

BF 71600 – Athabasca River Bridge on Local Road, 1 km north of Smith

Report Date: November 8, 2021

2021 Scour Survey Summary

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BACKGROUND	
Spans	7 spans – 8.5/8.5/8.5/61/76.2/61/4.9
Year Built	1945
AADT (2020)*	280
Detour Length / Dead End	60 km / N
Clear Roadway	5.5 m
Load Rating	32, 45, 64 Design load HS 20
Vert. Clearance	--
Structural Condition Rating*	38.9 %
Sufficiency Rating*	29.4 %
New Scour Priority	4
Overall Scour Risk Rating	Moderate
Foundation Type	Spread Footing
Minimum cover in last scour survey	1.1 m @ Pier 3
Pier Width	4.5 m
Geotech.	--
Last Scour Survey	2018
New RPW Priority	1
Overall RPW Risk Rating	Low

* BIM Level 2 report – updated July 6, 2020

HYDROTECHNICAL	
B	200 m
H	8 m
T	280 m
S	0.00035
Y	9.5 m
V	2.4 m/s
Q	5700 cms
HW Elev.	554.18 m (M-71600-99-A)
Deck Height	Approx. 14 m
Flood Years	1944, 1954, 1986
Freeboard	Approx. 2.4 m
B (@ Bridge)	Approx. 200 m
Constriction?	No

Scour Survey Results				
Pier	Cover – 2021	Cover – 2018	Cover – 2013	Cover – 1999
1	6.3 m	N/A	N/A	6.8 m
2	2.6 m	3.1 m	3.2 m	3.8 m
3	0.8 m	1.1 m	1.1 m	0.5 m
4	N/A	N/A	N/A	4.0 m

Notes

The bridge structure was digitized and footing elevations were based on as-built drawings 434-2-P-F01, 434-2-P-F02 and 434-8-P in 1944, and the scour survey report and drawing M-71600-99-A in 1999. Based on the 1999 scour survey report, it was concluded that there was a substantial discrepancy in the geodetic elevation for this site. The pre-1999 survey data and drawings were found too low. The datum has been corrected since 1999. All the survey data and results in this report are consistent with the 1999 datum.

Comments

1. Pier 1 – located near the channel bank and mostly dry. The risk of scour at the pier is low.
2. Pier 2 – no progression of scour was noted when comparing to the last survey in 2018. The risk of scour at the pier is low. The available cover above the footing bottom is approx. 2.6 m.
3. Pier 3 – drifts were found at the pier nose during survey. The condition was not ideal for data collection around the pier, but the surveyor was able to angle the sonar sensor trying to get as close as possible around the pier nose to collect the data. Comparing the survey data and results in 2018, the scour around the pier has been worsened significantly in the last few years and it is comparable to the conditions in 1999. Assuming the natural streambed elevation at 544.6 m, the general scour depth at the pier nose is approx. 2.6 m, which is close to the blue clay layer as indicated on the as-built drawings. The scour area of approx. 20 m x 12 m is located just upstream of the pier nose and along the right side of the pier. The remaining cover at the pier nose is approx. 0.8 m above the footing bottom elevation.
4. Pier 4 – located near the channel bank and mostly dry. The risk of scour at the pier is low.
5. RPW – N/A.

Recommendations

The scour identified at Pier 3 has been progressing significantly since 2018. The scour depth is getting close to the 1999 results. While the channel could potentially infill over time during low flow conditions; however, it appears that drifts are also found to be an ongoing issue at Pier 3 as there were records and photos in which drifts were identified in 2008, 2013, 2017 and 2021. The accumulation of drifts could likely accelerate the scour development at the pier nose; therefore, timely removal is recommended. It is also recommended to increase the inspection frequency to every 3 years for now and the next survey should be scheduled in 2024 to closely monitor pier scour for this site. It is imperative that drift removal be completed prior to the next survey. An additional survey and inspection is also recommended should a major flood event occurred before the next schedule to ensure that the piers are not severely damaged or extensive scour does not occur after the flood.



