CONSTRUCTABILITY PANEL

WITH HIGHWAY CONTRACTOR REPRESENTATIVES
INTENT OF SESSION

• To have respectful and meaningful discussions about constructability issues

• Seeing the issues from a different perspective (contractors/designers)

• Possibly find opportunities to improve constructability on future projects
PRESENTATION FORMAT

• Discuss the constructability challenge

• Review Plan details, if applicable

• Discuss possible solutions to improve constructability

• Input/discussion from designer’s perspective
PANELISTS

• Brian Billings-Vice President of ATS Construction-Lexington

• Fred Clark-Estimator-Bourne-Clark Construction-Mt. Sterling

• Thomas Haydon III-President-Haydon Bridge Company-Springfield

• Kenny Roller-Heavy/Highway Manager-Louisville Paving Company-Louisville
TOPIC #1-BRIDGES

- Skewed Bridge Deck Construction Joints
TOPIC #1-BRIDGES

• Constructability issues
  – Hard to form, brace and finish

• Potential solutions/alternatives to improve constructability
  – Place joints square to centerline
TOPIC #2-ROADWAY

• Part width construction
TOPIC #2-ROADWAY

• Constructability issues
  – Plans call for part width construction on SB from 197+00 - 195+95, restricted to 7pm-5am
  – Pavement design calls for one course asphalt drainage blanket and three courses asphalt base
  – Impossible to construct in a 10 hour shift

• Potential solutions/alternatives to improve constructability
  – Construct temporary diversion
  – Utilize part width construction without time restrictions
  – Temporary road closure with offsite detour
TOPIC #3-SPECIALTY

• Placing guardrail post on culvert
TOPIC #3-SPECIALTY

• Constructability issues
  – 9/16” X 8” Hook Bolts (RBR-015-04) must be poured in place. Each post requires four of these hook bolts.
  – It is virtually impossible for the bridge/culvert contractor to get these placed in the exact location required for proper alignment for future guard rail.
  – protecting the bolts once they are in place.
    • If you place the posts upon completion of the box culvert, they are in the way of the backfill operation and will likely get damaged.
    • If you backfill with the bolts exposed, they will also likely be damaged.

• Potential solutions/alternatives to improve constructability
  – Pour the deck of the culvert with no hook bolts in place.
  – Allow the guard rail subcontractor to dig/auger down and expose the deck of the culvert at each location where a guard rail post is to be placed.
  – Allow the use of 7/8” Wedge Anchors, specifications and length to be determined by KYTC. Guard rail subcontractor is responsible for backfilling holes upon completing the installation of the posts on the deck.
TOPIC #4-ROADWAY

WHAT'S BEHIND THIS DOOR?

STORAGE WARS
TOPIC #4-ROADWAY

- Geotechnical issue
TOPIC #4 - ROADWAY

Geo Technical Notes

The following geotechnical notes are intended to provide guidance and reference material for the geotechnical aspects of roadway construction. These notes cover topics such as soil classification, groundwater issues, and foundational recommendations. The geotechnical conditions are critical to the successful design and construction of roadway infrastructure.

1. Orientation of the roadway alignment shall be checked to ensure that it is aligned with the natural contours of the site.
2.地下水位需在路面工程范围内的地下水活力性层的冲刷影响深度内均需考虑。
3. 周围环境的土壤条件需考虑。
4. 道路填筑材料的力学性质需满足设计要求。

Approximate Section Limits for Utility Construction

- Approximate Section Limits for Utility Construction
  - Section Limits: [Specific Section Limits]
  - Construction Dates: [Specific Dates]
  - Contact Information: [Contact Details]

The following list includes key elements for roadway construction:

- Roadway Construction
- Bridge Construction
- Underground Utility Construction
- Utility Construction

Specific Sections and Locations

- Section A: [Specific Section A Details]
- Section B: [Specific Section B Details]
- Section C: [Specific Section C Details]

The geotechnical notes and specifications are intended to provide a comprehensive guide for engineers and contractors involved in roadway construction projects. These documents are subject to change based on site-specific conditions and project requirements.
TOPIC #4-ROADWAY
TOPIC #4-ROADWAY

• Constructability issues
  – Unknown/unexpected geotech issues
    • Significant amount of extra work
    • Delays to project completion

• Potential solutions/alternatives to improve constructability
  – Collection of additional geotech information
  – Designs should not assume best case scenario when interpreting geotech data
  – Geotech plan notes should be written to allow parties to work together for solutions, rather than making any unknowns incidental to the contractor’s bid
TOPIC #5-BRIDGES

