

Parcs Canada Parks Canada

# BENNETT BROOK CULVERT REPAIRS

## FUNDY NATIONAL PARK, NEW BRUNSWICK

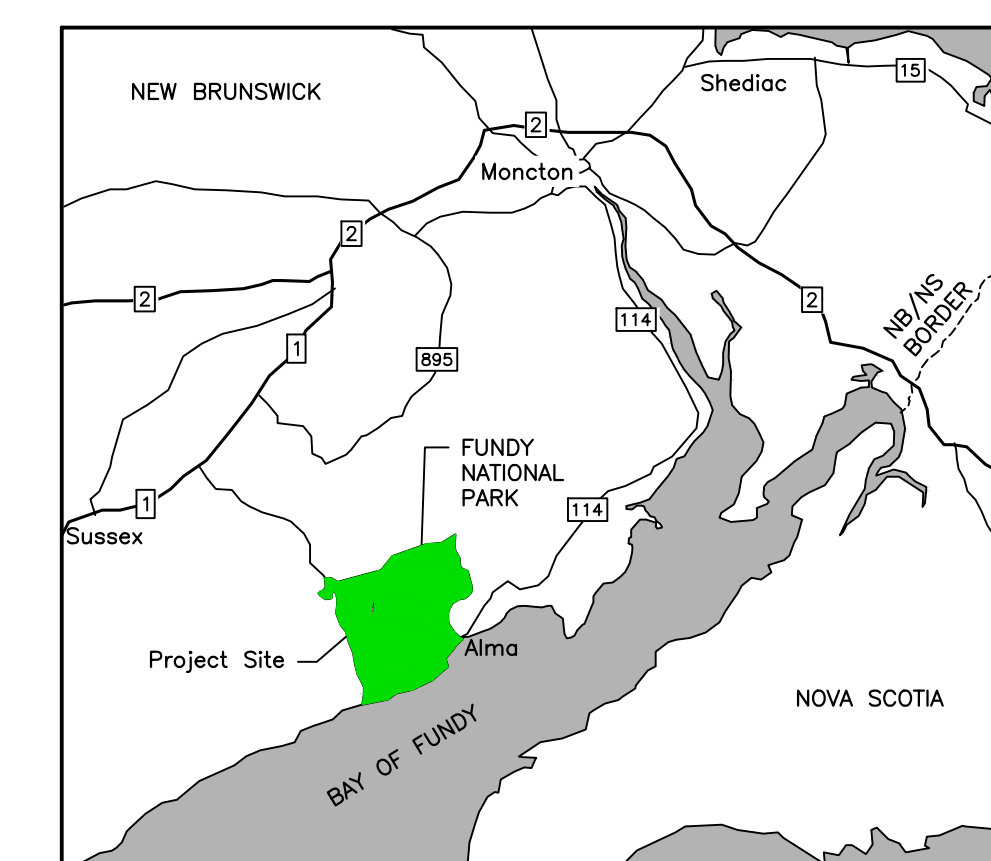
### PROJECT NO. 1765



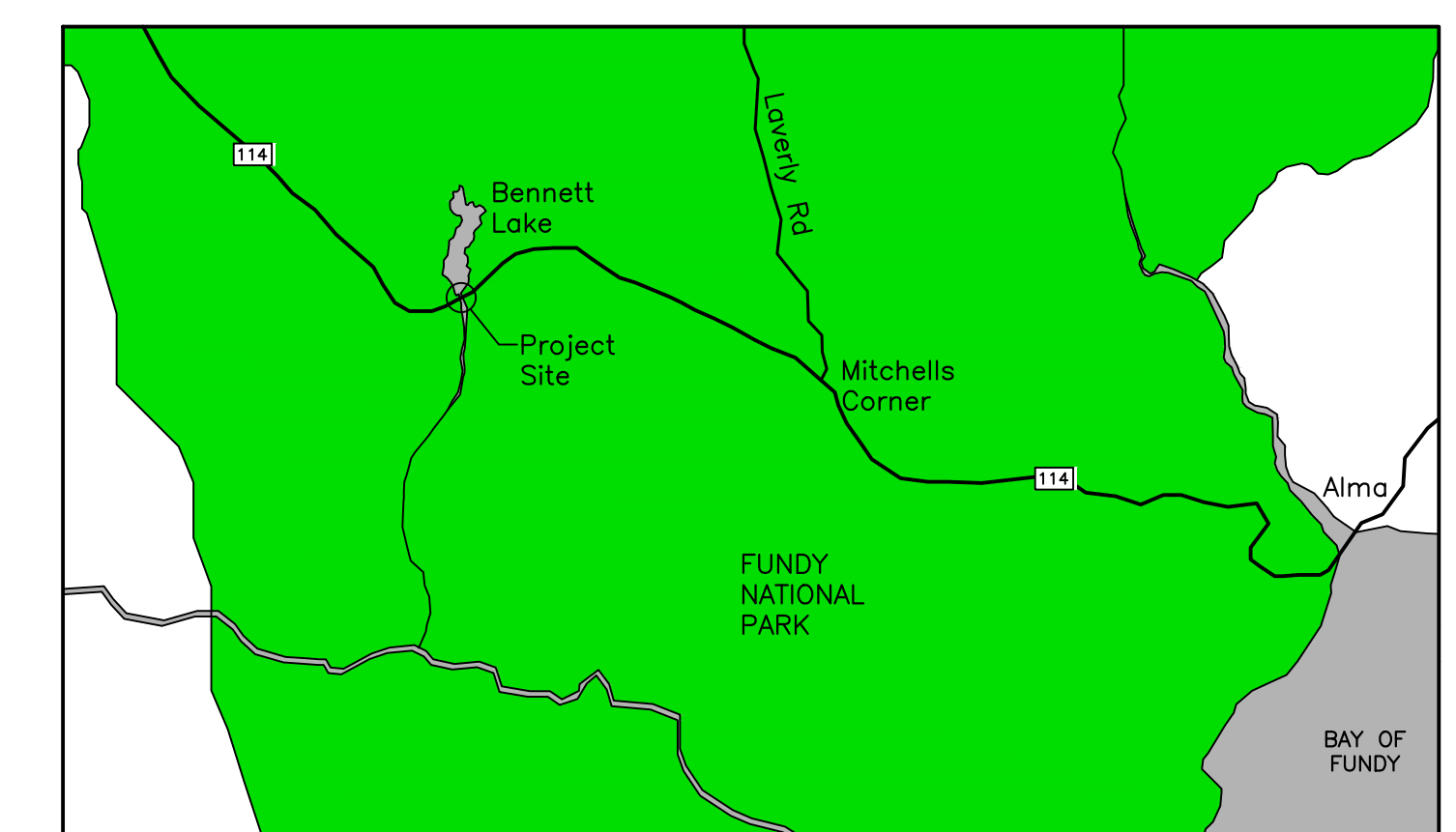
WSP Canada Inc.  
195 MacEwen Road  
Summerside, Prince Edward Island, Canada C1N 5Y4  
T 902-436-2669 F 902-436-8601 www.wsp.com

### DRAWING LIST

DRAWING NO.	TITLE
S1	EXISTING CONDITIONS OVERALL SITE PLAN
S2	EXISTING CONDITIONS CULVERT STRUCTURE PLAN AND PROFILE
S3	EXISTING CONDITIONS CULVERT STRUCTURE ELEVATIONS
S4	STRUCTURE REPAIR LAYOUT PLAN AND PROFILE
S5	STRUCTURE REPAIR ELEVATIONS AND SECTIONS
S6	TYPICAL STRUCTURE REPAIR DETAILS
S7	DOWNSTREAM RIFFLE REPAIR DETAILS



KEY PLAN  
NOT TO SCALE



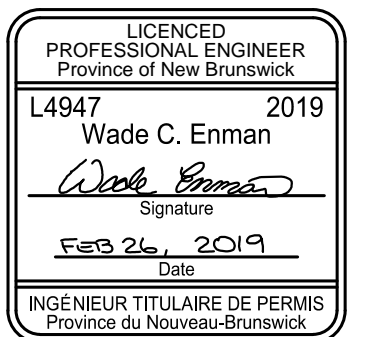
SITE PLAN  
NOT TO SCALE



PLAN NORTH



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 135 MacEwen Road  
 Summerside, Prince Edward Island, Canada C1N 5Y4  
 T 902-436-2669 F 902-436-8601 www.wsp.com



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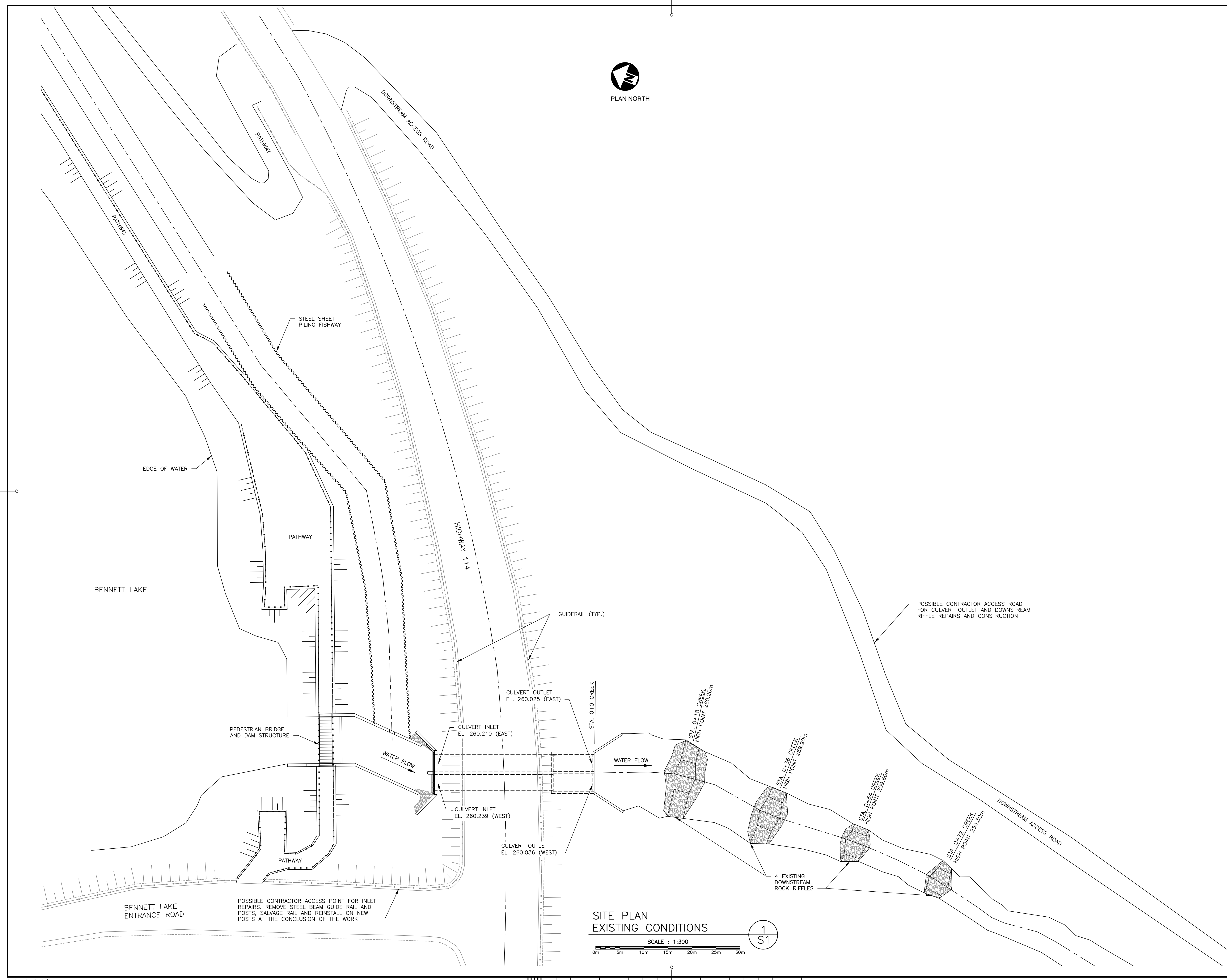
project **BENNETT BROOK CULVERT REPAIRS FUNDY NATIONAL PARK NEW BRUNSWICK** projet