Figure 1 – Aerial image from Google Earth, image date August 30, 2019.

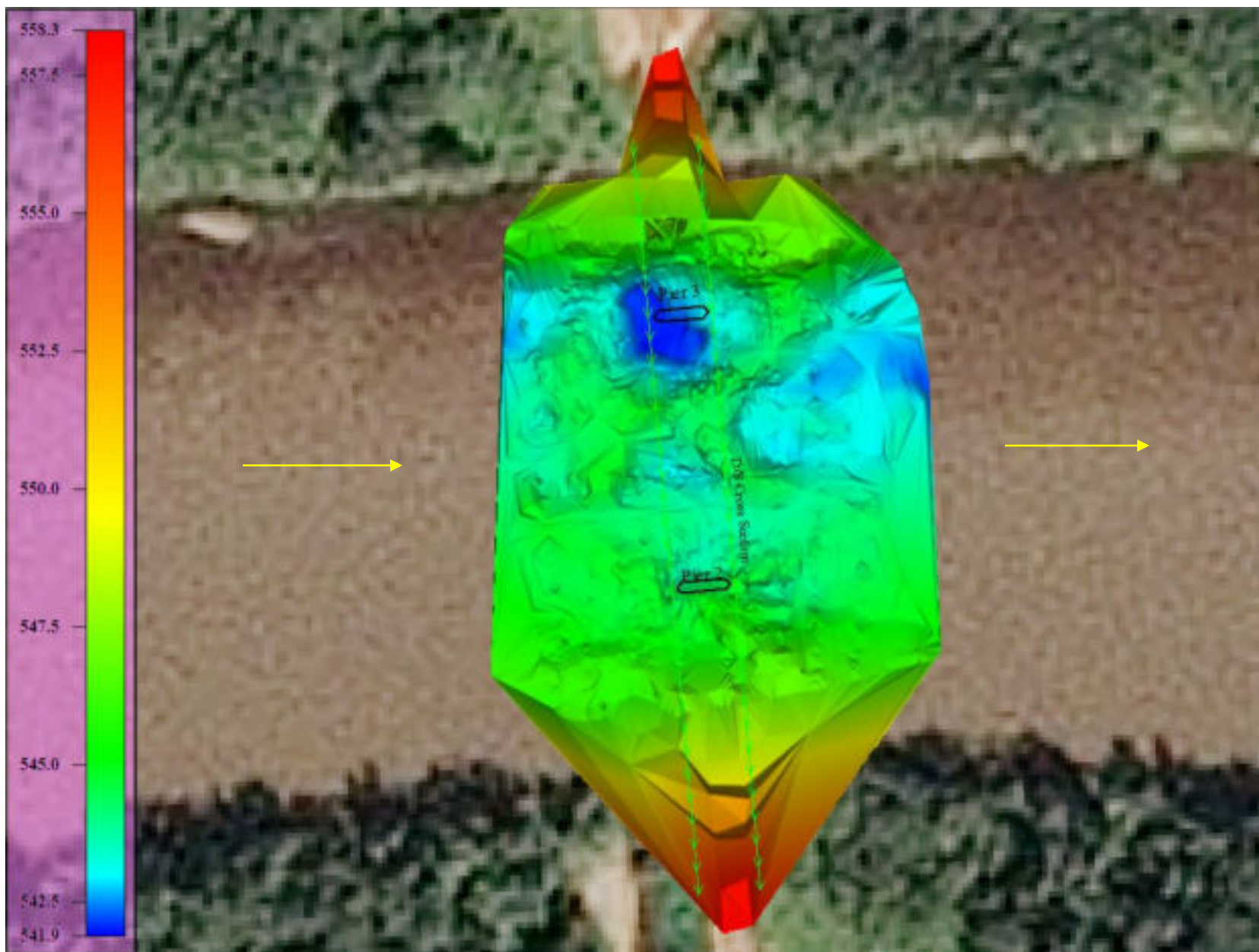


Figure 2 – Triangulated Elevations in 2021

