



July 15, 2026

Our File No. 0002-171-00

Tim Neirinck, M.Sc., P.Eng.
Tetra Tech Canada Inc.
400-161 Portage Ave East
Winnipeg, MB
R3B 0Y4

**RE: Louise Bridge Rehabilitation Preliminary Design, Winnipeg, MB
Hydraulic Assessment of Proposed Temporary Berms**

The following memorandum summarizes the hydraulic assessment completed by TREK Engineering Inc. (TREK) for Tetra Tech Canada Inc. (Tetra Tech) for the proposed temporary north and south access berms for the Louise Bridge Rehabilitation. The analysis includes an assessment of impacts to upstream Red River water levels from the berms and commentary on the proposed berm elevation in the context of historic spring water levels at the project site.

This memorandum should be reviewed and considered in conjunction with the draft report titled “Louise Bridge Rehabilitation Preliminary Design, Winnipeg, MB – Hydraulic Assessment” prepared by TREK on June 11, 2026.

Hydraulic Assessment

The 1D steady-state HEC-RAS model of the Red River developed for the Louise Bridge Rehabilitation Preliminary Design was modified to incorporate the proposed north and south temporary berms according to drawings provide by Tetra Tech (attached). The modified model was run for the Q5%, Q10%, Q50%, and Q50% summer frequency flow events for existing conditions with and without the temporary berms. Additional analysis was conducted to determine the flow corresponding to a water level equal to the top of the proposed berm elevation of 222.60 m. It was found that a flow of 219 m³/s corresponds to a water level of 222.60 m at the Louise Bridge.

The top of berm elevation was set to 222.60 m with 1H:1V slopes extending to the river bottom. Figure 1 compares the existing cross-section (pink) and cross-section with berms included (black) immediately upstream of the Louise Bridge.

