

DILLON
CONSULTING

GOVERNMENT OF THE NORTHWEST TERRITORIES
DEPARTMENT OF INFRASTRUCTURE

Erosion and Sediment Control Plan

Bouvier Creek Culvert Rehabilitation

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Version History

| Version | Effective Date | Prepared By (Name and Title) | Pages Revised | Description of Revisions |
|---------|-------------------|---|---------------|--------------------------|
| 01 | February 25, 2025 | Jacob Rovere Associate – Dillon Consulting Limited | N/A | N/A |

1.0 Introduction

This Erosion and Sediment Control (ESC) Plan has been developed by Dillon Consulting Limited (Dillon) on behalf of the Government of the Northwest Territories (GNWT) Department of Infrastructure (INF) for use during the culvert rehabilitation activities at the existing Bouvier Creek Culvert structure to improve fish passage and address structural deficiencies at the crossing (the Project). Work will be completed under the GNWT-INF's existing Land Use Permit MV2023E0012; however, as the culvert rehabilitation will require in-water work a Water Licence is required.

This ESC Plan describes the mitigation measures to reduce erosion and sedimentation effects from activities related to the Project. The ESC Plan was developed in accordance with applicable guidelines and best practices in Northwest Territories and is one of several plans developed for the Project.

The Contractor will be identified through a public tender process to be initiated after permits are obtained. The Contractor will be responsible for providing a map with the locations of all ESC mitigation measures, on a map to scale with GPS coordinates.

1.1 Project/ Site Description

The existing structure was constructed in 1970, and consists of a 41.85 metre (m) long structural plate corrugated steel pipe (SPCSP) structure oriented in the north-south direction composed of two (2) 4.25 m width by 4.80 m high barrels complete with common cast-in-place (CIP) concrete inlet and outlet end treatments. At present, the culvert outlets are perched and the GNWT-INF has self-identified the structure as a potential barrier to fish passage for slower-swimming fish species (e.g., Northern pike). In light of this, the GNWT-INF is proactively seeking to improve fish passage through the structure by incorporating an additional fish passage route into the culvert rehabilitation design. Structural deficiencies observed at the crossing, which will be addressed during rehabilitation activities, include erosion and gully on the embankments, scour and erosion downstream of the culverts, corrosion along the SPCSP bottoms, and debris buildup at the culvert inlets. In-water work is proposed to occur from late August until mid-October 2025.

Culvert rehabilitation works include the following:

- Installation of a diversion weir at the upstream end of the east barrel;
- Installation of substrate retainers throughout the west barrel;
- Installation of a fish passage system at the outlet of the west barrel, to be fabricated from one meter diameter corrugated steel culvert sections with interior baffles;
- Pre-bagged cast-in-place concrete repairs to the existing inlet and outlet structures;
- Abrasive blasting/zinc metalizing of the SPCSP interiors;
- Targeted heavy rock riprap scour and erosion protection works at the outlets; and

- Repair/replacement of deteriorated guardrail.

The culvert structure is located at the following coordinates: 61.136709, -119.015068. The Project Area and 99% engineering drawing have also been provided in **Appendix A**.

1.2 Relevant Guidance

This ESC Plan has been developed in consideration of applicable legislation, guidelines, and best practices as they may apply to the project activities, including:

- Fisheries and Oceans Canada's (DFO's) codes of practice (DFO, 2022) and interim codes of practice (DFO, 2019);
- DFO's Measures to protect fish and fish habitat¹;
- Northern Land Use Guidelines: Roads and Trails (GNWT, 2015);
- Erosion and Sediment Control Manual (GNWT, 2013); and
- Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions (TAC, 2010).

¹ <https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>

2.0 Potential Effects

The erosion of soil or rock by water, wind or ice has the potential to result in deleterious effects to watercourses, through the transport and deposition of sediment and other deleterious substances in the material.

Activities associated with the work with the potential to result in erosion and sedimentation include, but are not necessarily limited to the following:

- Site preparation;
- Vegetation removal;
- Operation of heavy equipment adjacent to Bouvier Creek (e.g., ponding, rutting);
- Installation of the diversion weir at the upstream end of the east barrel;
- Installation of the fish passage system at the outlet of the west barrel; and
- Targeted heavy rock riprap scour and erosion protection works at the outlets.

Erosion and sedimentation from the works listed above have the potential to impact the local environment through:

- Direct impacts to fish or fish eggs through increases in suspended particles;
- Degradation of fish spawning habitat through the deposition of sediment;
- Overall degradation of water quality through the introduction of sediment.

3.0 Erosion and Sedimentation Mitigation

3.1 Mitigation Measures

To mitigate the potential for harmful effects from erosion and sedimentation of Bouvier Creek, mitigation measures have been developed using industry standards and best management practices (BMPs), in addition to guidance from DFO and GNWT resources (**Table 1**).

Table 1: Mitigation Measures

| Activity | Mitigation Measures |
|---|--|
| Site preparation and vegetation removal | <ul style="list-style-type: none"> • Work will be scheduled to avoid wet and rainy periods (where feasible) to avoid erosion of disturbed soils. Should precipitation events significantly increase flow in working areas, work will be temporarily suspended. • ESC measures will be installed prior to construction to prevent soil transport into Bouvier Creek. Silt fencing will be used downslope of the works where required. • Regular inspection and maintenance of ESC measures and structures will be undertaken during the course of the Project. |

| Activity | Mitigation Measures |
|--|--|
| | <ul style="list-style-type: none"> • A qualified environmental practitioner (QEP) will be present on-site to monitor for sediment plumes and/or increases in turbidity during the installation of ESC measures. • Organic material and topsoil will be retained, and stored >30 m from Bouvier Creek. ESC measures (e.g., silt fencing) will be installed around stockpiles to mitigate sedimentation from precipitation. • Direct cleared snow away from watercourses and drainages |
| Vegetation removal | <ul style="list-style-type: none"> • Riparian vegetation will be maintained whenever possible. • Where vegetation must be cut but is not removed, the cut will be made > 10 cm above the ground to retain the root structure. |
| Operation of heavy equipment adjacent to Bouvier Creek | <ul style="list-style-type: none"> • ESC measures will be installed prior to construction to prevent soil transport into Bouvier Creek. • Regular inspection and maintenance of ESC measures and structures will be undertaken during the course of the Project. |
| Installation of the diversion weir at the upstream end of the east barrel | <ul style="list-style-type: none"> • Minimize the extent and duration of in-water work, where feasible • Work will be isolated from flow using a dam-and-pump or flume bypass • A QEP will be present on-site to monitor for sediment plumes and/or increases in turbidity during instream works. |
| Installation of the fish ladder at the outlet of the west barrel | <ul style="list-style-type: none"> • Minimize the extent and duration of in-water work, where feasible • Work will be isolated from flow using a dam-and-pump or flume bypass • A QEP will be present on-site to monitor for sediment plumes and/or increases in turbidity during instream works. |
| Targeted heavy rock riprap scour and erosion protection works at the outlets | <ul style="list-style-type: none"> • Minimize the extent and duration of in-water work, where feasible • Work will be isolated from flow using a dam-and-pump or flume bypass • A QEP will be present on-site to monitor for sediment plumes and/or increases in turbidity during instream works. |

3.2 Monitoring, Inspection and Response Measures

3.2.1 Monitoring

Monitoring of water quality will occur during works with a high potential for erosion and sedimentation issues (e.g., in-water work when water is present), as well as during the installation of ESC measures. Turbidity monitoring is a method of sediment monitoring to be conducted only during the removal of sediment control structures, when pulses of sediment release are most likely to occur. Visual monitoring is to be used at other times to monitor performance of ESC measures. If sedimentation is observed while ESC measures are in place, work will be halted until the measures have been corrected.

Turbidity monitoring includes the establishment of four transects: one approximately 50 m upstream of the construction site (baseline), and three transects downstream (50 m, 100 m, 200 m). An additional transect at 300 m would be established if turbidity levels are not decreasing by the 200 m transect. Measurements using a turbidity meter will be taken at each station at approximately 30% water depth to avoid potential floating material (e.g., organic material) on the surface of the water affecting the

turbidity measurement. The three measurements are to be averaged to provide a turbidity level for each station.

Per Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life, Total Particulate Matter (CCME, 2002), if downstream turbidity levels exceed eight (8) Nephelometric Turbidity Units (NTUs) above baseline levels, work will be temporarily halted and additional site-specific mitigation measures will be employed to allow the continuation of the work.

3.2.2 Inspection

Work areas are to be inspected daily by the contractor during construction to:

- Observe and document the effectiveness of ESC measures
- Identify damage or degradation of ESC measures

3.2.3 Response

The response is to be based on the outcome of inspections conducted on the effectiveness and condition of ESC measures. Responses may include:

- Repair or replace damaged installations; and
- Add or substitute measures, as approved by the GNWT-INF, to improve effectiveness.

3.2.4 Documentation

All inspections and responses are to be documented by contractor supervisor and shared with the GNWT-INF.

4.0 Excavated Materials

The Bouvier Creek Rehabilitation project is designed with a focus on ecological restoration, specifically targeting the enhancement of fish passage. Minimal excavation quantities are anticipated as the project makes use of existing scour at the West culvert abutment created during high flows.

The excavated material will be repurposed and blended into the existing foreslopes of Mackenzie Highway #1. This method of material reuse is both environmentally and economically beneficial as the existing side slopes of the highway consist of mainly granular material limiting the growth of vegetation that assists in slope stabilization. This approach reduces the need for new materials to repair erosion gullies, minimizes waste, and helps stabilize the highway foreslopes, potentially preventing erosion and maintaining the structural integrity of the road. This practice reflects a sustainable approach to construction and rehabilitation, aligning with broader environmental conservation goals.

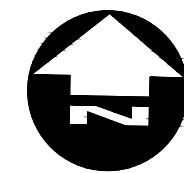
References

- CCME. 2002. Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life, Total Particulate Matter
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- Transportation Association of Canada (TAC). 2010. Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions. Available at: <https://www.tac-atc.ca/en/publications/ptm-permafrost>. Accessed January 2024.