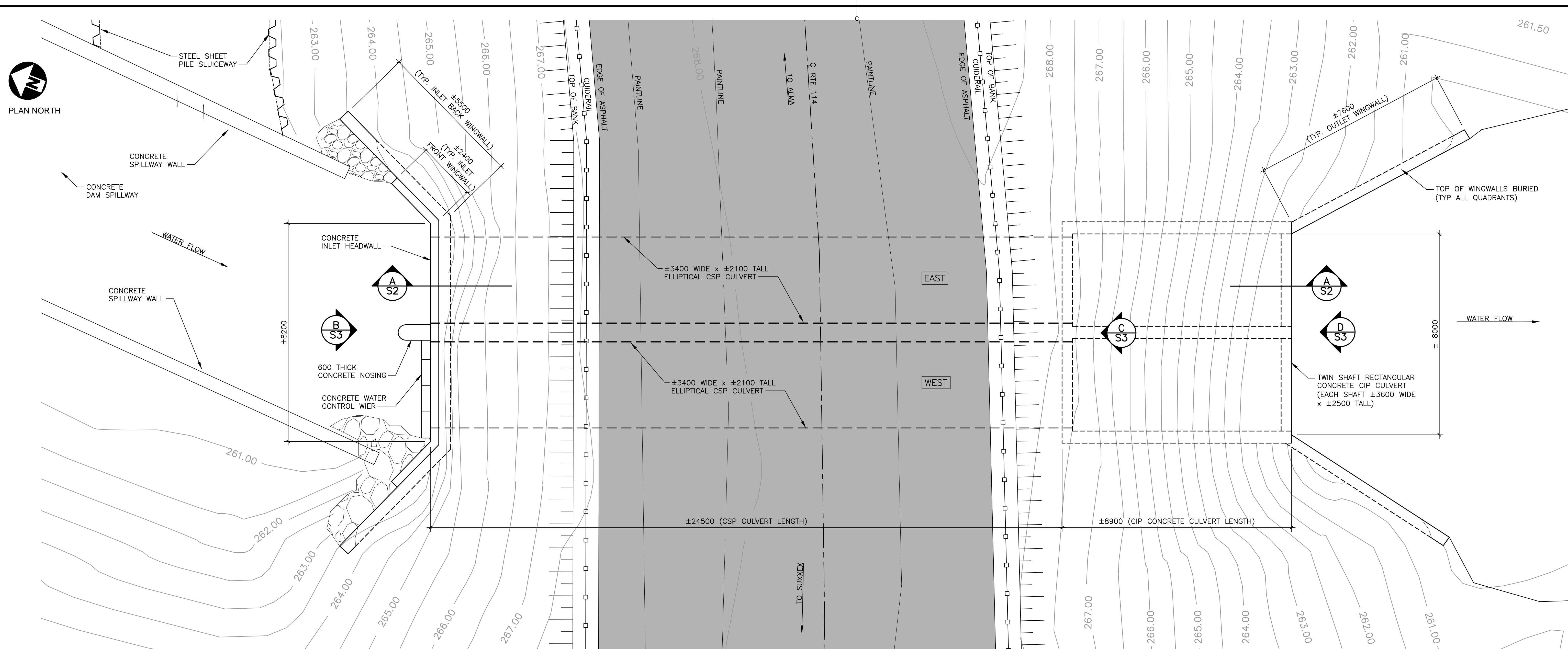
drawing **SITE PLAN EXISTING CONDITIONS** dessin

designed **W. ENMAN** conçu  
 date **2018/02/23**  
 drawn **D. BEAMAN** dessiné  
 date **2018/02/23**  
 approved **W. ENMAN** approuvé

Project Manager **Administrateur de projets**  
 project number **1765** no. du projet

drawing no. **S1** no. du dessin

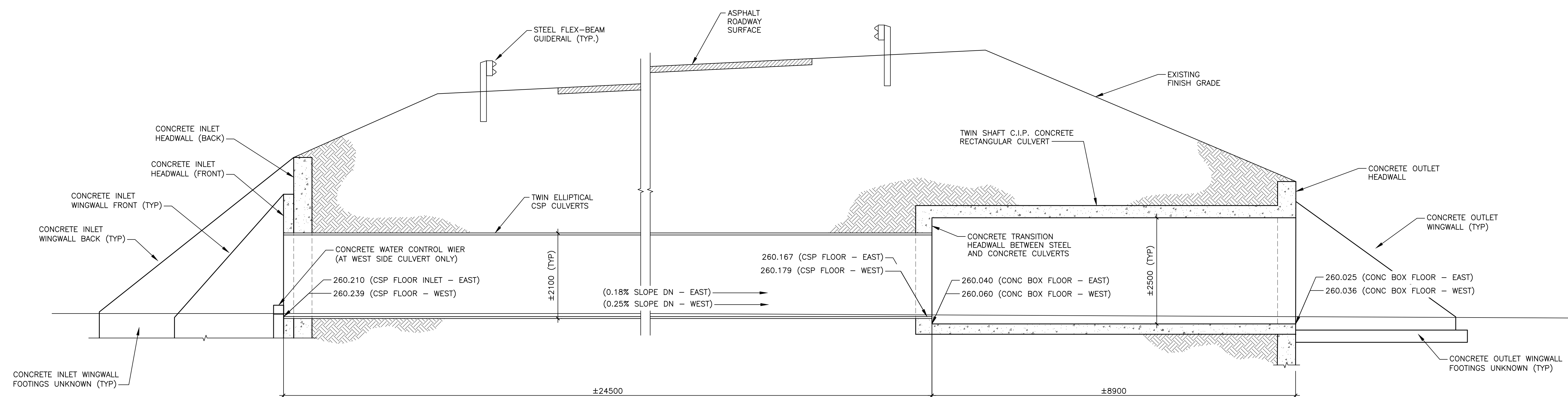
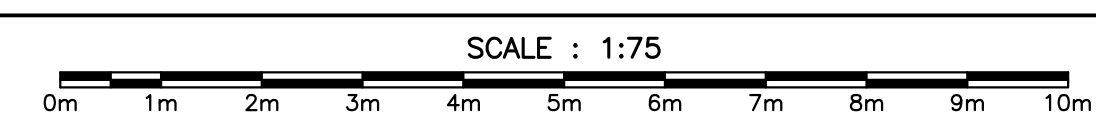




SITE ACCESS NOTE:  
SEE SITE PLAN ON DRAWING S1  
FOR SITE ACCESS INFORMATION

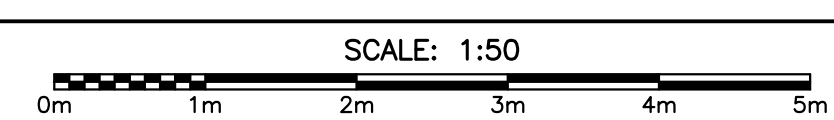
EXISTING CULVERT PLAN

1  
S2



LONGITUDINAL SECTION - LOOKING EAST

A  
S2



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revisions		date

project  
**BENNETT BROOK  
CULVERT REPAIRS  
FUNDY NATIONAL PARK  
NEW BRUNSWICK**  
project

drawing  
**EXISTING CONDITION  
CULVERT STRUCTURE  
PLAN AND PROFILE**  
dessin

designed W. ENMAN conçu  
date 2018/02/23  
drawn D. BEAMAN dessiné  
date 2018/02/23  
approved W. ENMAN approuvé  
date

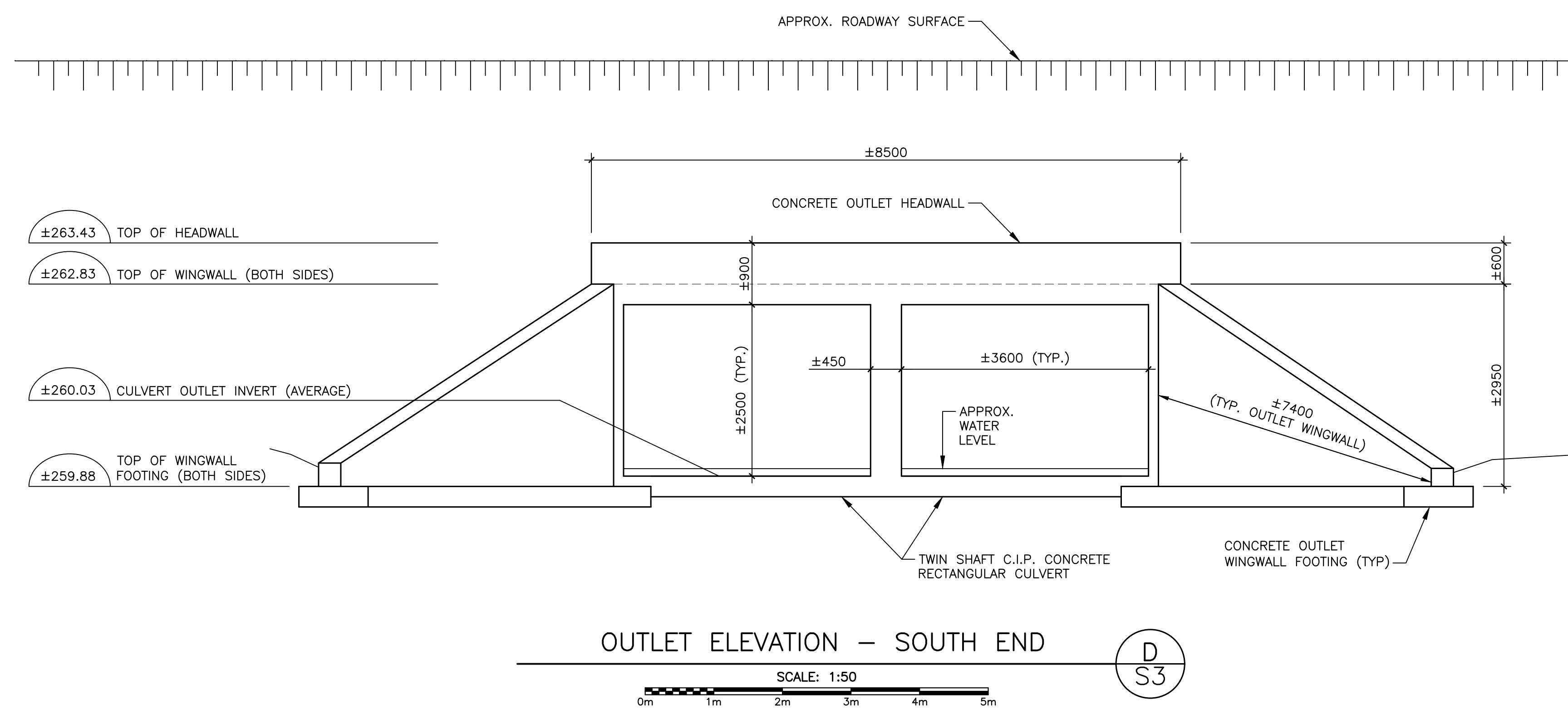
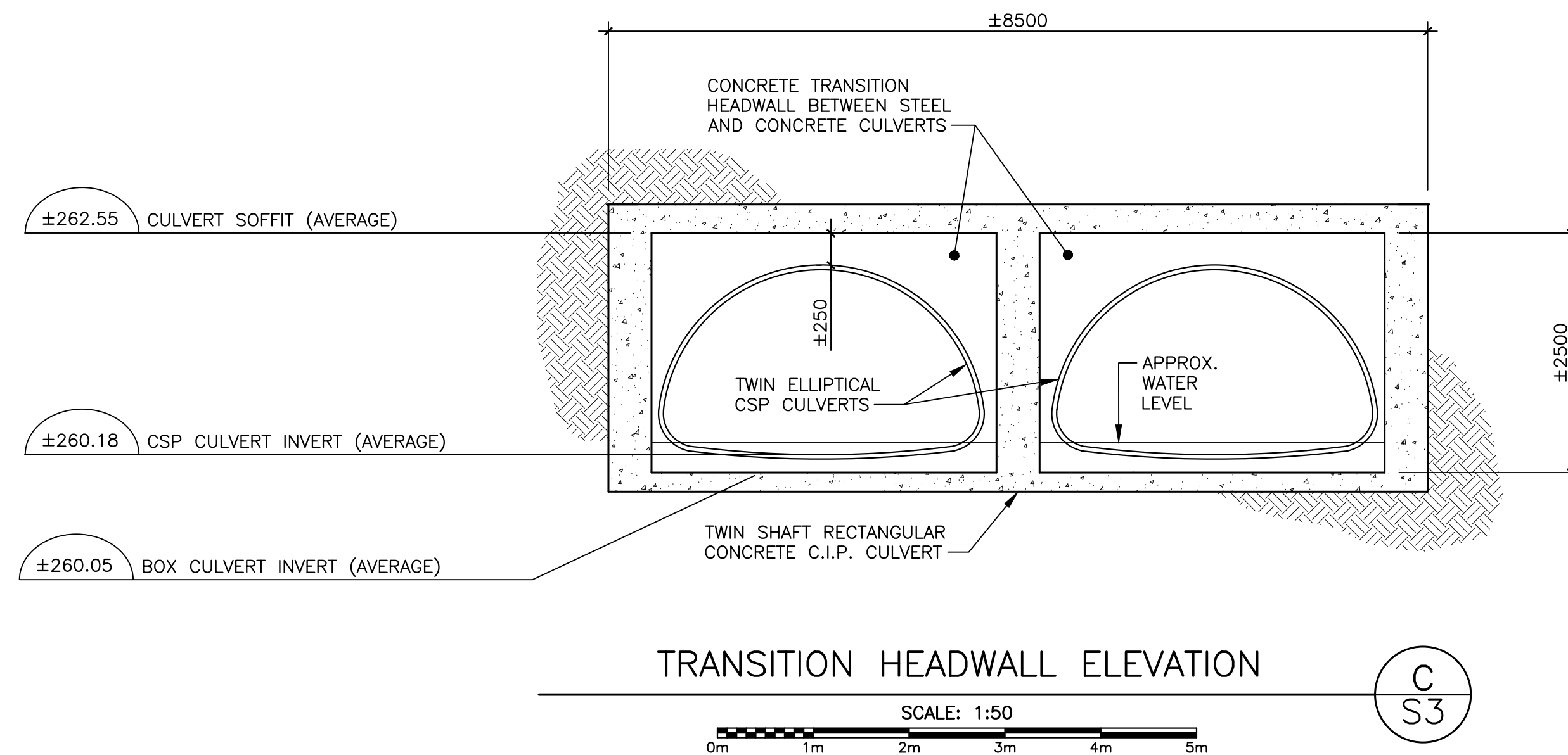
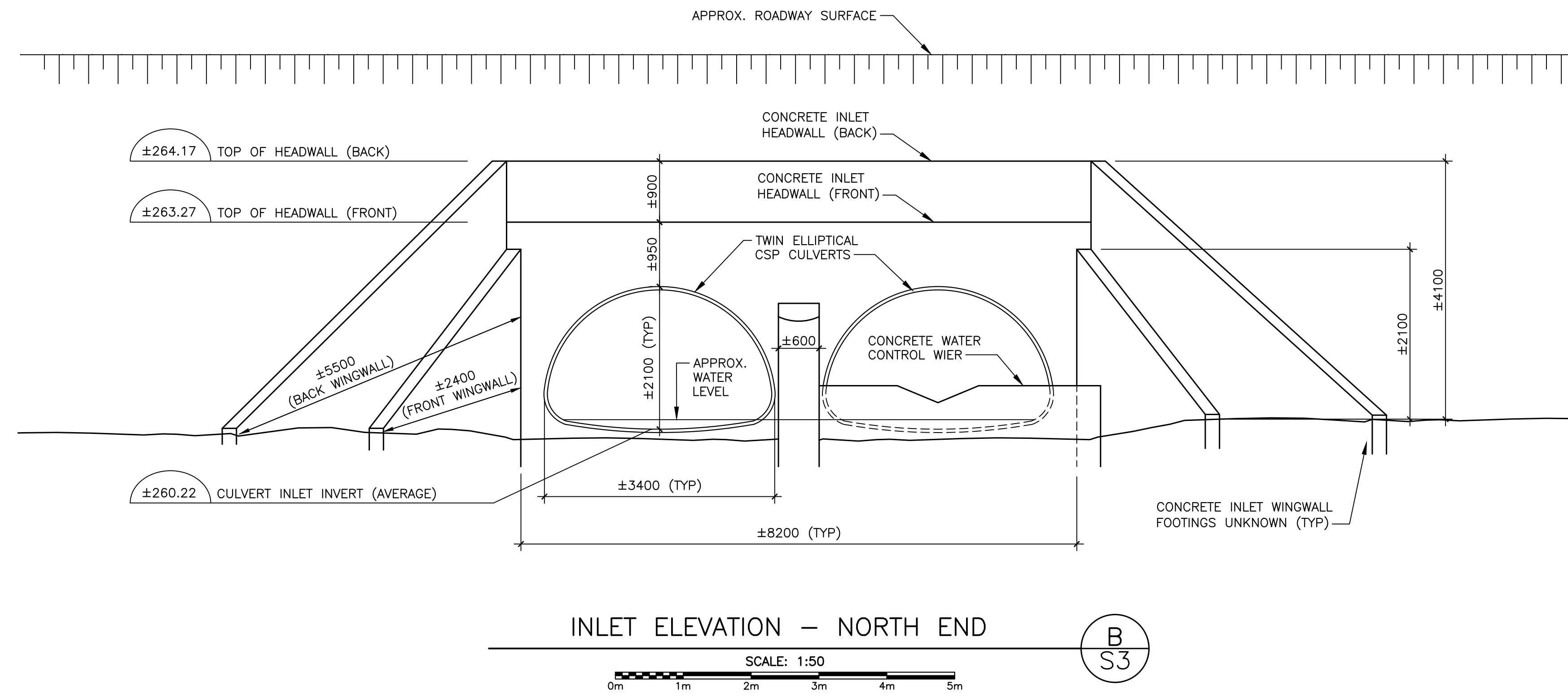
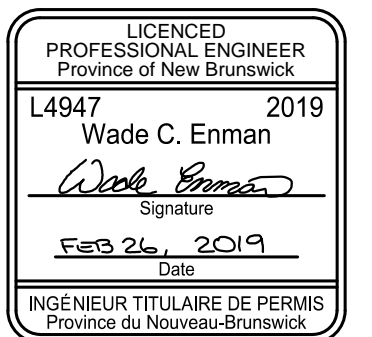
Tender  
Project Manager Administrateur de projets  
project number no. du projet

