



M E M O R A N D U M

DATE: July 17, 2026
TO: Tennessee Department of Transportation
FROM: American Structurepoint, Inc.
RE: TDOT Timber Bridge Bundle #2 – Bridge 37 (PIN: 137109.09) Hydraulic Summary
CC: Steve Sellers – Tennessee Department of Transportation
Derek Link – Tennessee Department of Transportation
David Flanders – HNTB
File

This memo presents the preliminary hydraulic modeling analysis findings for TDOT Timber Bridge Bundle #2 Contract DB2601, Bridge 37 (SR 222 over Branch, PIN: 137109.09). The goal of the analysis was to determine the approximate hydraulic impacts of performing a bridge replacement. All geometric structure data utilized in the modeling originated from the Bridge Concept Report unless noted otherwise.

Modeling Methodology: The hydraulic modeling is in accordance with the 2012 Design Procedures for Hydraulic Structures, consisting of Tennessee Hydraulics Memorandum (THM)-01 through THM-10. Modeling software used was HEC-RAS 6.6. Discharges were obtained from StreamStats mean discharge data. Site topography was based on field survey provided by HMB on 01/22/2026, where available, and Tennessee West 11 2019 LiDAR. Low girder elevations were recorded from field survey data.

Existing Conditions: The existing structure was modeled as a single-span bridge with a clear span of 26.5 ft and a total length of 28.5 ft. The structure was modeled with an out-to-out width of 25 ft. The structure depth was modeled at 2.07 ft, measured from profile grade to the low girder.

Natural Conditions: The natural conditions were modeled by duplicating the existing terrain, removing SR 222, and eliminating the existing structure to simulate the floodplain without the influence of the roadway and structural components.

Proposed Conditions: The proposed structure was modeled as a single span bridge with a structure depth of 3.58 ft, a total length of 60 ft, and a clear span of 54 ft with 3 ft wide abutments. The out-to-out bridge width was modeled as 33.25 ft, which is a deviation from the concept report out-to-out width of 25.25 ft. This was requested by TDOT to increase the shoulder widths on the bridge from 2 ft to 6 ft. The bridge was modeled with riprap spillslopes along each abutment with 4 ft berms and 2:1 slopes. A grade raise is recommended for the south approach. The existing grade and abutment stationing to the north was maintained to avoid additional coordination with the railroad. The proposed structure is modeled with a 3.02% grade from South to North, while the existing structure has a 5% grade. This results in a maximum estimated grade raise of 2.0 ft on the south approach. This grade raise is a deviation from the Concept Report in order to meet freeboard requirements.

Hydraulic Summary: The proposed structure results in a backwater of 0.54 ft, which satisfies TDOT's recommended 1 ft maximum per THM-03. The proposed structure also has improved velocities (5.25 ft/s) compared to existing (7.41 ft/s), and a freeboard of 1.02 ft that satisfies the 1 ft minimum TDOT requirement.



Hydraulic Summary Table

	Existing	Proposed
Drainage Area	0.76 mi ²	
Design Discharge (50 Year)	1,020 cfs	
50 Year Water Surface Elevation ⁽¹⁾	311.14	
100 Year Discharge	1,140 cfs	
100 Year Water Surface Elevation ⁽¹⁾	311.82	
Span Arrangement	28.5'	60'
Finish Grade Elevation	315.39 (south end)	316.28 (south end)
Low Chord Elevation ⁽²⁾	313.32 (south end)	312.70 (south end)
Structure Depth	2.07 ft	3.58 ft
50 year Headwater Elevation ⁽³⁾	312.12	311.68
Freeboard Provided Above 50 Yr Headwater ⁽⁴⁾	1.20 ft	1.02 ft
Water Area Provided Below El. 311.14	189.80 ft ²	263.32 ft ²
50 Year Velocity	7.41 ft/s	5.25 ft/s
50 Year Bridge Backwater	0.98 ft @ El. 312.12	0.54 ft @ El. 311.68
Roadway Overtopping El.	312.57	312.89

Note: Elevations provided are in feet in the NAVD88 vertical datum.

⁽¹⁾ Elevation taken at 1st cross section upstream of bridge in natural condition

⁽²⁾ Elevation taken as minimum allowed

⁽³⁾ Elevation taken at 1st cross section upstream of bridge

⁽⁴⁾ Freeboard = Low Chord Elevation – 50 Year Headwater Elevation