Associated Engineering

CANADA BEST MANAGED COMPANIES Platinum member

# Rainbow Road Bridge Replacement Project

Carter Lautner, P.Eng., Ryan MacPhee, C.E.T., and Olivia Lautner, P.Eng

# Project Team

| Carter Lautner, P.Eng.<br>Project Engineer<br>Associated Engineering | Ryan MacPhee, C.E.T.<br>Technologist<br>Associated Engineering | Olivia Lautner, P.Eng.<br>Project Manager<br>Volker Stevin Highways |
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# Introduction

- Location: Chestermere, Alberta
- Project Delivery Model: Design-Bid-Build (DBB)
- Key Project Stakeholders:
  - Consultant: Associated Engineering
  - Prime Contractor: Volker Stevin Highways (Bridge Division)
  - Owner: City of Chestermere
  - Other Affiliations: Western Headworks Canal, Canadian National Railway, Epcor, Various Utility Companies
- Collaboration Strategy: Focus on consultant-contractor-owner partnership to address daily challenges and foster innovation

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# Introduction – Existing Structure

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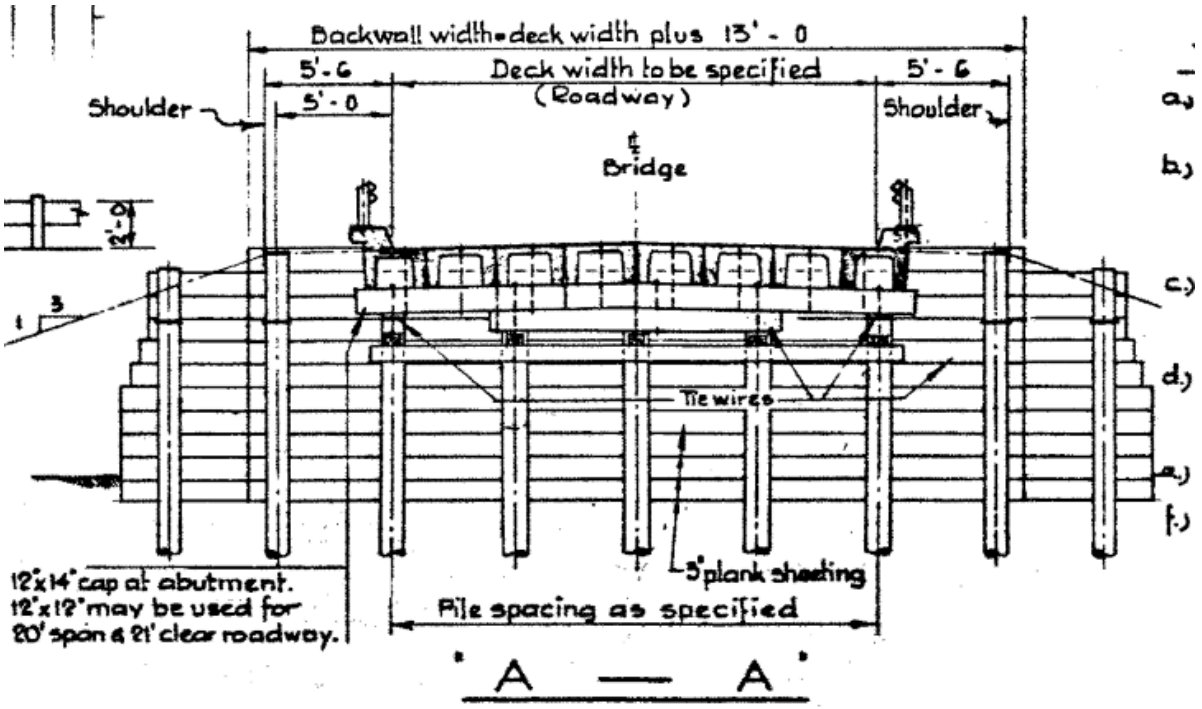
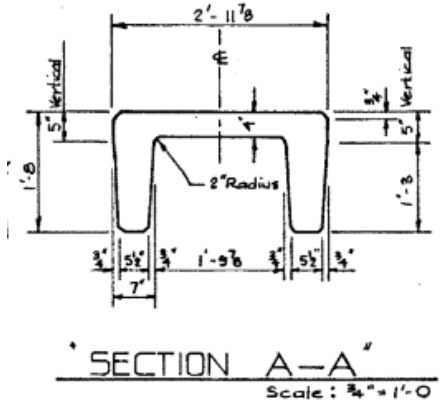
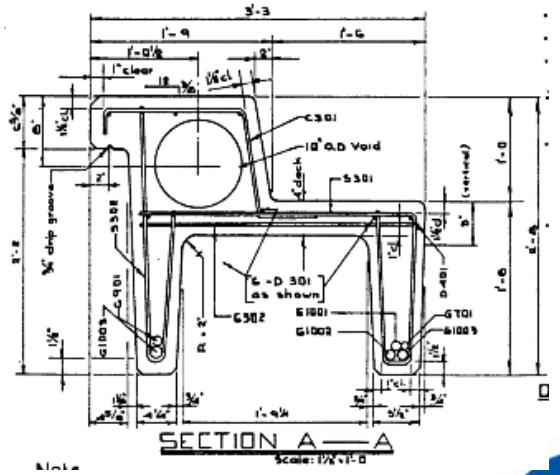
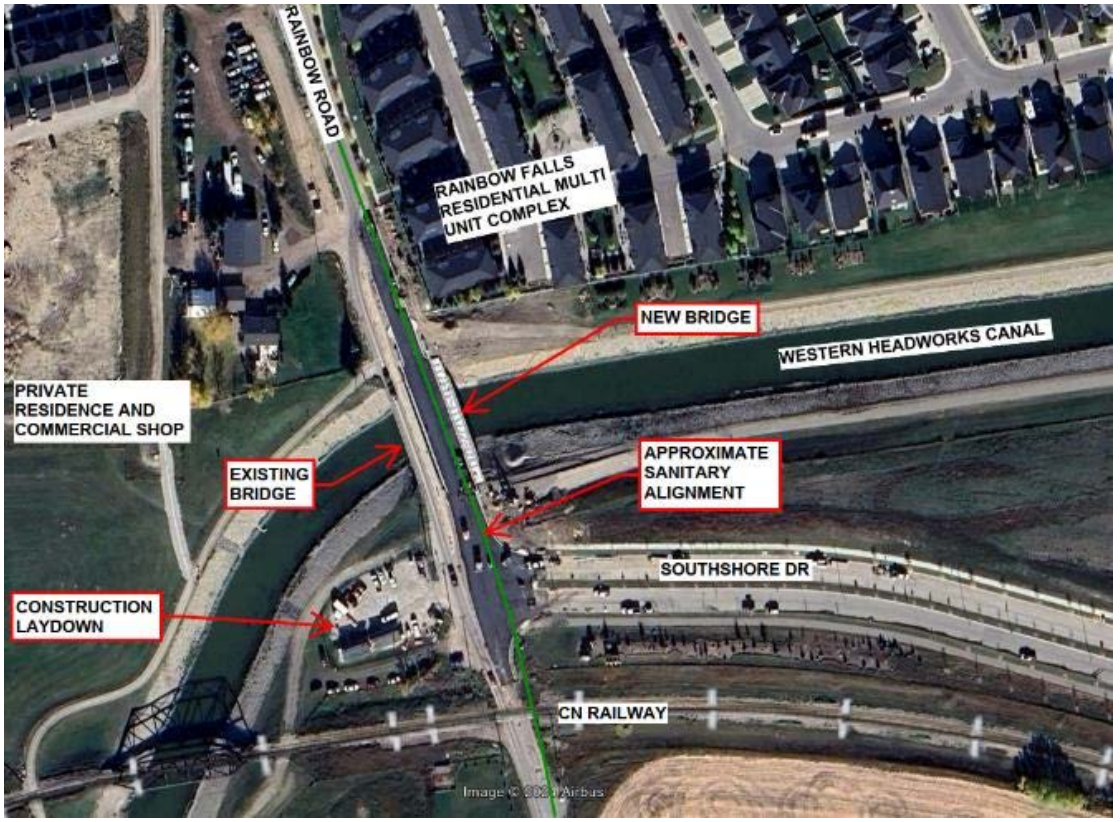


