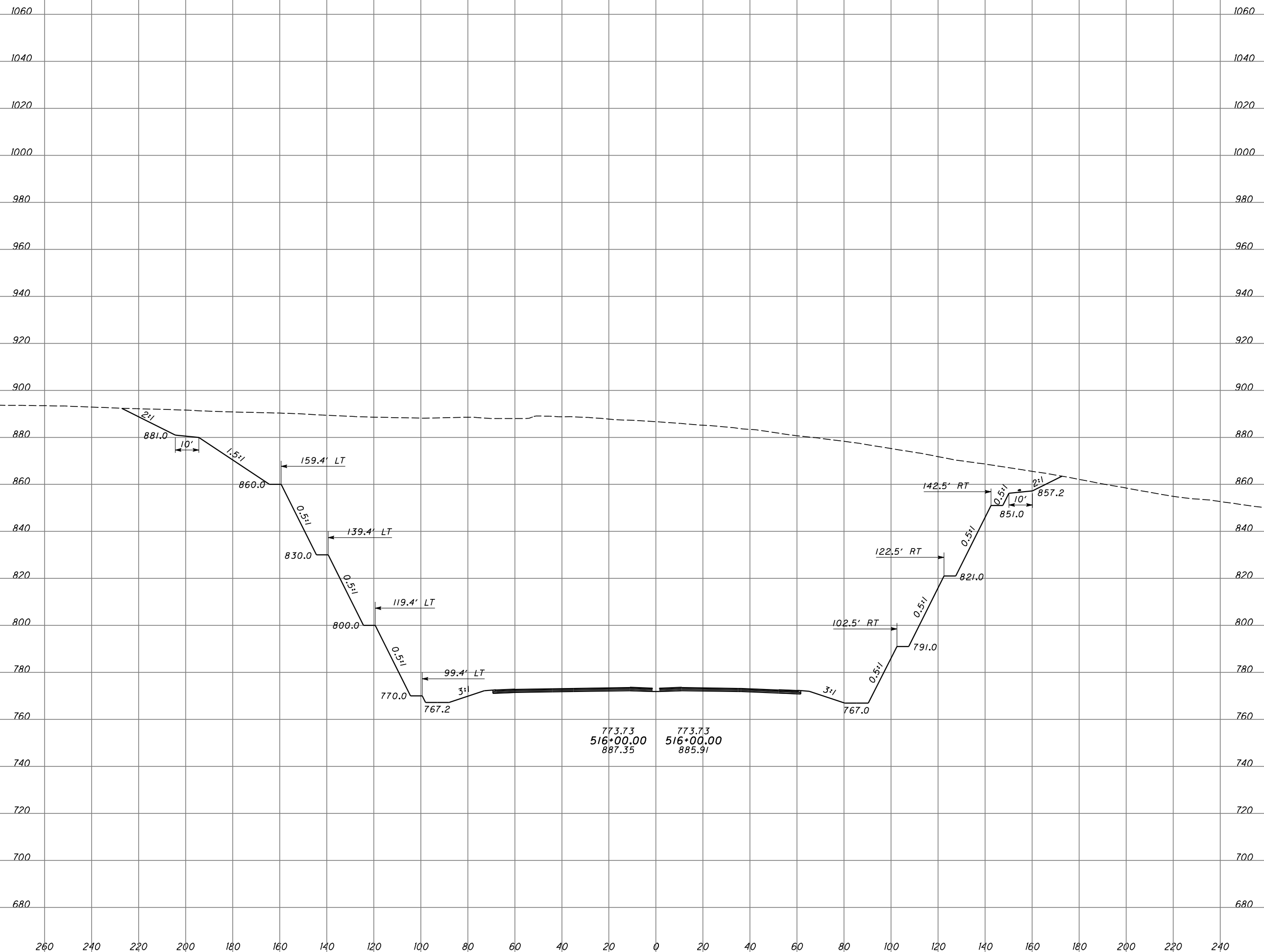
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SEEDING  
END WIDTH SQ. YDS.

