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March 7, 2008

Michael D. Weeks, P.E.
Project Engineer
TranSystems Corporation
5747 Perimeter Drive, Suite 240
Dublin, Ohio 43017

Re: **SCI-823-6.81, Portsmouth Bypass Project, PID 19415**
Response to Stage I Geotechnical Review Comments, Phase 1
DLZ Job No.: 0121-3070.03, Document No. 106

Dear Mr. Weeks:

DLZ has reviewed ODOT-Office of Geotechnical Engineering's (OGE's) Stage I review comments (dated January 31, 2007) for Phase 1 of the SCI-823 project. This document presents DLZ's formal responses to the above-referenced comments.

The original inter-office communication and geotechnical design checklists with comments from the Office of Geotechnical Engineering (OGE) are attached. Also attached is a form presenting DLZ's response to all comments, concerns, and statements. If modifications to analyses or recommendations were necessary, these changes were made and outlined in separate addendum documents.

Please feel free to contact DLZ if you have any questions regarding our response to the Stage I comments.

Sincerely,

DLZ OHIO, INC.

Steven J. Riedy
Geotechnical Engineer

Encl: As noted

cc: file

sjr

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DLZ's Response to Stage I Geotechnical Review Comments

PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Boring Program - General Comments Response

The boring program associated with this project was quite unique with respect to most in Ohio. The size of the project, terrain, and numerous vertical and horizontal alignment changes presented challenges in planning and executing a geotechnical boring plan for this project. The project alignment is situated on steep terrain, encountering a wide range of subsurface conditions. The initial roadway boring program was developed in 2004 in conjunction with Office of Geotechnical Engineering (OGE) utilizing ODOT's Specifications for Subsurface Investigations (SSI). All 3-digit, R-series borings were reviewed and approved by OGE.

The additional borings added throughout the project were developed utilizing the SSI. After the initial boring program approval by OGE, borings were added to ascertain subsurface conditions for bridges, retaining walls, subgrade evaluations, soil cut designs, and culverts. Structure borings were drilled at the bridge locations, based upon preliminary configurations, consisting of three-span bridges, using spill-through slopes. A preliminary bridge report was created based upon this information. The structure design was then submitted to a type-study review. After a bridge layout had been approved through the structure type-study review process, the need for additional structure borings was evaluated. If the approved layout changed significantly (using MSE walls, etc.) from the preliminary layout, addition structure borings were drilled based upon the current bridge layout. In areas where preliminary structure borings provide enough information to adequately develop foundation recommendations for the approved structure no new borings would be drilled. However, in many areas, because of the presence of highly compressible or weak soils it was necessary to obtain additional borings for the purposes of testing. In these cases, the drilling and testing program would be guided by the information obtained during the preliminary exploration. The boring locations and depths were determined using all available data. Retaining wall borings were drilled on SR 335 near the relocated Shumway Hollow Road (TR 234) intersection. These borings were spaced approximately 100 feet apart and cored bedrock in accordance with SSI, section 2.2.3.3. Culvert borings were planned and drilled in accordance with SSI, section 2.2.3.2.

It is understood that without the benefit of being able to view the several horizontal and vertical alignments relative to the borings, it may appear that the drilling program was excessive. Section 2.2.2.1 of the SSI concerning the excavation of bedrock is cited in the comments from OGE as a reference for excessive drilling. While the boring spacing of 1000 feet would be appropriate for a majority of projects situated in Ohio, the unique geographic setting for this project requires the borings to be spaced more closely to adequately define the rapidly changing subsurface conditions. Section 2.2.2 of the SSI states, "Borings shall be located to disclose the nature of subsurface materials at the deepest points of cuts, areas of transition from cut to fill, and foundation areas beneath the points of highest embankment." Additionally, the cut sections on this project often include sidehill cut-fill sections. In these sections, additional borings, positioned down slope are necessary to determine stability (refer to SSI, section 2.2.2.2 through section 2.2.2.4.)

Subsurface conditions for the project included soils ranging from highly compressible lacustrine deposits to residual granular soils. The Teays River system and the subsequent glacial lakes deposited vast amounts of soft compressible lacustrine soils. In the deeper valleys it was important to accurately defining the extent, depth, and character of these highly compressible and low-strength soils. Section 2.2.2.6 of the SSI states, "Areas of compressible or low strength soils, where significant consolidation and/or danger of shear failure are considered possible, shall be identified. Borings shall be spaced at intervals of not more than 100 feet longitudinally and transversely, for extensive areas, and at intervals of 50 feet longitudinally and transversely, for areas that are 300 feet or less in length along the centerline or baseline." The drilling in the major valleys (Shumway Hollow Road and Lucasville-Minford Road Interchange areas) were driven in part by the need to define the limits and depths of the soft, compressible clay layers.

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Bedrock conditions ranged from competent to highly weathered and decomposed sandstone and shales of Mississippian and Pennsylvanian age. Section 2.2.1 of the SSI states, "Spacing and depth of borings shall also consider topography, geologic origin of material, surface manifestation of soil conditions, and any special design considerations." Due to the topography and variability of the conditions of the project, the standard longitudinal spacing of borings would not have been adequate to accurately determine subsurface conditions.

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
** The comments received from OGE are summarized in the form below. To view the entire checklist with associated comments please refer to the attached documents.*			
Reconnaissance and Planning	Comment 1. Why all the borings in the vicinity of SR 823 station 485+00?	D	In this area, two phases of drilling were completed to provide the necessary subsurface information for the proposed structure. Initially, the TR borings were drilled to provide the information for the preliminary configuration consisting of a 4-span structure, using spill through slopes. A preliminary report was then prepared for this structure. After the type-study review process, a structure consisting of 2-spans using MSE walls to contain the abutments was considered. In order to provide recommendations for the reconfigured bridge, it was necessary to drill borings for the current configuration. Three bridge borings were drilled for the final configuration. Two borings were required at the repositioned pier location in order to accurately define the changing bedrock conditions near the bank of the creek. There is also a proposed culvert near this location that required two borings per SSI section 2.2.3.2.
Reconnaissance and Planning	Comment 2. Why all the borings on TR 234, from stations 25+00 to 35+00, approximately 18 borings in a 1000-foot stretch, including a cluster at 27+00?	D	Along TR234, field reconnaissance indicated that the subsurface conditions varied greatly. Originally, it was planned to have relocated Shumway Hollow Road cross over SR 823 (located in a cut). The preliminary boring program revealed conditions, which would be problematic for this configuration. Consequently, the entire interchange area was reconfigured to have SR 823 pass over relocated Shumway Hollow Road. Due to the poor soil conditions and new configuration (higher embankments), it was necessary to obtain undisturbed samples for testing soil layers that under the previous alignment

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DLZ **REVIEW COMMENTS**

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PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
			would be situated in a cut. Structure borings B-1 through B-4 were required because preliminary structure borings (TR-24 through TR-26) were drilled for a previous configuration, which essentially consisted of Shumway Hollow Road passing over SR 823. Also, due to the drainage characteristics of the area and the interchange ramp configuration, many culverts are proposed to channel drainage. As per SSI (section 2.2.3.2), and SGE, two culvert borings were drilled for nearly every culvert. Where information could be obtained from nearby roadway borings, this information was used in lieu of a culvert boring.
Reconnaissance and Planning	Comment 3. Borings R-457 and B-1228 drilled 100-foot apart, 10 feet difference	D	The difference in ground surface elevation is 22.6', and the difference in the top of rock elevation is 18.1'. Given the change in conditions over 100', DLZ felt that the change in terrain and subsurface conditions warranted the drilling of both borings.
Reconnaissance and Planning	Comment 4. SR 335 – borings drilled in a 550-foot section, all into bedrock.	D	A retaining wall is currently proposed along SR 335 to contain the fill required to construct the right turn lane. The use of tie-backs to control wall deflections and increase stability was considered. Consequently, bedrock was cored in roadway borings, as well as borings drilled for the retaining structure in order to ascertain the character and contact elevation of the bedrock in accordance with SSI, section 2.2.3.3.
Reconnaissance and Planning	Comment 5. R-211, why?	D	This boring was part of the original program approved by OGE. Boring R-211 was planned when this section of roadway was planned to be in an embankment fill section, approximately 65 feet high. This boring was required to asses the stability of the down-slope portion of the embankment. Therefore the location and depth of this boring was determined according to section 2.2.2.4 of the SSI. When R-210 and R-211 are compared, it is evident that the subsurface conditions change significantly in this area.
Reconnaissance	Comment 6. Why drill both R-353 and R-	D	These borings were part of the original program

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PROJECT SCI-823-6.81 (Phase 1), PID 19415 PROJECT NO: 0121-3070-03

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
and Planning	354?		approved by OGE. In original alignments, this portion of roadway was planned to be in a deep cut (75 feet deep). The borings were planned and laid-out accordingly. The boring locations and depths were determined according to the SSI, sections 2.2.2.1 and 2.2.2.3. Consequently, it was necessary to accurately define the top of rock and the subsurface conditions.
Reconnaissance and Planning	Comment 7. Why drill both R-370 and R-371?	D	These borings were part of the original program approved by OGE. Previous alignment was in a deep sidehill cut (120 feet deep). Relative to the current alignment, borings R-371 and R-370 are in an area where a sidehill cut/fill is anticipated. R-370 was drilled near the top of the cut, and R-371 was drilled near the proposed ditch line, in accordance with the SSI section 2.2.2.2.
Reconnaissance and Planning	Comment 8. Why drill both R-435 and R-436	D	These borings were part of the original program approved by OGE. Previous alignment in deep sidehill cut (100 feet deep). Borings R-435 and R-436 were drilled in an area where a cut is anticipated. R-435 was drilled near the top of the cut, and R-436 was drilled near the proposed ditch line, in accordance with the SSI section 2.2.2.2.
Reconnaissance and Planning	Comment 9. The most extreme case of "too much rock coring" are the sections drilled from SR 823 stations 512 to 524: 13 borings (including B-1228) totaling about 1400 feet of drilling, almost all bedrock, almost all the same. Why was all this rock drilling necessary?	D	Extensive drilling was done in this area to delineate areas of decomposed sandstone and shale that were a concern in designing the rock cuts for this area. In the lower elevations, extensive drilling was completed to determine the depth and extent of soft compressible clay for areas that would be under fill.
Reconnaissance and Planning	Comment 10. Why drill B-1302?	D	This is a shallow boring, which was drilled for cut slope design along realigned Shumway Hollow Road (TR 234).
Reconnaissance and Planning	Comment 11. Why drill both B-1343 and B-1344?	D	Spacing =400'. These are cut borings for the realignment of Shumway Hollow Road (TR 234), planned according to SSI, section 2.2.2.3.
Reconnaissance and Planning	Comment 12. Why drill both B-1327 and B-1345?	D	B-1327 was originally drilled as a cut boring. The borings were drilled to determine the local depth of the highly compressible clay found in the area.