1765

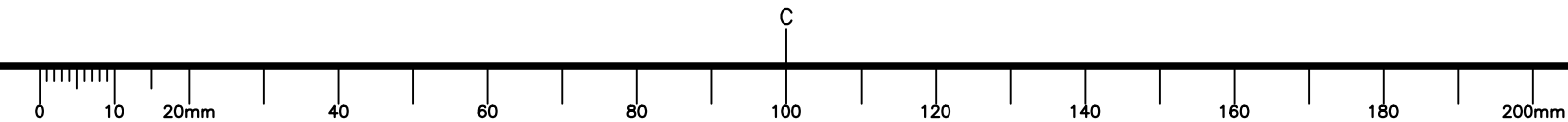
drawing no. no. du dessin  
**S2**



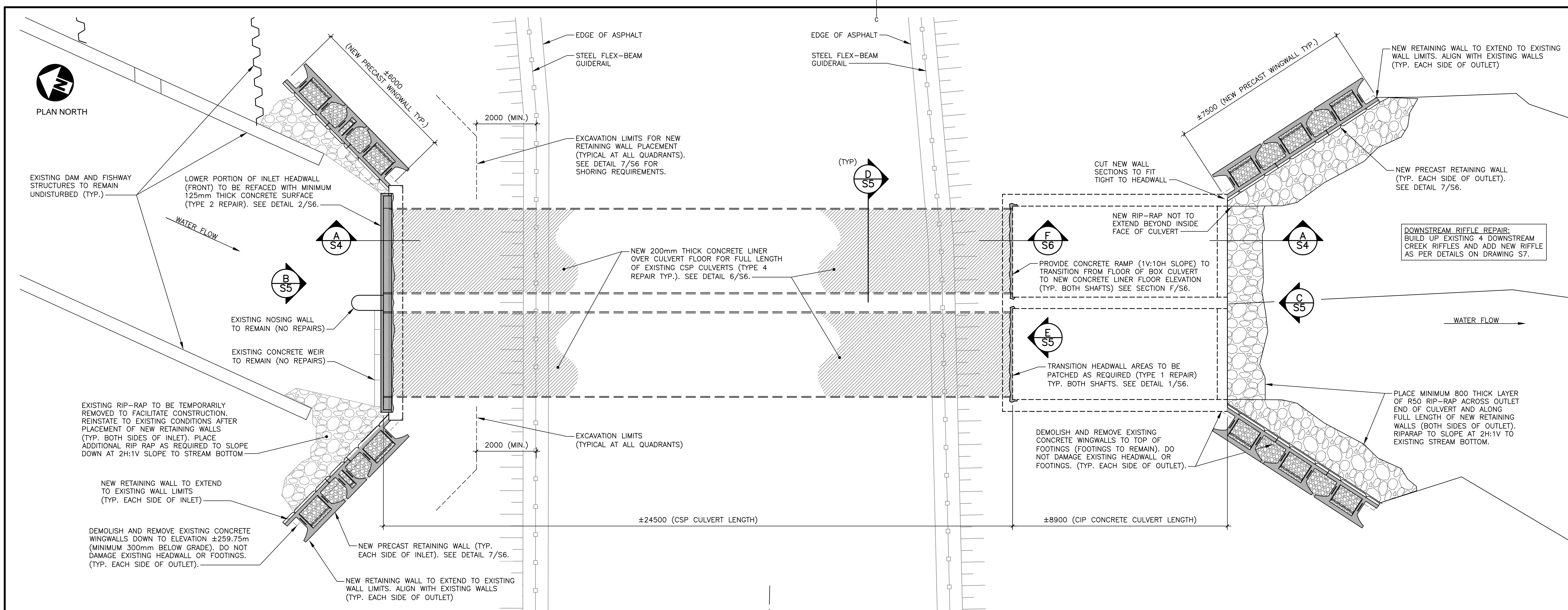
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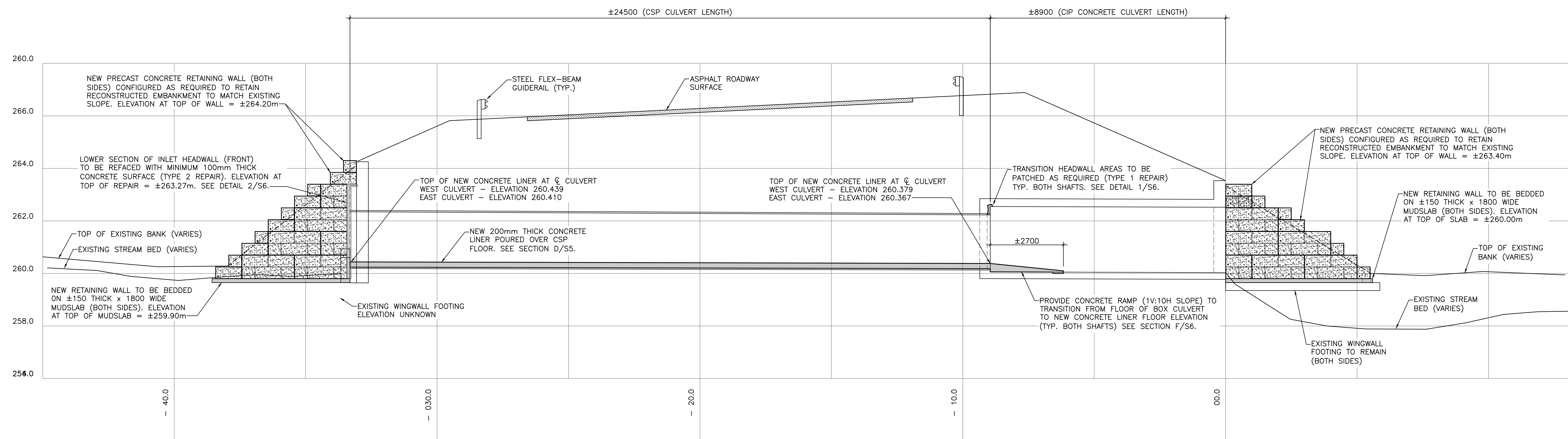
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revisions		date
project	BENNETT BROOK CULVERT REPAIRS FUNDY NATIONAL PARK NEW BRUNSWICK	
drawing	EXISTING CONDITIONS CULVERT STRUCTURE SECTION AND ELEVATION	
designed	W. ENMAN	conçu
date	2018/02/23	
drawn	D. BEAMAN	dessiné
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approved	W. ENMAN	approuvé
date		
Tender	Soumission	
Project Manager	Administrateur de projets	
project number	1765	no. du projet
drawing no.	S3	no. du dessin







**CULVERT REPAIR PLAN**  
SCALE : 1:75  
1 S4



**CULVERT REPAIR LONGITUDINAL SECTION - LOOKING EAST**  
SCALE : 1:200  
A S4

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project  
**BENNETT BROOK  
CULVERT REPAIRS  
FUNDY NATIONAL PARK  
NEW BRUNSWICK**

**STRUCTURE REPAIR  
LAYOUT PLAN  
AND PROFILE**

designed	W. ENMAN	conçu
date	2018/02/23	
drawn	D. BEAMAN	dessiné
date	2018/02/23	
approved	W. ENMAN	approuvé
date		
Tender		Soumission
Project Manager	Administrateur de projets	
project number		no. du projet
	<b>1765</b>	
drawing no.		no. du dessin
	<b>S4</b>	

**GENERAL NOTES:**

1. ALL DIMENSIONS SHOWN IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. ALL SPECIFICATION NOTES TO REFLECT THE "LATEST EDITION" AT TIME OF TENDER.
3. ALL STANDARDS TO REFLECT "LATEST EDITION".
4. CONSTRUCTION SHALL BE CARRIED OUT AS PER CAN/CSA-S6-14.
5. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING DIMENSIONS AND ELEVATIONS. ANY DISCREPANCIES BETWEEN DRAWINGS AND THE FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE DEPARTMENTAL REPRESENTATIVE PRIOR TO PROCEEDING WITH CONSTRUCTION.
6. CONTRACTOR SHALL DESIGN, INSTALL AND MAINTAIN TEMPORARY BRACING, SHORING AND FORMWORK OF ALL STRUCTURAL ELEMENTS FOR STABILITY AND SAFETY WHERE REQUIRED DURING CONSTRUCTION.
7. THE CONTRACTOR IS NOTIFIED THAT ALL IN-STREAM WORK IS TO BE CONDUCTED BETWEEN JUNE 1 - SEPTEMBER 30.
8. CULVERT LINER, HEADWALL REPAIRS AND RETAINING WALLS ARE TO BE COMPLETED IN THE DRY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY DEWATERING AND WATER DIVERSION PROCEDURES. A FISH SALVAGE UNDER THE DIRECTION OF THE DEPARTMENTAL REPRESENTATIVE WILL BE REQUIRED BEFORE DEWATERING AND WATER DIVERSION PROCEDURES ARE CARRIED OUT. ESTABLISHMENT AND MAINTENANCE OF A DOWNSTREAM FLOW IS REQUIRED AT ALL TIMES WHILE DEWATERING AND WATER DIVERSION CONTROLS ARE IN PLACE.
9. CONTRACTOR IS TO ENSURE THAT ALL WORK IS CARRIED OUT IN ACCORDANCE WITH NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.