END AREA VOLUME  
CUT FILL CUT FILL  
CALCULATED CHECKED



773.73 773.73  
516+00.00 516+00.00  
887.35 885.91

ROCK CUT RECCOMENDATIONS  
CROSS SECTION - STA. 516+00

SCI-823-6.81

102  
109

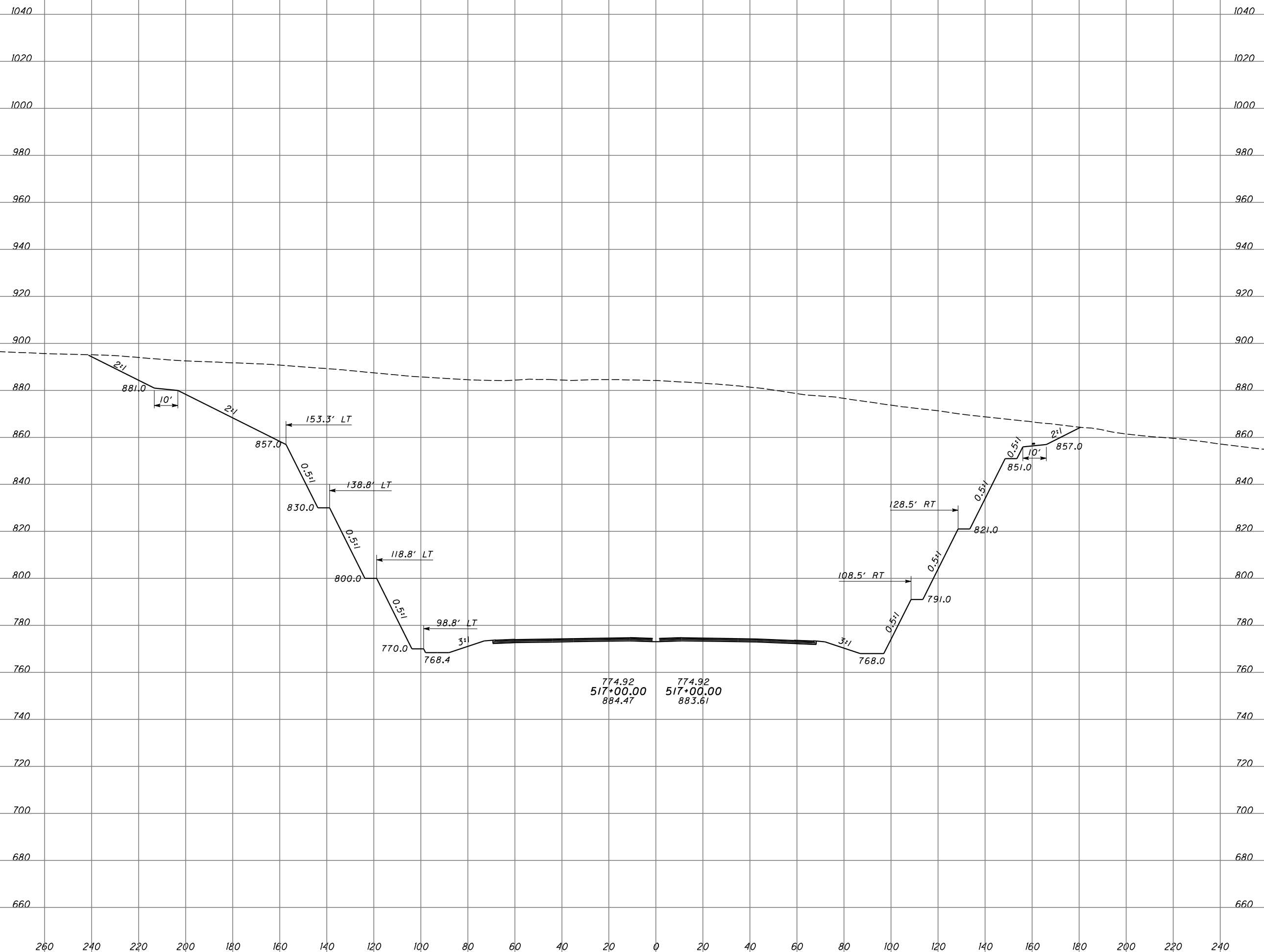


SEEDING

END WIDTH SQ. YDS.

END AREA VOLUME

CUT FILL CUT FILL CALCULATED CHECKED



774.92 774.92  
517+00.00 517+00.00  
884.47 883.61

ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 517+00

SCI-823-6.81

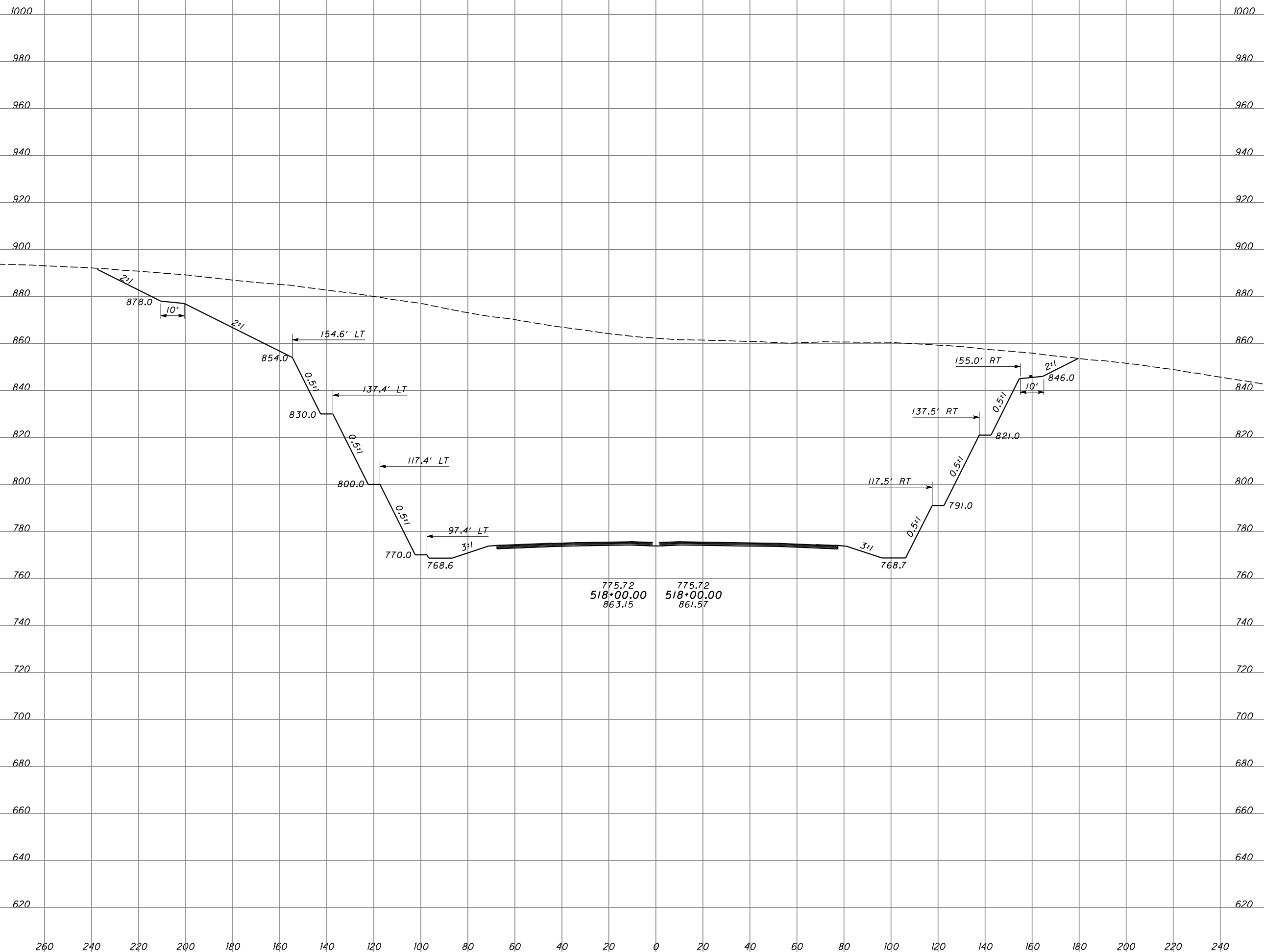
104  
109



SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED	CHECKED
------------	---------