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DLZ **REVIEW COMMENTS** DATE: March 7, 2008

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PROJECT SCI-823-6.81 (Phase 1), PID 19415 PROJECT NO: 0121-3070-03

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Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
			The depth of the clay and bedrock varied by up to 30 feet in this area.
Reconnaissance and Planning	Comment 13. Why drill both B-1321 and B-1322?	D	The profile was changed during the boring program. At the time of the planning of these borings, this interchange ramp was in a sidehill cut/fill area. The location and depth of the borings was determined in accordance with the SSI section 2.2.2.3.
Reconnaissance and Planning	Comment 14. Why drill both B-1319 and B-1320?	D	See #13.
Reconnaissance and Planning	Comment 15. Why drill both B-1324 and B-1325? Drill B-1324 in the ditch line and your done.	D	See #13.
Reconnaissance and Planning	Comment 16. Boring C-47 not drilled deep enough.	A	Miscommunication with field crews, it was thought that bedrock would be deeper here.
Reconnaissance and Planning	Comment 17. R-416 – why core the rock?	D	This boring was part of the original program approved by OGE. Previous alignment was in a deep sidehill cut (98 to 40 feet deep). Relative to the current alignment, this is a shallow sidehill cut section, the location and depth of the borings was determined in accordance with the SSI section 2.2.2.2.
Reconnaissance and Planning	Comment 18. Excessive boring depths from SR 823, stations 427 to 451 – grade changes?	D	This boring was part of the original program approved by OGE. The original alignment was in a deep sidehill cut (for example; station 432+00, planned cut was 120 feet deep at the uphill ditch line). The borings in this area were planned and drilled according to the original profile in accordance with SSI, Section 2.2.2.2.
Reconnaissance and Planning	Final Comments: "DLZ unnecessarily cored bedrock"	D	During the drilling program the alignment and profile were changed several times. Often this required re-drilling holes. Due to the variability of the depth of bedrock, we would generally core 5 feet of rock in the embankment areas to confirm rock and provide accurate top of rock information for the client. In many areas, embankments were to be constructed on steep slopes. Based upon reconnaissance, borings, and the area geology, the

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			stability of many slopes was considered to be in question. Consequently, many embankment borings cored bedrock as outlined by SSI, section 2.2.2.4.
Reconnaissance and Planning	Final Comments: *(last paragraph)*	D	See #9.
Centerline Cuts: Rock Cut Comments	Comment 1. In a February 2006 meeting between the District, the consultant, and OGE, a standard catchment ditch design was agreed upon. OGE recommends the District explore reducing the catchment ditch width to 25 feet in selected locations. OGE believes that there are locations where this can be done with the ditch width still acceptable to GB3 minimums and anticipates that it will also achieve the recommended 95% retention.	A	This may be true and is something the district may want to explore. The standard catchment ditch design was used as decided upon in the February 2006 meeting. Representatives from District 9, OGE, Transystems, and DLZ were present at this meeting and provided input on the design. Prior to this meeting, several different ditch configurations were considered. No rockfall analyses were performed using a different ditch configuration after this meeting took place. No action on this issue is being initiated by DLZ.
Centerline Cuts: Rock Cut Comments	Comment 2. In the rock cut recommendation report, where are the cross sections for Shumway Hollow Road?	A	The cross sections were added to the rock cut report in an addendum.
Centerline Cuts: Rock Cut Comments	Comment 3. Shumway Hollow Interchange Ramp D station 386+00 – OGE questions the slope based on B-1345. It appears the slope was designed based on B-1327.	A	Due to an alignment shift of TR 234, the cut slope in question was redesigned according to GB 3 using both B-1327 and B-1345. The rock cut slope design was also adjusted to correspond with the cut slope design for TR 234. The revised cross section is included in the rock cut report addendum.
Centerline Cuts: Rock Cut Comments	Comment 4. Rock Cut #11 – In both the design plans (sheets 164-166) and the rock cut report recommendations, from station 417+00 to 419+00, a construction bench is labeled as elev. 766 but is actually drawn at elev. 776.	A	The labels were corrected and the revised cross sections are included in the rock cut report addendum.
Centerline Cuts: Rock Cut Comments	Rock Cut #11 – In the vicinity of station 428+50 lt, there is a deign unit (elev. 852 to 874) described as soft to medium hard shale proposed to be cut a 2:1. OGE recommends that, based on GB3,	A	The cross sections were revised according to GB 3 and the revised cross sections are included in the rock cut report addendum.

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PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
	consideration be given to modifying the 2:1 to a 1.5:1 with adjustments to the overburden bench as warranted. At the ends of this unit (estimated as station 427+00 and 429+50), the slope can be flattened to 2:1 as per GB3.		
Centerline Cuts: Rock Cut Comments	Comment 6. Rock Cut #11 – In both the rock cut recommendation report and the design plans, for the cross section at station 428+50 RT, the design unit at elev. 819 to 832 is correctly drawn at 1.5:1 but incorrectly labeled as a 2:1.	A	The labels were corrected and the revised cross sections are included in the rock cut report addendum.
Centerline Cuts: Rock Cut Comments	Comment 7. Rock Cut #11 – In the vicinity of station 432+00 LT, there are design units of hard gray shale from elev. 808 to 815 proposed to be cut at 1.5:1 and the lower 10 feet of medium hard clayshale from elev. 815 to 825 proposed to be cut at 2:1. OGE recommends that both can be cut at 1:1, which should also allow for a quicker transition from the adjacent 0.5:1 cut so that there is no 2-foot high cut at 0.5:1 terminating at elev. 807 at station 431+50.	A	We agree that this will provide for a more constructible transition. The cross sections were revised and the revised cross sections are included in the rock cut report addendum.
Centerline Cuts: Rock Cut Comments	Comment 8. Rock Cut #13 – The geotechnical consultant has determined that the catchment ditch configuration developed for the project based on GB 3 recommended minimum catchment ditch widths will not be sufficient for station 479+50 to 483+00 and has recommended concrete barrier in order to achieve the 95% rockfall catchment standard. It appears that neither the typical sections nor the plan view in the plans reflects this recommendation. The section appears similar to other sections – why does the consultant feet this failed the 95% standard? CRSP output was not presented.	D	The CRSP analyses for the left slope at STA 481+00 did not achieve 95% retention. The input and output files were included in Appendix C of the rock cut report.

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PROJECT **SCI-823-6.81 (Phase 1), PID 19415**

PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE

PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
Centerline Cuts: Rock Cut Comments	Comment 9. Rock Cut #15 – In the vicinity of station 508+50 right cut, OGE questions the 0.5:1 slope, approximately 5-foot high, in soft gray and brown clayshale as indicated by Soil Profile Sheet 130/165 and boring R-445. On the left cut at this location, a 1:1 slope was designed for similar thickness medium hard clayshale. OGE recommends that a 2:1 slope for the soft clayshale (point load value of only 68 psi) be considered and benches modified accordingly. The progression of the cut in further stations should reflect the transition to the massive sandstone recommended to be cut at 0.5:1. The relevant soil profile sheet 130/165 should also be updated.	P	According to borings R-445, R-447, and R-448, the clayshale unit "pinches out" up station on the right side of the cut. The clayshale unit on the right side was changed to a 2:1 slope according to GB 3. The modified cross section is included in the rock cut report addendum. The clayshale on the left side of the cut was generally more competent and was cut at a 1:1 according to GB-3.
Centerline Cuts: Rock Cut Comments	Comment 10. Rock Cut #15 – The consultant should eliminate the 1.25:1 and 1.75:1 slopes and select values of 1:1, 1.5:1, and 2:1 as recommended by GB3.	A	The cross sections were revised according to GB 3 and the revised cross sections are included in the rock cut report addendum.
Centerline Cuts: Rock Cut Comments	Comment 11. Rock Cut #15 – Was it the geotechnical consultant's intention to quickly transition Ramp A station 518+50 to 520+00 Rt from 0.5:1 to 1:1 back to 0.5:1? This seems to deviate from the consultant's typical design for the rest of the project.	P	Yes, this was the intention of DLZ. There is a zone of decomposed sandstone and shale in this area that warranted a 1:1 slope according to GB-3.
Centerline Cuts: Rock Cut Comments	Comment 12. On the design plans, the benches need to be labeled and plan notes included to define each bench type.	A	A rock cut benching diagram is included in the rock cut report addendum to be added to the plans.
Centerline Cuts: Soil Cut Comments	Comment 1. Factor of safety for stability analyses below 1.3.	A	The cited factor of safety of 1.25 was generated via an infinite slope-type failure. Deeper failure surfaces were specified, which produced factors of safety in excess the minimum required value of 1.30. Results of stability analyses are included in the attached documents. The use of 2H:1V slopes in soil cuts is acceptable.
Centerline Cuts:	Comment 1. The stability of the soil cuts	A	DLZ has confirmed the stability of the soil cuts

