MEMORANDUM

SCI-823-6.81, PID#19415

PREPARED FOR: ODOT District 9

PREPARED BY: Mike Weeks/TranSystems

SUBJECT: VE Report Alternatives Evaluation, SCI-823-0.00, PID 19415, 79977 and 77366

DATE: March 17, 2008

Alternative 1 Reduce legal speed to 60 mph

This alternative is promising and needs additional study. It could be implemented for all three phases but would require at grade intersections at the interchanges and would require a significant amount of truck lanes.

Alternative 2/30 Use High Fill Culverts

This alternative is promising and could warrant additional study for Phases 2 and 3 if the Department revisited their decision made in 2005 to minimize non standard culverts due to special designs and future maintenance issues. If the profile is raised the fill footprint in the valleys will have to be assessed to determine if additional environmental studies are warranted. Impacts to streams will also increase.

Alternative 5 Raise pipe outlets in high fill areas

This alternative is promising and needs additional study. Some of the installations have already been flattened in Phase 2, but could be implemented in other location in Phases 2 and 3 with further study.

Alternative 9 Increase inclination of rock cuts

This alternative is promising and needs additional study. This alternative could be applicable to all 3 Phases. The geotechnical studies and recommendations need to be confirmed and additional analysis performed to verify the feasibility. This alternative should be assessed on Phase 3 right of Station 171 to minimize the impact to the 138kv transmission tower.

Alternative 10/28 Eliminate benches in soil and rock cuts

This alternative is promising and needs additional study. The possible elimination of the construction benches could be applicable to all 3 Phases.

Alternative 11A Use steepened fill slopes where advantageous at toe of design slope without impact to the right-of way

This alternative is promising and needs additional study for all 3 Phases. The savings may not be great enough to risk using the 1.5:1 slopes.

Alternative 11B Use steepened fill slopes where advantageous at top of design slope to reduce culvert lengths and stream impacts

This alternative is promising and needs additional study for all 3 Phases. The savings may not be great enough to risk using the 1.5:1 slopes.

Alternative 12 Use rock fall mesh and reduce catchment ditch width

This alternative is unlikely to provide a cost savings advantage and will have a complex maintenance component. The rock fall mesh cut section could be considered on Phase 3 right of Station 171 to minimize the impact to the 138kv transmission tower.

Alternative 14B Use 2:1 foreslopes for catchment ditches

This alternative is promising and needs additional study for all 3 Phases. ODOT Office of Geotechnical Engineering would have to approve the deviation from the GB-3 guidelines.

Alternative 19 Use ground nail walls to avoid some soil cuts at sliver cuts

This alternative is promising and needs additional study for Phases 1 and 2. The savings may not be great enough to offset the possible future maintenance and repairs.

Alternative 23 Sell excess rock as an aggregate source

This alternative is promising and needs additional study for all 3 Phases.

Alternative 25A Use a roundabout at the US 23 Interchange

This alternative is promising and needs additional study for Phase 2. Since roundabouts are typically low speed designs, there are concerns with using a high circulatory design speed. Studies into the operational and safety feasibility will be required. We have performed a cursory investigation using SIDRA and confirmed the VE team's finding that a roundabout solution is likely feasible operationally. The relocation of US 23 and the roundabout intersection will have additional environmental impacts and real estate costs. From a project background perspective, the systems interchange was the desired alternative in the feasible alternatives development – the VE session held in 2002 for the feasible alternatives actually indicated consideration should be given to providing higher speed ramp configurations even though there would be cost increases (this alternative was not carried forward into further plan development).

Alternative 25B Eliminate the ramp bridges at the US 23 Interchange

This alternative is promising and needs additional study for Phase 2. Moving US 23 to the east will result in more environmental impacts, higher real estate costs and work in the flood plain of the Scioto River.

Alternative 25C Reconfigure the US 23 Interchange

This alternative is promising and needs additional study for Phase 2. Eliminating Ramp B and providing a ramp parallel to NB US 23 with a continuous right turn and a widened mainline bridge may be a feasible cost reduction. Additional geotechnical analysis will also likely be needed to confirm the ramp retaining wall design and anticipated settlement adjacent to the RR.