775.72  
518+00.00  
863.15

775.72  
518+00.00  
861.57

**ROCK CUT RECCOMENDATIONS**  
**CROSS SECTION - STA. 518+00**

**SCI-823-6.81**

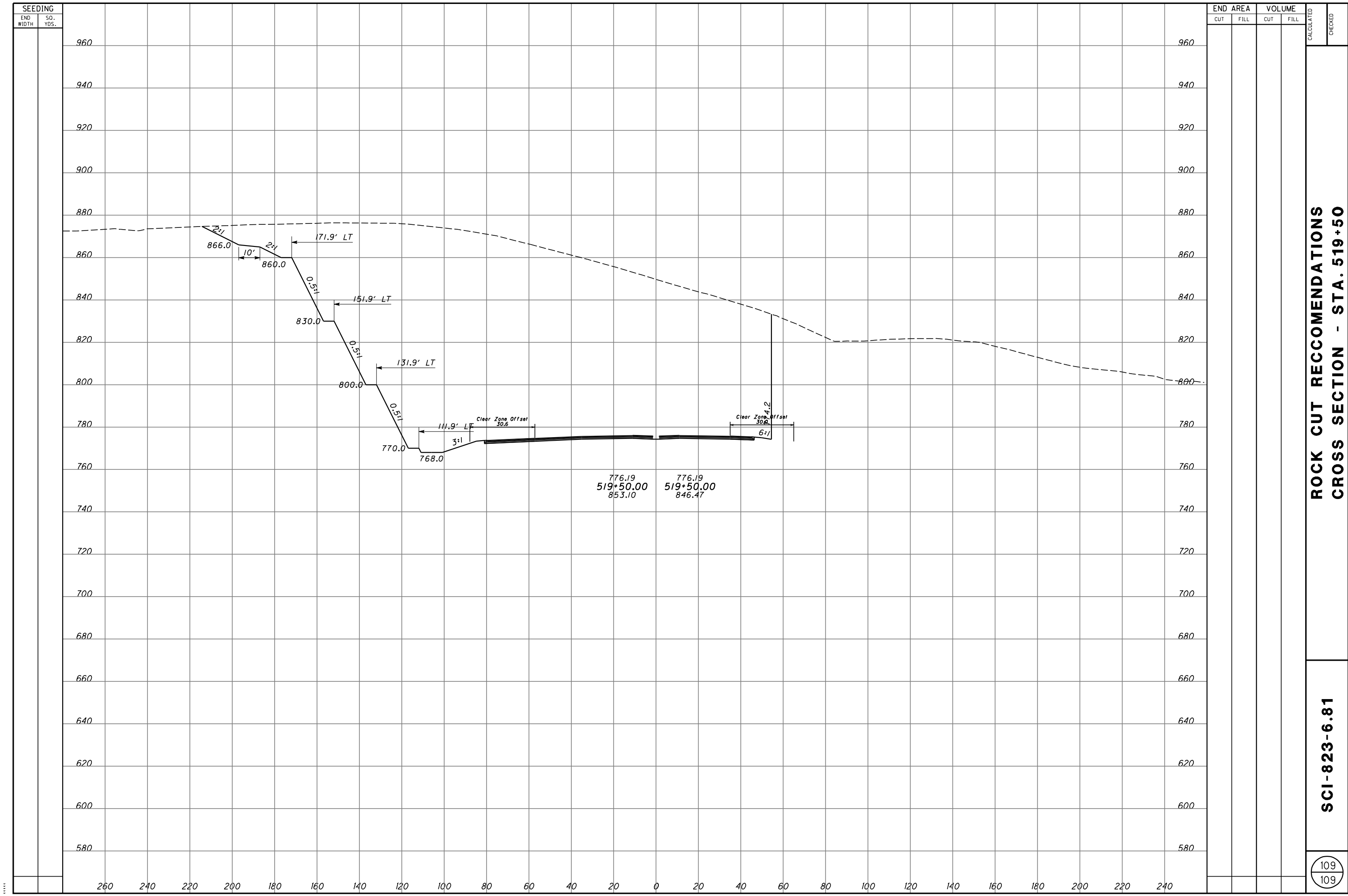
106  
109

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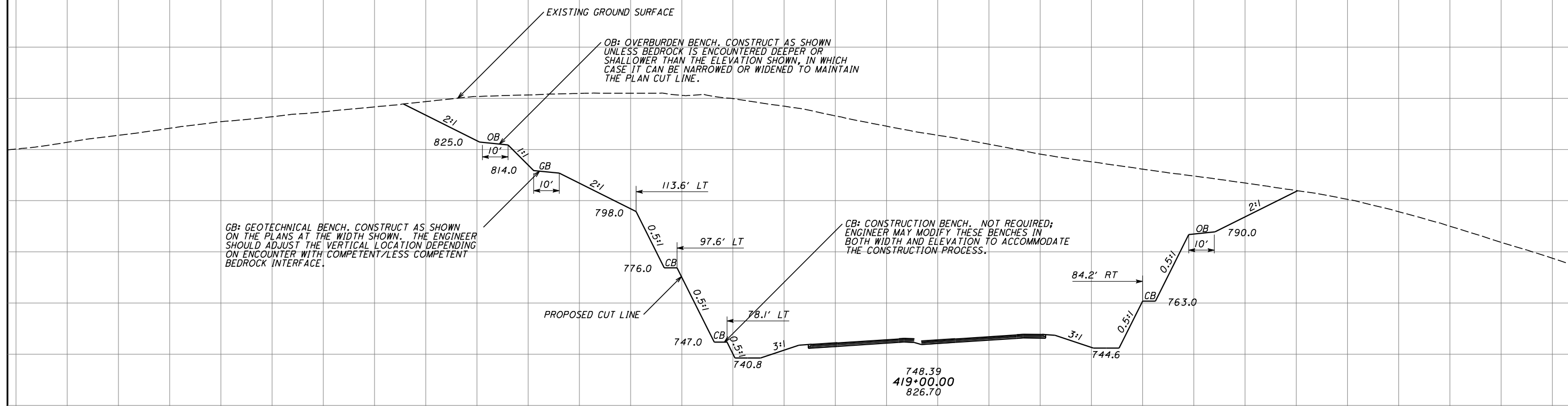
**ROCK CUT RECOMMENDATIONS  
CROSS SECTION - STA. 519+50**

