

1. GENERAL

- 1.1 THESE CONCEPTUAL STANDARD DRAWINGS APPLY TO THE DESIGN OF SIMPLE SPAN SINGLE LANE ALL-STEEL PORTABLE BRIDGES. THEY PROVIDE AND ILLUSTRATE MINIMUM STANDARD DESIGN GUIDELINES AND DETAILS.
- 1.2 VARIATION FROM THESE CONCEPTUAL STANDARD DRAWINGS MAY BE ACCEPTABLE IN CERTAIN SITUATIONS. THE PROFESSIONAL OF RECORD AND / OR COORDINATING REGISTERED PROFESSIONAL SHALL DOCUMENT ALL VARIATIONS FOR APPROVAL BY THE MINISTRY ENGINEER.
- 1.3 WHERE CODES, STANDARDS, GUIDELINES OR OTHER DOCUMENTS ARE REFERENCED, THE MOST RECENT VERSION APPLIES UNLESS SPECIFICALLY STATED OTHERWISE.
- 1.4 DEFINITIONS:
- 1.4.1 MINISTRY REFERS TO BRITISH COLUMBIA MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
- 1.4.2 STRUCTURAL DESIGN ENGINEER REFERS TO A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF BRITISH COLUMBIA, EXPERIENCED IN THE DESIGN OF ALL-STEEL PORTABLE BRIDGES AND IS RESPONSIBLE FOR THE STRUCTURAL DESIGN OF A BRIDGE IN CONFORMANCE WITH THESE DRAWINGS AND THE PROJECT SPECIFICATIONS.
- 1.4.3 MINISTRY ENGINEER REFERS TO A PROFESSIONAL ENGINEER DESIGNATED BY THE MINISTRY.
- 1.4.4 COORDINATING REGISTERED PROFESSIONAL (CRP) REFERS TO THE INDIVIDUAL RESPONSIBLE FOR PLANNING AND COORDINATING ALL PROFESSIONAL SERVICES FOR THE CROSSING PROJECT IN ACCORDANCE WITH THE EGBC AND ABCFP "PROFESSIONAL SERVICES IN THE FOREST SECTOR - CROSSINGS" GUIDELINES.
- 1.4.5 PROFESSIONAL OF RECORD (POR) REFERS TO A PROFESSIONAL ENGINEER OR A FOREST PROFESSIONAL RESPONSIBLE FOR THE DESIGN OF THE CROSSING IN ACCORDANCE WITH THE EGBC AND ABCFP "PROFESSIONAL SERVICES IN THE FOREST SECTOR - CROSSINGS" GUIDELINES.
- 1.5 THE STRUCTURAL DESIGN ENGINEER SHALL CARRY OUT THE STRUCTURAL DESIGN OF ALL BRIDGE COMPONENTS. A DOCUMENTED INDEPENDENT REVIEW OF STRUCTURAL DESIGNS (IF REQUIRED) IN ACCORDANCE WITH THE GUIDELINES PUBLISHED BY ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA (EGBC) CALLED "DOCUMENTED INDEPENDENT REVIEW OF STRUCTURAL DESIGNS" SHALL BE KEPT ON FILE, AND UPON REQUEST BE PROVIDED TO THE MINISTRY.
- 1.6 THE STRUCTURAL DESIGN ENGINEER SHALL INCLUDE NOTES ON THE DESIGN DRAWINGS TO ADDRESS THE FOLLOWING:
- 1.6.1 THE REQUIREMENT FOR FIELD REVIEWS DURING BRIDGE MATERIALS FABRICATION, IN ACCORDANCE WITH THE EGBC AND MINISTRY GUIDELINES.
- 1.6.2 DESIGNED LIFTING CONFIGURATIONS.
- 1.6.3 A COORDINATING REGISTERED PROFESSIONAL MUST OVERSEE THE DEVELOPMENT OF THE GENERAL ARRANGEMENT DESIGN DRAWINGS AND FIELD REVIEWS FOR THE INSTALLATION OF THE ALL-STEEL PORTABLE BRIDGE IN ACCORDANCE WITH EGBC AND ABCFP "PROFESSIONAL SERVICES IN THE FOREST SECTOR - CROSSINGS" GUIDELINES.
- 1.6.4 PRIOR TO INSTALLING AN ALL-STEEL PORTABLE BRIDGE, A QUALIFIED PERSON TAKING OVERALL RESPONSIBILITY FOR THE FIELD INSTALLATION, SHALL INSPECT THE BRIDGE, TO CONFIRM AND DOCUMENT THAT THERE IS NO DAMAGE OR DETERIORATION THAT MAY COMPROMISE THE BRIDGE'S STRUCTURAL INTEGRITY OR INTENDED USE.
- 1.6.5 THE BRIDGE DECK WEARING SURFACE REQUIRES REGULAR REPAIR OR MAINTENANCE TO ENSURE ADEQUATE SKID RESISTANCE. IF THE WEARING SURFACE DOES NOT PROVIDE ADEQUATE SKID RESISTANCE, IT SHOULD BE REPAIRED PRIOR TO USE.
- 1.7 THE FOLLOWING TABLE SPECIFIES STANDARD DECK WIDTHS FOR THE DESIGN TRAFFIC LOAD:

DESIGN TRAFFIC LOAD	STANDARD DECK WIDTH (mm)
BCL-625, L-100	4260
L-150, L-165	4860

- 1.8 SUPPLY BRIDGES WITH PERMANENT LIFTING BRACKETS AND SHACKLES, TO ALLOW FOR LIFTING BY AN EXCAVATOR.
- 1.9 EACH OF THE BRIDGE SUPERSTRUCTURE PRIMARY COMPONENTS (BOXES AND DECK WIDENING PLATES) SHALL HAVE UNIQUE IDENTIFICATION INFORMATION AS PER THE MINISTRY'S "BRIDGE IDENTIFICATION STANDARD". DRAWINGS MUST INCLUDE THE STRUCTURE NUMBER.

2. LIMITATIONS

- 2.1 THE ALL-STEEL PORTABLE BRIDGES SHOWN IN THESE DRAWINGS ARE INTENDED FOR TEMPORARY INSTALLATIONS UNDER THE FOLLOWING CONDITIONS:
- SINGLE LANE BRIDGE CROSSINGS.
 - TANGENT ROAD ALIGNMENTS.
 - MAXIMUM SPEED: 50 KM/HR.
 - MAXIMUM GRADE: 4%.
 - BRAKING AND TURNING VEHICLE ACTIONS ARE NOT ANTICIPATED ON THE BRIDGE.
 - ANTI-SKID DECK COATING MUST BE MAINTAINED.
- THE COORDINATING REGISTERED PROFESSIONAL OR PROFESSIONAL OF RECORD SHALL BE RESPONSIBLE FOR ADDRESSING ANY DESIGN IMPACTS WHERE THE DESIGN DEVIATES FROM THESE REQUIREMENTS.
- 2.2 ALL-STEEL PORTABLE BRIDGES ARE NOT INTENDED FOR USE BY TRACKED EQUIPMENT OR VEHICLES EQUIPPED WITH TIRE CHAINS.
- 2.3 ANTI-SKID DECK COATING HAS LIMITED SERVICE LIFE AND REQUIRES PERIODIC RECOATING TO MAINTAIN ANTI-SKID WEARING SURFACE.
- 2.4 OTHER CONCEPTS ARE SUGGESTED FOR CROSSINGS THAT DO NOT MEET THESE GUIDELINES.

