STANDARD STEEL GIRDER BRIDGE WITH NON-COMPOSITE DECK

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NOT FOR CONSTRUCTION

<table>
<thead>
<tr>
<th>DRAWING No. / MODEL TYPE</th>
<th>DESCRIPTION</th>
<th>REV</th>
<th>DATE</th>
</tr>
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<tr>
<td>STD-EC-040-01</td>
<td>GENERAL NOTES - SHEET 1</td>
<td>0</td>
<td>MARCH 2010</td>
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<tr>
<td>STD-EC-040-02</td>
<td>GENERAL NOTES - SHEET 2</td>
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<td>GENERAL ARRANGEMENT</td>
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<td>STD-EC-040-04</td>
<td>PRECAST DECK PANEL - TYPES</td>
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<td>STD-EC-040-05</td>
<td>PRECAST DECK PANEL TYPE 1 &amp; TYPE 2 - REINFORCING</td>
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<td>STD-EC-040-07</td>
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<td>STD-EC-040-08</td>
<td>PRECAST DECK PANEL - DETAILS</td>
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1 GENERAL

1.1 THESE STANDARD DRAWINGS APPLY TO THE DESIGN AND SUPPLY OF SIMPLE SPAN SINGLE LANE STEEL GIRDERS BRIDGES WITH NON-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 GIRDERS AND NON-COMPOSITE PANELIZED PRECAST CONCRETE DECK BRIDGES.

MFR: A PROFESSIONAL ENGINEER DESIGNATED BY THE MINISTRY OF FORESTS AND RANGE.

1.5 APPROPRIATE OVERALL BRIDGE GIRDER LENGTH (OUT-TO-OUT), TYPICAL FOR A STEEL GIRDERS BRIDGE IS 15.24 m (50') TO 48.63 m (160'). OVERALL BRIDGE GIRDER LENGTHS GREATER THAN 48.63 m (160') OR CONTINUOUS WAVE SPAN BRIDGES WILL REQUIRE SPECIAL INVESTIGATION. DETAILS TO BE APPROVED BY MFR PRIOR TO USE.

1.6 STANDARD DECK WIDTHS

THE FOLLOWING TABLES SPECIFY STANDARD DECK WIDTHS FOR THE DESIGNATED VEHICLE TYPES.

<table>
<thead>
<tr>
<th>Design Vehicle</th>
<th>Standard Deck Width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC105</td>
<td>4386</td>
</tr>
<tr>
<td>LT16</td>
<td>4876</td>
</tr>
</tbody>
</table>

1.7 STANDARD GIRDER SPACINGS

THE FOLLOWING TABLES SPECIFY STANDARD GIRDER SPACINGS FOR SEVERAL DECK WIDTHS.

<table>
<thead>
<tr>
<th>Deck Panel Width (mm)</th>
<th>Standard Girder Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4386 (17)</td>
<td>3008</td>
</tr>
<tr>
<td>4876 (19)</td>
<td>3008</td>
</tr>
</tbody>
</table>

1.8 STANDARD DECK PANEL EDGE THICKNESS AND DECK PANEL CROSSFALL

THE FOLLOWING TABLE SPECIFIES STANDARD DECK EDGE THICKNESS FOR SQUARE PRECAST CONCRETE DECK PANELS. VARIATIONS MAY BE REQUIRED FOR SHAPED OR CURVED DECK PANELS.

<table>
<thead>
<tr>
<th>Design Vehicle</th>
<th>Deck Panel Width (mm)</th>
<th>Standard Deck Edge Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC105</td>
<td>4876 (19)</td>
<td>175</td>
</tr>
<tr>
<td>LT16</td>
<td>4386 (17)</td>
<td>175</td>
</tr>
</tbody>
</table>

2 DESIGN

2.1 DESIGN LIFE

- BRIDGE DESIGN LIFE: 45 YEARS
- STRUCTURAL DESIGN LIFE: 100 YEARS
- EXISTING STRUCTURAL DESIGN LIFE: 75 YEARS
- SERVICE LIFE: 100 YEARS
- EXISTING SERVICE LIFE: 75 YEARS