Appendix A

99% Review Drawings

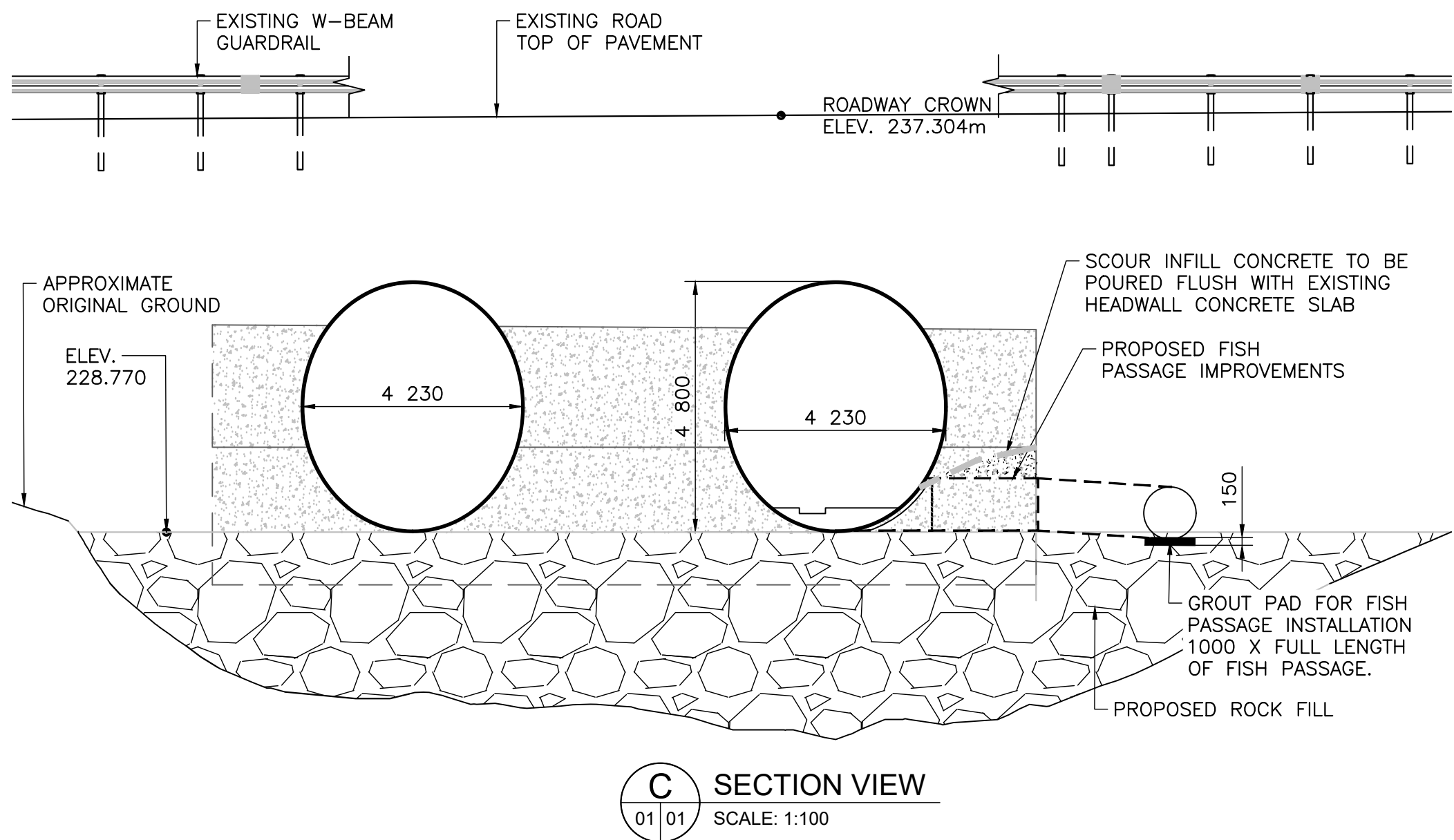
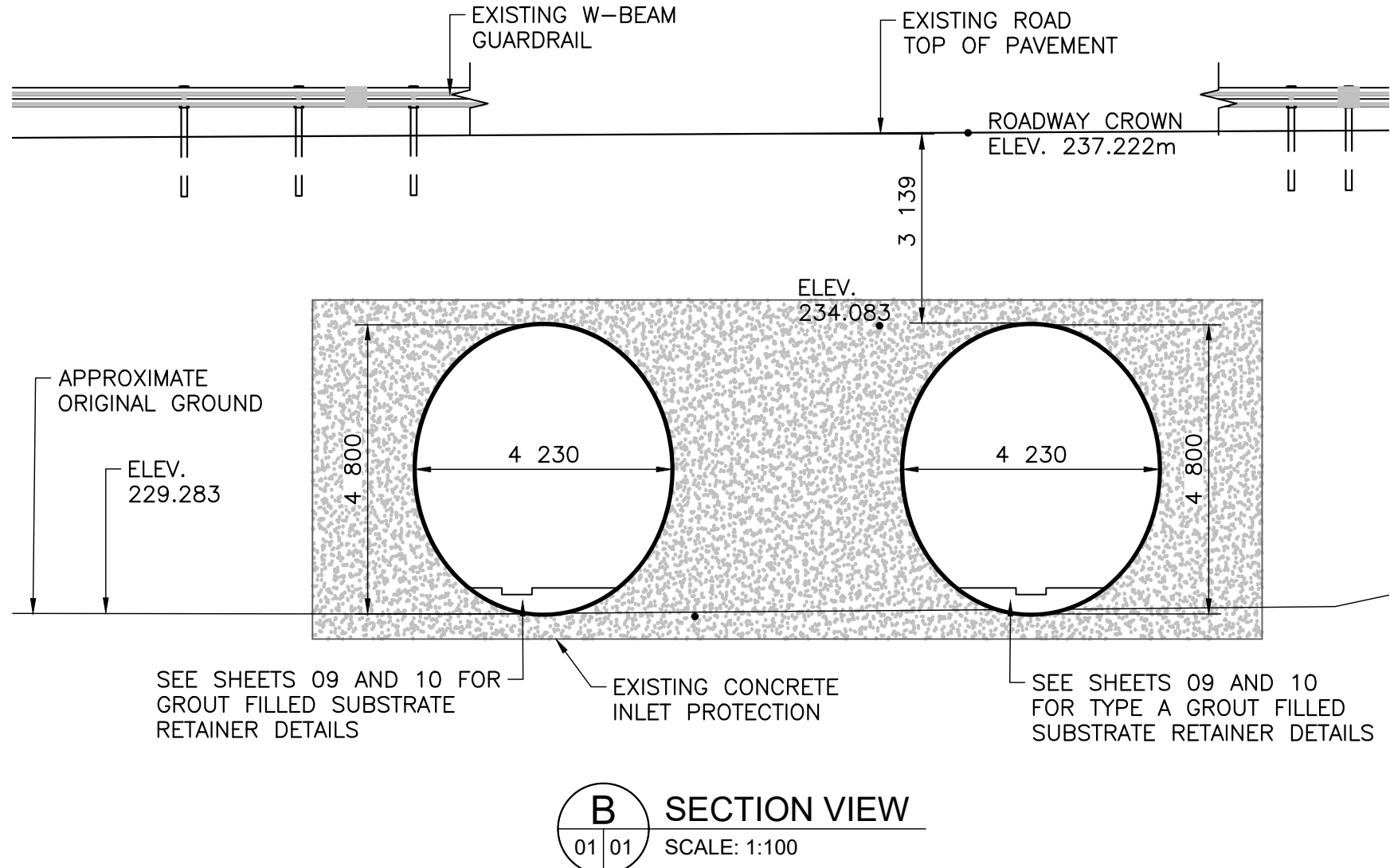
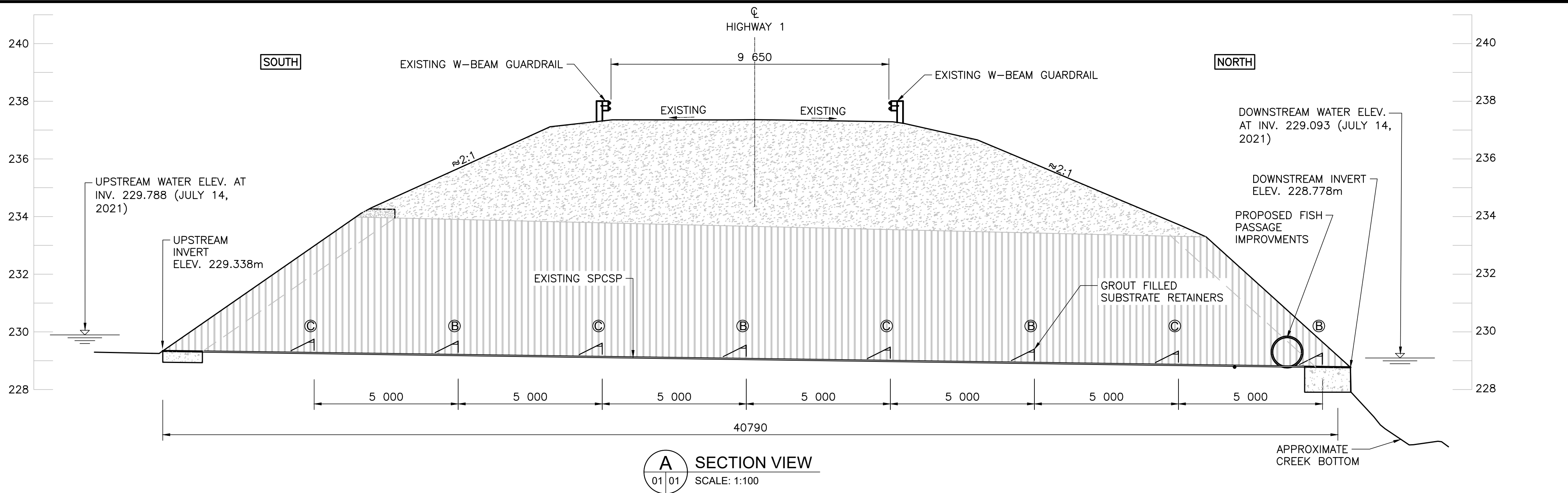
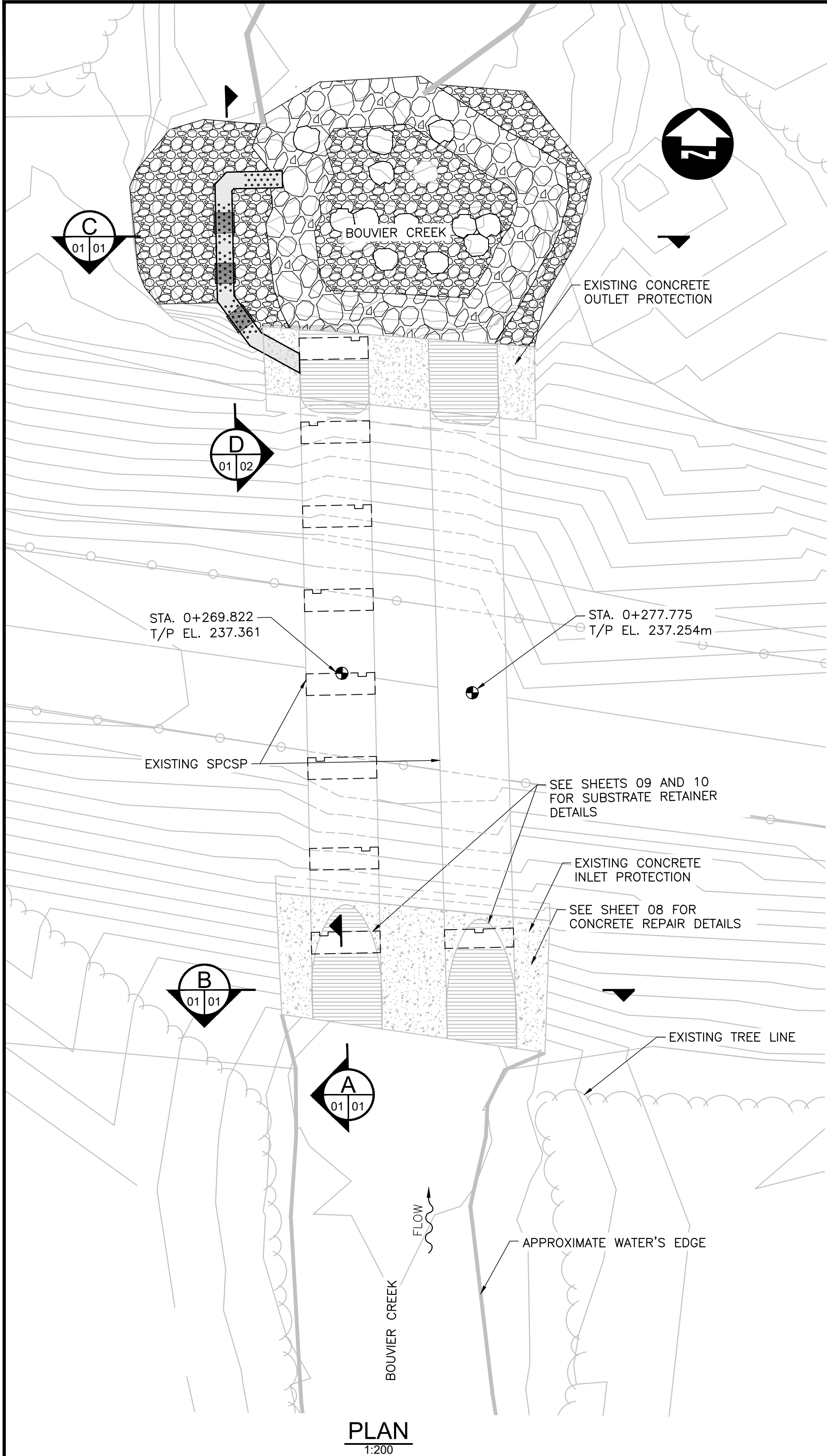
BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5 BRIDGE-CULVERT REHABILITATION



| DRAWING LIST | |
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| DRAWING NO. | DRAWING TITLE |
| 00 | COVER SHEET |
| 01 | GENERAL ARRANGEMENT OF PROPOSED REHABILITATION WORKS |
| 02 | DETAILS AND ISOMETRIC OF PROPOSED FISH PASSAGE IMPROVEMENTS TO EXISTING CULVERT CONNECTION |
| 03 | EXISTING SITE PHOTOS |
| 04 | STAGING PLAN |
| 05 | FISH PASSAGE PLAN, SECTIONS AND DETAIL |
| 06 | FISH PASSAGE SECTIONS |
| 07 | EROSION & SCOUR PROTECTION |
| 08 | CONCRETE & STRUCTURAL REPAIRS |
| 09 | SPCSP SUBSTRATE RETAINER DETAILS 1 OF 2 |
| 10 | SPCSP SUBSTRATE RETAINER DETAILS 2 OF 2 |
| 11 | SUBSTRATE RETAINER RENDERING TYPE B |
| 12 | ROADWAY & EROSION DETAILS |

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GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE PROJECT SPECIFICATIONS.
2. THE METRIC SYSTEM OF MEASUREMENT IS USED ON ALL DRAWINGS. ELEVATIONS AND STATIONS ARE SHOWN IN METERS AND ALL OTHER DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, DETAILS, AND ELEVATIONS OF THE PROPOSED WORK SHOWN ON THE DRAWINGS PRIOR TO COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED SHALL BE SUBMITTED FOR APPROVAL.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL TEMPORARY WORKS INCLUDING, BUT NOT LIMITED TO, COFFERDAMS, DEWATERING SYSTEMS, CONSTRUCTION PLATFORMS, ETC.
5. ANY DAMAGE TO ANY EXISTING UTILITIES BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT HIS/HER OWN COST TO THE ENGINEER'S SATISFACTION.
6. ALL WORK SHALL CONFORM TO CSA S6-19, THE CANADIAN HIGHWAY BRIDGE DESIGN CODE.
7. CONTRACTOR SHALL VERIFY PRESENCE OF ANY AND ALL EXISTING UTILITIES PRIOR TO EXCAVATION OR CONSTRUCTION.
8. STRUCTURE SHALL NOT BE BACKFILLED (BACKFILL AGAINST ANY CONCRETE COMPONENT) UNTIL CONCRETE HAS REACHED 70% OF ITS SPECIFIED STRENGTH.
9. ALL REFERENCES TO CODES, STANDARDS, SPECIFICATIONS, GUIDELINES, ETC. SHALL BE THE LATEST EDITION UNLESS OTHERWISE INDICATED.
10. ALL WORKS TO BE PERFORMED IN ACCORDANCE WITH APPLICABLE LEGISLATION AND REGULATION INCLUDING BUT NOT LIMITED TO THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS.

CULVERT STEEL:

1. ALL EDGES SHALL BE GROUND SMOOTH AND FREE OF SHARP EDGES, BURRS, ETC.
2. ALL STEEL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM SPECIFICATION A123/A153 TO A MINIMUM RETENTION OF 610 g/m² UNLESS NOTED OTHERWISE.
3. THE FISH PASSAGE SHALL BE CORRUGATED STEEL PIPE WITH A MINIMUM SHEET METAL THICKNESS OF 2.8mm
4. ALL CULVERT STEEL SHALL CONFORM TO CSA G401 UNLESS NOTED OTHERWISE.
5. CORRUGATION PROFILE (125mm x 25) FOR THE FISH PASSAGE CULVERT.
6. HOLES IN CSP/SPCSP TO BE FIELD DRILLED AND COATINGS SHALL BE REPAIRED IN ACCORDANCE WITH ASTM A123.

STRUCTURAL CONCRETE:

1. ALL STRUCTURAL CONCRETE SHALL CONFORM TO CLASS C FROM SSBC: $f'c = 35 \text{ MPa} @ 28 \text{ DAYS}$.
2. ALL CONCRETE AND METHOD OF CONSTRUCTION TO CONFORM TO CSA-A23.1 AND TESTING TO CSA A23.2.
3. COLD WEATHER REQUIREMENT TO BE CARRIED OUT IN TO THE REQUIREMENTS OF CSA-A23.1 LATEST EDITION.
4. AIR CONTENT SHALL BE 5-8%, SLUMP RANGE 100 +/- 30, EXPOSURE CLASS C-1.
5. MAXIMUM SIZE AGGREGATE - 20mm.
6. ALL EXPOSED EXTERIOR CONCRETE EDGES TO BE CHAMFERED BY 20mm.
7. ALL CONCRETE SHALL BE PLACED ON UNFROZEN GROUND ONLY.
8. CONCRETE POURS FOR THE CONCRETE REPAIRS SHALL BE COMPLETED IN ONE STAGE POUR PER REPAIR AREA.

REINFORCING STEEL:

1. ALL REINFORCING STEEL SHALL CONFORM TO CSA-G30.18 400W UNLESS NOTED OTHERWISE.
2. PROVIDE 50mm CLEAR COVER TO REINFORCING STEEL UNLESS NOTED OTHERWISE.
3. ALL REINFORCING STEEL SHALL BE SHOP FABRICATED TO INCLUDE HOOKS AND BENDS. ALL LAP SPLICES SHALL BE IN ACCORDANCE WITH CSA. A23.3, CLASS B TENSION LAP SPLICES.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA G40.21 GRADE 300W UNLESS NOTED OTHERWISE.
2. ALL MATERIALS, EXCEPT STAINLESS STEEL ITEMS, SHALL BE HOT DIP GALVANIZED IN ACCORDANCE OF ASTM A123 WITH NET RETENTION OF 610 g/m² UNLESS NOTED OTHERWISE.
3. SELF-FLUXING, LOW TEMPERATURE, ZINC-BASED ALLOY RODS IN ACCORDANCE WITH ASTM A780 (ACCORDING SSBC 18.2.9.1) SHALL BE USED TO TOUCH-UP DAMAGED HOT-DIP GALVANIZING ON SITE AND TO METALLIZE FIELD WELDS.
4. ALL EDGES SHALL BE GROUND SMOOTH AND FREE OF SHARP EDGES, BURRS, ETC.
5. METALLIZING OF THE EXISTING SPCSP TO BE IN ACCORDANCE WITH HE CONTRACT DOCUMENTS.

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BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5
BRIDGE-CULVERT REHABILITATION