**REMOVAL NOTES:**

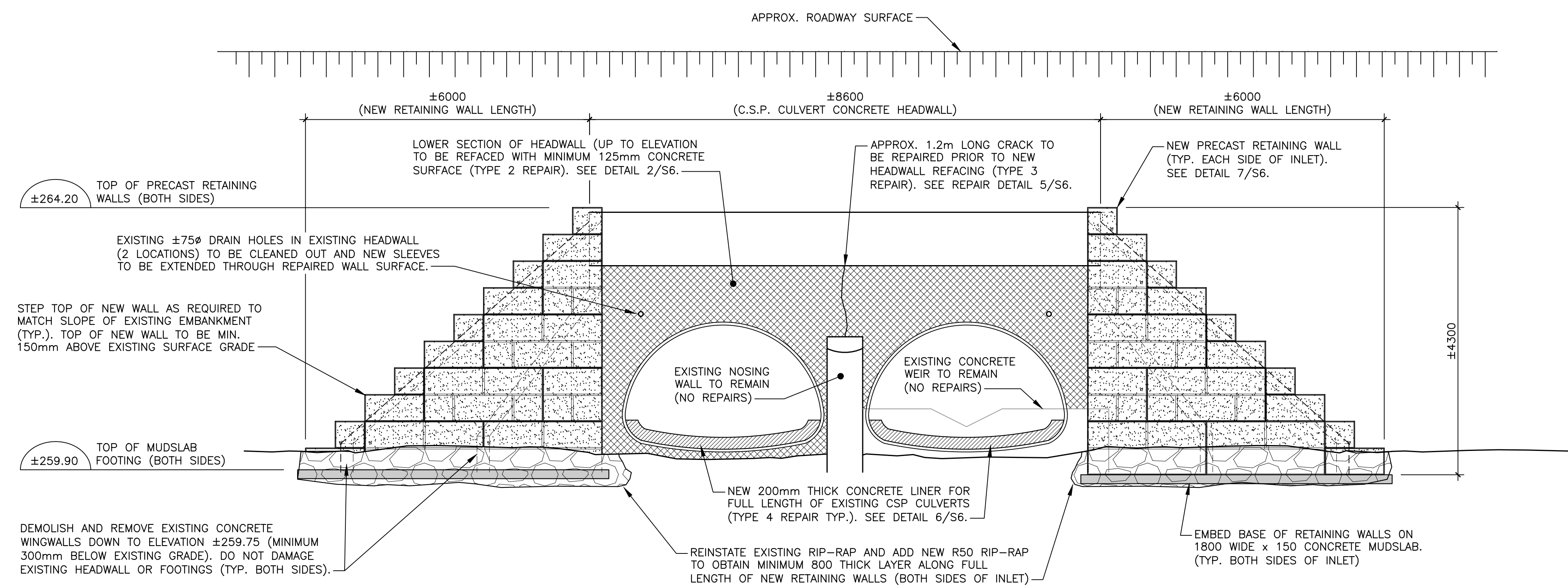
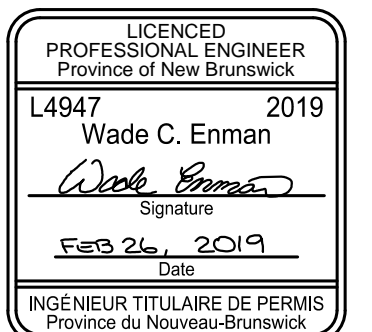
1. SEE ALL DRAWINGS FOR ADDITIONAL NOTES AND DETAILS.
2. ALL AREAS DISTURBED DURING CONSTRUCTION (I.E. ASPHALT, CONCRETE, GRASS, ETC.) ARE TO BE REINSTATED TO THE ORIGINAL CONDITION TO THE APPROVAL OF THE DEPARTMENTAL REPRESENTATIVE.
3. ALL GRASSED AREAS DISTURBED DURING CONSTRUCTION ARE TO BE BACKFILLED AND GRADED TO 100mm FROM FINISH GRADE. FOLLOW ALL LANDSCAPING REQUIREMENTS AS PER SPECIFICATIONS AND NOTES ON DRAWING S7. PLACE 100mm TOPSOIL AND HYDROSEED AS PER SPECIFICATIONS.
4. CONTRACTOR MUST PROTECT ALL EXISTING LANDSCAPING FEATURES SUCH AS FENCES, RETAINING WALLS, TREES, SHRUBS, ETC. MARK ALL TREES AND SHRUBS WHICH ARE REQUIRED TO BE REMOVED AND/OR SALVAGED, AND NOTIFY DEPARTMENTAL REPRESENTATIVE FOR REVIEW PRIOR TO ANY CUTTING.
5. PRIOR TO COMMENCING ANY DEMOLITION AND/OR CONSTRUCTION ACTIVITIES, THE CONTRACTOR IS TO ESTABLISH ALL ENVIRONMENTAL CONTROL MEASURES AS PER SPECIFICATIONS. ALL REQUIRED CONTROLS ARE TO BE MAINTAINED FOR DURATION OF CONSTRUCTION.
6. CONTRACTOR IS ADVISED THAT GALVANIZED STEEL FLEX-BEAM GUIDERAIL SYSTEMS ARE PRESENT ALONG BOTH SIDES OF ROADWAY. PORTIONS OF GUIDERAIL SYSTEM WITHIN THE EXCAVATION AREA OR TO PROVIDE ACCESS ARE TO BE CAREFULLY DISMANTLED, REMOVED AND STORED PRIOR TO ANY EXCAVATION IN THE AREA. UPON COMPLETION OF WORK, THE CONTRACTOR IS TO RE-INSTALL REMOVED PORTION OF GUIDERAIL SYSTEM TO MATCH EXISTING LAYOUT. ANY DAMAGE TO EXISTING GUIDERAIL COMPONENTS SHALL BE REPAIRED OR REPLACED AT THE CONTRACTORS EXPENSE TO THE SATISFACTION OF THE DEPARTMENTAL REPRESENTATIVE. NO EXTRA COST WILL BE ALLOWED.

**PRECAST AND CAST-IN-PLACE CONCRETE NOTES**

1. ALL CAST-IN-PLACE CONCRETE SHALL CONFORM TO CSA STANDARD A23.1, AND TEST METHODS FOR CONCRETE TO CSA STANDARD A23.2.
2. ALL EXPOSED CORNERS OF CONCRETE TO HAVE 25mm CHAMFERS.
3. LOCATION OF ANY CONSTRUCTION JOINTS AND SEQUENCE OF CONCRETE PLACEMENT TO BE APPROVED BY THE DEPARTMENTAL REPRESENTATIVE.
4. CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS:  
PRECAST MSE WALLS, CAST-IN-PLACE CULVERT LINERS, AND HEADWALL REPAIR; 45 MPa WITH 20mm MAX. AGGREGATE SIZE AND 6% ± 1% AIR ENTRAINMENT, MAX. WATER-CEMENT RATIO 0.35. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
5. CONCRETE COVER TO REINFORCEMENT AS NOTED ON DRAWINGS.
6. REINFORCING STEEL TO BE GALVANIZED WITH YIELD STRENGTH OF 400 MPa (WELDABLE).
7. BENT REINFORCING BAR TYPES IN SCHEDULE REFER TO R.S.I.C. "STEEL MANUAL OF STANDARD PRACTICE" TYPICAL BAR BENDS.
8. ALL REINFORCEMENT TO BE INSPECTED BY THE DEPARTMENTAL REPRESENTATIVE PRIOR TO CLOSING FORMWORK OR PLACING CONCRETE.
9. EACH PHASE OF WORK TO BE INSPECTED BY THE DEPARTMENTAL REPRESENTATIVE PRIOR TO PROCEEDING TO THE NEXT PHASE OF WORK.

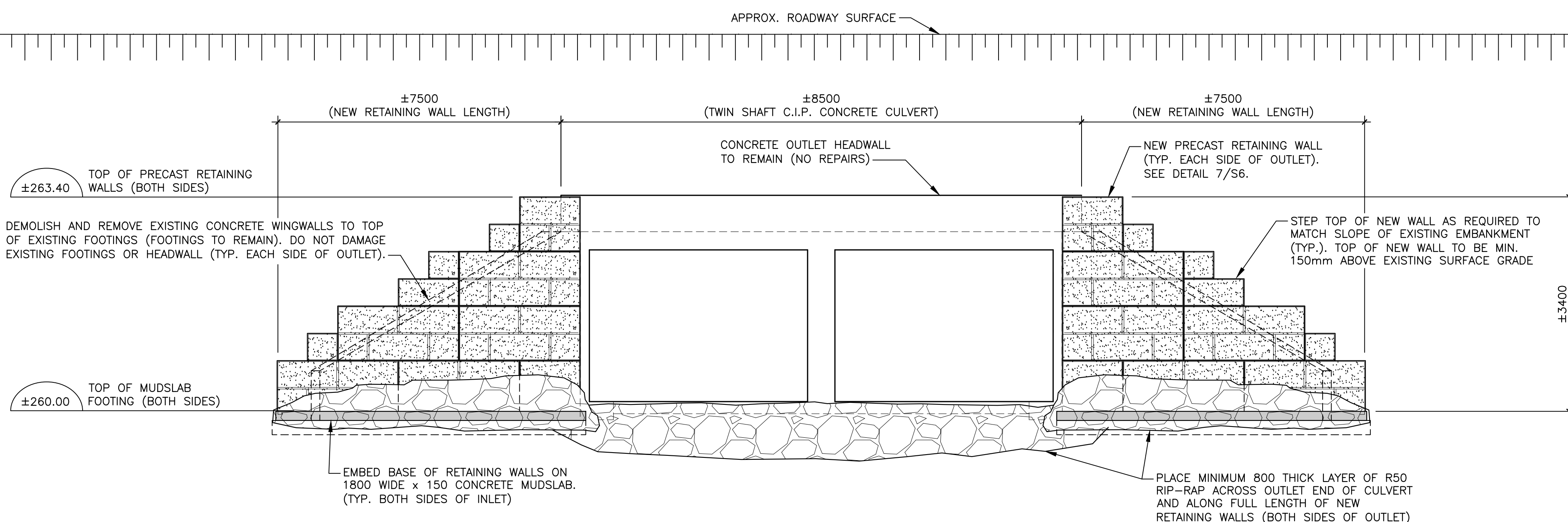
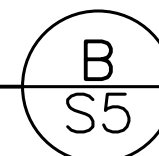


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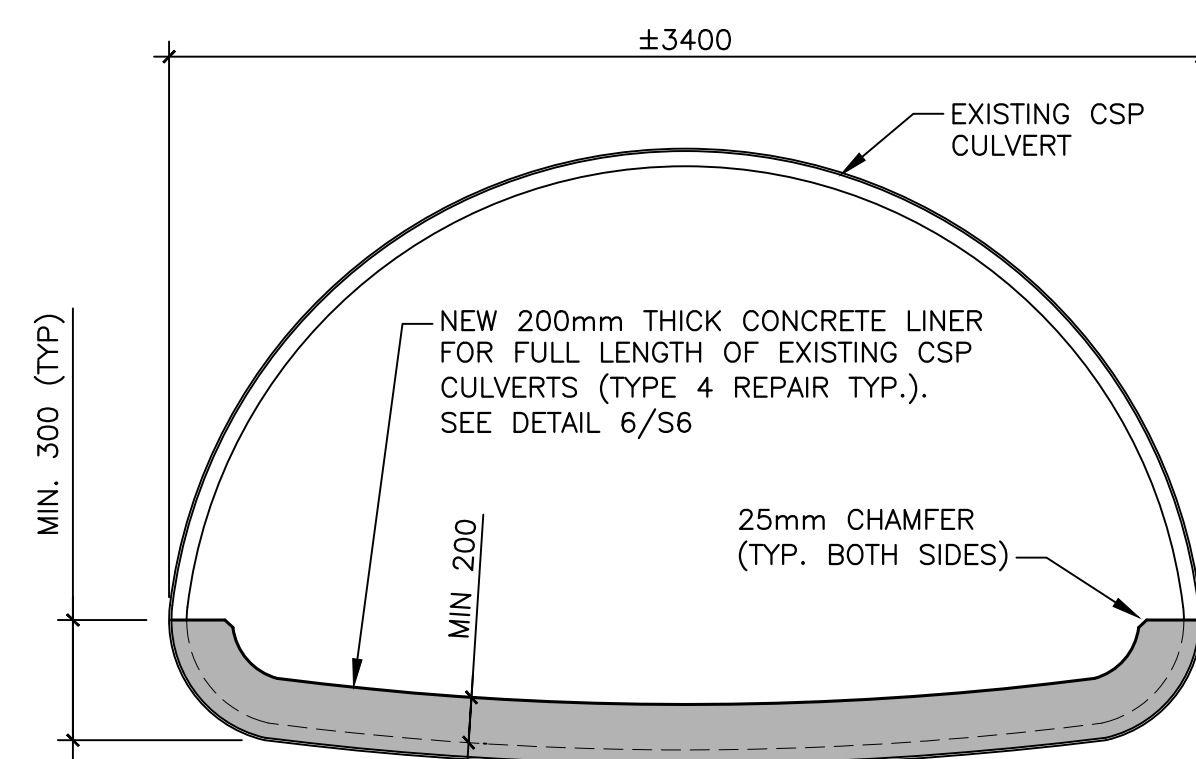
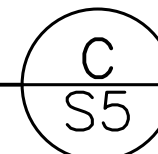
**INLET REPAIRS - NORTH END ELEVATION**