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Soil Cut Comments	at Shumway Hollow and Lucasville-Minford should be evaluated in their entirety to confirm the recommendation of 2H:1V soil cuts.		using 2H:1V slopes. Amendments to the reports have been created which reflect the results of the analyses. The results of the slope stability analyses are included in these amended documents.
Subgrade	Comment 1. OGE questions the application of the sampling and mechanical testing requirements as per GB-1 specifically in the area of the Shumway Hollow Road Interchange and Lucasville-Minford Road (CR 28) Interchange.	P	Borings R-210 and R-220 were drilled in August 2004. Boring B-1226 was drilled in August 2005. The vertical alignment changed from the PAVR in the fall of 2005 (October-November). Consequently, borings R-210, R-220 were drilled for a roadway section that was understood to be in a high embankment fill (example: station 357+50 was an embankment section approximately 65 feet high). As per the specifications, no GB 1 specific sampling or testing was required. After the alignment changed, DLZ applied the GB 1 specifications to the available information in an effort to preventing excessive additional drilling and property re-entry for the purposes of subgrade recommendations.
Subgrade	Comment 2. At this preliminary stage, specific subgrade details have not been added to the plans. However, specific remediation recommendations have been provided by the geotechnical consultant.	A	No action required.
Subgrade	Comment 3. *(SR 823)* Within the subgrade / pavement design report, only the CBR value is mentioned. The consultant has not provided recommendations for subgrade remediation in the area of soil cut in the vicinity of the CR 28 interchange	A	While most of the mainline subgrade in existing soil occurs in transition areas from cut to fill (these sections are generally very short along the roadway alignment), DLZ concurs that a significant portion of the proposed mainline subgrade in the CR 28 interchange will be situated in marginal soils. DLZ has evaluated the condition of the subgrade soils and made recommendations regarding the remediation of the subgrade.
Subgrade	Comment 3. *(TR 234, Shumway Hollow Road)* 3' undercut for station 11+00 to 13+90 should be adjusted to station 10+90 to 14+00. Concur with rock undercut limits. OGE recommends 2' undercut from station 26+00 to 31+00	A	DLZ will comply with the comments. Amendments to the subgrade reports have been created which reflect the comments.

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	rather than 3'.		
Subgrade	Comment 3. (CR 28, Lucasville-Minford Road) The limits for 1' undercut recommended from station 4+56 to 14+40 should be revised to 10+05 to 12+00. The limits for 3' undercut recommended from station 14+40 to 20+75 should be revised to station 14+50 to 21+00. The limits for the 3' undercut recommended from station 28+28 to 37+31 should be revised to station 28+00 to 37+31.	A	DLZ will comply with the comments. Amendments to the subgrade reports have been created which reflect the comments.
Subgrade	Comment 3. (SR 335) The consultant has recommended minimal subgrade remediation based on pavement performance and the coarse-grained soils encountered within the proposed subgrade. However, based upon GB-1 guidelines, OGE recommends that a 3' undercut be performed from station 10+50 to 14+64. Currently, a 3' undercut is recommended from station 10+50 to 11+00.	A	DLZ will comply with the comments. Amendments to the subgrade reports have been created which reflect the comments.
Embankment: Settlement	Comment 1. OGE concurs that a drainage blanket with wick drains along with waiting periods is the proper course of remediation.	A	No action required.
Embankment: Settlement	Comment 2. The geotechnical consultant has created plan insert sheet for wick drains / geotechnical instrumentation. A general note regarding the staged construction for both interchanges has been included in the plans.	A	No action required.
Embankment: Settlement	Comment 3. For areas were significant amounts of settlement are anticipated, a benchmark time-rate of settlement of U=90% should be used.	A	Time-rate of settlement calculations have been revised to reflect the appropriate benchmark of U=90%. Additionally, wick drain spacing options have been provided for the affected areas in the two interchanges. The associated consolidation times using the various spacing options is also presented in these plans.

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Embankment: Settlement	Comment 3. At least 90% of primary consolidation should occur before the preparation steps for pavement begins.	A	DLZ agrees with the statement. The amended documents include language regarding this waiting period after the final stage is constructed.
Embankment: Stability	Comment 1. Consultant used shear strength parameters for the embankment fill which varied from phi = 32 to 35 degrees, with no cohesion. What is the reason for this? OGE concurs with the assumption that the embankments will be built primarily from the projects excavated rock.	A	DLZ agrees that consistent shear strength parameters should be used for these analyses. The stability analyses have been revised to reflect shear strength values of c = 0, and phi = 35 degrees.
Embankment: Stability	Comment 2. The consultant used the minimum acceptable factor of safety for slope stability of 1.25 rather than the correct value of 1.30.	A	DLZ concurs with the comment. All affected stability analyses have been revised to reflect the required minimum factor of safety of 1.30.
Embankment: Stability	Comment 3. The geotechnical consultant has created plan insert sheet for wick drains / geotechnical instrumentation. A general note regarding the staged construction for both interchanges has been included in the plans.	A	No action required.
Embankment: Special	In the Lucasville-Minford report, a recommendation is made for Type D riprap with a separator for stream channels and specifically the pond at station 530+50 to 531+50. In the Shumway Hollow report, a similar comment is only made for stream channels but ponds are not mentioned despite there being several within the interchange. Although spring drains are included in the plans, OGE recommends that existing ponds have remediation included in the plans.	A	DLZ will include recommendations for remediation of ponds in the footprint area where applicable.
Soil Profile Checklist	#11a. Refer to Note #2	A	Missing soil and bedrock symbols will be added to the Legend.
Soil Profile Checklist	#12. Beginning and ending stations are not shown.	A	Beginning and ending stations will be added to the Location Map.

Response Code:

'A' – Agree or will comply; will revise

'P' – Partially agree; will revise to some degree (see written response)

'D' – Disagree; will not revise (see written response)

DLZ

REVIEW COMMENTS

DATE: March 7, 2008

SHEET 12 OF 15

PROJECT **SCI-823-6.81 (Phase 1), PID 19415**

PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE

PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
Soil Profile Checklist	#23, 24	A	Stratigraphic rock sections will be added to the soil profile and cross sections where applicable.
Soil Profile	Comment 1. The correct designation for Lucasville-Minford Road is (CR 28) not (SR 728) as noted in the plans.	A	CR 28 is the correct designation for Lucasville Minford Road. The soil profile will be changed to reflect this.
Soil Profile	Comment 2. Several hatches used in the presentation are not shown in the legend.	A	Missing soil and bedrock symbols and other hatching patterns will be added to the Legend.
Soil Profile	Comment 3. Sheet 2/165 – the 2nd paragraph of item B.2. is repeated at the bottom of the 2nd column and the top of the 3rd column.	A	The duplicate paragraph will be removed.
Soil Profile	Comment 4. Throughout the General Information, there are text format issues that cause unintended fractions.	A	The "unintended" fractions will be replaced by the correct text.
Soil Profile	Comment 5. Sheet 31/165 – B-1226, P-I & P-2, values for the C-U test appear are reversed and are questionable with regards to an effective phi of 47 degrees.	A	The test results for B-1226 P-1 and P-2 will be corrected. The effective phi for P-2 was 47 degrees but this value was not used in the analyses.
Soil Profile	Comment 6. Sheet 32/165 – R-464, Sample P-1 – the C_c value should be 0.47 (value listed in Lucasville-Minford Interchange Rpt) rather than 36.83.	A	The C_c result for R-464, P-1 is 0.44 and this will be corrected in the table.
Soil Profile	Comment 7. Sheet 45/165 – the title block text appears to have the overlapping words *soil profile* and *boring plan*.	A	The title block text will be corrected on sheet 45.
Soil Profile	Comment 8. Sheets 48 through 53/165 – there is some discrepancy between the designations of borings R-2436 vs. R-436 (as shown in typed logs in report), R-2444 vs. R-444, and R-2452 vs. R-452. There are also therefore issues with sheet 17/165, where R-2451, R-2449, R-2452, an dR-2455 are presented in the Summary of Soil Test Data.	A	Borings R-436, R-437, R-444, R-449, R-451, R-452, R-455, and R-457 were replaced by R-2436, R-2437, etc., which were drilled at the same location but deeper than the original borings. Only the deeper borings will be shown on the plans, profiles, and cross sections but both will be included in the summary of test data.
Soil Profile	Comment 9. Sheet 52/165 – there appears to be a drafting construction line	A	The construction line on R-453 on sheet 52 will be removed.