PROJECT NO.
211344

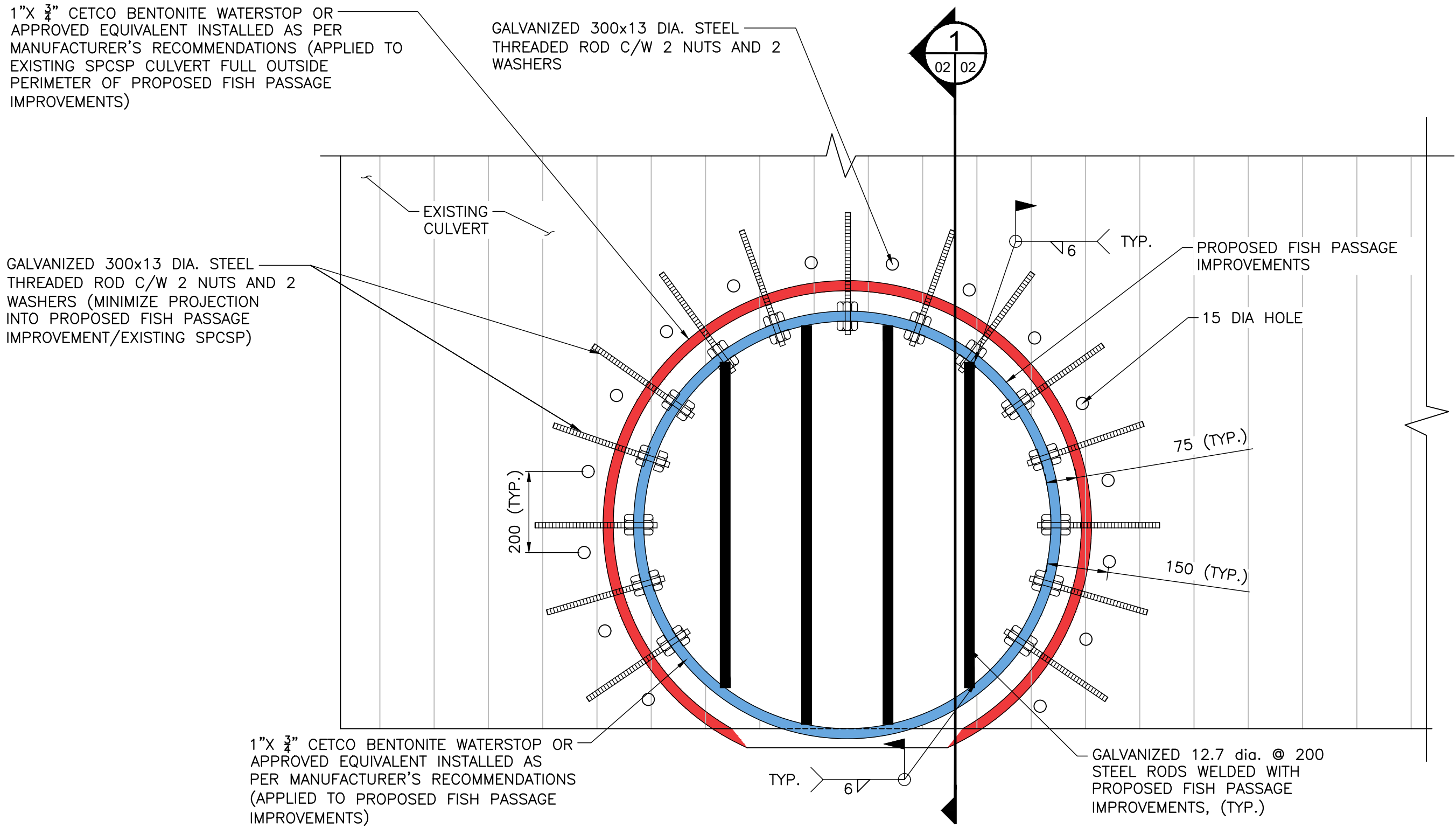
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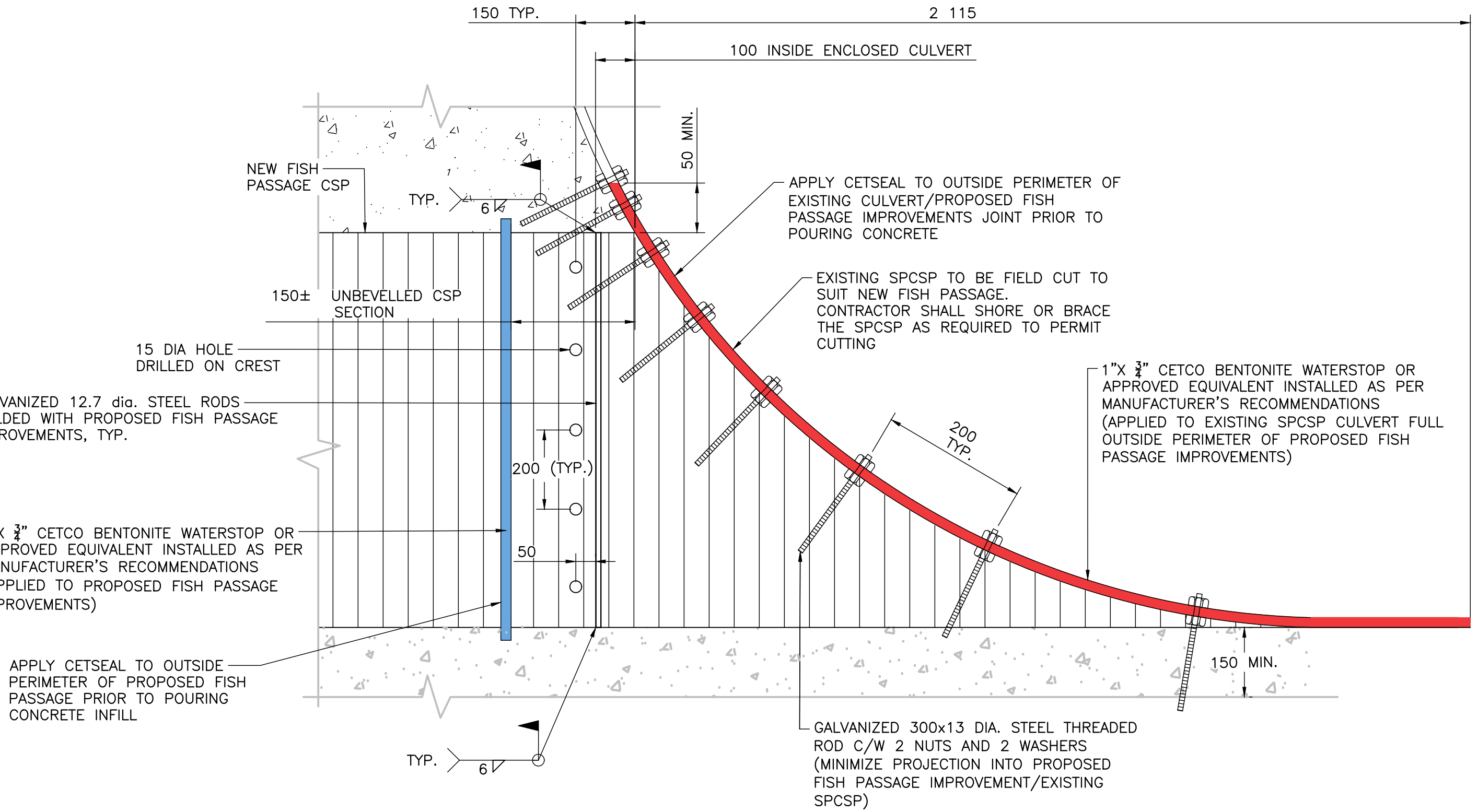
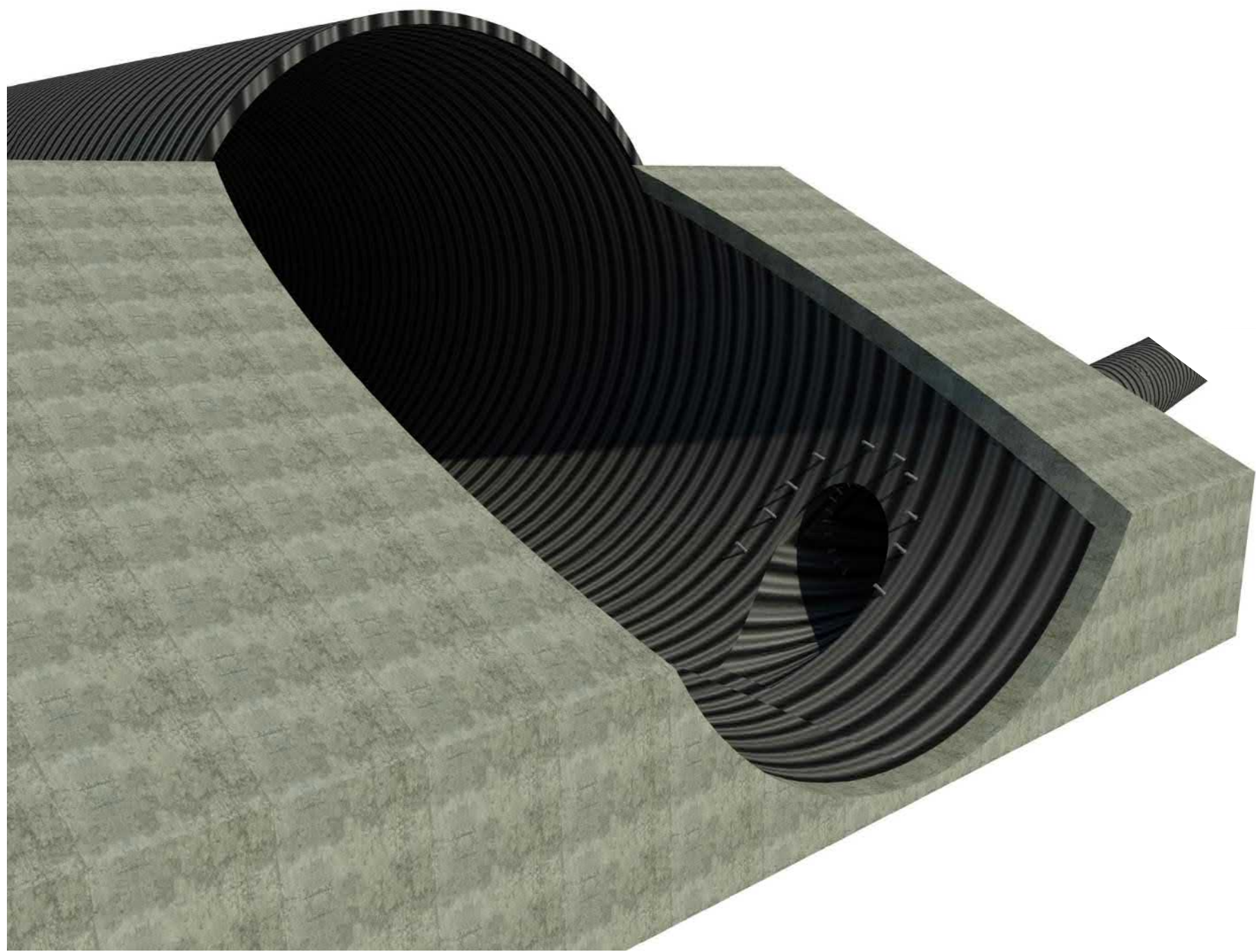
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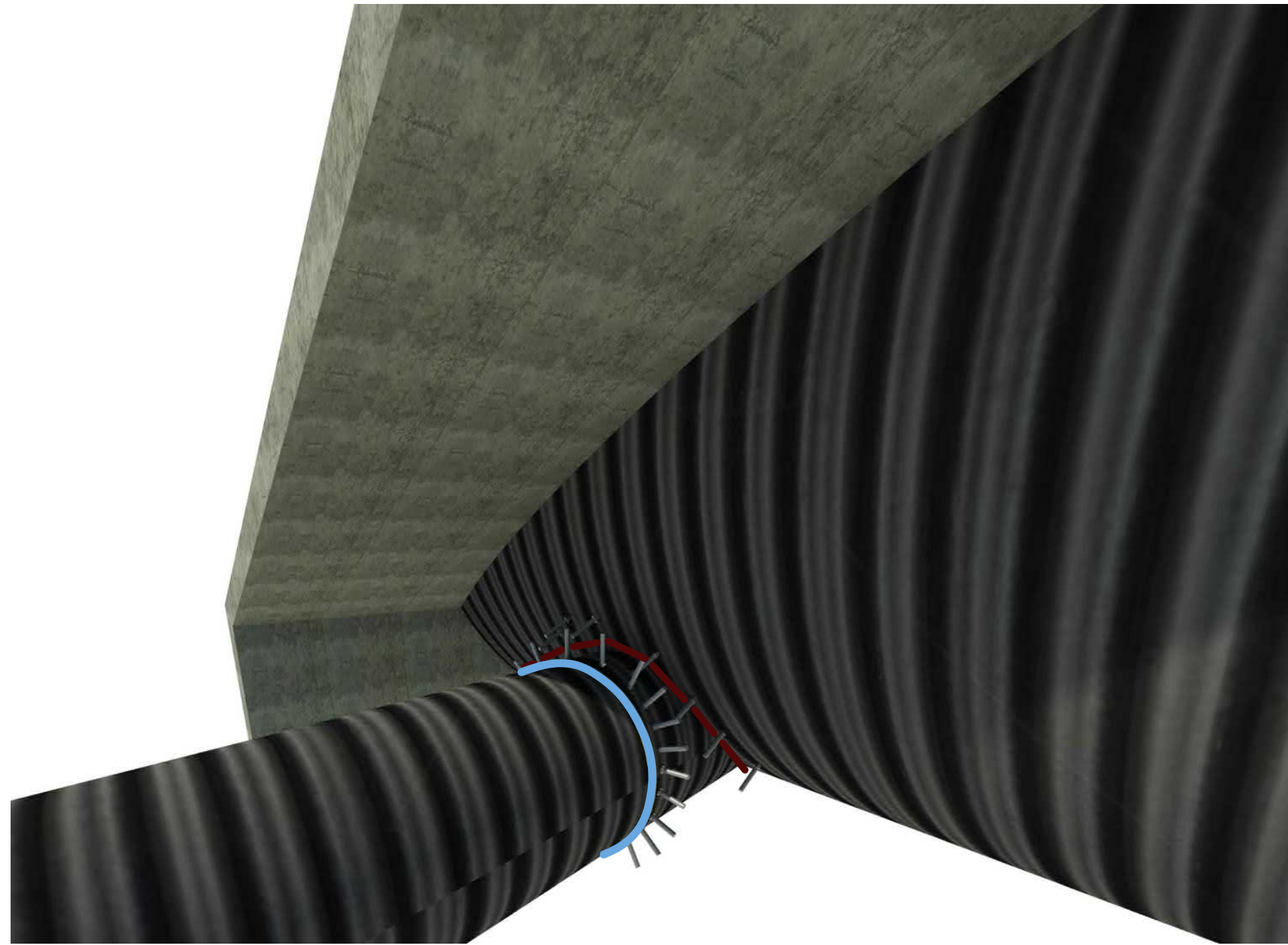
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D SECTION VIEW
01 02 SCALE: 1:10



1 DETAIL 1
02 02 SCALE: 1:10



SPCSP - PROPOSED FISH PASSAGE IMPROVEMENTS
N.T.S

NOTE: SUBSTRATE RESTRAINERS NOT SHOWN FOR CLARITY

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DETAILS AND ISOMETRIC OF PROPOSED
FISH PASSAGE IMPROVEMENTS TO
EXISTING CULVERT CONNECTION

SHEET NO.

02

NOTE: PHOTOGRAPHS WERE CAPTURED JULY 12, 2022.



GENERAL SITE LOOKING DOWNSTREAM (NORTH)
N.T.S



TYPICAL CULVERT INTERIOR CONDITION
N.T.S



TYPICAL INLET PROTECTION CONCRETE SPALL
N.T.S



SCOUR BEHIND WEST BARREL OUTLET PROTECTION
N.T.S



CULVERT OUTLET
N.T.S



CULVERT INLET
N.T.S

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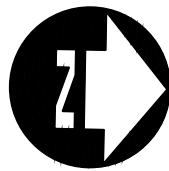
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| BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5 BRIDGE-CULVERT REHABILITATION | | PROJECT NO. 211344 |
| EXISTING SITE PHOTOS | | SHEET NO. 03 |



COFFERDAM TO ISOLATE THE EAST BARREL INLET (TO BE DESIGNED BY THE CONTRACTOR)

CONCRETE REPAIRS AROUND WEST BARREL

WEST CULVERT SUBSTRATE RETAINERS SHOWN SCHEMATICALLY. SEE SECTION VIEWS ON SHEETS 09 AND 10 FOR PARTICULAR DETAILS, TYP.