SCALE: 1:50



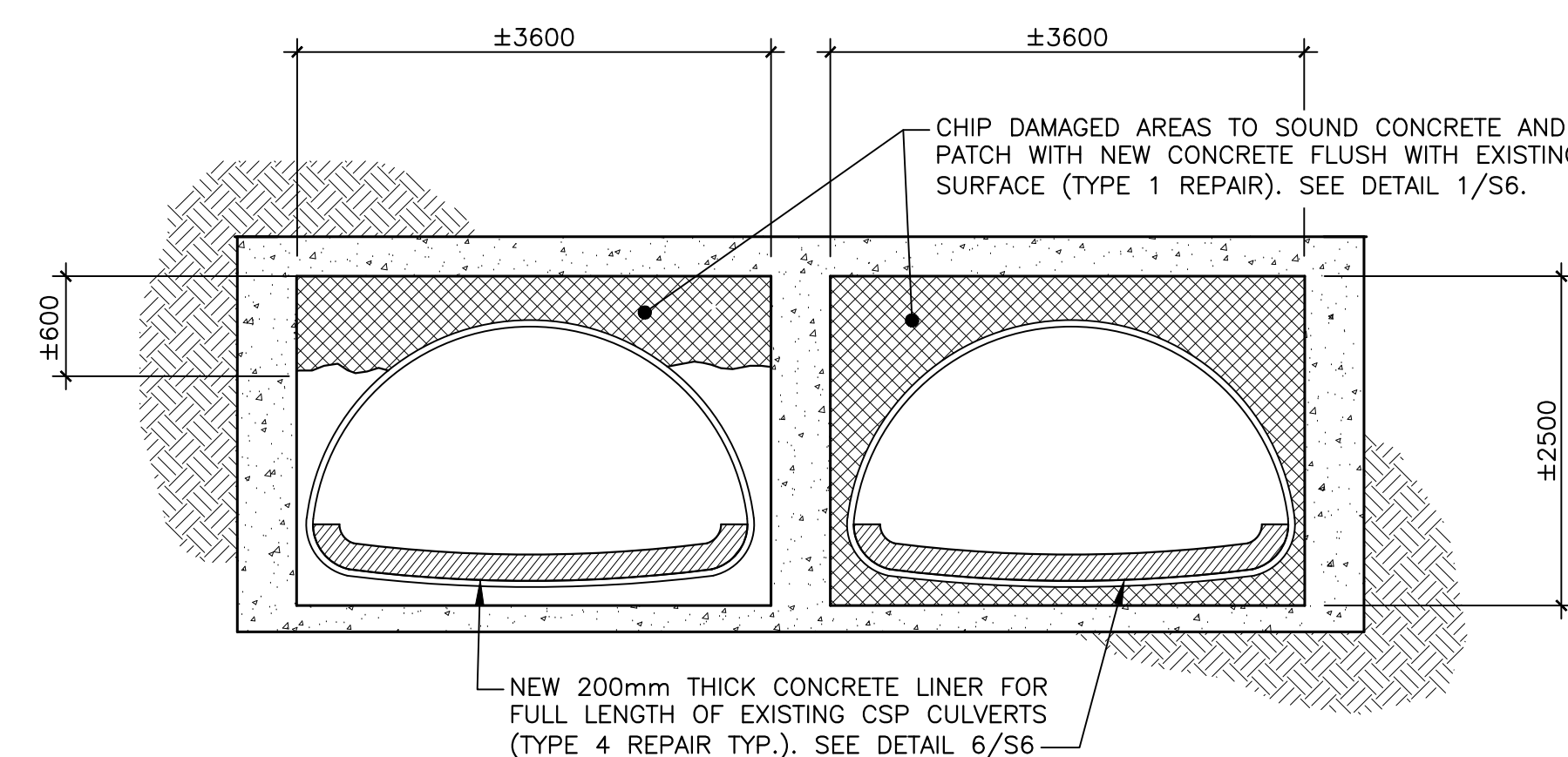
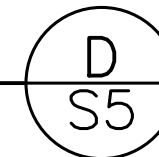
**OUTLET REPAIRS - SOUTH END ELEVATION**

SCALE: 1:50



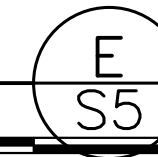
**CSP CULVERT REPAIR SECTION - FLOOR LINING**

SCALE: 1:25



**TRANSITION HEADWALL REPAIR SECTION - CSP/CONCRETE CULVERT JUNCTION**

SCALE: 1:50



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project **BENNETT BROOK CULVERT REPAIRS FUNDY NATIONAL PARK NEW BRUNSWICK** projet

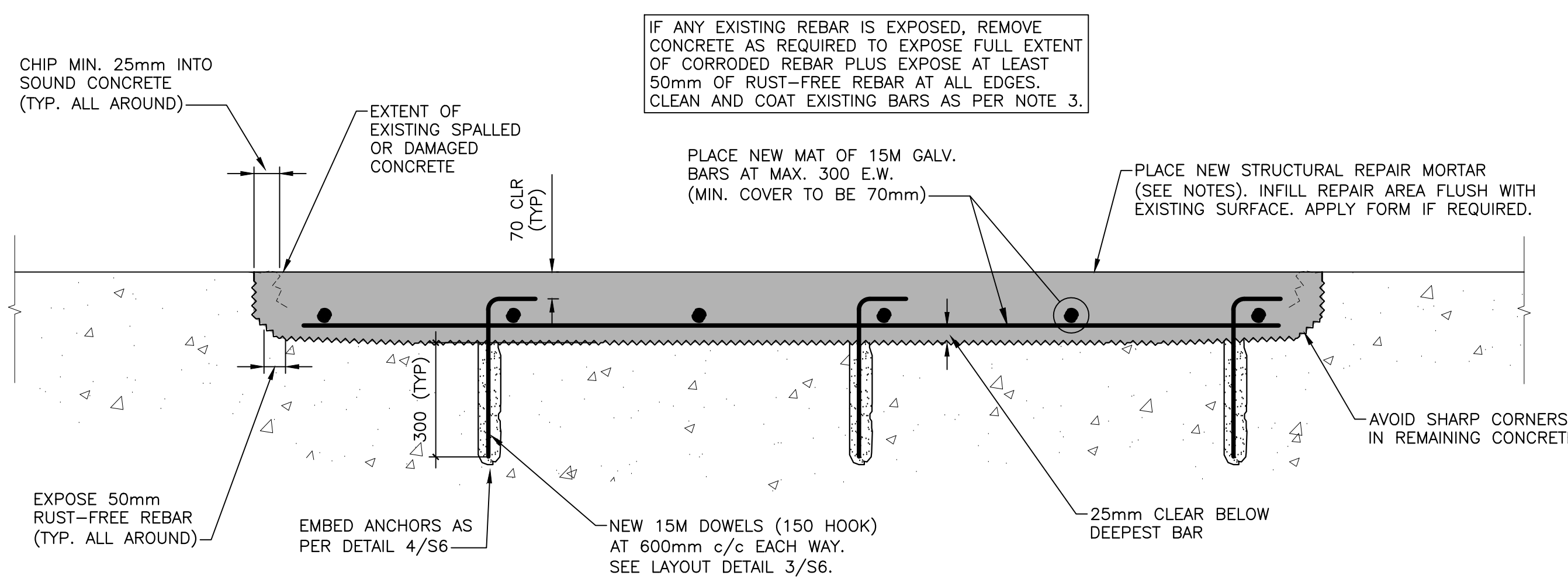
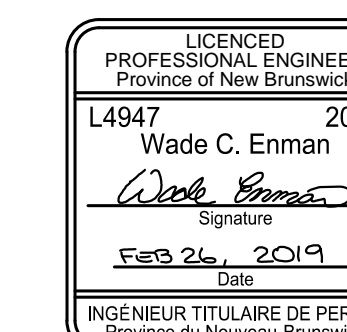
drawing **STRUCTURE REPAIR LAYOUT ELEVATIONS AND SECTIONS** dessin

designed **W. ENMAN** conçu  
date **2018/02/23**  
drawn **D. BEAMAN** dessiné  
date **2018/02/23**  
approved **W. ENMAN** approuvé

date  
Tender  
Project Manager  
project number **1765** no. du projet  
no. du dessin

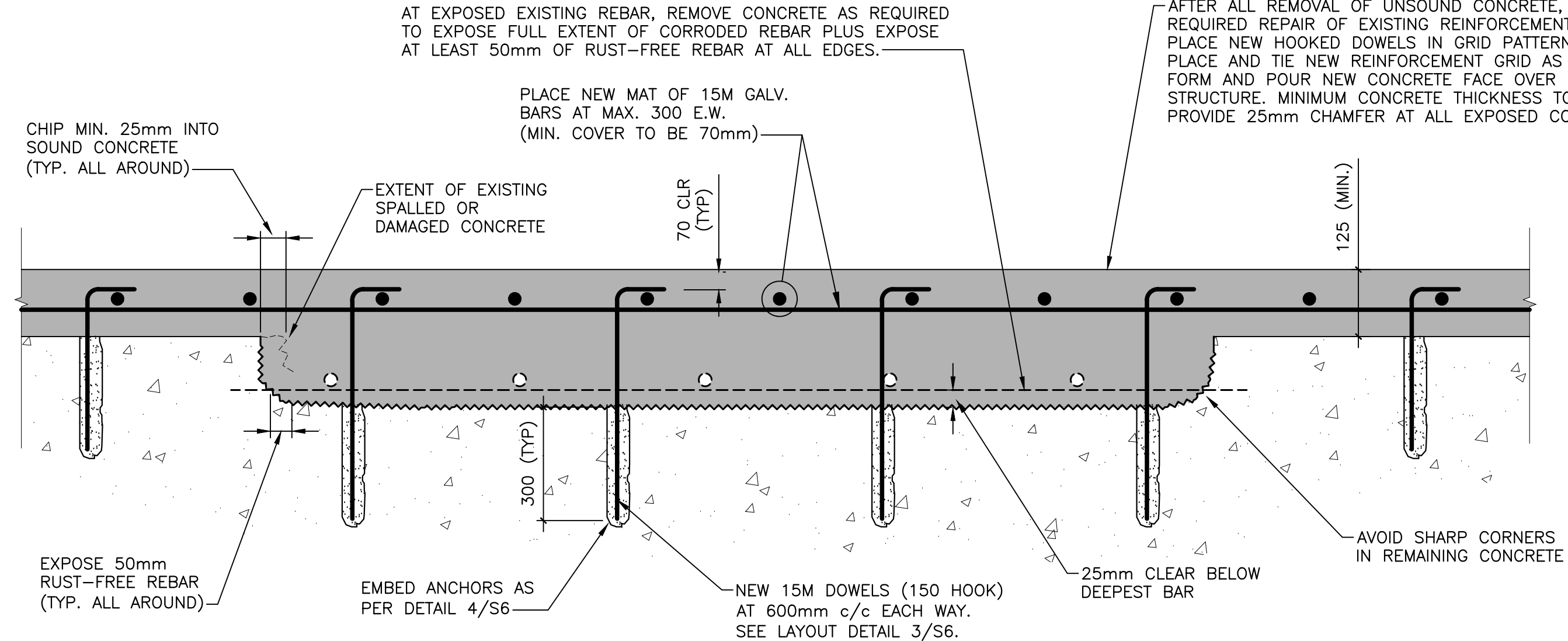
no. du dessin **S5**





CONCRETE PATCHING  
- TYPE 1 REPAIR

SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm



CONCRETE REFRACING  
- TYPE 2 REPAIR

SCALE : 1:10  
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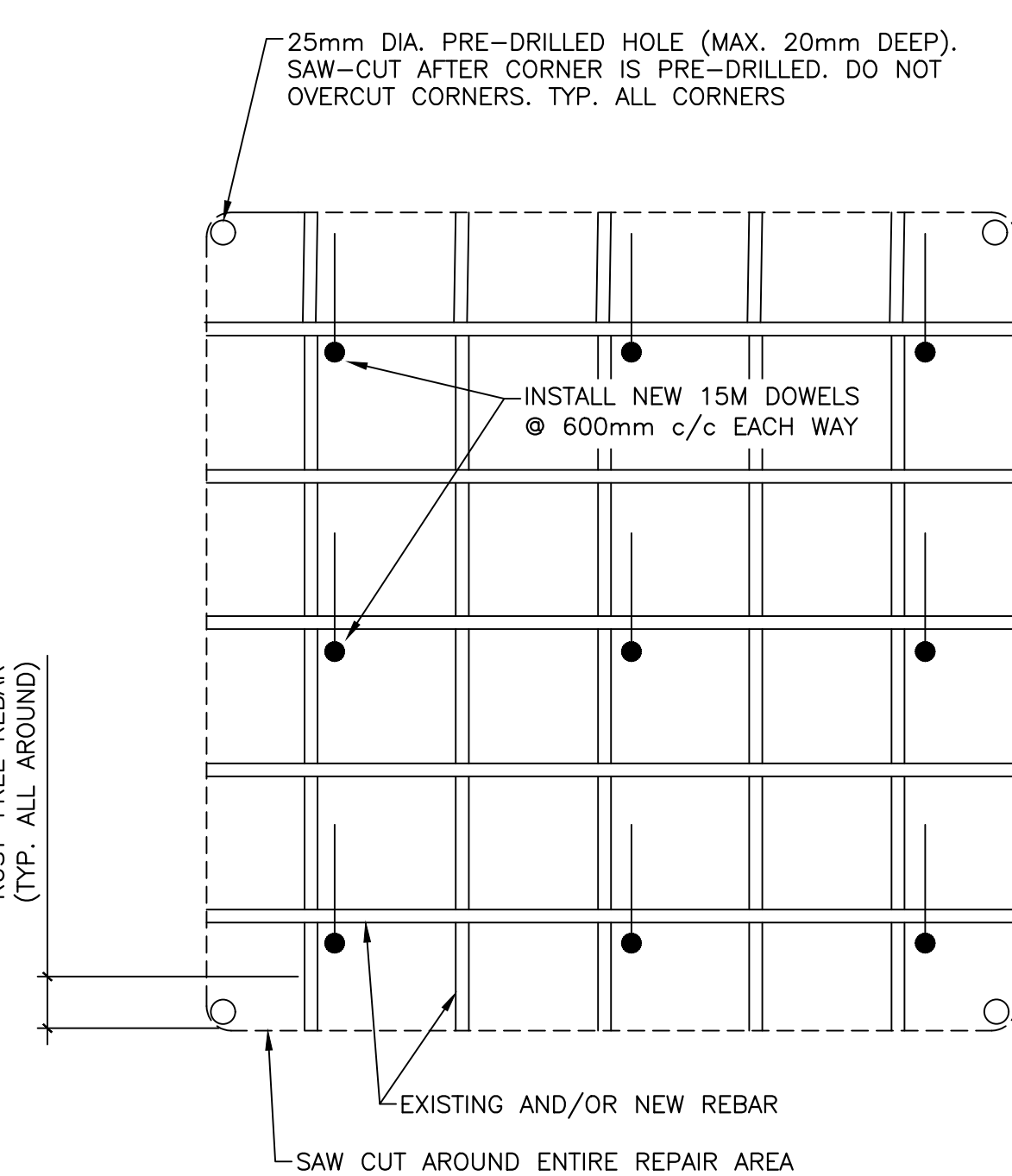
ROUGHEN EDGES OF SAWCUTS PRIOR TO PLACING REPAIR CONCRETE. DO NOT OVERCUT CORNERS OF PATCH AREAS (STOP SAW BEFORE CORNER PATCH). AT CORNERS AND WHERE SAWCUTTING IS NOT PRACTICAL, USE CHIPPING TOOLS TO REMOVE CONCRETE. CUT EDGES OF REPAIR AREA PERPENDICULAR TO SURFACE.