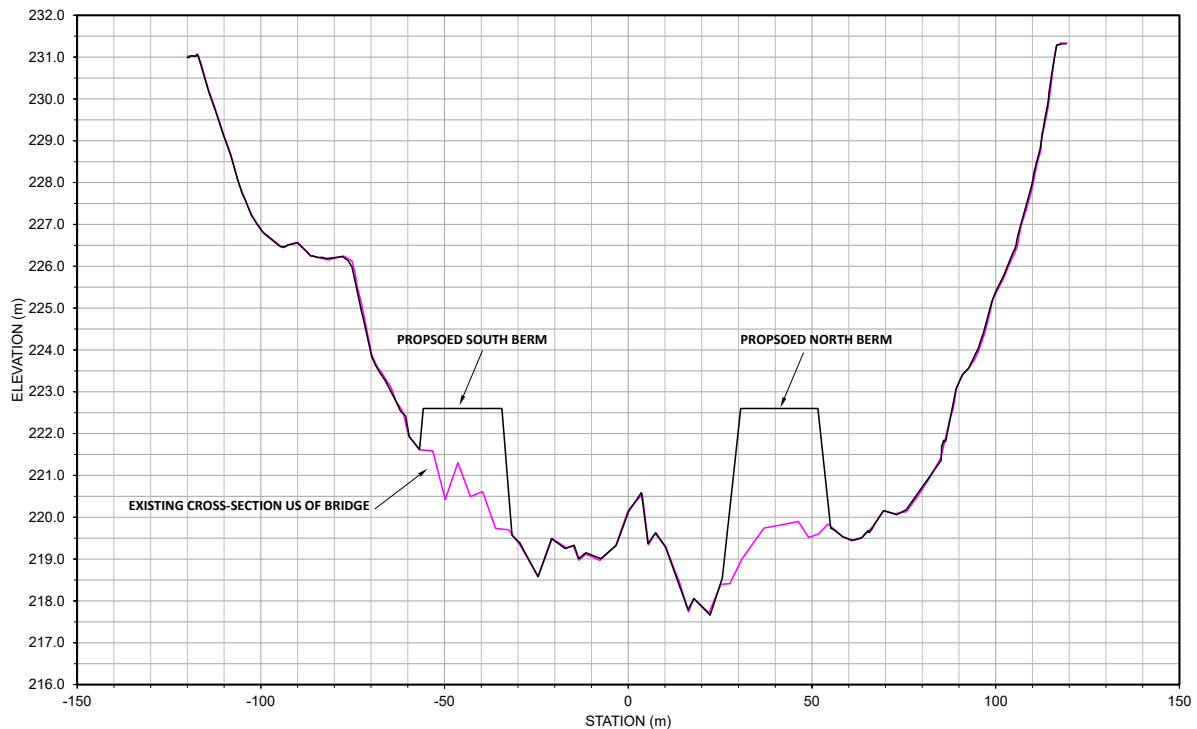


Figure 1: Comparison of Cross-section for Existing (pink), and Proposed Berms (black) US of Louise Bridge

A comparison of water surface profiles for existing conditions with and without the berms is provided in Figure 2. The results indicate that the impact of the berms on upstream water levels is minimal for each of the simulated events. The simulated water levels 100 m upstream of the bridge (approximately 80 m upstream of the start of the berm) are summarized in Table 1. The table also presents the reduction in cross-sectional flow area associated with the berms compared to the existing flow area immediately upstream of the bridge (widest section of the berm). It is estimated that the addition of the berms would reduce flow area by 12 to 14% for the Q5%, Q10%, Q50% events; 25% for the Q50% summer event; and 35% if the water level is equal to the top of the berm elevation.

