



Ministry of Forests,
Lands, Natural
Resource Operations
and Rural Development

ENGINEERING BRANCH

STANDARD BRIDGE DRAWINGS:
SUBSTRUCTURES

| DRAWING SCHEDULE | | | |
|------------------|---|------|--------------|
| DRAWING NUMBER | DRAWING TITLE | REV. | DATE |
| STD-EC-050-01 | GENERAL NOTES | 1 | MARCH 2015 |
| STD-EC-050-02 | CONCEPTUAL CONCRETE BALLAST WALL FOR STEEL BRIDGES | 1 | JANUARY 2022 |
| STD-EC-050-03 | CONCRETE BALLAST WALL DETAILS FOR STEEL BRIDGES - SHEET 1 | 1 | JANUARY 2022 |
| STD-EC-050-04 | CONCRETE BALLAST WALL DETAILS FOR STEEL BRIDGES - SHEET 2 | 1 | JANUARY 2022 |
| STD-EC-050-05 | SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 1 | 1 | MARCH 2015 |
| STD-EC-050-06 | SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 2 | 1 | MARCH 2015 |
| STD-EC-050-07 | SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 3 | 0 | APRIL 2014 |
| STD-EC-050-08 | SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 4 | 0 | APRIL 2014 |
| STD-EC-050-09 | ABUTMENT CAP FOR STEEL BRIDGES | 1 | MARCH 2015 |
| STD-EC-050-10 | PIER CAP FOR STEEL BRIDGES | 1 | MARCH 2015 |
| STD-EC-050-11 | LOCK BLOCK ABUTMENT FOR STEEL BRIDGES | 1 | MARCH 2015 |
| STD-EC-050-12 | LOCK BLOCK ABUTMENT FOR ALL STEEL PORTABLE BRIDGES | 0 | APRIL 2014 |
| STD-EC-050-13 | LOCK BLOCK ABUTMENT FOR CONCRETE BRIDGES | 0 | APRIL 2014 |
| STD-EC-050-14 | CONCEPTUAL CONCRETE SILLS FOR CONCRETE BLOCK ABUTMENTS | 1 | APRIL 2021 |
| STD-EC-050-15 | PRECAST CONCRETE BASE SLAB DETAILS | 0 | APRIL 2014 |
| STD-EC-050-16 | INVERTED " T " ABUTMENT DETAILS | 0 | APRIL 2014 |
| STD-EC-050-17 | CONCEPTUAL INTEGRAL CAP BEAM/WINGWALL FOR CONCRETE SLAB BRIDGES | 1 | APRIL 2021 |
| STD-EC-050-18 | SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 1 | 0 | APRIL 2014 |
| STD-EC-050-19 | SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 2 | 0 | APRIL 2014 |
| STD-EC-050-20 | SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 3 | 0 | APRIL 2014 |
| STD-EC-050-21 | SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 4 | 0 | APRIL 2014 |

1 GENERAL

- 1.1 THESE STANDARD DRAWINGS APPLY ONLY TO THE DESIGN AND SUPPLY OF SIMPLE SPAN, SINGLE LANE BRIDGE SUBSTRUCTURES. THE STANDARD DRAWINGS PROVIDE DESIGN GUIDELINES AND STANDARD DETAILS.
- 1.2 VARIATIONS FROM THE STANDARD DESIGN REQUIREMENTS MAY BE ACCEPTABLE IN CERTAIN SITUATIONS. ALL SUCH VARIATIONS SHALL BE DOCUMENTED AND REQUIRE APPROVAL FROM FLNR 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 AND CONCRETE BRIDGES, WHO IS RESPONSIBLE FOR THE DETAILED STRUCTURAL DESIGN OF A BRIDGE IN CONFORMANCE WITH THESE DRAWINGS
- FLNR:
- A PROFESSIONAL ENGINEER DESIGNATED BY THE MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS (FLNR).
- 1.5 APPLICABLE OVERALL BRIDGE LENGTH (OUT-TO-OUT):
- OVERALL BRIDGE GIRDER LENGTHS GREATER THAN 40m (130') FOR STEEL BRIDGES AND 15m (50') FOR CONCRETE BRIDGES, OR CONTINUOUS MULTI-SPAN BRIDGES WILL REQUIRE SPECIAL INVESTIGATION. DETAILS TO BE APPROVED BY FLNR 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) |
|----------------|--------------------------|
| BCL-625, L100 | 4268 |
| L150, L165 | 4876 |

- THESE STANDARD DRAWINGS ARE BASED ON THESE STANDARD DECK WIDTHS.

- 1.7 STANDARD GIRDER AND COLUMN SPACING
- THE FOLLOWING TABLE SPECIFIES STANDARD GIRDER AND COLUMN / FOOTING SPACING.

| DECK WIDTH mm(ft) | STANDARD COLUMN SPACING (mm) (PERPENDICULAR TO BRIDGE) |
|-------------------|---|
| 4268 (14') | 3000 |
| 4876 (16') | 3600 |
| 5486 (18') | 4200 |

- 1.8 COMPONENT WEIGHTS
- PRECAST CONCRETE COMPONENT WEIGHTS SUCH AS BASE SLAB, BALLAST WALL, CAP AND FOOTINGS, SHALL BE SPECIFIED ON THE DESIGN DRAWINGS.
- 1.9 DRAWINGS INCORPORATING ENGINEERED DETAILS APPLY TO STANDARD WIDTH SQUARE BRIDGES ONLY.
- 1.10 ACCOMMODATE GRADES IN EXCESS OF 2% WITH A BEVEL PLATE OR SLOPED CAP BEAM.
- 1.11 ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS NOTED OTHERWISE.
- 1.12 ENGINEER SHOULD PROVIDE A LAYOUT TABLE ON THE SHOP DRAWINGS FOR FOOTING LOCATION ON SKEWED BRIDGES.
- 1.13 FLNR PROJECT SPECIFICATIONS WILL TAKE PRECEDENCE OVER THE STANDARD DRAWINGS.
- 1.14 BEARING:
- FOR SPAN LESS THAN OR EQUAL TO 40m (130'), DEFORMATION AND TRANSLATION CAN BE ACCOMMODATED AS DETAILED IN THE STANDARD DRAWINGS.
- FOR SPAN GREATER THAN 40m (130'), ENGINEER TO DESIGN BEARINGS TO ACCOMMODATE DEFORMATION AND TRANSLATIONS.

2 DESIGN

- 2.1 DESIGN LIFE:
- BRIDGE DESIGN LIFE: 45 YEARS
- 2.2 DESIGN CODE AND FLNR REFERENCE STANDARDS:
- CAN/CSA-S6-06 C/W S6S1-10, S6S2-11 AND S6S3-13 (CSA-S6)
- FLNR BRIDGE DESIGN AND CONSTRUCTION MANUAL
- FLNR INTERIM BRIDGE DESIGN GUIDELINES
- 2.3 DESIGN VEHICLES
- REFER TO FLNR STANDARD DRAWINGS STD-EC-000-01 TO -02
- THE DESIGN DRAWINGS SHOULD CLEARLY SPECIFY THE DESIGN VEHICLE THAT WAS USED FOR THE BRIDGE DESIGN.
- 2.4 MULT-LANE LOADING
- WHERE A BRIDGE IS ABLE TO SIMULTANEOUSLY SUPPORT MORE THAN ONE LANE OF TRAFFIC, THE ENGINEER SHOULD SEEK CLARIFICATION FROM FLNR ON HOW TO ACCOUNT FOR MULT-LANE LOADING.

- 2.5 DYNAMIC LOAD ALLOWANCE:
- DYNAMIC LOAD ALLOWANCE SHALL BE APPLIED IN ACCORDANCE WITH CAN/CSA-S6 AND FLNR STANDARD DRAWINGS STD-EC-000-01 TO -02
- 2.6 STANDARD CONCRETE COVER:
- THE FOLLOWING ARE THE STANDARD CONCRETE COVERS, UNLESS NOTED OTHERWISE:
- | | |
|-------------------------------|-------|
| - CONCRETE FOOTING, ALL FACES | 35 MM |
| - CONCRETE BALLAST WALL | 35 MM |
| - CONCRETE CAP (ALL AROUND) | 35 MM |
- 2.7 BEARINGS:
- MAXIMUM AVERAGE PRESSURE ON PLAIN ELASTOMERIC BEARING NOT TO EXCEED 4.5 MPA AT SLS COMBINATION 1, INCLUDING DYNAMIC LOAD ALLOWANCE.
- WHERE LAMINATED BEARING PADS ARE USED, THEY SHOULD INCORPORATE A MINIMUM OF TWO REINFORCING PLATES AS SHOWN ON THE STANDARD DRAWINGS.

3 MATERIALS AND FABRICATION

- 3.1 STRUCTURAL STEEL FOR SUBSTRUCTURE:
- CONFORM TO CAN/CSA-G40.21M, GRADE AS FOLLOWS
- | | |
|--|------------|
| - PLATES: | GRADE 350A |
| - SECTIONS (EXCEPT COLUMN BRACING): | GRADE 350A |
| - COLUMN BRACING, INCLUDING BASE PLATES, GUSSETS & SECTIONS, (PAINTED) | GRADE 300W |
| - HP SECTIONS: (PAINTED) | GRADE 300W |
| - ANY REQUIRED VARIATION REQUIRES FLNR APPROVAL. | |
- 3.2 STEEL PIPE
- CONFORM TO ASTM A252 GRADE 2 OR BETTER.
- 3.3 WELDING
- ALL WELDS TO BE COMPLETED IN ACCORDANCE WITH CSA W59.
- MINIMUM 6 mm FILLET WELD, U.N.O.
- 3.4 STEEL SUBSTRUCTURE FABRICATION CERTIFICATION
- STEEL CAP: FABRICATOR TO BE CERTIFIED FOR DIVISION 1 OR 2 IN ACCORDANCE WITH CSA W47.1
- OTHER STEEL COMPONENTS: FABRICATOR TO BE CERTIFIED FOR DIVISION 1, 2 OR 3 IN ACCORDANCE WITH CSA W47.1
- 3.5 FIELD WELDING:
- BY COMPANY CERTIFIED TO CSA W47.1 DIVISION 1, 2 OR 3
- 3.6 STRUCTURAL BOLTS:
- CONFORM TO ASTM A325 TYPE 3 M22 U.N.O. INSTALL IN ACCORDANCE WITH CAN/CSA-S6
- 3.7 ANCHOR BOLTS:
- CONFORM TO ASTM A193 GRADE B7 THREADED ROD AS INDICATED IN DRAWINGS.
- CONFORM TO ASTM A307 GRADE B GALV. AS INDICATED IN DRAWINGS
- 3.8 STUDS:
- CONFORM TO CSA W59 APPENDIX H FOR TYPE A AND B STUDS
- ASTM A108 GRADE 1015, 1018 OR 1020
- 3.9 PAINTING:
- COAT STEEL SUBSTRUCTURE INCLUDING BASE PLATES AND ANCHOR BOLTS WITH ONE COAT XYMAX MONOGUARD OR APPROVED EQUAL PRIOR TO BACKFILLING.
- 3.10 GALVANIZING:
- ALL ITEMS SPECIFIED AS GALVANIZED ARE TO BE HOT DIP GALVANIZED TO CSA G164
- 3.11 REINFORCING:
- TO CAN/CSA G30.18M GRADE 400R
- REINFORCING STEEL MUST NOT BE WELDED OR TACK WELDED
- 3.12 GROUT:
- GROUT TARGET TRAFFIC PATCH (FINE) TO BE INSTALLED ACCORDING TO MANUFACTURERS INSTRUCTIONS. EQUIVALENT PRODUCTS MUST BE APPROVED BY FLNR PRIOR TO USE.

- 3.13 PRECAST CONCRETE:
- CSA A23.1 EXPOSURE CLASS C1, F'C = 35 MPA @ 28 DAYS
- PRECAST CONCRETE TO BE FABRICATED IN ACCORDANCE WITH CSA A23.4, COMPANIES MUST BE CERTIFIED BY THE CANADIAN STANDARD ASSOCIATION (CSA), OR THE CANADIAN PRECAST / PRESTRESSED CONCRETE INSTITUTE (CPCI)
- FABRICATION TOLERANCES TO CAN/CSA-A23.4
- ALL CORNERS C/W 20X20 CHAMFER U.N.O. ON THE APPLICABLE STANDARD DRAWING.
- 3.14 PRECAST CONCRETE UNREINFORCED INTERLOCKING BLOCKS:
- MIN. f_c = 20 MPa @ 28 DAYS TO CAN/CSA A23.1 AND A23.4
- BLOCKS SHALL BE CAST MONOLITHICALLY, NO COLD JOINTS ALLOWED.
- ALL EXPOSED SURFACES SHALL HAVE A SMOOTH FINISH CONFORMING TO CSA CAN3-A23.4-00 SECTION 24.2.5 GRADE A. THE FINISH MUST NOT BE HONEYCOMBED.
- BLOCKS SIZE MUST BE 750MM x 750MM x 1500MM LONG, PROVIDED WITH SHEAR KEY.
- DIMENSIONAL TOLERANCE MUST BE ± 20 MM FOR LENGTH, WIDTH AND HEIGHT AND THE BLOCKS SHALL BE REASONABLY SQUARE, WITH THE DIAGONALS WITHIN A TOLERANCE OF ± 15 MM OF EACH OTHER.
- TOP AND BOTTOM SURFACES MUST BE FLAT TO A TOLERANCE OF ± 3 mm UNDER 600mm STRAIGHT EDGE.
- CONCRETE SHALL BE AIR ENTRAINED 4-7% TO PROTECT THE SURFACE FROM FREEZE THAW DEGRADATION.
- EACH BLOCK MUST CONTAIN A SATISFACTORY EMBEDDED LIFTING DEVICE.
- INTERLOCK PATTERN AND GEOMETRY MUST BE APPROVED BY THE MINISTRY.
- EDGED SHALL BE CHAMFERED.
- BEFORE A NEW SUPPLIER IS APPROVED TO SUPPLY CONCRETE BLOCKS TO THE FLNR FOR BRIDGE PROJECTS, THE FLNR SHALL INSPECT THE SUPPLIER'S OPERATION AND A SAMPLE OF THEIR PRODUCT FOR CONFORMANCE TO THE ABOVE SPECIFICATIONS.
- 3.15 BEARINGS:
- TO CAN/CSA-S6: OZONE RESISTING NATURAL RUBBER, (NATURAL POLYISOPRENE)
- LAMINATED BEARING REINFORCING STEEL PLATE: CAN/CSA-G40.21M, GRADE 300W
- 3.16 DOWEL BLOCKOUT:
- GALVANIZED CORRUGATED METAL STAY-IN-PLACE BLOCK-OUT FORMS


4 TRANSPORTATION AND ERECTION OF BRIDGES

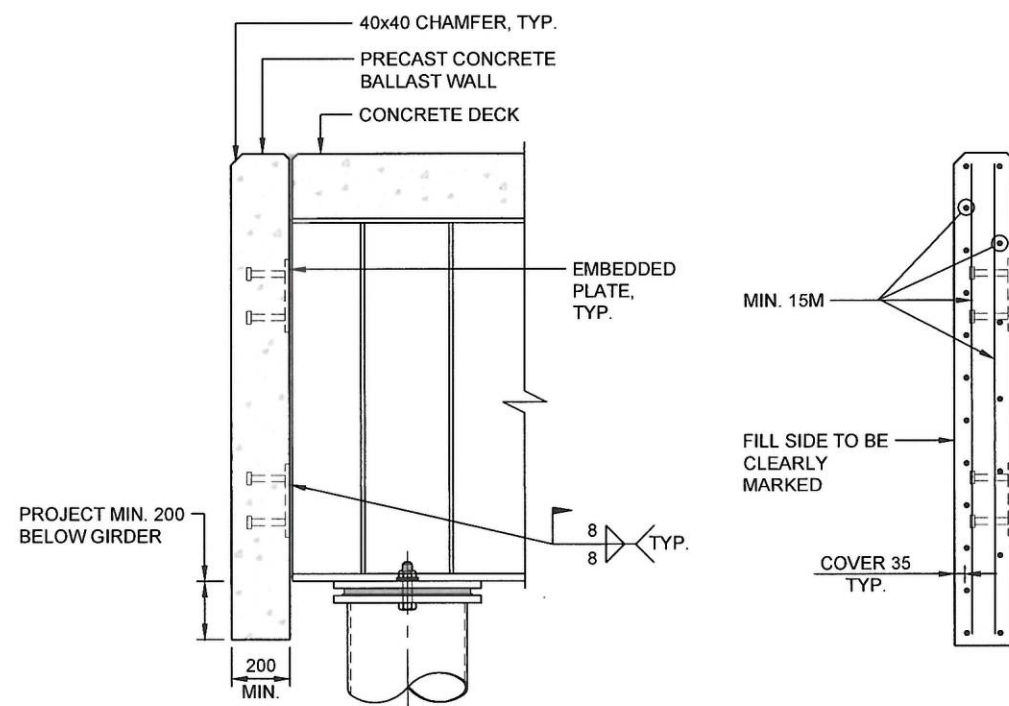
- 4.1 SUPPORT PRECAST AND STEEL COMPONENTS IN SUCH A WAY THAT THEY SUSTAIN NO DAMAGE DURING TRANSPORTATION.
- 4.2 LIFTING DEVICES:
- ALL PRECAST COMPONENTS (EXCEPT UNREINFORCED INTERLOCKING CONCRETE BLOCKS) MUST UTILIZE BURKE LIFTING INSERTS (OR PRE-APPROVED EQUIVALENT) AS LIFTING DEVICES. FILL RECESS AFTER INSTALLATION USING 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, EXCEPT FOR INTERLOCKING BLOCK.
- 5.2 PROVIDE MILL CERTIFICATES FOR ALL STEEL INCORPORATED INTO THE STRUCTURE.
- 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.
- 5.4 TEST RESULTS FOR STEEL:
- MILL TEST CERTIFICATES OF STRUCTURAL STEEL PLATES PLATES AND SECTIONS.
- ANY RADIOGRAPHIC OR ULTRASONIC TEST REPORTS.
- 5.5 TEST RESULTS FOR CONCRETE:
- FORMWORK RELEASE CONCRETE COMPRESSIVE STRENGTH TEST RESULTS.
- 7 DAY CONCRETE COMPRESSIVE STRENGTH REST RESULT.
- 28 DAY CONCRETE COMPRESSIVE STRENGTH REST RESULT.
- 5.6 IN-PLANT QUALITY ASSURANCE INSPECTION:
- ALL BRIDGE MATERIALS MUST CONFORM TO THE CURRENT MINISTRY STANDARDS AND SHALL NOT BE ACCEPTABLE WITHOUT IN-PLANT INSPECTION BY THE MINISTRY'S IN-PLANT QUALITY ASSURANCE INSPECTION AGENCY.