Response Code:

'A' – Agree or will comply; will revise

'P' – Partially agree; will revise to some degree (see written response)

'D' – Disagree; will not revise (see written response)

PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
	extending from the top of the graphical log for R-453.		
Soil Profile	Comment 10. Sheet 71/165 – the target for PB-33 (from the preliminary investigation) is shown but not labeled.	A	Sheet 71 will be removed from the revised sheet set, but the label for PB-33 will be confirmed on other applicable sheets.
Soil Profile	Comment 11. Sheet 62/165 – the targets for R-335 and B-1317 are presented in reverse in the plan view as to what is actually presented on sheet 63/165 in the profile view. It is assumed that the intention was to actually present R-355 on sheet 63.	A	In the revised sheet set, all targets will be the same line weight (not screened). The intent was to show B-1317 on sheet 63 (TR 234 Ramp A profile) and R-335 on sheet 37 (SR 823 profile).
Soil Profile	Comment 12. Sheet 71/165 – target for R-341 should be emboldened as the following sheet (72/165) includes the graphical log for this boring.	A	In the revised sheet set, all targets will be the same line weight (not screened).
Soil Profile	Comment 13. Above the graphical log for R-356, the station rather than the offset should be shown.	A	The station number will be shown in the heading for R-356 on the cross section on sheet 107 (SR 823 420+50).
Soil Profile	Comment 14. Proposed grade alogn the far left goes above existing grade and does not agree with the Stage 1 plans. Proposed grade along the far right does note intersect existing grade at the top of the cut.	A	The grade lines for the cross section on sheet 134 (SR 823 520+00) will be corrected.
Soil Profile	Comment 15. Boring R-455, run R-1, section A, should be hatched as breccia rather then sandstone. In sheet 134/165 – boring R-452, section B, the breccia section is too small to confirm but it appears than it is also incorrectly hatched as sandstone.	A	R-452 and R-455 will be replaced by R-2452 and R-2455, respectively (see Note #8).
Soil Profile	Comment 16. Proposed grade for LT rock cut as shown in soil profile does not match the rock cut recommendation report or the Stage 1 plans.	A	The proposed grade line for the cross section on sheet 152 (TR 234 Ramp D 386+00) will be corrected.
Soil Profile	Comment 17. R-419 plotted in cross	A	The elevation for R-419 will be corrected on sheet

Response Code:

'A' – Agree or will comply; will revise

'P' – Partially agree; will revise to some degree (see written response)

'D' – Disagree; will not revise (see written response)

DLZ **REVIEW COMMENTS**

DATE: March 7, 2008

SHEET 14 OF 15

PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
	section at SR 823, station 484, looks to be at the wrong elevation.		124 (SR 823 484+00).
Soil Profile	Comment 18. The number of soil profile sheets could be reduced substantially by; a) eliminating several redundant plan views.	A	Redundant plan view will be eliminated at the interchanges.
Soil Profile	Comment 18. The number of soil profile sheets could be reduced substantially by; b) showing a full length of profile on a page.	A	Sheets 90 and 92 will be combined.
Soil Profile	Comment 18. The number of soil profile sheets could be reduced substantially by; c) presenting rock core descriptions on the profile page wherever possible.	A	Rock core descriptions will be presented on the profile or cross section sheet where possible.
Soil Profile	Comment 18. The number of soil profile sheets could be reduced substantially by; d) TR 234 plan view should all be on one page.	A	TR 234 plan view will be placed on on one page.
Soil Profile	Comment 18. The number of soil profile sheets could be reduced substantially by; e) put all of CR 28 on one page.	A	CR 28 plan and profile will be placed on one sheet.
Soil Profile	Comment 19. The "screened boring" targets don't work – all boring targets need to be shown in the same line weight. It is much too difficult to see all the borings in plan view.	A	All boring targets will be changed to the same line weight (not screened).
Soil Profile	Comment 20. Instead of the screened boring target and the boiler plate note where to find them, each plan view sheet needs an index of cross sections relevant to that page and, when completed sections of ramp s or side roads are shown, where to find the profile for those.	A	A cross section index will be added to each plan sheet. The note will also be revised on each plan sheet to indicate where other profiles are located.
Soil Profile	Comment 21. Exposed bedrock symbols were not used.	A	Exposed bedrock symbols will be used.
Soil Profile	Comment 22. Exposed bedrock was not	A	Exposed bedrock will be shown in profile/section.

Response Code:

'A' – Agree or will comply; will revise

'P' – Partially agree; will revise to some degree (see written response)

'D' – Disagree; will not revise (see written response)

PROJECT **SCI-823-6.81 (Phase 1), PID 19415** PROJECT NO: **0121-3070-03**

REVIEWER: ODOT - Steve Taliaferro, OGE PHASE: 1 Stage I Review

Reference Item	Review Comments – Office of Geotechnical Engineering*	Code	Designer Response
	shown in profile/sections (such as TR 234, 38+00)		
Soil Profile	Comment 23. Not enough borings that could be shown in profile were shown, especially at the points of highest cut and fill.	A	Additional borings will be shown in profile where possible.
Soil Profile	Comment 24. Land usage and geotechnical features of interest appear throughout the plan view, however, the limits of the geotechnical features are not defined.	A	Limits of geotechnical features will be defined.
Soil Profile	Comment 25. Several cross-sections are incomplete, such as SR 823 station 504+50 where borings R-442 (drilled near centerline) is not shown (by the way, C-16 and C-17 don't show up on the plan view). Every boring in a section should be shown, regardless if it is shown elsewhere.	A	Borings will be added to the cross sections where applicable.
Soil Profile	Comment 26. Cross sections shouldn't show end area columns down the right side.	A	End area columns will be removed from the cross sections.
Soil Profile	Comment 27. Showing just one boring in a cross section is not very helpful. In almost all cases, a near-by centerline or opposite side boring has been drilled and should be shown for comparison.	A	Cross sections with only one boring will be eliminated.

Response Code:

'A' – Agree or will comply; will revise

'P' – Partially agree; will revise to some degree (see written response)

'D' – Disagree; will not revise (see written response)

Office Of Geotechnical Engineering's
Stage I Review Comments

SCI-823 Stage I, Geotechnical Comment Resolution Meeting Minutes
SCI-823 Stage I, Geotechnical Design Checklists with OGE comments

SCI-823-6.81
Stage 1 Geotechnical Comment Resolution Meeting Minutes

Attendees: Chris Merklin and Steve Taliaferro (OGE) / Mike Weeks and Ram Nunna (TranSystems) / Pete Nix, Dorothy Adams, Brian Mott, Andrew Jalbrzikowski, Steven Riedy, Eric Tse (DLZ)

Exploration Program

- DLZ acknowledged that as presented, the boring program appears to be excessive. However, the changes in alignment, both horizontal and vertical were the cause according to DLZ.
- Since there was no explanation for the additional borings in any of the submitted geotechnical reports, DLZ will respond to OGE's boring comments in a separate letter and possibly in a separate meeting. The response does not need to address every single questionable boring but should highlight the key changes that impacted the program.

Rock Cuts

- DLZ asked for clarification as to what extent OGE expected CRSP analysis to be submitted. OGE expects data for representative sections and marginal outputs to be submitted. Discussion also included that OGE was surprised in the phase 2 rock cut submission that 180-foot high cuts passed 95% retention. Clarification from the consultant(s) was given that CRSP analysis was on-going for phase 2 and that in fact barrier will be needed in several locations.
- TranSystems asked about OGE's comment on reducing catchment ditch width in selected locations. OGE indicated that it was intended to simply ask that the possibility be explored. TranSystems indicated that it was being evaluated but that drainage issues would likely prohibit catchment ditch width reductions from the typical.
- DLZ asked whether it was OGE's preference for areas where 95% catchment was not obtained to expand the ditch width or place barrier. OGE indicated that either a 2:1 slope instead of a 3:1 or barrier were the preferred options since guardrail was already going to be included.
- TranSystems will create a plan note to specify bench types and will present on a typical section rather than on every cross section. OGE finds this acceptable and TranSystems will send OGE the typical section and plan note for their review.
- OGE also indicated that it has reviewed Phase 3 rock cuts and found them to be in general agreement with ODOT Geotechnical Bulletin 3.

Subgrades

- DLZ will address any potential subgrade issues in soil cut areas along mainline and ramps that were omitted from the submitted reports. This will likely result in undercuts being added to the plans in a few locations.

Embankments

- In order to bring the standard of primary consolidation from 80% to 90%, this will cause only minor changes to the embankment heights for the staged construction (foot or two) and the waiting periods.
- Shear strength parameters will be adjusted so that all 3 reports are in agreement.
- DLZ will provide TranSystems with specific recommendations regarding embankment construction at the locations of the numerous existing ponds so that quantities can be included as warranted in Stage 2.

Soil Profile

- DLZ questioned the OGE comment regarding their use of the standard ODOT cross section border that includes area columns down the right side. OGE indicated that the soil profile cross sections should not include those columns and DLZ will comply.
- DLZ believes that complying with some of the OGE comments regarding soil profile presentation may make the sheets difficult to read. DLZ will send OGE some sample sheets before going forward with changing all the soil profile sheets.
- DLZ asked for clarification on the designation of Lucasville-Minford Rd. TranSystems indicated that it should be designated as CR 28.
- All other minor drafting comments are being addressed.

NOTE - All changes as a result of these comments will be addressed in an addendum to the initial report.

Ohio Department of Transportation

Inter-Office Communication

Office of Geotechnical Engineering
Design Resources Section

Date: January 31, 2007

To: Tom Barnitz, P.E., District 9

From: Stephen Taliaferro, P.E., Office of Geotechnical Engineering

Subject: SCI-823-6.81, PID 19415 – Stage 1 Geotechnical Review

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We have completed our Stage 1 geotechnical review for phase 1 of the SCI-823 project, designated as SCI-823-6.81. We were supplied with the following materials for this review, all received on December 6, 2006 unless noted:

- Stage 1 plans by TranSystems Corporation (including revised sheets received on December 27, 2006)
- Soil Profile Sheets by DLZ Ohio, Inc.
- Subsurface Investigation – Pavement Design Information – Phase 1 Mainline and Side Road CBR Values
- Subsurface Investigation – Embankments (Station 416+00 to 509+50)
- Subsurface Investigation – Lucasville-Minford Road Interchange
- Subsurface Investigation – Shumway Hollow Road Interchange
- Report of Geology and Field Reconnaissance
- Report of Rock Cut Slopes

For this review we utilized sections of the Geotechnical Engineering Design Checklist, and presented our Stage 1 comments on the checklist. At this stage of design, this checklist should be considered a "work in progress" until the plans address all geotechnical issues.

If you have any questions, please contact our office.

ST : CM

c: file, reading file, QAR file, D-9 DGE

II. Reconnaissance and Planning Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: ST/CM/ECG	Date: 1/31/07

All projects must establish the geologic setting and identify possible geologic hazards that may exist in the project area prior to preliminary design. This Reconnaissance and Planning Checklist should be followed as a guide to establishing the above conditions.

