Engineering Planning

Groundbreaking by Design.

DRAFT MEETING MINUTES

Project:	I-64 Planning Study Franklin County Item No. 5-551.00
Purpose:	Geotechnical and Structures SME Meeting
Place:	KYTC Central Office, Frankfort
Meeting Date:	February 8, 2023 9:00 a.m.
Prepared By:	Qk4

In Attendance:		
	Andre Johannes	KYTC
	Dave Heil	KYTC
	Stephen DeWitte	KYTC
	Joseph Van Zee	KYTC
	Michael Carpenter	KYTC
	Christian Wallover	KYTC (virtual)
	Adam Ross	KYTC (virtual)
	Theresa Owen	Qk4
	Courtney Evans	Qk4
	Taylor Kelly	Qk4
	Rebecca Thompson	Qk4

The meeting opened with a project overview by Taylor Kelly. This meeting's purpose is to discuss structures and geotechnical concerns prior to the upcoming design charette scheduled for February 27, 2023.

Project Background

A set of plans and a Design Executive Summary (DES) were completed in late 1990's (Item No. 5-56), but these plans were completed in metric and are over 20 years old. The project had an approved environmental document and a signed DES. A Value Engineering study was also completed at this time. One of the original project constraints was that no new right of way be purchased as part of the project.

Project Discussion

- It has been common practice that interstate widening does not acquire additional right of way, but the Cabinet will reconsider its stance if it brings value and betterment to the project. Value encompasses more than just financial cost—such as eliminating or minimizing the need for lightweight fill over existing step-down box culverts.

- Currently slopes are not pre-split and without an existing fall bench, they are a perpetual maintenance issue.
- There may be cost savings by reusing the existing pavement by widening to the outside. The construction could be done similar to the recent construction on I-65 with the use of lane closures during presplitting, clearing the roadway, and then reopening to traffic. Widening to the outside could potentially impact utilities especially on the eastbound side.
- There was a discussion regarding raising the eastbound bridge height to flatten the upgrade to eliminate the truck climbing lane/steep grade on the eastbound side. A single alignment located in the center could also utilize this strategy.
- Based on the historical roadway geotechnical report (links provided), it was suggested to look to see if a more standard cut could be used in the smaller cut sections, look at the use of a 2:1 slope. In the larger cuts sections consider the use of ½:1 slopes with 18 ft benches.
- Typically, the interstate standard is 18 feet from the edge of shoulder to beginning of the cut to provide a 30 ft clear zone. Standard pre-split slopes are ¼ to 1 or ½ to 1 with 18+ ft benches. For this project the existing outside rock cut (which is not pre-split) would require an 18 ft fall bench beyond the 30' clear zone, this eliminates the use of the existing pavement.
- If existing cuts are kept on the opposite side of the new construction, how to protect the road as those cuts continue to deteriorate needs to be considered. One suggestion was to use jersey barrier walls.

Bridges

- The Hanly Ln Bridge is a haunch girder bridge and will need to be reconstructed to accommodate the interstate widening. A complete closure with detour route is not likely due to access to parcels south of the interstate.
- The river bridges were constructed in 1963 for HS-20 but the design requirements have since changed. If new structures are required, a single river crossing should be considered. The condition of the substructures will need to be evaluated for reuse. The 1990's plans did not recommend keeping the existing bridges.
- The step-down culverts are a big concern and any alternative that eliminated or reduced the amount of fill over those existing culverts would be preferred.

Geotechnical

- The Geotechnical reports needs to be reviewed and updated. Adam provided the historical roadway geotechnical report (R-3597 FMSM).
- There are existing Geotech files these need to be reviewed.
- The cut benches were recommended to be 1.5:1 slopes with 18' benches, this can be verified from the historical geotechnical report.

Construction

A single bridge across the river in the center, away from traffic, could potentially encourage innovative construction techniques. There is no road for access and the river doesn't allow for the

use of barges, so a launching approach was discussed as a method of the construction of the bridge. The use of a design-build contract for the project was brought into question by the team. KYTC expressed a desire to have a discussion regarding various procurement methods and their advantages and disadvantages to this project included in the final project report.