Alternative 26 Eliminate exclusive right-turn lanes at intersections, particularly along Shumway Hollow Road

This alternative is promising and needs additional study for Phase 1. The turn lane for WB SHR to Ramp A is warranted (not shown correct in VE exhibit) but only needs to be 125 ft. full lane in length – the lane was extended east across the bridge to simplify the bridge construction at the forward abutment and retaining wall along SR 335 by providing a smaller radius. Decreasing the bridge width and providing a large radius will require complex framing of the steel beams and/or possible use of curved beams, potentially offsetting any savings from a reduction in the square foot cost of the bridge.

Alternative 31/51 Dispose of excess rock/soil on land adjacent to facility

This alternative is promising and needs additional study for Phases 1, 2 and 3. The areas to be considered will have to be assessed to determine if previous investigations are adequate or if additional studies will be required.

Alternative 33 Consider relocating SR 335 approximately 14 ft. east to facilitate construction of right-turn lane without the need for a retaining wall at Shumway Hollow Road

This alternative can be implemented now for Phase 1. The shifting of SR 335 to the east will require the environmental studies to be assessed and possible additional cultural resource investigation performed to update the NEPA documentation.

Alternative 34/37 Use waste to create developable land at or close to interchanges

This alternative is promising and needs additional study for Phase 1. ODOT to determine real estate, environmental and legal issues.

Alternative 39 Consider the Value Engineering Change Proposal (VECP) potential of specific structures

This alternative is promising and needs additional study for all three Phases. The structures noted for possible VECP assessment could be investigated during the Stage 2 design effort, particularly for the Phase 1 bridges since the sale date is only a few years out.

Alternative 40 Reduce bridge spans by providing short retaining wall and safety barrier

This alternative is promising and needs additional study for Phase 2 and possibly other Phases. The 1018 and 1357 bridges could be assessed in Stage 2 of design to determine the feasibility to shorten spans. Taller abutments were assessed in the Bridge Type Studies to minimize span lengths but were not economical – the retaining wall option was not considered in any detail but could be a viable option. Other structures could be investigated also.

Alternative 43/21 Break project into smaller bid packages and change the phasing to use excavated material early

This alternative is promising and needs additional study for all Phases. This alternative seems feasible, especially for the earthwork and drainage work.

Alternative 45 Modify subgrade preparation to improve drainage and potentially increase strength of pavement design

This alternative is promising and needs additional study for all three Phases. This alternative would utilize the abundance of rock fill available to drain the subgrade – this will need the approval of the Offices of Pavement Engineering and Geotechnical Engineering. Coordination with other DOTs (WV, KY) could confirm the feasibility and possible design issues.

Alternative 52 Eliminate some underdrains

This alternative is promising and needs additional study for all three Phases. The underdrains shown in the Stage 1 plans are typical for ODOT projects. The Offices of Structures-Hydraulics and Pavement Engineering will have to approve any deviation.

Alternative 54 Reduce 3-span ramps at US 23 over railroad to a single-span or 2-span ramps

This alternative is promising and needs additional study for Phase 2. Per the design team's Revised Structure Type Study dated June 2007, the 3-span configuration does not require temporary falsework between the tracks. In addition, the design team concluded the increased span length required to accommodate the addition of two future Norfolk Southern tracks would eliminate the single span alternative – ODOT OSE concurred with this conclusion in their comment #1 dated 7/9/07 (Ramp B) and 7/18/07 (Ramp C).

Alternative 59 Use fill berms in lieu of guardrails

This alternative is promising and needs additional study for all three Phases. This alternative would help reduce the amount of waste, but could also increase stream impacts and require additional environmental studies if outside the NEPA footprint. ODOT would have to agree to clear zone grading in lieu of the safety grading typically used for this type of facility.

Alternative 61 Replace safety grading with clear zone grading

This alternative is promising and needs additional study for all three Phases. ODOT would have to agree to clear zone grading in lieu of the safety grading used for similar type facilities.

Alternative 63 Sell separate clearing and grubbing contract

This alternative is promising and needs additional study for all three Phases. ODOT has done this in past – District 10 sold a similar contract for the MEG-124 (later named US 33) to avoid the Indiana Bat issue.