PROPOSED FISH PASSAGE IMPROVEMENTS

FLOW

BOUVIER CREEK

FLOW

STAGE 1 WORKS:

- CONSTRUCT COFFERDAM TO ISOLATE THE WEST BARREL
- DEWATER WEST BARREL
- COMPLETE INLET CONCRETE PROTECTION CONCRETE REPAIRS AROUND WEST BARREL
- ABRASIVE BLAST AND METALLIZE SPCSP
- INSTALL SUBSTRATE RETAINERS IN WEST BARREL
- CONSTRUCT ACCESS TO WEST SIDE OF OUTLET
- PLACE HEAVY ROCK RIP-RAP PROTECTION ALONG WITH PROPOSED FISH PASSAGE IMPROVEMENTS CHANNEL

STAGE 1 - WEST BARREL

SCALE: 1:100

COFFERDAM TO ISOLATE THE WEST BARREL INLET (TO DESIGNED BY THE CONTRACTOR)

FLOW

BOUVIER CREEK

FLOW

COFFERDAM TO ISOLATE THE EAST BARREL OUTLET (TO BE DESIGNED BY THE CONTRACTOR)

EAST CULVERT SUBSTRATE RETAINER SEE SHEETS 09 AND 10 FOR DETAILS

CONCRETE REPAIRS AROUND EAST BARREL

STAGE 2 WORKS:

- CONSTRUCT COFFERDAM TO ISOLATE THE EAST BARREL
- DEWATER EAST BARREL
- COMPLETE INLET CONCRETE PROTECTION CONCRETE REPAIRS AROUND EAST BARREL
- ABRASIVE BLAST AND METALLIZE SPCSP
- INSTALL HEADWATER SUBSTRATE RETAINER IN EAST BARREL
- CONSTRUCT ACCESS TO EAST SIDE OF OUTLET
- PLACE HEAVY ROCK RIP-RAP PROTECTION

STAGE 2 - EAST BARREL

SCALE: 1:100

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BRIDGE-CULVERT REHABILITATION

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STAGING PLAN

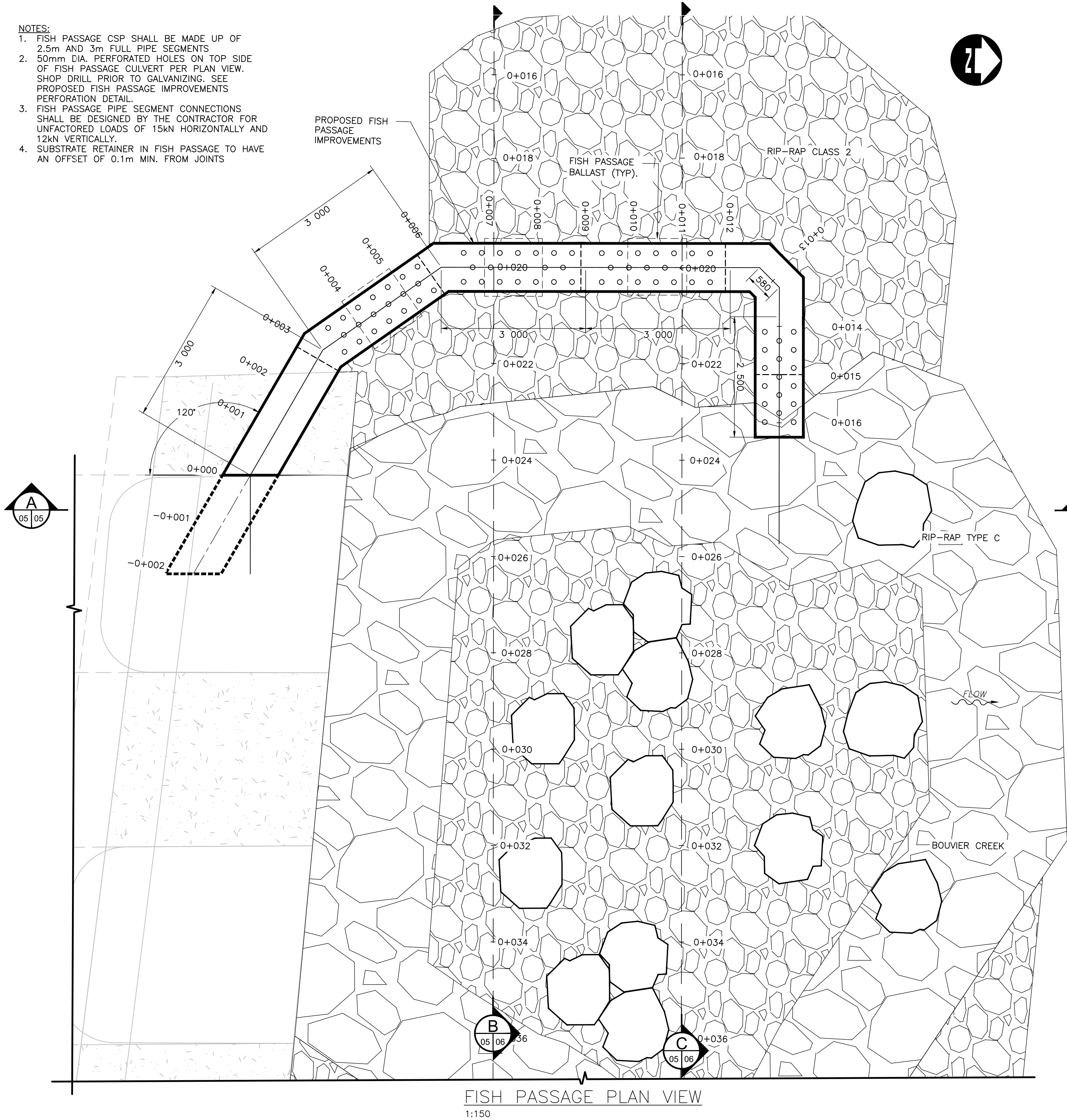
SHEET NO.

04

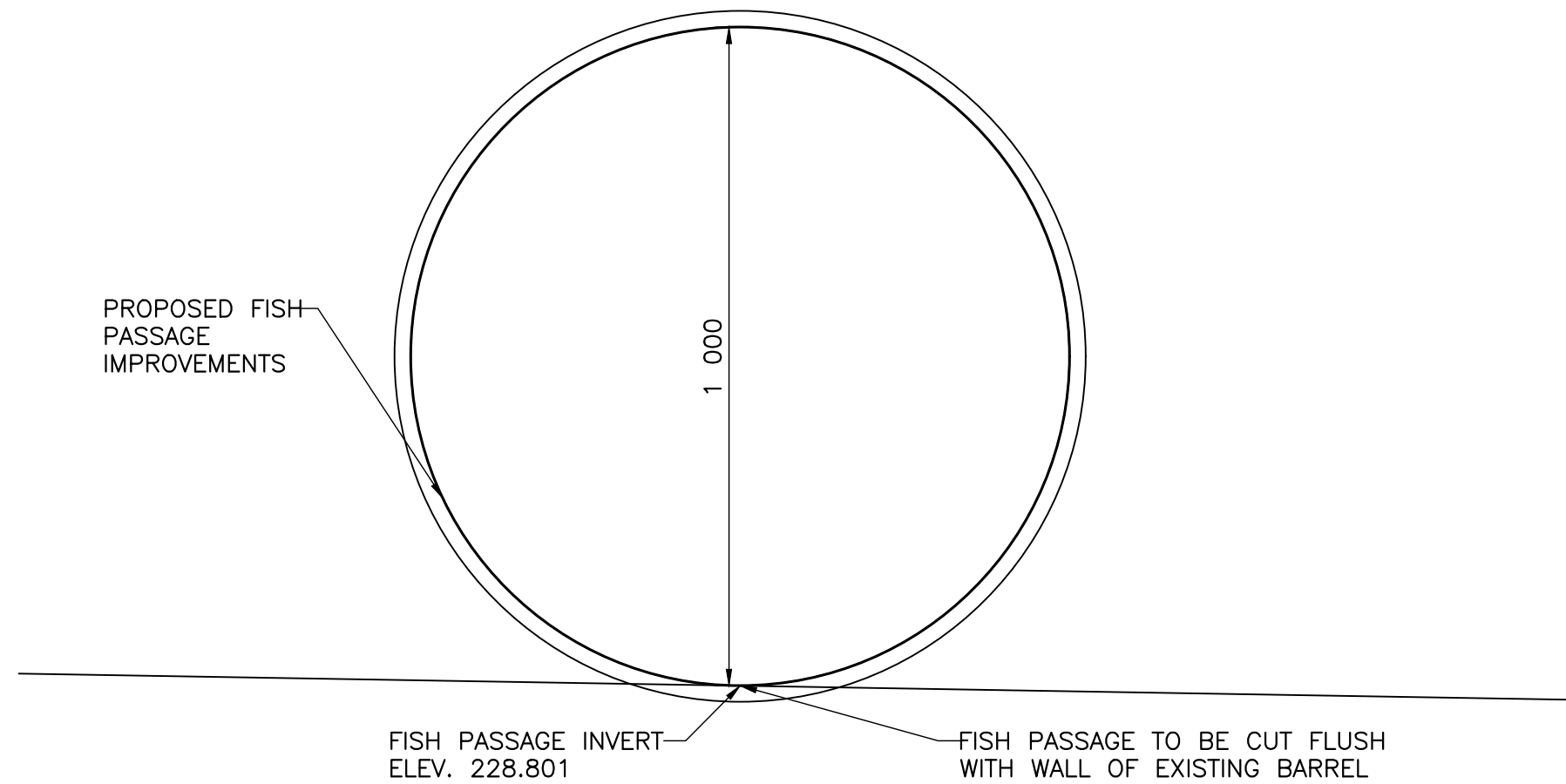
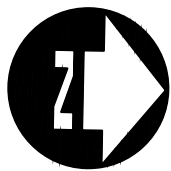
DILLON CONSULTING LIMITED Winnipeg, Manitoba, 1558 Wilson Place, R3T 0Y4 204-453-2301

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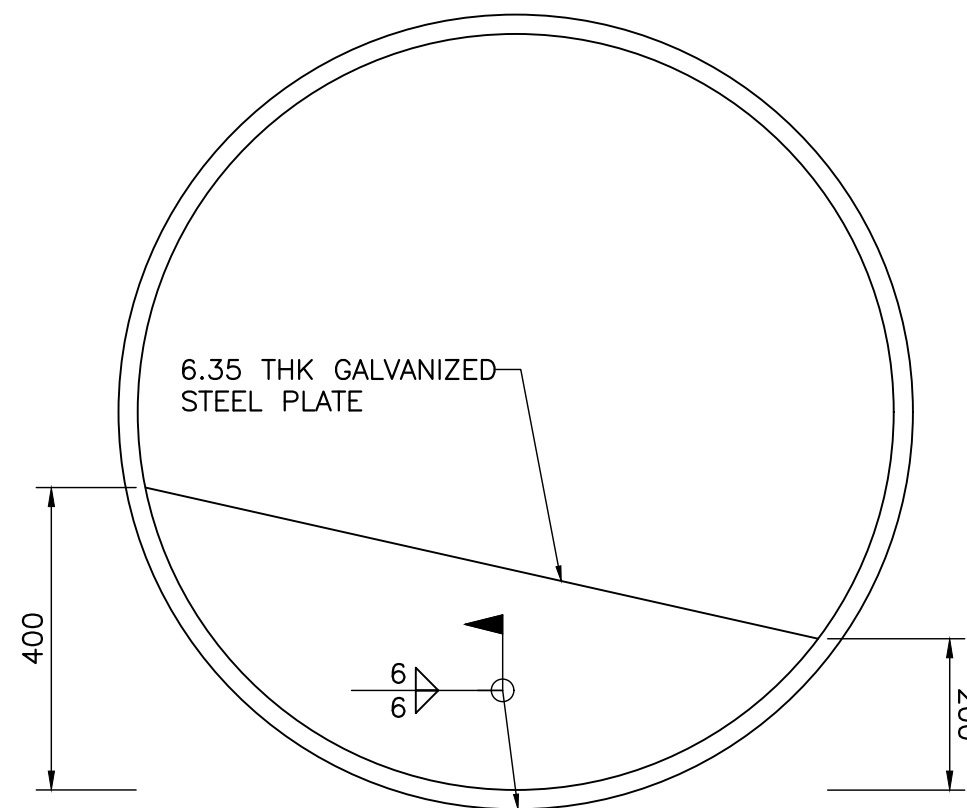
- NOTES:
- FISH PASSAGE CSP SHALL BE MADE UP OF 2.5m AND 3m FULL PIPE SEGMENTS
 - 50mm DIA. PERFORATED HOLES ON TOP SIDE OF FISH PASSAGE CULVERT PER PLAN VIEW. SHOP DRILL PRIOR TO GALVANIZING. SEE PROPOSED FISH PASSAGE IMPROVEMENTS PERFORMANCE DETAIL.
 - FISH PASSAGE PIPE SEGMENT CONNECTIONS SHALL BE DESIGNED BY THE CONTRACTOR FOR UNFACTORED LOADS OF 15kN HORIZONTALLY AND 12kN VERTICALLY.
 - SUBSTRATE RETAINER IN FISH PASSAGE TO HAVE AN OFFSET OF 0.1m MIN. FROM JOINTS



