

2008 Spring Field Review

June 9-11, 2008
Close-Out Meeting Minutes

SITE (1) R-0609IA – GUILFORD COUNTY

Location:

US 311 (Future I-74) at I-85.

Item(s) of Interest:

- Project with 9 bridges and 2 culverts.
- I-85 bridges have integral end bents and are using bearing pads in lieu of standard anchorage assembly (sole plate with leveling nuts on anchor bolts).
- Curved girder bridge over US 311 has integral end bents.
- Culvert at Cecil Pond is using a rock embankment for slope stability.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Eliminating the anchor assembly did not yield significant cost savings.
- ▶ Use of elastomeric bearing pads in integral abutments does not provide a means for field adjustment of girder seats.
- ▶ For interior bents, Structure Design should consider use of disc bearings in lieu of pot bearings.
- ▶ Use of disc bearings will not yield cost savings, but they are simpler bearings with fewer pieces and parts.
- ▶ Access conditions at integral abutment bridge sites may necessitate construction of the reinforced approach fill prior to setting the girders.
- ▶ Design of the approach fill would be based on crane loads which are unknown during bridge design phase, and it would also serve as formwork for the integral abutment diaphragm.
- ▶ Drip beads were not utilized.
- ▶ Culvert inspection issues were discussed, and it was noted that culverts with spans greater than 20 ft. should be documented in the bridge inventory system.

ACTION ITEM(S):

- ▶▶ Structure Design will investigate standardizing disc bearings with a goal of increasing their use.
- ▶▶ Structure Design will discuss construction of reinforced approach fills for integral abutment bridges at the AGC-DOT Joint Bridge Design Committee meeting.
- ▶▶ Structure Design will let a trial integral abutment bridge with the approach fill to be constructed prior to setting girders.
- ▶▶ Structure Design will review other States' practices on drip beads and sources such as Mid-Atlantic SCEF and TRB's bridgeaesthetics.org web site.
- ▶▶ Bridge Management will investigate the feasibility of documenting culverts with spans over 20 ft. in the bridge inventory system.

SITE (2) BRIDGE # 149 – DAVIDSON COUNTY

Location:

Bridge #149 over Rich Creek.

Item(s) of Interest:

- Division Bridge Management Purchase Order Contract (POC) project.
- Interior bents utilize H-piles which are driven into pre-augered weathered rock
- Estimated cost for H-piles with pre-augering (\$15,560) was compared to cost of drilled piers (\$35,300).
- Potential for cost effective foundation type for sub-regional tier bridges located west of I-95.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ A culvert was not used because of the high potential for sediment transport.
- ▶ Coal-tar epoxy protective coating was damaged during driving and welding.
- ▶ Materials and Tests Unit recommended the Bridge Management Unit eliminate coal-tar epoxy piles from its inventory.

ACTION ITEM(S):

- ▶▶ Geotechnical Engineering will develop a policy for using H-piles in pre-augered weathered rock.

SITE (3) MAGGIE VALLEY GRS WALL – HAYWOOD COUNTY

Location:

Dogwood Drive in the Town of Dellwood near Maggie Valley.

Item(s) of Interest:

- Geosynthetically reinforced soil (GRS) walls are a non-proprietary, FHWA developed wall system.
- The Engineer's estimate for an MSE wall was \$217,000 and the lowest bid was \$485,000.
- The wall was built by Division personnel for \$105,485.
- Potential for utilizing more GRS walls in lieu of MSE walls where appropriate.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Wall did not have coping at the top of the wall. Coping should always be required to prevent weathering at the top of the wall.
- ▶ Long term maintenance questions, such as repairs for loss of facing blocks, remain. A positive soil-wall connection is preferred to mitigate loss of facing blocks.
- ▶ GRS walls are typically founded on rock or weathered rock.
- ▶ The Geotechnical Engineering Unit recommends the Bridge Management Unit construct a trial bridge with GRS abutments.
- ▶ Concerns with using GRS walls for bridge abutments include scour potential at the base of the wall and access for superstructure inspections when the superstructure sits on the wall.
- ▶ Guardrail details associated with the wall need to be developed.

