

1.0 DESIGN USAGE

- 1.1 THESE STANDARD DRAWINGS APPLY TO THE DESIGN AND SUPPLY OF SIMPLE SPAN, SINGLE LANE, SOLID, SHEAR-CONNECTED AND NON-SHEAR-CONNECTED PRECAST CONCRETE SLAB BRIDGES. SHEAR-CONNECTION CAN BE PROVIDED USING WELDED OR GROUTED SHEAR CONNECTORS. THE 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:
 - PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF BRITISH COLUMBIA EXPERIENCED IN THE DESIGN OF CONCRETE SLAB BRIDGES, WHO IS RESPONSIBLE FOR THE DETAILED STRUCTURAL DESIGN OF A BRIDGE IN CONFORMANCE WITH THESE DRAWINGS
 - MFR:
 - A PROFESSIONAL ENGINEER DESIGNATED BY THE MINISTRY OF FORESTS AND RANGE.
- 1.5 APPLICABLE OVERALL BRIDGE LENGTH (OUT-TO-OUT):
 - TYPICAL APPLICABLE SPAN RANGE IS 4 m TO 15 m.
- 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 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 AND RANGE
 - THE HEIGHT OF THE LETTERING SHALL BE 50 mm MINIMUM.
 - ALTERNATIVE IDENTIFICATION MARKINGS SHALL REQUIRE PRIOR APPROVAL FROM MFR.
- 1.8 SKEW:
 - BRIDGE SKEW IN PLAN IS PERMITTED UP TO AN ANGLE OF 30°, AS SHOWN ON DWG. -03. ADJUST BRIDGE DETAILS ACCORDINGLY.
- 1.9 MAXIMUM SLAB WEIGHT:
 - SLAB BRIDGES PROCURED THROUGH A DESIGN/SUPPLY CONTRACT SHALL HAVE A MAXIMUM COMPONENT WEIGHT OF 9100 kg (20 000 lb) UNLESS SPECIFIED. WHERE THE CONTRACT IS DESIGN/SUPPLY AND INSTALL, COMPONENT WEIGHT SHALL BE AT THE DISCRETION OF THE ENGINEER.
- 1.10 COMPONENT WEIGHTS
 - PRECAST CONCRETE COMPONENT WEIGHTS (SLABS, CAPS AND FOOTINGS) SHALL BE INCLUDED ON THE DRAWINGS.