Alternative 64 Survey trees for marketability

This alternative is promising and needs additional study for all three Phases. Real Estate needs to assess this option since the landowner is also compensated to some extent during acquisition for the loss of timber.

Alternative 65 Split Ramp B into two separate bridges at the US 52 interchange

This alternative is promising and needs additional study for all Phase 3. During the Bridge Type Study development ODOT OSE directed the design team to investigate the use of a single structure to avoid a large skew over Ohio River Road (see Sept. 2005 BTS comments).

Alternative 67 Ensure the use of 50 ksi H-piles driven to bedrock

Implement this alternative now. The Stage 2 design team has to prepare the final pile design and can switch from 36 ksi to 50 ksi steel piles in their calculations.

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Project Memo

To: Tom Barnitz, ODOT	
From: Brad Hyre, HDR	Project: SCI-823-Phase1
CC:	
Date: 02/29/08	Job No: 45878

RE: SCI-823-0.00/6.81
PID No. 19415
Portsmouth Bypass Phase 1
HDR VE Comments Evaluation

Listed below are HDR's comments on the project's December 2007 Value Engineering (VE) report alternatives as per your letter dated February 13, 2008.

Alternative Number 1: Reduce the legal speed to 60 mph.
Evaluation: All of the rock excavation and embankments, the major cost items, would still be completed as part of an intiail super-two. Examination of the profile indicates the need for truck lanes on the majority of the roadway; incorporating truck-lanes with only initially building one of each of the dual mainline bridges (as proposed) would need to be examined. Because access and the road type would be changed from the approved FEIS, it would likely require re-opening the environmental document.
Recommendation: ***Do not implement.***

Alternative Number 2: Use high fill culverts.
Evaluation: Since excavation and waste represent a significant amount of the project costs, this alternative should be re-evaluated on a case by case basis. This alternative could potentially work in conjunction with Alternative 11B to minimize additional stream impacts.
Recommendation: ***Alternative appears promising, needs additional study.***

Alternative Number 5: Raise pipe outlet in high fill areas.
Evaluation: As proposed, this suggestion would require outlet maintenance on relatively steep slopes, as well as filling of the approaching stream/valley, which would result in additional stream impacts.
Recommendation: ***Do not implement.***

Alternative Number 9: Increase inclination of the rock cuts.
Evaluation: The rock cut details have been reviewed many times and ODOT appears comfortable with the current design.
Recommendation: ***Do not implement.***

Alternative Number 10: Eliminate benches in soil and rock cuts.
Evaluation: The rock cut details have been reviewed many times and ODOT appears comfortable with the current design.
Recommendation: ***Do not implement.***

Alternative Number 11A: Use steepened fill slopes where advantageous at toe of design slope without impact to the right-of-way.
Evaluation: The greater quality control requirements to construct the 1 1/2:1 rock embankments over extended lengths may result in higher unit costs for placement, countering some of the cost savings with reduced waste. In addition, the aesthetic impact of long stretches of high non-vegetated rock embankments would need to be addressed. In areas where an embankment slope is flatter than 2:1 (and not restricted by geotechnical conditions), steepening the slope to 2:1 and wasting more material appears advantageous.
Recommendation: ***Do not implement as proposed; may be promising to steepen flat slopes to 2:1.***

Alternative Number 11B: Use steepened fill slopes where advantageous at top of design slope to reduce culvert length and stream impacts.
Evaluation: Similar issues as 11A, although over very limited distances and in conjunction with the need to reduce stream impacts (such as with Alternative 2), this appears worthy of consideration.
Recommendation: ***Alternative appears promising if need to reduce stream impacts, needs additional study.***

Alternative Number 12: Use rock fall mesh and reduce catchment ditch width.
Evaluation: The rock cut details have been reviewed many times and ODOT appears comfortable with the current design.
Recommendation: ***Do not implement.***

Alternative Number 14B: Use 2:1 foreslopes for catchment ditches.
Evaluation: Appears to have the potential to reduce the amount of excavation by a worthwhile amount (would pull each side of a cut slope in by 5 feet). It would require re-evaluation of the 95% catchment criteria.
Recommendation: ***Alternative appears promising, needs additional study.***