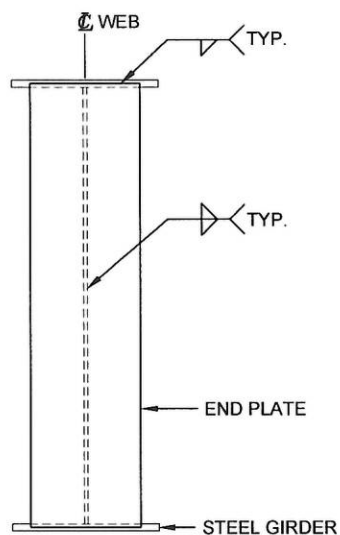
ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

| | | | | | | | | |
|---|---|---|------|---------------------------------------|------------------------------|--|--|-------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters |  <div>Ministry of Forests, Lands and Natural Resource Operations</div> ENGINEERING BRANCH | | | | | | |
| | <table><tr><td></td><td></td><td></td><td></td><td></td></tr></table> | | | | | | | SCALE AS SHOWN |
| | | | | | | | | |
| | 0 20 40 mm | | | | | | | |
| | BAR LENGTH IS 40mm ON ORIGINAL. | | | | | | | |
| Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFUN FARJOO</u> Date <u>14/04/01</u> | | | | | | | | |
| Rev | Date | DESCRIPTION | Init | DRAWING TITLE: GENERAL NOTES | | | | |
| 1 | 15/03/31 | REVISED NOTES | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: | | | |
| | | | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: | | | |
| | | | | FILE No. | DRAWING No. STD-EC-050-01 | | | |
| PROFESSIONAL SEAL | REVISIONS | | | | 1 | | | |



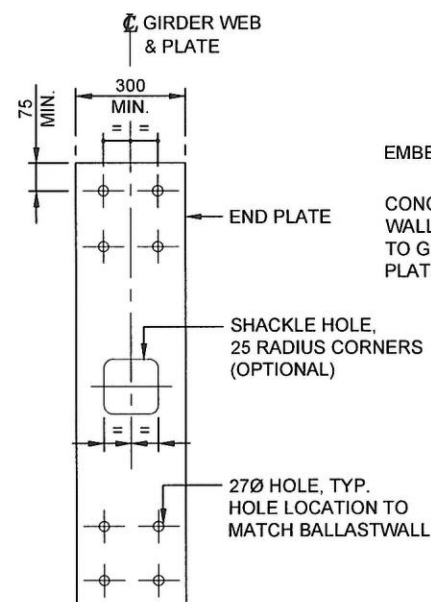
CONNECTION DETAILS

BALLAST WALL DETAILS
1:25

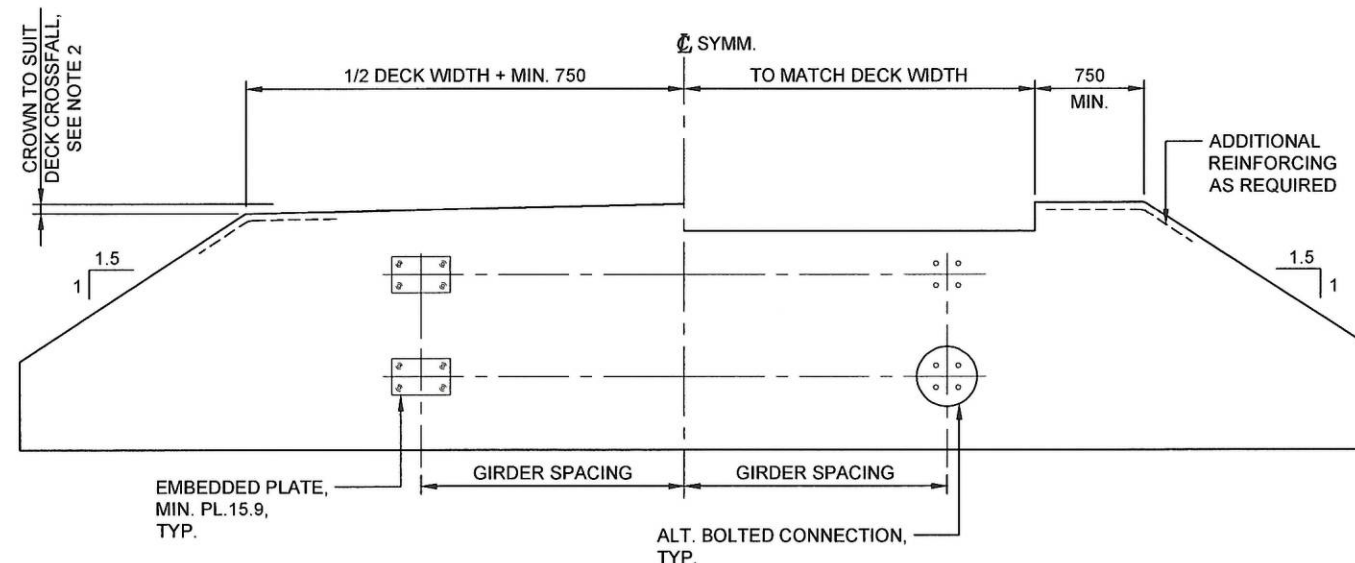


GIRDER END PLATE CONNECTION DETAILS
1:20

REINFORCEMENT DETAILS



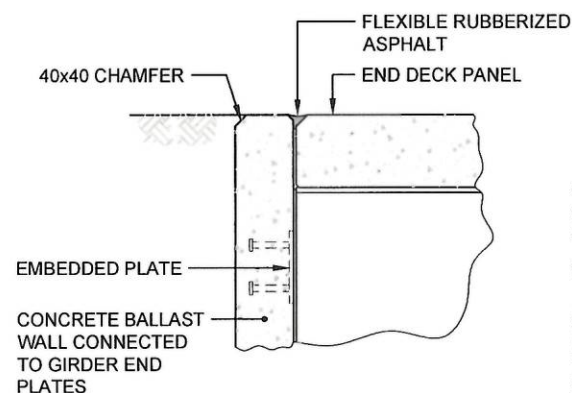
ALTERNATE BOLTED CONNECTION & END PLATE HOLES DETAIL
1:20



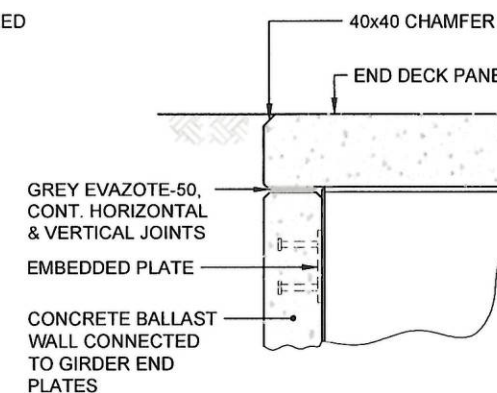
1/2 DECK BESIDE BALLAST WALL

1/2 DECK OVER BALLAST WALL

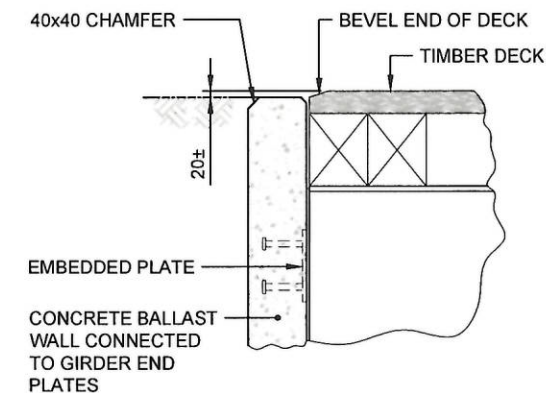
BALLAST WALL ELEVATION
1:50



DECK BESIDE BALLAST WALL CONNECTION DETAIL
1:25



DECK OVER BALLAST WALL CONNECTION DETAIL
1:25



TIMBER DECK BESIDE BALLAST WALL CONNECTION DETAIL
1:25

**NOT FOR CONSTRUCTION
 ASSUME NOT TO SCALE**

NOTES:

1. THE STRUCTURAL DESIGN ENGINEER SHALL DESIGN THE BALLAST WALLS TO RESIST EARTH PRESSURE FORCES.
2. TOP OF THE BALLAST WALL IS FLAT FOR TIMBER DECK BRIDGE.
3. DECK OVER BALLAST WALL CONNECTION DETAIL DOES NOT PROVIDE STRUCTURAL SUPPORT OF THE DECK EDGE. THE CONNECTION SHALL BE DESIGNED BY THE STRUCTURAL DESIGN ENGINEER TO OBTAIN DECK EDGE STRUCTURAL SUPPORT, IF REQUIRED.
4. LIFTING ANCHORS TO BE DETERMINED BY THE STRUCTURAL DESIGN ENGINEER AND SHOWN ON THE STRUCTURAL DESIGN DRAWINGS WITH LIFTING ANCHOR LIMITATIONS.

| REV # | DATE | REVISION DESCRIPTION | DRAFTING | DESIGN | CHECK | PROF. OF RECORD | |
|-------|---------------|-------------------------------|-------------------------|----------------------|------------------------------|-------------------------|--|
| 0 | APR. 1, 2014 | ORIGINAL DRAWING | E. FARJOO (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | J. HENLEY (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | |
| 1 | JAN. 27, 2022 | REMOVED LIFTING ANCHORS/LOOPS | N. HARVEY (CREEKSIDE) | M. PENNER (MINISTRY) | J. RUPAR GILLIATT (MINISTRY) | J. HENLEY (ASSOC. ENG.) | |
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SEAL - PROFESSIONAL OF RECORD

J. Henley
 FEB 09, 2022
 CHIEF ENGINEER (SIGNATURE)

BRITISH COLUMBIA
 Ministry of Forests, Lands, Natural Resource Operations and Rural Development

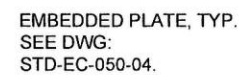
STANDARD BRIDGE DRAWING

SUBSTRUCTURES

SHEET 02 OF 21

CONCEPTUAL CONCRETE BALLAST WALL FOR STEEL BRIDGES

DWG #: STD-EC-050-02



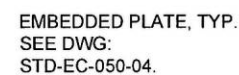
— HOLE SPACING, TYP.
SEE DWG:
STD-EC-050-04.

1/2 TYP. WELDED CONNECTION

1/2 ALT. BOLTED CONNECTION

TYPICAL DECK BESIDE BALLAST WALL ELEVATION

1:50



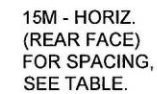
— HOLE SPACING, TYP.
SEE DWG:
STD-EC-050-04.

1/2 TYP. WELDED CONNECTION

1/2 ALT. BOLTED CONNECTION

TYPICAL DECK OVER BALLAST WALL ELEVATION

1:50



15M @ 250 (RE
FACE)

FILL SIDE, —
SEE NOTE 3

— 15M @ 250
(FRONT FACE)

— 15M - HORIZ.
(FRONT FACE)
FOR SPACING,
SEE TABLE.

COVER
TYP.

CONNECTION DETAILS

REINFORCEMENT DETAILS

BALLAST WALL DETAILS

1:25

| HORIZONTAL REINFORCEMENT TABLE | | |
|--------------------------------|--------------|------------|
| DIMENSIONS (mm) | SPACING (mm) | |
| | REAR FACE | FRONT FACE |
| $A \leq 1600$ | 150 | 250 |
| $1600 < A \leq 2000$ | 125 | 250 |
| $2000 < A \leq 2400$ | 100 | 200 |
| $2400 < A \leq 2800$ | 75 | 150 |

NOT FOR CONSTRUCTION
ASSUME NOT TO SCALE

1. LIFTING ANCHORS TO BE DETERMINED BY THE STRUCTURAL DESIGN ENGINEER AND SHOWN ON THE STRUCTURAL DESIGN DRAWINGS WITH LIFTING ANCHOR LIMITATIONS.

3. FILL SIDE OF WALL TO BE CLEARLY MARKED IF BOLTED CONNECTION TO GIRDER IS USED.


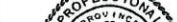

| <div> SEAL - PROFESSIONAL OF RECORD  FEB 09, 2022 CHIEF ENGINEER (SIGNATURE)</div> | REV # | DATE | REVISION DESCRIPTION | DRAFTING | DESIGN | CHECK | PROF. OF RECORD | <div> STANDARD BRIDGE DRAWING</div> |
|--|-------|---------------|-------------------------------|----------------------------|-------------------------|---------------------------------|----------------------------|---|
| | 0 | APR. 1, 2014 | ORIGINAL DRAWING | E. FARJOO (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | J. HENLEY (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | |
| | 1 | JAN. 27, 2022 | REMOVED LIFTING ANCHORS/LOOPS | N.HARVEY (CREEKSIDE) | M. PENNER (MINISTRY) | J. RUPAR GILLIATT (MINISTRY) | J. HENLEY (ASSOC. ENG.) | |
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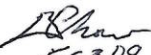

Diagram illustrating the connection between the deck panel and the concrete ballast wall. The diagram shows a cross-section of the assembly with the following components labeled:

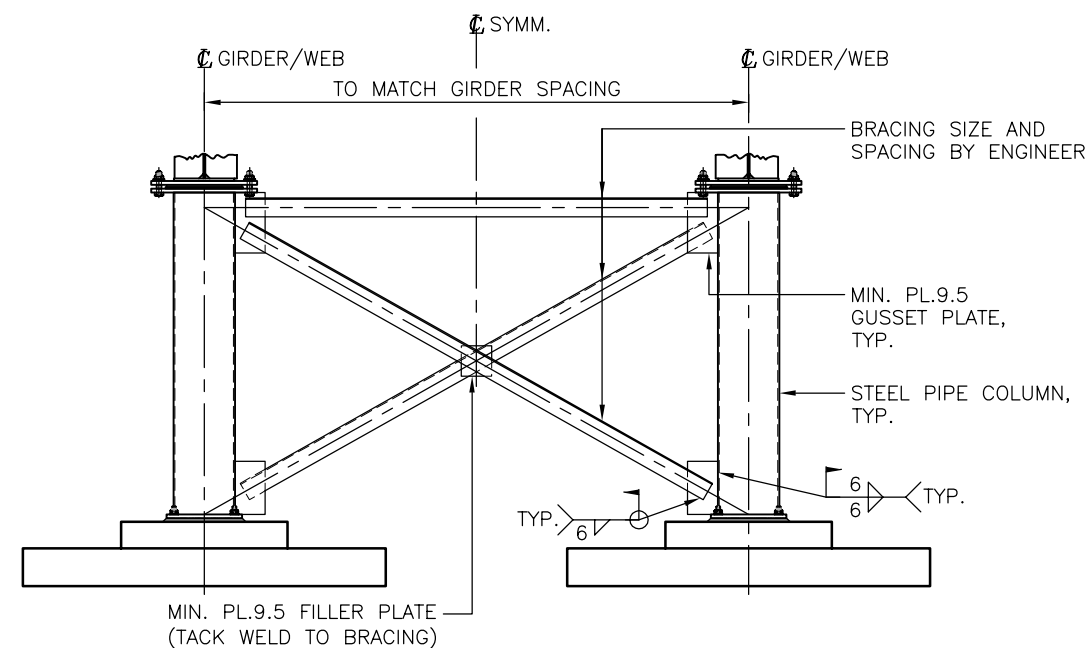
- 40x40 CHAMFER
- END DECK PANEL
- GREY EVAZOTE-50, CONT. HORIZONTAL & VERTICAL JOINTS
- EMBEDDED PLATE
- CONCRETE BALLAST WALL CONNECTED TO GIRDER END PLATES

**DECK OVER BALLAST
WALL CONNECTION DETAIL**
1:25

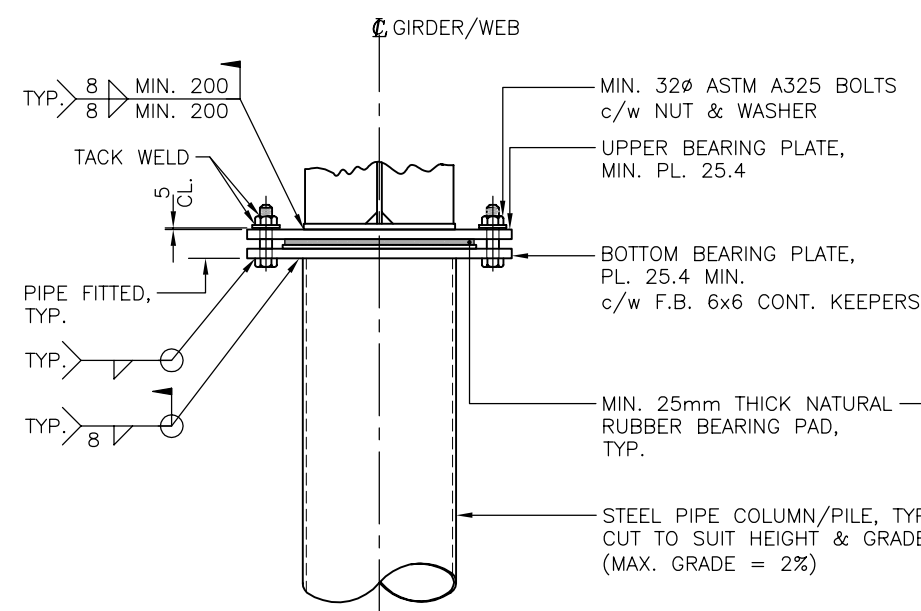


**NOT FOR CONSTRUCTION
ASSUME NOT TO SCALE**

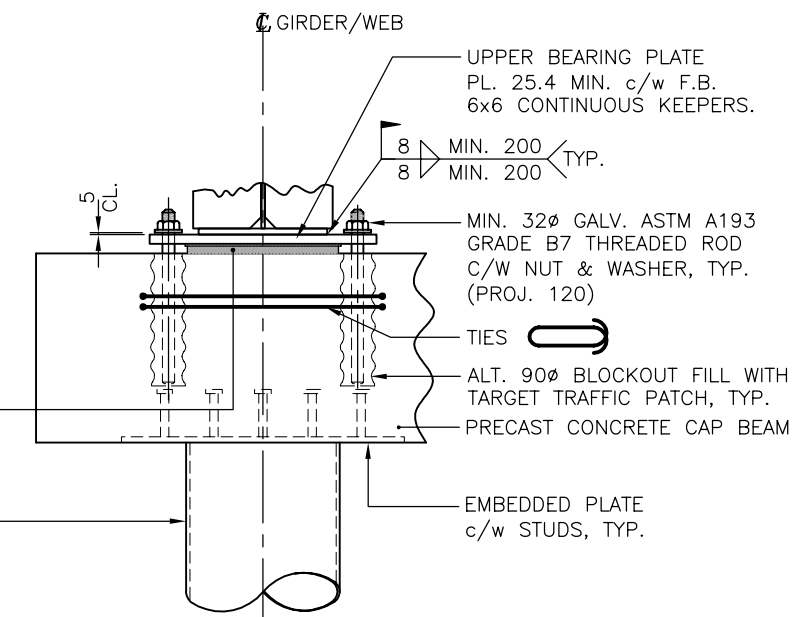
| <div><p>2022-02-09</p></div> <div>SEAL - PROFESSIONAL OF RECORD</div> <div><p>FEB 09 2022</p><p>CHIEF ENGINEER (SIGNATURE)</p></div> | REV # | DATE | REVISION DESCRIPTION | DRAFTING | DESIGN | CHECK | PROF. OF RECORD | <div><p>Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p></div> <div>STANDARD BRIDGE DRAWING</div> <div>SUBSTRUCTURES</div> <div>SHEET 04 OF 21</div> <div>CONCRETE BALLAST WALL DETAILS FOR STEEL BRIDGES - SHEET 2</div> <div>DWG #: STD-EC-050-04</div> |
|--|----------|---------------|-------------------------------|----------------------------|-------------------------|---------------------------------|----------------------------|---|
| | 0 | APR. 1, 2014 | ORIGINAL DRAWING | E. FARJOO (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | J. HENLEY (ASSOC. ENG.) | H. DU (ASSOC. ENG.) | |
| | 1 | JAN. 27, 2022 | REMOVED LIFTING ANCHORS/LOOPS | N.HARVEY (CREEKSIDE) | M. PENNER (MINISTRY) | J. RUPAR GILLIATT (MINISTRY) | J. HENLEY (ASSOC. ENG.) | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |



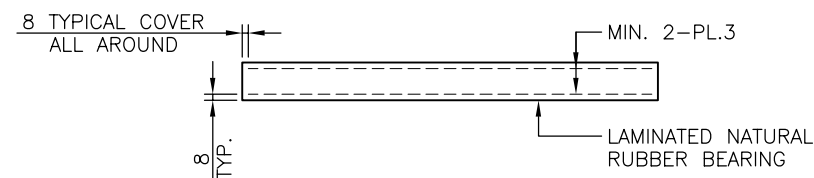
ABUTMENT ELEVATION DETAIL
1:50



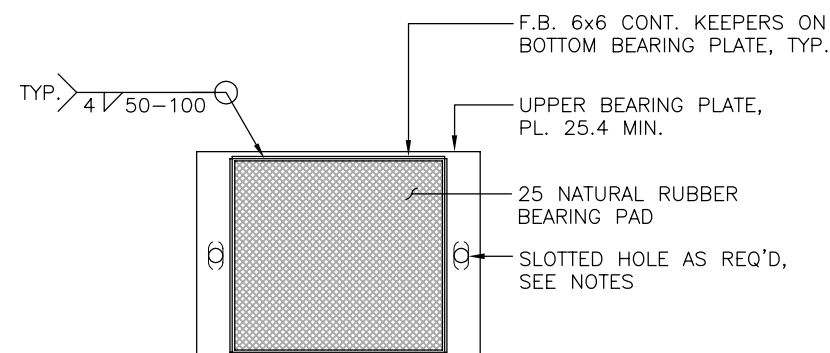
BEARING DETAIL
1:20



BEARING ON CONCRETE CAP DETAIL
1:20



CONCEPTUAL LAMINATED BEARING PAD
1:10
(WHERE SPECIFIED BY ENGINEER)

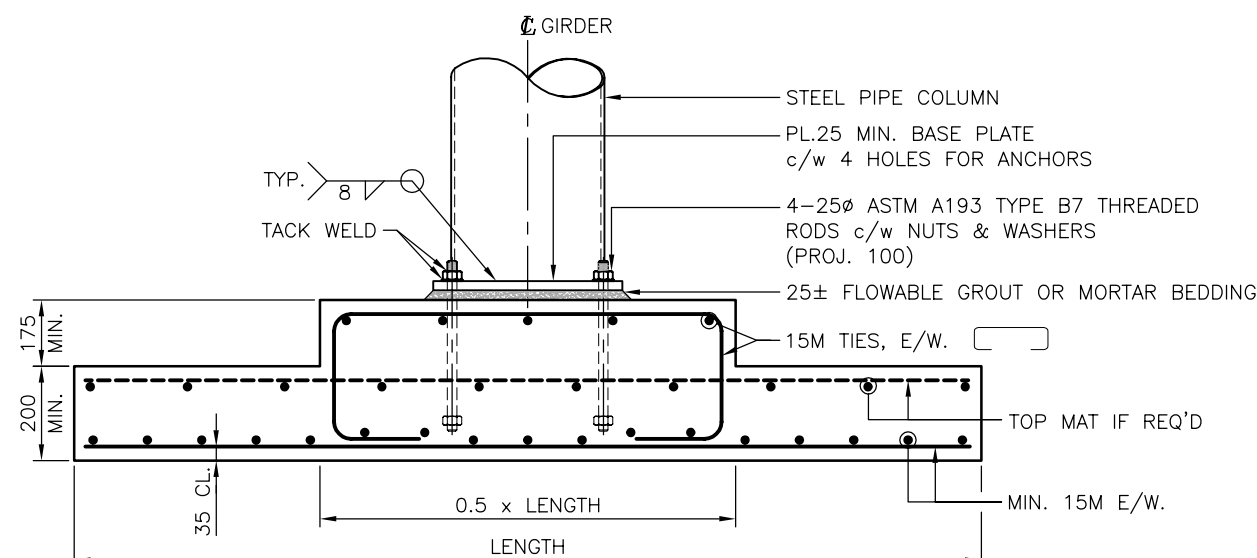


BEARING PLAN
1:20


ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

NOTES:

- ACCOMMODATE GRADES IN EXCESS OF 2% WITH A BEVEL PLATE OR SLOPED CAP BEAM.
- FOR SINGLE SPAN BRIDGE WITH OVERALL LENGTH LESS THAN 40m (130'), ACCOMMODATE LONGITUDINAL SUPERSTRUCTURE DEFORMATIONS THROUGH THE USE OF SLOTTED HOLES. AS A MINIMUM PROVIDE THE FOLLOWING:
 - OVERALL LENGTH < 24m (80') SLOTTED HOLES AT ONE ABUTMENT
 - 24m (80') <= OVERALL LENGTH <= 40m (130') SLOTTED HOLES AT BOTH ABUTMENTS.
 - OVERALL LENGTH > 40m (130') BEARING SHALL BE AS SPECIFIED BY THE ENGINEER TO ACCOMMODATE ANTICIPATED DEFORMATIONS AND TRANSLATIONS.
- THE DESIGN DRAWINGS SHOULD INCLUDE THE MAXIMUM APPLIED SERVICEABILITY LIMIT STATE COMBINATION 1 AND ULTIMATE LIMIT STATE STRESS FOR PRECAST CONCRETE FOOTINGS AND SERVICEABILITY LIMIT STATE COMBINATION 1 AND ULTIMATE LIMIT STATE LOADS FOR DRIVEN PILES.



PRECAST CONCRETE FOOTING DETAIL
1:20

| | | | | | |
|-------------------|---|--|--|--|--|
| DESIGN ENGINEER | <div>0246810 meters</div> <div><div></div><div></div><div></div><div></div><div></div></div> <div>02040 mm</div> <div>SCALE AS SHOWN</div> <div>BAR LENGTH IS 40mm ON ORIGINAL.</div> | | | <div><div><div>BRITISH COLUMBIA</div></div><div>Ministry of Forests, Lands and Natural Resource Operations</div><div>ENGINEERING BRANCH</div></div> | |
| | <div>Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u></div> <div>Drawn <u>ERFUM FARJOO</u> Date <u>14/04/01</u></div> | | | <div>STANDARD BRIDGE DRAWING</div> <div>DRAWING TITLE: CONCEPTUAL SUBSTRUCTURE DETAILS FOR STEEL BRIDGES</div> | |
| | <div><div>RevDateDESCRIPTIONInit</div><div>115/03/31REVISED NOTES & ADDED SLOTTED HOLES</div><div><div></div><div></div><div></div><div></div><div></div><div></div></div></div> | | | | |
| | <div><div></div><div></div><div></div><div></div><div></div><div></div></div> | | | <div>DESIGNED BY: HELEN DU, P.ENG.</div> <div>APPROVED BY:</div> | |
| | <div><div></div><div></div><div></div><div></div><div></div><div></div></div> | | | <div>COORDINATING REGISTERED PROFESSIONAL:</div> <div>FLNR ENGINEER:</div> | |
| PROFESSIONAL SEAL | <div>REVISIONS</div> | | | <div>FILE No.</div> <div>DRAWING No. STD-EC-050-05</div> | |


| FOOTING SELECTION FOR STEEL BRIDGES | | | | |
|-------------------------------------|--------------|--------|--------|--------|
| FOOTING TYPE | MAXIMUM SPAN | | | |
| | BCL-625 | L100 | L150 | L165 |
| S1 | 22 000 | 14 000 | | |
| S2 | 34 000 | 22 000 | 14 000 | 12 000 |
| S3 | 40 000 | 30 000 | 24 000 | 20 000 |
| S4 | | 40 000 | 32 000 | 30 000 |
| S5 | | | 40 000 | 40 000 |

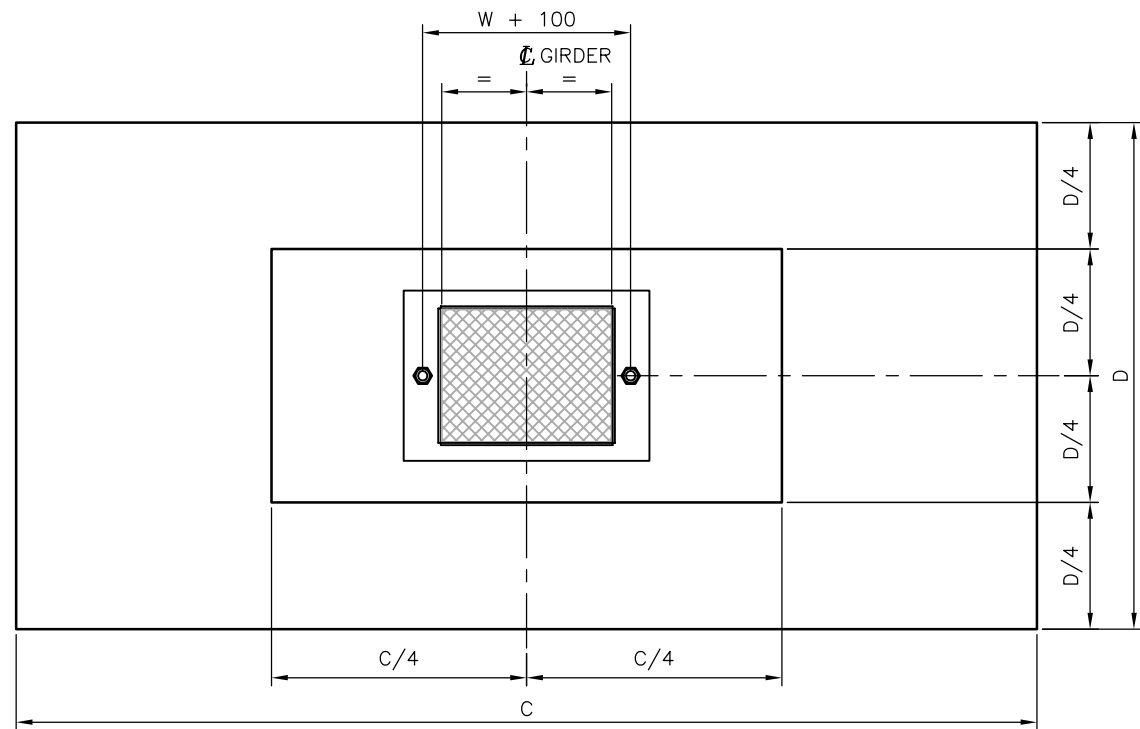
| FOOTING DIMENSIONS FOR STEEL BRIDGES | | | | | | | |
|--------------------------------------|--------------|-----|------|------|-----|---|--------|
| FOOTING TYPE | FOOTING SIZE | | | | | | WEIGHT |
| | A | B | C | D | E | F | (kg) |
| S1 | 175 | 200 | 900 | 1800 | 425 | 5 | 1960 |
| S2 | 175 | 250 | 1100 | 2100 | 475 | 5 | 3350 |
| S3 | 175 | 250 | 1200 | 2400 | 475 | 6 | 4310 |
| S4 | 200 | 250 | 1400 | 2700 | 500 | 6 | 5640 |
| S5 | 225 | 275 | 1600 | 3000 | 550 | 6 | 7775 |

| STEEL COLUMN SELECTION FOR STEEL BRIDGES | | | | | |
|--|-----------|--------------|--------|--------|--------|
| PIPE SIZE | | MAXIMUM SPAN | | | |
| DIAMETER | THICKNESS | BCL-625 | L100 | L150 | L165 |
| 323 | 9.53 | 34 000 | 20 000 | | |
| 406 | 9.53 | 40 000 | 32 000 | 20 000 | 14 000 |
| 406 | 12.7 | | 40 000 | 32 000 | 30 000 |
| 508 | 12.7 | | | 40 000 | 40 000 |
| BASED ON MAXIMUM COLUMN HEIGHT OF 4000 | | | | | |

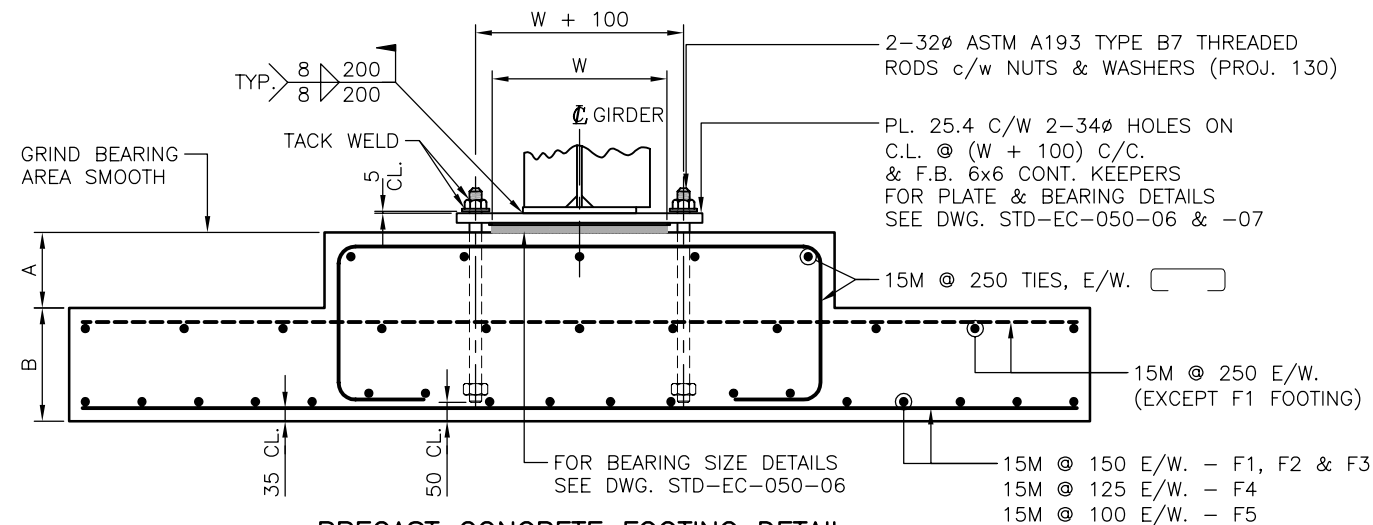
| RUBBER BEARING DIMENSIONS AND TOP BEARING PLATE THICKNESS FOR STEEL BRIDGES | | | | | | |
|---|--------------|------|--------------|--------|--------|--------|
| L (LENGTH) | W (WIDTH) | T | MAXIMUM SPAN | | | |
| | | | BCL-625 | L100 | L150 | L165 |
| 400 | 450 | 25.4 | 24 000 | 14 000 | | |
| 400 | 500 | 25.4 | 36 000 | 20 000 | 14 000 | |
| 450 | 500 | 25.4 | 40 000 | 28 000 | 18 000 | 14 000 |
| 450 | 550 | 25.4 | | 36 000 | 22 000 | 20 000 |
| 500 | 550 | 25.4 | | 40 000 | 28 000 | 24 000 |
| 500 | 600 | 31.8 | | | 34 000 | 32 000 |
| 550 | 600 | 31.8 | | | 40 000 | 38 000 |
| 550 | 650 | 31.8 | | | | 40 000 |

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

| | | | | | |
|-------------------|---|---|--|---------------------------------------|------------------------------|
| DESIGN ENGINEER | 0246810 meters |  <div>Ministry of Forests, Lands and Natural Resource Operations</div> | ENGINEERING BRANCH | | |
| | <div>02040 mm</div> SCALE AS SHOWN | | STANDARD BRIDGE DRAWING | | |
| | BAR LENGTH IS 40mm ON ORIGINAL. | | | | |
| | Checked JULIEN HENLEY Date 14/04/01 Drawn ERFUN FARJOO Date 14/04/01 | | | | |
| | RevDateDESCRIPTIONInit | | DRAWING TITLE: SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 2 | | |
| | | | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | | | FILE No. | DRAWING No. STD-EC-050-07 |
| PROFESSIONAL SEAL | REVISIONS | | | | |