It was also noted that during construction two lanes of traffic per direction must be maintained.

Next Steps

- Review Geotech Reports.
- Look at a single alignment that is located between the two existing alignments and utilizes a single structure at all crossings, including the river.
- Update the cost estimate for the 1990's plan (Item No. 5-56)
- Check for Utility, Drainage, crash history, and environmental concerns.

The next meeting is scheduled for February 27, 2023.

End of Minutes

Engineering Planning

Groundbreaking by Design.

DRAFT MEETING MINUTES

Project:	I-64 Planning Study Franklin County Item No. 5-551.00
Purpose:	First Project Team Meeting/Design Charrette
Place:	KYTC Central Office, Frankfort
Meeting Date:	February 27, 2023 9:00 a.m.
Prepared By:	Qk4

In Attendance:			
	Andre Johannes	KYTC	Design
	Stephen DeWitte	KYTC	Planning
	Karl Sawyer	KYTC	Design
	Joseph Van Zee	KYTC	Structures
	Adam Ross	KYTC	Geotech
	Brent Sweger	KYTC	Planning
	Sean House	KYTC	Geotech
	Patrick Perry	KYTC	Design
	Mikael Pelfrey	KYTC	Planning
	Tracy Lovell	KYTC	District 5
	Taylor Kelly	QK4	
	Theresa Owen	Qk4	
	Courtney Evans	Qk4	
	Rebecca Thompson	Qk4	

KYTC project manager Stephen DeWitte opened the meeting and introduced attendees. Theresa Owen provided a brief project overview and review of handout materials.

Project Background

The section of I-64 between the two Frankfort exits (US 127 and US 60) was designed to be widened from four lanes to six lanes with final plans completed in 1997 with an approved Design Executive Summary and environmental document. These plans are now 26 years old, in an outdated cadd format, and in metric. The cabinet wants to take a fresh look at these plans to determine if the widening strategy utilized in 1997 still proves the most effective today, or if there is a more strategic way to widen in this challenging corridor. The components of this corridor that make it challenging are large, deteriorating rock cuts, 7 existing strutures – 2 of which cross the Kentucky River, large fill approaches at the river, and step-down culverts to name a few.

The objective the day's charrette was to revisit the previous design's assumptions and design strategy. Since so much time has passed since the project's intial design, we hope to be able to employ new, alternate strategies that could deliver the project more effectively. Using the assumptions and ideas developed from today's meeting, Qk4 will develop build concepts and identify associated impacts and costs.

Project Discussion

Rock Cuts

In a previous design coordination meeting (1/8/2023) with Geotech and Structures SME's there were discussions about pre-splitting of rock along the corridor. Sean House shared with the group additional information that had been researched since that meeting:

- The 1997 splitting recommendations were like what we'd recommend today with a few minor changes. Today the distance from the edge of shoulder to the face of cut is 18 ft. at 4:1 (H:V) slope. Used to do a 4 ft flat bottom at the bottom of a 6:1; however, an Oregon study showed that the 18 ft. contained material better.
- The bottom lift should be 30 ft tall maximum. Downgrade, 30 ft at lowest point, benches must be horizontal or there are flow issues.
- Cut slopes can stand at a 1:4 (H:V) or a 1:2 (H:V). They will still weather eventually and the benches will need maintenance, i.e., to be cleared off. Otherwise, the fallen material creates ramps for loose material to launch from.
- In an ideal world everything would be cut at a 2:1 (H:V) and no continual maintenance. However, this creates greater cut volumes and right-of-way impacts (if widening to the outside through this corridor).
- Intermediate benches are 18-20 ft.
- In karst, terrain, the top of cuts will have an overburden bench, likely 15 ft at a 2:1 (H:V) slope. This is decided during construction. Soil isn't very deep, so assume only 5 ft of overburden material.
- Construction of blasting discussion
    - Would want to use rolling roadblocks to keep traffic out of blasting areas. Total shut down is not ideal.
    - Contractor will want to blast the entire length of the cut section, not by sections. Will need to clear roadway or be far enough away from existing lanes to safely blast.
- Are there caves or mining facilities under the interstate? Harrod concrete isn't quite that far; they appear to own property on both sides of the interstate.
- The advantage to pre-splitting the existing slopes to the outside would be salvaging the existing pavement. Adam Ross noted that the existing surface and base course will need to be milled and overlaid after construction blasting anyway. Therefore, salvaging the existing pavement will not reap enough benefit to offset the cost of additional cuts to the outside and