Alternative Number 19: Use ground nail walls to avoid some soil cuts at sliver cuts.
Evaluation: Due to the limited areas applicable and the potential disadvantages discussed in the report, it is not worthy of additional examination.
Recommendation: ***Do not implement.***

Alternative Number 23: Sell excess rock as an aggregate source.
Evaluation: Good idea in concept, however significant logistical issues would likely prevent ODOT involvement in selling excess rock as aggregate.
Recommendation: ***Do not implement.***

Alternative Number 25A: Use a roundabout at the US 23 Interchange.
Evaluation: The estimated cost savings appears to be significant. With slip ramps shown, roundabout is simple operations.
Recommendation: ***Additional study of the US 23 Interchange needed.***

Alternative Number 25B: Eliminate the ramp bridges at the US 23 Interchange.
Evaluation: The estimated cost savings appears to be significant. It is apparent that the US 23 interchange needs further study.
Recommendation: ***Additional study of the US 23 Interchange needed.***

Alternative Number 25C: Reconfigure the US 23 Interchange.
Evaluation: It is apparent that the US 23 interchange needs further study.
Recommendation: ***Additional study of the US 23 Interchange needed.***

Alternative Number 26: Eliminate exclusive right-turn lanes at intersections, particularly along Shumway Hollow Road.
Evaluation: This alternative recommends eliminating the exclusive right-turn lanes only along Shumway Hollow Road, and elimination of the additional lane on the bridge over CSX. This alternative appears to provide a savings without any disadvantages.
Recommendation: ***Implement the Alternative now.***

Alternative Number 31: Dispose of excess rock/soil on land adjacent to the facility.
Evaluation: There is an environmental risk associated with this alternative that may necessitate re-opening the FEIS. This action can not create any more stream or wetland impacts.
Recommendation: ***Be mindful of opportunities during design.***

Alternative Number 33: Consider relocating SR 335 approximately 14 ft. east to facilitate construction of right-turn lane without the need for a retaining wall at Shumway Hollow Road.
Evaluation: Right-of-way appears to be available and the cost savings with elimination of the retaining wall is significant. Also provides improved geometry for the right turn movement onto the bridge. Would need to verify right-of-way availability and long-term stability of existing slope along the railroad.
Recommendation: ***Alternative appears promising, needs additional study to confirm.***

Alternative Number 34: Use waste to create developable land at or close to interchanges.
Evaluation: There is an environmental risk associated with this alternative that may necessitate re-opening the FEIS. This action can not create any more stream or wetland impacts. Would likely be a significant cost to place the controlled fill required for development, reducing or even eliminating any cost savings..
Recommendation: ***Do not implement.***

Alternative Number 39: Consider the Value Engineering Change Proposal (VECP) potential of specific structures.
Evaluation: On the surface many of the ideas presented look feasible. A meeting would have to be held with the ODOT OSE to see if changes can be made without new structure type studies. Need to verify that there are no adverse drainage impacts. only if no further STS.
Recommendation: ***Meet with ODOT OSE and evaluate bridge by bridge – Implement where possible.***

Alternative Number 40: Reduce bridge spans by providing short retaining wall and safety barrier.
Evaluation: This alternative may present possible adverse drainage impacts and adds safety hazards for the roadway under the bridge.
Recommendation: ***Do not implement.*** discuss draw-backs OSE comments— hold mtg w/ OSE.

Alternative Number 43: Break project into smaller bid packages and change the phasing to use excavated material early.
Evaluation: Already being done.
Recommendation: ***Already being done.***

Alternative Number 45: Modify subgrade preparation to improve drainage and potentially increase strength of pavement design.
Evaluation: Appears to have potential. Need to examine possible contractor construction methods in rock cut areas with installation of underdrains (would they over-excavate anyway?) as this alternative will increase the amount of excavation. Appears very feasible in embankment areas.
Recommendation: ***Alternative appears promising, needs additional study.***

Alternative Number 52: Eliminate some underdrains.
Evaluation: If underdrains are used, they should meet ODOT requirements for placement.
Recommendation: ***Do not implement.***

