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Architectural and Engineering Services

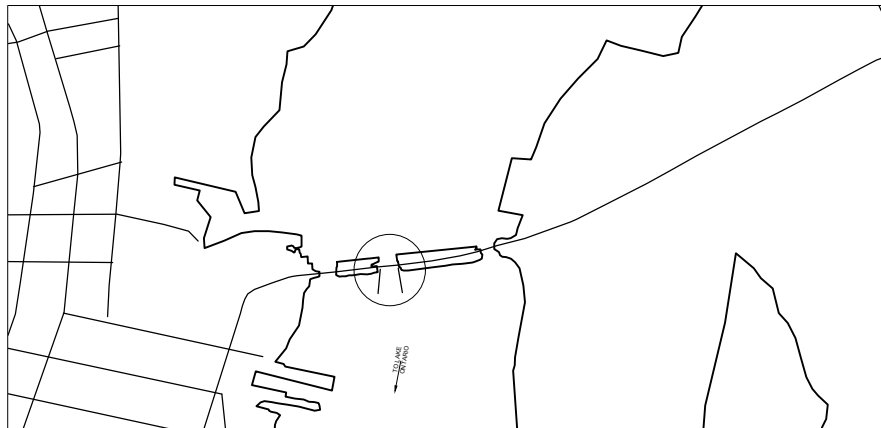
Ontario Region

Services publics et Approvisionnement Canada

Services d'architecture et de génie

Région de l'Ontario

LASALLE CAUSEWAY BASCULE BRIDGE KINGSTON, ONTARIO



SITE PLAN

STRUCTURAL STEEL REPAIRS

PSPC Proj. No.: R.097736.002

Canada

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NOT FOR CONSTRUCTION



NOT FOR CONSTRUCTION



GENERAL NOTES:

GENERAL:

- 1. DO NOT SCALE DRAWINGS.
2. THE LATEST VERSION OF ALL REFERENCE DOCUMENTS SHALL APPLY.
3. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE CSA S6-19 (LATEST EDITION).
4. FOR EACH REPAIR/REPLACEMENT/MODIFICATION DETAIL, DETAILS DEPICT ONE LOCATION ONLY AND ARE INCLUDED TO INDICATE DESIGN INTENT AT SIMILAR LOCATIONS. THE DIMENSIONS CAN VARY FROM ONE LOCATION TO ANOTHER, SINCE CONNECTIONS OF SAME GEOMETRY ARE NEVER IDENTICAL.
5. DIMENSIONS RELATING TO EXISTING CONSTRUCTION OR IDENTIFIED AS REQUIRING FIELD VERIFICATION MUST BE FIELD VERIFIED BY CONTRACTOR BEFORE COMMENCING SHOP DRAWING PREPARATION, FABRICATION OR WORK.
6. THE CONTRACTOR SHALL EXAMINE THE SITE AND SATISFY HIMSELF OF THE ACTUAL CONDITIONS AND REQUIREMENTS OF THE WORK.
7. RIVETS ARE NOTED ON THE ORIGINAL DRAWING AS BEING 3/4" RIVETS IN 13/16" HOLES. ORIGINAL CONSTRUCTION 1916.
8. MANY RIVETS HAVE BEEN PREVIOUSLY REPLACED WITH BOLTS.
9. FIT-UP ADJUSTMENT TO ALIGN COMPONENTS MAYBE REQUIRED.
10. FOR ALL NOTES IN THE DRAWINGS, THE MENTION OF "APPROVED BY THE DEPARTMENTAL REPRESENTATIVE" MEANS "APPROVED IN WRITING BY THE DEPARTMENTAL REPRESENTATIVE".
11. HISTORICAL WATER LEVEL DATA IS AVAILABLE ON THE FOLLOWING WEBSITES:
https://waterlevels.gc.ca/eng/station/Month?sid=13988&tz=EST&pres=2&type=1 [waterlevels.gc.ca]
https://waterlevels.gc.ca/C&A/bulletin-eng.html [waterlevels.gc.ca]
https://jic.org/en/loslrb/watershed/water-levels [jic.org]

STRUCTURAL STEEL:

- 1. NEW STRUCTURAL STEEL SHALL CONFORM TO CSA G40.20 AND CSA G40.21 GRADE 350WT FOR PLATE PRODUCTS, ROLLED SECTIONS SHALL CONFORM TO CSA STANDARD G40.20/G40.21 350WT OR ASTM SPECIFICATION A588. ASTM A588 MAY BE SUBSTITUTED FOR G40.21 GRADE 350A STEEL, AND WHEN THE CHARPY IMPACT ENERGY REQUIREMENTS ARE VERIFIED BY THE SUBMISSION OF TEST DOCUMENTATION, ASTM A588 MAY BE SUBSTITUTED FOR G40.21 GRADE 350WT STEEL.
2. STEEL IS DESIGNED AND SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH CSA S6-19.
3. ALL BOLTS SHALL BE NEW M20 OR 3/4" DIAMETER AND CONFORM TO ASTM STANDARD F3125/F3125M, GRADES A325M OR A325 TYPE 1 RESPECTIVELY UNLESS NOTED OTHERWISE. HOLES SHALL BE NOT MORE THAN 2MM LARGER THAN THE ACTUAL SIZE OF THE BOLT. BOLT THREADS TO BE EXCLUDED FROM ALL SHEAR PLANES, UNLESS NOTED OTHERWISE. INSTALLATION TO CONFORM WITH "TURN-OF-NUT METHOD" DESCRIBED IN ANNEX A10.1 OF CHDC S6-19 CHAPTER 10. ALL A325 BOLTS TO BE GALVANIZED. GALVANIZED A490 BOLTS MUST NOT BE USED. A490 TYPE 3 BOLTS TO BE PAINTED.
4. NO FIELD WELDING IS PERMITTED, UNLESS NOTED OTHERWISE.
5. WELDING SHALL BE IN ACCORDANCE WITH CSA W59 AND SHALL BE PERFORMED BY A WELDER QUALIFIED UNDER CSA W47.1. SURFACES TO BE WELDED SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATTER INCLUDING PAINT FILM.
6. THE SHOP FABRICATOR SHALL BE CERTIFIED TO THE REQUIREMENTS OF CSA STANDARD W47.1 (DIVISION 1 OR 2.1).
7. STRUCTURAL STEEL MEMBERS SHALL BE PAINTED WITH THREE COAT PAINT SYSTEM SPECIFIED. FAYING SURFACES OF ALL BOLTED CONNECTIONS MUST BE CLASS B OR BETTER. THE MEAN SLIP COEFFICIENT FOR CLASS B SHALL BE 0.5 MINIMUM. TOUCH-UP DAMAGED AREAS AFTER ERECTION. PAINT ALL SURFACES AFFECTED BY WORK WITH PAINT SYSTEM SPECIFIED.
8. ALL WELDS SHALL BE SHOWN ON SUBMITTED SHOP DRAWINGS. WELDS SHALL COMPLY WITH MINIMUM SIZES STIPULATED IN CSA W59.
9. WHERE HOLE LOCATIONS MUST BE LOCATED TO SUIT EXISTING BOLT HOLES, PLATE DIMENSIONS SHALL BE ADJUSTED TO PROVIDE BOLT EDGE/END DISTANCE IN ACCORDANCE WITH CSA S6-19.
10. ALL MAIN TRUSS MEMBERS ARE FRACTURE CRITICAL MEMBERS (FCMS). ALL FLOOR BEAMS ARE PRIMARY TENSION MEMBERS (PTMS), STRINGERS AND SILLS ARE NOT FCMS NOR PTMS. ALL NEW STRUCTURAL STEEL FOR PLATES PRODUCTS AND ROLLED SHAPES USED ON PTMS AND FCMS SHALL COMPLY WITH THE RELEVANT CHDC S6-19 (LATEST EDITION) TABLE 10-14 (PTM) AND 10-15 (FCM) REQUIREMENTS FOR IMPACT TEST TEMPERATURES AND CHARPY IMPACT ENERGY FOR A MINIMUM SERVICE TEMPERATURE OF -30°C.
11. NO STRUCTURAL STEEL SHALL BE SHEAR CUT.

STEEL FABRICATION AND ERECTION:

- 1. SHOP DRAWINGS SHALL BE SUBMITTED TO DEPARTMENTAL REPRESENTATIVE FOR APPROVAL FOR ALL ITEMS.
2. NEW HOLES IN EXISTING MATERIAL SHALL BE DRILLED TO A TEMPLATE OR MATCH DRILLED ON SITE.
3. EXACT LOCATIONS OF DRILLED HOLES AT CRACK ENDS SHALL BE DETERMINED BY MAGNETIC PARTICLE TESTING (MT) AND APPROVED BY THE DEPARTMENTAL REPRESENTATIVE PRIOR TO START OF DRILLING. DYE PENETRANT INSPECTION (DPI) SHALL BE PERFORMED AFTER DRILLING ON THE INSIDE SURFACE (THICKNESS) OF THE MATERIAL TO CONFIRM THE CRACK TIP HAS BEEN REMOVED. IF CRACK NOT COMPLETELY REMOVED, REPEAT DRILLING AT NO COST TO DEPARTMENTAL REPRESENTATIVE WITH LARGER SIZE HOLE, FOLLOWING THE DIRECTION OF THE DEPARTMENTAL REPRESENTATIVE.

CONCRETE REQUIREMENTS:

- 1. CONCRETE FOR THE NEW ARMOURING ANGLE REPLACEMENT SHALL BE A FAST SET, RAPID STRENGTH GAIN CONCRETE WITH FINAL 28 DAY PROPERTIES CONFORMING TO EXPOSURE CLASS C-1 FROM CSA A23.1 AND HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 MPa.
2. CONCRETE SHALL BE CAPABLE OF ACHIEVING 75% OF THE SPECIFIED STRENGTH WITHIN 24 hrs.

REINFORCING STEEL REQUIREMENTS:

- 1. REINFORCING STEEL SHALL BE GRADE 400W, UNLESS NOTED OTHERWISE.
2. BAR MARKS WITH PREFIX "G" DENOTE GALVANIZED BARS.
3. BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE MINISTRY OF TRANSPORTATION OF ONTARIO'S STRUCTURAL STANDARD DRAWINGS SS12-1 AND SS12-2, UNLESS INDICATED OTHERWISE.
4. EXPOSED EXISTING REINFORCING STEEL SHALL BE ABRASIVE BLAST CLEANED AND COATED WITH A CORROSION INHIBITING COATING COMPATIBLE WITH THE APPROVED CONCRETE.

GENERAL CONSTRUCTION AND PROCEDURES:

- 1. THE CONTRACTOR SHALL PLAN AND CONTROL THE PROCESS/PROCEDURES TO THE EXTENT NECESSARY TO ENSURE THAT TOLERANCES IN THE CONTRACT DOCUMENTS ARE COMPLIED WITH. THE DEPARTMENTAL REPRESENTATIVE SHALL BE ENTITLED TO DEMAND THAT ANY SPECIFIC WORKING INSPECTION PROCEDURE BE ADJUSTED IF SUCH PROCEDURE APPEARS NOT TO PROVIDE ADEQUATE SECURITY AGAINST EXCEEDING OF TOLERANCES.
2. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATION TO CONSTRUCTION DETAILS AND WORK QUANTITIES. THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH FIELD CONDITIONS FOLLOWING WRITTEN APPROVAL FROM DEPARTMENTAL REPRESENTATIVE.
3. IF THE CONTRACTOR DAMAGES ANY MATERIALS WHICH ARE TO REMAIN IN PLACE, OR WHICH ARE TO REMAIN ON THE STRUCTURE, THE DAMAGED MATERIALS SHALL BE REPAIRED OR REPLACED IN A MANNER SATISFACTORY TO THE DEPARTMENTAL REPRESENTATIVE AT THE EXPENSE OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL TAKE PRECAUTIONS SO AS NOT TO LEAVE DEBRIS, MATERIALS, TOOLS, ETC. ON THE BRIDGE SURFACE WHEN LEAVING THE WORK AREA ON A DAILY BASIS.
5. HORIZONTAL, VERTICAL AND DETAIL DIMENSIONS AND ELEVATIONS SHOWN ON THESE PLANS HAVE BEEN OBTAINED FROM THE ORIGINAL DESIGN DRAWINGS, SHOP DRAWINGS, AND SUBSEQUENT MODIFICATION DRAWINGS OF THE EXISTING STRUCTURES. RECORD DRAWINGS DO NOT EXACTLY REFLECT THE AS-BUILT CONDITION AND THEY SHOULD BE USED ONLY IN CONJUNCTION WITH FIELD MEASUREMENTS. THE CONTRACTOR SHALL PERFORM FIELD MEASUREMENTS TO ESTABLISH CONTROL POINTS AND TO VERIFY ALL EXISTING DIMENSIONS AFFECTING FABRICATION AND CONSTRUCTION. SHOP AND CONSTRUCTION DRAWINGS SHALL SHOW DESIGN DIMENSIONS AND FIELD DIMENSIONS WHENEVER THEY DIFFER.
6. RECORD DRAWINGS OF THE EXISTING STRUCTURE WILL BE MADE AVAILABLE TO THE SUCCESSFUL BIDDER FOR REFERENCE.
7. WHERE EXISTING MATERIAL IS TO BE CONNECTED TO NEW MATERIAL, UNLESS OTHERWISE NOTED, THE EXISTING SURFACE SHALL BE CLEANED TO SSPC-SP11, POWER TOOL CLEANING OF ALL PAINT, LOOSE RUST, OR OTHER FOREIGN MATERIAL PRIOR TO INSTALLATION OF NEW MATERIAL. THE SSPC-SP11 SHALL BE ATTAINED WITH A MONTI BRISTLE BLASTER EQUIPPED WITH A HEPA FILTER OR ANY OTHER POWER TOOL PROVIDING THE SAME SURFACE PROFILE (SUBJECT TO DEPARTMENTAL REPRESENTATIVE APPROVAL). FAYING SURFACES SHALL BE PRIMED ONLY. AFTER NEW MATERIAL IS INSTALLED, THE AFFECTED SURFACES MUST BE PRIMED AND PAINTED WITH PRESCRIBED PAINT SYSTEM. PRIMER SHALL COMPLY TO COATING CLASS B OR BETTER. THE MEAN SLIP COEFFICIENT FOR CLASS B SHALL BE 0.5 MINIMUM.
8. REMOVAL OF RIVETS SHALL BE PERFORMED IN A MANNER SUCH THAT EXISTING MATERIAL TO REMAIN IS NOT DAMAGED. REMOVAL METHODS SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
9. ANY WORK OVER THE NAVIGATION CHANNEL MUST BE COORDINATED WITH THE BRIDGE OPERATOR. THE CONTRACTOR SHALL SUBMIT TO THE DEPARTMENTAL REPRESENTATIVE FOR APPROVAL TWO (2) COPIES OF THE PLANS AND SCHEDULE OF OPERATIONS FOR WORK OVER THE NAVIGATIONAL CHANNEL AT LEAST 14 DAYS PRIOR TO THE COMMENCEMENT OF ANY WORK OVER THE NAVIGATIONAL CHANNEL. DEPARTMENTAL REPRESENTATIVE SHALL NOT BE HELD RESPONSIBLE FOR ANY DELAYS SUFFERED BY THE CONTRACTOR FOR FAILURE TO ADHERE TO THIS REQUIREMENT.
10. BOLT LAYOUT AND SPACING NOT INDICATED ON THE DRAWINGS SHALL BE IN ACCORDANCE WITH CHDC CSA S6-19 AND SHALL BE DETAILED ON SUBMITTED SHOP DRAWINGS.
11. ONLY 1 RIVET/BOLT ON THE STRUCTURAL STEEL TRUSS MEMBERS MAY BE REMOVED AT ANY ONE TIME UNLESS OTHERWISE INDICATED ON THE CONTRACT DRAWINGS OR APPROVED BY THE DEPARTMENTAL REPRESENTATIVE.
12. ALL CUTTING OF STEEL IN THE FIELD SHALL BE BY MECHANICAL CUTTING WHEEL, SAW CUTTING OR DRILLING UNLESS OTHERWISE DIRECTED. THE CUT SURFACES SHALL BE GROUND SMOOTH. THERMAL CUTTING INCLUDING USE OF TORCHES IS PROHIBITED.
13. PAINT REMOVAL AND TOUCH-UP PAINTING REQUIRED FOR THE WORK IN THIS CONTRACT SHALL BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT SPECIFICATIONS FOR PAINTING. ALL COSTS FOR PAINT REMOVAL AND TOUCH-UP PAINTING SHALL BE COVERED UNDER THE LUMP SUM CONTRACT BID.
14. THE CONTRACTOR SHALL SUBMIT TO THE DEPARTMENTAL REPRESENTATIVE A DETAILED WRITTEN PLAN OF OPERATIONS COINCIDENT WITH THE PROJECT SCHEDULE AND EACH SUBSEQUENT SCHEDULE UPDATE AS DEFINED WITHIN THE CONTRACT SPECIFICATIONS.
15. THE CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH THE PERMITTED LANE CLOSURES AS DEFINED IN THE CONTRACT SPECIFICATIONS.

- WORK THAT DOES NOT AFFECT THE TRAFFIC OR PEDESTRIANS MAY BE PERFORMED OUTSIDE THE TIMES OF THE RESTRICTIVE LANE CLOSURES BUT MUST REMAIN IN CONFORMANCE WITH THE ACCEPTED WRITTEN PLAN OF OPERATIONS AND DEPARTMENTAL REPRESENTATIVE'S APPROVALS.
16. DURING REMOVAL AND CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL NOT BE PERMITTED TO DROP MATERIAL OR DEBRIS FROM THE BRIDGE NOR SHALL ANY WATER WHICH IS USED FOR WASHING PURPOSES OR OTHER SIMILAR OPERATIONS WHICH CAUSES IT TO BECOME POLLUTED WITH SAND, SILT, CEMENT, OIL OR OTHER IMPURITIES BE DEPOSITED INTO ANY WATERCOURSE.
17. PROTECTIVE SHIELDS SHALL BE USED TO CATCH POTENTIAL FALLING MATERIAL AND SHIELD THE AREA BELOW THE WORK INCLUDING THE SIDEWALK WHERE NECESSARY. THE LOAD CARRYING CAPACITY OF THE PROTECTIVE SHIELDS SHALL BE CONSISTENT WITH THE NATURE OF THE WORK BEING PERFORMED IN ANY PARTICULAR LOCATION. IF THE DEPARTMENTAL REPRESENTATIVE DETERMINES THAT ADEQUATE PROTECTIVE SHIELDS ARE NOT BEING PROVIDED, THE WORK SHALL BE SUSPENDED UNTIL ADEQUATE WORK SHIELDS ARE EMPLOYED.
18. THE CONTRACTOR SHALL SUBMIT TO THE DEPARTMENTAL REPRESENTATIVE FINAL DESIGN DRAWINGS OF ALL TEMPORARY ACCESS AND CONSTRUCTION PLATFORMS AND PROTECTIVE SHIELDS. THESE DRAWINGS SHALL BE FULLY DIMENSIONED AND SHALL SHOW ALL ATTACHMENTS TO THE EXISTING BRIDGE MEMBERS. DRAWINGS SHALL BEAR THE SIGNATURE AND SEAL OF THE DESIGNER WHO SHALL BE A LICENSED PROFESSIONAL ENGINEER IN ONTARIO. ATTACHMENTS TO THE EXISTING STRUCTURE, THAT IN THE OPINION OF DEPARTMENTAL REPRESENTATIVE, COULD BE DAMAGING TO ANY COMPONENT OF THE BRIDGE STRUCTURE SHALL NOT BE USED.
19. THE CONTRACTOR SHALL OBTAIN HIS OWN ELECTRICAL POWER SOURCE FOR ALL CONSTRUCTION OPERATIONS AND SHALL NOT BE PERMITTED TO USE ANY EXISTING UTILITIES ON THE BRIDGE AS A SOURCE OF POWER.
20. EXCEPT WHILE INCLUDED WITHIN A PARTICULAR PHASE OF CONSTRUCTION, THE BRIDGE MAINTENANCE WALKS, THE ROADWAY, AND ANY BRIDGE EASEMENT SHALL NOT BE USED FOR STORAGE OF MATERIALS OR EQUIPMENT AND SHALL NOT BE COVERED OR BLOCKED IN ANY WAY WITHOUT WRITTEN AUTHORIZATION BY DEPARTMENTAL REPRESENTATIVE.
21. THE CONTRACTOR SHALL SUBMIT TO DEPARTMENTAL REPRESENTATIVE FOR APPROVAL, HIS PLAN AND SCHEDULE FOR ERECTING ALL NEW STRUCTURAL STEEL ON THE BRIDGE SUPERSTRUCTURE. THIS PLAN MUST BE SUBMITTED AT LEAST 14 DAYS PRIOR TO THE COMMENCEMENT OF ANY REMOVAL WORK.
22. UNLESS OTHERWISE DIRECTED BY THE DEPARTMENTAL REPRESENTATIVE, ALL EXISTING OPEN BOLT OR RIVET HOLES REMAINING AFTER THE REMOVAL OF EXISTING MATERIAL THAT ARE NOT TO BE USED FOR A NEW CONNECTION, SHALL BE FILLED WITH THE APPROPRIATE SIZE FULLY TENSIONED HIGH STRENGTH BOLT.
23. ALL FULLY PAINTED UPWARD-FACING EDGES OF NEW STRUCTURAL STEEL MEMBERS AND OTHER ELEMENTS MATED TO GUSSET PLATES, SPLICE PLATES, SHEAR TABS, CLIP ANGLES, BEAM WEBS, TO EACH OTHER, ETC. ARE TO BE SEALED WITH SILICONE BASED CAULKING PERMANENTLY AGAINST ACCUMULATION AND/OR PENETRATION OF MOISTURE BETWEEN THE FAYING SURFACES OF CONNECTIONS.
24. CONTRACTOR TO SUBMIT SITE-SPECIFIC HEALTH AND SAFETY PLAN PER SPECIFICATION REQUIREMENTS.
25. ENSURE THE STABILITY OF ALL NEW AND EXISTING STRUCTURAL COMPONENTS, IMPACTED DIRECTLY OR INDIRECTLY BY THE WORK, DURING STEEL STRENGTHENING AND RETROFITTING/REPLACEMENT AND UNTIL THE STRUCTURAL STEEL IS IN ITS FINAL LOCATION. GLOBAL AND LOCAL STABILITY OF COMPONENTS SHALL BE TAKEN INTO ACCOUNT, INCLUDING THEIR STRENGTH TO RESIST LOADS APPLIED TO THEM.
26. BRIDGE TO REMAIN OPERABLE AS DESCRIBED IN SPECIFICATIONS.

TRAFFIC AND PEDESTRIAN CONTROL:

- 1. CONTRACTOR SHALL PROVIDE SCHEDULE OF LANE CLOSURES FOR APPROVAL AT LEAST 14 DAYS PRIOR TO WORK COMMENCEMENT.
2. CONTRACTOR SHALL CONFIRM WORK OR CANCELLATION OF LANE CLOSURES PRIOR TO WORK COMMENCEMENT. NIGHTLY LANE CLOSURES ARE ONLY PERMITTED FROM 20:00 TO 06:00 BUT FOR DECK JOINT ARMORING ANGLE REPLACEMENT, APPROACH SLAB CRACK INJECTION AND CONCRETE PATCH REPAIRS LANE CLOSURE FROM FRIDAY 20:00 TO MONDAY 06:00 WILL BE PERMITTED. FULL BRIDGE CLOSURE WILL NOT BE PERMITTED, EXCEPT FOR THE BUFFER REMOVAL, BALLAST PLATES INSTALLATION AND BRIDGE BALANCING CHECKS. SUCH CLOSURES ARE TO BE PERFORMED ON WEEKEND NIGHTS (FRIDAY, SATURDAY OR SUNDAY) BETWEEN 22:00 AND 6:00. ONLY THREE ALL NIGHT CLOSURES WILL BE ALLOWED TO COMPLETE THE BUFFER REMOVAL, BALLAST PLATES INSTALLATION AND THE BRIDGE BALANCING CHECKS. LIMITED DURATION FULL BRIDGE CLOSURE OF 20 MINUTES MAXIMUM ARE ALLOWED ON FRIDAY, SATURDAY AND SUNDAY NIGHTS BETWEEN 22:00 AND 6:00.
3. CONTRACTOR SHALL FOLLOW PUBLIC NOTICE REQUIREMENTS AS PER LASALLE CAUSEWAY ROAD CLOSURE PROTOCOL DOCUMENT (PROVIDED AS ATTACHMENT TO THE CONTRACT SPECIFICATIONS).
4. ALL NIGHTLY DETOUR SIGNAGE, PORTABLE TEMPORARY TRAFFIC SIGNALS AND TEMPORARY BARRIERS TO BE STORED AND/OR PLACED OUT OF TRAFFIC SIGHT LINES BETWEEN CLOSURE PERIODS.
5. PORTABLE TEMPORARY TRAFFIC SIGNAL AND REFLECTIVE SIGNS SHALL FOLLOW PUBLIC NOTICE REQUIREMENTS AS PER LASALLE CAUSEWAY ROAD CLOSURE PROTOCOL DOCUMENT (PROVIDED AS ATTACHMENT TO THE CONTRACT SPECIFICATIONS).
6. ADVANCED WARNING SIGNS SHALL FOLLOW PUBLIC NOTICE REQUIREMENTS AS PER LASALLE CAUSEWAY ROAD CLOSURE PROTOCOL DOCUMENT (PROVIDED AS ATTACHMENT TO THE CONTRACT SPECIFICATIONS).
7. TRAFFIC CONTROL PLAN FOR TEMPORARY CONDITIONS (LANE CLOSURES) SHALL BE PROVIDED BY CONTRACTOR AND BE IN ACCORDANCE WITH OTM-BOOK 7. THE TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE DEPARTMENTAL REPRESENTATIVE.
8. THE CONTRACTOR SHALL MAINTAIN SIDEWALK ACCESS OR PROVIDE A SAFE TEMPORARY WALKWAY AT LEAST THE SAME WIDTH AS THE EXISTING SIDEWALK THROUGH THE WORK ZONE. THE TEMPORARY WALKWAY SHALL BE PROTECTED FROM ADJACENT TRAFFIC AND WORK ACTIVITIES. AN ACCESSIBLE SURFACE SHALL BE PROVIDED, AND THE TRANSITION TO THE SIDEWALK ON EITHER END SHALL BE ACCESSIBLE.

SCOPE OF WORK

THE FOLLOWING SCOPE OF WORK SHALL BE CARRIED OUT IN STAGES AND IS NOT INTENDED TO BE A COMPREHENSIVE LIST OF ALL ITEMS REQUIRED TO COMPLETE THE REHABILITATION WORK, NOR IS IT TO BE A SEQUENCE OF WORK

- 1. MOBILIZE TO SITE;
2. PROCURE AND INSTALL ACCESS, IMPLEMENT TRAFFIC CONTROL PLAN AS DESCRIBED IN SPECIFICATIONS;
3. PERFORM SURVEY OF EXISTING CONDITIONS AND TAKE MEASUREMENTS TO ENABLE PREPARATION OF SHOP DRAWINGS, ALLOW DEPARTMENTAL REPRESENTATIVE ACCESS TO WITNESS SURVEY;
4. PROVIDE ACCESS AND TRAFFIC CONTROL. START REPAIRS AND MODIFICATIONS TO STRUCTURE THAT DO NOT REQUIRE FABRICATION, SUCH AS, BUT NOT LIMITED TO: MODIFICATIONS AND REPAIRS TO ALL STRINGERS TOP AND BOTTOM COPES, INSPECTION OF ALL FLOOR BEAM END PLATE WELDS, GRINDING OF PRIMARY MEMBER TACK WELDS, GRINDING OF SHARP EDGES OF PERFORATIONS AND CORRODED AREAS, NON-DESTRUCTIVE TESTING AND GRINDING OF PERFORATIONS AT LOCATIONS REQUIRING REINFORCEMENT, PAINT TOUCH-UP REPAIRS ON TRUNNION PLATES AND AT LOCATIONS WHERE STRAIN GAUGES WERE INSTALLED IN 2019 (REFER TO SPECIFICATION APPENDIX LaSalle Strain gauges for paint touchup), REPAIRS TO LEAF TRUSS VERTICAL 9S-10S AND DIAGONAL 9S-8S CRACKS, PROVIDE ACCESS FOR CHARPY IMPACT TESTING COUPON SAMPLING (BY OTHERS), NDT INSPECTION AND REPAIR OF TOP CHORD 1S-3S FATIGUE CRACKING, DRILLING OF DRAINAGE HOLES IN TOWER TRUSS MEMBERS 15S-17S AND 15N-17N, DRILLING AND INSTALLATION OF BOLTS AT MAIN TRUSS MEMBER FATIGUE CRACKS, 1 LEAF TRUSS DIAGONAL 13N-16N NDT INSPECTION AND GRINDING, AND REMOVAL OF THE MECHANICAL BUFFERS AT THE TOE END OF THE LEAF SPAN;
5. SUBMIT SIGNED AND SEALED SHOP DRAWINGS FOR NEW STEEL FOR REINFORCEMENTS;
6. AFTER RECEIVING SHOP DRAWING APPROVAL, PROCEED TO FABRICATION;
7. PROCEED TO INSTALLATION OF REINFORCEMENT PLATES, INCLUDING EXISTING SURFACE PREPARATION, PRIMING AND PAINTING OF NEW AND EXISTING SURFACES. REMOVE EXISTING LATTICES/COVER PLATES TO PROVIDE ACCESS WHERE NEEDED AND AS APPROVED BY DEPARTMENTAL REPRESENTATIVE. LOCATIONS TO REINFORCE/REPAIR ARE: 16N VERTICAL GUSSET PLATE, 16S VERTICAL GUSSET PLATE, 1S-3S TOP CHORD (PROVISIONAL), 3S-5S TOP CHORD, 14S-16S BOTTOM CHORD, 15S-18S TOWER TRUSS MEMBER, 18S-19S TOWER TRUSS MEMBER, 21N-27N COUNTERWEIGHT TRUSS MEMBER, 21S-27N COUNTERWEIGHT BRACING AT 27N, DECK GRATING PANELS (REPLACEMENT OF 2 PANELS), LOOSE/MISSING BOLTS AND REPLACEMENT OF MISSING SILL SHIMS, SOUTH SPAN LOCK RECEIVER, AND NORTH LIVE LOAD SUPPORT; COATING TOUCH-UP REPAIRS; REPLACE DECK JOINT ARMORING ANGLES (BOTH JOINTS) ON ABUTMENTS INCLUDING CONCRETE TO LIMITS SHOWN, INJECT APPROACH SLAB CRACKS (BOTH SLABS), REPAIR APPROACH SLAB SPALLS (BOTH SLABS), REMOVE ACCESS.
8. AFTER COMPLETION OF ALL REPAIRS, PROCEED TO BALANCE CHECK OF BRIDGE, AS DIRECTED AND UNDER THE SUPERVISION OF THE DEPARTMENTAL REPRESENTATIVE;
9. REINSTATE STAGING AREAS TO THEIR INITIAL STATE OR BETTER AND CLEAN SITE TO DEPARTMENTAL REPRESENTATIVE'S SATISFACTION;
10. DEMOBILIZE.

Table with 3 columns: revision, description, date. Row 1: 4, -, -. Row 2: 3, -, -. Row 3: 2, -, -. Row 4: 1, ISSUED FOR TENDER, 01/22/2021.

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

Detail No. A, drawing no. - where detail required. B, drawing no. - where detailed. C, drawing no. - where detailed.

project title: Kingston, Ontario, PSC LaSalle Causeway Bascule Bridge

STRUCTURAL STEEL REPAIRS

NOTES SHEET

drawn by: RICHARD DYNKA / THOMAS NIEDZWIADK

designed by: JEAN-BERNARD CHARRON

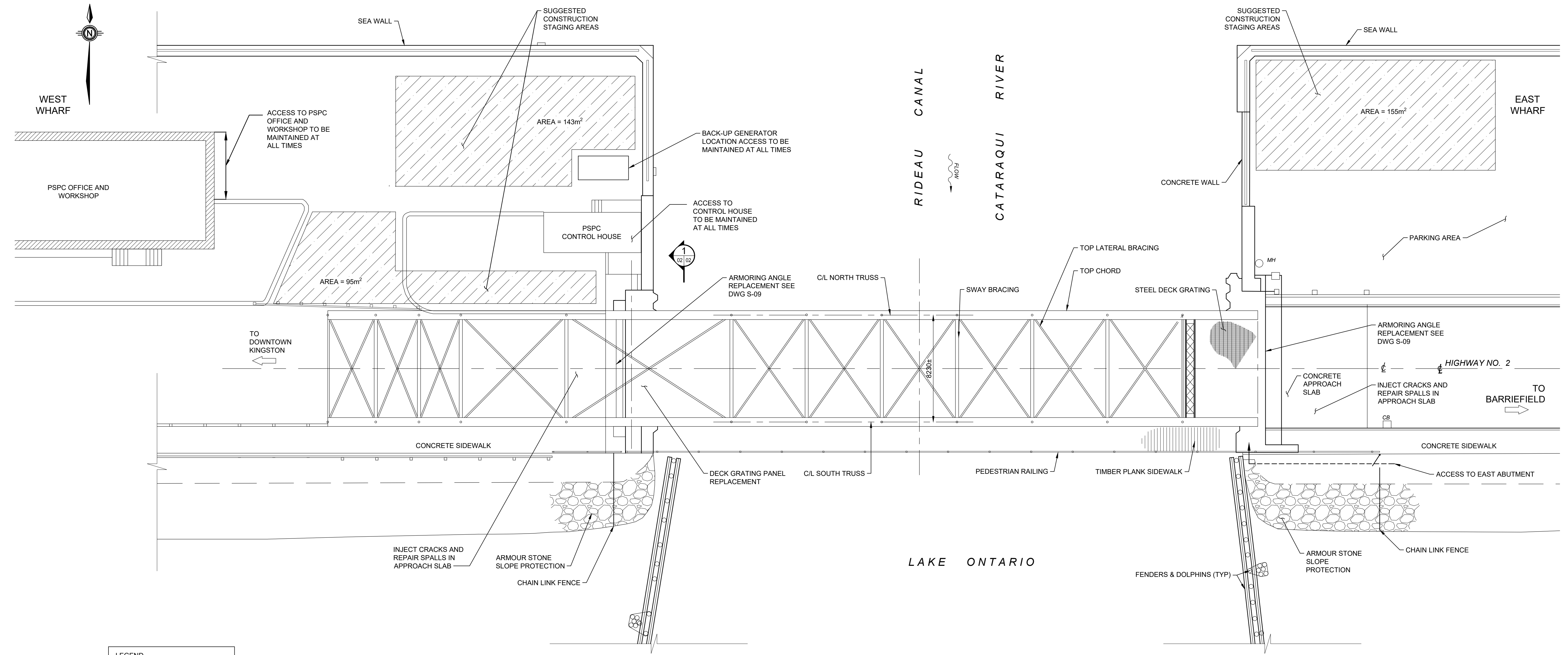
approved by: PETER HARVEY

tender: RANYA EL SADAWY project manager

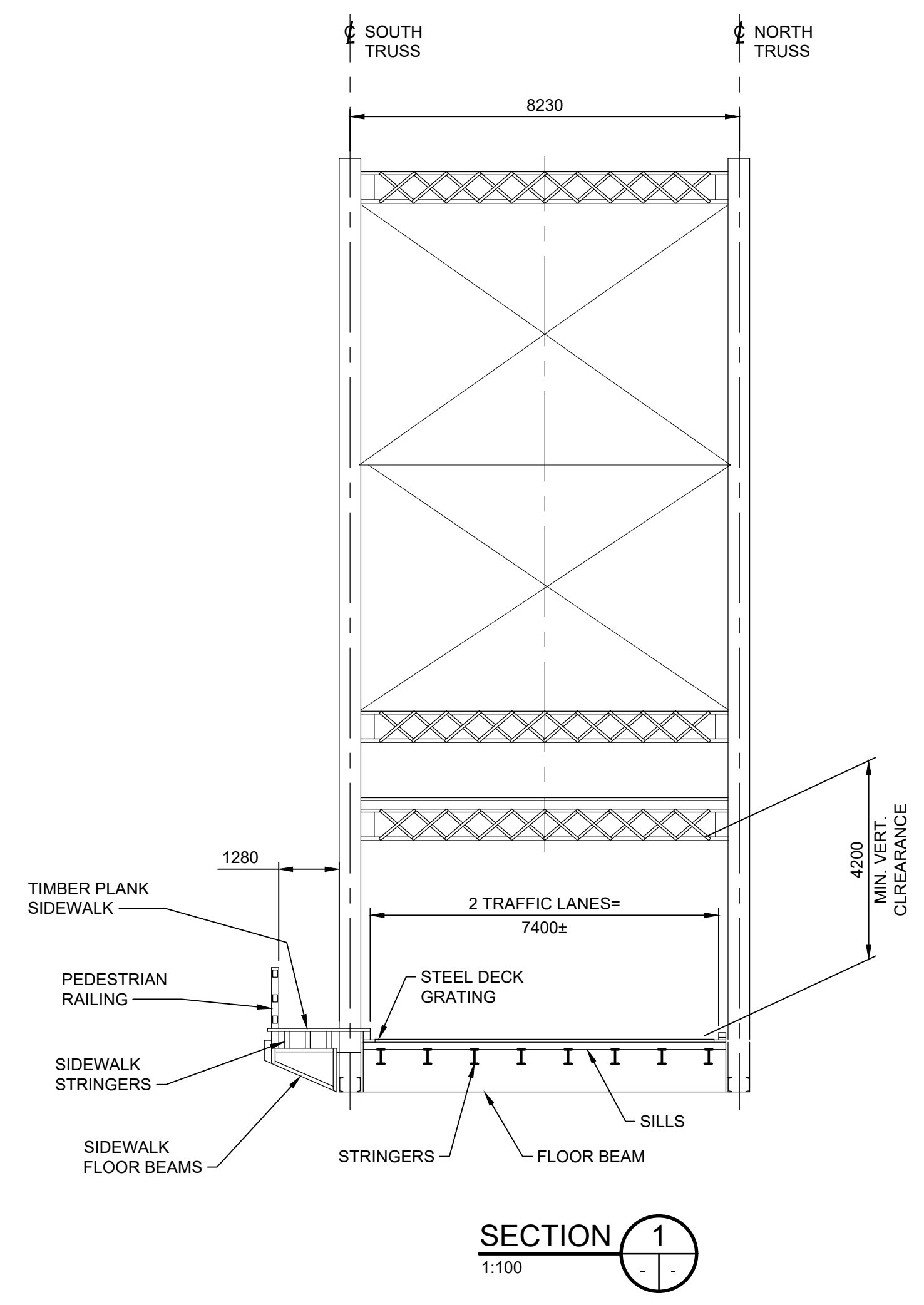
project date: 2021/01/22

project no.: R.097736.002

drawing no.: S-01



LEGEND
 CONSTRUCTION STAGING AREA



SECTION 1
1:100



NOT FOR CONSTRUCTION



4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021
revision	description	date

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
 PSPC
 LaSalle Causway
 Bascule Bridge
STRUCTURAL STEEL REPAIRS

drawing title
GENERAL ARRANGEMENT SHEET 1

drawn by
 RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
 JEAN-BERNARD CHARRON

approved by
 PETER HARVEY

tender
 RANYA EL SADAWY project manager

project date
 2021/01/22

project no.
 R.097736.002

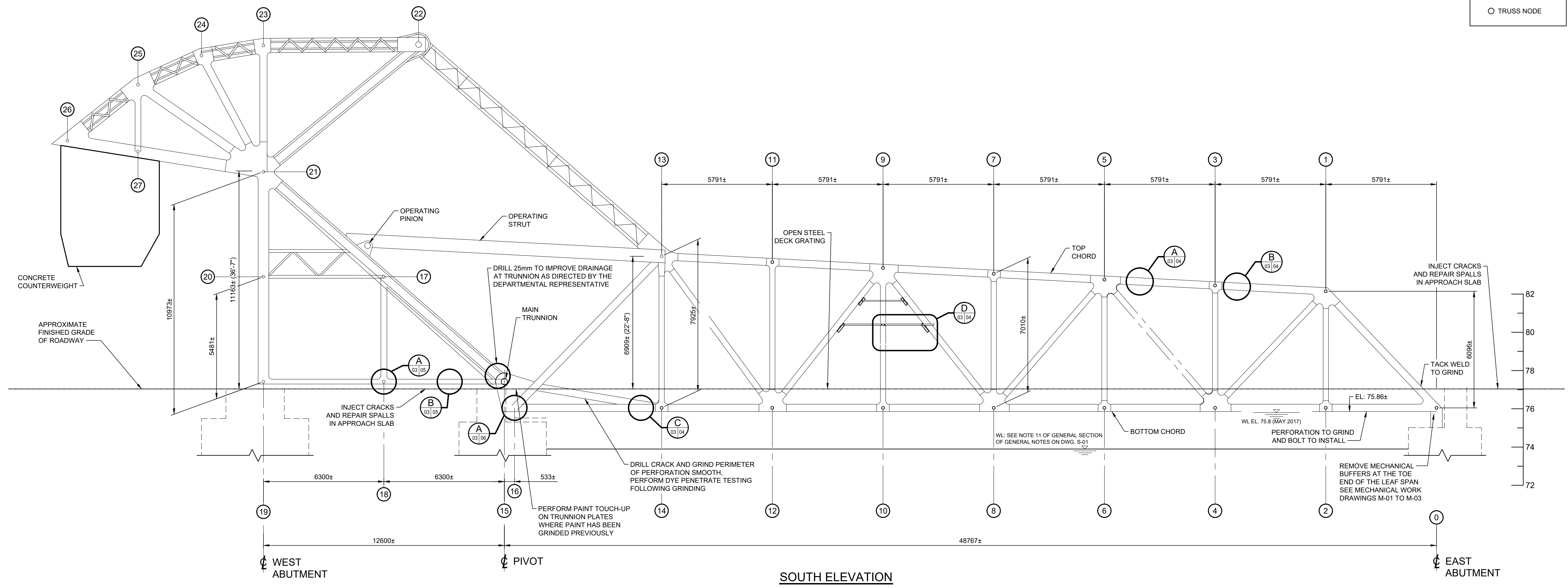
drawing no.
 S-02

LEGEND
○ TRUSS NODE

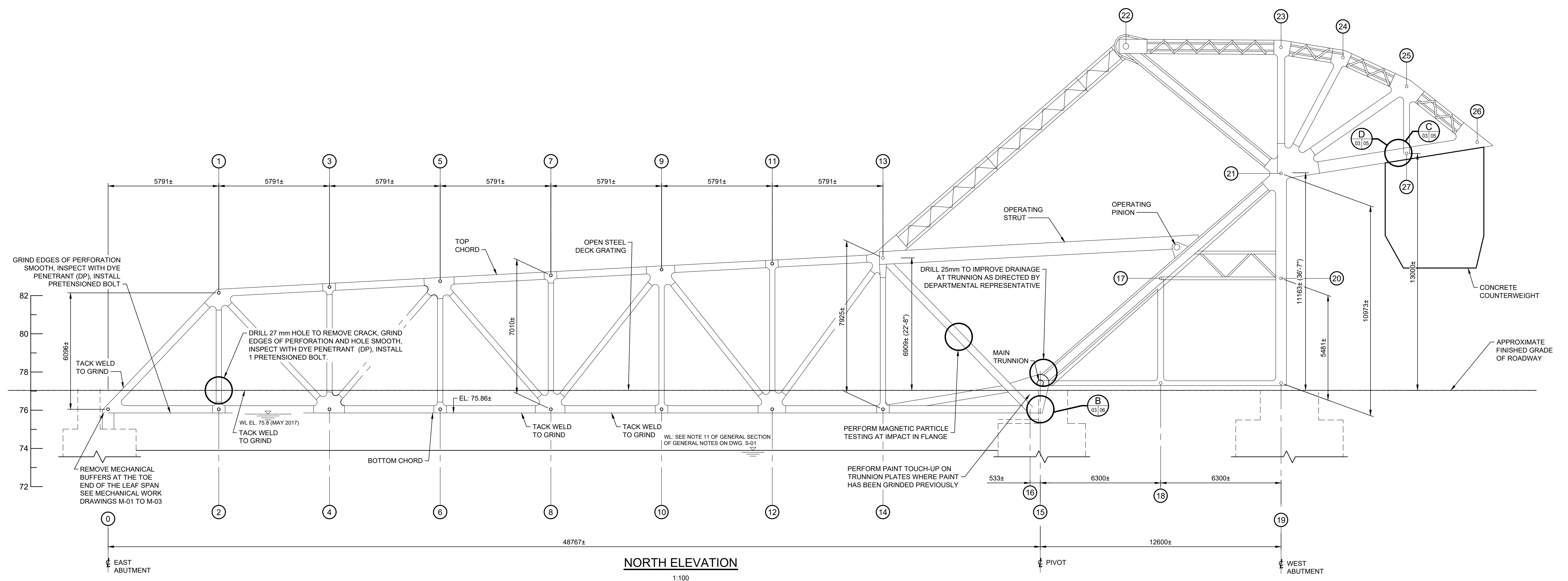
Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region
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Services d'architecture et de génie
Région de l'Ontario



NOT FOR CONSTRUCTION



SOUTH ELEVATION
1:100



NORTH ELEVATION
1:100

4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021
revision	description	date