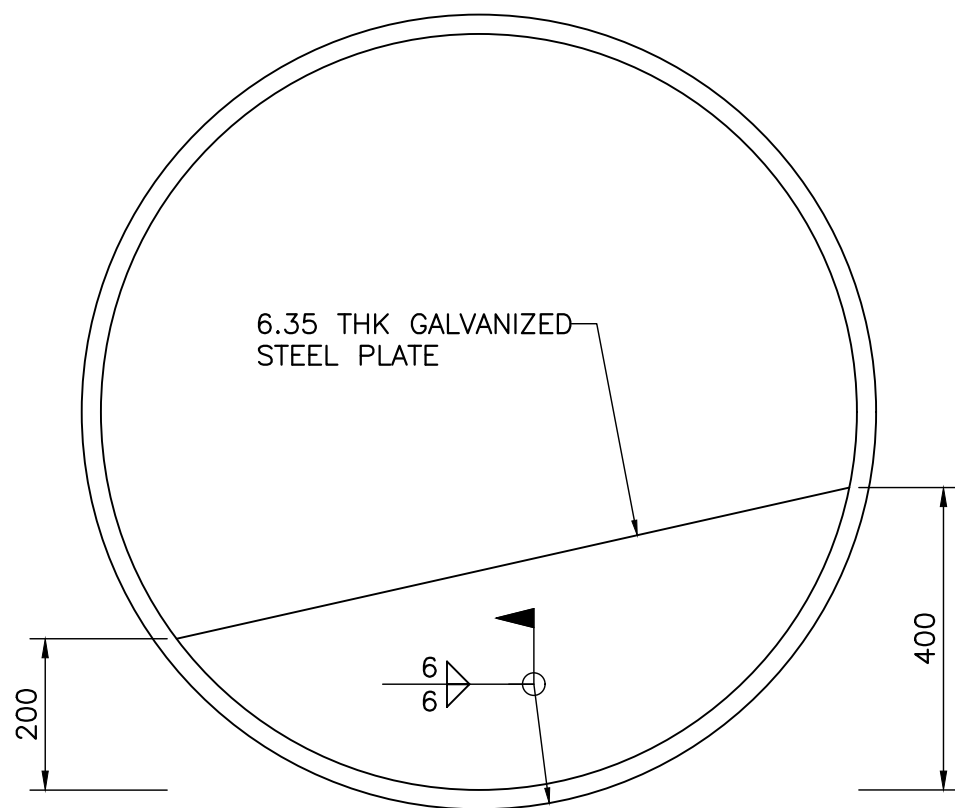
FISH PASSAGE PLAN VIEW
1:150



A SECTION VIEW
05/05 SCALE: 1:10

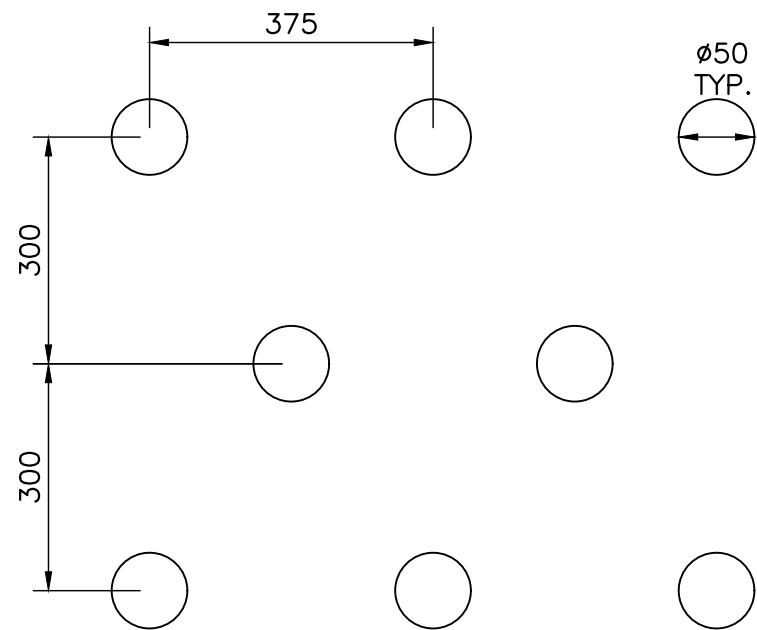


BAFFLE TYPE A DETAIL
SCALE: 1:100



BAFFLE TYPE B DETAIL
SCALE: 1:100

PROPOSED FISH PASSAGE IMPROVEMENTS PERFORATION DETAILS
SCALE: 1:10



Conditions of Use

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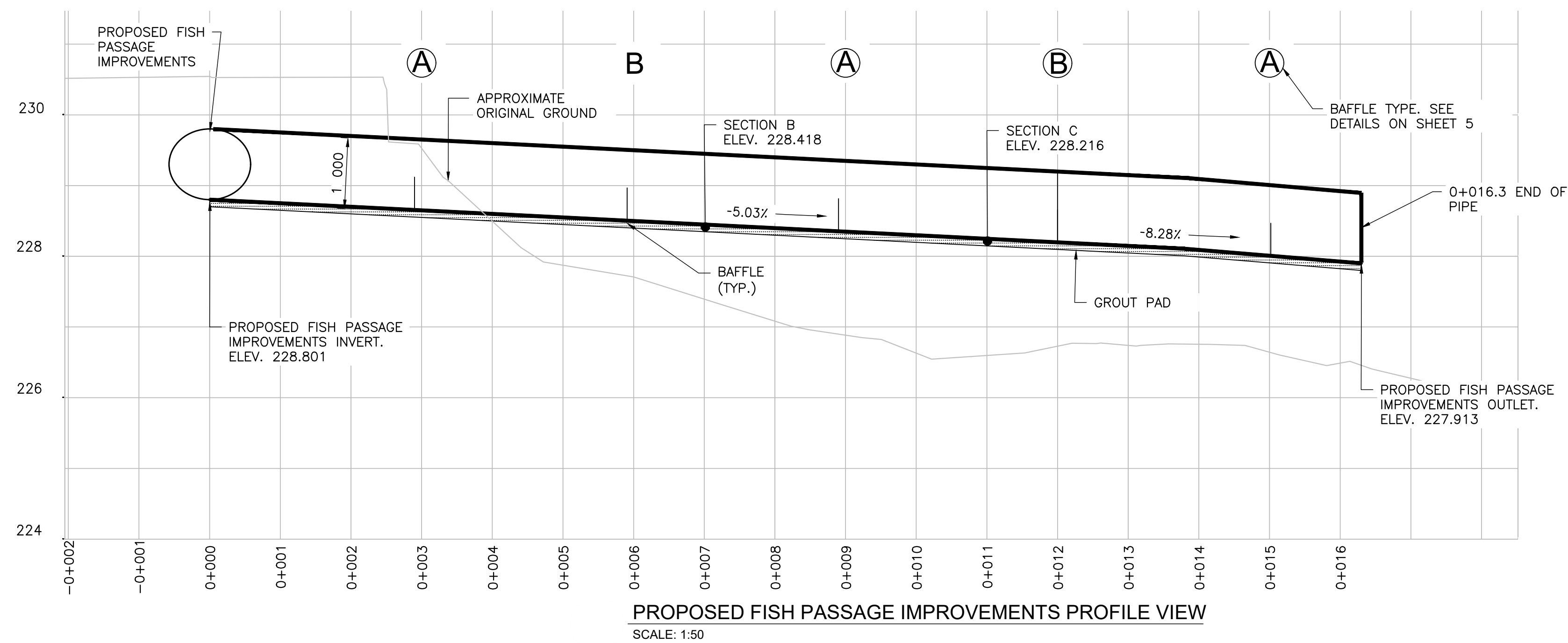
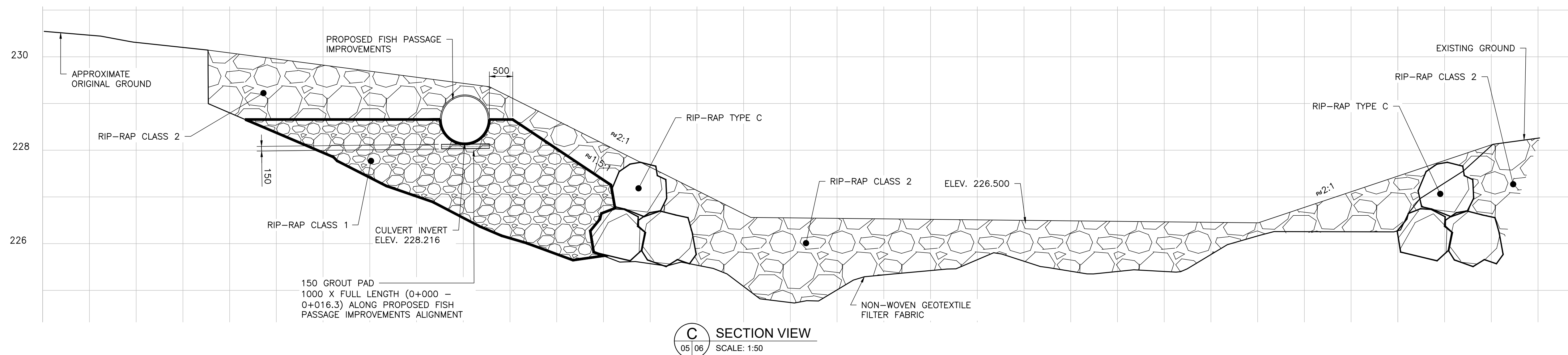
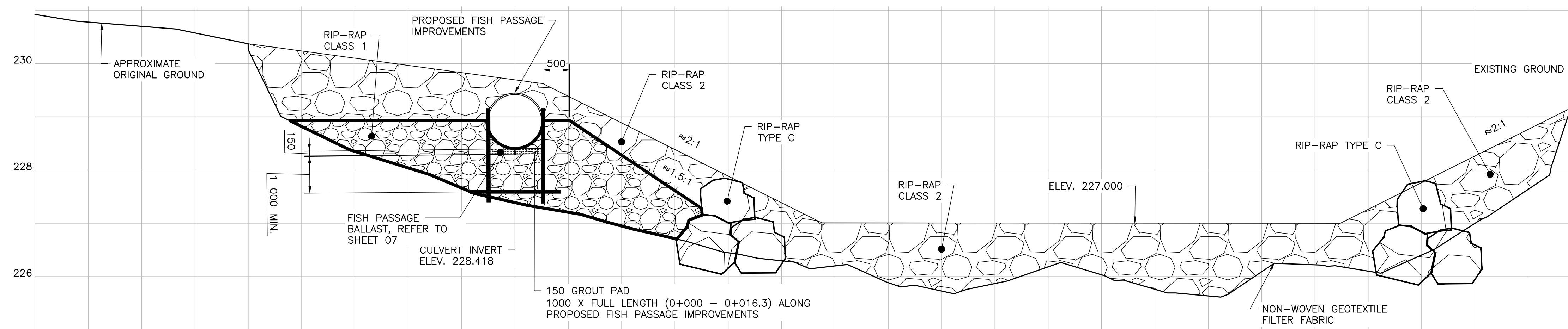
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BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5
BRIDGE-CULVERT REHABILITATION

PROJECT NO.
211344

FISH PASSAGE PLAN,
SECTIONS AND DETAIL

SHEET NO.
05



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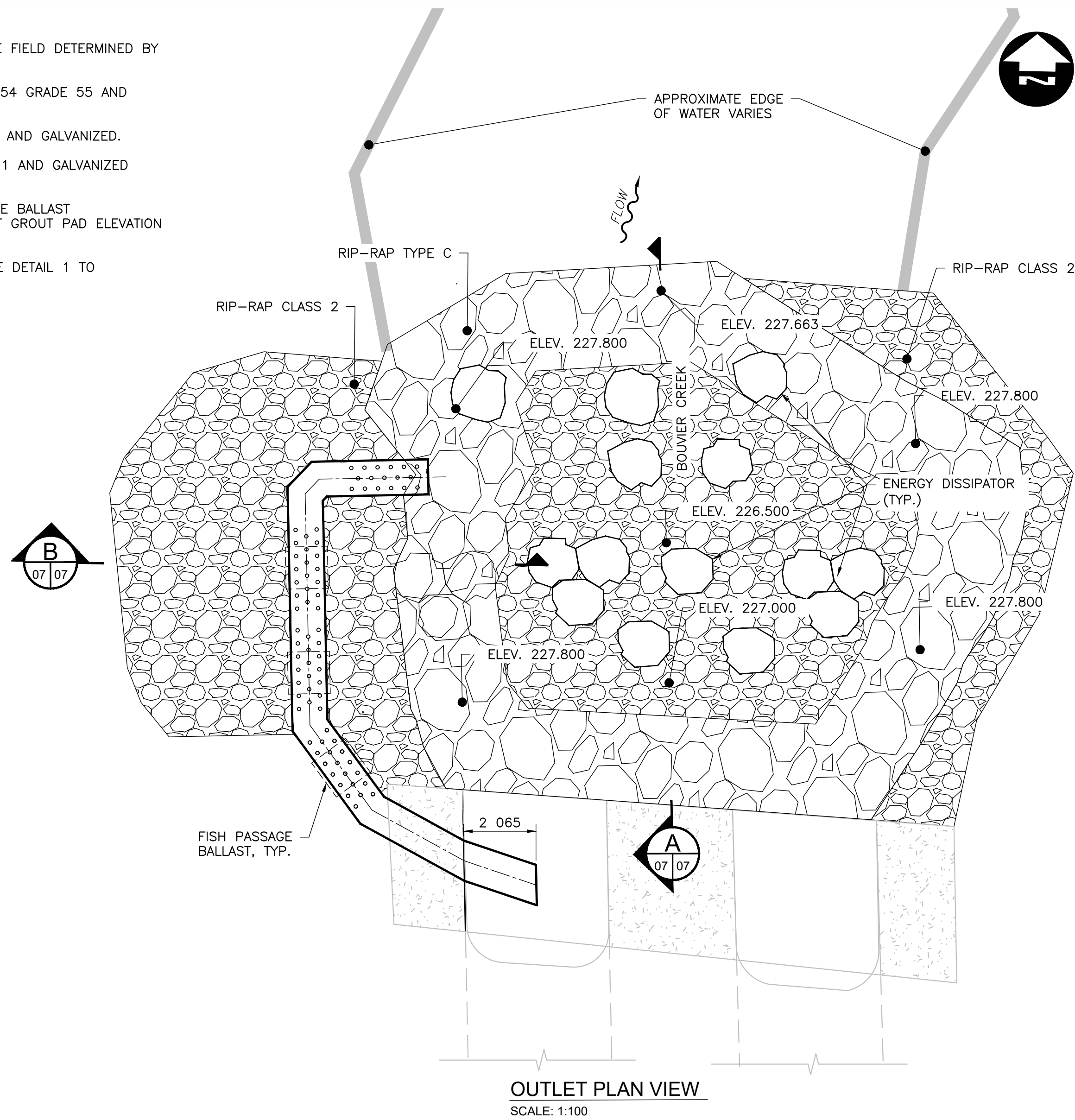


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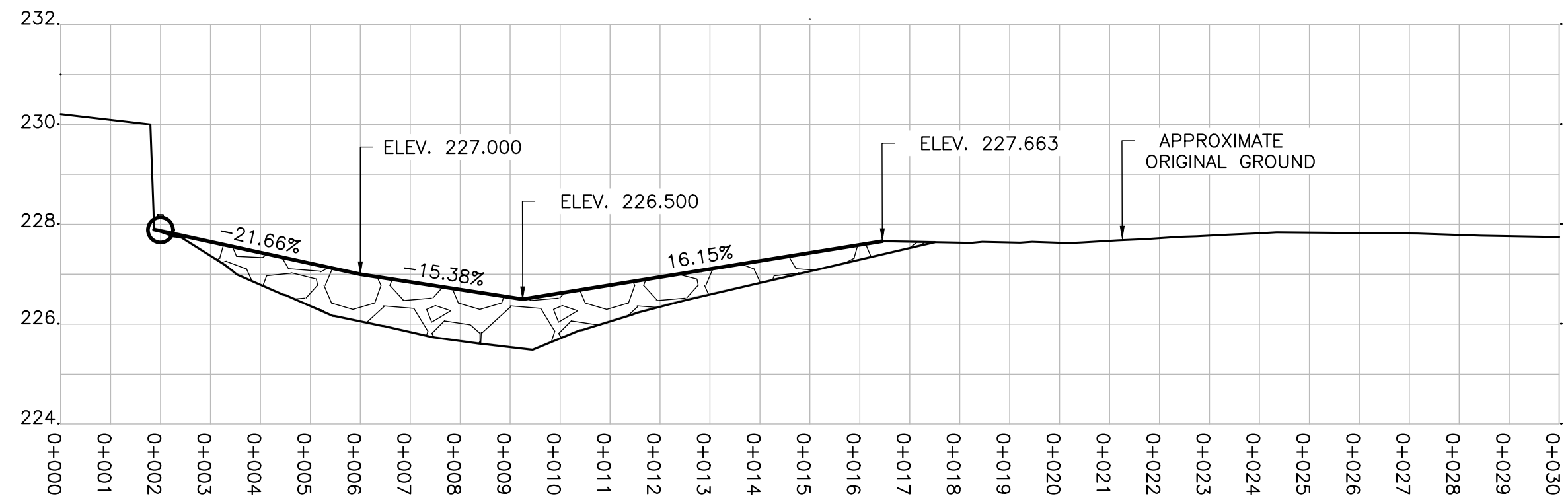
SHEET NO.

06

- NOTES:
1. ENERGY DISSIPATOR LOCATIONS TO BE FIELD DETERMINED BY CONTRACT ADMINISTRATOR
 2. THREADED RODS SHALL BE ASTM F1554 GRADE 55 AND GALVANIZED.
 3. NUTS SHALL BE ASTM A563 GRADE A AND GALVANIZED.
 4. WASHER SHALL BE ASTM F436 TYPW 1 AND GALVANIZED
 5. POTENTIAL CONSTRUCTION SEQUENCE:
 - INSTALL DETAIL 2 ON FISH PASSAGE BALLAST
 - BACKFILL CLASS 2 TO BOTTOM OF GROUT PAD ELEVATION
 - FORM AND POUR GROUT PAD
 - INSTALL CSP WITH DETAIL 1
 - INSTALL WASHER, NUT AND SECURE DETAIL 1 TO THREADED ROD OF DETAIL 2
 - BACKFILL CLASS 1