3. DECK WIDENING PLATES

- 3.1 DECK WIDENING PLATES CAN BE USED TO INCREASE THE WIDTH OF ALL-STEEL PORTABLE BRIDGES TO ACCOMMODATE EXTRA WIDE LOADS. DECK WIDENING PLATES SHALL NOT BE USED TO INCREASE THE BRIDGE WIDTH TO ACCOMMODATE VEHICLE TRACKING (SEE NOTE 3.5).
- 3.2 THE MAXIMUM INCREASE IN BRIDGE WIDTH USING A DECK WIDENING PLATE IS 610 mm. DECK WIDENING PLATES SHALL NOT BE USED TO INCREASE THE BRIDGE WIDTH FROM 4.286 M TO 4.876 M.
- 3.3 DECK WIDENING PLATES SHALL BE SECURED TO THE INDIVIDUAL BRIDGE SECTIONS. WHERE THE DECK WIDENING PLATE COMPRISES INDIVIDUAL SEGMENTS, THE TWO END SEGMENTS MUST BE SECURED TO THE BRIDGE SECTIONS.
- 3.4 DECK WIDENING PLATES SHALL NOT BE USED IN TRAFFICKED AREAS, I.E. WHEELS SHOULD NOT TRACK OVER DECK WIDENING PLATES. WHERE ADDITIONAL BRIDGE WIDTH IS REQUIRED FOR VEHICLE TRACKING, ALL COMPONENTS SHALL BE DESIGNED TO ACCOMMODATE THE ASSOCIATED LIVE LOADS.
- 3.5 DESIGN DECK WIDENING PLATES IN NON-TRAFFICKED AREAS USING A MINIMUM LIVE LOAD FACTOR OF 1.3 AND THE APPLICABLE DYNAMIC LOAD ALLOWANCE. DECK WIDENING PLATES WITHIN TRAFFICKED AREAS SHALL BE DESIGNED FOR FULL LIVE LOAD FACTORS AND THE APPLICABLE DYNAMIC LOAD ALLOWANCE IN ACCORDANCE THE CSA S6. DESIGN DRAWINGS SHALL CLEARLY STATE THE DECK WIDENING PLATE DESIGN CRITERIA.
- 3.6 DECK WIDENING PLATES SHALL BE CLEARLY MARKED WITH WHETHER THEY HAVE BEEN DESIGNED FOR NON-TRAFFICKED AREAS "NO VEHICLE LOADING" OR MARKED WITH THE SPECIFIED DESIGN TRAFFIC LOAD "BCL-625 / L100 / L150 / L165".

4. DESIGN

- 4.1 DESIGN LIFE: 45 YEARS.
- 4.2 DESIGN CODE: CSA S6 CANADIAN HIGHWAY BRIDGE DESIGN CODE AS MODIFIED IN THIS STANDARD DRAWING PACKAGE.
- 4.3 MINISTRY STANDARDS:
- 4.3.1 MINISTRY STANDARD BRIDGE DRAWINGS.
- 4.3.2 MINISTRY BRIDGE GUIDELINES, STANDARDS AND SPECIFICATIONS (BGSS).
- 4.3.3 MINISTRY ENGINEERING MANUAL.
- 4.4 DESIGN TRAFFIC LOAD:

- 4.4.1 REFER TO MINISTRY SUPPLEMENT TO CHBDC (CSA S6).
- 4.4.2 CLEARLY SPECIFY AND ILLUSTRATE DESIGN TRAFFIC LOAD ON THE DESIGN DRAWINGS.
- 4.5 DYNAMIC LOAD ALLOWANCE:
- 4.5.1 DYNAMIC LOAD ALLOWANCE SHALL BE APPLIED IN ACCORDANCE WITH THE SUPPLEMENT TO CHBDC (CSA S6).
- 4.6 FATIGUE DESIGN OF STEEL GIRDERS:
- 4.6.1 COMPLETE FATIGUE DESIGN IN ACCORDANCE WITH THE SUPPLEMENT TO CHBDC (CSA S6) AND THE FOLLOWING MODIFICATIONS:
- 4.6.1.1 DESIGN TRAFFIC LOAD:
- AS PER PROJECT SPECIFICATIONS.
 - FOR L-165 USE L-150 FOR FATIGUE DESIGN LOAD.
- 4.6.1.2 FATIGUE DESIGN TRAFFIC LOAD SHALL BE ONE TRUCK ONLY CENTERED ON BRIDGE.
- 4.6.1.3 LATERAL WHEEL DISTRIBUTION: 50% - 50%.
- 4.6.1.4 FATIGUE DESIGN CRITERION:
- $f_{sr} < F_{sr}$
- f_{sr} = THE CALCULATED FATIGUE STRESS RANGE AT THE DETAIL DUE TO THE DESIGN TRAFFIC LOAD. (NOTE: THE STRESS RANGE IS NOT REDUCED BY THE 0.52xCL AS DESCRIBED IN CAN/CSA S6 CL. 10.17).
- F_{sr} = FATIGUE RESISTANCE.
- 4.6.2 NUMBER OF CYCLES:
- 500 000 FOR SPANS > 12 m.
- 1 000 000 FOR SPANS ≤ 12 m.
- 4.6.3 LIMIT THE CALCULATED FLS STRESS RANGE (f_{sr}) IN THE WEB/ BOTTOM FLANGE TO THAT SPECIFIED FOR A DETAIL CATEGORY C. (TO ACCOUNT FOR USE OF TABS (AS SHOWN ON THE STANDARD DRAWINGS) THAT SUPPORT THE BOTTOM FLANGE DURING FABRICATION BUT REMAIN A PART OF THE PERMANENT STRUCTURE).
- 4.7 LIVE LOAD DEFLECTION:
- 4.7.1 MAXIMUM LIVE LOAD DEFLECTION = SPAN/350.
- 4.7.2 WHERE USING THE L-165 DESIGN TRAFFIC LOAD, CALCULATE THE DEFLECTION USING THE L-150 DESIGN TRAFFIC LOAD.
- 4.7.3 THE DESIGN TRAFFIC LOAD SHALL BE ONE TRUCK ONLY CENTERED ON THE BRIDGE. THE LANE LOAD SHALL NOT BE CONSIDERED.
- 4.7.4 LATERAL WHEEL DISTRIBUTION: 50% - 50%.
- 4.8 BEARING PLATE:
- 4.8.1 DESIGN BEARING PLATE TO ALLOW BRIDGE TO BE SUPPORTED ON FULL LENGTH DOUGLAS FIR TIMBER SILL, GRADE NO.2 OR BETTER.
- 4.8.2 MIN. SILL WIDTH = 400 mm
- 4.9 WEB INCLINATION:
- 4.9.1 MAXIMUM WEB INCLINATION 1H:2.5V UNLESS APPROVED BY MINISTRY ENGINEER.
- 4.10 GUARDRAILS:
- 4.10.1 GUARDRAILS HAVE BEEN DESIGNED TO MEET THE CRITERIA FOR CONTAINMENT LEVEL CL-1 OR CL-3 AS DEFINED BY THE MINISTRY. GUARDRAILS HAVE NOT BEEN DESIGNED TO CONTAIN ERRANT VEHICLES.
- 4.11 WELDING:
- 4.11.1 WELD SYMBOLS SHOWN INDICATE APPROVED WELD TYPES. WELD SIZE TO BE DETERMINED BY STRUCTURAL DESIGN ENGINEER

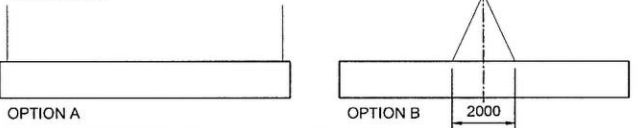
5. MATERIALS AND FABRICATION

- 5.1 STRUCTURAL STEEL PLATE:
- CAN/ CSA-G40.21M.
 - DECK, FLANGES AND WEB PLATES: GRADE 350AT CATEGORY 3.