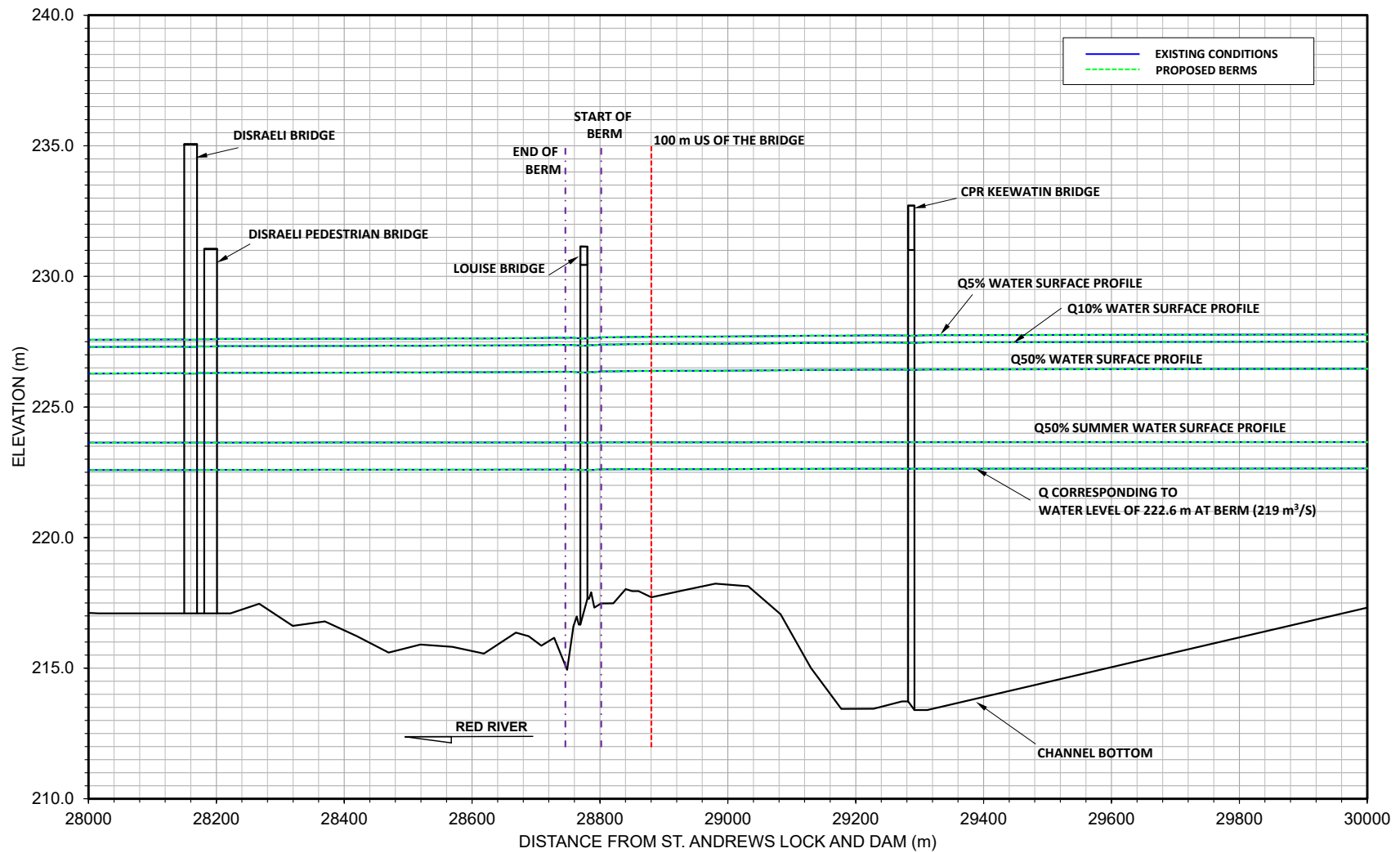


Figure 2: Water Surface Profile Plots for Existing Conditions with and without the Temporary Berms

Table 1: Comparison of Water Level and Flow Area for Existing Conditions with and without the Temporary Berms

Event	Flow (m ³ /s)	Water Level (m) 100 m US of the bridge		Change in Water Level (m)	Flow area (m ²) immediately US of the bridge		Flow Area Reduction (%)
		Existing Conditions	Proposed Berms		Existing Conditions	Proposed Berms	
Q5%	1,671	227.68	227.70	0.02	1,295	1,145	12%
Q10%	1,586	227.40	227.43	0.03	1,237	1,088	12%
Q50%	1,203	226.37	226.39	0.02	1,032	884	14%
Q50% Summer*	200	223.65	223.65	0.00	577	431	25%
Flow corresponding to water level of 222.6 m at the berm	219	222.61	222.64	0.03	418	272	35%

*The summer water level is controlled by St. Andrews Lock and Dam

To evaluate historic water level trends in March, Figure 3 compares water levels at James Avenue for 31 years (1991-2021) for all days in March. The data shows that in general, water levels rise from a few feet James to about 15 feet James during the second half of the month. This figure also indicates that the water level can rise about 10 feet within two days.