Alternative Number 54: Reduce 3-span ramps at US 23 over railroad to a single-span or 2-span ramps.
Evaluation: The US 23 interchange needs further study. Utilization of sheet pile isolation along railroad will reduce bridge costs. This should be strongly considered even if ultimately keep the interchange the same.
Recommendation: ***Additional study of the US 23 Interchange needed.***

Alternative Number 59: Use fill berms in lieu of guardrails.
Evaluation: The alternative provides a great use of waste material. The environmental impacts need to be checked on a case by case basis. Likely needs to have Alternative 61 implemented.
Recommendation: ***Alternative appears promising, needs additional study to confirm.***

Alternative Number 61: Replace safety grading with clear zone grading.
Evaluation: Safety grading is not attainable on most of the project. Clear zone grading is better than guardrail.
Recommendation: ***Use safety grading where possible, clear zone grading where safety grading is not attainable, use barrier grading where clear zone grading can not be met.***

Alternative Number 63: Sell separate clearing and grubbing contract.
Evaluation: Already being done.
Recommendation: ***Already being done.***

Alternative Number 64: Survey trees for marketability.
Evaluation: Timber is being bid as separate package.
Recommendation: ***Already being done.***

Alternative Number 65: Split Ramp B into two separate bridges at the US 52 interchange.
Evaluation: High skew (60 degrees) on single span bridge. If not acceptable, skew could be reduced to a more acceptable level (45 degrees) by lengthening to approximately 125 feet. Supplemental type study recommended to refine cost savings.
Recommendation: ***Alternative appears promising, needs additional study.***

Alternative Number 67: Ensure the use of 50 ksi H-piles driven to bedrock.
Evaluation: 50 ksi piles are typically used.
Recommendation: ***Implement the Alternative now.***

Except for those Alternatives that reference a specific location/area, the Alternatives could be applicable in all three phases of the project.

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February 29, 2008

Mr. James Brushart
District Deputy Director
Ohio Department of Transportation
District 9
650 Eastern Avenue
P.O. Box 467
Chillicothe, Ohio 45601-0467

Attn.: Mr. Tom Barnitz, P.E.

Re: SCI-823-0.00
Value Engineering Report Evaluation

Dear Mr. Barnitz,

We are submitting our evaluation of the Alternatives presented in the Value Engineering report prepared by Lewis and Zimmerman Associates, Inc., dated December 2007, as requested. The evaluation is based on three criteria: implementing the alternative now; the alternative is promising, but needs additional cost/benefit study or do not implement.

1 *Reduce the legal speed to 60 mph.*

Do not implement: Based on our experience with the design of super 2 roadways and at-grade crossings, reducing the design speed will have minimal impacts and increased safety issues. A recent design provided for a future grade separation using a nearby structure at one of the at-grade crossings. Shortly after the construction was completed, the decision was made to construct the grade separation. In hindsight, it would have been more cost effective to incorporate the grade separation with the original contract. This applies to all phases.

2/30 *Use high fill culverts.*

Do not implement: Raising the profile and using high-fill culverts may have some benefits as it pertains to balancing the job. However, while it may be possible to raise the outlet of some of the proposed culverts, the ability to channel the water may become problematic. This job will produce primarily durable rock and coarse-grained material from the cuts, to be used as fill material. In most areas, the lack of fine-grained soil for fill material will not permit the surface drainage in the fill sections to be captured and channeled into the inlet of the culvert. This applies to all phases.

5 *Raise pipe outlet in high fill areas.*

Do not implement: While it may be possible to raise the outlet of some of the proposed culverts, the ability to channel the water may become problematic. This job will produce primarily durable rock and coarse-grained material from the cuts, to be used as fill material. In most areas, the lack of fine-grained soil for fill material will not permit the surface drainage in the fill sections to be captured and channeled into the inlet of the culvert. This applies to all phases.