**SCI-823-6.81**

109
109



ROCK CUT SLOPE RECCOMENDATIONS - BENCH TYPES



## Colorado Rock Fall Simulation Analysis

**SCI-823-6.81 Phase I  
CRSP Results  
Summary**

**New Construction**

**Left Side**

Percent Retained @ AP-2 Percent Retained @ AP-2

<b>Station</b>	<b>Height</b>	<b>Max (1.5' x 1.5')</b>	<b>Average (1'x1')</b>	<b>Barrier?</b>
428+00	135	98%	100%	No
455+00	107	100%	99%	No
481+00	143	90%	100%	Yes
501+00	118	100%	100%	No
516+00	101	100%	100%	No

**Weathered**

**Left Side**

Percent Retained @ AP-2 Percent Retained @ AP-2

<b>Station</b>	<b>Height</b>	<b>Max (1.5' x 1.5')</b>	<b>Average (1'x1')</b>	<b>Barrier?</b>
428+00	135	99%	100%	No
455+00	107	100%	100%	No
481+00	143	99%	100%	No
501+00	118	100%	100%	No
516+00	101	99%	100%	No

**New Construction**

**Right Side**

Percent Retained @ AP-2 Percent Retained @ AP-2

<b>Station</b>	<b>Height</b>	<b>Max (1.5' x 1.5')</b>	<b>Average (1'x1')</b>	<b>Barrier?</b>
428+50	101	100%	100%	No
501+00	46	100%	100%	No
524+00	94	100%	100%	No

**Weathered**

**Right Side**

Percent Retained @ AP-2 Percent Retained @ AP-2

<b>Station</b>	<b>Height</b>	<b>Max (1.5' x 1.5')</b>	<b>Average (1'x1')</b>	<b>Barrier?</b>
428+50	101	98%	100%	No
501+00	46	100%	100%	No
524+00	94	100%	100%	No

## STA 428+00 Left Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 16

Analysis Point 1 X-Coordinate: 212

Analysis Point 2 X-Coordinate: 217

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 135

Initial Y-Base Starting Zone Coordinate: 100

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.5	0.5	0.15	0	152	33	135
2	0.12	0.85	0.2	33	135	43	134
3	0.15	0.75	0.18	43	134	102	105
4	0.14	0.75	0.18	102	105	110	89
5	0.12	0.85	0.2	110	89	120	88
6	0.14	0.75	0.18	120	88	135	81
7	0.12	0.85	0.2	135	81	140	81
8	0.12	0.85	0.2	140	81	149	60
9	0.12	0.85	0.2	149	60	154	60
10	0.12	0.85	0.2	154	60	169	30
11	0.12	0.85	0.2	169	30	174	30
12	0.12	0.85	0.2	174	30	189	0
13	0.12	0.85	0.2	189	0	199	0
14	0.12	0.85	0.2	199	0	212	5
15	0.12	0.85	0.2	212	5	217	6
16	0.1	0.9	0.9	217	6	242	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 16

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 212, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

Analysis Point 2: X = 217, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 428+00 Left Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 16

Analysis Point 1 X-Coordinate: 212

Analysis Point 2 X-Coordinate: 217

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 135

Initial Y-Base Starting Zone Coordinate: 100

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.5	0.5	0.15	0	152	33	135
2	0.15	0.85	0.2	33	135	43	134
3	0.3	0.75	0.18	43	134	102	105
4	0.25	0.75	0.18	102	105	110	89
5	0.15	0.8	0.2	110	89	120	88
6	0.25	0.8	0.2	120	88	135	81
7	0.15	0.9	0.25	135	81	140	81
8	0.15	0.95	0.3	140	81	149	60
9	0.15	0.95	0.3	149	60	154	60
10	0.15	0.95	0.3	154	60	169	30
11	0.15	0.95	0.3	169	30	174	30
12	0.15	0.9	0.25	174	30	189	0
13	0.15	0.95	0.3	189	0	199	0
14	0.15	0.95	0.3	199	0	212	5
15	0.15	0.9	0.3	212	5	217	6
16	0.1	1	0.3	217	6	242	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 2

Ending Cell Number: 16

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 212, Y = 5

Total Rocks Passing Analysis Point: 1 = 3

### CRSP Analysis Point 2

Analysis Point 2: X = 217, Y = 6

Total Rocks Passing Analysis Point: 1 = 1

## STA 428+00 Left Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 212

Analysis Point 2 X-Coordinate: 217

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 135

Initial Y-Base Starting Zone Coordinate: 105

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.5	0.5	0.15	0	152	102	105
2	0.21	0.8	0.18	102	105	135	81
3	0.21	0.8	0.18	135	81	189	0
4	0.21	0.8	0.18	189	0	199	0
5	0.21	0.8	0.18	199	0	212	5
6	0.21	0.8	0.18	212	5	217	6
7	0.1	0.9	0.9	217	6	235	6

CRSP Simulation Specifications: Used with M:\proj\0121\3070.03\Cut Slope Designs\GB-3\Phase I CRSP Analyses\06 CRSP Analysis\STA 428+00\Left\Weathered\STA 428+00 Left Slope weathered max.dat

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 212, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 217, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 428+00 Left Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 212

Analysis Point 2 X-Coordinate: 217

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 135

Initial Y-Base Starting Zone Coordinate: 105

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.5	0.65	0.15	0	152	102	105
2	0.5	0.65	0.15	102	105	135	81
3	0.3	0.25	0.85	135	81	189	0
4	0.25	0.7	0.15	189	0	199	0
5	0.25	0.75	0.2	199	0	212	5
6	0.2	0.85	0.2	212	5	217	6
7	0.15	1	0.3	217	6	235	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 140 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: .5 ft

Thickness: .167 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 212, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 217, Y = 6