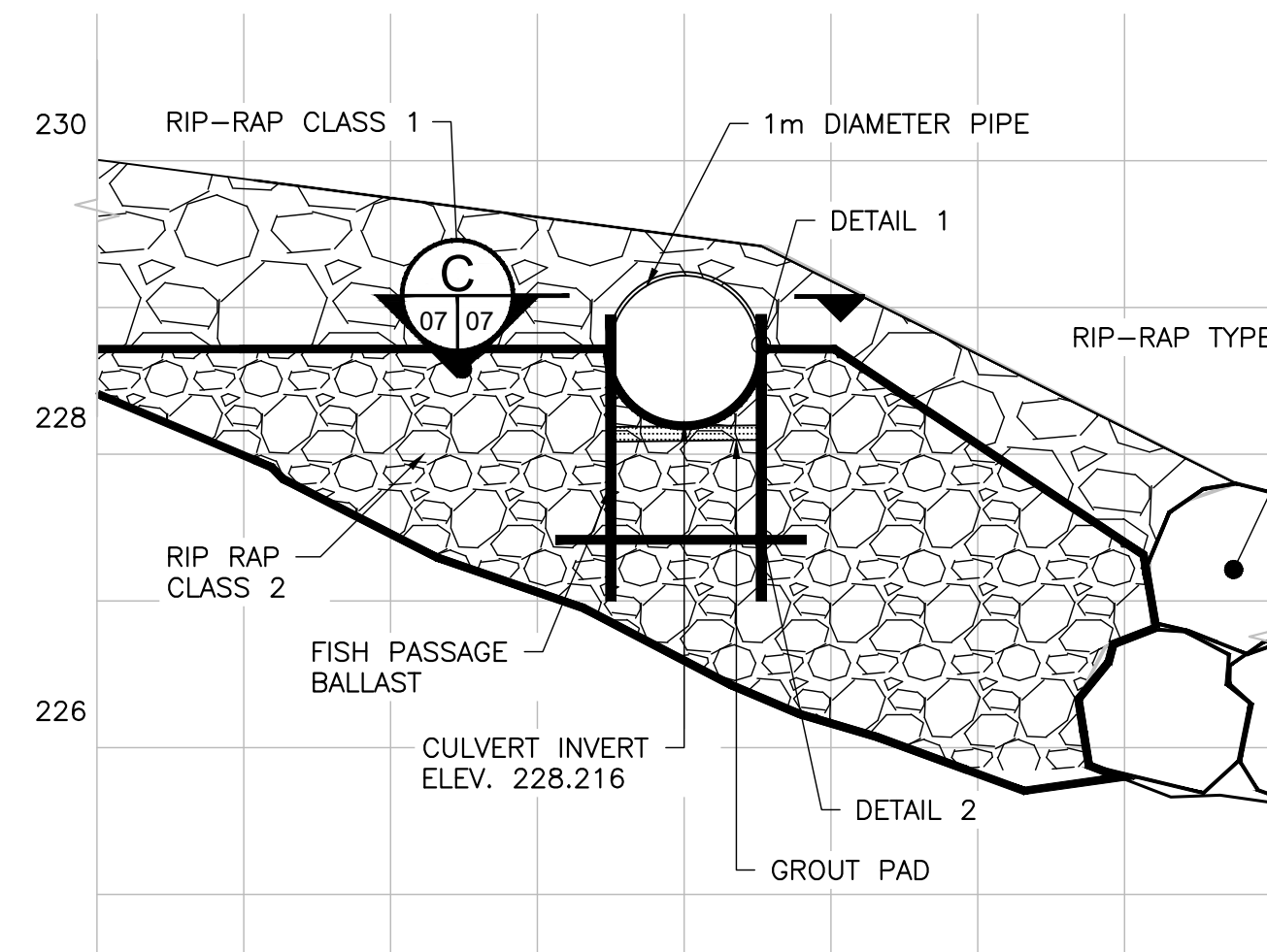


OUTLET PLAN VIEW
SCALE: 1:100



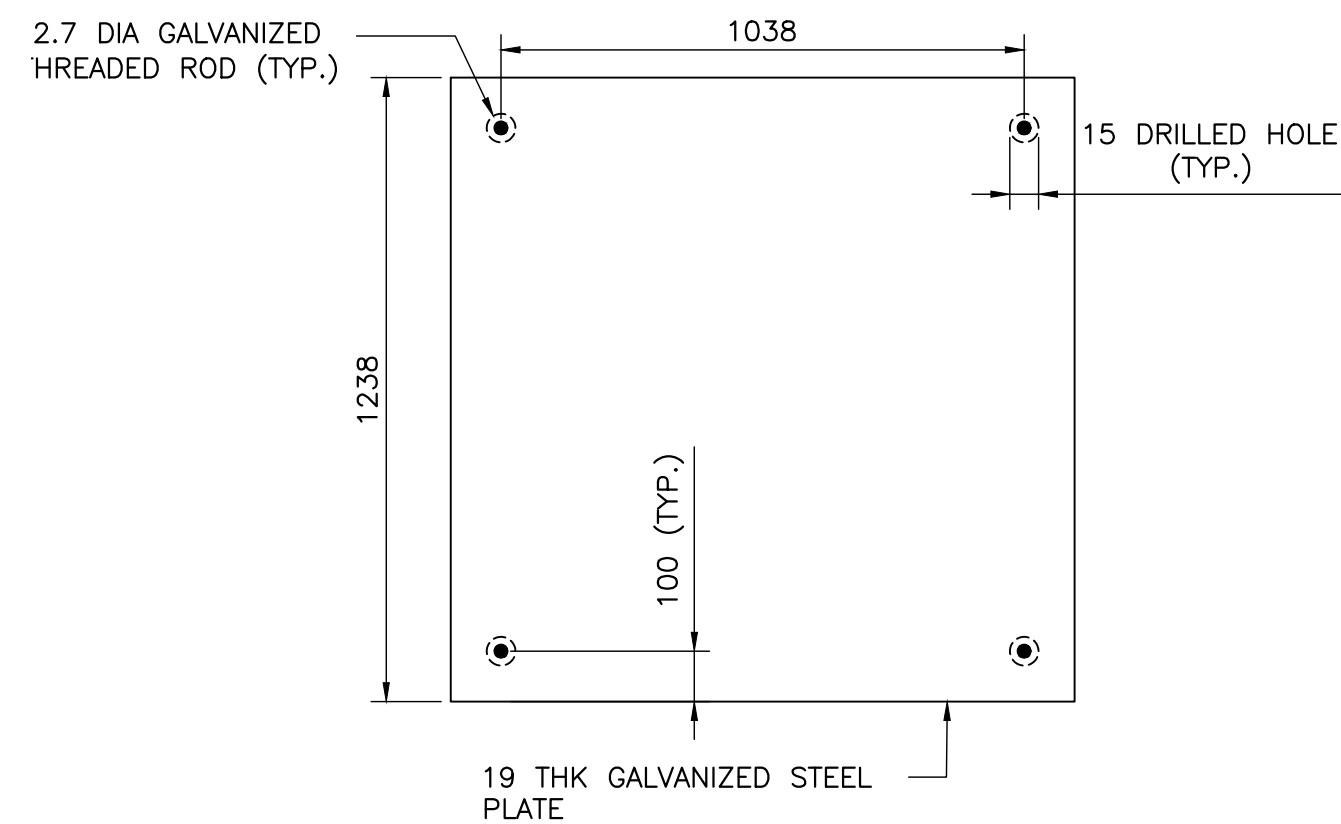
A SECTION VIEW
07 07 SCALE: 1:100

NOTE: ENERGY DISSIPATORS NOT SHOWN, LOCATIONS ARE TBD IN FIELD

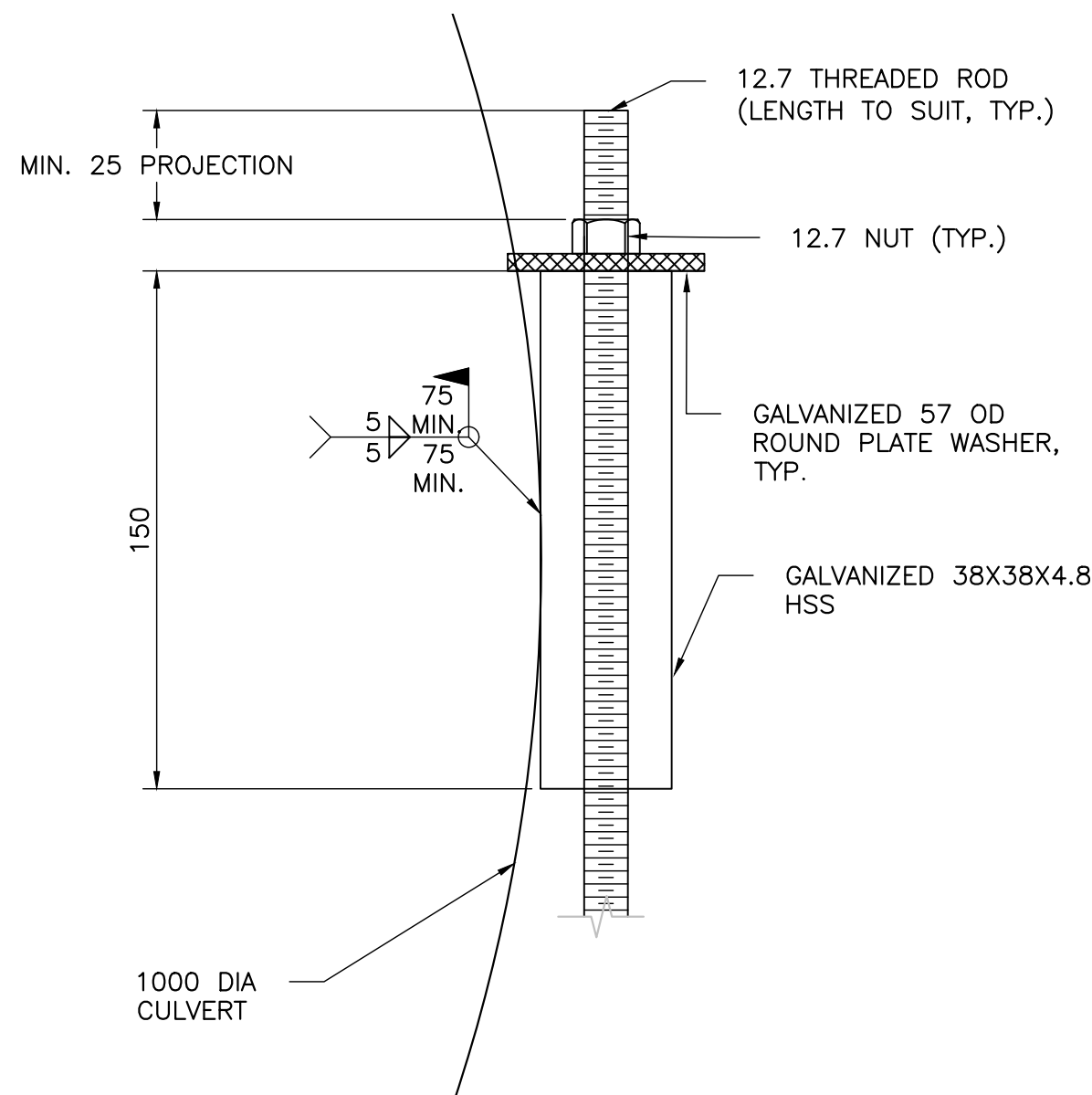


B SECTION VIEW
07 07 SCALE: 1:50

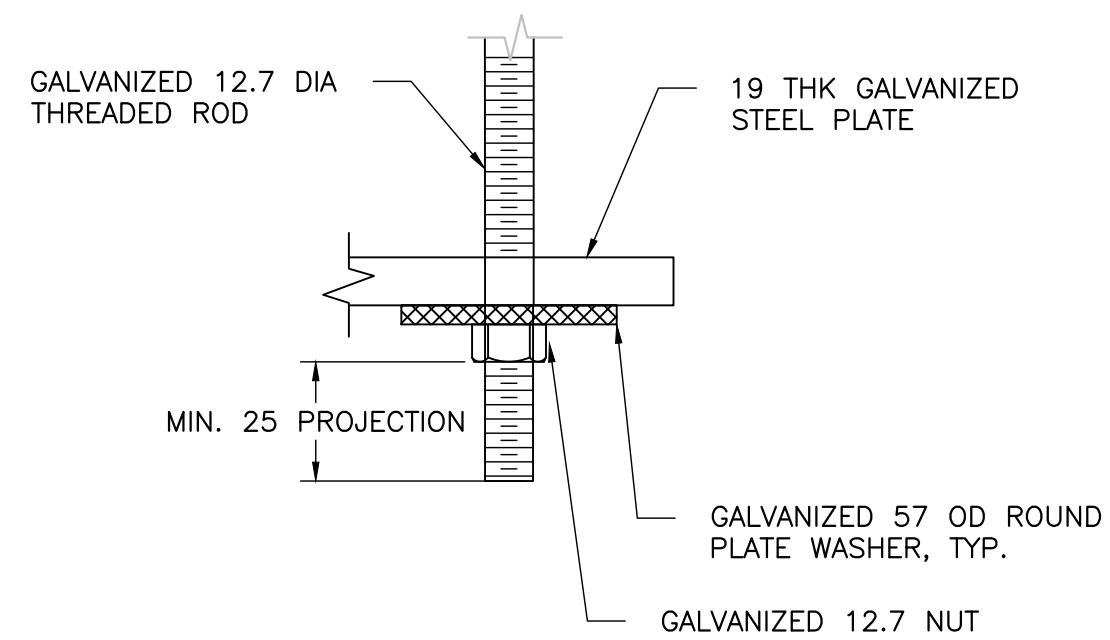
NOTE: ENERGY DISSIPATORS NOT SHOWN, LOCATIONS ARE TBD IN FIELD



C FISH PASSAGE BALLAST - PLAN VIEW
07 07 SCALE: 1:15



FISH PASSAGE BALLAST - DETAIL 1
SCALE: 1:2



FISH PASSAGE BALLAST - DETAIL 2
SCALE: 1:2

Conditions of Use

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BRIDGE-CULVERT REHABILITATION

PROJECT NO.
211344

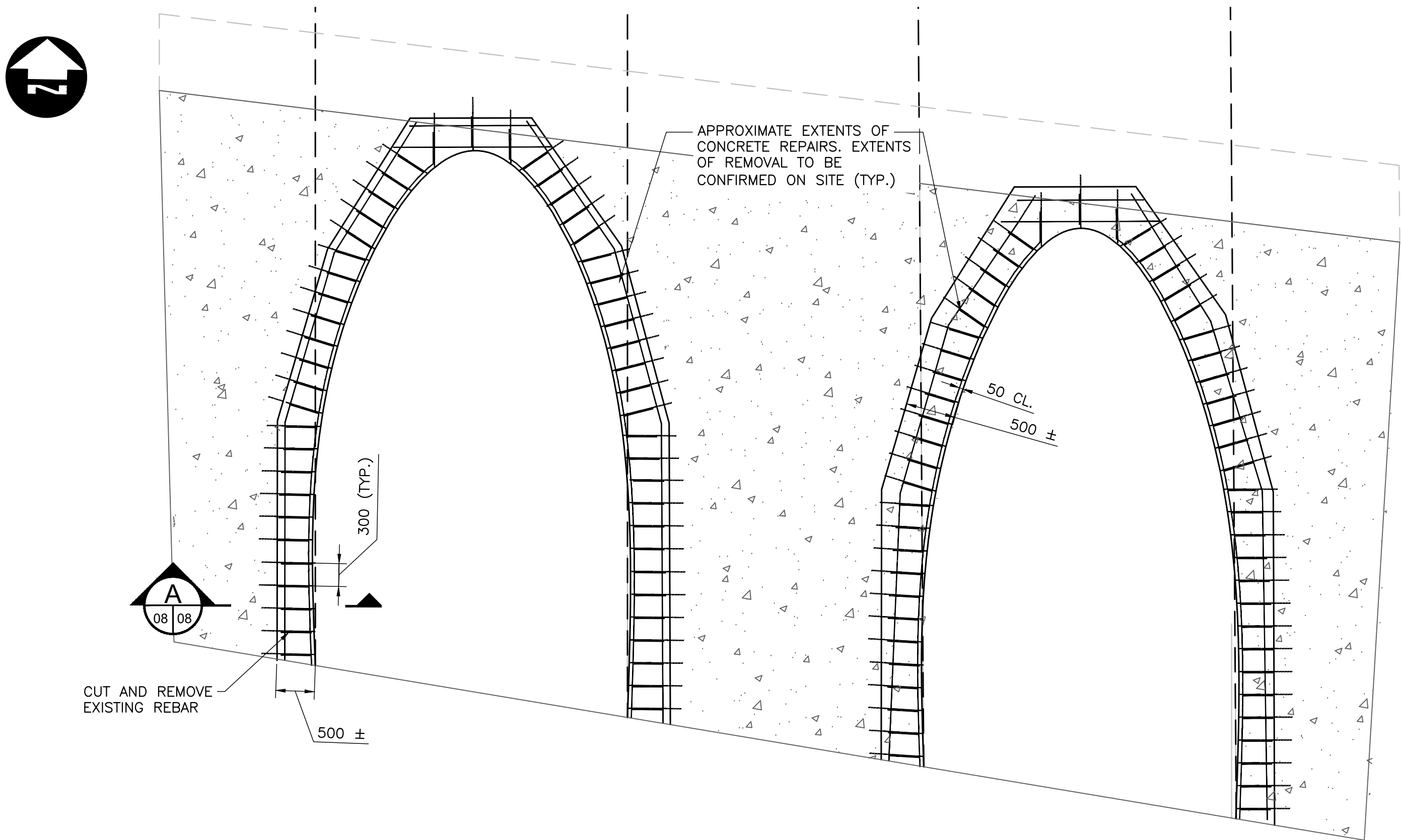
EROSION & SCOUR PROTECTION

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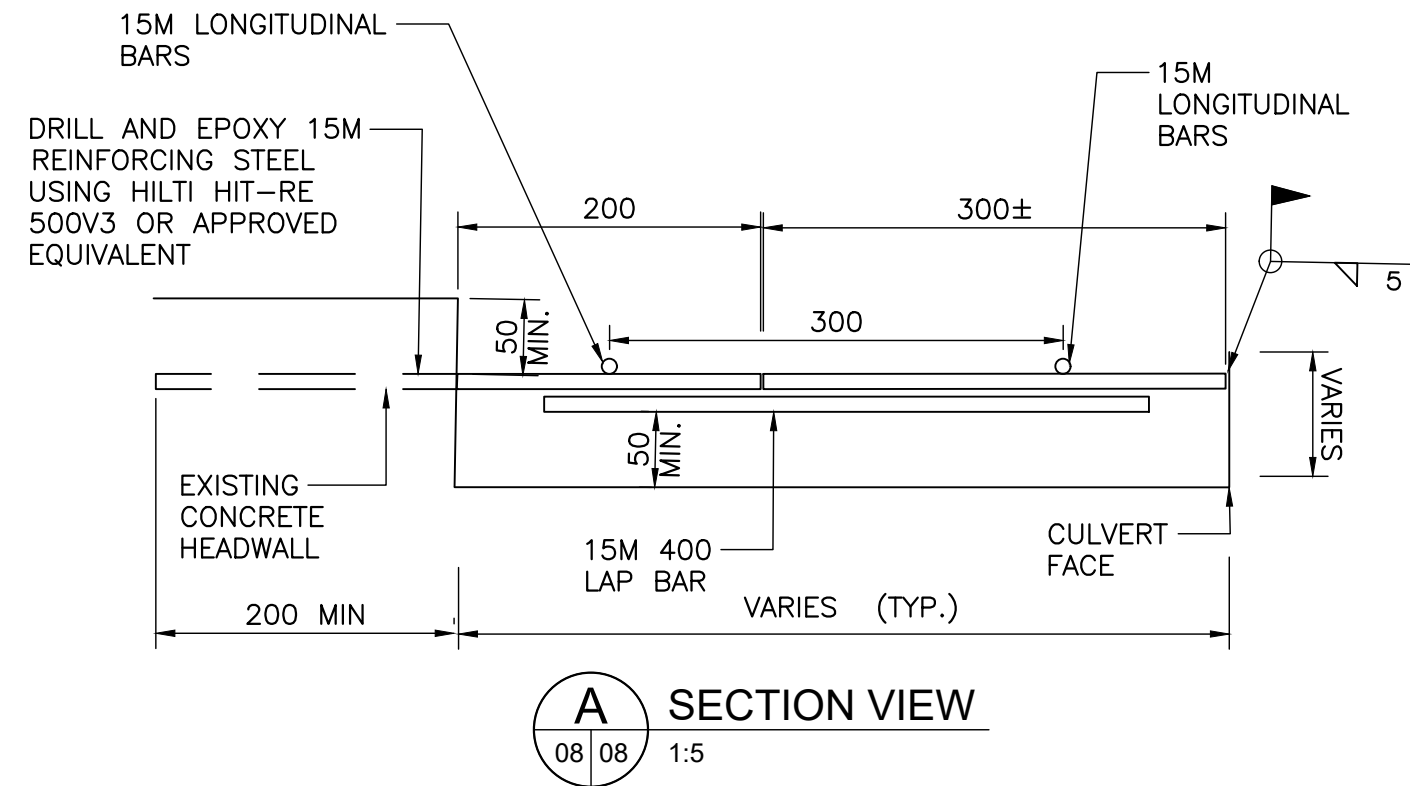
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CULVERT INLET HEADWALL CONCRETE REPAIR
SCALE: 1:50