9 *Increase inclination of the rock cuts.*

The alternative is promising, but needs additional cost/benefit study: While this suggestion may warrant consideration, ODOT's Office of Geotechnical Engineering (OGE) has developed Geotechnical Bulletin No. 3 (GB 3) "Rock Cut Slope & Catchment Design". This document was under development during the geotechnical work on Phase 1 of this project, and was published and in-effect during the subsequent phases of the project. Consequently, the rock cut slope design was carried out according to the specifications outlined in GB 3. ODOT would need to consider any changes to the current design guidelines. This applies to all phases.

10/28 *Eliminate benches in soil and rock cuts.*

Do not implement: The construction benches are necessary to perform the work and are typically shown on the plans in Ohio. Also, to ensure adequate performance of the rock cut slopes, the use of geotechnical (lithologic) benches are required. These benches prevent weaker, underlying rock formations from undermining more competent overlying rock. Based on the calculations, it does not seem that a significant savings would be realized by eliminating the overburden bench. This applies to all phases.

11A *Use steepended fill slopes where advantageous at toe of design slope to reduce culvert length and stream impacts.*

Do not implement: While in some locations bedrock is shallow, and would likely permit the steepening of slopes, many of the culvert locations lie in valleys, which are filled with weak, compressible soils. In high fill areas, the subsurface conditions may not permit the use of slopes, which are steeper than 2H:1V.

Strict controls/inspection would have to take place to ensure that coarse-grained or durable rock material was used in these "zoned" portions of the embankments and that the proper compaction effort was applied. This applies to all phases.

11B *Use steepended fill slopes where advantageous at top of design slope to reduce culvert length and stream impacts.*

Do not implement: While in some locations bedrock is shallow, and would permit the steepening of slopes, many of the culvert locations lie in valleys, which are filled with weak, compressible soils. In high fill areas, the subsurface conditions may not permit the use of slopes, which are steeper than 2H:1V.

Strict controls/inspection would have to take place to ensure that coarse-grained or durable rock material was used in these "zoned" portions of the embankments and that the proper compaction effort was applied. This applies to all phases.

12 *Use rock fall mesh and reduce catchment ditch width.*

The alternative is promising, but needs additional cost/benefit study: Colorado Rockfall Simulation Program (CRSP) analyses would need to be run to gauge the effect of the mesh on reducing the required width of catchment ditch. This applies to all phases.

14B *Use 2:1 foreslopes for catchment ditches.*

The alternative is promising, but needs additional cost/benefit study: CRSP analyses would need to be run to gauge the effect of using steeper foreslopes, thus reducing the width of catchment ditch. This applies to all phases.

19 *Use ground nail walls to avoid some soil cuts at sliver cuts.*

The alternative is promising, but needs additional cost/benefit study: This applies to all phases.

23 *Sell excess rock as an aggregate source.*

The alternative is promising, but needs additional cost/benefit study: This applies to all phases.

25A *Use roundabout at the US 23 Interchange*

The alternative is promising, but needs additional cost/benefit study: Without considering the extent of the environmental document, embankments can be built in the floodplain (west of US 23) generally without the need for staged construction or wick drains. The embankments constructed along US 23 would also be used to raise the grade so the SCI-823-1601L&R bridge over Norfolk Southern Railroad will meet the required vertical clearances. This could increase the length of work along existing US 23 depending on the elevation of the roundabout. This also provides another location for using waste material from other parts of Phase 2. DLZ has in-house experience designing multi-lane, high-speed roundabouts and can easily assist ODOT. Environmental impacts would also have to be investigated.

25B *Eliminate the ramp bridges at the US 23 Interchange.*

The alternative is promising, but needs additional cost/benefit study: Without considering the extent of the environmental document, embankments can be built in the floodplain (west of US 23) generally without the need for staged construction or wick drains. The Scioto River hydraulic analysis would need to be investigated to determine effects of encroachment into the floodplain. Environmental impacts would have to be investigated.

25C *Reconfigure the US 23 Interchange.*

The alternative is promising, but needs additional cost/benefit study: Without considering the extent of the environmental document, embankments can be built in the floodplain (west of US 23) generally without the need for staged construction or wick drains. The Scioto River hydraulic analysis will need to be investigated to determine effects of encroachment into the floodplain. Environmental impacts would have to be investigated.