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A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
GENERAL ARRANGEMENT SHEET 2

drawn by
RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
JEAN-BERNARD CHARRON

approved by
PETER HARVEY
project manager

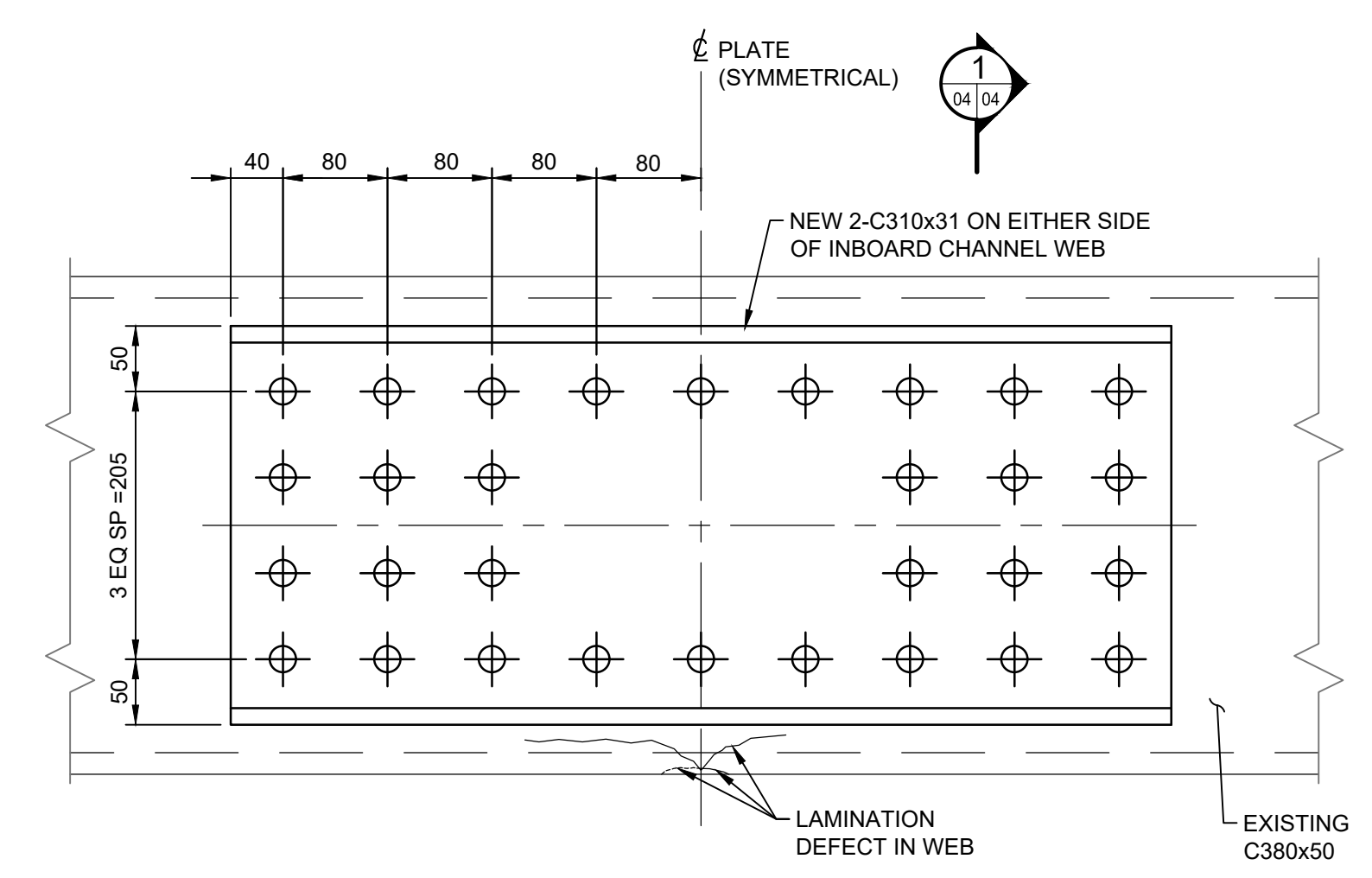
tender
RANYA EL SADAWY

project date
2021/01/22

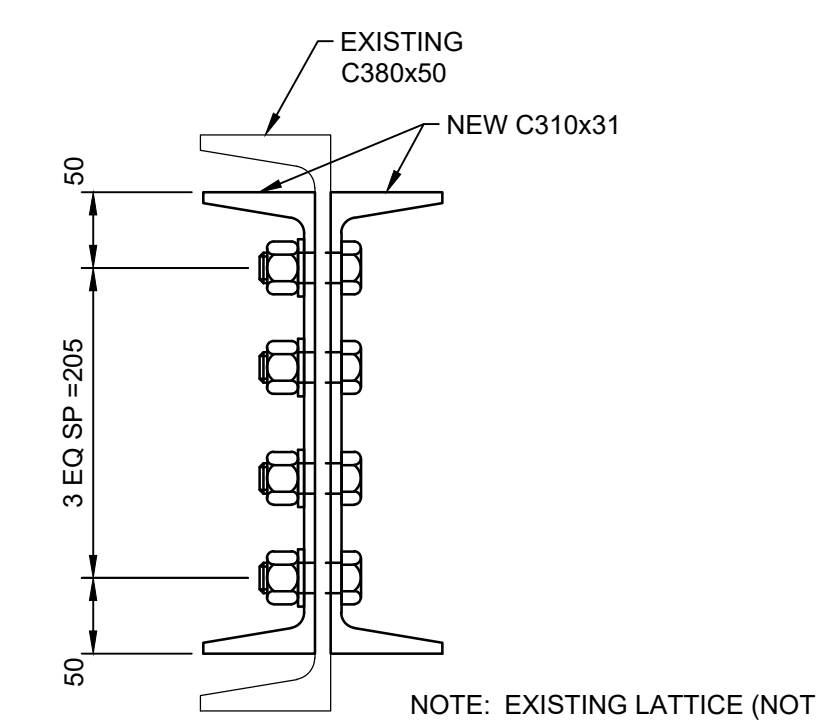
project no.
R.097736.002

drawing no.
S-03

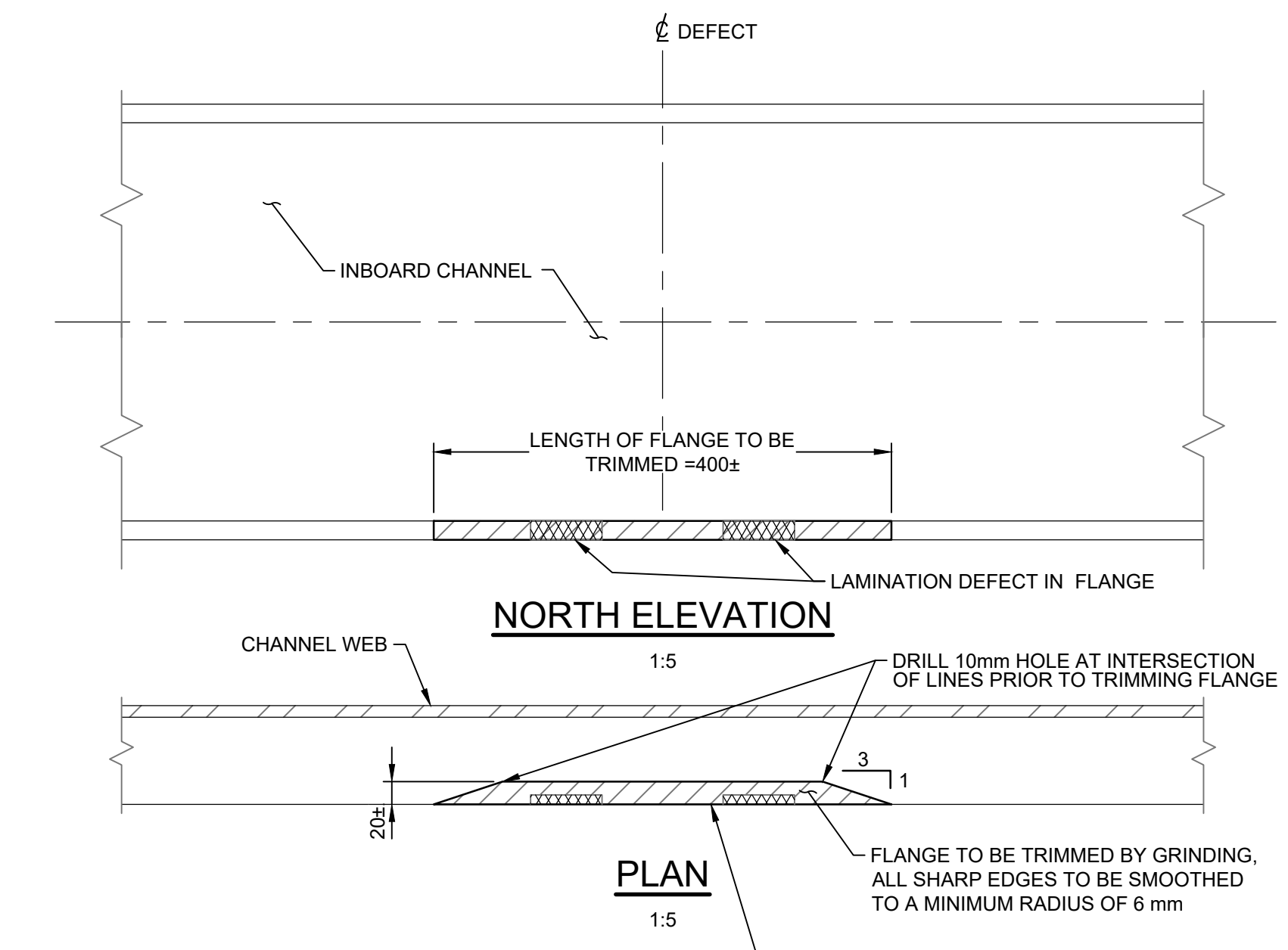
NOT FOR CONSTRUCTION



DETAIL A
1:5 03 | 04
3S-5S - INBOARD CHANNEL - SOUTH ELEVATION



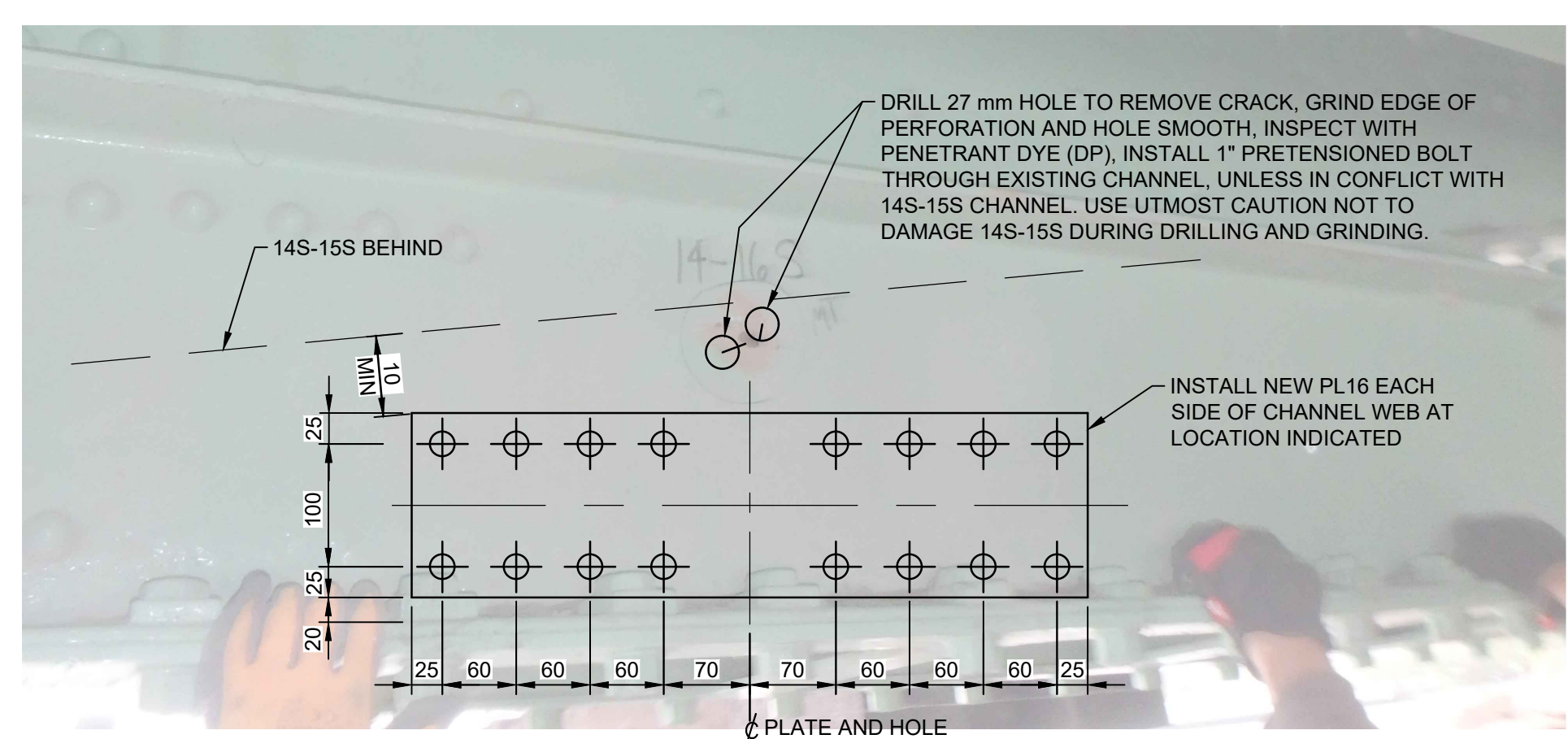
SECTION 1
1:5 04 | 04



DETAIL B
1:5 03 | 04
1S-3S - INBOARD CHANNEL REPAIR
(1 LOCATION)



9S-10S VERTICAL - CRACK BEHIND SIGN SUPPORT ANGLE



DETAIL C
1:5 03 | 04
14S-16S - NORTH CHANNEL REPAIR
(1 LOCATION)



14S-16S NORTH CHANNEL EXISTING CONDITION

LEGEND

- DENOTES EXISTING RIVET OR BOLT
- ⊙ DENOTES EXISTING RIVET OR BOLT TO BE REPLACED WITH NEW BOLT
- ⊕ DENOTES NEW BOLT

revision	description	date
4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge
STRUCTURAL STEEL REPAIRS

drawing title
ABOVE DECK REPAIR DETAILS SHEET 1

drawn by
RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
JEAN-BERNARD CHARRON

approved by
PETER HARVEY

tender
RANYA EL SADAWY project manager

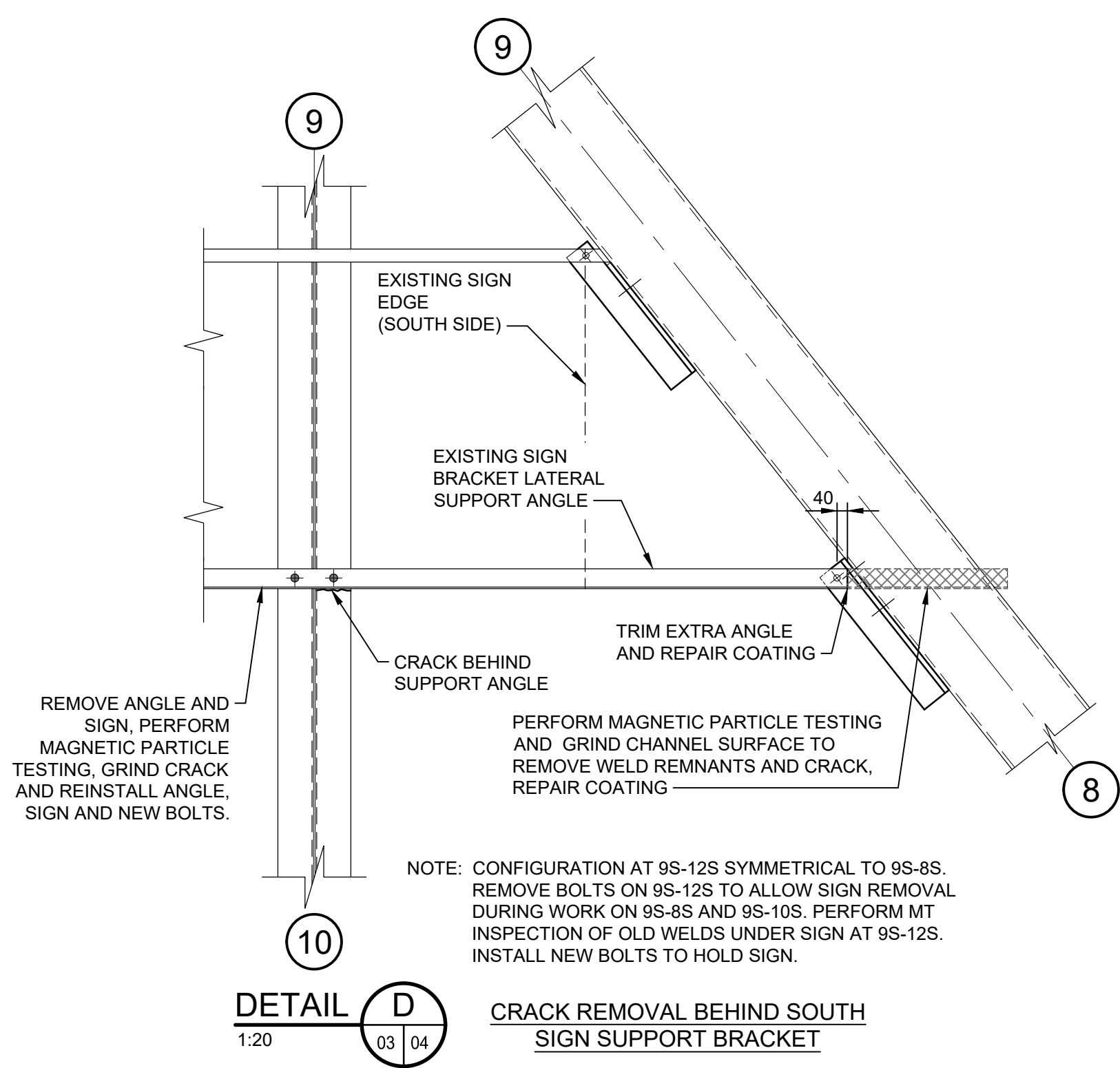
project date
2021/01/22

project no.
R.097736.002

drawing no.
S-04

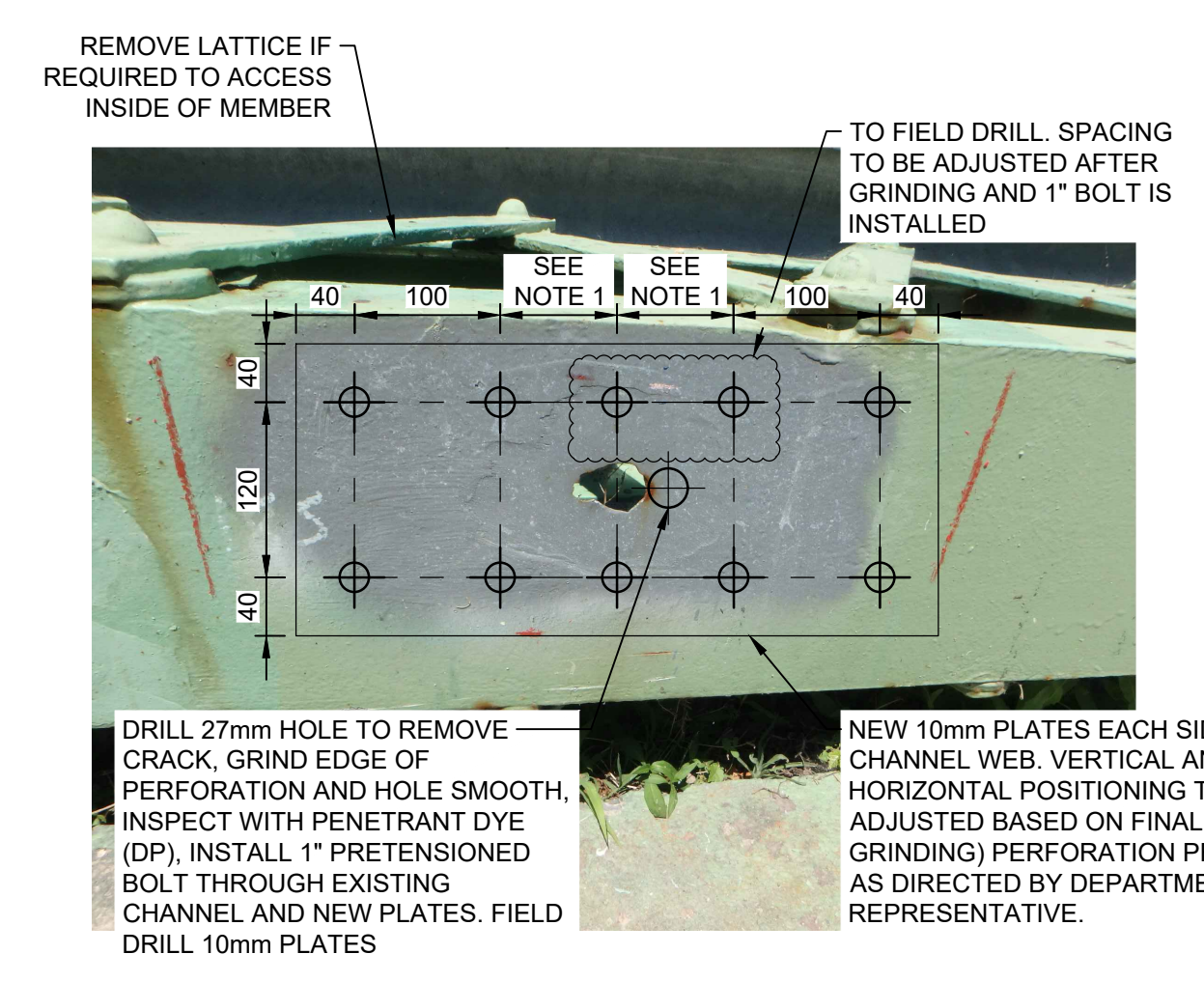
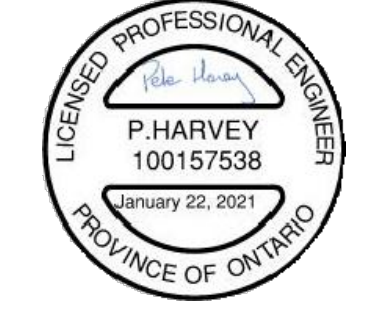


8S-9S DIAGONAL - SIGN SUPPORT ANGLE TO BE TRIMMED



DETAIL D
1:20 03 | 04
CRACK REMOVAL BEHIND SOUTH
SIGN SUPPORT BRACKET

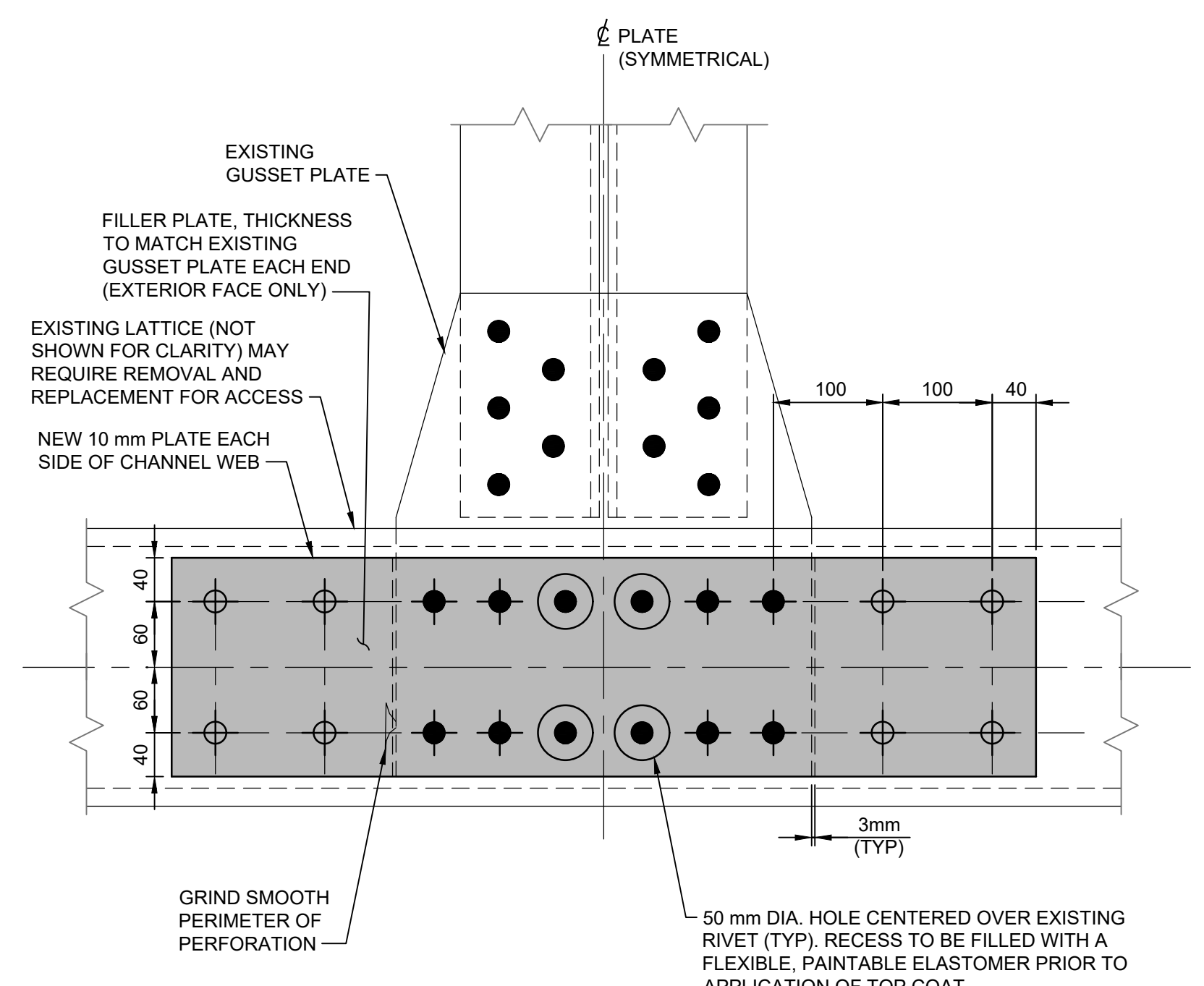
NOT FOR CONSTRUCTION



15S-18S

NOTE 1: 60mm MIN, 140mm MAX, TO ADJUST AFTER 1" BOLT LOCATION IS CONFIRMED

DETAIL B
1:5



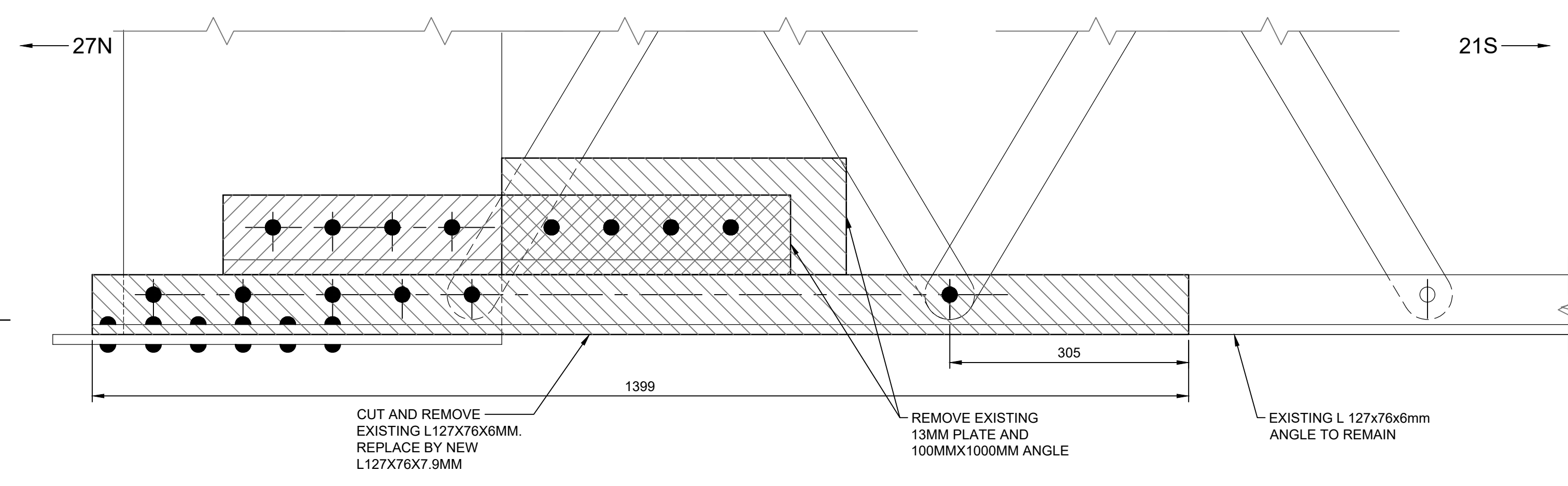
NOTE: BOLT HEADS TO BE LOCATED ON THE EXTERIOR SURFACES.

DETAIL A
1:5

18S-19S - TOWER TRUSS STRENGTHEN SOUTH TRUSS (1 LOCATION)

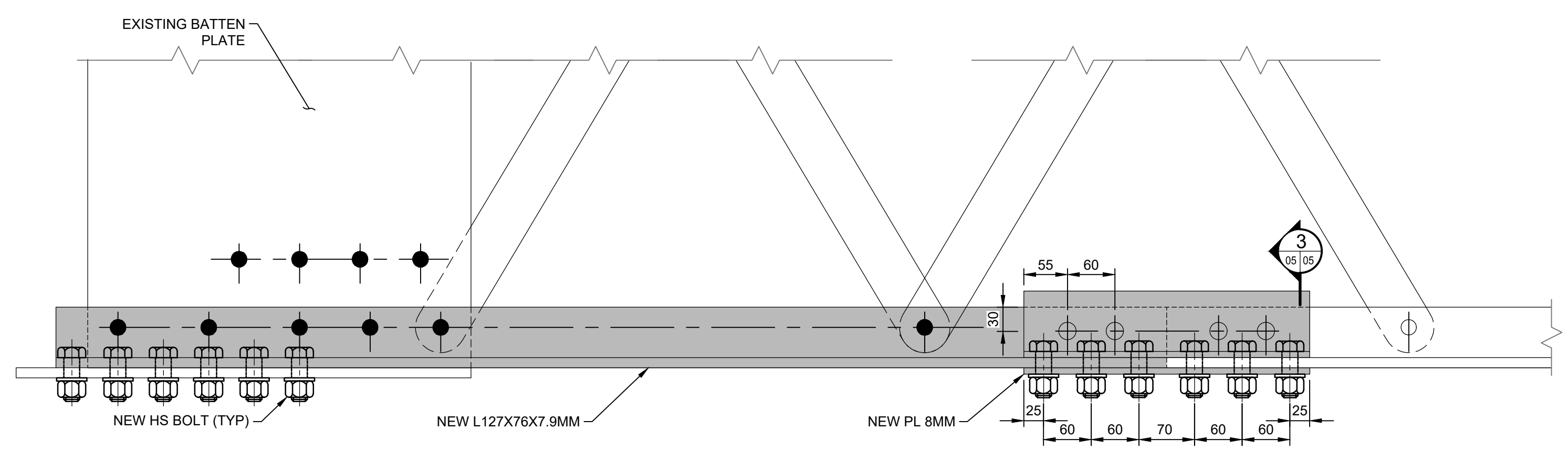


18S-19S - TOWER TRUSS EXISTING CONDITION



21S-27N SIDE VIEW REMOVALS

DETAIL C
1:5



21S-27N SIDE VIEW REHABILITATION

DETAIL C
1:5

LEGEND

- DENOTES EXISTING RIVET OR BOLT
- ⊙ DENOTES EXISTING RIVET OR BOLT TO BE REPLACED WITH NEW BOLT
- ⊕ DENOTES NEW BOLT

4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021
revision	description	date

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

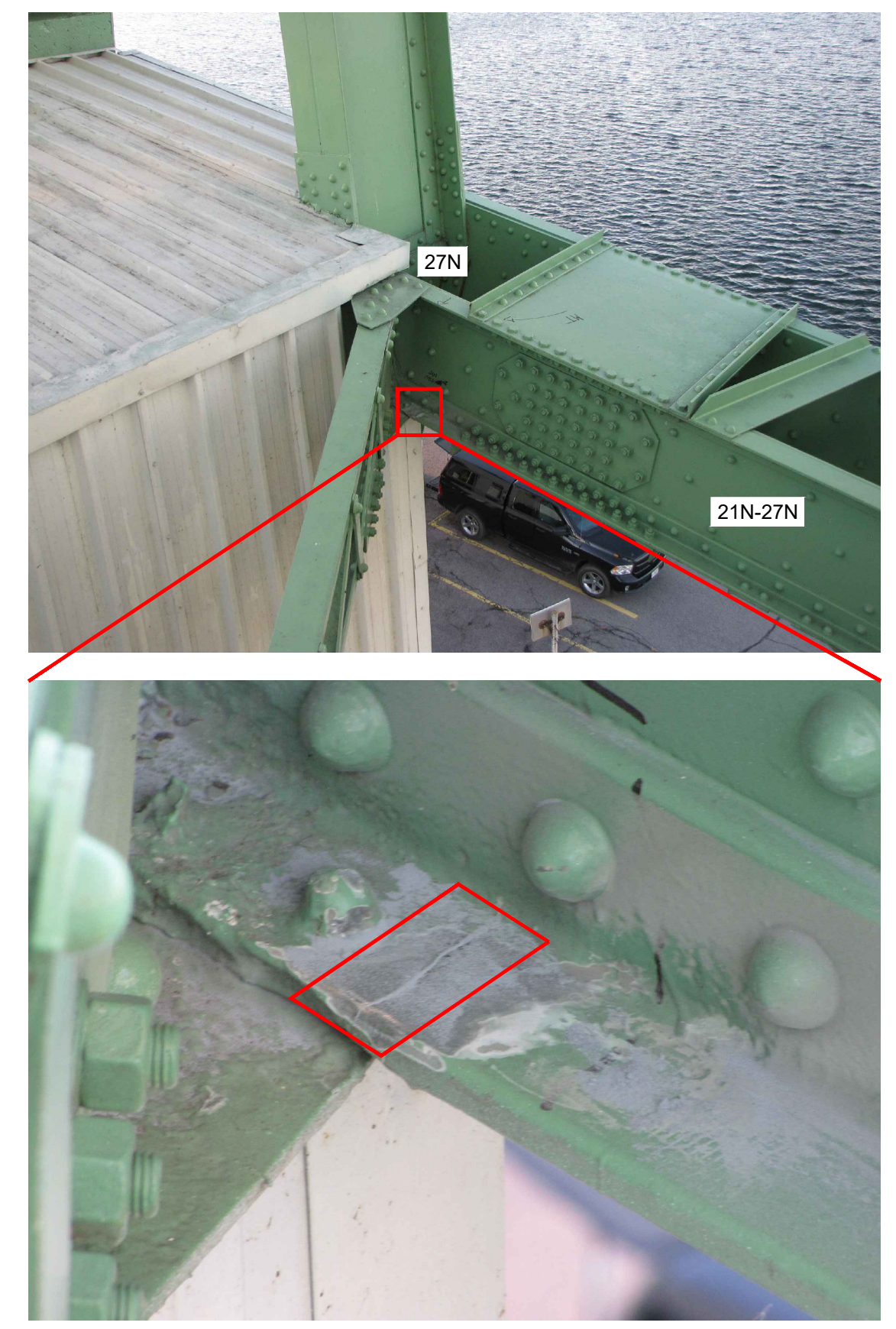
A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
 PSPC
 LaSalle Causway
 Bascule Bridge

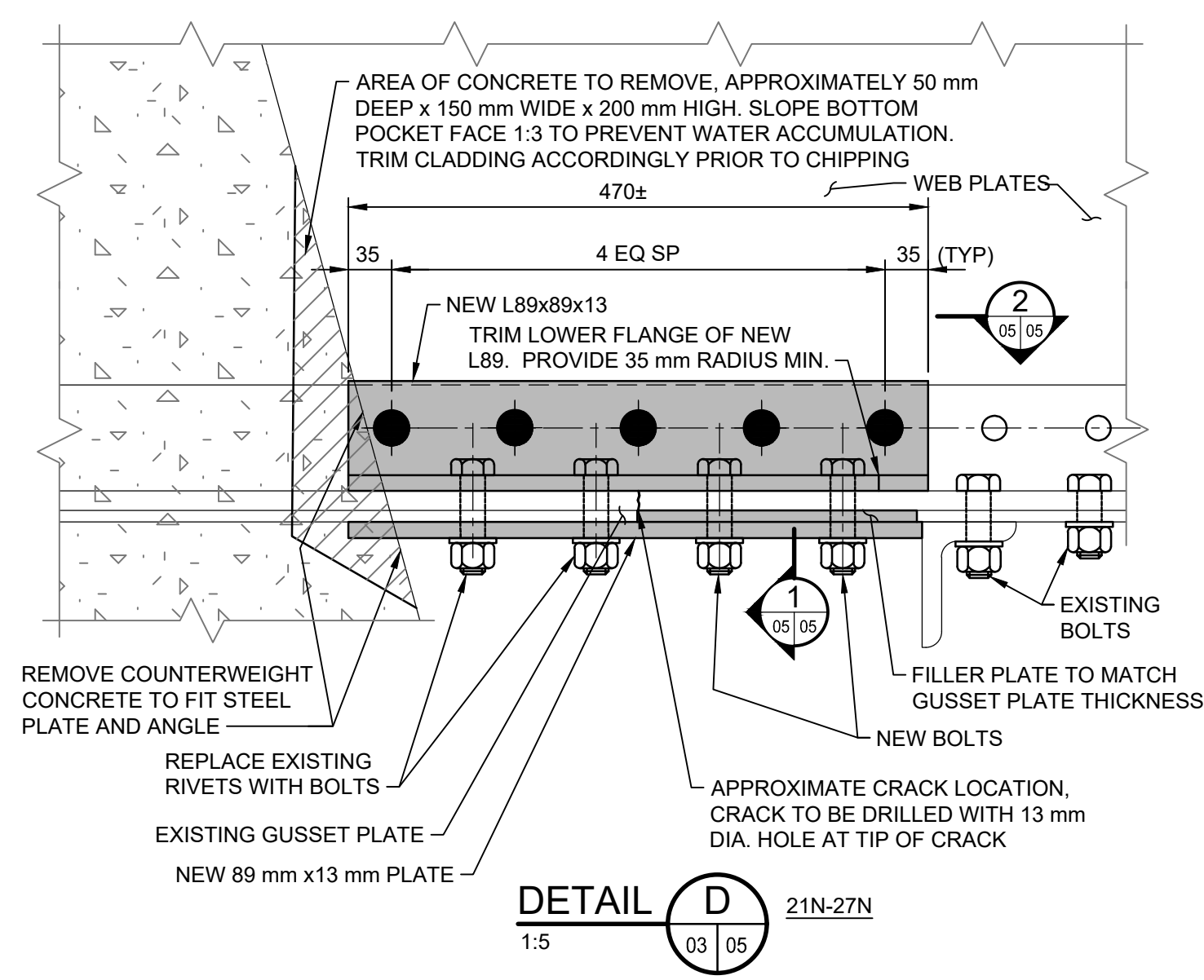
STRUCTURAL STEEL REPAIRS

drawing title
ABOVE DECK REPAIR DETAILS SHEET 2

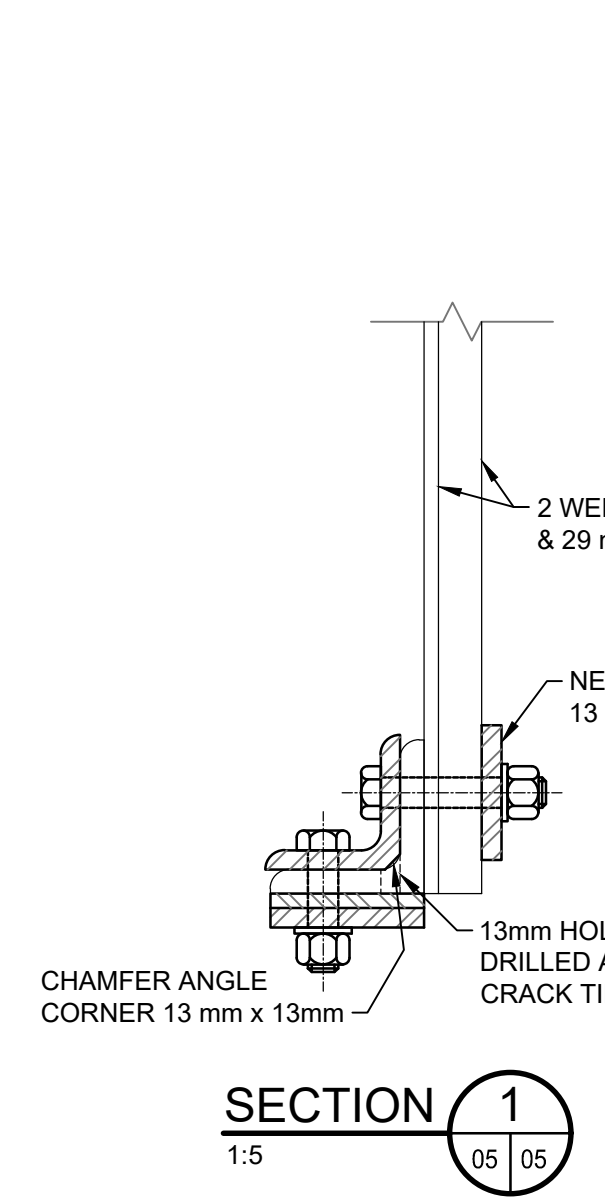
drawn by	RICHARD DYNKA / THOMAS NIEDZWIADK
designed by	JEAN-BERNARD CHARRON
approved by	PETER HARVEY
tender	RANYA EL SADAWY
project manager	
project date	2021/01/22
project no.	R.097736.002
drawing no.	S-05