# Introduction – New Structure



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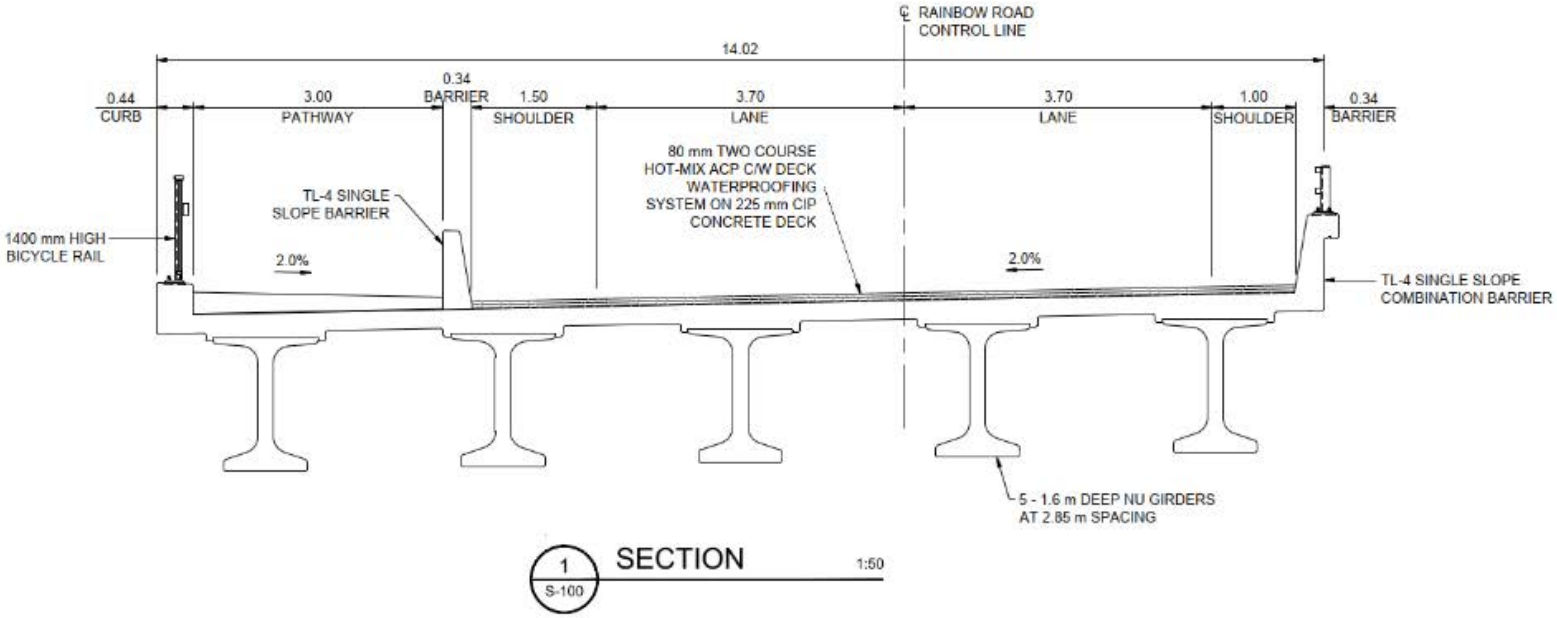