EXTENTS OF CULVERT COATING REPAIRS
N.T.S

- GENERAL INLET CONCRETE HEADWALL SCOPE OF WORK:
1. SAW CUT AND REMOVE CONCRETE AND EXISTING REBAR TO EXISTING AS SHOWN AND VERIFIED ON SITE WITH THE ENGINEER.
 2. INSTALL REINFORCING STEEL
 3. APPLY SIKADUR-32 HI-MOD EPOXY BONDING AGENT OR APPROVED EQUIVALENT TO FACE OF CULVERTS AND THE ADJACENT CONCRETE FACE PRIOR TO POURING NEW CONCRETE.
 4. POUR CONCRETE.



CULVERT INLET HEADWALL CURRENT CONDITION
N.T.S



WEST CULVERT OUTLET SCOUR CURRENT CONDITION
N.T.S

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BRIDGE-CULVERT REHABILITATION

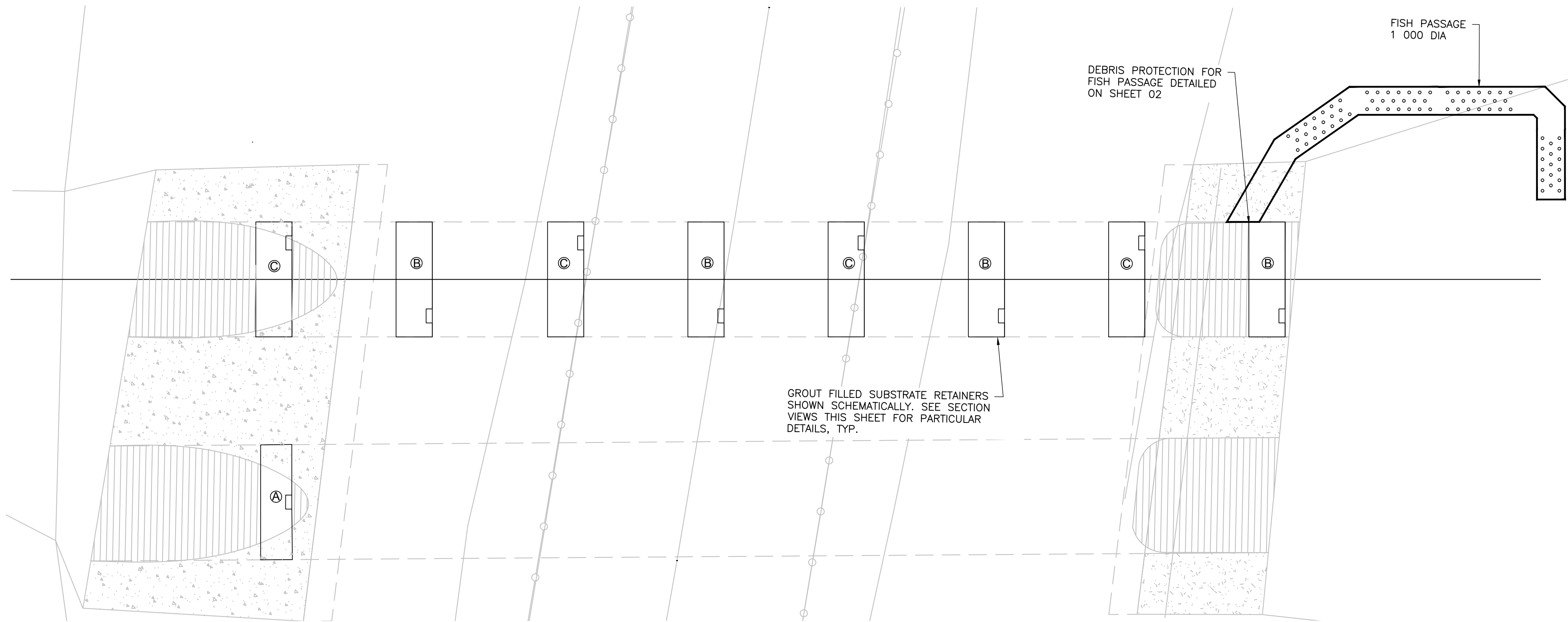
CONCRETE & STRUCTURAL REPAIRS

PROJECT NO.
211344

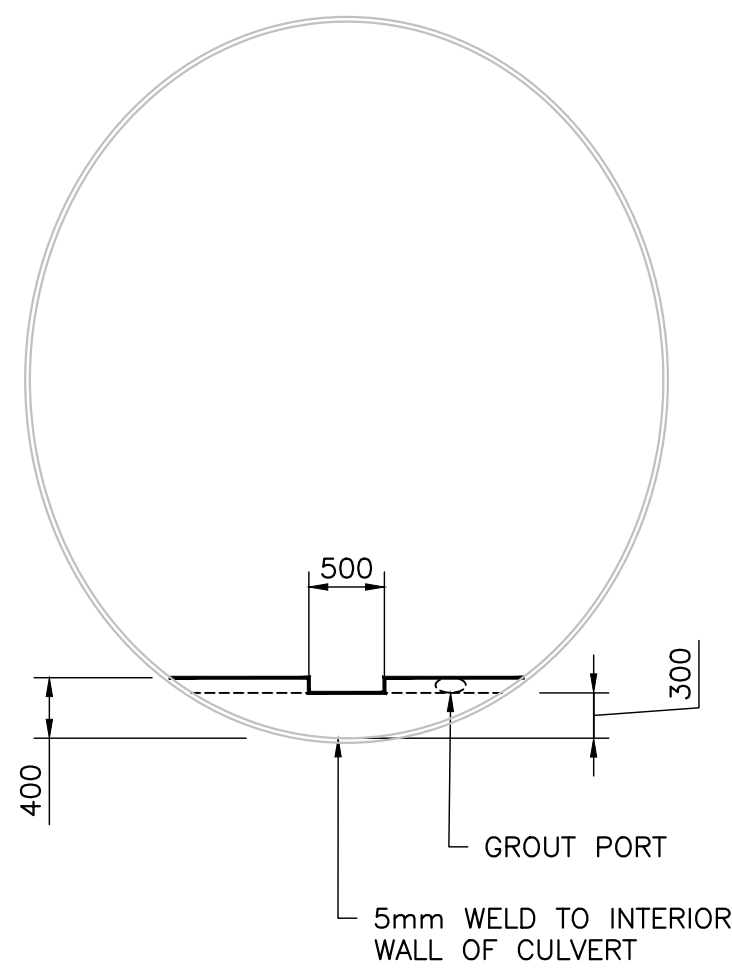
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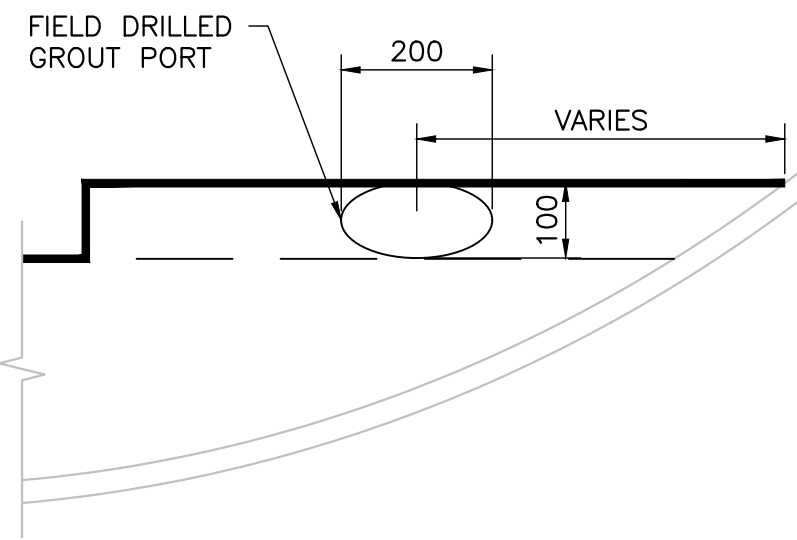
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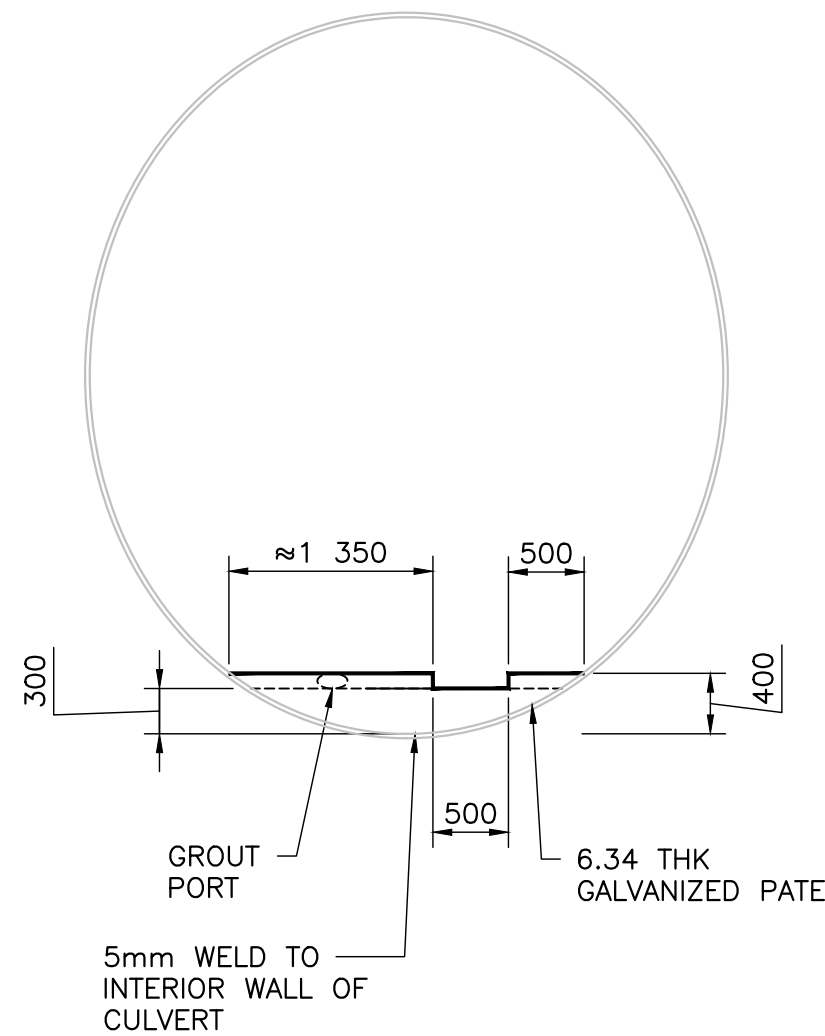
SPCSP CULVERT PLAN VIEW
SCALE: 1:100



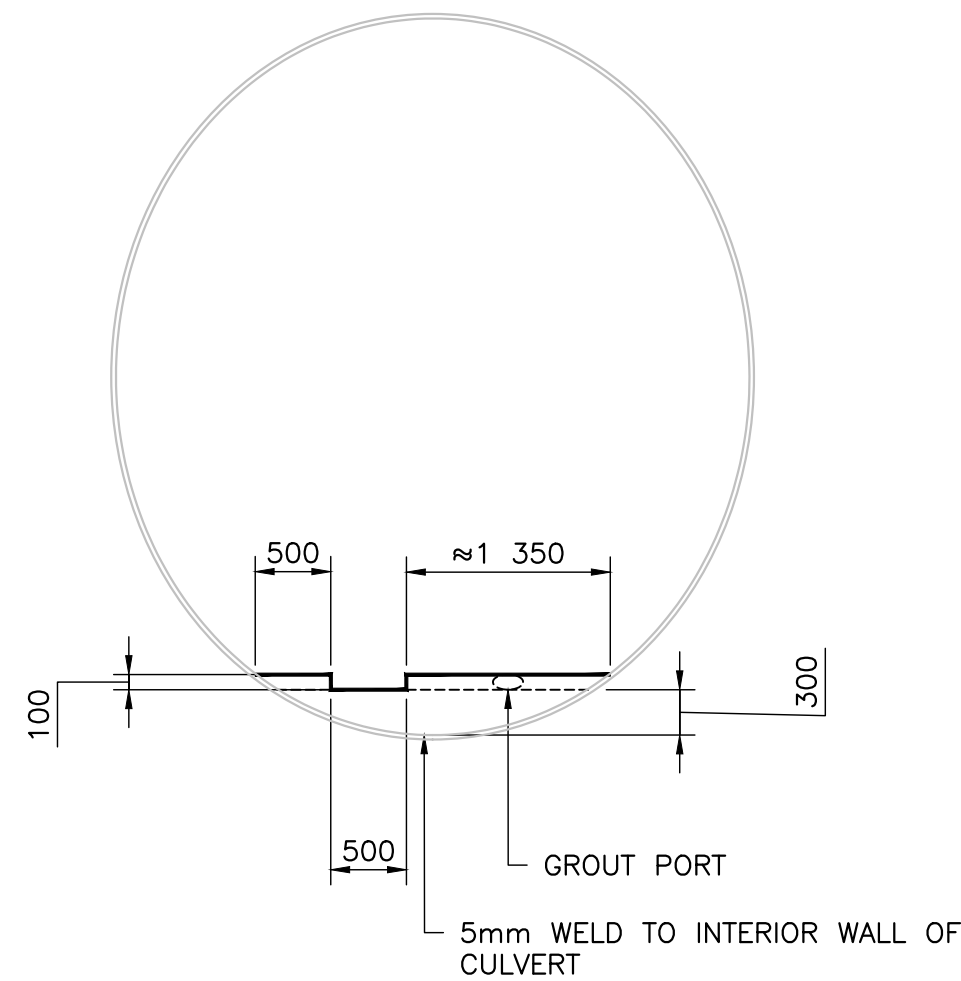
GROUT FILLED SUBSTRATE RETAINER TYPE A FRONT VIEW
SCALE: 1:25 U/S TO D/S