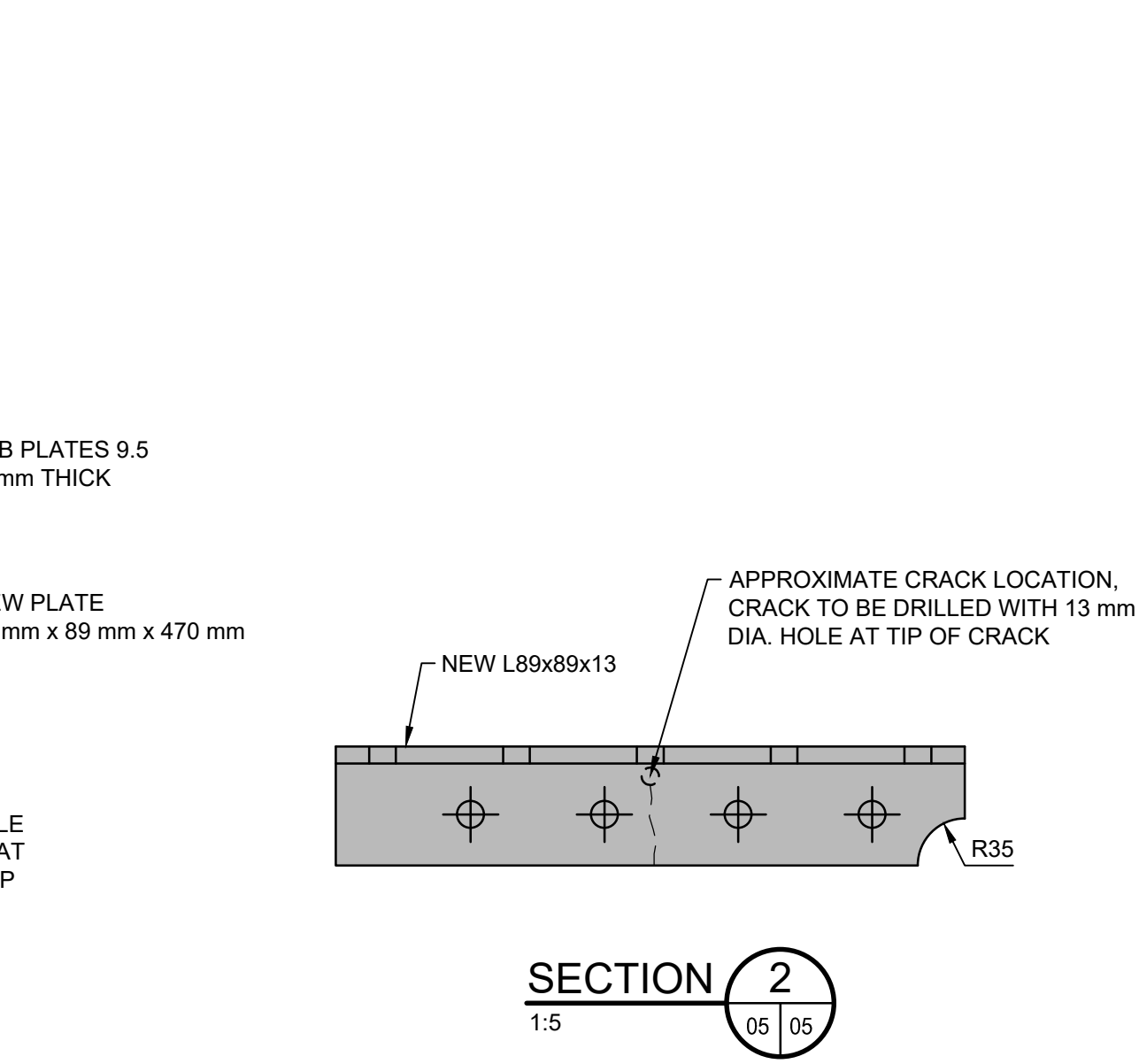
21N-27N CRACK LOCATION



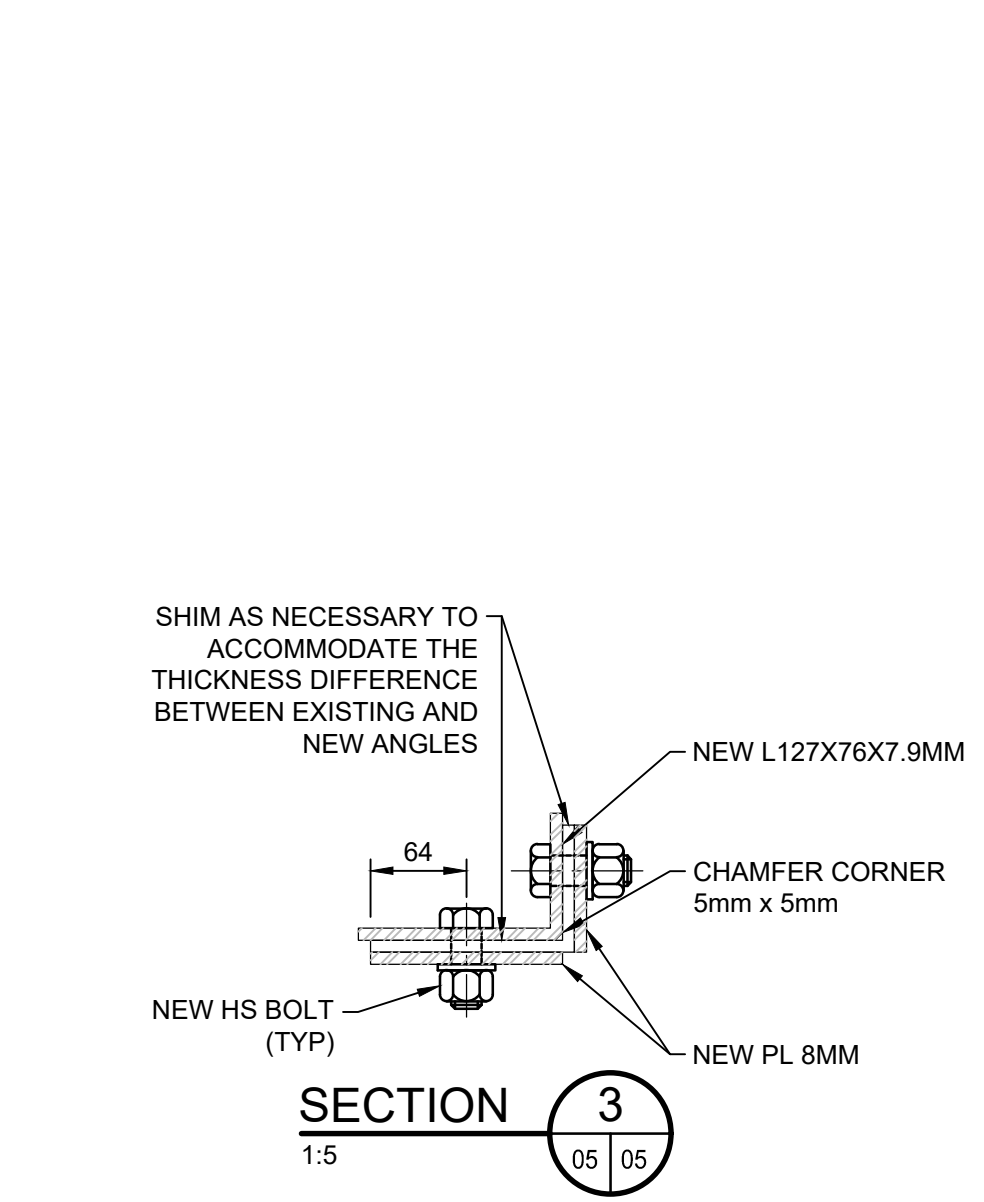
DETAIL D
1:5



SECTION 1
1:5



SECTION 2
1:5



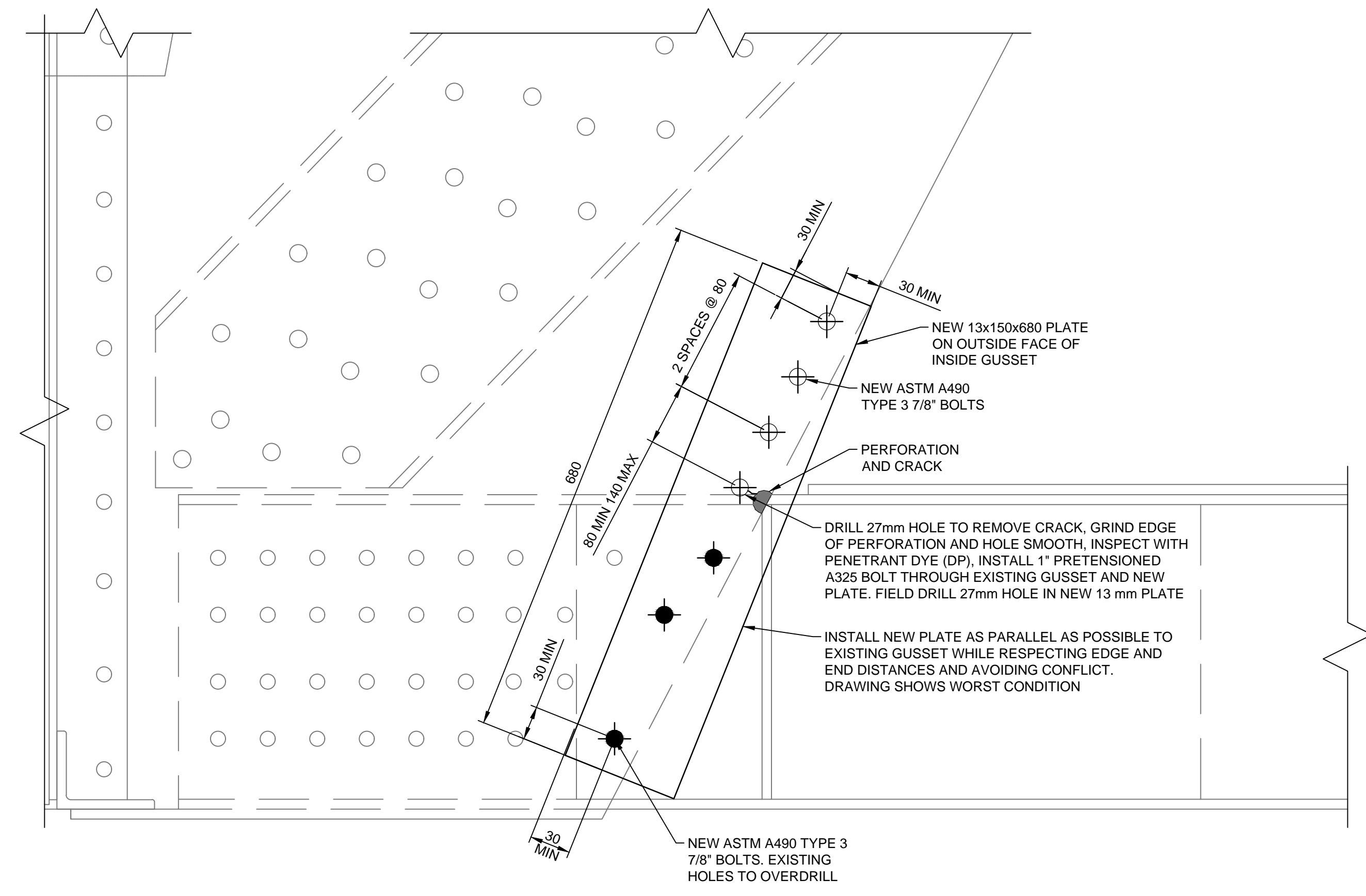
SECTION 3
1:5

NOT FOR CONSTRUCTION



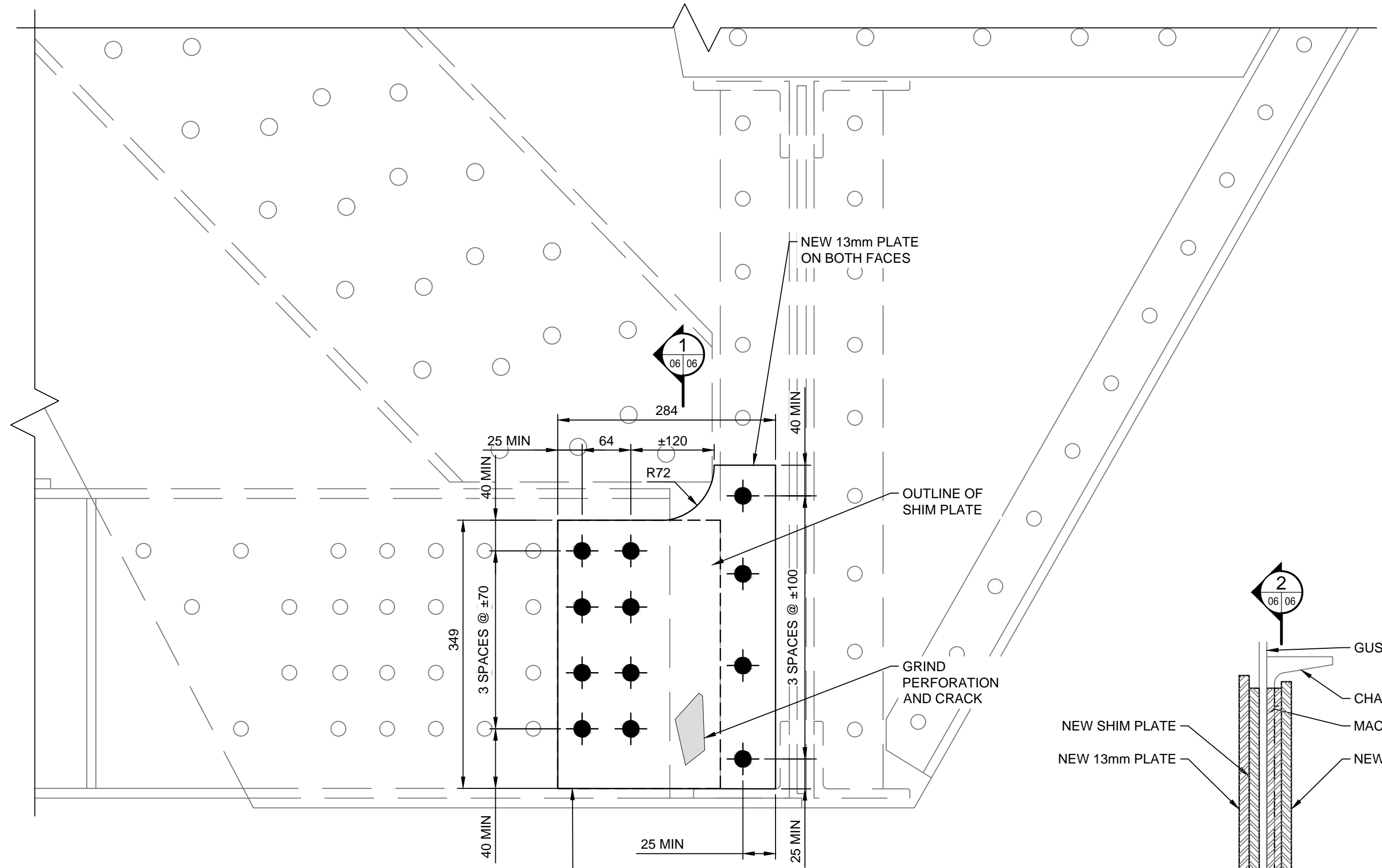
LEGEND

- DENOTES EXISTING RIVET OR BOLT
- ⊙ DENOTES EXISTING RIVET OR BOLT TO BE REPLACED WITH NEW BOLT
- ⊕ DENOTES NEW BOLT

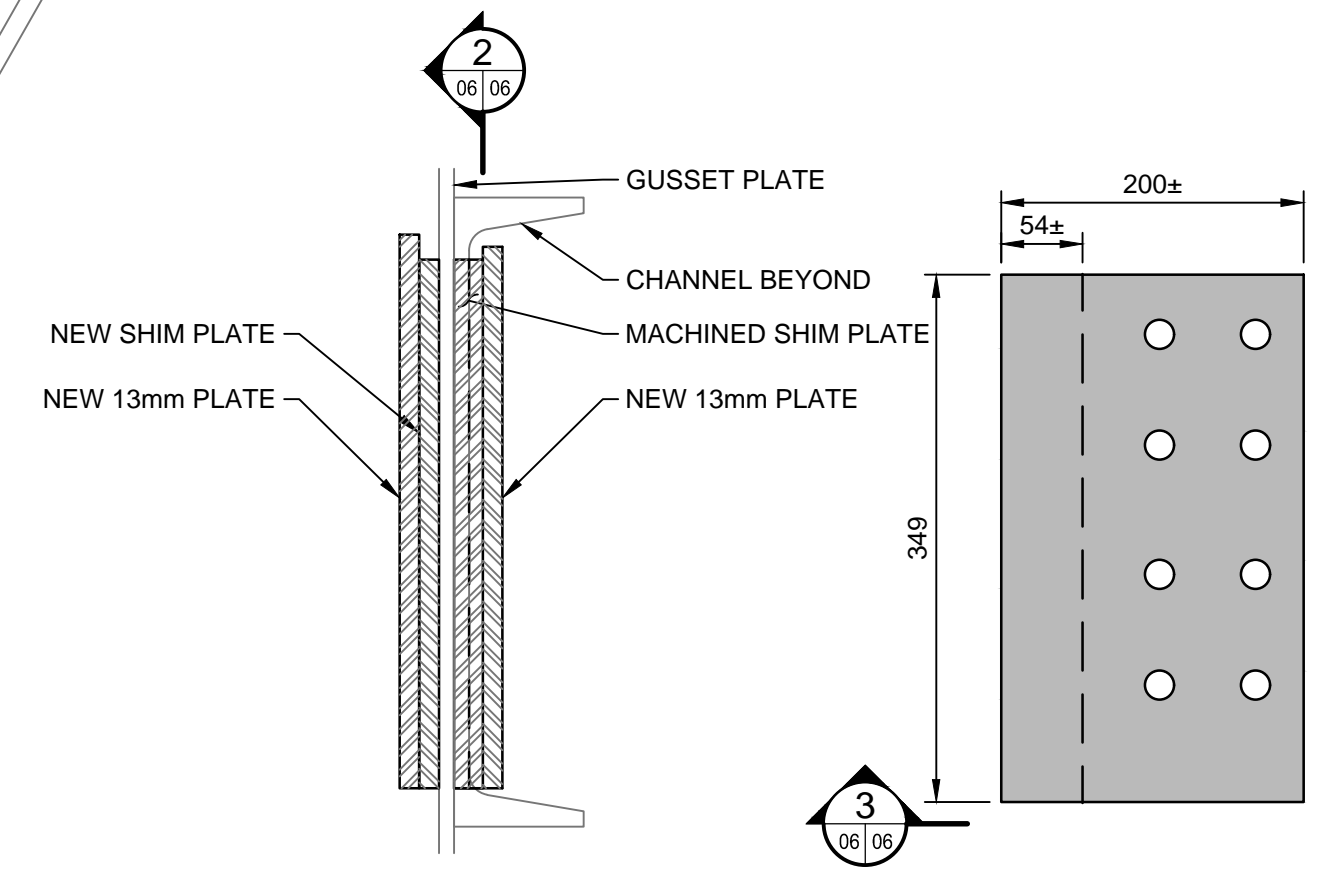


16S - SOUTH FACE OF NORTH GUSSET PLATE OF NODE 16S

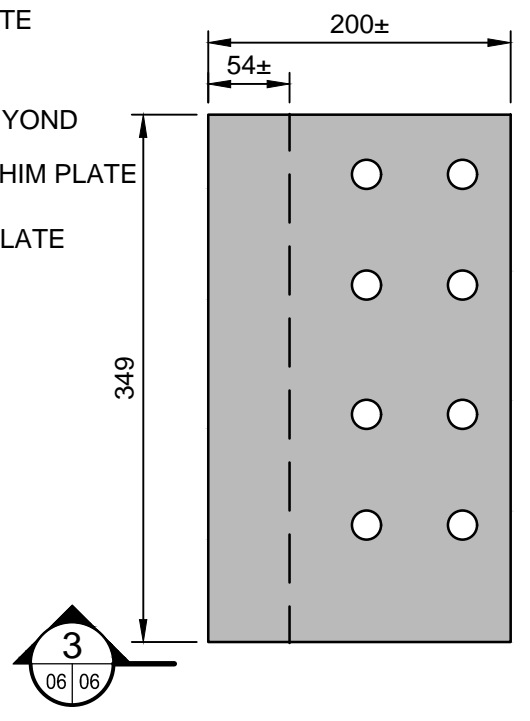
DETAIL A
 1:5 INSIDE THE NODE



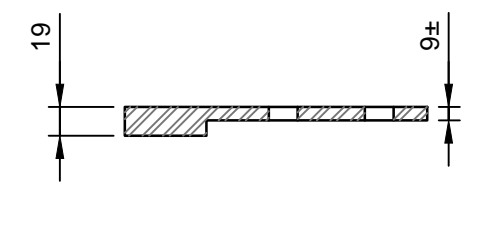
DETAIL B
 1:5 INSIDE THE NODE



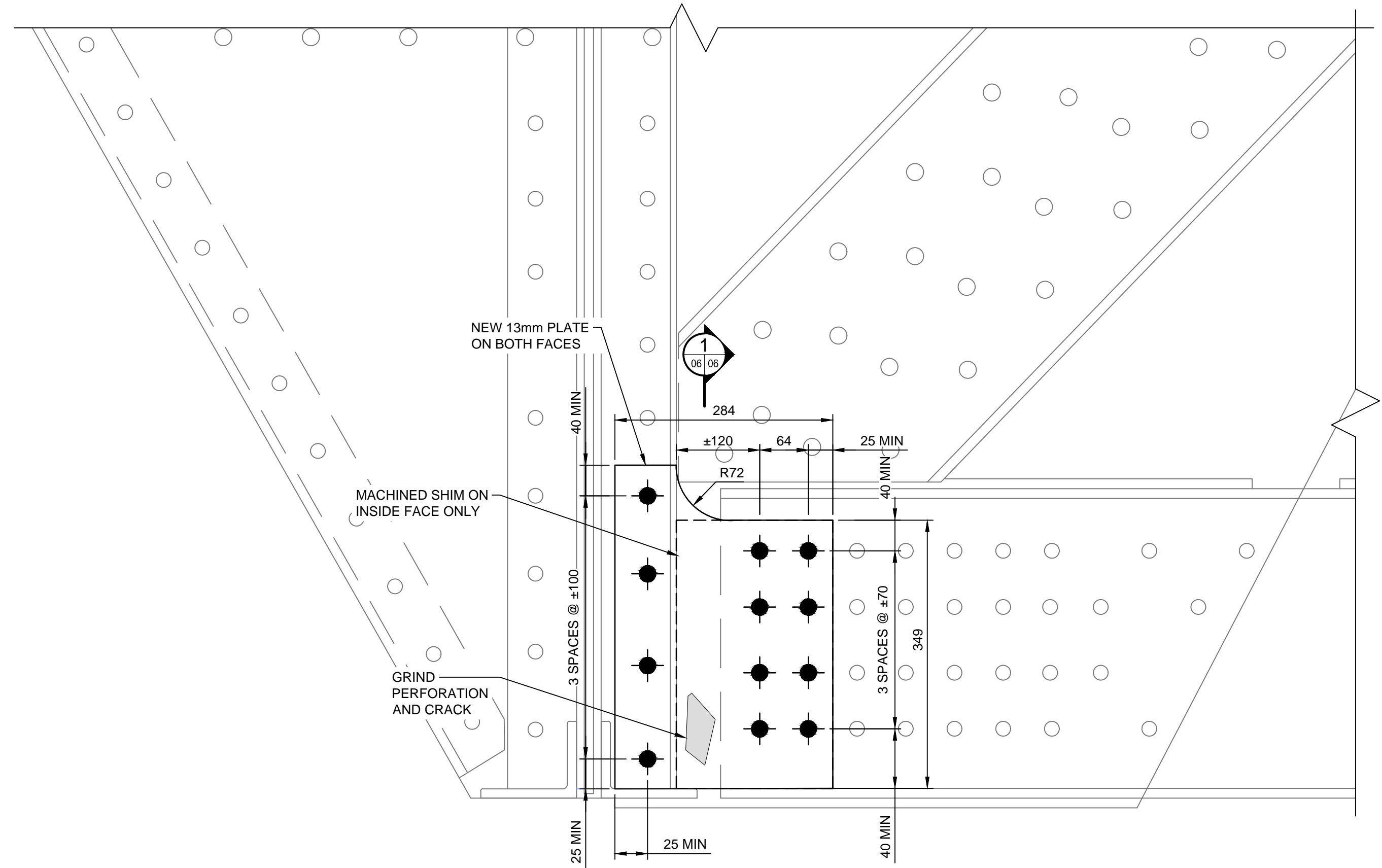
SECTION 1
 1:5



SECTION 2
 1:5



SECTION 3
 1:5



DETAIL B
 1:5 OUTSIDE THE NODE

4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021
revision	description	date

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A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
 PSPC
 LaSalle Causway
 Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
ABOVE DECK REPAIR DETAILS SHEET 3

drawn by
 RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
 JEAN-BERNARD CHARRON

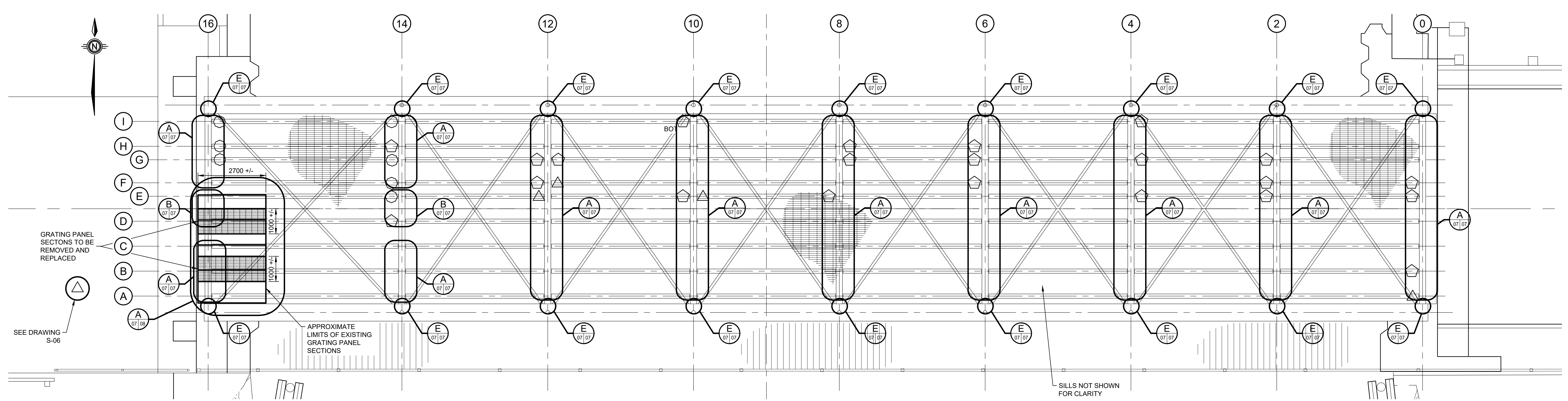
approved by
 PETER HARVEY

tender
 RANYA EL SADAWY project manager

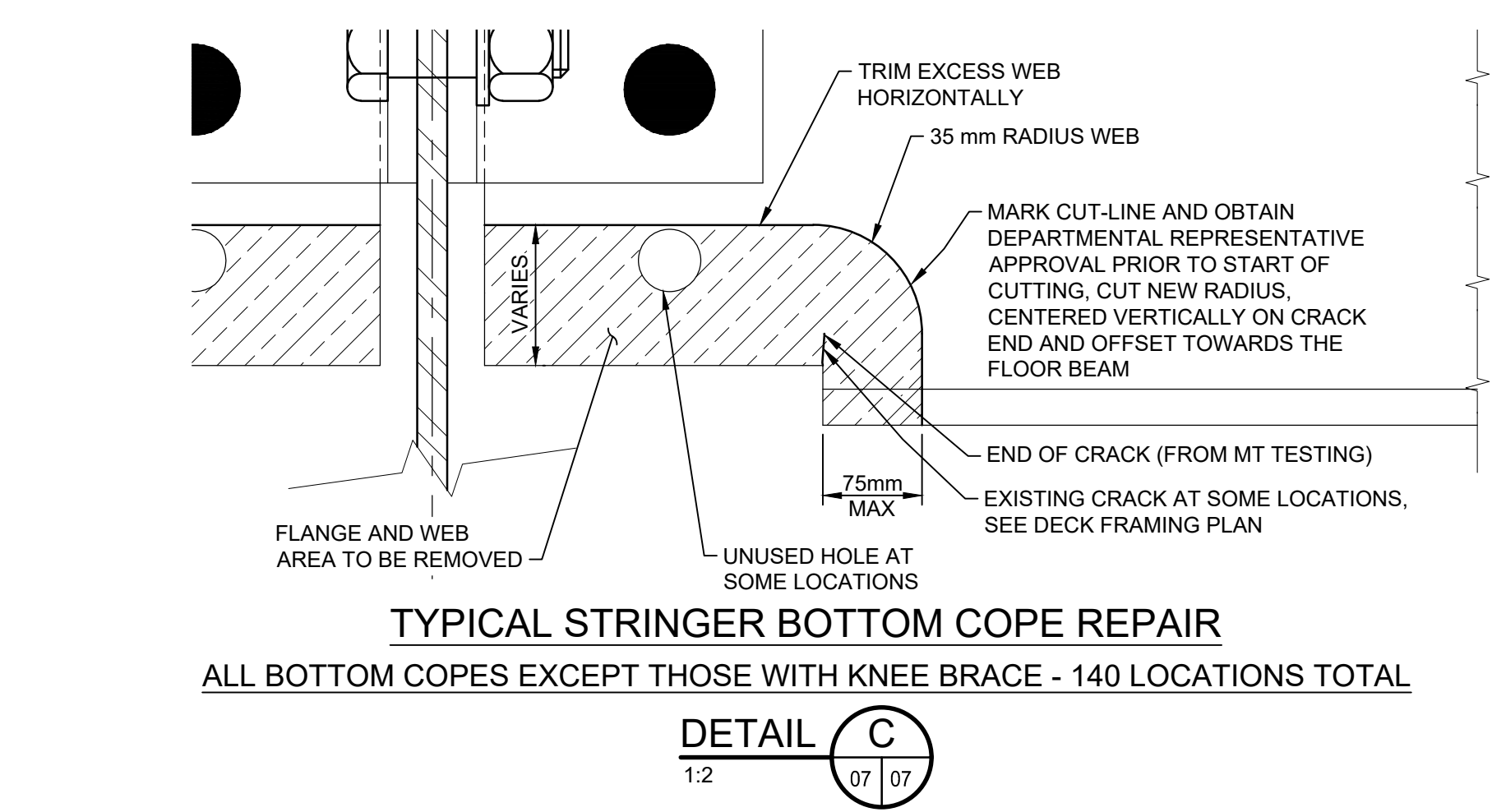
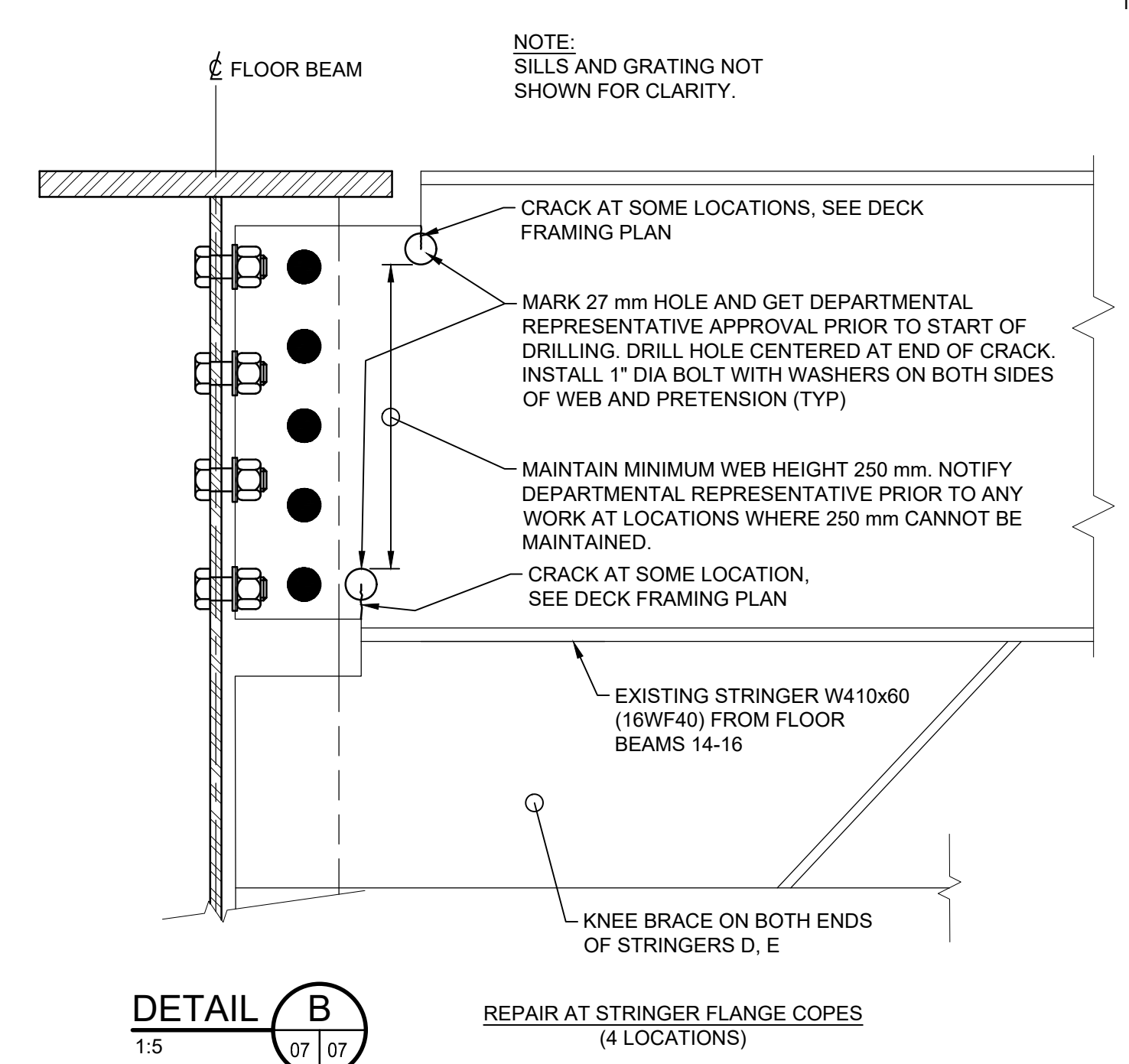
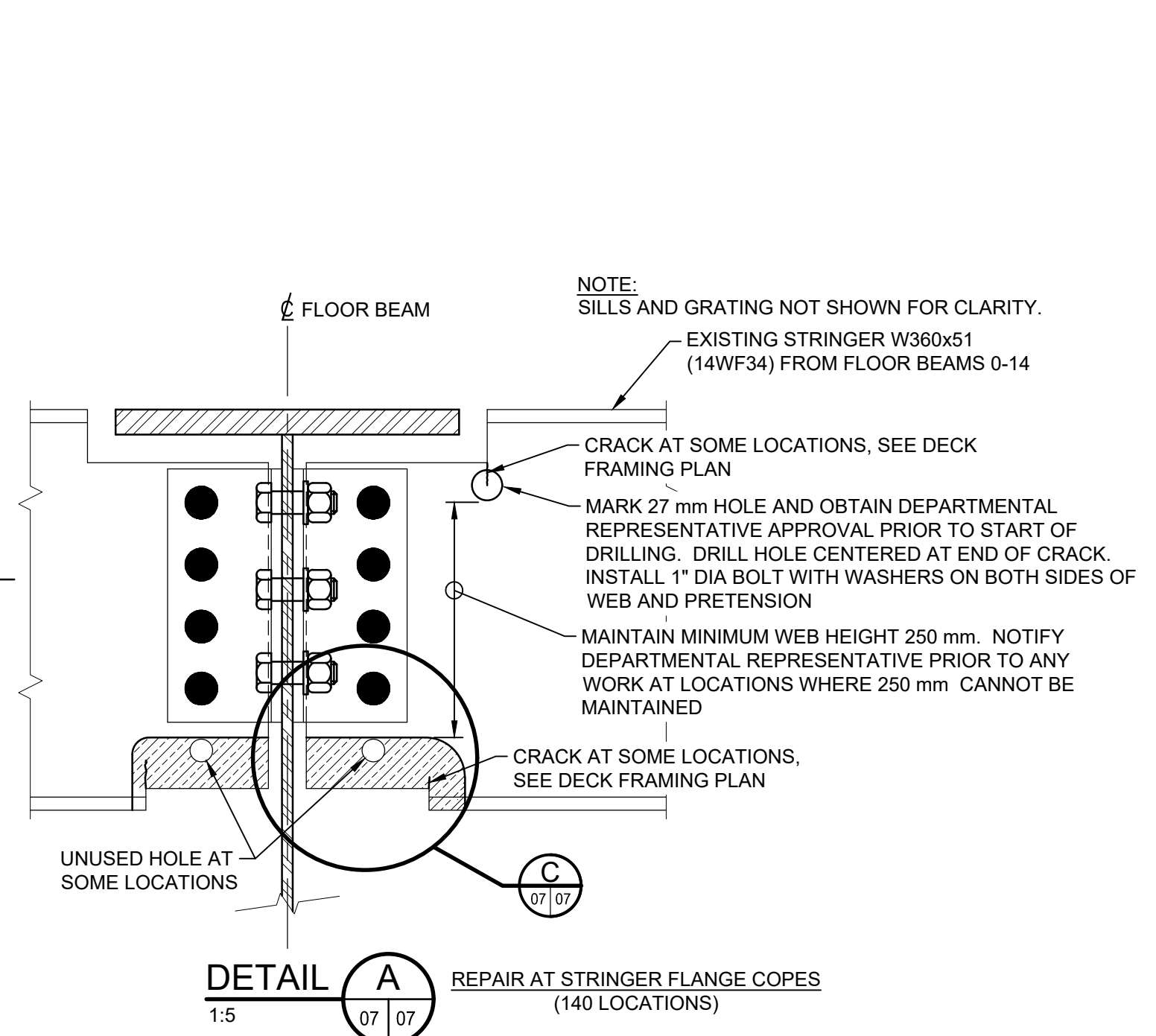
project date
 2021/01/22

project no.
 R.097736.002

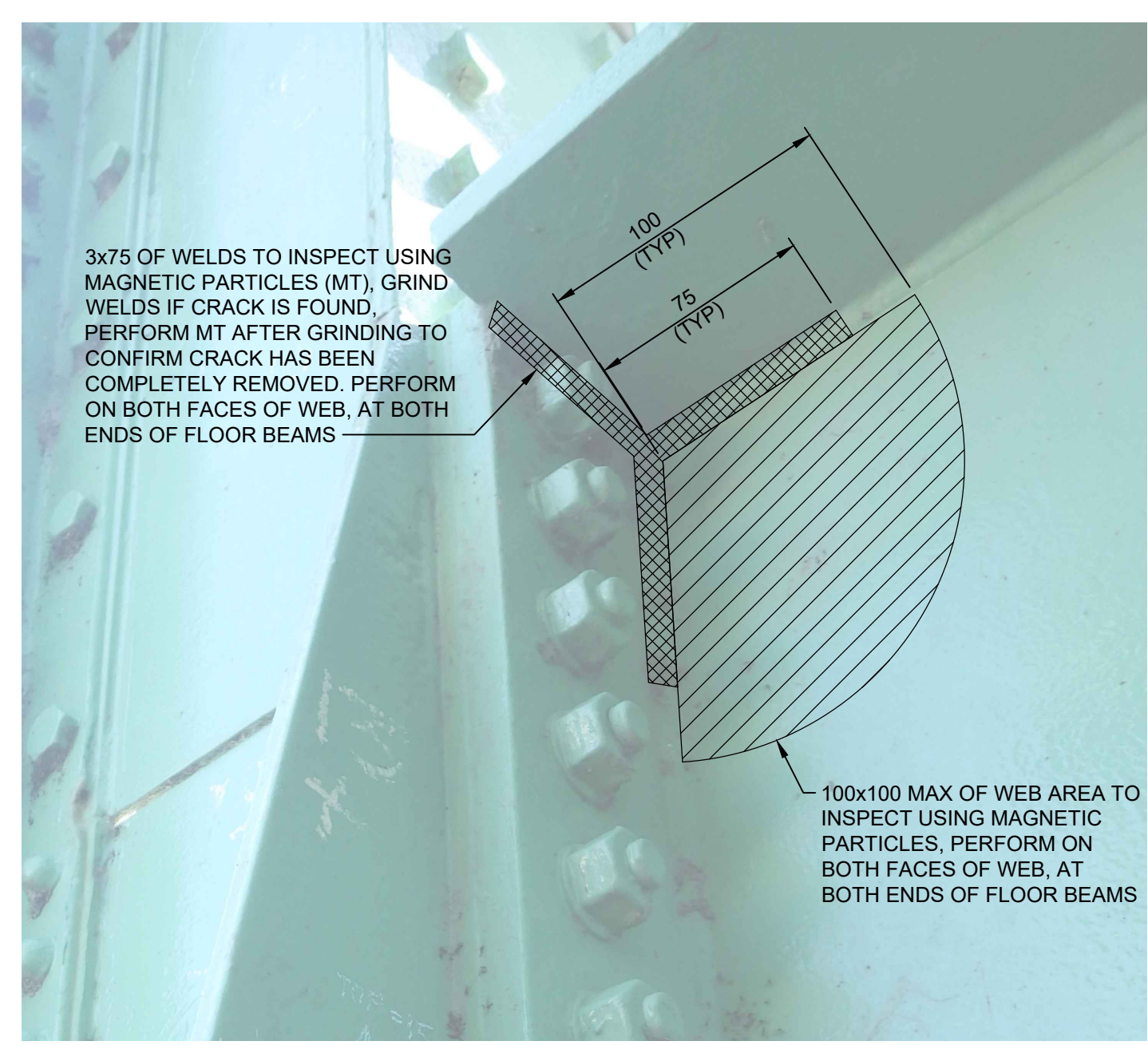
drawing no.
 S-06



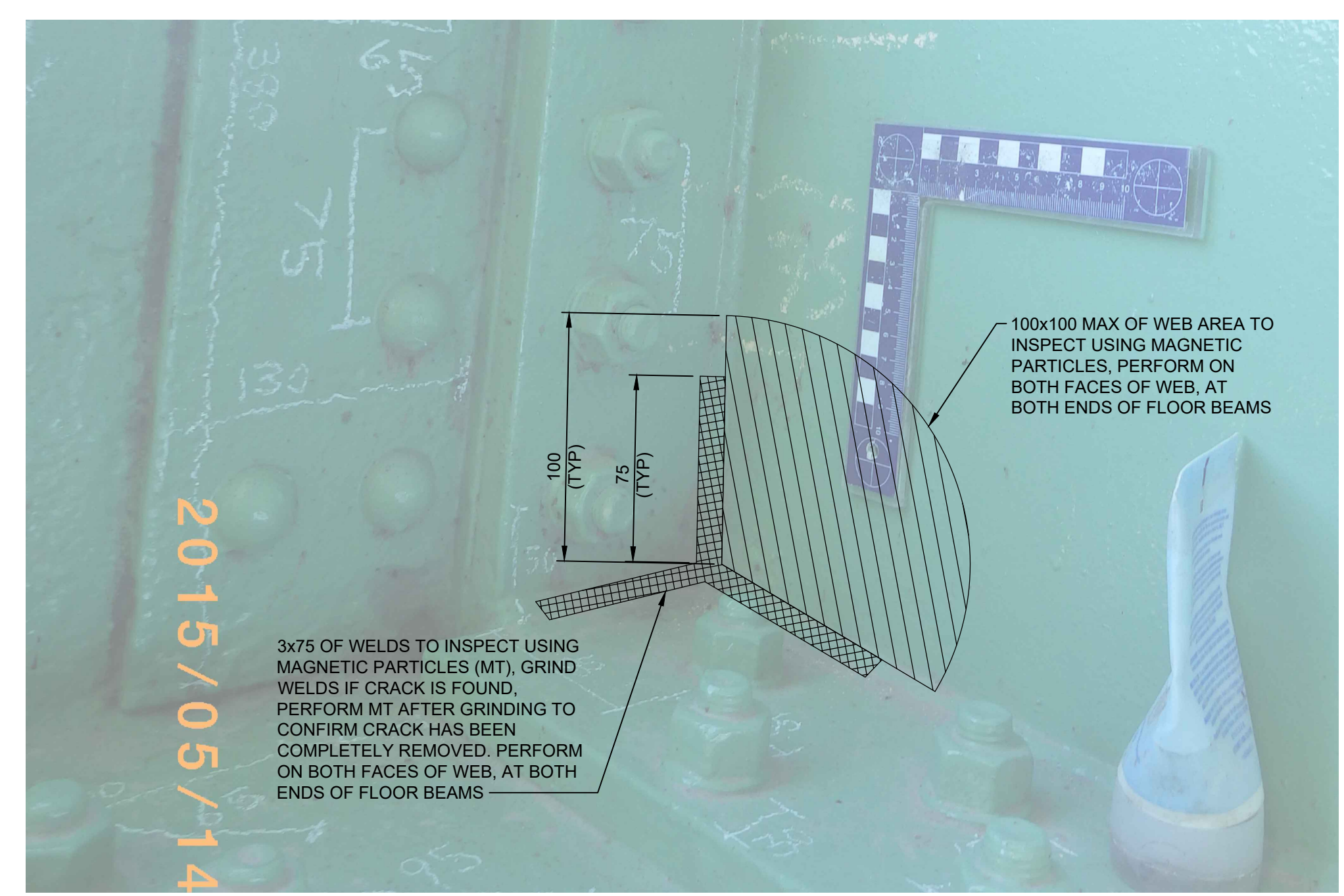
DECK FRAMING PLAN
1:75



NOTE: IN THE EVENT THAT THE MINIMUM 250 mm WEB HEIGHT CANNOT BE MAINTAINED, NOTIFY THE DEPARTMENTAL REPRESENTATIVE. DIRECTION WILL BE GIVEN ON HOW TO PROCEED, DEPENDING ON A REFINED ANALYSIS OF THE EXTENT OF THE DAMAGE. IN THE EVENT THE EXISTING W360x51 STRINGER CANNOT BE SALVAGED, DEPARTMENTAL REPRESENTATIVE WILL REQUIRE THE REPLACEMENT IN KIND OF THE STRINGER. IN SUCH CASE, THE CONTRACTOR IS TO TAKE THE APPROPRIATE MEASUREMENTS ON SITE TO FABRICATE A NEW W360x51 STRINGER WITH COPES THAT WILL SUIT THE EXISTING CONNECTION. THE MINIMUM COPE RADIUS IS TO BE 35MM AND ALL DETAILS ARE TO BE COMPLIANT TO CHBDC S6-19



TOP



BOTTOM

FLOOR BEAM END PLATE WELD INSPECTION AND GRINDING
ALL FLOOR BEAMS (9) - BOTH ENDS, TOP & BOTTOM (72 LOCATIONS)

DETAIL E
1:2



NOT FOR CONSTRUCTION



LEGEND

- DENOTES EXISTING RIVET OR BOLT
- ⊕ DENOTES EXISTING RIVET OR BOLT TO BE REPLACED WITH NEW BOLT
- ⊙ DENOTES NEW BOLT
- △ DENOTES CRACK AT TOP COPE
- ◡ DENOTES CRACK AT BOTTOM COPE
- DENOTES CRACK AT TOP & BOTTOM COPE

revision	description	date
4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

Detail No.	drawing no. - where detail required	drawing no. - where detailed
A		
B		
C		

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
DECK LEVEL AND BELOW REPAIR DETAILS SHEET 1

drawn by
RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
JEAN-BERNARD CHARRON

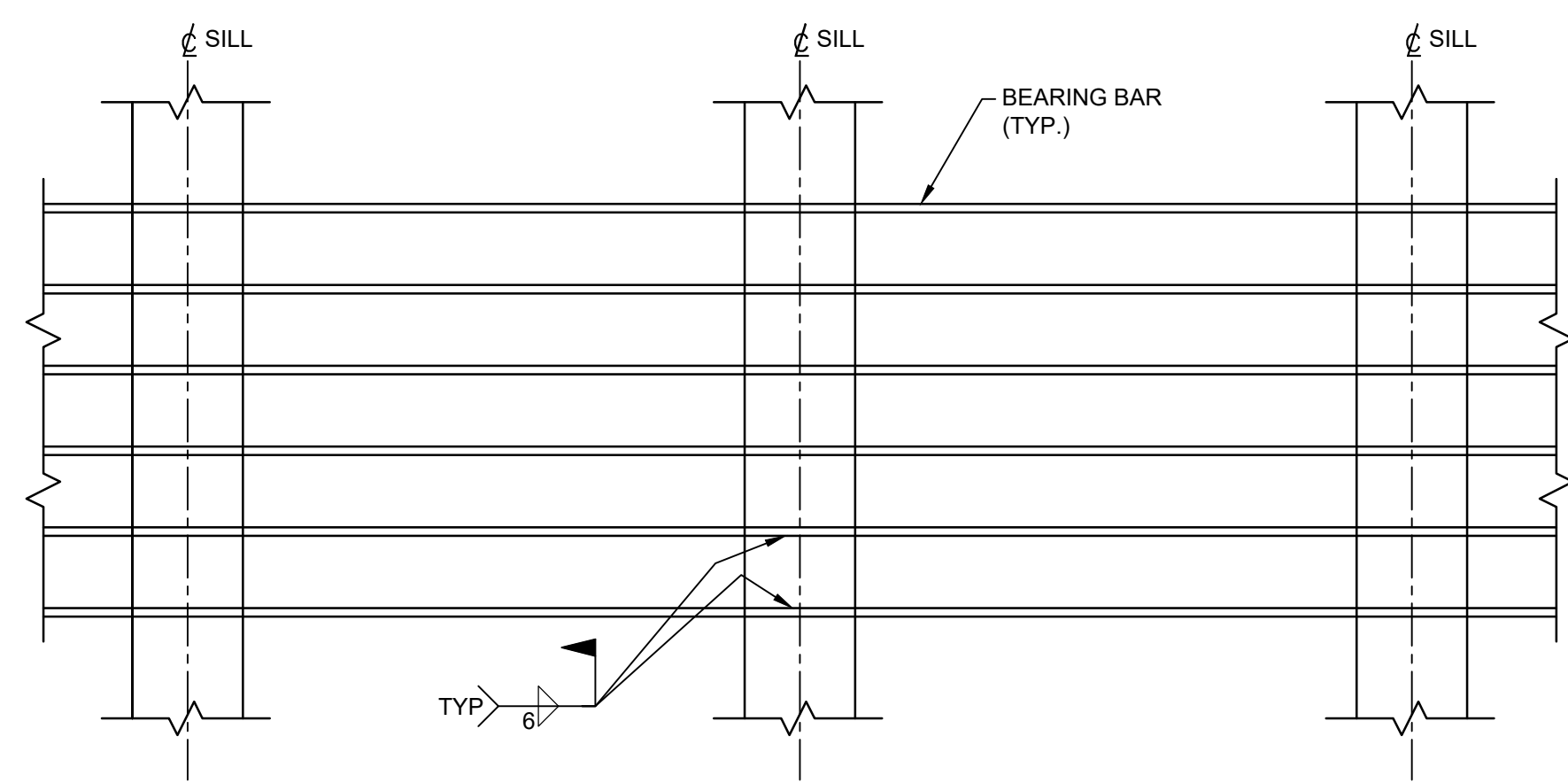
approved by
PETER HARVEY

tender project manager
RANYA EL SADAWY

project date
2021/01/22

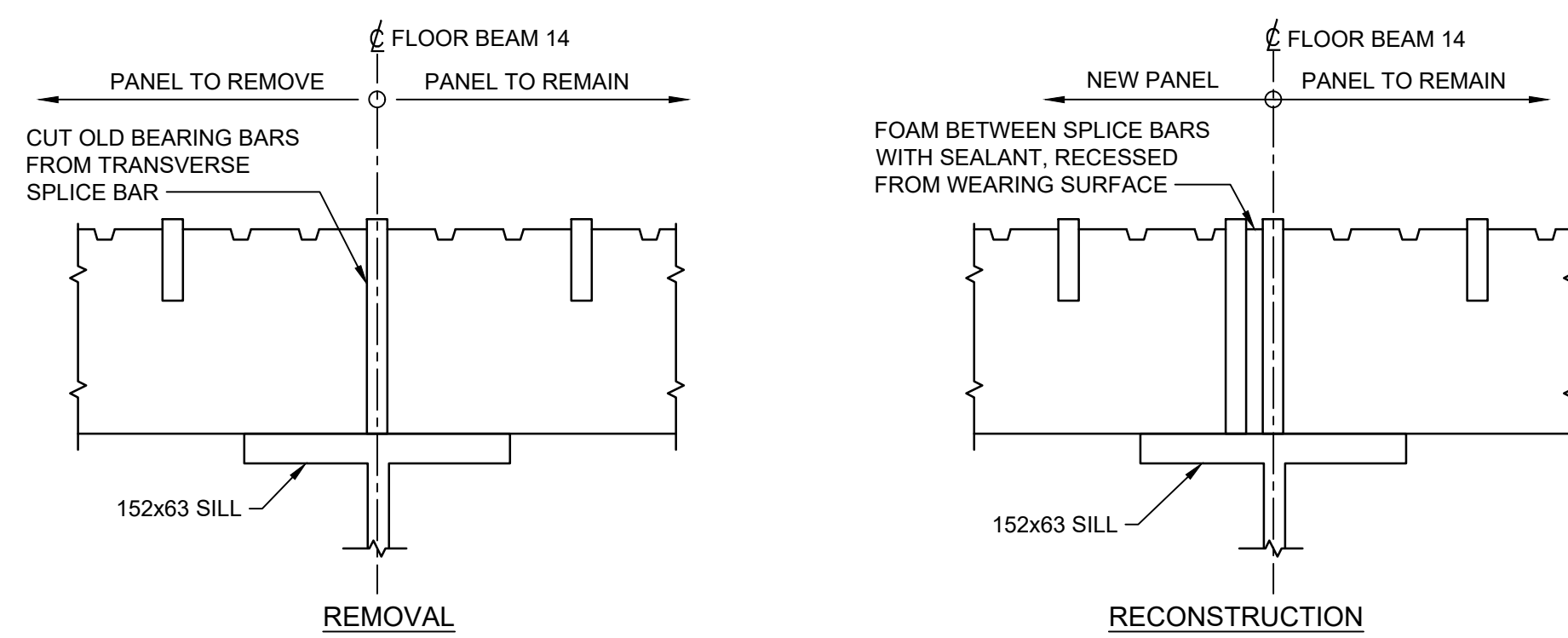
project no.
R.097736.002

drawing no.
S-07



WELDING PATTERN FOR NEW GRATING

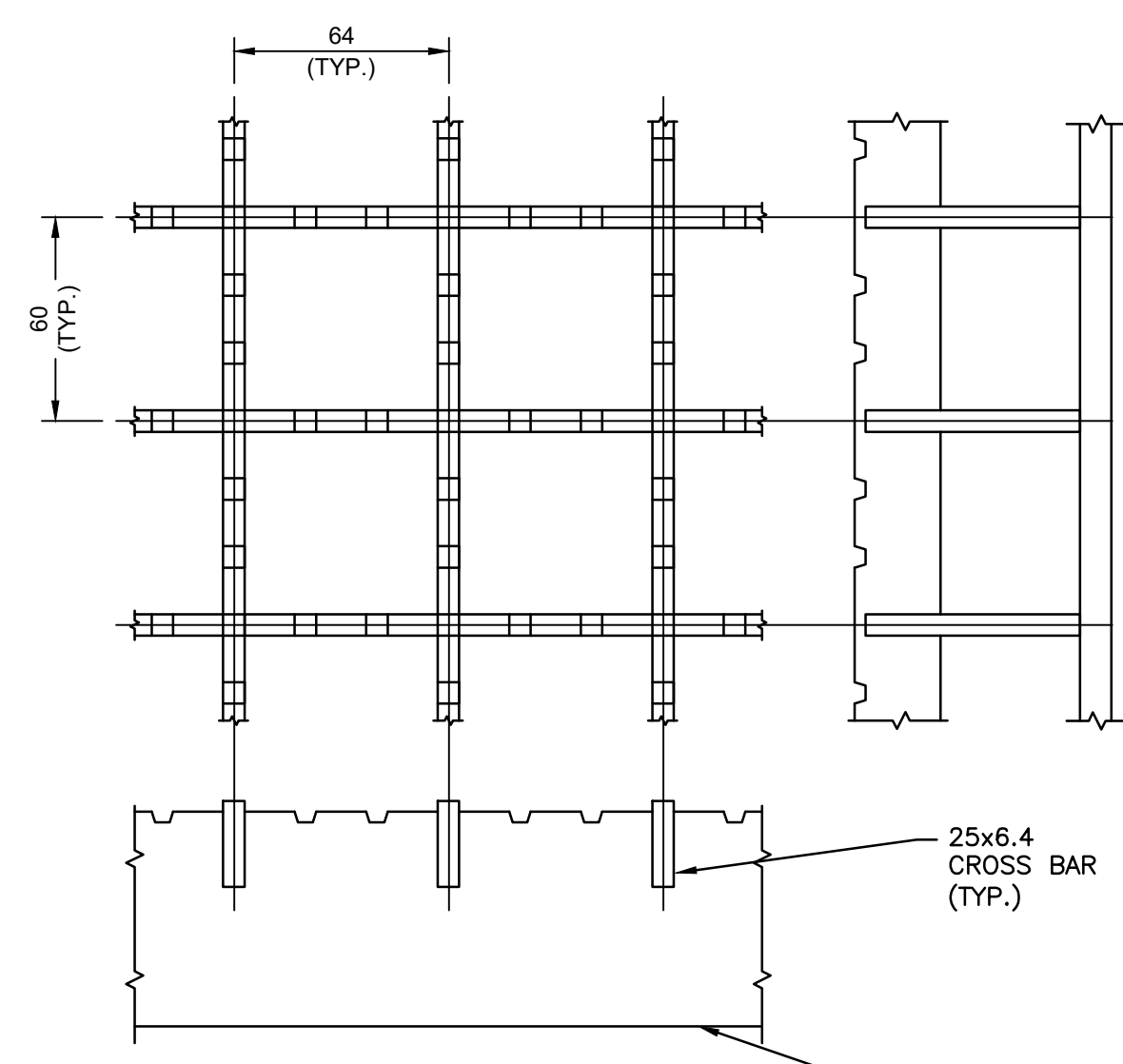
1:5



GRATING PANEL - TRANSVERSE SPLICE

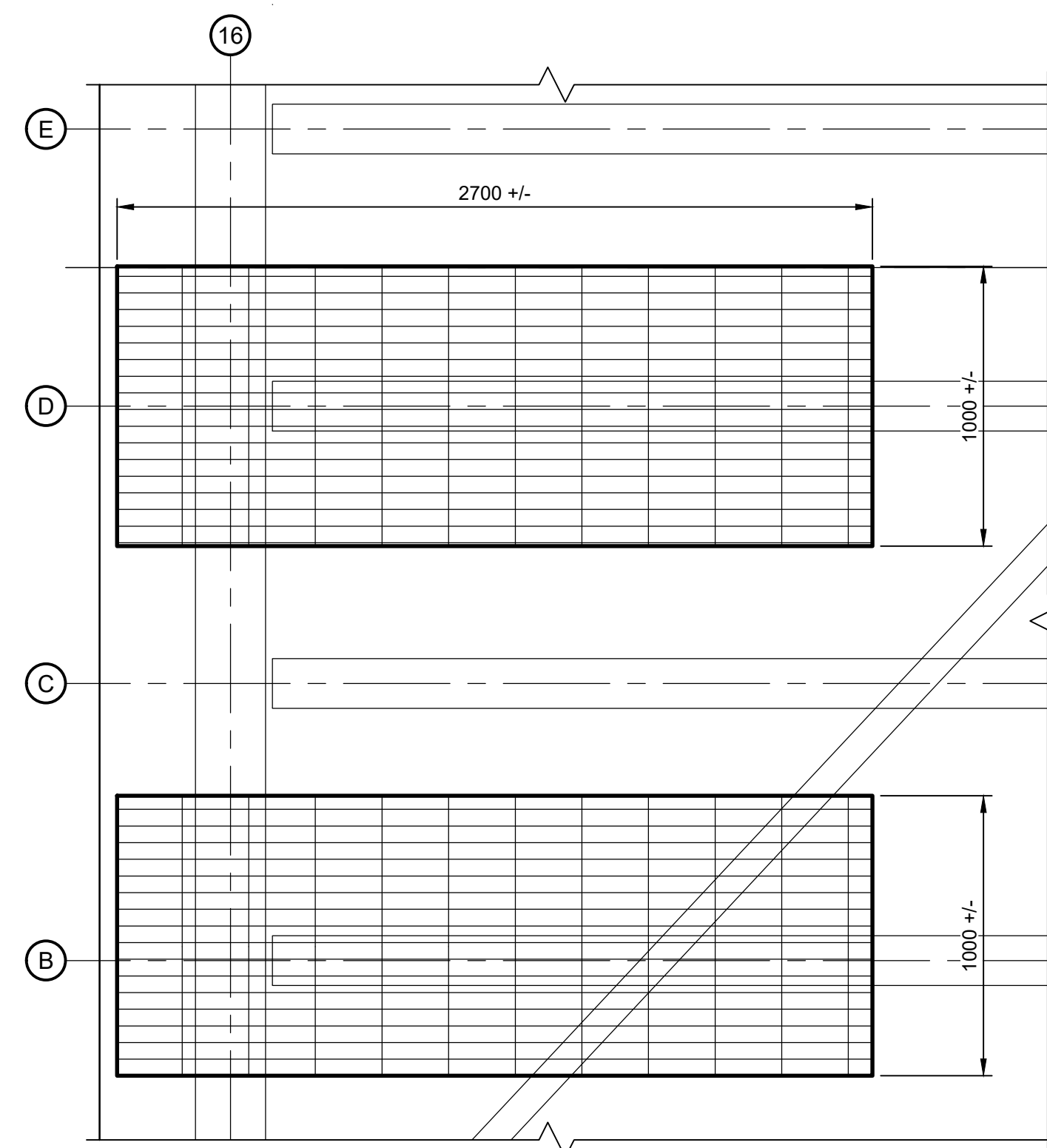
1:2

(AT FLOOR BEAM 14)