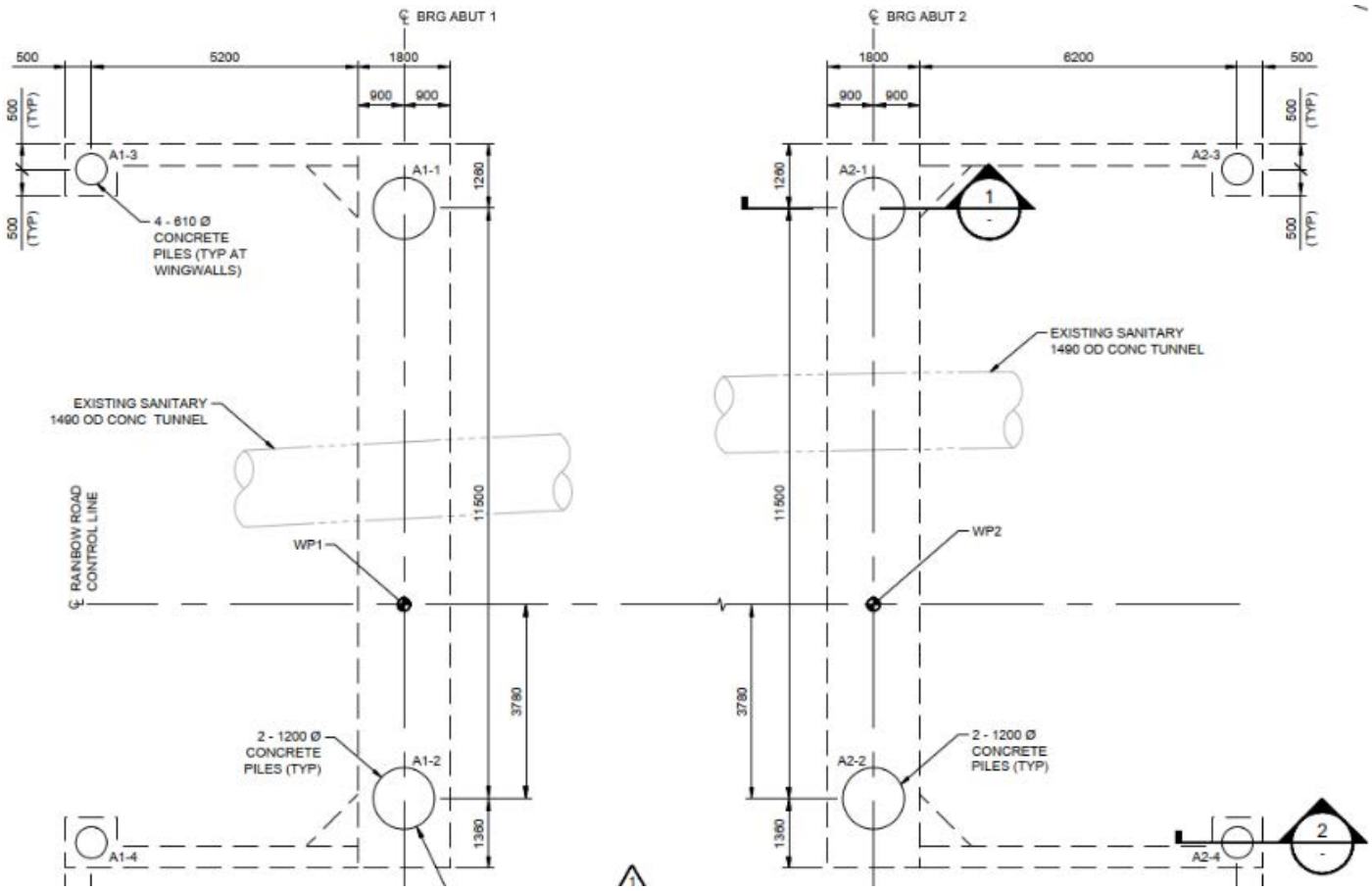
- 31.5 m single span 1600 NU girders, five girder lines
- Semi-integral abutment, cast-in-place concrete pile foundation