NO ROCKS PAST ANALYSIS POINT 2



## STA 428+50 Right Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 16

Analysis Point 1 X-Coordinate: 163

Analysis Point 2 X-Coordinate: 168

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.15	0.75	0.18	0	120	40	101
2	0.12	0.85	0.2	40	101	50	100
3	0.15	0.75	0.18	50	100	56	88
4	0.12	0.85	0.2	56	88	66	87
5	0.12	0.85	0.2	66	87	85	76
6	0.12	0.85	0.2	85	76	90	76
7	0.12	0.85	0.2	90	76	96	71
8	0.12	0.85	0.2	96	71	108	46
9	0.12	0.85	0.2	108	46	113	46
10	0.12	0.85	0.2	113	46	127	16
11	0.12	0.85	0.2	127	16	132	16
12	0.12	0.85	0.2	132	16	140	0
13	0.12	0.85	0.2	140	0	150	0
14	0.12	0.85	0.2	150	0	163	5
15	0.12	0.85	0.2	163	5	168	6
16	0.1	0.9	0.9	168	6	193	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 16

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 163, Y = 5

Total Rocks Passing Analysis Point 1 = 4

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 168, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 428+50 Right Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 16

Analysis Point 1 X-Coordinate: 163

Analysis Point 2 X-Coordinate: 168

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	120	40	101
2	0.15	0.85	0.2	40	101	50	100
3	0.3	0.75	0.18	50	100	56	88
4	0.15	0.85	0.2	56	88	66	87
5	0.15	0.85	0.2	66	87	85	76
6	0.15	0.85	0.2	85	76	90	76
7	0.15	0.85	0.2	90	76	96	71
8	0.15	0.85	0.2	96	71	108	46
9	0.15	0.85	0.2	108	46	113	46
10	0.15	0.85	0.2	113	46	127	16
11	0.15	0.85	0.2	127	16	132	16
12	0.15	0.85	0.2	132	16	140	0
13	0.15	0.85	0.2	140	0	150	0
14	0.15	0.85	0.2	150	0	163	5
15	0.15	0.85	0.2	163	5	168	6
16	0.1	0.9	0.9	168	6	193	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 16

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 163, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 168, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 428+50 Right Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 162

Analysis Point 2 X-Coordinate: 167

Analysis Point 3 X-Coordinate: 0

Initial Y-Top Starting Zone Coordinate: 72

Initial Y-Base Starting Zone Coordinate: 70

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	119	87	72
2	0.21	0.8	0.18	87	72	139	0
3	0.21	0.8	0.18	139	0	149	0
4	0.21	0.8	0.18	149	0	162	5
5	0.21	0.8	0.18	162	5	167	6
6	0.1	0.9	0.9	167	6	195	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 162, Y = 5

Total Rocks Passing Analysis Point 1 = 46

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 167, Y = 6

Total Rocks Passing Analysis Point 2 = 7

## STA 428+50 Right Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 162

Analysis Point 2 X-Coordinate: 167

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 72

Initial Y-Base Starting Zone Coordinate: 70

### Cell Data

Cell	No. S.R.	Tang. C.	Norm C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	119	87	72
2	0.3	0.8	0.18	87	72	139	0
3	0.3	0.8	0.18	139	0	149	0
4	0.3	0.8	0.18	149	0	162	5
5	0.3	0.8	0.18	162	5	167	6
6	0.1	0.9	0.9	167	6	195	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 162, Y = 5

Total Rocks Passing Analysis Point 1 = 58

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 167, Y = 6

Total Rocks Passing Analysis Point2 = 9

## STA 455+00 Left Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 12

Analysis Point 1 X-Coordinate: 155

Analysis Point 2 X-Coordinate: 166

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	107	52	81
2	0.15	0.85	0.2	52	81	62	80
3	0.15	0.85	0.2	62	80	90	51
4	0.15	0.85	0.2	90	51	95	51
5	0.15	0.85	0.2	95	51	108	39
6	0.15	0.85	0.2	108	39	117	21
7	0.15	0.85	0.2	117	21	122	21
8	0.15	0.85	0.2	122	21	132	0
9	0.15	0.85	0.2	132	0	142	0
10	0.15	0.85	0.2	142	0	155	5
11	0.15	0.85	0.2	155	5	166	6
12	0.1	0.9	0.9	166	6	185	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 12

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 155, Y = 5

Total Rocks Passing Analysis Point 1 = 3

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 166, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 455+00Left Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 12

Analysis Point 1 X-Coordinate: 155

Analysis Point 2 X-Coordinate: 166

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	107	52	81
2	0.15	0.85	0.2	52	81	62	80
3	0.15	0.85	0.2	62	80	90	51
4	0.15	0.85	0.2	90	51	95	51
5	0.15	0.85	0.2	95	51	108	39
6	0.15	0.85	0.2	108	39	117	21
7	0.15	0.85	0.2	117	21	122	21
8	0.15	0.85	0.2	122	21	132	0
9	0.15	0.85	0.2	132	0	142	0
10	0.15	0.85	0.2	142	0	155	5
11	0.15	0.85	0.2	155	5	166	6
12	0.1	0.9	0.9	166	6	185	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 12

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 155, Y = 5

Total Rocks Passing Analysis Point 1 = 10

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 166, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 455+00 Left Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 155

Analysis Point 2 X-Coordinate: 166

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 107

Initial Y-Base Starting Zone Coordinate: 68

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	107	52	81
2	0.21	0.8	0.18	52	81	93	49
3	0.28	0.68	0.15	93	49	132	0
4	0.21	0.8	0.18	132	0	142	0
5	0.21	0.8	0.18	142	0	155	5
6	0.21	0.8	0.18	155	5	166	6
7	0.1	0.9	0.9	166	6	185	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 150 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 155, Y = 5

Total Rocks Passing Analysis Point 1 = 29

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 166, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 455+00 Left Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 155

Analysis Point 2 X-Coordinate: 166

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 107

Initial Y-Base Starting Zone Coordinate: 68

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	107	52	81
2	0.3	0.8	0.18	52	81	93	49
3	0.5	0.68	0.15	93	49	132	0
4	0.3	0.8	0.18	132	0	142	0
5	0.3	0.8	0.18	142	0	155	5
6	0.3	0.8	0.18	155	5	166	6
7	0.1	0.9	0.9	166	6	185	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 150 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 155, Y = 5