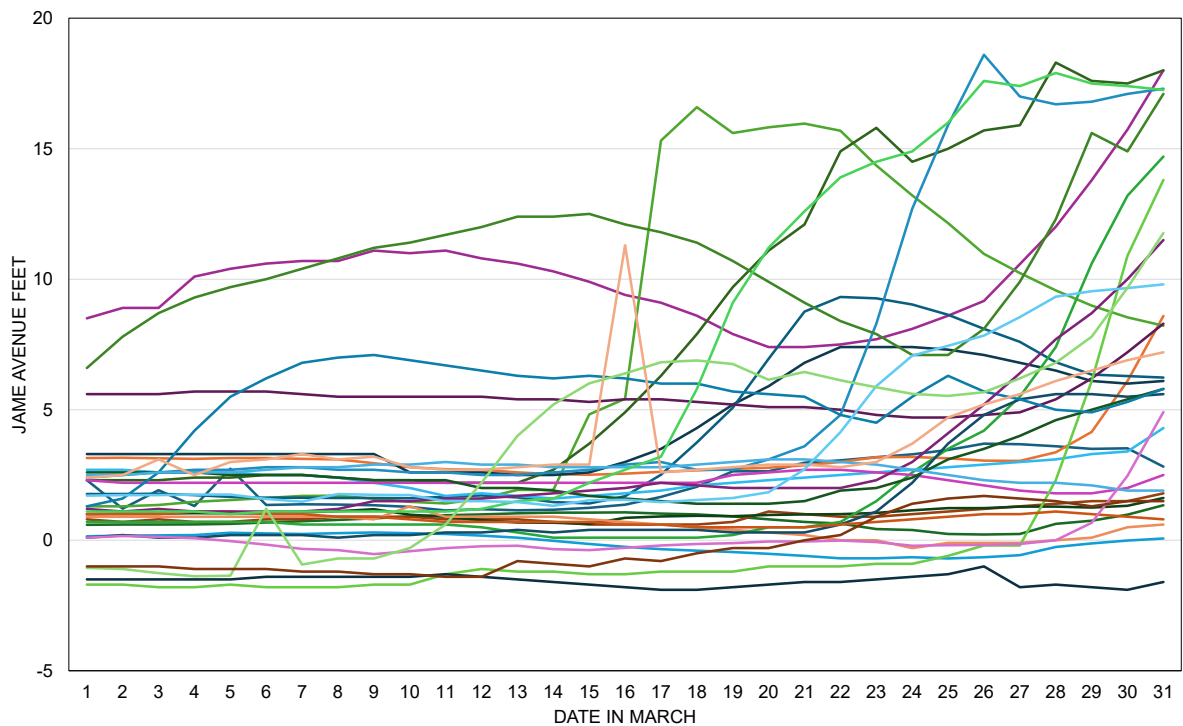


Figure 3: Historic James Avenue Water Levels for March

Figure 4 summarizes the water level records into a range of percentiles compared to the top of berm elevation (black dashed line). Note that the top of berm elevation was converted to the local James datum and corrected for the difference in water level between James Ave and the Louise Bridge (approx. 0.23 m). An elevation of 3.5 ft James corresponds to a water level of approximately 222.6 m at the Louise Bridge. The data shows that the 5% (P95) and 10% (P90) water levels overtop the berm elevation at the beginning of March; the 25% (P75) water level overtops the berm in the second week of March; and the 50% (P50) water level overtops the berm in the third week of March. Noting that a 5% (P95) water level is typically used for temporary works, this level is already exceeded before early March. A 10% (P90) water level is sometimes used as an alternative to the 5% level; however, this level is exceeded (on average) by March 3rd.

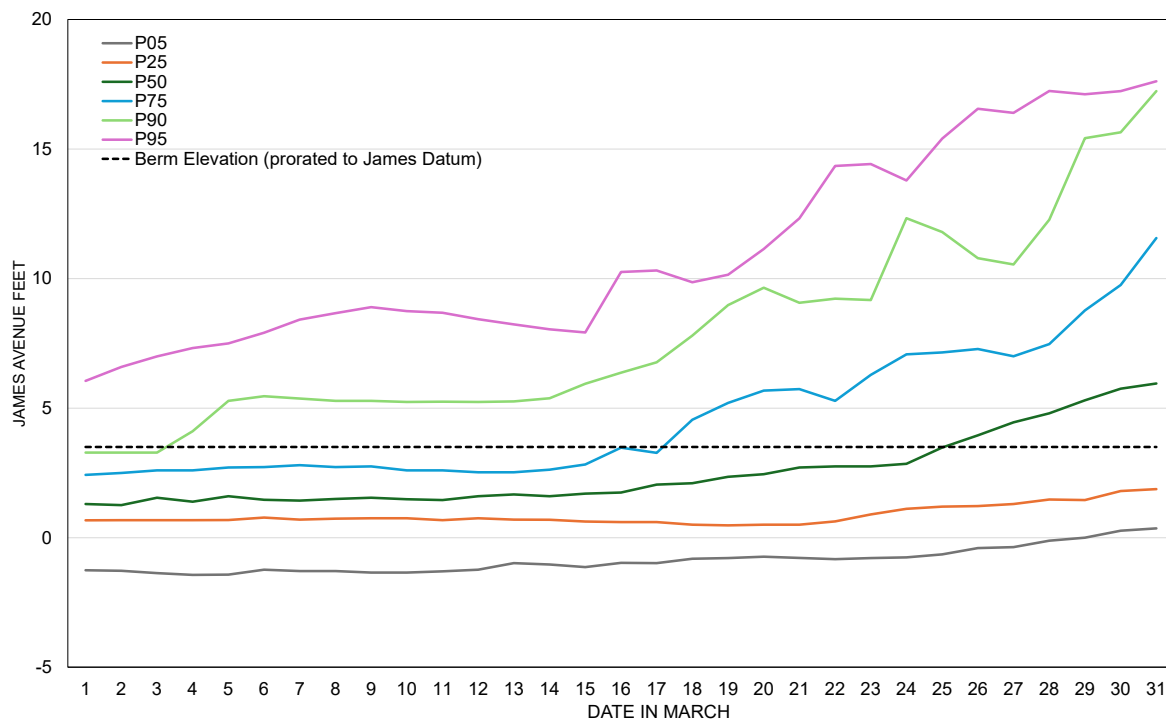


Figure 4: Probability of Exceedance for James Avenue Water Levels in March

In conclusion, the addition of the temporary north and south berms at the Louise Bridge is not expected to have a significant impact on upstream water levels compared to existing conditions. However, it is likely that the berms will be overtopped at some point in March as water levels on the Red River rise.

