

# INTEROFFICE COMMUNICATION

TO: Nick Chaney P.E., District Bridge Engineer  
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DATE: July 23rd, 2024  
SUBJECT: Brief Structure Type Study (STS) for bridge ATB-193-2019 (SFN: 0405620) PID: 118703

This memo serves as a brief structure type study for the subject bridge to assist in establishing a rehabilitation or replacement strategy. The conclusions of this study are based upon analysis of the existing structure design, previous project history, existing conditions, and field observations.

ATB-193-2019 is a 64' long, single span, non-composite prestressed concrete box beam (PSBB) bridge carrying SR 193 over Griggs Creek. The existing structure was constructed in 1990 and received minor repairs in 2023 including an asphalt concrete overlay. The current asphalt concrete wearing surface ranges from 2½" to 4" and includes a type 3 waterproofing membrane. The HS20 Modified legal load limit is 150%. The 2023 bridge inspection summary indicates the bridge is currently in fair condition with a GA of 5. The GA rating is driven by the fair deck/superstructure ratings. Spalling and delamination is present in beams 1, 3, 6, 8, and 9. Beams 1, 8, and 9 have exposed and broken strands. The majority of spalling is at the forward and rear abutments with midspan spalling in the fascia beams. The substructure (rated 7) is in good condition with deterioration being recently patched. The channel (rated 7) is in good condition with no defects noted.

With the accelerated degradation of the PSBBs expected, a superstructure replacement is warranted. The substructure has a good rating (7), suggesting that a full replacement is not required per BDM C401.4. 3 alternatives superstructure types have been examined:

- **Prestressed concrete box beam w/ composite deck** - A composite box beam superstructure will likely be the fastest to construct of all the alternatives. The roadway profile will likely need to be increased to accommodate the composite concrete deck. Because of reduced lifespan, non-composite PSBB is not being considered as an alternative.
- **Concrete slab** - A concrete slab superstructure will require additional closure time and effort to construct but will have a longer service life than the other alternates. A 64' span is not possible with a concrete slab superstructure. A center pier will be required.
- **Steel beam w/ composite deck** - Replacement with a steel beam superstructure would require reconfiguring of the top abutments to properly seat the steel beams. the depth of beams and required 8" deck would require profile adjustment. Profile adjustment needs could be reduced but at the cost of additional beam lines. This alternative will require a protection coating system (PCS).

For superstructure replacement on ATB-193-2019 the preferred structure type is a prestressed concrete box beam w/ composite deck. The PCS required for the steel beam type superstructure and the need for a center pier for the concrete slab makes PSBBs the preferred alternative. While exact cost differences between the 3 superstructure types were not examined the shorter construction time and minimal modification to the substructure likely means PSBBs are the most economical option.

The superstructure replacement should maintain the original hydraulic opening. The proposed bottom deck cord elevations should match the existing elevations. The substructure will retain the existing design loading. Address existing substructure defects with 519 / 844 patching or 512 epoxy injection crack repair.