Total Rocks Passing Analysis Point 1 = 23

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 166, Y = 6

Total Rocks Passing Analysis Point 2 = 1



## STA 481+00 Left Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 16

Analysis Point 1 X-Coordinate: 212

Analysis Point 2 X-Coordinate: 217

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 146

Initial Y-Base Starting Zone Coordinate: 116

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.65	0.12	0	152	33	135
2	0.15	0.7	0.15	33	135	43	135
3	0.35	0.7	0.15	43	135	102	105
4	0.25	0.75	0.15	102	105	110	89
5	0.2	0.8	0.2	110	89	121	89
6	0.25	0.8	0.2	121	89	135	81
7	0.15	0.9	0.25	135	81	140	81
8	0.15	0.95	0.3	140	81	149	60
9	0.15	0.95	0.3	149	60	154	60
10	0.15	0.95	0.3	154	60	169	30
11	0.15	0.95	0.3	169	30	174	30
12	0.15	0.9	0.25	174	30	189	0
13	0.15	0.95	0.3	189	0	199	0
14	0.15	0.95	0.3	199	0	212	5
15	0.15	0.9	0.3	212	5	217	6
16	0.1	1	0.3	217	6	242	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 16

Rock Density: 150 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 212, Y = 5

Total Rocks Passing Analysis Point 1 = 15

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 217, Y = 6

Total Rocks Passing Analysis Point 2 = 11

## STA 481+00Left Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 10

Analysis Point 1 X-Coordinate: 228

Analysis Point 2 X-Coordinate: 232

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 143

Initial Y-Base Starting Zone Coordinate: 116

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	146	146	73
2	0.15	0.85	0.2	146	73	156	72
3	0.3	0.75	0.18	156	72	163	59
4	0.3	0.75	0.18	163	59	168	29
5	0.25	0.75	0.18	168	29	183	29
6	0.25	0.75	0.18	183	29	204	0
7	0.15	0.85	0.2	204	0	214	0
8	0.15	0.85	0.2	214	0	228	5
9	0.15	0.85	0.2	228	5	232	6
10	0.1	0.9	0.9	232	6	257	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 10

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 228, Y = 5

Total Rocks Passing Analysis Point 1 = 136

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 232, Y = 6

Total Rocks Passing Analysis Point 2 = 51

## STA 481+00 Left Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 163

Analysis Point 2 X-Coordinate: 168

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 143

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	146	152	73
2	0.28	0.68	0.15	152	73	204	0
3	0.28	0.68	0.15	204	0	214	0
4	0.28	0.68	0.15	214	0	228	5
5	0.28	0.68	0.15	228	5	232	6
6	0.1	0.9	0.9	232	6	257	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 163, Y = 58

Total Rocks Passing Analysis Point 1 = 7

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 168, Y = 51

Total Rocks Passing Analysis Point 2 = 7

## STA 481+00 Left Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 163

Analysis Point 2 X-Coordinate: 168

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 143

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	146	152	73
2	0.5	0.68	0.15	152	73	204	0
3	0.5	0.68	0.15	204	0	214	0
4	0.5	0.68	0.15	214	0	228	5
5	0.5	0.68	0.15	228	5	232	6
6	0.1	0.9	0.9	232	6	257	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 163, Y = 58

Total Rocks Passing Analysis Point 1 = 7

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 168, Y = 51

Total Rocks Passing Analysis Point 2 = 7

## STA 501+00 Left Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 15

Analysis Point 1 X-Coordinate: 146

Analysis Point 2 X-Coordinate: 153

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 118

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.15	0.75	0.18	0	138	32	118
2	0.12	0.85	0.2	32	118	42	117
3	0.12	0.85	0.2	42	117	48	107
4	0.12	0.85	0.2	48	107	53	107
5	0.12	0.85	0.2	53	107	67	67
6	0.12	0.85	0.2	67	67	72	67
7	0.12	0.85	0.2	72	67	88	47
8	0.12	0.85	0.2	88	47	93	47
9	0.12	0.85	0.2	93	47	108	17
10	0.12	0.85	0.2	108	17	113	17
11	0.12	0.85	0.2	113	17	121	0
12	0.12	0.85	0.2	121	0	131	0
13	0.12	0.85	0.2	131	0	146	5
14	0.12	0.85	0.2	146	5	153	6
15	0.1	0.9	0.9	153	6	163	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 15

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 146, Y = 5

Total Rocks Passing Analysis Point 1 = 9

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 153, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 501+00Left Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 15

Analysis Point 1 X-Coordinate: 146

Analysis Point 2 X-Coordinate: 153

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 118

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	138	32	118
2	0.15	0.85	0.2	32	118	42	117
3	0.15	0.85	0.2	42	117	48	107
4	0.15	0.85	0.2	48	107	53	107
5	0.15	0.85	0.2	53	107	67	67
6	0.15	0.85	0.2	67	67	72	67
7	0.15	0.85	0.2	72	67	88	47
8	0.15	0.85	0.2	88	47	93	47
9	0.15	0.85	0.2	93	47	108	17
10	0.15	0.85	0.2	108	17	113	17
11	0.15	0.85	0.2	113	17	121	0
12	0.15	0.85	0.2	121	0	131	0
13	0.15	0.85	0.2	131	0	146	5
14	0.15	0.85	0.2	146	5	153	6
15	0.1	0.9	0.9	153	6	163	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 15

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 146, Y = 5

Total Rocks Passing Analysis Point 1 = 10

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 153, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 501+00 Left Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 146

Analysis Point 2 X-Coordinate: 153

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 118

Initial Y-Base Starting Zone Coordinate: 90

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	135	34	118
2	0.3	0.6	0.15	34	118	50	108
3	0.3	0.6	0.15	50	108	121	0
4	0.3	0.6	0.15	121	0	131	0
5	0.3	0.6	0.15	131	0	146	5
6	0.21	0.8	0.18	146	5	153	6
7	0.1	0.9	0.9	153	6	163	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 146, Y = 5

Total Rocks Passing Analysis Point 1 = 2

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 153, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 501+00 Left Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 146

