DESIGN PROJECT BRIEF

PROPOSED TITLE BLOCK

Jean Marie River Bridge Replacement

Highway No.1 (Mackenzie Highway) km 411.2

Design Codes:	CAN/CSA S6:19
Other References:	Bridge Structures Design Criteria (GNWT & AT) Standard Drawings (GNWT & AT) Highway Geometric Design Criteria
Design Selection Report:	March 2023
Latest Construction Cost Estimate:	$16,701,000

Project Scope & Short Description of Structure:

Replacement of the existing bridge on Highway No.1 (Mackenzie Highway) km 411.2 km at Jean Marie River crossing, near the south of the junction to Hwy 7, and is approximately 65 km south of Fort Simpson, Northwest Territories.

	REV	DESCRIPTION	
General		Superstructure type:	Steel plate girders composite with full depth precast concrete deck,
		Span:	1- 39.2 m.
		o/o width:	11.0 m
		AADT/year:	61/2021, Roads designed per the Low Volume Road (LVR, AADT< 200v/day) per the email from GNWT on Dec. 14, 2022; Structural design for fatigue based on AADT = 4000 per GNWT instruction
		Roadway classification:	Rural arterial road undivided (RAU)
		Highway Class:	A
		Approach roadway design speed within Jacobs scope:	90 km/h
		Design speed at structure:	90 km/h
		Clear zone:	N/A (1.3 m wide shoulder and 3:1 sideslope without guardrail)

		Horizontal alignment (curve radius): Bridge located on tangent. Crown or super-elevation: 2% crown on bridge deck. Grade-line: 1.25% (north end up) Skew (LHF/RHF): 0˚ Curb width: 0.5 m each side Lane width: 2 x 3.7 m Shoulder width: 1.3 m Clear roadway width: 10.0 m Future widening requirements: N/A Approach guardrail type: Steel W-beam with buried end treatment per GNWT Standard drawing SD-700-04-05 Bridge-rail type: TL-4 Double Tube (per AT S-1642-20) Identify any obstacles behind bridge-rails: None Set-back requirement for obstacles: N/A Approach guardrail transition type: Thrie-beam transition (per AT Standard Drawing S-1643-20) Approach pavement type: Double asphaltic surface treatment Clearance Box under Structure: 1.2 m min. free board between bottom flange of girders and Design High Water Level (HWL) Elevation 205.10 m Additional Comments: N/A
Design Parameters		Live Load: CL-800 (plus DLA and lane load) Fatigue Stress Cycles: Highway Class A Pier Collision Load: N/A Wind Load: Q_{50} = 0.41 kPa (hourly mean wind pressure) Design horizontal wind pressure = 1.64 kPa Design vertical wind pressure = 0.82 kPa Temperature Range: Minimum effective temperature = -46 ºC Maximum effective temperature = 43 ºC Earth Pressures: At-rest earth pressure

		Ice Loads:	N/A
		Earthquake:	Site Class: C, Lifeline Bridge Seismic performance category: 1 Single span bridge, no seismic analysis required per CSA S6-19. However, the minimum design connection force effect in the restrained directions between the superstructure and the substructure shall be the tributary dead load at the abutment multiplied by the larger of 0.8S(0.2) and 0.05. This force shall be considered to act separately in each horizontally restrained direction. Longitudinal force restrained by backfill soil from the semi-integral abutment system; transverse force is restrained by CIP concrete shear blocks.
		Soil Borehole Data:	Refer to Geotechnical Report (3 boreholes)
		Geotechnical Features:	Refer to Geotechnical Report
		Additional Comments:	N/A
Structural Materials		Concrete:	
		35 MPa Class C:	Abutment seat elements, wingwall elements, approach slab sleeper beam, CIP concrete drain troughs, CIP shear blocks
		45 MPa Class HPC:	Precast deck panels, abutment diaphragms, approach slab panels
		UHPC:	All field placed connections and pockets
		Reinforcing Steel Grade and Type:	
		Stainless Steel:	Approach slab dowels only, Grade 420
		Black Reinforcing Steel:	CSA-G30.18M Grade 400W
		Structural Steel:	Girders: CSA G40.21M Grade 350AT CAT 3 Bracing & intermediate diaphragms: CSA G40.21M Grade 350A Miscellaneous Steel – CSA G40.21M, Grade 300W or 350W Structural Steel Bolts – ASTM A325M
		Other Materials:	H-Piles – CSA G40.21M Grade 350W