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
 - SINGLE LANE SHEAR-CONNECTED SLAB BRIDGES THAT CONFORM TO THE REQUIREMENTS OF CAN/CSA-S6-06 CLAUSES 5.6.1 AND 5.6.2 SHALL BE DESIGNED BASED ON THE METHODOLOGY DESCRIBED IN THE ASSOCIATED ENGINEERING REPORT- DESIGN OF SINGLE-LANE SHEAR-CONNECTED SLAB BRIDGES REV. 1, AVAILABLE ON THE MFR WEBSITE (http://www.for.gov.bc.ca/hth/engineering/Bridges_And_Major_Culverts.htm)
- 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:
 - IN ACCORDANCE WITH CAN/CSA-S6-06
 - WHERE WELDED SHEAR CONNECTORS CONFORM TO THE DETAILS AND SPACING REQUIREMENTS SHOWN ON THE STANDARD DRAWINGS, NO FATIGUE DESIGN OF THE WELDED SHEAR CONNECTOR OR WELD CONNECTION BETWEEN SLABS IS REQUIRED.
 - IF WELDED SHEAR CONNECTORS DO NOT CONFORM TO THE DETAILS AND SPACING REQUIREMENTS SHOWN ON THE STANDARD DRAWINGS, THE ENGINEER SHALL COMPLETE THE FATIGUE DESIGN 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 MAXIMUM LIVE LOAD DEFLECTION:
 - BRIDGES MUST BE DESIGNED SO THAT LIVE LOAD DEFLECTION (CALCULATED AS THAT CAUSED BY ONE TRUCK ONLY, PLACED AT THE CENTRELINE OF THE TRAVELLED ROADWAY, DYNAMIC LOAD ALLOWANCE INCLUDED) DOES NOT EXCEED L/350. WHERE USING THE L165 DESIGN VEHICLE, THE DEFLECTION SHALL BE CALCULATED USING THE L150 DESIGN VEHICLE.
- 2.8 SEISMIC DESIGN:
 - SEISMIC DESIGN NOT REQUIRED UNLESS OTHERWISE SPECIFIED.
- 2.9 WEARING SURFACE:
 - AS A MINIMUM, DESIGN SHALL INCORPORATE AN ALLOWANCE FOR A 50 mm CONCRETE OVERLAY.
- 2.10 CONSTRUCTION LOAD:
 - SLAB GIRDER REINFORCEMENT SHALL BE DESIGNED TO ALLOW INSTALLATION BY CANTILEVERED LAUNCHING, ASSUMING A MAXIMUM CANTILEVER OF 50% OF THE SLAB LENGTH.
- 2.11 CONNECTION TO THE ABUTMENT:
 - INCORPORATE SUFFICIENT CONNECTION OF THE SLAB TO ABUTMENT (DOWELS) TO RESIST ALL APPLIED LOADS INCLUDING BRAKING LOADS AND EARTH PRESSURES.
 - MINIMUM NUMBER OF DOWELS FOR SHEAR CONNECTED SUPERSTRUCTURES: 2 PER ABUTMENT: ONE LOCATED IN EACH EXTERIOR SLAB.
 - MINIMUM NUMBER OF DOWELS FOR NON-SHEAR CONNECTED SUPERSTRUCTURES: ONE DOWEL AT EACH END OF EACH SLAB.
- 2.12 STANDARD CONCRETE COVER:
 - THE FOLLOWING ARE THE STANDARD CONCRETE COVERS:
 - TOP OF SLAB: 50 mm
 - UNDERSIDE OF SLAB 30 mm
 - VERTICAL FACE OF SLAB 50 mm
- 2.13 MINIMUM SLAB DEPTH
 - MINIMUM SLAB DEPTH = 250 mm

3 MATERIALS AND FABRICATION

- 3.1 STRUCTURAL STEEL:
 - TO CAN/CSA-G40.21M STEEL PLATE AND SECTIONS: GRADE 350A
- 3.2 WELDING
 - ALL WELDS TO BE COMPLETED IN ACCORDANCE WITH CSA W59.

- 3.3 STEEL FABRICATION CERTIFICATION
 - FABRICATOR OF SHEAR CONNECTORS TO BE CERTIFIED IN ACCORDANCE WITH CSA W47.1 DIVISION 1,2 OR 3
- 3.4 FIELD WELDING:
 - BY COMPANY CERTIFIED TO CSA W47.1 DIVISION 1,2 OR 3
- 3.5 STUDS:
 - SHEAR STUDS SHALL MEET THE REQUIREMENTS OF CSA W59 APPENDIX H FOR TYPE A AND B STUDS
 - ASTM A108 GRADE 1015, 1018, 1020
- 3.6 GALVANIZING:
 - ALL ITEMS SPECIFIED AS GALVANIZED ARE TO BE GALVANIZED TO CSA G164
- 3.7 REINFORCING:
 - TO CAN/CSA G30.18M GRADE 400R
 - REINFORCING STEEL MUST NOT BE WELDED OR TACK WELDED
- 3.8 PRECAST CONCRETE:
 - CSA A23.1 EXPOSURE CLASS C1, $f_c = 35$ MPA AT 28 DAYS
 - PRECAST CONCRETE TO BE FABRICATED IN ACCORDANCE WITH CSA A23.4 BY A PLANT CERTIFIED IN ACCORDANCE WITH CSA A23.4
 - FABRICATION TOLERANCES TO CAN/CSA-A23.4
 - FINISH: TRANSVERSE BROOM TO TOP OF DECK, OTHERWISE TO CSA-A23.1 AND A23.4.
 - ALL CORNERS C/W 20X20 CHAMFER U.N.O. ON THE APPLICABLE STANDARD DRAWING.
- 3.9 GROUT:
 - GROUT MIN $f_c = 35$ MPa AT 28 DAYS TO BE INSTALLED ACCORDING TO MANUFACTURERS INSTRUCTIONS
 - GROUT FOR SHEAR KEYS SHALL BE TARGET TRAFFIC PATCH WITH COARSE AGGREGATE, OR ALTERNATE EQUIVALENT PRODUCT. EQUIVALENT PRODUCTS MUST BE APPROVED BY MFR PRIOR TO USE.
 - COLD WEATHER GROUTING:
 - WHERE IT IS ANTICIPATED THAT THE TEMPERATURE SHALL DROP BELOW 5°C DURING GROUTING, THE CONTRACTOR SHALL IMPLEMENT COLD WEATHER CONCRETING PROCEDURES IN ACCORDANCE WITH CAN/CSA A23.1. PRIOR TO COMMENCING THE GROUTING OPERATION, THE CONTRACTOR SHALL PROVIDE THE MFR WITH WRITTEN COLD WEATHER CONCRETING PROCEDURES.
- 3.10 BEARINGS:
 - TO CAN/CSA-S6-06: OZONE RESISTING NATURAL RUBBER, (NATURAL POLYISOPRENE)
- 3.11 DOWEL BLOCKOUTS:
 - CORRUGATED METAL STAY-IN-PLACE BLOCK-OUT FORMS
- 3.12 COUPLERS
 - COUPLERS SHALL CONFORM TO ASTM A563 GRADE A MIN TENSILE STRENGTH OF 120% OF THE YIELD STRENGTH OF THE ELEMENTS BEING CONNECTED OR AS SPECIFIED ON THE STANDARD DRAWINGS.