GROUT PORT DETAIL
SCALE: 1:10



GROUT FILLED SUBSTRATE RETAINER TYPE B FRONT VIEW
SCALE: 1:25 U/S TO D/S



GROUT FILLED SUBSTRATE RETAINER TYPE C FRONT VIEW
SCALE: 1:25 U/S TO D/S

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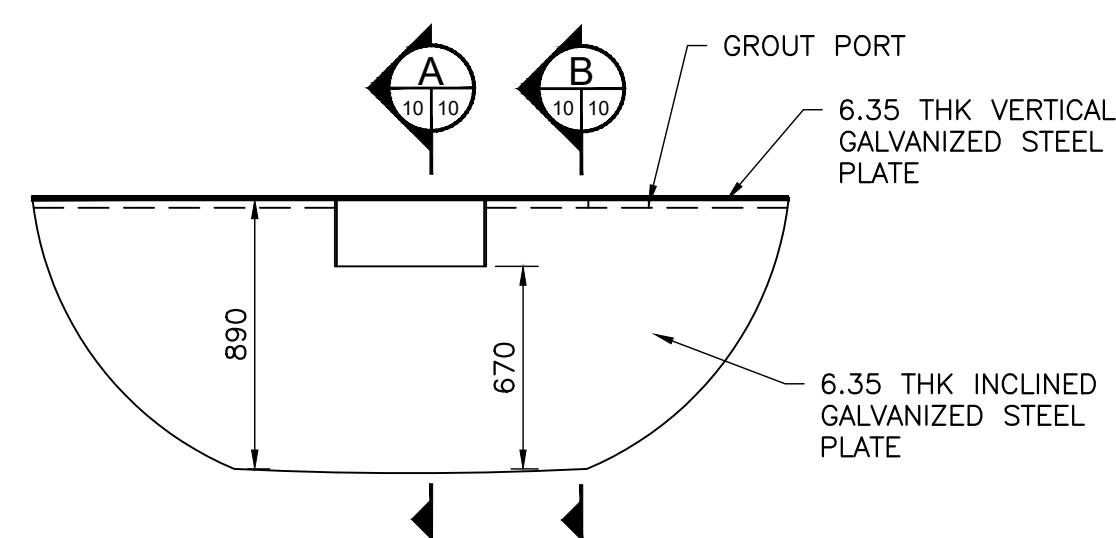
BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5
BRIDGE-CULVERT REHABILITATION

SPCSP SUBSTRATE RETAINER DETAILS 1 OF 2

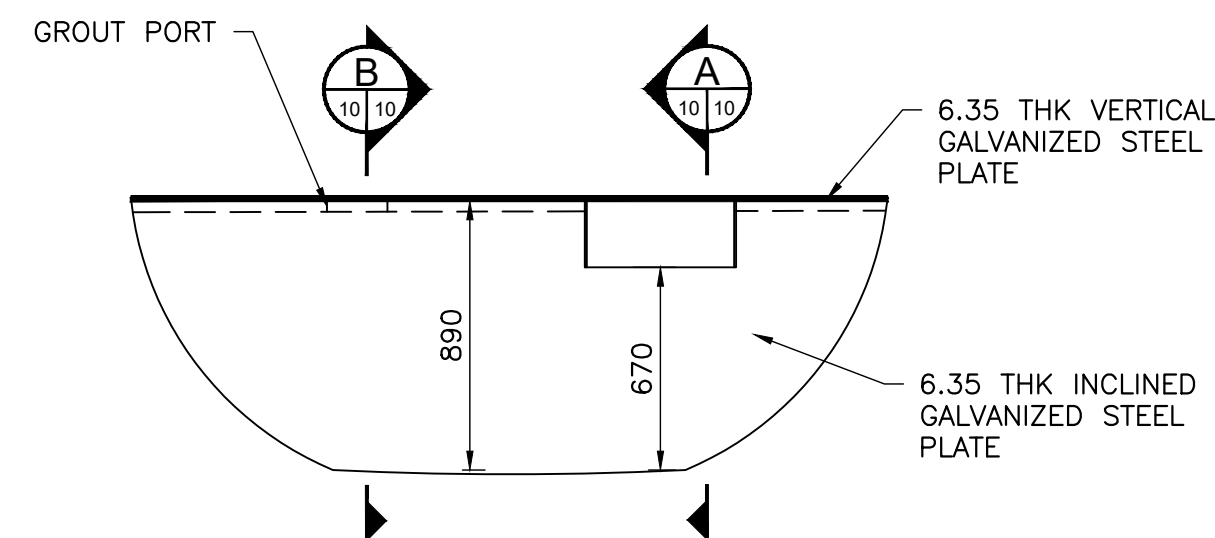
PROJECT NO.
211344

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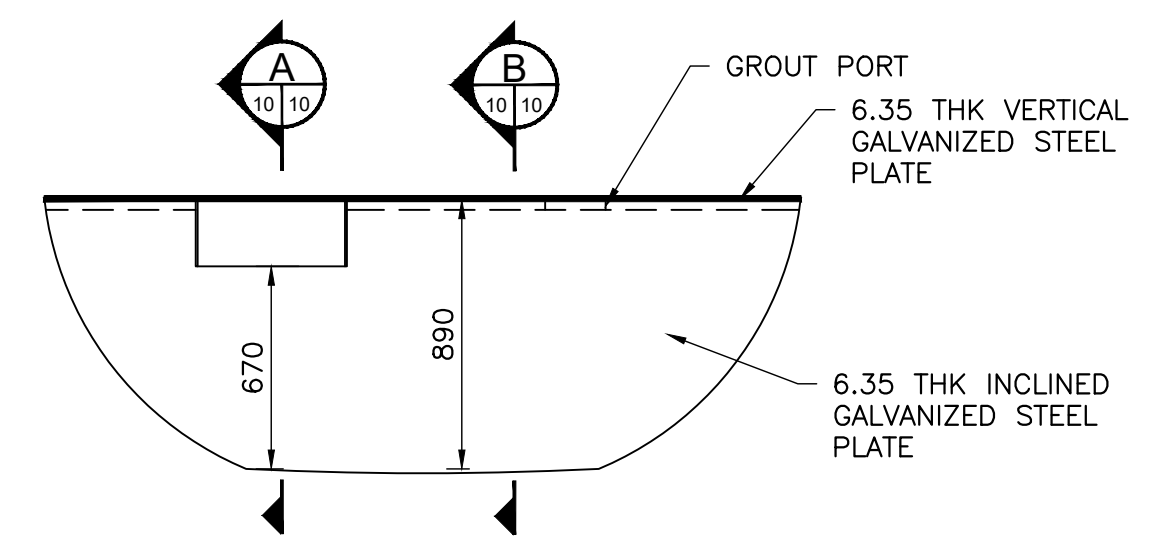
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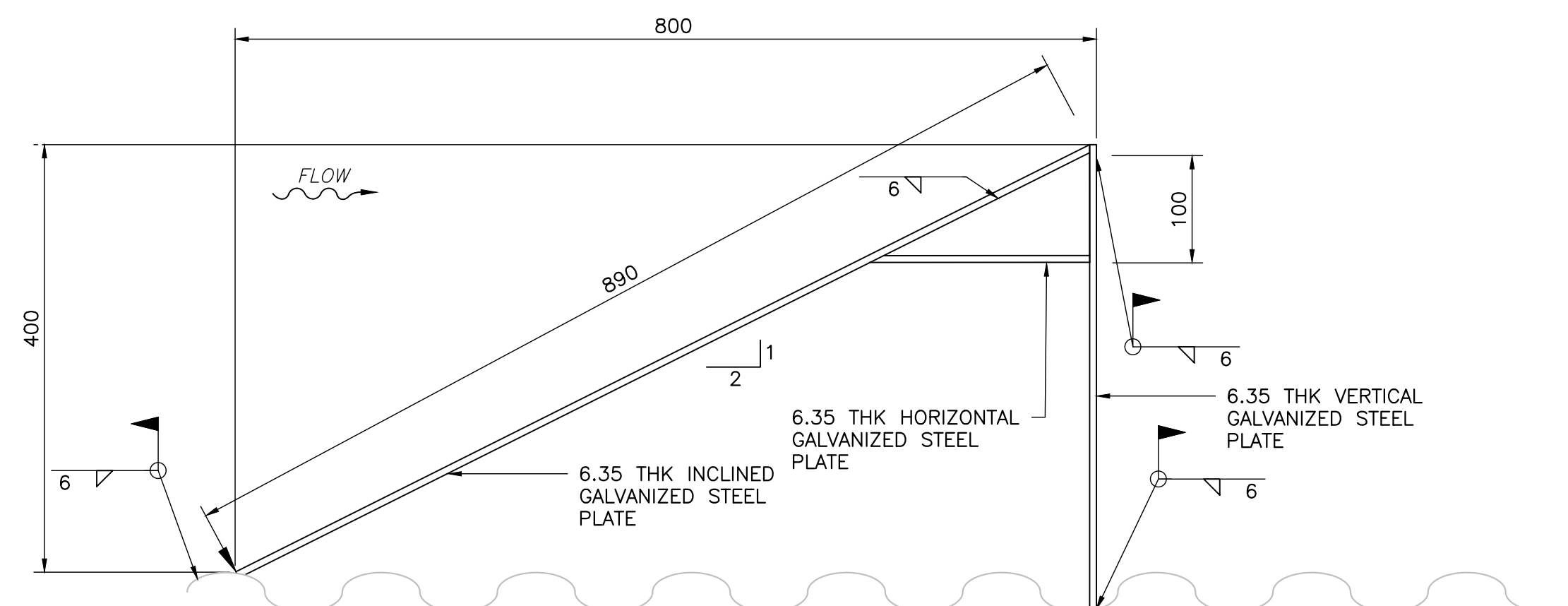
GROUT FILLED SUBSTRATE RETAINER TYPE A PLAN VIEW
SCALE: 1:25



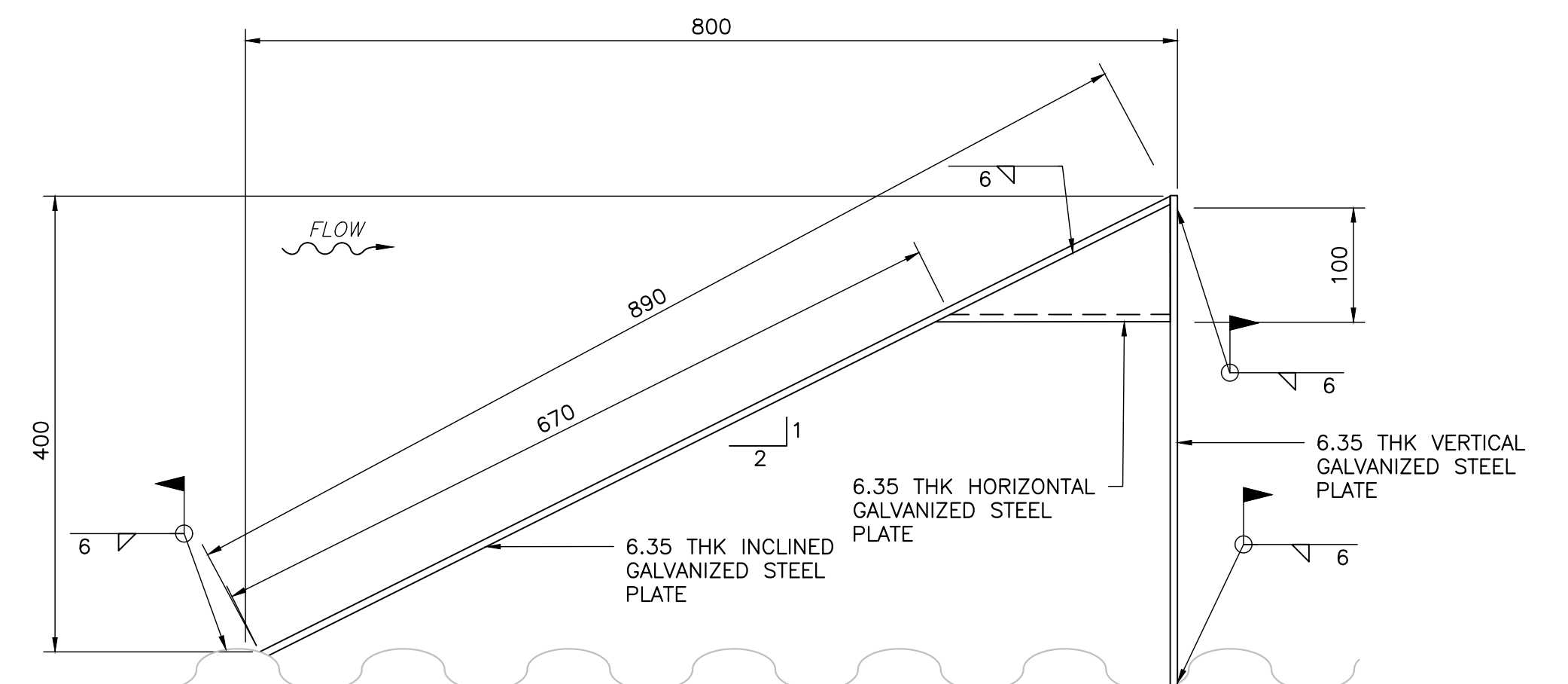
GROUT FILLED SUBSTRATE RETAINER TYPE B PLAN VIEW
SCALE: 1:25



GROUT FILLED SUBSTRATE RETAINER TYPE C PLAN VIEW
SCALE: 1:25



A RETAINER TYPE A,B & C SECTION VIEW DETAILS
10 10 SCALE: 1:5



B RETAINER TYPE A,B & C SECTION VIEW DETAILS
10 10 SCALE: 1:5

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**BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5
BRIDGE-CULVERT REHABILITATION**

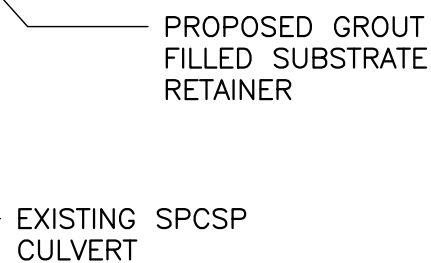
SPCSP SUBSTRATE RETAINER DETAILS 2 OF 2

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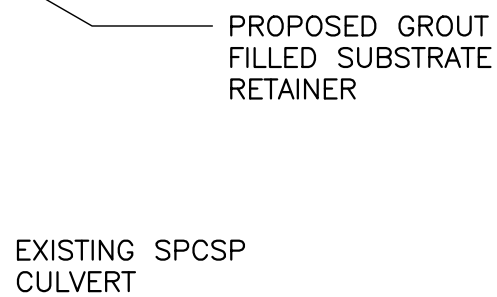
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SE ISOMETRIC VIEW VIEW

SCALE: 1:25

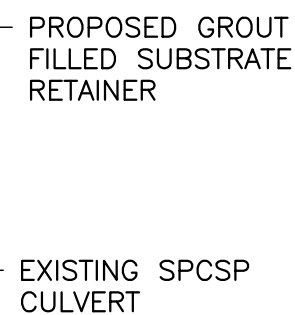


FRONT VIEW
SCALE: 1:25



TOP VIEW

SCALE: 1:25



BACK VIEW

SCALE: 1:25

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**BOUVIER CREEK (01C016) HIGHWAY 1 KM 277.5
BRIDGE-CULVERT REHABILITATION**

PROJECT NO.

211344

SUBSTRATE RETAINER RENDERING

SHEET NO.

11

1. CONTRACTOR TO REPLACE DEFORMED GUARDRAIL PANELS TO REPLACE DEFORMED GUARDRAIL PANELS, ROTATE SPACER BLOCKS, AND INSTALL MISSING HARDWARE AS DETERMINED BY THE ENGINEER AND MISSING HARDWARE AS DETERMINED BY THE ENGINEER. REMOVAL OF EXISTING PANELS AND INSTALLATION OF NEW PANELS TO BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2021) SECTION 7.2 AND SECTION 7.3.
2. EROSION GULLYING IN EMBANKMENTS TO BE FILLED WITH DES 2 CLASS 40 GRANULAR AND COMPACTED AS DETERMINED BY THE CONTRACT ADMINISTRATOR.
3. GRANULAR WINDROW UNDER GUARDRAIL TO BE REMOVED AND PLACED ON EXISTING ROADWAY SURFACE AND GRADED. MATERIAL PLACED SHALL MAINTAIN POSITIVE DRAINAGE.