Abutments		Abutment Type:	Semi-integral abutment with approach slab
		Piles:	Steel H-piles
		Abutment Base:	Precast concrete seat elements with field connections, 1910 mm thick (at CL) x 1800 mm wide
		Backwall:	N/A (Semi-integral abutment)
		Wingwalls:	Precast concrete wall elements, 400 mm thick, with field connections to abutment diaphragms,
		Curtain Walls:	N/A
		Approach Slab:	Precast concrete panels, 370mm thick x 6 m long
		Roof Slab:	N/A
		Grade beam:	N/A
		Sleeper Slab:	Precast concrete sleeper beam elements, 610 mm high x 900 mm wide, supported by H-piles
		Sidewalk Slab:	N/A
		Median:	N/A
		Finishes and Sealing:	Class 3 finish with Type 3 sealer on exposed surfaces
		Slope Protection:	Class 1 riprap
		Drain Troughs:	CIP reinforced concrete / riprap
		Additional Comments:	none
Piers		Pier Type:	N/A
Bearings		Type:	Reinforced elastomeric bearings at abutments.
		Expansion Bearings:	At Abutment
		Fixed Bearings:	N/A
		Orientation w.r.t. Skew:	On square
		Additional Comments:	Bearings include longitudinal directional and multi-directional. Shear blocks provided at

			abutments to carry lateral bridge loads.
Girders		Method of Analysis:	Simplified Method as per CAN/CSA S6:19 Section 5, check against 3D model
		Girder Type:	Structural steel plate girders composite with deck
		Number and Spacing:	5 Girders @ 2200 mm
		Continuity:	Single span
		Transverse Connectivity:	Concrete deck and intermediate diaphragms and lateral bracing
		Wheel Line Distribution:	As per CAN/CSA-S6:19
		Abutment Diaphragm:	Precast concrete diaphragms, 700 mm thick
		Pier Diaphragms:	N/A
		Intermediate Diaphragms:	Steel K-frame diaphragms at 7.2 m spacing
		Paint Colour:	N/A
		Additional Comments:	Girders will be temporarily supported during construction to prevent sliding.
Deck		Deck Thickness:	250 mm
		Haunch Height:	75 mm nominal
		Waterproofing System:	N/A
		Wearing Surface:	Concrete deck top 20 mm considered as wearing sacrificial thickness
		Curbs Width and Height:	500 mm wide x 200 mm high, per AT Standard Drawing S-1642-20
		Roadway deck drains:	None. (Drain troughs at Abutment 1 end)
		Sidewalks:	N/A
		Median:	N/A
		Utilities:	No attachments to the bridge
		Deck Joints:	N/A (semi-integral abutments)
		Special Features:	Full depth precast concrete deck panels with field UHPC connections.

Construction Features:		River Bridge, precast concrete elements with field UHPC connections. River permits required, detour road with temporary bridge.

Preliminary List of Drawings:

Northwest Territories Transportation Standard Drawings

Drawing No.	Drawing Title
SD-200-02-12	TYPICAL SIGN INSTALLATION HEIGHT AND LATERAL LOCATIONS
SD-200-02-13	BREAKAWAY SIGN POST (TYPICAL) INSTALLATION DETAILS)
SD-300-06-01	BENCHING FOR EMBANKMENT WIDENING
SD-400-01-51	STANDARD SLOPED END SECTIONS (C.S.P. ROUND CULVERTS)
SD-400-01-53	TYPICAL SLOPED END CULVERT MARKER INSTALLATION
SD-700-04-01	STEEL W-BEAM GUARDRAIL RAIL DETAIL
SD-700-04-02	STEEL W-BEAM GUARDRAIL BURIED TERMINALS INSTALLATION DETAIL
SD-700-04-03	STEEL W-BEAM GUARDRAIL POST CAP DETAILS
SD-700-04-04	STEEL W-BEAM GUARDRAIL PLACEMENT AT BRIDGE APPROACHES (TWO-LANE TRAFFIC)