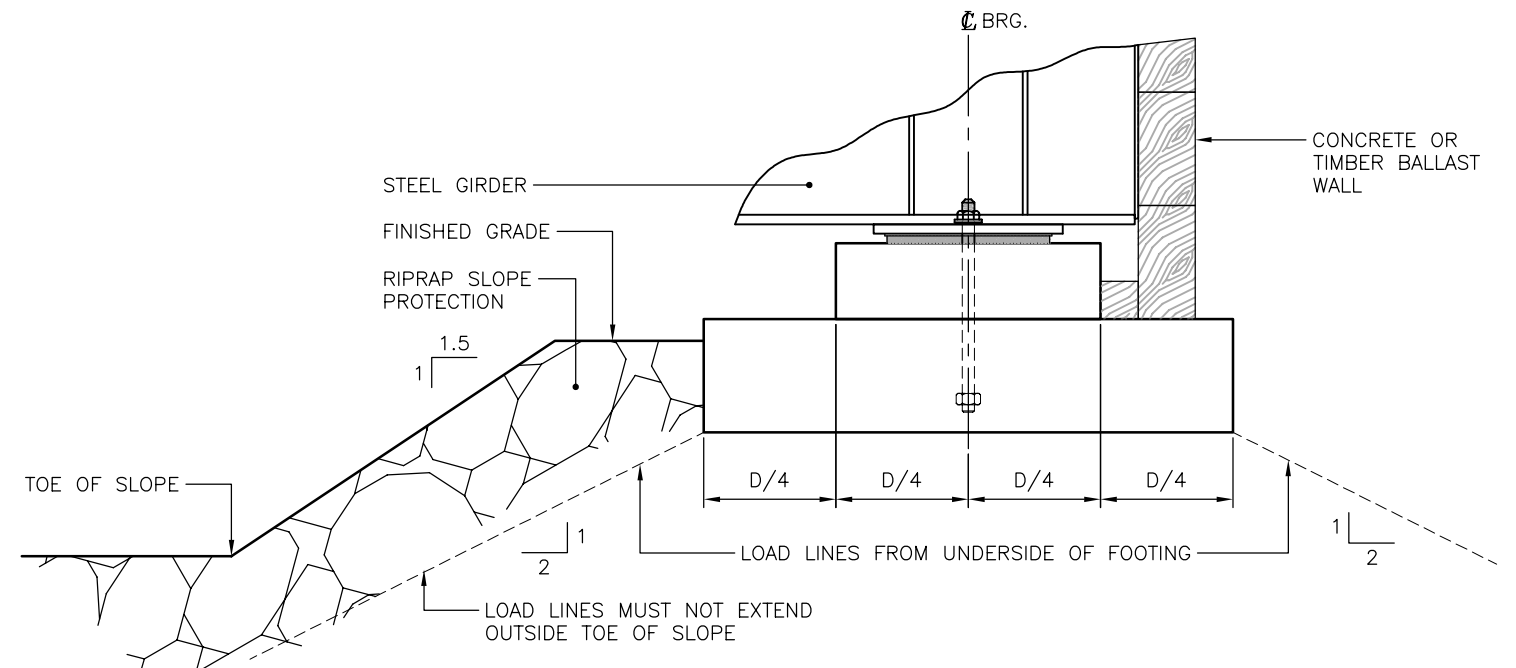
PRECAST CONCRETE FOOTING PLAN
1:20



PRECAST CONCRETE FOOTING DETAIL
1:20

| FOOTING DIMENSIONS | | | | | |
|--------------------|--------------|-----|------|------|--------|
| FOOTING TYPE | FOOTING SIZE | | | | WEIGHT |
| | A | B | C | D | kg |
| F1 | 175 | 250 | 2400 | 1200 | 2030 |
| F2 | 200 | 300 | 2700 | 1400 | 3180 |
| F3 | 225 | 350 | 2900 | 1500 | 4250 |
| F4 | 225 | 350 | 3200 | 1600 | 5000 |
| F5 | 225 | 350 | 3500 | 1800 | 6150 |

**ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION**




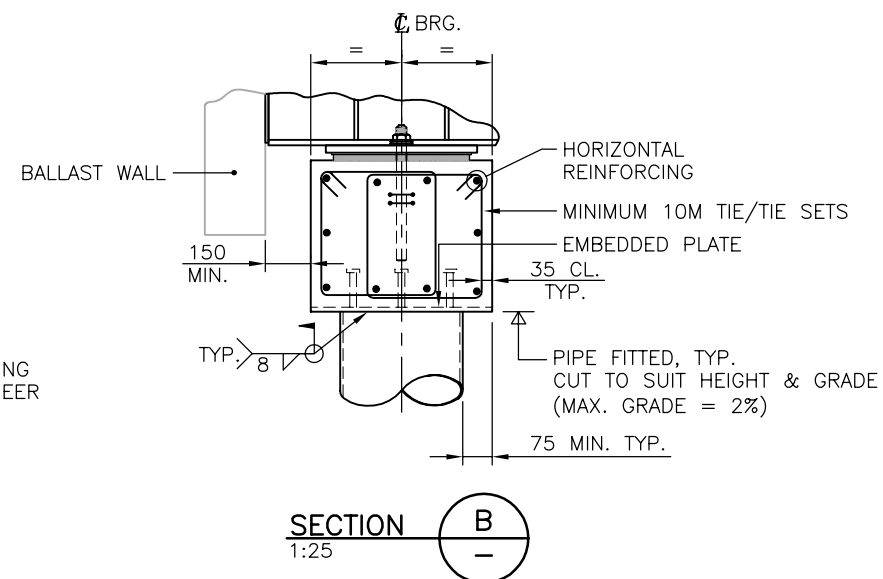
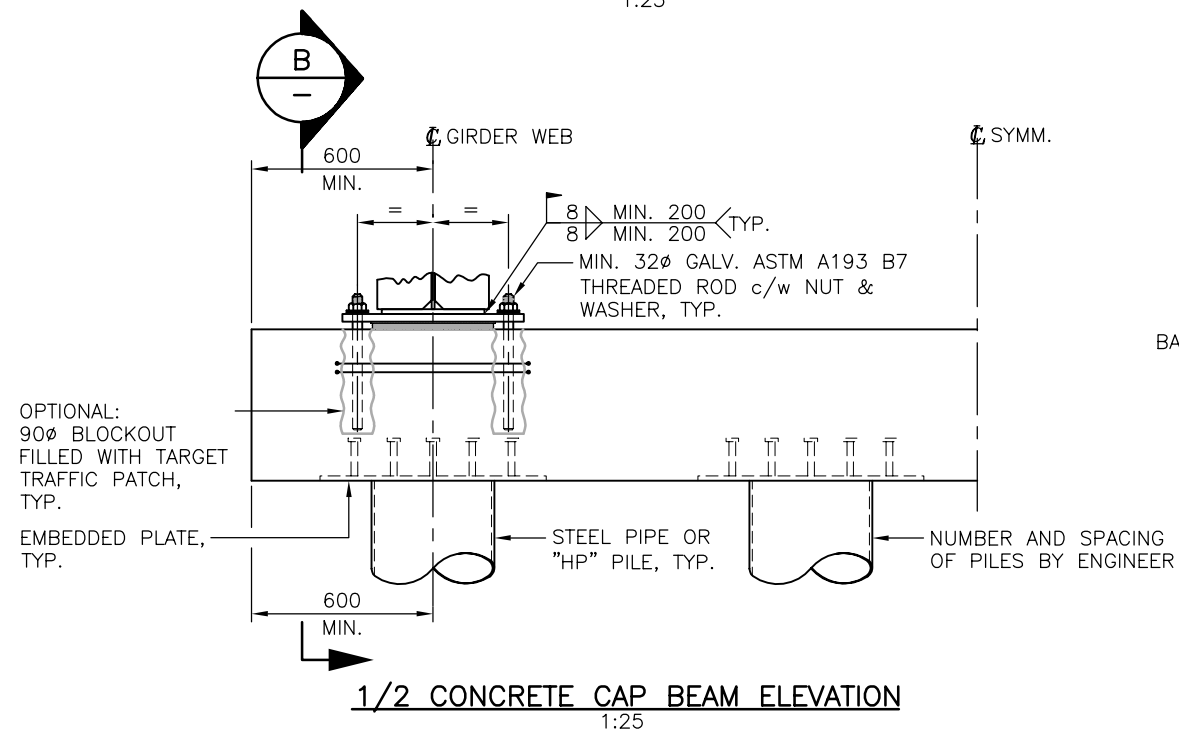
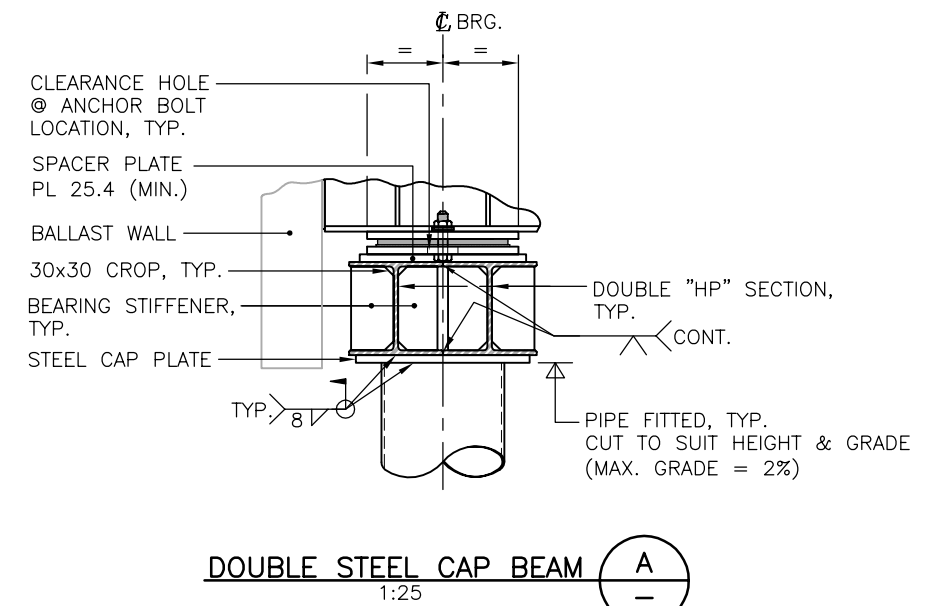
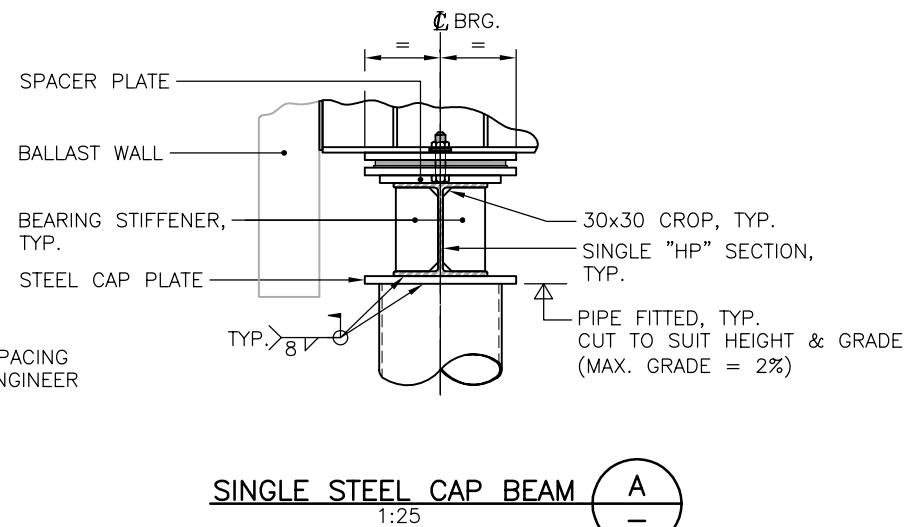
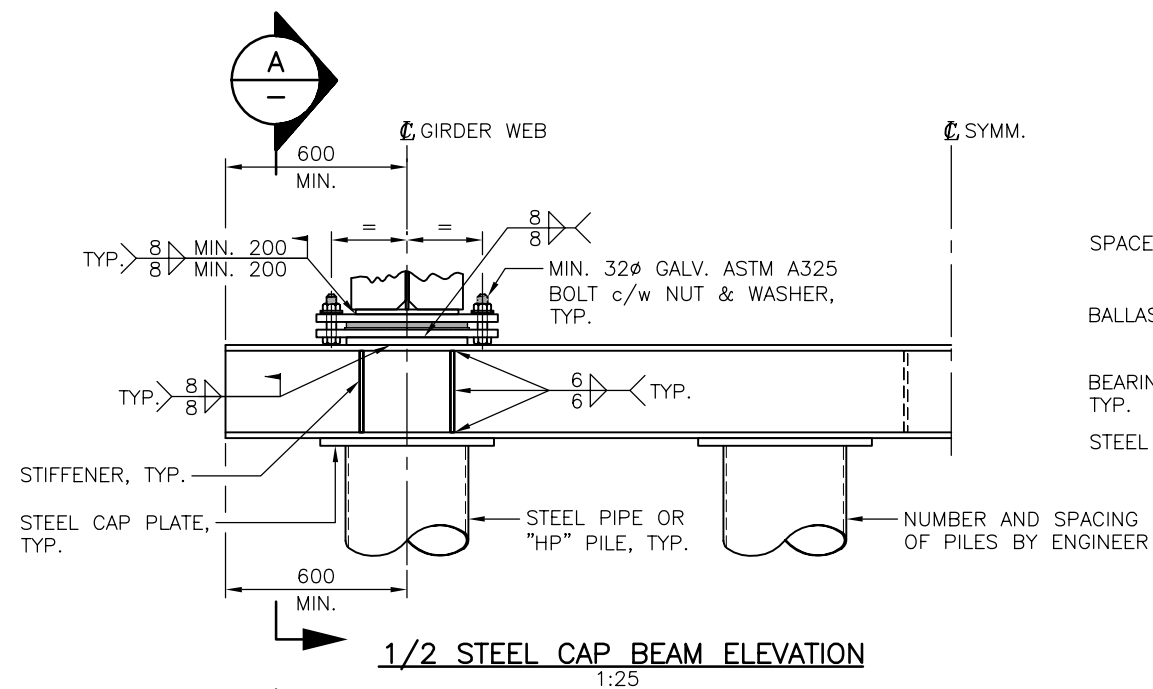
ABUTMENT ELEVATION
1:20

| FOOTING SELECTION | | | | |
|------------------------------------|--------------|--------|--------|--------|
| FOOTING TYPE | MAXIMUM SPAN | | | |
| | BCL-625 | L100 | L150 | L165 |
| F1 | 20 000 | 12 000 | | |
| F2 | 28 000 | 20 000 | 12 000 | 10 000 |
| F3 | 30 000 | 24 000 | 16 000 | 14 000 |
| F4* | | 28 000 | 22 000 | 18 000 |
| F5* | | 30 000 | 30 000 | 26 000 |
| *USE FOR 3600 GIRDERS CENTERS ONLY | | | | |

NOTES:

- FOOTINGS HAVE BEEN SIZED BASED ON THE ASSUMPTION THAT THE UNDERLYING FOUNDATION MATERIAL HAS THE ABILITY TO SUPPORT A MINIMUM 200 KPa SERVICEABILITY LIMIT STATES COMBINATION 1 STRESS IN ACCORDANCE WITH SECTION 3 AND 6 OF THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CAN/CSA-S6). WHERE THE UNDERLYING MATERIAL IS UNABLE TO SUPPORT THIS APPLIED STRESS, THE ENGINEER SHALL DESIGN THE SUBSTRUCTURE COMPONENTS BASED ON THE ASSESSED STRENGTH OF THE FOUNDATION MATERIALS OR DESIGN FOR AN ALTERNATIVE FOUNDATION SYSTEM SUCH AS DRIVEN PILES.
- THE DESIGN DRAWINGS SHOULD INCLUDE THE DESIGN MAXIMUM APPLIED SERVICEABILITY LIMIT STATES COMBINATION 1 AND ULTIMATE LIMIT STATE STRESSES FOR PRECAST CONCRETE FOOTINGS AND SERVICEABILITY LIMIT STATES COMBINATION 1 AND ULTIMATE LIMIT STATE LOADS FOR DRIVEN PILES.
- ACCOMMODATE GRADES IN EXCESS OF 2% WITH A BEVEL PLATE OR SLOPED CAP BEAM.

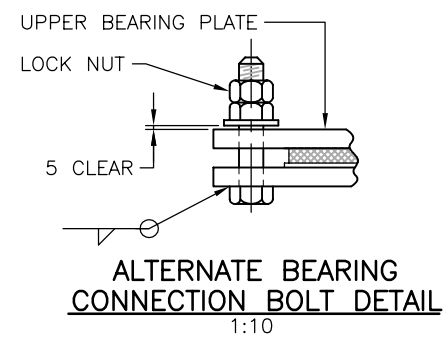
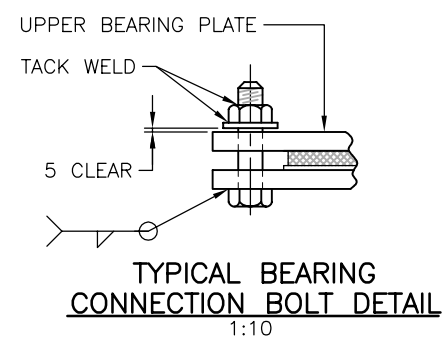
| | | | |
|-------------------|---|---|-------------------------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters |  Ministry of Forests, Lands and Natural Resource Operations | ENGINEERING BRANCH |
| | 0 20 40 mm | | |
| PROFESSIONAL SEAL | SCALE AS SHOWN BAR LENGTH IS 40mm ON ORIGINAL. | STANDARD BRIDGE DRAWING | |
| | Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u> | DRAWING TITLE: SUBSTRUCTURE DETAILS FOR STEEL BRIDGES - SHEET 3 | |
| | Rev Date DESCRIPTION Init | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | FILE No. | DRAWING No. STD-EC-050-08 |
| | REVISIONS | | 0 |