TYPES 1 & 2 REPAIR REINFORCEMENT NOTE:  
REPAIR DETAILS TO BE USED WHERE ALL EXPOSED EXISTING REINFORCING STEEL HAS LESS THAN 15% LOSS OF SECTION. IF ANY EXISTING REBAR MEMBER(S) HAVE MORE THAN 15% SECTION LOSS, ADD SECTION OF NEW REINFORCING BAR OF EQUAL DIAMETER, LAPPED AND TIED WITH SOUND PORTIONS OF DEFECTIVE BAR(S). ALL LAPS ARE TO DEVELOP CLASS "B" TENSION SPLICES AT EACH END OF NEW SPLICE SECTION. CHIP ADDITIONAL CONCRETE AS REQUIRED TO EXPOSE SUFFICIENT REBAR FOR LAP.

ROUGHEN EDGES OF SAWCUTS PRIOR TO PLACING REPAIR CONCRETE. DO NOT OVERCUT CORNERS OF PATCH AREAS (STOP SAW BEFORE CORNER PATCH). SEE DETAIL 3/S6. AT CORNERS AND WHERE SAWCUTTING IS NOT PRACTICAL, USE CHIPPING TOOLS TO REMOVE CONCRETE. CUT EDGES OF REPAIR AREA PERPENDICULAR TO SURFACE.

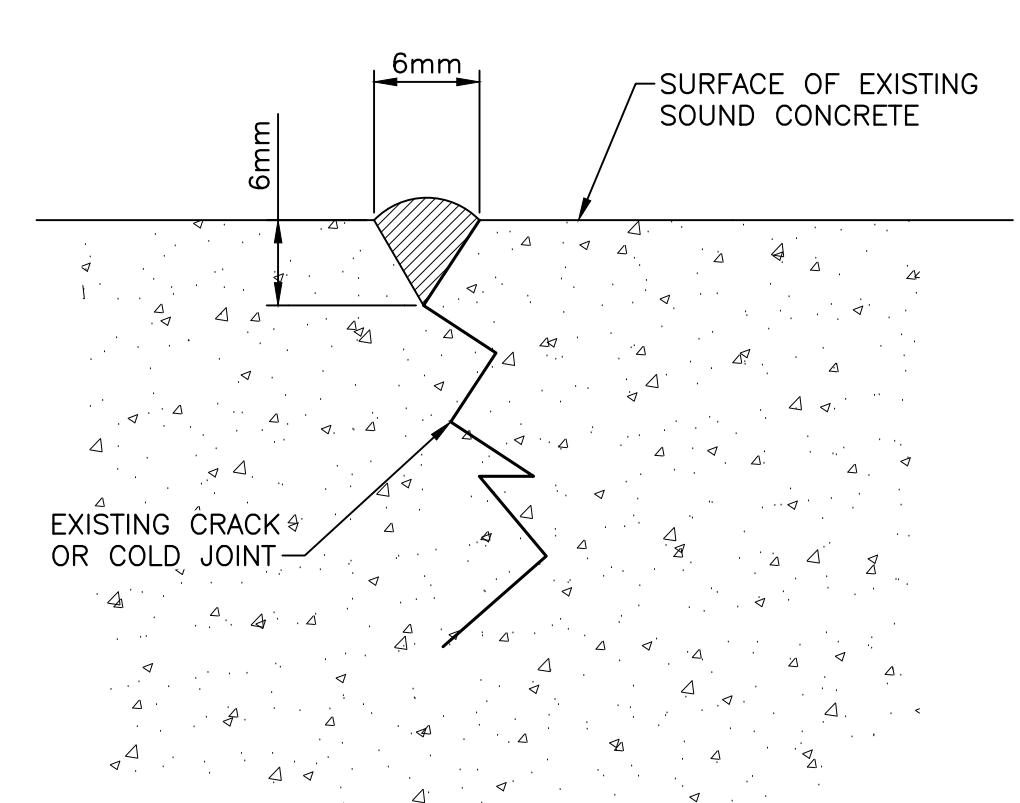
GENERAL REPAIR NOTES:

- ALL DIMENSIONS ARE TO BE VERIFIED AND ANY DISCREPANCIES REPORTED TO THE DEPARTMENTAL REPRESENTATIVE BEFORE PROCEEDING WITH THE WORK.
- CONTRACTOR IS RESPONSIBLE TO VISIT THE SITE TO DETERMINE ACCESS TO UNDERSIDE OF BRIDGE AND TO IDENTIFY ANY OBSTRUCTIONS IN THE WORK AREA.
- CONTRACTOR TO REMOVE BY MECHANICAL MEANS ANY AND ALL AREAS OF CONCRETE INDICATED. CARE SHALL BE TAKEN NOT TO DAMAGE EXISTING REINFORCING STEEL. THE PERIMETER EDGES OF ALL PATCHES ARE TO BE SAWCUT TO A MINIMUM DEPTH OF 15mm (U.N.O.) TO PREVENT FEATHERED EDGES. NO OVERCUTTING IS PERMITTED AT THE CORNERS OF THE REMOVAL AREAS. THE AREA IS THEN TO BE WIRE BRUSHED AND AIR BLOWN WITH HIGH PRESSURE TO REMOVE ALL FINE DUST MATERIAL (PRESSURE WASHING NOT PERMITTED WITHOUT MEASURES TO CONTAIN AND DIVERT EXCESS WATER FROM THE WATER COURSE.) ALL DELETERIOUS MATERIAL SHALL BE CONTAINED AND REMOVED FROM THE SITE SO AS NOT TO IMPACT THE ENVIRONMENT BELOW. DURING DEMOLITION OF CONCRETE ANY EXISTING REINFORCING EXPOSED BY DEMOLITION TO BE EXPOSED FOR 25mm AROUND THE ENTIRE BAR, CLEAN BAR AND APPLY RUST INHIBITOR. ALL DEMOLISHED OR OTHERWISE DAMAGED AREAS SHALL BE RE-CAST TO ACCURATELY RESTORE THE ORIGINAL LINES, DECK SOFFIT, ETC. (U.N.O.) WHERE CLASS "B" LAPS CANNOT BE ACHIEVED, PROVIDE DOWEL/ANCHOR BARS SECURED WITH ADHESIVE ANCHORING SYSTEM AS PER SPECIFICATIONS.
- MATERIALS:
  - ADHESIVE ANCHOR - HILTI HY-200 ADHESIVE OR APPROVED EQUAL INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.
  - STRUCTURAL REPAIR MORTAR: EMACO S66-CI BY BASF OR APPROVED EQUAL INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS. ADD AGGREGATE TO MORTAR AS REQUIRED AS PER MANUFACTURER'S INSTRUCTIONS.
  - CRACK REPAIR BY EPOXY INJECTION: DENEPOX 140 BY DENEFF OR APPROVED EQUAL INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS.
- MINIMUM COVER TO REINFORCING: 70mm UNLESS NOTED OTHERWISE.
- TOUCH UP AREAS OF DAMAGE TO GALVANIZING AT DRILLED HOLES, FIELD WELDS, ETC. WITH HIGH BUILD ALUMINUM MASTIC PAINT. ACCEPTABLE PRODUCT: AMERON AMERLOCK 400 AI, COLOUR LIGHT GREY TO MATCH GALVANIZING.
- SUBSTITUTION OF MATERIALS MUST BE SUBMITTED TO THE DEPARTMENTAL REPRESENTATIVE FOR REVIEW PRIOR TO USE.
- INSPECTION: THE DEPARTMENTAL REPRESENTATIVE IS REQUIRED TO INSPECT THE REPAIRS TO ENSURE FIELD REPAIR IS CARRIED OUT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL ADVISE THE DEPARTMENTAL REPRESENTATIVE 24 HOURS IN ADVANCE OF PLACING PATCH MATERIALS, PLACING CONCRETE, AND BRIDGE JACKING.
- AREAS OF CONCRETE REPAIR ARE APPROXIMATE. EXACT EXTENT AND LOCATION OF REPAIR ARE TO BE DETERMINED IN THE FIELD BY THE DEPARTMENTAL REPRESENTATIVE.
- ALL REINFORCEMENT TO BE HOT-DIP GALVANIZED.



TYPICAL ELEVATION  
- TYPE 1 & 2 REPAIR

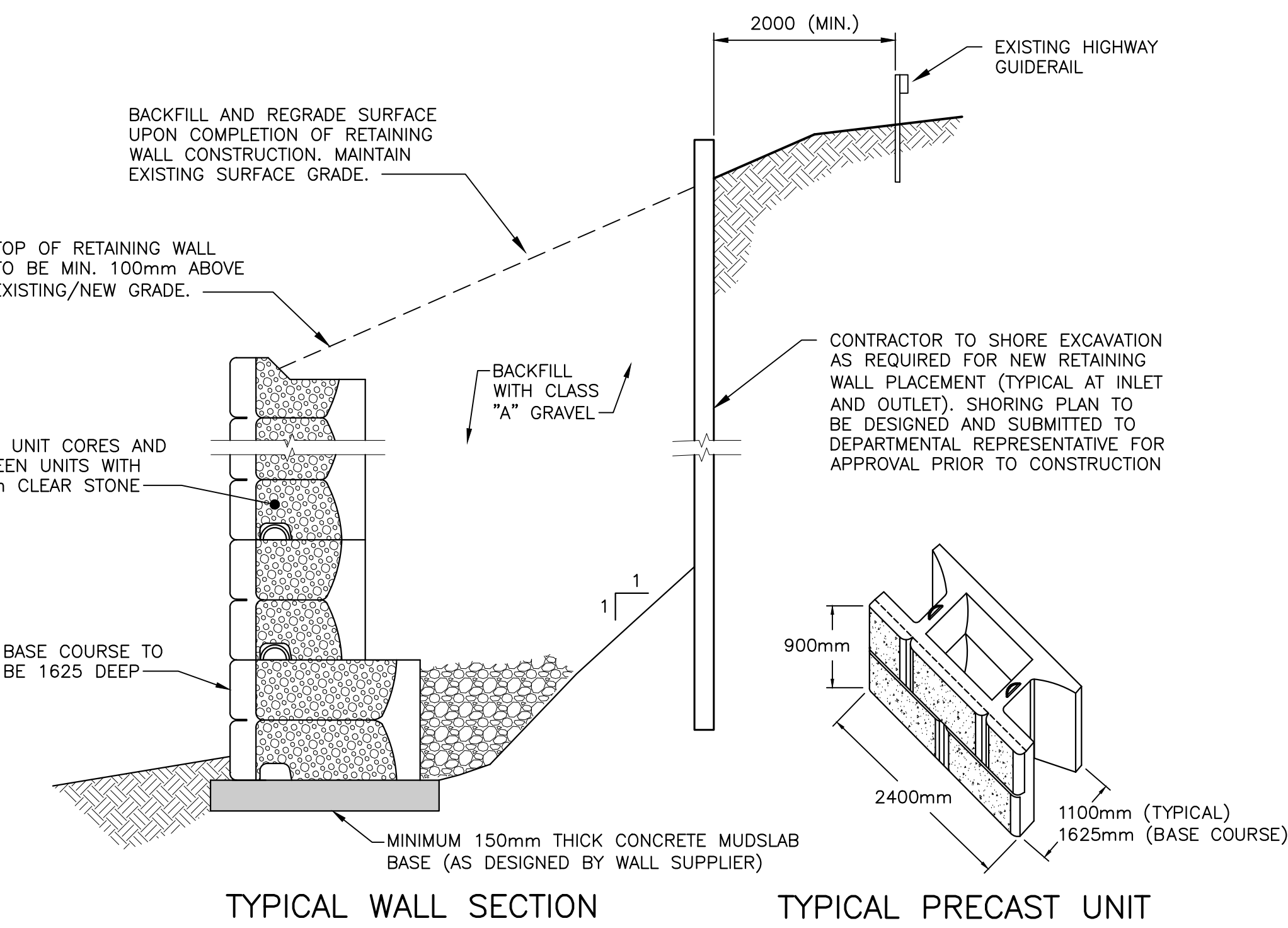
SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm



- REQUIRED AT ALL CRACKS IN EXISTING SOUND CONCRETE THAT ARE BETWEEN 1mm AND 6mm WIDE. CONDUCT PATCH REPAIR FOR WIDER CRACKS OR CRACKS IN DAMAGED OR UNSOUND CONCRETE.
- PROVIDE CONTINUOUS V-GROOVE ALONG FULL LENGTH OF EXISTING CRACK.
- CLEAN GROOVE WITH OIL-FREE AIR JET AND DRY SURFACE.
- INSTALL GROUT INJECTION PORTS MAX. 300mm c/c ALONG CRACK.
- APPLY EPOXY-BASED CRACK SEALANT INTO V-GROOVE BETWEEN PORTS AS SPECIFIED.
- FLUSH THE CRACK WITH WATER TO CLEAN IT AND TEST THE SEAL.
- INJECT EPOXY INTO THE CRACK USING PRESSURE. MAINTAIN PRESSURE FOR SEVERAL MINUTES AFTER CRACK IS COMPLETELY FILLED.
- REMOVE INJECTION PORTS AND FILL HOLES WITH EPOXY.