- OTHER STEEL PLATE: GRADE 350A.
- 5.2 RAILS AND POSTS:
- CAN/ CSA-G40.21M GRADE 350W OR 350A.
 - ASTM A500 GRADE C OR A847.
- 5.3 BOLTS: ASTM F3125 GRADE A325 TYPE 3, U.N.O.
- 5.4 STEEL FABRICATION:
- 5.4.1 FABRICATOR TO BE CERTIFIED TO DIVISION 1 OR 2 IN ACCORDANCE WITH CSA W47.1.
- 5.4.2 FABRICATE ALL-STEEL PORTABLE BRIDGES AS PRIMARY TENSION MEMBERS IN ACCORDANCE WITH CSA S6. STEEL PLATES FOR BOTTOM FLANGES AND WEBS SHALL CONFORM TO THE REQUIREMENTS FOR PRIMARY TENSION MEMBERS IN ACCORDANCE WITH CSA S6 EXCEPT THAT CHARPY V-NOTCH TESTING RESULTS ARE ONLY REQUIRED ON A PER HEAT FREQUENCY.
- 5.4.3 COMPLETE ALL WELDS IN ACCORDANCE WITH CSA W59. WELD METAL SHALL MEET THE CVN TOUGHNESS REQUIREMENTS OF CSA S6 FOR PRIMARY TENSION MEMBERS FOR A MINIMUM SERVICE TEMPERATURE OF < -40°C.
- 5.4.4 COMPLETE WELD INSPECTION IN ACCORDANCE WITH CSA W59.
- 5.4.5 ALL BUTT WELDS ON THE FLANGE, WEB AND DECK SHALL BE RADIOGRAPHIC OR ULTRASONIC TESTED IN ACCORDANCE WITH CSA W59.
- 5.4.6 THE WELDING PROCEDURE DATA SHEETS, AS PER CSA W47.1, SHALL BE AVAILABLE FOR REVIEW PRIOR TO FABRICATION.
- 5.4.7 WEB TO FLANGE WELDS SHALL BE MADE BY MACHINE OR AUTOMATIC WELDING USING SUBMERGED ARC WELDING, FLUX-CORED ARC WELDING OR METAL-CORE ARC WELDING. WEB TO FLANGE WEB WELDS SHALL GENERALLY BE MADE AS CONTINUOUS, UNINTERRUPTED AND UNIFORM WELDS WITHOUT ABNORMALITIES.
- 5.4.8 WHERE WELDS REQUIRE REPAIR, THEY MAY BE REPAIRED USING A SEMI-AUTOMATIC OR MANUAL PROCESS IN ACCORDANCE WITH CSA W59. THE REPAIRED WELD SHALL BLEND SMOOTHLY WITH THE ADJACENT WELDS.
- 5.4.9 FIELD WELDING OF PRIMARY BRIDGE COMPONENTS IS NOT PERMITTED.
- 5.5 DECK COATING:
- 5.5.1 TOP OF BRIDGE DECK SHALL BE SANDBLASTED TO SSCP-SP6 AND COATED WITH AMERLOCK 400 (OR EQUIVALENT AS APPROVED BY THE MINISTRY ENGINEER) WITH 16 GRIT SAND TO PROVIDE ANTI-SKID WEARING SURFACE.
- 5.5.2 THE MINISTRY MAY APPROVE ALTERNATE FRICTION RESISTANT COATINGS.
- 5.6 GUARDRAIL POST AND RAIL COATING:
- 5.6.1 PAINT GUARDRAIL POST AND RAILS IN ACCORDANCE WITH MINISTRY STEEL GUARDRAIL COMPONENT PAINT STANDARD.
- 5.6.2 COLOUR: SAFETY YELLOW.
- 5.7 DECK WIDENING PLATE :
- 5.7.1 DECK WIDENING PLATES SHALL BE PAINTED SAFETY YELLOW.
- 5.7.2 DECK WIDENING PLATES DESIGNED FOR A NON-TRAFFICKED AREA SHALL BE CLEARLY MARKED AS "NO VEHICLE LOADING".
- 5.7.3 DECK WIDENING PLATES DESIGN TO ACCOMMODATE TRAFFIC LOADS SHALL BE CLEARLY MARKED WITH THE DESIGN LOAD E.G. BCL-625, L100, L150 OR L165.

6. INSTALLATION

- 6.1 CONTRACTOR TO TAKE SUITABLE PRECAUTIONS TO PREVENT DAMAGE TO THE ALL-STEEL PORTABLE BRIDGE DURING INSTALLATION.
- 6.2 ONLY LOW-IMPACT LIFTS ARE PERMITTED. ANGLE OF LIFT MUST NOT EXCEED 30 DEGREES FROM VERTICAL.
- 6.3 THE FOLLOWING FIGURES ILLUSTRATE ANTICIPATED VERTICAL LIFTING SCENARIOS:



PROFESSIONAL ENGINEER

2022-02-01

SEAL - ENGINEER OF RECORD

J. Henley

FEB 7 2022

CHIEF ENGINEER (SIGNATURE)

REV #	DATE	REVISION DESCRIPTION	DRAFTING	DESIGN	DESIGN CHECK / REVIEW	PROF. OF RECORD
0	JAN. 26, 2022	ISSUED FOR PUBLICATION	W. RILEY (ASSOC. ENG.)	J. RUPAR GILLIATT (MINISTRY)	D. HARVEY (ASSOC. ENG.)	J. HENLEY (ASSOC. ENG.)

PERMIT TO PRACTICE ASSOCIATED ENGINEERING (B.C.) LTD. PERMIT NUMBER: 1000163 Engineers & Geoscientists BC

STANDARD BRIDGE DRAWING

ALL-STEEL PORTABLE BRIDGE

SHEET 01 OF 05

GENERAL NOTES

DWG #: STD-EC-091-01