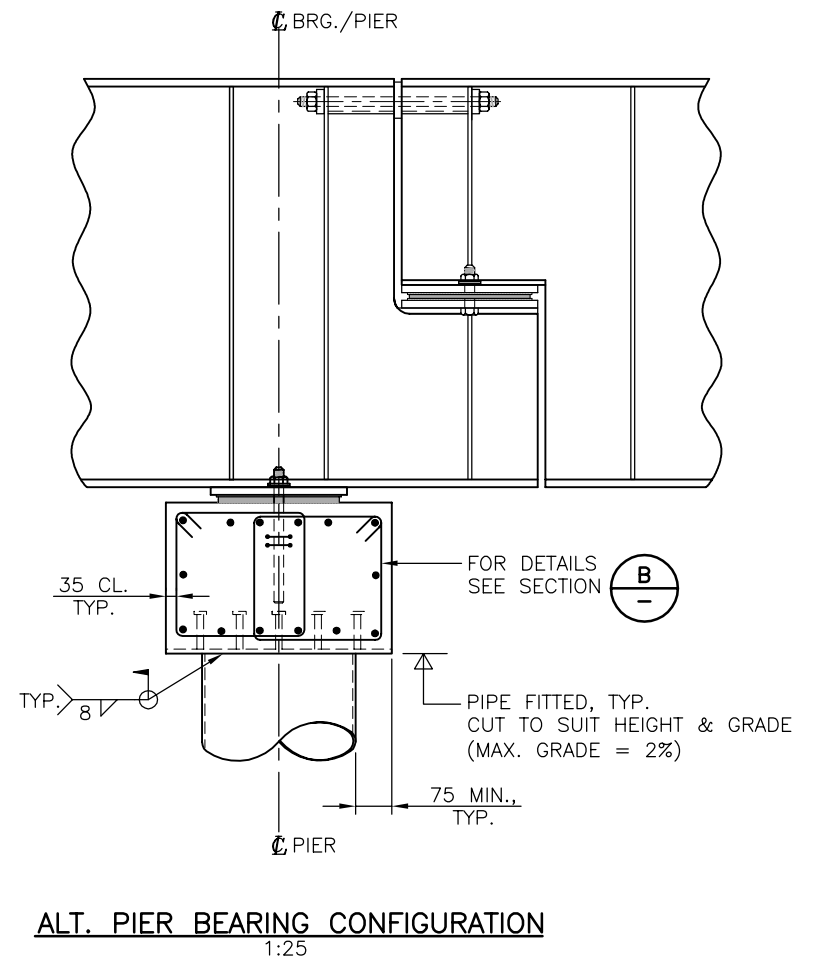
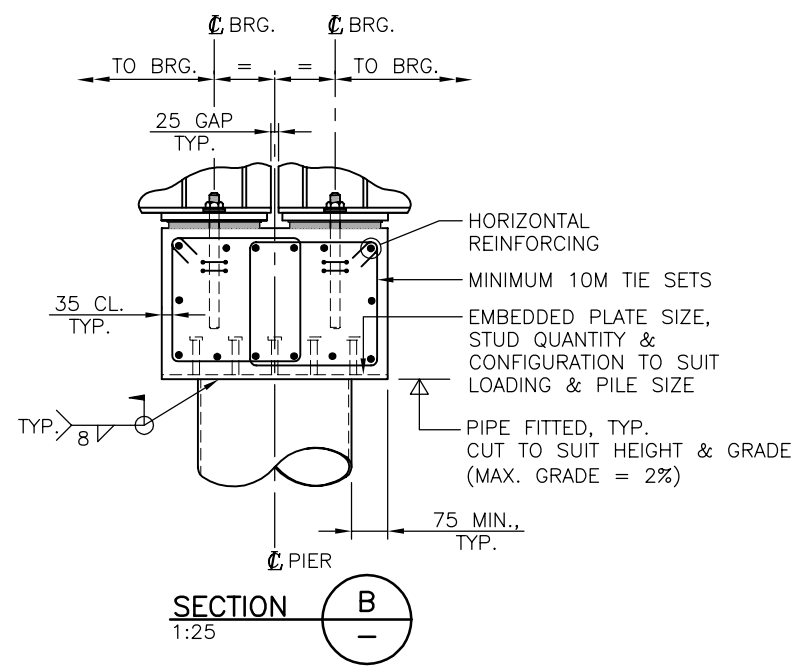
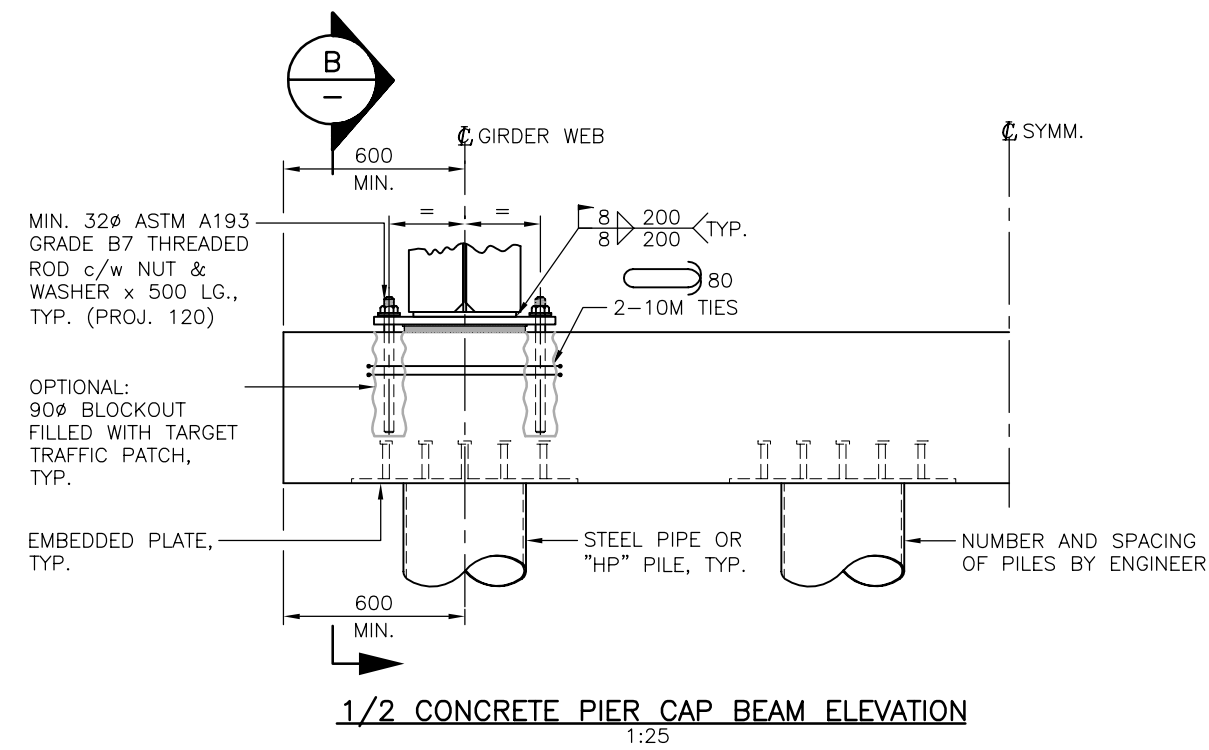
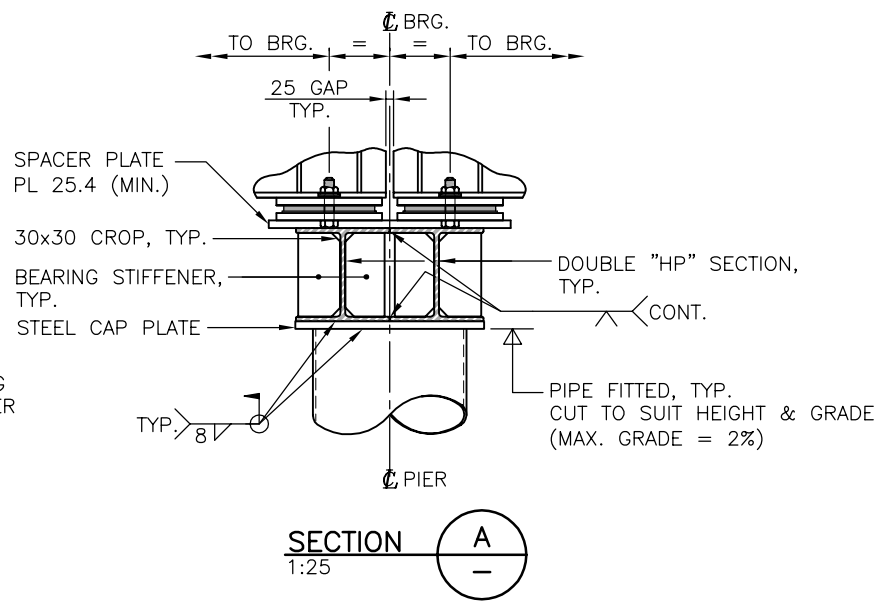
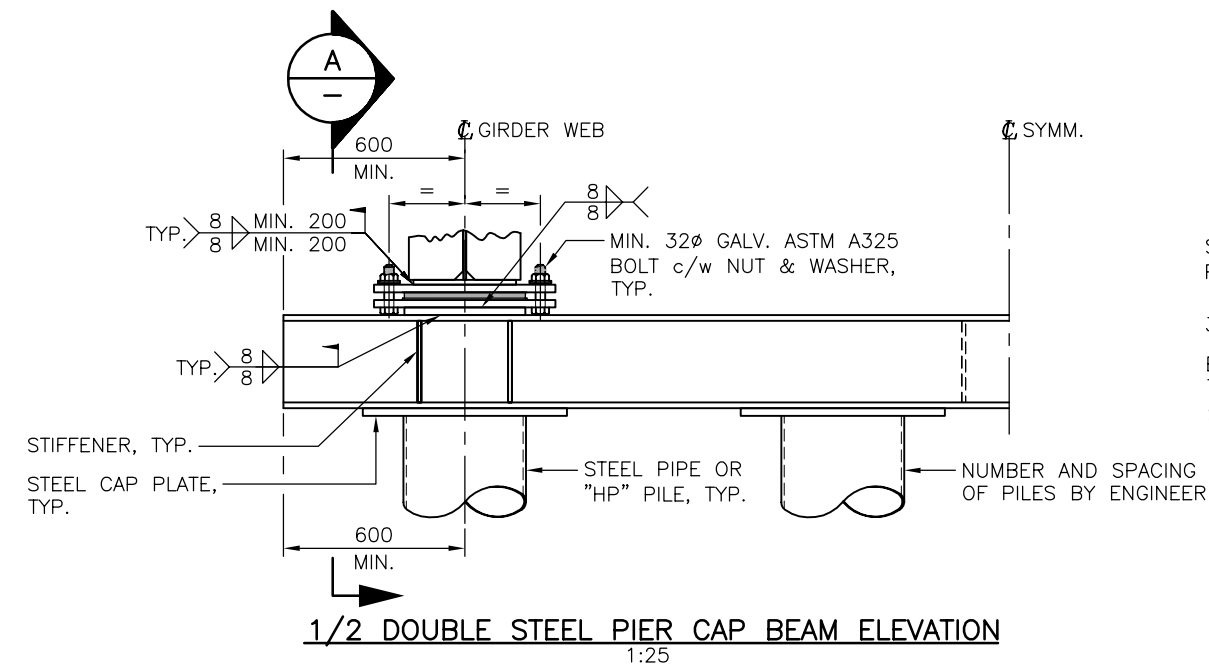
ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

NOTES:

1. ACCOMMODATE GRADES IN EXCESS OF 2% WITH A BEVEL PLATE OR SLOPED CAP BEAM.
2. SEE DWG. STD-EC-050-05 FOR BEARING DETAILS.




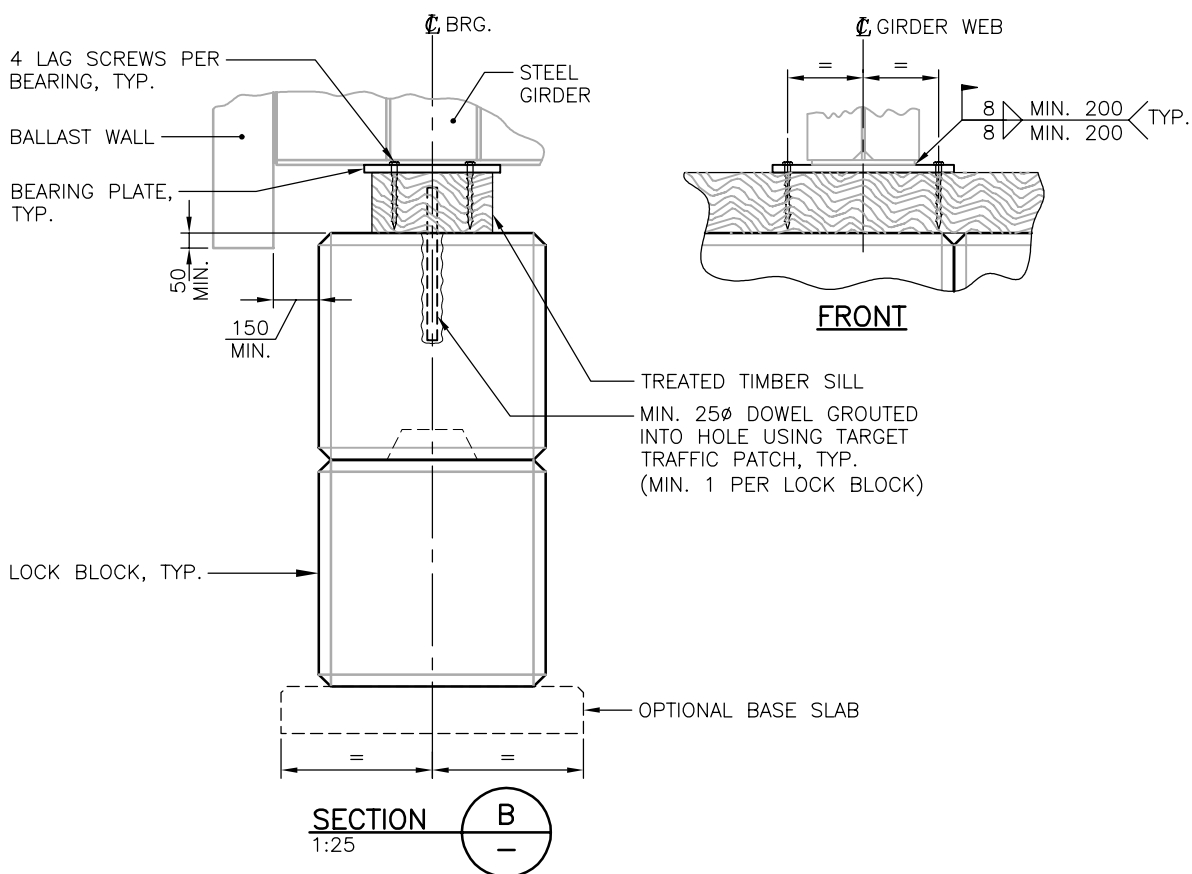
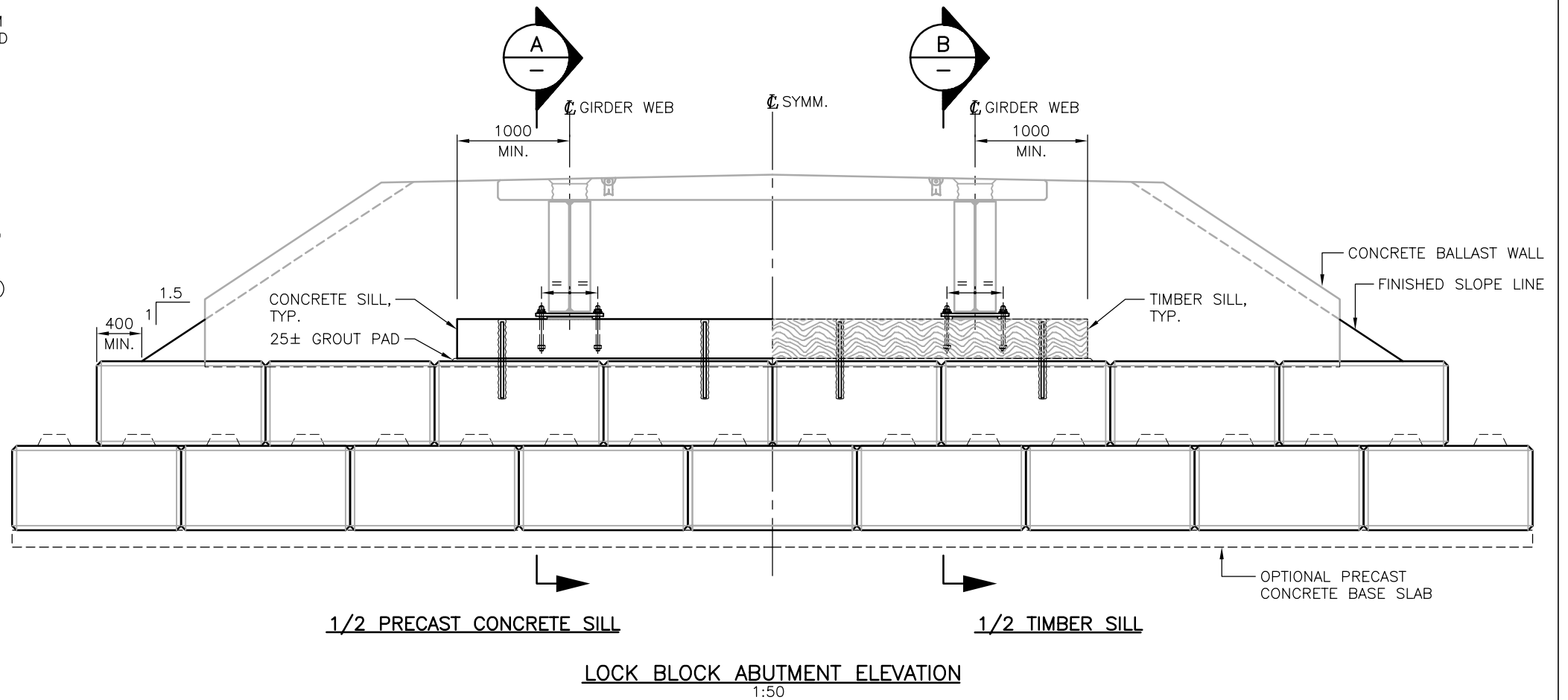
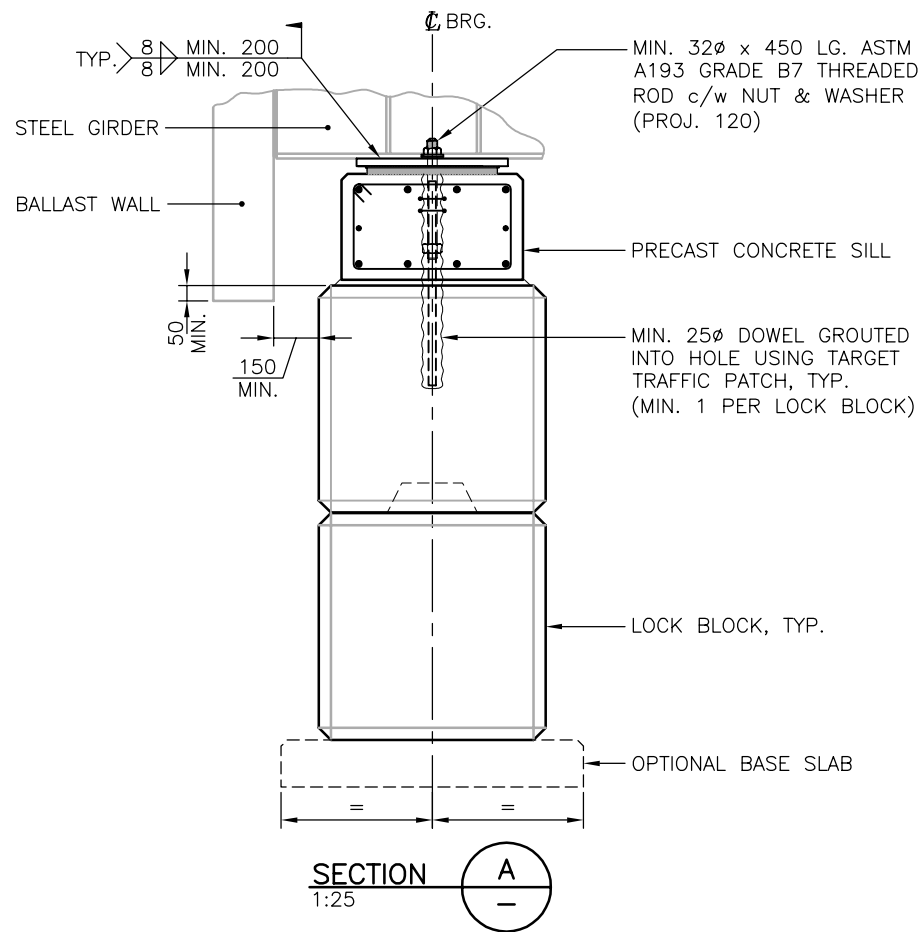
| DESIGN ENGINEER | <div>0246810 meters</div> <div><div></div><div></div><div></div><div></div></div> <div>02040 mm</div> <div>SCALE AS SHOWN</div> | | | | <div>BRITISH COLUMBIA</div> <div>Ministry of Forests, Lands and Natural Resource Operations</div> <div>ENGINEERING BRANCH</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|--|----------|---------------|---|--|------|-------------|------|---|----------|---------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|
| | BAR LENGTH IS 40mm ON ORIGINAL. | | | | STANDARD BRIDGE DRAWING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFJUN FARJOO</u> Date <u>14/04/01</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table><tr><th>Rev</th><th>Date</th><th>DESCRIPTION</th><th>Init</th></tr><tr><td>1</td><td>15/03/31</td><td>REVISED NOTES</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table> | | | | Rev | Date | DESCRIPTION | Init | 1 | 15/03/31 | REVISED NOTES | | | | | | | | | | | | | | | | | | | | | | DRAWING TITLE: CONCEPTUAL ABUTMENT CAP FOR STEEL BRIDGES | |
| | Rev | Date | DESCRIPTION | Init | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 15/03/31 | REVISED NOTES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | DESIGNED BY: HELEN DU, P.ENG. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | COORDINATING REGISTERED PROFESSIONAL: FLNR ENGINEER: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | FILE No. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | DRAWING No. STD-EC-050-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REVISIONS | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PROFESSIONAL SEAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



- NOTES:**
1. FOR BEARING CONNECTION BOLT DETAIL SEE DWG: STD-EC-050-09
 2. ACCOMMODATE GRADES IN EXCESS OF 2% WITH A BEVEL PLATE OR SLOPED CAP BEAM.
 3. BEARINGS SHALL BE SPECIFIED BY THE ENGINEER TO ACCOMMODATE ANTICIPATED DEFORMATION AND TRANSLATIONS.

**ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION**

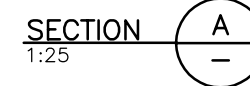
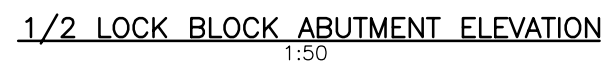
| | | | | |
|-------------------|--|-------------------|---|-------------------------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters | SCALE AS SHOWN |  Ministry of Forests, Lands and Natural Resource Operations | ENGINEERING BRANCH |
| | 0 20 40 mm | | | |
| PROFESSIONAL SEAL | BAR LENGTH IS 40mm ON ORIGINAL. Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u> | | STANDARD BRIDGE DRAWING | |
| | Rev Date DESCRIPTION Init 1 15/03/31 REVISED NOTES | | DRAWING TITLE: CONCEPTUAL PIER CAP FOR STEEL BRIDGES | |
| | | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | | FILE No. | DRAWING No. STD-EC-050-10 |
| | REVISIONS | | 1 | |



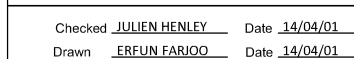
ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

NOTE:
1. SEE DWG. STD-EC-050-05 FOR BEARING DETAILS.

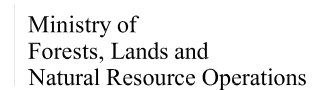
| | | | | | |
|-------------------|--|--|--|---|--|
| DESIGN ENGINEER | <div>0246810 meters</div> <div><div><div></div><div></div><div></div><div></div><div></div></div></div> <div>02040 mm</div> <div>SCALE AS SHOWN</div> <div>BAR LENGTH IS 40mm ON ORIGINAL.</div> | | | <div><div><div><div></div><div>BRITISH COLUMBIA</div></div><div>Ministry of Forests, Lands and Natural Resource Operations</div></div><div>ENGINEERING BRANCH</div></div> | |
| | <div>Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u></div> <div>Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u></div> | | | <div>STANDARD BRIDGE DRAWING</div> | |
| | <div>RevDateDESCRIPTIONInit</div> <div>115/03/31REVISED NOTES</div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> | | | <div>DRAWING TITLE:</div> <div>CONCEPTUAL LOCK BLOCK ABUTMENT FOR STEEL BRIDGES</div> | |
| | | | | <div>DESIGNED BY:</div> <div>HELEN DU, P.ENG.</div> | |
| | | | | <div>COORDINATING REGISTERED PROFESSIONAL:</div> <div>FLNR ENGINEER:</div> | |
| PROFESSIONAL SEAL | <div>REVISIONS</div> | | | <div>FILE No.</div> <div>DRAWING No.</div> <div>STD-EC-050-11</div> | |
| | | | | <div>1</div> | |



DESIGN ENGINEER



REVISIONS

ENGINEERING
BRANCH

DRAWING TITLE:
CONCEPTUAL LOCK BLOCK ABUTMENT FOR ASP BRIDGES

| | |
|--------------|------------------|
| DESIGNED BY: | HELEN DU, P.ENG. |
|--------------|------------------|

APPROVED BY:

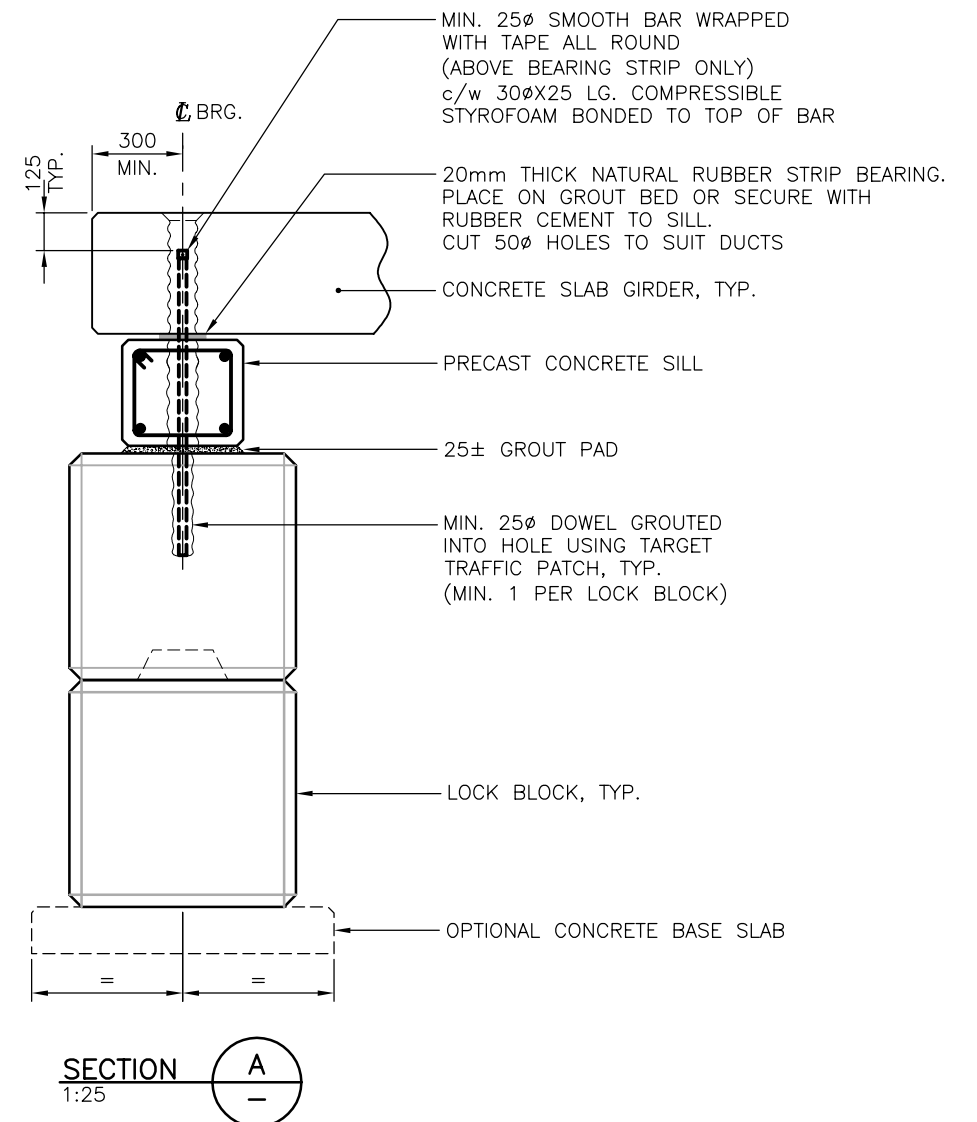
COORDINATING REGISTERED PROFESSIONAL:

FLNR ENGINEER:

| | |
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| FILE No. | |
|----------|--|

DRAWING No.
STD-EC-050-12

PROFESSIONAL SEAL



ANCEL PRINTS BEARING
ORIGINAL LETTER

Technical drawing of a bridge deck cross-section showing the connection between a wing wall and the main deck. The drawing includes dimensions and labels for various components:

- Wing Wall:** A trapezoidal structure on the left. Its height is labeled C . The top horizontal edge has a slope of 1.5 vertical to 1 horizontal. A circular detail 'B' is shown at the top corner.
- Deck Slab:** The main horizontal structure. Its total thickness is labeled $C = \text{SLAB THICKNESS} + 20\text{mm, TYP.}$. A circular detail 'A' is shown on the top surface.
- Field Installed Compressible Filler:** Indicated by a wavy line between the wing wall and the main deck. A label points to it: "FIELD INSTALLED COMPRESSIBLE FILLER (E.G. EVAZOTE) TO FILL VERTICAL GAP BETWEEN WINGWALL AND EXTERIOR SLAB. GLUE TO CONCRETE."
- Dimensions:**
 - A horizontal dimension of 750 MIN. is shown from the wing wall face to the start of the filler.
 - Two horizontal dimensions of $\frac{1}{2} (\text{TOTAL SLABS} + \text{GAPS WIDTH}) + 50$ (2800 MAXIMUM) are shown, centered on the filler area.
 - A vertical dimension of 25 TYP. is shown for the filler layer.
 - A vertical dimension of 350 MIN. is shown for the total deck height.
- Other Labels:**
 - "EXTEND CAP BEAM INTO WING WALL AS REQ'D TO ACCOMMODATE LIFTING, HANDLING AND EARTH FORCES."
 - "25± GROUT BED IF REQ'D TO ENSURE EVEN BEARING ON ABUTMENT BLOCKS"
 - "CORRUGATED PIPE BLOCKOUT, TYP."
 - "RUBBER BEARING STRIP"

Technical drawings of bridge sills, showing Section B (left) and Section A (right).

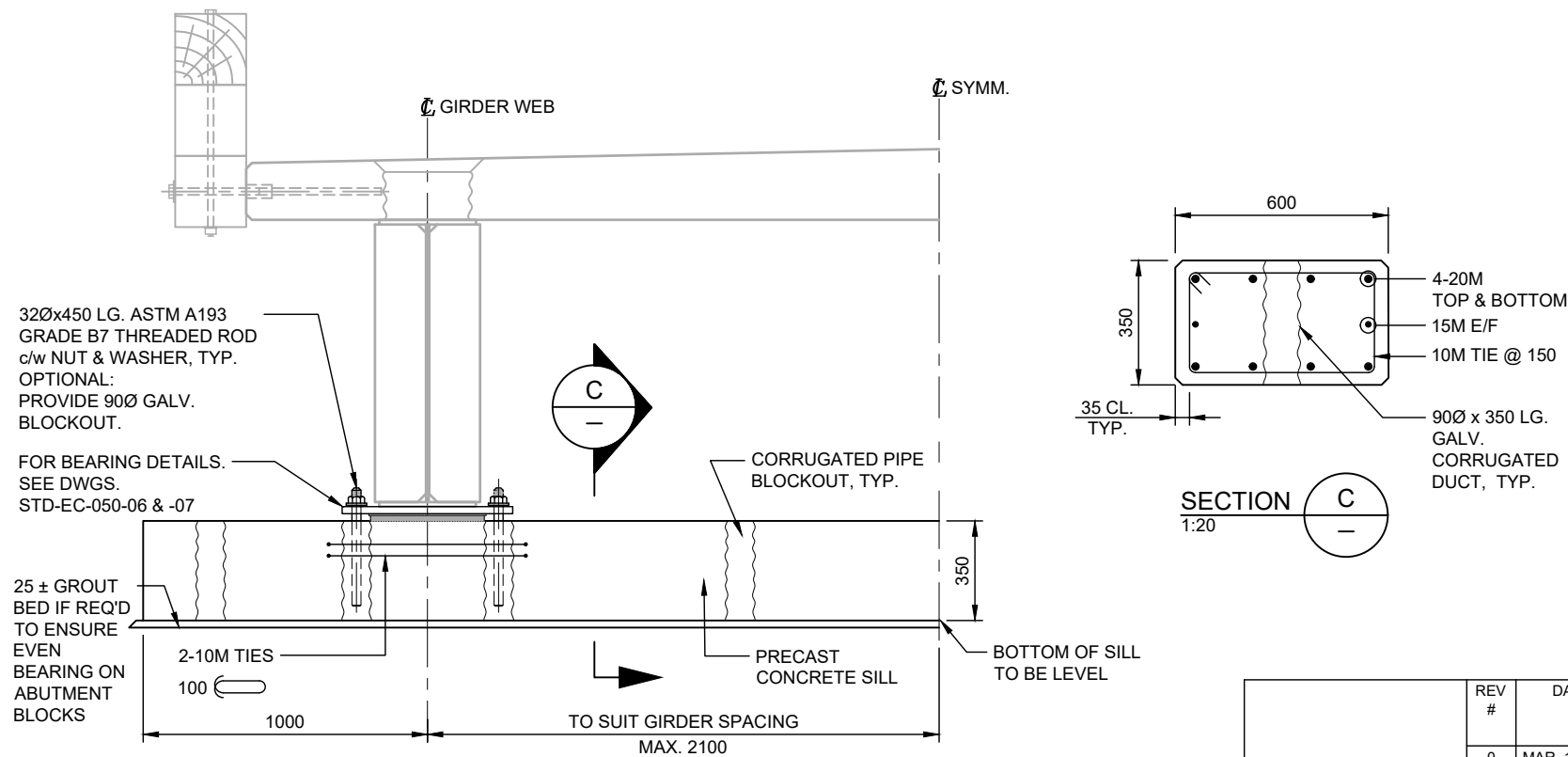
Section B (Left):

- CONCRETE SLAB, TYP.
- 35 CL. TYP.
- 200 MIN.
- MIN. 15M @ 150 E/F
- 150 MAX. SPACE E/F
- LOWER WINGWALL HORIZ. REINFORCEMENT TO BE CONTINUATION OF SILL REINFORCEMENT AND/OR REINFORCEMENT SUFFICIENTLY PROJECTING INTO SILL. (MIN. 15M @ 150 E/F; MIN. PROJ. INTO SILL = 700MM)
- MIN. 15M @ 250
- TOP OF SILL TO BE CAST SLOPED TO MATCH BRIDGE DECK LONGIT. GRADE
- 400 MIN.
- BOTTOM OF SILL TO BE LEVEL
- SECTION B
- 1:20

Section A (Right):

- MIN. 150 x 20 FULL WIDTH NATURAL RUBBER STRIP BEARING. PLACE ON DURABLE GROUT BED OR SECURE WITH RUBBER CEMENT TO SILL. CUT 50Ø HOLES AT DUCT LOCATIONS.
- 350 MIN.
- MIN. 2-25M TOP & BOTTOM
- MIN. 15M E/F
- MIN. 10M TIE @ 150
- 90Ø GALV. CORRUGATED DUCT, TYP. @ DOWEL LOCATIONS
- 35 CL. TYP.
- 400 MIN.
- SECTION A
- 1:20

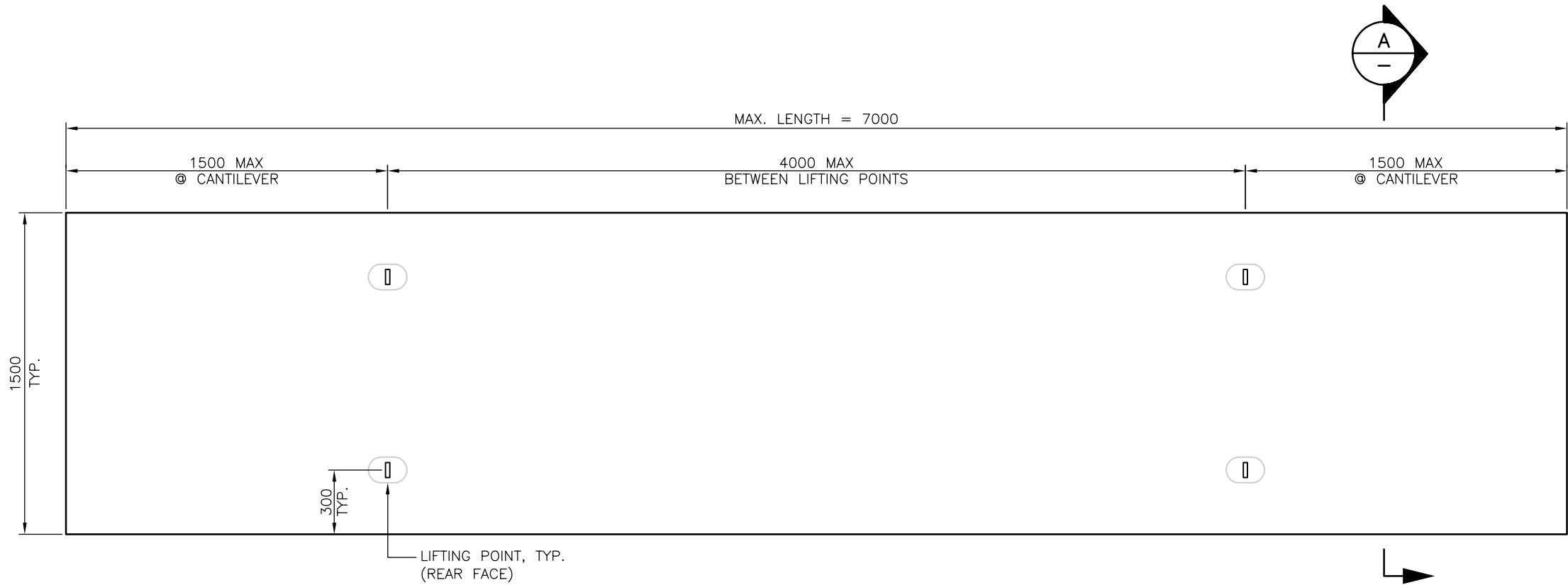
1. THE ENGINEER SHALL DESIGN THE WINGWALLS TO RESIST EARTH PRESSURE FORCES.
2. LIFTING DEVICES AND LIFTING PROCEDURES TO BE DETERMINED BY ENGINEER AND SHOWN ON THE DETAILED DESIGN DWGS.
3. NUMBER AND LOCATION OF GALV. CORRUGATED BLOCKOUTS SHALL SUIT LAYOUT OF SLAB GIRDERS, STEEL GIRDERS, SILLS, CONCRETE BLOCKS AND BEARING ASSEMBLIES AND SHALL BE AS PER THE FOLLOWING:
 - MIN. ONE BLOCKOUT ABOVE EACH CONCRETE BLOCK, WITH MATCHING HOLE IN BLOCK TO BE LOCATED > 250 FROM BLOCK EDGES AND > 250 FROM LIFTING CABLE AT CENTER OF BLOCK.
 - LOCATION AND MIN. NUMBER OF BLOCKOUTS (FOR DOWELS TO CONNECT SLAB GIRDERS TO SILLS) SHALL BE AS PER GENERAL NOTES STD-EC-070-01.