right-of-way costs. Also, the time that would be required for the purchase of additional right-of-way would lengthen the project's schedule. Therefore, it was determined by the team that widening the existing cuts to the outside would not provide value to the project and this strategy was eliminated from consideration as a build concept.

Step-Down Culverts

- Step-down Culverts are a challenge for design: how to facilitate the increased loading from the median fills. The goal is to not place more weight on top of the culvert than exists on top of the culvert today. This is typically achieved by digging out existing material and putting back lighter material plus increased fill material that has the same weight as the material removed.
- KYTC prefers to be able to completely replace the culvert and have it designed to withstand the proposed fill height without using lightweight fill.
- An alternative down the center of the corridor that would avoid placing any fill over the existing step-down culverts would eliminate the need for lightweight fill.
- Estimating the amount of lightweight fill is a complicated task due to the calculation of existing and proposed loading over the culvert. Different lightweight materials may be better in some situations than others. Lightweight material options include lightweight concrete or encapsulated Styrofoam. Calculations become even more complicated when a culvert is located on a skew.
- More box culverts are located along the WB alignment – 7 along WB, 2 along EB. Not all are step-downs.
- It is possible to take off the top slab of the culvert and replace it with a thicker slab rather than a full replacement of the culvert.
- 2:1 (H:V) fill slopes are a reasonable assumption for the fill sections over culverts.
- After the meeting KYTC provided record drawings for existing culverts to determine which ones were step-down culverts. A summary is provided below:

RCBC	Size	Record Plan Location	Existing Length	Step-Down Culvert?	Drawing #
1	4'x4'	2398+XX L	1,117 ft	TBD	
2	6'x5'	2403+27 L	361 ft	yes	14036
3	5'x4'	2456+50 L	65 ft	not	14039
4	6'x5'	2464+44 L	284 ft	yes	14041
5	4'x4'	2458+50 R	68 ft	not	14040
6	6'x6'	2484+80 L	510 ft	yes	14044
7	5'x4'	2514+40 L	207 ft	TBD	
8	8'x4'	2516+00 R	88 ft	not	14100
9	5'x4'	2522+89 L	437 ft	yes	14102
10	6'x6'	47+00 (Johnson Rd.)	221 ft	yes	14045

Truck Climbing Lanes

- According to the Green Book (GB), a speed reduction of 10 MPH or greater warrants consideration for a truck climbing lane. A 15 MPH reduction may be considered if there is a steep downgrade before the upgrade – such is the case with this project. Looking at both 10 MPH and 15 MPH reductions, the critical lengths are exceeded for both speeds in both EB and WB directions.
- The following data regarding the EB and WB steep grade sections was presented:

	Existing Grade	**Length of Grade**	**Critical Length of Grade (10 MPH reduction)**	**Critical Length of Grade (15 MPH reduction)**
Eastbound	3.78%	8,129 ft	1,330 ft	2,000 ft
Westbound	3.00%	4,600 ft	1,740 ft	2,700 ft

***Table 1**: Critical Lengths of Grade for Design based off AASHTO GB Figure 3-21*

- Level of service (LOS) showed that the biggest impact is going from 2 to 3 lanes with minimal benefit from adding an additional fourth lane. The 1997 grade reduction has less impact on operations. The GB states that a truck climbing lane should not be considered unless LOS D or worse.