Analysis Point 2 X-Coordinate: 153

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 118

Initial Y-Base Starting Zone Coordinate: 90

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	135	34	118
2	0.6	0.6	0.15	34	118	50	108
3	0.6	0.6	0.15	50	108	121	0
4	0.6	0.6	0.15	121	0	131	0
5	0.6	0.6	0.15	131	0	146	5
6	0.3	0.8	0.18	146	5	153	6
7	0.1	0.9	0.9	153	6	163	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 146, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 153, Y = 6

NO ROCKS PAST ANALYSIS POINT 2



## STA 501+00 Right Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 9

Analysis Point 1 X-Coordinate: 78

Analysis Point 2 X-Coordinate: 85

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 36

Initial Y-Base Starting Zone Coordinate: 16

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.15	0.75	0.18	0	46	20	37
2	0.12	0.85	0.2	20	37	30	36
3	0.12	0.85	0.2	30	36	41	16
4	0.12	0.85	0.2	41	16	46	16
5	0.12	0.85	0.2	46	16	53	0
6	0.12	0.85	0.2	53	0	63	0
7	0.12	0.85	0.2	63	0	78	5
8	0.12	0.85	0.2	78	5	85	6
9	0.1	0.9	0.9	85	6	110	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 9

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 78, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 85, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 501+00 Right Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 9

Analysis Point 1 X-Coordinate: 78

Analysis Point 2 X-Coordinate: 85

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 46

Initial Y-Base Starting Zone Coordinate: 6

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	46	20	37
2	0.15	0.85	0.2	20	37	30	36
3	0.15	0.85	0.2	30	36	41	16
4	0.15	0.85	0.2	41	16	46	16
5	0.15	0.85	0.2	46	16	53	0
6	0.15	0.85	0.2	53	0	63	0
7	0.15	0.85	0.2	63	0	78	5
8	0.15	0.85	0.2	78	5	85	6
9	0.1	0.9	0.9	85	6	110	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 9

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 78, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 85, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 501+00 Right Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 78

Analysis Point 2 X-Coordinate: 85

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 30

Initial Y-Base Starting Zone Coordinate: 17

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	46	20	37
2	0.28	0.68	0.15	20	37	53	0
3	0.28	0.68	0.15	53	0	63	0
4	0.28	0.68	0.15	63	0	78	5
5	0.21	0.8	0.18	78	5	85	6
6	0.1	0.9	0.9	85	6	110	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 78, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 85, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 501+00 Right Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 78

Analysis Point 2 X-Coordinate: 85

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 46

Initial Y-Base Starting Zone Coordinate: 17

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	46	20	37
2	0.5	0.68	0.15	20	37	53	0
3	0.5	0.68	0.15	53	0	63	0
4	0.5	0.68	0.15	63	0	78	5
5	0.3	0.8	0.18	78	5	85	6
6	0.1	0.9	0.9	85	6	110	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 78, Y = 5

NO ROCKS PAST ANALYSIS POINT 1

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 85, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 516+00 Left Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 13

Analysis Point 1 X-Coordinate: 144

Analysis Point 2 X-Coordinate: 149

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 111

Initial Y-Base Starting Zone Coordinate: 73

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.15	0.75	0.18	0	119	20	109
2	0.12	0.85	0.2	20	109	30	108
3	0.12	0.85	0.2	30	108	60	89
4	0.12	0.85	0.2	60	89	65	89
5	0.14	0.75	0.18	65	89	80	59
6	0.12	0.85	0.2	80	59	85	59
7	0.14	0.75	0.18	85	59	100	29
8	0.12	0.85	0.2	100	29	105	29
9	0.14	0.75	0.18	105	29	121	0
10	0.12	0.85	0.2	121	0	131	0
11	0.12	0.85	0.2	131	0	144	5
12	0.12	0.85	0.2	144	5	149	6
13	0.1	0.9	0.9	149	6	174	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 13

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 144, Y = 5

Total Rocks Passing Analysis Point 1 = 4

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 149, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 516+00Left Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 13

Analysis Point 1 X-Coordinate: 144

Analysis Point 2 X-Coordinate: 149

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 111

Initial Y-Base Starting Zone Coordinate: 73

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	119	20	109
2	0.15	0.85	0.2	20	109	30	108
3	0.15	0.85	0.2	30	108	60	89
4	0.15	0.85	0.2	60	89	65	89
5	0.25	0.75	0.18	65	89	80	59
6	0.15	0.85	0.2	80	59	85	59
7	0.25	0.75	0.18	85	59	100	29
8	0.15	0.85	0.2	100	29	105	29
9	0.25	0.75	0.18	105	29	121	0
10	0.15	0.85	0.2	121	0	131	0
11	0.15	0.85	0.2	131	0	144	5
12	0.15	0.85	0.2	144	5	149	6
13	0.1	0.9	0.9	149	6	174	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 13

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 144, Y = 5

Total Rocks Passing Analysis Point 1 = 9

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 149, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 516+00 Left Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 144

Analysis Point 2 X-Coordinate: 149

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	119	63	89
2	0.21	0.8	0.18	63	89	121	0
3	0.21	0.8	0.18	121	0	131	0
4	0.21	0.8	0.18	131	0	144	5
5	0.21	0.8	0.18	144	5	149	6
6	0.1	0.9	0.9	149	6	174	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 144, Y = 5

Total Rocks Passing Analysis Point 1 = 22

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 149, Y = 6

Total Rocks Passing Analysis Point 2 = 3

## STA 516+00 Left Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 6

Analysis Point 1 X-Coordinate: 144

Analysis Point 2 X-Coordinate: 149

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 101

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	119	63	89
2	0.3	0.8	0.18	63	89	121	0
3	0.3	0.8	0.18	121	0	131	0
4	0.3	0.8	0.18	131	0	144	5
5	0.3	0.8	0.18	144	5	149	6
6	0.1	0.9	0.9	149	6	174	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 6

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 144, Y = 5

Total Rocks Passing Analysis Point 1 = 25

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 149, Y = 6

Total Rocks Passing Analysis Point 2 = 7



## STA 524+50 Right Slope New Construction Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 13

Analysis Point 1 X-Coordinate: 115

Analysis Point 2 X-Coordinate: 120

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 94

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.15	0.75	0.18	0	103	15	95
2	0.12	0.85	0.2	15	95	24	94
3	0.12	0.85	0.2	24	94	29	86
4	0.12	0.85	0.2	29	86	35	86
5	0.12	0.85	0.2	35	86	51	56
6	0.12	0.85	0.2	51	56	56	56
7	0.12	0.85	0.2	56	56	72	26
8	0.12	0.85	0.2	72	26	77	26
9	0.12	0.85	0.2	77	26	90	0
10	0.12	0.85	0.2	90	0	103	0
11	0.12	0.85	0.2	103	0	115	5
12	0.12	0.85	0.2	115	5	120	6
13	0.1	0.9	0.9	120	6	155	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 13