2.2 DESIGN CODE AND MFR REFERENCE STANDARDS

- CAN/CSA-S6-06
- CAN/CSA-S6-10
- SEI/ASCE 7-02
- CAN/CSA-A23.3-94
- CAN/CSA-A23.3-04

2.3 DESIGN SPECIFICATIONS

- THE DESIGN DRAWINGS SHALL 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 MULTIPLE 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 L50 USE L50 FOR FATIGUE DESIGN LOAD
  - DESIGN VEHICLE TO BE CENTRED ON BRIDGE

- FATIGUE STRESS RANGE
  - t = 35.7
  - R = 0.5
  - THE CALCULATED STRESS RANGE AT THE DETAIL IS LESS THAN THE PASSAGE OF THE DESIGN VEHICLE.
  - RECOMMENDED FATIGUE DESIGN VEHICLE t = 0.5

2.7 CRACKING CRITICAL AND PRIMARY TENSION COMPONENTS

- ENGINEER TO SPECIFY CRACK CRITICAL AND PRIMARY TENSION COMPONENTS ON THE DESIGN DRAWINGS.

2.8 MAXIMUM LOAD DEFLECTION OF STEEL GIRDERS

- BRIDGES MUST BE DESIGNED SO THAT THE MAXIMUM DEFLECTION CALculated AS THAT CAUSED BY ONE TRUCK ONLY, PLACED AT THE CENTRE LINE OF THE TRAVELLED ROADWAY, DYNAMIC LOAD ALLOWANCE INCLUDED DUE TO THE L150 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 DESIGNERS 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 THE MAXIMUM PERMISSIBLE CONSTRUCTION LOADS ON THE DRAWINGS WHERE A BRIDGE WILL BE INSTALLED UNDER A SEPARATE CONTRACT FROM THE DESIGN/SUPPLY ENGINEER.
- THE FOLLOWING ARE THE STANDARD REQUIRED CONCRETE COVERS AS PER PROJECT SPECIFICATIONS.

- FOR DECK OVER BALLAST WALL: 3300 mm
- FOR DECK BESIDE BALLAST WALL: 3048 mm
- MINIMUM DECK PANEL LENGTH: 1524 mm

2.12 DLA (DESIGN LIFE ALLOWANCE)

- MIN DLA = 10% (ASSUMED DESIGN SPEED = 10 km/hr)
- A VERTICAL LIVE LOAD OF 445 kN (40 TON EQUIPMENT + 10 TON PANEL) DISTRIBUTED OVER A LENGTH OF 4 m, POSITIONS ON THE BRIDGE TO PRODUCE THE MAXIMUM EFFECT; ECCENTRICITY = 100 mm, AS SHOWN ON DWG. OR, ADJUST BRIDGE DETAILS ACCORDINGLY.

2.13 ENHANCED STRENGTH DESIGN

- THE FOLLOWING COMPONENTS SHALL BE DESIGNED ADHESION STRENGTH DESIGN VEHICLE TO BE CENTRED ON BRIDGE ACCORDING TO CAN/CSA-S6-10.

- ENGINEER MUST CONSIDER THE FOLLOWING MINIMUM CONSTRUCTION LOADS:
  - SELF WEIGHT OF THE STRUCTURE, SUPPORTED AT THE BEARINGS, INCLUDING ALL DECK PANELS IN POSITION BUT UN-GROUTED.
  - AS A MINIMUM, ALL DESIGNERS SHALL INCORPORATE AN ALLOWANCE FOR A FUTURE 50 mm CONCRETE OVERLAY.

- MIN DLA = 10% (ASSUMED DESIGN SPEED = 10 km/hr)

2.14 STANDARD CONCRETE COVER

- THE FOLLOWING ARE THE STANDARD REQUIRED CONCRETE COVERS

<table>
<thead>
<tr>
<th>Design Vehicle</th>
<th>Deck Panel Width (mm)</th>
<th>Standard Concrete Cover (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC105</td>
<td>4876 (19)</td>
<td>75</td>
</tr>
<tr>
<td>LT16</td>
<td>4386 (17)</td>
<td>75</td>
</tr>
</tbody>
</table>

MINISTRY OF FOREST & RANGE
ENGINEERING BRANCH, FIELD OPERATIONS DIVISION

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3 MATERIALS AND FABRICATION

3.1 STRUCTURAL STEEL:
- TO CAN/CSA-G40.21M
  - STEEL GIRDER FLANGES AND WEB PLATES: GRADE 350 AT CATEGORY 3
  - OTHER STEEL PLATE: 350A
  - BRACING (DIAPHRAGMS AND PLAN BRACING): GRADE 350A.