	2 Lane	**3 Lane**	**4 Lane (Climbing)**
Eastbound 3.78% Grade (Existing)	LOS E 0.97 v/c 55.8 mph average 41.5 pc/mi/ln	LOS C 0.64 v/c 71.9 mph 21.5 pc/mi/ln	LOS B 0.48 v/c 75.1 mph 15.4 pc/mi/ln
Eastbound 3.52% Grade (1997 proposed)		LOS C 0.64 v/c 72.1 mph 21.2 pc/mi/ln	LOS B 0.48 v/c 75.1 mph 15.3 pc/mi/ln
Westbound 3.0% Grade (Existing)	LOS E 0.93 v/c 58.1 mph average 38.5 pc/mi/ln	LOS C 0.62 v/c 72.5 mph 20.6 pc/mi/ln	LOS B 0.47 v/c 75.2 mph 14.9 pc/mi/ln

***Table 2**: HCS Freeways model Level of Service (LOS) analysis, projected 2045 traffic (3132 vph, 25% trucks). AASHTO GB states climbing lanes should not be considered unless the directional traffic volume for the upgrade is equal to or greater than a LOS D.*

- The data presented does not require the construction of a truck climbing lane in either the EB or WB direction.
- Historical project knowledge suggests that the driving factor for the truck climbing lane may have been the desire to have all interstates operate at a LOS B.
- Could look at grading out the fourth lane, but likely would not be feasible since the main cost is in the rock cut not the pavement cost. Analyses should identify costs versus benefits of the truck climbing lane(s).

- Shoulder widths may be reduced in areas with truck climbing lanes since those are considered ancillary lanes.

Maintenance of Traffic (MOT)

- The 1997 proposed maintenance of traffic plan widened the WB lanes, then shifted the EB traffic over the WB lanes enabling the EB to be constructed and the upgrade from the KY river to be adjusted from 3.78 to 3.52%. And the last phase shifted EB traffic back onto the newly constructed EB lanes.
- Hauling heavy rock over existing bridges, particularly the KY River bridges, will be expensive. The haul weight will likely be limited over the structurally deficient structures thereby reducing the weight capacity of the haul trucks and creating more trips and ultimately increased costs.
- The large fill section is sandwiched between the Johnson Road and KY River bridges, and the large cuts are located west of Johnson Road. Therefore, the contractor is likely to develop a haul strategy that does not transport rock across the KY River.
- Construction phasing needs to consider options to keep as much work on the same side of the river as possible. Contractors may elect to build KY 420 structure first to use as a haul road to get peak efficiency for haul trucks. They may even purchase adjacent ROW to be able to avoid hauling off-site.

Bridges

- The focus is on the KY River crossing bridges; their existing condition is structurally deficient due to their non-redundant load path structure type. The piers may be the only salvageable component of the existing bridge; however, the piers would likely need to be encased to strengthen them and at that point it would likely be better to just construct new piers.
- From an MOT perspective, are there any accelerated bridge construction (ABC) techniques that could be utilized if the bridge were to be constructed off alignment? Would there be benefits to construction process or costs?
    - Nothing ABC related came to mind.
    - Options further away from existing bridges and having only one structure will decrease crane costs, and beams will be able to be slid into place.
    - Any bridge construction within 10 feet of the existing bridge will impact traffic. Even if offset 20 ft from the existing bridge, you must come back in another phase to build another set of substructures which means more MOT impacts and costs.
- Planning-level costs to construct bridges can be assumed as follows:
    - Little bridges (such as Johnson Road and Hanly Ln) ~$250/SF
    - Larger bridges (such as KY River and KY 420) ~$350/SF

    - Any phased construction bridges increase the cost by 30%

- From an emergency standpoint, does a single structure crossing of the KY River provide benefit? Clays Ferry was given as an example. It was noted though that Clays Ferry is unique due to its proximity to the Depot. It was also noted that a new bridge would have redundancy built in which would make a catastrophic failure less of a concern.