Y ■	1	Has the "Planning and Reconnaissance" section of the ODOT Specifications for Subsurface Investigations been followed?	1. See comment below.
	2	Have the following ODOT sources of geotechnical information been reviewed:	
■ N X		a past construction plans, including soil profile sheets from District	
Y N ■		b past project construction diaries	
■ N X		c interviews with people knowledgeable of the project site	
■ N X		d archived boring logs on file with the OGE	
■ N X		e past District and County Garage maintenance records	
■ N	3	Has ODNR geotechnical information been reviewed?	
		Indicate which references were reviewed:	
		■ "Bedrock Geologic Map(s)"	■ "Bedrock Structure Map(s)"
		■ "Bedrock Topography Map(s)"	■ "Geologic Map of Ohio"
		■ "Known and Probable Karst in Ohio"	■ "Quaternary Geology of Ohio"
		■ "Soil Survey(s)"	■ National Wetland Inventory Map
		■ Ohio Wetland Inventory Map	■ Report of Investigations
		■ "Landslides and Related Features"	
		■ aerial photographs	9 measured geologic section(s)
		■ boring logs ■ water well logs	9 Bulletins 9 Information Circulars
		9 Other List Other items:	
■ N	4	Has information regarding the possible existence of geologic hazards in, or adjacent to, the project area been requested and obtained from individuals in the project area?	
		Indicate which individuals were consulted:	
		■ ODOT construction and maintenance employees	
		9 ODOT employees (active or retired) who were involved with the original construction?	
		■ current, former, adjacent landowner(s)	
		9 County Engineer / County employees	
		9 Township Trustees and employees	

II. Reconnaissance and Planning Checklist

		9 local planning and zoning officials	
		9 City or Village officials	
		9 Other List Other items:	
■ N	X 5	Has information pertaining to the existence of underground mines within, or adjacent to, the project area (requested from the District AUMIRA Coordinator, DMRM, and DGS) been reviewed?	
■ N	X 6	Has the information from DMRM and DGS been reviewed regarding the existence of active, reclaimed, or abandoned surface mines within, or adjacent to, the project areas?	
■ N	X 7	Has any of the geotechnical information gathered in Question 3, indicated the potential presence of lake bed sediments, organic soil, or peat deposits?	
	8	Identify the geologic features that may influence the design on this project:	
		■ Landslide 9 Wetland or Peat 9 Fractures / Faults in exposed rock faces ■ Other	
		■ Rockfall 9 Karst 9 Underground Mine 9 Surface Mine	

Notes

Stage 1: In a unique project such as this with varying terrain and resulting geotechnical exploration complexity, along with changes in alignment and profile during the exploration phase, OGE acknowledges that the consultant was presented with a challenging task in managing this boring program. Regardless, we feel it is necessary to offer the following comments:

Boring Program Comments (Planning)

The boring program, as originally developed was reviewed by this office. Comments were made, revisions made, and eventually, a program was approved. How that approved program compares to the program of borings executed and presented here, we cannot fully evaluate. Nonetheless, we view this boring program, to have been excessive.

The program drilled was not executed in the spirit of the SSI as noted in the following paragraphs.

> Section 2.2.1 states, "Borings shall be selectively located for development of maximum subsurface information, using a minimum number of borings that will achieve that end."

Section 2.2.2.1 states, "In areas of roadway excavation involving bedrock, the stratigraphic column shall be determined within a given vertical interval of the geologic column at longitudinal intervals of approximately 300 meters (1000 feet). Where major changes occur, the longitudinal interval shall be reduced to establish major changes in stratigraphy. Rock core utilized in developing the stratigraphic column of bedrock shall be kept to a minimum. Borings in bedrock shall be supplemented by borings in soil to develop the elevation of bedrock surface and the nature of soil overburden throughout the cut."

II. Reconnaissance and Planning Checklist

Throughout the alignment, and it will become more apparent when all boring targets are made the same, borings are drilled very close to one another, to similar and substantial depths including bedrock, for no apparent reason. Some examples:

1. Why all the borings in the vicinity of SR823 station 485?
2. Why all the borings on TR234, from stations 25+00 to 35+00, approximately 18 borings in a 1000-foot stretch, including a cluster at 27+00?
3. Borings R-457 and B-1228 drilled 100-foot apart, 10 feet difference in elevation, each to 100+ feet, all bedrock.
4. TR335 – borings drilled in a 550-foot section, all into bedrock
5. R-211, why?
6. Why drill both R-353 and R-354?
7. Why drill both R-370 and R-371?
8. Why drill both R-435 and R-436?
9. The most extreme case of "too much rock coring" are the sections drilled from SR823 stations 512 to 524: 13 borings (including B-1228) totaling about 1400 feet of drilling, almost all bedrock, almost all the same. Why was all this rock drilling necessary?
10. Why drill B-1302?
11. Why drill both B-1343 and B-1344?
12. Why drill both B-1327 and B-1345?
13. Why drill both B-1321 and B-1322?
14. Why drill both B-1319 and B-1320?
15. Why drill both B-1324 and B-1325? Drill 1324 in the ditchline and your done.
16. C-47 – not drilled deep enough.
17. R-416 – why core the rock?
18. Excessive boring depths from SR823, stations 427 – 451 – grade change?

> Section 2.2.2.8, "Where embankments are in excess of 3 meters (10 feet) in height, borings shall be required to penetrate to a minimum depth of 3 meters (10 feet) plus one half the height of the embankment, or to encounter relatively stiff or dense soils or bedrock."

In nearly all the embankment borings, DLZ unnecessarily cored bedrock.

> Section 2.2.1, "...As subsurface information becomes available during progression of the boring and sampling program, the location of borings shall be reviewed with consideration given to increasing or decreasing the number of borings initially considered, or changing borings to more strategic locations."

A good example of borings being appropriately planned but not appropriately adjusted are the borings on 200-foot spacings along SR 728, Ramp C/D. If every other one of these borings is drilled, you realize, all of them are not necessary. Of those borings questioned above, it is apparent to our office that borings were being drilled without knowing what information was already collected or considering that information if it was known. This leads to much of the excess.

III.A. Centerline Cuts Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: ST	Date: 1/31/07

If you do not have a centerline cut on the project, you do not have to fill out this checklist.

Soil Cuts				
■ N	X	1	Does drilling provide continuous stratigraphic sections for the range of elevations that represent proposed cut slope areas?	
Y ■	X	2	Do the cut slopes have a minimum stability F.S. of 1.30 and are not steeper than 2:1?	2. Refer to note #1 on the following page.
			Check stability calculation method used:	
			9 STABL or equivalent software	
			9 hand calculations	
Y N ■		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	X	4	Have erosion protection measures been addressed for backslopes, side slopes, and ditches (including riprap recommendations or special slope treatments)?	4. Question cannot be answered until questions regarding stability are addressed.
Y N ■		5	Have issues related to any special usage of excavated soils been addressed?	
		6	If the cut is not completely above the water table,	
Y N ■			a Did the design consider the construction or long term ramifications of cutting below the water table?	
Y N ■			b Did the design consider additional drainage in the cut slope (springs / seeps) and roadway base?	
Rock Slopes				
			For rockfall and additional design considerations, see the "Rockfall Corrections Checklist."	
■ 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)?	
■ N	X	8	Have the slope angles, benching scheme, rockfall catchment design, and drainage controls been determined as prescribed in GB 3?	8. Generally follows philosophy of GB 3. Specific comments are on following page.
■ N	X	9	In accordance with GB 3, are the rock cut slopes, benches, and catchment areas indicated on all appropriate cross-sections?	

III.A. Centerline Cuts Checklist

[redacted]	N	X	10	In accordance with GB 3, has the rockfall catchment software analysis output and the cost analysis comparing catchment configurations been provided?	10. Rockfall catchment was determined in a series of design meetings between consultant and OGE.

Notes:

Stage 1: Soil Cut Comments

1. The consultant apparently has omitted its software output from the soil cut slope stability analysis. Factor of safety results for the Shumway-Hollow interchange (primary location of soil cuts) are presented in tabular format. For the long-term analysis, the factor of safety for both a 30-foot and 60-foot high cut equaled 1.25, below the ODOT minimum acceptable value of 1.30. Due to the lack of information regarding the analysis, it is unclear as to the reason for the inadequate value. The stability of the soil cuts at Shumway-Hollow and the soil cut at Lucasville-Minford should be evaluated in their entirety to confirm the recommendation of 2:1 soil cuts at each location using the ODOT minimum acceptable factor of safety.

Rock Cut Comments

1. In a February 2006 meeting between the District, the consultant, and OGE, a standard catchment ditch design (30 feet = 10' flat ditch + 15' @ 3:1 + 5' for guardrail considerations) was agreed upon. OGE recommends the District explore reducing the catchment ditch width to 25 feet (i.e., reduce the 3:1 to 10') in selected locations (e.g. TR 234 Ramp D or possibly reducing the ditch at the end of cuts)? OGE believes that there are locations where this can be done with the ditch width still acceptable to GB 3 minimums and anticipates that it will also still achieve the recommended 95% catchment when computer analysis is performed.
2. In the rock cut recommendation report, where are the cross sections for Shumway Hollow Road?
3. Shumway-Hollow Interchange Ramp D Station 386+00 – OGE questions the slope based on B-1345. It appears the slope was designed based on B-1327.
4. Rock Cut #11 – In both the design plans (sheets 164-166) and the rock cut report recommendations, from Station 417+00 to 419+00, a construction bench is labeled as elev. 766 but is actually drawn at elev. 776.
5. Rock Cut #11 – In the vicinity of Station 428+50 LT, there is a design unit (elev. 852 to 874) described as soft to medium hard shale proposed to be cut at 2:1. OGE recommends that, based on GB 3, consideration be given to modifying the 2:1 to a 1.5:1 with adjustments to the overburden bench as warranted. At the ends of this unit (estimated as Station 427+00 and 429+50), the slope can be flattened to 2:1 as per GB 3.
6. Rock Cut #11 – In both the rock cut recommendation report and the design plans, for the cross section at Station 428+50 RT, the design unit at elev. 819 to 832 is correctly drawn at 1.5:1 but incorrectly labeled as a 2:1.
7. Rock Cut #11 – In the vicinity of Station 432+00 LT, there are design units of hard gray shale from elev. 808 to 815 proposed to be cut at 1.5:1 and the lower 10 feet of medium hard clayshale from elev. 815 to 825 proposed to be cut at 2:1. OGE recommends that both can be cut at 1:1, which should also allow for a quicker transition from the adjacent 0.5:1 cut so that there is no 2-foot high cut at 0.5:1 terminating at elev. 807 at Station 431+50.