ACTION ITEM(S):

- ▶▶ None

SITE (4) B-3701 – SWAIN COUNTY

Location:

Bridge #106 on SR 1303 over Alarka Creek

Item(s) of Interest:

- 100 foot single span steel girder bridge with end bents on drilled piers and sheet piling.
- 4 walls on this project. 2 walls are extensions of the end bent wings, 1 is an MSE wall on the approach roadway, and 1 is a soil nail wall that supports the slope of the Great Smoky mountain railroad.
- There were concerns the deck would crack due to the heavy skew. Retarding admixture was considered for the deck concrete, but was not used.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Elastomeric bearings were deformed in shear during the coolest time of the day. A plan note to jack the bridge and correct the bearings was suggested. Using grout cans for spans less than 120 ft. was discussed but not recommended.
- ▶ The bridge was a single 100 ft. span, with a bolted field splice (BFS) detailed on the plans. In some cases the fabricator can omit the BFS and still deliver the girders to the site. There was consensus to denote the BFS as optional for spans less than 135 ft.
- ▶ 4" ϕ approach fill drain pipe was crushed at the outlet end. The Construction Unit recommended using a 4" ϕ schedule 40 PVC pipe in lieu of the corrugated pipe.
- ▶ The site had an approach roadway drainage flume. The Hydraulics Unit discourages their use for maintenance reasons.
- ▶ The 4" thick shoulder berm gutter (SBM) was cracked. The Construction Unit reported that similar cracks sometimes develop during driving the guardrail posts. They recommended increasing the thickness of the SBM.
- ▶ To achieve an adequate hydraulic opening, the bridge length was computed from face of shaft at end bent 1 to face of shaft at end bent 2. When the Hydraulics Unit uses this method, it needs to be communicated to Structure Design so the bridge length can be adjusted accordingly.

ACTION ITEM(S):

- ▶▶ Structure Design will place a note on plans for an optional bolted field splice for spans less than 135 ft.
- ▶▶ Structure Design will place a note on the plans to require resetting the bearings.
- ▶▶ Structure Design will investigate detailing 4" ϕ schedule 40 PVC pipe in lieu of the corrugated pipe in the reinforced approach fill.

SITE (5) B-4286 – SWAIN COUNTY

Location:

Bridge #3 on US 19/74 over Nantahala River.

Item(s) of Interest:

- 3-span reinforced concrete bridge located in the Nantahala National Forest.
- Park facility adjacent to the bridge.
- Heavy recreational traffic (rafting) on the river.
- Heavy vehicular traffic on roadway.
- Rock quarry located near the site.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Site has limited construction access, and will probably require causeway access. Rock for the causeway is readily available from a nearby quarry.
- ▶ Access from the upstream side will require cutting into the mountainside, which the Forest service will not allow.
- ▶ The Department will need to obtain easements for access.
- ▶ Site will require coordination with various regulatory agencies.
- ▶ The Department has constructed a bridge with similar constraints near the Nantahala Outdoor Center (NOC).

ACTION ITEM(S):

- ▶▶ None.

SITE (6) R-0977A – CHEROKEE COUNTY

Location:

US 64 – New alignment with 5 bridges and a culvert.

Item(s) of Interest:

- Bridge #1 over Hiwassee River has a 330 ft. main span.
- Bridge #3 over Martin Creek has two spans which are more than 270 ft.
- The bridges utilize hybrid high performance steel girders, with Tennessee rocker bearings and top flange lateral bracing.
- Construction issues included low bridge seats and vertical clearance on Bridge #2.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Bridge #1
 - Tennessee Rocker bearings were used. The keeper plates were independent of the masonry plate.
 - A construction error resulted in low final elevations at one of the interior bents.
 - There was visible girder uplift at bearing at end bent #1. Design calculations predicted uplift during pours 1, 2 and 3, which raised concerns about the effects on the hardened concrete during pour 4.
 - FHWA expressed concerns about fogging concrete during the deck pour. It was noted that the Standard Specifications require wet burlap for maintaining moisture.
 - Excluder plates were not always flat on the stay-in-place forms.
- ▶ Bridge #3
 - Modular joints with welded tabs for snow plow protection were used. If future traffic in one of the lanes is reversed the welded tabs will require replacement. Structure Design noted that they prefer using armored evazote joints whenever possible.
 - The two-lane two-way bridge was built with a bicycle rail on only one side.
 - The bridge seemed excessively long due to a wide 100 year floodway derived from the natural flood plain – a FEMA issue.
 - On the far end of the bridge there was a hazardous fill basin to capture outstanding resource water. The basin was negotiated for in 1996. There were questions on documenting reasons and purposes for commitments and agreements for future reference.

ACTION ITEM(S):

- ▶▶ FHWA will initiate a process review for placing, pumping, and curing deck concrete.
- ▶▶ FHWA will conduct a process review for FEMA issues and scour issues for uniformity of standards.

SITE (7) I-4401 – BUNCOMBE COUNTY

Location:

US 19/23 over I-40.