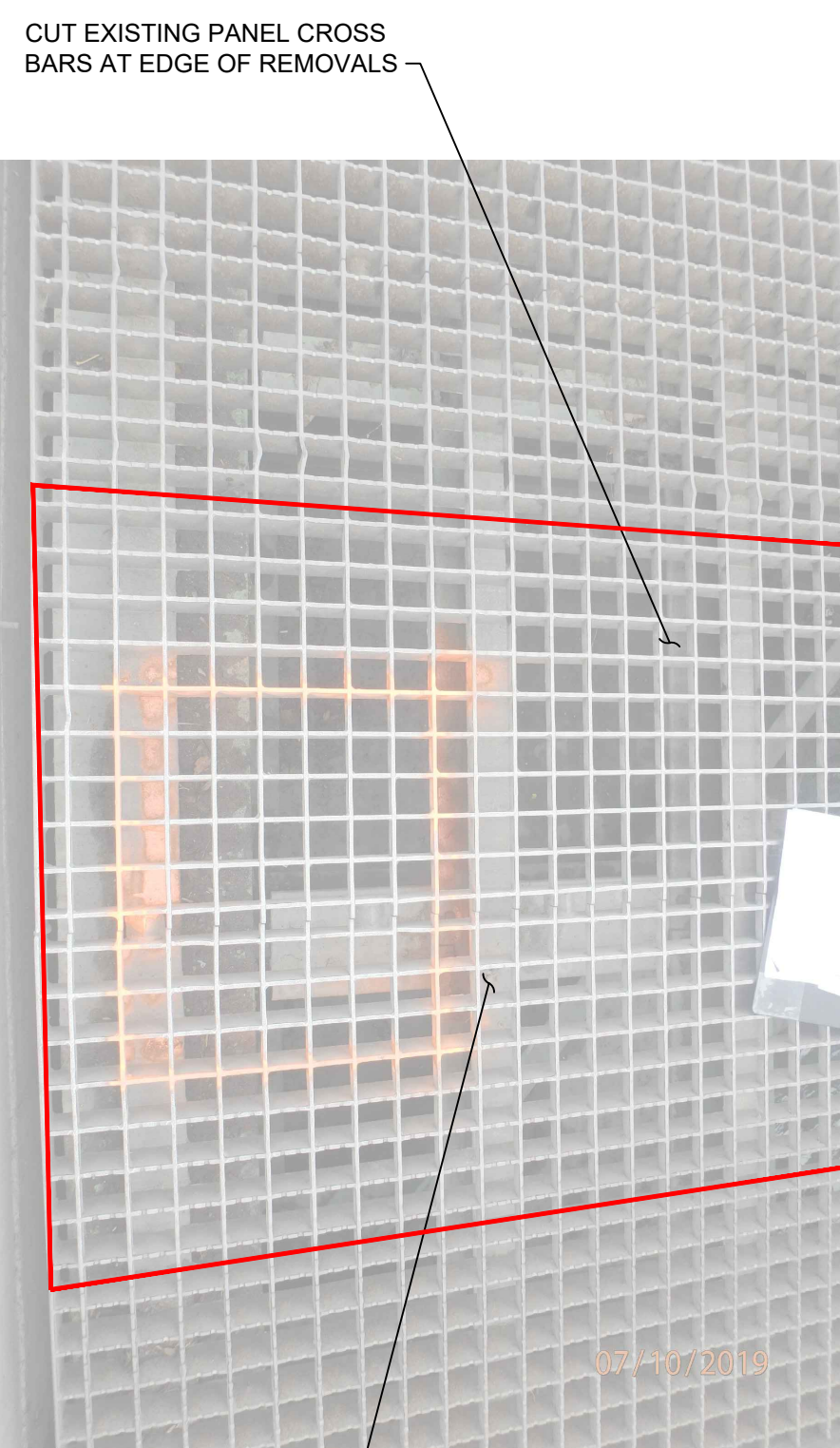


GRATING DETAIL

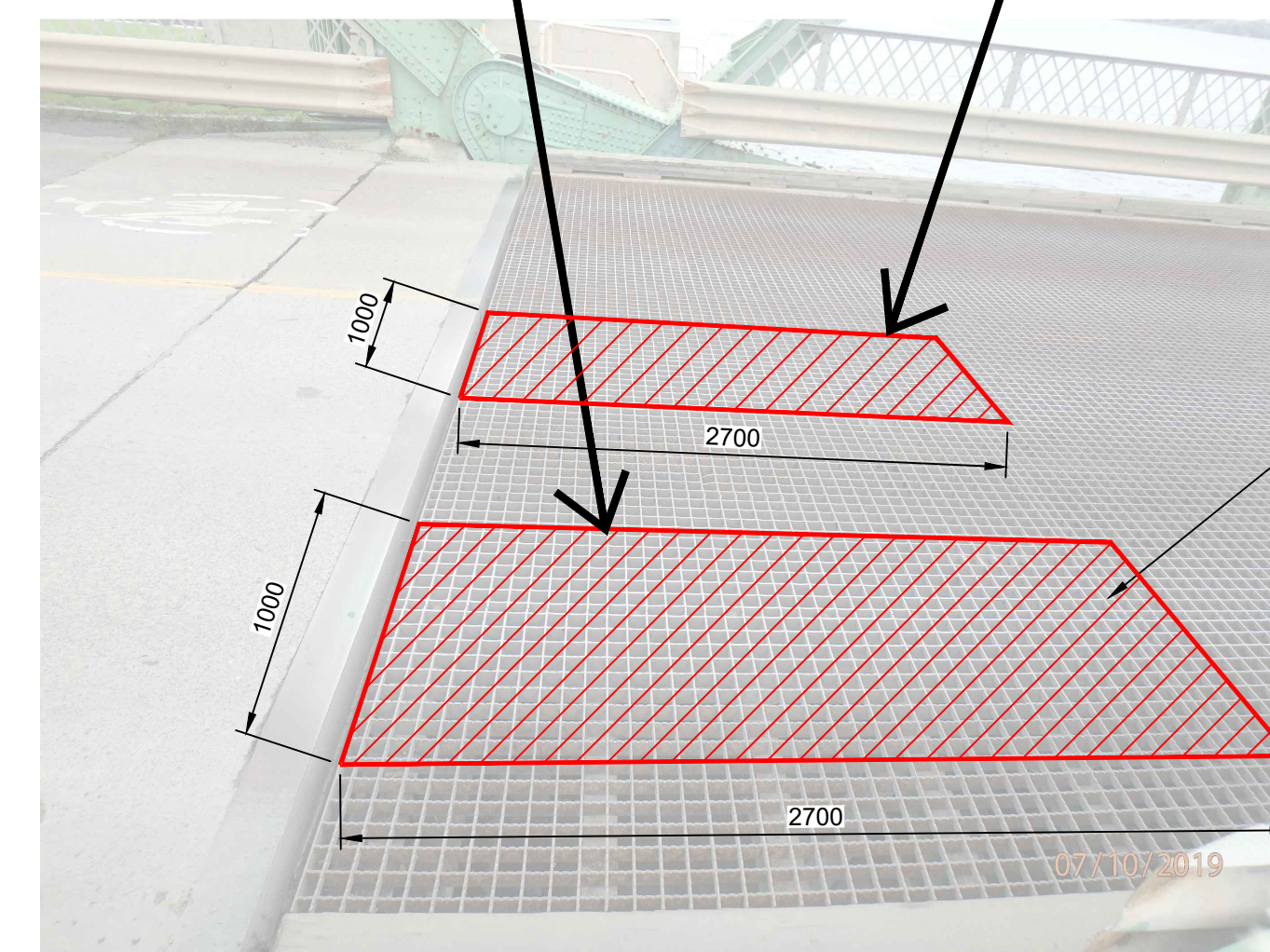
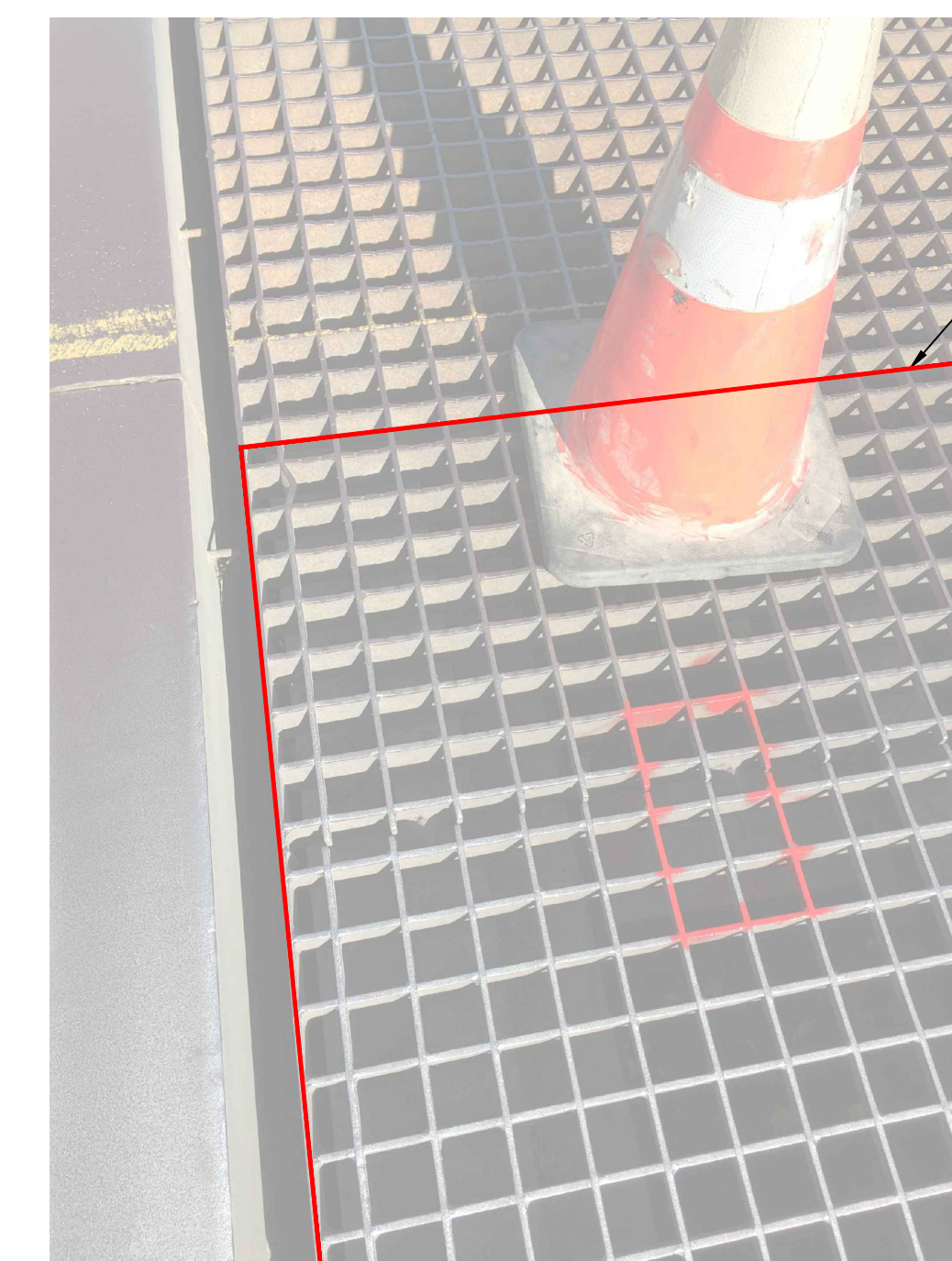
1:2



GRATING PANEL REPLACEMENT - FLOOR BEAMS 14-16



BEARING BARS ARE WELDED TO THE SILLS. TYPICAL WELDING LOCATIONS ARE SHOWN ON THE EXISTING DRAWINGS BUT ARE EXPECTED TO VARY IN ACTUAL LOCATION AND QUANTITY. REMOVE WELDS WITHOUT DAMAGING SILLS.



GRATING PANEL REPLACEMENT - FLOOR BEAMS 14-16

NOTES:

- GRATING HEIGHT (INCLUDING SERRATION) TO MATCH THICKNESS OF EXISTING GRATING WITH WORN OUT SERRATIONS. CUSTOM GRATING FABRICATION MIGHT BE REQUIRED.

Public Services and Procurement Canada
 Architectural and Engineering Services
 Ontario Region
 Services publics et Approvisionnement Canada
 Services d'architecture et de génie
 Région de l'Ontario



NOT FOR CONSTRUCTION



revision	description	date
4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
Kingston, Ontario
 PSPC
 LaSalle Causway
 Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title

GRATING REPAIRS

drawn by
RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
JEAN-BERNARD CHARRON

approved by
PETER HARVEY

tender
RANYA EL SADAWY project manager

project date
2021/01/22

project no.
R.097736.002

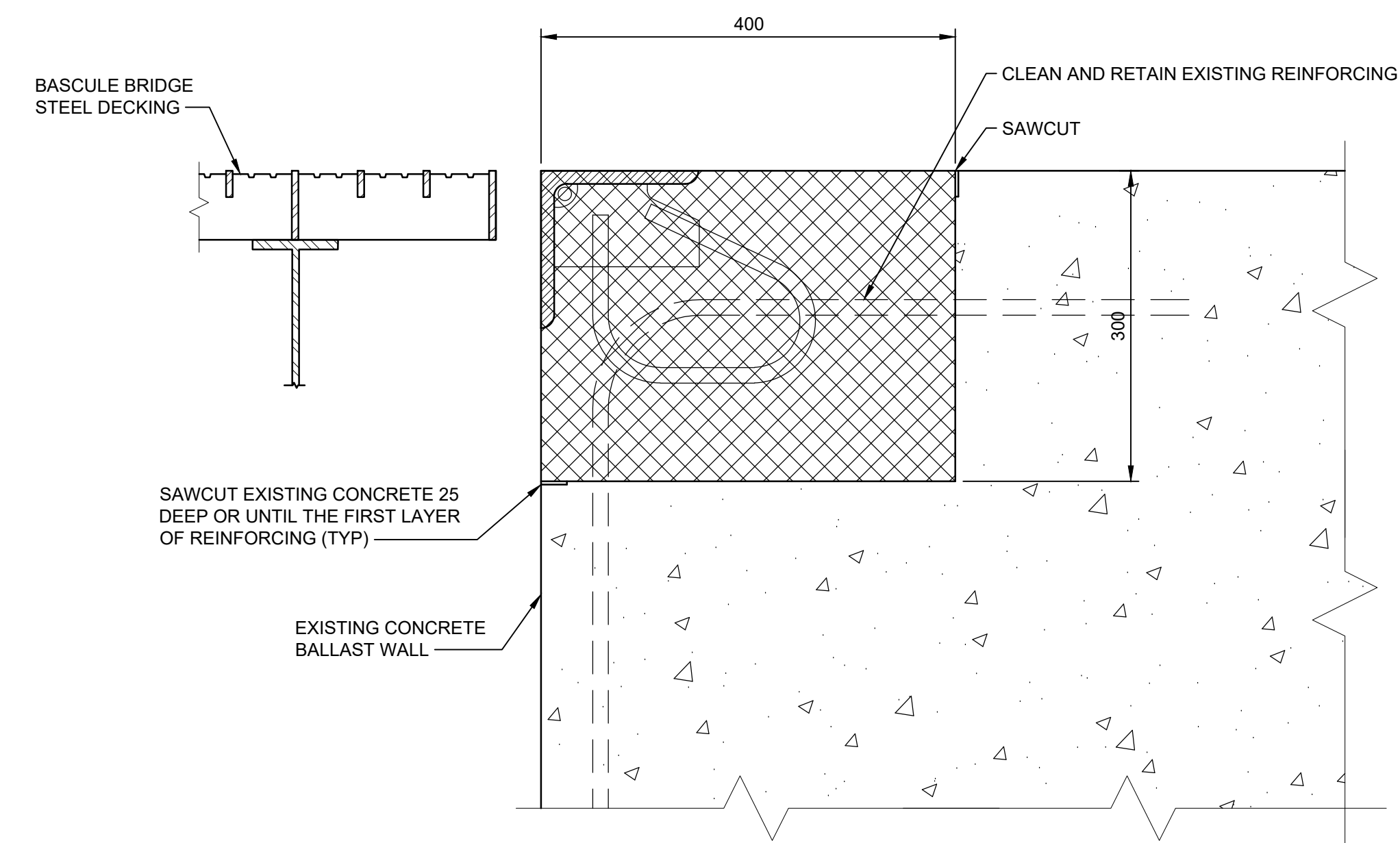
drawing no.
S-08

- NOTES:**
- PROCEED TO ARMOURING ANGLES INSTALLATION AND INJECTION AS PER OPSS PROV 920 USE MTO DSM APPROVED INJECTION PRODUCT AND HARDWARE. USE PRODUCTS AS PER MANUFACTURER SPECIFICATIONS.
 - PROTECT INJECTION HOSE AND FITTINGS ADJACENT TO FIELD SPLICE DURING WELDING AND REMOVE PROTECTION PRIOR TO PLACING OF CONCRETE IN BLOCKOUT.

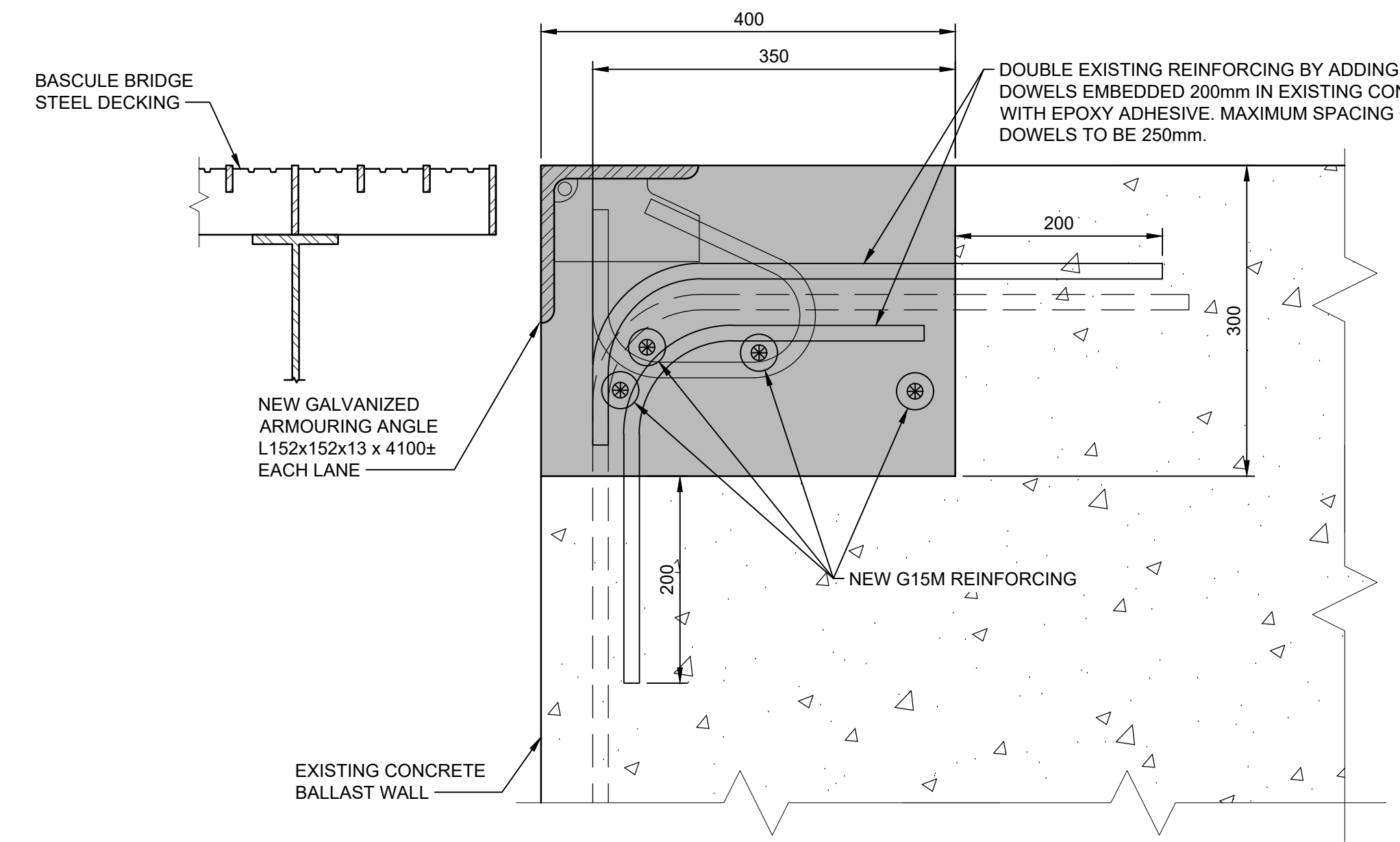
Public Services and Procurement Canada
 Architectural and Engineering Services
 Ontario Region
 Services publics et Approvisionnement Canada
 Services d'architecture et de génie
 Région de l'Ontario



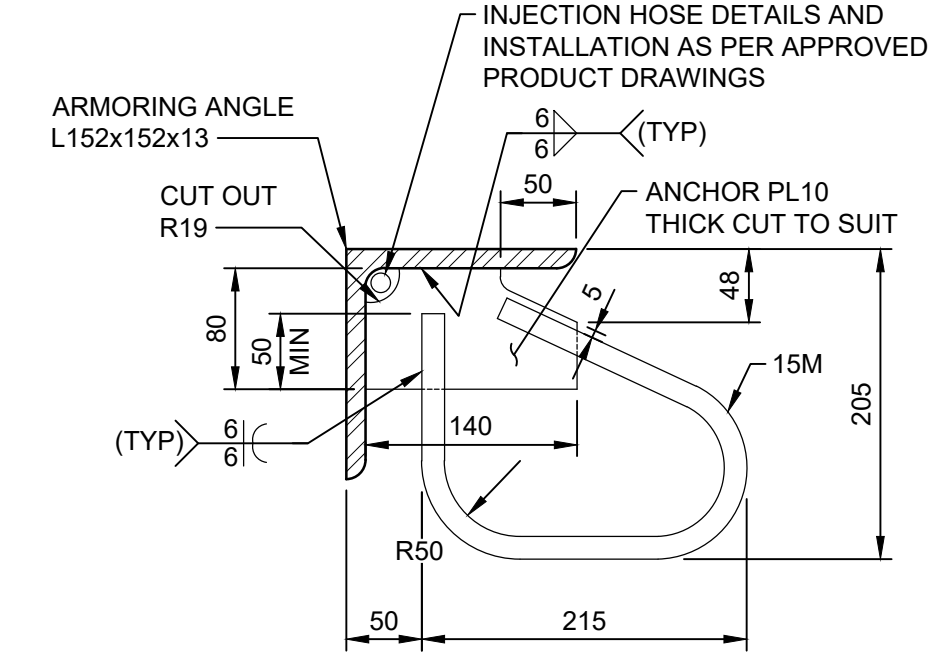
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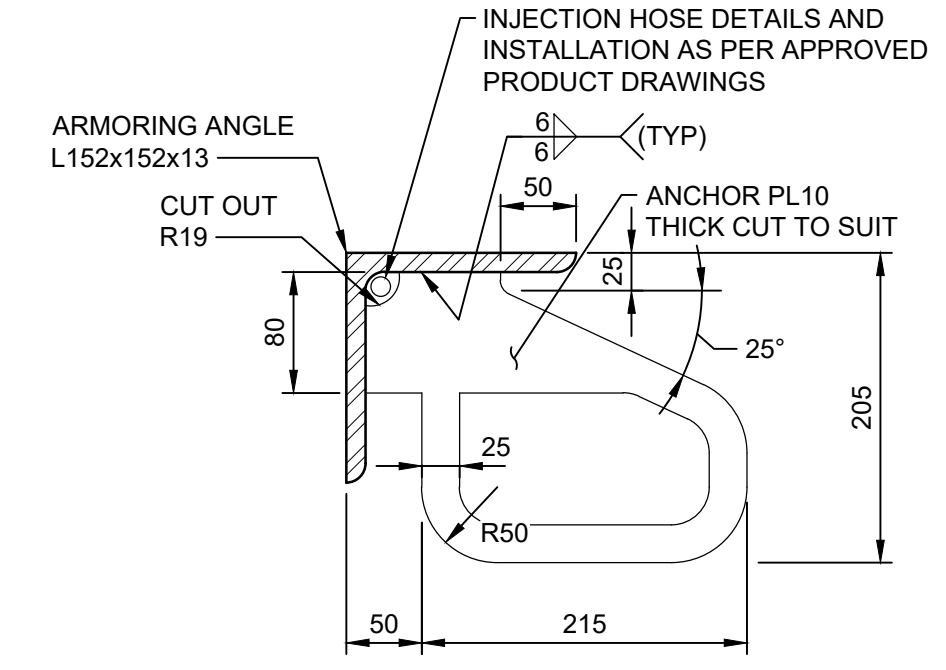
ARMOURING ANGLE REPLACEMENT - REMOVALS
1:5



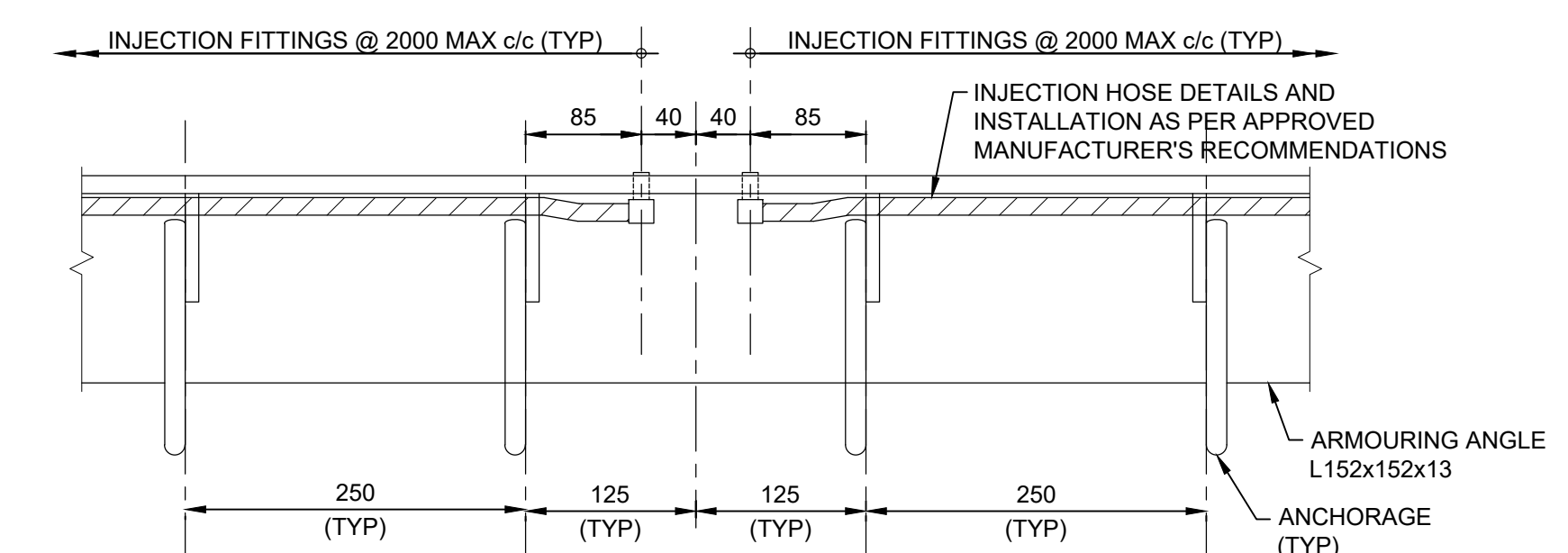
ARMOURING ANGLE REPLACEMENT - REHABILITATION
1:5



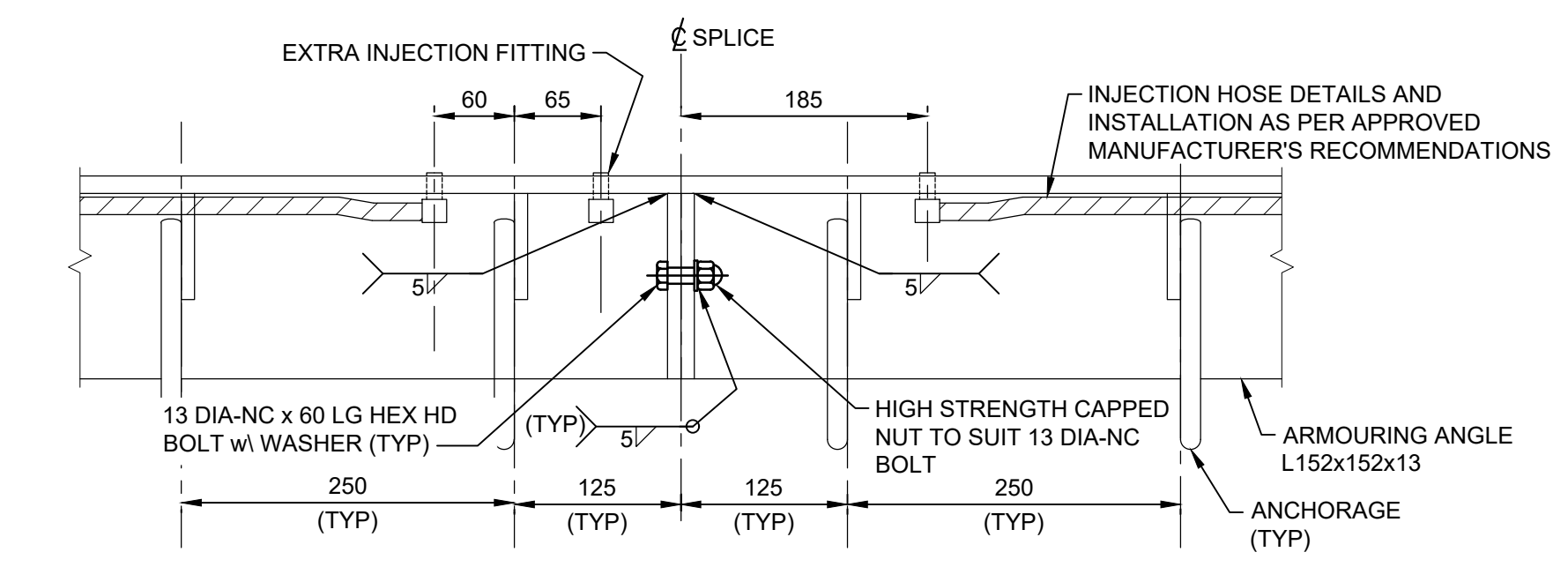
ANCHORAGE DETAIL
1:5



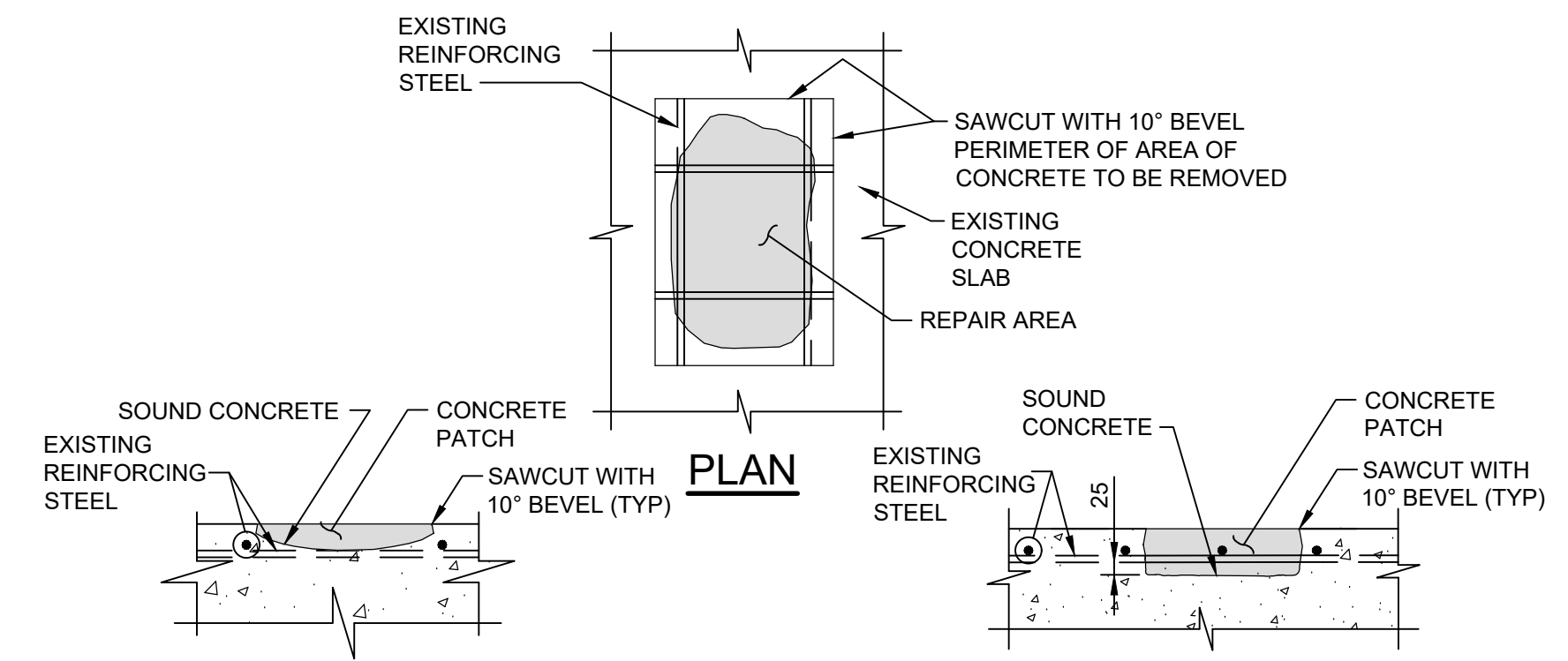
ALTERNATIVE ANCHORAGE DETAIL
1:5



ANCHORAGE DETAIL
1:5 INJECTION HOSE FOR ARMOURING ANGLE



ARMOURING ANGLE FIELD SPLICE DETAIL
1:5



DETERIORATION ABOVE REINFORCING STEEL
DETERIORATION BELOW REINFORCING STEEL
APPROACH SLAB REPAIRS-UNFORMED SURFACES
1:15

4	-	-
3	-	-
2	-	-
1	ISSUED FOR TENDER	01/22/2021
revision	description	date

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A	Detail No.
B	drawing no. - where detail required
C	drawing no. - where detailed

project title
 titre du projet
Kingston, Ontario
 PSPC
 LaSalle Causway
 Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
 titre du dessin
ARMOURING ANGLES REPLACEMENT

drawn by
 dessiné par
RICHARD DYNKA / THOMAS NIEDZWIADK

designed by
 conc par
JEAN-BERNARD CHARRON

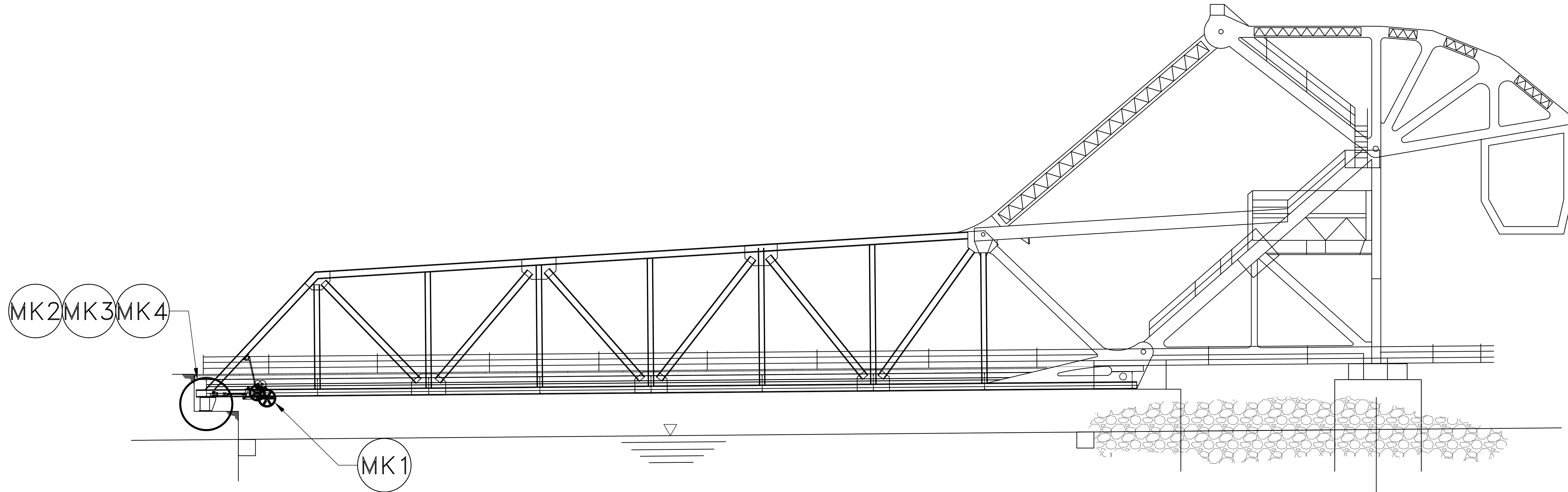
approved by
 approuvé par
PETER HARVEY

tender submission
 soumission
RANYA EL SADAWY project manager
 administrateur de projets

project date
 date du projet
2021/01/22

project no.
 no. du projet
R.097736.002

drawing no.
 dessiné no.
S-09

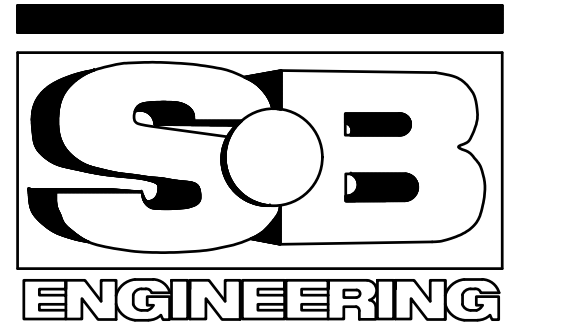


NORTH ELEVATION VIEW
NOT TO SCALE

MECHANICAL SYSTEMS REPAIR SCHEDULE			
MK. NO.	COMPONENT	DESCRIPTION	REF. DWGS.
MK1	SPAN LOCK MACHINERY	CLEAN AND PAINT CORRODED SPAN LOCK MACHINERY COMPONENTS	M-03
MK2	SPAN LOCK RECEIVER	REPLACE DAMAGED RECEIVER MOUNTING BOLTS AND ADJUST SPAN LOCK RECEIVER CLEARANCES	M-02
MK3	LIVE LOAD SUPPORTS	CLEAN AND PAINT CORRODED LIVE LOAD SUPPORT COMPONENTS AND ADJUST LIVE LOAD SUPPORT SHIMS	M-02, M-03
MK4	BUFFER REMOVAL	REMOVAL OF EXISTING BUFFERS	M-02
MK5	BRIDGE BALANCING	SEE SPECIFICATION	-

GENERAL NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH CONTRACT DRAWINGS S-01 THRU S-09 AND M-1 THRU M-3 AND THE SPECIFICATIONS. ALL DISCREPANCIES AND/OR CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE DEPARTMENTAL REPRESENTATIVE FOR REVIEW AND CLARIFICATION.
- ALL DISASSEMBLY IS TO BE NON-DESTRUCTIVE UNLESS COMPONENTS CANNOT BE OTHERWISE REMOVED. NOTIFY DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY DESTRUCTIVE REMOVAL. CARE SHALL BE TAKEN TO NOT DAMAGE ANY EXISTING COMPONENTS WHICH ARE TO REMAIN.



revision	description	date
4	-	-
3	-	-
2	-	-
1	-	-

Do not scale drawings. Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

	A Detail No.
	B drawing no. - where detail required
	C drawing no. - where detailed

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
MECHANICAL WORK ID AND SCHEDULE

drawn by
M. BROGLIE

designed by
M. BROGLIE

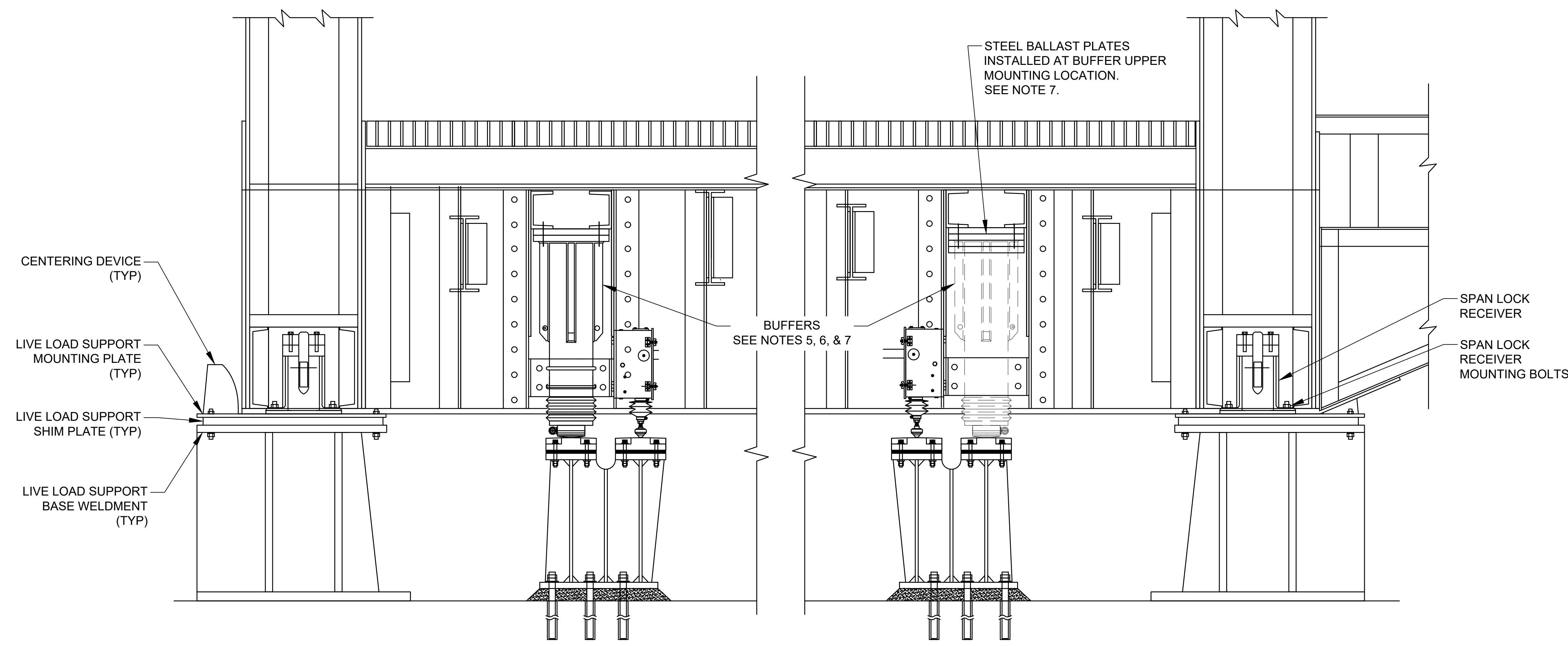
approved by
J. WILLIAMS

tender
- project manager

project date
2021/01/22

project no.
R.097736.002

drawing no.
M-01



**ELEVATION VIEW
BRIDGE TOE LOOKING EAST**
NOT TO SCALE

NOTES:

1. SEE DRAWING M-01 FOR GENERAL NOTES.
2. REMOVE BOTH SPAN LOCK RECEIVERS, SECURING EACH SET OF EXISTING SHIMS AS A BUNDLE. INSPECT THE CONDITION OF MOUNTING PLATE HOLE THREADS. PROVIDE NEW TURNED BOLTS AT THE SOUTH RECEIVER AND RE-INSTALL BOTH RECEIVERS. SEE SPECIFICATION FOR ADDITIONAL INFORMATION. (MK2)
3. ADJUST AND VERIFY SPAN LOCK RECEIVER CLEARANCES AND ALIGNMENT (BOTH SPAN LOCKS). PERFORM FUNCTIONAL TESTING PER SPECIFICATIONS. SEE SPECIFICATION FOR ADDITIONAL INFORMATION. (MK2)
4. ADJUST LIVE LOAD SUPPORT SHIMS AS REQUIRED TO FIRMLY SEAT THE BRIDGE ON BOTH LIVE LOAD SUPPORTS. SEE SPECIFICATION FOR ADDITIONAL INFORMATION. (MK3)
5. SPAN SHALL NOT BE OPERATED FOLLOWING BUFFER REMOVAL UNTIL CORRESPONDING CONTROL SYSTEM MODIFICATIONS HAVE BEEN PERFORMED. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION. (MK4)
6. BUFFERS CONTAIN INTERNAL SPRINGS. REMOVE BUFFERS WITH SPAN PARTIALLY OPENED AND WITHOUT BUFFERS COMPRESSED. BUFFERS SHALL BE REMOVED BY REMOVAL OF TOP MOUNTING BOLTS AND BODY U-BOLTS. CONTRACTOR MAY REPLACE EXISTING FASTENERS WITH TEMPORARY FASTENERS TO FACILITATE REMOVAL. (MK4)
7. APPROXIMATE BUFFER WEIGHT: 125 kg [275 LB] (MK4)
8. REFER TO THE SPECIFICATION FOR DETAILS OF THE STEEL BALLAST PLATES TO BE FURNISHED BY THE CONTRACTOR. (MK5)

4	-	-
3	-	-
2	-	-
1	-	-
revision	description	date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

- A Detail No.
- B drawing no. - where detail required
- C drawing no. - where detailed

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
**MECHANICAL WORK
DETAILS I**

drawn by
M. BROGLIE

designed by
M. BROGLIE

approved by
J. WILLIAMS

tender
- project manager

project date
2021/01/22

project no.
R.097736.002

drawing no.
M-02



**PHOTO OF SOUTH
SPAN LOCK RECEIVER**



**PHOTO OF NORTH
BUFFER**



PHOTO OF CORRODED SPAN LOCK SHAFT



PHOTO OF CORRODED SPAN LOCK MOTOR/REDUCER SUPPORT MOUNTING BOLTS



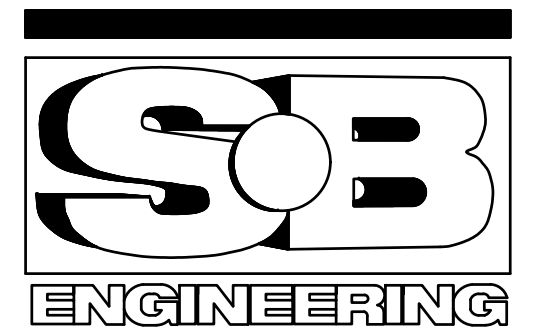
PHOTO OF LIVE LOAD SUPPORT UNDER SIDE



PHOTO OF CORRODED SPAN LOCK CROSS SHAFT BEARING

NOTES:

1. SEE DRAWING M-01 FOR GENERAL NOTES.
2. REMOVE CORROSION BY USE OF HAND-HELD TOOLS AND POWER TOOLS ONLY. BLASTING IS NOT PERMITTED. EXERCISE CAUTION TO PREVENT CLEANING AND PAINTING MATERIALS FROM ENTERING MACHINERY COMPONENTS AND COMING INTO CONTACT WITH SLIDING SURFACES WHICH WOULD BE DAMAGED BY SUCH INTRUSION. EXERCISE EXTREME CARE TO PROTECT ALL LUBRICATED AND FAYING SURFACES. DO NOT PAINT LUBRICATED, SLIDING, AND FAYING SURFACES.
3. CLEAN AND PAINT ISOLATED AREAS OF CORROSION ON THE FOLLOWING COMPONENTS:
 - 3.1. SPAN LOCK MACHINERY (MK1);
 - 3.1.1. MOTOR AND REDUCER MOUNTING BOLTS AND SUPPORT
 - 3.1.2. BEARING MOUNTING BOLTS
 - 3.1.3. CROSS SHAFTS AND BEARINGS
 - 3.1.4. POSITION INDICATOR ARMS AND MOUNTING BOLTS
 - 3.1.5. ROTARY CAM LIMIT SWITCH ENCLOSURE
 - 3.2. LIVE LOAD SUPPORTS (MK3);
 - 3.2.1. TOP AND BOTTOM OF MOUNTING PLATES
4. SEE SPECIFICATION FOR ADDITIONAL PAINTING INFORMATION.



4	-	-
3	-	-
2	-	-
1	-	-
revision	description	date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

- A Detail No.
- B drawing no. - where detail required
- C drawing no. - where detailed

project title
Kingston, Ontario
PSPC
LaSalle Causway
Bascule Bridge

STRUCTURAL STEEL REPAIRS

drawing title
MECHANICAL WORK DETAILS II

drawn by
M. BROGLIE

designed by
M. BROGLIE

approved by
J. WILLIAMS

tender
- project manager

project date
2021/01/22

project no.
R.097736.002

drawing no.
M-03

Project Title: KINGSTON ONTARIO
LASALLE CAUSEWAY BASCULE BRIDGE
STRUCTURAL STEEL REPAIRS

Project Number: R. 097736.002

Project Date: 2021-01-22

END OF SECTION

Consultant for General, Structural, Construction Specifications



Consultant for Mechanical Specifications



END OF SECTION

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Appendix 5	STRAIN GAUGES LOCATIONS FOR PAINT TOUCH-UPS

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general repair and construction of the La Salle Causeway Bascule Bridge located at Kingston, Ontario; and further identified as PSPC Project Number R.097736.002.
- .2 All work to be carried out in accordance with applicable federal, provincial, and municipal regulations and those agencies having jurisdiction.

1.2 CONTRACT METHOD

- .1 Construct Work under Lump Sum contract with the exception of the Unit Price items identified in the Unit Price Table in Appendix 1.

1.3 COST BREAKDOWN

- .1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown by Section aggregating Contract amount.
- .2 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.4 WORK SUMMARY

- .1 Construct Work to accommodate bridge operators continued use of premises during construction.
- .2 Coordinate progress schedule and coordinate with bridge operators' occupancy during construction.
- .3 Required stages:
 - .1 Project award.
 - .2 Prepare and submit cost breakdown.
 - .3 Prepare and submit project schedule showing critical path.
 - .4 Obtain necessary permits.
 - .5 Contractor mobilization and installation of environmental control measures.
 - .6 Prepare and submit traffic control plan.
 - .1 Coordinate lane closures when required.
 - .7 Initiate and maintain shop drawing submittal and review process.
 - .8 Construct access to work areas.
 - .9 Prepare a weight log to track the weight of steel being removed and the weight being added.
 - .10 Replace the indicated sections of steel deck grating.
 - .11 At deck grating sections indicated by the Departmental Representative, repair the broken bearing bars.
 - .12 Replace missing or loose sill bolts as indicated by the Department Representative.
 - .13 At the indicated stringers, drill holes and install bolts.

- .14 At the indicated stringers, cut web and bottom flange to create the specified radius.
- .15 At all floor beams, grind the paint, inspect the end welds, grind the cracked welds, and reinstate paint.
- .16 Grind perforations, drill holes at ends of cracks, and install 1” A325 bolts at 0N-2N, 0S-2S, 1N-2N, and primary truss member locations indicated by the Departmental Representative. Additionally, grind tack welds and reinstate coating on primary truss members.
- .17 Trim top chord channel flange and grind delaminations/cracks at 1S-3S. Add local reinforcement as directed by the Departmental Representative.
- .18 Install top chord local reinforcement at 3S-5S.
- .19 Fatigue crack repairs at the following: 8S-9S, 9S-10S, 14S-16S, 15S-18S, 16N, 16S, 18S-19S, 21N-27N.
- .20 Perform NDT inspection of the impact damage at 13N-16N.
- .21 Grind smooth cracks and perforation in bottom batten plate near 15S on member 14S-15S.
- .22 Drainage improvements at 15S-17S and 15N-17N.
- .23 21S-27N bracing bottom angle repair.
- .24 Localized structural steel coating repairs, outside of the steel repair areas.
- .25 Deck joint armouring angle replacement, including abrasive blast cleaning of existing reinforcing and installing dowels.
- .26 Partial depth concrete repairs to approach slabs as directed by the Departmental Representative.
- .27 Concrete approach slabs crack injection.
- .28 Mechanical work, including replacement of south span lock receiver mounting bolts and adjustments to span lock receiver clearances, buffer removal, live load support shim adjustment, and coating corroded live load supports and span lock machinery.
- .29 Bridge balancing.
- .30 Removal of access to work areas and construction waste.
- .31 Demobilization and removal of environmental control measures.