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 115, Y = 5

Total Rocks Passing Analysis Point 1 = 4

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 120, Y = 6

Total Rocks Passing Analysis Point 2 = 1

## STA 524+50 Right Slope New Construction Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 13

Analysis Point 1 X-Coordinate: 115

Analysis Point 2 X-Coordinate: 120

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 94

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.75	0.18	0	103	15	95
2	0.15	0.85	0.2	15	95	24	94
3	0.15	0.85	0.2	24	94	29	86
4	0.15	0.85	0.2	29	86	35	86
5	0.15	0.85	0.2	35	86	51	56
6	0.15	0.85	0.2	51	56	56	56
7	0.15	0.85	0.2	56	56	72	26
8	0.15	0.85	0.2	72	26	77	26
9	0.15	0.85	0.2	77	26	90	0
10	0.15	0.85	0.2	90	0	103	0
11	0.15	0.85	0.2	103	0	115	5
12	0.15	0.85	0.2	115	5	120	6
13	0.1	0.9	0.9	120	6	155	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 13

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 115, Y = 5

Total Rocks Passing Analysis Point 1 = 6

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 120, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 524+50 Right Slope Weathered Condition Average Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 115

Analysis Point 2 X-Coordinate: 120

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 94

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.21	0.8	0.18	0	103	15	95
2	0.3	0.6	0.15	15	95	29	87
3	0.3	0.6	0.15	29	87	90	0
4	0.21	0.8	0.18	90	0	103	0
5	0.21	0.8	0.18	103	0	115	5
6	0.21	0.8	0.18	115	5	120	6
7	0.1	0.9	0.9	120	6	155	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1 ft

Thickness: 1 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 115, Y = 5

Total Rocks Passing Analysis Point 1 = 6

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 120, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## STA 524+50 Right Slope Weathered Condition Maximum Size Rock

### Input File Specifications

Units of Measure: U.S.

Total Number of Cells: 7

Analysis Point 1 X-Coordinate: 115

Analysis Point 2 X-Coordinate: 120

Analysis Point 3 X-Coordinate:

Initial Y-Top Starting Zone Coordinate: 94

Initial Y-Base Starting Zone Coordinate: 72

### Cell Data

Cell	No. S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	0.3	0.8	0.18	0	103	15	95
2	0.6	0.6	0.15	15	95	29	87
3	0.6	0.6	0.15	29	87	90	0
4	0.3	0.8	0.18	90	0	103	0
5	0.3	0.8	0.18	103	0	115	5
6	0.3	0.8	0.18	115	5	120	6
7	0.1	0.9	0.9	120	6	155	6

### CRSP Simulation Specifications

Total Number of Rocks Simulated: 500

Starting Velocity in X-Direction: 1 ft/sec

Starting Velocity in Y-Direction: -1 ft/sec

Starting Cell Number: 1

Ending Cell Number: 7

Rock Density: 155 lb/ft<sup>3</sup>

Rock Shape: Discoidal

Diameter: 1.5 ft

Thickness: 1.5 ft

### CRSP Analysis Point 1 Data

Analysis Point 1: X = 115, Y = 5

Total Rocks Passing Analysis Point 1 = 2

### CRSP Analysis Point 2 Data

Analysis Point 2: X = 120, Y = 6

NO ROCKS PAST ANALYSIS POINT 2

## **APPENDIX C**

ODOT General Earthwork Design Checklist - Centerline Cuts Checklist

### III.A. Centerline Cuts Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: B. Mott & E.Tse	Date: 11-29-06
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If you do not have a centerline cut on the project, you do not have to fill out this checklist.

<b>Soil Cuts</b>	
<input checked="" type="radio"/> Y   N <input type="radio"/> X	1 Does drilling provide continuous stratigraphic sections for the range of elevations that represent proposed cut slope areas?
<input checked="" type="radio"/> Y   N <input type="radio"/> X	2 Do the cut slopes have a minimum stability F.S. of 1.30 and are not steeper than 2:1?  Check stability calculation method used: <input checked="" type="checkbox"/> STABL or equivalent software <input type="checkbox"/> hand calculations
<input checked="" type="radio"/> Y   N <input type="radio"/> X	3 If there is a "red bed" or other historically unstable soil or rock layer through the cut slopes, was this layer considered as a possible failure zone?
Y   N <input checked="" type="radio"/> X	4 Have erosion protection measures been addressed for backslopes, side slopes, and ditches (including riprap recommendations or special slope treatments)?
Y   N <input checked="" type="radio"/> X	5 Have issues related to any special usage of excavated soils been addressed?
Y   N <input checked="" type="radio"/> X	6 If the cut is not completely above the water table,  a Did the design consider the construction or long term ramifications of cutting below the water table?
Y   N <input checked="" type="radio"/> X	b Did the design consider additional drainage in the cut slope (springs / seeps) and roadway base?

### III.A. Centerline Cuts Checklist

Rock Slopes	
<i>For rockfall and additional design considerations, see the "Rockfall Corrections Checklist."</i>	
<input checked="" type="radio"/> Y   N   X   7	Has the subsurface exploration adequately characterized the rock in accordance with the Geotechnical Bulletin 3: Rock Cut Slope and Catchment Design (GB 3)?
<input checked="" type="radio"/> Y   N   X   8	Have the slope angles, benching scheme, rockfall catchment design, and drainage controls been determined as prescribed in GB 3?
Y   N <input checked="" type="radio"/> X	In accordance with GB 3, are the rock cut slopes, benches, and catchment areas indicated on all appropriate cross-sections?
<input checked="" type="radio"/> Y   N   X   10	In accordance with GB 3, has the rockfall catchment output and the cost analysis comparing configurations been provided?

Notes:

Stage 1: