

1 GENERAL

- 1.1 THESE STANDARD DRAWINGS APPLY TO THE DESIGN AND SUPPLY OF SIMPLE SPAN SINGLE LANE STEEL GIRDER BRIDGES WITH COMPOSITE PRECAST CONCRETE DECK PANELS. THE STANDARD DRAWINGS PROVIDE DESIGN GUIDELINES AND STANDARD DETAILS.
- 1.2 VARIATIONS FROM THE STANDARD DESIGN REQUIREMENTS MAY BE ACCEPTABLE IN CERTAIN SPECIAL SITUATIONS. ALL SUCH VARIATIONS SHALL BE DOCUMENTED AND REQUIRE APPROVAL FROM MFR PRIOR TO USE.
- 1.3 A PROFESSIONAL ENGINEER REGISTERED TO PRACTICE IN THE PROVINCE OF BRITISH COLUMBIA SHALL DESIGN ALL BRIDGE COMPONENTS.
- 1.4 DEFINITIONS
 - ENGINEER:
 - A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF BRITISH COLUMBIA EXPERIENCED IN THE DESIGN OF STEEL GIRDER AND COMPOSITE PANELIZED PRECAST CONCRETE DECK BRIDGES, WHO IS RESPONSIBLE FOR THE DETAILED STRUCTURAL DESIGN OF A BRIDGE IN CONFORMANCE WITH THESE DRAWINGS
 - MFR:
 - PROFESSIONAL ENGINEER DESIGNATED BY THE MINISTRY OF FORESTS AND RANGE.
- 1.5 APPLICABLE OVERALL BRIDGE GIRDER LENGTH (OUT-TO-OUT):
 - TYPICAL APPLICABLE OVERALL COMPOSITE BRIDGE GIRDER LENGTH IS 15.240 m (50') TO 48.632 m (160').
 - FOR GIRDER LENGTHS UP TO 18.288 m (60') IT MAY BE MORE ECONOMICAL TO DESIGN A NON-COMPOSITE SYSTEM.
 - OVERALL BRIDGE GIRDER LENGTHS GREATER THAN 48.623 m (160') OR CONTINUOUS MULTI-SPAN BRIDGES WILL REQUIRE SPECIAL INVESTIGATION. DETAILS TO BE APPROVED BY MFR PRIOR TO USE.

- 1.6 STANDARD DECK WIDTHS
 - THE FOLLOWING TABLE SPECIFIES STANDARD DECK WIDTHS FOR THE DESIGNATED DESIGN VEHICLES.

DESIGN VEHICLE	STANDARD DECK WIDTH (mm)
BCL625, L100	4268
L150, L165	4876

- 1.7 STANDARD GIRDER SPACINGS
 - THE FOLLOWING TABLE SPECIFIES STANDARD GIRDER SPACINGS FOR SEVERAL DECK WIDTHS.

DECK WIDTH	mm (ft)	STANDARD GIRDER SPACING	mm
4268	(14')	3000	
4876	(16')	3600	
5486	(18')	4200	

- 1.8 STANDARD DECK PANEL EDGE THICKNESS AND DECK PANEL CROSSFALL
 - PRECAST CONCRETE DECK PANELS SHALL INCORPORATE A MINIMUM 2% CROSSFALL.
 - THE FOLLOWING TABLE SPECIFIES STANDARD DECK EDGE THICKNESS FOR SQUARE PRECAST CONCRETE DECK PANELS. VARIATIONS MAY BE REQUIRED FOR SKEWED OR FLARED DECK PANELS.

DESIGN VEHICLE	DECK PANEL WIDTH mm (ft)	STANDARD DECK EDGE THICKNESS mm
BCL625	4268 (14')	175
	4876 (16')	175
	5486 (18')	200
L100	4268 (14')	200
	4876 (16')	200
	5486 (18')	225
L150 & L165	4876 (16')	225
	5486 (18')	250

- 1.9 DECK PANEL LENGTH
 - THE PREFERRED DECK PANEL LENGTH IS 3048 (10').
 - NOTWITHSTANDING, DECK PANEL LENGTHS SHOULD CONFORM TO THE FOLLOWING:
 - MINIMUM DECK PANEL LENGTH: 1524 mm
 - MAXIMUM INTERNAL DECK PANEL LENGTH: 3048 mm
 - MAXIMUM END DECK PANEL LENGTH
 - (DECK BESIDE BALLAST WALL): 3048 mm
 - MAXIMUM END PANEL LENGTH
 - (DECK OVER BALLAST WALL): 3300 mm
- 1.10 SUPERSTRUCTURE IDENTIFICATION MARKING:
 - EACH BRIDGE SUPERSTRUCTURE SHALL HAVE CLEARLY STAMPED OR PERMANENTLY MARKED ON AT LEAST ONE SIDE OF THE SUPERSTRUCTURE:
 - STRUCTURE NUMBER
 - LOAD RATING
 - DATE OF MANUFACTURE
 - MANUFACTURER'S NAME, AND
 - "MINISTRY OF FORESTS & RANGE"
 - THE HEIGHT OF LETTERING MUST BE 50 mm MINIMUM.
 - ALTERNATIVE IDENTIFICATION MARKING SHALL REQUIRE PRIOR APPROVAL FROM MFR.
- 1.11 BOLTED GIRDER FIELD SPLICES:
 - PROVIDE BOLTED FIELD SPLICES ON ALL BRIDGE SPANS PROCURED THROUGH A DESIGN/SUPPLY CONTRACT FOR GIRDERS WITH AN OVERALL LENGTH (OUT-TO-OUT) LENGTH > 24.384 m (80') UNLESS APPROVED BY MFR.
 - WHERE THE CONTRACT IS DESIGN/SUPPLY AND INSTALL, BOLTED FIELD SPLICES SHALL BE PROVIDED AT THE DISCRETION OF THE ENGINEER.
- 1.12 DIAPHRAGMS:
 - PROVIDE DIAPHRAGMS AT BEARING LOCATIONS.
 - PROVIDE INTERNAL DIAPHRAGMS AS REQUIRED. MAXIMUM SPACING OF INTERNAL DIAPHRAGMS NOT TO EXCEED 8.0 m
- 1.13 PLAN BRACING:
 - PROVIDE CONTINUOUS PLAN BRACING ON ALL BRIDGES PROCURED THROUGH A DESIGN/SUPPLY CONTRACT WHERE THE OVERALL BRIDGE LENGTH (OUT-TO-OUT) EXCEEDS 24.384 m (80').
 - WHERE THE CONTRACT IS DESIGN/SUPPLY AND INSTALL, PLAN BRACING SHALL BE PROVIDED AT THE DISCRETION OF THE ENGINEER WHO SHALL CONSIDER THE METHOD OF ERECTION
- 1.14 ERECTION BRACE:
 - PROVIDE ERECTION BRACING ON ALL BRIDGES PROCURED THROUGH A DESIGN/SUPPLY CONTRACT. WHERE THERE IS NO BOLTED FIELD SPLICE, A SINGLE ERECTION BRACE IS REQUIRED. FOR GIRDERS INCLUDING A BOLTED FIELD SPLICE, AN ERECTION BRACE IS REQUIRED AT EACH END.
 - FOR BRIDGES PROCURED THROUGH DESIGN/SUPPLY AND INSTALL, ERECTION BRACING IS AT THE DISCRETION OF THE ENGINEER WHO SHALL CONSIDER THE METHOD OF ERECTION.
- 1.15 SKEW:
 - BRIDGE SKEW IN PLAN IS PERMITTED UP TO AN ANGLE OF 30°, AS SHOWN ON DWG. -05. ADJUST BRIDGE DETAILS ACCORDINGLY.
- 1.16 COMPONENT WEIGHTS
 - THE FOLLOWING COMPONENT WEIGHTS SHALL BE SPECIFIED ON THE DESIGN DRAWINGS:
 - GIRDER WEIGHT - SINGLE GIRDER
 - ASSEMBLED STEEL GIRDERS PLUS BRACING AND DIAPHRAGMS - TOTAL WEIGHT
 - PRECAST CONCRETE COMPONENT WEIGHTS (DECK PANELS, BALLAST WALL, CAPS AND FOOTINGS)


2 DESIGN

- 2.1 DESIGN LIFE:
 - BRIDGE DESIGN LIFE: 45 YEARS
- 2.2 DESIGN CODE AND MFR REFERENCE STANDARDS:
 - CAN/CSA-S6-06
 - MINISTRY OF FORESTS AND RANGE BRIDGE DESIGN AND CONSTRUCTION MANUAL
 - MFR INTERIM BRIDGE DESIGN GUIDELINES
- 2.3 DESIGN VEHICLES
 - REFER TO MFR STANDARD DRAWING STD-EC-000-01 TO STD-EC-000-02
 - THE DESIGN DRAWINGS SHOULD CLEARLY SPECIFY THE DESIGN VEHICLE THAT WAS USED FOR THE BRIDGE DESIGN