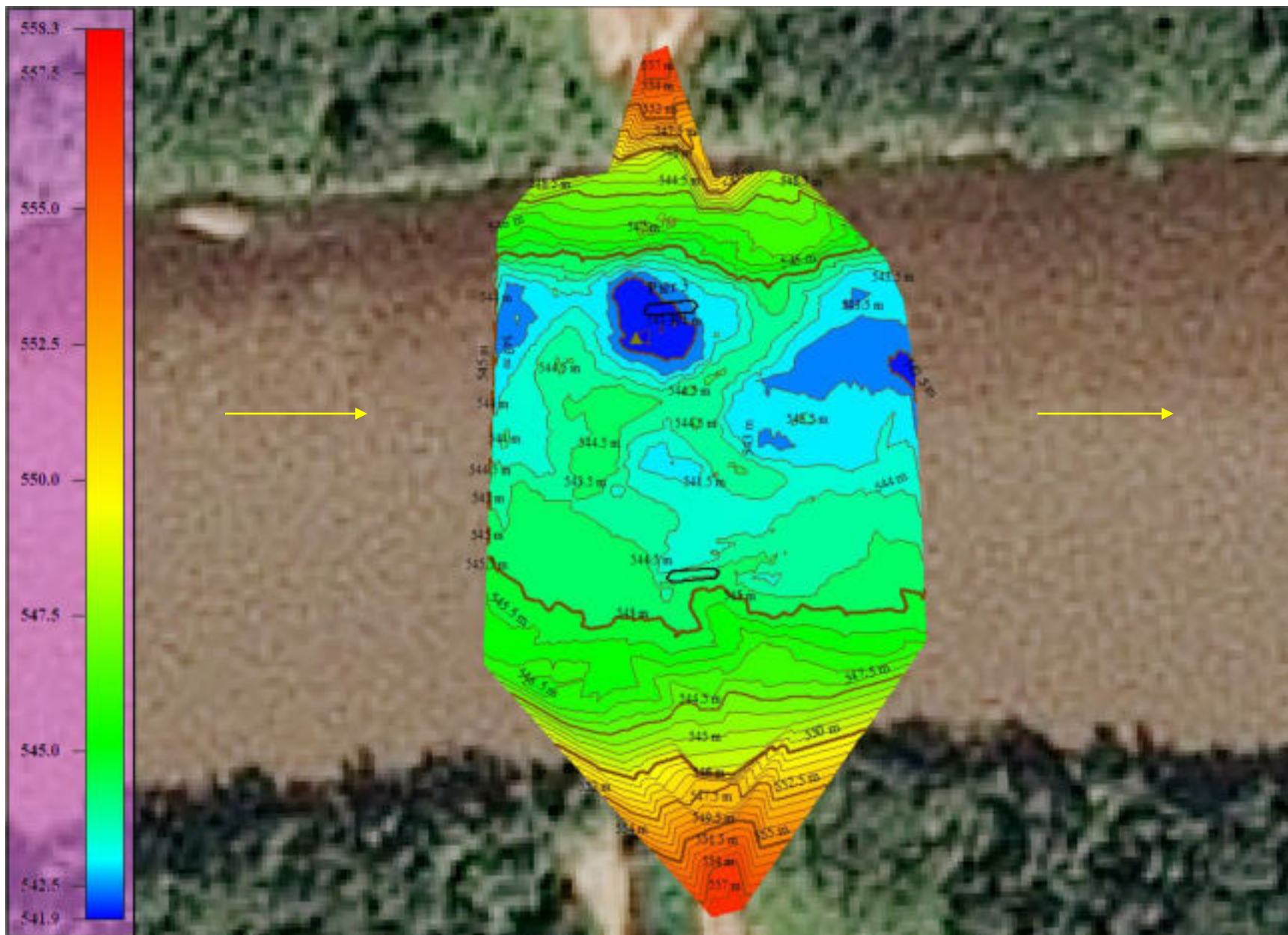


Figure 3 – Contours in 2021

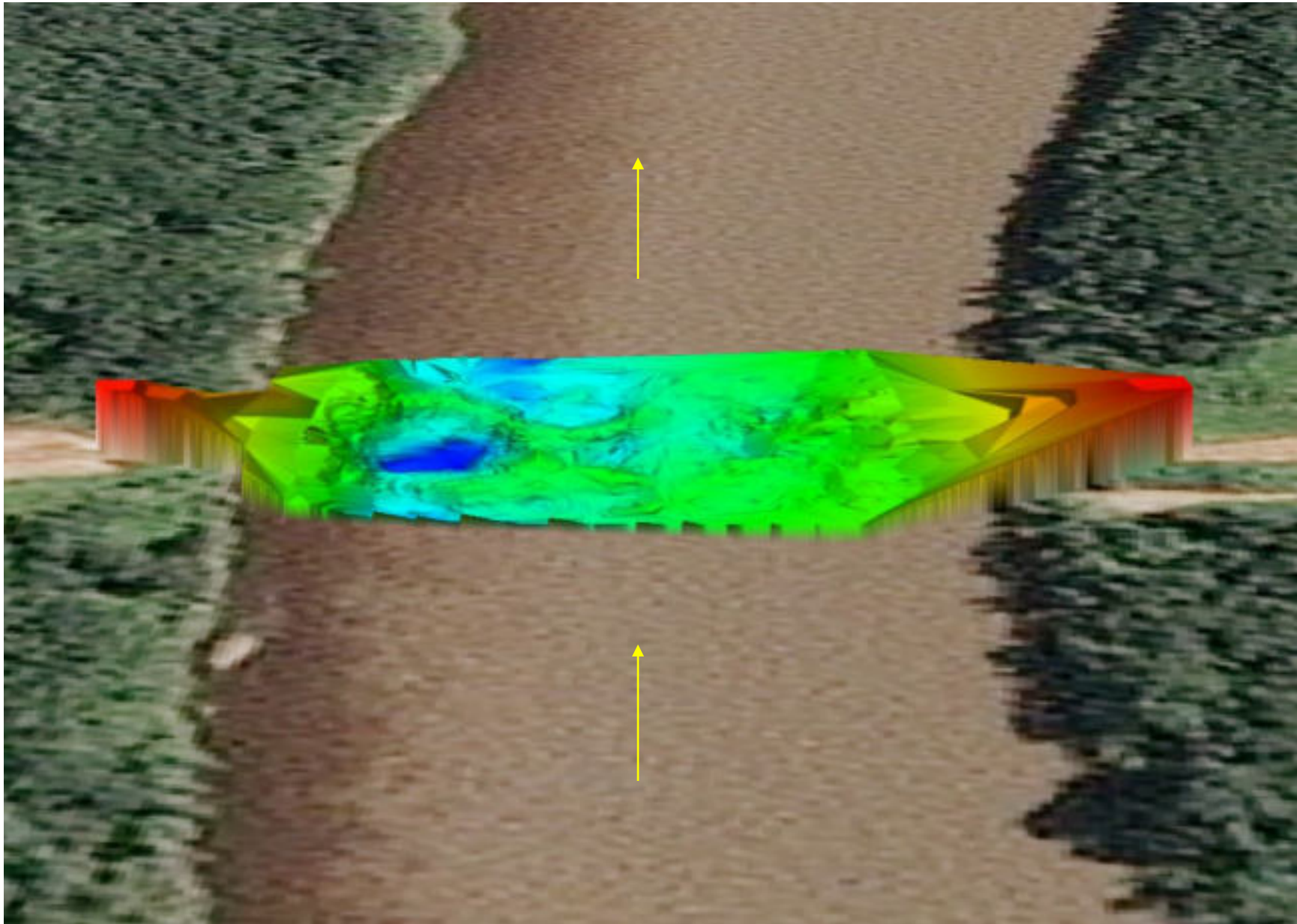


Figure 4 – 2021 Survey 3D view