1.5 CONTRACTOR USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
 - .1 Departmental Representative occupancy.
 - .2 Public usage.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered or damaged during construction operations to match existing or adjoining work, as directed by Departmental Representative.

- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 DEPARTMENTAL REPRESENTATIVE OCCUPANCY

- .1 Departmental Representative will occupy premises during entire construction period for execution of normal operations.
- .2 Contractor is not permitted access to buildings due to COVID-19 restrictions.
- .3 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental Representative usage.
 - .1 Departmental must be able to operate the bridge and be able to perform routine maintenance on the property as needed.
Vehicular access to the property must be maintained at all times. Ensure there is sufficient parking for the bridge operators.

1.7 ALTERATIONS TO EXISTING BRIDGE

- .1 Execute work with least possible interference or disturbance to bridge operations, pedestrians, vehicles, navigation and normal use of bridge. Arrange with Departmental Representative to facilitate execution of work.

1.8 SCHEDULING

- .1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed and approved by the Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

1.9 VERIFICATION OF SITE DIMENSIONS

- .1 The Contractor is advised that all elevations, dimensions, and grades shown on the plans are approximate only. Verify all existing elevations, dimensions, and grades before preparing and submitting show drawings and before planning and undertaking any construction work. Immediately report all discrepancies, in writing, to the Departmental Representative.

1.10 PROTECTION

- .1 The Contractor will be held fully responsible by the Departmental Representative for any damage to utilities, services, properties, building, or structures adjacent to or in the general area of the Work. The Contractor to make good and repair all such damage at Contractor's expense.
- .2 The Contractor shall supply and install the support systems and protective shields at his own judgement to protect the existing utilities, services, buildings and structures from damage for the duration of the construction. The cost for this item shall be included in the tender price and the Contractor shall not make any claim against the Departmental for extra work on this item.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 01 36 – Epoxy Injection
- .2 Section 03 30 00 – Cast-in-Place Concrete
- .3 Section 05 12 33 – Structural Steel for Bridges
- .4 Section 29 05 00 – Mechanical Work

1.2 WORKING HOURS

- .1 Perform the work in a series of multiple single traffic lane closures between 20:00 and 06:00. Reopen all traffic lanes by 06:00 and do not close lanes before 20:00. Sidewalk to remain operational at all times except for short term 20-minute closures during overnight weekend closures. Bridge to remain available to be opened to marine traffic (free of all equipment and material) upon request within 15 minutes from 06:00 to 22:00 and for scheduled lifts on each hour between 06:00 and 22:00 during navigation season.
 - .1 For the work relating to the deck joint armouring angle replacement and approach slab concrete repairs, a lane closure for 48 hours will be required for each of the two stages.
 - .1 Such a closure will only be permitted from Friday 20:00 to Monday 06:00.
 - .2 Bridge shall remain operational between 06:00 to 22:00 during closure.
 - .2 Lane closures during the morning and afternoon weekday peak periods (06:00 to 09:30 and 15:00 to 18:00, respectively) are not permitted.
 - .3 Full bridge closure will not be permitted, except for the buffer removal and bridge balancing. Limited duration full bridge closure of a maximum of 20 minutes are allowed on Friday, Saturday, and Sunday nights between 22:00 and 06:00.
 - .1 Only one night closure will be allowed for the buffer removal and one for the bridge balancing. These two closures shall occur on consecutive nights.
- .2 Complete all the work within the roadway and sidewalk including traffic control setup and removal in accordance with the requirements and timing restrictions of Section 01 55 26 - Traffic Control.
- .3 Work which does not interrupt traffic or pedestrian flow can occur outside the above restriction.
- .4 Provide Departmental Representative 5 working days notice prior to commencement or modification of the work schedule.

1.3 USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, for storage, and for access, to allow:

- .1 Departmental Representative occupancy.
- .2 Public usage.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered or damaged during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.4 SPECIAL REQUIREMENTS

- .1 Carry out the Work between permitted lane closure periods and in compliance with marine traffic restrictions.
- .2 Submit schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart
- .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .4 Prior to use of equipment or installation of access platforms, confirm operation envelope of the bridge. Contractor is responsible for identifying any possible operational interference issues with proposed equipment and access platforms. All equipment, tools, platforms and scaffolding need to be removed prior to any bridge lift.
- .5 All equipment, tools, platform, temporary structures and protection shall be removed prior to any bridge lift.

1.5 ACCOMODATION OF TRAFFIC

- .1 Maintain marine, vehicular, pedestrian and cyclist traffic in accordance with the Contract Drawings and Documents. Maintain existing conditions for traffic throughout period of contract except where required to complete the work under contract and where measures have been taken in accordance with the Traffic Control Plan and as approved by the Departmental Representative to protect and control public traffic.

1.6 MAINTENANCE OF NAVIGATIONAL CHANNEL

- .1 Maintain the existing navigation channel during the hours of bridge operation in accordance with Section 01 55 26 - Traffic Control.

1.7 BRIDGE OPERATION

- .1 The bridge is not to be operated during work on bracing 21S-27N. The work shall be scheduled to be completed in one night as to not impede the bridge operation.

- .1 Inform the Departmental Representative and the PSPC bridge operators 5 working days prior to undergoing this work.
- .2 The bridge is not to be operated following the buffer removal until the control system modifications are performed.

1.8 EPOXY/CHEMICAL GROUT CRACK INJECTION CURING

- .1 Epoxy/chemical grout shall achieve 75% of its specified compressive strength prior to reopening the lane for vehicular traffic.

1.9 DECK JOINT END DAM & APPROACH SLAB CONCRETE PATCH REPAIRS CURING

- .1 Concrete shall achieve 75% of its specified compressive strength prior to reopening the lane for vehicular traffic.
- .2 Armouring angle epoxy injection to be performed during a separate night closure.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting 5 days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings or conduct meetings virtually using commonly used software programs (e.g. Microsoft Teams, Skype, etc.).
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within 3 days after meetings and transmit to meeting participants and, affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings shall be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities after award of Contract.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time of meeting and notify parties concerned a minimum of 5 days before meeting. Location will be the physical space arranged by the Contractor for the meetings.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (Gantt) Chart.
 - .3 Schedule of submission of shop drawings, samples, and colour chips.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.
 - .5 Site security.
 - .6 Traffic Plan.
 - .7 Pre-construction survey
 - .8 Allowances.
 - .9 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

- .10 Record drawings.
- .11 Take-over procedures, acceptance, warranties.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 Throughout the course of Work progress meetings will be held every two (2) weeks or as required at the location prepared by the Contractor and approved by the Departmental Representative.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representative are required to be in attendance.
- .3 Notify parties a minimum of three (3) days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days of meeting.
- .5 The Agenda will include as a minimum:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Progress on action items from previous meetings.
 - .3 Review of Work progress since previous meeting.
 - .4 Field observations, problems, conflicts.
 - .5 Problems which impede construction schedule.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revised copies of the project schedule.
 - .8 Construction budget / cash flow review and update.
 - .9 Review proposed changes for effect on construction schedule and on completion date.
 - .10 Review of health and safety issues or concerns.
 - .11 Shop drawing and submittal status and review.
 - .12 Site instructions.
 - .13 Environmental issues.
 - .14 Other business.

1.4 NOTIFICATIONS/REPORTS

- .1 Throughout the course of Work immediately inform the Departmental Representative of any issues or concerns arising during the Work. The Contractor shall keep a journal of progress on site, including:
 - .1 Reports all safety related issues and subsequent resolutions.
 - .2 Regular accounts of work progress.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule and site resolutions as agreed by the Departmental Representative

- .5 Revisions to construction schedule.
- .6 Maintenance of quality standards.
- .2 At the end of construction, submit both a scanned original of the journal and a transcribed Microsoft Word format copy to the Departmental Representative.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Sunday to Thursday, inclusive, will provide five nights work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involve using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 5 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Project award.
 - .2 Obtain necessary permits.
 - .3 Contractor mobilization.
 - .4 Implement and maintain traffic control plan.
 - .5 Establish temporary staging area.
 - .6 Traffic and pedestrian control.
 - .7 Field verification of existing conditions.
 - .8 Non-destructive testing (NDT).
 - .9 Removal of existing components.
 - .10 Modification of existing components.
 - .11 Fabrication and installation of new components.
 - .12 Bridge balancing.
 - .13 Removal of traffic and pedestrian detour.
 - .14 Demobilize.

1.5 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.

- .3 Approvals.
- .4 Mobilization.
- .5 Traffic and pedestrian control.
- .6 Field verification of existing conditions.
- .7 Removal of existing components.
- .8 Modification of existing components.
- .9 Fabrication and installation of new components.
- .10 Commencement and completion of coating.
- .11 Removal of traffic and pedestrian detour.
- .12 Demobilize.
- .3 Project key dates:
 - .1 Bridge maintenance and possible bridge operation (lift) for the local boating industries beginning April 1st, 2021 and lasting the week.
 - .2 Waterway start of 2021 navigation season May 1st, 2021.
 - .3 Start of Work: April 5th, 2021.
 - .4 Completion of Work: August 1st, 2021.

1.7 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review or approval. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files as applicable to the documents being submitted on USB compatible with PSPC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by Professional Engineer licensed to practice in the Province of Ontario of Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which

adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow 5 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

- .11 Submit one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 1 year of date of contract award for project.
- .13 Submit one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit one electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, an electronic response will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted an electronic response will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's site office.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.
- .2 Submit transcription of insurance immediately after award of Contract.

1.5 FEES, PERMITS AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Fire Protection Standards issued by Fire Protection Services, Labour Program Division of Service Canada:
 - .1 FCC No. 301-June 1982 Standard for Construction Operations.
 - .2 FCC No. 302-June 1982 Standard for Welding and Cutting.
- .2 Fire Protection and Prevention Act, 1997 (Ontario Regulation 213/07)
 - .1 <https://www.mcscs.jus.gov.on.ca/english/FireMarshal/Legislation/FireCode/FireCode.html>
- .3 National Fire Code 2015 (NFC):
 - .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

1.2 DEFINITIONS

- .1 Hot Work defined as:
 - .1 Welding work.
 - .2 Cutting of materials by use of torch or other open flame devices.
 - .3 Grinding with equipment which produces sparks.
 - .4 Use of open flame torches such as for roofing work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.

1.4 FIRE SAFETY REQUIREMENTS

- .1 Implement and follow fire safety measures during Work. Comply with following:
 - .1 National Fire Code 2015.
 - .2 Fire Protection Standards FCC 301 and FCC 302.
 - .3 Federal and Provincial Occupational Health and Safety Acts and Regulations.
- .2 In the event of conflict between any provisions of above the authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.5 HOT WORK AUTHORIZATION

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.

- .2 To obtain authorization, submit to Departmental Representative:
 - .1 Contractor's written Hot Work Procedures to be followed on site as specified below.
 - .2 Description of the type and frequency of Hot Work required.
 - .3 Sample Hot Work Permit to be used.
- .3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:
 - .1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
 - .2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.
- .4 Requirement for individual authorization will be based on:
 - .1 Nature or phasing of work;
 - .2 Quantity of various trades needing to perform hot work on project or;
 - .3 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
- .5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

1.6 HOT WORK PROCEDURES

- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Hot Work Procedures to include:
 - .1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in section 01 35 29.13
 - .2 Use of a Hot Work Permit system with individually issued permit by Contractor's Superintendent to worker or subcontractor granting permission to proceed with Hot Work.
 - .3 Permit required for each Hot Work event.
 - .4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 60 minutes immediately following the completion of the Hot Work.
 - .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.
- .4 Procedures to clearly establish responsibilities of:
 - .1 Worker performing hot work,

- .2 Person issuing the Hot Work Permit,
- .3 Fire Safety Watcher,
- .4 Subcontractor(s) and Contractor.
- .5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

1.7 HOT WORK PERMIT

- .1 Hot Work Permit to include the following:
 - .1 Project name and project number;
 - .2 Specific area where hot work will be performed;
 - .3 Date of issue;
 - .4 Description of hot work type needed;
 - .5 Special precautions to be followed, including type of fire extinguisher needed;
 - .6 Name and signature of permit issuer;
 - .7 Name of worker to which the permit is issued;
 - .8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date;
 - .9 Worker's signature with time/date of hot work completion;
 - .10 Stipulated time period of safety watch;
 - .11 Fire Safety Watcher's signature with time/date.
- .2 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.8 FIRE PROTECTION

- .1 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

1.9 DOCUMENTS ON SITE

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 NOT USED.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.1-18, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CAN/CSA-C22.3 No.1-15, Overhead Systems.
- .3 CSA C22.3 No.7-15, Underground Systems.
- .4 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

1.2 DEFINITIONS

- .1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.
- .2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated.
- .3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit copy of lockout procedures, sample of lockout permit and lockout tags proposed for use in accordance with Section 01 33 00 – Submittal Procedures. Submit within 14 calendar days of acceptance of bid.

1.4 COMPLIANCE REQUIREMENTS

- .1 Comply with the following in regards to isolation and lockout of electrical facilities and equipment:
 - .1 Canadian Electrical Code.
 - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.

- .3 Regulations and code of practise as applicable to mechanical equipment or other machinery being de-energized.
- .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply.

1.5 ISOLATION OF EXISTING SERVICES

- .1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.
- .2 To obtain authorization, submit to Departmental Representative the following documentation:
 - .1 Written request to isolate the particular service or facility and;
 - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, as follows:
 - .1 Fill-out standard form in current use at the Facility as provided by Departmental Representative or;
 - .2 Where no form exist, make written request indicating:
 - .1 The equipment, system or service to be isolated and its location;
 - .2 Duration of isolation period (ie: start time & date and completion time & date).
 - .3 Voltage of service feed to system or equipment being isolated.
 - .4 Name of person making the request.
- .4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the work.
 - .1 Note that Departmental Representative may designate another person at the Facility being authorized to grant the Isolation Request.
- .5 Conduct safe, orderly shutdown of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.
- .6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require isolation of existing services.
- .7 Plan and schedule shut down of existing services in consultation with the Departmental Representative.
- .8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified in Section 01 35 29.13.

1.6 LOCKOUTS

- .1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.

- .2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.
- .3 Prepare written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tagout it's sources of energy.
- .4 Include as part of the Lockout Procedures a system of lockout permits managed by the Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
 - .1 A lockout permit is to be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
 - .2 Duties of person managing the permit system to include:
 - .1 Issuance of permits and lockout tags to workers.
 - .2 Determining permit duration.
 - .3 Maintaining record of permits and tags issued.
 - .4 Making a Request for Isolation to Departmental Representative when required as specified above.
 - .5 Designating a Safety Watcher, when one is required based on type of work.
 - .6 Ensuring equipment or facility has been properly isolated.
 - .7 Collecting and safekeeping lockout tags returned by workers as a record of the event.
- .5 Clearly establish, describe and allocate responsibilities of:
 - .1 Workers.
 - .2 Person managing the lockout permit system.
 - .3 Safety Watcher.
 - .4 Subcontractor(s) and General Contractor.
- .6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.
 - .1 Incorporate site specific rules and procedures in force at site as provided by Facility Manager through the Departmental Representative.
 - .2 Clearly label the document as being the Lockout procedures applicable to work of this contract.
- .7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
- .8 Use industry standard lockout tags.
- .9 Provide appropriate safety grounding and guards as required.

1.7 CONFORMANCE

- .1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.

1.8 DOCUMENTS ON SITE

- .1 Post Lockout Procedures on site in common location for viewing by workers.
- .2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.
- .3 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 NOT USED.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA): Canada
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .3 National Building Code 2015 (NBC):
 - .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .4 National Fire Code 2015 (NFC):
 - .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- .5 Province of Ontario
 - .1 Occupational Health and Safety Act, R.S.O. 1990, Chapter O.1 as amended, and regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 O. Reg. 490/09, Designated Substances.
 - .3 Workplace Safety and Insurance Act, 1997.
 - .4 Municipal statutes and authorities
- .6 Canadian Construction Association
 - .1 COVID-19 – Standardized Protocols for all Canadian Construction Sites

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan, within 7 days after date of Notice to Proceed and prior to mobilization to site. Address following items:
- .3 Safety and health risk or hazard analysis for each site task and operation.
- .4 Develop checklist for items to be inspected on a daily basis. Document actions taken.
- .5 Personnel training requirements including:
 - .1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.
 - .2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.
- .6 Personal protective equipment (PPE) program addressing:

- .1 Donning and doffing procedures.
 - .2 PPE selection based upon site hazards.
 - .3 PPE use and limitations of equipment.
 - .4 Work mission duration, PPE maintenance and storage.
 - .5 PPE decontamination and disposal.
 - .6 PPE inspection procedures prior to, during, and after use.
 - .7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - .8 Medical surveillance requirements for personnel assigned to work at site.
 - .9 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - .10 Site control measures employed at site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
 - .11 Decontamination procedures for both personnel and equipment.
 - .12 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
 - .13 Written respiratory protection program for project activities.
 - .14 Procedures dealing with heat and/or cold stress.
 - .15 Confined space entry procedures.
 - .16 Spill containment program if drummed waste material is generated, excavated, stored, or managed on site.
-
- .7 Develop emergency procedures and water rescue plan for Work over, in or adjacent to the waterway and include in the site-specific Health and Safety Plan.
 - .8 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor.
 - .9 Medical Surveillance: submit certification of medical surveillance for site personnel, within 7 days after date of Notice to Proceed and prior to mobilization to site. Submit additional certifications as personnel are sent to site.
 - .10 Respirator Fit Testing: submit proof of respirator fit testing for site personnel, within 7 days after date of Notice to Proceed and prior to mobilization to site.
 - .11 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
 - .12 Off-site Contingency and Emergency Response Plan:

- .1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.
- .2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from site.

1.3 COVID-19 RESTRICTIONS

- .1 Develop a pandemic response plan to mitigate potential exposure to COVID-19 on-site. Submit to the Departmental Representative for review prior to beginning of Work.
- .2 Comply with current applicable provincial requirements and municipal by-laws.
 - .1 It is recognized that requirements and by-laws are subject to change on short notice. Update the pandemic response plan when new directives are issued by public health authorities.
- .3 Comply with “COVID-19 – Standardized Protocols for All Canadian Construction Sites” by the Canadian Construction Association (CCA) when developing the pandemic response plan.
- .4 Access to the bridge operator’s house is prohibited.
- .5 Separate portable washrooms are required for the Contractor’s personnel and the Departmental Representative.

1.4 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.5 WORK PERMIT

- .1 Obtain building and other permits related to the project prior to beginning of Work

1.6 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

1.7 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.8 REGULATORY REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.

1.9 PROJECT/SITE CONDITIONS

- .1 Work at site may involve contact with:
 - .1 Silica in concrete.
 - .2 Lead in paint (the majority of lead paint were removed in previous recoating contracts. Some areas, notably in nodes, have residual amounts of lead. The

maximum concentration of lead measured in recent sampling of the existing paint is below 600ug/g.).

- .3 Guano on bridge surfaces
 - .4 Rusted metals from structure
 - .5 Work near water
 - .6 Work near utilities
 - .7 Arsenic (CCA) in preserved wood
 - .8 Contact with moving equipment
 - .9 Work on the roadway
 - .10 Falling hazards
 - .11 Animals and pests
 - .12 Low temperatures
 - .13 Ice
 - .14 Heating equipment
 - .15 Air quality/vapours inside enclosures
- .2 The Contractor shall comply with the PSPC lock out/tag out procedures for the equipment at the site.

1.10 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.
- .3 Ensure Health and Safety guidelines provide for safe and minimal risk working environment for site personnel and minimize impact of activities involving contact with hazardous materials or hazardous wastes on general public and surrounding environment.
- .4 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety plan shall be submitted to the Departmental Representative in writing. Departmental Representative will respond in writing, either accepting or requesting improvements.

1.11 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Health and Safety Act, R.S.O. 1990 Chapter O.1, as amended.
- .2 Comply with Canadian Construction Association, COVID-19 – Standardized Protocols for all Canadian Construction Sites.

1.12 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Where applicable the Contractor shall be designated “Constructor”, as defined by Occupational Health and Safety Act for the Province of Ontario.

1.13 UNFORSEEN HAZARDS

- .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.14 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have site-related working experience specific to activities associated with abatement of lead and guano containing materials.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.15 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
 - .1 Contractor’s Safety Policy
 - .2 Constructor’s Name.
 - .3 Notice of Project.
 - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
 - .5 Ministry of Labour Orders and reports.
 - .6 Occupational Health and safety Act and Regulations for Construction Projects for province of Ontario.
 - .7 Address and phone number of nearest Ministry of Labour office.
 - .8 Material Safety Data Sheets.
 - .9 Written Emergency Response Plan.
 - .10 Site Specific Safety Plan

- .11 Valid certificate of first aider on duty.
- .12 WSIB :In case of Injury at Work: poster.
- .13 Location of toilet and cleanup facilities.

1.16 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 BLASTING

- .1 Blasting or other use of explosives is not permitted.

1.18 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.19 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to Competent supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

1.20 DESIGNATED SUBSTANCES

- .1 The Contractor is to familiarize himself with the designated survey reports provided by the Departmental Representative

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This Section covers the required environmental procedures to be implemented on-Site to mitigate the potential impact of in or around water construction projects, including bridges operation and maintenance, on aquatic and riparian habitats and water quality. These procedures are to be followed before and during work execution.
- .2 Contractor shall comply with all applicable laws, by-laws, ordinances, rules, regulations and orders of authority having jurisdiction, and other legally enforceable requirements applicable to Work within that region; or come into force during Work performance.

1.2 RELATED REQUIREMENTS

- .1 Section 02 81 00 – Hazardous Materials.

1.3 DEFINITIONS

- .1 Barge: a long flat-bottomed boat for carrying freight on canals and rivers, either under its own power or towed by another.
- .2 Erosion: deterioration, displacement, or transportation of land surface by wind or water, intensified by land clearing practices related to construction work.
- .3 Sediment: particulate matter transported and deposited as a layer of solid particles within a body of water.
- .4 Shroud: a protective casing or cover.

1.4 REFERENCE STANDARDS

- .1 Refer to laws, by laws, ordinances, rules, regulations and orders or authority having jurisdictions, and other legally enforceable requirements applicable to Work at that area, or become in force during Work performance.
- .2 Canada Water Act (R.S.C., 1985, c. C-11)
 - .1 Comprehensive Water Resource Management
- .3 Canada Labour Code, Part 2, Canada Occupational Health and Safety Regulations
 - .1 Canadian Centre for Occupational Health and Safety (CCOHS), OSH Answers Fact Sheets, Working on or near water
- .4 Ontario Acts and Regulations
 - .1 Environmental Protection Act, R.S.O. 1990, c. E.19
- .5 Fisheries Act (R.S.C., 1985, c. F-14)
 - .1 Fisheries and Oceans Canada (DFO).
- .6 Species at Risk Act (S.C. 2002, c. 29)
- .7 Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22)
- .8 Canadian Environmental Protection Act, 1999 (CEPA 1999)

1.5 COORDINATION

- .1 Coordinate the requirements by authority having jurisdictions of each province/territory to Departmental Representative as applicable, to achieve compliance during work performance.
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2018.
 - .2 Toxics Reduction Act, 2009 (S.O. 2009, c. 19)
 - .3 Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat.

1.6 PRE-INSTALLATION MEETINGS

- .1 Arrange for a Site meeting, before Work starts, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to :
 - .1 Verify project requirements.
 - .2 Examine existing Site conditions and adjacent areas to construction's work, before starts.
 - .3 Identify potential impact on existing aquatic and riparian habitats and water quality.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Site-specific Health and Safety Plan (HSP), within 7 days after date of Notice to Proceed and before mobilization to Site in accordance with Section 01 35 29.13 - Health and Safety Requirements.
 - .1 Submit written Emergency Response Plan (ERP) appropriate to potential emergencies should happen during working on or above water in accordance with authorities having jurisdiction.
 - .2 List any relevant hazardous or contaminated materials or substances as required by the authority having jurisdiction, which need to be included in the HSP
 - .3 Site-specific HSP to be reviewed and approved by Departmental Representative before Work starts.
- .3 Submit Site-specific Environmental Protection Plan (EPP) within 7 days after date of Notice to Proceed and before mobilization to Site. Submit EPP for review and approval by Departmental Representative.
- .4 Submit temporary Site-specific Erosion and Sediment Control Plan (ESCP) identifying the type and location of erosion and sediment controls to be provided including monitoring and reporting requirements.

1.8 RESPONSIBILITY

- .1 Contractor shall make arrangements with and obtain permits from authorities having jurisdiction for the disposal of construction waste and debris.

- .2 Contractor shall provide copies of permit(s) to Departmental Representative before Work starts on site.
- .3 Contractor shall pay, unless otherwise indicated in the Contract, any fees associated to obtain necessary permits and regulatory approvals before Work starts.
- .4 Contractor is responsible for the protection of human health, fish and wildlife habitats including species at risk.
- .5 Contractor is responsible for complying with amendments as they become effective.

1.9 REGULATORY REQUIREMENTS

- .1 Perform Work in accordance with Section 01 41 00 - Regulatory Requirements.
- .2 Work to meet or exceed minimum requirements established by federal, provincial, and local laws and regulations which are applicable.
 - .1 Work of this Project is subject to: review by authority having jurisdiction.

1.10 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations.
- .2 Contractor to inform Departmental Representative of proposed corrective action and proceed only when written approval of Departmental Representative is received.
- .3 Departmental Representative may issue stop work order until satisfactory corrective action has been taken.
 - .1 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 ESCP MEASURES

- .1 Erosion and Sediment Control Measures Include:
 - .1 Silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, turbidity curtains, vegetative cover, dikes, and other materials as required to prevent erosion and migration of silt, mud, sediment, and other debris off site or to other sensitive areas adjacent to Work area.

Part 3 Execution

3.1 VERIFICATION OF SITE CONDITIONS

- .1 Identify on-Site sensitive areas, within and adjacent to the work area, as they are addressed on the Site-specific EPP.
- .2 Assess any on-Site unknown conditions observed through Site verification and discuss with Departmental Representative should any extra precaution actions are required.

- .3 Conduct a visual inspection of Work area to confirm the presence of birds or bird nests before Work starts.
 - .1 If birds or bird nests are present on-Site, then a qualified avian biologist will need to identify any migratory bird nests on the bridge.
 - .2 Complete consultation with Environment Canada regarding migratory birds under Species At Risk (SAR) management options in accordance with the Species at Risk Act (S.C. 2002, c. 29), if there is any evidence of migratory birds or SAR nesting within the immediate project area.

3.2 PREPARATION

- .1 Provide all required protection measures in accordance with HSP and EPP before the Work starts.
- .2 Seal drains and catch basins with filter cloths and sandbags in close proximity to Work area with filter cloths and sandbags.
 - .1 Seal drains adequately and open joints before sweeping or washing to prevent material or sediment-laden wash-water from falling or entering the waterway.

3.3 INSTALLATION

- .1 Ensure that on-Site control measures are installed in accordance with Federal, Provincial, and Municipal laws and regulations.

3.4 INSPECTION

- .1 Inspect temporary ESC measures on Site regularly during the course of construction and make all necessary repairs if any damage occurs.

3.5 POLLUTION PREVENTION

- .1 Ensure construction activities have no negative impact on water quality in accordance with Canada Water Act:
 - .1 Use measures such as barges or shrouding to trap and prevent blasting abrasives, protective coatings, rust and grease from entering the waterbody.
 - .2 Remove paint or protective coatings in a manner that prevents any paints, paint flakes, primers, blasting abrasives, rust, solvents, degreasers or other waste material from entering the waterbodies.
 - .3 Prevent concrete and other bridge materials from entering waterbodies. Use barges or shrouding to trap concrete, when Work involves structural repairs and reinforcement.
 - .4 Do not allow water containing suspended materials into waterways, sewer or drainage systems.
 - .5 Contain paint flakes, abrasives, and other waste materials for safe disposal.
- .2 Emission Control:
 - .1 Control emissions from equipment and vehicles in accordance with local authorities' emission requirements.

- .2 Use new or well-maintained equipment and machinery, preferably fitted with fully functional emission control systems, mufflers, exhaust system baffles, and engine covers.
- .3 Ensure that machinery is to arrive on-Site in a clean condition and is to be maintained free of fluid leaks.
- .3 Dust Control:
 - .1 Take the required steps to prevent dust nuisance resulting from Work operations within the right of way, over river or waterbody in accordance with EPP.
 - .2 Prevent debris and other extraneous materials from contaminating air beyond work area by providing the necessary control of dust and debris.
 - .3 Provide temporary enclosures to contain possible airborne contaminants.
 - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .4 Spill Control:
 - .1 Develop Site-specific spill response plan (SRP) that will contain and clean up any leaks or spills of hazardous materials before Work starts.
 - .2 Keep (SRP) at hand all times during the completion of the project, so that any leaks or spills that occur can be promptly contained and cleaned up.
 - .3 Maintain vehicles and equipment in good working condition to avoid leaks and spills of hazardous materials.
 - .4 Contact local Environmental Emergency immediately when a spill occurs.
 - .1 Ontario Spill Action Centre, toll free 1-800-268-6060.
 - .5 Wash, refuel and service machinery and store fuel and other materials for the machinery away from waterbody to prevent any deleterious substance from entering.
 - .6 Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
 - .7 Store, mix and transfer paints and solvents on land and not on the bridge to prevent these materials from entering waterbodies in the event of a spill.
- .5 Noise Control:
 - .1 Keep construction noise level below restricted levels assigned to the Work area and in accordance with regulations and municipals by-laws.

3.6 WILDLIFE HABITAT PROTECTION

- .1 Ensure the intakes of pumping hoses are equipped with an appropriate device, when extracting water from a waterbody, to avoid entraining and impinging fish.
 - .1 Refer to Guidelines to determine the appropriate mesh size for intake screens, DFO (Freshwater Intake End-of-Pipe Fish Screen Guideline (1995)).

3.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove and dispose waste materials from Site at scheduled times as directed by Departmental Representative.

- .2 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management And Disposal.
- .3 Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any waterbody.
 - .1 Concrete materials cast in-place shall remain inside sealed formed structures.
- .4 Do not dispose of waste or volatile materials into waterways, storm or sanitary sewers.
- .5 Prevent foreign materials, including garbage, sand, debris, cleaning solvents or paint from falling or washing into river or through deck drains.
 - .1 Use hand tools or machinery for emergency debris removal at any time of the year. Emergencies include situations where carrying out the project immediately is in the interest of preventing damage to property or the environment, or is in the interest of public health or safety.
- .6 Handle the disposal of hazardous materials in accordance with 02 81 00 – Hazardous Materials.
- .7 Stabilize any waste materials removed from the work Site to prevent them from entering the waterbody.
- .8 Do not bury rubbish and waste materials on Site.
- .9 Do not burn waste materials on Site.

3.8 CLEANING

- .1 Clean and remove debris and sediment from drainage devices and dispose of the material that will prevent it from entering the waterbody.
- .2 Remove seals and filter cloth from drains and catch basins at end of Work and dispose of seals and filter cloth to approved landfill site.
- .3 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .4 Do not clean equipment in the watercourse or where the wash-water can enter the waterbody.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 02 81 00 – Hazardous Materials
- .2 Section 02 83 10 – Lead-Based Paint Abatement – Minimum Precautions

1.2 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 CSA S6-19, Canadian Highway Bridge Design Code.
- .3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

- .1 Stop work immediately when material suspected as being hazardous is encountered during demolition work. Notify Departmental Representative immediately.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 05 12 33 Structural Steel for Bridges
- .2 Section 09 91 13.23 Exterior Painting of Structural Steel

1.2 MEASUREMENT AND PAYMENT

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.3 REFERENCE STANDARDS

- .1 NACE International
 - .1 NACE International
 - .1 ANSI/NACE No. 13/SSPC-ACS-1-2016-SG, Industrial Coating and Lining Application Specialist Qualification and Certification.

1.4 DEFINITIONS

Application Specialist: An individual who performs surface preparation and application of protective coatings and linings to steel and concrete surfaces of complex industrial structures.

1.5 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.6 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.

- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.7 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.8 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.9 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.10 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.11 TESTS AND MIX DESIGNS

- .1 Furnish test and mix designs results as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.12 MILL TESTS

- .1 Submit mill test certificates for all steel and steel products, including bolts, electrodes, etc.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
 - .3 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
- .2 United States Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Indicate use of supplemental or other staging area.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, and platforms.

1.5 HOISTING

- .1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment.
- .2 Hoists cranes to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.
- .4 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
 - .1 Departmental Representative occupancy.
 - .2 Public usage.

1.8 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
- .4 Departmental Representative's site office:
 - .1 Provide temporary office for Departmental Representative.
 - .2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3m above grade, complete with four 50% opening windows and one lockable door.
 - .3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.
 - .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
 - .5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.
 - .6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
 - .7 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
 - .8 Maintain in clean condition.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force and Departmental Representative in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 The use of the sanitary facilities in the operator's house is prohibited.

1.12 CONSTRUCTION SIGNAGE

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .7 Dust control: adequate to ensure safe operation at all times.
- .8 Lighting: to assure full and clear visibility for full width work areas during night work operations.
- .9 Provide snow removal during period of Work.

1.14 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.2 DESCRIPTION OF THE WORK

- .1 This section covers the requirements for the installation of access for:
 - .1 All necessary field measurements and verifications for shop drawing preparation.
 - .2 Construction of scaffolding, work platforms, protective netting, pedestrian protection and use of mobile access buckets.
 - .3 Carrying out all work under the Contract.
 - .4 Inspection of all work by the Departmental Representative.
 - .5 Additional requirements for sealing and containment of areas during paint removal and surface preparation are provided in Section 01 35 43.10 – Environmental Protection - Bridges.
- .2 The PSPC Control House and Office/Workshop are not available for use, by this Contractor, at any time during this Contract.

1.3 REFERENCES

- .1 Province of Ontario
 - .1 Occupational Health and Safety Act, RSO 1990 - Updated 2018.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3, Design of Concrete Structures.
 - .3 CAN/CSA-086, Engineering Design in Wood
 - .4 CSA 0121, Douglas Fir Plywood.
 - .5 CAN/CSA-S269.1, Falsework and Formwork.
 - .6 CAN/CSA-S269.2, Access Scaffolding for Construction Purposes.
 - .7 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel I Structural Quality Steels.
 - .8 CAN/CSA-157, Strength Design in Aluminum.
 - .9 CAN/CSA Z797-2018 - Code of practice for access scaffold.

1.4 DEFINITIONS

- .1 Access to Work: any method used for access to carry out the work, including but not limited to rigid framed scaffolding, mobile access buckets, cranes, ladders, work/suspended platforms.

1.5 DESIGN REQUIREMENTS

- .1 Design Access to Work components in accordance with the applicable CAN/CSA Standards and Ontario Regulations.
- .2 Field welding to new or existing structural steel components will not be permitted, unless otherwise noted in the plans.
- .3 Drilling of holes or modifications to structural steel components not shown as part of the work on the contract drawings, is not permitted.
- .4 Where proprietary systems are used, the design to be in conformance with the manufacturer's recommendations.
- .5 Access to and from the Access to Work facilities must conform to all relevant occupational and health and safety regulations.
- .6 All scaffolding, work platforms, boats, barges, dry docks, protective netting, pedestrian protection and temporary access shall be removed after every night of work not to interfere with the operation of the bridge during the operating hours during the canal navigational season, or with the passage of vehicular, bicycle, and pedestrian traffic.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures. For contracts where another authority is affected (such as navigable waters), two additional copies are required for each authority.
- .2 Show the location, magnitude of all applied loads and safety factor on shop drawings bearing the seals and signatures of two Professional Engineers registered or licensed in the Province of Ontario.
- .3 Access to Work shop drawings to include at least the following:
 - .1 Longitudinal, lateral, vertical, live, snow, impact and anticipated construction loads used in the design, including wind loads for scaffolding, work platforms, and the temporary bridge supports.
 - .2 The grade and actual size of all structural materials.
 - .3 Posts, connections, bracing and welding to be in sufficient detail for analysis.
 - .4 Fully detailed frame shoring.
 - .5 Type and mass of equipment, moving or stationary, to be supported by the Access to Work platforms.
 - .6 All proprietary equipment and systems.
 - .7 Details and methods of maintaining rotational and lateral stability of existing structure sections.

1.7 LIGHTING

- .1 In all areas of work ensure sufficient lighting is provided to complete and inspect the work.

- .2 During night time work provide additional lighting in work areas to compensate for the lack of natural lighting.
- .3 Provide for the use of the Departmental Representative additional work lights for inspection.

1.8 HOUSING

- .1 Provide strong and durable housing for portions of the work which must be protected, heated, and/or ventilated during the work. Design housing to withstand rain, wind and snow.

1.9 PROTECTION

- .1 As part of this work protect all greased surfaces which may be affected by the work by covering with tarps or and or plastic wrapped or taped to form an effective barrier.
- .2 Provide safety netting for scaffolding as required to ensure loose equipment and material do not fall onto the roadway or sidewalk below.

Part 2 Products

2.1 MATERIALS

- .1 Scaffolding, work platforms and other access materials is to be new, or used materials in good condition.
- .2 Scaffolding to be in accordance with CAN/CSA-S269.2 and CAN/CSA Z797 and requirements of Occupational Health and Safety Act of the Province of Ontario.
- .3 Materials to be in accordance with relevant standards detailed in Section 1.3 References.

Part 3 Execution

3.1 MEANS OF ACCESS TO CARRY OUT THE WORK

- .1 Provide and maintain all scaffolding, ramps, ladders, swing staging, platforms, temporary stairs, access lifting equipment, etc. as necessary to carry out the Work. All means of access to be approved by the Departmental Representative and in accordance with the Occupational Health and Safety Act. Field measure ensuring proper fit of all works.
- .2 Prior to commencement of construction work from any Access to Work facilities the Contractor is to complete an interim site inspection and issue a Certificate of Conformance, to be submitted to the Departmental Representative.
- .3 Land based scaffolding to be erected on mud sills. Mud sills are to be of sufficient size ensuring no damage to existing features. Where the scaffolding is suspended from the superstructure steel, the methods of suspension must be such as to permit the execution of the work and also not adversely impact the construction schedule. All methods of

suspension must be designed by the Contractor and administratively approved by the Departmental Representative. All temporary structures including scaffolding, suspended or not, shall be removed before each bridge opening.

- .4 Provide boats, barges, dry dock access, etc. for Work over, in or adjacent to the waterway.
 - .1 The Contractor shall observe the historical data for the water levels and determine the most appropriate means of access.
 - .2 Emergency procedures and water rescue for work near water shall be in accordance with Section 01 35 29.13 – Health and Safety Procedures.
 - .3 Any boats, barges, dry docks, etc. used by the Contractor shall not impede the passage of boat traffic during bridge operation.
- .5 Where access is provided for Work over, in or adjacent to the waterway, ensure environmental protection is provided in accordance with Section 01 35 43 - Environmental Procedures. Where platforms are provided to the underside of the superstructure, ensure all levels where work is being carried out have plastic sheeting or tarps to ensure that all debris and contaminated fluids are contained to those levels. Remove all debris and other contaminants in a safe manner, on a regular basis and, to the satisfaction of the Departmental Representative.
- .6 Do not damage the coating on steel components as a result of operations. Repair any coating damage resulting from the erection, use, or dismantling of scaffolding or work platforms in accordance with the Contract Documents at the Contractor's expense.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Ministry of Transportation, Ontario (MTO)
 - .1 Ontario Traffic Manual, Book 7: Temporary Conditions – January 2014
(Including July 2016 Errata).
- .2 Public Services and Procurement Canada (PSPC)
 - .1 LaSalle Causeway – Road Closure Protocol – March 2019

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.3 PROTECTION OF PUBLIC TRAFFIC, PEDESTRIANS, AND WORK ZONE

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 The Contractor shall be responsible for the complete safety and protection of his workers and public and of the bridge structure, including all necessary provisions to prevent unauthorized vehicular or pedestrian access to the work zone.
- .3 When working within, and in the vicinity of, the publicly travelled portions of the roadway/sidewalk (travelled way):
 - .1 Place equipment in position to minimize interference and hazard.
 - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight outside of work zone.
- .4 Institute work zone protection and ensure that traffic control measures are fully implemented and that all traffic across the LaSalle Causeway has cleared the work zone.
- .5 Return the roadway to its pre-construction configuration outside of the lane closure window. Sidewalk to be safe and accessible to the public outside of the lane closure window. Remove all scaffolding, hoarding, protective netting or any other material after each lane closure to allow unimpeded bridge operation.
- .6 Provide and maintain road access and egress to property fronting along the LaSalle Causeway affected by the work zone, except where other means of road access exist that meet approval of Departmental Representative.
- .7 Provide traffic management plan in accordance with timelines indicated in the Road Closure Protocol, to the Departmental Representative. Assist the Departmental Representative to coordinate with affected stakeholders. Include the following in the traffic management plan:
 - .1 Start and completion times of work;

- .2 Specific location of work;
 - .3 Requirement to work during peak hours, if any;
 - .4 Lane use requirements;
 - .5 Requirements for road closure;
 - .6 Requirement for temporary no stopping signs;
 - .7 Identification of any bus route(s) and bus stops affected by work activity; and
 - .8 Traffic routing and detour requirements where required.
- .8 Provide traffic control plan that details the specific traffic control layout(s), necessary for the completion of the works at least two weeks prior to closures, to the Departmental Representative. Assist the Departmental Representative to coordinate with affected stakeholders. Include the following in the traffic control plan:
- .1 Monitoring and Repair (24 hour contact number if not acquired);
 - .2 Reference to Applicable OTM Book 7 Typical Layouts;
 - .3 Traffic control signs (regulatory, warning and temporary);
 - .4 Traffic control delineation;
 - .5 Traffic Control vehicles and devices (TC-12, Crash Trucks, Temporary Lighting etc.);
 - .6 Contract-specific operational requirements;
 - .7 Night time requirements;
 - .8 Traffic staging and scheduling;
 - .9 Construction vehicle access/egress;
 - .10 Public access/egress for all existing entrances and side roads;
 - .11 Pedestrian safety; barriers and barricades;
 - .12 Emergency Vehicle access;
 - .13 Parking for Departmental Representative; and
 - .14 Any other traffic control measures.

1.4 CONTROL OF PUBLIC TRAFFIC

- .1 Provide competent flag personnel or Portable Temporary Traffic Signals (PTTS) in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions for situations as follows:
 - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
 - .2 Where roadway, carrying two-way traffic, is restricted to one lane on the bridge.
 - .3 When labourers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
 - .4 Delays to public traffic due to Contractor's operators: 15 minutes' maximum.
 - .5 Where temporary protection is required while other traffic control devices are being erected or taken down.
 - .6 For emergency protection when other traffic control devices are not readily available.

- .7 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .8 At each end of restricted sections where pilot cars are required.

1.5 OPERATIONAL REQUIREMENTS

- .1 The Contractor shall maintain existing conditions for traffic throughout period of Contract except that, when required for construction under Contract and when measures have been taken as determined by the Contractor, as indicated, and approved by Departmental Representative to protect and control the public.
- .2 The Contractor shall schedule his operations in such a manner that the duration of activities which prevent emergency vehicle crossing of bridge are kept to an absolute minimum. Such events should be planned and approved by the Departmental Representative prior to closure.
- .3 All closures shall be carried out in accordance with the requirements of the PSPC - LaSalle Causeway – Road Closure Protocol, located in Appendix 4.
- .4 Perform the work in a series of multiple single traffic lane closures between 20:00 and 06:00. Reopen all traffic lanes by 06:00 and do not close lanes before 20:00. Sidewalk to remain operational at all times except for short term 20-minute closures during overnight weekend closures. Bridge to remain available to be opened to marine traffic (free of all equipment and material) upon request within 15 minutes from 06:00 to 22:00 and for scheduled lifts on each hour between 06:00 and 22:00 during navigation season.
 - .1 For the work relating to the deck joint armouring angle replacement and approach slab concrete repairs, a lane closure for 48 hours will be required for each of the two stages.
 - .1 Such a closure will only be permitted from Friday 20:00 to Monday 06:00.
 - .2 Bridge shall remain operational between 06:00 to 22:00 during closure.
 - .2 Lane closures during the morning and afternoon weekday peak periods (06:00 to 09:30 and 15:00 to 18:00, respectively) are not permitted.
 - .3 Full bridge closure will not be permitted, except for the buffer removal and bridge balancing. Limited duration full bridge closure of a maximum of 20 minutes are allowed on Friday, Saturday, and Sunday nights between 22:00 and 06:00.
 - .1 Only one night closure will be allowed for the buffer removal and one for the bridge balancing. These two closures shall occur on consecutive nights.

1.6 MARINE NAVIGATION REQUIREMENTS

- .1 The LaSalle Causeway Bascule Bridge operates during navigation season from May to November. The bridge lifts on the hour between 06:00 and 22:00 for pleasure craft according to the schedule below to allow for rush hour road traffic and on demand for commercial vessels. Furthermore, discrete bridge operation will start in April for maintenance and occasional ship passing. During these hours the bridge must be available to be opened to marine traffic upon request within 15 minutes.
- .2 Scheduled lifts are as follows:

- .1 Weekdays: 06:00; 07:00; 09:00; 10:00; 11:00; 13:00; 14:00, 15:00, 18:00, 19:00, 20:00, 21:00, and 22:00.
- .2 Weekends: Every hour on the hour (06:00 to 22:00).
- .3 The bridge can be closed to marine traffic nightly from 22:00 and 06:00.

Part 2 Products

2.1 PORTABLE TEMPORARY TRAFFIC SIGNALS (PTTS)

- .1 Portable Temporary Traffic Signals (PTTS) in accordance with requirements of Ontario Traffic Manual, Book 7: Temporary Conditions.

Part 3 Execution

3.1 TRAFFIC AND PEDESTRIAN CONTROL

- .1 Carry out traffic and pedestrian control requirements in accordance with approved plans and drawings and all requirements of this specification.
- .2 Set up and maintain Portable Variable Message Sign(s) in accordance with the requirements of the PSPC - LaSalle Causeway – Road Closure Protocol prior to and during construction notifying the public of upcoming closures. The signs shall be located at the locations identified in the Road Closure Protocol. Message to be displayed is subject to approval by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 05 12 33 – Structural Steel for Bridges
- .2 Section 09 91 13.23 - Exterior Painting of Structural Steel
- .3 Section 29 05 00 – Mechanical Work

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.3 DEFINITIONS

- .1 Scaffolding: any method used for access to carry out the Work such as a barge, rigid framed scaffolding, mobile access buckets, cranes, ladders, etc. Scaffolding includes swing staging.
- .2 Housing: enclosure placed around Work to provide protection for the work taking place, and to the waterway and, to provide an air tight micro-climate more suitable to the work than ambient atmospheric conditions.

1.4 REFERENCES

- .1 SSPC Guide 6 – Steel Structures Painting Council Guide for Containing Surface Preparation Debris During Paint Removal Operations.
- .2 SSPC Guide 16 – Steel Structures Painting Council Guide to Specifying and Selecting Dust Collectors.

1.5 DESIGN

- .1 It is anticipated that a full airtight enclosure will not be required as the majority of lead paint were removed in previous recoating contracts.
 - .1 Some areas, notably in nodes, have residual amounts of lead. The maximum concentration of lead measured in recent sampling of the existing paint is below 600ug/g. All power tools used for paint removal shall have an effective dust collection system equipped with a HEPA filter. Effective implies that the dust collection system should be capable of controlling airborne lead concentration levels to below 0.05 mg/m³. Contractor shall follow manufacturer's recommendations and maintenance specifications for optimal function. The maximum concentration of lead measured in recent sampling of the existing paint is below 600ug/g.
 - .2 The contractor shall plan the paint removal work and choose the appropriate equipment to keep airborne lead levels below 0.05 mg/m³ at all times.
 - .3 Containment of dust and removed material will be required when the small areas of paint are removed from the old structure.

- .2 General design concepts and detailing relative to the containment of debris and the provision of dust collection will be in accordance with this specification and SSPC Guide 6 and SSPC Guide 16.
 - .1 The enclosure will be designed to a containment classification of Class 3P.
- .3 Engage a Professional Engineer licensed to practice in the Province of Ontario, who is experienced in this work, to design, draw and inspect the scaffolding, temporary housing, temporary lighting and heating and humidity measures. All drawings shall be sealed and signed by this Professional Engineer.
- .4 All temporary work required under this Contract shall be erected and removed in accordance with Section 01 55 26 Traffic Control. Furthermore, all material, equipment and temporary work including scaffolding shall be removed before each bridge opening and after each Work shift.
 - .1 Lightweight housing (e.g. tarps, etc.) that is securely attached to the bridge and does not interfere with bridge operation does not need to be removed before each bridge opening.

1.6 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures:
 - .1 Drawings for all scaffolding, temporary housing and temporary lighting.
 - .2 Heating and humidity control measures.
 - .3 Site barriers sufficient to protect the public and exclude them from the work area.

1.7 SCAFFOLDING

- .1 Provide all scaffolding, ladders, access lifting equipment, to carry out the work and protect the public.
- .2 Carry out work in accordance with the Occupational Health and Safety Act and the Site Specific Plan. Make all changes required by the Ministry of Labour and Departmental Representative.
- .3 Make periodic inspections of the scaffolding as the work progresses.
- .4 Make no holes in the structural steel nor any welds to the structural steel to attach the scaffold.

1.8 HOUSING

- .1 Provide strong and durable housing for portions of the work which must be protected, heated, and/or ventilated during the work. Design housing to withstand rain, wind and snow.
- .2 Install and maintain temporary coverings to protect existing features, such as gearing, limit switches and electrical equipment from damage in the course of the work. Remove these at the end of the work. Make good all damage to the satisfaction of the Departmental Representative.
- .3 For coating application:
 - .1 Temperature and relative humidity requirements refer to Section 09 91 13.23 - Exterior Painting of Structural Steel

- .2 The Contractor shall manage water from precipitation to prevent fouling or damage to the coating system or prepared surfaces.
- .4 The access, housing, lighting, heating and ventilating must be sufficient:
 - .1 To ensure a safe working environment.
 - .2 To facilitate progress of Work in an efficient manner.
 - .3 To eliminate any chance of debris falling to the waterway, roadway and sidewalk below.
 - .4 To protect areas or features adjacent to the Work during procedures which may damage those areas or features.
 - .5 To protect the Work and products against dampness and cold.
 - .6 To prevent moisture condensation on surfaces.
 - .7 To provide ambient temperatures and humidity levels for storage, application, installation and curing of materials.
 - .8 To provide sufficient lighting to work areas.