4 TRANSPORTATION AND ERECTION OF BRIDGES


- 4.1 SUPPORT GIRDERS WITHIN 1 METRE OF BEARING LOCATIONS DURING TRANSPORTATION AND STORAGE.
- 4.2 LIFTING DEVICES:
 - ALL PRECAST COMPONENTS (EXCEPT CONCRETE ROADSIDE BARRIERS AND UNREINFORCED INTERLOCKING CONCRETE BLOCKS) MUST UTILIZE BURKE LIFTING INSERTS (OR PREAPPROVED EQUIVALENT) AS LIFTING DEVICES. FILL RECESS AFTER INSTALLATION USING EITHER GROUT OR ASPHALT.
 - ENGINEER TO DESIGN LIFTING INSERTS TO FACILITATE LIFTING USING FOUR EQUAL LENGTH SLINGS/CHAINS.
 - ONLY LOW IMPACT LIFTS ARE PERMITTED. ANGLE OF LIFT MUST NOT EXCEED 30 DEGREES FROM VERTICAL.

5 CERTIFICATION AND QUALITY CONTROL

- 5.1 PROVIDE CONCRETE TEST RESULTS BY AN APPROVED TESTING LABORATORY FOR ALL PRECAST CONCRETE COMPONENTS.
- 5.2 FIELD GROUT SAMPLES FOR THE BLOCKOUTS AND DECK JOINTS CAN COMPRISE 50 mm X 50 X 50 mm CUBE SAMPLES OR 50 mm DIAMETER X 100 mm CYLINDERS.
- 5.3 CERTIFICATION TO CSA STANDARD FOR STEEL AND PRECAST CONCRETE MANUFACTURE MUST BE IN EFFECT AT THE TIME OF OPENING THE TENDERS AND ALSO THROUGHOUT THE PERIOD OF MANUFACTURE

**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			



MINISTRY OF FORESTS & RANGE
ENGINEERING BRANCH, FIELD OPERATIONS DIVISION

STANDARD BRIDGE DRAWING

**STANDARD PRECAST REINFORCED CONCRETE SLAB BRIDGE
GENERAL NOTES – SHEET 1**

ORIGINAL SIGNED and SEALED BY: JULIEN HENLEY	APPROVED BY:
DESIGN ENGINEER	MOF ENGINEER
DATE JULIEN HENLEY	DATE
FILE No.	DRAWING No. STD-EC-070-01