8. Rock Cut #13 – The geotechnical consultant has determined that the catchment ditch configuration developed for the project based on GB 3 recommended minimum catchment ditch widths will not be sufficient for Station 479+50 to 483+00 and has recommended concrete barrier in order to achieve the 95% rockfall catchment standard. It appears that neither the typical sections nor the plan view in the plans reflects this recommendation. The section appears similar to other sections – why does the consultant feel this failed the 95% standard? CRSP output was not presented.

9. Rock Cut #15 – In the vicinity of Station 508+50 RT cut, OGE questions the 0.5:1 slope, approximately 5-foot high, in soft gray and brown clayshale as indicated by Soil Profile Sheet 130/165 and boring R-445. On the LT cut at this location, a 1:1 slope was designed for similar thickness medium hard clayshale. OGE recommends that a 2:1 slope for the soft clayshale (point load value of only 68 psi) be considered and benches modified accordingly. The progression of the cut in further stations should reflect the transition to the massive sandstone recommended to be cut at 0.5:1. The relevant soil profile sheet 130/165 should also be updated.

10. Rock Cut #15 – The consultant should eliminate the 1.25:1 and 1.75:1 slopes and select values of 1:1, 1.5:1, and 2:1 as recommended by GB 3.

11. Rock Cut #15 –Was it the geotechnical consultant's intention to quickly transition Ramp A Station 518+50 to 520+00 RT from 0.5:1 to 1:1 back to 0.5:1? This seems to deviate from the consultant's typical design for the rest of the project.

12. On the design plans, the benches need to be labeled and plan notes included to define each bench type. The plan notes that the designer creates should be developed with the following considerations:

- OB – Overburden bench – Construct as shown unless bedrock is encountered deeper or shallower than the elevation shown, in which case it can be narrowed or widened to maintain the plan cut line.
- GB – Geotechnical bench – Construct as shown on the plans at the width shown. The engineer should adjust the vertical location depending on encounter with competent/less competent bedrock interface.
- CB – Construction bench – Not required; engineer may modify these benches in both width and elevation to accommodate the construction process.

III.B. Embankments Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: ST	Date: 1/23/07

Settlement

■	N	X	1	If soil conditions and project requirements warrant, have settlement issues been addressed? If not applicable (X), go to Question **14**	
■	N	X	2	Have consolidation properties of the foundation soils been determined? Check methods used: ■ laboratory consolidation tests ■ empirical correlations with moisture content and Atterberg values 9 other	
■	N	X	3	Have calculations been performed to estimate the total expected embankment settlement and the time of consolidation? Check method used: 9 EMBANK or equivalent software ■ hand calculations	
■	N	X	4	If differing foundation soil and/or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate consolidation at locations representative of the most critical conditions?	4. Refer to note #1 on the following page.
Y	■	X	5	Have the total settlement and the time of consolidation analyses indicated acceptable values at all locations for the scope of the embankment work?	
■	N	X	6	If total settlement or time of consolidation is unacceptable, have the stations and lateral extent of the problem areas been defined?	
■	N	X	7	Has a method been chosen as a solution to the settlement issues? Check methods used: ■ waiting periods with monitoring ■ drainage blanket and wick drains 9 surcharge (preloading) 9 removal and replacement of weak soil 9 lowering proposed grade / change alignment 9 lightweight fill	

III.B. Embankments Checklist

			9 other	List Other items:	
▮	N	X	8	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?	
Y	▮	X	9	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
Y	▮	X	10	Have all necessary notes, specifications, and details for the chosen solution been determined?	10. Refer to note #2 below.
Y	▮	X	11	Have the need, locations, type, plan notes, and reading schedule for settlement platforms been determined?	11. Refer to note #2 below.
Y	▮	X	12	Have the effects of the predicted settlement and the chosen solution been determined and accounted for on the construction schedule?	12. Refer to note #3 below.
▮	N	X	13	Has the effect of any foundation soil consolidation (including differential settlement) been evaluated with regard to adjacent structures (e.g., bridges, buildings, culverts, utilities) which will also undergo settlement and be subject to stresses induced by the consolidation of the surrounding soil?	13. Consultant states that any discussion of this issue is addressed in structural foundation reports provided to the Office of Structural Engineering for their review.

Notes :

Stage 1:

1. Settlement issues are significant at both the Shumway-Hollow and Lucasville-Minford Interchanges. OGE concurs that a drainage blanket with wick drains along with waiting periods is the proper course of remediation. It is the opinion of OGE that the consultant's predicted settlement amounts of the interchanges are generally conservative and that the actual values may be slightly lower than predicted. Regardless, the magnitude of settlement will still warrant remediation.

2. The geotechnical consultant has created plan insert sheets for wick drains/geotechnical instrumentation and included them in their report. At this early stage of design, these sheets have not yet been included in the plans. A general note regarding staged construction for both interchanges has been included in the plans.

3. The staged construction already discussed in the plans along with foundation consolidation that occurs while the Stage 2 embankment is constructed will impact the amount of time for primary consolidation to occur. With wick drains installed, the consultant estimated times for 80% primary consolidation of up to 120 days. With all of the above considered, in areas where significant settlement is anticipated, has the consultant recommended a waiting period post-Stage 2 embankment construction not yet accounted for in the plans? The only waiting period discussed in either the design plans or the plan insert sheets is the period between Stage 1 and Stage 2 embankment construction. For the areas where say 24 inches or more of total settlement is expected, OGE believes that 90% primary consolidation (consultant used 80% as its standard) should be the standard before the preparation steps for pavement begin.

III.B. Embankments Checklist

Stability					
■	N	X	14	If soil conditions and project requirements warrant, have stability issues been addressed? If not applicable (X), go to Question **27**	
■	N	X	15	Has the total (short term) and effective (long term) shear strength of the foundation soils been determined? Check method used: ■ laboratory shear tests 9 estimation from SPT or field tests	
Y	■	X	16	Have the OGE's recommended values of shear strength for proposed embankment fill material (total: c = 2000 psf, phi = 0; effective: c = 300 psf, phi = 28) been used in the stability analyses?	16. See note #1 on the following page.
■	N	X	17	Have calculations been performed to determine the F.S. for stability? Check method used: ■ STABL, XSTABL, or equivalent software 9 hand calculations	
			18	Have the following F.S. been met or exceeded, as determined by the calculations, for the given stability conditions:	
Y	■	X		a 1.30 for short term condition	18a. See note #2 on the following page.
■	N	X		b 1.30 for long term condition	
Y	N	■		c 1.10 for rapid drawdown, flood condition	
Y	N	■		d 1.50 for embankment supporting bridge abutments (not on deep foundations)	
■	N	X	19	When differing soil or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate the stability at locations representative of the most critical conditions?	
Y	■	X	20	If the F.S. was not met or exceeded, have the stations and lateral extent of the problem areas been defined?	20. See note #2 on the following page
■	N	X	21	Has a method been chosen as a solution to the stability issues? Check the method(s) used: 9 flattening slopes 9 counterberm 9 lightweight embankment	

III.B. Embankments Checklist

				9 reinforced soil slope	
				9 soil nailing	
				9 drainage blanket and wick drains	
				9 removal of soft soil, adding shear key	
				9 reduced grade / change alignment	
				▮ stage construction	
				9 controlled rate of fill placement	
				9 drilled shaft slope stabilization	
				9 other List Other items:	
Y	▮	X	22	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?	22. See note #2 below. Consultant has evaluated solution but further evaluation is recommended.
Y	▮	X	23	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
Y	▮	X	24	Have all necessary notes, specifications, and details for the chosen solution been determined?	24. See note #3 on the following page.
Y	▮	X	25	Have the need, location, type, plan notes, and reading schedule for piezometers and inclinometers been determined?	25. See note #3 on the following page.
▮	N	X	26	If piezometers will be used, has the critical pressure value been determined and the appropriate information included in the plans?	
▮	N	X	27	Have the effects of the stability solution been determined and accounted for on the construction schedule?	
Y	N	▮	28	Has the effect of the stability solution been evaluated with regard to structures (e.g., bridges, buildings, culverts, utilities) which may be subject to unusual stresses or require special construction considerations?	28. Consultant states that any discussion of this issue is addressed in structural foundation reports provided to the Office of Structural Engineering for their review.

Notes:

Stage 1:

1. The consultant used c = 0, phi = 35 degrees for most of Shumway-Hollow interchange report and all of the mainline report. For Lucasville-Minford and the Stage 2 undrained case at Shumway-Hollow, c = 0, ph i= 32 degrees was used. What is the reason for the deviation between reports? OGE concurs with the assumption that the embankment will be built primarily from the project's excavated rock.

2. The consultant, in both the Shumway-Hollow and Lucasville-Minford interchange reports, states that the ODOT minimum acceptable factor of safety for slope stability is 1.25 rather than the correct value of 1.30. Therefore for the staged construction, stage 1 undrained at Shumway-Hollow as shown at F.S.=1.29 is actually below the minimum acceptable value. OGE recommends that the consultant review its analysis and evaluate the sensitivity of the height of the Stage 1 embankment versus the actual ODOT minimum of 1.30.

III.B. Embankments Checklist

3. The geotechnical consultant has created an instrumentation plan insert sheet that, at this early stage of design, has not been included in the plans. A general note discussing the staged construction has been inserted in the plans.