Item(s) of Interest:

- Single span, staged construction, steel bridge with MSE walls in front of end bents.
- 3-span 45" prestressed girder bridge on I-40 over Norfolk Southern railroad.
- Leaf motif and mountainscape on precast panels for sound barrier wall.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ The textures applied to the wall panels resulted in a splotchy appearance, but were deemed satisfactory to stakeholders.
- ▶ The mountainscape and leaf motif will be stained to reflect seasons of the year.

ACTION ITEM(S):

- ▶▶ None.

SITE (8) R-2813B – BUNCOMBE COUNTY

Location:

Long Shoals bridge on I-26 over NC 146

Item(s) of Interest:

- Design-Build Project.
- 250 ft. single span curved steel girder bridge over a single point urban interchange (SPUI) with MSE walls in front of the end bents.
- HPS utilized for girders.
- 4-span bridge on NC 146 over the French Broad River utilizes 72" modified bulb-tee and 45" prestressed girders.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ The project required a long rock causeway for construction access. The Contractor was able to convey specific means and methods to the regulatory agencies, which facilitated a straightforward permitting process.

ACTION ITEM(S):

- ▶▶ None.

SITE (9) B-2515 – BUNCOMBE COUNTY

Location:

Bridge #39 on NC 81 (Biltmore Avenue) over the Swannanoa River.

Item(s) of Interest:

- Bridge programmed for replacing.
- Bridge provides access to hospital. Location has high ADT, and has businesses at all four corners. Construction access is limited.
- Accelerated construction is being considered.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ The project has been postponed several times. If the Division is prepared to move forward with the proposed accelerated option, then it will be necessary to hold public hearings, constructibility reviews, and obtain city approval.
- ▶ Existing roadway grade and hydraulic opening need to be maintained. As such, the existing superstructure depth will need also to be maintained.
- ▶ Turning radii into businesses and access road at the ends of the bridge are very tight and need to be carefully considered.
- ▶ Accelerated construction favored for this location.
- ▶ Micropiles may be used as part of the accelerated construction strategy.

ACTION ITEM(S):

- ▶▶ Structure Design will evaluate various accelerated construction techniques to determine feasibility at this location.
- ▶▶ The Division Construction Engineer will let Structure Design know if the Division is prepared to proceed with the accelerated construction option.

SITE (10) B-4199 – McDOWELL COUNTY

Location:

Bridge #198 on SR 1782 over the Second Broad River.

Item(s) of Interest:

- 3-span (25'-60'-25') 36" prestressed concrete girder bridge.
- Location features rock near the natural ground elevation.
- Foundation consists of drilled shafts with bent caps at the natural ground elevation.
- A single span bridge should have been considered.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Project would have been a good candidate for the sub-regional tier design guidelines.
- ▶ At least one of the three spans on this bridge might have been eliminated.
- ▶ Drilled shafts appear oversized, possibly due to the minimum column size suggested in the Structure Design Manual.

ACTION ITEM(S):

- ▶ Structure Design will investigate reducing the minimum diameters for columns and drilled shafts.

SITE (10A) I-4411 – IREDELL COUNTY

Location:

Bridge #28 on SR 1102 (Langtree Road) over I-77.

Item(s) of Interest:

- Staged Construction 2-span continuous steel girder bridge.
- 2006 IBRD project which utilizes HPS 100W steel.

OBSERVATIONS AND POINTS OF DISCUSSION:

- ▶ Visible bulging in the elastomeric bearing laminates indicated some internal shim misalignment, which raised quality control concerns. For bearings, quality assurance is provided to the Materials and Tests (M&T) Unit through manufacturer certifications. There was some discussion on whether M&T should resume proof load tests for bearings.
- ▶ Observed evidence of difficulties in supporting screed rail run-out.
- ▶ There was visible bulging in the fabric wall used for staging the reinforced approach fill.
- ▶ Weathering black bolts were used to connect end bent diaphragms to the girders in the painted areas. M&T recommends using mechanically galvanized bolts, which may raise an issue with use of dissimilar materials.
- ▶ There was some discussion on reasons for differences in median barrier rail height on the bridge than on the approach roadway. Median barrier rails are typically shorter on the bridge generally because Structure Design Engineers are trying to minimize the loads on the bridge. The discussion noted that, in general, there would not be a negative impact on the bridge design if a slightly taller barrier rail was detailed.

ACTION ITEM(S):

- ▶▶ Structure Design will investigate reducing the minimum diameters for columns and drilled shafts.
- ▶▶ Materials and Tests will review other States' practices on proof load tests for bearings.
- ▶▶ Materials and Test will review the Standard Specifications and make a recommendation on type of bolts for painted areas.
- ▶▶ Structure Design and Roadway design Units will coordinate to maintain the barrier rail height on the bridge to that detailed on the approach roadway.