Pavement

- The previously proposed section was concrete pavement. We would want to change that to be an asphalt section today. Still want to cost out to see what a concrete section would cost, and what the savings are between a concrete and asphalt section.
- If we salvage any existing pavement, we'll want to mill off the surface layers and top base layer in the areas of cut because those layers will be damaged by blasted rock that falls on top of existing pavement.
- If you widen the existing pavement you don't want to match what is in place because it greatly exceeds current standards. Therefore, a new pavement design will be required and will be thinner than the existing section.
- The previous design was 13 inches of concrete. If concrete is proposed again, assume 12-13 inches. This is a more expensive option, but if a new alignment is considered, use both concrete and asphalt for cost comparison.
- For an asphalt section assume a 2-foot rock roadbed, 6 inches of crushed stone base, and 12 inches of asphalt, with the top 2 layers being PG 76-22 and the rest PG 64-22.
- It was reiterated to not look at widening to outside because it only salvages pavement, half of which must be removed/replaced anyway due to damage from rock falling on it. WB cell towers are also to the outside of right-of-way. Document that it was considered but determined as not practicable.

Costs

- Prices for hauling on- versus off-road assumptions: hauling off-road will be less expensive than on-road. For on-road excavation costs use the current I-64 bridges construction project as a reference for excavations costs. For off-road hauling reference Mountain Parkway Wolfe County section excavation costs. Document all assumptions.

Environmental

- All build concepts are on the same footing; all will need to have an environmental document (NEPA analysis) which considers such items as threatened and endangered species, archaeological, and noise walls.
- Impacts to blue line streams are a concern with the center common median section. May consider a channel change instead of a full impact.

Fill Sections

- A common structure crossing the KY River will also entail filling on top of the existing fill sections west of the river. These fills will require settlement time. Historical plans researched during the charrette indicated that these fills were granular, which means their settlement times will be much faster than if they had been a less favorable material. The previous geotechnical report estimated a 40-day settlement timeframe.

Procurement Methods

- Due to the complexities of this project, input from a contractor will be a valuable component. This will likely make this project a candidate for an alternative project delivery method such as design build, progressive design build, or Construction Manager/General Contractor (CM/GC) method.

Build Concepts to Consider

1. Common Median Section
    a. Assume a maximum upgrade of 3.0% based on traffic operations.
    b. Include costs with and without truck climbing lanes in EB and WB upgrades.
    c. Include costs for concrete or asphalt pavement
2. Original 1997 concept
3. Modified 1997 concept
    a. Do not flatten 3.78% EB upgrade to 3.52%
    b. Include costs with and without truck climbing lanes in EB and WB upgrades.
    c. Include costs for concrete or asphalt pavement

Engineering Planning

Groundbreaking by Design.

DRAFT MEETING MINUTES

Project:	I-64 Planning Study Franklin County Item No. 5-551.00
Purpose:	Review Build Concepts
Place:	KYTC Central Office, Frankfort (CO 107) & virtually (MS Teams)
Meeting Date:	May 22, 2023 10:30 AM
Prepared By:	Qk4

In Attendance:			
	Andre Johannes	KYTC	Design
	Stephen DeWitte	KYTC	Planning
	Karl Sawyer	KYTC	Design
	Joseph Van Zee	KYTC	Structures
	Adam Ross	KYTC	Geotech
	Christian Wallover	KYTC	Geotech
	Sean House	KYTC	Geotech
	Patrick Perry	KYTC	Design
	Catherine Davis	KYTC	Planning
	Dave Heil	KYTC	Planning
	Tracy Lovell	KYTC	District 5
	Brent Sweger	KYTC	Planning
	Taylor Kelly	Qk4	
	Theresa Owen	Qk4	
	Rebecca Thompson	Qk4	

Theresa Owen opened the meeting by stating that this is the third project team meeting for the planning study examining the widening of I-64 between the two Frankfort exits. At previous meetings the team defined design assumptions and generated design strategies. The input and ideas generated from those meetings have been incorporated into various build concepts that were defined during the design charette meeting held on February 27, 2023. This meeting's purpose is to review those build concepts.