III.B. Embankments Checklist

Sidehill Fills					
■	N	X	29	If soil conditions and project requirements warrant, have sidehill fill issues been addressed? If not applicable (X), go to Question **34**	
■	N	X	30	In accordance with Geotechnical Bulletin 2: Special Benching and Sidehill Embankment Fills (GB 2), have sidehill fills been evaluated to determine if special benching or shear keys are needed?	
			31	In accordance with GB 2, if special benching or shear keys are required, has	
■	N	X		a Plan Note G110 from L&D3 been included in the General Notes?	
Y	■	X		b quantities for both excavation and embankment been calculated for the benched areas and added to the plan General Quantities?	31b. At this stage of design, these quantities have not been included in the plans.
■	N	X		c the special benching or shear keys been indicated on the appropriate cross sections?	
■	N	X	32	Have water bearing zones been identified and their impact addressed?	
■	N	X	33	Have subsurface drainage controls been adequately addressed?	

Notes:

Stage 1: No Notes

III.B. Embankments Checklist

Special			
Y N	34	Have all of the environmental factors, including wetlands, stream mitigation, and landfills, been considered and incorporated prior to design and analysis of embankment settlement and stability, including EPA or other government agencies' involvement, mitigation, or special design or construction considerations?	
	35	If an embankment is to be placed through standing water or over weak, wet soils (with or without a fabric separator), the fill should be placed by the method of end dumping to a given height above the standing water or until compaction is achievable over the soft soil. If end dumping is to be specified,	35. See Note 1 below.
Y N X		a has the material type for the fill to be end dumped been specified?	35a. See Note 1 below.
Y N X		b has the need for a fabric separator or filter layer been determined?	35b. See Note 1 below.
Y N X		c has the height of fill to be end dumped been determined?	35c. See Note 1 below.
Y N X		d have all notes and specifications for end dumping been developed?	35d. See Note 1 below.

Notes:

Stage 1: 1. In the Lucasville-Minford report, a recommendation is made for Type D riprap with a separator (if soil is to be used for the initial embankment layers) for stream channels and specifically the pond at Station 530+50 to 531+50. In the Shumway-Hollow report, a similar comment is only made for stream channels but ponds are not mentioned despite there being several within the interchange. It is noted that spring drain quantities for spring-fed ponds have been included in the plans. Embankment construction over drained ponds has been an issue with recent ODOT new-alignment projects. OGE recommends that all existing ponds in the footprint of proposed embankments throughout the project have remediation (quantity for riprap, notes, etc.) included in the plans.

III.C. Subgrade Checklist

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If you do not have any subgrade work on the project, you do not have to fill out this checklist.

■ N X 1	Has the subsurface investigation adequately characterized the soil or rock according to Geotechnical Bulletin 1: Plan Subgrades (GB1)?	1. See comments below
Y ■ X 2	If soils classified as A-2-5, A-4b, A-5, or A-7-5 are present at the proposed subgrade (soil profile), do the plans specify that these materials need to be removed and replaced?	2. See comments below
Y ■ X	a If these materials are to be removed and replaced, have the station limits, depth, and lateral limits for the planned removal been provided?	2a. See comments for Item 2
Y ■ X 3	If there is any rock, shale, or coal present at the proposed subgrade (CMS 204.05), do the plans specify the removal of the material?	3. See comments for Item 2
Y ■ X	a If removal of any rock, shale, or coal is required, have the station limits, depth, and lateral limits for the planned removal of the material at proposed subgrade been provided?	3a. See comments for Item 2
■ N X 4	In accordance with GB1, do the SPT values and existing moisture contents for the proposed subgrade soils indicate the need for subgrade stabilization?	
Y ■ X	a If removal and replacement is applicable, has the detail of subgrade removal been shown on the plans, including depth of removal, station limits, lateral extent, replacement material, and plan notes (Item 204 – Subgrade Compaction and Proof Rolling)?	4a. See comments for Item 2
Y N ■	b If chemical stabilization is applicable, has the detail of this treatment been shown on the plans, including depth, percentage of chemical, station limits, lateral extent, and plan notes? Indicate type of subgrade treatment specified: 9 cement treatment 9 lime treatment 9 other List Other items:	4b. See comments for Item 2
■ N X 5	If drainage or groundwater is an issue with the proposed subgrade, has an appropriate drainage system (e.g., pipe, underdrains) been provided?	
Y ■ X 6	Has an appropriate quantity of Proof Rolling been included in the plans (CMS 204.06)?	6. See comments for Item 2
■ N X 7	Has a design CBR value been provided?	

III.C. Subgrade Checklist

Notes:

Stage 1:

1. In a unique project such as this with massive cuts and embankments, along with changes in profile during the exploration phase, OGE acknowledges it is difficult to apply the sampling and testing requirements for GB 1. In cases such as R-220, two adjacent samples were mechanically classified but likely due to profile changes, the top sample was obtained from an elevation just above the proposed subgrade. It is noted however that for R-210, for example, 1 sample was mechanically classified nearly 15 feet above subgrade and another was classified within the 6-foot subgrade analysis region rather than 2 within the region as per GB 1. Another example of further significance is at the CR 28 (Lucasville-Minford) interchange including Ramp B, B-1226, where 6-blow material at subgrade elevation was not mechanically classified. Again OGE acknowledges that profile changes may have impacted sample selection for testing but a localized subgrade undercut in the soil cut at this interchange is now predicted based on GB 1.

2. At this preliminary stage of design, specific details regarding subgrade undercuts have not been added to the plans. However, specific subgrade remediation recommendations have been provided by the geotechnical consultant for a majority of relevant areas.

3. OGE offers the following comments on subgrade remediation:

   SR 823

   Within the subgrade/pavement design report, the only item discussed for mainline SR 823 is the recommended CBR value. However, within the various mainline and interchange geotechnical reports, tables with limits where rock will be encountered at subgrade are presented. The geotechnical consultant has not provided recommendations for subgrade remediation in the area of the soil cut in the vicinity of the CR 28 interchange (~Station 528+00). Based on N-values (mechanical classification not performed for 2 samples within the subgrade analysis range) and the recommendations in GB 1, undercuts of 2' along SR 823 and Ramp B as well as up to 5' along Ramp C are predicted. Specific limits for these undercuts need to be provided by the geotechnical consultant for inclusion in the plans.

   TR 234 (Shumway Hollow Rd)

   - 3' undercut for Station 11+00 to 13+90 should be adjusted to Station 10+90 to 14+00
   - Concur with rock undercut limits
   - OGE recommends a 2' undercut from Station 26+00 to 31+00 rather than a 3' undercut from Station 26+00 to 31+75. It appears that the consultant used final grade rather than subgrade elevation as the basis for its recommendations.

   CR 28 (Lucasville-Minford Rd – referred to in report as SR 728)

   - The limits for the 1' undercut recommended from Station 4+56 to 14+40 should be revised to Station 10+05 to 12+00
   - The limits for the 3' undercut recommended from Station 14+40 to 20+75 should be revised to Station 14+50 to 21+00
   - Due to the phase construction, it is likely that the undercut option will be selected, therefore OGE concurs with the recommendation for no undercut from Station 21+00 to 28+00
   - The limits for the 3' undercut recommended from Station 28+28 to 37+31 should be revised to Station 28+00 to 37+31

III.C. Subgrade Checklist

SR 335

- The consultant has recommended no subgrade remediation based on pavement condition and the coarse-grained soils encountered within the proposed subgrade despite the predictions using GB 1. If the decision is made to replace the entire pavement, OGE expects that a 3' undercut from Station 10+50 to 14+64 will be necessary as it believes that the 1-foot or less thick stiff to very stiff layer will not bridge over the soft A-4a and very loose A-3a soils beneath when proof rolling takes place. Based on the current cross sections, a 3' undercut from only Station 10+50 to 11+00 is recommended.

VI.A. Soil Profile Checklist

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Bold italic terms are different than those currently indicated in the SSI, but will be included in the revised specifications

General Presentation				
Y	N X	1	Have the plan sheets been prepared using the lettering, format, and CADD standards as prescribed in the applicable sections of the L&D Manual, Volume 3?	
Y	N X	2	Based on the project length, has the correct horizontal scale been used to plot the project data?	
			Check scale used:	
			9 1" = 50' projects 1500' or less	
			9 1" = 100' projects greater than 1500'	
Y	N X	3	Has a scale of 1" = 10' been utilized for the vertical scale of the project data?	
Y	N X	4	Have cross-sections been developed to show subsurface conditions disclosed by a series of borings drilled transverse to centerline or baseline?	
Y	N X	5	Have the cross-sections been plotted at a scale of 1" = 10' (preferred) or 1" = 20'	5. 1" = 20' scale
Title and Data Sheets				
Y	N X	6	Has a summary table of test data and visual descriptions for all samples been shown?	
Y	N X	7	If borings from previous subsurface explorations are being used, has that data been shown in a separate table?	7. PB-33 only previous boring close enough to proposed alignment
Y	N X	8	Have the station, offset, and ***boring number*** been provided for each boring presented in the table?	
		9	For each sample, has the following information been provided in the summary table:	
Y	N X		a. Boring depth interval?	
Y	N X		b. Percentage of aggregate, coarse sand, fine sand, silt, and clay?	
Y	N X		c. Liquid limit, plastic limit, and moisture content, all rounded to the nearest percent or whole number?	
Y	N X		d. ODOT classification ?	
Y	N X		e. Visual description, if not classified by ODOT method?	