Alberta Transportation and Economic Corridors Standard & Typical Drawings

Drawing No.	Drawing Title
S-1411-87-REV6	STANDARD CONCRETE JOINTS
S-1642-20	TL-4 DOUBLE TUBE TYPE BRIDGERAIL - BRIDGERAIL DETAILS
S-1643-20	TL-4 DOUBLE TUBE TYPE BRIDGERAIL - APPROACH RAIL TRANSITION DETAILS WITH STRONG POST W-BEAM GUARDRAIL
S-1847-20	STANDARD IDENTIFICATION PLAQUES AND BENCHMARK TABLETS
S-1850-20	STANDARD STEEL PILE DETAILS
T-1761-20	STANDARD IDENTIFICATION PLAQUES AND BENCHMARK TABLETS

Contract Drawings

Drawing No.	Drawing Title
COVER	COVER SHEET
G001	DRAWING LIST AND SITE MAP

		C001	GENERAL NOTES AND LEGEND
		C101	L100 PLAN AND PROFILE - SHEET 1
		C102	L100 PLAN AND PROFILE - SHEET 2
		C110	L10 PLAN AND PROFILE
		C111	L20 PLAN AND PROFILE
		C201	LANING AND GEOMETRICS
		C211	SIGNING AND PAVEMENT MARKING
		C301	TYPICAL SECTIONS - SHEET 1
		C302	TYPICAL SECTIONS - SHEET 2
		C310	CULVERT SECTIONS AND DETAILS
		C601	L100 CROSS SECTIONS - SHEET 1
		C602	L100 CROSS SECTIONS - SHEET 2
		C603	L100 CROSS SECTIONS - SHEET 3
		C604	L100 CROSS SECTIONS - SHEET 4
		C605	L100 CROSS SECTIONS - SHEET 5
		C606	L100 CROSS SECTIONS - SHEET 6
		C607	L100 CROSS SECTIONS - SHEET 7
		C610	L10 CROSS SECTIONS
		C620	L20 CROSS SECTIONS - SHEET 1
		C621	L20 CROSS SECTIONS - SHEET 2
		S001	GENERAL LAYOUT
		S002	GENERAL NOTES
		S003	GEOTECHNICAL INFORMATION SHEET
		S004	ABUTMENT LAYOUT
		S005	FOUNDATION LAYOUT - SHEET 1
		S006	FOUNDATION LAYOUT - SHEET 2
		S007	PRECAST ABUTMENT SEAT ELEMENT DETAILS - SHEET 1
		S008	PRECAST ABUTMENT SEAT ELEMENT DETAILS - SHEET 2
		S009	PRECAST ABUTMENT SEAT ELEMENT DETAILS - SHEET 3
		S010	PRECAST ABUTMENT SEAT ELEMENT DETAILS - SHEET 4

		S011	PRECAST ABUTMENT DIAPHRAGM ELEMENT DETAILS
		S012	PRECAST ABUTMENT WINGWALL ELEMENT DETAILS - SHEET 1
		S013	PRECAST ABUTMENT WINGWALL ELEMENT DETAILS - SHEET 2
		S014	PRECAST SLEEPER BEAM ELEMENT DETAILS
		S015	BEARING LAYOUT
		S016	BEARING AND SHEAR BLOCK DETAILS
		S017	GIRDER LAYOUT
		S018	GIRDER DETAILS - SHEET 1
		S019	GIRDER DETAILS - SHEET 2
		S020	GIRDER DETAILS - SHEET 3
		S021	GIRDER CAMBER DIAGRAM
		S022	DECK AND APPROACH SLAB LAYOUT
		S023	PRECAST TYPICAL DECK DETAILS - SHEET 1
		S024	PRECAST TYPICAL DECK DETAILS - SHEET 2
		S025	PRECAST TYPICAL DECK DETAILS - SHEET 3
		S026	PRECAST END DECK DETAILS - SHEET 1
		S027	PRECAST END DECK DETAILS - SHEET 2
		S028	PRECAST APPROACH SLAB - EXTERIOR ELEMENT DETAILS
		S029	PRECAST APPROACH SLAB - INTERIOR ELEMENT DETAILS
		S030	SAFETY RAIL DETAILS
		S031	DRAIN TROUGH & APPROACH RAIL TRANSITION DETAILS
		S032	BAR LIST – SHEET 1
		S033	BAR LIST – SHEET 2
Scheduling:			Submit 100 % Design Package: March 25, 2024 Submit Final Tender Package: May 2024 Construction Completion: Nov 2025
Unresolved Major Items:			1) There are Water Survey of Canada (WSC) monitoring utilities at the bridge site. Underground infrastructure connecting these water monitoring stations to the station building on the west is still unknown.