Other Considerations

Best Management Practices for working near waterways including the appropriate implementation of sediment and erosion control measures should be followed. Exposed slopes not covered with a rock blanket should be revegetated and covered with erosion control blanket. Construction activities within the river shall not take place between April 1 and June 15 of any given year. An Environmental Management Plan should be prepared which details the specific environmental management requirements and sediment and erosion control.

Water management during construction can be an important aspect of any project and may influence the cost and scheduling for crossing replacement. The largest flows within the river are expected to occur during the spring runoff period and following a heavy summer rainfall event. Construction should therefore take place in the late fall and winter period when the potential for runoff is reduced, thereby minimizing water management requirements. All instream work should be completed no later than March 1. Although minimal, flows are expected to continue throughout the winter and should be considered as part of the water management plan with appropriate measures taken to deal with the flow.

This assessment is limited to hydraulic considerations for the proposed temporary berms and does not consider any geotechnical analysis or design that may be required.

Closure

The technical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information collected by GDS Surveys in 2025. Hydrotechnical analysis is based on environmental characteristics assumed to extend uniformly throughout the contributing area and watershed-scale, temporally-discrete hydrologic events.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Engineering Inc. (the Consultant) for the exclusive use of Tetra Tech Canada Inc. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

TREK Engineering Inc.

Prepared By:



Randula Senarathbandara, Ph.D., E.I.
Water Resources Engineering Intern

Reviewed By:



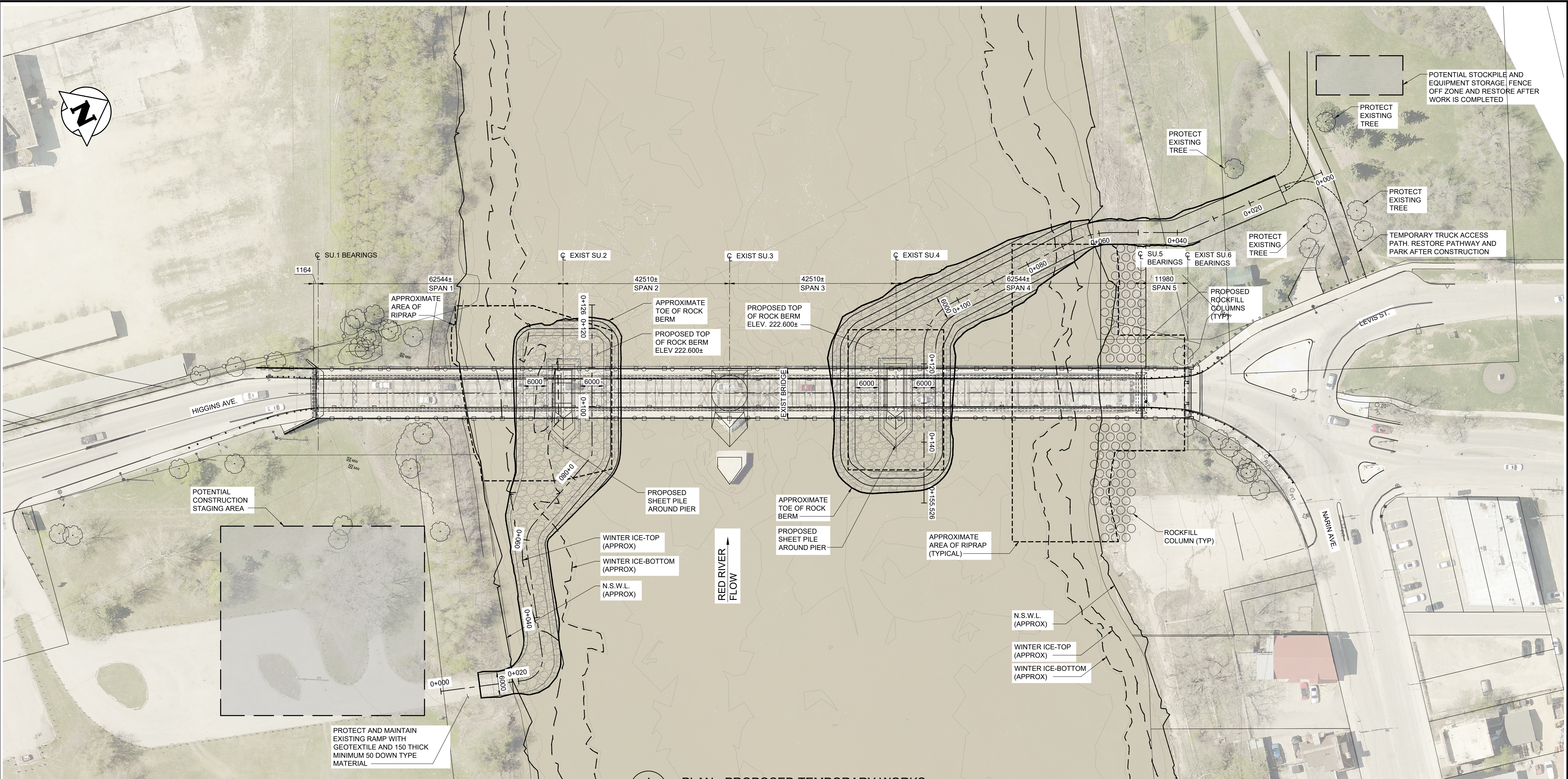
Lucas Vonderbank, M.Sc., P.Eng.
Water Resources Engineer