Review of Assumptions:

Rock Cuts

- Rock cuts to the outside would be undisturbed with an 18-foot-wide fall bench at the bottom. The new, inside rock cuts were at a 1H:2V with a 20 ft intermediate bench.

- In addition to the base assumptions detailed above, a few models were developed not utilizing benching on the inside of the proposed roadway to determine if there was a cost savings. Once the height of cut got to 30 feet, an 18-foot fall bench was added and then straight up at a 1H:2V slope indefinitely. This gave minimal earthwork savings because the benching alternative utilized a 20 ft intermediate bench which is only a 2-foot savings over the 18-foot fall bench. Therefore, no significant savings are realized until height of cut exceeds 60 feet (2 bench iterations) which is a relatively small portion of the corridor. The tallest height of cut is about 80 feet. The resulting earthwork savings were approximately $500,000 for the project, considered negligible compared to the overall project costs.

Truck Climbing Lanes

- The biggest improvement in Level of Service (LOS) is from adding the third lane: improving LOS E to LOS C. Adding in a fourth truck climbing lane (TCL) improves to LOS B. The Green Book states that generally climbing lanes are considered with LOS D or worse.
- For the proposed common median build concept, a 3.0% max grade was assumed.
- In the 1990s, FHWA's desire was to have LOS B for the corridor, which would explain why the eastbound TCL was originally proposed.
- Build concepts with and without TCL in both directions were developed for comparison.

Bridges

- Seven bridges along the corridor are proposed to be replaced.
- All concepts that were developed maintain a minimum 10-foot separation from existing structures to avoid phased construction. Phased construction was previously identified as a constraint as it is more costly to construct.
- The costs per square foot of structure developed at the design charette were utilized to estimate the structure costs.

Pavement Design

- The original design utilized concrete pavement, though an asphalt section was proposed for the developed build concepts. The section utilized was from the recommendation given at the design charette.
- As requested, build concepts with asphalt or concrete were developed for comparative estimates.

Step-Down Culverts

- Feedback given at the previous project meetings said that the step-down culverts are a challenge to design and can be very costly. Therefore, Qk4 estimated costs to replace sections of step-down culverts that would have their fill heights adjusted. Due to the complexity of light-weight fill calculations and the high costs of the lightweight fill, the decision was made to estimate the step-down culvert costs in this manner.

- All but one of the step-down culverts will be extended. There is one at the western terminus of the project that will have median fill adjustments only and will not be extended. This was considered for lightweight fill, but without detailed fill calculations the estimated fill volume seemed unrealistic; so, the cost to dig up and replace that section of culvert was used instead for estimating purposes.

Environmental

- All build concepts are on the same footing; all will need to have an environmental document (NEPA analysis) which considers such items as threatened and endangered species, archaeological, and noise walls.
- Impacts to blue line streams were considered due to the impact to the median. Qk4 has quantified and estimated the stream mediation costs (AMU's) in planning-level costs.

Right-of-Way & Utilities

- Assuming no right-of-way impacts
- No major utilities were identified for consideration at previous meetings.

MOT

- Estimate was based on the cost of temporary barrier wall at $100/LF plus an additional $200k per interchange.

Other meeting discussion items included:

- The truck climbing lanes were originally proposed to meet LOS B. No coordination with FHWA has occurred to confirm if this is still a project goal.
- Though the eastbound truck climbing lane was the only one originally (1997 plans) proposed, the westbound direction also had a critical length of grade that would necessitate a climbing lane.
- Both eastbound and westbound TCL were included in some build concepts.
- The widening to the outside to salvage the existing pavement section was eliminated from consideration during the design charette meeting. It was discussed that the blasting activities would damage the existing pavement anyway which would negate some of the benefits of keeping the existing section. That, combined with the cost of right-of-way, eliminated it from further consideration.

The following build concepts were taken from the design charette meeting. The bolded names represent the naming convention used in the modeling and cost tables.