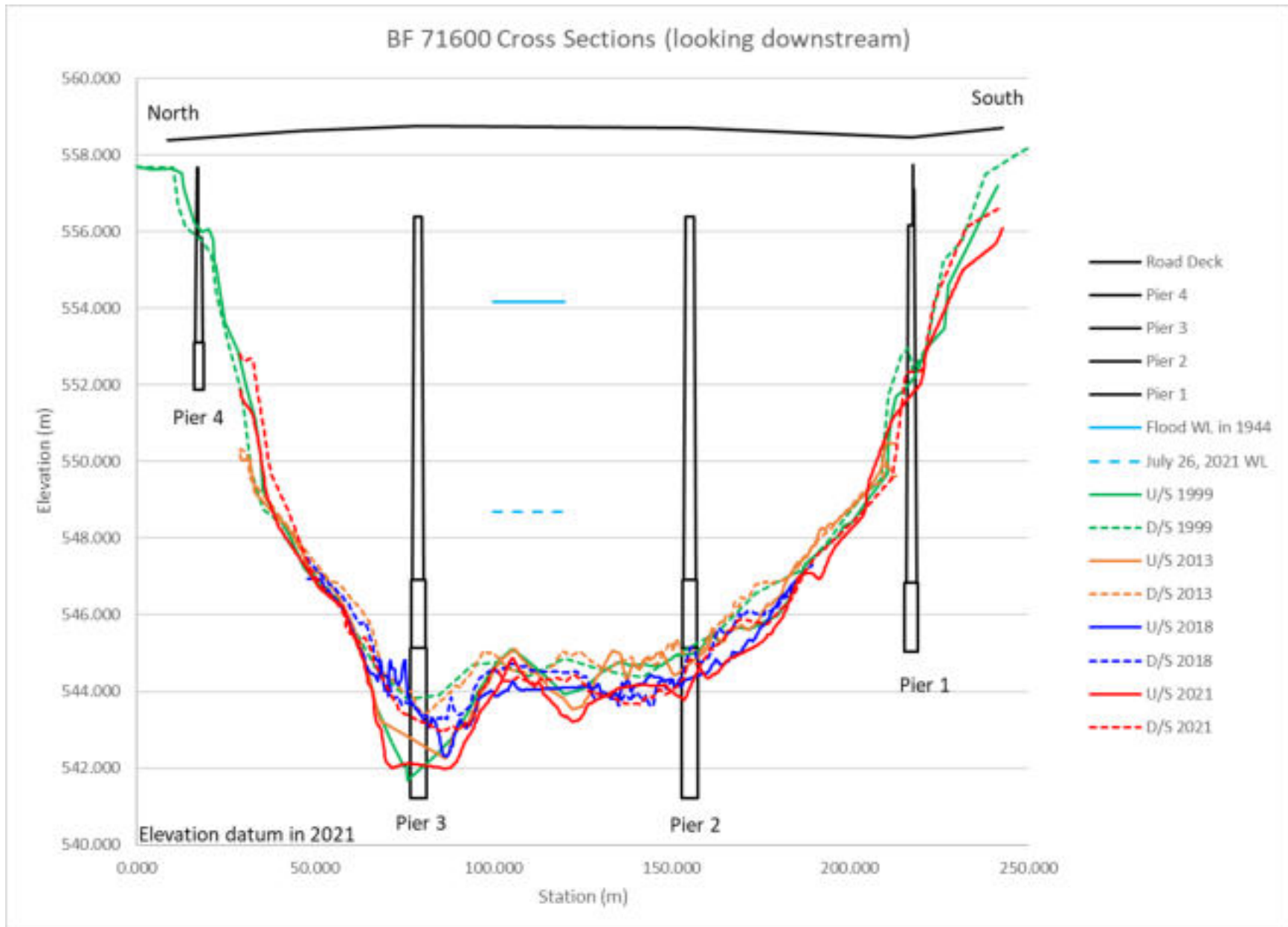


Figure 5 – Cross Sections



Site Photo 1 – upstream face of the bridge



Site Photo 2 – downstream face of the bridge



Site Photo 3



Site Photo 4



Site Photo 5



Site Photo 6



Site Photo 7 – Drifts at Pier 3



Site Photo 8 – looking south



Site Photo 9 – looking north