26 *Eliminate exclusive right-turn lanes at intersections, particularly along Shumway Hollow Road.*

The alternative is promising, but needs additional cost/benefit study: A review of the traffic volumes to warrant removal should be conducted. There are safety concerns with the through traffic, if the turn lane is eliminated. These issues should be investigated.

31/51 *Dispose of excess rock/soil on land adjacent to the facility.*

The alternative is promising, but needs additional cost/benefit study: The designer needs to consider the area where the spoils are to be wasted. In many of the valleys, thick deposits of

soft compressible clays are present. The need for staged construction is evident from the analyses performed for the mainline embankments and interchange ramps situated in the deeper valleys. If material is wasted in these areas, the maximum fill height may be limited due to global stability concerns. This applies to all phases.

33 *Consider relocating SR 335 approximately 14 ft east to facilitate construction of right-turn lane without the need for a retaining wall at SR 335 and Shumway Hollow Road.*

The alternative is promising, but needs additional cost/benefit study: If the right-of-way exists to do this and the sight distances are appropriate, this suggestion should be used.

34/57 *Use waste to create developable land at or close to interchanges.*

The alternative is promising, but needs additional cost/benefit study: Unfortunately, the Shumway Hollow Road, and Lucasville-Minford Road Interchanges are positioned in wide, deep valleys, which are filled with soft compressible soils. The construction of the embankments and ramps requires the use of staged construction and wick drains to accelerate consolidation. Consequently, if fill was to be placed to create developable land, it would likely have to be constructed in a similar manner; using staged construction (depending on fill height) and wick drains to consolidate foundation soils prior to building any structures on the fill. This applies to Phases 1 and 3.

39 *Consider the Value Engineering Change Proposal (VECP) potential of specific structures.*

Implement the alternative now: The reduction in structure lengths is due to reduced lateral clearances per the L&D Manual, Section 302 and Bridge Design Manual Section 207.3. This applies to all phases.

40 *Reduce bridge spans by providing short retaining wall and safety barrier.*

The alternative is promising, but needs additional cost/benefit study: additional resistance (either piles or larger footings) may be required to resist the increased lateral load on the piers. This applies to SCI-823-1018L&R and SCI-823-1357L&R.

43/21 *Break project into smaller bid packages and change the phasing to use excavated material early.*

The alternative is promising, but needs additional cost/benefit study. This applies to all phases.

45 *Modify subgrade preparation to improve drainage and potentially increase strength of pavement design.*

The alternative is promising, but needs additional cost/benefit study. This applies to all phases.

52 *Eliminate some underdrains.*

The alternative is promising, but needs additional cost/benefit study. This applies to all phases.

54 *Reduce 3-span ramps at US 23 over railroad to a single-span or 2-span ramps.*

The alternative is promising, but needs additional cost/benefit study: The MSE walls will likely need to be constructed using staged construction. This cost will need to be captured for an accurate comparison. Based on our experience with FRA-International Gateway, reducing the bridge to a single span will not reduce the girder depth. In fact, it may be deeper.

59 *Use fill berms in lieu of guardrails.*

The alternative is promising, but needs additional cost/benefit study: May not be possible without purchasing additional right-of-way. This applies to all phases.

61 *Replace safety grading with clear zone grading.*

The alternative is promising, but needs additional cost/benefit study: This applies to all phases.

63 *Sell separate clearing and grubbing contract.*

The alternative is promising, but needs additional cost/benefit study: This applies to all phases.

64 *Survey trees for marketability.*

The alternative is promising, but needs additional cost/benefit study: This applies to all phases.

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February 29, 2008

Re: SCI-823-0.00
Value Engineering Report Evaluation

65 *Split Ramp B into two separate bridges at the US 52 interchange.*

The alternative is promising, but needs additional cost/benefit study.

67 *Ensure the use of 50 ksi H-piles driven to bedrock.*

Implement the alternative now: The increase in pile capacity is already included in the Bridge Design Manual. This applies to all phases.

If you have any questions or would like additional information, please contact us.

Sincerely,

DLZ OHIO, INC.

Manoj Sethi, P.E.
Executive Vice President

cc: file (0621-1008-00)