VI.A. Soil Profile Checklist

☒	N	X	10	Has a legend been provided on the Title Sheet?	
			11	Have the following items been included in the Legend:	
☒	N	X		a. Symbols and usual descriptions for each soil and bedrock type encountered, as per the ODOT classification in the SSI?	11a. Refer to Note #2
☒	N	X		b. The average test results for each classification?	
☒	N	X		c. The Group Index number for each classification?	
Y	☒	X	12	Has a Location Map, showing the beginning and end stations for the project, been shown on the Title Sheet?	12. Beginning and ending stations are not shown
			13	Has the following supplemental information been provided on the Title Sheet	
☒	N	X		a. Brief introduction of project type?	
☒	N	X		b. Brief presentation of geological and topographical information?	
☒	N	X		c. Brief presentation of boring and sampling methods?	
☒	N	X		d. Summary of general soil and bedrock conditions, including a generalized interpretation of findings?	
☒	N	X		e. Statement of where original drawings and data may be inspected?	
Y	N	☒		f. Statement of where soil or rock samples may be inspected, if applicable?	
☒	N	X	14	Have all undisturbed test results been displayed in summary tabular form on the sheet prior to the plan and profile sheets?	
Surface and Subsurface Data					
☒	N	X	15	Has land usage and all pertinent topographical and geotechnical features, per Section 5.1.5 of the SSI, been indicated on the plan views?	
Y	N	☒	16	Have any borings from previous explorations been labeled to identify their source and date?	16. Refer to item 7
☒	N	X	17	Have any observations not easily described through graphics been explained through notes on the plan sheets?	
☒	N	X	18	Have the correct stationing and elevations been displayed on the plan and profile views?	

VI.A. Soil Profile Checklist

☒	N	X	19	Has all the roadway subsurface data been presented in the form of a profile along the centerline or baseline?	
☒	N	X	20	Have the proposed groundline (solid) and existing groundline (dashed) been shown on the profile view?	
☒	N	X	21	Have the offsets from centerline or baseline been indicated above the borings?	
Y	☒	X	22	Have offset borings in or near the same elevation interval of a centerline or baseline boring been plotted immediately above or below the centerline boring in a box containing an elevation scale?	22. Due to unique project (large relief in terrain and boring depths) only borings near the centerline are shown in the profile
Y	☒	X	23	Have stratigraphic rock sections determined by logging exposed bedrock been shown ***0.4"*** wide with no bold vertical line?	23. Presented in Geology and Field Reconnaissance Report but should also be plotted on soil profile.
Y	☒	X	24	Have stratigraphic sections of bedrock shown on the cross-sections been plotted along the contour of the cross-section?	24. Refer to Item 23
Graphical Boring Logs					
			25	Have the graphical boring logs been correctly shown, as follows:	
☒	N	X		a. Location and depth of boring indicated by a bold vertical line?	
☒	N	X		b. Logs indicate soil and bedrock layers with symbols 0.4" wide?	
☒	N	X		c. Soil and bedrock symbols as per ODOT standards?	
Y	N	☒		d. Previous borings shown in same manner with source and date above the boring?	25d. Refer to Item 7
			26	Has the following information been provided adjacent to the graphical logs or stratigraphic rock section:	
☒	N	X		a. ***Boring number shown immediately above the boring?***	
☒	N	X		b. Thickness of sod/topsoil or other shallow surface material written above the boring (with corresponding symbology at top of log)?	
☒	N	X		c. Moisture content, to nearest whole percent, shown next to boring at center elevation of the sample?	
☒	N	X		d. Blow counts from SPT, shown at center elevation of sample, ***In x/y/z format?***	
☒	N	X		e. Free water indicated by a horizontal line with a 'w' attached?	

VI.A. Soil Profile Checklist

☒	N	X		f. Static water indicated by a horizontal line with an upside down triangle attached?	
☒	N	X		g. Complete geologic description of each bedrock interval, including RQD, % recovery, ***SDI, and shear strength***?	
☒	N	X		h. Visual description of any material not designated by a graphical symbol?	
☒	N	X		i. Visual description of any random fill encountered?	
Y	N	☒		j. Organic content in percent, with modifiers?	
☒	N	X		k. Designate a plastic soil with moisture content equal to or greater than the liquid limit minus three with a 1/8" solid black circle adjacent to the moisture content?	
☒	N	X		l. Designate a non-plastic soil with moisture content exceeding 25% or exceeding 19% but appearing wet with a 1/8" open circle with a horizontal line through it adjacent to the moisture content?	
Y	N	☒		l. The reason for discontinuing a boring prior to reaching the planned depth indicated immediately below the boring?	
Y	N	☒	27	***When applicable, has a scroll view of the boring profile been provided?***	

Notes:

Stage 1: The following review comments are provided to supplement the above checklist items. Due to the consultant's use of the soil profile checklist, these comments will be limited for a soil profile of this size.

1. Throughout the soil profile in plan/profile/cross section sheets, summary tables, etc., Lucasville-Minford Rd is designated as SR 728. However, the Stage 1 plans refer to this road as CR 28. The soil profile and Stage 1 plans should agree on this item.
2. Several hatches used in the presentation are not shown in the legend, including
   a. Area showing instability
   b. Clear cut area
   c. Dual hatches indicating interbedded bedrock
   d. Weathered siltstone
3. Sheet 2/165 – the 2nd paragraph of item B.2 is repeated at the bottom of the 2nd column and the top of the 3rd column.
4. Throughout the General Information, there are text format issues that cause unintended fractions (e.g. 13/32).
5. Sheet 31/165 – B-1226, P-1 & P-2, values for the C-U test appear are reversed and are questionable with regards to an effective phi of 47 degrees.
6. Sheet 32/165 – R-464, Sample P-1 – the C_c value should be 0.47 (value listed in Lucasville Minford Interchange Rpt) rather than 36.83.
7. Sheet 45/165 – the title block text appears to have the overlapping words *soil profile* and *boring plan.*

VI.A. Soil Profile Checklist

8. Sheets 48 through 53/165 – there is some discrepancy between the designations of borings R-2436 vs. R-436 (as shown in typed logs in report), R-2444 vs. R-444, and R-2452 vs. R-452. There are also therefore issues with Sheet 17/165, where R-2451, R-2449, R-2452, and R-2455 are presented in the Summary of Soil Test Data.
9. Sheet 52/165 – there appears to be a drafting construction line extending from the top of the graphical log for R-453.
10. Sheet 71/165 – the target for PB-33 (from the preliminary investigation) is shown but not labeled.
11. Sheet 62/165 – the targets for R-335 and B-1317 are presented in reverse in the plan view as to what is actually presented on sheet 63/165 in the profile view. It is assumed that the intention was to actually present R-335 on sheet 63.
12. Sheet 71/165 – target for R-341 should be emboldened as the following sheet (72/165) includes the graphical log for this boring.
13. Sheet 107/165 – Above the graphical log for R-356, the station rather than the offset should be shown.
14. Sheet 134/165 – proposed grade along the far left goes above existing grade and does not agree with the Stage 1 plans. Proposed grade along the far right does not intersect existing grade at the top of the cut.
15. Sheet 136/165 – Boring R-455, run R-1, section A, should be hatched as breccia rather than sandstone. In sheet 134/165 – Boring R-452, section B, the breccia section is too small to confirm but it appears that it is also incorrectly hatched as sandstone.
16. Sheet 152/165 – Proposed Grade for LT rock cut as shown in soil profile does not match the rock cut recommendation report or the Stage 1 plans.
17. R-419 plotted in cross section at SR 823, station 484, looks to be at the wrong elevation.
18. The number of soil profile sheets could be reduced substantially by
    a. eliminating several redundant plan views, for example
        i. all of the ramp plan views for the two interchanges are shown in their entirety on the mainline plan view. No need to show all eight of them in their own individual plan views. A note indicating where to find the ramp profile views needs to be presented on the plan view page.
    b. Showing a full length of profile on a page, for example
        i. Sheet 92 could be shown on Sheet 90 if you show profile all the way to within 100 feet of the edge of page, allowing one column of blocks for the elevations, and the elevations are shown all the way at the edge of the page in this outer block.
    c. Presenting rock core descriptions on the profile page wherever possible. Page 88 is an example of this error. The order of preference for where to place rock core information is:
        i. Adjacent to the boring stick
        ii. Below or above the boring stick
        iii. On the same page in a place where there is room with proper labeling
        iv. On the next page
    d. TR 234 plan view should all be on one page
    e. Put all of CR 28 (or SR 728) on one page

VI.A. Soil Profile Checklist

19. The "screened boring" targets don't work – all boring targets need to be shown in the same line weight. It is much too difficult to see all the borings in plan view.

20. Instead of the screened boring target and the boiler plate note where to find them, each plan view sheet needs an index of cross sections relevant to that page and, when complete sections of ramps or side roads are shown, where to find the profile for those.

21. Exposed bedrock symbols were not used.

22. Exposed bedrock was not shown in profile/section (such as TR 234, 38+00)

23. Not nearly enough borings that could be shown in profile were shown, especially at the points of highest cut and fill; a few examples: C-3 should be shown on TR234 Ramp B profile, C-2 should be shown on TR234 Ramp C profile, R-387 should be shown at SR 823 station 454±. There are plenty of other examples throughout. Too many borings were relegated to cross sections and side roads/ramps only. Borings should be shown in both places if there is room.

24. Land usage and geotechnical features of interest appear throughout the plan view, however, the limits of the geotechnical features are not defined. For example, the shallow pit mining at station 450+00±, and the limits of low lying wet areas elsewhere.

25. Several cross-sections are incomplete, such as SR 823 Station 504+50 where borings R-442 (drilled near centerline) is not shown (by the way, C-16 and C-17 don't show up on the plan view). Every boring in a section should be shown, regardless if it is shown elsewhere. Other examples are SR 823, station 498+00 – where is boring R-434 - and SR 823, station 391+00, could show 4 borings, only showed 2, SR823 station 407+00 should go to edge of fill and show PB-33.

26. Cross sections shouldn't show end area columns down the right side.

27. Showing just one boring in a cross section is not very helpful. In almost all cases, a near-by centerline or opposite side boring has been drilled and should be shown for comparison.