1.9 AIR QUALITY

- .1 Monitor air quality inside the enclosure and the integrity of the housing to ensure temperature and relative humidity requirements set forth in Section 09 91 13.23 – Exterior Painting of Structural Steel are satisfied, and that all requirements of the coating manufacturer are additionally satisfied.
- .2 Provide separate air supply for workers.
- .3 Implement and maintain dust control measures in accordance with Province of Ontario regulations.
- .4 Monitor temperatures, humidity and minimum air exchange rates within enclosures.

1.10 LIGHTING

- .1 In all areas of work ensure sufficient lighting is provided to complete and inspect the work.
- .2 During night time work provide additional lighting in work areas to compensate for the lack of natural lighting.
- .3 Provide for the use of the Departmental Representative additional work lights for inspection.

1.11 TEMPORARY HEATING

- .1 Provide temporary heating required during the construction period.
- .2 For coating application:
 - .1 Temperature and relative humidity requirements refer to Section 09 91 13.23 - Exterior Painting of Structural Steel.

1.12 TEMPORARY VENTILATING

- .1 Ventilate storage spaces containing hazardous or volatile materials but in a manner not to reduce the containment of dust.

1.13 PROTECTION

- .1 As part of this work protect all greased surfaces or components which may be affected by the work by covering with tarps or and or plastic wrapped or taped to form an effective barrier.

1.14 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 The following alternatives are acceptable:
 - .1 New materials; or
 - .2 Used, salvaged or recycled materials, in good condition, subject to the approval of the Departmental Representative; or
 - .3 Prefabricated, portable components in a good, safe condition, approved by the Departmental Representative as to type, materials and detail.

Part 3 Execution

3.1 HEATING EQUIPMENT

- .1 Use only heating equipment types acceptable to the Departmental Representative
- .2 Use electricity, gas, diesel oil or other fuels approved by the Departmental Representative
- .3 Store fuel to the requirements of the Fire Commissioner of Canada.
- .4 Provide and maintain temporary fire protection equipment during performance of Work commensurate with fuel source selected.
- .5 Locate fuel storage facilities away from the water and structural components of the bridge.
- .6 Ensure that the heating requirements are met by providing, at optimum efficiency of the equipment, a capacity of 125% of the heat requirement and a sufficient number of standby heaters ready for use at the site.
- .7 Vent the exhausts of heating equipment to the outside of the housing and well clear of combustible materials. Maintain air quality within the enclosure and do not pollute the environment. If the products of combustion enter the enclosure provide regular (minimum twice a week) air sampling for products of combustion.
- .8 Upon receipt of the Departmental Representative's approval:
 - .1 Discontinue heating operations;
 - .2 Remove the housing and heating equipment from the site.

3.2 FIELD QUALITY CONTROL

- .1 Provide maximum-minimum thermometers inside the housing.
- .2 Measure and monitor humidity levels to ensure they are compatible with painting operations.
- .3 Ensure continuity of protection by providing a Watchkeeper to make periodic checks, at all times when work is and is not in progress. The Watchkeeper's qualifications are to be sufficient to perform maintenance on heating and ventilating equipment:
 - .1 Maintain strict supervision of the operation of heating and ventilating equipment.
 - .2 Enforce safe work practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes due to mis-use of the heating and ventilating equipment.
 - .5 Undertake preventative maintenance and re-fuelling.
 - .6 Complete emergency repairs of minor complexity.
 - .7 Place standby items into service.
 - .8 Record maximum and minimum temperatures.
 - .9 Make the written temperature records available to the Departmental Representative.
 - .10 In the event that heating or humidity levels are not maintained all suspect work shall be replaced.

3.3 REVIEW OF WORK

- .1 In the event that heating or humidity levels are not maintained all suspect work shall be replaced.
- .2 Suspect work shall be considered to include all work that is not fully cured based on 150% of manufacturer's written curing times.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products shall be provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to quality or fitness of products, decision rests solely with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 METRIC SIZED MATERIALS

- .1 SI metric units of measurement are used extensively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market, or where imperial products are specified.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.5 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.7 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

- .1 Quality of Work shall be of the highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if site conditions will impact the quality of the work.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable by the Departmental Representative. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise. Torque bolts in accordance with manufacturer's instructions; structural bolts shall be installed as specified elsewhere in the Contract Documents.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work in concrete, unless stainless steel or other material is specifically requested in affected specification Section.

- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .7 Re-drilling of holes on site is not permitted.

1.12 EQUIPMENT - FASTENINGS

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Prevent electrolytic action between dissimilar metals and materials.
- .4 Bolts may not project more than one diameter beyond nuts.
- .5 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of any part of the structure. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to the site, including on the bridge, bank/pile snow in designated areas only or remove from site.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.

- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .7 Remove dirt and other disfiguration from exterior surfaces.
- .8 Sweep and wash clean paved areas.
- .9 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .10 Remove snow and ice from access to bridge and off the bridge.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.2 CONSTRUCTION & DEMOLITION WASTE

- .1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .3 Brick and portland cement concrete.
 - .4 Corrugated cardboard.
 - .5 Wood, not including painted or treated wood or laminated wood.
 - .6 Gypsum board, unpainted.
 - .7 Steel.
- .3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested.
- .4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.3 WASTE PROCESSING SITES

- .1 Provincial Ministry Office from which information pertaining to reuse and recycle centers, and waste processing sites may be obtained are as follows:
 - .1 Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
Telephone: 800-565-4923 or 416-325-4000.
Fax: 416-314-6713.

- .2 Recycling Council of Ontario
55 University Avenue, #1500, Toronto, ON, M5J 2H7.
Telephone: 416-657-2797.
Email: rco@rco.on.ca.
Internet: <http://www.rco.on.ca/>.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative's inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and fully operational.
 - .4 Certificates required by Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Departmental Representative's personnel, including as many bridge lifts as required for balancing checks and adjustments.
 - .6 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
 - .7 Final Payment:

- .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
- .2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 CLEANING

- .1 Maintain project free of accumulated waste and rubbish.
- .2 Final cleaning:
 - .1 Remove temporary protection.
 - .2 Remove dust, dirt and foreign matter from surfaces.
 - .3 Remove surplus materials, excess materials, rubbish, tools and equipment.
 - .4 Broom clean paved exterior surfaces, rake clean other exterior surfaces.
 - .5 Remove snow and ice from access to building and parking lots.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to conclusion of Contract with Contractor's representative, Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements, manufacturer's installation instructions.
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 AS -BUILTS DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, maintain at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. The CADD files shall conform to PSPC National CDD Standards and Supporting Documents. Submit pdf and CADD files on USB compatible with PSPC encryption requirements; through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.
- .7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.4 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings, and in copy of Manufacturer's Project Manual.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Field changes of dimension and detail.
 - .2 Changes made by change orders.
 - .3 Details not on original Contract Drawings.
 - .4 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Amendments and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.5 MATERIALS AND FINISHES

- .1 Construction products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Additional requirements: as specified in individual specifications sections.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.7 WARRANTIES AND BONDS

- .1 Warranty period shall be twelve (12) months from the date of Substantial Performance in accordance with GC3.13.
- .2 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.
 - .5 Verify that documents are in proper form, contain full information, and are notarized.
 - .6 Co-execute submittals when required.
 - .7 Retain warranties and bonds until time specified for submittal.

1.8 NOT USED

- .1 Not Used

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 29 05 00 – Mechanical Work

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.3 CONTRACTOR’S RESPONSIBILITIES

- .1 Completion of construction works and subsequent notification to the Departmental Representative that bridge is ready for balancing checks.
- .2 Cooperation with the Departmental Representative for balancing checks deemed necessary by the Departmental Representative to bridge operation in accordance with the Contract Documents.
- .3 Adjustments to correct balancing deficiencies identified by and as directed by the Departmental Representative. Adjustments will be limited to addition, subtraction or reorganisation of a maximum of 220kg.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 PREPARATION

- .1 Confirm installation is complete in accordance with the Contract Documents prior to notification of the Departmental Representative to commence bridge balancing checks
- .2 Coordinate with bridge operation to arrange for bridge movements deemed necessary by the Departmental Representative.

3.2 EXECUTION

- .1 Make adjustments to ballast (add, remove or displace weight) as directed by the Departmental Representative to establish correct bridge balancing to the satisfaction of the Departmental Representative.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.2 SUMMARY

- .1 Elements to demolish or remove are shown on the contract drawings. They include but are not limited to:
 - .1 Parts of bottom flange and web of all stringers
 - .2 Tack welds
 - .3 Expansion joints armoring angles, including concrete removal
 - .4 Partial depth concrete removals on approach slabs
 - .5 Localized concrete removals at counterweight at member 21S-27S
 - .6 Sections of deck grating
 - .7 Part of the single support angle
 - .8 Part of 21S-27N bracing angle
 - .9 Removal of the existing buffers

1.3 RELATED REQUIREMENTS

- .1 Section 05 12 33 Structural Steel for Bridges
- .2 Section 29 05 00 Mechanical Work

1.4 REFERENCES

- .1 Definitions:
 - .1 Demolition: selective removal of components following removal of hazardous materials.
 - .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.
 - .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
 - .4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .2 Reference Standards:
 - .1 Canadian Environmental Protection Act (CEPA) 1999
 - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).
- .3 OPSS.PROV 928 Construction Specification for Structure Rehabilitation – Concrete Removal
- .4 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Hazardous Materials:
 - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .3 Waste Reduction Workplan:
 - .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 19 – Waste Management and Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.
 - .5 Name and address of haulers, waste facilities, waste receiving organizations.
- .4 Certificates:
 - .1 Submit certified bills of lading, receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
 - .2 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, TDGA and applicable Provincial regulations.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Storage and Protection.
 - .1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
 - .2 Remove and store materials to be salvaged, in manner to prevent damage.

- .3 Store and protect in accordance with requirements for maximum preservation of material.
- .4 Handle salvaged materials as new materials.
- .3 Develop Waste Reduction Workplan related to Work of this Section
- .4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 – Waste Management and Disposal.

1.8 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform Work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent mechanical/electrical systems, watercourses, or contribute to excess air and noise pollution.
 - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.
 - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
 - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities and as directed by Departmental Representative.
 - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .2 Existing Conditions.
 - .1 Should materials resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in unexpected areas during deconstruction, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.
 - .1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction and as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.
 - .2 List of hazardous materials:
 - .1 Bird droppings (possible).
 - .2 Residual amounts of lead in existing coating system.

- .2 List items to be salvaged for reuse:
 - .1 None.

Part 2 Products

2.1 EQUIPMENT

- .1 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.
- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .3 Saw cutting equipment shall not be used unless it can be demonstrated that no damage will occur to the structural steel of the bridge. This includes control of sparks and cutting, nicking or otherwise affecting the existing members.
- .4 Air hammers shall be hand-held and meet the following requirements:
 - .1 Chipping hammers shall have a maximum weight of 9.0 kg prior to any handle modification and a maximum piston stroke of 102 mm.
 - .2 Jack hammers shall have a maximum weight of 14.0 kg.
 - .3 All hammers shall have the manufacturer's name and part or model number engraved on them by the manufacturer. All information must be clearly legible.
- .5 The manufacturer's published specifications shall be the sole basis for determining weight and piston stroke.
- .6 See Section 05 12 33 – Structural Steel for Bridges Item 3.5 for acceptable methods and equipment for rivet removals and reaming of rivet holes.
- .7 New bolt holes shall be made by drilling or coring existing steel elements.
- .8 Existing steel members shall be cut only by abrasive steel cutting wheels or other non-thermal means.

Part 3 Execution

3.1 DECONSTRUCTION

- .1 Reuse of Bridge Elements: this project has been designed to result in end of project rates for reuse of bridge elements as follows: Do not demolish bridge elements beyond what is indicated on drawings without approval by Departmental Representative.

3.2 SITE VERIFICATION OF CONDITIONS

- .1 Employ necessary means to assess site conditions and structure to determine quantity and locations of hazardous materials.
- .2 Investigate site and structure to determine dismantling, processing and storage logistics required prior to beginning of Work.
- .3 Develop strategy for deconstruction to facilitate optimum salvage of reusable and recyclable materials.

3.2 PREPARATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Disconnect and re-route if necessary electrical, telephone and communication service lines entering elements to be deconstructed. Post warning signs on electrical lines and equipment which will remain energized to serve other products during period of demolition.
- .3 Locate and protect utilities. Preserve active utilities traversing site in operating condition. There are utilities immediately to the north and south of the bridge for the full length of the bridge and in the abutments.
- .4 Notify and obtain approval of utility companies before starting demolition.

3.3 REMOVAL OF HAZARDOUS WASTES

- .4 Prior to start of deconstruction work remove contaminated or hazardous materials listed from site and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements, in accordance with Section 02 81 00 - Hazardous Materials.

3.4 REMOVAL OPERATIONS

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Only 1 rivet/bolt on the structural steel struss members may be removed at any one time unless otherwise indicated on the contract drawings or approved by the Departmental Representative.
- .4 Concrete demolition to be performed according to OPSS.PROV 928. Follow OPSS.PROV 928 requirements for Concrete Removal – Partial Depth - Type A for expansion joint concrete and Type C for Counterweight modification at 21N-27N. Saw cut perimeter to 25mm depth.

- .5 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan and as instructed by Departmental Representative.
- .6 Provide adequate access to facilitate, determine location and extent of repair, performance of the work and inspection of the work by the Departmental Representative.

3.5 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 CLEANING

- .1 Progress Cleaning:
 - .1 Clean in accordance with Sections 01 74 00 – Cleaning and 01 77 00 – Closeout Procedures.
 - .2 Leave Work area clean at end of each day.
 - .3 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .4 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 77 00 – Closeout Procedures.
- .3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 13 - Selective Site Demolition
- .2 Section 02 83 10 - Lead-Based Paint Abatement – Minimum Precautions
- .3 Section 05 12 33 - Structural Steel for Bridges
- .4 Section 09 91 13.23 – Exterior Painting of Structural Steel

1.2 REFERENCES

- .1 Canadian Environmental Protection Act, (CEPA) 2012
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA) 1992, (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 WHMIS Safety Data Sheets (SDS).
- .4 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada-2015 (NFC).

1.3 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the Lump Sum Price.

1.4 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS SDS in accordance with Section 01 35 29.13 - Health and Safety Requirements, to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
- .3 Submit Hazardous Materials Management Plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
- .4 Construction Waste Management:
 - .1 Submit project Waste Reduction Work Plan in accordance with Section 01 74 19 – Waste Management and Disposal highlighting recycling and salvage requirements.
- .5 Spill response: establish spill response procedures. Comply with applicable requirements according to classification of waste material. Designate an emergency coordinator and emergency contacts for comprehensive emergency response and incident mitigation.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and all other applicable federal, provincial and municipal regulations.
- .4 Storage and Handling Requirements:
 - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
 - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
 - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
 - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
 - .7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
 - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
 - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
 - .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .12 Report spills or accidents immediately to Departmental Representative, and in accordance with Section 01 35 43 – Environmental Procedures. Submit a written spill report to Departmental Representative within 24 hours of incident.
- .5 Develop Waste Reduction Work Plan related to Work of this Section and in accordance with Section 01 74 19 – Waste Management and Disposal.
- .6 Packaging Waste Management: remove for reuse as specified in Waste Reduction Work Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Description:
 - .1 Bring on site only quantities hazardous material required to perform Work.
 - .2 Maintain WHMIS SDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
 - .3 Spill Response Materials: provide spill response materials which can be used for absorbing/shoveling and containing hazardous materials.

- .4 Provide personal protective equipment.

Part 3 Execution

3.1 HANDLING OF ON-SITE HAZARDOUS MATERIALS

- .1 Lead: Lead-based paints were identified on structural steel members and connections. Handling and disposal procedures to be done in accordance with provincial and federal legislation.
- .2 Silica: Silica is presumed to be present in all existing concrete. Handling and disposal procedures to be done in accordance with provincial and federal legislation.
- .3 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Recycle hazardous wastes for which there is approved, cost effective recycling processing available.
 - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
 - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
 - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
 - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
 - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
 - .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Removal of lead-containing coatings or materials using a power tool with an effective dust collection system equipped with a HEPA filter on existing structural steel.
 - .2 Removal of lead-containing coatings or materials with non-powered hand tool, other than manual scraping and sanding on existing structural steel.

1.2 RELATED REQUIREMENTS

- .1 Section 02 81 00 – Hazardous Materials.
- .2 Section 09 91 13.22 – Exterior Painting of Structural Steel.

1.3 REFERENCE STANDARDS

- .1 Department of Justice Canada
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .2 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
- .3 Human Resources and Social Development Canada (HRSDC)
 - .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.
- .4 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 United States Environmental Protection Agency (EPA)
 - .1 EPA 747-R-95-007-1995, Sampling House Dust for Lead.
- .6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).
- .7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances
 - .1 Lead in Construction Regulation - 29 CFR 1926.62-1993.
- .8 Underwriters' Laboratories of Canada (ULC)
- .9 Province of Ontario

- .1 Environment Council of Ontario (EACO)
 - .1 Lead Guideline for Construction, Renovation, Maintenance or Repair, October 2014.
- .2 Ontario Ministry of Labour
 - .1 Occupational Health and Safety Branch, Guideline Lead On Construction Projects, September 2004, and O. Reg. 490/09 respecting Designated Substances - Lead made under the Occupational Health and Safety Act as amended by O. Reg. 148/12 and O. Reg. 149/12.

1.4 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Authorized Visitors: Departmental Representative or designated representatives.
- .3 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects over cuts and tears, and elsewhere as required to provide protection and isolation. For protection of underlying surfaces from damage and to prevent lead dust entering in clean area.
- .4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .5 Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic metre of air (50 ug/m^3) calculated as 8-hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic metre of air for removal of lead-based paint by methods noted in paragraph 1.1.
- .6 Competent person: individuals capable of identifying existing lead hazards in workplace taking corrective measures to eliminate them.
- .7 Lead dust: wipe sampling on vertical surfaces and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead-based paint waste in accordance with requirements of authority having jurisdiction.
- .3 Provide proof of Contractor's General and Environmental Liability Insurance.
- .4 Quality Control:
 - .1 Provide Departmental Representative necessary permits for transportation and disposal of lead-based paint waste and proof that lead based paint waste has been received and properly disposed of.

- .2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial, Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.13 - Health and Safety Requirements.
 - .2 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers and visitors in work area in accordance with provincial regulations, detailed in the Contractor's site-specific health and safety plan.
 - .2 Eating, drinking, chewing, and smoking are not permitted in work area.
 - .3 Ensure workers wash hands and face when leaving work area. Facilities for washing to be provided by the Contractor.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .3 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 0.15 mm bags or leak proof drums. Label containers with appropriate warning labels.
- .4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 The majority of lead paint were removed in previous recoating contracts. Some areas, notably in nodes, have residual amounts of lead. The maximum concentration of lead measured in recent sampling of the existing paint is below 600ug/g.
- .2 Notify Departmental Representative of lead-based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

- .1 Not later than two days before beginning Work on this Project notify following in writing:

- .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Ontario Ministry of Labour.
 - .3 Disposal Authority.
 - .4 Environment Council of Ontario (EACO).
- .2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.
 - .3 Provide Departmental Representative copy of notifications prior to start of Work.

1.10 PERSONNEL TRAINING

- .1 Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators if applicable.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- .3 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.
- .4 Lead waste containers: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm thickness sealable polyethylene liners.
 - .1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

Part 3 Execution

3.1 SUPERVISION

- .1 One Supervisor for every ten workers is required.

- .2 Supervisor must remain within work area during disturbance, removal, or handling of lead-based paints.

3.2 PREPARATION

- .1 Remove and store items to be salvaged or reused.
 - .1 Protect and wrap items and transport and store in area specified by Departmental Representative.
- .2 Work Area:
 - .1 Shut off and isolate HVAC system to prevent dust dispersal into other building areas. Conduct smoke tests to ensure duct work is airtight.
 - .2 Pre-clean fixed casework and equipment within work area, using HEPA vacuum and cover and seal with polyethylene sheeting and tape.
 - .3 Clean work area using HEPA vacuum. If not practicable, use wet cleaning method. Do not raise dust.
 - .4 Seal off openings with polyethylene sheeting and seal with tape.
 - .5 Protect floor surfaces covered from wall to wall with polyethylene sheets.
 - .6 Maintain emergency fire exits or establish alternatives satisfactory to Authority having jurisdiction.
 - .7 Where water application is required for wetting lead containing materials, provide temporary water supply appropriately sized for application of water as required.
 - .8 Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical cables and equipment.
- .3 Do not start work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Tools, equipment, and materials waste containers are on site.
 - .3 Arrangements have been made for building security.
 - .4 Notifications have been completed and preparatory steps have been taken.

3.3 LEAD ABATEMENT

- .1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap; or removal equipped with HEPA filters; or removal with using power tools non-powered hand tool, other than manual scraping and sanding.
- .2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.

- .4 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.
- .5 After wire brushing and wet sponging to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean entire work area, and equipment used in process. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces of work area. Do not disturb work area for 8 hours no entry, activity, ventilation, or disturbance during this period.

3.4 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Owner.
- .2 Departmental Representative will inspect work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 FINAL CLEANUP

- .1 Following cleaning and when lead wipe surfaces sampling are below acceptable concentrations, proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.
- .3 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .4 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.6 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

- .1 Epoxy injection system and chemical grout will be measured in linear metres and shall include all labour and material required to perform the work.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Site Visit: Schedule a site visit with Departmental Representative to examine existing site conditions and to verify cracks conditions and surface repairs work as required before work starts.

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM C109/C109M-20b, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. (50-mm) Cube Specimens).
 - .2 ASTM C496/C496M-17, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
 - .3 ASTM C881/C881M-20a, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - .4 ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.
 - .5 ASTM D695-15, Standard Test Method for Compressive Properties of Rigid Plastics.
- .2 Health Canada/ Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical properties, finish and limitations.
- .3 Submit copies of WHMIS SDS in accordance with Section 01 35 29.13 - Health and Safety Requirements.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Applicator: company name specializing in Epoxy Injection Grouting work with a list of previously completed similar work.
- .2 Manufacturer's Instructions: submit manufacturer's application instructions and special handling criteria and cleaning procedures.

- .3 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
 - .1 Submit in accordance with Section 01 45 00 - Quality Control.

1.6 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Maintain uniform minimum temperature of 15 degrees C and humidity of 20% to 40% before and during application as well as after completion.
 - .2 Temperature of concrete being bonded must be 7 degrees C and to be maintained at this temperature for 24 hours during curing of epoxy.
 - .3 Use epoxy injection system only for well-ventilated areas and not into a building.

Part 2 Products

2.1 MATERIALS

- .1 Epoxy injection system: two component, modified epoxy resin capable of structurally rebonding cracks, delaminations and hollow planes in Portland cement concrete, 100% solids.
 - .1 Zero VOC material: pre-packaged cartridge kit with manual shotgun style static nozzle gun.
 - .1 To ASTM C881/C881M: Type IV, Grade 1, Class A, B, C.
 - .2 Tensile elongation to ASTM D638 (7 days): 1-4%.
 - .3 Compressive Strength to ASTM D638 (7 days): 58 MPa.
 - .2 Very Low Viscosity Injection Resin:
 - .1 To ASTM C881/C881M: Type I, II, Grade 1, Class B and C.
 - .2 Tensile elongation to ASTM D638 (14 days): 3-4%.
 - .3 Compressive Strength to ASTM D695 (28 days): 61 MPa.
- .2 Epoxy injection system: two-component, modified epoxy resin and modified amine curing agent pumped and mixed at gun nozzle, 40 MPa compressive strength, elongation 4%, flexural strength 50 MPa.
- .3 Epoxy resin: low viscosity, two component modified epoxy resin and modified curing agent pumped and mixed at gun nozzle, elongation 1.6%, moisture insensitive, frost resistant, clear colour.
 - .1 Tensile strength to ASTM D638: 48 MPa at 7 days.
- .4 Epoxy gel sealer: non-sag, two component epoxy gel for sealing cracks and setting injection entry ports.
 - .1 Tensile strength to ASTM D638: 28 MPa at 7 days
- .5 Crack sealer: type recommended by manufacturer of epoxy or chemical grout.

- .6 Epoxy grout: low viscosity, two component modified epoxy resin and modified curing agent pumped and mixed at gun nozzle, elongation 1.6%, moisture insensitive, frost resistant, clear colour.
 - .1 Compressive strength to ASTM C109/C109M: 84 MPa at 7 days.
 - .2 Tensile strength to ASTM D638: 48 MPa at 7 days.
- .7 Epoxy sealer: non-sag, two component epoxy gel for sealing cracks and setting injection entry ports.
 - .1 Tensile strength to ASTM D638: 22 MPa at 7 days.

Part 3 Execution

3.1 STAGING

- .1 Approach slab crack injection to be performed in two stages to maintain traffic in one lane at all times. Contractor shall develop injection procedure accordingly
 - .1 Injection must be performed in a sequence minimizing epoxy losses. Crack ends sealing injections or multiple injections might be required for each stage.

3.2 PREPARATION

- .1 Contractor shall clean cracks and make sure they are free of rust, sand and debris.
 - .1 Injection is not recommended where steel has already begun expanding due to corrosion.
 - .2 Contractor shall assess the condition inside the crack, and take cores where cracks are dirty and structural repair is desired rather than a sealing operation.
 - .3 Perform any additional crack preparations in accordance with the epoxy injection manufacturer's written recommendations.
- .2 Check size and vacuum drilled cracks in travelled areas, as their top edges might be broken away due to freeze-thaw action and shear forces.
- .3 Clean cracks and fractures to receive epoxy resin with pressure water jet or compressed air.
 - .1 Do not use where cracks are filled with water. Cracks should be dry for maximum bond.
- .4 Drill crack for injection ports or T-fittings.
- .5 Apply crack sealer over front surface of crack and allow it to dry sufficiently before injection of epoxy in accordance with manufacturer's instructions.

3.3 EPOXY PRESSURE GROUTING

- .1 Mix and apply epoxy crack sealer and set injection ports in accordance with manufacturer's instructions and space at not more than 1-1/2 times the crack depth.
- .2 Set injection gun to sufficient pressure to inject resin to full depth of crack.
- .3 Inject epoxy resin in accordance with manufacturer's instructions.

- .4 Remove epoxy resin injection ports. Restore concrete surfaces to original profiles.
- .5 Allow for 48 hours of curing prior to reopening the roadway to vehicular traffic.

3.4 INSPECTION

- .1 Departmental Representative will inspect work for
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 CLEANING

- .1 Progress cleaning in accordance with Section 01 74 00 - Cleaning.
- .2 Leave work area clean at end of each working day.
- .3 Divert unused grouting compounds and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
- .4 Do not dispose of unused grouting compounds and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .5 Prevent grouting compounds and additive materials from entering drinking water supplies or streams.
- .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.
- .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.
- .8 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .9 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.6 PROTECTION OF COMPLETED WORK

- .1 Protect adjacent finished work against damage which may be caused by on-going work.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 20 00 – Concrete Reinforcing.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the unit price for Deck Joint Armoring Angle Replacement.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-A23.3-14, Design of Concrete Structures.
 - .3 CAN/CSA O86-14, Engineering Design in Wood.
 - .4 CSA O121-08(R2013), Douglas Fir Plywood.
 - .5 CSA O151-09(2014), Canadian Softwood Plywood.
 - .6 CSA O153-13, Poplar Plywood.
 - .7 CAN/CSA O325.0-16, Construction Sheathing.
 - .8 CSA O437 Series-93(R2011), Standards for OSB and Waferboard.
 - .9 CSA S269.1-16, Falsework and Formwork.
 - .10 CAN/CSA S269.3-M92(R2003), Concrete Formwork.
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .3 Ontario Provincial Standards (OPSS):
 - .1 OPSS.MUNI 904, Construction Specification for Concrete Structures.
 - .2 OPSS 919, Construction Specification for Formwork and Falsework.

1.4 DEFINITIONS

- .1 Cold Weather: means those conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.
- .2 Hot Weather: when the air temperature is at or above 27°C or is likely to raise above 27°C within 24 hours of concrete placement.

- .3 High Performance Concrete (HPC): means concrete with a minimum specified 28-Day compressive strength of at least 45 MPa.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings and design calculations for formwork and falsework at least 4 weeks before construction.
 - .1 Submit drawings stamped and signed by professional engineers registered or licensed in the Province of Ontario.
 - .2 The seals and signatures of a design Engineer and a design-checking Engineer to be affixed on the shop drawings verifying that the drawings are consistent with the contract documents.
 - .3 Where multi-discipline engineering work is depicted on the same shop drawing and the design or design-checking Engineer or both are unable to seal and sign the shop drawing for all aspects of the work, the drawing is to be sealed and signed by as many additional design and design-checking Engineers as necessary.
 - .4 The submission is intended for information purposes only and does in no way relieve the Contractor of full responsibility to carry out work related in accordance with CSA S269.3 for formwork and CSA S269.1 for falsework.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1 for falsework drawings and CAN/CSA-S269.3 for formwork drawings.
- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .6 Indicate sequence of erection and removal of formwork/falsework.
- .7 Wood design in accordance with CSA O86.
- .8 Structural steel design in accordance with CSA S16.
- .9 Aluminum designed in accordance with CSA S157.
- .10 Concrete designed in accordance with CSA A23.3.
- .11 Design according to manufacturer's recommendations where scaffolding, fabricated shoring, or patented accessories are used.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Divert wood materials from landfill to a recycling facility as approved by the Departmental Representative.

- .4 Divert plastic materials from landfill to a recycling facility as approved by the Departmental Representative.
- .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Forms and falsework to be constructed of wood or metal except as specified.
- .2 Use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.
- .3 Structural steel to be in accordance with CSA G40.20/G40.21 and be of the grade shown on the shop drawings.
- .4 Aluminum to be in accordance with CSA-S157 and be of the alloy and temper shown on the shop drawings.
- .5 Tubular column forms: round, steel, internally treated with release material.
- .6 Form ties:
 - .1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
 - .2 All form ties left in place to be hot dip galvanized according to CSA G164-M.
 - .3 Maximum diameter of plastic cones for form ties is 30 mm.
- .7 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121.
- .8 Form release agent: biodegradable, non-staining.
- .9 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm²/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .10 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1.
- .3 Construct the falsework and formwork in accordance with the approved shop drawings. Variations from the drawings is not permitted unless variations are approved by the Designer and the Departmental Representative is provided revised drawings prior to construction.

- .4 The Contractor shall form construction joints at the locations shown on the Contract Documents.
 - .1 In addition, construction joints can be formed where control joints are specified in barrier walls and parapet walls. No other construction joints shall be permitted unless approved in advance by the Departmental Representative.
 - .2 A straight 20 mm V-groove shall be formed at the exposed face of the concrete at all construction joints. V-grooves shall not be used on bridge deck surfaces, except for the bottom slab of post tensioned box voided slabs.
 - .3 A bulkhead shall be used to form vertical or inclined construction joints.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .8 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .9 Use 20 mm chamfer strips on external corners and/or 20 mm fillets at interior corners, joints, unless specified otherwise.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .12 Constructed forms devoid of warp and defects in order to achieve a face alignment free from distortion. This is to apply to all panel forms including prefabricated boards, plywood and steel panels.
- .13 Treat forms and panels with form release agent prior to placing the reinforcing steel.
- .14 Formwork to be supported on shores to sustain all horizontal and vertical loads during placing of the concrete.
- .15 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.
- .16 The tolerances in Table 1 are permitted for lines, grades or dimensions shown on the contract drawings.

Table 1: Formwork Tolerances

Variation From Contract Drawings	Tolerance
(I) End dam and approach slab partial depth concrete patch repairs	3 mm in 1 m

3.2 REMOVAL AND RESHORING

- .1 Do not remove formwork until concrete has reached 75% of its design strength and with approval from the Departmental Representative.
- .2 Remove formwork progressively with care so that corners of concrete members are not damaged during removal.
- .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

3.3 QUALITY CONTROL

- .1 Submit Certificates of Conformance for all formwork and falsework for which shop drawings are submitted.
- .2 A completed certificate of installation to be submitted to the Departmental Representative upon completion of the formwork and falsework installation prior to the placement of concrete. The Contractor's falsework design Engineer or design-checking Engineer's seal and signature to be affixed on the completed certificate of installation confirming that the formwork and falsework have been installed in general conformance with the shop drawings and contract documents. The certificate of installation to also certify that the interim milestone inspections have been completed as specified in the contract documents.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Forming and Accessories.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with this section.
- .2 Payment for work associated with this section is included in the unit price for Deck Joint Armoring Angle Replacement and Concrete Patch Repairs – Partial Depth.

1.3 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004.
- .2 ASTM International
 - .1 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM 276-10, Stainless Steel bars and Shapes.
 - .3 ASTM 955M/A 955-12e1, Deformed and Plain Stainless Steel Bars for Concrete Reinforcement.
 - .4 ASTM A1060/A1060M-14, Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .3 CSA International
 - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-14, Design of Concrete Structures.
 - .3 CSA-G30.18-09(2014), Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21-13(R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.
- .5 Steel Structures Painting Council (SSPC)
 - .1 SSPC-SP-10/NACE No. 2 Near White Blast Cleaning.
- .6 Ministry of Transportation, Ontario (MTO)
 - .1 Ontario Provincial Standard Specification (OPSS)

- .1 OPSS.MUNI 905, Construction Specification for Steel Reinforcement for Concrete.
- .2 OPSS. MUNI 1440, Material Specification for Steel Reinforcement for Concrete.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario at least one week prior to commencement of placing reinforcing bars.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices/connectors if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Steel, stainless steel, and GFRP grades.
 - .6 Indicate sizes, spacings and locations of chairs, spacers and hangers.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
 - .1 Provide Class B tension laps unless otherwise indicated.
 - .3 Do not proceed with fabrication until approved shop drawings are received from the Departmental Representative.
 - .4 The Contractor shall provide the Department Representative 2 days notice prior to the projected completion of the installation of reinforcement to allow the Departmental Representative to complete inspection of the work.
 - .5 A copy of the approved shop drawings shall be kept at the site before and during placing of reinforcement.
 - .6 The Contractor shall carry out pull testing of dowels in the trial installations and during production. The Contractor shall notify the Departmental Representative in writing when the trial installation or a lot is ready for testing. The Contractor shall allow 3 Business Days for the Departmental Representative to witness the testing.
 - .1 The Contractor shall provide documentation of equipment calibration to the Departmental Representative a minimum of 14 Days prior to any pull testing of the dowels.

1.5 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.
 - .3 The sampling of reinforcing bars shall be at the discretion of the Departmental Representative and shall be on a random basis.
 - .1 The sampling of stainless steel reinforcing bars shall consist of three bars, 1.5 m long, randomly selected samples of each bar size supplied in a lot, and shall be submitted to the Departmental Representative with the mill certificates for that lot.
 - .2 The Contractor shall deliver the samples of reinforcing bars and accessories to the Departmental Representative's designated laboratory or as directed by the Departmental Representative.
- .2 After all reinforcing bars are in place a final inspection is to be made to locate any damage or deficiencies. All visible damage or any deficiencies to be repaired to the satisfaction of the Departmental Representative before the concrete is poured.
- .3 Dowel pull test: The Contractor shall conduct pull testing for the trial installation and each lot within 3 Business Days of installation. The Departmental Representative shall be present during the testing procedure. The Departmental Representative shall randomly select 5% of the dowels in each lot or 10 dowels, whichever is greater, for testing. The applicable pull test load shown in Table 1 must be sustained by the dowel, without displacement, for a time period of no less than one minute.
 - .1 All dowels failing the pull test requirement shall be replaced by the Contractor by installing a new dowel in an adjacent location approved by the Departmental Representative.
 - .2 Dowels failing the pull test requirement shall be removed and the hole filled with proprietary patching material.
 - .3 If a dowel is not capable of achieving the test load and time due to failure of the surrounding concrete, the Contractor shall not be permitted to install any additional dowels of that type in the work until further advised by the Departmental Representative.

Table 1: Pull Test Loads

Dowel Size	Test Loads (kN)	
	Embedment depth less than 200 mm	Embedment depth 200 mm or greater
10M	20	35
15M	40	70
20M	60	110

25M	100	180
30M	140	250
35M	190	340

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Keep reinforcing bars and accessories clean of all mud, oil, and other deleterious materials.
- .4 Handle and support reinforcing bars to prevent excessive deformation.
- .5 Store stainless steel reinforcing bars separately from reinforcing steel bars.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel:
 - .1 Billet steel, grade 400W, deformed bars to CSA-G30.18, unless indicated otherwise.
 - .2 Stainless steel, minimum grade 500, shall be Type 316LN or Duplex 2205.
- .3 Mechanical splices/connectors: subject to approval of Departmental Representative.
 - .1 Mechanical connectors: to OPSS.MUNI 905.
 - .2 Stainless steel mechanical connectors: to OPSS.MUNI 905 and OPSS.MUNI 1440.
- .4 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M. Tie wire to be 2.6 mm in diameter.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A1060/A1060M.
- .6 Deformed stainless steel wire for concrete reinforcement: to ASTM A-496/A 496M-07.
- .7 Welded steel wire fabric: to ASTM A1064/A1064M.
- .8 Welded deformed steel wire fabric: to ASTM A1064/A1064M.
- .9 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .10 Epoxy adhesive: Shall be Hilti HIT-HY-200 or approved equivalent.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.2 CUTTING

- .1 The cutting of reinforcing steel bars and splice bars by oxyacetylene torch may be carried out only where permitted in writing by the Departmental Representative.
- .2 Do not cross contaminate saw blades when cutting different types of reinforcing steel.

3.3 WELDING

- .1 Welding of bars, including tack welding, is not permitted unless approved by the Departmental Representative.
- .2 Welding of reinforcing steel bars, when permitted, to be according to CSA Standard W186 and shall be performed by companies certified by the Canadian Welding Bureau according to CSA W186.

3.4 ABRASIVE BLAST CLEANING

- .1 The following surfaces shall be abrasive blast cleaned:
 - .1 All existing steel reinforcement that shall be incorporated into the rehabilitation of a concrete structure component.
 - .2 All surfaces of existing structural steel against which new concrete shall be placed for the rehabilitation of a concrete structure component.
 - .3 All new or existing concrete surfaces against which new concrete shall be placed.

3.5 BONDING AGENT

- .1 A bonding agent shall be used for:
 - .1 Vertical surfaces of concrete against which new concrete is to be placed.
 - .2 Block outs in concrete for installation and modification of deck joint assemblies.
- .2 A thin uniform coating of bonding agent shall be brushed onto the prepared surface immediately before placing fresh concrete. Bonding agents shall be mixed by means of a mixer. Any bonding agent not used within 30 minutes of mixing shall be discarded. Bonding agent that has dried shall be removed and replaced prior to placing concrete against it.

3.6 DOWEL INSTALLATION

- .1 The Contractor shall drill holes to the required dimensions, clean holes, place dowel adhesive, and properly position the dowels as specified in the Contract Documents. Core drilling of the dowel holes shall not be permitted.
- .2 Steel reinforcement and other existing embedments shall not be cut or damaged by the drilling process. Prior to drilling holes, the Contractor shall locate existing steel reinforcement using a covermeter, Utility ducts, post tensioning hardware, and any unsound concrete in the vicinity of the dowel locations. If any of the above is encountered during drilling operations, the Departmental Representative shall be notified immediately.
- .3 The Contractor's operations shall not cause spalling, cracking, or other damage to the surrounding concrete. Concrete spalled or otherwise damaged by the Contractor's operations shall be repaired in a manner acceptable to the Departmental Representative.
- .4 The Contractor shall clean the holes using compressed air to remove all deleterious material, including dust and debris, and shall dry them prior to placing the dowel adhesive. Holes that are started but not completed shall be cleaned and filled with a proprietary patching material.
- .5 The handling and placement of the dowel adhesive shall conform to the manufacturer's written instructions. All excess dowel adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.
 - .1 Dowel adhesive shall be as described in Part 2.1 – MATERIALS.
- .6 Dowels shall be clean and free of deleterious material.
- .7 The Contractor shall maintain dowels in the proper position during the setting of the dowel adhesive and shall prevent the loss of dowel adhesive from the holes.
- .8 The Contractor shall not install formwork or attach anything to the dowels such as steel reinforcement and Utility ducts until the pull tests have been completed and the dowels are accepted into the work.

3.7 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Tie bars at least at every second intersection. The maximum untied length of any bar to be 0.3 m.
- .5 For uncoated reinforcing bars, plain tie-wire is acceptable. Use stainless tie-wire for stainless reinforcing bars.
- .6 Ensure bars are free of mud, oil, concrete or other contaminants, and surface finish defects that adversely affect bonding strength or other properties at the time the concrete is placed.
- .7 Bars shall be protected from contamination caused by concrete splatter during adjacent placements. Any concrete contamination shall be removed immediately while the concrete is still plastic without damaging the bars. Removal of other materials present on the bars shall be according to the materials and methods recommended by the bar manufacturer.
- .8 Tie top layer of deck reinforcement to the shear studs or shear stirrups on each girder at approximately 1.5 m centres.
- .9 Spacers for spirals to be equally spaced around the spiral and be so that the specified pitch of the spiral is maintained.
- .10 Steel reinforcing bars with rust, mill scale, or a combination of both shall be acceptable, provided the minimum physical properties including height of deformations and mass of a wire brushed test specimen are not less than the applicable specification requirements. Loose scale shall be removed.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Forming and Accessories.
- .2 Section 03 20 00 – Concrete Reinforcing.
- .3 Section 07 95 13 – Expansion Joint Assemblies.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work related to the concrete required for the Deck Joint Armouring Angle Replacement.
- .2 Concrete Patch Repairs – Partial Depth shall be measured in square meters.
- .3 Payment for work associated with this section is included in the unit price for Deck Joint Armoring Angle Replacement and Concrete Patch Repair – Partial Depth.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-19, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C 881/C881M-20a, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - .5 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .6 ASTM C C1059/C1059M-13, Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
 - .7 ASTM D412-16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .8 ASTM D624-2012, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .9 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .10 ASTM D1752-18, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 CSA Group (CSA)
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283-06-R2019, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 Ministry of Transportation, Ontario:
 - .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS.PROV 904, Construction Specification for Concrete Structures.
 - .2 OPSS.PROV 920 – Construction Specification for Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops – Structures
 - .3 OPSS.PROV 1350, Material Specification for Concrete – Materials and Production.
 - .2 Designated Sources of Materials (DSM) List
- .5 U.S. Army Corp of Engineers:
 - .1 CRD-C48-92, Standard Test Method for Water Permeability of Concrete

1.4 ABBREVIATIONS AND ACRONYMS

- .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:
 - .1 GU, GUb and GUL - General use cement.
 - .2 MS and MSb - Moderate sulphate-resistant cement.
 - .3 MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 HE, HEb and HEL - High early-strength cement.
 - .5 LH, LHb and LHL - Low heat of hydration cement.
 - .6 HS and HSb - High sulphate-resistant cement.
- .2 Fly ash types:
 - .7 F - with CaO content maximum 8%.
 - .8 CI - with CaO content 15 to 20%.
 - .9 CH - with CaO minimum 20%.
- .3 GGBFS - Ground, granulated blast-furnace slag.

1.5 DEFINITIONS

- .1 Cold Weather: means those conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at

or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.

- .2 Hot Weather: when the air temperature is at or above 27°C or is likely to raise above 27°C within 24 hours of concrete placement.
- .3 Crystalline Waterproofing Admixture: a concrete waterproofing system of the crystalline type that chemically controls and permanently develops an insoluble crystalline structure throughout the capillary voids of the concrete. The admixture is added to the concrete during the mixing cycle. The system seals the concrete against the penetration of liquids from any direction and protects the concrete from deterioration due to harsh environmental conditions.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: convene pre-installation meeting one week prior to beginning concrete works.
 - .1 Ensure key personnel, site supervisor, Departmental Representative, speciality contractor - finishing, forming, concrete producer, and testing laboratories attend.
 - .1 Verify project requirements.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide mix designs for each class of concrete to be used for review by Departmental Representative. Do not pour concrete until written approval of mix design has been obtained.
 - .1 Along with the mix designs, provide product data sheets and WHMIS sheets for any chemical admixtures to be used in the concrete.
- .3 Provide copy of ticket for each truck load of concrete to Departmental Representative.
- .4 Provide testing results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found. Provide accurate records of poured concrete indicating date, time and location of pour, ambient air temperature, number and location of test samples.
- .5 Provide Temperature Control Plan to Departmental Representative a minimum of one week prior to commencement of placing concrete that requires temperature control.
 - .1 Plan to include methods for monitoring and controlling concrete temperature and the temperature difference prior to, during, and after placement for concrete subject to cold weather, bridge decks and large concrete components where the smallest dimension is 1.5 metres.
 - .2 For concrete subject to cold weather, include the type of insulation, R value and number of layers, including test data verifying the R value in the temperature control plan.
 - .3 For concrete subject to cold weather, include the type and layout of heaters and extent of housing.

- .6 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .7 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .8 Provide Departmental Representative, a minimum of one week before intended application, with product data and WHMIS sheets for any curing agents used, including recommended rate of application, description of equipment to be used, and a statement from the manufacturer approving the equipment.
- .9 Provide Departmental Representative with product data for concrete sealer prior to the start of sealer application.
- .10 Provide two copies of WHMIS MSDS – Material Safety Data Sheets for any chemicals and products used on site to the Departmental Representative.
- .11 Crystalline Waterproofing System: At least three (3) weeks prior to delivery of the materials, provide the following information to the Contract Administrator for review:
 - .1 Submit manufacturer’s descriptive product literature consisting of detailed specifications, installation instructions, general recommendations for waterproofing applications, and performance test data. Also include manufacturer’s certification or other data substantiating that products comply with requirements of Contract Documents
 - .2 Submit complete test reports from approved independent testing laboratories certifying that the waterproofing system conforms to the performance characteristics and testing requirements as specified below.
 - .1 Crystalline Formation: Crystallizing capability of waterproofing system shall be evidenced by independent SEM (Scanning Electron Microscope) photographs showing crystalline formations within the concrete matrix.
 - .2 Permeability: Independent testing shall be performed according to U.S. Army Corps of Engineers CRD-C48-92. Treated concrete samples shall be pressure tested to 1.05 MPa (106 m head of water). The treated samples shall exhibit no measurable leakage.
 - .3 Chemical Resistance: Independent testing shall be performed to determine “Sulfuric Acid Resistance of Concrete Specimens”. Treated concrete samples (dosage rates of 3%, 5% and 7%) shall be tested against untreated control samples. All samples shall be immersed in sulfuric acid and weighed daily until a control sample reaches a weight loss of 50% or over. On final weighing the percentage weight loss of the treated samples shall test significantly lower than the control samples.
 - .4 Compressive Strength: Independent testing shall be performed according to ASTM C39/C39M. Concrete samples containing the crystalline waterproofing additive shall be tested against untreated control sample. At 28 days, the treated samples shall exhibit a minimum of 10% increase in compressive strength over the control sample.

- .3 Test reports shall be accompanied by certificates from the manufacturer certifying that products comply with requirements of Contract Documents.
- .4 Certificate of Conformance or Compliance: Provide a certificate signed by manufacturer or manufacturer's representative certifying that the previously tested material is of the same type, quality and make as that proposed for this project.
- .5 References: Product must have a history of over 15 years of successful use and must be accompanied by a list of three (3) projects of a similar nature

1.8 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
- .4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
 - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .2 All materials to be delivered to site in original sealed containers, clearly marked with the manufacturer's name, brand name, type of materials, batch number and date of manufacture.

- .3 Deliver, store, handle, and apply products in accordance with the manufacturer's written instructions.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials.

1.10 SITE CONDITIONS

- .1 Placing concrete during rain or weather events that could damage concrete is prohibited.
- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.
- .3 Cold weather protection:
 - .1 Maintain protection equipment, in readiness on Site.
 - .2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.
 - .3 Placing concrete upon or against surface at temperature below 5°C is prohibited.
- .4 Hot weather protection:
 - .1 Protect concrete from direct sunlight when ambient temperature above 27°C.
 - .2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.
- .5 Protect from drying.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland Cement: Use Portland cement to CSA A3001, Type GU, for concrete.
 - .1 Supplementary cementing materials: a portion of the Portland cement may be replaced with supplementary cementing materials. Supplementary cementing materials to be fly ash and/or silica fume. The Departmental Representative reserves the right to limit their proportions to 20% and 10% respectively in the mix.
 - .2 Supplementary cementing materials: Other supplementary materials may include Type F fly ash and or Type S ground blast furnace slag to the requirements of

CSA 3001. Set retarding admixtures may be used as ambient and site conditions warrant.

- .2 Water:
 - .1 To CSA A23.1.
 - .2 For high performance concrete: water to be clean and free from injurious amounts of oil, acid, alkali soluble chlorides, organic matter, sediment or any deleterious substances.
- .3 Aggregates: to CSA A23.1/A23.2.
- .4 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494 and ASTM C1017/C1017M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing. Retarding admixture is required for the deck placement.
 - .3 Store admixtures above freezing temperatures at all times and in accordance with the manufacturer's recommendations.
 - .4 Calcium chloride or any admixtures containing chlorides are not permitted.
 - .5 The mass of Type S silica fume, if added as a separate component to the mixture during the batching process, to consist of full packages of the silica fume, rounded up to the next full package as required by the batch volume.
 - .6 Crystalline Waterproofing Admixture: Concrete in the joint blockouts and approach slabs spall repairs to include a crystalline waterproofing chemical admixture. The approved crystalline waterproofing admixture system shall be added to the appropriate concrete mix design in strict accordance with the manufacturer's written instructions.
- .5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 40 MPa at 28 days.
- .6 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 40 MPa at days.
- .7 Curing compound: White pigmented Type 2 curing compound, meeting the requirements of ASTM C309.
- .8 Moisture vapour barrier: White opaque polyethylene film 100 microns thickness to ASTM C171.
- .9 Pre-moulded joint fillers:
 - .1 Bituminous impregnated fiber board to ASTM D1751.
- .10 Bonding agent: Portland cement, Type GU, and sand in the ratio of 1:1 by volume and sufficient water to produce a consistency so that it can be applied with a stiff brush to the existing concrete in a thin even coating that will not run or puddle.
- .11 Proprietary patch materials for horizontal and vertical applications:

- .1 Must be an approved product from the MTO DSM list.
- .12 Proprietary bag mix concrete: to meet the performance requirements described in SECTION 2.5 – MIXES.
 - .1 Proposed products are subject to approval from the Departmental Representative.