STRUCTURAL CONCRETE CRACK INJECTION - TYPE 3 REPAIR

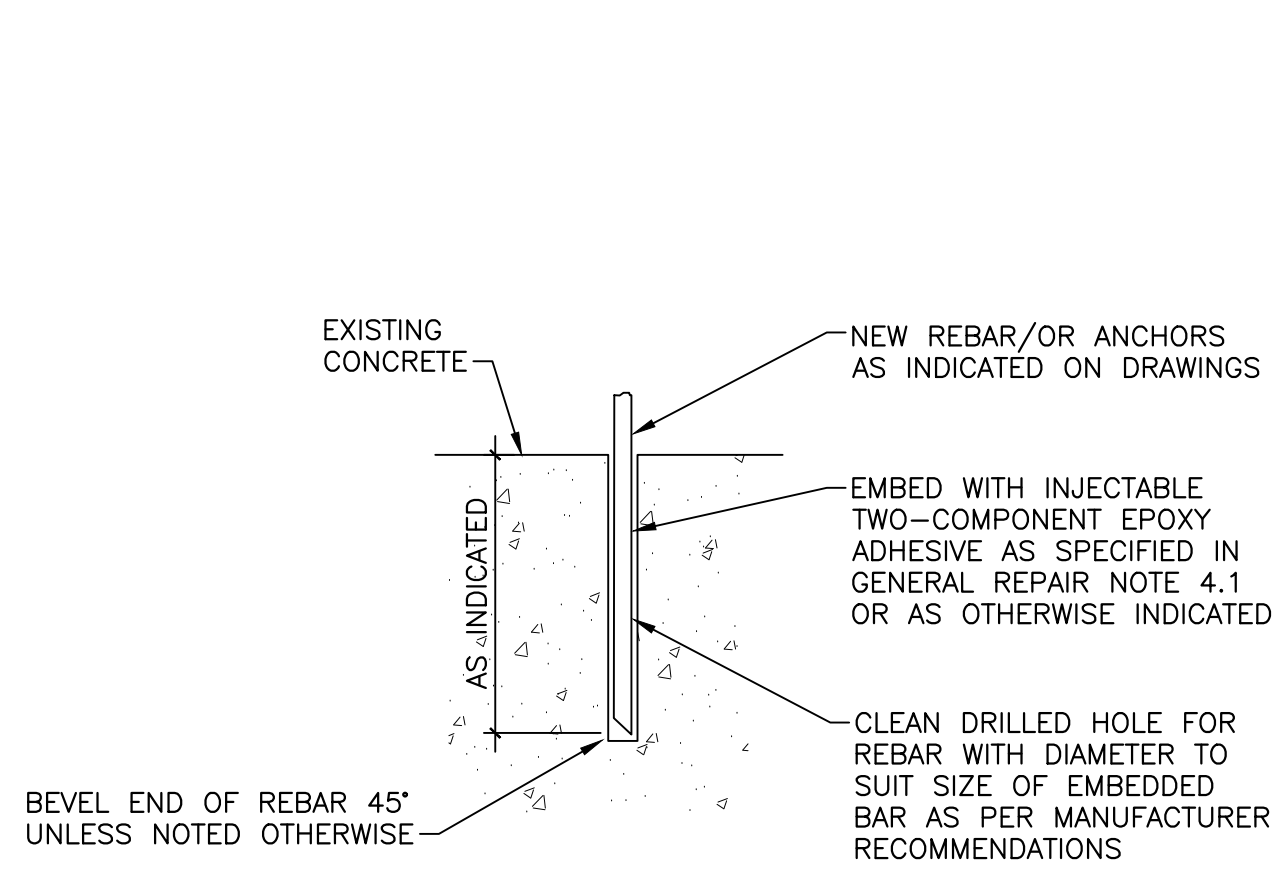
SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm



PRECAST CONCRETE RETAINING WALLS TO BE DESIGNED BY SUPPLIER. DETAILED SHOP DRAWINGS, INCLUDING LAYOUT PLANS, ELEVATIONS AND ALL PRECAST UNIT DETAILS ARE TO BE SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL. ALL SHOP DRAWINGS ARE TO BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF NEW BRUNSWICK FOR THE CURRENT CALENDAR YEAR.

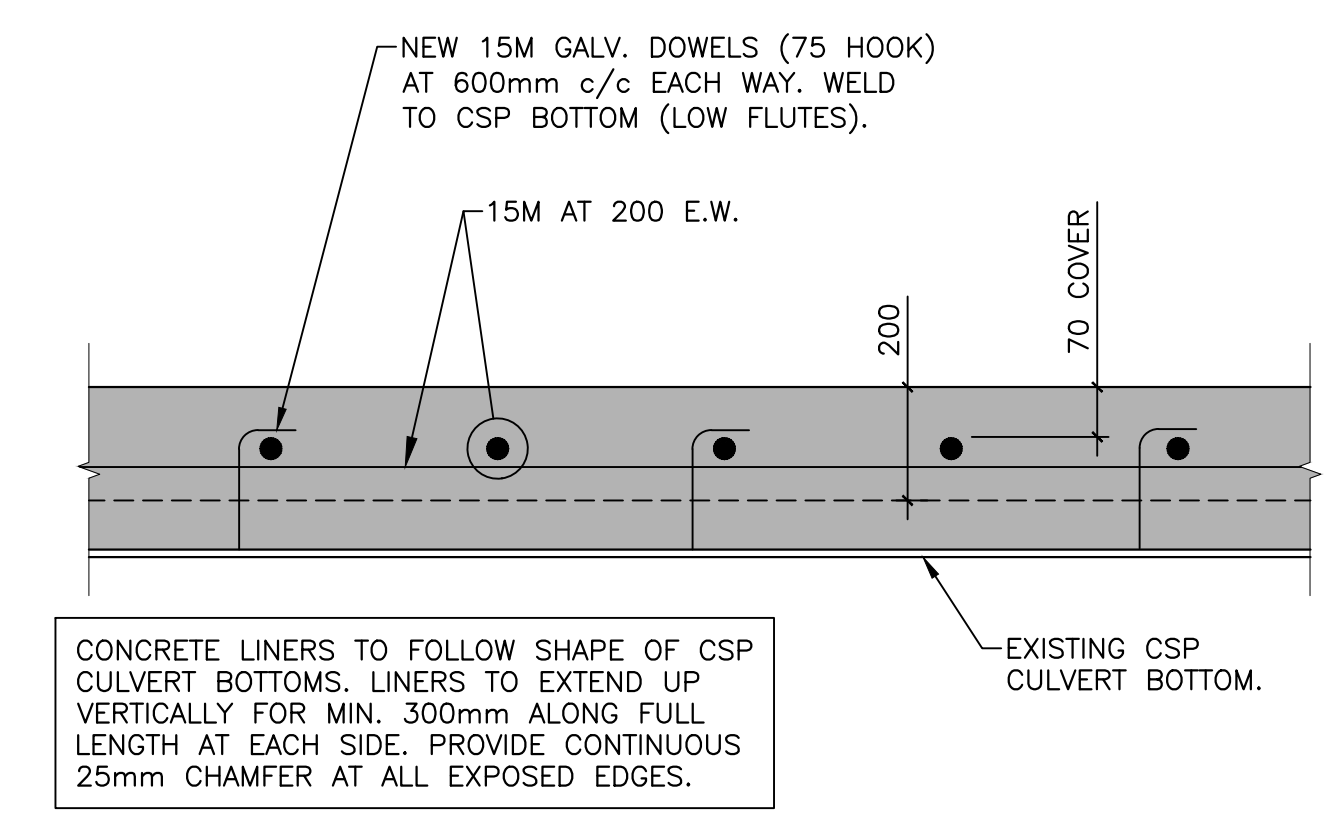
TYPICAL PRECAST CONCRETE RETAINING WALL

SCALE : N.T.S.



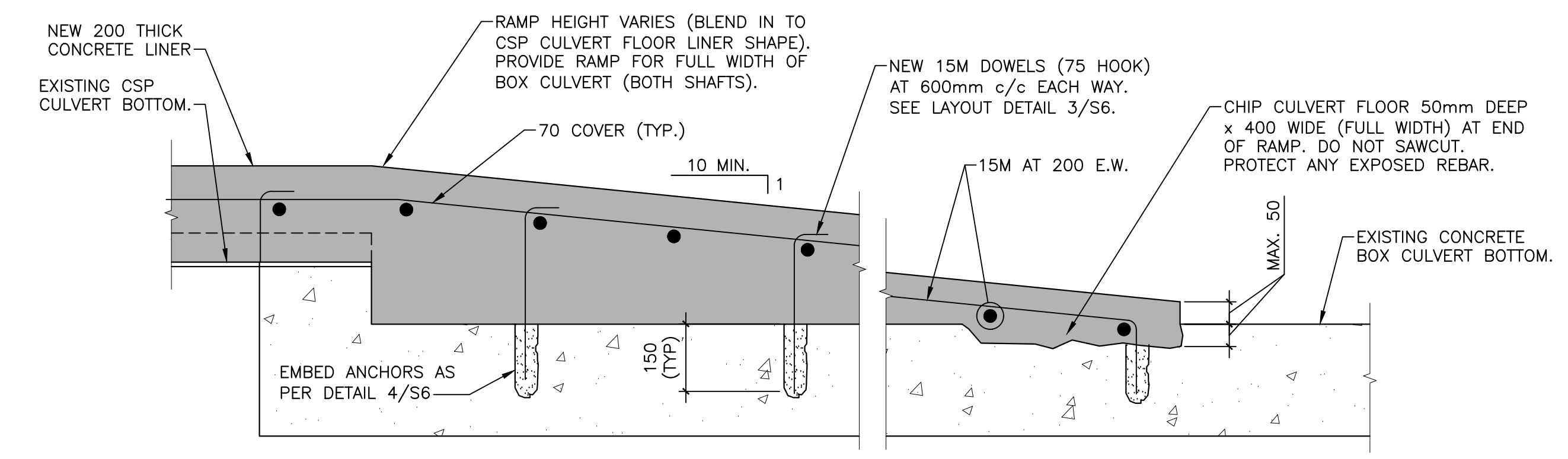
EMBEDMENT DETAIL FOR EPOXY GROUTED REBAR/ANCHORS

SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm



NEW CONCRETE LINER FOR FLOOR OF EXISTING CSP CULVERTS - TYPE 4 REPAIR

SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm



NEW CONCRETE LINER TRANSITION TO CONCRETE BOX CULVERT FLOOR

SCALE : 1:10  
0mm 100 200 300 400 500 600 700 800 900 1000mm

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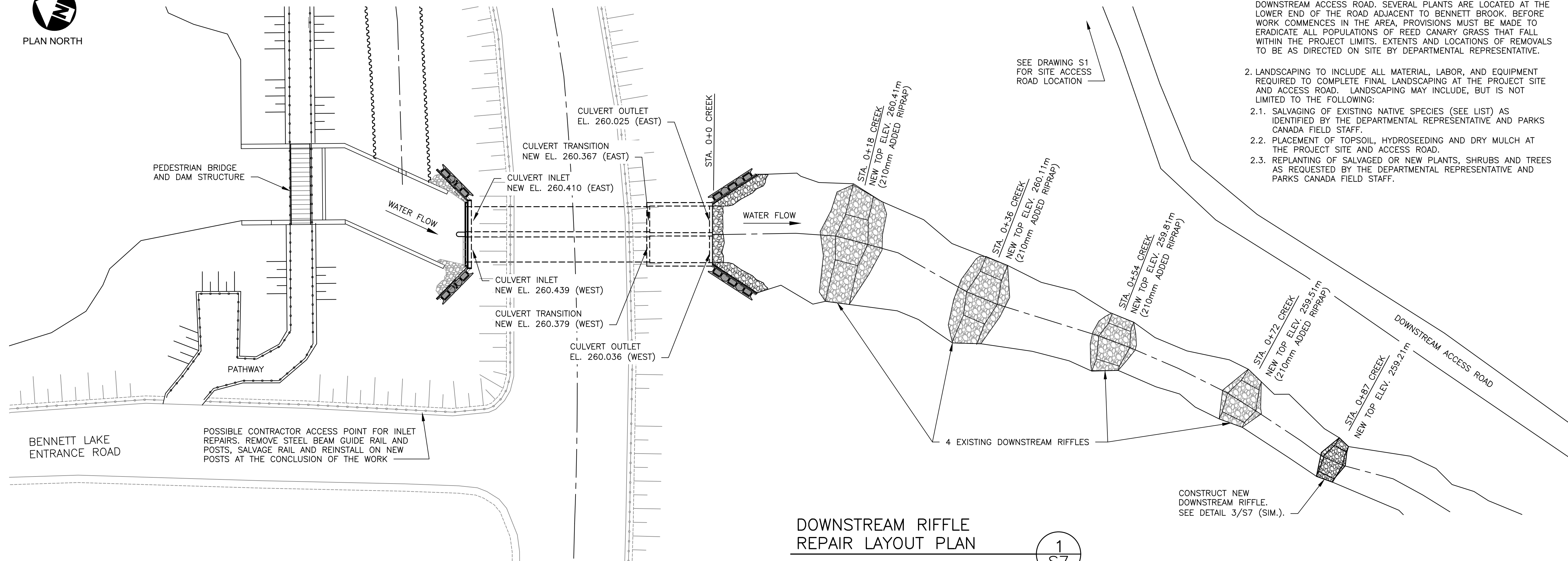
project  
**BENNETT BROOK CULVERT REPAIRS FUNDY NATIONAL PARK NEW BRUNSWICK**  
project

drawing  
**TYPICAL STRUCTURE REPAIR DETAILS**  
dessin

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Tender Soumission  
Project Manager Administrateur de projets  
project number 1765 no. du projet  
drawing no. S6 no. du dessin