- ANY REQUIRED VARIATIONS REQUIRE MFR APPROVAL. IF NON WEATHERING STEEL IS APPROVED BY MFR, A CORROSION PROTECTION SYSTEM WILL BE REQUIRED.
- COMPLETE ALL WELDS IN ACCORDANCE WITH CSA W59. WELD METAL OF PRIMARY TENSION MEMBERS AND FRACTURE CRITICAL MEMBERS SHALL MEET THE CVN TOUGHNESS REQUIREMENTS OF TABLE 10.14 OF CAN/CSA-S6-06.
- INSPECT ALL BUTT WELDS BY ULTRASONIC OR X-RAY EXAMINATION IN ACCORDANCE WITH CSA W59.
- FABRICATOR TO BE CERTIFIED FOR DIVISION 1 OR 2 IN ACCORDANCE WITH CSA W47.1
- FIELD WELDING BY COMPANY CERTIFIED TO CSA W47.1 DIVISION 1, 2 OR 3
- FABRICATE GIRDER AS FRACTURE CRITICAL MEMBERS IN ACCORDANCE WITH CAN/CSA-S6-06, AS NOTED ON DESIGN DRAWINGS. STEEL PLATES FOR BOTTOM FLANGES AND WEBS SHALL CONFORM TO THE REQUIREMENTS FOR FRACTURE CRITICAL ACCORDANCE WITH CAN/CSA-S6-06 EXCEPT THAT CHARPY V-NOTCH TESTING RESULTS ARE ONLY REQUIRED ON A PER HEAT FREQUENCY.
- MAKE ALL GIRDER FLANGE TO WEB WELDS USING SUBMERGED ARC WELDING.
- WHERE SPECIFIED BY MFR, PAINT STEEL GIRDERS IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
  - SURFACE PREPARATION: BLAST CLEAN TO SSPC SP-6
  - PAINT: HIGH SOLIDS, SELF-PRIMING EPOXY OR MOISTURE CURE URETHANE. SPECIFIC PAINT PRODUCT TO BE AMERLOCK 400 OR ALTERNATE EQUIVALENT PRODUCT. EQUIVALENT PRODUCTS MUST BE APPROVED BY MFR PRIOR TO USAGE.
  - PAINT SHALL BE UTILIZED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS
  - MINIMUM 2 COATS
  - MINIMUM 8 MILS DRY FILM THICKNESS
  - COLOUR BY MFR
- SHOP TRIAL FIT ALL FIELD SPLICES UNLESS CNC EQUIPMENT IS USED.

3.2 STRUCTURAL BOLTS:
- ALL BOLTS INCORPORATED INTO STEEL GIRDER CONNECTIONS (BOLTED FIELD SPLICES, DIAPHRAGMS AND BRACING) TO BE ASTM A325 TYPE 3 M22 U.N.O. INSTALLED IN ACCORDANCE WITH CAN/CSA-S6-06

3.3 STUDS:
- SHEAR STUDS SHALL MEET THE REQUIREMENTS OF CSA W59 APPENDIX H FOR TYPE A AND B STUDS
- ASTM A108 GRADE 1015, 1018, 1020

3.4 GALVANIZING:
- ALL ITEMS SPECIFIED AS GALVANIZED ARE TO BE GALVANIZED TO CSA G164.

3.5 REINFORCING:
- TO CAN/CSA G30.18M GRADE 400R
- REINFORCING STEEL MUST NOT BE WELDED OR TACK WELDED

3.6 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
- PRECAST COMPONENTS: TRANVERSE BROOM TO TOP OF DECK PANELS, OTHERWISE TO CSA-A23.1 AND A23.4.
- ALL CORNERS TO COME WITH 20X20 CHAMFER U.N.O. ON THE APPLICABLE STANDARD DRAWING.