# Introduction – New Structure Plan



# Introduction – Additional Project Scope

- Roadway re-alignment and pathway tie ins
- Stormwater tie in manholes and catch basin into existing infrastructure. Drain troughs not suitable for Western Headworks Canal (WHC)
- Shallow Utilities Relocation – Fortis Overhead Power
- Alberta Irrigation Land Access to WHC
- Replacement bridge structure – pedestrian connectivity

# Project Objectives and Timelines

- Primary Goal: Timely replacement of the Rainbow Road Bridge (a main thoroughfare in the City) to meet the City's completion deadline
- Tight Schedule: Highlighting the importance of the City's deadline and how it influenced decision making

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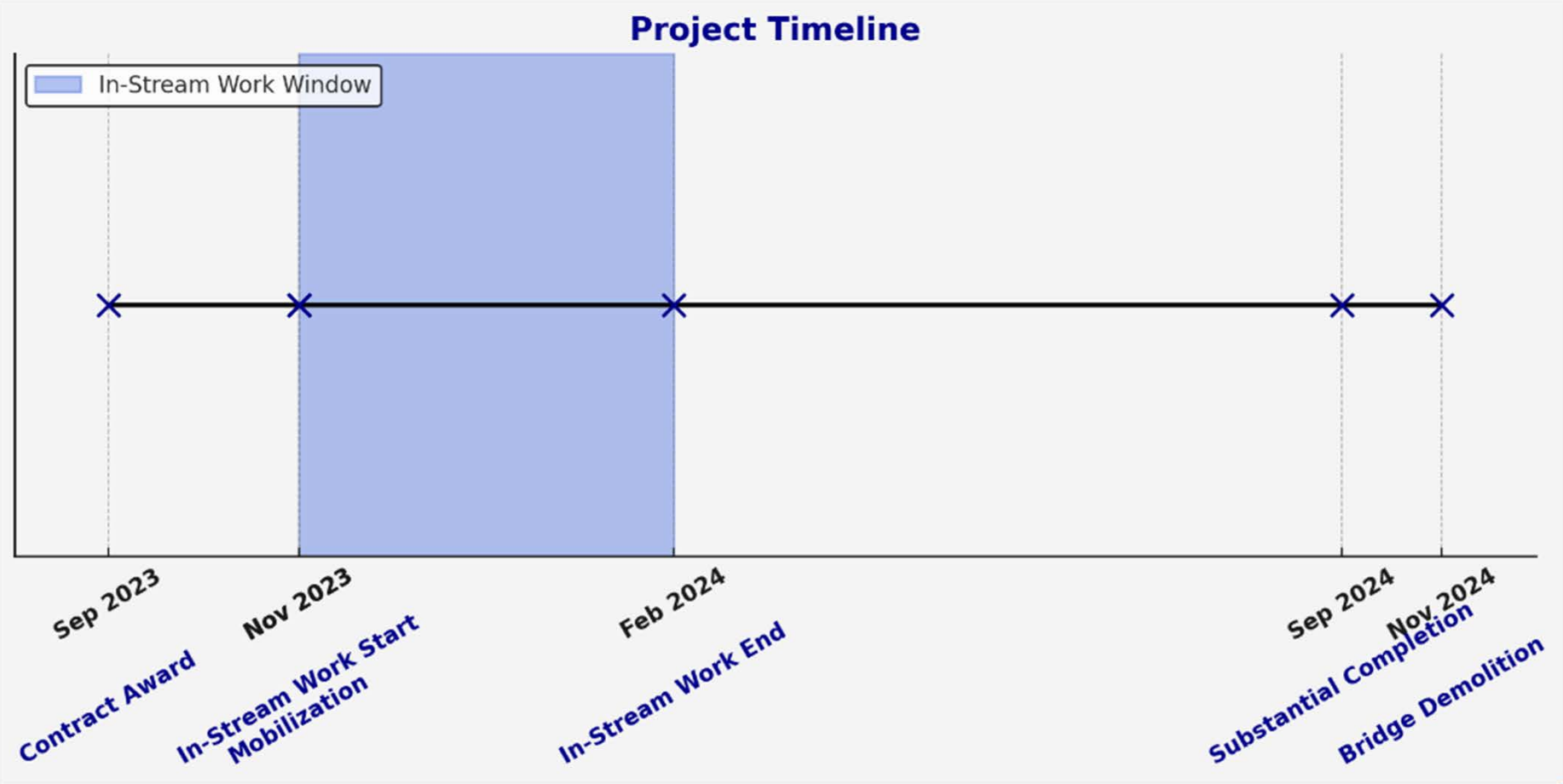

# Design Challenges and Solutions

- Tight Urban Area
- Consultant Design Challenges:
  - Foundation design dictated the abutment type
    - Unreliable as built records
    - Sanitary sewer right through the design alignment for the roadway
    - Pipe alignment on horizontal curve
  - Robotic LiDAR survey required to confirm alignment and offset to bridge foundation piles

# Construction Challenges and Solutions

- Challenge: Deep Sanitary Line Survey
  - Solutions:
    - Conduct thorough site investigation
    - Confined space entry support
    - Survey during low flow conditions
    - Flush line
  - Outcome: Confirmed location of the 1200 mm HDPE-lined sanitary trunk

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- Challenge: Geometric Constraints for Girder Installation
  - Issue: Limited space for equipment in urban area, load restricted bridge, and limited road closures allowed
  - Solution:
    - Tandem lift
    - Pre-erection activities at EPCOR facility
  - Outcome: Installed NU girders safety and efficiently, minimizing public disruption

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- Challenge: Fall Protection
  - Issue: Varied fall heights (3 m - 4 m) required adaptive safety systems
  - Solutions:
    - Man-Lifts with Lanyard: Secured workers during crane hand-off
    - Horizontal Lifeline Systems: Protected workers during deck formwork installation (4 m)
    - Rebar and Self Retracting Lifelines: Anchored workers during diaphragm and bracing installation (<4 m)
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- Challenge: Proximity to Active CN Spur Line
  - Issue: Transporting 100 ft girders over active train tracks required precise coordination.
  - Solution:
    - Early and continuous communication with CN Rail
    - Secured green lights for track crossings, ensuring no train activity during girder delivery

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  - Issue: Traditional finishing machines and standard work bridges cannot maneuver around obstacles like barrier reinforcing steel.
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# Project Impact and Concluding Remarks

# Thank you! Questions?