- Piling under a wingwall in Phase construction
TOPIC #5-BRIDGES

• Constructability issues
  – Very expensive to return to drive minimal piling
  – Working room is very limited in this case

• Potential solutions/alternatives to improve constructability
  – Design Phase 2 wing without need for piling
TOPIC #5-BRIDGES

• Alternative
TOPIC #6-ROADWAY

- Wrapping rock roadbed with geotextile fabric
TOPIC #6-ROADWAY
TOPIC #6-ROADWAY

• Constructability issues
  – Plans indicate rock roadbed to be wrapped with geotextile fabric
  – KYTC personnel directed to extend DGA over fabric
  – DGA tends to slide off fabric during rain events

• Potential solutions/alternatives to improve constructability
  – Rock roadbed could be underlain and overlain with geotextile fabric, but not completely wrapped
TOPIC #7-SPECIALTY

• Bridge Connector-Type A
• Constructability issues
  – This bridge connector works best when connecting to Rail System Type III.
  – We now see many bridges with architectural features and wider barrier ends.
  – We have seen some barrier ends over two feet thick making it difficult to obtain the long bolts to connect the Bridge Connector Type “A” in accordance with the standard drawing.

• Potential solutions/alternatives to improve constructability
  – On barrier wall ends that are not standard (or normal), consider using a four-bolt assembly to connect the end shoe and a two-bolt assembly to connect the rub rail.
EXAMPLE OF WELL DESIGNED BRIDGE CONNECTION
TOPIC #8-ROADWAY

• Geotech issue
TOPIC #8-ROADWAY

GEOTECHNICAL NOTES

1. In accordance with Section 205 of the current Standard Specifications, the quantities of embankment materials are not to exceed the volumes specified in Article 205 by more than 3 percent. The embankment materials shall be graded and have a density equal to that required by the Engineer. A per-pass compaction test shall be conducted at all major fill locations.

2. Grading of borrow materials in embankment areas shall be performed in accordance with the provisions of the Standard Specifications. The materials shall be placed in the embankment areas as specified in Article 205, and the embankment shall be monitored for settlement and disarrangement caused by the embankment.

3. The embankment shall be compacted to 90 percent of the maximum dry density as specified in Article 205. The compaction test shall be conducted at all major fill locations.

4. The embankment shall be constructed in accordance with the requirements of the current Standard Specifications. The embankment shall be compacted to 90 percent of the maximum dry density as specified in Article 205. The compaction test shall be conducted at all major fill locations.

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TOPIC #8-ROADWAY
TOPIC #8-ROADWAY

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TOPIC #9-BRIDGES
• Construction elevation layout and plan dimension info
TOPIC #9-BRIDGES

• Constructability issues
  – Can’t be laid out by average field guys
  – Shouldn’t have to “survey” point location

• Potential solutions/alternatives to improve constructability
  – On skewed and/or curved bridges, provide enough plan dimension information for the builder.
  – Forget grids being square and just go down a beam line at some spacing beginning at CL Bearing
• Plans calling for the use of Type 4A end treatments
TOPIC #10-SPECIALTY

• Constructability issues
  – The End Treatment Type 4A is less expensive than the End Treatment Type 1.
  – It also has lower maintenance costs than the End Treatment Type 1.
  – The recovery area required for this end treatment can be in the ditch lines on the project or beyond KYTC right-of-way.

• Potential solutions/alternatives to improve constructability
  – When projects are designed, the cost of one end treatment versus the other should not be the primary consideration.
  – The primary consideration should be if the end treatment will work as intended in the field. Particularly an issue on proposal only projects.
TOPIC #11-BRIDGES

• Utility location on bridge plans
TOPIC #11-BRIDGES

• Constructability issues
  – Just easier to see utility conflicts in bridge area with utilities shown on bridge plans.

• Potential solutions/alternatives to improve constructability
  – Put existing utilities on bridge plans
TOPIC #12-BRIDGES

- Pouring of pier diaphragms (allowing joints)
TOPIC #12-BRIDGES

• Constructability issues
  – Bracing Forms of height and skew
  – Focus is entirely on deck pour.
  – If something goes wrong and the form blows out, you’ve only lost a diaphragm and not a piece of the deck which could create an emergency joint situation.
  – The deck should finish better as you don’t stop to fill up the diaphragm, can continue the deck in a smoother fashion.
  – Deck pours will go quicker with less concrete to place at time of pour

• Potential solutions/alternatives to improve constructability
  – Design and/or allow construction joints in diaphragms when possible.