John Doering, Ph.D., P.Eng., FCSCE, FEC, FCSSE, FCAE
Senior Water Resources Engineer

APPENDIX

Drawings Provided by Tetra Tech

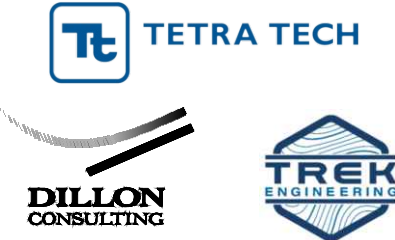


1 PLAN - PROPOSED TEMPORARY WORKS
1 : 500

- LEGEND**
- CL ROAD
 - PROPOSED ROCK BERM
 - APPROXIMATE RIPRAP AREA
 - WINTER ICE-TOP (APPROX)
 - WINTER ICE-BOTTOM (APPROX)
 - N.S.W.L. (APPROX)

NOTES:

1. THIS DRAWING DEMONSTRATES POTENTIAL ACCESS BERM CONSTRUCTED TO ELEVATION 222.60m. THE ACCESS ROAD AND WORK BERM ELEVATION MAY VARY TO REFLECT THE WINTER ICE LEVEL AT TIME OF CONSTRUCTION AS WELL AS WIDTH/OFFSETS REQUIRED FOR CONSTRUCTION EQUIPMENT AND ACTIVITIES. THESE DRAWINGS SHOW THE MAXIMUM PLAN VIEW EXTENTS OF RIVERBED DISTURBANCE APPROVED BY REGULATORY AGENCIES.



VERTICAL DATUM:			
HORIZONTAL DATUM:			
NO.	REVISIONS	DATE	BY

TETRA TECH	
DESIGNED BY	TN
REVIEWED BY	BN
DRAWN BY	EV
APPROVED BY	MJB
SCALE:	AS NOTED
ACCEPTED BY	DATE
NO.	REVISIONS
DATE	BY

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION
CONSULTANT DRAWING NO. 704-INF.MB\03029-01-DWG-S3005

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
LOUISE BRIDGE SUBSTRUCTURE REHABILITATION AND RIVERBANK STABILIZATION WORKS	
TEMPORARY WORKS	
CITY DRAWING NUMBER B107-26-005	
SHEET 5 OF X	
5	