- 2.4 MULTI-LANE LOADING
 - WHERE A BRIDGE IS ABLE TO SIMULTANEOUSLY SUPPORT MORE THAN ONE LANE OF TRAFFIC, THE DESIGNER SHOULD SEEK CLARIFICATION FROM MFR ON HOW TO ACCOUNT FOR MULTI-LANE LOADING.
- 2.5 DYNAMIC LOAD ALLOWANCE:
 - DYNAMIC LOAD ALLOWANCE SHALL BE APPLIED IN ACCORDANCE WITH CAN/CSA-S6-06
- 2.6 FATIGUE DESIGN FOR STEEL GIRDERS
 - FATIGUE DESIGN TO BE COMPLETED IN ACCORDANCE WITH CAN/CSA-S6-06 WITH THE FOLLOWING MODIFICATIONS:
 - DESIGN VEHICLE:
 - AS PER PROJECT SPECIFICATIONS
 - FOR L165 USE L150 FOR FATIGUE DESIGN LOAD
 - FATIGUE DESIGN VEHICLE TO BE CENTRED ON BRIDGE
 - LATERAL WHEEL DISTRIBUTION: 50% - 50%
 - FATIGUE STRESS RANGE
 - $f_{sr} < F_{sr}$
 - WHERE:
 - f_{sr} = THE CALCULATED STRESS RANGE AT THE DETAIL DUE TO THE PASSAGE OF THE DESIGN VEHICLE
 - F_{sr} = FATIGUE STRESS RANGE RESISTANCE
 - NUMBER OF DESIGN CYCLES:
 - 500 000 FOR SPANS >12 m
 - 1 000 000 FOR SPANS ≤ 12 m
- 2.7 FRACTURE CRITICAL AND PRIMARY TENSION COMPONENTS
 - ENGINEER TO SPECIFY FRACTURE CRITICAL AND PRIMARY TENSION COMPONENTS ON THE DESIGN DRAWINGS.
- 2.8 MAXIMUM LIVE LOAD DEFLECTION OF STEEL GIRDERS:
 - BRIDGES MUST BE DESIGNED SO THAT LIVE LOAD DEFLECTION (CALCULATED AS THAT CAUSED BY ONE TRUCK ONLY, PLACED AT THE CENTRE LINE OF THE TRAVELLED ROADWAY, DYNAMIC LOAD ALLOWANCE INCLUDED) DOES NOT EXCEED L/450. WHERE USING THE L165 DESIGN VEHICLE, THE DEFLECTION SHALL BE CALCULATED USING THE L150 DESIGN VEHICLE.
- 2.9 SEISMIC DESIGN:
 - SEISMIC DESIGN NOT REQUIRED UNLESS OTHERWISE SPECIFIED.
- 2.10 WEARING SURFACE:
 - AS A MINIMUM, ALL DESIGNS SHALL INCORPORATE AN ALLOWANCE FOR A FUTURE 50 mm CONCRETE OVERLAY.
- 2.11 CONSTRUCTION LOAD:
 - ENGINEER MUST CONSIDER THE WEIGHT OF MATERIALS, WORK CREWS AND EQUIPMENT SUPPORTED DURING CONSTRUCTION WHEN DESIGNING THE BRIDGE.
 - ENGINEER MUST SPECIFY MAXIMUM PERMISSIBLE CONSTRUCTION EQUIPMENT LOADS ON THE DRAWINGS.
 - WHERE A BRIDGE WILL BE INSTALLED UNDER A SEPARATE CONTRACT FROM THE DESIGN/SUPPLY CONTRACT FOR THE MAIN BRIDGE COMPONENTS, AS A MINIMUM, UNLESS OTHERWISE SPECIFIED BY THE MINISTRY, THE DESIGNER SHALL CONSIDER THE FOLLOWING MINIMUM CONSTRUCTION LOADS:
 - SELF WEIGHT OF THE STRUCTURE, SUPPORTED AT THE BEARINGS, INCLUDING ALL DECK PANELS IN POSITION BUT UN-GROUTED.
 - A VERTICAL LIVE LOAD OF 445 kN (40 TON EQUIPMENT + 10 TON PANEL) DISTRIBUTED OVER A LENGTH OF 4m, POSITIONED ON THE BRIDGE TO PRODUCE THE MAXIMUM EFFECT; ECCENTRICITY = 100 mm
 - LOAD FACTORS IN ACCORDANCE WITH CAN/CSA-S6-06
 - MIN DLA = 10% (ASSUMED DESIGN SPEED = 10 km/hr)
- 2.12 STUD GROUPS:
 - MAXIMUM SPACING BETWEEN STUD GROUPS = 1200 mm C/C.
 - DESIGN OF STUD GROUPS PLACED IN POCKETS SHALL TAKE ACCOUNT OF REDUCED EFFECTIVE STRENGTH FOR STUD SPACINGS LESS THAN 4 DIAMETERS.
 - THE ENGINEER SHALL DETERMINE THE NUMBER AND LOCATION OF STUD GROUPS BASED ON THE DETAILED MINIMUM AND MAXIMUM SPACING REQUIREMENTS.

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

SCALE AS SHOWN		Designed <u>J.H.</u>	Date <u>MAR 2010</u>
		Checked <u>D.J.H.</u>	Date <u>MAR 2010</u>
		Drawn <u>W.R.</u>	Date <u>MAR 2010</u>
Rev	Date	DESCRIPTION	Init
REVISIONS			

 <p>MINISTRY OF FORESTS & RANGE ENGINEERING BRANCH, FIELD OPERATIONS DIVISION</p>	
STANDARD BRIDGE DRAWING	
STANDARD STEEL GIRDER BRIDGE WITH COMPOSITE DECK GENERAL NOTES – SHEET 1	
ORIGINAL SIGNED and SEALED BY: JULIEN HENLEY	APPROVED BY:
DESIGN ENGINEER DATE JULIEN HENLEY	MOF ENGINEER DATE
FILE No.	DRAWING No.
	STD-EC-030-01