Build Concepts to Considered

1. Common Median Section (**CM & CM_TCL)**)

    - Assume a maximum upgrade of 3.0% based on traffic operations.
    - Include costs with and without truck climbing lanes in EB and WB upgrades.
    - Include costs for concrete or asphalt pavement.
    - While many potential alignments were initially considered, the common median section follows the westbound direction more closely since it had less sinuosity to it than the eastbound direction.
    - The critical section to developing the profile for all concepts is the fill section west of the KY River. The profile can only be raised so high before the fill slopes of the common median section go beyond the existing outside fill slopes, creating right-of-way impacts and MOT challenges. Raising the bridge to reduce grades was thus limited by how much fill could be placed in that section.

2. Original 1997 concept (**1997**)

    - The 1997 concept took the eastbound bifurcated section and flattened the EB upgrade from the river from 3.78 to 3.52% with a TCL in the EB upgrade from the KY River
    - The 3.52% grade provided a more balanced earthwork situation over the 3.78% profile grade.
    - The MOT plan would not require both bridges to be offset a minimum distance of 10 feet as traffic could all be shifted to the new bridge while the other bridge could be replaced on-alignment.
    - Include costs with and without truck climbing lanes in EB and WB upgrades. (**1997_3.52_noTCL, 1997_3.52_2-TCL**)

The team discussed an additional concept that utilized the existing WB alignment with a common median section. The existing WB profile grades would be maintained; thus, grades greater than 3.0% would be utilized. It was noted that the WB downgrade to the river is 3.96%; in a common median section that grade would then become the EB upgrade. Thus, a truck climbing lane would need to be considered because the grade would be steepened.

3. Modified 1997 concept

    - Do <u>not</u> flatten 3.78% EB upgrade to 3.52% (**1997_3.78**)
    - Include costs with and without truck climbing lanes in EB and WB upgrades. (**1997_noTCL_3.78, 1997_2-TCL_3.78**) and
    - Include costs for concrete or asphalt pavement.

The assumed unit price assumptions were reviewed. It was noted that the common median structures were priced higher because they had a larger footprint due to the median barrier width and inside shoulder widths. However, without design information it is hard to say if there would be any cost savings to building one structure versus two. Therefore, no adjustments to the structure

costs were made based on one structure vs two. There may be construction savings, but that depends on the contractor's means and methods, which cannot be quantified at this point.

Theresa presented plans, profiles, and cost estimates for eight build options. Variations on the 1997 concept range from $153 million to $179 million. Variations on the common median section range from $179 million to $204 million.

- A common median section will still have increased costs with the permanent median barrier wall, culvert extensions, and stream impacts.
- If a common median section was utilized, the length of the Hanly Lane overpass could be shortened when the EB direction is abandoned, decreasing costs.
- An option to close Johnson Road to eliminate a mainline structure was discussed. However, it was noted that Johnson Road experiences frequent flooding. Therefore, having two ways out is necessary during those flood events.
- If a common median section was to be created from the WB alignment, then the EB upgrade would be made steeper. Qk4 will attempt to quantify user benefits for the grade difference to weigh against increased costs. I-75 in Rockcastle County was mentioned as an example of safety concerns. Both sections of roadway have similar ADTs.
- How long would traffic be affected by construction? Preliminary instincts assume a minimum of two years for a two-phase construction. Phasing for the construction will also be included as a discussion topic in the final report.
- No right-of-way has been assumed, but there may be an impact at Hanly Lane during the phased construction of that overpass.
- No major utilities have been identified; based on downstream I-64 widening projects there is likely AT&T legacy fiber that will be encountered.
- In the final report, include discussions about MOT and procurement options/innovative delivery methods. There are opportunities to introduce creative, cost-saving measures. This project may have enough draw to attract an out-of-state contractor. It was also suggested to leave the pavement type (asphalt vs. concrete) as an option to the contractor.
- No additional geotechnical information is being provided currently. Additional exploration will need to be performed, but not until the project is further into design.

Next Steps

- Qk4 will develop one more build concept that utilizes the WB alignment and profile to develop a common median section.
- Qk4 will explore user costs (i.e., safety impacts) associated with the 4% grade.
- Qk4 will prepare a concise report summarizing the findings of the study and build concepts.