2.4 EQUIPMENT

- .1 Internal vibrators: High frequency type with 8,000 minimum to 12,000 maximum vibrations per minute when immersed in concrete.
- .2 External vibrators: Minimum frequency of 3,600 vibrations per minute.
- .3 Hand finishing tools: Floats to be made of magnesium or wood. Magnesium bull floats to be commercially made.
- .4 Straight edges: Use two straight edges commercially made of metal, one 3 metres and one 500 mm long.
- .5 Compressor – Air blasting: Compressor to have minimum capacity of 3.5 m³/minute. Compressed air to be free of oil or other contaminants.
- .6 Mixer for bonding agents: mixer to be a stationary mixer, power driven, and capable of uniformly mixing the materials.
- .7 Apply curing compound by means of motorized spraying equipment approved by the manufacturer of the curing compound. The equipment to include a mechanical agitator.
- .8 Equipment made of aluminium to not come in contact with the plastic concrete.

2.5 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
 - .2 All concrete to be air entrained.
 - .3 Provide concrete mix to meet following plastic state requirements:
 - .1 For end dam and partial depth concrete patch repairs:
 - .1 Compressive strength at 28 days: 35 MPa.
 - .2 Aggregate size: 13.2 mm maximum.
 - .3 Superplasticizer: Used only in expansion joints with cross slopes of 4% or less.
 - .4 Initial slump: 40 mm ± 20 mm
 - .1 Superplasticizer for end dam:
 - .1 Superplasticizer will be added on-site according to the written manufacturer's instructions.
 - .2 After the addition of the superplasticizer, the air content will be 8.0% ± 1.5% and the slump shall be 150 mm ± 30 mm.

- .5 Exposure class: C-1.
- .6 Concrete to be fast set, rapid strength gain capable of achieving 75% of its compressive strength in 24 hours.
- .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.
- .6 Concrete shall include the crystalline waterproofing system as previously described in this specification.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Maintain all concrete surfaces to receive new concrete in a wet condition for a period of 1 hour prior to placing any new concrete. Remove all dust and loose material prior to wetting the concrete surface using compressed air. Remove all excess water using compressed air prior to pouring concrete.
- .5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous Work from staining.
- .7 Clean and remove stains prior to application for concrete finishes.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
 - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with shrinkage compensating grout or epoxy grout to anchor and hold dowels in positions as indicated.
- .10 Remove all sawdust, chips, construction debris and other deleterious materials from the interior of forms.
- .11 Remove all snow and ice from any surface against which new concrete is to be placed.
- .12 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 SLEEVES AND INSERTS

- .1 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

- .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
- .3 Confirm locations and sizes of sleeves and openings shown on drawings.

3.3 JOINT FILLER

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
- .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

3.4 BONDING AGENTS

- .1 Mix bonding agent with a mixer. Brush a thin layer of bonding agent onto the prepared surface immediately prior to placing fresh concrete. Discard bonding agent not used within 30 minutes of mixing. Use a bonding agent for the following applications:
 - .1 Exposed vertical surfaces of concrete, less than 300 mm in height, against which new concrete is to be placed.
 - .2 Horizontal surfaces against which new concrete is to be placed.
 - .3 Blockouts in concrete for installation and modification of deck joint assemblies.

3.5 CONCRETE PLACEMENT

- .1 Place concrete in accordance with CSA A23.1/A23.2.
- .2 Do not place any concrete before receiving approval by the Departmental Representative.
- .3 Provide 24 hours minimum notice prior to placing of concrete.
- .4 Do not place any concrete until all curing materials and all cold weather protection materials have been delivered to the site.
- .5 Select methods of transporting, mixing, placing and consolidating concrete to prevent segregation or damage to the mix.
- .6 Keep forms dry during concrete placement.
- .7 Do not support concrete placing and transporting devices on the steel reinforcing.
- .8 Deposit concrete at point of final deposit using means and equipment that prevent segregation or loss of material.
- .9 Size and section to be placed in one continuous operation as noted on the drawings or as directed by the Departmental Representative.
- .10 Deposit concrete into forms in lifts of 500 mm and in layers that are approximately horizontal and as close as practicable to its final position. Do not move concrete horizontally with vibrators or other methods that could cause segregation.
- .11 Keep conveying equipment free from deleterious materials and clean equipment at frequent intervals.
- .12 Provide suitable protection during adverse weather conditions.

- .13 Do not impart harmful vibrations to concrete or misalign forms if conveying equipment is supported on formwork.
- .14 Consolidate thoroughly and uniformly by means of hand tamping, vibrators or finishing machines to obtain a dense, homogeneous structure, free from cold joints, voids and honeycomb.
- .15 Chutes to have sufficient slope to deliver concrete of the approved consistency and have a maximum length of 15 metres.
- .16 A sufficient number of vibrators are to be employed to adequately handle the anticipated rate of placement. The size and frequency of vibrators to be as specified in CSA A23.1.
- .17 Use internal vibrators wherever practicable. External type vibrators may be used where surfaces cannot be properly consolidated with the internal type alone.
- .18 Vibrate each layer of concrete. Extend vibrators into the previous layer to produce a homogeneous mixture at the layer interface.
- .19 Do not use vibration to make the concrete flow or spread more than 1.5 metres from the point of deposit.
- .20 Do not disturb reinforcing steel with vibrators.
- .21 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

3.6 OPERATIONAL CONSTRAINTS

- .1 All activities related to the armoring angle replacement and partial depth concrete repairs to the approach slabs will have to be performed in two stages to accommodate one lane of traffic to remain open at all time.

3.7 CONSTRUCTION JOINTS

- .1 No construction joint will be allowed, but for the construction joint between the two stages. Submit locations and details for construction joints not indicated on contract drawings for approval from the Departmental Representative.
- .2 For all construction joints, remove surface laitance and expose the course aggregate to create a rough surface.
- .3 Use a bulkhead to form vertical or inclined construction joints.

3.8 FINISHING

- .1 Finish concrete surface while it is sufficiently plastic to achieve the desired grades, elevations and texture. Ensure that excessive fines and water are not drawn to the surface.
- .2 Do not apply material to the concrete surface or finishing tools to aid in the finishing.
- .3 Produce a surface which is smooth, free from open-texturing, undulations, projections and ridges. Hand finish with a float, except for bridge deck placement.
- .4 Ensure the finished surface conforms to the lines, grades and elevations shown on the contract drawings.

3.9 CURING

- .1 Protect and cure in accordance with CSA A23.1/A23.2.
- .2 Begin curing immediately after concrete finishing without damaging the surface.
- .3 For curing of proprietary concrete mixes, follow the manufacturer's recommendations.
- .4 Cure to be achieved by one or more of the following:
 - .1 Burlap:
 - .1 Pre-soak burlap by immersing it in water for a period of at least 24 hours prior to placing concrete.
 - .2 Prevent burlap from freezing during cold weather.
 - .3 Carefully lay 2 layers of burlap on the surface as soon as the concrete has sufficiently set to support the burlap.
 - .4 Do not allow water to drip, flow or puddle on the concrete surface.
 - .5 Strips to be overlapped 150 mm, secured to the surface and kept continuously wet during the curing period.
 - .6 Cover with a moisture vapour barrier immediately following the placement of the burlap.
 - .7 Water used for curing to be clean and free from any material which could cause staining or discoloration of the concrete.
 - .8 Burlap to be free from holes, clay or other substances which would have a deleterious effect on concrete.
 - .2 Moisture vapour barrier:
 - .1 Provide an effective vapour barrier and prevent any flow of air between it and the concrete surface.
 - .2 Overlap sheets by 150 mm and secure the vapour barrier to the surface without damaging the concrete.
 - .3 Curing compound:
 - .1 Curing compound may be approved by the Departmental Representative in circumstances where it is impracticable to wet cure and where curing compounds will not affect the appearance of the concrete.
 - .2 Curing compound only permitted on non-structural elements.
 - .3 Do not use curing compound where a bond is required for additional concrete.
 - .4 Apply curing compounds as per the manufacturer's recommended rate.
 - .5 Do not apply curing compounds on construction joints, surfaces requiring waterproofing sealants or deck sections.
- .5 Curing formed surfaces:
 - .1 Formed surfaces require no additional curing where the formwork is left in place for the minimum specified curing period. Where the formwork is removed prior to the curing period is completed, formed surfaces are to be cured with burlap and water for the remainder of the minimum curing period.

- .6 Protect all freshly placed concrete from the elements and from defacement due to construction operations, traffic and vandals.

3.10 HOT WEATHER CONCRETING

- .1 Employ special measures detailed in CSA A23.1 to protect the concrete from hot or drying weather conditions when the air temperature is at or above 27°C or is likely to raise above 27°C within 24 hours of concrete placement.
- .2 Temperature of the formwork, reinforcing steel or the material on which the concrete is to be placed to not exceed 27°C.
- .3 Do not exceed the concrete temperatures specified in CSA A23.1.

3.11 COLD WEATHER CONCRETING

- .1 Cold weather: conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.
- .2 Employ special measures detailed in CSA A23.1 and this specification when temperature is at or below 5°C or is likely to fall below 5°C within 24 hours of concrete placement.
- .3 Do not place concrete against any surface which is at a temperature less than 5°C.
- .4 Do not use calcium chloride or other de-icing chemicals as a de-icing agent in the forms.
- .5 If heating of the mix water and/or aggregates is specified, alter the charging cycle to prevent flash setting of the concrete. Do not heat water or aggregates above 80°C. Water and/or aggregates heated to a temperature in excess of 40°C, to be batched in the mixer first to reduce the temperature of the combination below 40°C, prior to the addition of the cementing materials.
- .6 Provide the following methods of protection, depending on the outside temperature. Heating of the mix water and/or aggregates is required for all classes of protection.
 - .1 Special protection:
 - .1 When the outside temperature is below 5°C and above 0°C, provide adequate covering of all surfaces with tarpaulins or polyethylene sheets.
 - .2 Special protection with insulation:
 - .1 When the outside temperature is below 0°C and above -5°C, cover all surfaces with an approved insulating material, over which tarpaulins or polyethylene sheets are placed.
 - .3 Complete housing with heat:
 - .1 When the outside temperature during placing or during the protection period may fall below -5°C, a complete housing of the concrete, together with supplementary heat, is to be provided.
 - .2 Ensure heat is uniformly supplied to the concrete.
 - .3 For mass concrete, defined as minimum section dimension in excess of 2 metres, the temperature gradient is to not exceed 20°C/m from the interior of the element to the exterior face.

- .4 In thin sections, less than 2 m, the temperature differential from the interior to the exterior is not exceed 20°C.
- .5 Steam or hot air blowers may be used, but a means of maintaining relative humidity of not less than 95% is to be provided.
- .6 When dry heat is used, hot air is not be permitted to flow directly onto the concrete surface.
- .7 Vent exhaust fumes.

3.12

CONTROL OF TEMPERATURE AND TEMPERATURE DIFFERENCE

- .1 Ensure that during the curing period the concrete temperature does not fall below 10°C or exceed 70°C.
- .2 If monitoring is required, install thermocouple wires and associated instrumentation with a combined accuracy of $\pm 1^\circ\text{C}$ capable of recording and displaying temperature. The instrumentation is to include data loggers capable of recording at hourly intervals or less and allow direct reading of temperature.
- .3 Thermocouples for concrete temperature measurement during cold weather to be installed as per Table 1.

Table 1: Minimum Number of Thermocouple Sets for Concrete Temperature Measurement

	Concrete Elements Requiring Temperature Monitoring	Concrete Elements Requiring Temperature Monitoring	Concrete Elements Requiring Temperature Monitoring	Concrete Elements Requiring Temperature Monitoring
Concrete Elements Requiring Temperature Monitoring	Each concrete element.	Minimum of 3 per element or stages thereof.	2	At locations where the concrete is expected to reach the highest temperature and at the surface of concrete
Notes: N/A				

- .4 Begin recording temperatures at the start of the concrete placement.
- .5 Automatically record temperatures at intervals no greater than one hour until the end of the monitoring period. Monitor for a minimum of seven days or until withdrawal of protection is permitted as described under Cold Weather Concreting.
- .6 Physically monitor and verify concrete and ambient air temperature readings every 6 hours, or more frequently, for the first 3 Days and every 12 hours for the remainder of the monitoring period. Take the necessary measures to maintain the temperature within the specified limits.
- .7 Provide access for the Departmental Representative to verify the readings. If the datalogger does not have a digital display that allows the Departmental Representative to verify the temperature, provide the Departmental Representative with the necessary instruments to allow the Departmental Representative to verify thermocouple function and readings.
- .8 Provide weatherproof box for data logging equipment.
- .9 Prepare a record of temperatures for each day during the temperature monitoring period. At the end of the temperature monitoring period, prepare complete temperature records, including graphical plot of temperature versus time.
- .10 Withdrawal of protection and heating:
 - .1 Withdraw in such a manner as not to induce thermal shock stresses in the concrete.
 - .2 Gradually reduce the temperature of the concrete to avoid cracking due to sudden temperature changes.
 - .3 Do not completely remove the protection until the concrete has cooled to the temperature differential between concrete and air as stated in CSA A23.1.
 - .4 For concrete subject to cold weather and for large concrete components where the smallest dimension is 1.5 metres, gradually remove or reduce the protection in such a manner that the maximum allowable drop of

concrete temperature for each 24 hour period does not exceed the following:

- .1 10°C for elements with a thickness greater than 2.0 metres.
- .2 15°C for elements with a thickness between 1.0 and 1.99 metres.
- .3 20°C for elements with a thickness less than 1.0 metre.

3.13 CONCRETE SURFACE FINISH

- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
- .3 All formed surfaces to receive the basic treatment and all exposed surfaces to receive a smooth form finish.
- .4 Basic treatment:
 - .1 Upon removal of the forms, fill all cavities, honeycomb, surface voids, bugholes (greater than 6 mm in diameter) and other deficiencies as identified by the Departmental Representative with a sand cement mortar of the same composition as that used in the concrete or an approved proprietary patch repair product.
 - .2 Remove all bolts, ties, nails, or other metal not specifically required for construction purposes, or cut back to a depth of 25 mm from the surface of the concrete unless otherwise directed by the Departmental Representative. Fill the depressions with a grout or proprietary patch repair product.
 - .3 Fins, unsightly ridges, or other imperfections to be chipped or rubbed off flush with the surface.
 - .4 Patches in excess of 25 mm to be applied in layers not exceeding 25 mm with a 30 minute interval between the placing of layers. The surface of the patch to be textured equivalent to the adjacent concrete.
 - .5 Do not repair honeycomb areas or cavities exceeding 25 mm in diameter until inspected by the Departmental Representative.
 - .6 Where honeycombing has occurred in non-structural elements, remove the affected area and fill with mortar or proprietary patch repair product.
 - .7 Where honeycombing has occurred in structural elements, carry out the corrective method of treatment as directed by the Departmental Representative.
 - .8 Maintain concrete saturated for one hour prior to the application of the repair product.
- .5 Smooth form finish:
 - .1 Smooth form finish to be high quality concrete which has been homogeneously placed and thoroughly compacted. Smooth form finish to be uniform in colour, pattern and texture.
 - .2 Elements to have smooth form finish include curbs, sidewalks, parapet walls, abutments, piers and any other surfaces designated by the Departmental Representative.

- .3 Perform the basic treatment as previously described. Remove stains, rust marks or other blemishes.
- .4 If the concrete, after stripping the forms and performing the basic treatment, does not exhibit a smooth form finish, perform corrective measures as directed by the Departmental Representative.
- .5 Leave concrete surfaces against which new concrete is to be placed with a rough surface finish.
- .6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
- .7 Do not treat concrete surface with cement slurry or paste.
- .8 Select proprietary patch repair products to achieve uniformity of colour and appearance.
- .9 Prevent contamination by oil or other deleterious substances.

3.14 SURFACE TOLERANCE

- .1 Formed and unformed surfaces to be such that when tested with a 3 metre long straight edge placed anywhere in any direction on the surface, there is no gap greater than 6 mm between the bottom of the straight edge and the surface of the concrete. When the straight edge is placed across a construction joint, the gap between the straight edge and the surface of the concrete is not be greater than 3 mm.
- .2 All unformed construction joint surfaces against which sidewalks, curbs, medians, and barrier walls are to be placed to be such that when tested with a 500 mm straight edge placed anywhere in any direction on the surface, there is no gap greater than 20 mm between the bottom of the straight edge and the surface of the concrete.
- .3 The position of the inner and outer top edges of structural components to be set true to the elevations, alignment, and camber as specified on the contract drawings without visible deviation from one end of the structure to the other. All concrete items or structural components to be constructed to the specified geometry.
- .4 Variations from plumb or a specified slope to not exceed 1H:400V. Departure from specified alignment to not exceed ± 25 mm.

3.15 CRACK REPAIRS IN NEW CONCRETE

- .1 Inspect all concrete to identify and document any cracks including, their location, width, and density. Report the results of the inspection to the Departmental Representative. Continue to inspect and monitor cracks up to the date of completion of the Work.
- .2 Identify areas requiring repair or replacement and identify the limits of such repair or replacement. Provided this information to the Departmental Representative along with a proposal for remedial action to be taken. Do not perform repairs until the proposal has been accepted by the Departmental Representative in writing.
- .3 For bridge decks to be waterproofed, inspect the surface to be waterproofed after completion of the curing and prior to the application of tack coat for waterproofing. For all other concrete, inspect the concrete in a timely manner, but no later than one month following completion of curing.
- .4 Cracks 0.3 mm or greater in width to be repaired by the Contractor at no additional cost, except in high performance concrete.

- .5 For high performance concrete, cracks 0.15 mm or greater in width to be repaired by the Contractor at no additional cost.
- .6 Fine cracks are defined as less than 1 mm, medium cracks as 1 to 2 mm, and wide cracks as greater than 2 mm.
- .7 Fine crack repair:
 - .1 Fine cracks are defined as less than 1 mm in width.
 - .2 Fine cracks identified for repair to be filled with a low viscosity epoxy resin approved by the Departmental Representative.
 - .3 The resin is to be applied by pressure injection or by gravity feed into crack and allowing the sealant to be absorbed.
 - .4 A second application may be required, depending on the absorption and crack depth. The second application, if required by the Departmental Representative, to be made as soon as possible after the first application has set.
 - .5 All use and placement of resin materials to be in accordance with the manufacturer's written instructions.
- .8 Medium and wide crack repair:
 - .1 May require a higher viscosity resin for repair.
 - .2 Submit manufacturer's data sheet for the proposed resin for approval from the Departmental Representative prior to use.
 - .3 Excess resin in the vicinity of the crack will require removal by grinding and/or abrasive blast cleaning as per the Departmental Representative's direction.

3.16 FIELD QUALITY CONTROL

- .1 Site tests: Designated testing company will conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
 - .5 Air and concrete temperature.
- .2 Cast, cure, transport and test concrete in accordance with CSA A23.1/A23.2. Ensure testing laboratory is certified to CSA A283.
- .3 Test concrete at the point of discharge as delivered to the work site.
- .4 Secure all cylinders in an approved storage medium prior to leaving the site.
- .5 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.
- .6 Cost of testing to be included in the unit price item for Deck Joint Armouring Angle Replacement.

- .7 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .8 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.
- .9 As a minimum, the frequency of testing is to be in accordance with Tables 2 and 3.
 - .1 Additional 7 day compressive test cylinders will be taken at the same frequency as the 28 day test cylinders.

Table 2: Production Sampling and Testing Minimum Frequencies

Construction categories (See table 3)	Quantity for each Class of Concrete (m3)	28 Day Compressive Test Cylinders	FIELD TESTS Air, Slump and Temperature Tests (Note 2)
I	< 100	1 set/day	One test for each load of concrete until satisfactory control (Note 1) is established; then 1 test for each 5 loads of concrete.
	100-500	2 sets/day	

Note 1) Satisfactory control is considered to have been established when tests on five consecutive truckloads or batches of concrete are within specification requirements.

Note 2) Air, slump and temperature tests to also be done whenever compressive cylinders are cast.

Table 3: Construction Categories

CATEGORY	Type of Construction
I	Abutments, Catchbasins and Maintenance Holes, Columns, Culverts, Approach Slabs, Footings, Foundations, Piers, Wingwalls, Misc. Work.

3.17 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling.
 - .1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.
 - .2 Provide appropriate area on job site where concrete trucks can be safely washed.
 - .3 Divert unused admixtures and additive materials from landfill to official hazardous material collections site as approved by Departmental Representative.
 - .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
 - .5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

- .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
- .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 20 00 – Concrete Reinforcing.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Costs associated with the work described in this section that is not subject to a particular item of the Unit Price Table must be included either in the general lump sum portion of the contract or in the cost of the associated work paid under an article of the Unit Price Table.
 - .1 If the reinforcing steel in the approach slab partial depth concrete repairs reveals to have significant section loss during abrasive blast cleaning, new bars will be added as indicated by the Departmental Representative. Such Work will be paid on a time and material basis.

1.3 REFERENCES

- .1 Joint Publications of the Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE)
 - .1 SSPC-SP 6/NACE No. 3-2007 Commercial Blast Cleaning
- .2 The Society for Protective Coatings (SSPC)
 - .1 VIS 1-2002 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Use commercially manufactured abrasive blast medium. Do not use silica sand.

2.2 EQUIPMENT

- .1 Air compressor.

- .1 Be capable of delivering material at a pressure of 620 kPa, measured in the delivery system at a distance not greater than 3 m from the nozzle end.
- .2 Be capable of producing oil-free air in accordance with ASTM D4285.
- .2 Abrasive blast equipment:
 - .1 Minimum nozzle diameter: 8 mm.
 - .2 Nozzle diameter: indicated on nozzle.
 - .3 Hoses: 40 mm minimum internal diameter.

Part 3 Execution

3.1 CONSTRUCTION

- .1 Abrasive blast clean only when concrete and reinforcing steel are surface dry.
- .2 Protect areas and components not designated for abrasive blast cleaning from damage.
- .3 Protect GFRP reinforcement in the vicinity of the abrasive blast cleaning operations.
- .4 Provide adequate access to the work area to facilitate the work and for any inspection or measurement required by the Departmental Representative.
- .5 Undertake abrasive blast cleaning in accordance with all applicable Environmental laws, acts and regulations.

3.2 ABRASIVE BLAST CLEANING OF CONCRETE SURFACES

- .1 Abrasive blast clean new and existing concrete surfaces against which new concrete will be placed.
 - .1 Expose and clean coarse aggregate and remove dirt, laitance, and hardened concrete slurry.
 - .2 Remove oil and grease from surface using hand tools.
 - .3 Perform abrasive blast cleaning of concrete surfaces not more than 48 hours prior to the placement of concrete against them.
- .2 Departmental Representative to inspect abrasive blast cleaned surface for fractured concrete and loose aggregate. Remove this material as directed by Departmental Representative.

3.3 ABRASIVE BLAST CLEANING OF REINFORCNG STEEL

- .1 Abrasive blast clean existing reinforcing steel exposed during concrete removals.
 - .1 Abrasive blast clean full circumference of existing exposed reinforcing steel in accordance with SSPC-SP6 Commercial Blast Cleaning.
 - .2 Departmental Representative will accept cleaned surface based on the SSPC surface preparation specification and visual standards given in SSPC-VIS-1 Visual Standard for Abrasive Blast Cleaned Steel.

- .2 Maintain reinforcing steel in commercial clean condition. Restore reinforcing steel to required cleanliness if corrosion occurs.
- .3 If there is significant reinforcing steel section loss due to corrosion, either replace bars or dowel and/or splice new bars onto existing as directed by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 13 – Selective Site Demolition
- .2 Section 09 91 13.23 – Painting of Structural Steel
- .3 Section 29 05 00 – Mechanical Work

1.2 REFERENCES

- .1 ASTM International (Latest Editions)
 - .1 ASTM F3125M-19, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
 - .2 ASTM A588/A588M-19 Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
- .2 CSA International (Latest Editions)
 - .1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA S6-19, Canadian Highway Bridge Design Code.
 - .3 CSA S269.1-16, Falsework for Construction Purposes.
 - .4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W59-18, Welded Steel Construction, (Metal Arc Welding).
 - .6 CSA W47.1-19 Certification of companies for fusion welding of steel.
- .3 Ontario Provincial Standard Specification
 - .1 OPSS.PROV 906 Construction Specification for Structural Steel for Bridges (latest version)

1.3 PRICE AND PAYMENT PROCEDURES

- .1 Measurement for work associated with this section will be per unit, as described in the Unit Price Table.
- .2 Payment for work associated with this section will be made on a per unit base, as described in the Unit Price table. The price includes costs for incidental work such as NDT testing.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Removals and Pre-Installation Meetings:
 - .1 Convene pre-removals and pre-installation meeting one week prior to beginning work of this Section, with Contractor's Representative and Departmental Representative to:

- .1 Verify project requirements.
 - .2 Review removals/installation procedures
 - .3 Review installation and substrate conditions.
 - .4 Co-ordination with other sub-trades.
 - .5 Review manufacturer's written installation instructions and warranty requirements.
 - .6 Review bridge operation, marine and vehicular traffic restrictions.
- .2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions.
 - .3 Ensure Departmental Representative, site supervisor, project manager, subcontractor representatives attend.
 - .4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature, data sheets and mill certificate for structural steel and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.13 - Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 All submissions below to be stamped and signed by a Professional Engineer registered or licensed in the Province of Ontario.
 - .2 Submit shop drawings. At minimum, provide all information required by clause "A10.1.2.3 Shop details" of CAN/CSA S6-19, Canadian Highway Bridge Design Code. Steel fabrication cannot start before "Approved" or "Approved as noted" shop drawings are returned to Contractor by Departmental Representative. To be complete, shop drawing submittal package must include all relevant mill tests and data sheets, including those for fasteners, electrodes and all other products used in fabrication of the new elements or modification of the existing elements.
 - .3 Make schedule allowance for 5 workdays for shop drawing approval. If resubmittal of all or some shop drawings is required, make allowance for 5 workdays for revised shop drawing approval. The Contractor shall allocate sufficient time and resources to enable the work to proceed within the allocated time and the cost shall be deemed to be included in the lump sum price.
 - .4 Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets and welds. Indicate welds by CSA W59, welding symbols.
 - .5 Proposed welding procedures to be approved by Canadian Welding Bureau. The bridge is a dynamic structure and welding would be contingent on the details exceeding the fatigue life of the original structure. Welding to be authorized only with written approval of Departmental Representative.

- .6 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel signed and sealed by a Professional Engineer licensed in the Province of Ontario.
 - .7 No later than 14 days after the end of construction work, submit final version of Shop Drawings including all approved modifications. For each steel element considered as Fracture Critical or Primary Tension Member indicate heat numbers and reference appropriate mill certificate on final Shop Drawings.
- .4 Mill Test Certificates:
- .1 Prior to the use of any material in fabrication, 2 copies of the mill test certificates for that material shall be submitted to the Departmental Representative, confirming that the material is according to the Contract Documents.
 - .2 Copies of the mill test certificates for all material to be used in the fabrication are to be available for review at the fabricating plant during fabrication. The certificates to show that the material is according to the contract documents.
 - .3 If the material cannot be identified by mill test certificates, coupons are to be taken and tested and these test certificates are to be made available.
 - .4 When mill test certificates originate from a mill outside of Canada or the United States of America, the Contractor is to have the information on the mill test certificate verified by testing at a Canadian laboratory. This laboratory is to be certified by an organization accredited by the Standards Council of Canada to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates is to be stamped with the name of the Canadian laboratory and appropriate wording stating that the material is according to the specified Contract requirements. The stamp is to include the appropriate material specification number, testing date (i.e., yyyy-mm-dd), and the signature of an authorized officer of the Canadian laboratory.
- .5 Test Reports for Fasteners:
- .1 Submit to the Departmental Representative, proof that the bolts, nuts, and washers meet the chemical composition, mechanical properties, dimensions, workmanship, and head burst as required by ASTM A 325M, ASTM A 490M, ASTM A 563M, or ASTM F 436M.
 - .2 For bolts, nuts, and washers supplied from a manufacturer outside Canada or the United States of America, the above information will be verified by testing at a Canadian laboratory as outlined in the Mill Test Certificates clause.
- .6 Structural Steel Weight Log for Bridge Balancing:
- .1 Prior to any removals, prepare and submit a proposed weight log to the Departmental Representative for approval.
 - .2 The weight log shall track the weight of the structural steel removed and added to the bridge. The net change in weight shall be clearly indicated.
 - .3 Submit the weight log periodically to the Departmental Representative for informational purposes. A final version shall be submitted to the Departmental Representative upon completion of the structural steel repairs and prior to the bridge balancing.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Ensure Departmental Representative has delivery schedules 7 days minimum prior to shipping.
- .3 Storage and Handling Requirements:
 - .1 Provide protective blocking for lifting, transportation and storing.
 - .1 Exercise care during fabrication, transportation and erection so as not to damage plates and sections.
 - .2 Do not notch edges of members.
 - .3 Do not cause excessive stresses.
 - .2 Mark mass on members weighing more than 3 tonnes.
 - .3 Protect unpainted weathering steel, before erection, with waterproof covering.
 - .4 Store fasteners accordingly to OPSS.PROV 906 (latest version) requirements.
 - .5 Ensure that no portion of steel comes into contact with ground.
 - .1 Replace defective or damaged materials with new.

1.7 QUALITY ASSURANCE

- .1 Preconstruction Testing:
 - .1 Provide suitable facilities and cooperate with Departmental Representative in carrying out inspection and tests required.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CSA G40.20/G40.21, grades as indicated. ASTM A588 may be substituted for G40.21 grade 350WT steel upon Departmental Representative approval. Charpy impact energy requirements must be verified by the submittal of test documentation to the Departmental Representative with the substitution request.
- .2 Filler plates: To similar requirements as structural steel above.
- .3 Welding electrodes: to CSA W48 series, low hydrogen (H16 or less).

2.2 FASTENERS

- 1. Bolts smaller than 1 ½ in. (38mm): high strength heavy hex bolts to ASTM F3125, grades as indicated, unless noted otherwise. The nuts, bolts, and washers shall be supplied and shipped together as an assembly from the same manufacturer.

2.3 SOURCE QUALITY CONTROL

- .1 Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.

- .2 The shop fabricator shall be certified to the requirements of CSA W47, Division 1.
- .3 Submit to Departmental Representative Mill Certificate for every batch of steel supplied.
- .4 Submit to Departmental Representative Test Reports and Mill Certificates of products delivered to site.
- .5 Provide suitable facilities and co-operate with Departmental Representative in carrying out inspection and tests required.
- .6 Submit to Departmental Representative copies of certified test reports for Charpy V-notch test.

Part 3 Execution

3.1 QUALIFICATIONS

- .1 Provide steelworkers and supervising engineers with a minimum of two historical steel truss bridge jobs as previous experience in the repair of structural steel components. The steel repairs is to be led by steelworkers with a minimum of ten years of experience in this class of work. It is not acceptable for the structural steel repairs to be led by workers of any trade other than the steelworker trade.
- .2 Magnetic Particle (MT), Dye Penetrant (DP) and Ultrasonic Testing (UT) shall be performed by a certified independent testing agency qualified in ultrasonic testing of this nature by an individual with ASNT NDT Level III or equivalent certification.

3.2 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .2 Stringers: If the minimum 250mm web height cannot be maintained, notify the Departmental Representative. Direction will be given on how to proceed, depending on a refined analysis of the extent of the damage.
 - .1 If the existing W360x51 stringer cannot be salvaged, Departmental Representative will require the replacement in kind of the stringer. In such a case, the Contractor is to take the appropriate measurements on site to fabricate a new W360x51 stringer with copes that will suit the existing connection. The minimum cope radius is to be 35mm and all details are to be compliant to CHBDC S6-19.

3.3 PREPARATION

- .1 Contractor is responsible for the stability and integrity of the structure at all times during repairs.

- .2 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.
- .3 Work near river in accordance with the Contractor's Health and Safety Plan submitted to the Departmental Representative prior to commencing work.
- .4 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.
 - .1 Enlarge holes if necessary by reaming only after receipt of written approval from Departmental Representative.
 - .2 Reamed holes shall be a maximum of 2 mm larger than bolt size used.

3.4 REMOVALS

- .1 Cutting of existing structural steel members is required to modify the existing sign support, repair 21S-27N bracing, and to create a radius at the copes of cracked stringers. Cutting of stringer webs and bottom flanges is required, as shown on Contract Drawings.
- .2 Removal and reinstallation of lattices, batten plates or cut out plates will be required to perform the designated repairs. Such removals and reinstallation shall be performed without damaging the existing structural steel elements. All existing bolts that need to be removed shall be replaced by a new bolt of the same diameter. The Contractor shall allocate sufficient resources to perform removal of lattices, batten plates or cut out plates and reinstallation to enable the work to proceed within the allocated time. The cost shall be deemed to be included in the unit price of the activity requiring removal and reinstallation of lattices and plates.
- .3 Contractor to perform Magnetic Particle Testing (MT) prior to any structural steel work, in presence of the Departmental Representative. Such inspection will require the localized removal of paint, rust or any other coating to expose the bare metal. Based on MT result, the Contractor shall mark the crack tip(s) and get written approval for the Departmental Representative prior to proceeding with drilling or grinding. After grinding or drilling, perform Dye Penetrant Inspection (DP) on metal thickness at each location, in presence of the Departmental Representative. Notify the Departmental Representative 24hrs prior to any inspection (MT or DP). Depending on the results of DP Inspection, further grinding or drilling will be directed by the Departmental Representative if required. The Contractor shall allocate sufficient resources to perform MT Inspection, marking, grinding and drilling and DP Inspection to enable the work to proceed within the allocated time and the costs of all activities described above shall be deemed to be included in the unit price, including multiple stages of grinding/drilling of crack tip(s).
- .4 The Contractor shall submit to the Departmental Representative the proposed method for cutting and removal of structural steel a minimum of 10 working days prior to the scheduled work. Such removal operations will not be permitted until the removal method has been approved by the Departmental Representative.
- .5 Acceptable removal methods shall conform to the following:
 - .1 Any thermal method (such as a torch or thermal lance), which has potential of damaging, weakening or changing any property of the adjacent steel, as determined by the Departmental Representative, shall not be used.

- .2 Any mechanical removal method must be controlled so as to prevent damage to the parent steel and of any other steel members to remain.
- .6 In the event that the Departmental Representative determines that removal work is resulting in damage to the structure, the Contractor shall cease removal operations until a modified method of removal has been submitted to the Departmental Representative and approved.
- .7 Any paint or material to remain that is damaged as a result of the Contractor's operations, shall be repaired at the Contractor's expense. The Contractor shall develop a proposed repair methodology and submit to the Departmental Representative for review and approval prior to commencing work. The Contractor shall perform the repairs to the Departmental Representative satisfaction.
- .8 Drill 25 mm drainage holes in tower truss members 15S-17S and 15N-17N as directed by the Departmental Representative.

3.5 REMOVAL OF EXISTING FASTENERS

- .1 The removal of existing fasteners (rivets and bolts) will be required to complete the designated repairs. It is further anticipated that some or all of the existing bolts will be seized and may need to be cut in order to perform removals. The Contractor shall allocate sufficient resources to perform fastener removal to enable the work to proceed within the allocated time and the cost shall be deemed to be included in the unit price of work being performed.
- .2 The Contractor shall submit to the Departmental Representative the proposed method for rivet / seized bolt removal a minimum of 10 working days prior to the scheduled replacement of fastener removals. Removal of such fasteners will not be permitted until the removal method has been approved by the Departmental Representative.
- .3 Acceptable removal methods shall conform to the following:
 - .1 The sequence of removal and replacement, and the number of fasteners that can be removed at any time shall be such that the global and local structural integrities are not compromised.
 - .2 Any thermal method (such as a torch or thermal lance), which has potential of damaging, weakening or changing any property of the adjacent steel, as determined by the Departmental Representative, shall not be used.
 - .3 Any mechanical removal method must be controlled so as to prevent damage to the parent steel or enlarging of the existing hole in the structural steel through which the existing fastener passes.
 - .4 Any other restrictions identified in the Contract Documents.
- .4 In the event that the Departmental Representative determines that fastener removal work is resulting in damage to the structure, the Contractor shall cease fastener removal operations until a modified method of removal has been submitted to the Departmental Representative and approved.
- .5 Difficult fastener removal is anticipated due to the presence of restricted access to the existing fasteners. The Contractor is to account for these difficulties and include these factors when pricing the work.
- .6 Where fasteners are removed and the holes require enlargement due to misalignment, the holes shall be enlarged by **NOT** more than 2mm and only after the proposed enlargement

is reviewed and approved by the Departmental Representative. Holes shall be enlarged by reaming. Full compensation for enlarging holes up to 2mm shall be considered as included in the contract unit price of the activity requiring bolt or rivet replacement.

- .7 At locations where surrounding material is damaged as a result of the Contractor's operations, the surrounding material shall be repaired. When reaming of more than 2mm in diameter greater than the nominal rivet diameter and installing an oversize bolt is required for the repair, the cost of the reaming, furnishing and installing the oversize bolts shall be at the Contractor's expense. This method of repair shall not be used without the prior approval of the Departmental Representative for each fastener hole.
- .8 At locations where small nicks and burrs in the vicinity of the fastener head are created, they shall be ground smooth to result in a less than 10:1 slope provided the bolt will be properly seated and the thickness of the plate to remain is acceptable as verified by the Departmental Representative.
- .9 At locations where fastener holes contain cracked, torn, or otherwise damaged material due to conditions other than the Contractor's operations, The Contractor shall immediately contact the Departmental Representative for review prior to fastener removal and installation of the new bolt.

3.6 STEEL DECK GRATING REPAIRS (PROVISIONAL)

- .1 As directed by Departmental Representative, repair broken grating bearing bars by plug welding new 8mm x 40mm x 250mm steel plate on each side of broken bar. Provide minimum of 100mm overlap each side of break in existing bar. Provide two 16mm plug welds on each side of break in bearing bar, spaced at 64mm center to center.

3.7 SILLS MISSING OR LOOSE BOLTS REPLACEMENT (PROVISIONAL)

As directed by Departmental Representative, replace missing or loose bolts with appropriate diameter F3125 type 1, galvanized bolts. Tapered washers will be required to account for tapered S section flanges.

3.8 INSTALLATION

- .1 Do falsework in accordance to CSA S269.1.
- .2 Do fabrication and erection of structural steel in accordance with CAN/CSA S6-19, Canadian Highway Bridge Design Code.
- .3 Do welding in accordance with CSA W59, except where specified otherwise.
 - .1 All deposited weld metal to have Charpy V-Notch value not lower than that of the specified Charpy V-Notch value of the parent steel.
 - .2 Do welding in shop unless otherwise permitted by Departmental Representative. Except where shown on the drawings, field welding is not permitted on-site without written approval from the Departmental Representative.
 - .3 Weld only at locations indicated on approved shop drawings.
- .4 High strength bolting: in accordance with CAN/CSA S6-19. Use 'turn-of-nut' tightening method. Prequalification testing shall be performed accordingly to section A10.1.6.9.1 Pre-installation verification testing. Perform on site a test using 3 fastener assemblies for each combination of grade, type, coating, diameter, length, lot number, heat number of component and number of washer(s) used. The testing shall be carried on site in presence

of the Departmental Representative, at least 48hrs prior to any bolt installation. Discard all bolts from a testing lot that failed the prequalification testing. Fill and submit the testing documentation including at a minimum the bolt grade, type, coating, diameter, length, lot number (assembly), heat number of each component, number of washer(s) used, pre-tension value, maximum tension attained, rotational values, status (pass or fail) and date of testing. Provide written proof that the testing equipment has been calibrated successfully within the last 12 months.

- .5 Install bolts with the threads excluded from the shear plane.
- .6 Install only new bolts. Discard **ALL** bolts which have been installed and fully tensioned, but for any reason require loosening or removal, and replace with new bolts.
- .7 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.
- .8 Allowable tolerance for bolt holes:
 - .1 As indicated. Where not specified, the following tolerances shall apply:
 - .1 Matching holes for bolts to line up so that a dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.
 - .2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.
 - .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
 - .4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the following:

Centre-to-Centre distance in metres	Tolerance in plus or minus mm
less than 10	1
10 to 20	2
20 to 30	3
 - .5 Correct mispunched or misdrilled members only as directed by Departmental Representative.
- .9 Length tolerances:
 - .1 Girders, beams and plates: plus or minus 3 mm.
- .10 Do not shop splice.
- .11 Field splices: to approval of Departmental Representative.
- .12 Mark members in accordance with CSA G40.20/G40.21.
 - .1 Do not use die stamping.
 - .2 Place marking at locations hidden when viewed from exterior after erection when steel is to be left in unpainted condition.
- .13 Match marking: shop mark.

3.9 QUALITY ASSURANCE

- .1 Visual inspection, non-destructive testing, and sampling to be done in the fabricating shop and in the field by Departmental Representative to confirm the material supplied, fabrication, and erection has been done as specified in the contract documents.
- .2 Supply electric power, scaffolding, protection from the weather, and free access for inspection and testing of material, to all aspects of the fabrication, delivery, and erection of the structural steel.

3.10 LANE CLOSURE

- .1 Work of the Contract shall be performed within the lane closure duration set forth elsewhere in the Contract Documents
- .2 The Contractor is responsible for the verification of all necessary measurements required to do the Work. All field measurements required to perform fabrication and to record the base-line reference dimensions/alignment of bridge elements where structural removals are to take place shall be taken by the Contractor to verify existing conditions.
- .3 The Contractor is responsible for correct fabrication and fit of all fabricated components and shall submit documentation of said verification to the Departmental Representative, prior to commencing removals.
- .4 The Contractor shall demonstrate and submit for review a written plan methodology including an itemized step by step sequence of every task required to fully complete the project 14 days before the planned work and demonstrate the availability of all necessary material, equipment and labour on site.

3.11 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 77 00 – Closeout Procedures.
- .3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 – Cast-in-Place Concrete.
- .2 Section 03 30 60 – Abrasive Blast Cleaning.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .3 ASTM A240/240M-20, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Application.
 - .4 ASTM F835-20, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
 - .5 ASTM F2329/F2329M-15, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
 - .6 ASTM F3125/F3125M-19e2, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040MPa Minimum Tensile Strength
- .2 Canadian Standard Association (CSA) Standards
 - .1 CSA G30.18-09(R2019), Carbon Steel Bars for Concrete Reinforcement.
 - .2 CSA G40.20-13/G40.20-13 (R2018), General Requirements for Rolled and Welded Structural Quality Steel / Structural Quality Steel.
 - .3 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel.
 - .4 CSA W59-18, Welded Steel Construction.
 - .5 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 Ontario Ministry of Transportation Publications
 - .1 LS-407, Method of Test for Compressive Strength of Moulded Cylinders
 - .2 LS-433, Method of Test of Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration.
- .4 Ontario Provincial Standard Specification (OPSS).
 - .1 OPSS 904, Concrete Structures

- .2 OPSS 920, Construction Specification for Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops – Structures.
- .3 OPSS 1210, Material Specification for Deck Joint Assemblies.
- .4 OPSS 1350, Concrete-Materials and Production

1.3 SUBMITTALS

- .1 Within 30 Days of the Contract award, submit the name and address of the manufacturer of the deck joint assembly to the Departmental Representative.
- .2 Submit product data and shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario.
- .4 Submit deck joint assembly shop drawings that clearly indicate the following:
 - .1 Material properties
 - .2 Dimensions
 - .3 Connection attachments
 - .4 Injection hose system components and name of approved injection company
 - .5 Shop, field, and stage construction splices
 - .6 Fasteners and accessories
 - .7 Installation details
 - .8 Individual alpha-numeric identification number for each stage of installation
 - .9 Handling procedures including lifting points
 - .10 Manufacturer's recommended installation procedure for achieving the required bolt tension specified in the Contract Documents.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets.
- .6 Cast, cure, and transport concrete cylinders in accordance with Section 03 30 00 – Cast-in-Place Concrete.

1.4 GENERAL DESIGN REQUIREMENTS

- .1 Design deck joint assemblies to function satisfactorily under critical combinations of maximum and minimum factored loads, translations, and rotations at serviceability and ultimate limit states according to CAN/CSA-S6.
- .2 Design fasteners and anchorage devices to transfer static and dynamic loads from each side of deck joint assembly to structure.
- .3 Field splices in expansion joint assemblies are only permitted at staged construction, and/or as shown on the Contract Drawings.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle, store and protect materials of this section in accordance with Section 01 61 00 - Common Product Requirements.
- .2 During storage, the deck joint assembly is to be protected from dirt and deleterious materials and stored so that distortion cannot occur. The deck joint assembly is to be supported on wood blocking spaced a maximum of 2 m apart.
- .3 The deck joint assembly is to be lifted by nylon slings placed at the lifting points indicated on the deck joint assembly shop drawings.

Part 2 Products

2.1 MATERIALS

- .1 Expansion Joints
 - .1 Mild steel components to be according to CSA G40.20/G40.21, Grade 300W.
 - .2 Stainless Steel to have a minimum corrosion resistance in accordance with ASTM A240/A240M.
 - .3 Steel fasteners other than stainless steel to be according to ASTM F3125/A3125M (Grade A325M) or ASTM F835.
- .2 Anchors to in headed type stud shear connector according to CSA W59, Appendix H.
- .3 Reinforcing Steel Bars to be in accordance with CAN/CSA G30.18, Grade 400W.
- .4 Anti-seize compound to be LOCTITE Moly 50 manufactured by Henkel Corporation or approved equivalent.
- .5 Injection Hose System for Deck Joint Assembly
 - .1 The injection hose system is to be installed on the deck joint assembly armouring angles. This system to be long enough to extend the full width of the structure, including the sidewalk and curbs.
 - .2 No bleeder holes in the armouring angles are permitted.
- .6 Concrete to be in accordance with Section 03 30 00 – Cast-In-Place Concrete.

Part 3 Execution

3.1 INSTALLATION

- .1 Install deck joint assemblies in accordance with stamped deck joint assembly shop drawings.
- .2 Any damage to the galvanic corrosion protection system, including surface areas of field welds to be repaired with 2 coats of brush applied zinc-rich touch-up coating applied according to the coating manufacturer's recommendations.

- .3 The threaded portion of the bolts and the underside of bolt head to be liberally coated with anti-seize compound immediately prior to installation.
- .4 The re-use of the bolts that have been fully tensioned and require removal after final installation is not permitted.
- .5 The deck joint assemblies to be placed after the asphalt paving operation has been completed and in accordance with OPSS 920.
- .6 Ensure existing concrete is saturated surface dry prior to placing concrete in expansion joint dams.
- .7 Remove setting devices as specified by the joint manufacturer, but not less than 4 hours after completion of concrete placement.

3.2 TRAFFIC RESTRICTIONS

- .1 Traffic, including construction traffic, is not permitted on any part of the deck joint assembly until all the following conditions are met:
 - .1 Concrete has attained a minimum of 75% of its design compressive strength. Early strength determination of concrete compressive strength in accordance with OPSS 904.
 - .2 Epoxy injection has been completed and cured for a minimum of 24 hours. 48 hours or the curing time specified in the manufacturer's data sheet is required for cold weather.

3.3 EPOXY INJECTION

- .1 Store epoxy at a temperature of 20°C ± 5 prior to its use.
- .2 Inject epoxy once the concrete has been in place for a minimum of seven (7) days and has reached a minimum of 75% of its design compressive strength.
- .3 Injection of epoxy used in the injection hose system to be done by expansion joint supplier or an approved representative.
- .4 Mix and pressure inject epoxy according to the manufacturer's specifications
- .5 Start at the fitting at one end of a two-metre section of hose to initially fill the hose and continue until the epoxy emits at the other fitting of the same section. Alternate injection at both fittings of the same section until the epoxy emits from the voids in the concrete or at the interface between the steel angles and concrete or both. The injection ports to then be plugged.
- .6 Repeat the above procedure in each section of hose until the full length of the expansion joint system has been filled with epoxy. The top surface of the blockout is to be thoroughly cleaned to remove any excess epoxy prior to hardening.
- .7 After the epoxy has set, remove all adapters and injection plugs and then plug holes filled with epoxy.

- .8 The deck joint assembly to be checked for voids remaining under the angles. Holes to be drilled in angles where voids are detected and voids and bolt holes to be filled with epoxy.
- .9 Cold Weather Epoxy Injection Requirements:
 - .1 Epoxy injection to not be performed in cold weather conditions without protection when the ambient air temperature is below 5°C or is likely to fall below 5°C within forty eight (48) hours immediately following the epoxy injection.
 - .2 When the epoxy injection is to be performed under cold weather conditions, the temperature of the concrete in the expansion joint blockout is to be at a minimum of 5°C prior to the commencement of the injection. Maintain temperature at a minimum of 5°C for a period of forty eight (48) hours after injection or the curing time as specified in the manufacturer's data sheet.

3.4 QUALITY ASSURANCE

- .1 Concrete
 - .1 Acceptance of air void system in accordance with OPSS 1350 and OPSS 920
 - .2 Acceptance of rapid chloride permeability in accordance with OPSS 920 and LS-433
 - .3 Acceptance of compressive strength in accordance with OPSS 920 and LS-407.
- .2 Acceptance of Deck Joint Assembly
 - .1 On completion of the deck joint assembly installation, the assembly shall be free of the following defects or deficiencies:
 - .1 Cracks wider than 0.3mm and voids in concrete end dams
 - .2 Defective coating
 - .3 Turn-of-nut procedure for bolt installation not followed
 - .4 Defective, loose, or missing structural components or welds
 - .5 A line parallel to the centreline of the structure joining the tops of all steel components of the deck joint assembly that deviates from a line parallel to the pavement profile between nosing angles by more than 3mm, at any location along the length of the expansion joint.
 - .6 Any portion of the deck joint assembly is extending above the finished road surface.

3.5 CLEANING

- .1 Clean Work in accordance with Section 01 74 11 - Cleaning.
- .2 Clean to Departmental Representative's approval, soiled surfaces, spatters, and damage caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Ontario Provincial Standard Specification
 - .1 OPSS.PROV 911 Construction Specification for Coating Structural Steel Systems, November 2014
 - .2 OPSS.PROV 1704 Material Specification for Paint Coating Systems for Structural Steel, November 2014
- .2 Ministry of Transportation (MTO) Designated Sources List DSM # 9.20.39, Structural Coatings – Low VOC.
- .3 The Society for Protective Coatings (SSPC)
 - .1 SSPC-SP 1, Solvent Cleaning.
 - .2 SSPC-SP 2, Hand Tool Cleaning.
 - .3 SSPC-SP 3, Power Tool Cleaning.
 - .4 SSPC-SP 10/NACE No.2, Near White Metal Blast Cleaning
 - .5 SSPC-SP 11, Power Tool Cleaning to Bare Metal
 - .6 SSPC-V-3, Guide and Reference Photographs for Steel Surfaces Prepared By Power and Hand Tool Cleaning
 - .7 SSPC-PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 - .8 SSPC Good Painting Practice, Volume 1, 5th Edition.
 - .9 Manufacture’s current product data sheets must be used in conjunction with, and form part of, this specification. Where contradictions occur, the most stringent requirement that will produce the best quality and durability of the coating system as judged by the Departmental Representative, thus protecting the structure, shall be used.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 There will be no measurement for work associated with structural steel repairs.
- .2 Payment for work associated with structural steel repairs is included in the unit price for each repair.
- .3 Payment for “Localized Structural Steel Coating Repairs (outside steel repair areas) will be measured by square meter (m2) of paint applied as per the Unit Price Table. Area to clean and recoat to be marked by contractor and approved by Departmental Representative before work begins. No payment will be made for cleaning or coating outside the approved areas identified by the Departmental Representative.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit painting plan designating the locations and order of painting as well as locations of laps in coating system layers.

- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and galvanized coating touch-ups and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copies of WHMIS SDS.
- .4 Samples:
 - .1 Submit for review and acceptance 1 L of each unit to the Department Representative for analysis and acceptance prior to commencing work.
 - .2 Mark samples with name of project, its location, paint manufacturer's name and address, name of paint and manufacturers paint code number.
 - .3 Enable Departmental Representative to take 1 L samples of each paint delivered to site, one sample from manufacturer's containers and one sample from painters' pot.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.5 QUALITY ASSURANCE

- .1 Preconstruction Testing:
 - .1 Provide suitable facilities and cooperate with Departmental Representative in carrying out inspection and tests required.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

Part 2 Products

2.1 MATERIALS

- .1 Paint system: Inorganic Zinc/Epoxy/Polyurethane (IZEP) system to Ministry of Transportation of Ontario Designated Sources of Material DSM # 9.20.39 and conform to the provisions of OPSS.PROV 1704 November 2014.
- .2 Paint components shall comprise a coating system from a single manufacturer, suitable for application to steel surfaces.
- .3 Paint for existing and new steel shall be comprised of the following coating system components known to be compatible with the existing bridge coating system. Other products equivalent to those listed could be accepted by Departmental Representative if proved to be compatible with existing system:
 - .1 Primer Coat 1: Carbozinc 11HS or other approved primer.
 - .2 Intermediate Coat 2: Carboguard 890 LT or other approved midcoat.

- .3 Topcoat 3: Carbothane 133LH (field-applied)/Carbothane 133HB (shop-applied) or other approved topcoat.
- .4 Colours: Match existing paint colour where painting affected steel work. Colours to be approved by Departmental Representative.
- .5 All materials must be applied in a climate controlled environment which is in accordance with the manufacturer's recommendations and this specification.
- .6 All primer must have an unlimited recoat time to allow areas to be painted in stages.

2.2 ALTERNATIVES

- .1 Due to compatibility issues, alternatives to specified paint system will not be considered.

2.3 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.

Part 3 Execution

3.1 PREPARATION

- .1 Remove existing loose and rusted paint from exterior metal surfaces.
- .2 Metal surfaces to be repainted in the field:
 - .1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease, existing paint on faying surfaces of new connections and other foreign substances. Existing surfaces within the bolt pattern of new steel elements and a distance of 50 mm beyond the new metal shall be cleaned to requirements of SSPC-SP 11 Power Tool Cleaning to Bare Metal with a power tool achieving the same surface profile as a Monti Bristle Blaster.
 - .1 Submit specifications of power tool to Departmental Representative for approval. All power tools used for paint removal shall have an effective dust collection system equipped with a HEPA filter. Effective implies that the dust collection system should be capable of controlling airborne lead concentration levels to below 0.05 mg/m³. Contractor shall follow manufacturer's recommendations and maintenance specifications for optimal function.
 - .2 The maximum concentration of lead measured in recent sampling of the existing paint is below 600ug/g. The contractor shall plan the paint removal work and choose the appropriate equipment to keep airborne lead levels below 0.05 mg/m³ at all times.
 - .3 Clean existing coating within 300 mm of the edge of the new coating by power washing using potable water to remove all contaminants.
 - .4 The edges of the existing coating shall be feathered into areas cleaned to bare steel so that at least 10 mm of each coat of the existing coating is exposed.

- .2 Solvent cleaning to SSPC-SP 1 shall be used to remove grease and oil prior to power tool cleaning.
- .3 Scrape edges of old paint back to sound material where remaining paint doesn't show signs of debonding and feather exposed edges.
- .3 Metal surfaces to be painted in the shop: comply with OPSS.PROV 911.
 - .1 Solvent cleaning to SSPC-SP 1.
 - .2 Near white blast cleaning to SSPC-SP 10
- .2 Solvent cleaning shall be used to remove grease and oil prior to abrasive blast cleaning.
- .4 Galvanized coating repair in the field:
 - .1 Clean surfaces of all weld slag, rust, dirt, oils, dust or other deleterious substances in accordance with the following:
 - .1 Power Tool Cleaning to Bare Metal to SSPC-SP 11 or in accordance with the manufacturer's written instructions.
 - .2 Solvent cleaning to SSPC-SP 1.
 - .2 Solvent cleaning shall be used to remove grease and oil prior to power tool cleaning.
- .5 Compressed air to be free of water and oil before reaching nozzle.
- .6 Remove traces of loose paint after cleaning from surfaces, pockets and corners to be painted by: brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.
- .7 Apply paint after prepared surfaces have been accepted by Departmental Representative.
- .8 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-Vis3 for field painting.
 - .1 Apply primer, paint, or pre-treatment after surface has been cleaned and before deterioration of surface occurs.
 - .2 Clean surfaces again if rusting occurs after completion of surface preparation.
- .9 Mixing paint:
 - .1 Follow manufacturer's instructions for mixing, straining, and thinning paint. In addition to the manufacturer's instruction:
 - .1 Do not dilute or thin paint for brush application.
 - .2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
 - .3 Do not mix or keep paint in suspension by means of air bubbling through paint.
 - .4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

- .10 Number of paint coats (field painting):
 - .1 One primer coat to minimum dry film thickness of 75 μm and to a maximum of 150 μm .
 - .2 One intermediate coat to minimum dry film thickness of 100 μm .
 - .3 One top coat to a minimum dry film thickness of 50 μm .
 - .4 Follow the written manufacturer's recommendations if the dry film thickness differ from those given above.
- .11 For the paint system submitted the optimum dry film thickness and the manufacturer's acceptable range for each layer shall be submitted for review as part of the review process. The Departmental Representative reserves the right to reduce the range and require stricter control if it is deemed that the range is too large compared to the range of other manufacturers products and to require the Contractor to come closer to the optimum thickness.

3.2 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Apply paint by brushing or spraying. Use sheepskins or daubers when no other method is practical in places of difficult access.
- .3 Use dipping or roller coating method of application when specifically authorized by Departmental Representative in writing.
- .4 The Contractor shall provide enclosures and indirect (dry) heat to maintain air and surface temperatures within the manufacturer's prescribed limits during painting and curing operations both to maintain adequate conditions for coating / curing and to ensure curing is completed within the available working time as required.
- .5 Do not apply paint when:
 - .1 Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.
 - .2 Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Fog or mist occurs at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
 - .4 Surface is wet, damp, frosted, or contaminated with dirt or chlorides.
 - .5 Previous coat is not dry.
- .6 Adequate ventilation shall be provided to ensure proper curing and a safe working environment.
- .7 Supply cover when paint must be applied in damp or cold weather. Shelter or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable in accordance with Manufacturer's specifications.
- .8 Remove paint from areas which have been exposed to freezing, rain, snow or condensation. Prepare surface again and repaint.

- .9 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .10 Brush application:
 - .1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
 - .2 Brush out runs and sags.
 - .3 Remove runs, sags and brush marks from finished work and repaint.
- .11 Shop Painting:
 - .1 Paint 3 coats in shop according to requirements of OPSS.PROV 911. Paint faying surfaces with primer coat only.
- .12 Field Painting:
 - .1 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
 - .2 Field paint surfaces (other than faying surfaces) which are accessible before erection but which are not to be accessible after erection.
 - .3 The surface within the bolt pattern and for a distance of 50 mm beyond the new metal shall receive only the prime coat of paint prior to assembly. Prime coated surfaces that are exposed after assembly shall receive the second and third coats of the paint system after cleaning of the surfaces according to the manufacturer's recommendations.
 - .4 Where painting does not meet with requirements of specifications, and when so directed by Departmental Representative remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.
- .13 Handling painted metal:
 - .1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
 - .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests, Inspections:
 - .1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2. Submit results to the Department Representative within 72 hours.
 - .2 Departmental Representative may engage the services of a coating inspector for quality control purposes.

3.4 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.

- .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
- .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect painted surfaces from damage during construction.
- .2 Protection of surfaces:
 - .1 Protect surfaces not to receive paint.
 - .2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
 - .3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.
 - .4 Take preventive actions to prevent peeling or damage to existing paint system outside areas to be repainted for steel repairs. Such actions might include physical protection, careful planning and execution of cleaning operations, etc. All costs associated with repairing existing paint damaged during repairs will be borne by the Contractor.
- .3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Under the Mechanical Work section the Contractor shall clean and paint span lock machinery components, replace the damaged span lock receiver mounting bolts and adjust the receiver clearances, clean and paint the corroded live loads support components and adjust the live load support shims, remove the existing buffers, and adjust the bridge balance to compensate for this work and all other work performed to the movable span as part of this project. All work shall be performed as detailed on the Contract Plans and as detailed in these Specifications.
- .2 The Contractor shall be responsible for the coordination of the Mechanical Work with all other work items as necessary to produce completed systems which meet the requirements of the Contract Documents.
- .3 This work includes furnishing all labour, materials, tools, services and equipment required to perform the removal, installation, adjustment, lubrication and testing of the mechanical machinery shown on the Contract Drawings and as indicated herein.

1.2 LIMITS OF WORK

- .1 The limits of work included for this section are as indicated on drawings M1 to M3 of the Contract Drawings and as specified herein.

1.3 RELATED SECTIONS

- .1 Section 09 91 13 23 Exterior Painting of Structural Steel for additional information.

1.4 PRICE AND PAYMENT PROCEDURES

- .1 The work related to this specification and drawings M1 to M3 of the Contract Drawings shall be included in the fixed price for Mechanical Repairs and Bridge Balancing in the unit price table.
- .2 The Contractor is not responsible for performing work provided by the Departmental Representative.
 - .1 The Contractor shall coordinate work with the Departmental Representative as specified in Part 3.4 of this specification.
 - .2 The lump sum price shall include ballast plate installation and adjustment performed by the Contractor as directed by the Departmental Representative.
- .3 There will be no measurement for work associated with this section.

1.5 STANDARDS

- .1 All new machinery items must meet the requirements of the CAN/CSA-S6-14 Canadian Highway Bridge Design Code, hereinafter referred to as CHBDC.

- .2 Standards referred to in the Contract Documents are published by the following organizations and are directly applicable to the material and workmanship required by this item. Use the latest available standard unless otherwise noted.
 - .1 ASTM F3125/F3125M – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength – 2019.
 - .2 ASTM A449 – Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use – 2014.
 - .3 ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts - 2015.
 - .4 ASTM A563M – Standard Specification for Carbon and Alloy Steel Nuts (Metric) – 2013.
 - .5 ASTM F436/F436M – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions – 2016.
 - .6 CSA G40.21 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel - 2018.
 - .7 SSPC-SP1 - Standard for Solvent Cleaning - 2016.
 - .8 SSPC-SP3 - Standard for Power Tool Cleaning - 2018.
 - .9 SSPC-SP10 - Standard for Near-White Blast Cleaning - 2007.
 - .10 OPSS.PROV 911 - Construction Specification for Coating Structural Steel Systems, November 2014.

1.6 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

1.7 QUALIFICATIONS

- .1 The mechanical work is to be performed by millwrights. It is not acceptable for the disassembly and reassembly of the machinery to be led by workers of any trade other than the millwright trade.

1.8 ADMINISTRATIVE

- .1 Submit to the Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock ups in Metric units with secondary Imperial units.

- .4 Review submittals prior to submission to the Departmental Representative. This review shall confirm that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .5 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and coordinate existing conditions with the Work.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representative's review.
- .9 Keep one reviewed copy of each submission on site.

1.9 DIMENSIONS/CERTIFIED DRAWINGS

- .1 Dimensions indicated on the Contract Drawings are nominal and intended for information. Many of the dimensions indicated on the Contract Drawings have been obtained from the original existing drawings which are of poor quality. The dimensions have been field verified where possible without any disassembly of the machinery. All dimensions indicated on the Contract Drawings must be verified in the field or machine shop during disassembly of components. Notify the Departmental Representative of any dimensional deviations found during the verification. Make all required measurements before proceeding with shop drawings, final machining, and installation. The Contractor is solely responsible for converting dimensions from Imperial to Metric units, or vice versa, as required.

1.10 SUBMITTALS

- .1 Shop drawings and other required submittals specified herein, shall be submitted in accordance with the requirements of the Contract.

Submit complete drawing packages. Any submittals that do not contain all documents required for the manufacture, assembly, and erection of the machinery system will be returned without review.

1.11 SHOP DRAWINGS AND MATERIAL DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings that have been reviewed for conformance with the Plans and Specifications, stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .3 Draw all shop drawings to scale and provide the scale on the drawings. Ensure that details of a given part are clearly visible at the scale selected for that part with the

exception that enlarged views of small details within a part may be used to improve clarity and prevent excessively large drawings.

- .4 Indicate materials, methods of construction and attachment, connections, schedules for fabrication, shop assembly procedures, diagrams showing sequence and details for erection, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .5 Identify variations between Contract Documents and product or system limitations that may be detrimental to the successful performance of the completed work.
- .6 Submit copies of producer or manufacturer data. This includes specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned.
 - .1 Mill reports and physical tests of all metals
 - .2 Bolts, nuts, washers, cotter pins, and other fasteners
 - .3 Paint
- .7 Allow 14 days for the Departmental Representative's review of each submission.
- .8 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Departmental Representative prior to proceeding with Work.
- .9 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .10 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 A sequential number. Number resubmittals with the original submittal number and an alphabetic suffix.
 - .6 Other pertinent data.
- .11 Submissions include
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.

- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 A complete shop bill of materials for all machinery parts.
- .6 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Performance characteristics.
 - .5 Standards.
 - .6 Instructions for painting the machinery.
 - .7 The surface finish of machined surfaces and tolerances for each dimension for which a specific fit is required. Fit and finish per CHBDC sections 13.7.5 and 13.7.6.
 - .8 Dimension and provide tolerances for all parts to ensure that components of a common purpose that are fabricated from the same detail are interchangeable.
 - .9 Tolerances for all drawing dimensions, either directly or via a standard title block, as necessary to obtain proper fit and function of assembled components.
 - .10 The required tension, method of tightening and all other pertinent information for all machinery connection bolts.
- .7 Complete assembly and erection drawings shall be furnished. These drawings shall be given identifying marks and essential dimensions for locating each part or assembled unit with respect to the bridge or equipment foundation. Every part shall be cross referenced to the sheet on which it is detailed. Contract Plans shall not be submitted as a substitute for assembly or erection drawings.
- .8 Indicate on the shop drawings, for review by the Departmental Representative, the type of tightening, type of wrench and the value of torque or other pertinent information of all connection bolts for all items and machinery.
- .12 After the Departmental Representative's review, distribute copies.
- .13 Submit electronic copies of test reports for requirements requested in the specifications and as requested by the Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .14 Submit electronic copies of certificates for requirements requested in the specifications and as requested by the Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of material attesting that material meets specification requirements.

- .2 Certificates must be dated after award of project contract complete with project name.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by the Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, reviewed electronic documents will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.12 MECHANICAL WORK PROCEDURE

- .1 Prepare a detailed written procedure for the mechanical work. Include sequence of disassembly and installation, bolt tightening methods and required tension values for all fasteners.
- .2 Demonstrate to the Departmental Representative that the Contractor has full knowledge of machinery connections and alignment procedures and understands the required sequence of work and the necessary coordination with the Departmental Representative.
- .3 Disassembly of the machinery cannot begin until the required procedure is submitted and reviewed, field verification of the existing components to be replaced have been submitted and reviewed by the Departmental Representative.
- .4 After installation of any component, Contractor personnel shall witness the first opening of the bridge and be prepared to halt the opening to avoid damage should a conflict be discovered.

Part 2 Products

2.1 GENERAL MATERIALS AND WORKMANSHIP

- .1 All materials shall be new and conform to ASTM standards and other standards listed in these Specifications and on the Contract Plans, unless noted otherwise.
- .2 Supply materials from manufacturers who have manufactured similar materials for similar applications for a period of not less than ten years.

2.2 FASTENERS

- .1 Bolt head and nut bearing surfaces must be flat and square with the axis of the bolt holes; spot face nut bearing surfaces as necessary to produce firm bearing around the entire perimeter of the contact surface.
- .2 Turned bolts are called out by nominal thread diameter and shall meet the requirements of ASTM A449. The bodies of turned bolts shall be 1.6 micrometers (63 microinch) finish or finer, and as defined by CHBDC 13.7.22, unless noted otherwise on the Contract Plans. Turned bolt body diameters shall be 1.6 mm larger than thread diameter. Turned bolt heads shall be standard hex for bolts of the next nominal size

larger than the thread diameter or heavy hex for nominal thread diameter, unless noted otherwise on the Contract Plans. Provide an LC6 fit in accordance with ANSI B4.1 between the reamed hole and the turned bolt.

- .3 Furnish positive type lock nuts and hardened washers for all turned bolts. Double heavy hex nuts conforming to ASTM A563 are required unless indicated otherwise on the Contract Drawings. Submit alternate locking methods to the Departmental Representative for approval. All hardened steel washers shall be in accordance with ASTM F436.
- .4 All bolts and studs shall be coated with anti-seize before assembly of the nuts to prevent corrosion or galling, to provide a uniform friction factor when torquing and to facilitate future removal if necessary.

2.3 PAINT

- .1 All new machinery components or components that have had paint removed as part of this work shall be painted following installation.
- .2 Paint components shall comprise a coating system from a single manufacturer, suitable for application to steel surfaces.
- .3 Paint applied to machinery in the field shall be comprised of the following coating system components known to be compatible with the existing bridge coating system:
 - .1 Primer Coat 1: shall be aluminum flake filled epoxy mastic, applied to a dry film thickness of 5 to 7 mils DFT suitable for application with SSPC-SP3 surface preparation.
 - .2 Intermediate Coat 2: to conform to the requirements of the IZEP system according to MTO designated Sources of Materials DSM # 9.20.39.
 - .3 Topcoat 3: Aliphatic Polyurethane to CAN/CGSB-1.177.
- .4 Colors: Match existing paint colour where painting affected steel work. Colors to be approved by Departmental Representative.
- .5 All materials must be applied in an environment which is in accordance with the manufacturer's recommendations and this specification.
- .6 All primer must have an unlimited recoat time to allow areas to be painted in stages.
- .7 Refer to Section 09 91 13 23 Exterior Painting of Structural Steel for additional information.

Part 3 Execution

3.1 CONSTRUCTION DETAILS

- .1 Supply all apparatus, tools, devices, materials and labour to manufacturer, ship, install, erect, align, adjust, test, and paint the complete machinery as provided in the Contract Documents. Furnish any apparatus, tools, devices, materials and labour incidental to the work, but not specifically stated or included at no additional cost.

3.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new (unless specified otherwise in the contract documents), not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. The Contractor shall remove and replace defective products at their own expense and be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to quality or fitness of products, decision rests strictly with the Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout.

3.3 INSPECTION

- .1 The Departmental Representative reserves the right to inspect all machinery during machine shop work or in the field to augment the Contractor's quality control procedures. Provide the Department Representative with full access to the manufacturer's fabrication facility, testing facilities and the bridge site for such inspections.
- .2 Inspections are based on the requirements of the Specifications and Contract Drawings, referenced codes or standards, and the Contractor's reviewed submittal documents. The Departmental Representative has the authority to stop fabrication or shipment of any material, component, or assembly that does not comply with specified requirements. Replace or repair to the satisfaction of the Departmental Representative any such rejected item. All such replacements or repairs are made at the Contractor's expense.
- .3 The Department Representatives will make inspections of machinery throughout the construction period. Correct defects, deficiencies, or deviations from the Contract Drawings or Specifications discovered during such inspections at no additional cost. Shop or field approval of machinery does not relieve the Contractor from making such repairs as directed by the Departmental Representative if defects are found at a later time.
- .4 If inspection by the Departmental Representative identifies discrepancies between component measurements and the measurements recorded on the Shop Inspection Reports, this may be cause for rejection of the Shop Inspection Reports. If this occurs, that Contractor shall re-measure the components with different personnel and submit for approval.

3.4 COORDINATION AND SEQUENCE

- .1 The following mechanical work items must be performed in sequence as follows:
 - .1 Removal and inspection of the span lock receiver mounting bolts

- .2 Buffer removal (performed by the Contractor) and control system modification (performed by the Departmental Representative)
 - .3 Balance testing (performed by the Departmental Representative) and ballast installation (performed by the Contractor)
 - .4 Live load support shim adjustments
 - .5 Span lock clearance adjustments
 - .6 Painting corroded live load supports and span lock machinery
- .2 The intent is for the following work items to be planned to be completed over a short duration (1-3 days) while Departmental Representatives are on site with the Contractor having given two weeks advance notice for the work:
- .1 Buffer removal (performed by the Contractor) and control system modification (performed by the Departmental Representative).
 - .2 Balance testing (performed by the Departmental Representative) and ballast installation (performed by the Contractor)
 - .3 Live load support shim adjustments
 - .4 Span lock clearance adjustments

3.5 MACHINERY ASSEMBLY AND FUNCTIONAL TESTING

- .1 Machinery assembly shall follow the Mechanical Work Procedure prepared by the Contractor and reviewed by the Departmental Representative. As part of the installation procedure the Contractor shall verify prior to installation that any modifications to the bridge will not result in conflicts between the fixed and movable elements of the structure. After installation of any component, Contractor personnel shall witness the first opening of the bridge and be prepared to halt the opening to avoid damage should a conflict be discovered. The Contractor should not leave the site after working on the movable span without performing a test opening to verify that the leaf is available to be operated.

3.6 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

3.7 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in a manner to prevent damage, adulteration, deterioration and soiling.
- .2 Coat finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, as soon as practical after finishing with a corrosion inhibitor. Remove this coating prior to erection.
- .3 Correct damage that occurs to the machinery components as a result of improper protection during shipment or storage by the Contractor to the satisfaction of the Departmental Representative at no additional cost.

3.8 PAINTING CORRODED LIVE LOAD SUPPORTS AND SPAN LOCK MACHINERY (MK1 AND MK3)

- .1 Clean and paint corroded live load support and span lock machinery components as detailed in the Contract Plans.
- .2 The preparation of surfaces prior to painting shall be in strict accordance with the paint manufacturer's requirements.
- .3 Remove existing loose and rusted paint from exterior metal surfaces.
- .4 Metal surfaces to be repainted in the field:
 - .1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease, existing paint on faying surfaces of new connections and other foreign substances. Clean existing coating within 300mm (12") of the edge of the new coating by power washing using potable water to remove all contaminants. The edges of the existing coating shall be feathered into areas cleaned to bare steel so that at least 4 mm of each coat of the existing coating is exposed.
 - .2 Solvent cleaning to SSPC-SP 1 shall be used to remove grease and oil prior to power tool cleaning to SSPC-SP 3.
 - .3 Scrape edges of old paint back to sound material where remaining paint doesn't show signs of debonding and feather exposed edges.
- .5 Metal surfaces to be painted in the shop:
 - .1 Comply with OPSS.PROV 911.
 - .1 Solvent cleaning to SSPC-SP 1.
 - .2 Near white blast cleaning to SSPC-SP 10
 - .2 Solvent cleaning shall be used to remove grease and oil prior to abrasive blast cleaning.
- .6 Exercise caution to prevent cleaning and painting materials from entering machinery components and coming into contact with sliding surfaces which would be damaged by such intrusion. At a minimum, rope caulk shall be used to seal the edges of journal bearings prior to painting in that vicinity. Exercise extreme care to protect all lubricated and faying surfaces. Do not paint lubricated, sliding and faying surfaces.
- .7 Mask or otherwise protect data and name plates from painting.
- .8 Re-apply grease to opening gears and purge bearings with grease following completion of painting.

3.9 REPLACEMENT OF SOUTH SPAN LOCK RECEIVER MOUNTING BOLTS AND ADJUSTMENTS TO SPAN LOCK RECEIVER CLEARANCES (MK2)

- .1 Remove all four span lock receiver mounting bolts at both span locks. Clean and inspect the bolts and the threads in the mounting plate for damage. Clean the shims and faying surfaces of the receiver and mounting plate.
 - .1 If hole threads are stripped or damaged, ream receiver and tap mounting plate holes for 25.4mm (1") diameter turned bolts.

- .2 Provide four new turned bolts to replace the bolts at the south span lock to be used as mounting screws with sufficient length to ensure full thread engagement through the mounting plate.
- .3 Ensure transverse alignment is maintained from existing. Adjust receiver shims to provide 0.5mm to 1.5 mm (0.020” to 0.059”) vertical clearance between the top of lock bar and bottom of receiver pin with span fully seated and lock bar driven. This work shall be performed after the buffer removal, bridge balancing and live load support shim adjustment work is completed.
- .4 Perform touch up painting of the span lock receiver and the corroded span lock components after the adjustments to the span lock receiver clearances are completed.
- .5 Following the adjustments to the span lock receiver clearances and the painting work, the Contractor shall demonstrate satisfactory operation of the span locks by performing three (3) test openings of the bridge while observing the span locks. Confirm that there is no unusual noise, heat or vibration of the span locks during operation and that after seating the clearance between the lock bar and receiver pin is within acceptable limits.

3.10 LIVE LOAD SUPPORT SHIM ADJUSTMENT (MK3)

- .1 Adjust existing shims at the live load supports as required to fully seat the bridge on the live load supports. Prior inspection indicates anticipated adjustment of 6mm (1/4”) addition to north live load support. The live load support shim adjustment work shall be performed after removal of the buffers and bridge balancing.
- .2 Suggested procedure to determine shim adjustments is below. The Contractor may develop an alternative procedure for review by the Departmental Representative.
 - .1 Complete the buffer removal and bridge balancing work.
 - .2 Operate the bridge through and open and close cycle. During closing, stop the leaf just above the seated position (less than .3m off of the support). Measure the gap at each live load support at the four corners of the support plates.
 - .3 Release the span drive brakes in a controlled manner and allow the leaf to drift closed and settle on the live load supports. Check both live load supports for contact. Measure any gaps at each live load support at the four corners of the support plates using feeler gages.
 - .4 Repeat the bridge operation and measurements three times to confirm they are repeatable.
 - .5 It is anticipated that there will be a larger gap when open/gap when seated at the north live load support based on the prior inspection. Install a temporary shim on top of the north live load support to eliminate this condition.
- .3 Following the temporary shim installation, repeat the bridge operation and measurements as described above to confirm the span will land firmly on both live load supports. Once this is confirmed, open and seat the bridge normally and confirm that both live load supports will remain in contact with vehicular traffic passing over the span. Document the vertical alignment of the roadway joint.

- .4 Once the results of the temporary shim are reviewed by the Departmental Representative, install permanent shims between live load support base weldment and mounting plate and remove the temporary shims.
 - .1 If destructive removal of existing mounting plate fasteners is required, replace in kind with ASTM F3125 Type A325 bolts with ASTM F436 hardened washer and ASTM 563 double heavy hex nuts.
 - .2 Install temporary chocks or similar to ensure alignment of mounting plates are maintained during shim adjustments.
- .5 New permanent shims shall be type 316 stainless steel and shall match the dimensions of the existing shims. Temporary shims may be stainless steel, carbon steel, or brass.
- .6 Perform touch up painting of the live load support mounting plate, shims, and hardware per Section 3.8.
- .7 Following live load support shim adjustments and painting, perform three (3) test openings of the bridge. Verify that no gap is present at the live load supports after seating and that the fully seated limit switch is triggered when the bridge seats under normal operation.

3.11 BUFFER REMOVAL (MK4)

- .1 Remove existing buffers from the span by removing top mounting bolts and U-bolts around the body.
- .2 Clean and paint faying surfaces for these components that are disturbed by the removals.
- .3 The bridge balance and control system must be modified in conjunction with buffer removal. Contractor shall provide two weeks notice to Departmental Representative prior to removing the buffers to coordinate this work.

3.12 BRIDGE BALANCING (MK5)

- .1 Furnish (12) 305mm x 305mm x 25mm (12"x12"x1") galvanized steel ballast plates with mounting holes to match the existing buffer support. Ballast plates shall be grade 300W or approved equivalent.
- .2 Secure ballast plates with four (4) 25.4mm (1") diameter ASTM A307 Grade B galvanized bolts at each location.
- .3 Following buffer removal, the Department will perform strain gage balance testing to confirm the resulting balance condition. The Contractor shall mount the ballast plates to the buffer support at the direction of the Departmental Representative following the strain gage testing. Any steel ballast plates that are not installed shall be turned over to the Department for future use.

END OF SECTION

APPENDIX 1 - COMBINED PRICE FORM

- 1) The prices per unit will govern in establishing the Total Extended Amount. Any arithmetical errors in this Appendix will be corrected by Canada.
- 2) Canada may reject the bid if any of the prices submitted do not reasonably reflect the cost of performing the part of the work to which that price applies.

LUMP SUM

The Lump Sum Amount designates Work to which a Lump Sum Arrangement applies.

- (a) Work included in the Lump Sum Amount represents all work not included in the unit price table.

LUMP SUM AMOUNT (LSA) Excluding applicable tax(es)
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UNIT PRICE TABLE

The Unit Price Table designates Work to which a Unit Price Arrangement applies.

- (a) Work included in each item is as described in the referenced specification section.
- (b) The Price per Unit shall not include any amounts for Work that is not included in that unit price Item.

Item	Specification Reference	Class of Labour, Plant or Material	Unit of Measurement	Estimated Quantity (EQ)	Price per Unit applicable tax(es) extra (PU)	Extended amount (EQ x PU) applicable tax(es) extra
1	05 12 33	Steel deck grating repairs – broken bearing bars (Provisional)	Each	5		
2	05 12 33	Steel deck grating replacement	M2	5.4		
3	05 12 33	Sills missing and loose bolts replacement (Provisional)	Each	20		
4	05 12 33	Stringers copes: Drill holes and install bolts	Each	148		
5	05 12 33	Stringers copes: Cut web and bottom flange to create 35mm radius	Each	140		
6	05 12 33	Floorbeams: Grind paint, inspect end welds, grind cracked welds, reinstate paint	Each	72		
7	05 12 33	Primary Truss Members: Grind perforation, drill hole at end of crack, install 1" A325 bolt (Provisional)	Each	5		
8	05 12 33	Primary Truss Members: Grind tack weld, reinstate coating	Each	10		
9	05 12 33	0N-2N, 0S-2S and 1N-2N: Grind perforation, drill hole at end of crack, install 1" A325 bolt	Each	3		
10	05 12 33	1S-3S Trim top chord channel flange and grind delaminations/cracks	Each	1		
11	05 12 33	1S-3S top chord local reinforcement (Provisional)	Each	1		
12	05 12 33	3S-5S top chord local reinforcement	Each	1		

Item	Specification Reference	Class of Labour, Plant or Material	Unit of Measurement	Estimated Quantity (EQ)	Price per Unit applicable tax(e)s extra (PU)	Extended amount (EQ x PU) applicable tax(e)s extra
13	05 12 33	8S-9S Fatigue crack repair	Each	1		
14	05 12 33	9S-10S Fatigue crack repair	Each	1		
15	05 12 33	13N-16N Impact damage NDT Inspection	Each	1		
16	05 12 33	14S-15S: Grind smooth cracks and perforation in bottom batten plate near 15S	Each	1		
17	05 12 33	14S-16S Fatigue crack repair	Each	1		
18	05 12 33	15S-17S and 15N-17N drainage improvement	Each	2		
19	05 12 33	15S-18S Fatigue crack repair	Each	1		
20	05 12 33	16N Fatigue crack repair	Each	1		
21	05 12 33	16S Fatigue crack repair	Each	1		
22	05 12 33	18S-19S Fatigue crack repair	Each	1		
23	05 12 33	21N-27N Fatigue crack repair	Each	1		
24	05 12 33	21S-27N Bracing bottom angle repair	Each	1		
25	09 91 13.23	Localized Structural Steel Coating Repairs (outside steel repair areas)	M2	20		
26	29 05 00	Mechanical Repairs	LS	1		
27	07 95 13	Deck Joint Armoring Angle Replacement	Each	2		
28	03 01 36	Concrete Approach Slabs Crack Injection	M	40		
29	03 30 00	Concrete Patch Repairs – Partial Depth (includes new rebar)	M2	5		
30	29 05 00	Bridge Balancing	Each	1		
31	05 12 33	New W360x51 stringer (Provisional)	Each	1		
TOTAL EXTENDED AMOUNT (TEA)						
Excluding applicable tax(e)s						

TOTAL BID AMOUNT (LSA +TEA)	
Excluding applicable tax(e)s	

APPENDIX 2 - LISTING OF SUBCONTRACTORS AND SUPPLIERS

The Bidder must submit the list of Subcontractors and Suppliers for any division of the Work as listed in the table below. If “own forces” of the General Contractor are planned to be used to execute certain division(s) of work it must also be indicated in the table below.

	Subcontractor and Suppliers	Division
1		Division 03 - Concrete
2		Division 05 - Metals
3		Division 29 - Mechanical
4		
5		

APPENDIX 3 - QUALIFICATION FORMS

MANDATORY QUALIFICATIONS AND SUBMISSIONS

1. Bidder's Experience – Historical Steel Truss Bridge Structural Steel Rehabilitation Work

Each bidder must provide with their bid certifications that they (or their sub-contractor) have substantially completed a minimum of two (2) historical steel truss bridge structural rehabilitation projects within the last 5 years and with a structural rehabilitation contract value of at least \$250,000 not including taxes. Requirements for the Structural Steel rehabilitation contractor/subcontractor experience are defined in the contract documents under Section 05 12 33, 3.1, Qualifications, bullet point 1.

Bidders must provide a project form for each of the two (2) projects using the forms herein or a facsimile that includes all the information contained therein, identifying their historical steel truss experience. This form must be included as part of the bid submission in "Envelope One – QUALIFICATIONS".

- a. Form No. 1a – Historical Steel Truss Bridge Structural Steel Rehabilitation Work
- b. Form No. 1b – Historical Steel Truss Bridge Structural Steel Rehabilitation Work

2. Include Bid Security in Envelope 1 – Qualifications.

APPENDIX 3 - QUALIFICATIONS FORM

FORM No. 1a

Bidder's Experience – Historical Steel Truss Bridge Structural Steel Rehabilitation Work

(THIS FORM OR A COPY IDENTICAL IN CONTENT and FORMAT,
MUST BE INCLUDED IN ENVELOPE 1 – QUALIFICATIONS)

Bidder's Name: _____

Title of Project: _____

Name and Location of Project: _____

Municipality and Province: _____

Description of Work: _____

Final Completion Date: _____

Final Value of All Work: _____

Contact Name of Project Client: _____

Client Telephone: _____

Client Email Address: _____

This is to certify that we acted as the contractor who completed the project referenced above.

Bidder's Signature

Print Name

Please be advised PSPC reserves the right to contact the person named above to verify the information contained herein.

APPENDIX 3 - QUALIFICATIONS FORM

FORM No. 1b

Bidder's Experience – Historical Steel Truss Bridge Structural Steel Rehabilitation Work

(THIS FORM OR A COPY IDENTICAL IN CONTENT and FORMAT,
MUST BE INCLUDED IN ENVELOPE 1 – QUALIFICATIONS)

Bidder's Name: _____

Title of Project: _____

Name and Location of Project: _____

Municipality and Province: _____

Description of Work: _____

Final Completion Date: _____

Final Value of All Work: _____

Contact Name of Project Client: _____

Client Telephone: _____

Client Email Address: _____

This is to certify that we acted as the contractor who completed the project referenced above.

Bidder's Signature

Print Name

Please be advised PSPC reserves the right to contact the person named above to verify the information contained herein.



Lasalle Causeway – Road Closure Protocol **Unplanned Closures**

Definition: Unplanned closures are bridge closures impacting pedestrians and/or traffic due to a malfunction, an accident, or any other unforeseen event that affects public safety.

Responsibility: PSPC Bridge Operator on duty

Step 1: Safely assess situation within 24 hours

Step 2: Call 911, in case of an accident with injuries and/or when public safety is compromised

Step 3: In case of malfunction, use available resources to troubleshoot and resolve issues on site.

Step 4: If closure is expected to exceed 15 minutes call Kingston 24 h Communications Dispatch at 613-548-4001 x5156.

Step 5: Call NCSS

Step 6: Repeat Steps 4 and 5 when an update on the expected closure duration is available, or when bridge has reopened.



Lasalle Causeway – Road Closure Protocol **Short Term, Lower-Impact Closures**

Definition: Short term is less than 5 days.

Lower impact are closures during the following periods:

Single lane closures (alternating traffic):

00:00 to 06:00, 09:30 to 15:00 and 18:00 to 24:00 on Monday to Friday

00:00 to 24:00 on weekends

Full closures (bridge closed to traffic but not pedestrians):

00:00 to 06:00, 7 days a week

Closures during other periods are considered high-impact closures

Responsibility: PSPC Project Manager or Project Engineer

In the calendar week prior to the closure:

Step 1: Obtain or prepare closure details and Traffic Management Plan

Step 2: For full closures investigate conflicts with MTO and Parks Canada

Step 3: Prepare and submit closure communication to COMS

Text of the closure communication to include:

- Brief description of the work
- Closure details (hours, type, pedestrians)
- Indicate if closure is tentative
- Advise public to follow Kingston web site and/or social media

By Thursday 15:00 the week prior to the closure:

Step 4: Notify and submit closure communication to Kingston by e-mail:

Mark Dickson:	mdickson@cityofkingston.ca
Craig Hollingsworth:	chollingsworth@cityofkingston.ca
Deanna Green:	dgreen@cityofkingston.ca

Step 5: For full closures arrange for PVMS 48 hours in advance of the closure. Two (2) required, one at each end of the crossing.

During the closure:

Step 6: Provide confirmation to City of Kingston by 15:00 whether closure is continued the following night/day. If notice is not given bridge will have to remain open the upcoming night/day.



Lasalle Causeway – Road Closure Protocol **Long Term OR Short Term High-Impact Closures**

Definition: Long term is 5 days or more.

High Impact are closures during peak periods or closure preventing the passage of pedestrians.

Responsibility: PSPC Project Manager or Project Engineer

At least 21 days prior to the closure:

Step 1: Obtain or prepare proposed closure details and Traffic Management Plan (TMP)

Step 2: Circulate closure details and TMP to Kingston by e-mail and obtain comments:

Mark Dickson: mdickson@cityofkingston.ca
Craig Hollingsworth: chollingsworth@cityofkingston.ca
Deanna Green: dgreen@cityofkingston.ca

Step 3: Obtain comments from MTO and Parks Canada

Step 4: Review comments and revise closure details and TMP as required.

Step 5: Prepare and submit closure communication to COMS

Text of the closure communication to include:

- Brief description of the work
- Closure details (hours, type, pedestrians)
- Indicate if closure is tentative
- Advise public to follow Kingston web site and/or social media

At least 8 days or the Thursday a full week prior to the closure, by 15:00, whichever is earlier:

Step 6: Notify and submit closure communication to Kingston by e-mail:

Mark Dickson: mdickson@cityofkingston.ca
Craig Hollingsworth: chollingsworth@cityofkingston.ca
Deanna Green: dgreen@cityofkingston.ca

Step 7: For full closures arrange for PVMS 48 hours in advance of the closure. Three (3) will be required, one at each end of the crossing and one on CR 15 at the Highway 401 exit.

During the closure:

Step 8: Provide confirmation to City of Kingston whether there are any changes by 15:00, including cancelled closures, reduced schedules, etc.



Lasalle Causeway – Road Closure Protocol

PSPC Contacts:

Robert Pratt, Chief Engineer: robert.pratt@pwgsc-tpsgc.gc.ca

Ranya El Sadawy, Senior Bridge Engineer: ranya.elsadawy@pwgsc-tpsgc.gc.ca

Effective: 05-11-2019

Per: PSPC Bridges and Transportation Structures
& Reviewed by: City of Kingston

APPENDIX 5 - STRAIN GAUGES LOCATIONS FOR PAINT TOUCH-UPS

La Salle Causeway Bridge Rehabilitation

Gauges for dynamic measurements

Total:

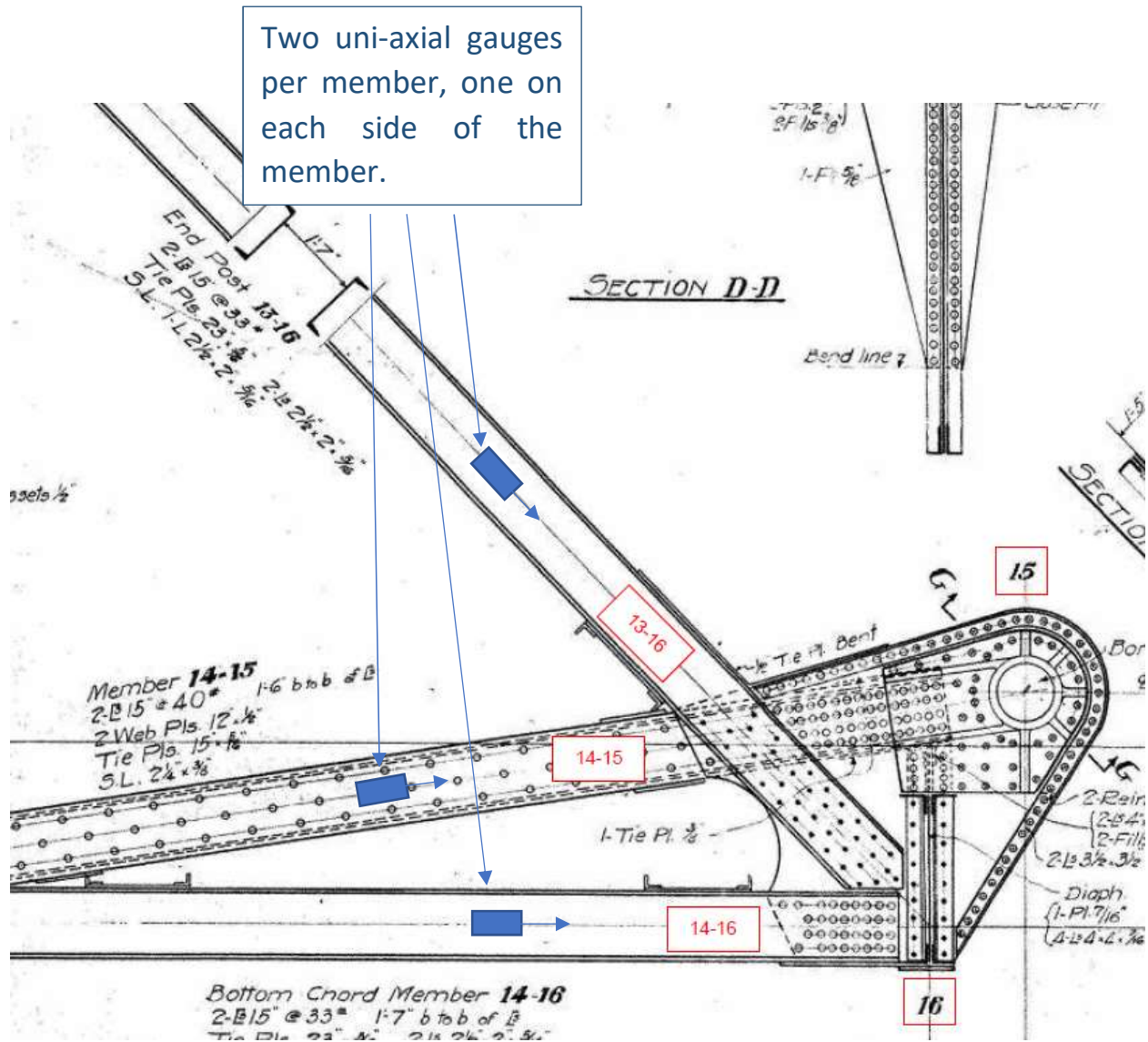
24 uni-axial gauges (12 North side, 12 South side)

13 tri-axial gauges (6 North side, 7 South side)

■ uni-axial gauges
(axis oriented in the direction of the frame)

▲ tri-axial gauges

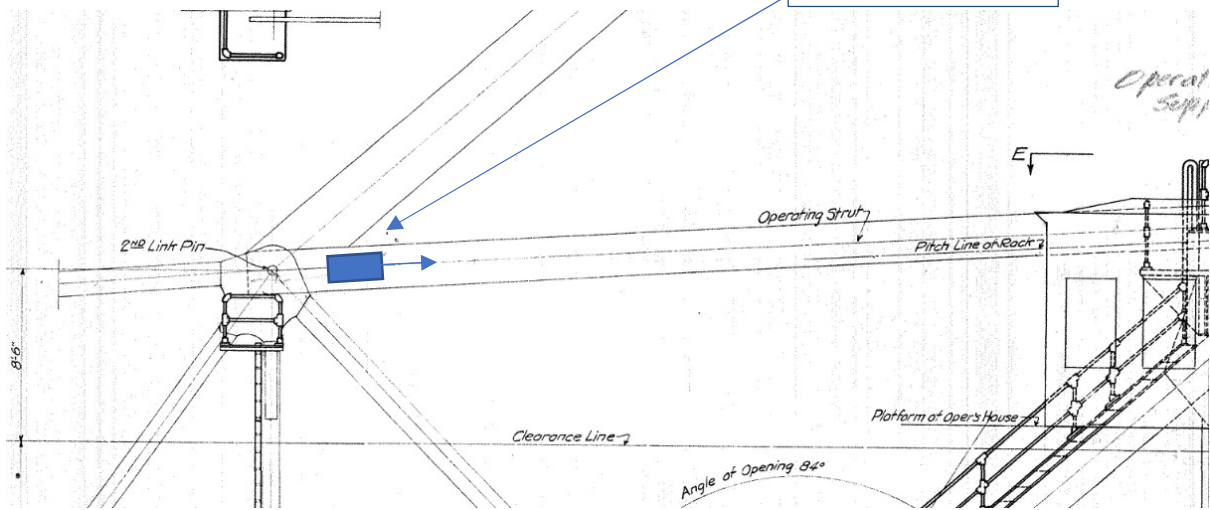
Members



Members

Operation strut

Two uni-axial gauges per member, one on each side of the member



Trunnions

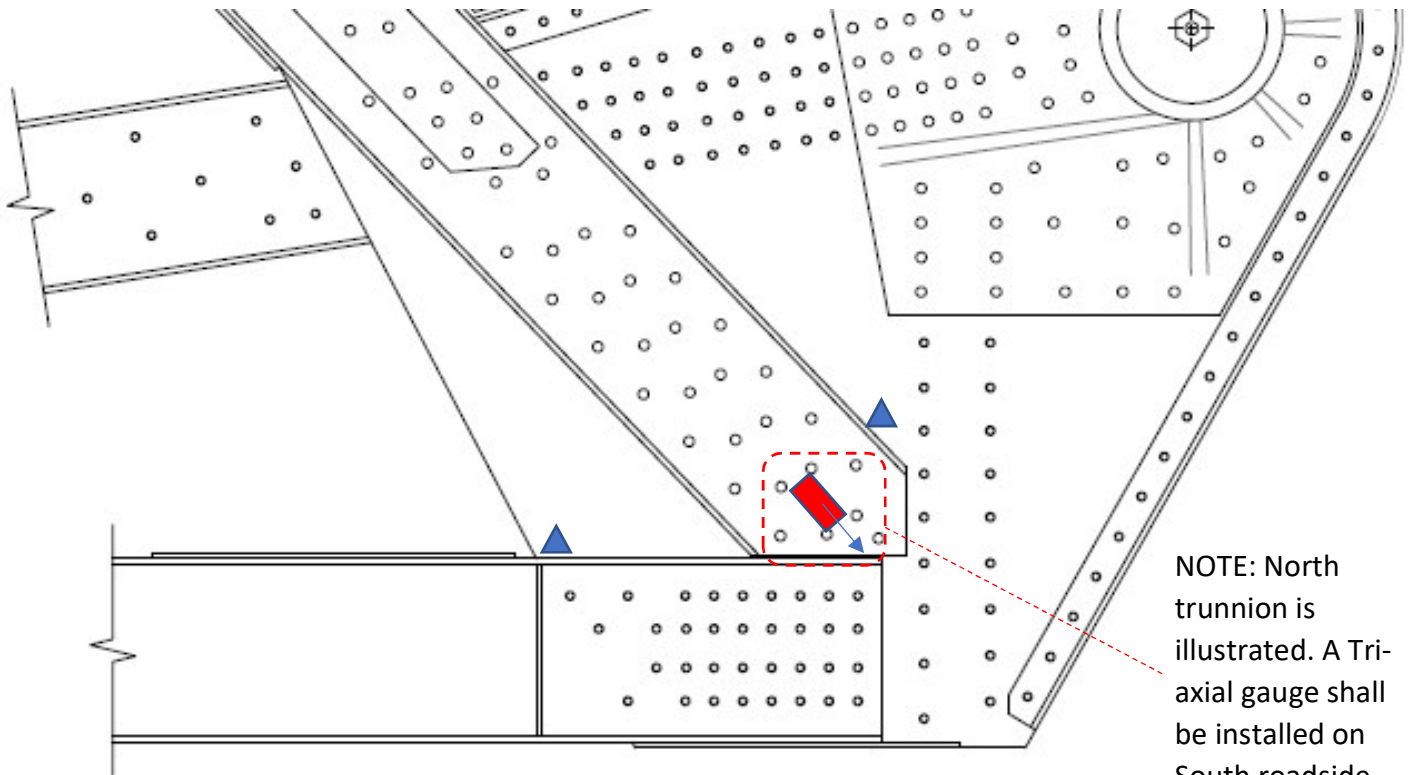
Plane view



Nine (9) tri-axial gauges and One (1) uni-axial gauge. The gauges in red must be installed from the inside of the trunnion assembly.

Each box (above) is a trunnion which is composed of 2 gusset plates (and other minor plates). On each trunnion there is an exterior gusset plate and an interior gusset plate. All gusset plates shall receive 2 tri-axial gauges (blue), installed on the outside face of the trunnion (box). The red gauges (one tri-axial and one uni-axial) shall be installed on the interior face of the two interior gusset plates.

Side view



NOTE: North trunnion is illustrated. A Tri-axial gauge shall be installed on South roadside trunnion at this location.