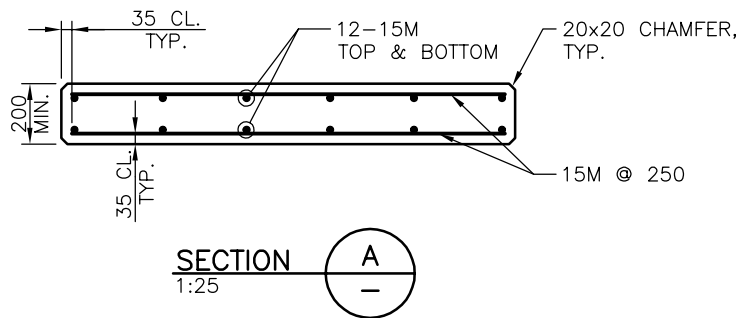
NOTE:
- BEARING PLATE TO BE BEVELED OR TOP OF SILL TO BE CAST SLOPED TO MATCH BRIDGE LONGITUDINAL GRADE.

[illegible]

NOT FOR CONSTRUCTION
ASSUME NOT TO SCALE




PRECAST CONCRETE BASE SLAB PLAN
1:25

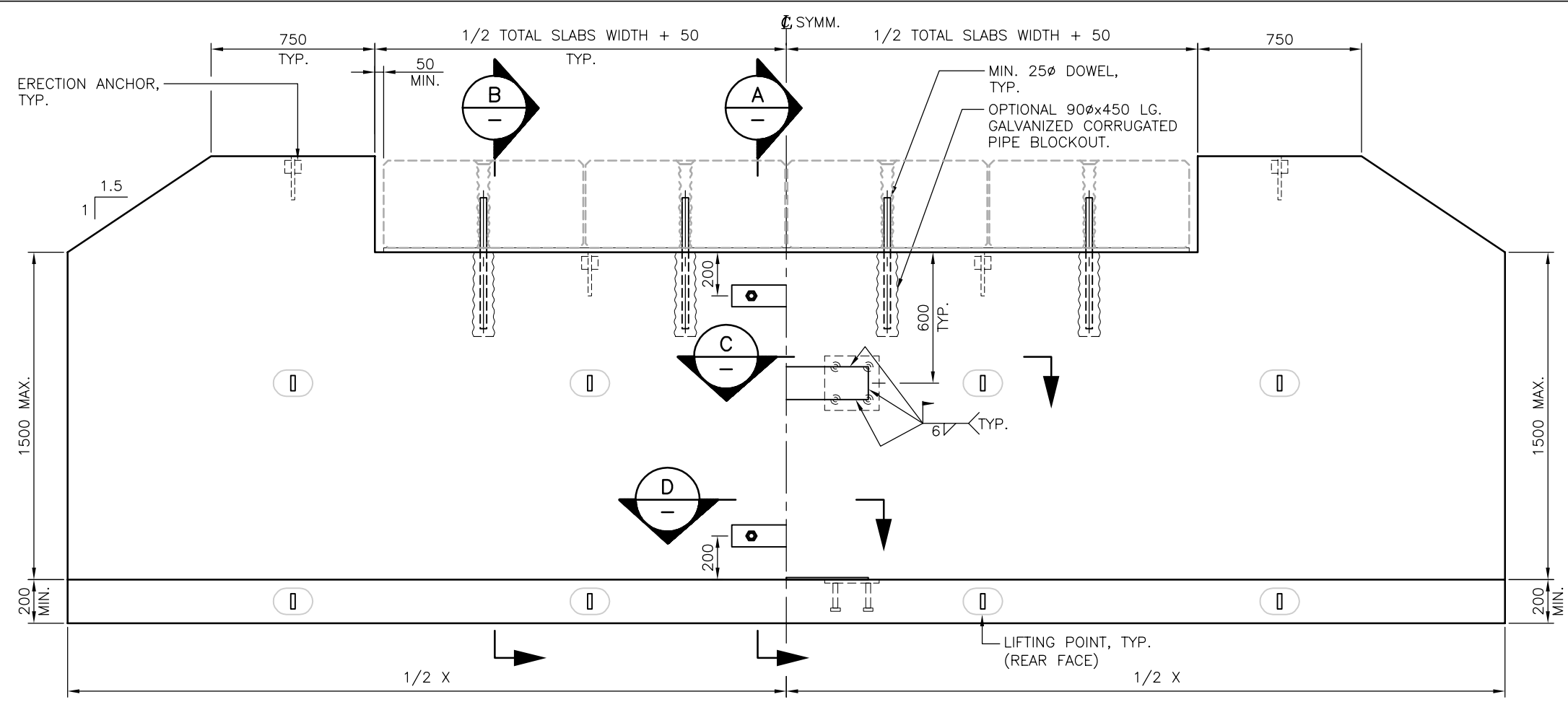


**ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION**

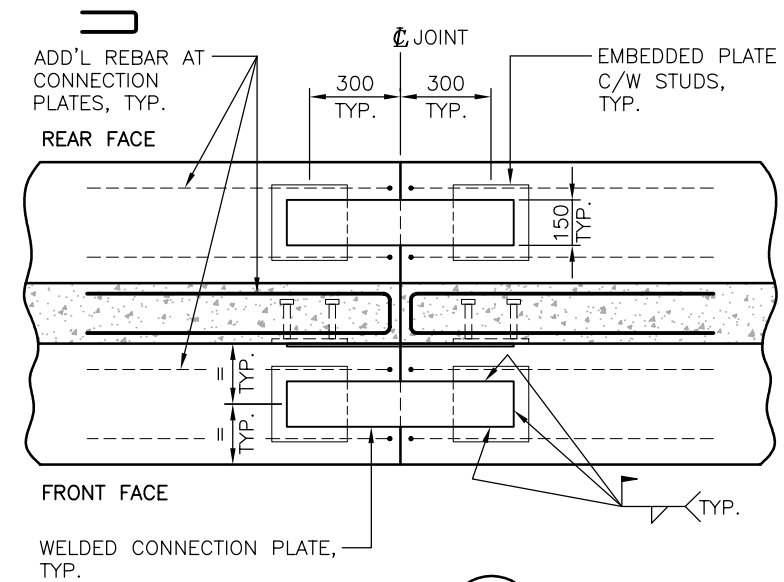
NOTES:

1. PRECAST CONCRETE BASE SLAB IS OPTIONAL AS PRESCRIBED BY ENGINEER. FOR USE WITH LOCK BLOCK ABUTMENT, REFER TO DWG. STD-EC-050-11 THRU STD-EC-050-13.
2. INSTALL LIFTING DEVICES AS REQUIRED.
3. NUMBER AND LENGTH OF PRECAST BASE SLAB SPECIFIED IN CONTRACT DOCUMENTS.

| | | | | | | |
|-------------------|---|-------------------|--|-----------------------|---------------------------------------|----------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters | SCALE AS SHOWN |  Ministry of Forests, Lands and Natural Resource Operations | ENGINEERING BRANCH | | |
| | 0 20 40 mm | | | | | |
| PROFESSIONAL SEAL | BAR LENGTH IS 40mm ON ORIGINAL. | | STANDARD BRIDGE DRAWING | | | |
| | Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u> | | DRAWING TITLE: PRECAST CONCRETE BASE SLAB DETAILS (OPTIONAL FOR USE WITH LOCK BLOCK ABUTMENT) | | | |
| | Rev | Date | DESCRIPTION | Init | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | | | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | | | | FILE No. | DRAWING No. |
| | | | | | | |
| | | | | | | |
| | REVISIONS | | STD-EC-050-15 | | | |



| ABUTMENT SCHEDULE | | | |
|-------------------|-----------------------|---------|---------------|
| | | WALL | CONNECTION |
| X | $X \leq 6500$ | 1 PIECE | N/A |
| | $6500 < X \leq 10000$ | 2 PIECE | WELDED/BOLTED |



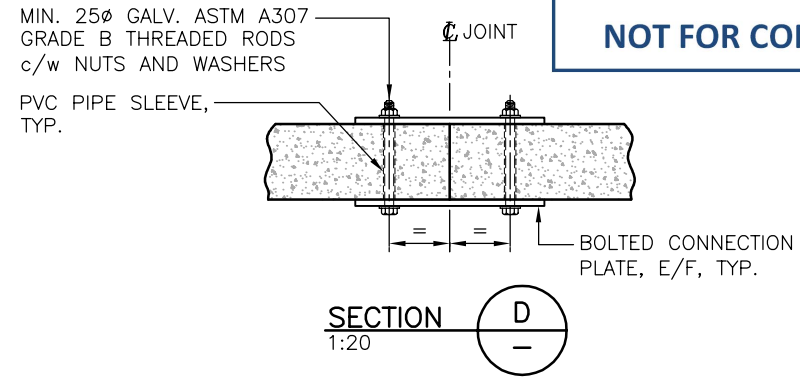
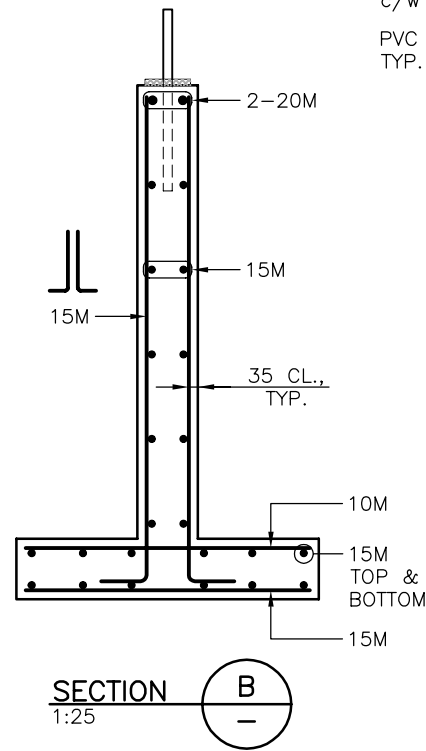
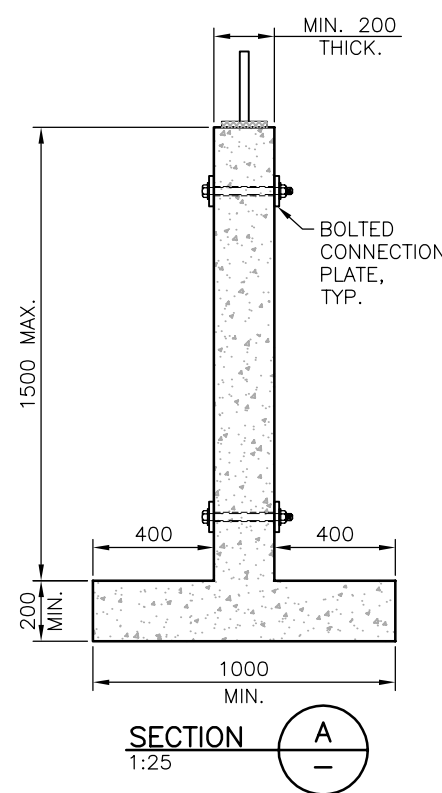
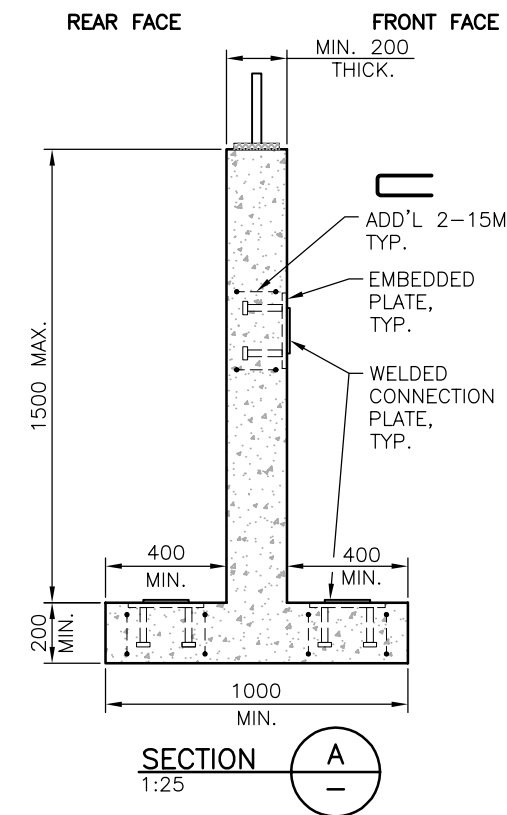
1/2 BOLTED CONN.

1/2 WELDED CONN.


ABUTMENT ELEVATION
1:25

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

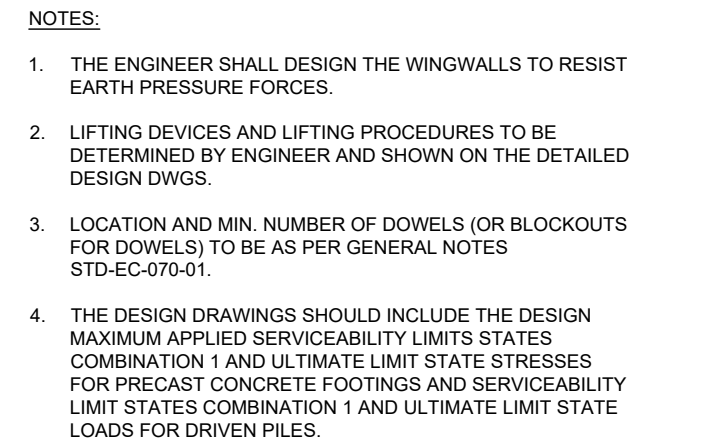
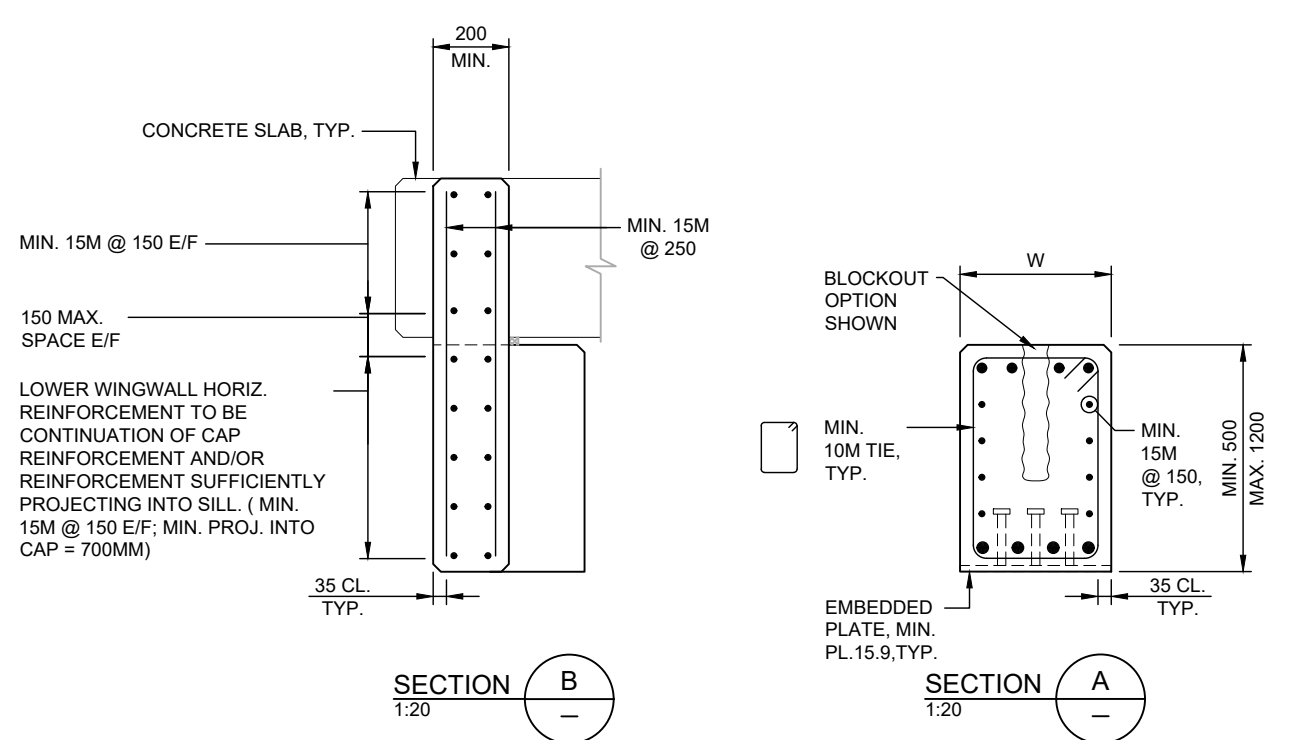
SECTION C
1:25



- NOTES:
1. ENSURE SUFFICIENT LIFTING DEVICES INSTALLED TO FACILITATE FABRICATION AND ERECTION.
 2. DOWELS WHERE SPECIFIED BY ENGINEER, MINIMUM 2 DOWELS PER ABUTMENT.
 3. FOOTING BASE MUST BE BELOW CHANNEL GRADE.
 4. THE DESIGN DRAWINGS SHOULD INCLUDE THE DESIGN MAXIMUM APPLIED SERVICEABILITY LIMIT STATES COMBINATION 1 AND ULTIMATE LIMIT STATE STRESSES. LIMIT SERVICEABILITY LIMIT STATES COMBINATION 1 STRESSES TO MAXIMUM 200 KPa.

| | | | | |
|-------------------|---|---------------------------------|--|------------------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters | SCALE AS SHOWN |  Ministry of Forests, Lands and Natural Resource Operations | ENGINEERING BRANCH |
| | 0 20 40 mm | | | |
| PROFESSIONAL SEAL | Checked JULIEN HENLEY Date 14/04/01 Drawn EREUN FARJOO Date 14/04/01 | BAR LENGTH IS 40mm ON ORIGINAL. | STANDARD BRIDGE DRAWING | |
| | Rev Date DESCRIPTION Init | | DRAWING TITLE: CONCEPTUAL INVERTED "T" ABUTMENT DETAILS | |
| | | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | | FILE No. | DRAWING No. STD-EC-050-16 |
| | | REVISIONS | | 0 |