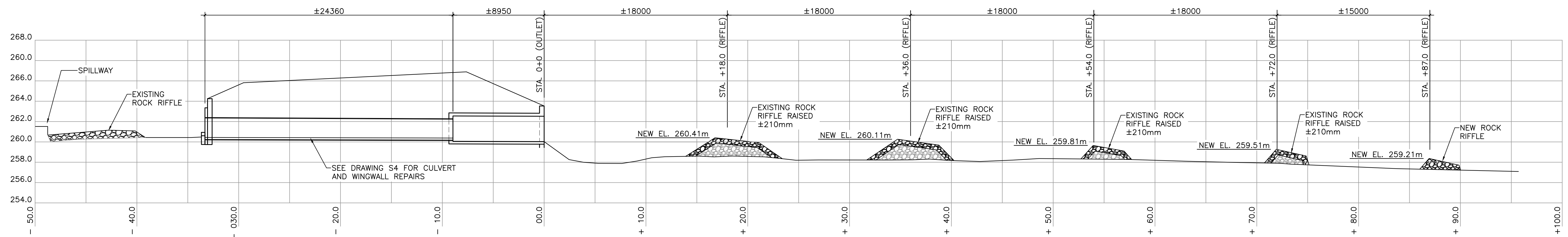
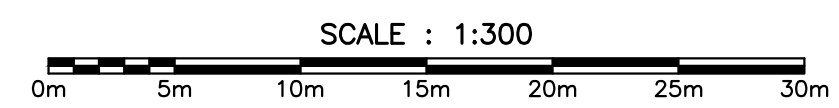


PLAN NORTH



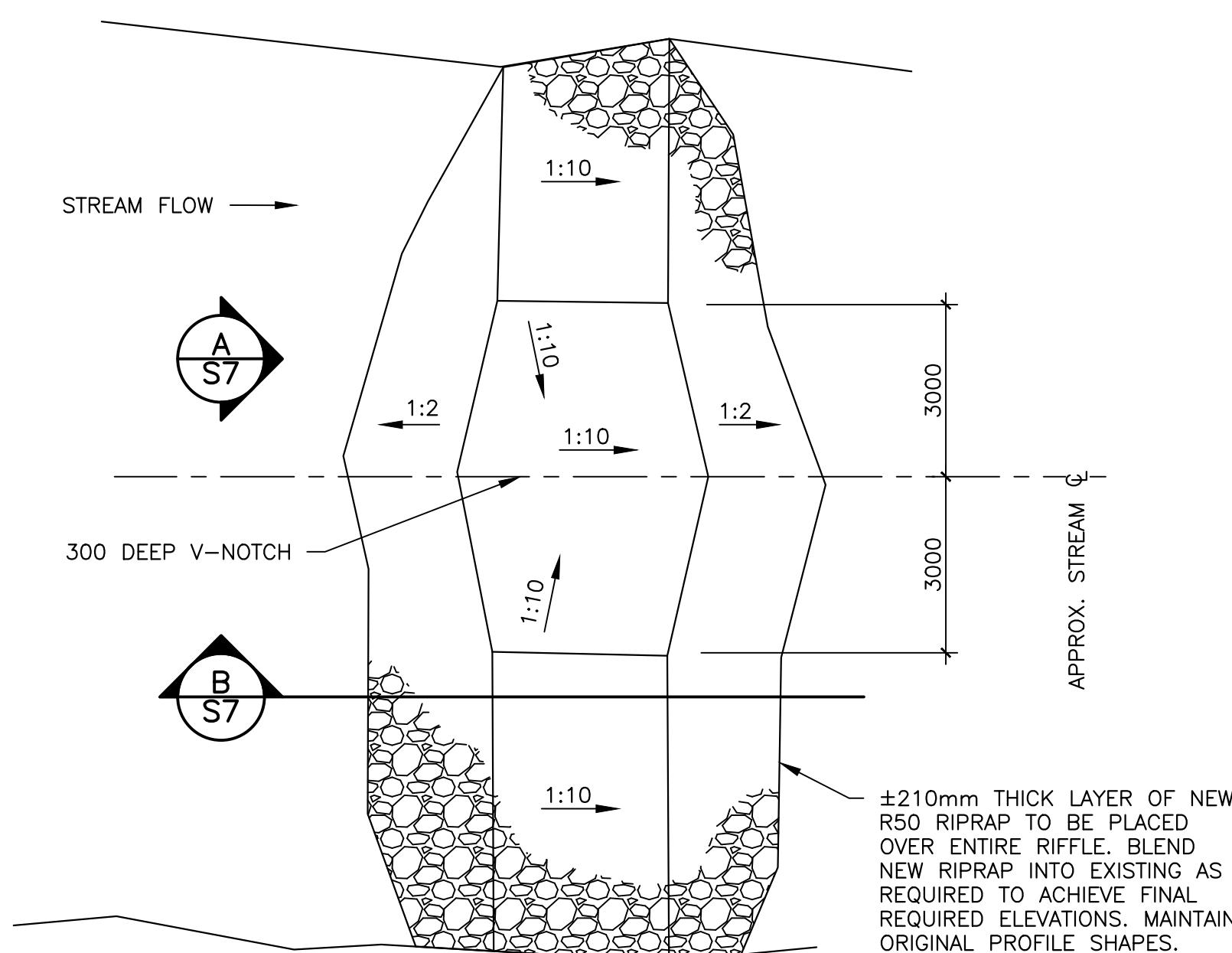
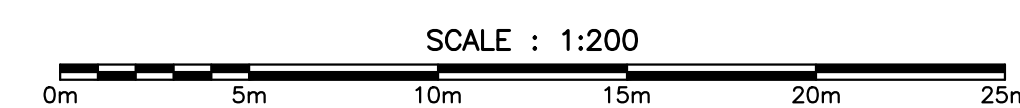
DOWNSTREAM RIFFLE REPAIR LAYOUT PLAN

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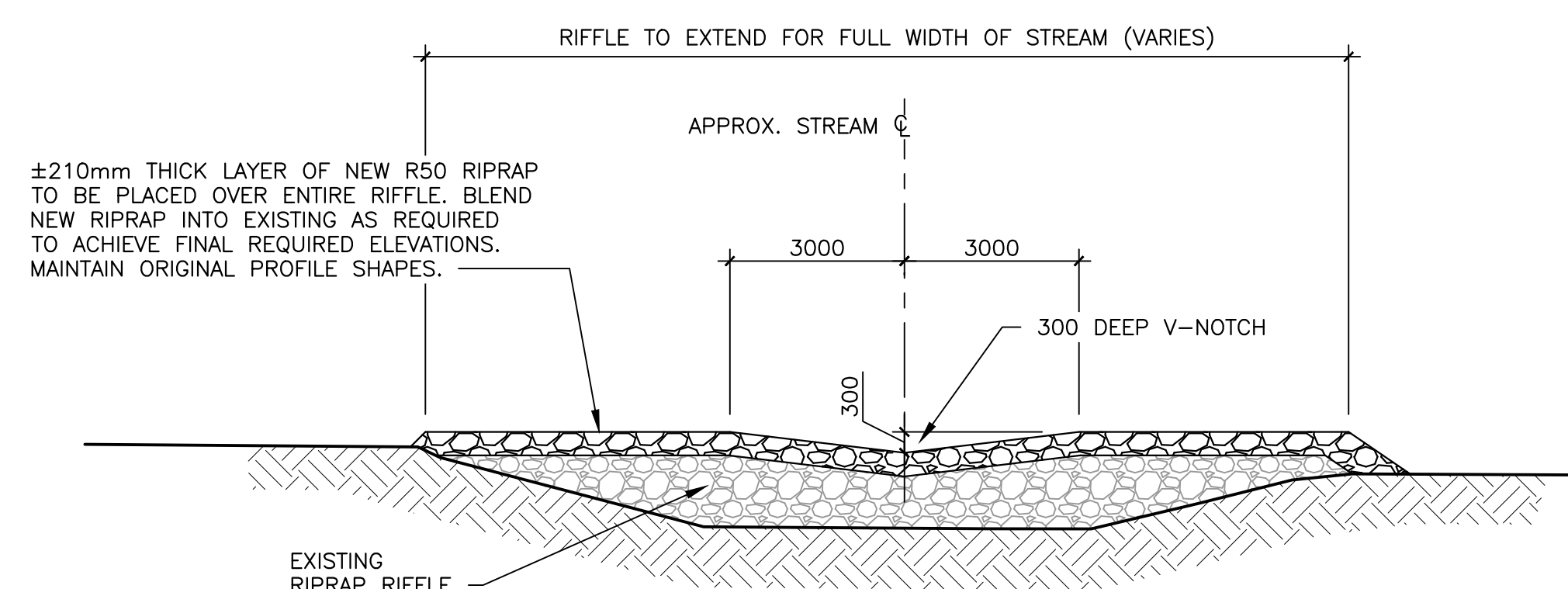
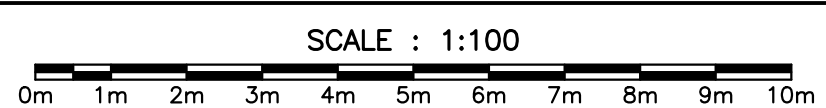
DOWNSTREAM RIFFLE REPAIR LONGITUDINAL SECTION - LOOKING EAST

2 / S7



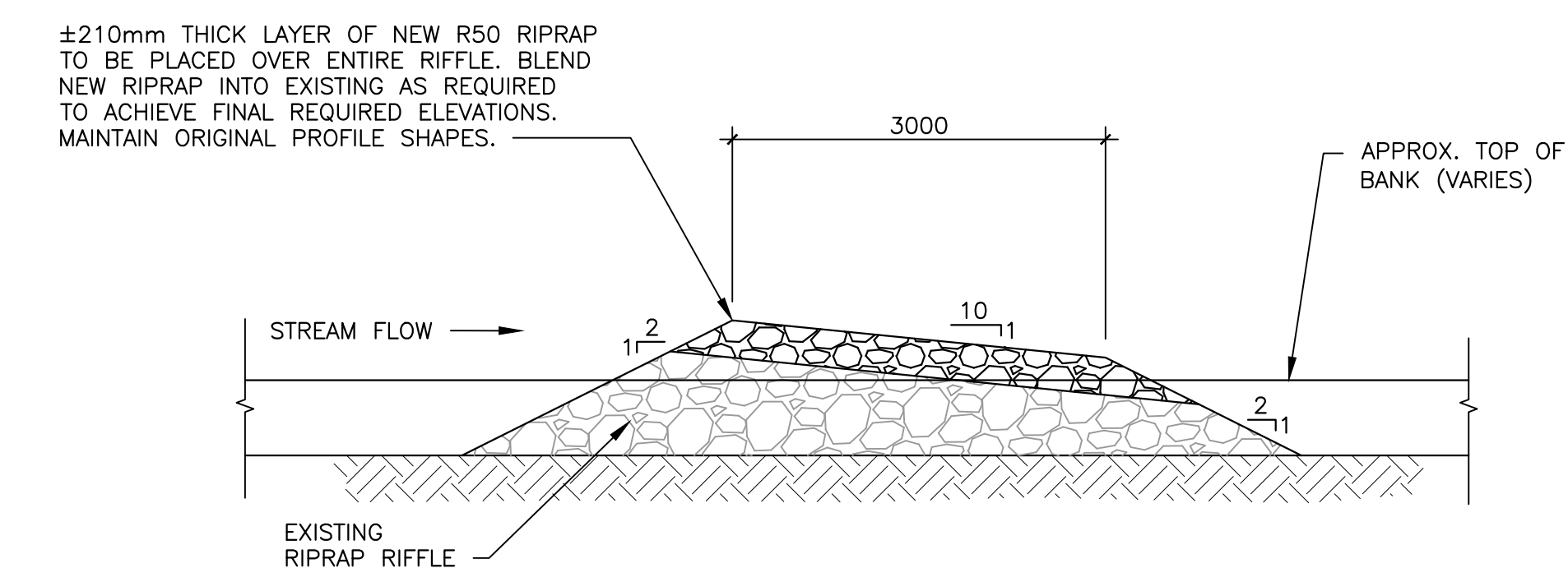
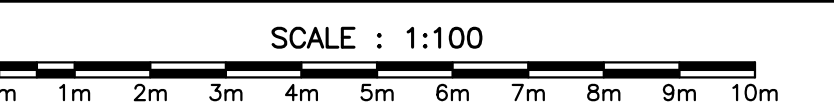
DOWNSTREAM CREEK RIFFLE - PLAN

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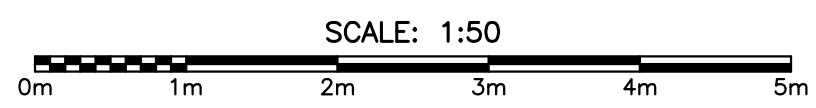
DOWNSTREAM CREEK RIFFLE - ELEVATION

A / S7

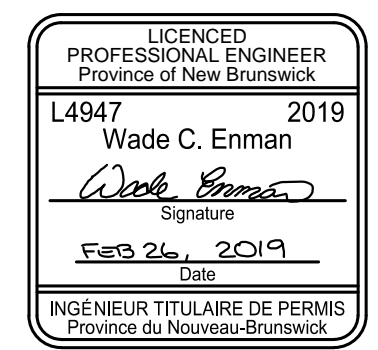


DOWNSTREAM CREEK RIFFLE - SECTION

B / S7



WSP Canada Inc.  
135 MacEwen Road  
Summerside, Prince Edward Island, Canada C1N 5Y4  
T 902-436-2669 F 902-436-8601 www.wsp.com



0	ISSUED FOR TENDER	FEB 26/19
revisions		date

project  
**BENNETT BROOK  
CULVERT REPAIRS  
FUNDY NATIONAL PARK  
NEW BRUNSWICK**  
project

drawing  
**DOWNSTREAM RIFFLE  
REPAIR DETAILS**  
dessin

designed W. ENMAN conçu  
date 2018/10/22  
drawn D. BEAMAN dessiné  
date 2018/10/22  
approved W. ENMAN approuvé

Project Manager Administrateur de projets  
project number no. du projet

1765

drawing no. no. du dessin

S7