3.7 GROUT:
- GROUT MIN f'c = 35 MPa AT 28 DAYS, INSTALLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS
- GROUT FOR BLOCKOUTS SHALL BE TARGET TRAFFIC PATCH WITH FINE 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 MFR WITH WRITTEN COLD WEATHER CONCRETING PROCEDURES

3.8 BEARINGS:
- TO CAN/CSA-G6-00: (OZONE RESISTING NATURAL RUBBER, NATURAL POLYISOPRENE)
- WHERE EXPANSION JOINTS ARE USED, ENGINEER TO INCLUDE SUFFICIENT INFORMATION TO FACILITATE INSTALLATION AT VARIOUS TEMPERATURES

3.9 COUPLERS:
- COUPLERS SHALL CONFORM TO ASTM A954 GRADE A MIN TENSILE STRENGTH OF 10% OF THE YIELD STRENGTH OF THE ELEMENTS BEING CONNECTED OR AS SPECIFIED ON THE STANDARD DRAWINGS.

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4 TRANSPORTATION AND ERECTION OF BRIDGES

4.1 SUPPORT STEEL GIRDER IN SUCH A WAY THAT THEY SUSTAIN NO DAMAGE DURING TRANSPORTATION. WHEN TRANSPORTING STEEL GIRDER ON THE FLAT, PROVIDE A TRANSPORTATION PLAN PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF BRITISH COLUMBIA.

4.2 LIFTING DEVICES:
- ALL PRECAST COMPONENTS EXCEPT CONCRETE ROADSIDE BARRIERS AND UNREINFORCED INTERLOCKING CONCRETE BLOCKS, MUST UTILIZE BURIED LIFTING INSERTS OR PREAPPROVED EQUIVALENT AS LIFTING DEVICES. GROUT Recess AFTER INSTALLATION.

4.3 STEEL GIRDERS SHALL BE CLEAN AND FREE OF SHOP MARKS

5 CERTIFICATION AND QUALITY CONTROL

5.1 PROVIDE CONCRETE TEST RESULTS BY AN APPROVED TESTING LABORATORY FOR ALL PRECAST CONCRETE COMPONENTS AND FOR FIELD GROUTING.

5.2 FIELD GROUT SAMPLES FOR THE BLOCKOUTS CAN COMPRISE 50 mm CUBE SAMPLES OR 50 mm DIAMETER X 100 mm CYLINDERS.

5.3 PROVIDE MILL CERTIFICATES FOR ALL STEEL INCORPORATED INTO THE STRUCTURE.

5.4 CERTIFICATION TO CSA STANDARDS FOR THE STEEL AND PRECAST CONCRETE MANUFACTURERS MUST BE IN EFFECT AT THE TIME OF TENDER OPENING AND THROUGHOUT THE MANUFACTURING PERIOD.
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ENGINEERING BRANCH, FIELD OPERATIONS DIVISION

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REMOVABLE DECK/GIRDER CONNECTION DETAIL

Nelson stud, typ. stud length to suit deck panel thickness

250 galv. coupler, typ.

Nelson stud, typ. stud length to suit deck panel thickness

250 galv. coupler, typ.

FILL WITH TARGET TRAFFIC PATCH.
ENGINEER TO ENSURE FULL BEARING BETWEEN PANEL AND GIRDERS FLANGE.
SEE NOTE 1.

250 galv. coupler, typ.

FILL WITH TARGET TRAFFIC PATCH.
ENGINEER TO ENSURE FULL BEARING BETWEEN PANEL AND GIRDERS FLANGE.
SEE NOTE 1.

NOTE:
1. THIS TYPE OF DECK SYSTEM USES PANEL ATTACHMENT DETAILS THAT DO NOT PROVIDE VERTICAL SUPPORT OF THE DECK PANELS. THE ENGINEER SHALL TAKE MEASURES TO ENSURE ADEQUATE VERTICAL SUPPORT OF THE DECK PANELS IS ACHIEVED.