CANCEL PRINTS BEARING PREVIOUS LETTER

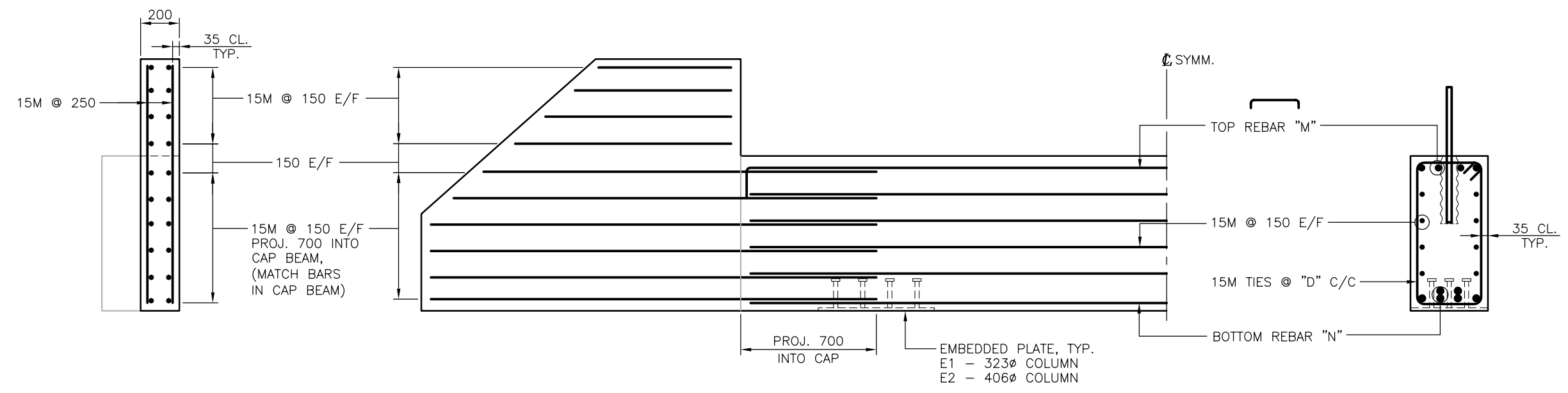


| PIPE/COLUMN DIA. | *W MIN. |
|------------------|---------|
| 323 | 400 |
| 406 | 500 |
| 508 | 600 |

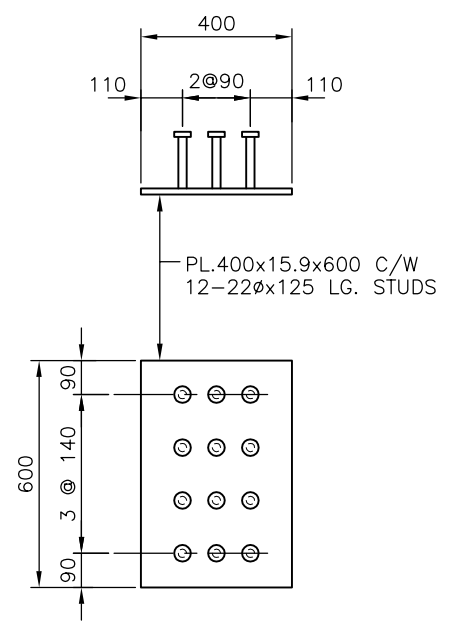
*CONSIDER SPECIFYING WIDER CAPS FOR FOUNDATIONS WITH 3 OR MORE PILES PER ABUTMENT TO ACCOMMODATE POSSIBLE PILE MISALIGNMENT.

[illegible]

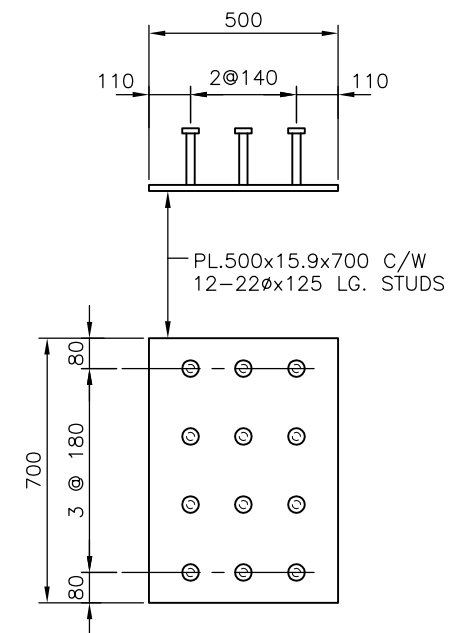
**NOT FOR CONSTRUCTION
ASSUME NOT TO SCALE**



1/2 CAP BEAM/WINGWALL REINFORCEMENT DETAIL
1:25



EMBEDDED PLATE E1 DETAIL
1:20



EMBEDDED PLATE E2 DETAIL
1:20

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

NOTE:
1. FOR REINFORCING DETAILS REFER TO DWG. STD-EC-050-20

| | | | | | | | | |
|-------------------|---|--|--|---------------------------------------|---|----------------|--------------|--|
| DESIGN ENGINEER | <div>0246810 meters</div> <div><div></div><div></div><div></div><div></div><div></div></div> <div>02040 mm</div> <div>SCALE AS SHOWN</div> | | | | <div><div><div></div><div>BRITISH COLUMBIA</div></div><div>Ministry of Forests, Lands and Natural Resource Operations</div></div> <div>ENGINEERING BRANCH</div> | | | |
| | <div>BAR LENGTH IS 40mm ON ORIGINAL.</div> | | | | STANDARD BRIDGE DRAWING | | | |
| | <div>Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u></div> <div>Drawn <u>ERFUNG FARJOO</u> Date <u>14/04/01</u></div> | | | | | | | |
| | <div>Rev Date DESCRIPTION Init</div> <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div></div> | | | | DRAWING TITLE: SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 2 | | | |
| | <div>REVISIONS</div> | | | | DESIGNED BY: HELEN DU, P.ENG. | | APPROVED BY: | |
| | | | | COORDINATING REGISTERED PROFESSIONAL: | | FLNR ENGINEER: | | |
| | | | | FILE No. | | DRAWING No. | | |
| | | | | | | STD-EC-050-19 | | |
| PROFESSIONAL SEAL | | | | | | 0 | | |

| CAP BEAM DEPTH & TIE SPACING – BCL–625 | | | | | | |
|--|-----------------|---|------------|-------|-------|-------|
| SPAN | MAX. SLAB DEPTH | | DECK WIDTH | | | |
| | | | 4276 | 4876 | 5486 | 6096 |
| 9000 | 350 | H | 550 | 600 | 600 | 600 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–20M | 4–20M | 4–20M | 4–25M |
| | | N | 4–30M | 4–30M | 5–30M | 5–30M |
| 12000 | 400 | H | 550 | 650 | 650 | 650 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–20M | 4–20M | 4–20M | 4–25M |
| | | N | 4–30M | 4–30M | 6–30M | 6–30M |
| 15000 | 480 | H | 550 | 700 | 700 | 700 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–20M | 4–20M | 4–20M | 4–25M |
| | | N | 4–30M | 5–30M | 6–30M | 6–30M |


| CAP BEAM DEPTH & TIE SPACING – L100 | | | | | | |
|-------------------------------------|-----------------|---|------------|-------|-------|-------|
| SPAN | MAX. SLAB DEPTH | | DECK WIDTH | | | |
| | | | 4276 | 4876 | 5486 | 6096 |
| 9000 | 430 | H | 600 | 650 | 700 | 700 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–25M | 4–25M | 4–25M | 4–25M |
| | | N | 4–30M | 5–30M | 6–30M | 6–30M |
| 12000 | 480 | H | 700 | 750 | 800 | 800 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–25M | 4–25M | 4–25M | 4–25M |
| | | N | 4–30M | 5–30M | 6–30M | 6–30M |
| 15000 | 530 | H | 750 | 800 | 900 | 900 |
| | | D | 150 | 150 | 150 | 150 |
| | | M | 4–25M | 4–25M | 4–25M | 5–25M |
| | | N | 4–30M | 6–30M | 6–30M | 6–30M |

| CAP BEAM DEPTH & TIE SPACING – L150 | | | | | |
|-------------------------------------|-----------------|---|------------|-------|-------|
| SPAN | MAX. SLAB DEPTH | | DECK WIDTH | | |
| | | | 4876 | 5486 | 6096 |
| 9000 | 480 | H | 800 | 900 | 900 |
| | | D | 150 | 150 | 150 |
| | | M | 4–25M | 4–25M | 4–25M |
| | | N | 5–30M | 6–30M | 6–30M |
| 12000 | 550 | H | 800 | 950 | 950 |
| | | D | 125 | 125 | 125 |
| | | M | 4–25M | 4–25M | 5–25M |
| | | N | 6–30M | 6–30M | 6–30M |
| 15000 | 600 | H | 850 | 1050 | 1050 |
| | | D | 125 | 125 | 125 |
| | | M | 4–25M | 4–25M | 5–25M |
| | | N | 6–30M | 6–30M | 6–30M |

| CAP BEAM DEPTH & TIE SPACING – L165 | | | | | |
|-------------------------------------|-----------------|---|------------|-------|-------|
| SPAN | MAX. SLAB DEPTH | | DECK WIDTH | | |
| | | | 4876 | 5486 | 6096 |
| 9000 | 500 | H | 800 | 900 | 900 |
| | | D | 125 | 125 | 125 |
| | | M | 4–25M | 4–25M | 5–25M |
| | | N | 6–30M | 6–30M | 6–30M |
| 12000 | 580 | H | 900 | 1100 | 1100 |
| | | D | 125 | 125 | 125 |
| | | M | 4–25M | 4–25M | 5–25M |
| | | N | 6–30M | 6–30M | 6–30M |
| 15000 | 650 | H | 1000 | 1150 | 1150 |
| | | D | 125 | 125 | 125 |
| | | M | 4–25M | 5–25M | 5–25M |
| | | N | 6–30M | 6–30M | 6–30M |

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

NOTES:
1. PRECAST CONCRETE CAP BEAM DESIGNED BASED ON THE MAXIMUM SLAB DEPTH SHOWN. IF THE SLAB DEPTH EXCEEDS THAT SHOWN, DWG’S STD–EC–050–18 THROUGH 21 ARE NOT APPLICABLE AND AN ENGINEER SHOULD COMPLETE A PROJECT SPECIFIC SUBSTRUCTURE DESIGN.

| | | | |
|-------------------|---|--|------------------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters |  Ministry of Forests, Lands and Natural Resource Operations | ENGINEERING BRANCH |
| | <div>0 20 40 mm</div> SCALE AS SHOWN | | |
| | BAR LENGTH IS 40mm ON ORIGINAL. | | |
| | Checked <u>JULIEN HENLEY</u> Date <u>14/04/01</u> Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u> | | |
| | Rev Date DESCRIPTION Init | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| PROFESSIONAL SEAL | REVISIONS | STANDARD BRIDGE DRAWING | |
| | | DRAWING TITLE: SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 3 | |
| | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | FILE No. | DRAWING No. STD-EC-050-20 |

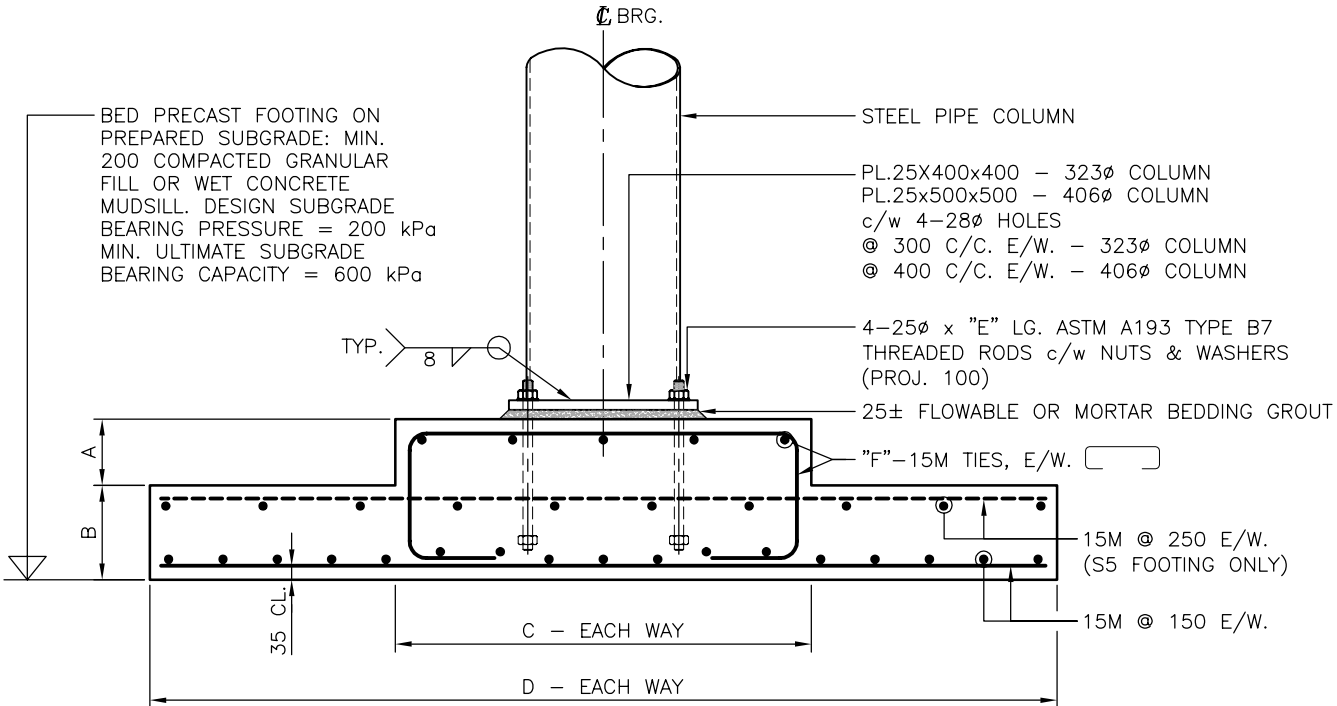
| CONCRETE SLAB BRIDGES FOOTING SIZE SELECTION BCL-625 | | | | |
|---|--------------|--------------|--------------|--------------|
| DECK WIDTH | 4276 | 4876 | 5486 | 6096 |
| SPAN | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING |
| 9000 | S1 | S1 | S1 | S1 |
| 12000 | S1 | S1 | S1 | S1 |
| 15000 | S1 | S1 | S2 | S2 |

| CONCRETE SLAB BRIDGES FOOTING SIZE SELECTION L150 | | | |
|--|--------------|--------------|--------------|
| DECK WIDTH | 4876 | 5486 | 6096 |
| SPAN | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING |
| 9000 | S2 | S2 | S2 |
| 12000 | S2 | S3 | S3 |
| 15000 | S3 | S3 | S3 |

| FOOTING DIMENSIONS FOR CONCRETE SLAB BRIDGES | | | | | | | |
|--|--------------|-----|------|------|-----|---|--------|
| FOOTING TYPE | FOOTING SIZE | | | | | | WEIGHT |
| | A | B | C | D | E | F | (kg) |
| S1 | 175 | 200 | 900 | 1800 | 425 | 5 | 1960 |
| S2 | 175 | 250 | 1100 | 2100 | 475 | 5 | 3350 |
| S3 | 175 | 250 | 1200 | 2400 | 475 | 6 | 4310 |
| S4 | 200 | 250 | 1400 | 2700 | 500 | 6 | 5640 |

| CONCRETE SLAB BRIDGES FOOTING SIZE SELECTION L100 | | | | |
|--|--------------|--------------|--------------|--------------|
| DECK WIDTH | 4276 | 4876 | 5486 | 6096 |
| SPAN | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING |
| 9000 | S1 | S1 | S1 | S1 |
| 12000 | S1 | S1 | S2 | S2 |
| 15000 | S2 | S2 | S2 | S3 |


| CONCRETE SLAB BRIDGES FOOTING SIZE SELECTION L165 | | | |
|--|--------------|--------------|--------------|
| DECK WIDTH | 4876 | 5486 | 6096 |
| SPAN | MIN. FOOTING | MIN. FOOTING | MIN. FOOTING |
| 9000 | S2 | S2 | S3 |
| 12000 | S3 | S3 | S3 |
| 15000 | S3 | S4 | S4 |



PRECAST CONCRETE FOOTING DETAIL
1:20

ASSUME NOT TO SCALE
NOT FOR CONSTRUCTION

- NOTES:**
1. FOOTINGS HAVE BEEN SIZED BASED ON THE ASSUMPTION THAT THE UNDERLYING FOUNDATION MATERIAL HAS THE ABILITY TO SUPPORT A MINIMUM 200 kPa SERVICEABILITY LIMIT STATES COMBINATION 1 STRESS IN ACCORDANCE WITH SECTION 3 AND 6 OF THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CAN/CSA-S6). WHERE THE UNDERLYING MATERIAL IS UNABLE TO SUPPORT THIS APPLIED STRESS, THE ENGINEER SHALL DESIGN THE SUBSTRUCTURE COMPONENTS BASED ON THE ASSESSED STRENGTH OF THE FOUNDATION MATERIALS OR DESIGN FOR AN ALTERNATIVE FOUNDATION SYSTEM SUCH AS DRIVEN PILES.
 2. FOOTING DESIGNED BASED ON THE MAXIMUM SLAB DEPTH SHOWN ON DWG. STD-EC-050-20. IF THE SLAB DEPTH EXCEEDS THE SPECIFIED LIMITS, DWG'S STD-EC-050-18 THROUGH 21 ARE NOT APPLICABLE AND AN ENGINEER SHOULD COMPLETE A PROJECT SPECIFIC SUBSTRUCTURE DESIGN.

| | | | |
|-------------------|--|--|------------------------------|
| DESIGN ENGINEER | 0 2 4 6 8 10 meters 0 20 40 mm SCALE AS SHOWN BAR LENGTH IS 40mm ON ORIGINAL. |  Ministry of Forests, Lands and Natural Resource Operations ENGINEERING BRANCH | |
| | Checked <u>HELEN DU</u> Date <u>14/04/01</u> Drawn <u>ERFAN FARJOO</u> Date <u>14/04/01</u> | | |
| PROFESSIONAL SEAL | Rev Date DESCRIPTION Init | STANDARD BRIDGE DRAWING | |
| | | | |
| | | DRAWING TITLE: SUBSTRUCTURE DETAILS FOR CONCRETE SLAB BRIDGES - SHEET 4 | |
| | | DESIGNED BY: HELEN DU, P.ENG. | APPROVED BY: |
| | | COORDINATING REGISTERED PROFESSIONAL: | FLNR ENGINEER: |
| | | FILE No. | DRAWING No. STD-EC-050-21 |
| | | REVISIONS | |
| | | | |
| | | | |
| | | | |